

August

N.S.E.
25 Cents

POPULAR MECHANICS

MAGAZINE

WITH WHICH IS INCORPORATED THE ILLUSTRATED WORLD

WRITTEN SO YOU CAN UNDERSTAND IT

REG'D. TRADE MARK, GREAT BRITAIN, No. 410426

REG. U. S. PAT. OFF.



SEE PAGE 106

It takes *only* 8 weeks to get a big job



O. H. Justus owns a big agency and repair shop at Parkersburg, W. Va. He says "that my schools give motor secrets that will put any man 'on easy street.'"



Emanuel Rushfeldt, Alberta, says: "Earning \$10 a day and only 20 years old."



W. W. Peace gets \$250 a month and expenses operating a tractor in the oil fields.



Louis Beimer at 24 was made foreman over men many years older. That's not luck—it's Rahe training.

In the Auto and Tractor Business

Read what these men are doing — here is your big chance to get "on easy street." Come to these great shops on the biggest FREE offer ever made.

Big Firms Need Trained Men

The Auto and Tractor Business is on the boom. Thousands of trained men will be needed during the next few months. I get calls every day from Garages, Battery Stations, Auto Repair, Welding Shops and other successful concerns for Rahe men. When the big fellows need high grade men they know where to come for them. They want Rahe trained men.

MY TRAINING UNUSUAL

Scientific tool training—that's the secret. You do things here according to the latest engineering standards. Thousands of dollars have been spent in modern tools and equipments. That's why my men are at home in the biggest shops in the country. If you want to succeed the way Beimer and Justus and the rest have—qualify by the same method in only eight weeks or stay as long as you like.

I'll Pay Your Railroad Fare and Board You

In order to fill the openings that now exist, I am making an offer no one has ever made before—**Free Railroad Fare, Free Board for eight weeks.** You Save Big Money by acting now. Pack your grip—get on a train—Come to school right now before it is too late—**OR WRITE TODAY.**



Send for **FREE Book** My big illustrated training book tells how others are succeeding. It tells many things you ought to know about Autos and Tractors. Write for it and my **short time** offer NOW. It soon expires.

Rahe Auto & Tractor Schools

CHICAGO
4445 Grand Blvd.

Dept. 906

CINCINNATI
Ninth and Walnut

RAHE AUTO & TRACTOR SCHOOLS, Dept. 906

[address school nearest you]

4445 Grand Blvd.,

Chicago, Illinois

or

Ninth & Walnut,

Cincinnati, Ohio.

Without any obligation, send me your big free book, "The Evolution of Transportation." Also information regarding special temporary offer.

Name

Street

City..... State.....



Wonderful 32-Piece Aluminum Set consists of 2 Bread Pans; Doughnut Cutter; 2 Loose Bottom Jelly Cake Pans; Combination Tea-kettle and Rice Boiler with lid; Sausage Pan with lid; Dipper; Colander; Measuring Cup; Percolator; 2 Fry Pans; Complete Caster Set; Tea or Coffee Strainer; Fry Pan; also includes set of 5 pieces—makes 11 unusual combinations; Preserving Kettle; Convex Kettle; Combination Cooker; Casserole; Fuddling Pan; Tubed Cake Pan; Colander; Roaster; Corn Pepper; Steamer Set; Double Boiler.

FREE 10-Piece Kitchen Set



No Money Down!

Just mail the coupon and we send this 32-Piece Aluminum Cooking Set, and the 10-Piece Kitchen Set Free. When the goods arrive, pay only \$2.00 and small postage charges on the Aluminum Set. Nothing for the Kitchen Set—it is FREE. Use both sets 30 days on Free Trial and if not satisfied send them back and we will refund your money and pay transportation both ways. If you keep them, pay for Aluminum Set, only a little every month.

FREE 10-Piece Kitchen Set
Not a penny to pay for this set. You get it absolutely free with Aluminum Set.
Potato Masher
Mixing Spoon
Measuring Spoon
Ice Pick
Egg and Cream Beater
Can Opener
Vegetable & Pan Brush
Fork
Egg and Cake Turner
Wall Rack
All have white enameled handles and hang on wall rack—keeping them conveniently at hand.

Complete 32-Piece Aluminum Set and FREE Kitchen Set

Hartman's special, selected set of heavy gauge Aluminum Ware—a complete cooking outfit, light to handle, easy to clean, always bright as silver. Will never chip, crack or rust. We guarantee it for life. 32 utensils—everything for baking, boiling, roasting, frying. And—absolutely free—a Combination Kitchen Set, 10 utensils with pretty white handles.

Nearly a Year to Pay

You pay only \$2.00 and postage on arrival (on the Aluminum Set—not a penny to pay at any time on the Kitchen Set). The balance a little every month.

Order by No. 417EEM7. Price for Aluminum Set, \$17.95. No money down. \$2 and postage on arrival. Balance \$2 monthly. 10-Pc. Kitchen Set is Free.

HARTMAN Furniture & Carpet Co.
Dept. 5525 CHICAGO, ILLINOIS

Copyright, 1933, by Hartman's, Chicago

FREE BARGAIN CATALOG and FREE GIFTS

This great 316-page book offers the world's greatest bargains in home furnishings, jewelry and farm machinery—all sold on easy monthly payment terms and 30 days' free trial on everything.

Wonderful Gifts

Catalog explains how you can get Glassware, Silverware, Tablecloths, Napkins, etc., free with purchases. Send for it today. "Let Hartman Feather YOUR Nest!"



HARTMAN FURNITURE & CARPET CO.

Dept. 5525 Chicago, Ill.

Send the 32-Piece Aluminum Cooking Set No. 417EEM7, Price \$17.95, and 10-Piece Kitchen Set. Will pay \$2 and postage on the Aluminum Set on arrival. Kitchen Set is Free. I am to have 30 days' free trial. If not satisfied, I will ship both sets back. If I keep them, I will pay you \$2.00 monthly until the price of the Aluminum Set, \$17.95, is paid. Title remains with you until final payment is made.

Name.....
Occupation.....
R. F. D., Box No. or Street and No.....
Post Office..... State.....
(If shipping point is different from your post office, fill in line below.)
Send shipment to.....

This One



XXEJ-NQ0-7AZP

ed material

"Stop Depreciation BEFORE IT BEGINS—BUILD WITH CYPRESS AT FIRST"

For All of Its Proper Uses

Tide Water
Cypress
"The Wood Eternal"

is the "lumber buyers' best insurance."

"AS SIDING IT PRACTICALLY WEARS
 OUT BEFORE IT DECAYS" (From page 44 U. S. Dept.
 of Agri. Bulletin 95)

Same report says, "CYPRESS shows paint well and holds it for many years, but lasts a long time without it"
 (You know the conservatism of Government Reports)



Here's a photograph (straight from the wood) of a piece of Cypress Siding taken from St. Charles College, La., duly attested in writing by the president, Father Maring. Built 1819—Torn down 1910. NOT A TRACE OF ROT. Note that the lower or exposed edge, originally the thicker, has become the thinner by the simple erosion of nearly a century of rains.

CYPRESS SIDING SOUND AS A DOLLAR after withstanding the tempests of a century and willing to start again! 91 YEARS "ON THE JOB" WITHOUT EVEN PAINTING, on a church in use till the day it was razed to make room for a larger building, and the CYPRESS LUMBER COMPOSING IT THEN USED AT ONCE to erect a new gymnasium!

THERE'S Investment Value Worth While!

When planning new improvements or repairs to old ones, just remember—"With CYPRESS you build but once"

Southern Cypress Manufacturers' Assn.
 1219 Poydras Bldg., New Orleans, La., or 1219 Graham Bldg., Jacksonville, Fla.

INSIST ON TRADE-MARKED CYPRESS AT YOUR LOCAL LUMBER DEALER'S. IF HE HASN'T IT, LET US KNOW IMMEDIATELY



Popular Mechanics Magazine

200 E. Ontario Street, Chicago, U. S. A.

H. H. WINDSOR, Editor

London: Hachette & Co.,
16-17 King William Street, Charing Cross, W. C. 2

Paris: Hachette & Co.,
111 Rue Reaumur

Melbourne, Australia
The Australasian News Co.

ISSUED MONTHLY

SUBSCRIPTION:

SINGLE COPY, 25 CENTS

In United States and its possessions, also Canada, Cuba, and Mexico, per year, postpaid - \$3.00

To all other countries in the Postal Union - 3.50

All subscriptions are discontinued at expiration. Please examine the date printed on your wrapper.

Entered as Second Class Matter Sept. 15, 1901, at the Post Office at Chicago, Illinois, under Act of March 3rd, 1879.

Entered as Second Class Matter at the Post Office Department, Canada.

Published monthly by POPULAR MECHANICS CO.

Copyright, 1923, by H. H. Windsor. Copyright in Australia

Vol. 40

Contents for August, 1923

No. 2

Accident, Race, Eye of Camera Records.....	219	Camera, Huge, U. S. Builds for Life Size Photos.....	275
Air Routes to Tropics.....	201	Candles, Ten Foot, for Churches.....	175
Air Tank on Back Used to Save Lives.....	170	Cane, Hearing Through, to Aid Deaf.....	255
Airdrome, Movable, Raised High Above Earth for Safety of Aviators.....	222	Caterpillars, Plague of, Stops Railway Trains.....	236
Airplane, Dazzle Painted, Confuses the Eye.....	175	Cattle Guard, Concrete, Can't Burn or Bend.....	173
Airplane Air Buffers Guard from Landing Shocks.....	210	Chair and Table, Folding, for Campers.....	106
Airplane Express to Fly Day and Night.....	244	Chair and Table, Folding, Occupies Less Space.....	229
Airplane Fire Fighters Soar Over Forests.....	198	Chair Float, Bath's, Moved by Paddling.....	232
Airplane Landing, Turntable, Has 500-Foot Runway.....	223	Character Machine Reads Person Using It.....	218
Airplane Mailmen Sleep as Relief Crew Works.....	200	Cigar Ends Kill Insects, and Ashes Aid Plants.....	242
Airplane, Monster Bombing, Britain Builds.....	225	Citrus Growers Use Gas to Preserve Fruit.....	280
Airplanes Greeted as Gods in Papua.....	185	City Buried by Volcano Found in Mexico.....	232
Alligators Raised on Farm for Shoe Leather.....	169	Clock, Giant, Has Letters in Place of Figures.....	277
Anchor, Huge Floral, Dipped as Tribute to Sailors.....	274	Clothes Basket Has Legs by Touch on Handle.....	167
Animals, Game Destroying, War Urged on.....	281	Clothes Closer for Travelers.....	235
Animals, Life Size Toy, Move by Electricity.....	253	Clothesline Kept in Post Until Needed.....	195
Animals, Many Strange, in Private Zoo.....	282	Coffee Measuring Cup Has Slide Bottom.....	248
Animals, "Stuffed," Made Realistic.....	244	Coffeepot, Campers', Won't Burn Hands.....	267
Animals, Wild, Brought Up on Bottles.....	241	Coffeepot Spout Rim Stops Dripping.....	277
Animals, Zoo, Kept Healthy by Science.....	240	Cornice Cleaning Railway for Tall Buildings.....	235
Ants, Army of, March Blindly in Circle.....	165	Crib Guard Teaches Baby to Stand.....	275
Ants Help Bugs to Steal Sugar.....	171	Cripple Drives Car without Using His Feet.....	280
Artist, Japanese Woman, Paints Court Lady.....	237	Daylight, Artificial, King Tut's Wealth Sorted in.....	201
Ash Tray, Movable, Clamps on Arm of Chair.....	220	Daisy Chain, College Girls Carry.....	202
Astronomy—Jupiter's Night Sky Ablaze with Many Moons.....	160	Dance, Devil, Cures Ills, Island Folk Think.....	230
Automobile Armrest Folds into Seats.....	170	Desk, Writing, Convertible into Table.....	220
Automobile Bed Made Loose or Tight by Use of Handle.....	237	Dishes, Three, from One for Kitchen Oven.....	197
Automobile Compass and Grade Dial.....	242	Dishpan Raised to Aid Housewife.....	246
Automobile Fender, Folding, Picks Up Victim.....	165	Diving Bell, New, Walks on Sea Bottom.....	282
Automobile Lock, Keyless, Acts When Car is Stopped.....	167	Doll Shows, Mechanical, Revived in Europe.....	255
Automobile Luggage Carrier Hidden When Not in Use.....	235	Drum, Heavy, Rolls Off Train and Upsets Cars.....	278
Automobile Opens Floodgates by Turning a Wheel.....	274	Earthquake Study, Explosions to Aid.....	221
Automobile Pilot Light Turns with Steering Wheel.....	285	Einstein's Theory, Sticks Used to Test.....	202
Automobile Race, Pike's Peak, Bars Freak Cars.....	278	Electrical Appliances for Housewives Save Time and Toll.....	230
Automobile, Racing, Takes Supplies "On the Go".....	248	Electricity for Campers from Portable Plant.....	277
Automobile Shield Protects Driver from Glare.....	165	Elephant Tusks, Record Size, from Dark Continent.....	277
Automobile Steered by Cripple with False Arm.....	239	Engine, New Diesel, Has Sliding Cylinders.....	286
Automobiles Stopped by Mystery Radio.....	195	Exposition, Swedish, Millions of Lights Lend Glow to.....	240
Babies Checked in Lockers by Busy Mothers.....	212	Fish Board Swimming Latest Water Sport.....	229
Baby Carriage Converted into Rocker or Crib.....	259	Flag—"Old Glory" Too Long, Its Size is Changed.....	193
Baby Cart, Mother's Head, for African Family.....	201	Flower Basket, Leakproof.....	259
Balloons, Toy, Gas Tank for Filling.....	199	Fruit Jar Opener Also Opens Cans and Bottles.....	258
Baseball Bats, Big League, Made in Small Shop.....	229	Furs, Wrapping the World in, by T. Winfield Thackeray, Part II.....	213
Bath Spray Turns Tub into Shower Bath.....	228	Gas Tank, Gigantic, Moving with Hand Jacks.....	221
Bear Carved by Indian from Tree Trunk.....	231	Gas Tank Truck, Two Wheeled.....	235
Boat, Canvas Folding, Requires No Tools.....	273	Gas Valve Avoids Death and Fire Danger.....	286
Boat, "Eagle," in Clutches of Niagara Falls.....	173	Gauge, Pocket, Tells Amount of Alcohol in Liquid.....	281
Boat Paddle Wheels Act like Oars on River.....	259	Girls Faces "Done Over" So They Look Alike.....	195
Bookbinding of Ancient Masters Rivalled by Woman.....	200	Gold Lures Adventurers Toward Arctic.....	234
Bread, U. S. Keeps Tab on Heat inside of.....	171	Golf Club, Many Purpose, to Suit All Players.....	275
Bridge, Spiral, Makes Queer Entry into Town.....	213	Golf Scorer, Pocket, Keeps Tab on Two Players.....	228
Brush Carries Paint or Polish in Handle.....	233	Grain Fever, Storage, Told by Electricity.....	219
Brush for Suede Shoes Picks Up Nap.....	198	Grass, China, Turned into Strong Fabric by Germs.....	194
Bugs Aid in Growing Fruit in West.....	167	Gun Shells, Cork Wads in.....	242
Building, Five Story Office, Only Ten Feet Wide.....	186	Gun Sights, Ivory, for Use in Dark.....	238
Building, Office, with Spiral Driveway for Autos.....	226	Guns, Three Million, on Uncle Sam's Hands.....	273
Building—Westminster Roof Endangered by Bugs and Time.....	180	Guns, U. S. Navy's Biggest, Given First Test.....	229
Busts, Lincoln and Grant, Put in Hall of Fame.....	260	Hairdressing, Science Aids.....	202
Camels, Medical Treatment of, before Entering U. S.....	257	Hammer, Air Operated, for Breaking Concrete Pavement.....	268
Camera Aids Sculptor in Making Busts.....	230	Hammer Handle, Hollow, Holds Screwdrivers.....	260
Camera, Baby Movie, Takes Full Size Pictures.....	178	Heart Examined with Lens While Beating.....	257
		Horseshoes, Machine Made, in Old Smithy.....	250

[Continued on Page 4]

[Contents—Continued]

House, Thermos, Saves Fuel and Helps Keep Cool... 220
 House, Two Story, Moved Across 20-Foot Canon... 258
 Houses, Small, More Light and Air for... 279
 Ice Age, Freaks of, Cause Good and Bad Crops... 212
 Ice Cream Cone Holder, Made of Cardboard... 198
 Ice Fields May Return, Say Some Scientists... 277
 Ice Made with Burning Gas and No Motor... 179
 Iron, Age Old Ways of Making, Used in China... 227
 Iron, Melted, Spray of, Won't Burn Hand... 259
 Iron Sprayed with Zinc... 226
 Irrigation Methods, Ancient, Used in Indo-China... 253
 Ivory Carving in Alaska Becoming Lost Art... 200
 King and Queen of England Visit Colosseum... 179
 Kites and Radio Aerials Source of Danger... 245
 Knot Tying Machine Straps to Hand... 222
 Lamp Post Directory Makes Handy Guide... 186
 Lathe Sub-Headstock Aids Cutting Long Lead Screws... 225
 Letter, Folding, Used to Bring Back Coins... 232
 Letters Sorted by Machine Directly into Bags... 174
 Letters X-Rayed to Find Missing Checks... 273
 Life Saving Suit to Keep Eight Persons Afloat... 170
 Light Intensity, Gigantic Globe Built to Measure... 267
 Light Socket Has Six Changes of Light... 269
 Lighting, "White Way," Halts Crime... 220
 Liquor Plant Now School for Training Bakers... 186
 Logs Floated to Sea Weighted with Iron... 275
 "Loud Speaker" Guides Vessels to Port... 245
 Mail, 6,000,000 Pounds of, Handled in One Day... 243
 Map, Electric Lights on, Mark City's Growth... 257
 Maps, Aerial, of Alaska to be Made by Navy... 248
 Matchbox, Tiny Home in, Feat of Carver... 203
 Metal Strength Told by Squeaks... 278
 Micrometer Snap Gauge Aids Inspection Work... 286
 Midget—"Little Princess" of Circus in Race with Giant... 227
 Milk Bottle Cap Lifter Sanitary and Useful... 173
 Mind in Action Photographed without Camera... 267
 Mirror, Light in, Aids in Shaving... 239
 Monkeys Worshipped in India as Friend of Man... 298
 Monument—Death Shaft Is Warning to Careless Drivers... 223
 Monument, French, Shows Gratitude to U. S... 225
 Moose, Lordly, in Quest of... 271
 Mop, Five in One, Keep Hands Clean... 263
 Motorcycle Race Abroad to Show Economy... 221
 Motorist, Iceless Box Keeps Food Cool for... 178
 Mount Rainer Model Exact in Detail... 187
 Mountain—Can Mount Everest be Ascended? by Sven Hedin... 203
 Mud Used to Lubricate Oil Well Bits... 224
 Museum Treasures, Light Found to be Enemy of... 187
 Needles and Frying Pans Sized by Numbers... 273
 Oil Basins, Huge, Dug for Oil They Cannot Market... 231
 Oil Well Lights, Flaming, a Beacon of Wealth... 255
 Oversuit with Bellows Keeps Wearer Cool... 282
 Pan Fries without Odor and Saves Gas... 232
 Pan Holder Prevents Burning... 258
 Pan Set Makes Five Dishes from Three... 233
 Photograph, Huge, of Wild Life... 238
 Pigeon House, Old French, Looks Like Fort... 269
 Plants, Wounded, Are Easy Victims of Germs... 270
 Plow, Trusty, Soon to be Only a Relic, by Frank Ridgway... 250
 Poison Test Made in Three Minutes... 185
 Popular Mechanics Records of 20 Years... 176
 Potato Grater also Slices... 220
 Printer and Sealer, Postal Permit, of Large Capacity... 224
 Pump Makes Fire Fighter of Automobile... 245
 Pump, Small Plunger, Uses Elastic Ring Valves... 225
 Pumps in India, Men Cheaper than... 175
 Radio Eye Sends Moving Picture through Air... 171
 Radio, Naval, Controlled by Phone Switchboard... 250
 Radio on Motorcycle Used to Catch Bandits... 199
 Radio on Top of Alps to Give Wider Range... 170
 Radio Secrecy Gained by "Scrambling" Words... 269
 Radio Speeds Up Taking of Moving Pictures... 165
 Railroad, Electric, Birthday of, 40 Years Ago... 219
 Railroad Fire Fighting on the Right-of-Way... 265
 Railroad Sand Sprinklers in India Ride on Engines... 174
 Railroad Train Stopped with Water-Buffer... 274
 Railroad Trestle over Great Salt Lake... 276
 Razor Sharpener Imitates Barber's Motion... 253
 Rubber Vulcanized in 30 Minutes... 171
 Rugs, Rubber, Aid in Cleaning Floors... 223
 Saxophones, Slide, Speeds Up "Jazz" Music... 221
 Scale, Rapid, Easily Solves Heating Problems... 224
 Scales in Road Weigh Moving Traffic... 174
 Scarecrows, Mirrors Used as... 219
 Screen, Traveling, Used as Clothes Closet... 245
 Scrub Board Rubber Saves Much Labor... 242
 Shale Cliff Shaver Cuts Fifty Tons an Hour... 264
 Shears and Razor Heavier than Their Maker... 187

Ship, Fog Forces, to Take Voyage to Europe... 272
 Ship "Seaconnet," Sinking of, Is Strange Mystery... 192
 Ship Steers Itself with a "Gyro-Pilot"... 222
 Ships—Warships, Old Wooden, Live Longer than Steel... 169
 Shoe Heel Guards, Nonscuff, for Auto Drivers... 225
 Shopping Bag Has Scale to Weigh Contents... 269
 Signs Direct and Protect Lives of Tourists... 211
 Sink Strips, Wood, Save Dish Breakage... 276
 Size Finding Dial Aids Artists and Printers... 187
 Sleeping Coach for Air or Railway Service... 251
 Smokestack, Holes Shot in, to Keep City Lighted... 269
 Soldier Race, Obstacle, to Test Endurance... 255
 Spark Plug, Double Head, Cleans Itself... 222
 Stage Coach and Camels Used in Australia... 197
 Stage Scenery, Aluminum, Easy to Erase... 275
 Stamp, Rare, Found in Italy After Long Search... 174
 Steel, Flame Cuts through, Two Inches a Minute... 210
 Stove and Table, Folding, for Small Kitchens... 212
 Stove Knows When to Stop Cooking... 173
 Stovepipe, Kitchen, Used as Warming Shelf... 225
 Street Car Wrecks Building When Brakes Fail... 188
 Street Cars, Two Coach, Run on Three Trucks... 225
 Submarine as Big as Lake Ship Launched... 201
 Sundial Lens Shows Wonders of Nature... 262
 Table Top, Bins under, Saves Bending... 255
 Tap, Spiral Fluted, Has Greater Speed... 225
 Tar Spreader, Four Spray, Displaces Many Men... 229
 Telephone and Telegraph Set for Army Keeps Messages Secret... 242
 Telephone Hour Glass Marks Time of Talk... 244
 Telephone Science, Latest Marvel of, in Use... 163
 Temple, Long Lost, Is Restored, by A. N. Mirzaoff... 182
 Temple Model Shows Skill of Ancient Builders... 220
 Tennis Court in Squares to Teach Accuracy... 160
 Tent Peg like Corkscrew... 237
 Toothbrush, Automatic, Attaches to Faucet... 222
 Torpedoes Tied to Planes Launched in Flight... 195
 Tractor Wheels, "Squirrel Cage"... 251
 Traffic Rules, Science in, Explains Right Turn... 257
 Tree Older than Ice Age Moved for Builders... 193
 Tree, Sleeping Porch in, Has Winding Stair... 263
 Trees, Fruit, Trained in Many Queer Shapes... 272
 Turbine Casting, Record Size... 234
 Typing, Best Way of, Shown by Tests... 169
 Umbrella, Has Light in Handle... 232
 Vacuum Brush, Hand, Run by Electric Motor... 231
 Vise, Improved, Grips Odd Shaped Pieces... 226
 Wall Paper Pattern Instantly Changed... 221
 Wastebasket in Office Desk... 272
 Watches, Pig's Bristle to, Is Progress of Time... 180
 Water Wheel, Floating, Taps Current's Power... 220
 Weather Dial on Tower Instead of Clock... 251
 Weather, Freak, Explained by Science... 262
 Weather Prophet Climbs Over 400 Miles... 221
 Weeding Tool for Flowerpots... 190
 Woodworking Machine Has Many Conveniences... 224
 Wreaths, Metal, for Grave... 267
 X-Ray Balks Smugglers' Use of Huge Bales... 264

SHOP NOTES

Automobile Tourist Camps, Equipment for, Part II... 294
 Baskets, Collapsible, Simplify Fruit Display... 289
 Chimney Extensions, Bracing... 303
 Commutators, Small, Making... 301
 Concrete, Placing in Water... 293
 Derrick Sheaves, Lubricating... 304
 Drill Chuck for Milling Machine... 300
 Drill Holes, Cleaning, in Rock or Concrete... 288
 Drill Press Bolt Holder... 291
 Enamel Ware Repaired by Brazing... 304
 Engine, Farm, Making More Convenient... 303
 Flatiron Coil Used in Ignition System... 303
 Fossils, Removing Rock Coatings from... 290
 Funnel for Filling Crankcase... 289
 Grinder, Foot Power, for Small Shop... 302
 Grinder, Vise, of Simple Design... 290
 Hog Feed, Novel Method of Mixing... 304
 Hose Connections, Wire Clamp for... 293
 Ladder, C-Clamps Support, While Hanging Eaves Trough... 291
 Lamp Connections, Portable, Clamp Protects... 290
 Lamps, Bayonet Socket, Changing Base Connections of... 292
 Lath, Homemade Metal... 303
 Log Peeling Tool... 293
 Miter Box Clamps, Quick Acting... 299
 Newspaper Half-tones, Copying... 302
 Pine Covering, Protecting... 292
 Pine Lane Hangers, Tightening... 292
 Planer Converted into Shaper... 292
 Screws, Broken, Removing... 300

Photo-Sulfure 230

DRAKE'S PRACTICAL MECHANICAL BOOKS

THEY WILL RAISE YOUR PAY—

ORDER ON 5-DAY TRIAL

The books listed below will perfect you in your chosen trade — pave the way to the big positions. Written in non-technical language—easy to read and understand. *Every book covers its subject completely. An entire course of instruction condensed into one volume.* Your choice sent postpaid — you benefit 5 days — money refunded in full if not entirely satisfactory. Order direct from this page.



Automobile Books

- Automobile Ignition, by ManlyLeatherette **\$2.00**
- Automobile Starting and Lighting, by Manly.....Leatherette **\$2.00**
- Brookes' Automobile Handbook.....Leatherette **\$2.00**
- Ford Motor Car, Truck and Tractor, by Manly.....Cloth **\$1.50**
- Starting and Lighting Troubles, Remedies and Repairs, by ManlyLeatherette **\$3.00**
- Automobile Battery, Care and Repair, by Manly.....Leatherette **\$2.00**
- Automobile Catechism and Repair Manual.....Leatherette **\$1.50**
- Tires and Vulcanizing, by TufordCloth **\$2.00**
- Gas and Oil Engine Handbook.....Cloth **\$1.50**
- Automobile Upkeep and Care, by Manly.....Cloth **\$1.50**
- Motorcycle Handbook, by ManlyCloth **\$1.50**

Shop Practice Books

- Sheet Metal Workers' Manual.....Leatherette **\$2.00**
- Oxy-Acetylene Welding and CuttingCloth **\$1.25**
- Slide Rule and Logarithmic TablesLeatherette **\$2.00**
- Handbook for Millwrights.....Cloth **\$2.00**
- Modern Blacksmithing.....Cloth **\$1.25**
- Machine Shop Practice.....Cloth **\$2.00**

- Mechanical Drawing and Machine DesignCloth **\$2.00**
- Pattern Making.....Cloth **\$1.50**

Carpentry Books

- Cloth Binding
- Modern Carpentry, 2 vols.....\$3.00
- The Steel Square, 2 vols.....\$3.00
- Wooden Boat and Shipbuilding.....\$1.50
- Modern Estimator\$1.50
- Timber Framing\$2.00
- Builder's Architectural Drawing.....\$2.00
- Concretes\$1.50
- Practical Bungalows\$1.00
- Low Cost Homes.....\$1.00
- Roof Framing, by Van Gasbeek.....\$1.50
- Star Building and Hand Railing\$1.50

Electrical Books

- Practical Applied Electricity.....\$2.00
- Alternating Current\$1.50
- Electric Motor Control Systems.....\$1.50
- Wiring Diagrams and Descriptions\$1.50
- Electrical Tables and Data.....\$1.50
- Armature and Magnet Winding.....\$1.50
- Modern Electrical Construction.....\$1.50
- Modern Electric Illumination.....\$1.50
- Electricians' Operating and Testing\$1.50
- Motion Picture Operation.....\$1.50
- Drake's Electrical Dictionary.....\$1.50
- Electric Motors, D. & A.....\$1.50
- Electrical Measurements and Meter Testing\$1.50
- Drake's Telephone Handbook.....\$1.50
- Easy Experiments.....Cloth **\$1.25**
- Wireless Telegraph and Telephone Handbook.....Cloth **\$1.25**
- Telegraphy Self-Taught...Cloth **\$1.25**

Steam Engineering

- Swingle's Handbook for Steam Engineers and Electricians.....Leatherette **\$4.00**
- Examination Questions and Answers for Marine and Stationary Engineers.....Leatherette **\$2.00**
- Steam Boilers.....Leatherette **\$2.00**
- Swingle's Catechism of Steam, Gas and Electrical EngineeringLeatherette **\$1.50**

Painting Books

- Scene Painting and Bulletin ArtCloth **\$4.00**
- A Show at Sho' Cards.....Cloth **\$4.00**
- Sign PaintingCloth **\$4.00**
- Strong's Book of Designs.....Leatherette **\$4.00**
- Strong's Art of Show Card WritingCloth **\$4.00**
- Signist's Alphabets.....Cloth **\$1.50**
- Modern Painter's Cyclopedia.....Cloth **\$2.00**
- Automobile Painting.....Cloth **\$1.50**
- Estimates, Costs and Profits, Painting and Decorating.....Cloth **\$1.50**
- New Hardwood Finishing.....Cloth **\$1.50**
- The Amateur Artist.....Cloth **\$1.50**
- New StencilsCloth **\$1.25**
- Chalk Talk and Crayon PresentationCloth **\$1.25**

Farm Books

- Farm Mechanics.....Cloth **\$1.25**
- Farm Buildings.....Cloth **\$1.25**
- Farm Engines.....Cloth **\$1.25**
- Traction Farming.....Cloth **\$1.50**

Business and Reference Books

- Better Business Letters.....Cloth **\$1.00**
- Better Business English.....Cloth **\$1.00**
- Better Advertising.....Cloth **\$1.00**
- Finger Prints Simplified.....Cloth **\$2.00**
- Practical Bricklaying.....Cloth **\$1.25**
- Practical Instruction for DetectivesCloth **\$1.00**
- Practical PlumbingCloth **\$1.50**
- Hot Water Heating.....Cloth **\$1.50**
- Elementary Chemistry.....Cloth **\$1.50**
- Courses in Civil Service.....Cloth **\$1.50**
- Cyclopedia of Recipes.....Cloth **\$1.50**
- American Star Speaker...Cloth **\$1.50**

Modern Languages

- By Prof. P. S. Allen, U. of Chicago
- French without a Teacher.....Cloth **\$1.25**
- Spanish without a Teacher.....Cloth **\$1.25**
- German without a Teacher.....Cloth **\$1.25**
- Everyday French.....\$1.25
- Everyday Spanish.....\$1.25

ORDER DIRECT FROM THIS PAGE—ON OUR MONEY-BACK PLAN

The books listed above are only a few of the many in our catalogue, which you will receive promptly after filling out and mailing us the attached coupon. For quick action order direct from this page—cross name of each book wanted and send in with price quoted. We prepay postage and send the books on our money-back plan.

FREDERICK J. DRAKE & CO.

PUBLISHERS

1008 Michigan Ave., Chicago
Drake Books Are For Sale at All Book Stores

FREDERICK J. DRAKE & CO.
1008 Michigan Avenue
Chicago, Ill.

GENTLEMEN:—Please send me free, postage paid, your illustrated catalogue which lists and describes over 100 Practical Mechanical Books for Home Study.

My name is

and my address

Mail Coupon For Free Catalogue
Your Guide to Home Study



Agents

**"Ye Gods,
—some seller!
I made \$215 to-day"**
—writes Bentley

Read what these
Oliver agents say:

\$660 a month
"Have averaged \$660 profit a month for last six months."
A. M. Russell, Conn.

\$1000 in 4 weeks
"Am making \$1000 per month. I have made big money before, but did not expect so much. Your Burner is just the thing."
J. Carnegie, S. Dak.

Buy car with profit
"Have earned enough in one month to buy me a new auto."
S. W. Knappen, Col.

Sells like beer in a dry town
"Am sending today for seven Oliver's. This is one day's orders (\$80 profit). Selling like beer in a dry town."
W. H. Drew, Mich.

\$43 in one evening
I made \$43 last night.
N. B. Chelan, Wash.

The Oliver Oil-Gas Burner

does away with coal and wood. Burns 95% air—5% oil. Turns any range into an oil-gas stove. Just like using city gas. Gives much or little heat by simply turning valve. Think of the appeal you can make in every community. Heat only when wanted—that means doing away with sweltering kitchens in summer. Cheaper than coal or wood—absolutely safe. No fires to make, no ashes, dirt, smoke, chopping, carrying coal and wood. Easy to install. Doesn't change stove. Easy to demonstrate—slips in or out of stove in one minute. Show any woman how to have a cool kitchen and sale is made. Big demand all year. Make you more money this summer than ever before. The big season is on.

Free Sample Case Offer
and book "New Kind of Heat"

Write for them now.

OLIVER OIL-GAS BURNER CO.

Oldest, largest Manufacturers Oil-Gas Burners in the world.

2014-T Oliver Building, ST. LOUIS, MO.



[Contents—Continued from page 4]

Screws, Small, Holding in Lathe.....	292
Skimming Knife, Novel.....	288
Spike Pulling Tool, Handy.....	304
Switches, Push Button, Making Water Tight.....	300
Truck Engine Mishring, Curing.....	289
Truck, Open, Detachable Top for.....	291
Tubes, Thin, Holding in Hacksaw Vise.....	301
Valve Cage Puller.....	292
Wagon, Attaching to Harvester Thresher.....	287
Well Sampler, Deep, of Novel Design.....	290
Wire, Attaching to Concrete Posts.....	300
Wire Straightener.....	299

AMATEUR MECHANICS

Aluminum Vessel Holes, Mending.....	322
Automobile—Camp Car, How to Build, Part II.....	310
Automobile Emergency Lights.....	324
Automobile Fan Belt Tension, Dash Control for.....	323
Automobile Headlamp Rims, Removing.....	307
Automobile Theft Alarm Safeguards Car.....	308
Battery Box Straps, Making.....	317
Brass, Cutting Chemically.....	315
Cabinet Doors, Sliding, Novel Arrangement of.....	322
Camera Mirrors, Reflecting, Replacing.....	321
Camera, Small, Soft Focus Effects Produced with.....	315
Cedar Chest Scent, Renewing.....	307
Clothes Rack for Closet.....	307
Cucumbers, Protecting from Beetles.....	309
Door Knob, Repairing.....	316
Faucet, Governing Flow of.....	324
Fishhook, Spoon, How to Make.....	323
Foal, Hose Protects in Stall.....	316
Inner Tubes, Protecting from Rim Rust.....	315
Jack, Cordwood, Simple.....	307
Kettle, Copper, Mending.....	315
Lamp Shade Socket and Tassel Combined.....	309
Lawnmower, Nonskid Attachment for.....	316
Magnifier for Close Work.....	306
Monkey, Cycling, How to Make.....	305
Motor Mounting, Universal.....	322
Nuts, Inaccessible, Tape Holds.....	323
Phonograph Stop Lever, Convenient.....	309
Photography—Campfire Photographs.....	324
Piano, Banjo Effect on.....	316
Plaster Ceilings, Loose, Repairing.....	324
Radio Frequency Amplification.....	318
Radio Ground Switch, Improved.....	308
Sap Bucket, Mason Jar Used as.....	309
Setscrews, Headless, Making.....	306
Silk Fabrics, Light, Cleaning.....	308
Soap Chip Cutter, Simple.....	322
Stationery Cabinet, Improving.....	306
Typewriter Desks, Folding, Method of Locking.....	316
Wagon Brake, Increasing Power of.....	317
Washing Machine Used for Canning.....	315
Wheelbarrow Shock Absorbers.....	317
Whipper, Homemade Electric.....	317

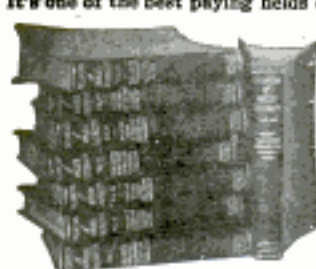
Electrical Course

In Book Form

Here is the quickest, easiest, cheapest way to learn electricity. Think of it! A complete electrical course in book form. No tiresome lessons with a lot of mathematics. Just plain everyday electrical facts—the very things and the only things you need know to hold down a good paying job. Written and simplified by 27 of the biggest men in the electrical field. 3 big books—4100 pages and 3300 pictures.

Electricity Means Success

—Good Pay and a Good Job. You can succeed in electricity. It's one of the best paying fields open to young men who know.



You do not have to give up your present position, just a few pleasant hours spent in the evenings on this subject, and success is yours.

FREE TRIAL!

Just mail the coupon—don't send a cent. We send books for a week's free use. Look them over yourself, and see how thoroughly and completely everything about electricity is explained in them.

American Technical Society
58th St. & Drexel Ave. Dept. E-19-C

American Technical Society, Dept. E-19-C, Chicago

Send me your 8 volume set of Electrical Books for a week's free use. I will either return the books in 7 days or remit \$2.50 and pay you \$3.00 each month until a total of \$28.00 is paid.

Name.....
Address.....
Employed by.....
Copy this coupon on larger sheet if more convenient

Learn Autos and Make Money



Our Graduates either get good Automobile Positions or make BIG MONEY in their own business. Let us tell you how to do the same. We have the **Oldest School—Lowest Rates—7000 Graduates. Catalog Free.**
Cleveland Automobile School
1814 East 24th St., Cleveland, Ohio

COLUMBIA SCHOOL OF DRAFTING

Specializing in training of professional Draftsmen—Mechanical, Architectural and others; personal instruction in spare time, at home by mail; complete course 3 to 9 months. Free Catalog. Address Dept. 2059, R. C. Claffin, Pres., 14th and T Sts., N.W., Wash., D. C.

Learn Photography at HOME

Make \$75.00 a Week on the Side
Establish yourself as a Photographic Expert quickly—during your spare time—under a leading photographer. I'll show you how to start your own business—or command a large salary. Send for my special offer—It's only \$5.00. Ask at once. A postal will do. H. R. VANT.
INTERNATIONAL STUDIOS, Inc.
Dept. 119C, 3601 Michigan Ave., Chicago, U.S.A.



CARPENTERS AND BUILDERS!

JUST OUT!

Giving You the How and Why of Modern Carpentry

AUDEL'S CARPENTERS and BUILDERS GUIDES

Just available — Audel's Carpenters and Builders Guides — the short cut, professional information you want.

A Guide that keeps you in close touch with your work and shows you how you may increase your earning power.

No need to guess or take chances. Every day you have before you in this set, exact, practical, useful information to help you with your daily work.

HOW TO HANDLE THE JOB THAT PUZZLES YOU

How to use the different kinds of wood—complete detailed information on nails and screws—how to use the steel square—how to file and set saws—how to make wood joints—how to build furniture—how to make a mitre shooting board—how to plumb, and level work—how to lay out work—how to understand carpenter's arithmetic—how to solve mensuration problems—how to estimate the strength of timbers—how to proportion beams—how to read plans—how to draw up specifications—how to estimate

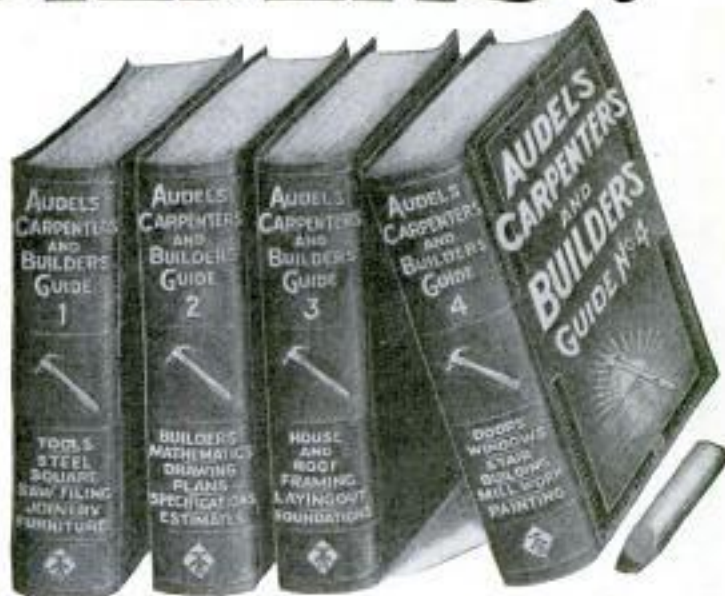
the cost of buildings—how to build houses, barns, garages, bungalows, etc.—how to build foundations—how to proportion foundation footings—how to frame houses—how to set girders and sills—how to frame joists—how to frame a studding—how to set window frames—how to cut rafters—how to use the settings 12, 13, and 17 on the steel square—how to put on wood, fibre and metal shingles—how to hang doors—how to frame windows—how to put on sheathing—how to put on exterior trim—how to do cornice work—how to build stairs—how to lay floors—how to paint.

FREE

EXAMINATION

Not a cent to pay until you see the books. No obligation to pay unless you are satisfied. Send coupon now—today and get this fine, helpful new set for Carpenters and Builders. After you have looked them over 5 days send only \$1, then

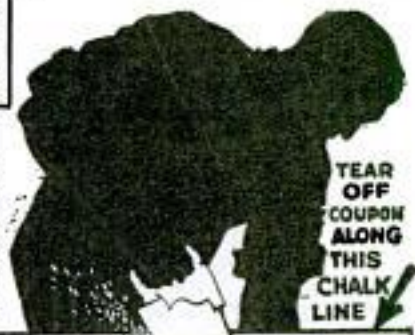
\$1 a month until \$6 is paid—if you want to keep them. Return them if you do not.



\$1 Per Month—Entire Set \$6
SIXTEEN HUNDRED PAGES
3700 TRADE ILLUSTRATIONS
POCKET SIZE—FLEXIBLE COVERS

There are thousands of examples of modern construction and building work—new methods, new ideas, proved efficiency plans, short cuts, time saving suggestions, new ways that cover the entire theory and practice of modern carpentry. Every point is easy to read and understand and clearly illustrated with sketches and forms. Decide for yourself whether they are worth the money to you. Pay only \$1 a month if you like them. Return the Guides if you don't. **USE COUPON NOW!**

**SEND NO
MONEY**
NOTHING to PAY
To the POSTMAN



THEO AUDEL & CO., 72 Fifth Avenue, New York City.

Please submit me for approval and free examination:—AUDEL'S CARPENTERS AND BUILDERS GUIDES. Ship at once, prepaid, the 4 numbers. If satisfactory I agree to send you \$1 within five days and to further mail you \$1 monthly until \$6 is paid.

SEND NO MONEY
FILL IN AND MAIL
THIS COUPON NOW

Name

Occupation

Address

Employed by

Reference

PM, Aug. '23



"Your Future in Electricity"

This book tells you
how you can make
good in the greatest
field of all—Electricity

Get your **FREE**
copy—Use the
coupon

American School, Chicago

Dept. EC-74, Drexel Ave. & 58th St.

Send me a free copy of your 300-page bulletin describing the wonderful opportunity for me in Electricity. This request puts me under no obligation.

Name.....

Address.....

City.....State.....



American School

The American School is not a money-making corporation, but like resident schools and colleges, is chartered strictly as an "Educational Institution, not for profit."

More than 200 famous engineers and educators prepared the special instruction papers for our students.

For over a quarter of a century, Big Engineers, Educators and Business Men have recommended the American School. They know that our long experience as an educational institution guarantees better training at less cost than can be given by any school conducted for profit.



George Debble's Pay Check and—YOURS!

George studied with me only a short time. Before that he could not make over \$20 a week. He left me to take a position at \$65.00 a week. This is only one instance of many. It is a common thing for my students to secure big increases in pay weeks and months before they graduate, and scores have earned enough within a short time after enrolling to pay for their course several times over.

I give my students a practical training for the big pay electrical jobs and offer every student FREE and unlimited employment service. It is my claim I have placed every student who asked me for

a job in an acceptable position—and the same service is FREE to you and all other graduates.

What Do You Earn?

If it is less than \$60.00 a week—stop and think. With the aid of my simplified plan of teaching Practical Electricity by Home Study, you can fit yourself in spare time for the highest paid jobs in this wonderful profession. My course covers all types of electrical work such as House Wiring (Pay \$8.00 a day up); Central and Sub-station Operating and Maintenance (Pay

\$2,500.00 to \$10,000.00 a year); Automobile and Tractor Starting Lighting and Ignition (Pay \$35 to \$85 a week); Electrical Jobbing and Battery Station Service (Pay \$40 weekly to \$20,000.00 a year); Illuminating Engineering; Farm Light, Heat and Power; Radio; and Motor Installation, Maintenance and Repairs (Pay \$6.00 to \$15.00 a day); and is easily and quickly mastered by any one with a common school education. The cost is small, payable in easy installments and when you graduate, I shall give you a diploma and valuable certificate of competency with the degree of E. T. or passed Electrical Technician.

Be a Registered Electrical Technician and Make \$60 to \$200 a Week

You cannot lose by my plan for my course is so clearly explained and so wonderfully illustrated with original cuts, pictures, diagrams, plans and designs, and my personal supervision of your work is so thorough and complete and painstaking that I can, and I will guarantee your success in this study; and more than that, in my reply to your letter of inquiry, I will prove that

LOSS TO YOU IS IMPOSSIBLE

I will undertake to train you until you are fitted to begin earning \$50 to \$70 a

week, and when you graduate, if for any reason whatsoever you are not more than satisfied, if you are not convinced you have received the most up-to-date PRACTICAL expert electrical man's training obtainable, I will gladly and instantly REFUND to you every cent paid me for tuition.

FREE

By acting Now, you save ONE-HALF the usual cost of tuition, and by replying at once you make sure of receiving with your course a valuable outfit of Electrical Appliances, Instruments, Apparatus and Material with which you can do many

kinds of electrical lighting, signaling, power and installation work right at home, and even make money to help pay for your tuition. This outfit is ABSOLUTELY FREE. Make sure of getting this great outfit by securing full details of my course—NOW.

FREE REVIEW COURSE

When you finish the Home Study course, you can come in with me in my big shops for a wonderful Review Training Without One Penny extra for tuition to you.

Sample Lessons Sent—FREE
Write or Mail Coupon
at once—don't delay—do it NOW!

S. V. Smith, Chief Engineer
S. & H. Electrical Works

H. S. Dept. K. K. 1
1422 W. Monroe St. Chicago, Ill.

Chief Engineer Smith, E. T.,
1422 W. Monroe St., H. S. Dept. K. K. 1
Chicago, Ill.

Dear Sir:

Send me catalog and full particulars of your course in Practical Electricity, with sample lessons; free of charge or obligation to me.

Name.....

\$300 a Month



waiting for YOU!



B. W. COOKE, President of the great Coyne Schools, "largest institution of its kind in the world." Mr. Cooke has trained more successful draftsmen than any other one man in the world.

Start now to make a success of yourself! "Loan me a part of your spare time," says President Cooke, "and I'll make you an Expert Draftsman quickly!" Hundreds have been trained in only a few months to hold down jobs at \$250 to \$350 a month. *You can, too!* If you like to draw, if you want the easiest, pleasantest work at the top salary, send for my *Free Books* and get started quick!

Draftsmen Wanted!

Cooke-trained Draftsmen are never out of work! In every city in the U. S. — in every factory, contractor's office, engineer's office, ship yards and dozens of other places there are Draftsmen needed at \$350 a month and up. Learn at home in your spare time. No more schooling needed than ability to read and write. *Big costly Drafting outfit Free.* Radio Course, Free. Take advantage of reduced Summer rates now in effect, soon to be withdrawn.

Mail Coupon for 2 FREE Books!

B. W. COOKE, President

Coyne School of Drafting
Dept. 502, 552-598 S. Throop St., Chicago



COUPON brings my offer of \$19 Drafting Instruments FREE!

Please send me without cost or obligation your reduced rate Summer offer, also information about Free Drafting Instruments and Free Radio Course. Also send me your 2 Free Books about the Drafting Business, and how I can prepare quickly for a big-pay job.

Name.....

St. No.....

City..... State.....

BECOME AN AUTOMOBILE PAINTING ENGINEER

HERE

is an amazing OPPORTUNITY to enter a new field and start in business for yourself. Learn Automobile Painting, Paint Mixing, Etc.,

The WULF WAY

LEARN IN 8 TO 10 WEEKS' TIME

No talent or education necessary. Instructions are Individual. You can start any time. TODAY — RIGHT NOW — Write for our SPECIAL OFFER and catalogue.

DETROIT AUTO PAINTING SCHOOL

28 D. A. P. S. Bldg., 426 Superior St., DETROIT, MICH.

BE AN EXPERT REPAIRMAN ON MOTORS and GENERATORS

Repair and Maintenance Men are in Big Demand.

LEARN IN 3 MONTHS

Insure yourself permanent income and bigger opportunities — here at this Great Electrical School you actually wind D.C. and A.C. armatures under expert instructors. 72-page Book. It's FREE. Write for it today.

SCHOOL OF ENGINEERING OF MILWAUKEE
P.M. 8, 415 Marshall St., Milwaukee, Wis.



What Shall I Be?



DECIDE THIS QUESTION ONCE FOR ALL!

WEALTH — POWER — HAPPINESS — all the worthwhile things of life — depend upon the right choice of occupation. Expert Vocational Guidance of the right kind now available to everybody. Write for free information today.

BUREAU OF VOCATIONAL RESEARCH
296 Broadway Dept. 117 NEW YORK CITY

NO JOKE TO BE DEAF

—Every Deaf Person Knows That I make myself hear, after being deaf for 25 years, with these Artificial Ear Drums. I wear them day and night. They are perfectly comfortable. No one sees them. Write me and I will tell you a true story, how I got deaf and how I make you hear.



Address
GEO. P. WAY, Artificial Ear Drum Co. (Inc.)
80 McKercher Building, 2631 Woodward Avenue, Detroit, Michigan



Medicated Ear Drum
Pat. Nov. 3, 1903

TOBACCO HABIT CURED OR NO PAY

Any form, cigars, cigarettes, pipe, chewing or snuff. Guaranteed. Harmless. Complete treatment sent on trial. Costs \$1.00 if it cures. Nothing if it fails.

SUPERBA CO., E-41, BALTIMORE, MD.

NO MORE BALD HEADS

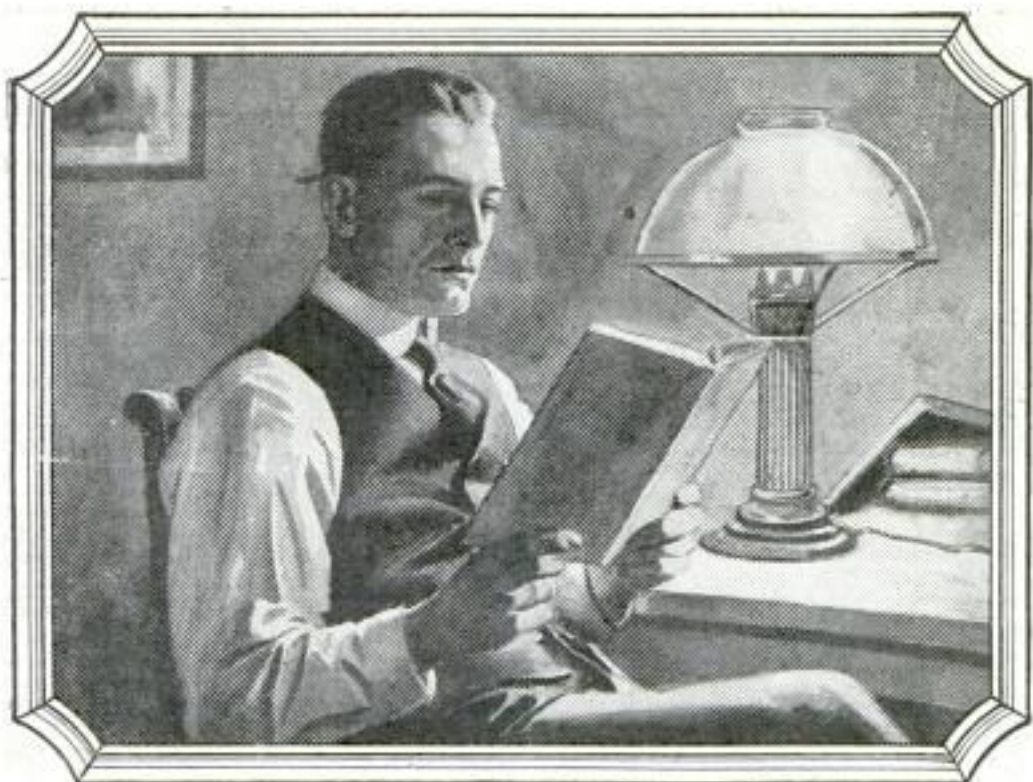


WHEN our VACUUM CAP is used a few minutes daily. We accept no pay until you have tried the Cap 60 days and are satisfied. The Vacuum Cap is an appliance that draws the blood to the Hair Roots and starts a new healthy crop of hair. It stops Dandruff, stops the hair from falling out.

Bought by Doctors and men who know that it is the only reasonable HAIR GROWER known to science. No Drugs Used. Write for application blank, testimonials, and booklet on "HAIR" sent sealed in plain envelope, FREE.

THE MODERN VACUUM CAP CO.

M 559 BARCLAY, DENVER, COLO.



\$95 An Hour!

"Every hour I spent on my I. C. S. Course has been worth \$95 to me! My position, my \$5,000 a year income, my home, my family's happiness—I owe it all to my spare time training with the Scranton Schools!"

Every mail brings letters such as this from some of the thousands of I. C. S. students. For 31 years, in offices, stores, shops, factories, mines, railroads—in every line of technical and commercial work—men have been winning promotion and increased salaries through spare time study with the I. C. S. Over 180,000 men are getting ready *right now* for bigger jobs ahead.

What are *you* doing with the hours after supper? Can you afford to let them slip by unimproved when you can easily make them mean so much?

No matter where you live, the I. C. S. will come to *you*. No matter what your handicaps, or how small your means, we have a plan to meet your circumstances. No matter how limited your previous education, the simply written, wonderfully illustrated I. C. S. lessons make it easy to learn. No matter what career you may choose, some one of the 300 I. C. S. Courses will surely suit your needs.

One hour a day spent with the I. C. S. will prepare you for the position you want in the work you like best. Yes, it will! Put it up to *us* to prove it. Mark and mail this coupon *now!*

----- TEAR OUT HERE -----
INTERNATIONAL CORRESPONDENCE SCHOOLS
 Box 5533-D, Scranton, Penna.

Without cost or obligation, please tell me how I can qualify for the position or in the subject before which I have marked an X:

BUSINESS TRAINING COURSES

- | | |
|---|---|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Foreign Trade |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Business Spanish | <input type="checkbox"/> Illustrating |
| <input type="checkbox"/> French | <input type="checkbox"/> Cartooning |

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|---|--|
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Blue Print Reading |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Gas Engine Operating | <input type="checkbox"/> Plumbing and Heating |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Chemistry |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Metallurgy | <input type="checkbox"/> Automobile Work |
| <input type="checkbox"/> Steam Engineering | <input type="checkbox"/> Navigation |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Agriculture and Poultry |
| <input type="checkbox"/> Airplane Engines | <input type="checkbox"/> Mathematics |

Name.....

Street.....

Address..... 3-27-23

City..... State.....

Occupation.....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada.

LEARN CARTOONING

Successful cartoonists earn big salaries. Many of the most popular cartoonists of to-day learned to draw in their spare time, at home, through the Landon Course of Cartooning and now earn \$75 to \$200 a week.



The Landon Picture Chart Method of teaching ORIGINAL drawing makes cartooning easy to learn. Hundreds of sketches like the above explain every step in creating ORIGINAL heads, figures, animals, etc. Write today for Sample Landon Picture Chart, long list of successful Landon students and full information showing possibilities for you. Please state your age. **The LANDON SCHOOL, 738 National Building, CLEVELAND, OHIO**

Results Prove Merit

The long list of successful Landon students includes—

Gene Byrnes, creator of "REG-LAR FELLERS";
 Branner, who draws "WINNIE WINKLE";
 Blosser, originator of "FRECKLES";
 Edwina, who created "CAP STUBBS," and
 Locher, now drawing "CICERO SAP."

Many others have made national reputations drawing political or sport cartoons.

Get the same instruction these boys received—the same personal coaching.

If I Send You a Suit



made to your measure, in the latest style, would you keep and wear it, show it to your friends, let them see our beautiful samples and splendid new styles? Could you use \$3.00 an hour for a little spare time? **Every tailoring agent, send for our wonderful new proposition.** Just write a letter or postal or fill out and mail coupon below. I will send you our big new book of samples and styles to pick from and my new, special offer, **all free.** Even if you don't care to be agent, send anyway, and learn how to get all your own clothes **FREE.**

To **L. E. ASHER, President**
BANNER TAILORING CO.
 Dept. 847. CHICAGO, ILL.

Dear Sir: Send me your sample book and special offer, all **FREE.**

Name

R.F.D. Box St. and No.

P.O. State

JUST OUT

THE AUTOMOBILE PAINTERS' MANUAL

By D. P. WULF, A. V. P. E., Founder of The Detroit Auto Painting School

For the auto painter, garageman and auto owner. Written to give precise information, pertaining to the Painting, Stripping, Monogramming and Lettering of an automobile. Covers the subject of color mixing—color blending—and tinting with a hundred and fifty different shades. Considered by experts, the book of the hour. Self instructional and self educational. Also contains numerous and various styles of alphabets, monograms and initials. Special introductory offer. Edition limited. **Post Paid \$1.50.**

DETROIT AUTO PAINTING SCHOOL, 426 Superior Street, Dept. P, DETROIT, MICH.

Sure Rupture Comfort

BE COMFORTABLE—Wear the Brooks Appliance, the modern scientific invention which gives rupture sufferers immediate relief. It has no obnoxious springs or pads. Automatic Air Cushions bind and draw together the broken parts. No salves or plasters. Durable. Cheap. Sent on trial to prove its worth. Never on sale in stores as every Appliance is made to order, the proper size and shape of Air Cushion depending on the nature of each case. Beware of imitations. Look for trademark bearing portrait and signature of C. E. Brooks which appears on every Appliance. None other genuine. Full information and booklet sent free in plain, sealed envelope.

BROOKS APPLIANCE CO., 126J State St., Marshall, Mich.



MR. C. E. BROOKS

Learn To Repair Your Car—Booklet FREE

We show you how to save repair bills; how to keep your car always at top notch of efficiency. Or, if it stops on the road, how to fix it and drive on. Our special Home Series of Simple Instructions does it—clearly! Covers everything. When you finish the Series you know! Illustrated **BOOKLET** of important facts and advice **FREE**, together with full information about complete Series. *Send postal today for Booklet "A."*

CHICAGO AUTOMOTIVE COMPANY, 1014 S. Michigan Avenue, CHICAGO, ILL.

WANTED

RAILWAY POSTAL CLERKS

\$1600 to \$2300 Year

MEN — BOYS, 18 UP

WRITE IMMEDIATELY

Steady work. No layoffs. Paid Vacations
 Travel—See the Country

Common education sufficient. Send coupon to day—SURE



MAIL CLERKS

FRANKLIN INSTITUTE, Dept. W179, Rochester, N. Y.

Sirs: Send me without charge, (1) Sample Railway Postal Clerk Examination questions; (2) List of government jobs obtainable; (3) Send sample coaching lessons and send list of examination places. (4) Send free illustrated book, "Government Positions."

Name

Address

What Do You Call an Opportunity?

IN my lifetime I have heard many men speak of opportunity. I have read some very fine definitions of this wonder-word. It has been the subject of many splendid speeches; authors have written abundantly about it in prose and poetry.

You have said, "I wish I had an opportunity."

But I am wondering what you call an opportunity.

Do you—as so many do—mistakenly associate it with "good fortune" or "good luck"?

Suppose tomorrow you heard of a \$10,000 position seeking a man. Could you fill it? If so, it would be an opportunity. If not, it would be no opportunity at all so far as you are concerned. It would be merely a bit of information from which you could not benefit.

Opportunity, I believe, is usually a recognition of worth.

The biggest opportunity that can ever come to you will never be any bigger than your preparation—your worth-whileness.

If you are not worth considering, Opportunity won't give you a thought.

The biggest job of all the big jobs open and

filled in the last twenty-four hours would have been an opportunity for you—

—if you had been prepared.

And I am not one who believes that Opportunity knocks but once.

The hundreds of opportunities which are here to-day will come again to-morrow—

—if you are prepared.

But you can be sure they will never be found on the door-steps of worthless prospects—men who are not ready.

Opportunity seeks and finds only those who have paid the price of preparation. She does not pick men as

you pick a number from a lottery; neither does she cover up what she has to offer. Her gifts are an open book—yours from which to choose.

Pick the thing you want, and get ready for it. Opportunities do not come except as you attract them. LaSalle training offers a sure way to increase your powers of attraction.

Just bear in mind that the biggest opportunity that can ever come to you will never be greater than your preparation.

J. M. ...
President LaSalle Extension University
of Chicago, Illinois

HOME-STUDY COURSES

THAT LEAD TO BUSINESS CAREERS

LaSalle Extension University

The Largest Business Training Institution in the World

INQUIRY COUPON

LA SALLE EXTENSION UNIVERSITY Dept. 864-R CHICAGO, ILLINOIS

Please send me catalog and full information regarding the course and service I have marked with an X below. Also a copy of your booklet, "Ten Years' Promotion in One," all without obligation to me.

- | | | |
|--|---|---|
| <input type="checkbox"/> Business Management: Training for Official, Managerial, Sales and Executive positions. | <input type="checkbox"/> Railway Station Management: Training for Railway Auditors, Comptrollers, Accountants, Clerks, Station Agents, Members of Railway and Public Utilities Commissions, etc. | <input type="checkbox"/> Modern Foremanship and Production Methods: Training in the direction and handling of industrial forces—for Executives, Managers, Superintendents, Contractors, Foremen, Sub-foremen, etc. |
| <input type="checkbox"/> Modern Salesmanship: Training for Sales and Advertising Executives, Solicitors, Sales Promotion Managers, Salesmen, Manufacturers' Agents and all those engaged in retail, wholesale or specialty selling. | <input type="checkbox"/> Industrial Management Efficiency: For Executives, Managers, Office and Shop Employees and those desiring practical training in industrial management principles and practice. | <input type="checkbox"/> Personnel and Employment Management: Training for Employers, Employment Managers, Executives, Industrial Engineers. |
| <input type="checkbox"/> Higher Accountancy: Training for positions as Auditor, Comptroller, Certified Public Accountant, Cost Accountant, etc. | <input type="checkbox"/> Modern Business Correspondence and Practices: Training for Sales and Collection Correspondents; Sales Promotion Managers; Credit and Office Managers; Correspondence Supervisors, Secretaries, etc. | <input type="checkbox"/> C. P. A. Coaching for Advanced Accountants. |
| <input type="checkbox"/> Traffic Management—Foreign and Domestic: Training for positions as Railroad or Industrial Traffic Manager, etc. | <input type="checkbox"/> Banking and Finance. | <input type="checkbox"/> Commercial Law. |
| <input type="checkbox"/> Law: Training for Bar; LL. B. Degree. | | <input type="checkbox"/> Expert Bookkeeping. |
| | | <input type="checkbox"/> Business English. |
| | | <input type="checkbox"/> Commercial Spanish. |
| | | <input type="checkbox"/> Effective Speaking. |

Name..... Present Position..... Address.....



Make Opportunity Come!

"For the most part, Opportunity comes to those who fairly burn for it—in other words, to those who make Opportunity instead of waiting for it."

Editorial from Saturday Evening Post



You're Right!
Where'd You Learn That?

Nine out of ten young men are waiting for Opportunity. They wish, they dream, they sigh. Often they complain.

The tenth man is looking ahead, seeing what he can create for himself—one, two or three years hence.

If you are one of the "tenth" group, we invite you to write for a helpful chart showing how to plan your spare hours for a bigger career. We will tell you about a new type of instruction-by-mail service that is bringing every month scores of letters telling of new positions and responsibilities, more comforts and privileges, bigger lives.

An Indiana student writes: "I have been asked by directors and large stockholders to take the cashiership made vacant by the promotion of Mr. B——. This marks a big upward step for me."

Some of our Correspondence Courses

School of Commerce

Accountancy
Advertising
Better Letters
Bookkeeping
Business Administration
Business Arithmetic
Business English
Business Law
Commercial Art
Public Speaking
Salesmanship
Shorthand and Typewriting
Snow Card Writing
Traffic Management

High School

Junior High School
First Year High School
General High School
Commercial High School
Trade High School

Start Opportunity in your direction
by marking and mailing this coupon

School of Engineering

Architecture
Automobile Courses
Building Construction
Civil Engineering
Concrete Engineering
Drafting Courses
Electrical Engineering
Foremanship
Mathematical Courses
Mechanical Engineering
Radio Telegraphy
Radio Engineering
Steam Engineering
Structural Drafting

Miscellaneous

Applied Psychology
French
Spanish
Physical Director's Training
Poultry Husbandry

Without obligating me, please advise regarding the course in.....

Name.....

Full Address.....

Dept. 2-Ag

Please write plainly

United Y.M.C.A. Schools

Correspondence
Instruction

The most Service
for the least Money

347 Madison Ave. New York City, N.Y.

Please Mention Popular Mechanics

Why Miss Half the Fun in Life?



BE POPULAR—Learn to dance well! Arthur Murray, America's greatest dancing teacher, has invented a remarkable new easy method which enables anyone to learn all the newest dances at home—in a few hours—at very little cost! No music or partner needed. *Success positively guaranteed!* "90,000 learned dancing by mail."

FREE 5 DANCING LESSONS—To prove you can learn easily and quickly, Arthur Murray will send you Five FREE lessons, including Fox Trot, Secret of Leading, and How to Gain Confidence. To pay cost of mailing, printing, etc., enclose 25c. Act NOW and be a good dancer soon.

Arthur Murray, Studio 799
290 Broadway New York

Music Lessons

UNDER MASTER TEACHERS
At Home

Any Instrument Write, naming course you are interested in: Piano, Harmony, Voice, Public School Music, Viola, Cornet, Mandolin, Guitar, Banjo or Reed Organ—and we will send FREE CATALOG. SEND for it NOW!

University Extension Conservatory, 101 Sepulchre Bldg., Chicago

Complete Conservatory Course by Mail

Wonderful home study music lessons under great American and European teachers. Endorsed by Paderewski. Master teachers guide and coach you. Lessons a marvel of simplicity and completeness.

Be An Automotive Electrician

Men are needed by the hundreds in the larger cities to take care of automobile electrical repairs. 78% of automobile repairs are electrical, yet only a few men are qualified to take advantage of the openings that pay from \$150 to

\$500 a Month

Now, by a new easy method you can learn this interesting work by a few weeks training in Chicago, or right in your own home. Write for particulars to Ambu Engineering Institute, Dept. 18, 2632 Prairie Ave., Chicago, Ill.

LAW

STUDY AT HOME

Become a lawyer. Legally trained men win high positions and big salaries in business and public life. Greater opportunities now than ever before. Lawyers earn \$3,000 to \$10,000 Annually. We guide you step by step. You can train at home during spare time. Let us send you records and letters from LaSalle students admitted to the bar in various states. Money refunded according to our Guarantee Bond if dissatisfied. Degree of LL.B. conferred. Thousands of successful students enrolled. Low cost, easy terms. We furnish all text material, including four-volume Law Library. Get our valuable 120-page "Law Guide" and "Evidence" books FREE. Send for them—NOW.

LaSalle Extension University, Dept. 84-4, Chicago, Ill.

HOW TO BECOME A PROFESSIONAL PHOTOGRAPHER

EARNING \$35 TO \$125 A WEEK



Three to six months' course. Motion Picture, Commercial, Portraiture. Practical instruction. Modern equipment. Ask for Catalog No. 49.

N. Y. INSTITUTE OF PHOTOGRAPHY
NEW YORK CHICAGO BROOKLYN
141 W. 36th St. 630 So. Wabash Ave. 505 State St.

ELECTRICITY LEARN AT HOME

Send for catalog which tells how Burgess Home Training enables men and boys to get good jobs and keep them. BURGESS ELECTRICAL SCHOOL, Dept. P8, 744 E. 42nd Street, CHICAGO

AVIATION Information FREE

Send us your name and address for full information regarding the Aviation and Airplane business. Find out about the many great opportunities now open and how we prepare you at home, during spare time, to quality. Our new book "Opportunities in the Airplane Industry" also sent free if you answer at once.

AMERICAN SCHOOL OF AVIATION
Dept. 119C 3601 Michigan Ave. CHICAGO

This Stylish, Goodyear All Weather Coat FREE!



**Don't
Lose
Time
Act
NOW
!**

For advertising purposes we offer to send this handsome Goodyear All Weather Coat Free to one person in each locality who will show and recommend it to friends and take orders. It is a beauty, of rich triple texture tweed, cut in the season's latest style with all around belt, semi-dent lapels, convertible collar and storm tabbed sleeves. Guaranteed rain, dust and wind proof. A handsome topcoat, overcoat, raincoat and motor coat combined. Good for all year 'round wear.

Send No Money

Write your name and address in the coupon below and mail today. Send no money. Prove by your promptness that you are the one we seek. **MAIL IT NOW.**

Big Pay for Spare Time

When people see your wonderful sample All Weather Coat they will admire it, ask about it, and want one like it. That is why we make this Unparalleled Free Offer.

You can make big money just taking these orders. Have all the money you want to spend. Don't lag behind and miss this great offer. Fill in the Coupon and Mail NOW!

THE GOODYEAR MFG. CO.
1746 Goodyear Bldg.
KANSAS CITY, MO.

THE GOODYEAR MFG. CO.
1746 Goodyear Bldg.
Kansas City, Mo.

Without any obligation on my part please send me by return mail your FREE COAT and AGENCY OFFER.

Here's
the
**BigFREE
COUPON**

Mail The Coupon NOW!

**This Sensational Free Offer
May Never Be Made Again.**

Tear out here and mail before you forget it.

NAME _____

ADDRESS _____

TOWN _____ STATE _____

Why haven't
you
clipped this
coupon

TEAR OUT HERE

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 5334-D, Scranton, Penna.

Without cost or obligation, please tell me how I can qualify for the position or in the subject before which I have marked an X:

BUSINESS TRAINING COURSES

- | | |
|---|---|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Foreign Trade |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Accountancy (Including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Business Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|--|--|
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Blue Print Reading |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Gas Engine Operation | <input type="checkbox"/> Plumbing and Heating |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Automobile Work |
| <input type="checkbox"/> Metallurgy <input type="checkbox"/> Mining | <input type="checkbox"/> Navigation |
| <input type="checkbox"/> Steam Engineering | <input type="checkbox"/> Agriculture and Poultry |
| <input type="checkbox"/> Radio <input type="checkbox"/> Airplane Engines | <input type="checkbox"/> Mathematics |

Name.....
Street..... 3-27-23
Address.....

City..... State.....

Occupation.....
Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada.

Please Mention Popular Mechanics

FREE To Machinists

POPULAR MECHANICS MAGAZINE

has prepared a table of decimal equivalents of the fractions of an inch, a copy of which will be mailed free to any machinist or auto repairman upon application. The table is 16½ in. wide by 23 in. long, printed on good, heavy paper, and will prove of great value in any shop.

There are no strings to this offer; simply send us your name, and the address of the shop or garage in which you work, and the table will be forwarded at once, carefully wrapped, and postpaid.

Address _____

The Editor, Shop Notes Dept.
Room 512, Popular Mechanics Bldg.
200 East Ontario Street, Chicago, Ill.

WRITE TODAY for
Our 168-PAGE
FREE BOOK on

Deafness

and learn how Perfect Hearing is now being restored in every condition of deafness or defective hearing. Our "Little Wireless Phones for the Ears" require no medicine, but effectively replace what is lacking or defective in the natural ear drums. They are simple devices, which the wearer easily fits into the ears, where they are invisible. Soft, safe and comfortable.

WILSON EAR DRUM CO., Incorporated
1258 Inter-Southern Bldg. LOUISVILLE, KY.

Try This on Your
Hair
15
Days



Then let your mirror prove results
Write Today for Free Trial Offer

Your hair need not thin out, nor need you be bald, for a way has been found to destroy the microbe that destroys the hair. This new and different method will prevent thinning out of the hair, dandruff, lifeless hair, baldness, gray hair, by strengthening and prolonging life of the hair. Send now before it is too late for the 15-days' free trial offer.

AYMES CO., 3932 N. Robey St., M390, Chicago

AGENTS

For the Biggest Money-Making
Selling Proposition You Ever Saw

See Pages 126 & 127

Discovers New Way To Teach Salesmanship in 20 Weeks!



After fifteen years an amazing new method has been formulated whereby it is possible for any ambitious man to get into this fascinating and best paid of all professions in 20 weeks.

By J. E. Greenslade

HERE is the biggest discovery that has been made since men first began to prepare themselves for selling positions through spare time study at home.

After fifteen years' intensive study the National Demonstration Method has been perfected—and men can now step into a selling position inside of twenty weeks—with years of practical experience in their heads.

This amazing discovery may well enable you to call yourself a MASTER salesman at the very beginning of your actual selling career. For, after all, MASTER salesmanship is nothing more than a knowledge of what to do in every situation—and this is what you will have learned from this new method.

For the sales problems which every salesman meets during his experience have all been charted and the most masterful way to handle each of these 64 conditions is shown you. In addition to the National Demonstration Method you will get the same wonderful groundwork of selling and business knowledge which has been responsible for the success of thousands in the past.

How Well It Works

This is the method that enabled Wagner—a fireman—without any previous business training or without any fluency as a talker—to exchange his shovel for a sample case and to exchange his poorly paid hard-working situation for the most fascinating of all professions; with a salary of \$7,000 a year.

EMPLOYERS
are invited to write to the Employment Dept. of the N. S. T. A. No charge for this service to you or our members. Employers are also cordially invited to request details about the N. S. T. A. Group Plan of instruction for entire sales forces. Synopsis and charts sent without obligation.

After 3 months' study, in his spare time, at home, it enabled H. D. Miller, of Chicago, a stenographer, to step out of a \$100 a month job right into a \$100 a week position.

And I could cite hundreds of other instances, where these remarkable changes

from poorly paid positions into this high salaried profession have been made after from 12 to 20 weeks of this easy, fascinating study. Men in every walk of life have made this change—farmers, laborers, mechanics, bookkeepers, ministers—and even physicians and lawyers have found that Salesmanship paid such large rewards and could be learned so quickly by this new method that they have preferred to ignore the years they spent in reading law or studying medicine and have become master salesmen.

What This Method Means to You

Are you tired of doing routine work which wears a man out long before his time? Are you tired of the daily monotonous grind at a salary that makes it impossible to get any of life's luxuries whatever? Are you tired of the uncertainty of permanence which is always a feature of the average clerical position? Then why not decide to enter the profession where the earnings are high—where the constant demand for good salesmen insure that one may never fear loss of a position and where the work is so fascinating that it is like playing an interesting game and getting paid for it?

Get Free Book on Selling

This amazing new Demonstration Method—which gives you years of practical experience in less than 5 months—is all explained in an interesting book called "Modern Salesmanship." It also explains the wonderful opportunities which exist in the selling field and tells all about our free employment service. It should be in the hands of every ambitious man who wishes to insure that his future will be a bright and prosperous one. It will be sent free and without obligation. Mail attached coupon today.

NATIONAL SALESMEN'S TRAINING ASS'N.
Dept. 12-K, CHICAGO, ILLINOIS

National Salesmen's Training Association, Dept. 12-K, Chicago, Illinois

Send me free book "Modern Salesmanship" which explains the New Demonstration Method and shows how I can become a Master Salesman. This does not obligate me in any way.

Name.....
Address.....
City..... State.....
Age..... Occupation.....

Are YOU in a Rut?



The way to get out

Put your shoulder to the wheel. Stop saying you have no chance, that luck is against you. You have your spare evening hours, seven o'clock to ten, which you can use in gaining technical or business knowledge. You have to possess this knowledge before employers will give you more responsibility. Experience is a fine teacher, but make use of the experience of other men. That kind of experience has been laid down plainly in the practical courses of the United Y. M. C. A. Schools.

More than 35,000 ambitious young men have enrolled for our unique form of instruction by mail, which "gives the most for the least money." It brings you man-to-man counsel and expert assistance on all of your problems.

Some of our Correspondence Courses

School of Commerce

Accountancy
Advertising
Bette, Letters
Bookkeeping
Business Administration
Business Arithmetic
Business English
Business Law
Commercial Art
Public Speaking
Salesmanship
Shorthand and Typewriting
Show-Card Writing
Traffic Management

High School

Junior High School
First Year High School
General High School
Commercial High School
Trade High School

School of Engineering

Architecture
Automobile Courses
Building Construction
Civil Engineering
Concrete Engineering
Drafting Courses
Electrical Engineering
Foremanship
Mathematical Courses
Mechanical Engineering
Radio Telegraphy
Radio Engineering
Steam Engineering
Structural Drafting

Miscellaneous

Applied Psychology
French
Spanish
Physical Director's Training
Poultry Husbandry

Let us help you to get out of the rut and on the high road to the place in the world that is rightfully yours—if you work for it. Mark and mail the coupon below.

Without obligating me, please advise regarding the course in.....

Name

Full Address

Dept. 74-Ag

Please write plainly

United Y.M.C.A. Schools

Correspondence Instruction *The most Service for the least Money*

347 Madison Ave. New York City, N.Y.

Please Mention Popular Mechanics



Learn to Write

I Teach by Mail

I can make a good penman of you at your home during spare time, no matter where you live or how poorly you now write. My simplified system has shown thousands the way to good penmanship during the past twenty-five years — it CAN and WILL do the same for YOU.

My beautifully illustrated 32-page Book

"How to Become a Good Penman" FREE!!

It contains many beautiful specimens of penmanship showing what others have accomplished by the Tumblyn System, with testimonials and general information about our courses. (Your name elegantly written on a card if you enclose stamp for postage.) Ladies laughless successfully as men. Write Today. Address

F. W. TUMBLYN
410 Ridge Bldg. Kansas City, Mo., U. S. A.

F. W. Tumblyn

Cheapest Way to Go

to work or school and recreation is on a **Ranger** bicycle. You can have your choice of **44 Styles, colors and sizes, 30 DAYS' FREE TRIAL, Express prepaid. Factory-to-Rider Prices save you \$10 to \$25.**

12 Months to Pay if desired. Saved time and carfare easily meets the small payments. Parents often advance first payment.

Tires best quality, at factory prices, *express prepaid.* Lamps, wheels and equipment, *low prices, send No Money, do business direct with makers.*

Mead Cycle Company
Dept. A108 Chicago

Write today for free Ranger Catalog, factory prices and marvellous easy payment terms



LEARN WATCH REPAIRING

Be a watchmaker—you can learn this profitable trade by correspondence in a few weeks in your own home by the DeSelms Chart System. After you complete the course you will know a watch from A to Z. You will know just what the matter is and how to repair one. When you graduate you will be a practical watchmaker and repairer and competent to fill any position. Positions for our graduates. Ask for our Free Book. It explains our system and terms.

THE DeSELMS WATCH SCHOOL
23 Perry Street ATTICA, INDIANA



STAMMER

If you stammer attend no stammering school till you get my large FREE book entitled "STAMMERING, Its Origin and the Advanced Natural Method of Cure," bound in cloth and stamped in pure gold. Ask for special tuition rate and a FREE copy of "The Natural Speech Magazine." Largest, best equipped and most successful school in the world for the cure of stammering; stuttering, etc. No sing-song or time beat. Write today.

The North-Western School, 2317 Grand Ave., Milwaukee, Wis.

IT'S EASY TO PLAY THE TENOR-BANJO

THIS \$15.00 TENOR BANJO FREE

No Previous Musical Knowledge Necessary. Play Music Your First Lesson. Wonderful Method Only 5 motions and you master them quickly. After a short period of easy practice you will be playing all the popular hits, just as you have heard experts play them on the stage, in Dance Orchestras—everywhere! It is the most popular instrument of the age and you can quickly learn to play it. Prof. Barker will teach you to chord and harmonize exactly as he does in an amazingly short time! And remember we furnish your tenor banjo free. Write for details of our course and free offer. Address

First Hawaiian Conservatory of Music, Inc., Desk 60, 233 Broadway, (Woolworth Bldg.) N. Y.



Repair Any Auto or Auto Truck

Examine These NEW AUTO BOOKS FREE

Be an expert auto repair man. You can have the skill that makes every complicated trouble as easy to fix as taking out a spark plug. Learn every detail of all makes of cars and trucks. Know exactly how to find what's wrong and how to make all repairs quickly. These great new Auto Books show you how.

Make Money Repairing Autos

Over 9 million cars are in operation and thousands of men are needed to keep them in good going condition. There are more jobs open than there are good men to fill them. Never before have expert auto repair men been in such great demand and made so much money. Now is your great money-earning opportunity in the auto repair business. Every mechanic, every chauffeur, every car owner needs this great New Library of Automobile Engineering.

Tells About

Explosion Motors, Welding, Motor Construction and Repair, Carburetors and Settings, Valves, Cooling, Lubrication, Fly-Wheels, Clutch Transmission, Final Drive, Steering Frames, Tires, Vulcanizing, Ignition, Starting and Lighting Systems, Shop Kinks, Public Garage Design, Equipment and Operation, Electric, Storage Batteries—Care and Repair, Steam Cars, Motorcycles, Commercial Trucks, Glossary, More than 100 blue prints Wir'g Diagrams.

75c a Week If You Decide to Buy

Let us send you the complete six-volume set of Automobile Engineering for one week's examination. Read the simple directions for repairing every automobile trouble. Six thick volumes 5½x 8¾ inches, flexibly bound and stamped in gold, 2,650 pages, 2,100 illustrations, wiring diagrams, etc. Everything in plain, every-day language simple to understand. If you decide to keep them, send only \$2.80 in seven days, and \$3 a month thereafter until the special introductory price of \$21.80 has been paid. The regular price is \$45.00, so you save \$23.20 by acting at once.

Send No Money

Don't send a penny! Your name and address in the coupon brings the six books to you at once for seven days' trial.

Mail Coupon NOW

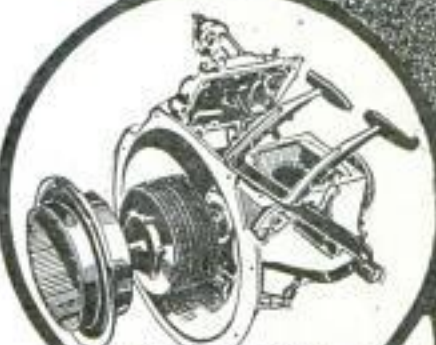
American Technical Society
Dept. A19C Chicago, U. S. A.



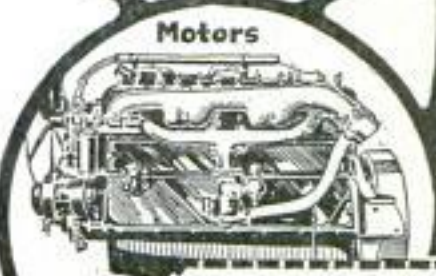
Starting and
Lighting



Welding



Transmission



Motors

AMERICAN TECHNICAL SOCIETY

Dept. A19C Chicago, U. S. A.

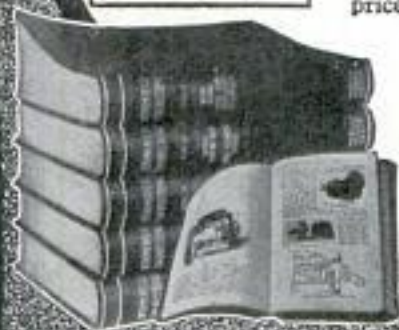
Please send me the six-volume set of Automobile Engineering for seven days' examination, shipping charges collect. If I decide to buy, I will send \$2.80 within seven days and balance at \$3.00 a month until \$21.80 has been paid. Then you will send me a receipt showing that the set of books are mine and fully paid for. If I think I can get along without the books, I will return them, after 7 days, at your expense.

To insure prompt shipment fill out all lines.

Name _____

Address _____

Employed by _____



BE A RAILWAY TRAFFIC INSPECTOR

EARN UP TO \$250 PER MONTH
Expenses Paid



**What I
Have Done,
YOU CAN DO!**

By J. A. SMALLICK

After one year's work in the capacity of "Railway Traffic Inspector," I find myself in a position which pays \$180 per month plus expenses.

There is no doubt but what I owe my success entirely to the course taken thru the Standard Business Training Institute a little over a year ago. Due to the completeness and easily understandable language of the course, what would in other channels take years to learn can be learned in a few months.

The value of the course is explained by my personal experience. I do not think that a quicker or greater return can be found for money invested.

Big Opportunities Ahead

You can begin your preparation, in spare time at home, knowing that you will enter an uncrowded profession, with many opportunities to travel, with pleasant, outdoor work, with frequent contact with leading railway executives and with many chances for advancement.

Position Guaranteed

After about three months' preparation, you are GUARANTEED A POSITION paying at least \$110 a month and expenses or your entire enrollment fee is returned. You take no risk! The S. B. T. I. has many more openings than they can fill.

Send the coupon to the Standard Business Training Institute, Carlton Court, Buffalo, N. Y., today for Booklet No. D-63 giving full details and easy terms of payment.

---MAIL TODAY---

**Standard Business Training Institute,
Carlton Court, Buffalo, New York**

Send me, entirely free, Booklet No. D-63 giving full particulars about course in Railway Traffic Inspection.

NAME.....

STREET.....

CITY.....

DRAW THIS SUMMER

Cartoonists Trained by W. L. EVANS

MAKE MONEY



SOME of the cleverest cartoonists in America today are former students. They studied during their spare time and are now making good money. Cartoonist Evans' system of teaching is so simple, easy and practical that it is not hard to learn to draw originals. The school has a long established reputation and is recommended by well-known cartoonists because they know the students are handled right.

If you like to draw, send us a sample of your work, either a copy or an original. You may have more ability than you think. We will send you a portfolio of cartoons and full details about the school.

The Course is NOT EXPENSIVE

**THE W. L. EVANS SCHOOL
OF CARTOONING**

821 Leader Bldg. CLEVELAND, OHIO



LEARN TO GET DOLLARS OUT OF WATCHES.
WATCH REPAIRING, ENGRAVING, JEWELRY REPAIRING.
WRITE NOW.
ENICAR TRADE SCHOOL
530 W MONUMENT SQUARE, RACINE, WIS.

STAMMERERS
You can be cured by our course of natural individual lessons. Write today for free booklet, "How To Stop Stammering."
SAMUEL A. ROBBINS, Director,
Boston Stammerers' Institute, Founded, 1907
246 Huntington Ave. Boston 17, Mass.

TRI-STATE COLLEGE OF ENGINEERING

Makes you a Civil, Mechanical, Electrical or Chemical Engineer in two years, 48 weeks each. No entrance examinations. High School Diploma not required. Compact courses made up of essentials only. Expenses low.
FOR CATALOG ADDRESS 100 M. Street, Angola, Indiana



Mount Birds

We teach you by mail to stuff and mount all kinds of Birds, Animals, Game Heads. Also to taxidermy and make rugs. Be your own taxidermist. Decorate your home with your beautiful trophies or increase your income selling specimens and mounting for others. Easily, quickly learned in spare time by men and women. Highest endorsements by thousands of students. Write today for our great free book "How to Mount Birds and Animals" Free—write today, N. W. School of Taxidermy, C1 77 Elwood Bldg., Omaha, Neb.

Make \$10 a Night
Be a Drummer Professional drummers in demand everywhere and make big money. You can quickly and easily learn to play band, orchestra and dance music through my home study course. Write for particulars Today, NOW! Write for folder of special snare drum offer.
The Herman H. Rinne Correspondence School of Modern Drumming
3154 Park Ave. INDIANAPOLIS

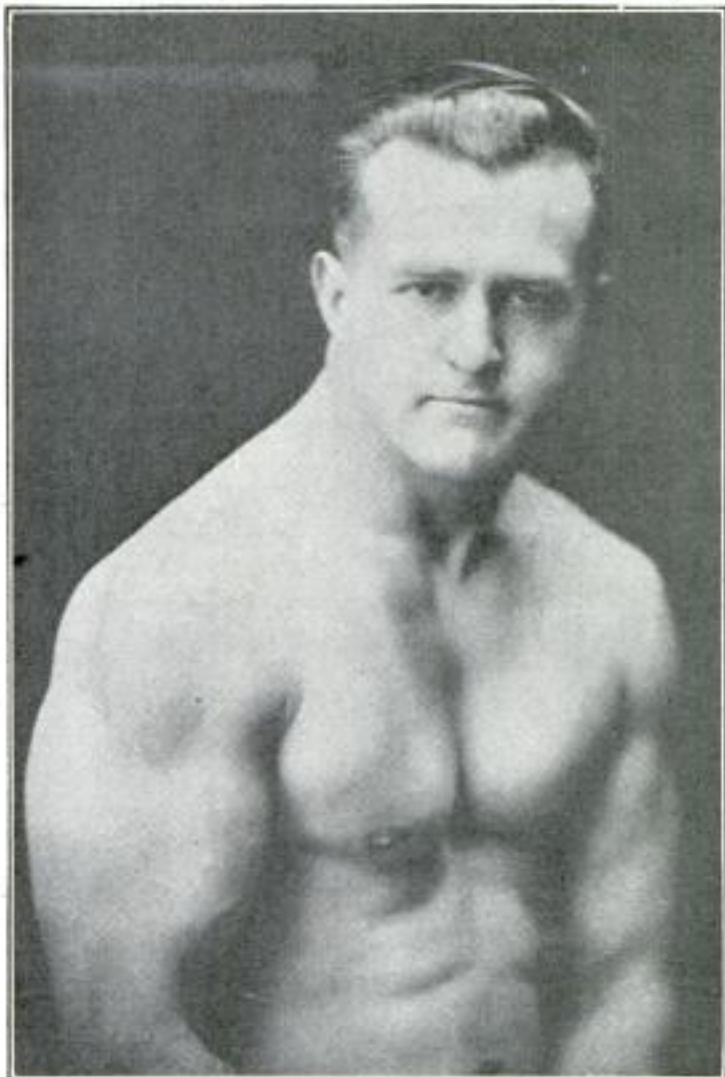
Some day a little bug is going to get you—

Germis are here, there and everywhere. They are in the air, in your food and the very water you drink. In fact, scientists say your body is full of them. They are only waiting for your vitality to weaken and then they are going to get you.

But what does a strong, healthy man care about all this? Once these terrible germis find your lungs breathing deep with oxygen and your heart pumping rich, red blood, they are going to run for their lives. A disease germ has as much chance in a healthy body as a fly has in a spider's web.

Food Was Meant to Eat

I don't ask you to give up all the good things in life. I make you fit to enjoy them. Everything was made with some purpose. Food was meant to eat and a healthy man has no regrets for satisfying his keen appetite. A man who takes the proper exercise craves food and must have it. Water was meant to bathe with—both inside and out. By drinking plenty of water you remove the waste matter within, just as washing your skin removes the waste matter without.



EARLE E. LIEDERMAN as he is to-day

I MAKE MUSCLE

I am not a doctor—I don't claim to cure disease. That is a physician's job. But follow my advice and the doctor will starve to death waiting for you to take sick. I build strength and endurance. I make muscle. Follow my instructions and you will increase your arm one full inch in thirty days—yes, and put two inches on your chest in the same length of time. But that is only a starter. Meanwhile, I work on those inner muscles surrounding your heart and other vital organs which affect your entire physical being. You will soon feel the thrill of life pulsing through your veins. You will have pep in your old backbone. There will be a flash to your eye and a spring to your step. You will radiate vitality and have the strong robust body to put it over. I don't promise these things—I guarantee them. Come on and make me prove it. That is what I like, because I know I can do it.

Send for My New 64-Page Book "Muscular Development"

It contains forty-three full-page photographs of myself and some of the many prize-winning pupils I have trained. Some of these came to me as pitiful weaklings, imploring me to help them. Look them over now and you will marvel at their present physiques. This book will prove an impetus and a real inspiration to you. It will thrill you through and through. All I ask is ten cents to cover the cost of wrapping and mailing and it is yours to keep. This will not obligate you at all, but for the sake of your future health and happiness, do not put it off. Send today—right now, before you turn this page.

EARLE E. LIEDERMAN
Dept. 2008, 305 Broadway, New York City

EARLE E. LIEDERMAN

Dept. 2008, 305 Broadway, New York City

Dear Sir:—I enclose herewith 10 cents for which you are to send me, without any obligation on my part whatever, a copy of your latest book, "Muscular Development." (Please write or print plainly.)

NAME.....

STREET.....

CITY.....STATE.....



"We pay him \$100 a week"

AND he's worth every cent of it. Came here several years ago asking for a job. He got just that—a small job at a small salary.

"Then I forgot about him—hardly knew he was on the payroll until one day I got a letter from the International Correspondence Schools telling me that he had enrolled for a course of home study. It was remarkable the way he went ahead.

"We pay him \$100 a week now and he's going to be earning even a larger salary some day. I wish we had more men like him."

HOW do you stand when your employer checks up his men for promotion? Does he think of you? Is there really any reason why you should be selected? Ask yourself these questions fairly. You must face them if you expect advancement and more money.

One hour after supper each night spent with the I. C. S. in your own home will prepare you for the position you want in the work you like best.

Yes, it will! Put it up to us to prove it. Without cost or obligation, just mark and mail this coupon.

TEAR OUT HERE

INTERNATIONAL CORRESPONDENCE SCHOOLS Box 5535-D, Scranton, Penna.

Without cost or obligation, please tell me how I can qualify for the position or in the subject before which I have marked an X:

BUSINESS TRAINING COURSES

- | | |
|---|---|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Foreign Trade |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Business Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|---|--|
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Blue Print Reading |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Gas Engine Operating | <input type="checkbox"/> Plumbing and Heating |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Automobile Work |
| <input type="checkbox"/> Metallurgy <input type="checkbox"/> Mining | <input type="checkbox"/> Navigation |
| <input type="checkbox"/> Steam Engineering | <input type="checkbox"/> Agriculture and Poultry |
| <input type="checkbox"/> Radio <input type="checkbox"/> Airplane Engine | <input type="checkbox"/> Mathematics |

Name.....
Street.....
Address..... 3-27-23

City..... State.....

Occupation.....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada.

Please Mention Popular Mechanics

VALPARAISO UNIVERSITY

Founded in 1873

An unparalleled opportunity

Departments—Education, Arts and Sciences, Engineering, Pharmacy, Law, Pre-Medicine, Home Economics, Public Speaking, Music, Manual Training, Preparatory, High School, Commerce, Stenography and Typewriting.

LOW COST of LIVING

Under University supervision, the cost of board and room, as well as tuition, is exceptionally low. Detailed figures are available in our catalog. The University is governed by a board of trustees—all influential men, eager for the students' welfare. It is not operated for profit. Valparaiso is beautifully situated, 44 miles from Chicago.

FIFTY-FIRST YEAR OPENS OCT. 1, 1923

Address President for free catalog

Box 11, University Hall VALPARAISO, IND.

Become An Expert SALESMAN

Men who have mastered salesmanship—who are really proficient—name their own salaries. \$5,000 to \$10,000 a year and better not uncommon. Big money and opportunities in business always open to trained salesmen. Success in selling field leads to highest executive positions. Demand enormous. Old theory about "born salesman" exploded. Any man of average intelligence can now learn to sell thru scientific coaching, Training, the secret. Write today for free book, MODERN SALESMANSHIP. Learn in spare hours at home principles and methods of ablest sales organizations in America. Successful salesmen report sales doubled and trebled thru scientific study of salesmanship under LaSalle Problem Method. Low tuition fee—easy terms. Write now for information.

LaSalle Extension University, Dept. 864-S, Chicago

The Largest Business Training Institution in the World

ELECTRICAL men with training are in demand. For more than a quarter of a century this school has been training men of ambition and limited time, for the electrical industries. Condensed course in Electrical

ENGINEERING

enables graduates to secure good positions and promotions. Theoretical and practical Electricity, Mathematics, Steam and Gas Engines, Mechanical Drawing. Students construct dynamo, install wiring and test electrical machinery.

Course with diploma, complete



IN ONE YEAR

Thoroughly equipped fireproof dormitories, dining hall, laboratories, shops. Over 3000 men trained.

Write for catalog. 31st year begins Sept. 26, 1923.

BLISS ELECTRICAL SCHOOL

104 TAKOMA AVENUE, WASHINGTON, D. C.



"BECOME A LIGHTNING TRICK CARTOONIST"

MAKE MONEY CHALK TALKING. SEND \$1.00 FOR SAMPLE PROGRAM OF TRICK DRAWINGS WITH INSTRUCTIONS BY A PROFESSIONAL CARTOONIST SATISFACTION GUARANTEED. CIRCULAR FREE. BALDA ART SERVICE, 51, OSHKOSH, WIS.

LEARN MUSIC

AT HOME! Special Short Time Offer

— Easy Lessons Free — Piano, Organ, Violin, Banjo, Mandolin, Guitar, Cornet, Harp, Cello, Singing, etc. You pay only for music and postage—which is small. No extras. Beginners or advanced pupils. Plain, simple, systematic. Twenty-five years' success. Start at once. Send for special short-time offer and free booklet and sample lesson by return mail. Address

U. S. SCHOOL OF MUSIC, 78 Brunswick Building, NEW YORK CITY

Drafting Plan Reading Building

Never before such a demand for skilled Draftsmen and Building Experts. More big jobs open than men to fill them.

TRAIN BY MAIL

Let Chicago "Tech" give you the training that brings quick advancement and a high salary. Send for information.

CHICAGO TECHNICAL COLLEGE
830 Chicago "Tech" Bldg., Chicago

Copy this Sketch



Draftsman's Pocket Rule

and Get This Rule

FREE

I AM anxious to find men with desire to become draftsmen. With business picking up everywhere many thousands of draftsmen will be needed at salaries ranging up to \$3,000 and \$3,600 per year.

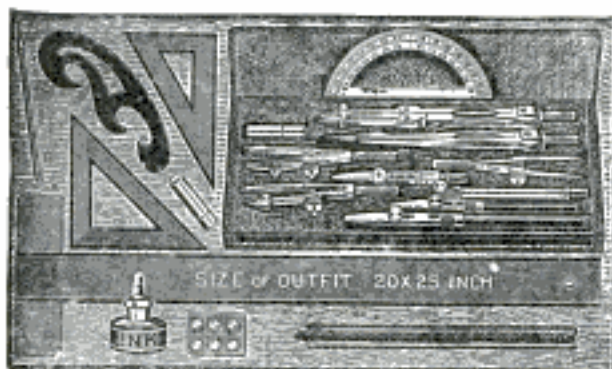
To every person 16 years or older sending a sketch I am going to mail free and prepaid the Draftsman's Ivorine Pocket Rule shown here. This will come to you entirely with my compliments. With it I will send a 6 x 9 book on "Successful Draftsmanship." If you are interested in becoming a draftsman, if you think you have or may attain drafting ability, sit down and copy this drawing, mailing it to me today, write your name, and your address and your age plainly on the sheet of paper containing the drawing.

Salaries up to

\$250 and \$300 a Month

I am Chief Draftsman of the Engineers' Equipment Co. and I know that there are thousands of ambitious men who would like to better themselves, make more money and secure faster advancement. Positions paying up to \$250 and \$300 per month, which ought to be filled by skilled draftsmen, are vacant. I want to find men who with practical training and personal assistance will be qualified to fill these positions. No man can hope to share in the great coming prosperity in manufacturing and building unless he is properly trained and able to do first class practical work.

I know that this is the time to get ready. That is why I am making the above offer. I can now take and train a limited number of students personally and I will give to those students a guarantee to give them by mail practical drawing room training until they are placed in a permanent position with a salary up to \$250 and \$300 per month. You should act promptly on this offer because it is my belief that even though you start now the great boom will be well on by the time you are ready to accept a position as a skilled draftsman. So write to me at once.



FREE

\$80 Drafting Course

To every student enrolling now I give an opportunity of getting an \$80 drafting course absolutely without cost to him. So send in your sketch today and learn all about this offer.

Mail Your Drawing at Once

FREE this \$25 Draftsman's Working Outfit

These are regular working instruments—the kind I use myself. I give them free to you if you enroll at once. Don't delay. Send for full information today.

— and Get an Ivorine Pocket Rule Absolutely **FREE!**

Ambitious men interested in drafting hurry! Don't wait! This is your opportunity to get into this great profession. Accept the offer which I am making now. Send in your sketch or request for free book and free Ivorine Pocket Rule.

Chief Draftsman, Engineers' Equipment Co., 1951 Lawrence Av. Div. C-135 Chicago

Free latest BOOK on HEALTH and BEAUTY

VIOLET RAYS



Only \$1.00 DELIVERS now **to Your Home**

ONLY \$1.00 brings this complete, scientific Violet Rays outfit to you. Treat yourself and family at home, save delay, costly doctors and medicines. Thousands use Violet Rays at home to relieve pain and sickness. The identical outfits doctors have bought from us for years and with which they successfully treat many ailments.



QUICK RESULTS—No Medicine

Violet Rays work quickly, it's scientific, goes after the cause. That's why results are quick, permanent. Dr. Duncan, Kewanee, Ill. writes, "Violet Rays is the finest thing I ever used . . . to relieve pain, treatments are so pleasant all my patients like it." Use it yourself at home, you save Doctor's bills.

BEAUTY AID

Brings natural, magnetic beauty of health, no dieting, exercise or drugs. FREE book tells in detail how high priced beauty specialists use it to improve scalp and skin.

EARN CASH

Men, women, without experience earn liberal profits in spare time showing Violet Rays to neighbors. Proves results first demonstration. Sells on sight. Get attractive offer and wholesale prices now.

SEND FOR FREE BOOK

Explains how Nikola Tesla discovered Violet Rays, how it works, why it heals. Tells what doctors and plain folks accomplish in conquering pain, disease and nervous trouble with Violet Rays.

Reveals **Marvelous Scientific Discovery** Shows charts of human body, explains where pains start, how to banish them. Offered FREE for a limited time only, to introduce Violet Rays. Send for FREE copy.

Mail Coupon—Send No Money

VI-REX ELECTRIC COMPANY
326 West Madison St., Dept. 28, Chicago

Please send me without cost or obligation your free book describing your VI-REX Violet Ray outfit, and details of your \$1.00 offer.

Name _____
Address _____
City _____ State _____

Please Mention Popular Mechanics



SHORTHAND IN ONE MONTH

Wonderful, Easy System—The **BOYD**
Writers hold World's Record

100 to 150 words a minute in 30 days guaranteed. Big demand for trained Stenographers and Private Secretaries. Learn a profession that pays big.

What Students Say:
"Your Course is Wonderful."—M. R. W.
"It beats all other Systems."—F. Z.

The Boyd can be learned in one-sixth the time of other systems. It is the NEW WAY in Shorthand. Dictation first week—in 30 days you are ready for a position. Send today for Catalog and Money-Back Guarantee.

CHICAGO HOME-STUDY SCHOOLS
802 Reaper Block Chicago, Illinois

LEARN

Wrestling Secrets at Home by Mail



Yes, learn the secrets of World's Champions—how to wrestle expertly—how to handle big men with ease—how to win. Be athletic, be strong, be healthy. Learn how to defend yourself.

Farmer Burns

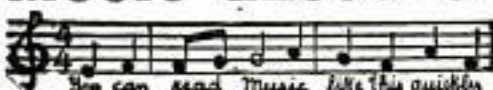
the world's most scientific wrestler, who trained the undefeated Champion Frank

Getch—who also trained six other World's Champions, will now train you. Investigate today his wonderful methods—the secrets of Champions. Every man and boy in the world, no matter what age, needs this information on **SCIENTIFIC WRESTLING—PHYSICAL CULTURE—JU-JITSU—SELF DEFENSE.**

Free Book Send your name and age and get my splendid 32 page illustrated wrestling and athletic book—absolutely free, no obligations of any kind. Write NOW.

FARMER BURNS, C 177 Ry. Exchange Bldg., Omaha, Neb.

MUSIC LESSONS FREE



IN YOUR OWN HOME

See how you can read music like this quickly
Piano, Organ, Violin, Mandolin, Guitar, Banjo, etc.
Beginners or advanced players. One lesson weekly. Illustrations make everything plain. Only expense about 2¢ per day to cover cost of postage and music used.

Write for FREE booklet which explains everything in full.
AMERICAN SCHOOL OF MUSIC, 51 Lakeside Building, CHICAGO

POSITION GUARANTEED

I Want You

The Finger Print profession wants men immediately. Big pay. Interesting work, no lay-offs or shut-downs. I will teach you quickly to become a trained Finger Print expert. I guarantee a position and back it up with a \$1,000 bank deposit. Write at once for full explanation and details about my free Secret Service course, free Secret Service reports and special law rates. Offer is limited. Write at once. No obligation. U. S. SCHOOL OF FINGER PRINTS, Dept. C135, 7003 N. Clark St., Chicago.

FREE

PIMPLY SKIN made WELL

When a few applications of this wonder-working lotion has cleared faces of pimples,

FREE BOOK **Clear-Tone**
blackheads, acne eruptions on the face or body, barbers itch, eczema, enlarged pores, oily

or shiny skin, you can realize why CLEAR-TONE has been tested and approved in over 100,000 Test Cases.

The simplicity of the treatment, and The Story of How I Cured Myself are all explained in my free booklet, "A Clear-Tone Skin." Write for your copy today and learn of the results gotten by thousands of men and women.

E. S. GIVENS, 128 Chemical Bldg., Kansas City, Mo.

You Can Easily Learn to Play Any Music on the HAWAIIAN GUITAR

Just As Hawaiians Do—Native Instructors Teach You QUICKLY!

Here's Proof of our Remarkable Course

Rochester, Va.
First Hawaiian Conservatory of Music, Inc.

It has been two months since I have finished your course on the Hawaiian Guitar and I can play anything I wish. The course was all that could be desired and I am perfectly pleased with my playing ability since finishing your course.

Respectfully yours,
Louise H. Hammond

Koester School,
314 So. Franklin St.,
Chicago, Ill.

First Hawaiian Conservatory of Music, Inc.

I shall certainly be very glad to recommend your course whenever the chance is mine to do so. Mr. W. R. Johnson has not phoned me yet, and if he does not phone in a day or so, will write him. Am sending a letter to Miss Helen Slavik today which I think may help to secure her enrollment, and I shall be glad at any time to write a personal letter to anyone whom you may suggest.

Your former student,
W. L. Walker

Special Courses under famous Teachers. Tenor-Banjo, Violin, Banjo-Ukelele and Ukelele. Fine Toned Instruments FREE!

In Half an Hour You Will Be Playing "ALOHA". Soon You Will Be Winning Praise Everywhere Playing "Stumbling", "Three O'Clock in the Morning", "Hot Lips" and ALL Popular Music as Well as the Beautiful Hawaiian Melodies

Here's the chance you've been waiting for—the opportunity to play popular music quickly on the most entrancing instrument of the age—the Hawaiian Guitar. No previous musical knowledge necessary.

ONLY FOUR MOTIONS TO LEARN and these you acquire in a few minutes. No troublesome scales or runs, you begin to play harmonious chords immediately! We don't care if you never saw a note of music in your life, we guarantee to teach you to play just as the Hawaiians do!

We Furnish Everything—a Beautiful Hawaiian Guitar, Picks, etc., and 52 Pieces of Music FREE!

You have always wanted to play some instrument, so we have made it unusually easy for you by furnishing everything—a beautiful Hawaiian Guitar, complete Conservatory Course of instruction and 52 pieces of especially selected music.

No Other Course Teaches as Quickly and Easily This is the only Conservatory Course where you get the personal instruction of Native Hawaiian Experts—Frank Ferera, Walter Kolomoku, Lawrence Kalaluki and Carl Seville, famous the world over and the most noted makers of phonograph records, supervise your playing.

Mail Coupon for Details of FREE Offer Don't wait another minute—clip, fill in and mail the coupon NOW and get full details of our remarkable offer to teach you how to play the Hawaiian Guitar just as the Hawaiians do.

Special Arrangements for Lessons if You Have Your Own Instrument

FREE

This \$15
Hawaiian
Guitar

You will be delighted with the fine tone of this splendid Hawaiian Guitar



First Hawaiian Conservatory of Music, Inc.,
Desk 48 233 Broadway (Woolworth Bldg.), New York.

Send me at once details about your 62 easy lessons and FREE Hawaiian Guitar offer!

Name.....

Address.....

Town.....

State.....

Print name and address clearly.

"STAMMERING Its Cause and Cure"

You can be quickly cured if you stammer. Send 10 cents, coin or stamps, for 288 page cloth bound book on Stammering and Stuttering. It tells how I cured myself after Stammering and Stuttering for 20 years. BENJAMIN N. BOGUE
6902 Bogue Building, 1147 N. Ill. St. Indianapolis

LEARN Penmanship

I Teach Penmanship by Mail

Small Cost. Spare Time. Write for my Free Book, "How to Become an Expert Penman." It contains specimens and tells how others became expert writers by the Tevis Method. Your name written on card if you enclose stamp. Write Today.

T. M. TEVIS, Box 25K, CHILLICOTHE, MO.



Whatever Your Question;—be it the pronunciation of Bolsheviki, the spelling of a puzzling word, the location of Murman Coast—the meaning of blighty, ace, tank, ukulele, etc., this Supreme Authority—

WEBSTER'S NEW INTERNATIONAL DICTIONARY

contains an accurate, final answer 400,000 Words, 2700 Pages, 6000 Illustrations.
Regular and India-Paper Editions. G. & C. MERRIAM CO., Springfield, Mass.
Write for specimen pages, prices, etc., and FREE Pocket Maps per Popular Mechanics



LEARN WATCHMAKING AND ENGRAVING

Earn while learning. Most practical watch school. Individual instructions. Graduates in great demand. Book free.
Chicago School of Watchmaking, Dept. 20, 4540 Lincoln Ave., Chicago

WANTED

RAILWAY POSTAL CLERKS
\$1600 to \$2300 Year
MEN—BOYS 18 OR OVER SHOULD
WRITE IMMEDIATELY
Steady work. No layoffs. Paid Vacations
Travel on Pass—See the country
Common education sufficient
Send coupon today—SURE

LEARN MECHANICAL DENTISTRY

EARN \$35 TO \$125 A WEEK. Taught by actual practice—day or night. Three months' course. Modern laboratories. No previous training required. Established 30 years. For 36-page catalog, write Dept. 2.
NEW YORK 186 W. 52d St. PHILADELPHIA 1395 N. Broad St. BUFFALO 1226 Main St. BROOKLYN 15 Flatbush Ave.



FRANKLIN INSTITUTE, Dept. W178, Rochester, N. Y.

Send me without charge, (1) Sample Railway Postal Clerk Examination questions; (2) List of Government Jobs obtainable; (3) Send free illustrated book of Government Positions.

Name.....

Address.....

Copyrighted material

Auto Mechanics in Demand

More Greer Graduates
Needed for Jobs Paying
\$50-\$125 A WEEK

You can become an Auto Expert in just eight weeks through GREER Special Summer Course, now open. Good jobs waiting for GREER graduates in all parts of the U. S. Big Pay—\$50-\$125 a week! Automobile business booming. Count the cars you see on every street. Each one is a prospect for the Auto Expert who knows how to repair an automobile the *right way*.

GREER training gives you the "Know How" advantage over the unskilled mechanic. You learn by actually working with real motors. Complete course includes Machine Shop Practice, Shop Management, Selling; Truck, Tractor and Automobile Repairing, Lighting and Starting Systems, Vulcanizing, Driving, Primary Ignition, etc.

Employment Guaranteed

Demand for men so great we can now guarantee you a job that pays living expenses and even more while you learn! GREER employment department flooded with openings.

Write, today, for GREER FREE BOOK, "How to Succeed in the Automobile Business." Learn all about this Special Summer offer at greatly reduced cost. Start now for the GREER COLLEGE, a Better Job, Big Pay and Permanent Employment! Use coupon below.

GREER COLLEGE

of Automotive Engineering

2058 South Wabash Ave., CHICAGO, U. S. A.

MAIL THIS FREE BOOK COUPON

ERWIN GREER, President

Greer College of Automotive Engineering,
2058 S. Wabash Ave., Chicago, Ill.

Send me your Free Book, "How to Succeed in the Automobile Business," and Special Tuition Offer.

Name

Address

Please Mention Popular Mechanics

WE TEACH COMMERCIAL ART

Meyer Both Company, the largest Commercial Art Organization in the World, offers you an unusual opportunity for practical training, based upon twenty-three years of success. This nationally known organization each year produces and sells to advertisers over 15,000 commercial drawings. Meyer Both instruction is the difference between successful fact and experimental theory. This well paid profession equally open to men and women. Home study instruction.

Get Facts Before You Enroll in Any School

Ask the Advertising Manager of the leading newspapers in your city, anywhere in the United States, Canada, England or Australia about the Meyer Both Company—let them tell you about us. Write for our illustrated book telling about the success of our students—for one-half the cost of mailing—four cents in stamps.

MEYER BOTH COMPANY

Department of Art Instruction
Michigan Ave. at 26th St., Dept. 16 CHICAGO, ILL.

Note—To Art and Engraving Firms: Secure practical artists among our graduates. Write us.

SEND for the INTERNATIONAL CATALOG

FOR
FORD—
PRICES
FROM
\$27.85
UP.

Factory
to Con-
sumer
direct—
Pay only one profit.



Our net price list. Full line of auto bodies and accessories for Ford at Wholesale Prices. Save big money on bodies by buying direct from factory.

INTERNATIONAL BODY WORKS, Dept. 7, 914 W. Ohio Street, CHICAGO, ILL.

Learn Watchwork, Jewelrywork and Engraving.

A fine trade commanding a good salary, and your services are always in demand. Address **Horological**, Dent. P. Bradley Institute, PEORIA, ILL.; for our latest catalog.

FREE BOOK LEARN PIANO

This Interesting Free Book shows how you can become a skilled player of piano or organ at quarter usual cost. It shows why one lesson with an expert is worth a dozen other lessons. Dr. Quinn's famous Written Method includes all of the many important modern improvements in teaching music. Brings right to your home the great advantages of conservatory study. For the beginner or experienced players. Endorsed by great artists. Successful graduates everywhere. Scientific yet easy to understand. Fully illustrated. All music free. Dignities granted. Write today for free book. **Quinn Conservatory, Studio PMGB, 598 Columbia Road, Boston 23, Mass.**

LEARN WATCH REPAIRING

You can learn by our modern and original system of instruction every part of the **Watch Repairing Trade** at home as good or better than at a shop. You can earn money while learning and secure a well paying position or start in business after completing our course of instruction. Good watch repairers are always in demand and earn from \$30 to \$70 per week. For particulars apply to the **Wisconsin School of Watch Repairing** 166 Mason St., MILWAUKEE, WIS.

LAW

IN YOUR SPARE TIME
Learn law with only institution giving same course by correspondence as was given for years at resident classes of this college. **DEGREE OF LL. B. CONFERRED.** One year business law course prepares you for success in business. Law trained business men in demand. Three year university course covers preparation for bar examination. Money back guarantee if not satisfied. Low fee, easy terms, includes complete 1921 thirteen volume library, text material and all expenses. Write for **FREE BOOK.** **Hamilton College of Law** 431 South Dearborn St., Dept. 60-C Chicago

Win Back The Joy of Health, Strength and Vitality



LIONEL STRONGFORT

Dr. Sargent, of Harvard, declared that "Strongfort is unquestionably the finest specimen of physical development ever seen."

SEND FOR MY FREE BOOK

The experience and research of a lifetime are contained in my wonderfully instructive book "Promotion and Conservation of Health, Strength and Mental Energy." It will tell you frankly how you can make yourself over into a vigorous specimen of Vital Manhood. It is absolutely free. Just check the subjects on the free consultation coupon (write other ailments on extra line) on which you want special confidential information and send to me with a ten cent piece (one dime) to help pay postage, etc. I will do the rest. Send for my free book Right Now—TODAY.

LIONEL STRONGFORT Physical and Health Specialist

Dept. 483 Founded 1895 Newark, New Jersey

Special Notice.—Lionel Strongfort, the World's Famous Athlete and Physical and Health Specialist, has achieved wonderful results with the Principles of Strongfortism. Thousands of pupils throughout the world have testified to the benefits gained under his guidance. He enjoys an excellent reputation in his profession and can be depended upon to do exactly as he promises.

Brace Up—You Can Come Back—You Can Regain Your Stamina and Be a Real Man Again. There isn't the least doubt about it. You can conquer the elements of weakness and neglect that are dragging you down and sapping your very life forces. You can get rid of the nagging complaints that snatch away the joys of life. You can banish Catarrh, Constipation, Indigestion, Dyspepsia, Biliousness, Headache, Rheumatism, Nervousness, etc. (See consultation coupon.) You can aid Nature in reviving the wornout decaying cell-life and rebuild it into live vital tissue. Don't wait until you are bed-ridden—Don't delay until you are down on your back, probably dependent on charity. Get busy NOW before it's too late.

Banish Your Weaknesses

Your vital forces have ebbed away from sheer neglect. You are run down physically and mentally. You have burned the candle at both ends—used up your store of nervous energy—robbed your blood and cheated your body and brain out of the elements of vigorous manhood. The delicate mechanism of your body is out of adjustment because you have neglected and violated the inflexible laws of Nature. You dare not take on responsibilities—you are not even half a man. The future looks dark and dreary to you but cheer up—you can

Make Yourself Over

Refuse to stay down. Win back your pep and vitality, your ambition and spirit, your health and strength. No matter what your condition is or what caused it—no matter how many methods you have tried in vain—no matter how often you have been disappointed, you will find my Scientific Principles entirely different and resultful. Tell me your story as you would to a brother—everything will be held strictly confidential—come to me in full faith and let me teach you Nature's way, back to Health and Manhood.

STRONGFORTISM

The Modern Science of Health Promotion

Strongfortism is Nature's way of ridding the human organism of ailments and irregularities that have clogged its normal action and thrown its delicate machinery out of gear. The heart, lungs, liver, stomach, brain, all act in harmony in health. Strongfortism restores this harmony; helps to create new red blood, which, in its turn, creates new body and brain tissues, strengthens the vital organs, brings back health, strength, vigor, vitality—the ability both to do things worth while and to enjoy to the fullest, the good things of life.

Be a Red-Blooded Man

Develop your latent powers. Make the most of Nature's supreme gifts. Shake off the burdens of bad habits and neglect. Stop using dope and drugs. Waste no more precious time with useless fads and fancies. Use your God-given intelligence to know good from evil—the useful from the useless—the safe and sane from the dangerous and the experimental. Be guided by Nature's unfailing laws.

Once you accept Strongfortism you enter a new life. The results are immediate and positively thrilling. You feel the rich blood racing through your body—you feel new strength and power developing in every organ and function—you acquire poise and a pleasing personality. Your success with Strongfortism is guaranteed.

FREE CONSULTATION COUPON

ABSOLUTELY CONFIDENTIAL

Mr. Lionel Strongfort, Dept. 483, Newark, N. J.—Please send me your book, "PROMOTION AND CONSERVATION OF HEALTH, STRENGTH AND MENTAL ENERGY," for postage on which I enclose a 10c piece (one dime). Send me special information on subjects marked (X) below, as well as those I may write on extra line, without obligation.

- | | | |
|---|--|---|
| <input type="checkbox"/> Colds | <input type="checkbox"/> Catarrh | <input type="checkbox"/> Debility |
| <input type="checkbox"/> Asthma | <input type="checkbox"/> Blackheads | <input type="checkbox"/> Weak Eyes |
| <input type="checkbox"/> Hay Fever | <input type="checkbox"/> Insomnia | <input type="checkbox"/> Gastritis |
| <input type="checkbox"/> Obesity | <input type="checkbox"/> Short Wind | <input type="checkbox"/> Increased Height |
| <input type="checkbox"/> Headache | <input type="checkbox"/> Flat Feet | <input type="checkbox"/> Heart Weakness |
| <input type="checkbox"/> Fear | <input type="checkbox"/> Stomach Disorders | <input type="checkbox"/> Poor Circulation |
| <input type="checkbox"/> Thinness | <input type="checkbox"/> Constipation | <input type="checkbox"/> Skin Disorders |
| <input type="checkbox"/> Rupture | <input type="checkbox"/> Biliousness | <input type="checkbox"/> Neurasthenia |
| <input type="checkbox"/> Lumbago | <input type="checkbox"/> Torpid Liver | <input type="checkbox"/> Dependency |
| <input type="checkbox"/> Neuritis | <input type="checkbox"/> Indigestion | <input type="checkbox"/> Round Shoulders |
| <input type="checkbox"/> Neuralgia | <input type="checkbox"/> Nervousness | <input type="checkbox"/> Lung Troubles |
| <input type="checkbox"/> Flat Chest | <input type="checkbox"/> Poor Memory | <input type="checkbox"/> Weaknesses (Specify) |
| <input type="checkbox"/> Deformity (Describe) | <input type="checkbox"/> Rheumatism | <input type="checkbox"/> Muscular Development |
| <input type="checkbox"/> Diabetes | <input type="checkbox"/> Pimples | <input type="checkbox"/> Great Strength |
| <input type="checkbox"/> Female Disorders | <input type="checkbox"/> Falling Hair | |

Mention other ailments here.....

Name.....

Age.....Occupation.....

Street.....

City.....State.....



\$2,500 Reward For the Capture of An Unknown Man

TWICE he had entered the St. Clair Mansion. What was he after? Who? What was in danger? Berteau, the famous detective, had warned St. Clair that the mysterious marauder would come again. And now—a noise in the passage! The creak of an opening door. A shot in the dark! A capture!

Is this wounded stranger the mysterious intruder? Who could tell? Yet Berteau identified the man without hesitation and won the \$2500 reward.

How did he do it? Easy enough for the Finger Print Expert. He is the specialist, the leader, the *cream* of detectives. Every day's paper tells of their wonderful exploits in solving mysterious crimes and convicting dangerous criminals.

More Trained Men Needed

The demand for trained men by governments, states, cities, detective agencies, corporations, and private bureaus is becoming greater every day. Here is a real opportunity for YOU. Can you imagine a more fascinating line of work than this? Often life and death depend on finger print evidence—and big rewards go to the expert. Many experts earn regularly from \$3,000 to \$10,000 per year.

Learn At Home in Spare Time

And now you can learn the secrets of this science at home in your spare time. Any man with common school education and average ability can become a Finger Print Detective in surprisingly short time.

Free Course in Secret Service

For a limited time we are making a special offer of a Professional Finger Print Outfit, absolutely Free and Free Course in Secret Service Intelligence. Mastery of these two kindred professions will open a brilliant career for you.

Write quickly for fully illustrated free book on Finger Prints which explains this wonderful training in detail. Don't wait until this offer has expired. Mail the coupon now. You may never see this announcement again! You assume no obligation. You have everything to gain and nothing to lose. Write at once. Address

University of Applied Science

Dept. C-135 1920 Sunnyside Avenue, Chicago

UNIVERSITY OF APPLIED SCIENCE
Dept. C-135 1920 Sunnyside Avenue, Chicago, Ill.

Gentlemen:—Without any obligation whatever, send me your new, fully illustrated, FREE book on Finger Prints and your offer of a FREE course in Secret Service Intelligence and the Free Professional Finger Print Outfit.

Name.....

Address.....

Age.....

Please Mention Popular Mechanics

The Key to Success

Stop Forgetting

Make Your Mind a File—Not a Pile

The Key to Success is the ability to remember. I can make your mind an infallible classified index from which you can instantly select thoughts, facts, figures, names, faces. Enables you to concentrate, develop self-control, overcome bashfulness, forgetfulness, address an audience. Easy, 20 years' experience developing memories of thousands.

Write Today for free booklet, "How to Remember" member, and Copyrighted Memory Test, and how to secure Free my \$3.00 book, "How to Speak in Public."

DICKSON MEMORY SCHOOL
Dept. 705-Z Evanston, Ill.

BE AN ARTIST

We can teach you **DRAWING** in your own home during your spare time.

Our 18 years of successful teaching prove our ability. 30 Courses in Commercial and Illustrative Drawing. Teachers Normal and Applied Art. Endorsed by high art authorities. Students trained by members of our Faculty are filling high-salaried positions. Artist's Outfit FREE to Enrolled Students. Write today for Art Year Book.

OUR HANDSOME ART YEAR BOOK FREE

SCHOOL OF APPLIED ART
APPLIED ART BLDG. No. 2 BATTLE CREEK MICH.

AGENTS

For the Biggest Money-Making Selling Proposition You Ever Saw

See Pages 126 & 127

STAMMER NO MORE

Kill the fear of stammering. Re-education the key. The widely famed Hatfield Method fully outlined in an accurate, dependable, worthwhile book—"HOW TO STOP STAMMERING." It has inspired thousands. Free copy today.

THE HATFIELD INSTITUTE, 109 N. Dearborn, Chicago, Ill.

LEARN TO PITCH

Lessons by "MATTY" WALSH, WHITE, JOHNSON, RUCKER, WOOD—PITCH THE FADE-A-WAY, SPITTER, KNUCKLER, SMOKE BALL, etc. Clearly described and illustrated by 56 Pictures. Entire COURSE OF LESSONS sent p. p. for **25c**

J. C. DORN, 721 S. Dearborn Street, Dept. 65, CHICAGO, ILL.

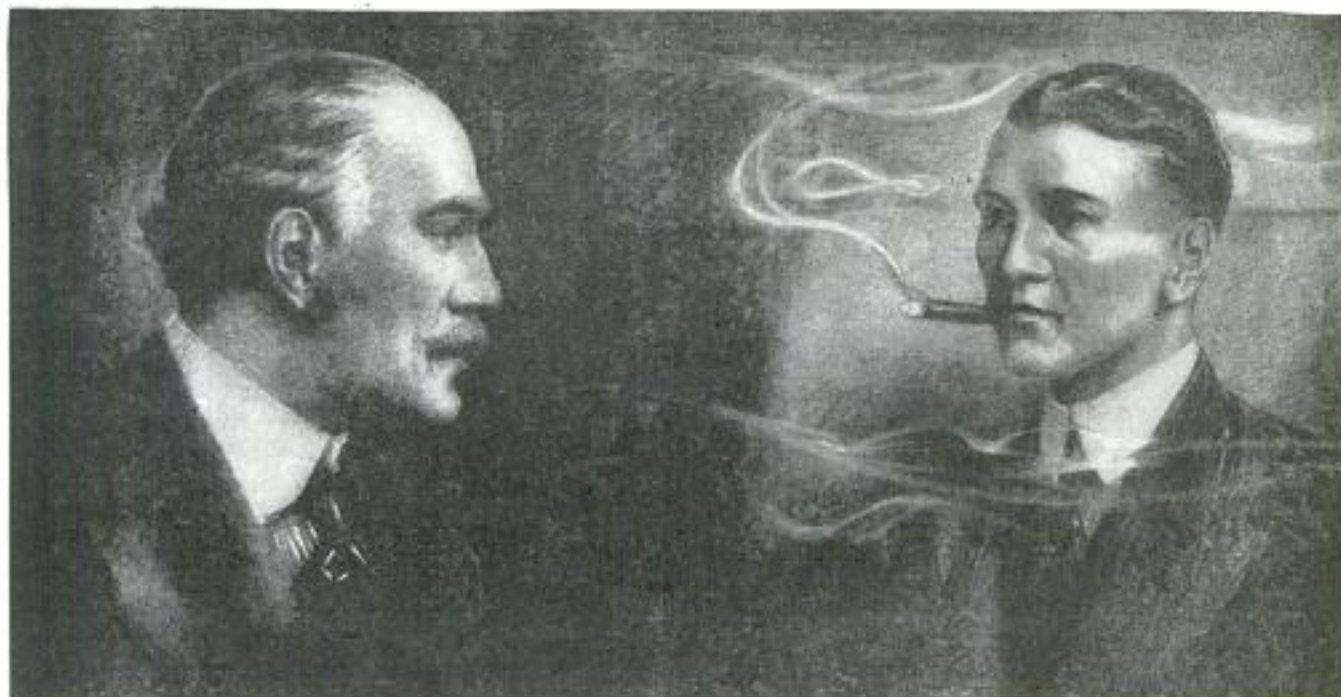
BE A JAZZ MUSIC MASTER

PLAY PIANO BY EAR

Play popular song hits perfectly by ear. Hum the tune, play it BY EAR. No tedious, ding-dong daily practice—just twenty brief, entertaining lessons which you can master At Home in Your Spare Time. Send for the FREE BOOK. It tells how to start if you want musical ability at which friends will marvel.

NIAGARA SCHOOL OF MUSIC, Dept. 563 Niagara Falls, N. Y.

Send for this Free Book



Tobacco Is Hurting You

Look at the facts square in the face, Mr. Tobacco User. You may think tobacco is not hurting you.

That is because you haven't as yet, perhaps, felt the effects of the nicotine poison in YOUR system. For you know that nicotine, as absorbed into the system through smoking and chewing tobacco, is a slow working poison. Slow, yes—but sure.

Tobacco is lowering your efficiency. It slows a man down. Makes it harder for you to concentrate your mind on your work. You haven't near the amount of "pep" and energy you would have if you stopped using it. There's many a man twice as old as you in years who's twice as young in energy, simply because he lets tobacco alone.

Some day you will realize to what an alarming extent tobacco has undermined your system.

When your hands begin to tremble—
and your appetite begins to fail—
and your heart seems to "skip a beat" now and then—
and slight exertion makes you short of breath—
then you have a right to suspect that
TOBACCO is getting the upper hand.

Any well-informed doctor will tell you that these are only a few of many symptoms of tobacco poisoning.

And YOU know that the use of tobacco in any form is an expensive, utterly useless habit. You know you ought to quit.

Tobacco Habit Banished

Let Us Help You

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it—whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—**Tobacco Redeemer** will positively remove all craving for tobacco in any form in a very few days. Not the slightest shock to the nervous system. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

It is in no sense a substitute for tobacco. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It helps to quiet the nerves and make you feel better in every way.

Results Guaranteed A single trial will convince you. Our legal-binding, money-back guarantee goes with each full treatment. We will refund every cent you pay for the treatment if after taking it according to the easy-to-follow directions, it should fail to banish the tobacco habit completely.

SEND Coupon for Free Proof Let us send you our free booklet on the deadly effects of tobacco, together with testimonial letters from men all over the country telling how they have been absolutely freed from the tobacco habit by this simple home treatment. You could not ask for stronger proof that **Tobacco Redeemer** will free you from the habit than the evidence we will gladly send on request. Just mail the coupon—or a postal will do.

NEWELL PHARMACAL CO.
Dept. 300 St. Louis, Mo.



Free Book Coupon

NEWELL PHARMACAL CO.
Dept. 300 St. Louis, Mo.

Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that **Tobacco Redeemer** will positively free me from the tobacco habit or my money will be refunded.

Name

Street and No.

Town..... State.....



"I'm Going to Make More Money!"

"I'm tired working for a small salary. I know I have just as good a head on me as Fred Moore and Bob Roberts, for we used to work side by side. But they've gone far ahead of me.

"Why? Because they saw the value of special training, and I didn't.

"But I know better now. If the International Correspondence Schools can raise the salaries of men like Fred Moore and Bob Roberts, they can raise mine, too!

"If they have helped others to advance, they can help me. Today—right now—I'm going to send in this coupon and at least find out what the I. C. S. can do for me."

----- TEAR OUT HERE -----

INTERNATIONAL CORRESPONDENCE SCHOOLS Box 5537-D, Scranton, Penna.

Without cost or obligation, please tell me how I can qualify for the position or in the subject before which I have marked an X:

BUSINESS TRAINING COURSES

- | | |
|---|---|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Foreign Trade |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Business Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|--|--|
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Blue Print Reading |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Gas Engine Operating | <input type="checkbox"/> Plumbing and Heating |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Automobile Work |
| <input type="checkbox"/> Metallurgy <input type="checkbox"/> Mining | <input type="checkbox"/> Navigation |
| <input type="checkbox"/> Steam Engineering | <input type="checkbox"/> Agriculture and Poultry |
| <input type="checkbox"/> Radio <input type="checkbox"/> Airplane Engines | <input type="checkbox"/> Mathematics |

Name.....
Street.....
Address.....

3-27-23

City..... State.....

Occupation.....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada.

Please Mention Popular Mechanics

LEARN BY DOING

Every phase of all branches of

ELECTRICITY

Taught by Actual Practice

In America's foremost and oldest institution for trade training

No Books Used
Individual Instruction
Start Any Day

A SPECIAL and SEPARATE Course in Ignition, Auto Lighting and STARTER Systems. Write for FREE 64-page catalog.

THE
NEW YORK ELECTRICAL SCHOOL
44 West 17th Street, NEW YORK CITY

BE AN ARTIST

Comics, Cartoons, Commercial, Newspaper and Magazine Illustrating, Pencil Crayon Portraits and Fashion. Our simple method quickly develops your talent in spare time. By Mail or Local Classes. Write for terms and list of successful students. ASSOCIATED ART STUDIOS, 87-B Flatiron Building, NEW YORK

30 Days' Free Trial

Select from 44 Styles, colors and sizes, famous **Ranger** bicycles. Delivered free on approval, express prepaid, at **Factory Prices**. You can easily save \$10 to \$25 on your bicycle.

12 Months to Pay on any Ranger if desired. Parents and girls can easily earn small monthly payments.

Tires best quality, at factory prices, express prepaid. Lamps, wheels and equipment, low prices. Send No Money, do business direct with makers.

Mead Cycle Company
Dept. 108 Chicago

Write today for free Ranger Catalog, Factory prices and marvellous easy payment terms



Wonderful, new device, guides your hand; corrects your writing in few days. Big improvement in three hours. No failures. Complete outline FREE. Write C. J. Orment, D-34, St. Louis, Mo.



WANTED — Railway Postal Clerks

\$1600 First Year

MEN—BOYS—18 UP

Travel—See the Country

MAIL COUPON
IMMEDIATELY

FRANKLIN INSTITUTE
Dept. W 181, Rochester, N. Y.

Send me, without charge, (1) specimen Railway Postal Clerk Examination questions; (2) list of government jobs obtainable;

(3) send free illustrated book of Government Positions. Name.....

Address.....

MAKE BIG MONEY IN THE BUILDING GAME

FREE Consulting Membership

A resident consulting staff of 19 practical experts is waiting to solve for you any building or contracting troubles that you may have. A letter or a wire to the American Technical Society will bring you an immediate answer and the solution to your problems. This advisory staff of practical building men plus your library of Carpentry and Contracting will enable you to handle successfully any job. These men know all the latest methods and the newest and best ways of doing things. Let this pay-raising consulting staff be YOUR SILENT PARTNER. Use this service daily if necessary. *This free consulting membership offer is good for a limited time only and can be withdrawn without notice.*

Building Is Booming

Contractors and builders make great profits. Carpenters, brick-layers, plasterers, plumbers, concrete workers, excavators, are earning unheard of wages. Why don't you get your share of this big money? Experts in the building business are in great demand this year and will be needed still more next year and the years thereafter. Men who know the best methods in this line of work will be at a premium. You can be an expert—earn a big income. Learn in your spare time—at your own home—get started now. Get in the Big Pay Class with the help of a set of

Carpentry and Contracting

Twenty-two big nationally known experts—architects and practical builders—will give you this expert knowledge and explain everything about the building business in 5 big volumes. Every method is explained clearly—there are no confusing technical terms to worry you—there are no useless mathematics. There are more than 1000 illustrations, diagrams and plans. The books outline efficient methods, equipment, specifications, estimating, management—in fact every detail you need to know.

7 Days' Free Trial

Let us send you the set for seven days' FREE examination. Try the books in your own home or on the job. **No Money Down.** Mail the coupon TODAY! The books will be sent to your home at once, express collect. Try them out thoroughly for a week—test them in every way you can think of. Then after a week has passed send us only \$2.80 and \$3.00 a month until the special price of \$19.80 is paid. If, by any chance, the books do not come up to your expectations, send them back and you owe us nothing. But remember this—you owe it to yourself to see these books. You can't lose—send the coupon NOW.

AMERICAN TECHNICAL SOCIETY, Dept. G-19-C, Chicago, Illinois



30,000 Carpenters, Contractors, Builders, Estimators, Bricklayers, Plumbers, etc., are making more money with these books.

AMERICAN TECHNICAL SOCIETY, Dept. G-19-C, Chicago, U.S.A.

Send me a set of the books as checked below, by express collect. I will send them back in one week at your expense or send you \$2.80 and \$3.00 each month until I have paid the special advertised price. It is understood that as purchaser of a set of your books I am entitled to a FREE Consulting Membership.

This is a list of Pay Raising Books published by us, including the set described above. Put a mark in front of the set you want for seven days' FREE trial.

5 vols. Carpentry & Contracting—was \$37.50 now	\$19.80
12 vols. American Law & Practice (including free reading course and 250 page book of standard legal forms) was \$97.50 now	49.80
8 vols. Applied Electricity—was \$60.00 now	29.80
6 vols. Auto Engineering—was \$45.00 now	21.80
9 vols. Civil Engineering—was \$67.50 now	34.80
8 vols. Business Management—was \$52.50 now	29.80
7 vols. Steam and Gas Engineering—was \$52.50 now	24.80
4 vols. Sanitation, Heating & Ventilating—was \$30.00 now	14.80
4 vols. Fire Prevention & Insurance—was \$30.00 now	14.80
6 vols. Modern Machine Shop Practice—was \$45.00 now	21.80
4 vols. Telephone & Telegraphy—was \$30.00 now	14.80
4 vols. Drawing—was \$30.00 now	14.80

Name.....

Address.....

Reference.....

(Give Local Merchant, Landlord, Bank or Employer)

©A.T.S.1923

CHIEF ENGINEER

Your Job!

Make it Pay You
\$70 to \$200 a Week

Be a Certificated **Electrical Expert**

It's a shame for you to work for small pay when Trained "Electrical Experts" are in great demand at such high salaries, and the opportunities for advancement and a big success in this line are the greatest ever known. "Electrical Experts" earn \$70 to \$200 a week. Fit yourself for one of these big paying positions.

Learn at Home to Earn **\$12.00 to \$30.00 a Day**

Today even the ordinary Electrician—the "screw driver" kind—is making money—big money. But it's the trained man—the man who knows the whys and wherefores of Electricity—the "Electrical Expert"—who is picked out to "boss" ordinary Electricians—to boss Big Jobs—the jobs that pay. You, too, can learn to fill one of these jobs—spare-time only is needed. **BE AN "ELECTRICAL EXPERT"**—Earn \$70 to \$200 a week.

Age or Lack of Experience No Drawback

You don't have to be a College Man; you don't have to be a High School graduate. If you can read and write English, my course will make you a big success. It is the most simple, thorough, and successful Electrical Course in existence, and offers every man, regardless of age, education, or previous experience, the chance to become, in a very short time, an "Electrical Expert," able to make from \$70 to \$200 a week.

I Give You a Real Training

As Chief Engineer of the Chicago Engineering Works, I know exactly the kind of training a man needs to get the best positions at the highest salaries. Hundreds of my students are now earning \$3,500 to \$10,000 a year. Many are successful **ELECTRICAL CONTRACTORS**.

Use This "FREE OUTFIT" Coupon

L. L. COOKE, Chief Engineer
 Chicago Engineering Works, Dept. 1-C, 2150 Lawrence Ave., Chicago, Ill.

Dear Sir:—Send at once the "Vital Facts" containing Sample Lessons, your Big Book, and full particulars of your Free Outfit and Home Study Course—all fully prepaid, without obligation on my part.

Name.....

Address.....

City and State.....

Occupation..... Age.....

Your Satisfaction Guaranteed

So sure am I that you can learn Electricity—so sure am I that after studying with me, you too, can get into the "big money" class in electrical work, that I will guarantee under bond to return every single penny paid me in tuition if, when you have finished my course, you are not satisfied it was the best investment you ever made.

FREE—Electrical Working Outfit, Radio Course and Employment Service

I give each student a splendid Outfit of Electrical Tools, Materials and Measuring Instruments absolutely FREE. You do PRACTICAL work—AT HOME with this Outfit. You start right in after the first few lessons to WORK AT YOUR PROFESSION in a practical way. I also give free a complete Radio course and a special course for men going into business for themselves.

Get Started Now—MAIL COUPON

I want to send you the "Vital Facts" of the Electrical Industry including my Electrical Book, Proof Lessons, and a sample of my guarantee bond all FREE. These cost you nothing and you'll enjoy them. Make the start today for a bright future in Electricity. Send in the coupon—NOW.

L. L. COOKE, Chief Engineer

Chicago Engineering Works
 Dept. 1-C 2150 Lawrence Ave., Chicago, Ill.

The "Cooke" Trained Man is the "Big Pay" Man

CLASSIFIED ADVERTISEMENTS

WORLD'S BEST WANT AD MEDIUM

Advertisements in this section, 25 cents per word, each insertion, minimum 10 words, payable in advance. To be inserted under proper classification in September issue, copy should be in our office July 15th.

ADVERTISING AGENCIES

25 WORDS—355 Rural Weeklies, \$14.20. Ad-Meyer Agency, 4112-M Hartford, St. Louis.

ADVERTISERS—Write us for rates when placing your advertising. Been in business thirty-five years and can surely help you. Write for lists. Stanley Day Agency, Plainfield, N. J.

To secure agents or salesmen or for selling farms and reaching investors, use classified (want) ads in largest newspapers and magazines. Price list No. 30 sent free. Ankrum Advertising Agency, 20 W. Jackson Blvd., Chicago, Ill. The largest classified advertising agency in the U. S.

FOR ADVERTISERS

INCH Display 100 magazines, three \$8. Beck Agency, 5403 Alaska, St. Louis.

ADVERTISE in 24 Big Sunday Newspapers, 25 words \$15.00. Catalog listing 1,000 leading Dailies, Weeklies, Magazines, 30 stamps. Union Advertising, Baltimore Bldg., Chicago.

AUTOMOBILE SUPPLIES

SOMETHING new in Car Bumpers—Twin Compression Spring Type—Invented. Patent Pending. Cash or R-yalty. For particulars and Details, E. Nasiri, 16 Oakland St., Brooklyn, N. Y.

TOURIST Auto Sleeping Beds—Camp Equipment, Vanderpool's, Springfield, Ohio.

INSYDE Tyres in your old casings give from 3 to 5 thousand miles more service. Positively prevent punctures and blowouts. Used over and over again. Low priced. Big money saver. Agents wanted. Write for terms. American Accessories Co., B-TS, Cincinnati, Ohio.

AUTOMOBILE parts, guaranteed new for all cars. Save money; get our wholesale prices on gears, shafts and bearings. State make of car, model and parts wanted. Parts shipped immediately from stock. We refund your money, including transportation charges, if not satisfied. Mechanics Gear Co., 5708 No. Halsted St., Chicago.

KEEPS Out Carbon—Gasoline Thrift. More power; increased mileage 35%; saves oil. Legas System easily installed. What car have you? Postpaid \$12. Apex Co., 415 Chestnut St., St. Louis, Mo.

REPAIRING Ford Cars, Trucks and Tractors in the most proper and efficient way is explained in a new 320-page book by the former director of the Ford Motor Co. Service School. This information is otherwise unavailable outside of the Ford plant. Written more especially for the mechanic and repairman. Price \$2 postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

AUTO parts—Save 25-90%. New seats, axles, bearing, springs, radiators, magnets—4,000 models. Bankrupt supplies, re-capping outfit. Brightman Auto Exchange, 321 Windsor Ave., Hartford, Conn. Largest in the East.

AUTOMOBILE Motors—Allen Model—4 cyl. 3 1/2 in. bore, 5 in. stroke, with starter, generator and magneto. Can be used for Auto, Farm-lighting outfit, trucks, tractors, and motor boats. \$100.00 f.o.b. Chicago. Auto Electric Sales & Service Co., 57 E. 26th St., Chicago, Ill.

NEW Principal Piston Rings stop oil pumping, give original power to old cars. Guaranteed satisfactory or money refunded. Price 50c each. Send no money—pay postman when delivered. Particulars Free. Cordell Mfg. Co., 709 Pine, St. Louis, Mo.

AUTOMOBILE Parts—Used parts for most any car at half factory list prices. Allen, Briscoe, Buick, Cadillac, Chalmers, Chevrolet, Dodge, DeS, Grant, Hudson, Huppville, Oakland, Overland, Oldsmobile, Buick, Studebaker and many others. Send list of parts wanted. Maxwell Bros., 4106 Olive St., St. Louis, Mo.

AT Last—The Perfect fan belt for 490 model Chevrolets. Replaces your old or broken belt in thirty seconds, without tools or loosening of pulleys. This belt snaps into place instantly, any one can install it, night or day. Automatic tension, always tight, eliminates bothersome adjustments. Fan driven perfectly at all motor speeds. Two belts packed in side pack carton, \$1.00—postpaid, Joe V. Romig, 1210 Union St., Allentown, Pa.

EMERY Belt Polisher. Best for valves, rods, golf clubs, etc. Uses 3/8 hp. motor, \$5.00. Harlan Feeder Co., Harlan, Ia.

AUTOMATIC Air Compressor, quietest, most compact outfit on market. No noisy racking belts. Motor and pump one unit. Thousands garages, filling stations, tire shops, using. Most economical to operate. Absolutely dependable. \$35 each, balance terms. Iron Clad Satisfaction or Money-back guarantee. Write for details. Hobart Brothers, Troy, Ohio.

AUTO Parts at cut prices! All kinds of new and used, for all cars. Engines, Crutches, Transmissions, Axles, Radiators, Magnets, Generators, Batteries, Shafts, Gears, Bearings, Springs, etc., etc. If you have never known the House of Warshawsky, you had better write us and get acquainted. Think of buying the Osgood lens for 25c per pair, and rims for any car at \$2.00 each. Windshields from \$8.00 to \$10.00. Spotlights \$1.75. Welding outfits at a low price. Specify make and model of car when writing. "Ask for Bargain List." Warshawsky & Co., 1935 S. State St., Chicago, Ill.

LIBERTY Air Compressors, for garages, tire-shops, filling stations, also paint spraying equipment. Air Compressor & Equipment Co., 1437 Carroll Avenue, Chicago, Ill. Distributors wanted.

8-HOUR Battery Charging with Constant Potential Pays Big. Easy Payments. Profits Pay. Postal brings details. Hobartco, Troy, Ohio.

MAGNETO Recharger; State Rights free, State Distributors, Reliable, 328 Jay St., Utica, N. Y.

AUTOMOBILES

ALTIMETERS, indicates up to 25,000 feet height from sea level. Beautiful dashboard instrument for airplanes and automobiles for mountain climbing. Brand new, \$5.00. Air Transport Co., L. I. City, N. Y.

MOTORISTS Save \$100.00 renovating your cars. Quickly learned at home. No experience needed. Good chance to establish yourself in profitable and growing business. We teach you how. Autofinish Co., Sheboygan, Wis.

AUTO Trail Maps, Pocket Size, Hand McNally Official. Most Popular Road Guides, 21 maps, covering 21 touring districts, each complete in itself. Featuring marked auto routes with explanation of markers; all main traveled auto roads; mileage between towns; city maps of larger towns; reliable information concerning hotels, garages and service stations. Price 35c ea. postpaid. Send for further particulars. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

PATENTS Procured. Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and blank form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 562 Southern Building, Washington, D. C.

DYKE'S Automobile Encyclopedia, 13th edition, new, greater than ever, entirely rewritten and rearranged. Contains greatest array of automobile facts ever published in one volume. Separate books containing same information cost \$21. Over 1,200 pages and 4,100 illus. Cloth \$6. Flex. Amer. Morocco \$7.50 postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

PATENTS—Write for our free illustrated Guide Book and Evidence of Conception Blank. Send model or sketch and description of your invention and we will give our opinion of its patentable nature. Highest references. Prompt service. Reasonable terms. Victor J. Evans & Co., 185 Ninth, Washington, D. C.

FOR FORD OWNERS

FORD Owners: The low gas per gallon solved. The Sure Feed Cap does this and more. It saves gas. Delivered direct or through agents for One Dollar. Absolute guarantee. Agents wanted. Sure Feed Cap Company, Dallas, So. Dak.

FORD Car Repair Book Sent Free. This complete and well illustrated valuable book explains in a simple way how to overcome Ford car troubles; Repairing, Economical Winter Driving, Cold Weather Car Starting, Equipment for Fall and Winter, Curving Piston Ring Troubles, Carburetor Adjustments and Repairs, Connecting Rods, Timers, Transmission Troubles, and practically every phase of Ford car driving, repairing and equipment. Send 25c coin for three months' trial subscription and get the valuable repair book free. Ford Owner and Dealer Magazine, 532 Montgomery Bldg., Milwaukee, Wis.

FORD Owners—L. H. Gas-Savers increase mileage 30 to 50 percent—make starting easy—give perfect motor action. Price \$2. Howard L'Hommeleu, Montclair, N. J.

MAKES Ford Ride DeLuxe—Shock Equalizer makes Ford ride and steer easily. All unpleasant vibration eliminated. Saves tires and nerves. Postpaid \$10. Apex Co., 415 Chestnut St., St. Louis, Mo.

UNDERSLING with "RKO" Siding Lo Irons. See "Red-I-Kut" ad, page 129.

FORD Owners! Learn About Wonderful New Power Maker. Practically eliminates spark lever—stops misfiring—adds power and speed—saves gas and is waterproof. Price is low. Ask for booklet and learn about Free Trial Offer. A. B. M. Co., Box Z, Brightwood, Mass.

CLAHOLME Power delivery systems fill more than double power and traction, reducing upkeep. An essential demanded by every Ford driver. Low priced and easily applied in original housings. Agree with dealers, garage owners and owner drivers can make big money in exclusive territory. Quick turnovers with big demand and sales. Claholme Universal Joint Corp., 25 Broad St., New York City.

MOTORCYCLES, BICYCLES AND SUPPLIES

SAVE Money on motorcycle accessories and salvage parts; all leading makes. Big discount. Send for catalogue. Tulsa Motor & Cycle Co., 202 So. Lansing, Tulsa, Okla.

SEND for our Bargain Bulletin and Money Saving Message. It will save you money on Motorcycles, Side Car, Motor Wheels, Repair Parts, and Accessories. Some used parts at less than half. Cleveland and Ace Motorcycles our specialties. See our ad on page 142. American Motor Cycle Co., 2045-5-7 W. Chicago Ave., Chicago.

1920 HARLEY-DAVIDSONS, \$90; 1919, \$85; 1917, \$55; 1915, \$40. Guaranteed. Money refunded if not satisfied. Free list free. Wisconsin Cycle Sales Co., 726 National Ave., Milwaukee, Wis.

USED Motorcycles fully guaranteed like new, \$25 to \$100. Motorcycle tires, \$3. Auto tires, \$3. Bicycle tires, \$1. Bicycles, \$3; tandem, \$10. Disk Talking Machines, \$9. Records for all Talking Machines, 25c. Send stamps for catalogues. Deninger Price Cutter, Rochester, N. Y.

USED parts for all motorcycles, cheap. State wants. Schuck Cycle Co., 1922 Westlake, Seattle, Wash.

WONDERFUL bargains in reconditioned motorcycles. Priced as low as \$35. Sidecars from \$25 up. Everyone expertly rebuilt and guaranteed in absolutely first-class condition. Don't delay. Send 2c for new big catalog showing 1923 bargains. Western Supplies Co., 539 Hayutin Bldg., Denver, Colo.

'19 INDIAN 3 Speed \$75.00. '20 Indian 3 Speed \$95.00. '21 Indian 3 Speed \$125.00. Howard A. French Company, Baltimore, Md., Washington, D. C.

SEND for big list of slightly used motorcycles on the easy payment plan. Howard Cycle Co., Trenton, N. J.

DON'T buy a Bicycle Motor Attachment until you get our new catalogue and prices. Also runs washers, pumps and sloop machinery. Shaw Mfg. Co., Dept. 27, Galtsburg, Kans.

AVIATION

SPORTPLANE wings, brand new, \$10.00; new landing gear, \$15.00. Wheels with tires, \$6.00; wing cloth, extra wide, 32c yard. Air Transport Co., L. I. City, N. Y.

TEN lessons in the air, of twenty minutes each, will make you a pilot, by our advanced method of training. This, together with our five-week shop course at \$109.00, makes America's oldest aircraft factory the most popular flying school. Work after class hours guaranteed. Heath Airplane Co., Chicago, Ill.

AVIATORS Bestial Goggles \$3.00; other types \$1.00, sent parcel post. Aeroplane motors 15 to 400 Horsepower \$25.00 to \$5,000.00. Complete planes, Army types, \$350.00-\$1,500.00. Propellers \$5.00, \$10.00 and \$20.00. Write Marvin A. Northrup, Builders Exchange, Minneapolis, Minn.

LEARN to navigate the air with Annapolis Flyers. Write for particulars. The Annapolis School of Aviation, Box 439, Annapolis, Md.

AIRPLANE Pilots made by our \$164 complete 18-lesson instruction course. Curtiss planes. Graduates "solo." Living expenses small. Ready always! Are you coming? Aviation Engineering Co., Lawrence, Kan.

BARGAIN. Aeroplane, 2 Roberts motors. Lohrig, 707 W. 7th, Davenport, Iowa.

SEND 10c for our latest aeronautical catalog listing a complete line of airplane goods at reduced prices. Propeller catalog 4c; Ford or Motorcycle motored airplane catalog, 4c each. Heath Airplane Co., Chicago, Ill.

PATENTS Procured. Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and blank forms on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 561 Southern Building, Washington, D. C.

AIRPLANES, Motors and Propellers. New or Slightly Used, about 1/3 of original cost. Aviators' Leather Coats. Smith Machinery Co., 463 Goggan Bldg., Houston, Texas.

The American School of Aviation announces a new correspondence course in Mechanics of Aviation, A thorough training in Practical Aeronautics. American School of Aviation, Dept. 186-B, 3601 Melman Ave., Chicago, Ill.

28-H. P., 2-cylinder Lawrence motor, weighs 117 pounds. New, \$190.00; slightly used, \$75.00. Extra wings and OX5 parts. Tjos & Smith, 463 Goggan Bldg., Houston, Texas.

BIGGEST, best catalogue Model Aeroplanes, Parts and Supplies; 5c Postpaid. Ideal Aeroplane Co., 72 1/2 Green St., New York.

INVENTORS desiring patents should write for our Free Illustrated Guide Book and Evidence of Conception Blank. Send model or sketch for our opinion of its patentable nature. Highest references. Prompt service. Reasonable terms. Victor J. Evans & Co., 187 Ninth, Washington, D. C.

AEROPLANE Flying School. We guarantee you a Pilot's License, also a job from \$35.00 to \$65.00 a week, when you complete our course. Write today. Ohio State Flying School, A. 117 West Pearl St., Cincinnati, Ohio.

WELDING

ELECTRO plating Generators. Make money doing Plating Work. Priced reasonable. Terms if desired. Write us. Holbertsons, Troy, Ohio.

WELDING Encyclopedia—A complete instruction book on all welding processes; oxyacetylene, electric arc, electric resistance and thermit. Welding of all weldable metals fully discussed. 326 pp., 378 illus. The accumulated experience of the welding brains of America is yours for \$5. Money back if not satisfied. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

BOOKS AND PERIODICALS

HYPNOTISM Astounds, controls others. Wants gratified. 25 easy lessons \$1.10. "Mindreading" (any distance), Wonderful \$1.10. Popular Institute, AP-1014, Belmont, Chicago.

OUR valuable catalog of over 500 practical books arranged for easy reference under 80 different subject headings will be sent free on request. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

INDUSTRIAL Alcohol. Wright's book everybody wants. Full directions for making with drawings of necessary apparatus. \$2.50 postpaid. Spon & Chamberlain, 129 P. M. Liberty Street, New York, N. Y.

ELECTRICIANS—Examinations, Book of Questions and Answers, with diagrams, symbols, tables, notes and formulas for preparation for license, \$1.25. Aaron Shapiro, Dept. 18-296, Broadway, New York.

LEFAX—"Facts on Leaves." You make your own handbook, loose-leaf. From our complete list of Lefax data sheets you select only those that you actually need, then fill in your own notes or diagrams on extra blank sheets which come in 100 different styles. These in loose-leaf binder make up a book covering your individual needs. Send for complete information and price list to Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

BIG money in writing photoplays, stories, poems, songs. Send today for free copy America's leading writer's magazine, full of helpful advice on writing and selling. Writer's Digest, 798 Butler Building, Cincinnati.

YOU should have our New Illustrated List of Practical Books, Free. Spon & Chamberlain, 129 P. M. Liberty Street, New York, N. Y.

PICTURES AND POSTCARDS

JOIN Live Postcard club: Membership list, including Catalog, 10c. Harry Teple, Davenport, Ind.

JOIN the Old Reliable Card Club. Membership 10c, Riverside Club, Frederick, Md.

GAMES AND ENTERTAINMENTS

VENTRILOQUISM taught almost anyone at home. Small cost. Send 2c stamp today for particulars and proof. George W. Smith, Room M-736, 125 N. Jefferson Ave., Peoria, Illinois.

TRICK Cartooning—Complete course for \$1.00 includes 49 Clever Cartoon Stunts; "How To Give Performances," etc. Samples 15c. Modern Cartoon Service, Dept. K, 296 Bergen St., Brooklyn, N. Y.

GREATEST mind reading set ever sold. Not a toy. Easily mastered. Cannot be detected. Postpaid for \$1.00. The Benwills Co., P. O. Box 797, Macon, Ga.

200 KINDS Iron, wood and wire puzzles. Leader and Illustrated list 10c. Western Puzzle Works, St. Paul, Minn.

MAGIC TRICKS, BOOKS AND JOKERS' NOVELTIES

MAGIC—Tricks, Books and Supplies. For Amateurs as well as the great professionals. Anyone can learn through our instructions. Feature Acts in Mind Reading, Spiritualism, Rope Ties, etc. Large Illustrated Professional Catalog, 10c. Chicago Magic Co., 140 S. Dearborn St., Dept. B, Chicago, Ill.

MAGIC Disappearing Writing Pad. You simply write anything at all on the top sheet of the pad; then lift: Presto! the writing vanishes. Mystify your friends. Great fun. Price 25 cents postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

TRICKS, magic, puzzles, novelties, cards, books. Catalog free. C. Fenner, 2401 Jefferson, Louisville, Ky.

25% DISCOUNT until September First. Big Magic Catalogue free. C. Pentz, Minneapolis.

FUN! Fun!—Draw comic pictures of your friends. Illustrated instructions, 25c. Particulars free. Freeburn Artist, Hicksville, Ohio.

GOOD Books on Tricks, Magic, Puzzles, etc.—Houdini's Paper Magic, \$2.50—Houdini's Miracle Mongers and Their Methods, \$3—Walker's Conjuring Tricks, \$2—Hoffman's Later Magic, \$2.50—Goldstein's More Tricks and Puzzles, \$1—Maskebine and Devant's Our Magic, \$2.50—Elbiquet's Supplementary Magic, \$2—Elbiquet's Text Book of Magic, \$1.60. Prices postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

NEW 48-Page Magic Book 6c! Amaze and Mystify. Easy to learn. Send today. Lyle Douglas, Station A, Dallas, Texas.

TRICKS, Puzzles, jokes, magical apparatus, plays, stage supplies, mind-reading, sensational escapes. 160-page illustrated professional catalog, 10c. Oaks Magical Co., Dept. 548, Oshkosh, Wis.

EVERYTHING in Magic, Four Catalogs 15c. Gilmagico, Morgan Park, Ill.

STAMP COLLECTING

BEST one-cent approvals in America. F. P. Hand, 1117 So. 60th St., Philadelphia, Pa.

100 DIFFERENT foreign stamps 12c. Luther Matheson, Newton, N. C.

FREE—50 varieties or set to approval applicants sending 2c, 1,000 varieties \$1.49. Richard P. Lamprecht, Valparaiso, Ind.

FREE—New Europe, 20 diff. to applicants for my 1c, 2c and 3c approvals. Send reference and get extra premium. Chas. Schmidt, 3227 Benner St., Wissinoming, Philadelphia, Pa.

START a Stamp Collection—70 different stamps from 70 different foreign countries, including Africa, Asia, Australia, Europe, West Indies, etc. Our pamphlet which tells "How to make a collection properly," and price list of albums, packets and sets all for only 16 cents. Queen City Stamp Co., Room 35, 694 Race St., Cincinnati, O.

500 ALL different stamps 75c. Send for price lists. Alois von Isakovics, Monticello, New York.

202 DIFFERENT Azeberaldian, Danzig, Liechtenstein, Ukraina, Lithuania, etc., with Mekeel's Stamp Weekly, Beverly, Mass.; three months, 25c.

FREE—100 different stamps to approval applicants. References required. Head Stamp Co., 1232 1/2 Oakland, Milwaukee, Wis.

1,000 DIFFERENT Stamps, \$1.41; 500, 57c; 200, 27c. Micheal, 5353 Calumet, Chicago.

FREE; World's smallest stamp. Approvals. Postage 2c. Cannon, 1416 Carey, Davenport, Iowa.

FREE! Rare Hayti cataloging \$1 or Scarce Newfoundland to applicants for net approvals. Beginners or advanced collectors. Penna. Stamp Co., Manor, Pa.

\$9 VALUE 15c. Packet of scarce stamps from South and Central America, including Cuba, Hayti, Salvador, Venezuela, Uruguay, having catalog value of over \$9.00. Price to new applicants for Fenway net approvals 15c. Fenway Stamp Co., Fenway Station, Boston, Mass.

UNITED STATES, \$2.00 carmine and black, used, 37c postpaid. K. C. Stamp Co., Lee Bldg., Kansas City, Mo.

100 FOREIGN Stamps free to approval applicants. J. A. Flaten, Fertile, Minn.

GUARANTEED postally used stamps, old and recent issues. All countries. E. T. Nelson, 5056 Sansamon St., Chicago.

100 RARE and valuable foreign stamps, all different, and big catalog, 7c. Stanton, Nantico, Conn.

FREE set to applicants for 50c approvals. Dorval Stamp Co., Gloversville, N. Y.

106 DIFFERENT stamps free to approval applicants sending 2c for return postage. H. Anvelink, 2410 Prairie St., Milwaukee, Wis.

FREE! 25 British Colonials to approval applicants sending 2c. Nickles, 122 Florida, Washington, D. C.

ZAMBESIA, Zambar, Abyssinia, Herzegovina, Allenstein stamps, menagerie collection, hinges, 10c. Liberty, 3974 Arsenal, St. Louis, Mo.

A DOVER Bargain Stamp Outfit! 250 Peelable Hinges, 50 all diff. stamps, Flume, (triangle), Nyassa, French Colon. (Pictorial), Malay (Tiger), etc.; 20 Vars. War and New Europe, 5 Blank Approval sheets, 36-page list and Bargain list, all for only 10c to those asking to see my choice 50% approval. L. B. Dover (Dept. C), Buena Vista, Colo.

50 DIFFERENT United States 10c; 10 Nyassa 1901 25c. Seidenberg, Merton, Wis.

FREE, Dollar Stamp Free to applicants for my 60% approval. Norman Shultz, Colorado Springs, Colo.

STAMPS sent on approval at 70% discount. Reference required. Emory Renoll, Hanover, Pa.

STAMPS, 50 Varieties, Africa, Brazil, Peru, Cuba, Mexico, etc., 10c. 50 different U. S., 25c; 1,000 mixed, 40c; 1,000 hinges, 10c. List free. C. Stegman, 5948 Cote Brillante, St. Louis, Mo.

LIKE Triangular Stamps? To introduce our Sudden Service Approvals we'll send triangular Flume, set China ships, large \$1.00 United States revenue, also packet \$0.50 foreign, millimetre scale, perforation gauge, ruler and bargain lists for only 9c! Fennell Stamp Company, Dept. P, Fullerton Bldg., St. Louis, Mo.

158 GENUINE Foreign Stamps Mexico War Issues, Venezuela, Salvador and India Service, Guatemala, China, etc., only 10c. Finest approval sheets 50 to 60%. Agents Wanted. Big 72-p. Lists Free. We Buy Stamps. Estab. 29 yrs. Hussman Stamp Co., Dept. 54, St. Louis, Mo.

FRENCH Colonies Free—Beautiful Picture set, including Native Chiefs, Tigers, Pictorials, 2c Postage. Empire Stamp Company, Toronto, Canada.

24 VARIETIES Cuban stamps, 10 cents. List of 6,000 low-priced stamps free. Address Chambers Stamp Co., 1117, Nassau St., New York City, N. Y.

STAMPS, 20 unused, all different, free. Postage 2c. Mention paper. Quaker Stamp Co., Toledo, O.

PACKET of 23 stamps, no two countries alike. Packet hinges. Set of \$1 and \$2 U. S. Rev., all for 5c. Mention paper. Miami Stamp Co., Toledo, Ohio.

20 UNUSED stamps free. All different. Postage, 2c. Fisk Stamps, Toledo, Ohio.

FOREIGN Stamp Collection Sent Free. Cornish Company, Schenectady, N. Y.

105 CHINA, etc., stamp dictionary, list, 2c. Album (500 illustrations), 3c. Bullard, Sta. A. Boston.

FREE—Nyassa Set, also one set Neuropo, for a request for my 1, 2 and 3c not approvals also the higher-priced desirable stamps at 50% discount and better. You will find many good British Col. on my sheets and books, None better. Chas. T. Egner, 4821 Frankford Ave., FK'D, Philadelphia, Pa.

RARE COINS

MONEY of the Great War issued by the various countries, in paper and metal. All are curious and interesting. Will send you a fine specimen and my large 50-page Illustrated Coin Catalog for only 10c—"just to get acquainted." Send Now. E. Max Mehl, Numismatist, Mehl Bldg., Dept. P, Fort Worth, Texas. Largest Rare Coin Establishment in the United States.

SIX varieties iron war money 25c. Durso, 25 Mulberry, N. Y. City.

BY Return Mail, one over 1,200 years old, one Silver, one scarce old copper, for 50 cents silver, Southampton Coin Exchange, 5427 Nottingham, St. Louis.

Do you know that Coin Collectors pay up to \$100.00 for certain U. S. Cents, and high premiums for all rare coins? We buy all kinds. Send 4c for large Coin Circular. May mean much profit to you. Numismatic Bank, Dept. H, Fort Worth, Texas.

CALIFORNIA gold, $\frac{3}{4}$ size, 27c. $\frac{1}{2}$ size, 53c. 3c piece and catalogue, 10c. Address Norman Shultz, Colorado Springs, Colo.

OLD Coins. Large Fall selling catalogue of coins for sale, free. Catalogue quoting prices paid for coins, 10c. William Hestlein, 101-A Tremont St., Boston, Mass.

FOR BOYS

BOOKS — "Ventriloquism," "Toymaker Book," "Boy Electrician," 10c each, all for 25c. G. Elsea, Bowling Green, Ohio.

CAMERAS AND PHOTO SUPPLIES

REPAIRING—Cameras and Shutters of all makes adjusted and repaired by expert workmen, at reasonable prices. Repair Department, Seneca Camera Mfg. Company, Rochester, N. Y.

JUST Published—Our new complete 128-page catalog and bargain book of new and used cameras and supplies. Our goods are guaranteed finest quality obtainable. We have thousands of satisfied customers. Write at once for this bargain bulletin, just hot from the press. Address Central Camera Co., 124 S. Wabash Ave., Dept. E-72, Chicago, Ill.

BARGAINS in slightly used guaranteed cameras, kodaks, lenses, etc. No list published. Write stating exactly what you want. We can furnish anything and save you money. Empire Loan Bank, 649 No. Clark St., Chicago, Ill.

EXPERT Finishing and Enlargements—Superior quality work and individual attention of photographer with 5 years' U. S. Government experience, 5 years with Eastman Kodak, 10 years editor photographic publications. Write for price list. Carhuff Photo Finishing Co., 2129 W. Van Buren St., Chicago, Ill.

KODAK Films—Special trial offer; your next kodak film developed, 5c—prints, 2c each. Moser & Son, 1917 St. James Ave., Cincinnati.

MODERN Photography in all its branches now taught by mail. New Successful Method. Students earning \$300.00 while learning. Big Opportunity. Write for particulars and unusual offer open for short time. Dept. 3435 International Studios, Inc., 3601 Michigan Ave., Chicago.

SPECIAL Trial Offer: Any size Kodak film developed for 5c; prints 3c each. Overnight service. Get a Free Auto. Ask for details. Roanoke Photo Finishing Co., 209 Bell Ave., Roanoke, Va.

MAKE money with your camera. Lancaster, Box 967, Los Angeles, Calif.

HAVE You a Camera? Write for Free sample of our big magazine, showing how to make better pictures and earn money. American Photography, 790 Camera House, Boston, 17, Mass.

BIG Money Saved on Photographic Lenses and Apparatus—goods exchanged; repairing done. Ralph J. Golsen, 1128 Argyle St., Chicago, Dept. P.

BIG Variety Packet Foreign Stamps free for 2c postage. Gray Stamp Co., Station E., Toronto, Canada.

MOTION PICTURES

FILMS: Special Features—Comedies—Cartoons—Dramas and Serials. Lowest Prices. Bargain List Free. Monarch Theatre Supply Co., Dept. 81, Memphis, Tenn.

MOVIE Film: For Home Use. Send \$5.00 Cash or Money Order and we will ship you postage prepaid, Big 1,000-foot Reel. Complete stories with best screen stars. Dramas—Comedies—Features—Westerns. Special—only while they last. Monarch Theatre Supply Co., Dept. P, 724 So. Wabash Ave., Chicago.

FILMS For Sale—\$2.50 per Reel up. Address Queen Feature Service, Birmingham, Ala.

REMARKABLE value: Light Weight Professional Motion Picture Projector, Mazda Illuminated, with 1,000 feet of film, \$37.50. Send for photograph. DeFranne, Importers, 109 No. Dearborn St., Chicago, Illinois.

MACHINES, Films, Supplies, Bargain Lists. National Equipment Co., Duluth, Minn.

FILM: Standard size for Toy and Professional machines. Special Bargains—Complete subjects \$3.00 per reel. We sell everything for "The Movies." Monarch Theatre Supply Company, Dept. P, 724 S. Wabash Ave., Chicago.

MOVIE Films for Toy Projectors. 100 feet, \$1.00 postpaid; 800 feet, \$3. Dealers Supplied. Films rented for homes, churches and schools. Home Projector, \$35. Cameras \$60. Ray, 326 5th Avenue, New York, N. Y.

MOTION Picture Projectors for home or school use. Wonder values. Sold on easy payments. Write for photographs, terms and description. Sachheim, 649 No. Clark St., Chicago.

JUST in time to get in on the big money to be made! Bass will start you in the Motion Picture Making Business, enormous profits making Industrial Films, News Weeklies, etc. Catalogue and full information Free! The Cinema Handbook, 575 pages, for \$3.00 postpaid. Bass Camera Company, 105 No. Dearborn St., Chicago, Ill.

AMERICA'S Greatest Fortunes made in the Motion Picture Business. We furnish Complete Theatre Equipment on easy payments. Openings everywhere. Catalog Free. Monarch Theatre Supply Co., Dept. F—724 South Wabash Ave., Chicago.

\$35.00 PROFIT nightly. Small capital starts you. No experience needed. Our machines are used and endorsed by government institutions. Catalog free. Atlas Moving Picture Company, 482 Morton Bldg., Chicago.

FREE to Writers—A wonderful little book of money-making hints, suggestions, ideas; the A B C of successful story and play writing. Absolutely Free. Just address Authors Press, Dept. 12, Auburn, New York.

ONLY \$98.00 starts you in this business. Wonderful opportunities for making fortunes. Details Free. Monarch Theatre Supply Co., Dept. 46, Memphis, Tenn.

\$\$\$ FOR Ideas. Photoplay plots accepted any form; revised, criticized, copyrighted, marketed. Advice free. Universal Seymour Corporation, 917 Western Mutual Life Bldg., Los Angeles.

MAKE money writing photoplays; details free to beginners. No correspondence course. Producers League, 259 Walnwright, St. Louis.

BIG Money Nightly—Get my installment figures Complete Moving Picture Outfit before buying. Ralph J. Golsen, Dept. M, 1128 Argyle St., Chicago.

SCENERY TO RENT

SETTINGS for Opera, Plays, Minstrels. Flush Drops, Address Amelia Grain, Philadelphia.

EDUCATIONAL AND INSTRUCTION

USED books and educational matter bought, sold, exchanged. Bulletin free. Instruction Correspondence Exchange, 1969 Broadway, New York.

SPANISH—Spontaneous Method. You and I exchange letters in Spanish. Free Particulars. Hedlin, 3509 Franklin Ave., St. Louis, Mo.

WORLD-ROMIC System. Mastery to All Languages. Primers, 23 languages, \$1.94 each language: English, French, German, Italian, Portuguese, Spanish. Pronunciation-Tables, 102 languages, 30c each language. Languages Publishing Company, 8 West 40th Street, New York.

BE a Laboratory Expert. Earn \$300.00 to \$500.00 a month. Study Microbiology, Bacteriology, Laboratory Technology, Sanitation. Interesting Extension and Residential Courses. Diplomas and Degrees granted. 71-piece Urinalysis Outfit Free to students. Write for Free 48-page Prospectus Today. Int'l Physicians and Surgeons College of Microbiology, Room 355, 550 Garfield Ave., Chicago, Ill.

ROPP'S Calculator and Short-Cut Arithmetic shows the answer as quickly as a watch shows the time to all problems likely to occur in office, store, shop, bank, farm or factory. Price, pocket size, paper 35 cents; cloth 50 cents; leatherette \$1. Desk size, cloth, \$1.50 postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

ARE You between the ages of 18 and 25, single and employed? Have you a common school education? Can you follow instructions? Are you honest? If so, a rare opportunity awaits you. Send 11c for postage, etc. (coin only). Mattox Young Institute, Dept. C, 3292 Sacramento Street, San Francisco, Calif. "Watch Us Grow."

SHORTLAND in 100 Hours. Most rapid readable system. Introductory booklet free. Memoriscip Institute, Roanoke, Va.

LEARN the operating principles of the Corliss Engine from this book, "The Corliss Engine and Its Management," 92 pp., illustrated. Paper cover, 25 cents postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

"**WHAT** to Invent for Profit" free. Patent News-N, Washington, D. C.

BIG money distributing samples and tacking signs. No experience. Instructions \$1.00 full. G. Barney, 137 Briggs St., Syracuse, N. Y.

YOU can have a business profession of your own and earn big income in service fees. A new system of foot correction; readily learned by anyone at home in a few weeks. Easy terms for training; openings everywhere with all the trade you can attend to. No capital required or goods to buy, no agency or soliciting. Address Stephenson Laboratory, 1 Back Bay, Boston, Mass.

STUDENTS of the Steam Engine—Get this book, "The Slide Valve Simply Explained," 83 pp., illustrated. Paper cover, 25 cents postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

INVENTORS—Write for our illustrated public book and Evidence of Conception Blank. Send model or sketch and description for free opinion of its patentable nature. Highest references. Prompt attention. Reasonable terms. Victor J. Evans & Co., 147 Ninth, Washington, D. C.

DOUBLE Entry Bookkeeping mastered in 60 hours with 8 keys; guaranteed; diplomas. Our graduates lead in bookkeeping, auditing, accountancy, balance sheets, and financial statements. International Bookkeeping Institute, Dept. 8, Springfield, Mo.

WRITE articles, stories, news, in spare time for newspapers and magazines. Big pay. Copyright book free. Press Syndicate, 552, St. Louis, Mo.

BIG Money in writing photoplays, stories, poems, songs. Send today for Free copy America's leading writer's magazine, full of helpful advice on writing and selling. Writer's Digest, 603 Butler Building, Cincinnati.

ARTIFICIAL Marble, sanitary flooring instructions, ornamental casting, concrete plaster, papier-mache decorations, garden furniture, statuary, Rubber-moulds. Electrometallurgy, particulars and 200 illustrations free. Chris Mahler, Box 122, Huntington, N. Y.

STUDY Bacteriology, Hygiene, Public Health. Laboratory technologists make good incomes. Interesting course, can be mastered at home or school in a few months. Also courses in Arts and Sciences, Chiropractic, P. G. Pharmacy, etc. 15th year. Diplomas conferred. Free announcement. National University of Sciences, 223 So. Michigan Blvd., Chicago.

USED books and educational matter bought, sold, exchanged. List 1,000 items free. Students' Exchange, 47-A West Forty-second Street, New York, N. Y.

USED educational books sold, rented, bought and exchanged. Bargain list free. Lee Mountain, Pisgah, Ala.

TELEGRAPHY

TELEGRAPHY—Morse and Wireless—taught at home in half usual time and at trifling cost. Omnicograph Automatic Transmitter will send, on Sounder or Buzzer, unlimited messages, any speed, just as expert operator would. Adopted by U. S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U. S. Catalog free. Omnicograph Mfg. Co., 18 Hudson St., New York.

TELEGRAPHY—Both Morse and Wireless—taught thoroughly and quickly. Tremendous demand. Big salaries. Wonderful opportunities. Expenses low; chance to earn part. School established fifty years. Catalog free. Dodge's Institute, 11 St., Valparaiso, Ind.

RADIO OUTFITS AND SUPPLIES

FIBRE Panels any size; 3/4 inch 10 square inch, delivered. Ohio Com Co., Orville, O.

DEFLECTOR Tube \$2.00. Genuine WY501 Dry Cell Vacuum Tubes. Special Sockets 40c; Adaptors 75c. Radio Research Guild, 30 Clinton St., Newark, N. J.

REAL Radio Receivers, prices \$15.00 up. Maker to user only. Money-back guarantee. Write for latest Bulletin, Trio Radio Laboratories, 9916 E. 14th St., Oakland, Calif.

TESTED Reclines, Transmitter Button Hook-Ups, Amplification, Loud Speakers. Free Circular. K. Electric Co., 15 Park Row, New York City.

TRADE SCHOOLS

BE a Bricklayer. Good pay, outdoor work that is always interesting. Course is eight hours a day, five days a week, for six months. Tuition is \$100.00, one-half payable on entrance and one-half in three months. We have openings for a limited number of day students. Send for circular and give your age, and previous work. Associated Building Employers of Michigan, Grand Rapids, Mich.

BIG Money in the Painting Trade. Be your own Boss—Learn sign painting—Auto Painting—Decorating—Paperhanging—Graining—Marbling—Victrola Painting—Card Writing, in a few weeks. Write for Special Summer Rates Now. Chicago Painting School, 148 West Austin Ave., Chicago, Ill.

BUSINESS OPPORTUNITIES

CHEMICAL Expert furnishes manufacturing formulas with complete working directions, resulting products possessing distinct individuality and merit. Processes perfected. All lines. No lists of worthless stock formulas but reliable individual service. Charges reasonable, correspondence invited. Dr. Arthur Vaniteeden, 508 South Oakley Boulevard, Chicago.

LEARN swing trading and quick turns. Amazing new book shows you how. Write for circular of the Master Market Forecaster today. Market Forecaster Co., Dept. 13, Topeka, Kan.

STOP Plodding! Be Successful. Operate a Tire Repair Shop. Make big profits in any locality. We teach you and furnish complete equipments \$100.00 up. Book of Opportunity free. Haywood's, 1285 South Oakley Avenue, Chicago.

I HAVE over 100 stores paying \$5 monthly. You can do the same in your city. Month practice qualifies. Midnight Alarm System, 2970 Algonquin, Detroit.

DOLLARS yearly in your spare time. Indoors or outdoors. I'll show you how. Particulars free. PM Metz, 313 East 89th, New York.

GO into the tailoring business without investing a penny. No rent to pay. No stock to carry. Yet you make bigger profits than regular merchant tailors. Write for facts at once. Address Dept. 523, Goodwear Chicago, Inc., Chicago.

START Automobile Painting, Plating, etc. Profitable Plans Free. Rorick, 427 Carroll St., Akron, Ohio.

MAKE Money at Home—making toys. We show you how. Send \$1 for complete working drawings, instructions. DeHalt Designing Co., Dept. 6, Decatur, Ga.

LABORATORY Scientists are in demand. We teach you quickly and thoroughly and help secure positions. Extension and residential courses in Bacteriology, Microbiology and Sanitary Science. Taught by clear, concise, simple method. No preliminary training needed. Diplomas and degrees granted. The fascinating profession of Laboratory Scientist is recognized in business, detection of crime, disease prevention and cure. More experts needed daily. Become respected member of growing profession. Earn \$250 to \$500 a month. Students enrolling now will receive 48-piece Urinalysis outfit absolutely free. Write for Free 48-page prospectus today. Int'l Physicians and Surgeons College of Microbiology, Suite 971, 550 Garfield Ave., Chicago.

ICELESS Refrigerators: How to make, how to sell them, and how to finance your business. Details from Gen-Pac System, 1083 O'Farrell St., San Francisco, Calif.

\$597,378 NORMAL Value Foreign Money for \$5.00. Special Offer: 10,000 German Marks, \$1.25; 1,000,000 Soviet Rubles, \$1.50; 1,000 German Bond, \$1.75; 10,000 Austrian Bond, \$1.50; 10,000 Polish Marks, \$1.00, or all Five for \$5.00. Pacific State Bank, Dept. 76, Chicago, Ill.

PUBLISH a Magazine of your own! Start mail order business and Advertising agency on \$1 capital. Sample magazine and plan 10c. Harvey Teegle, Decatur, Ind.

START in Business. Samples and Stock 15c. Cochran, Graysville, Ohio.

BETTER Business Plan pays huge income. Absolutely honest. Permanent year round. Little capital to start. Particulars free. Write Bucknam, Room 1, 63 Court St., Boston, Mass.

\$4 HOURLY removing superfluous hair permanently; \$30 needed. B. Zitka, Fairview, Miss.

\$3,600 TO \$6,000 Yearly. Want it? Others are making it. Send check or money order today for our invaluable books "How to Sell Real Estate," \$3.00—and "How to Conduct Real Estate and Insurance Business," \$1.50. Absolute satisfaction guaranteed. Free catalogs. Realty Book Co., Dept. 32, Cleveland, Ohio.

PATENTS Procured; Trade Marks Registered—A comprehensive, experienced, prompt service for the protection and development of your ideas. Preliminary advice gladly furnished without charge. Booklet of information and form for disclosing idea free on request. Richard B. Owen, 30 Owen Bldg., Washington, D. C., or 2276-R Woolworth Bldg., New York.

LEARN how to establish own cash business; capital \$125 to \$1,000. Dept. M, Paul Kaye, 149 Broadway, New York.

FREE Book. Start little Mail Order business anywhere. Home employment earnings. Beginners Working Outfit furnished. Instruction, 500 circulars, samples, things to sell. You deal direct with manufacturers. No stock to carry. Instructive Book free, Pier, 261-A, 74 Cortland Street, New York.

WONDERFUL Opportunity. A new Silver Fox Ranch being started offers you a chance to buy Advanced Registered foxes at a lower price than ever heard of before. Monthly payments. Write for particulars. Keystone Silver Foxes, Inc., 859 Crucible St., Wal. S.A., Pittsburgh, Pa.

FORMULAS, Trade Secrets—Different, dependable. Catalog free. B. Thaxby Co., Washington, D. C.

PATENTS Procured. Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and blank form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 561 Southern Building, Washington, D. C.

HAVE you found your right occupation? Write for free circular on misdirected abilities. Robert Knox, Box 728, San Francisco, Calif.

GENUINE Big-money stunt. Legitimate, mutual, inexpensive. Amo Keumer, Eastbay, Olympia, Wash.

BEFORE Starting in Business for yourself insure your success by letting us help you. Vital, comprehensive, practical ideas, hints, points, and information by experts on buying, selling, merchandising, banking and advertising. A new business. Unusual service. Write for free booklet today. Western Bureau Business Research, Room 569B, 315 Montgomery St., San Francisco.

"**WHAT** to Invent for Profit" free. Patent News-C., Washington, D. C.

STATE Manufacturing rights for sale. Valuable Patent. Fortune for you. Machinery unnecessary. Dr. E. E. Schmidt, Blanton, Fla.

608 WAYS to Make Money—2,716 Formulas in "Encyclopedia Business Opportunities," 3 volumes; price, \$3; yours for \$1. Order at once. Ideal Book Shop, 5561-VH, North Haley, Chicago.

BECOME a Landscape Architect. Dignified, exclusive profession not overrun with competition. Crowded with opportunities for money-making and big fees. \$5,000 to \$10,000 incomes attained by experts. Easy to master through our correspondence methods. Established 1916. Get information today. American Landscape School, 56-K, Newark, N. Y.

"GET into the Specialty Manufacturing Business" or "Why Work for Others?" may sound good to you, but you won't succeed in that business unless you possess Formulas that are absolutely reliable, the same required by leading manufacturers supplying the Best. Don't be Bunked into buying a Collection of cheap "Formulas" and expect to succeed. Send today for my valuable literature and Formula Lists and Real Money-Makers in the Specialty Manufacturing Business. 26 years supplying the Best. Miller, Chemist, 805 De Leon St., Tampa, Fla.

"HOW to Sell Patents" free. Patent News-H., Washington, D. C.

EARN \$10 daily silvering mirrors, plating and refinishing metalware, auto, chandeliers, bedsteads, headlamps. Outfits furnished. E. Dele Laboratories, 1133 Broadway, New York.

SILVERBLACK Foxes \$300.00. Musk-rats: Skunks. Time payments. Arthur Schumacher, Lockland, O.

WANTED—Ambitious men to work at home. New business. Local or mail order. Ordinary men made \$15-\$25 day. You can too. Interesting particulars: write Kraft, Box 896-P. M., San Francisco, Calif.

MAKE toys and novelties at home. Big profits. Instructions and 200 illustrations, 25c. Astroline Company, Sharpshooter, Pa.

FOR \$3.00 you can start making and selling Fly Ejecting Window Screens. Frank Bohner, Palo Alto, Calif.

3,800 FORMULAS—Money-makers \$1. Ideal Book Shop, 5501-DH, North Robey, Chicago.

ENTER a new business. Earn \$3,000 to \$6,000 yearly in professional fees making and fitting a foot specialty, openings everywhere, with all the trade you can attend to; easily learned by anyone at home in a few weeks, at small expense; no further capital required, no goods to buy, job hunting, soliciting or agency. Address Stephenson Laboratory, (1) Back Bay, Boston, Mass.

RAISE Silver Foxes. I pay \$200 to \$500 for pups. Gerald P. Todd, St. Stephen, N. B.

MEN—Look into our proposition of Wallpaper Cleaning. Take big cleaning contracts. Unlimited field. C. Swanson & Sons, Mankato, Minn.

INCH Display Advertisement 161 Magazines Thrice \$15, Year \$50. Page \$100. Wood's Popular Services, Atlantic City, N. J.

LEARN the collection business. Good income, quick results. Interesting booklet, "Skillful Collecting," free. National Collectors Assn., Long St., Newark, O.

MAIL Order Business is your opportunity. Brenner's Famous Handbooks teach how to start small, grow big. Sell merchandise, service, ideas; enormous profits. Spare time to begin. Get complete set, 11 books, \$3.00, and be posted. Brenner, 335 Walnut, Philadelphia. Descriptive Catalog and big batch interesting mail order information, 25c. None free.

GET into the specialty manufacturing business. Amazing profits. We will send you free book explaining our system. Write immediately. A wonderful opportunity awaits you. National Scientific Laboratories, 211 North Monroe, Richmond, Va.

RAISE guinea pigs. Pay better than poultry or rabbits; easy to raise; little space required. We guarantee market. Particulars and booklet how to raise free. Cavies Distributing Co., 3102 Grand Ave., Kansas City, Mo.

WE Start You in Business, furnishing everything: men and women, \$30.00 to \$100.00 weekly operating our "New System Specialty Candy Factories" anywhere. Opportunity lifetime; booklet free. W. Hilber Razalske, Drawer 4, East Orange, N. J.

MODERN Photography in all its branches now taught by mail. New successful Method. Students earning \$200.00 while learning. Big Opportunity. Write for particulars and unusual offer open for short time. Dept. 2365, International Studios, Inc., 3601 Michigan Ave., Chicago.

EXCEPTIONAL Opportunity for Sales Manager capable of handling state distribution. Marvelous new Adding Machine. Retail \$15. Work equals \$350 machine. Tremendous possibilities. Unlimited profits. Write quick for details. Lightning Calculator Co., Dept. B., Grand Rapids, Mich.

"SCHEMER Magazine," Alliance, Ohio, prints big profit schemes; one subscriber making \$25,000 from three; another \$10,000 from one. Try your luck, Year, only \$1.00; three months, 25c.

GOOD money easily earned at home spare time silvering mirrors; no capital. Free instructive book tells how. Patterson & Co., Brooksville, Ky.

MARBLE mixing instructions, coloring wood or cement flooring 1/2 inch thick, fireproof, waterproof, low cost, sanitary, all colors. Particulars, 200 illustrations free. Chris Mahler, Box 122, Huntington, N. Y.

\$50 WEEK evenings—I made it. Mail Order business; booklet for stamp tells how. Sample and plan, 25c. Free 42 articles worth \$3. Algae Scott, Coboes, N. Y.

\$100 STARTS you in business; very lucrative; 500% profit; no competition; repeats. Box 482P, Los Angeles, Calif.

DON'T Incorporate. Organize any enterprise under common law; any capital; transact business any state; no incorporation taxes or reports; no personal liability; raise capital; Booklet free. Herbert Company, 5 Band-McNally Building, Chicago.

25c SIZE "Brillianta" Furniture Polish costs you 3c. Sample and information free. Box 55B, Newton, Mass.

ATTENTION!! You can have a business of your own. Establish and operate New System Real Estate Business, brokerage and insurance agency in your community. Office at home. Earn \$5,000 year. Representatives wanted everywhere. Send stamp free booklet. Hayes Realty Association, Cincinnati, Ohio.

CHEMISTRY

YOUR chemical problem solved and working process furnished Five Dollars. Write me. W. Stedman Richards, Consulting Chemist, address Box 2402, Boston, Mass.

FORMULAS AND TRADE SECRETS

500 VALUABLE Formulas 25c. Circular free. Harvey Teeple, Decatur, Ind.

800 FORMULAS 25c; Luminous Paint—Resilvering Mirrors—Renewing Dry Batteries—Mechanics Soap—Gas Tonic—Carbon Remover—Puncture Plugger, 20c each. Entire collection 50c. Catalog Free. Ideal Book Shop, 5501-PH North Robey, Chicago.

10,000 SELECTED chemical, technological and practical recipes and processes, including hundreds of so-called trade secrets for every business, alphabetically arranged in one large volume of 800 pages. Price \$4 postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

72 DROPS fixed me. Simple mixture for Rheumatism and Neuritis. Formula \$1. Satisfaction or money back. National Sales Co., Charlotte, N. C.

1,000,000 FORMULAS, Valuable Information, 1,016 pages, \$2. 500 Formulas Free if you order quick. Ideal Book Shop, 5501-MH, North Robey, Chicago.

BEAUTY Clay: Light and Dark. Six other Skin Beautifiers. Formulas for all 50c. Walland Supply Co., Box 4338, Station B, Kansas City, Mo.

ENGLISH beauty clay, easily made by anyone. Guaranteed formula and complete, easily understood, instructions for making. Postpaid 25c. Fletcher, Box 383, Jefferson City, Mo.

FORMULAS—Guaranteed. Catalog free. Bestovall Laboratories, 4019-FH, North Whipple, Chicago.

FORMULAS—Best that Chemical Science can devise. Not "Better Sort" Formulas, but Guaranteed Reliable processes in all lines. Stamp brings Valuable Literature and Latest Summer Sellers from an Analytical Chemist. Miller, Chemist, 807 De Leon, Tampa, Fla.

MAKE Money—Formula, Auto Cleaner and Polish. One Operation. Cleans anything. Positively Guaranteed for One Dollar. Flamid & Co., Wolcottville, Ind.

ONE MILLION Formulas, Trade Secrets, Processes, Calculations, etc. 500 Illustrations. Cloth, \$2.00 postpaid. Walland Supply Co., Box 4338, Station B, Kansas City, Mo.

500 FORMULAS; resilvering mirrors, valuable collection, 25c. Universal, 4049-EM, North Whipple, Chicago.

NEW Formulas. Catalog free. B. Fitzerald Laboratory, Stapleton, N. Y.

5,000 RECIPES, \$1.25. Best formulae and processes for every business, trade or occupation are in "Youman's Guide." Many never before published. Worth \$1.25 each, 530 pages. Paper cover \$1.25. Cloth \$2.00, postpaid. Book catalog free. Welland Edwards, X852 George, Chicago.

FORMULAS of the better sort. Write for our free catalog. National Scientific Laboratories, 211 North Monroe, Richmond, Va.

AGENTS WANTED

AGENTS—Send for sworn proof of \$5 to \$15 daily—introducing New Style Guaranteed Hosiery—57 styles, 17 colors—no capital or experience required. Just write orders—We deliver and collect. Your pay daily, also monthly bonus. Free auto offer besides. Complete outfit furnished. All colors—grades, including silks. Mac-O-Chee Mills Co., Desk 2548, Cincinnati, O.

EARN \$20 to \$35 extra every week taking orders for our high-class tailoring made-to-measure suits from \$14.95 to \$39.50. Your own clothes at low wholesale prices. No experience necessary. Write for our Big Free Sample Outfit. The Progress Tailoring Co., Dept. V-142, Chicago, Ill.

THESE Advertisements of mine have appeared in Popular Mechanics for sixteen years. Hundreds of Successful Manufacturers today owe their success to my formulas and valuable information. Majority started with practically nothing. You can do the same—write today for my valuable literature relative to my Guaranteed Manufacturer's Formulas for making Non-Thermic Ice-Saving Cloths, Delicious Beverages for Home, Bottlers and Fountain sale. Pure Food Products, Non-Alcoholic Flavors, Launderite Washing Marvel, Zebest, greatest Stain remover, Sta-Comed, Marcel Hair Curler, and latest Toilet specialties, Mexican Yucca Soap, Laundry Soaps, Flynox, Sensol, and all latest disinfectants. Amazon Tire Repair, Toy Rubber Balloons and all latest selling goods in all lines. Don't compare these with "junk" commonly offered. Analytical work carefully done. Highest references. Miller, Chemist, Tampa, Fla.

AGENTS clear \$50.00 weekly selling Opaline Portraits. Expense money advanced. Credit given. Big line now ready. Samples and Catalog free. Consolidated Portrait Co., Desk 2, Chicago.

AGENTS—Make \$75.00 a week and up selling our fine made-to-measure, all-wool suits at \$31.50 retail, direct to wearer. Biggest values ever offered—positively sell on sight. Biggest profits paid in advance. We attend to delivery and collections. 6x3 swatch samples furnished Free. State fully past experience. W. Z. Gibson, Inc., Dept. V-11, 161 W. Harrison St., Chicago.

SAVE the sole and you save the whole shoe. Introduce 25c item poor and middle-class people buy on sight. Steel discs for soles applied at home. The world your market. Pay 25c, save \$5.00. We protect you on territory. Patent pending. Wortendyke Steel Disc Mfg. Co., 504 Exchange Bldg., Portland, Ore.

IMPROVED Magic Writing Pad. Fifteen cents each to agents. Sell for 25 and 50 cents. Millions sold. Order stock Now. Send money order or certified check to Interstate Novelty House, P. O. Box No. 21, Station 1, Cincinnati, O.

AGENTS: \$30.00 daily representing factory. Electric lighted vanity cases. Fastest seller out. Pay advanced. We deliver. Write for sample. Goldsmith, 29 So. Clinton, Chicago.

SELL Something nine out of ten women will buy because it saves double its cost the day it is bought, 50c each, \$2.00 profit on \$3.00 sales. Premier Mfg. Company, Dept. 813, Detroit, Mich.

REPEAT Sales to every Business Man. Trousdel, Box 1272, San Francisco.

AGENTS wanted. Great novelty. \$100 weekly. Electric Flower Co., 439 South Irving Avenue, Chicago.

SELF-threading Needles and arks in every home. Fine side line. Easily carried. Big profits. Sample free. Prentice-Lee, 145 East 23rd St., New York.

WANTED—Tailoring salesmen, make \$60 to \$125 per week. Biggest merchants in many towns have started with our lines. We are the largest made-to-measure tailoring house in the country, furnishing elaborate sample equipments, including 500 all wool fabrics and guaranteed absolute satisfaction, perfect fit, best workmanship, or no sales. Write me for line and all accessories to be sent free. Tell us all about yourself. Address C. D. Mitchell, Sales Manager, Box 483, Chicago, Ill.

\$8 TO \$12 daily easy, quick selling practical invention, patented portable shoe shining cabinet; everybody buys; no investment; part time satisfactory. Sample free. Lokat Products, 18 W. 43rd St., New York City.

IDEAL Sideline; \$1 Check Protector. 300% profit. K. Home, 1957 Warren, Chicago.

BIG Money Selling Ford Accessory. Tremendous Equalizers for Ford Cars. Big profits—Fast sellers—Nationally advertised. Strong factory cooperation. Tremendous market. 1,500,000 Ford production this year. Exclusive state contracts offered Live Wire business men—permanent connection. \$1,000 to \$2,000 working capital required. Already 27 states under control. Write quick for open territory. Auto Specialties Mfg. Co., 10 Graves St., St. Joseph, Mich.

AGENTS—Everywhere—to sell Women's and Children's shoes direct to wearer, quality guaranteed. We deliver. A. B. Condon, Sales Manager, The Allen Shoe Co., 110 Summer St., Boston, Mass.

SPECIALTY Salesmen or State Distributors to sell Keystone E-Z Steering Post Bushings. This is a money maker. Repeats big. Keystone Sales Co., Pacific Bldg., San Francisco, Calif.

\$15.00 DAILY Easy selling Unbreakable Amberoid Combs, kind can hit with hammer, saw wood with the teeth, etc. Top-notch sellers with agents. Streetmen selling over \$100.00 worth Saturday afternoon and evening. You can do as well. Terms and convincing proof free. Oliver Gandy, Crisfield, Md.

TAILORING Agents—Get our powerful proposition. Biggest money-maker in America. We supply finest swatch line in handsome carrying case and pay highest commissions. Write at once. Dept. 201, Knickerbocker Tailoring Company, Chicago.

AGENTS (both sexes), we manufacture and control new household article. Fast seller. Big profits; exclusive territory. Write now. Connolly, 123 Liberty St., New York.

YOUR big opportunity. Make \$1 an hour. Everybody enjoys music. Particulars free. Crocker-Steinkamp Music Publishers, Quincy, Ill.

WONDERFUL Seller, Big Profits. Harper's Ten Use Cleaning Set washes and dries windows, scrubs, mops, cleans walls, sweeps, etc. Complete set costs less than broom. Can start without investing a cent. Write Harper Brush Works, 111-A St., Fairfield, Iowa.

START and Operate Your Own Business and acquire financial independence. Openings everywhere. Either men or women. We furnish everything and show you how. Big explanatory book "The Open Door to Fortune" free. Ask for it now. National Scientific Laboratories, 16A, Richmond, Va.

AGENTS—Guarantee six more miles to gallon. Hollow Air Tube Needle Valve for Ford carburetors. Remove old valve, insert new. 50% to 60% profit. Sample \$1.00. Standard Sales Agency, 253 So. Broadway, Los Angeles, Calif.

YOUR \$7.50 Sales to Merchants Net you \$20.00 Daily. Sayers Systems, 2815 Sheffield, Chicago.

SELL Patterns and Instructions for Making Cloth Working Gloves. Demand Unlimited. Sample 25c. Information Free. Chas. Whitehead, Cochranton, Pa.

AGENTS: Sell full line of guaranteed hosiery for men, women and children. Must wear 12 months or replaced free. All styles, colors and finest line of silk hose. Often take orders for dozen pairs in one family; permanent customers and repeat orders make you steady income. Write for sample outfit. Thomas Mfg. Co., Class 452, Dayton, Ohio.

CREW managers and agents sell a complete line of highest grade trade-marked stainless cutlery that eliminates cheap competition. Write for details. Rustnot Products Co., Marion Bldg., Cleveland, Ohio.

AGENTS: \$12 daily easy. Introducing Ladies' Summer Sweaters in silk and artificial silk; 12 colors. Latest novelties. Going like wildfire. You simply show samples we furnish; take orders; we deliver and collect. Your pay daily. Mac-O-Chee Mills Company, Form 1108, Cincinnati, Ohio.

"AGENTS"—\$10 to \$15 daily possible selling a line of factory priced rubber goods specialties for women direct from manufacturer. Free catalogue. American Rubber Products Co., Dept. 808, Pittsburgh, Pa.

INCREASE your earnings through the Alexander Free Sales Training course. This is the intensive course that doubles salesman's production. If you are accepted on our force it is yours without cost. You earn while you learn. We paid Covling, a newcomer, \$836.50 for one month's work in sparsely settled New Mexico. If you are a "be-salesman" and "pack a punch"—you should be selling Alexander Publicity Film Service. Alexander Film Company, 3389 Broadway, Denver, Colo.

AGENTS: Men or women. Year round position. No layoffs. Take orders for Jennings New Guaranteed Hose. Must wear and give satisfaction or replaced free. Write for outfit. Jennings Mfg. Co., Dept. 168, Dayton, Ohio.

NEW invention; reduces gas bills 50%; big money for agents; write quick. Allied Products, Box MP, Waterloo, Iowa.

TAILORING Salesmen: Make \$75 a week selling our strictly All-Wool Made-to-Measure Suits all at one amazing low price. You collect profits in advance and keep them. We supply finest selling outfit in America. Many exclusive money-making features. Tailoring, raincoat and side-line men, part or full time, get in touch with us immediately. Goodwear Chicago, Inc., Dept. 522, Chicago.

AGENTS, Stop Wishing—Work. You can make \$10.00 Daily Selling Articles Everybody Needs. Particulars Free. Write R. & G. Rubber Co., Dept. 315, Pittsburgh, Pa.

AGENTS—At last; big money maker; sample case free; contains 18 articles of pure food flavors, soaps, perfume toilet soaps, etc.; sell in every home; large profit on every sale; Edith Haut made \$54.00 in one week; Dora Kraft made \$24.00 in same time; Wm. Turner placed an order for \$100; Anna Lochray made \$4.00 an hour; Geo. Gates took order for \$72.00 in one week for flavors and perfumes; all big sellers; every woman buys; sell every day in the year; big repeat business; have a steady income; order your sample case today and make some real money and build up a big business. American Products Co., 9685 American Bldg., Cincinnati, Ohio.

27,000 RECORDS guaranteed with one Everplay Phonograph Needle; new—different; cannot injure records; \$15.00 daily easy. Free sample to workers. Everplay, McClurg Bldg., Desk 86, Chicago.

BIG money and fast sales—every owner buys gold initials for his auto. You charge \$1.50. Make \$1.44. Ten orders daily easy. Write for information and free samples. World Monogram Co., Dept. B, Newark, N. J.

GOLD Leaf Sign Letters; make and sell; profits exceed 1,000%; immense demand; particulars free. Johnston Co., Quincy, Ill.

NEW patented Article. Nothing like it. No competition. Sells on sight. Can use men and women Agents, part or full time. No experience required. Write at once. Dept. 36, Arden Products, 52 W. Van Buren, Chicago.

UNUSUAL Opportunity for Agents and Distributors to make \$15 to \$50 a day on biggest selling automotive specialty in recent years. Substantial company. Exclusive territory. Write quick. Sales Mgr., Dept. B, 1210 S. Michigan Ave., Chicago.

\$425.00 A MONTH made by Mr. Burt-sch selling our Spices, Extracts, Soaps, etc. Write for terms and territory. Laccasia Co., Dept. 127, St. Louis, Mo.

SALESMEN make as high as \$1,000 month with amazing new invention; spare-time workers \$25 a day easy. Read pages 126 and 127, then act quick.

SELL Madison "Better Made" Shirts direct from our factory to wearer. No capital or experience required. Easily sold. Big profits. Write for Free Samples. Madison Mills, 503 Broadway, New York.

AGENTS: Amazing new little article. Highly useful. Scientific. Wonderful demonstrator. Interests everybody instantly. Red hot seller. Circular free. Great side line. Big profit. Eureka Supply Co., Dept. C, Sedalia, Mo.

PORTRAITS, photo pillow tops, frames, sheet pictures, medallions, merchant's signs, water-proof and tea aprons, guaranteed hose, toilet requisites, luminous crucifixes; catalog, 50 specialties free. 30 days' credit. Jas. C. Bailey Co., Desk M-8, Chicago.

WONDERFUL Invention—Eliminates all needles for phonographs. Saves time and annoyance. Preserves records. Lasts for years. 12,000,000 prospects. \$15.00 daily. Free sample to workers. Everplay, Desk 823, McClurg Bldg., Chicago.

AGENTS, Salesmen, Demonstrators, you will have the devil's own time trying to find a better seller than "Zippe." If there was such a thing we'd have it. Splendid profit on 50c "Go Getter" repeat article that sells on ten second demonstration. Works While You Watch It. Demonstrates value, while others waste time making claims. New Discovery! Greatest Scientific Triumph of the age. It's the berries. Haven't room to tell our story here. Write immediately. Karam-Smith Co., 698 Clark St., Fort Wayne, Ind.

AGENTS—\$15 a day—Easy, quick sales—Free Auto—Big weekly Bonus—\$1.50 premium free to every customer. Simply show our beautiful 7-piece Solid Aluminum Handle Cutlery Set. Appeals instantly. We deliver and collect. Pay daily. New Era Mfg. Co., 803 Madison St., Dept. 21-Q, Chicago.

OUR 50c Labor-saving Household Necessity sells on minute demonstration to 8 women out of every 10, and repeats; liberal profit; exclusive territory. Sample 17c. Write Today. The Mallard Chemical Company, Lafayette Station (P), Saint Louis.

\$25.00 PROFIT on \$1.50 Outfit; Gold Initials for Automobiles, Bags, etc.; Free Samples. National Monogram Co., Station 11, Brooklyn, N. Y.

REALART Sign Letters. Look exactly like hand gilded work on glass. Dime brings samples. Realart Sign Co., Box 855, Chicago.

TAILORING Agents. We want fifty good men to earn \$75 to \$100 weekly. Our line contains 270 all wool suitings and 40 overcoatings to retail at \$18 to \$45. Positively biggest value line in America. Big 6x9 swatch outfit free. Commissions paid in advance. References required. Write R. E. Ferrin, Mgr., 2315 Warren Ave., Chicago.

300% PROFIT—Wildfire Seller. Sharp's Magic Merit. Washes Clothes Without Rubbing. Agent's Sample Free. Johnson-Sharp & Company, Bayfield, Wis.

\$100 TO \$300 a week. Men with slight knowledge of motors who can reach car owners can earn \$300 weekly without making single sale. If they can also make sales, profits may reach \$25,000 yearly. Only proposition of its kind ever offered. A. E. Phillips, 1904 Broadway, New York.

"HOW to Sell Patents" free. Patent News-O, Washington, D. C.

AGENTS—Glenco Dustaway makes broom a dust mop. Quickly attached to any broom. Can't slip off. Easily washed. No metal to scratch, no oil to streak. For floors, walls, ceilings, and hard to reach places. Women like it. Profit 100%. Sells \$1.00. Live wires, write Glenco Products Company, Dept. P-1, Quincy, Ill.

SILK Hosiery—Men or Women, write quick. Brand new proposition, selling 4 pairs guaranteed Japanese silk hose \$5. Direct from mill. Biggest money-making offer ever made. Styla Hosiery Mfg. Co., New Haven, Conn.

OWN a business, make your own sparkling chipped glass name and number plates, medallions, checkerboards, signs. I furnish complete outfit. Big hook 100 illustrations mailed free. E. Palmer, Woster, O.

THE Agents Guide—Tells where to buy almost everything. Copy 30c. Sealed. Wilson, Publisher, Box 74, Madison Square Station, New York.

AGENTS—Make \$5.00 an hour; our beautiful silk knitted neckwear sells on sight; latest New York styles direct from mill to you; popular price; instant sales, steady all year round proposition; big repeater; your own territory open. Write today. Knit-Art 80k Neckwear Co., 298 Broadway, New York City.

FORMULAS, Trade Secrets—Different, responsible. Catalog free. S. Thaxly Co., Washington, D. C.

PATENTS Procured. Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 562 Southern Building, Washington, D. C.

AGENTS Wanted, exclusive territory "Rupicola" original hair growing cosmetic, established since 1850. Room 512, 208 N. Wabash, Chicago.

AGENTS—Big moneymaker. Sells to Ford owners on simple demonstration. Gives 20% to 50% more mileage. New and patented. Moneyback guarantee. Marvel Gas Saver Co., Box 116, Rockford, Ill.

GENUINE Big-money stunt. Legitimate, nontax, inexpensive. Amo Keumer, Eastbay, Olympia, Wash.

ACT Quick—\$100 weekly. Sells like wildfire. Kleenrite. New washing compound. No rubbing. Women crazy about it. Premium plan gets big business. Samples free. Besterer Products Co., 1041-K8 Irving Park, Chicago.

DISTRICT Managers Wanted—All or spare time. Experience unnecessary; to represent large Casualty Company. Our \$10 policies are easily sold on first interview. Policy pays \$5,000 for accidental death; \$25 weekly for sickness or accident. Big commission and renewals—each year guarantees your future income. Baltimore Registry Company, 609-C American Building, Baltimore, Md.

NEWARK Manufacturer wants agents and distributors everywhere for automobile whistles all kinds, also glare shields. Exclusive territory to experienced accessory man. For particulars—Interstate, 192 Market Street, Newark, N. J.

EARN \$10 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, headlights. Outfits furnished. E. DeLo Laboratories, 1133 Broadway, New York.

PORTRAIT Agents—\$50,000 Profits I made canvassing. My valuable free book explains all. Guaranteed Prints, Portraits, Frames, Photo-Pillow-tops, Sheet Pictures, shipped all over the world. Samples free. Picture Man Friedman, Dept. 8-H, 673 Madison, Chicago.

WORLD'S Best Sellers—Needle threaders—\$2.50 gross. Pencil sharpeners \$8 gross. Sample 10c. Hutter-Specialties, Milton, N. Y.

SELL Guaranteed Hosiery, lowest prices. Samples Free. New patented demonstrator sample case that guarantees 50 percent more sales. Joseph Bros., 56-F Burnside Ave., New York.

PORTRAIT and Medallion Agents—Our Goods Will Make You Big Profits; delivery guaranteed; prompt shipments; low prices; send for latest catalog. Adam J. Kroll & Co., 602 Blue Island Ave., Chicago.

MAKE \$31.00 Profit—Cost You \$1.50. Complete Gold Monogramming Outfit. Transferred Instantly on Automobiles, Trunks, Bags, Windows. Experience Unnecessary. Free Samples. NuLife (A) Monogram, Hartford, Conn.

AGENTS: We pack Beauty creams, face powders, perfumes, toilet preparations, with your label. Repeat orders guaranteed. Big profits. Write Chemist, A-944 No. Clark, Chicago.

AGENTS—W. F. Omels, a former brush salesman, made over \$5,000.00 during 1922 selling our \$1.50 hitchen specialty. He is now a district manager. We are offering you the same proposition—an opportunity as big as you want to make it. You can do what Omels did. Write today to M. H. Tyler Mfg. Co., Manager's Desk, Muncie, Ind.

AGENTS—150 Fast Sellers. Toilet and Household Preparations. Every woman a buyer. Big profits. Sale guaranteed. Colonial Chemical Co., 631 Penn Ave., Pittsburgh, Pa.

MOST Wonderful Seller. 96c profit every dollar. No stock to carry. License unnecessary. Sample free. Mission Factory PM, 519 No. Halsted, Chicago, Ill.

SUCCESS in Business and Personal Affairs! Read character by handwriting and features. Conlin System. Low price for entire course. Write, H. E. Conlin, Dept. B, 21 St. John's Place, Buffalo, N. Y.

ANY man handy with paint brush or light tools can start new mechanical business on nearly nothing; needed everywhere; nearly all profit; experience not required. John Braceband, 457 So. Ninth, Philadelphia, Pa.

AGENTS Wanted—\$4.00 to \$10.00 daily taking orders for "Super" and "Junior" Fyr-Fyter Extinguishers on our new Sales Plan. Commissions paid cash daily. Everyone who owns anything that will catch fire is a live prospect. Homes, farms, auto-owners, schools, churches, factories, all need them. Sell on sight. Sales limited only by calls you can make a day. Write today for exclusive territory and free booklet, "Building a Permanent Income as a Fyr-Fyter Representative." Fyr-Fyter Co., 103 Fyr-Fyter Bldg., Dorton, Ohio.

EASY, pleasant work for Mechanics, Shop Men, Clerks, during spare hours; will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, O.

BIG Profits Selling New \$3.50 Automatic Adding Machine. Absolutely accurate. Fully guaranteed. Quick sales. Ten daily easy. No competition. Pocket size. Business people everywhere positive customers. Thousands being sold. Tremendous demand. Here's high-grade money-maker. Bassett Co., 1458-T, Hollywood Ave., Chicago.

AUTOMOBILE Safety Device. Sells at Sight. Men making \$10 a day alone, \$50 with subagents. No competition. Exclusive contracts. Lindl, 306 M & M Bank Bldg., Milwaukee.

WHY work for others? Make and sell your own goods. We show you how. Enormous profits. Write quick for free book explaining everything. National Scientific Laboratories, 211 North Monroe, Richmond, Va.

FREE Sample. "Rain Shield Wiper." Retail \$1.00—Costs (25c). Sold, Clear and Rainy Days. No Cloth—No Paste—No Attachment. (1) Rub keeps Windshield Clear (48) Hours. Experience unnecessary. NuLife (H) Corporation, Hartford, Conn.

MAKE money silvering mirrors, all kinds plating, knives, spoons, auto headlights. Outfits furnished. Free booklet. International Laboratories, Dept. 25, 311 Fifth Avenue, New York.

CALIFORNIA Rosebuds selling like hot cakes. Agents coinng money; new stuff. Big profits. Catalog free. Mission Factory PM, 519 No. Halsted, Chicago, Ill.

PHOTO Medallion Salesmen Earn \$100 to \$200 every week selling P. & G. Photo Medallions. No Investment—Free Equipment. Guaranteed 4-day Service. Send for Sales Plan and Free 1923 Catalogue with 102 beautiful designs, including clock and religious medallions. Puddin & Goldstein, 259 Bowery, Dept. A, New York.

AGENTS, Distributors, Energetic Men everywhere earn \$10 daily handling the HyKon Sewing Machine Belt; a new household necessity; sells on sight to homes, dressmaking and tailoring establishments. Be first; get this money-maker; put out sub-agents. Opportunity folder free. HyKon Mfg. Co., Alliance, Ohio.

AGENTS: Lowest priced gold window letters. Sample and Particulars Free. Empire Letter Works, 79 East Chapel St., New Haven, Conn.

LARGE manufacturer wants agents to sell guaranteed made to measure raincoats. Gabardines and Reversible top and raincoat combined. Make \$75 to \$100 weekly. Profit in advance. We deliver and collect. Outfit free. Standard Raincoat Co., 127 West 17th Street, New York, N. Y.

RAINCOAT Agents. Get Our Prices. Sell made-to-measure raincoats. We deliver and collect. Outfit free. World Raincoat Co., 659 Morris Park Ave., New York.

AGENTS make 100% profit selling Fibro Brooms, Push Brooms, Scrub Brooms, Mops, Dusters. Free Sample. National Fibre Broom Co., St. Louis, Mo.

EVERYBODY uses extracts. Sell Duo Double Strength Extracts. Complete line household necessities. Big repeaters. Write today, Duo Co., Dept. Et, Attica, N. Y.

IF you need good live agents—fellows who can get the business—ask me how others are doing it. I'll gladly render the necessary assistance. Geo. F. Baker, Mgr. Classified Advertising, Popular Mechanics Magazine, Chicago.

\$100 MADE in one week by young man in small town without capital or experience in local advertising business. Why can't you do likewise? Free book tells how. S. Meyer, 211 Seventh St., Louisville, Ky.

AGENTS—If you have formerly sold felt rugs, write for our new proposition concerning new goods. It's a winner. Newark Felt Rug Company, 56-C Bergen Street, Newark, N. J.

AGENTS—\$4.25 Profit on every sale of Nibco Service Set. Needed in every home and building. Get particulars quick. A. A. Silver-Chamberlin Company, Clayton.

WHY work for others? Make and sell your own goods. We show you how. Enormous profits. Write quick for free book explaining everything. National Scientific Laboratories, 211 North Monroe, Richmond, Va.

\$8.00 TO \$20.00 per day. A wonderful seller. Any man, woman, boy or girl can make big wages Selling Crimp Grip Clothes Line Fasteners. It is a perfect rope holder and can be used for many purposes. Crimp Grips are a simple, time-saving device. They last a life time and will not rust; it holds the line tight, and saves time on wash days. Every buyer is a booster. Send 5c for Mounted Sample and one pair of Crimp Grip Clothes Line Fasteners. Write for particulars, Crimp Grip Company, Belvidere, Ill.

WANT Distributing Agents everywhere for Hanslick, the new original powdered handsoap. Removes grease, grime, ink, paint, and most anything from the hands without injury to the skin. Every mechanic and auto-owner, everybody who gets his hands dirty will be a customer. A great opportunity for a hustler to get in business for himself. Full information free. Send 10 cents, coin or stamps, for liberal sample can. Solar Products Company, 122 West Lake Street, Chicago.

AGENTS—Send for sample "Fretnot"—the washday wonder. Be convinced you can do a whirlwind business. You can clear at least \$20 to \$100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory guaranteed to agents who can produce. Credits given. Don't call. P. M. Motter & Sons, 20 E. Jackson Blvd., Chicago.

AGENTS—Best seller: Jem Rubber Repair for tires and tubes; supersedes vulcanization at saving of over 800 per cent; put it on cold, vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube. Sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Amazon Bldg., Philadelphia, Pa., Dept. 503.

AUTO owner the agent wanted each locality to use and take orders for handmade Mellinger fabric and cord tires; guarantee bond 8,000 and 12,000 miles (no seconds); shipped prepaid on approval; get your tires free; no capital or experience required; make \$100 to \$300 weekly. Write for wholesale prices and sample kit. Address Mellinger Tire Co., Dept. 100, Kansas City, Mo.

AT Last—World's Greatest Adding Machine. Almost human. Retail \$15; work equals \$300 machine, \$500 monthly easily made, demonstrating to stores, offices, garages, factories. Simple, easy; adds, subtracts, multiplies, divides automatically. Speedy, accurate, durable, handsome. Five year guarantee. Tremendous demand; amazing profits. Liberal trial offer. Protected territory. Write quick. Lightning Calculator Corp., Dept. F, Grand Rapids, Mich.

GREATEST Sensation! Eleven piece toilet article set selling like blazes at \$1.75, with \$1.00 dressmakers' shears free to each customer. Spring rush on. Foster Held Co., 38 Windsor Bldg., Station C, Chicago.

REX India Fibre Broom: One of the biggest sellers on market. Outlasts five ordinary brooms—price no higher. 100% profit. Rex Fibre Products Company, 145-C New Jersey Ave., Brooklyn, New York.

BIG Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge \$1.50; make \$1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

\$75.00 WEEKLY with new specialty. Sells on sight to auto owners and trade. One man in Columbus, Ohio, sold 55 gross in 60 days. 100 to 200% profit on small investment. Write today for wonder-selling plan and information. C. L. Winegar, Dept. 13, West Fort Ann, N. Y.

LIVE Agents make \$10 Day selling Eureka Strainer and Splash Preventer for every water faucet. Takes on sight. Widely advertised and known. Get details today. A. B. Seed Filter Company, 73 Franklin, New York.

OUR Ex-Cel Luminous Crucifix "shines brilliantly in the dark." Sells on first demonstration. Big profits. W. G. Hannan Co., Dept. B, 57 E. 18th St., Chicago.

PATENTS—Write for our free illustrated guide book and Evidence of Conception Blank. Send sketch or model for our opinion of its patentable nature free. Highest references. Prompt attention. Reasonable terms. Victor J. Evans & Co., 163 Ninth, Washington, D. C.

"\$10 A DAY and More," our new book, shows clearly how you may gain sure success and large profits selling Guaranteed Hosiery and Underwear, factory to family. It is Free. Write today. C. & D. Company, 41-E. Grand Rapids, Mich.

LIVE man to distribute for great "Foot Ointment," hand or mail. Odor sells it. Splendid opportunity. Write now. The Elder Co., 294 Parkdale, Buffalo, N. Y.

AGENTS—\$3 per hour and more! Sell Iron Board Covers, Rubber Aprons, Shopping Bags, Embroidered Aprons, Satin Coverall Dresses. Free Sample offer! American Branding Company, Dept. P, 329 W. Monroe, Chicago.

MAKE \$25 to \$50 Week representing Clow's Famous Philadelphia Hosiery, direct from mill—for men, women, children. Every pair guaranteed. Prices that win. Free book "How to Start" tells the story. George Clow Company, Desk 31, Philadelphia, Pa.

YOU can be your own boss with our Key-Check outfit. Good for \$5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 20 cents. Prase Die Works, Dept. M, Winchester, N. H.

AGENTS—Genuine Gold Letters anyone can put on Store Windows. Guaranteed to not tarnish. Large profits. Enormous demand. Free samples. Write today. Genuine Gold Letter Co., 429-A North Clark, Chicago.

AGENTS: Big Money Monogramming by Transfer Method. Catalog Showing Over 50 Styles and Particulars Free. Motorists' Accessories Co., Mansfield, Ohio.

DUSTLESS Sponge Cloth. New Invention. Retail (50c)—Cost (16c). (1) Rub Cleans, Polishes Automobiles, Pianos, Furniture, NuLife (A) Sponge, Hartford, Conn.

WHY work for others? Make and sell your own goods. We show you how. Enormous profits. Write quick for free book explaining everything. National Scientific Laboratories, 211 North Monroe, Richmond, Va.

AGENTS—At last! Special machinery enables us to sell our patented curtain rods at the old price of Three Cents each. Big Spring sellers. Write Home Curtain Rod Co., Providence, R. I.

EARN big money fast applying gold initials to autos. Every owner buys—\$1.35 profit on \$1.50 sale—particulars and samples free. Write quick. Lithogram Co., Dept. 17, East Orange, N. J.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H., Decatur, Ill.

AGENTS—New discovery makes all Jelly "Jell." Big profits, constant repeater. Sample free. Address, Joy-Jel Company, 805 Grand, St. Joseph, Mo.

AGENTS: Big profits. Best and cheapest window letters made. Easily applied. Dime brings five samples. Particulars free. Stalbritts Co., 1115 Second Ave., New York.

AGENTS—Stamping names on Pocket Key Protectors; sample Check with your name and address, 25c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

AGENTS! A sale in every home for our beautiful dress goods, silks and general yard goods. Quick sales! Big profits! Large book of nearly 1000 handsome fabric samples furnished to agents. Write today. National Importing & Mfg. Co., Dept. 6X, 573 Broadway, New York, N. Y.

AGENTS—N-B-G Laundry Tablets, the old reliable moneymaker for live agents. Millions sold—used in many homes—sales waiting for you. Clothes washed spotlessly clean in 10 minutes without rubbing. Free samples. N-B-G Company, 732-A N. Franklin, Chicago.

POLMET Polishing Cloth cleans all metals; retails 25c; sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

SELL Necessities. Everybody needs and buys the "Business Guide." Bryant cleared \$800.00 in July. Send for sample. It's free. Nichols Co., Box 4-B, Naperville, Ill.

\$140 WEEKLY. Agents, Crew Managers. Absolutely new article selling big to housewives. No capital required. Commissions paid in advance. No collections. No delivery. Exclusive territory. Write quick. Pioneer Corp., 6301 Yale Ave., Chicago, Ill.

WHY work for others? Make and sell your own goods. We show you how. Enormous profits. Write quick for free book explaining everything. National Scientific Laboratories, 211 North Monroe, Richmond, Va.

AGENTS—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Maral Company, Tribune Bldg., New York, N. Y.

\$50-\$150 A WEEK. Free Samples Gold Window Letters Easily Applied. Liberal Offer to general agents. Enormous demand. Metallic Letter Co., 438 N. Clark St., Chicago.

AGENTS make 500% profit handling Auto Monograms, New Pictures, Window Letters, Transfer Flags; Novelty Signs. Catalog Free. Write Hinton Co., Star City, Ind.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

AGENTS, control territory, Edjol Flavors, household necessities, perfumes, creams, toilet waters, famous "Edring's Herb Tablets." Jet Pharmacal Co., Allentown, Pa.

AGENTS—Good salary and commission selling "Ratskyl" new rat and mouse exterminator; ready for use; no bait required; non-poisonous; rodents die outside premises; no odor. Empire Specialties Co., 1549 N. Wells, Dept. 301, Chicago, Ill.

FORDS use kerosene and start instantly with new Super Carburetor. Seward's profit, one day, \$71.00. Write quick. 1506 Super, 1304 Fondulac, Milwaukee, Wis.

AGENTS—Crew men, novelty men. Gloo-Pen, a 50c moullage fountain pen; everybody buys on demonstration. Write for big profit plan. Gloo-Pen Co., 75 (FF) Front St., New York.

WANTED—Representatives to sell Automobile necessity. Kills headlight and sun glare. Write for sample. Dept. P. The Clark Products Co., Springfield, Ohio.

PORTRAIT Agents—If you are looking for a better grade of work, we can satisfy you. Our enlargements have that finished appearance together with perfect likeness, which makes it a pleasure to deliver, and best of all our prices are not high. Export work a specialty. W. G. Hannan Co., Dept. A-5, 57 E. 18th St., Chicago.

PORTRAIT Agents and Others. Get Big Profits. Sell Perry Photo Medallions. You charge \$2.98; make 400% profit, \$10 daily easy. Big exclusive line. 4-day service. Perry Photo Novelty Corporation, Section 16, 360 Bowery, New York.

WE start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 201, St. Louis.

AGENTS make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404-B, Amsterdam, N. Y.

AGENTS—Sell Patented Cigar Lighters and Cigar-Case Moisteners. Big Profits. Start making money at once. Write for circulars, cuts and sales plan. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

SELLS Like Lightning; Big Profits; New Ironing Wax Pad and Asbestos Best; Clamps Board; Perfumes Clothes; Outfit 10c. Osh-Gloss, 380 Atlantic Ave., Brooklyn, N. Y.

AGENTS: Make cleanup selling Ever-ready Lite Patch. Samples free. Dealers Auto Supply Co., 4947 N. Kildare Ave., Chicago, Ill.

TEN Cents will bring you propositions every day from dozens of firms who want to secure agents. Try our way. Send ten cents today. Write Ovar Distributing Co., 58 Hayes Street, Newark, N. J.

\$10-\$20 DAILY easily. Spare or full time. Unlimited field. New, attractive. No competition. You will miss a golden opportunity unless you write us immediately. Stampo Products, 3226Y Seminary Ave., Chicago.

BRANCH Sales Managers for city and county. Experience unnecessary. Recent developments eliminates all competition. Under sell anybody by 1/2—enormous demand—liberal profit-sharing plan and bonus. Arme Co., 711 North Sedgewick, Chicago.

LARGE corporation wants a Service Man in every town to paste up its signs on store-keepers' windows. Excellent opportunity for reliable party. Steady work. No experience necessary. We also have attractive proposition for agents and salesmen. Guarantee Sign Service, 361 West Superior, Chicago.

AGENTS make \$10 daily—Big line guaranteed extracts, food products, perfumes, toilet goods, household necessities. No capital or experience needed. Free sample case and instructions. Write for amazing offer. Perkins Products Co., Desk 6, Hastings, Neb.

AGENTS: Big Returns, fast office sellers; particulars and samples free. One Dip Pen Co., 2 Daily Record, Baltimore, Md.

WANT man with \$1,000, in each State, take lease on fastest road-building invention of the age. Share millions spent on good roads. Address, J. P. Copeland, Wolfe Ctr., Texas.

NEW Business. Re-dye rugs on floor. Fibertint applied with brushes. Nine colors. \$1.00 box dyes 3x12 rug. Sample for small rug 10c. Agencies granted. Texpy Co., Inc., 13-A, Sumnerville, N. J.

SUPERSOAP washes hands without water, cleans white shoes; three cans \$1.00 postpaid. 75 paper towels free. Agents wanted. H. Meitz, 1969 West 77th, Cleveland, Ohio.

BIG Money in emblem goods. \$25 daily easy. Wall and Auto Emblems; Pins, Buckles and Leather Goods sell on sight. Sales guaranteed. Get free sample and cash bonus plan. Kier Emblem Co., Dept. P.M.-8, Como Bldg., Chicago.

HIGH-GRADE SALESMEN WANTED

SALESMEN. We pay larger commissions than any other Brush House in the country to men selling our line of twisted-in wire brushes. Sanitary Wire Grip Brush Co., 15-17 Mercer St., New York.

EXPERIENCED Ambitious Men can secure excellent well-paying connection selling a necessity to factories, business houses, and dealers. We want real salesmen. Commission basis. Little Giant Fireex Company, 1128 Wabash Ave., Chicago.

WORLD'S Fastest Selling Auto Accessory! County distributors wanted; write today. G. L. W. Spring Offer Co., San Diego, Calif.

IF You Can Sell—You can make from \$75 to \$150 a week taking orders for our guaranteed all-wool tailored-to-measure suits all at one amazing low price. Tailoring experience not necessary. We teach you and supply you with finest selling outfit. We do all delivering. You just write orders and get your pay cash with order. Get the facts. Write at once. Goodwear Chicago, Inc., Dept. 521, Chicago.

SALESMEN—Specialty—Window attraction, new article. Straight or Side Line. 40% commission; each sale nets you \$10. Deposit of \$15 required for sample. Live wires earn \$150 up Weekly. Chicago Thrift Co., 924 W. Madison St., Chicago.

EARN big money selling our Specialties. Sell one or entire line. Whole time or side line. Representatives wanted in each locality. Proven ready sellers; very liberal commissions. Barclay & Vaughan, 89 Boylston St., Boston, Mass.

SALESMEN. \$3.50 profit per sale. Ogden, 431 S. Ogden Ave., Columbus, Ohio.

AGENTS make as high as \$1,000 month with amazing new invention; spare-time workers \$25 a day easy. Read pages 126 and 127, then act quick.

SELL Our Beautiful Engraved Stationery, Announcements, etc. Liberal Commission. Northside Engraving Co., Valley at Troy, Dayton, Ohio.

TRAVELING Salesmen calling on retail stores, to sell our line of wonderful business getters. Main or side line; Rapid sellers; Big repeaters. Salesmen can average \$100 a week or better and expenses. For information write Blecker Mfg. Co., Scott City, Kan.

\$742 LAST month for Beck of Buffalo, introducing latest advertising plan; nothing else like it; every merchant wants it; easy sales; no deliveries; no collections; specialty salesmen write quick for offer. National Adv. Service, P. O. Box 38, La-Grange, Ind.

WANTED: Salesmen to handle the Jiffy Clothesline Tightener and Rope Lock. Instantly tightens and positively holds any rope up to 7/8". Every housewife needs one and will buy as soon as she sees what it will do. Also used to tighten and hold tent ropes, tennis court guys, etc. Sells for 50c, 100% profit. Send 25c for sample and full details of proposition. Jiffy Manufacturing Co., 91 Penn Avenue, Binghamton, N. Y.

SALESMEN—If \$500 to \$1,500 monthly interests you, write quick. Taylor made \$2,000 first 30 days. Specialty Mfg. Co., 123 S. Jefferson St., Chicago.

SALESMEN—Our new springless letter scales, best, most accurate, are in great demand. Write now, Mississippi Importing Co., 322 North Grand, St. Louis, Mo.

TAILORING Salesmen: Make more profit. Get our complete outfit made-to-measure suits, 160 fabrics, Six wholesale prices \$18.00 to \$39.00. Fix your own selling prices. Make all the profit you want. Undercut all competition. Lower prices than any other line—big profits for you. Guaranteed quality by firm established 1885. Write for full particulars. Fred Kauffmann, The American Tailor, 1300 W. Harrison St., Chicago, Dept. B-10.

SPECIALTY salesmen or distributors have the biggest business opportunity with Rustless since the auto industry started. Destroys and prevents rust and scale in radiators. Prevents leaks, repairs leaky pumps, etc. Good Territory open. Write or wire. Consolidated Chemical Works, Inc., 253-F Broadway, New York.

SALESMEN—Sell to stores. Well-known Tinsco Brand of decorated metalware. Liberal commissions paid weekly. Address Box 1017, Milwaukee, Wis.

SPECIALTY Salesmen: Sell boys' suits, Tailoring—raincoat—hosiery, or any live salesman can easily make \$30.00 to \$75.00 week selling boys' two-pants suits. Guaranteed quality. Profits in advance. We deliver. Prices 25% less than retail stores. Complete sample outfit—free. Write for full particulars quick—get exclusive territory. The Boys Store, Wright & Co., Dept. B-100, 500 S. Throop St., Chicago.

SALESMEN: Tailoring—High Grade All Wood Two Piece Line. Maker to Wearer. Deluxe Suits and Overcoatings. Custom Tailoring. Pattern drafted for each customer insuring perfect fit. Earn \$50.00 to \$125.00 weekly. Profits paid in advance. Wonderful proposition and outfit. Oliver E. Woods & Co., Dept. A-50, 535 So. Franklin St., Chicago.

TAILORING salesmen, add to your sales and profits. Sell boys' suits as well as men's. Make double profit on every sale. Get our complete outfit of men's and boys' suits. The greatest line in America. \$8.45 and up for boys' two-pants suits. \$21.50—\$26.50—\$29.50 and up for regular \$50.00 men's suits made-to-measure. Guaranteed quality. Our salesmen making \$75.00 week easy. Complete sample outfit in carrying case free. Write quick for full particulars—exclusive territory. Wright & Co., Dept. B-200, 500 S. Throop St., Chicago.

SALESMEN: Typewriter necessity. Minute demonstration sells. Write Salesman-ner, Vlm Mfg. Co., Topeka, Kan.

\$5 PROFIT selling \$7.50 necessity. Write for sample. Merchants Ass'n, Minneapolis, Minn.

\$4.00 PROFIT on Every \$5.00 Sale. "Free Sample."—New Specialty. (Money Getter.) Every Storekeeper, Doctor, buys quickly. Experience unnecessary. Territories open. Drawer 596, Hartford, Conn.

TAILORING Agents. We want fifty good men to earn \$75 to \$100 weekly. Our line contains 270 all wool suitings and 40 overcoatings to retail at \$18 to \$45. Positively biggest value line in America. Big 6x9 swatch outfit free. Commissions paid in advance. References required. Write R. E. Ferrin, Mgr., 2315 Warren Ave., Chicago.

\$45 TO \$75 Weekly—Men—Women, business in your home. Attractive new proposition. Cleveland School of Salesmanship and Mail Order Guide Co., Zanesville, Ohio.

STATE distributor. Newly invented price-card holders and price cards. No competition. Retail: \$4.00. Tremendous demand. \$409.00 weekly. Miller Mfg., 109 Boylston, Boston, Mass.

STATE distributor. Envelope Sealer seals 60 envelopes minute. No competition. Retail: \$3.50; tremendous demand. \$60.00 day easily made. Consolidated Co., Colonial Bldg., Boston, Mass.

SIDELINE Salesmen Wanted: sell coal to your trade in carload lots. Earn week's pay in an hour. Washington Coal Co., Stock Yards Station, Dept. J, Chicago.

DISTRICT Managers: Are you making 200% on your sales? If not, get our proposition. High-grade line of Household Necessities. Write for territory and full particulars. Midwest Drug Co., 185 East Nighthelm St., Columbus, Ohio.

SPECIALTY Salesmen, if you are convinced that it is "Good Business" to have a fire extinguisher in the home or car when a fire starts, you can sell others. Arrange with us for exclusive territory at a very good income. McMullen Fire Extinguisher Co., 6504 Dubois St., Detroit, Mich.

IF you want \$6,000 the first year, write me. Strong line for retail stores. Nationally advertised; liberal weekly advance to producers. Geo. R. Williams, Mgr., 1920 Euclid, Cleveland, Ohio, Dept. 200.

SALESMEN: 8-cure exclusive protected territory, high class, permanent business, worth \$10,000 yearly. Only small capital needed; no risk. Address Box 1336, New Haven, Conn.

SO Can You? Cota sold 400 one city. Beadle nine—town mine stores. Merchants need "Zim's Peerless" (Collection System). Retail: \$7.50. Creditors' Association, E-312 McKnight Bldg., Minneapolis, Minn.

CALIFORNIA Rosebuds selling like hot cakes. Agents earning money. Absolutely new. Big profits. Catalog free. Mission Factory SP, 519 No. Halsted, Chicago, Ill.

SIGN Letter Agents and Painters: 500% Profit Gold and Silver Sign Letters for Stores and Office Windows. Anyone can put on. Big demand. Free samples. Metallic Letter Co., 431D N. Clark St., Chicago.

SALESMEN Can make \$5.00 a day selling our Calendars, Pencils, Signs, Advertising Novelties, Yardsticks, Whistles, etc. Liberal terms. Sells entire year. Fine side line. Local and traveling agencies. Model Calendar Co., Dept. 226, South Bend, Ind.

SALESMEN—Sideline pays five to ten dollars a day taking orders for Specialty printed gummed advertising and Match Box Stickers. Write for proposition, samples, etc., today. Beardley's Printery, Rock Island, Ill.

A WONDERFUL Seller! Any man, woman, boy or girl can make big wages. Some agents make from \$8.00 to \$20.00 per day. Crimp Grip Clothes Line Fasteners are a simple, time-saving device for holding a rope—also used for many other purposes. It pays for itself quickly in time saved on wash days. No knots—it fastens and releases quickly. Every home a prospect. Every housewife who uses Crimp Grips—and there are thousands of them—is a booster. There is but one Crimp Grip. Write for particulars, or send 50c for one pair and a mounted sample, with full particulars to agents. Crimp Grip Company, Belvidere, Ill.

BEST Seller: Jem Rubber Repair for tires and tubes; supersedes vulcanization at saving of over 800%; put it on cold, vulcanizes itself in two minutes, guaranteed to last life of tire or tube; sells to every auto owner and accessory dealer. Get particulars how to make big money and free sample. Amazon Rubber Co., Philadelphia, Pa., Dept. 510.

TRAVELING Salesmen calling on retail stores wanted by large manufacturer to sell wonderful line of business-boosting articles. Year round, fast selling, main or side line. If not earning \$150 weekly, address Ebsaser Works, 222 Charles St., Beauville, N. Y.

SALESMEN—Become Independent. Own your business; experience unnecessary; selling our \$7,500 Accidental Death, \$50 Accident, \$25 Sick Weekly Benefits; \$12.50 yearly; other amounts proportionate. Guaranteed steady income from renewals. \$250,000 deposited Insurance Department. Registration Dept. A, Newark, N. J.

WERE You Ever Offered a Grocery Store? Our Proposition is Better. You can handle Sugar, Flour, Canned Goods, Dried Fruit, Coffee and entire line of Groceries, as well as Paints, Roofing, and Automobile Oils, with no rent to pay; no money invested; take large orders from samples. Goods are guaranteed and proven quality. Selling experience not necessary. Steady, profitable work for "workers." Address Hitchcock-Hill Co., Dept. 200, Chicago, Ill. Reference: Any Bank or Express Co.

TRAFFIC Management Home Study Course. Few states yet open for Sales Managers. Attractive proposition. Federal Railway Institute, Milwaukee.

HELP WANTED

AGENTS—Send for sworn proof of \$5 to \$15 Daily—introducing New Style Guaranteed Hosiery—57 styles, 17 colors—No capital or experience required. Just write orders. We deliver and collect. Your pay daily, also monthly bonus. Free auto offer besides. Complete outfit furnished. All colors—grades, including silks. Mer-tice Mills Co., Desk 2608, Cincinnati, Ohio.

FIREMEN, Brakemen, Baggage-men, Sleeping car, train porters (colored). \$140-\$200. Experience unnecessary. \$10 Railway Bureau, E. St. Louis, Ill.

WANTED—Men 18-35, Railway Postal Clerks, \$1600-\$2300 year. List Positions—free. Franklin Institute, Dept. W-20, Rochester, N. Y.

GOVERNMENT positions, \$1,400-\$2,300 yearly. Many openings. 26-page information booklet free. Chicago Civil Service College, A-11, Kesner Building, Chicago.

ALL men, women, boys, girls, 17 to 60, willing to accept Government Positions, \$117-\$190, traveling or stationary. Write Mr. Ozment, 101 St. Louis, Mo., immediately.

GOVERNMENT Railway Mail Clerks start \$133 monthly; expenses paid. Specimen questions free. Columbus Institute, Dept. E-2, Columbus, Ohio.

U. S. GOVERNMENT Wants Railway Postal Clerks. Men 18-35. \$1600-\$2300 year. Travel. See the country. List positions free. Write immediately. Franklin Institute, Dept. W-20, Rochester, N. Y.

MEN Wanted. Handle County business. Experience unnecessary. Largest concern of its kind in the world. Our men now getting \$200 weekly. Lowest mine prices. Guarantee Coal Mining Company, 3632 Wall St., Chicago.

EARN \$10 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, handlights. Outfits furnished. E. Dreie Laboratories, 1133 Broadway, New York.

WANTED—Men, Boys, 18 up to travel—See the country. Become U. S. Government Railway Postal Clerks. Steady employment. Commence \$133 month. Quick raise. Life position. Paid Summer vacation. Experience or influence unnecessary. Common education sufficient. Write today for free list Government positions now obtainable. Franklin Institute, Dept. W-1, Rochester, N. Y.

EARN your portrait; easy work. Black Studio, D-35, Los Angeles, Calif.

SILVERING Mirrors, French plate, Easily learned; immense profits. Plans free. Address, Wear Mirror Works, Excelsior Springs, Mo.

AGENTS, Distributors, capable of organizing sales force, make from \$3,000 to \$10,000 yearly; the best and fastest selling automobile accessory on the market; sells 4 to 8 at a time. Write for particulars, Continental Co., 912 7th Ave., New York City.

GOVERNMENT Wants Railway Postal Clerks. \$1,600 year. Particulars free. Rush. Franklin Institute, Dept. W-20, Rochester, N. Y.

WRITE articles, stories, news, in spare time for newspapers and magazines. Big pay. Copyright book free. Press Syndicate, 533, St. Louis, Mo.

OUR genuine gold window sign letters are an excellent money-making proposition for handy men. Sign Sign System, Bethune Ave. E., Detroit, Mich.

WANTED—Men—Women, 18 up. \$95-\$192 month. U. S. Government Jobs, List Free. Write immediately, Franklin Institute, Dept. W-20, Rochester, N. Y.

MEN Wanted, Learn Automotive Electricity. Best paying trade today. More positions than we can fill. Many graduates making \$300.00 per month. Taught by mail or personal attendance. You can make money spare time working for us. We pay you liberally and render valuable assistance. Your chance to start a business for yourself without capital. Write for particulars, Johnson's Automotive Electrical School, Dept. B, 729 Broadway, Denver, Colo.

LOCOMOTIVE Firemen for railroads nearest their homes—everywhere; beginners \$150-\$250 monthly. Railway Association, Desk M-1, Brooklyn, N. Y.

WANTED—Boys—Men, Be Auto Experts, \$45 week. Write immediately, Franklin Institute, Dept. W-401, Rochester, N. Y.

EARN \$110 to \$250 monthly, expenses paid, as Railway Traffic Inspector. Position guaranteed after 3 months' spare time study or money refunded. Excellent opportunities. Write for Free Booklet CM-46, Standard Business Training Inst., Buffalo, N. Y.

INVENTORS desiring to secure patents should write for our book "How to Get Your Patent," tells our terms and methods. Send sketch for our opinion of its patentable nature. Randolph & Co., Patent Attorneys, 620 F. Washington, D. C.

SIGN Letter Agents and Painters; 500% Profit. Gold and Silver Sign Letters for Stores and Offices, Windows. Anyone can put on. Big demand. Free Samples. Metallic Letter Co., 431-D N. Clark St., Chicago.

BE a Finger Print Expert. Demand increasing. Write for special free offer. American Finger Print System, 1966 Broadway, New York.

WANTED—Boys—Men, Be Auto Experts, \$45 week. Write immediately, Franklin Institute, Dept. W-401, Rochester, N. Y.

WANTED: Railway Mail Clerks—\$1,600 to \$2,300. Exams everywhere. Write today for full information. Patterson, Civil Service Expert, Box 4925, Rochester, N. Y.

HOTELS Need Trained Men. Nationwide demand for high-salaried men; past experience unnecessary. We train you by mail and put you in touch with big opportunities. Big pay, fine living, interesting work, quick advancement; permanent. Write for Free Book, "Your Big Opportunity." Lewis Hotel Training Schools, Room 351, Washington, D. C.

BE a Finger Print Expert—Opportunities opening everywhere. Write National System, 135 East 79th, New York.

STORIES, poems, plays, etc., are wanted for publication. Good ideas bring big money. Submit manuscripts or write Literary Bureau, 522, Hannibal, Mo.

ART AND ADVERTISING

3,000 COLORS—Mixing Guide (gives proportions) for painters, decorators, card writers, pressmen, artists. Postpaid \$1.00. Fine Arts, 1125 W. 27th, Indianapolis.

CARTOONISTS—Improve your style by following the work of the greatest cartoonists found in the bound volumes of Cartoons Magazine. Eight volumes, each covering six months, Jan.-June, 1917, to July-Dec., 1920, inclusive. 1,200 cartoons, 900 pages to a volume, 7 by 9 1/2 in., 3 in. thick. New books, durable and attractive binding. Sold separately at \$2 per vol. postpaid. Supply limited. Send at once. Popular Mechanics Book Dept., 290 E. Ontario St., Chicago.

INFORMATION

TRANSLATIONS, all languages. Information, all parts of world. Letters written. Low fees. International Information Service, 3312 N. Hoyne, Chicago, Ill.

CHEMICAL Processes, Analysis, Research, Technical Information, Consulting Chemist, Madison, Maine.

COMPLETE, accurate, information on any subject \$1. National Information Bureau, 1429 Milton St., S. E., Grand Rapids, Mich.

TYPEWRITERS AND SUPPLIES

UNDERWOOD Typewriters at far less than manufacturers' price; rebuilt, all worn parts replaced, guaranteed good as new. Cash, installment payments. Write for Catalog C-151, Shipman-Ward Mfg. Co., estab. 1892, Montrose and Ravenswood Ave., Chicago, Ill.

ALL Makes Rebuilt, refinished and guaranteed ten years. Remington, Oliver, Underwood, Monarch, \$15.00 up. shipped privilege of 30 days' trial. Send for list and special agents' proposition. Typewriter Exchange, 2316 University Ave., New York City.

BLACK Ribbons 33c each. Visible Makes. Typewriter Supplies, 7927-29 Colfax Ave., Chicago.

TYPEWRITERS, All Makes. Save one-half. Thoroughly Rebuilt in our factory by the famous "Young Process." Fully guaranteed. Free trial. We handle all standard makes. Cash or sold on easy terms. Write for Catalog, Young Typewriter Co., Dept. 502, Chicago, Ill.

BARGAINS in unredeemed good as new typewriters, all styles. Save you half or more. Write for list, Empire Loan Bank, 649 No. Clark St., Chicago.

ADDING MACHINES

NEW \$3.50 Automatic Adding Machine. Adds, Subtracts, Multiplies. Absolutely accurate. Capacity \$999,999.99. Fully guaranteed. 75,000 pleased users. Makes adding easy, positive, quick. Eliminates mistakes. Saves Time. Postpaid, \$3.50. Bassett Co., 1458-U Hollywood Ave., Chicago.

FREE Trial, Marvelous new Adding Machine. Adds, Subtracts, Multiplies, Divides, automatically. Work equals \$350.00 machine. Price only \$15.00. Speedy, durable, handsome. Five-year guarantee. Used by largest corporations. Write today for catalog and free trial offer. Lightning Calculator Co., Dept. E, Grand Rapids, Mich.

DUPLICATORS AND DEVICES

STENCIL Duplicator—Two Dollars. Note Size—Letter, Three-fifty. Prints Typewriting—Handwriting. On Approval. Primos Specialty Co., M-3, Primos, Pa.

YOU can make 50 to 100 copies of a letter, notice, etc., at a cost of three cents on a Heyer Quality Duplicator. Write for free trial offer. The Heyer Duplicator Co., 14 S. Wells St., Chicago, Ill.

"MODERN" Duplicators save Time, Labor, and Money. Gets Business, Reproduces Typewritten or Panned Letters, Drawings, Lessons, Music, Menus, Bids, Notices, Specifications, Maps or anything in one or more colors. Prints Two per minute. Special Sale On 30 Days' Free Trial. \$2.25 up. Booklet Free. J. E. Darkin-Reeves Co., Pittsburgh, Pa.

BUSINESS SERVICE

MANUSCRIPTS typed quickly and accurately, 50c per thousand words. One carbon copy. Dorothy Frey, Sidney, Ohio.

SPECIAL Financial Service. Obtain capital, any amount. Banking connections in United States and Europe. Incorporate your business. Sell stock, keep control. Transact any business anywhere. Avoid personal liability. Low cost for Expert Services, all corporation supplies, engraved stock certificates, etc. Lists of investors here and abroad. Can you pay eight per cent (8%)? Write for full information. Advice free. Registrar and Trustee Co., Rochester, N. Y.

AUTHORS' manuscripts typewritten. Sample, Terms. Ernest W. Glase, Rosenberg, Texas.

PROMOTERS' Opportunity — Patented Tire Reclaiming Machine, Automatic Tube Vulcanizing Machine, Steel Disc Puncture Proof Tire. Other devices. C. D. Hibbs, Ft. Worth, Texas.

MAILING LISTS

300 AGENTS \$5. 1,000 Auto Owners \$8. Ogden Co., 431 S. Ogden Ave., Columbus, Ohio.

PRINTING, ENGRAVING AND MULTIGRAPHING

200 BOUND letterheads \$1. Envelopes 50 cents per hundred. Artistic Work. Hedra, 3549 Franklin Ave., St. Louis, Mo.

USE Better Grade Printing. We print anything. Send us your order. Review Print Shop, Holgate, Ohio.

250 LETTERHEADS, 250 white envelopes, printed and mailed, \$3.00. Samples printing free. Sunco, Mohawk, N. Y.

1,000 20-LB. Hammermill Bond Letter-Heads \$4.00. Johnson-Sharp Company, Bayfield, Wis.

1,000 TWO color Letterheads \$4.50. Attractive samples free. Bamberg Printing Company, 637-39 N. Western, Chicago.

5,000 5 1/2 x 8 1/2 CIRCULARS, \$8.45; 10,000, \$15.00; 5,000 Envelope Slips, \$4.00; 10,000, \$7.50; direct from Ad. Bargain List—Samples Free. Good's Printery, Harrisonburg, Va.

2,000 LETTERHEADS or Envelopes \$6.25 prepaid. 3rd zone. Samples Free. Quality Printshop, Marietta, Ohio.

PRINTING! Advertising experts. Samples. Franklin Press, B-32, Milford, N. H.

PRINTING Outfits—Presses, type supplies, type nonettes. Send stamp for catalogue. Model Press, York, Penna.

WE print anything. Stationery, Catalogs, 1,000 small 4-page Circulars, \$5.00. Samples Hammermill Cabinets, Commercial Press, Batavia, Ohio.

QUALITY Printing! Reasonable Prices! Tell us your wants and let us quote our Money-Saving prices. Best Work. We print anything. Ernest Fantus, 525 South Dearborn Street, Chicago.

PRE-USED Printing Presses, Type and supplies. List for stamp. Popular Bargains, Richland, Pa.

1,000 LETTERHEADS or Envelopes, \$3.00. Sent Prepaid, Samples Free. Monitor Press, Morrisville, Pa.

225 BOND letterheads, envelopes, bill-heads, cards, \$1.25 each. Combination, \$1.00. Economic Press, Leonia, N. J.

FREE Card Case with calling card printed in gold on case with calling card order. 20 cards 25c. 100, 50c. Mail Order Print. Co., 2510 B S. Twelfth, St. Louis, Mo.

5,000 6 XXX Envelopes \$12.00. The Corner Press, 1302 N. 19th St., Philadelphia, Pa.

100 EACH Letterheads and Envelopes, \$1.50. Jacobus Service, Irvington, N. J.

FOR MEN

VINOBAR—The Brick with a Kick. Pipe-dream, Patent Pipe-cleaner. Sample for dime. Vinobar Co., 227-A Summit, Jersey City, N. J.

ARE you old at forty? See our advertisement on page 132 of this issue. The Electro Thermal Company, 2123 Main St., Steubenville, Ohio.

FOR SMOKERS

PURE Leaf Tobacco, Rich Red Color. Best Chewing, 4 lbs. \$1.35. 16 lbs., \$3.35. Smoking, 10 lbs. \$2.25. Prepaid, O. D. Collier, Martin, Tenn. ("Collier is reliable.")—Martin Bank.)

ENJOY Life. Smoke Old Field Tobacco. Sample 10c. East Malling Co., Paducah, Ky.

RAZORS AND BLADES

RAZOR Blades resharpened, one edge 2c, double 3c, all hand-honed. American Sharpening Co., 375 Orange St., Springfield, Mass.

BLADES resharpened 15c dozen. Agents wanted. Roseto Honery, Roseto, Pa.

BLADES, resharpened, one edge 2c; double 3c. New York Edge Co., Glen Cove, N. Y.

BOATS AND LAUNCHES

ROWBOATS—easily made. Blueprint 1st free. Woosho-Uco, West Market, Detroit, Mich.

"HOW to make your boat leakproof." Send for booklet, L. W. Ferdinand & Co., 132 Kneeland St., Boston, Mass.

OPTICAL GOODS

BEST Buy On Market—Imported 19 Ligne Field Glass. Ideal for travel, races, hunting, bird and nature study. Has large field and excellent illumination. Complete with genuine leather case and carrying straps, \$9.99 C. O. D. Money back in ten days if not satisfied. Deal with reliable firm established 1886. Borsch & Company, 61 East Adams St., Chicago, Ill.

BAUSCH-LOMB Microscope. Triple objectives, including oil immersion. Guaranteed like new, \$60.00. Send for complete description and photograph. Sackheim, 649 N. Clark St., Chicago.

DIAMONDS, WATCHES AND JEWELRY

21 JEWEL Watch \$4.99! All Makes about half regular price. Agents wanted. List free. Rex Co., Andover, Ohio.

WATCHMAKERS: Earn highest wages. Understand adjusting thoroughly. Circular free. Write Walter Kleinlein, Publisher, Waltham, Mass.

FOR THE HOME

BEAUTIFUL Leopard and Mountain Lion Rugs. Albert Gerlach, New Orleans, La.

ANTIQUES AND WAR RELICS

INDIAN Baskets, Blankets, Wampum, Mats Wholesale. Catalogue. Gilham, Kelseyville, Calif.

PHONOGRAPHS AND RECORDS

BUILD a genuine Choraleon phonograph and save over half. Big profit building and selling. We furnish motors, tone-arms, full instructions and all necessary parts. Send for catalog and free blueprint offer. Choraleon Phonograph & Radio Co., 823 11th St., Elkhart, Ind.

BUILD your own Phonograph. Get our free Catalog. American Phonograph Co., 3515 North Crawford, Chicago.

BUILD your own phonographs. We can supply you with motors, tone arms and all accessories at wholesale prices. Write for catalogue AX. Pleading Sound Phonograph Co., 204 East 118th St., New York, N. Y.

BUILD Your Phonograph. Quality phonographs. Quality Sereno-lo motor and motors of other types. Electric Motors, tonearms, reproducers, amplifiers, case material, accessories. Free blueprints and building instructions. Big saving. Wonderful results. Prompt delivery. Catalog mailed for ten cents. Hoosier Manufacturing & Supply Co., 313 Baldwin Block, Indianapolis, Ind.

MUSIC AND MUSICAL INSTRUMENTS

MUSIC rubber stamps, adjustable stencil letters, rubber type catalogue 25c. W. Karstaedt, Dayton, Ohio.

FOR Sale—Slide Trombone, Key of C, rotary change to B flat. Never used. R. P. Conrad, Williamstown, Ky.

CORNETISTS—Trombonists—Saxophonists—Clarinetists. Send for "Free Pointers No. 2." Name Instrument. Virtuoso School, Buffalo, N. Y.

CAN furnish anything in pool as new unredeemed musical instruments. Save you half or more. No list published. Write stating what you want. Empire Loan Bank, 649 No. Clark St., Chicago.

VIOLINS—Deep, Mellow, soulful—on credit. Easy terms for wonderful instrument. Get details today. Gustav F. Hennig, 2421 Garford St., Denver, Colo.

WRITE Songs. Big money and reputation. Write for information, J. Gordon Pub. Co., 201 N. Hoyne Ave., Chicago.

"MUSIC Composed" to words. Bauer Bros. (formerly of Sousa's Band), Oakkosh, Wis.

I WANT song poems. Casper Nathan, Garrick Theatre Building, Chicago.

PATENT ATTORNEYS

PATENTS—Before disclosing an invention the inventor should write for our blank form "Record of Invention." This should be signed, witnessed and returned to us together with model or sketch and description of the invention and we will give our opinion as to its patentable nature free. Our Three Books mailed free to inventors. Our Illustrated Guide Book, "How to Obtain a Patent," contains full instructions regarding patents. "List of Patent Buyers" sent free, contains unsolicited letters from manufacturers and others who are constantly writing us regarding the purchase or leasing of meritorious patents. We have recently received a number of requests, among which are the following: 45 requests for Miscellaneous Articles in all classes of invention, too numerous to mention. 14 requests for Household Novelties and Specialties. 11 requests for General Novelties and Mail Order Articles. 6 requests for Automobile Accessories and Specialties. 3 requests for Small Metal Articles and Metal Specialties. 2 requests for Radio Accessories and Equipment. 1 request for Amusement Apparatus. 1 request for Refrigerators. 1 request for Tractors and Similar Machines. 1 request for Farmers' Supplies. 1 request for Games. 1 request for Toys. We endeavor to assist our clients in the commercial development of their inventions. Owing to the growth of our business we have established for the benefit of our clients, Branch Offices in New York City at 1007 Woolworth Bldg., Philadelphia at 714 Liberty Bldg., Pittsburgh, Pa., at 514 Empire Bldg., Chicago, Ill., at 1114 Tacoma Bldg., and San Francisco, Calif., at 1010 Hobart Bldg. Victor J. Evans & Co. Main Offices, 146 Ninth, Washington, D. C.

INVENTORS should write us for our book, "How to Obtain a Patent," which clearly sets forth what may be patented and the necessary steps to protect an invention; it describes the procedure in patent office and tells about assignments, licenses and trade marks, and gives many useful facts about patents which every inventor should know; many persons well versed in patent matters have pronounced the book the best of its kind they have ever read; it is written so you can understand it; copy free upon request. Talbert & Talbert, Patent Lawyers, 481 McGill Bldg., Washington, D. C.

PATENTS Procured; Trade Marks Registered—A comprehensive, experienced, prompt service for the protection and development of your ideas. Preliminary advice gladly furnished without charge. Booklet of information and form for disclosing idea free on request. Richard B. Owen, 30 Owen Bldg., Washington, D. C., or 2274-R Woolworth Bldg., New York.

PATENT application filed on partial payment plan. Trade-marks, copyrights, etc. Milo B. Stevens & Co., 685 F St., Washington; 352 Monadnock Bldg., Chicago, Estab. 1864.

INVENTORS: Record invention legally before disclosing to others. Our Invention-Record and Data Sheet shows how. Sent free and valuable information given on patent procedure, costs, etc. Report on patentability includes copies of patents nearest your idea. O'Connell & O'Connell, Jeweler Building, Washington, D. C.

MONROE MILLER, Ouray Building, Washington, D. C., patent attorney, mechanical and electrical expert. Best quality of work and results. Moderate charges.

MILLIONS spent annually for ideas! Hundreds now wanted! Patent yours and profit! Write today for free books—tell how to protect yourself, how to invent, ideas wanted, how we help you sell, etc. American Industries, Inc., 500 Kresge Bldg., Washington, D. C.

TO proceed properly and safely, send sketch and description for personal advice in your particular case and estimate of costs. H. F. Lowenstein, Registered Patent Attorney, McLachlen Building, Washington, D. C.

PATENTS and Trade-marks obtained. Prompt service. Write for our new book on patents. Established in 1888. D. Swift & Co., 369 7th St., Washington, D. C.

INVENTORS—Send for form "Evidence of Conception," to be signed and witnessed. Form, fee schedule, information free. Lancaster & Aldwine, 221 Ouray Bldg., Washington, D. C.

PATENTS—Booklet and full instructions without obligation. B. P. Fishburne, Registered Patent Lawyer, 331 McGill Bldg., Washington, D. C.

PATENTS Procured. Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and blank form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 561 Southern Building, Washington, D. C.

PATENTS secured. Prompt service. Avoid dangerous delays. Send for our "Record of Invention" form and Free Book telling how to obtain a Patent. Send sketch or model for examination. Preliminary advice without charge. Highest Reference. Write today. Jacobs & Jacobi, 408 Ouray Bldg., Washington, D. C.

PATENTS promptly procured. Personal, careful and efficient service. Highest references. Moderate fees. Send sketch for model or actual search and advice. George P. Kimmel, Master of Patent Law, 34-K, Loan and Trust Bldg., Washington, D. C.

INVENTORS desiring patents, read the free treatise, "Reducing Inventions to Property Rights," Lester E. Barrett, 629 F Street, Washington, D. C.

LACEY Patent Sense. See page 60.

PATENTS, Trademarks, Copyrights procured; all countries; very reasonable; Booklet Free; ask about my Free sales service; 29 years' experience. H. Sanders, 7 Rand-McNally Building, Chicago, Ill.

INVENTOR: "Protective Evidence." Disclosure-blank and Selling Particulars, free. Thorough service, moderate cost. For Accommodations and quickness, send details. Sterling Brock, Washington, D. C.

EDWARD C. SASNETT, formerly a Principal Examiner U. S. Patent Office. Personal Service. 516 McGill Bldg., Washington, D. C.

INVENTORS: Send sketch or model of invention for opinion concerning patentable nature and exact cost of patent. Book "How to Obtain a Patent," sent free. Tells what every inventor should know. Established twenty-eight years. Highest references, prompt service, reasonable charges. Address Chandler & Chandler, 438 Seventh, Washington, D. C.

PATENTS, trade marks, copyrights. Prompt, personal, reliable service. Over 20 years' active practice. Write for terms. Book free. Address E. G. Siggers, N. U. Bldg., 918 F St., Washington, D. C.

PATENTS, Booklet free. Highest references. Best results. Promptness assured. Send model or drawing for preliminary examination. Watson E. Coleman, Patent Lawyer, 624 F Street, Washington, D. C.

"INVENTORS' Guide" free on request; gives valuable information and advice for all who have original ideas or improvements. Frank Ledermann, Registered Attorney and Engineer, 15-P Park Row, New York.

PATENTS. My fees in installments. Advice book free. Frank Fuller, Washington, D. C.

BOOK on inventions, patents, trade-marks, sent free, advice given; excellent references. Twenty-three years' experience. Robb, Robb & Hill, 1348 Hanna Bldg., Cleveland, Ohio. 811 McLachlen Bldg., Washington, D. C.

BEFORE or after filing application for patent on your invention it will pay you to read over my "Inventor's Advisor No. 3," free for asking. M. Labiner, Registered Patent Attorney, 3 Park Row, New York.

FOR INVENTORS

I SELL Patents. Established in 1909. Who else, in the United States, has devoted 23 years exclusively to this work? Such experience, and clean methods, will help your case before the business world. Charles A. Scott, 773PM Garson Ave., Rochester, N. Y.

TO sell your Patent, Write me; experienced handling, immediate action. Address Arthur S. Billings, Suite 401 Dekum Bldg., Portland, Ore.

SEND us your ideas for manufacturing development. Liberal payments for accepted inventions. Hoosier Corn Turner Company, Rushville, Ind.

PATENTS—"How to Obtain a Patent" is the name of a book which every inventor should have. It will be sent free upon request, and will tell you what you want to know about patents. It contains the whole story. It describes the different parts of the application and explains in simple language the prosecution before the Patent Office. It tells about joint applications, releases, agreements, assignments, licenses, interference, infringements, process patents, design patents, trade-marks, and prints and labels. If you are interested in patents either as an inventor, manufacturer or owner of a patent you will enjoy reading this book which was written by a lawyer who has had twenty-five years' experience in patent matters. If you have an invention and will send us a sketch, model or photograph of it we will promptly make a search of the Patent Office records and advise you whether or not, in our opinion, your invention is patentable, our charge for this service being \$3.00. We feel that our experience of twenty-five years has fitted us to render prompt and efficient service which will merit your confidence. Write today. Talbert & Talbert, 464 McGill Building, Washington, D. C.

PATENTS Procured. Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and blank form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 562 Southern Building, Washington, D. C.

INVENTIONS of merit manufactured royalty basis or bought outright. Large plant equipped for volume manufacture and large selling force. Write fully today. J. Gould, 186 N. LaSalle St., Chicago, Ill.

PATENTS secured. Prompt service. Avoid dangerous delays. Send for our "Record of Invention" form and Free Book telling how to obtain a Patent. Send sketch or model for examination. Preliminary advice without charge. Highest Reference. Write today. Jacobs & Jacobi, 409 Ouray Bldg., Washington, D. C.

UNPATENTED Ideas can be sold. I tell you how and help you make the sale. Particulars free. Write W. T. Greene, Jenifer Building, Washington, D. C.

INVENTORS—Send your ideas for manufacturing development in our modern sheet metal and angle-iron fabricating plant. Those pertaining to dust collecting or ventilating preferred. Liberal payment for accepted inventions. Kirk & Blum Manufacturing Co., 2851 Spring Grove Ave., Cincinnati, O.

PATENT Sense—"The book the inventor keeps." Free. See Lacey ad, page 69.

I BUY Patent and unpatented inventions of all kinds! Submit what you have for our consideration. Most all inventions are accepted. Emil T. Dahlene, Mansson, Iowa.

MODEL Making and experimental work; Modern Shop, expert workmen. Manufacturing, Lamson Electrical & Mfg. Co., 625 W. Jackson, Chicago.

PATENTS Procured; Trade Marks Registered—A comprehensive, experienced, prompt service for the protection and development of your ideas. Preliminary advice gladly furnished without charge. Booklet of information and form for disclosing idea free on request. Richard B. Owen, 30 Owen Bldg., Washington, D. C., or 2276-R Woolworth Bldg., New York.

INVENTORS. If you're not fully experienced on patent matter, better learn from one who is. My facts will prove valuable assistance. Adlard Prouffe, 38 South St., Woonsocket, R. I.

PATENT Application Blanks free to inventors. Patent News-D, Washington, D. C.

INVENTORS' Educator: 900 Mechanical Movements, 50 Perpetual Motions. How to procure and sell patents. Mechanical Movements greatly assist inventors, suggest new ideas. Explains how to select an attorney and avoid Patent Sharks. Price \$1.50. Postage Free. Albert E. Dieterich, 621 Ouray Building, Washington, D. C.

INVENTORS, write for free copy of Moulcraft, R. G. Clynne, St. Louis, Mo.

PATENTS. Write for free illustrated guide book. Send model or sketch and description for free opinion of its patentable nature. Highest references. Prompt attention. Reasonable terms. Victor J. Evans & Co., 157 Ninth, Washington, D. C.

PATENTS. If you have an invention which you wish to patent you can write fully and freely to Munn & Co. for advice in regard to the best way of obtaining protection. Please send sketches or a model of your invention and a description of the device, explaining its operation. All communications are strictly confidential. Our vast practice, extending over a period of seventy-seven years, enables us in many cases to advise in regard to patentability without expense to the client. Our Handbook on Patents is sent free on request. This explains our methods, terms, etc., in regard to Patents, Trade Marks, Foreign Patents, etc. "Scientific American" contains Patent Office Notes, Decisions of interest to inventors and particulars of recently patented inventions. Munn & Co., Solicitors of Patents, 623 Woolworth Bldg., New York; Scientific American Bldg., Washington, D. C.; 801A Tower Bldg., Chicago, Ill.; Hobart Bldg., San Francisco, Calif.

GET your own patents. Application blanks, complete instructions \$1. Cutting Sons, Campbell, Cal.

HAVE You an invention? If so, write for our free book, "How to Get Your Patent," tells our terms and methods. Send model or sketch for our opinion of its patentable nature. Randolph & Co., Dept. 144, Washington, D. C.

"INVENTORS' Guide" free on request; gives valuable information and advice for all inventors. Frank Ledermann, Registered Attorney and Engineer, 15-F Park Row, New York.

INVENTORS—Prosecute your own patent applications under our supervision. Instructions and blanks \$1.00. Inventors Co-operative Ass'n, Station "B," Box 2445, San Francisco, Calif.

PATENTS FOR SALE

OUTRIGHT or Royalty; Washer halves. Snaps, forming complete Washer instantly. No need removing nut. Manufactured cheaply. Patent 1,452,492. E. H. Carpenter, Balrd, Texas.

LAUNDRY drying appliance protected in U. S. and Canada. Inventor John E. Pieterick, Route 1; Box 9, Cayuga, N. Dak.

TELEPHONE Receiver Support. Thomas Meehan, 259 Union Street, St. John, West New Brunswick, Canada.

PATENT for Sale, Foldable rocking chair; screened against mosquitoes and flies. Strausky, 200 Greenway Ave., Darby, Pa.

IMPROVED Steel Tie Patent, Joseph Jordan, 3904 North 11th St., St. Louis, Mo.

PATENTS on self-loading dumping wagon. Illustrated, June issue this magazine. Robert Shedenhelm, Laura, Iowa.

VERTICAL lifting flying machine, patent 1,454,283, for sale. Hollander, 309 Stone, Brooklyn.

ASH Sifter: New features. Proven success. Outright or royalty. Kozlowski, 3726 No. Central Park, Chicago.

FOR Sale: Invention. Combination Tire tool. R. G. Scott, 122 Lake St., Akron, Ohio.

PATENT for Sale—Automatic Score Keeper. Keeps total at all times without any figuring; can be used for any games. Can be made from wood, metal or paper. Write for diagram and details. John Whitaker, Box 242, Monroe, La.

FOR Sale—Patent on a re-illable Pen-cil. Patent for United States and Canada. For particulars, address Conrad Steudl, R. R. 1, Box 53, Lezenzurg, Ill.

DENTAL Crown machine for dentists. Patent pending. Royalty. Dr. F. C. Secor, 1017, 1st Nat'l Bank Bldg., Omaha, Neb.

OUTRIGHT or royalty. Dirigible headlights. Invention comprises automatic turning of lights with front wheels of car. Additional feature tilts lights down, illuminating dimmers. A. C. Woodruff, Oakridge, Ore.

1,371,138, **SIMPLEST**, fastest, handiest Calculating Machine yet invented. Cheap. Models. Does everything. Dr. Joseph H. Bair, Camp Hill, Pa.

PATENTS For Sale: To sell, buy or obtain patents write Patent News—P, Washington, D. C.

KITCHEN necessity, doughnut cutter; ejects centers. Particulars from Alfred Johnson, 2155 Clarence Ave., Racine, Wisc.

YOU have a worth-while patent, haven't you? Why don't you tell our two million readers about it? Most of them are specially interested in patents and new inventions. Ask me to tell you how other inventors successfully sold their patents. Geo. F. Baker, Manager, Classified Advertising, Popular Mechanics Magazine, Chicago, Ill.

WINDSTORM Hat retainer. Louis Pichler, 1766 E. 22d, Cleveland, Ohio

DOUGH cutter for biscuits, cookies, doughnuts or tarts, all in one article. Patented U. S. and Canada. Outright or Royalty. F. C. Morris, 91 Brookland St., Sydney, Nova Scotia.

ACCIDENT Preventor, excellent testimonials and illustrations; terms arranged. Thomas Ashton, Richlieu Hotel Edmonton, Alberta, Canada.

SPARK-PLUG tester, gasoline tank gauge, pet-cock opener and cleaner: All one article. Cheaply manufactured—Royalty. J. A. Perryman, Columbia, Ky.

PATENT For Sale—Patriotic game. Sam Koleff, 418 3rd St., Toledo, Ohio.

SURVEYING INSTRUMENTS

NEW and used surveying instruments direct from factory. Satisfaction guaranteed or money refunded. Wissler, 619 Broadway, St. Louis.

MODELS AND MODEL SUPPLIES

MODEL Making and experimental work; Modern Shop, expert workmen. Manufacturing, Lamson Electrical and Mfg. Co., 625 W. Jackson, Chicago.

PATENTS Procured. Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 562 Southern Building, Washington, D. C.

DIES, Tools and General Manufacturing. Models, and Manufacturing of new inventions our specialty. Logan Machine Co., 222 S. Clinton St., Chicago, Ill.

WE make working models for inventors and do experimental work and carry a complete stock of brass gears and model supplies. Send for catalogue. The Pierce Model Works, Tinley Park, Ill.

BEFORE ordering your model write for free copy of Moulcraft. R. G. Clynne Engineering Co., St. Louis, Mo.

INVENTORS—Write for our free illustrated guide book and Evidence of Concentration Blank. Highest references. Prompt attention. Reasonable Terms. Victor J. Evans & Co., 165 Ninth, Washington, D. C.

RACING 2 and 3 cylinder poppet valve engines, original steel boilers. Special plant; engine, boiler, torch \$22.50. Send 10c in stamp for catalogue. Model Machine Shop Co., 417 East 71 St., New York City.

FOR MANUFACTURERS

SPECIAL labor saving machinery, Jigs and Fixtures and other production tools. Punches and Dies for all kinds of metal stampings. Gauges, manufacturing and machine work to order. Simplex Tool Company, Woonsocket, R. I.

WANTED—Metal Stamping and Model work taken on contract basis. We are ideally located and equipped to develop patents. Meyers Company, Box 326, Bedford, Ind.

MANUFACTURING

IRON, Brass, Aluminum Castings, Models, Patterns, Light Manufacturing. Welch Brothers Co., North Chicago, Ill.

CANADIAN factory would manufacture your wood or wood and metal specialties for Canadian or Empire export trade. Write Crowley, Milne Company, Ottawa, Canada.

MR. Belt-User: Save 50% of your belt expense by eliminating the use of Belt Dressing. Send 2c stamp for free booklet to explain. Dielectric Mfg. Company, St. Louis, Mo.

WE specialize on Dies, Making, Stamping, Light Mfg. The Times Mfg., 410 Kimball St., Danville, Ill.

EXPERIMENTS developed, dies, models and manufacturing, machine designing. Estimates and information promptly given. Address Schroer Bros. Machine Works, 512 East 25th Street, Kansas City, Mo.

LONG established manufacturer of auto accessories which are daily sold by practically all wholesale and retail accessory houses will consider manufacturing and distributing new automobile products, capable of equally wide sale through same channels. Patented articles preferred. Address Auto Accessory Manufacturer, 1512 North American Bldg., Chicago, Ill.

SCREWS, nuts, screw machine products, all metals. Autosew Works, 355 West Broadway, New York City.

WE design and build special machinery. Send for free copy of Modelcraft, R. G. Cline Engineering Co., St. Louis, Mo.

SPECIAL labor saving machinery, Jigs and Fixtures and other production tools. Punches and Dies for all kinds of metal stampings, Gages, manufacturing and machine work to order. Simplex Tool Company, Woonsocket, R. I.

PATTERNS, wood and metal. Models, tools and dies. Brass, bronze, aluminum and iron castings. Screw machine work, production work of all kinds. Write Modern Machine & Pattern Co., Terre Haute, Ind.

WIRE Goods, all kinds, made to order. Cooley Mfg. Co., 524-530 N. Western Ave., Chicago.

MACHINERY, TOOLS AND SUPPLIES

CONCRETE Building Block Machines and Molds. Catalogue free. Concrete Machine Co., 303 South Third St., St. Louis, Mo.

ONE 22"x5" Planer \$225. 1-16"x6" Lathes \$175. 1-28" Shaper \$285. 1-12" Drill press \$40. All kinds of machinery and supplies. Cincinnati Machinery Supply Co., 218 E. Pearl St., Cincinnati, Ohio.

ELECTRICAL

X-RAYS Simply Explained. An excellent and practical book on radiography for only 25 cents, postpaid. 93 pages, illustrated. Paper covers. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

LEARN how to wind D. C. Armatures. Engineering students will find in this book by W. E. Hennig a simplification of a difficult yet important subject. Mathematical and technical discussions have been avoided as far as possible. Contains all diagrams heretofore scattered in many books. 265 pp. Illus. in colors. Cloth binding. Price \$3.50 postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

WHOLESALE Prices Motors and Electrical supplies, including sockets, taze, rosettes, switches, wire, conduit, cleats, kom, porcelain goods. Illustrated Catalog free. Hyre Electric Co., 633-HR S. Dearborn St., Chicago.

ELECTRICAL Experimenters—Here is the book you have been waiting for—"How to Make Things Electrical." 256 articles, 427 pages, 353 illustrations. Price \$2 postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

ENGINES, MOTORS AND DYNAMOS

FOR Sale— $\frac{1}{4}$ -H. P. steam engine and boiler. $\frac{1}{2}$ -H. P. gasoline engine, 4 cycle. Write O. Schoneman, 401 E. 51st St., New York.

GOVERNORS on used auto engines make good power plants. Circulars. Address Candee-Smith Governor Co., Springville, N. Y.

ALTERNATING Current Motor Batteries. Reliable Makes only, including new $\frac{1}{4}$ H. P.—\$13.00; new $\frac{1}{2}$ H. P. General Electric \$39.00. Westinghouse, Crocker-Wheeler, Wagner, Emerson, Century motors, special prices. All guaranteed for one year. Buy now before prices advance. Motors repaired and exchanged. Hyre Electric Co., 633-FX South Dearborn St., Chicago.

FOR MECHANICS

1,000,000 INDUSTRIAL Facts, Calculations, Receipts, Processes and Trade Secrets for every business are contained in the 1,016-page book "Moore's Universal Assistant and Complete Mechanic," 500 Engravings, Cloth. Price \$2 postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

PATENTS—Write for our free illustrated guide book and Evidence of Conception Blank. Send model or sketch and description of the invention for our opinion of its patentable nature free. Highest references. Prompt attention. Reasonable terms. Victor J. Evans & Co., 184 Ninth, Washington, D. C.

FOR THE SHOP

POPULAR Mechanics Shop Notes are published annually in book form; price 50 cents postpaid. The latest volume containing all notes in the magazine during 1922 is ready. Better send \$1 to-day for the two latest issues and get acquainted with these wonderful aids in your work. Back volumes are in great demand and we can supply 15 of them at 50c each. Altogether they make an encyclopedia of mechanical information that is priceless to the owner. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

BLACKSMITHS

BLACKSMITHS. Listen: Any Handy man can make more money doing hard jobs easy. Forging and welding solid, with Toy's Modern Methods of Blacksmithing. Hardening and tempering to a standard with colored tempering charts. All for one dollar. Samples Free. W. M. Toy, Sidney, O.

BLACKSMITHS, Plumbers, etc. Here's what you have needed for years. Simple, Powerful, Inexpensive Universal Bending Machine. Bends Eres, U's, Angles, etc. Bends $\frac{1}{4}$ " standard Pipe rold. Also bends Automobile Spring Eyes. Send for circular. Little Giant Bender Co., Lewiston, Minn.

BE a tempering wizard. Secret method of tempering. Add life and strength to steel. All kinds of drills, springs, chisels, etc., toughened and tempered by this formula. Non-breakable, absolutely reliable. Never fails. You need it. \$1.00. The Cold Chisel King, 607 N. San Dimas Ave., San Dimas, Cal.

FOR SALE—MISCELLANEOUS

KNITTING machine—Sacrifice at \$20. Paul F. Young, Bragadocio, Mo.

SPECIALLY prepared spongecloth with full instructions how to press your own clothes \$1.00. Spongecloth Co., P. O. Box 1167, Springfield, Mass.

ADDRESSGRAPHS, Letter Folders, Multigraphs, Envelope Sealers, Duplicators. Less than half price. Guaranteed. Pruitt Co., 112-B N. La Salle, Chicago.

SURE Grip. A jar holder with a broad metal band, rubber lined. Excellent for holding jars while preserving, in any position or for any purpose. Send 35c for sample Qt. size. Doz. \$2.75 Post Paid in U. S. A. Pat'd May 29, '25. The Shank & Buckwalter Co., Paradise, Pa.

FISHING Reel, Aluminum Folding Star Tyre. A Success, Albert Jenks, Thackery, Ohio.

REVOLUTION indicators, brand new, U. S. Air Service. 7" dial, 0-2500 RPM., Radium, for motorboats, autos, machine tools, aircraft. \$7.50. Air Transport Co. L. I. City, N. Y.

FOR Sale—Push Button Penknives \$2.00, postpaid. R. Wilson, 191 Fulton St., New Brunswick, N. J.

BUY—Exchange—Sell! Many of our readers have for sale or exchange the article you are looking for—and lots of them are looking for the very items you want to turn into cash. Get together! Let our two million readers know your wishes—they'll help you! Send your ad today to Gen. F. Baker, Manager Classified Advertising, Popular Mechanics Magazine, Chicago.

FOR Sale, complete set of Watchmaker's Tools at a Bargain. R. Jaegermann, 5815 Easton Ave., St. Louis, Mo.

GASOLINE Lamps and Lanterns. Catalog Free. Little Wonder Light Co., Terre Haute, Ind.

WANTED—MISCELLANEOUS

NOVELTIES for Australasia. Firm of Organizing Specialties with highest credentials, are ready to place any quick selling, useful specialty before 8 millions of people in Australasia. Anything to save labor, time or money. Send particulars, prices and free samples direct to London Traders Syndicate, Bon Marche Chambers, Karangahape Road, Auckland, New Zealand.

WANTED—State contracts. Kitchen specialties. Mail complete detailed offers. United Supply House, Lyons, Iowa.

WANTED. Copies of Popular Mechanics Magazine of October 1922 in good condition. Will pay 25 cents per copy. Address Room 311, Popular Mechanics Magazine, 200 East Ontario St., Chicago, Ill.

PRINTING Presses, Type, Small Lathes, etc., wanted. Overhauled machines for sale. F. M. Rusbeck Co., 42 Auburn St., West Newton, Mass.

CASH for old gold, silver, platinum points, diamonds, false teeth, Liberty Bonds, unused stamps, and precious articles. Goods returned immediately if not satisfactory. Bush Products, 144 Fifth Ave., New York, N. Y.

MAIL us your discarded Jewelry, Gold Crowns and Bridges, Watches, Diamonds, Silver, Platinum, and Old False Teeth. Money promptly mailed. Goods returned if offer refused. United States Smelting Works (The Old Reliable), Dept. 71, Chicago.

REAL ESTATE AND FARM LANDS

\$10 TO \$50 down starts you on 20, 40, or 80 acre tracts; near bustling city in Michigan; balance long time. Learn how we help you get a farm home. Write for free illustrated booklet giving full information. Swartz Land Company, 11259 First Nat'l Bank Bldg., Chicago.

"THE Real Estate Educator." 208 pages of practical information for everybody who owns, sells, leases or controls real estate of any kind. \$2.00 postpaid. J. R. McGinn, Dept. K, 1287 Pacific St., Brooklyn, N. Y. Descriptive folder free.

FOR Sale—Three full sections in McKenzie County and two sections in Billings County, North Dakota. Each section contains land suitable for crops, balance for cattle. Each section has valuable deposits of lignite which some day will alone be worth many times the present value of the land. This part of the state is developing very rapidly, with good schools within easy access. As owner cannot use this land himself, will sell one or more sections at a price which almost anyone can afford to pay. Address W., care Popular Mechanics, 200 East Ontario St., Chicago.

SELL your property quickly for cash, no matter where located. Don't pay big commissions. Particulars free. Real Estate Salesmen Co., Desk B., Lincoln, Neb.

FARMS wanted by cash buyers, various states. Describe, state lowest price. R. A. McNow, 312 Wilkinson Bldg., Omaha, Neb.

ATTENTION—"Get acquainted." Cash for your property. Farm, Hotel or Retail Store, no matter where located; confidential service. Hayes' Business Agency, Cincinnati, Ohio.

DOGS

WILL buy all breeds of puppies. 4969 North 64th, Chicago.

FOR Sale—Coon, opossum, skunk, and squirrel dogs; Fox, cat and rabbit hounds. Trial allowed. Catalog free. Mt. Yonah Farm Kennels, Cleveland, Ga.

COLLIES for Sale. Training Book 35c. Sunnybrae Kennels, Bloomington, Ill.

A **FREE** copy descriptive booklet of world's largest dog kennels will be mailed on request listing for sale the famous Oorang Alredales specially trained as watch-dogs, farm dogs, stock drivers, automobile guards, companions and hunters on all kinds of game. Also choice breeding stock, puppy stock, kennel supplies, dog foods, dog medicines, etc. Satisfaction and safe delivery guaranteed. Oorang Kennels, Box No. 20, LaRue, Ohio.

POULTRY

PLANS for Poultry Houses. All styles. 150 illustrations; secret of getting winter eggs, and copy of "The Full Egg Basket." Send 25 cents. Inland Poultry Journal, Dept. 74, Indianapolis, Ind.

PERSONAL

UNUSUAL Horoscope—Six pages covering full year. Includes extensive reading, Astro-Analysis, valuable daily guide and special forecasts for each month. Scientific, complete. Try it. Send birthdate and 50c. Money returned if dissatisfied. Prof. Bolles, Box 5, Fordham Station, New York, N. Y.

FREE—Information of a scientific nature that has brought happiness through perfect health to thousands. No charge; no obligation. Enclose stamp for reply. C. O. Wood & Co., 551 East 47th Street, Chicago, Ill.

YOUR Horoscope—Business, Character, Changes, Friends, Enemies. Send birth date and ten cents (stamp) for remarkable test reading. Zanya, C-202 TW, 165th St., New York City.

YOUR greatest asset is Personality. Add to your stock success tips and self-revealing chart 10c. Thomson-Heywood, Dept. PM, Chronicle Bldg., San Francisco, Cal.

ARE things coming your way? They should! Send dime and birthdate for your guide to Happiness. Box 471, Huron, S. Dak.

ARE you bashful, self-conscious, easily embarrassed? These troubles overcome. Send dime for particulars. C. Veritas, 1400 Broadway, New York, N. Y.

TOBACCO Kills Manly Vigor. Quit easily. Cigarettes, chewing, smoking, snuff conquered or no charge. Small sum if satisfactory. Stops craving; harmless. Full treatment on trial. Perkins Co., 34-A, Hastings, Neb.

ARE You Old at Forty? See our advertisement on page 132 of this issue. The Electro Thermal Company, 2123 Main Street, Steubenville, Ohio.

FREE—Stop using tobacco. We will give free information how to conquer habit easily and permanently. Results guaranteed. Anti-Tobacco League, Box K, Omaha, Neb.

TOBACCO or Snuff Habit, cured or no 10c. \$1.00 if cured. Remedy sent on trial. Superba Co., TP, Baltimore, Md.

MISCELLANEOUS

LOCKSMITHS: Send \$1.00 for valuable chart for cutting tumbler padlock keys. Globe System, 278 Washington St., Newark, N. J.

CONCRETE Handbook, New, for the Amateur. We have just published a book describing 173 ways of using concrete in the home, shop and on the farm, with full directions for doing these things yourself with ordinary tools. 138 illustrations. It is "written so you can understand it." Price 50 cents, postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

INDIAN Eye Stone. Painless, sure, 50c. 3 sizes \$1.00. H. G. Brown, Lake Chelan, Washington.

ARE you old at forty? See our advertisement on page 132 of this issue. The Electro Thermal Company, 2123 Main St., Steubenville, Ohio.

MANUFACTURE chewing gum. No machinery necessary. Particulars for stamp. A. J. St. Germain, P. O. Box 575, Lewiston, Me.

ART Metal Workers—You will find our book "Metal Work and Etching" a complete manual on making book ends, desk sets, pad corners, paper knives, letter openers, stationery racks, rocking blotters, desk calendars, arts and crafts jewelry, etc.; 96 pp. illus. Price 50 cents postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

INCORPORATION in Arizona Completed in One Day. Any capitalization, least cost, greatest advantages. Transact business anywhere. Laws, by-laws and forms free. Stoddard Incorporating Co., Dept. 2, Phoenix, Arizona.

ARTIFICIAL Eyes, \$3. Booklet free. Denver Optic, 559 Barclay, Denver, Colo.

CUTS anybody can make. Simple, cheap process. \$1. Specimens, particulars, 20 stamp. M. Day, Windfall, Ind.

HOMEOPATHIC and Biochemie preparations sent postpaid to all parts of the world. Manual and booklets free. Halsey Bros. Co., 111 N. Wabash Ave., Chicago, Illinois. Established 1855.

STARTING a Company? Save expenses and taxes by organizing on the popular, Common Law plan under a pure Declaration of Trust. No experience required to fill in Demaree Standard Forms, issue shares and begin doing business at once. Genuine Demaree Forms are nationally known, approved by attorneys and utilized by successful concerns throughout the United States. Send for large, free pamphlet (C-58) containing valuable information that you may need. C. S. Demaree, legal blank publisher, 708 Walnut, Kansas City, Mo.

POCKET Maps. We will send you a reliable and comprehensive Rand-McNally indexed pocket map, tourists' and shoppers' guide of any state in the union, Canadian provinces, Alaska, Mexico or Central America, postpaid, upon receipt of 35 cents; also a splendid pocket reference map of practically any foreign country at 50 cents postpaid. Popular Mechanics Book Dept., 200 E. Ontario St., Chicago.

NEW INVENTION BURNS AIR IN ANY RANGE OR HEATER

Heats, Cooks and Bakes Better Than Coal or Wood. Cuts Housework in Half. Avoids Expensive Heat Waste. Proved by Many Severe Tests to Be Best Kind of Heat. Then Recommended to Housekeepers.

MANY modern homes are being built without coal bins or wood sheds simply because it is so much easier and cleaner to burn free air. Science has shown that one part of coal oil (kerosene), the cheapest of fuels, can be mixed with twenty parts of air (by a remarkable burner) and the result is a gas that is simply wonderful for heating, cooking and baking.

The Simplest Device of All

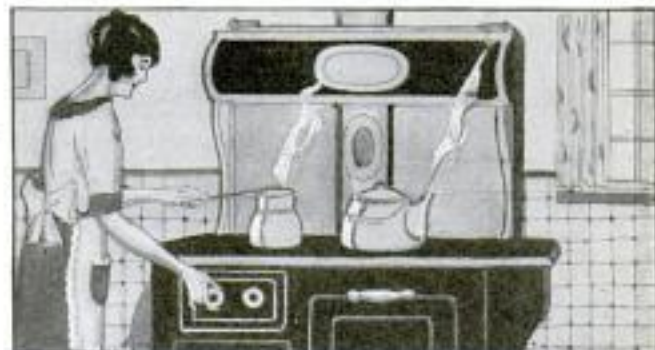
Following the original discovery of this new, easy way to make every stove a gas stove—a method which is used extensively in our Navy—devices were made which could be used in any kind of range, or heater and those housekeepers who were abreast of the times began to install them as fast as they could be secured.

Heat at Twist of Wrist



Don't freeze while building Winter Area. A twist of the wrist brings cheerful heat in few seconds.

Then, recently, later discoveries showed how to cut out certain parts and yet get even better results. The device which embodies these latest discoveries is called NU-HEAT. It is installed in any range or heater in a jiffy. It does away with all worry as to coal or wood prices or scarcity. It cuts half your housework and the dirtiest and most disagreeable half, at that. Not necessary to BUILD a fire. Just a twist of the wrist and in a few seconds there is an intense cheerful glow that warms the largest rooms on the coldest mornings in a few minutes. NU-HEAT gas is much cheaper than city gas. Gives three times the heat of coal—and it burns at a steady, even temperature that gives far better baking results than coal.



A twist of the wrist brings a fire in a few seconds. Good steady oven heat for better baking.

30 Days Free Trial

Absolutely safe. Nothing to get out of order. Sold under an iron clad guarantee. Sent on 30 days free trial.

Send for Free Book

Write for complete information FREE. Learn how to cut housework in half. Learn how to economize by having all the heat you want but only when you need it. Learn how to have the warmest, cleanest, coziest home in town. Learn how to get better cooking and baking results than ever before. Just say "Send NU-HEAT information." Mention if you have heater, range or furnace. Write at once to

WADE HILL MANUFACTURING CO.
Dept. 839 ST. LOUIS, MO.

Agents make \$50 to \$200 a week selling what every up-to-date woman wants. Here's a better burner at a low price—every home can easily afford. Personal co-operation. Free Sample Case offer. Write quick for exclusive territory.

Agents

**Establish
a business
of your own**

**Make from
\$250⁰⁰ to \$500⁰⁰
a month with
the GOODWEAR
Tailoring Line**

**No Capital
Required**

**No Experience
Necessary**

**The Handsomest
Selling Outfit Ever Offered**
Big assortment of All-Wool
Suits and Overcoatings.
Also Women's Overcoatings,
Men's and Women's Rain-
coats—all in large size swatch
samples—and a Sales Manual
that really tells you how
to sell.

There's money for **You** in the **Goodwear Tailoring Line**—big money—as much as you care to make. Beginners—men who never sold a dollar's worth of goods before—are making \$50 to \$100 a week. Experienced men make \$500 a month *and more* selling our tailored to measure **Guaranteed All-Wool Suits and Overcoats** all at one amazing low price that is fully \$25.00 less than regular retail prices. You save your customer about \$25.00 on his suit or overcoat besides making a fine profit for yourself on each order.

You Get Your Profits in Advance

You get your profit cash in hand the minute you take the order. Our values are so great, so startling, your man will buy as soon as he sees your samples. When he buys from you once he's your regular customer. He will recommend you to his friends and your business will grow rapidly from month to month.

1000 New Agents and Salesmen Will Be Put On by Us This Season

We will take on 1000 more good agents, furnish them with the beautiful complete sample line and outfit as illustrated and these men will make from \$50.00 to \$100.00 each and every week selling **Goodwear All-Wool suits and overcoats** all offered the customer his choice of any material, all at one sensational astonishing low price. *Would you like to become one of these big money making independent Goodwear agent-salesmen building up a fine business?* Then write us today sure, and we will send you complete details, everything about the business and start you on the road to big money making and an independent job.

No Experience Needed

We show you everything and there is nothing difficult. If you are honest, ener-

getic and ambitious, even if you've had no experience, *even if you can give us only your spare time*, you will make a success. Investigate this startling opportunity—find out the great advantages we offer. Sign and mail coupon below or write us a letter or postal today.

Special to Agents and Salesmen of Other Lines

Write at once and get **Our** proposition. *It is so much better* than anything you have. No matter what you are doing, selling groceries, books, soap, shirts, raincoats, kitchenware, cutlery, toilet goods, other lines of tailoring or just working, write today and see what we offer. Nothing sells as easy as **Goodwear Tailoring**, the values are so remarkable; nothing else offers such a great money-making business-building opportunity.

Write Today Sure

If you want to break into the most profitable branch of the selling field—if you want to tie up with one of the most responsible houses, if you want to make the greatest amount of money from your time—in short, if you want to be an unqualified sure-fire success, fill out the coupon or write us a letter or postal today sure.

FILL THIS OUT AND MAIL—TODAY

GOODWEAR CHICAGO, Inc., Dept. 520, Chicago

Please send me, all free, full particulars of your proposition

NAME _____

P. O. _____ STATE _____

ST. & NO. _____ R.F.D. _____ BOX _____

GOODWEAR *Chicago, Inc.* Dept. 520
Chicago

California's Auto School



New and finer National Automotive Bldg., located across the street from 130-acre Exposition Park, Los Angeles, Cal.

The many unusual advantages offered by National Automotive training, together with the wonders of a trip to California, will more than repay your railroad fare.

World's Largest Stadium, Exposition Park, Los Angeles



Wants 250 Men to Train for Auto Jobs Now Open

Only men who have the keenest desire to get into big-pay auto jobs are urged to answer this advertisement.

Now, auto opportunities are greatest in California. A million autos in the State—garages needed, repair shops needed, hundreds of auto jobs open.

This opportunity for only 250 mechanically inclined men. National Automotive is a **quality** school—our practical system of individual and specialized instruction makes it impossible to take thousands of students as some schools do. For this reason National Automotive is known as "Training Headquarters for Auto Experts." Since 1905 National Automotive has trained men to become auto experts. Now a new and greater National Automotive building and thousands of dollars' worth of new and special equipment are ready for you. Also wonderful recreation advantages—ball grounds, gymnasium, world's largest stadium, amusements, etc., across the street in 130-acre Exposition Park, all free to you.

FREE Illustrated Auto Book

sent only to men who are ready to come to Los Angeles to take this splendid course. A book of auto facts and information about National Automotive—tells why National training is more thorough and practical: how we make you a big-pay expert in a short time; how you can earn your room and board while learning. How National free employment service finds your job for you. Write today for this big free book.

National Automotive School

Dept. 51, 4001 S. Figueroa St.

Los Angeles, California

National Automotive



Accredited Day and Evening Courses leading to the degree of

Doctor of Medicine & Surgery

Study Medicine at night

Opportunity to work way through School, make up pre-medical credits. For catalog, address Registrar, Box 225, Chicago Medical School, 3122 Reser Ave., Chicago

OUR BUREAU OF INFORMATION will answer all questions regarding articles appearing in this magazine. Address Bureau of Information, Popular Mechanics Magazine, Chicago.

FREE FIRST LESSON RECORD

Learn to Play

Violin-Mandolin, and Banjo Mandolin without embarrassment by the World's Most Successful Method. Personal instructions on Records taught by the famous Prof. F. M. Schneider. Six year combined course teaches all three instruments. Simple as A. B. C. Play for money in 2 months. 30,000 have learned to play beautifully.



\$25 Instrument FREE With Course

Your choice of any one instrument given absolutely free to one pupil in each locality. Only small charge for lessons—a few cents a week. Success assured.

Write Today for Free Record

Send no money. Just ask for first lesson Record on one week's approval. We want to prove to you as we have to thousands of others the wonderful advantages of learning music the more simple and easy way by our personal instruction lessons given on Records. Write at once! TODAY!

SCHNEIDER SCHOOL OF MUSIC

Dept. B-8, 238 Vermont St., Blue Island Ill. (A suburb of Chicago)

AGENTS

For the Biggest Money-Making Selling Proposition You Ever Saw

See Pages 126 & 127

WANTED!

U. S. RAILWAY
MAIL CLERKS

\$133 to \$192 Month. Every second week off—full pay. Common education sufficient. Write IMMEDIATELY for free list of Government positions now obtainable; free-sample examination questions and schedule showing places of coming examinations in your locality.

FRANKLIN INSTITUTE Dept. W-352 ROCHESTER, N. Y.



THE PRACTICAL
Automobile, Wagon,
House and Sign Painter

By W. F. White
Postpaid \$1.00

This book is written for the man who wishes to paint his automobile, or his home, or wagon. It will tell the inexperienced just how to do it, and it will tell him how to mix paints. It also contains many painters' recipes and trade secrets of great value. Bound in Cloth—157 pages—Size 5 x 7 1/2.

Postpaid \$1.00

SHREWSBURY PUBLISHING COMPANY
5525 West Lake Street Chicago, Illinois

BIGGER PAY



The Entrance Fee— A Dime a Day!

HomeStudyBooksThatMake Happy Days of Pay Days. Select Your Own Line From This List for Week's Free Use

- | | |
|---|---------|
| 5 vols. Carpentry & Contracting—was \$37.50 now..... | \$19.80 |
| 12 vols. American Law & Practice (including free reading course and 250 page book of standard legal forms) was \$97.50 now..... | 49.80 |
| 8 vols. Applied Electricity—was \$60.00 now..... | 29.80 |
| 6 vols. Auto Engineering—was \$45.00 now..... | 21.80 |
| 9 vols. Civil Engineering—was \$67.50 now..... | 34.80 |
| 8 vols. Business Management—was \$52.50 now..... | 29.80 |
| 7 vols. Steam and Gas Engineering—was \$52.50 now..... | 24.80 |
| 4 vols. Sanitation, Heating & Ventilating—was \$30.00 now..... | 14.80 |
| 4 vols. Fire Prevention & Insurance—was \$30.00 now..... | 14.80 |
| 6 vols. Modern Machine Shop Practice—was \$45.00 now..... | 21.80 |
| 4 vols. Telephone & Telegraphy—was \$30.00 now..... | 14.80 |
| 4 vols. Drawing—was \$30.00 now..... | 14.80 |

Free Consulting Membership

A resident consulting staff of from 15 to 20 practical experts is waiting to solve for you any difficulty that you may have. A letter or a wire to American Technical Society will bring you an immediate answer and the solution to your problems. This advisory staff of practical men plus your working and reference library will enable you to handle successfully any job in your line. These men know all the latest methods and the newest and best ways of doing things. Let this pay-raising consulting staff be YOUR SILENT PARTNER. Use this service daily if necessary.

This free consulting membership offer is good for a limited time only and can be withdrawn without notice.

Would you spend a dime a day to double your pay? You can earn more money each pay day—without going to school. One of our home study courses in book form will give you more knowledge than you can ever acquire by going blindly ahead as a dutiful workman. That job above is not out of your reach if you'll study in your spare time or consult these books while "right on the job." Whenever you strike a "snag," look in the books and solve it instantly.

Anyone who can read plain English can understand these books. They are simply written, with all jaw-breaking technical terms omitted. They are prepared by the world's greatest experts in each line. Everything is explained. Every process is pictured out. You don't have to use your imagination. Thousands of illustrations, diagrams and plans in each set. Consult the list at the side of this ad, select the line that you wish to know more about, then mail the FREE TRIAL coupon that brings the set of books to you without any money in advance.

Use Books FREE for One Week

Send no money—just fill out the coupon. After you receive the full set of books, express collect, read them over and test them out for seven days. If you don't want them, send them back at our expense. If you decide they will do for you what they have done for more than 200,000 others, pay \$2.80 within one week and \$3 each month thereafter until the special price is paid. This amounts to only ten cents a day. Mail coupon NOW if you want a bigger, better job at higher wages.

Here's your opportunity, if you want to EARN MORE MONEY. Remember, we are taking all the chances—you pay NOTHING unless you are absolutely eager to after seeing the books. Isn't this about the fairest proposition you ever saw in print?

**American
Technical
Society**

Dept. X-19-C

Chicago,
Illinois

© A.T.S. 1923

**American
Technical Society
Dept. X-19-C, Chicago**

Please send me a set of.....
for seven days' FREE EXAMINATION, shipping charges collect. I will examine these books thoroughly, and if satisfied, will send \$2.80 within seven days and \$3 a month until I have paid the special price of \$..... If I decide not to keep the books, I will return them within one week at your expense. It is understood that if I keep the books I am entitled to a FREE Consulting Membership in the.....
.....
division of the Society.

Name.....

Address.....

Reference.....
(Please fill out all lines, give local merchant, banker or employer as reference.)



Over Crossed

Learn Mechanics

Be Independent

Over 20,000 Sweeney Men are in business for themselves. Garages, tire shops, vulcanizing shops, auto agencies can be started everywhere.

LEARN PRACTICAL ELECTRICITY

If you prefer electrical work I have the finest practical electrical course in the United States. You can qualify in three months for a real job by the Sweeney System of Practical Experience. You don't need to be an engineer or scientist to install, operate and repair all kinds of electrical machinery. We teach with tools. You learn by actually working on our \$150,000 special equipment in this world-famous Million-Dollar Trade School where we have turned out 60,000 trained mechanics.

**Free Railway
Fare to Kansas
City - Free
Radio Course
No Extras**

WHY not make your work play, by working at what you like? If you like machinery, if you are mechanically inclined, and are game, are not afraid of working in grease, gasoline, you and I will get along together fine. I cannot teach any man a trade if he does not like his work. If you don't like to work in the dirt, grease, among machinery, you are not mechanically inclined. If you are, write me, and write me NOW! Don't put it off, but get busy, get your pencil, fill out the coupon in the opposite corner, and mail it to me for my book.

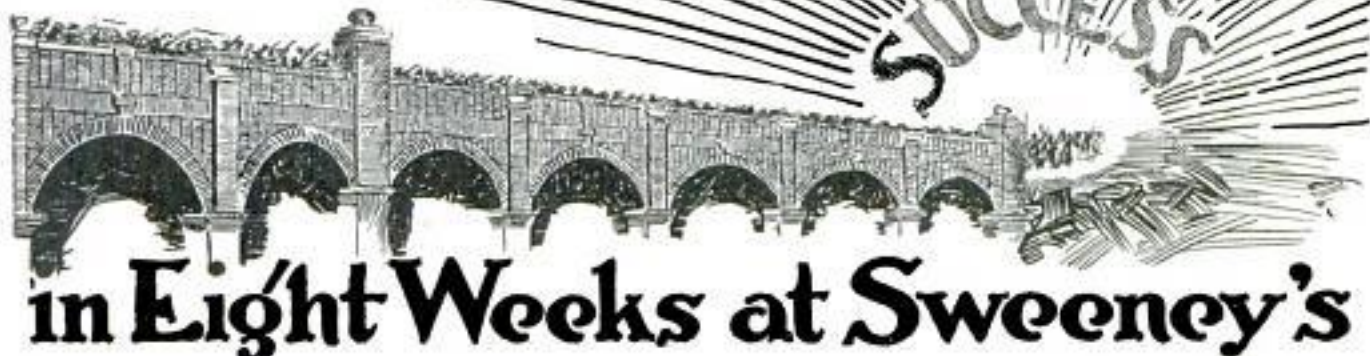
The Sweeney System of Practical Instruction

is the ONLY WAY to learn if you want to save time and money and be properly trained. You get this at the WORLD'S greatest trade school, the MILLION DOLLAR SWEENEY SCHOOL and you get it nowhere else.

Now is the time for you to learn a trade. I teach men to be successful auto mechanics. Can you make a tire? Can you weld a broken crank case? Can you build a battery? Can you repair an automobile? Can you go anywhere in U. S. and get a job in a garage, repair shop, auto agency tire shop, welding concern? Can you get a job as a driver or chauffeur?

LEARN
Sweeney
AUTOMOTIVE &
1201 SWEENEY BLDG.

60,000 Men Have This Bridge to Success



in Eight Weeks at Sweeney's

IF you like mechanics and want proof that you can make a real success in the auto and electric business look at the sixty thousand Sweeney trained men, many owning their own business, in all parts of the U. S. and foreign countries. These men learned their trade in eight weeks at the greatest trade school in the world, the Million Dollar Sweeney School. No previous experience is necessary. You will learn here-by the Sweeney System of Practical Experience, with tools, not books, by doing the actual work with your own hands on all kinds of cars, engines, parts, etc. The cost of training is small. Real jobs, success and independence reward the trained man.

With over TWELVE MILLION automobiles running the demand for mechanics, demonstrators, chauffeurs, truck drivers, garage men, etc., is greater than ever before. Countless opportunities in cities and towns and even remote places. Probably I can give you the names of successful Sweeney men right in your locality.

The AUTOMOBILE BUSINESS is America's greatest industry. It employs twice the capital of all the National banks in the United States. Yet this great business is just beginning. In ten years there will be over 23 million pleasure cars alone. That is about one for every family. Trained mechanics are in demand. Hundreds of thousands of men are needed not only as mechanics but as salesmen, garage owners, tire repairers, dealers, demonstrators, chauffeurs, etc.

FREE Simply send name today for my big 64-page catalog. Shows hundreds of pictures of men at work in the school. Tells all about wages, profits, opportunities in auto and tractor business. Explains step by step how you learn. Interesting letters from graduates telling how they made good. Shows how men come from all over the world to this big school. Makes you want to join the crowd. Tells everything you want to know. No costs, no obligation. Clip the coupon, or a postcard will do. Get the catalog now—that's the first step. Don't put it off one minute. No colored students accepted.

E. J. SWEENEY, President

If you are mechanically inclined I want also to tell you of many opportunities, not merely of getting employment at \$50.00 a week and up, but of owning your business, of establishing yourself as a garage owner, or partner, mechanic,

vulcanizer, tire dealer, battery station, automobile agent.

This is a young man's game—a game that doesn't take much investment, but does require training. Every man is a capitalist who has trained hands, trained brains, and KNOWS WHERE

TO LOOK for opportunity.

Of the Sixty thousand men I have trained I estimate that 20,000 are in business for themselves. I want you to read

letters from hundreds of men just like you, without experience, but with energy, who prepared themselves by 8 weeks intensive training at the Million Dollar

Sweeney School, for the big opportunity afforded by the automobile and electrical business. I am making a

special **THIRTY DAY**

OFFER. That is why you

should not delay. The first

step is to send for this

big free illustrated

catalog.



CLIP THIS COUPON

EMORY J. SWEENEY, President

Dept. 1201, Sweeney Bldg., Kansas City, Mo.

Please send me free without any obligation on my part your 64-page catalog and your Sweeney School News. Tell me of the opportunities in the Auto and Electrical Business.

Name

P. O.

State

A TRADE

Sweeney

**ELECTRICAL SCHOOL
KANSAS CITY, MO.**



ENTISTRY MECHANICAL

**THE IDEAL VOCATION FOR MEN
WHO ARE MECHANICALLY INCLINED**

Dentistry needs more Mechanical Dentists. For men who like mechanical work, Mechanical Dentistry offers an exceptional opportunity to rise above a limited income into professional work with professional earnings.

TRAIN 3 MONTHS—THEN EARN \$35 TO \$125 A WEEK
The Dental Profession is constantly calling for graduates of the four great schools of this institution. From \$35 to \$45 a week to start, with advancement up to \$125 a week. Many positions are unfilled for weeks because of the great shortage and the demand.

ESTABLISH A BUSINESS OF YOUR OWN

Work with a Surgeon Dentist, in a Dental Laboratory, or establish a business of your own with unlimited earning possibilities. Dental experience or special education not required.

FREE 36-PAGE ILLUSTRATED CATALOG

Contains illustrations of students "Learning by Doing" actual practical work through individual instruction, day and evening sessions. Describes the great field and demand, and how you can "Earn While Learning." Investigate—Write today for Free Catalog No. 2.

Founded 1892—No Correspondence Courses

BODEE DENTAL INSTITUTE

NEW YORK
136 West 52d Street

PHILADELPHIA
1305 No. Broad Street

BUFFALO
1226 Main Street

BROOKLYN
15 Flatbush Avenue

SEND NO MONEY

**If You Can Tell it from a
GENUINE DIAMOND Send it back**

To prove our blue-white MEXICAN DIAMOND cannot be told from a GENUINE DIAMOND and has same DAZZLING RAINBOW FIRE, we will send a selected 1 carat gem in Ladies Solitaire Ring (Cat. price \$5.25) for Half Price to introduce, \$2.63, or in Gent's Heavy Tooth Belcher Ring (Cat. Price \$6.50) for \$3.25. Our finest 1 1/2 Karat Gold Filled mountings. GUARANTEED 20 YEARS. SEND NO MONEY. Just mail postcard or this ad, State Size. We will mail at once. When ring arrives deposit \$1.63 for Ladies ring or \$3.25 for Gent's with postman. If not pleased return in 2 days for money back less handling charges. Write for Free catalog. Agents Wanted. MEXICAN DIAMOND IMPORTING CO., Dept. ET, Las Cruces, N. Mex. (Exclusive controllers Mexican Diamonds)

HOME LOVERS' BARGAIN BOOK FREE

Showing Over 10,000 Furniture Bargains
All selections loaned free for a month. Take a year to pay if satisfied, paying little by little almost as you please.
SPIEGEL, MAY, STERN CO., 1108 W. 35th St., Chicago

FREE \$20

Violin, Hawaiian Guitar, Ukulele, Guitar, Mandolin, Cornet, Banjo-Ukulele, Tenor Banjo or Banjo
Wonderful new system of teaching note music by mail. To first pupils in each locality, we give a \$20 superb Violin, Mandolin, Ukulele, Guitar, Hawaiian Guitar, Cornet, Tenor Banjo or Banjo absolutely free. Very small charge for lessons only. We guarantee success or no charge. Complete outfit free. Write now. No obligation. SLINGERLAND SCHOOL OF MUSIC, Inc., Dept. 214, CHICAGO, ILL.

BLANK CARTRIDGE PISTOL

Protection
Against
Burglars,
Tramps,
and Dogs

PRICES
50c
\$1.00
Post-paid

Well made and effective; modelled on latest type of Revolver; appearance alone is enough to scare a burglar. When loaded it may be as effective as a real revolver without danger to life. It takes standard .22 Cal. Blank Cartridges obtainable everywhere. Price 50c. Superior quality \$1.00 postpaid. Blank Cartridges, by express, 50c per 100. Johnson Smith & Co., 1218 Washington Ave., Dept. 949, Racine, Wis.

"THERE'S MONEY IN IT"

AT HOME **LEARN TELEGRAPHY** AT HOME
MORSE AND WIRELESS



TEACH YOURSELF in half usual time, at trifling cost, with the wonderful Automatic Transmitter, **THE OMNIGRAPH**. Sends unlimited Morse or Continental messages, at any speed, just as an expert operator would. Adopted by U. S. Government, and leading Universities, Colleges and Telegraph Schools. 3 Styles. Catalog free. **OMNIGRAPH MFG. CO., 16-22 Hudson St., NEW YORK**
If you own a Radio Phone Set—and don't know the code—you are missing most of the fun.



SHOP WORK with a

CARNES ARTIFICIAL ARM

FOR nearly ten years a Carnes Artificial Arm has kept Mr. Pabbe Yazze of Lawrence, Kan., on the payroll as a draftsman and machinist at a good salary. Thousands of other mechanics, artisans, office workers, farmers and laborers owe their independence to this improved arm.

Life-Like in Action and Appearance

The Carnes Arm cannot be detected from the natural except by close inspection. Its user can dress himself, use knife, fork, pen, pencil and keys; pick up large or small objects, carry grips—in fact, do virtually everything that was possible before. He can bend the elbow of the Carnes Arm, bend and turn the wrist and open and close the fingers at will, even if the amputation is at the shoulder.

192-Page Book FREE. A book of 192 pages, profusely illustrated with photographs showing what can be done with this remarkable invention, will be sent free to any person interested. Send for it now.

CARNES ARTIFICIAL LIMB CO.,

208 Carnes Bldg., Kansas City, Mo.

AUTO MECHANICS NEEDED

We have more positions available than graduates to fill them. Write today for catalog.

Address Dept. 328

AMERICAN MOTOR SCHOOLS, Inc., Washington, D. C.

Learn Expert Auto Painting



There is **Big Money** in auto painting and refinishing. Our Home Study Course in Practical Auto Painting will enable you to do the finest work and earn big wages. Wonderful opportunity for new money-making business of your own.

FREE circular tells all about this big new business. Be first. Write quick.

CHICAGO COLLEGE OF AUTO PAINTING

Dept. 53, 140 S. Dearborn St., CHICAGO, U. S. A.

LEARN WATCHMAKING

and become independent. Good-paying positions secured. Easy to learn. Send for FREE CATALOG.

ST. LOUIS WATCHMAKING SCHOOL, Dept. 5, ST. LOUIS, MO.

Buchstein's Fibre Limb

is soothing to your stump—strong, cool, neat, light. Easy payments. Braces for all deformities.

D. BUCHSTEIN CO.
113 6th St. S., MINNEAPOLIS, MINN.

Send for Catalog Today

DEAFNESS IS MISERY

I know because I was Deaf and had **Head Noises** for over 30 years. My invisible Antiseptic Ear Drums restored my hearing and stopped Head Noises, and will do it for you. They are Tiny Megaphones. Cannot be seen when worn. Effective when Deafness is caused by Catarrh or by Perforated, Partially or Wholly Destroyed Natural Drums. Easy to put in, easy to take out. Are "Unseen comforts." Inexpensive. Write for Booklet and my sworn statement of how I recovered my hearing.

A. O. LEONARD, Suite 226, 70 5th Avenue, New York City



An Easy Way to Learn PHARMACY AT HOME

Graduate pharmacists are always in demand. The work is interesting and pleasant and salaries are good. Many young men open drug stores of their own and become independent.

There's an easy way to learn pharmacy right in your own home in spare time, without losing a day or a dollar from your present work.

The International Correspondence Schools course in Pharmacy supplies the knowledge which it will be necessary for you to have in order that you may pass your State Board Examination.

Just mark and mail the coupon printed below to the International Correspondence Schools, Box 5536-D, Scranton, Pa., and full particulars about the Pharmacy Course or any other work of your choice will come speeding to you by return mail.

INTERNATIONAL CORRESPONDENCE SCHOOLS Box 5536-D, Scranton, Penna.

Without cost or obligation, please send me full information about the subject before which I have marked an X in the list below:

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|--|---|
| <input type="checkbox"/> PHARMACY | <input type="checkbox"/> Civil Engineer |
| <input type="checkbox"/> Chemistry | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Automobile Work | <input type="checkbox"/> Mine Foreman or Engineer |
| <input type="checkbox"/> Navigation | <input type="checkbox"/> Steam Engineer |
| <input type="checkbox"/> Agriculture and Poultry | <input type="checkbox"/> Gas Engine Operating |
| <input type="checkbox"/> Mathematics | <input type="checkbox"/> Wireless <input type="checkbox"/> Airplane Engines |
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electrician | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Plumbing and Heating |

BUSINESS TRAINING COURSES

- | | |
|---|---|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Foreign Trade |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Business Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |

Name.....
Street.....
Address.....

City.....State.....

Occupation.....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada.

Please Mention Popular Mechanics

WHY NOT YOU?



Garage foreman at \$75⁰⁰ a week ~ and in line for further promotion

Positions like this are waiting for men who can fill them. **AND BIGGER JOBS AHEAD.** Above the foreman, there is a better job as Service Manager. Every automobile dealer, every service station in every city in the country, needs one or more high grade foremen or superintendents. "Where can we get trained men?" they ask despairingly. *They will willingly pay big money to you if you can fill one of these jobs.* They want men who are not only good auto mechanics, but who know shop management, modern repair methods, electric service, and who have a thorough understanding of the business as a whole.

You can get that knowledge in three months at the Michigan State Automobile School in Detroit, the Auto Center.

I CAN MAKE YOU A BIG MONEY MAN

Whether You Are Now a Mechanic or Not

Are you mechanically inclined? If so you can develop that aptitude and make a success in the automobile business. Not necessarily as a mechanic, but as a business man—with a foundation of mechanical training so that you "know how" and can direct the work of others. Our training will enable you to rise above the ranks to a position of responsibility. Successful men are not "born," they are "made." Foresight, planning, training, is what "makes" them.

Do you know that in one month of this year 404,000 new automobiles were built? Notice in every city, the automobile dealers have fine establishments. "Automobile Row" is the center of activity. The automobile dealer is the biggest man in this great business. Can you begin to imagine how great the need is for big men to lead the business of giving service to these cars? The opportunity is simply astounding. The industry has advanced so fast that enough trained men have not been developed to hold the big pay jobs.

I can fit you for one of these jobs, and even to run a business of your own, to have a service station or be an automobile dealer. Our graduates are doing it now all over the U. S. A., and in many other countries. I can start you to success, as I have thousands of other men. This School and its courses are endorsed by automobile manufacturers and service men.

Write to me today for full information. I want you to have a good job. I can qualify you quickly. Write to me today.

A. G. ZELLER

MICHIGAN STATE AUTOMOBILE SCHOOL
Box 6868, 3729 Woodward Ave., Detroit, Michigan

***** Write a letter or use this coupon *****

A. G. Zeller, Michigan State Automobile School,
Box 6868, 3729 Woodward Ave., Detroit, Michigan

Tell me how I can become a big money man. My present work is

.....
Full Name.....

St. or R. F. D.....

City..... State.....

I am earning \$..... My age is.....

Play For Fun or Profit

Gibson
Instruments

Gibson MASTER-TONE TENOR BANJO

A masterpiece of workmanship, design, finish and tone. Easy to play and keep tuned, short scale, oval frets, light weight, completely equipped. Features are floating head, ball bearing contact air chambers, tuned to pitch, correct voicing, air bridge, co-ordinator, tone projector.

MAKE \$2,000 to \$5,000 A YEAR

Player-agents wanted: Organize Orchestra; we help you receive commission. Small payment, then \$6.00 a month pays for a Gibson; brings wholesome year-round entertainment and profit. Guaranteed for life.

Gibson
Instruments

Easy to Play
Easy to Pay

"Music Pals of the Nation"

Liberal allowance on old instrument in exchange for a Gibson.

Mandolin	Mando-bass	Mandolin-banjo
Mandola	Guitar	Tenor-banjo
Mando-cello	Harp-Guitar	Cello-banjo
	Guitar-banjo	

Write today for free book, catalog, free trial offer, stating the Gibson you prefer.

Gibson Mandolin-Guitar Co.
1587 Parsons Street
KALAMAZOO, MICH.



Summer Home in Maine

A gentleman's estate of 175 acres on the Maine coast, with frontage on a lake 9 miles long; master's house; large bungalow; caretaker's house; large garage; barns; private electric light and inexhaustible water works, and every modern improvement. Forty acres very large trees. Golf and yacht clubs only a few minutes away; good markets in the town.

The scenery of mountains, lake and ocean is pronounced one of the best five in New England. House and bungalow both completely furnished; steam heat.

Place will be sold at a great bargain as owner can no longer use it.

Address OWNER

206 East Ontario Street CHICAGO, ILL.



How to Box 40c

By Terry McGovern,
James J. Corbett,
J. Gardner Smith, M. D., Arthur P.
Keeley and Gus. E. Keeley.

How to Box to Win, How to Build Muscle;
How to Punch the Bag and How to Stand,
Walk or Run.

This interesting book written by experts
is known also as "The Book of Health and
Strength." It will greatly assist everyone
in keeping fit, in putting them in condition
to master a strenuous undertaking either
physical or mental.

62 illustrations, Size 4 1/2 x 7 1/2 in. Paper cover. 128 pages
SHREWSBURY PUBLISHING CO.
5525 West Lake Street, Chicago, Ill.



\$100.00 EARNED BY YOUNG ARTIST IN 2 DAYS

Well-trained artists earn
splendid incomes. The
Federal home-study
Course is a proven result-
getter. If you like to draw,
send six in stamps for 56-page
book "Your Future."
FEDERAL SCHOOL OF GEN'L DESIGNING
692 Federal Schools Building
Minneapolis, Minn.

AMATEUR MECHANICS

A book for those who like to make things. 132 separate articles
tell how to build electrical and mechanical devices, reed furni-
ture, fishing tackle, hammocks, etc. 128 pp., illustrated. 25 cents postpaid.
Popular Mechanics Book Dept., 200 E. Ontario St., Chicago

Rapid Lumber Calculator and Information Reference Book for LUMBERMEN and MILLMEN

Baughman's Buyer and Seller
Desk Edition, \$3 | Pocket Edition, \$1.50
500 Pages, Postpaid, 188 Pages, Postpaid . . .

POPULAR MECHANICS BOOK DEPARTMENT
200 East Ontario Street, Chicago

What About Radio in 1925?

Can You Keep Pace with Its Progress?

While RADIO is now a very big institution, it is true,
nevertheless, that there will be many new develop-
ments, some new parts, and many new "hook-ups"
before RADIO attains its final state of perfection.
Can you keep track of all these changes—to-day,
to-morrow, in 1924, and in 1925?

LEFAX RADIO HANDBOOK PERPETUALLY UP-TO-DATE!



LEFAX RADIO HANDBOOK always keeps pace with
new developments in Radio—the book is loose-leaf,
and every month to every purchaser of the book is sent
additional pages that keep the book up-to-date. No
extra charge for this service for one year. Written
by the two chiefs of the RADIO dept. U. S. Bureau
of Standards. Fine imitation morocco leather cover.

Price \$3.50 postpaid, complete with year's service
POPULAR MECHANICS BOOK DEPT.
200 E. Ontario St., CHICAGO



High School Course in Two Years!

You Want to Earn Big Money!

And you will not be satisfied unless you earn steady pro-
motion. But are you prepared for the job ahead of you?
Do you measure up to the standard that insures success?
For a more responsible position a fairly good education is
necessary. To write a sensible business letter, to prepare
estimates, to figure cost and to compute interest, you
must have a certain amount of preparation. All this you
must be able to do before you will earn promotion.
Many business houses hire no men whose general know-
ledge is not equal to a high school course. Why? Because
big business refuses to burden itself with men who are
barred from promotion by the lack of elementary education.

Can You Qualify for a Better Position

We have a plan whereby you can. We can give you a com-
plete but simplified high school course in two years, giving
you all the essentials that form the foundation of practical
business. It will prepare you to hold your own where
competition is keen and exacting. Do not doubt your abil-
ity, but make up your mind to it and you will soon have
the requirements that will bring you success and big
money. YOU CAN DO IT.

Let us show you how to get on the road to success.
It will not cost you a single working hour. Write today.
It costs you nothing but a stamp.

American School

Dept. HC74, Drexel Ave. and 58th St., Chicago

American School

Dept. HC74, Drexel Ave. and 58th St., Chicago
Send me full information on the subject checked and how
you will help me win success.

- | | |
|-----------------------------|---------------------------|
| ... Architect | ... Lawyer |
| ... Building Contractor | ... Machine Shop Practice |
| ... Automobile Engineer | ... Photoplay Writer |
| ... Automobile Repairman | ... Mechanical Engineer |
| ... Civil Engineer | ... Shop Superintendent |
| ... Structural Engineer | ... Employment Manager |
| ... Business Manager | ... Steam Engineer |
| ... Cert. Public Accountant | ... Foremanship |
| ... Accountant and Auditor | ... Sanitary Engineer |
| ... Bookkeeper | ... Surveyor (& Mapping) |
| ... Draftsman and Designer | ... Telephone Engineer |
| ... Electrical Engineer | ... Telegraph Engineer |
| ... Electric Light & Power | ... High School Graduate |
| ... General Education | ... Fire Insurance Expert |
| ... Vocational Guidance | ... Wireless Radio |
| ... Business Law | ... Undecided |

Name

Address

Please Mention Popular Mechanics

Copyrighted material

BE A HOTEL EXECUTIVE

Earn \$2,500 to \$12,000 a Year



You can qualify for any of hundreds of fine hotel positions paying enviable salaries even to beginners and leading rapidly to highest executive positions. Read what students and graduates write about the results of S. B. T. I. training.

Secured Fine Position

"I am certainly enthusiastic over your school and course. I am leaving today to take the fine position you secured for me at the Hotel _____."

Salary Nearly Double

"I know that if it was not for your course and efforts I would never have received this splendid position. Just think, my salary is nearly double that which I received three months ago when I enrolled with the S. B. T. I. Your service is certainly more than you claim."

\$250.00 a Month, Free House and Board

"I am very pleased to report that I have gotten the position as Steward for the _____ at a salary of \$250 per month with a free house and board or almost double my present salary."

A Position When Graduated

For completeness, interest and conciseness the Hotel Operation and Management Course is unequalled. We have gathered the experiences of men who have spent lifetimes in hotels and offer them to you in a series of condensed, thorough lessons which you can easily master in a few weeks of your spare time. The cost is moderate, easy terms if you desire. When you graduate, you will be equipped for one of many attractive positions in hotels seeking S. B. T. I. graduates—positions which we help you secure.

Mr. Harry Lutz, General Manager of a leading New York City hotel, opening soon, writes, "***** We will be pleased to give them (S. B. T. I. graduates) every consideration." Many other hotels, clubs, steamship lines, etc. are on the waiting list for our graduates. The demand for trained hotel employees at good salaries is greater than we can supply.

Let this coupon be the beginning of big things for you.

STANDARD BUSINESS TRAINING INST.

Carlton Court

Buffalo, N. Y.

STANDARD BUSINESS TRAINING INST.

Carlton Court, Buffalo, N. Y.

Send me Free Booklet H166 giving full information about Hotel Operation and Management Course—also Employment Bulletin.

Name.....

Street.....

City.....

Please Mention Popular Mechanics

COMMERCIAL ART

A Big Field for Men and Women

Be a Creative Commercial Artist. Don't be the "tell me what to do" kind. Creative artists are worth from \$100.00 to \$500.00 per week and more. Our academy is the only school basing its instruction upon the actual practices of the Master Commercial Artist. By analysis of Commercial Art Master Pieces we find the methods of the artist. By constructive instruction we teach these principles, developing the student step by step, until he is producing high grade Commercial Art.

The 1923 edition of our course embodies all up to date Commercial Art Practices. Large Commercial Art houses, employing hundreds of artists, have endorsed us as their training school. Students finishing half of this unusual course can secure and hold desirable positions. Four month students can begin to sell drawings.

Home study or class room instruction. Both day and evening classes. Get our big beautifully illustrated book telling all about Commercial Art and the opportunities it presents as WE TEACH IT. Send 6 cents in stamps for a copy.



RAISE POULTRY FOR PROFIT

We teach you how. Easily learned at home. Our guaranteed methods make success certain—indorsed by leading Agricultural Colleges. Send TODAY for FREE BOOK—"How To Raise Poultry For Profit."



National Poultry Institute

Dept. 312 Washington, D. C.

Learn to PAINT SIGNS and SHOW CARDS

Big field—unlimited possibilities—increasing demand for men with creative ideas. Our course develops ability and originality. Work intensely interesting.

EARN \$25 TO \$75 WEEKLY

You can do it! Ambitious, successful graduates everywhere. Our course thoroughly covers every phase of work. Our graduates command big salaries. Write for catalog, samples, guarantee and Free Outfit Offer.

Detroit School of Lettering, 623 D. S. L. Bldg., Detroit, Mich.





Get This Valuable Book!

We have just published an interesting, beautifully illustrated book describing the remarkable opportunities in *Photography, Photo-Engraving and 3-Color Work*. Write for free copy today. The largest and best college of its kind in the world teaches these fascinating professions in short time. Established over 30 years. Many attractive positions open. Hundreds of opportunities to start your own business. Graduates now earning \$200 to \$500 a month. Tuition and living expenses low. Be sure to write at once.

Illinois College of Photography, Box 483, Effingham, Ill.



LEARN A TRADE

in 8 Weeks in New York



WHEN our fathers were boys, no one thought of learning a trade or business without spending years as an apprentice at a low salary, but things are different now. Our scale of living was lower then. Food, clothing and amusements did not cost as much.

Today, no young man with ambition is satisfied with a small salary while he is learning a business. He wants to learn, quickly and get into the big pay class—the age we live in demands it!

Expert Training Gets Quick Results

In 1909 I opened the Stewart School. It had taken me years to learn the automobile business by the old apprentice method. Meanwhile, I had perfected a plan of teaching, that gave my students, in a few weeks, everything I had learned in years. I am very proud of my school and its graduates.

This is not the largest school in America. The job of turning out graduates like so many factory products, can be done by someone else. My aim is to give personal attention and personal instruction to every man. A student of mine is a friend of mine. His future is part of my future. There is nothing I would not do to teach him the business better than *he can learn it anywhere else in the world.*

The Opportunity Is Here

Already, there are about 12,000,000 cars in use—thousands more are being turned out each month. These cars need constant repairing and replacements. The opportunities for a man to get into business for himself are everywhere. With the growing number of cars—the opening of new roads are the increasing demand for repairs and adjustments, new and bigger garages must result. The auto business gives a man prestige in his community, he meets the auto owners, they are usually the most influential people in town.

Guarantee

I guarantee that any man who comes to this school will learn all he desires to know about the automobile business. This means that if there is any department that you do not get through quickly, you may remain and go over that part of the study until satisfied that you have learned this without additional cost.

Eight Weeks vs. Four Years

A Stewart man can learn in eight weeks what it would take him four years of dirty garage apprenticeship—sweeping floors, filling tires, and changing greas-pans, filling gasoline tanks—running errands. To learn these things, would take up much of your time. Here you have none of that. You get right into facts and

fundamentals. You learn on various kinds of cars. You have an instructor going out of his way to please you—you have testing machines like the Electric Dynamometer, that you will not find in a garage. You do not learn the same thing over and over again. You get straight and clear the first time. Our apparatus is complete. We give three courses—Mechanical Shop Course, Advanced Automobile Electricity, Battery Course and we make a specialty of combining all three courses in only eight weeks, spent pleasantly and profitably in New York. You can prepare yourself for a \$200.00 a month job.

Your Ambition Demands You Send the Coupon

Every man has his own personal ambitions. One man wants a wife and a comfortable home—another wants to make a fortune so he can retire—still another wants to travel. Almost every young fellow wants to be able to take care of his Mother and Father in their old age—to give them a good home and the best of everything in life. While every young ambition may be yours, you cannot realize it by dreaming. If you will send me the Coupon, I will send you a complete book, showing the views of the Auto School and also places you can see and things you can do in New York. Just clip off the coupon and send it in today—and get started on the road to bigger earnings and ultimate success.

-----COUPON-----

STEWART AUTO SCHOOL, 225 W. 57th St.,
Dept. C 177, New York, N. Y.

Please send me your free book that describes your school and the opportunities in the Automobile Business. I am under no obligation.

Name -----

Address -----

City -----

State -----

Great Inventors Now Teach You How to Invent

How to develop, patent and market your ideas; amazing new course teaches science of invention by mail. Every man, woman, and child is born with creative imagination. Some develop this faculty to a greater degree than others, and those who develop it to the greatest extent are successful inventors. Invention is an orderly process of the mind, which combines two or more known facts to produce a new fact. Anyone who develops the right mental process can become an inventor. Every successful inventor has this type of mind, developed by constant experience over a period of perhaps



Raymond Francis Yates

author of the New Course in Inventive Science, in collaboration with 15 other inventors. Mr. Yates is known throughout the country as Editor of scientific magazines, writer of hundreds of articles and inventor of many practical devices and machines.

many years. Heretofore those who succeeded in the field of invention had to discover all the principles themselves. But, now, just as any student of medicine, law, or engineering can take full advantage of all the recorded experience in these fields of study, so can YOU take the same kind of short cut to the habits of thought, and the methods of work required of successful inventors.

Little Inventions Win Fortunes

Fortunes have been made by men who have thought of a "little" idea in a flash. The man who invented the bottle top, the man who invented the crimped hairpin, the man who invented the thin lead automatic pencil, the man who invented the snap fastener—all these men, perhaps, got their ideas in a flash, and founded their fortunes as a result of a single idea. But in every case their minds operated in accordance with the scientific laws of successful invention.

Edison says: "Invention should be taught as a profession." Every inventor realizes the hopelessness of groping in the dark for the habits of thought and methods of work required for successful invention. Trying to invent without knowing the fundamental requirements of invention is like trying to build a bridge without knowing engineering.

Don't Waste Ideas! Every man at some time or other has an idea for something he would like to invent, but his mind doesn't know how to work. He doesn't know what to do about it—doesn't know how to think along inventive lines—and soon someone whose mind is trained along inventive lines invents just the thing you may have thought of.

Write for FREE BOOK

A wonderful book explaining this wonderful new course in detail has been written and will be sent free to those genuinely interested. This book explains the course in detail, and proves that anyone can become an inventor who trains his mind—may be the beginning of a fortune for you. If you have ever had an idea for an invention, or if you would like to become a spare-time or professional inventor and if you would like to know what to invent, send in your name at once on the coupon NOW! Only a limited number of these books are available for free distribution.

Bureau of Inventive Science, 38 Wisner Bldg., Rochester, N. Y.

BUREAU OF INVENTIVE SCIENCE,
Dept. 38, Wisner Bldg., Rochester, N. Y.

Please send me your free book "The Science of Invention."

Name.....

Address.....

City..... State.....

Please Mention Popular Mechanics

PATENTS

To the Man with an Idea

I offer a comprehensive, experienced, efficient service for his prompt, legal protection and the development of his proposition.

Send sketch, or model and description, for advice as to cost, search through prior United States patents, etc. Preliminary advice gladly furnished without charge.

My experience and familiarity with various arts frequently enable me to accurately advise clients as to probable patentability before they go to any expense.

Booklet of valuable information and form for properly disclosing your idea free on request. Write today.

Richard B. Owen, Patent Lawyer
9-303 Owen Building, Washington, D. C.
2276-E. Woolworth Bldg., New York City

STOP USING A TRUSS

Do Away With Steel And Rubber Bands

FREE TRIAL



TRADE MARK

STUART'S ADHESIVE
PLAPAO-PAD

PAT'D
APRIL 6
1909

Inner surface is made adhesive to secure the PLAPAO-PAD firmly to the body, keeping the PLAPAO continually applied and the pad from slipping. No straps, buckles or springs attached. Soft as velvet—easy to apply.

It's the Non-Slip-ping, yet Non-Rigid Pad and What is Within It That Counts

FREE to 5,000 Truss Sufferers

To the extent of 5,000 sufferers who may apply I will send, ABSOLUTELY FREE, a sufficient quantity of the Plapao to positively convince them that this is the only logical, common-sense way of treating rupture. Plapao is a highly astringent medication placed within the Plapao-Pad and being absorbed through the skin, creates a wonderful feeling of relief and at the same time tends to strengthen the weakened muscles and thus permanently close the rupture opening. The process of recovery is natural, so you'll have no use for a truss—you can throw it away forever! Old and young have testified under oath that the Plapao-Pads cured their rupture—many of them long-standing, aggravated cases—without delay from work. Patent allowed in U. S. and foreign countries. Awarded Gold Medal at Rome and Grand Prix at Paris.

Send No Money—for a sufficient quantity of the Plapao is sent without charge to enable you to give it a thorough test; you pay nothing for this trial now or ever. Write for it and full information today. Address Plapao Laboratories, Block 1427 St. Louis, Mo.

PATENTS TRADE-MARKS AND COPYRIGHTS

SPECIAL OFFER — Free Opinion as to Patentable Nature

Before disclosing an invention, the inventor should write for our blank form "Record of Invention." This should be signed and witnessed and if returned to us together with model or sketch and description of the invention, we will give our opinion as to its patentable nature.

Our Three Books Mailed FREE to Inventors

OUR ILLUSTRATED GUIDE BOOK

HOW TO OBTAIN A PATENT

Contains full instructions regarding Patents Trade-Marks, Foreign Patents. Our Methods, Terms, and 100 Mechanical Movements illustrated and described; Articles on Patent Practice and Procedure, and Law Points for inventors.

OUR TRADE-MARK BOOK

Shows the value and necessity of trade-mark protection and gives information regarding Trade-Marks and unfair competition in trade.

OUR FOREIGN PATENT BOOK

We have direct agencies in all foreign countries and secure foreign patents in the shortest possible time and at the lowest cost.

LIST OF PATENT BUYERS SENT FREE

IDEAS WANTED: Send for LIST OF PATENT BUYERS containing unsolicited letters from Manufacturers and others WISHING TO BUY meritorious patents. There is a great demand for NEEDED INVENTIONS. We endeavor to assist OUR clients in the commercial development of their inventions.

SPECIALIZATION—OUR STAFF

The field of invention is so vast that it is impossible for any one man to become an expert in all classes of invention. For this reason we employ a number of patent lawyers and mechanical experts selected for their special knowledge and ability in certain lines of invention.

THE VALUE OF YOUR PATENT

depends on the skill and care with which your case is prepared and prosecuted in the United States Patent office. That every case receives our best efforts, and that our work is done skillfully and thoroughly, is evidenced by the many unsolicited letters of commendation that we receive constantly from our clients. We will furnish upon request lists of clients from any state in the Union for whom we have secured patents.

Our New York, Philadelphia, Pittsburgh, Chicago and San Francisco Offices

We have established for the benefit of our clients Branch Offices in New York City, Philadelphia, Pa., Pittsburgh, Pa., Chicago, Ill., and San Francisco, Cal. These branch offices located in these large commercial cities together with our Main Office located near the U. S. Patent Office, in Washington, enable us to more promptly handle the business of our clients, particularly as the branch offices are in constant touch with the Main Office.

Highest References — Prompt Attention — Reasonable Terms

---FREE COUPON---

VICTOR J. EVANS & CO., Patent Attorneys

NEW YORK OFFICES
1007 Woolworth Building

CHICAGO OFFICES
1114 Tacoma Building

PHILADELPHIA OFFICES
714-715 Liberty Bldg.

PITTSBURGH OFFICES
514 Empire Building

SAN FRANCISCO OFFICES
Hobart Building

MAIN OFFICES: 765 9TH STREET, N.W., WASHINGTON, D. C.

Gentlemen: Please send me FREE OF CHARGE your books as described above.

Name Address



PATENTS

Booklet Free Highest References Promptness Assured Best Results

Send drawing or model for preliminary examination

ALL BUSINESS GIVEN PROMPT AND PROPER ATTENTION

WATSON E. COLEMAN, Patent Lawyer, 624 F St., Washington, D. C.

Have You An Invention?

If so the WORLD PROGRESS will show you how to
PROTECT AND PROFIT FROM YOUR IDEAS

This magazine is devoted entirely to the interests of In-
ventors. Sample copy free. One year's subscription **\$1.00.**
Also send for free book,

"WHAT TO INVENT"

containing **SUGGESTIONS TO INVENTORS** from prominent
inventors and scientists of Inventions Needed. We invite manu-
facturers and promoters to address us regarding any inventions
or patents they may want.

WORLD PROGRESS PUB. CO., Inc.
Room 203 Victor Bldg. WASHINGTON, D. C.

PATENTS

Trade-Marks, Copyrights and Patent Litigation

Write for advice and instructions how to proceed,
costs, etc. Hand Book with illustrations of 100 Mechanical
Movements sent free on request.

ALBERT E. DIETERICH

Patent Lawyer and Solicitor

Successor to Fred G. Dieterich & Co. 621 Ouray Bldg., Washington, D. C.

PATENTS Secured

Prompt service. Avoid dangerous delays. Send for our "Record of
Invention" form and Free Book telling How to Obtain a Patent. Send
sketch or model for examination. Preliminary advice without charge.
Highest Reference. Write TODAY.

JACOBI & JACOBI, 410 Ouray Bldg., Washington, D. C.

PATENTS

As one of the oldest pat-
ent firms in America we
give investors at lowest
consistent charge, a
service noted for results, evidenced by many well known
Patents of extraordinary value. Book, *Patent-Sense, Free.*
Lacey & Lacey, 645 F St., Wash., D. C. Estab. 1869.



PATENTS

Send us sketch or model for patentability opinion
and exact cost of patent. Our book "How to Obtain a
Patent," Sent Free on request. It tells how to apply
for Patents, Trade Marks, Foreign Patents, Copyrights,
etc.; gives information on Patent Procedure; tells
what every inventor should know. Thousands of In-
ventors, who are our clients, are our references.

Chandlee & Chandlee, 25 Years' Experience.
435 7th St. Washington, D. C.

PATENTS

C. L. PARKER

Formerly Member Examining
Corps, U. S. Patent Office

PATENT LAWYER

McGILL BLDG.
WASHINGTON, D. C.

Patents, Trade Marks, Copyrights, Patent Litigation

Handbook for Inventors, "Protecting, Exploiting
and Selling Inventions," sent free upon request.



GEARS ALL KINDS SMALL

The most accurate made and prices
reasonable. We carry a complete line
of gears in stock for immediate ship-
ment. Can also quote on special gears
of all kinds. Send us your inquiries.

WRITE FOR CATALOGUE.

CHICAGO STOCK GEAR WORKS
105-109 S. Jefferson St., CHICAGO

AGENTS

For the Biggest Money-Making
Selling Proposition You Ever Saw

See Pages 126 & 127

PATENTS If You Have an Invention and Desire to Learn How to Secure a Patent

Send for our Guide Book, **HOW TO GET A PATENT**, sent Free on
request. Tells our terms, methods, etc. Send model or sketch and
description of your invention and
we will give our opinion as to its
patentable nature.

RANDOLPH & CO.
600 F St., N.W., Washington, D. C.

NAME.....

STREET.....

CITY.....STATE.....

PATENTS

EXPERIENCE **SERVICE**

CLARENCE A. O'BRIEN

PATENT ATTORNEY

REGISTERED IN UNITED STATES PATENT OFFICE
MEMBER OF THE BAR OF
SUPREME COURT OF UNITED STATES, COURT OF APPEALS DISTRICT OF COLUMBIA,
SUPREME COURT DISTRICT OF COLUMBIA, UNITED STATES COURT OF CLAIMS.
PRACTICE CONFINED TO PATENTS AND TRADE MARKS.

PATENTS

Any new article, machine, design or improvement thereof, or any new combination of parts or improvements in any known article which increases its efficiency or usefulness, may be patented, if it involves invention.

If You Have Any New Ideas

which you feel are useful, practical and novel, *take prompt action toward protecting your rights.* If you have invented any new machine, or new combination of parts or improvement, or new process or design, **SEND DRAWING, MODEL OR DESCRIPTION** of it for information as to procedure to secure protection.

Write Today for Blank Form *All Communications Are Held in Strict Confidence*

"RECORD OF INVENTION"

to be returned to me with drawing, description or model of your idea. Promptly upon receipt by me of your idea I will write you fully as to procedure and costs. No charge for the above information.

My personal, careful and thorough attention is given to each case. I offer you efficient, reliable and prompt service—based upon practical experience. *Highest references.* Write today for free book: "How to Obtain a Patent." This book will give you valuable information, and it may save you much time and effort. *Send for it NOW.* My practice is devoted exclusively to United States and foreign patents and trade marks. Very probably I can help you. Write today.

CLARENCE A. O'BRIEN, Registered Patent Attorney
1701 Southern Building WASHINGTON, D. C.

CLARENCE A. O'BRIEN, 1701 Southern Bldg.,
Patent Attorney, Washington, D. C.

Please send me your free booklet, "How to Obtain a Patent" and blank form "Record of Invention" without any obligation on my part.

NAME

ADDRESS

(WRITE PLAINLY)

**HOW
TO
OBTAIN
A
PATENT**

PATENTS

*Seventy-six
Years of Practice*

THE firm of Munn & Company filed its first application for a patent in 1846, and for seventy-six years has endeavored to keep pace with the inventive genius of the United States.

An experience of many years is at your disposal. If you have an invention which you wish to patent, send your sketches or model together with a description of your device, explaining its operation, and you will receive prompt, courteous attention.

Write for our Handbook on
PATENTS

A full and complete booklet on Patents, Designs, Trade-Marks, Foreign Patents, Copyrights, Labels and Patent Office Practice with an explanation about our methods, terms, etc.

All communications strictly confidential.

Keep in touch with the inventions of the world by reading

SCIENTIFIC AMERICAN

The MONTHLY MAGAZINE with a special appeal to every man of inventive genius. Recent rulings of the Patent Office, descriptions of the latest patented inventions, legislation and court decisions affecting patents, are noted in this authoritative publication.

MUNN & COMPANY

Patent Attorneys

672 Woolworth Building, New York City

Scientific American Building, Room 2
625 F Street, Washington, D. C.

Suite 801, Tower Building, Chicago, Ill.

601 Hobart Building, San Francisco, Cal.

Please Mention Popular Mechanics

U.S. PATENTS



**SEND FOR
THIS FORM**

DON'T LOSE YOUR RIGHTS TO PATENT PROTECTION

Before disclosing your invention to anyone send for blank form "EVIDENCE OF CONCEPTION" to be signed and witnessed. A sample form together with printed instructions will show you just how to work up your evidence and establish the same before filing application for patent. As registered patent attorneys we represent hundreds of inventors all over the United States and Canada in the advancement of inventions. Our schedule of fees will be found reasonable. The form "Evidence of Conception," sample, instructions relating to obtaining of patents and schedule of fees sent upon request. Ask for them—a post card will do.

PATENTS AND TRADE MARKS



480 Ouray Bldg. Washington, D. C.
Originators of forms "Evidence of Conception."

Can You

think of a simple, practical idea that will fill one of the many requests we have on file for new inventions? It may mean a fortune for you. Thousands of things are needed **right now**. Your brains can help. Send today for our great new book—

"Inventions and Trade-Marks, Their Protection and Exploitation"

and learn more about making money from ideas than you ever knew before. It tells many things that are wanted, too.

**A postal will do—
It is free**

We Help Our Clients

without charge, to get the dollars out of their ideas—having facilities none others possess. Advice free. Don't delay—get the book at once.

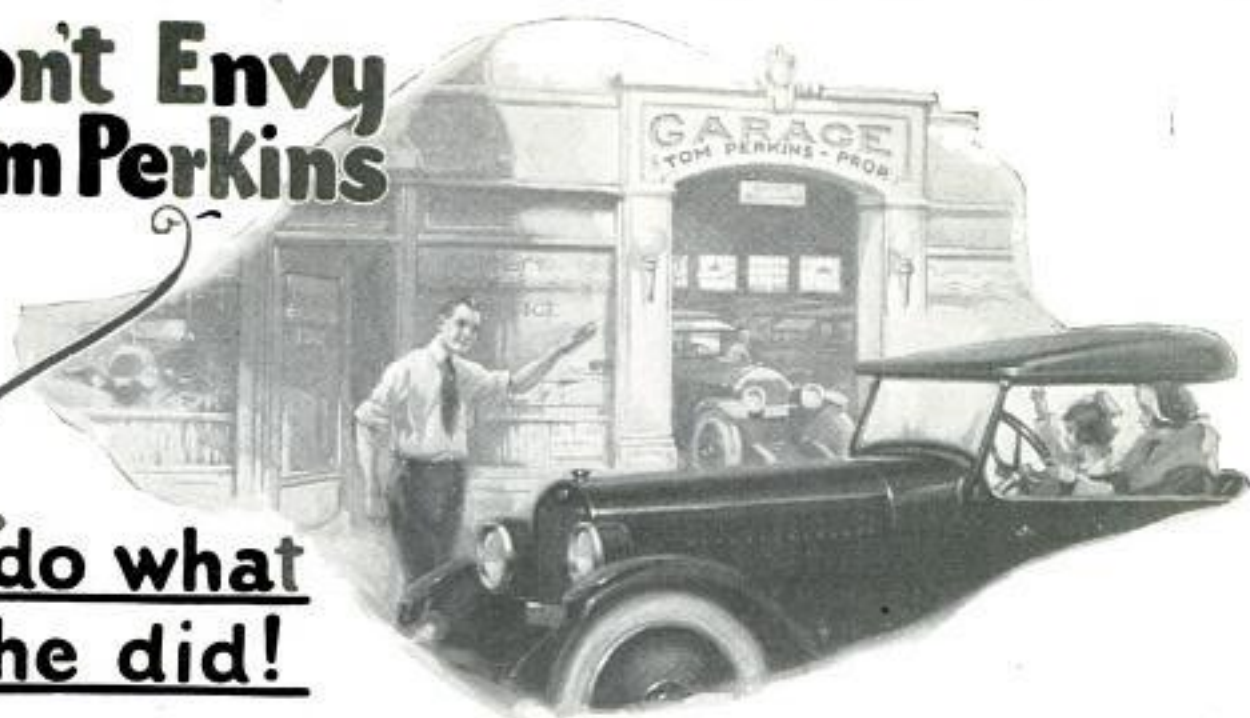
American Industries, Inc.
200 Patent Dept.
WASHINGTON, D. C.

**Patents
Advertised
For Sale Free**
in Invention and
Manufacturing Supplement

Published for the man with an idea. Send for free sample copy. One year's subscription, 50c.

Don't Envy Tom Perkins

-do what he did!



Tom Perkins liked the good things of life—he liked to attend the theatre; he liked to wear good clothes; he liked to have a nice home and drive a good car. He liked all these—but that was as far as he got. He did not have the money to buy them.

His wife liked the good things of life too—she liked silk stockings and sealskin coats; she liked to live in a cozy little home of her own; she liked the things that make life worth living. She liked all these—but she had to depend on Tom, and Tom couldn't earn them for her.

Tom tried. He always had a job of one kind or another—and he always gave an honest day's work for an honest day's pay. What more could he do? Was it any fault of his that he could never earn more than just enough to buy himself and his family the bare necessities of life?

The turning point in Tom's career came quite unexpectedly. A boyhood friend, who had lived in the same town several years before, came back for a visit and told Tom what a great success he had made in the garage business as the result of taking practical training at the M. S. A. S. in Detroit, the automobile center. Then and there Tom decided to investigate the possibilities in the automobile field himself—and he was greatly surprised at what he found.

A Wonderful Business

He found, among other things, that the automobile industry is the third largest business in the country today. He found that there are twelve million cars and trucks in use in the United States alone and that the automobile factories are adding to this number at the rate of about ten thousand every day. He found that as the number of automobiles increased, more and more work was piling up for automobile mechanics to do. And, most important of all, so far as he was concerned he found that the men who had trained themselves for this work were among the highest paid men in any line of industry.

Here, then, was a line of work that offered a real chance to get ahead in the world. There were jobs enough and to spare for all the men that the automobile training schools could turn out for years to come. And there was no chance of failure—unless people should some day stop driving cars, and he couldn't imagine anything like that happening.

It struck Tom that this was a good business to get into. Within two weeks he had gone off to Detroit and to the M. S. A. S.—and it seemed only a short time until he had completed his training and had received his diploma.

\$40 per Week to Start

When he returned home he went to the leading garage in the town, applied for a job, and got it—at \$40 a week, more than he had ever earned before. For the first time in his life he felt that he was really on the road to success.

At the end of a month, his pay was raised to \$55 and, in another month, it was again raised—to \$75 a week. Tom was truly getting up in the world.

That was three years ago. Today Tom is the owner of his own garage and has two mechanics working for him. Besides, he has secured the agency for Chevrolet cars and Willard Storage Batteries and has built up one of the leading auto electric service stations in his section of the country. He has won for himself the reputation of knowing his business—and, as a consequence, he gets not only the bulk of automobile repair work in his own town but also a great deal of work from car owners in neighboring towns where there are no first class garages.

Tom's earnings now average \$600 a month from the garage's repair work—and several times that amount from his sales of automobiles and batteries.

No Experience Necessary

But, you may say, Tom must have been an exceptional man—he must have known something

about automobiles before he took the M. S. A. S. Course. Quite the contrary—he had had no experience at all in automobile work. In fact, he couldn't even drive an automobile at that time and, as he himself says, he didn't know the difference between a carburetor and a wheel-base—didn't even know a car had a wheel-base. The only difference between him and the other young fellows in his town who are still working at \$15 to \$25 a week is that Tom made a step to better himself. He got off the short ladder that he was trying to climb and got his foot on a tall ladder where there was room to do some real climbing.

Any young man can start climbing the automobile ladder that leads to money and success by doing just what Tom did. As soon as he heard about the big money-making opportunity in the automobile business, he wasted no time in investigating it.

Start Climbing Today

Do what Tom did—write today to the M. S. A. S. in Detroit for particulars about their course. All you have to do is fill out the coupon and mail it—and you will receive full information without charge.

The day that Tom first heard about the M. S. A. S. was the turning point in his life. This may be the turning point in yours—who knows? Mail the coupon today!

MICHIGAN STATE AUTOMOBILE SCHOOL

308 Auto Bldg., 3729 Woodward Avenue, DETROIT, MICHIGAN

Without expense or obligation to me, please send Outline of your Complete Automobile Course and tell me about men like Tom Perkins who have made a big success in life by becoming automobile experts.

Name.....

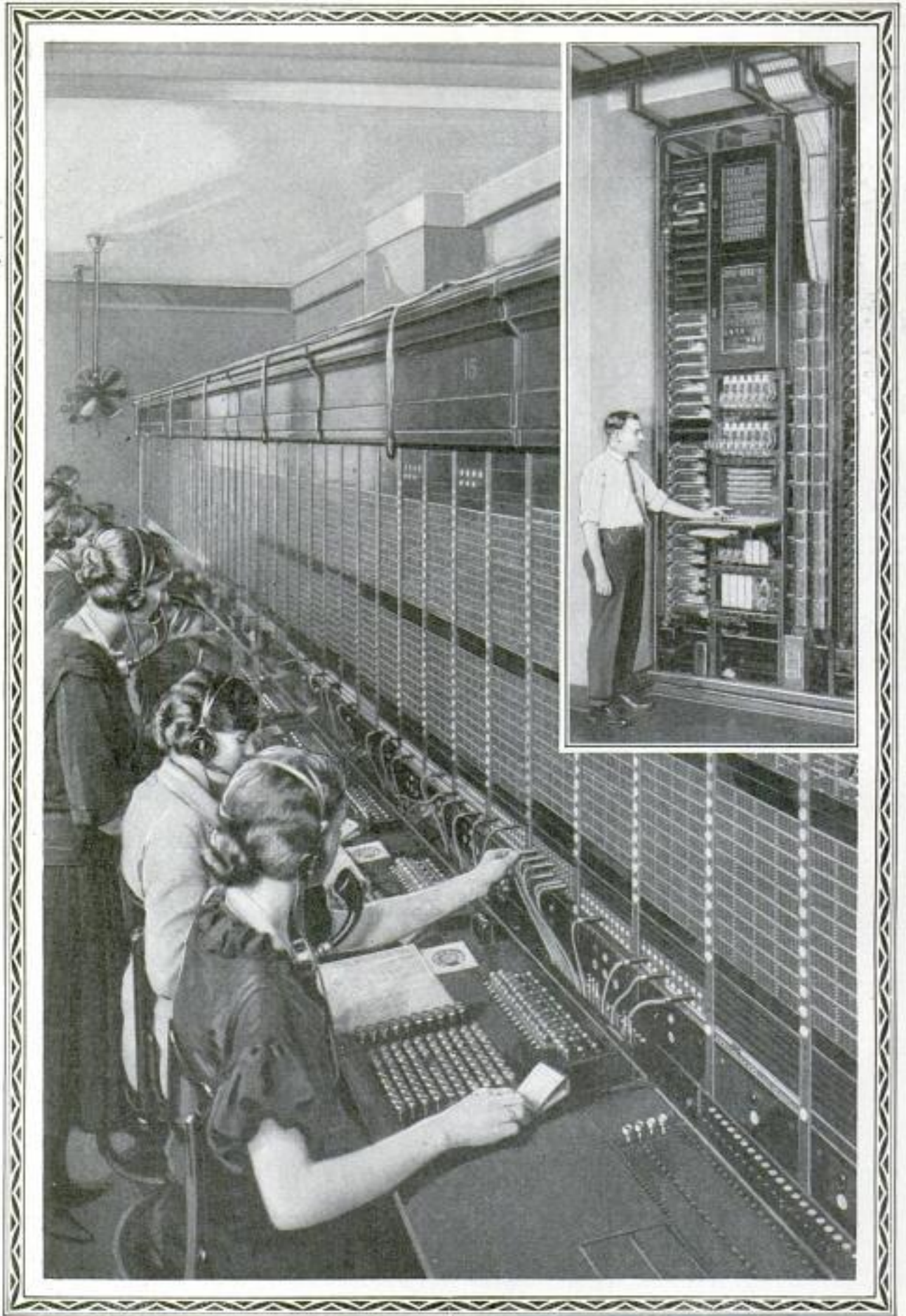
St. or R. F. D.....

City..... State.....

Do you wish to start your course at Home or at our School in Detroit?.....

2642

CHANGING FROM GIRL TO "GIRLLESS" TELEPHONES



Small Section of Old-Type Switchboard with Operators Who Tell Users How to Work New Dials; and, Above, Part of the Automatic, "Machine Switching" Apparatus

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 40

AUGUST, 1923

No. 2

LATEST MARVEL OF TELEPHONE SCIENCE IN USE

Phone Wonder Is Achievement of Hundreds of "Unknown" Minds

FOR one of the first times in the history of invention, a marvel of science has been developed as the work of hundreds of minds, rather than by one genius. This is the new system of telephony machine switching. Chicago was the latest city to adopt this wonderful system, changing 15,000 telephones to the "girlless" plan, but it will eventually be in use throughout the country. At the stroke of midnight a workman in grimy overalls threw a switch, and in 26 seconds nearly 3,000,000 residents of the city were given the result of the cooperation of hundreds of engineers, inventors, and scientists.

The new telephones are similar to the old automatic, which, strange to say, the small town is more familiar with than the big city. To each instrument a dial, with a movable top having a series of 10 finger holes, is attached. Under these holes are placed the numbers "1" to "9" and the "0," and in addition 24 letters of the alphabet arranged in series of threes. These run "ABC," "DEF," "GHI," etc., omitting "Q" and "Z." The letters are in black, and the numerals in red.

To make the description clear it is best to illustrate how the subscriber calls his number. Suppose the number wanted is Central 1470. On taking the receiver from the hook a subscriber listens until a faint buzzing sound is heard. This is the automatic's "number, please." He then places his finger in the hole in the dial which bears the black letters "ABC" and proceeds to pull the

movable top to the right until he reaches a small hook which stops further pulling. On releasing his finger the top returns to its first position. He then goes through the same operation for "E" and "N." On completing these three he has registered on the machine the first three letters of the word "Central." He now proceeds in the same manner to call the number "1470." If his call is completed he, of course, gets his party, but if the line is busy he gets the usual signal. If he has made a mistake the operator in the central station immediately informs him of the fact. Each call, as will be seen, requires seven movements of the dial, three to obtain the exchange and then the four numerals making up the number.

How this marvelous apparatus works is of intense interest. In its simplest outline it may be described as follows:

When the subscriber begins to move the dial, a switch at the central station begins to place the call with a great deal more accuracy than a human being. The exchanges are so made that there can be no mistake if the subscriber uses the dial correctly. At first

it is puzzling to understand how, when the user pulls down the "ABC" hole, for instance, the machine is going to register the letter that is to be selected, but by a clever study of names, those who perfected the system have chosen titles for the exchanges which permit the machine to select the desired letters.

When the subscriber pulls down



2642

Electric Co., Hawthorne Plant, Chicago

the three holes corresponding to "ABC," "DEF," and "MNO," the only possible exchange he could get would be "Central," as the combination of other letters made with the holes marked "ABC," "DEF," and "MNO" do not form the first three letters of any other exchange. Of course, after the exchange is obtained, the number, such as "1470," can only refer to one subscriber's telephone in that exchange.

After the exchange is registered on the machine, moving parts of the very complicated electrical switchboard pick out the line at that point. Now, in obtaining the "1470," when the figure "1" is pulled down, the phone is automatically connected with the 1000 group in the "Central" exchange. When the "4" is pulled the subscriber is then connected with the 400 group and so he now is in the 1400 group. When he pulls down "7" the machine selects the 70 group and when he pulls down the final "0" he is connected with "Central 1470."

As may be imagined, the solving of the problem of such an intricate system has taken many years. The general research staff of the telephone companies, numbering more than 2,000 experts and scientists, have had to develop all sorts of new material and new electrical appliances. Because of the great number of switches and other devices, which required, as a rule, the use of the very expensive metal platinum, the cost would have been prohibitive had not these research men developed new metal mixtures. They also had to produce a light combination of lead and antimony to cover cables in order that the capacity of local and long-distance lines could be made greater. Within these cables the size of the wires has been reduced

almost to a vanishing point. Formerly, long-distance wires were as thick as a pencil; now they are about the size of a thread. A single cable of this new type may carry as many as 2,400 wires, and because of the light lead and antimony mixture used to cover the cable, the same telephone poles which used to be able to carry only one or two cables, can now carry a great many more.

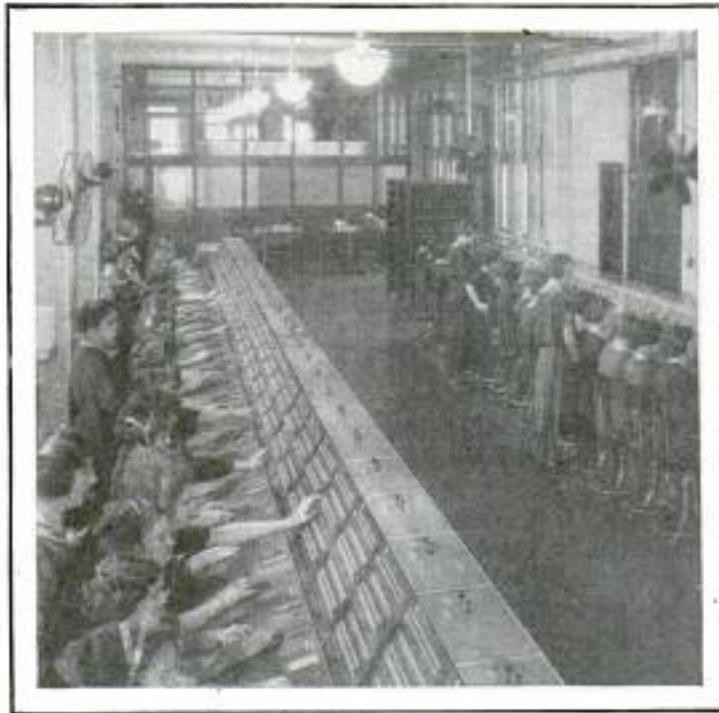
This is only one of the many new things these scientists have discovered. Since beginning to work on the finer points of machine-switching telephony,

more than \$11,000,000 has been saved the telephone companies of the country through new metals alone. Then, too, the discoveries have been applied to the automobile industry and others, making for another enormous saving.

The change of 15,000 phones is, of course, just a beginning on the Chicago system, which now numbers 654,008 sub-

scribers. While the change is being made, the numbers not equipped with the dial system will be obtained by the operators as heretofore. In making long-distance, emergency, and company calls the subscriber obtains service by simply pulling over the "operator" opening on the dial.

The greatest difficulty which the telephone company now faces is in educating the public in the way in which to use the system. First it was necessary to teach the telephone user to identify the exchanges by the first three letters of the name given them. Of course, each of the 654,008 subscribers could not be talked to personally and told how to do it, so the company for the last year has been printing in its telephone directory the first three letters of the exchange in capitals, as "CEN trl."



Operators are Still Needed to Transfer Calls from the Old to the New System

The idea of automatic telephones is almost as old as the switchboard itself. In the early '90s there were such systems, but they were not practical. For instance, Chicago had one, but could not run its wires overhead on poles, consequently it had to run its cables underground. This confined the use of the system to the down-town business section, and since everybody did not have

one of the automatics it was hard to persuade a subscriber of the old system to adopt a new one. Consequently, while the machine worked almost perfectly, the company was unable to continue because of financial troubles. Also, when the number of subscribers ran to much more than 20,000 the entire equipment had to be duplicated, for the switchboards broke down very quickly.

2697
RADIO SPEEDS UP TAKING OF MOVING PICTURES

Radio carried orders of the movie director to 5,000 members of the cast in a big scene in a western studio recently. Where, usually, the megaphone is used to shout instructions, while camera men are turning the cranks, this director, standing at a point from which he had a clear view of all the actors, spoke his orders calmly into a sending instrument, which made it heard clearly all over the lot. The directing, somewhat difficult because of the number of people employed, was simplified by use of radio, and the movie man predicted that it will be repeated in other big scenes. The same system was used to increase the carrying power of broadcast messages and concerts at the receiving end. Use of radio in this case not only spared the director's voice, but it produced better results by making it possible for all the actors quickly to go through with the scene without frequent stops.

2650
NO GLARE TO AUTO DRIVER BEHIND NEW SHIELD

Auto drivers who use a new type of protector, attached in a few minutes to the top of the windshield, can smile at



on the road. A small plate is fitted to the top of the windshield and, with a swivel joint, can be turned up to the roof of the car when not in use.

oncoming glaring headlights, for this new device tones them down to normal. It also gives protection against danger of sunlight in the driver's eyes and the glare of snow

2704
POISON-GAS TEST IS MADE IN THREE MINUTES

Simple tests to find the degree of poisoning from a gas known as carbon monoxide are now possible with the invention of an instrument that shows how much a person has been affected within



Girl being Tested with Instrument That Quickly Detects Poison Gas in Body

three minutes, where formerly it took from 24 to 48 hours before this could be accurately determined. The apparatus may be carried in the pocket, and is expected to prove of particular value in mines, where this gas is a much-dreaded menace. Because of the compactness of the new instrument and the fact that it can be applied to a patient by one who has had no special training, it will be of broad general service, it is predicted. Government experts, who tried it on a young girl, assert that it is the quickest method known to detect the gas.

Transmission of radio signals of standard frequency has been begun by the Bureau of Standards, the range of wave lengths used being 600 to 300 meters. It also is planned to use higher frequencies to include the waves used by amateurs. The general call is given at 11:00 p. m., eastern time.

Inventor, Dr. C. C. Sayers, tested by Bureau of Mines. Technologist.

*Detroit Sales Service Co.,
 1648 Penobscot Bldg.,
 Detroit, Mich.*

Along river sand, through a dense underbrush, up the bank, through a hollow log, they passed. Across a light jungle, around a small shack, and up to a large fallen log they continued in the insane march, ending in the very spot where they had started. Along the route many had weakened and dropped their burdens. The pace was slackened the second day, but on they went through sun and cloud, light and darkness, hour after hour. At last a half-dead ant broke ranks and moved away toward a beach, throwing the line behind him into confusion. Others followed and the lines were closed. The small army moved behind the new leader to a home.

**GROWING GOLD WITH HELP
2541 OF BUGS IN WEST**

With the aid of the ladybird beetle, California is growing a golden fruit crop the total value of which far exceeds the state's output of yellow metal. When thousands of adventurers braved the dangers of the western plains in '49 at the beckoning of a fortune to be wrested from the soil, none realized that in a few brief years farming and not mining would be the goal of their dreams.



Although oranges were not grown in California until 1873, the total value of the crop last year was estimated at \$100,000,000, while the gold output

amounted to only \$14,829,100, so that the wealth from the orange trees of the state was greater than the gold dug from the soil.

The big results have been due to intensive study. For instance, a scientist, watching through a microscope, saw a beetle no larger than the eye of a needle pounce upon

a newly hatched bug of a kind that was threatening the orchards with destruction, and devour it.

Immediately, an importation of ladybirds, the name of the beetle, was ordered, and ever since they have been at work protecting the fruit crop.

*Emb. Lee McCrae,
229 S. Wilson Ave.,
Pasadena, Calif.*

*Sold by Commonwealth
Edison Co. Chicago*
**LEGS ON CLOTHES BASKET
AT TOUCH ON HANDLE**

2613

Four sturdy legs have been put on a clothes basket by an inventor. These supports, normally, are folded away



Right: Legs of Basket Unfolding; Left: Release Spring in Handle

under the basket, but at a touch of the finger tips of springs near the handles, they let down, giving a solid table support for the heavy hamper. When it is raised, they automatically fold up again. It is claimed that this does away with tiresome stooping, spoiling of clothes from setting the basket on dusty ground, or the carrying of mud and snow on its bottom into the house.

**KEYLESS AUTO LOCK ACTS
WHEN CAR IS STOPPED**

2651

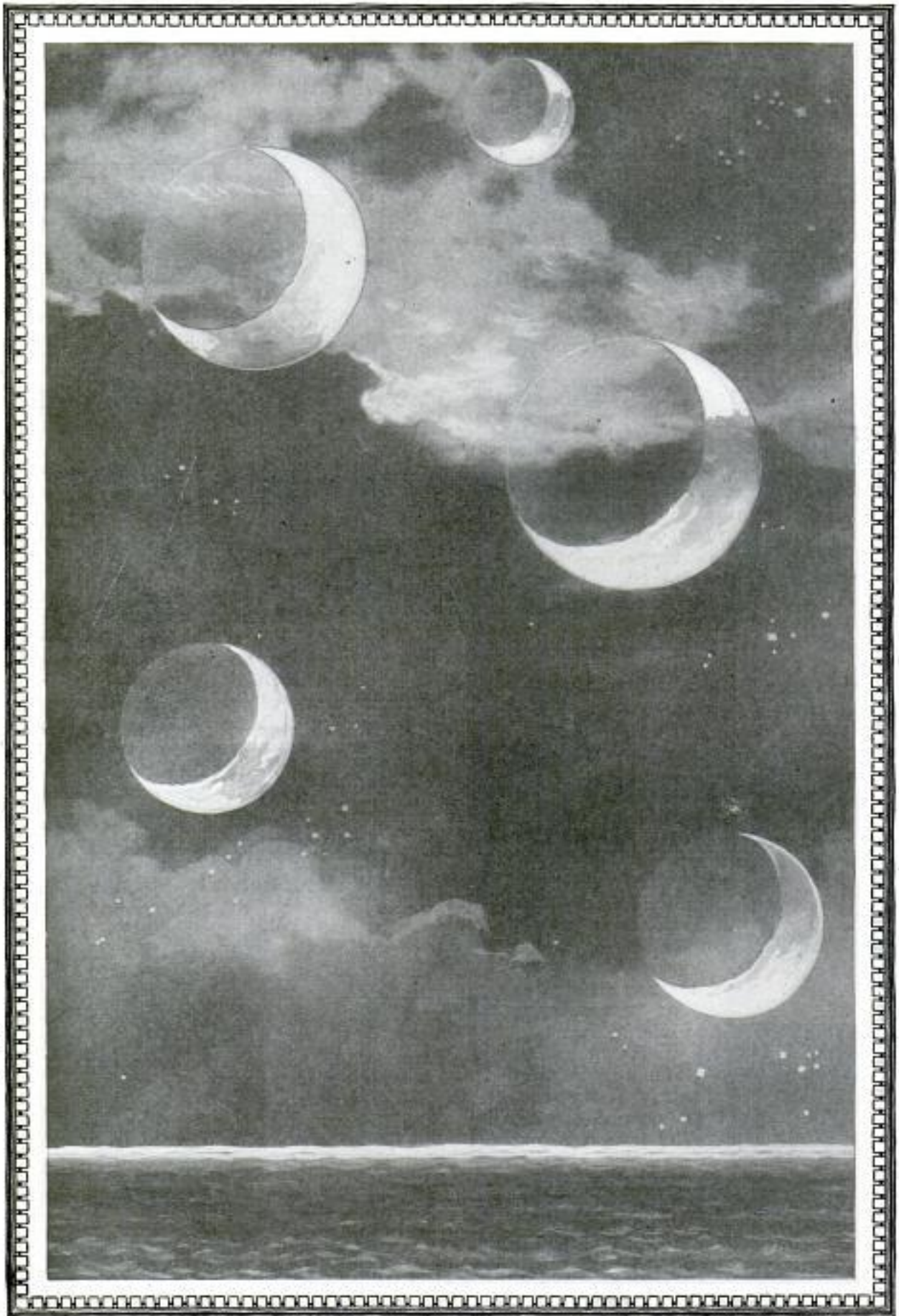
Besides automatically blocking the ignition when the car is stopped, a keyless automobile lock positively holds the steering gear.

There are no keys to forget, as the device is fitted to the steering post and operates with 10 buttons. It may be set with any number up to 10, and the combination may be



changed as often as desired. When a button is touched to shut off the ignition, the car is automatically locked and cannot be operated again until the combination is worked.

*Paragon Basket Co.
Esmond Rapids, Mich.
American Motor Guard Co.
2019 Michigan Ave.
Chicago*



If There Were Any Inhabitants on the Planet Jupiter, This Picture Shows How the Night Sky, Ablaze with Silver Moons and Stars, Appears to Them

Je Sais Tout.
French publication

2605

2665

JUPITER'S NIGHT SKY ABLAZE WITH MANY MOONS

While the people of the earth have only one moon, inhabitants of the planet Jupiter have five or six silver crescents hanging in their evening sky simultaneously, and spectacular eclipses are frequent. In all, the planet is surrounded by nine moons, but the number visible at any one time depends on their positions, as they travel very quickly in their orbits. Since the law of their movement has been established, it has enabled seamen to obtain their longitude by observing the positions of the moons.

— 2716

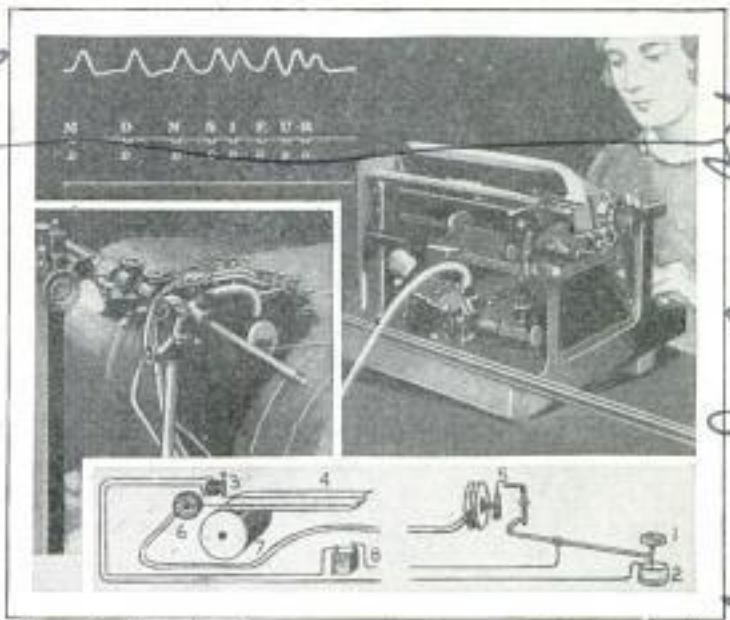
OLD-TIME WOODEN WARSHIPS LIVE LONGER THAN STEEL

Though built of steel the battleship of today does not last half as long as the wooden ship of a hundred years ago. The old-time frigate was made of sound oak fastened together with copper, and lasted for 40 years if no bad accidents happened to it. The iron-clad warship of today goes to the junk heap in less than 20 years from the time it is built. There are four stages in the life of the armored vessel. It takes about five years to build it. Then, for five more years, it is classed as a great fighting machine. After that, new ideas put it out of date and back to the rear squadrons. For a few years before target practice sinks it, this floating fortress is given special duty, which takes it out of the battle line.

naval Weekly 4/14/23

BEST WAY OF TYPING SHOWN BY TESTS 2606

In working out better and quicker methods of typewriting French scientists have used an air tube attached to a moving drum which indicates the force, time, rapidity, and rhythm of the touch on the keys. It also shows which letters are the most frequently used. The apparatus on which the record is made operates by electricity. After a careful study of the results obtained, a new system of arranging the keyboard was worked out, whereby letters, which formerly required more time to strike because of their position, were brought closer together, and other slight changes made.



Air and Electric Apparatus, and Record Made in Seeking Quicker Typewriting Methods

ALLIGATORS RAISED ON FARM FOR SHOE LEATHER

Raising alligators has become an industry, their hides having been found suitable for making shoes and other



Copyright, Underwood & Underwood Alligators on Farm Where They are Raised to Provide Supply of Valuable Leather

leather articles. While in the North they are to be seen only in zoos, in several of the southern states entire "farms" are devoted to their care. Although the teeth of these creatures and their powerful jaws look most formidable, those who handle them dread most a blow from their powerful tails. When provoked, they first seek to strike and stun their victim before attacking with their teeth.

Electricity is now supplying about 65 per cent of the industrial energy used in the United States, engineers estimate.

at Hol & Jennings Ark

dr. J. M. Luby.

Je & air Jour. Franc. publication material

Copyright

AIR FROM TANK ON BACK USED TO SAVE LIVES

For miners, firemen, and others who sometimes are cut off from fresh air, small tanks with a two-hour supply of



Oxygen Tank and They may be Easy

Copyright, Underwood & Underwood
Helmet So Light That it is Carried by a Girl

oxygen are being made. Weighing 36 pounds, they can be carried on the back. Due to its light weight and compact form, the miner can wear this breath-giving tank with ease while he works. There is no network of tubes and pipes to be disarranged and nothing to interfere with movement of the legs and arms. A fireman using it may enter a smoke-filled building without fear, as it will provide a constant supply of pure air. A number of the tanks in various parts of a mine provide an element of safety for the workers in case of accident. In a recent test the tank was used for nearly two hours by a young woman who felt no discomfort.

RADIO ON TOP OF THE ALPS TO GIVE WIDER RANGE

Instead of building steel towers, a radio firm is planning to stretch a wire cable between two lofty peaks of the Alps, in Bavaria, with which to receive and send wireless messages. Water power will be used to furnish the electric current. Because of the great height and the length of the aerial, its ends will be attached to devices like wagons weighted with stones. These heavy weights will take up and balance the effect of wind pressure. The peaks are easily reached from one side, but next to the valley they

are almost straight up and down, which is supposed to make the location a good one for the experiment. Two wave lengths will be used, a short one for near-by points, and a longer one with which it is hoped the station will reach places now out of the radius of the greatest wireless plants of the world. With fair weather the builders expect to have this giant radio finished in a few months and be able to set new distance records.

2380

LIFE-SAVING SUIT TO KEEP EIGHT PERSONS AFLOAT

Made of rubber, a life-saving suit which, it is claimed, will support eight persons besides the wearer in the water, has been devised by Capt. George Bray, who "shot" the Niagara Rapids in 1897. He says that the suit can be donned, ready for use, in one minute and without the removal of shoes or clothing.

Box 1592, Richmond, Calif.

ARM REST FOR MOTORISTS

2683 FOLDS INTO SEATS

Dividing each seating compartment in an automobile into two parts when desired, a folding arm rest reduces fatigue by providing support for the arms of the driver and passengers. When not in use, it disappears from view, folding back into the seat cushions. Although most car owners prefer a seat without divisions for general service on long tours, the lack of support for the right arm of the man at the wheel has been found to be tiring.



Rest for Auto Driver's Arm, Which Folds Back into Cushions When Desired

With the disappearing rest, motorists may enjoy the advantages of both the single and double seats.

Test made by Bureau of Mines

271

*Anacosta Standard
6/10/23*

*U. W. Abner Loble
c/o Loble Steam Motors
714 Harrison
San Francisco*

Copyrighted material

2671

2758 d.w. C. Francis

POPULAR MECHANICS

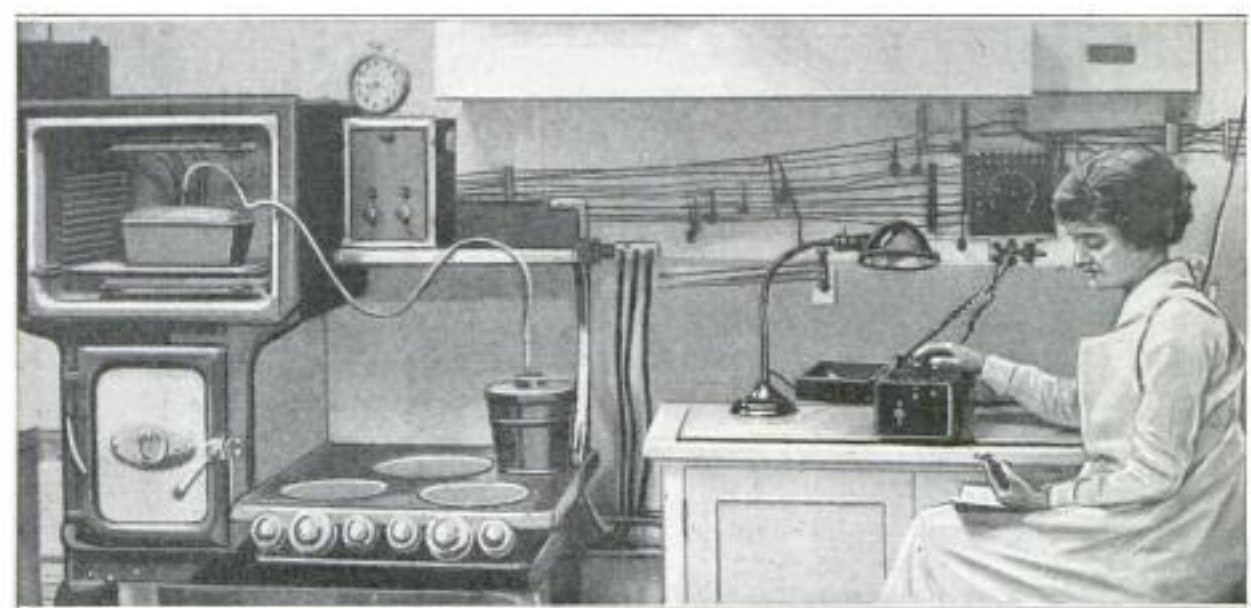
171

Jenkins, Washington, D. C.
RADIO EYE SENDS MOVING PICTURE THROUGH AIR

U. S. KEEPS TAB ON HEAT INSIDE BAKING BREAD

Heat inside a loaf of baking bread is carefully noted by government experts in one of numerous cooking tests. Through a series of such experiments, the temperature at which bread is properly baked is being sought. With a complex electrical apparatus, scientists watch progress of baking as heat is increased. An end of the recorder is thrust into the loaf. To find the correct cooking heat for va-

In a recent test before government scientists, pictures of a moving hand and other objects were transmitted by radio when they were held in front of a device known as an "eye." Witnesses declared they saw reproduced on a small cardboard screen in an adjoining room, the movements of the fingers as the inventor or his assistants "wiggled" them before the transmitter. The reproduction was



Electrical Machine Made by Government Scientists to Record Exact Temperature inside a Baking Loaf of Bread for the Information of the Busy Housewife

rious other foods, similar methods are used. Dialing of thermometers for stoves, that shut off the gas or sound an alarm when the desired temperature has been reached, depends upon such tests.

ANTS HELP BUGS TO STEAL MAN'S SUGAR SUPPLY 2760

Man's continual battle against harmful insects that destroy his food supply is seen in a curious plotting between ants and the mealy bug, a tiny pest, to consume the cane-sugar crop in the South. So serious is the menace that a poison campaign is being conducted by the federal and state governments to kill ants that assist the bugs. The mealy bug feeds upon tender parts of the sugar cane and kills or weakens the young shoots. Enemies, known as parasites, kept down the number of the bugs until the ants arrived. Then trouble began. With their taste for the honey-dew secretion of the bugs, these ants became defenders of the pest, building mud barns to protect them.

said to have been somewhat indistinct but unmistakable. Improvements now in course of completion will bring out sharply the transmitted "movie," it is expected, and the prediction was made that the near future would see radio motion pictures in the home become one of the most popular pastimes of the world. The distance to which the pictures may be sent is said to be limited only by the capacity of the sending station.

GUM TURNED INTO RUBBER IN THIRTY MINUTES 2759

By the use of two different gases, raw rubber has been vulcanized in about half an hour. As the work is carried on at ordinary temperatures, it is possible to utilize filling materials and coloring which will not withstand the high temperatures needed in the ordinary vulcanizing process. At present the process is being applied to the manufacture of materials for boots and shoes, and for bookbinding and upholstery.

Science June 15, 1923

Peachey process used at Walsley, England.

London Times Weekly June 2, 1923

2643

Com. H. S. McIntyre, 613 Chestnut Ave.
Niagara Falls, N.Y.



"Eagle Boat" That Barely Escaped Plunge over Niagara Falls by Stranding on Sunken Rocks in the Rapids: Unaware of Their Danger, After They had Turned in the Wrong Direction on a Trip to Buffalo, the Crew Waved Greetings Back to the Horrified Spectators Who were Trying to Warn Them

2643

"EAGLE BOAT" IN CLUTCHES OF NIAGARA FALLS.

Few thrilling escapes from death in going over Niagara Falls equal that of the crew of the "eagle boat" "Sunbeam," which landed on sunken rocks recently when heading straight for the Horseshoe Falls. It had been purchased from the government by a western man, who intended to use it as a yacht, and was being taken from New York to Chicago, going up the Hudson River and then through the barge canal to the Niagara River. Here, instead of turning to the west, the boat's owners, mistaking the way, headed straight for the falls. Unaware of their danger, those on board the craft were swept along in the strong current toward the falls. People on the shore made frantic efforts to attract the attention of the crew. Whistles were blown and every possible warning given, but the eagle boat plunged on into the upper rapids. It was only prevented from going over the falls by lodging on the rocks, and the voyagers were rescued by scows and boats attached to the bank by ropes. Later the boat drifted farther down the river and hung on a rock just back of the brink.

CONCRETE CATTLE GUARD CAN'T BURN OR BEND

To keep cattle off its tracks a western railroad is using a guard made of con-



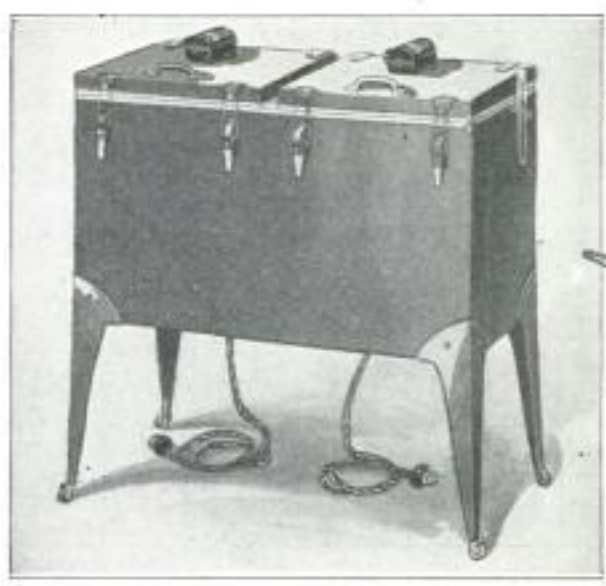
Cones on Heavy Concrete Slab Keep Cattle off Railway Tracks

crete. It is a flat slab with small cones on the top. Through the cones are passed spikes. When cattle step on these, they quickly get off and decide that the meadow affords a more pleasant place to walk. The pointed ends of the spikes are exposed about 1/2 inch above the concrete. Being of concrete, the guards, of course, cannot burn or bend, nor can they be torn up or carried away because of their weight.

*Cont. A. J. B. Curtis
111 W. Washington
Chicago*

STOVE CUTS OFF THE HEAT WHEN FOOD IS COOKED

Just a glimpse of the future is given the housewife by an electrical stove that, in appearance, is just an attractive cabi-



Electric Stove Which Automatically Reduces the Amount of Heat as the Cooking Progresses

net raised on four legs. After the food is prepared, it is placed in the stove and the covers closed. A touch of a button starts the cooking. After the food is partly done, an automatic control shuts off the current and the cooking continues, only a trifle slower than when the current is on. The control device is said to save watching and waiting, and to govern automatically the amount of current needed to cook any article of food, shutting off the electricity according to the kind of food being cooked.

MILK-BOTTLE CAP LIFTER SANITARY AND USEFUL

To protect the contents of a milk bottle and to enable the contents to be easily poured, a cap has been devised which fits over the neck of any bottle. There is a hinge and spring on the cover so it may be easily lifted with the finger.



*Trledo Cooker Co., Toledo, Ohio.
Kirby-Coggeshall Co., 172 Huron, Chicago*

LETTERS SORTED BY MACHINE DIRECTLY INTO BAGS

2726 Labor of a large number of mail clerks is saved by use of a machine which sorts letters and places them into the correct



Machine That Does Work of Several Clerks in Sorting Letters into Bags by Cities and States

bags for shipment. The machine, now being tried by the post office at Washington, D. C., separates letters and routes them into sacks much more quickly than is done in the old way and with less expense. Five men, seated before keyboards like the typewriter, run the sorter, pressing two keys to send a letter directly into the outgoing bag. Use of the invention means almost no handling of mail and a saving of space.

RARE STAMP FOUND IN ITALY AFTER A LONG SEARCH

2709 One of the rarest of early United States stamps, issued in 1845, recently was discovered in Italy where it has been hidden for more than 75 years. It is valued at \$7,500. Made in Baltimore in 1845, when James M. Buchanan was postmaster, it preceded government issues of 5 and 10-cent stamps. So far as known, there are only six specimens of this issue in existence, and at a Paris sale last year one of these stamps was bought for \$6,600 by an American. The stamp found in Italy is said to be distinguished from all other known copies because it shows all of the four outside border lines. It has been cut from the original envelope, but a large piece of the cover has been retained and it is canceled with a small ink mark and the last two letters of the word "Paid."

Owned by Edwin Stern
87 Nassau St.
New York.

MOVING TRAFFIC IS WEIGHED BY SCALES IN THE ROAD

2711 To show the worth of improved highways, government experts have made an automatic device for recording traffic, which shows not only the number of vehicles passing over the road, but also their weight. When installed, there is no delay in traffic, as the machine is hidden under the road bed and is covered with concrete slabs, over which the vehicles pass. In this way it is hoped to obtain a comparative record of the cost of moving vehicles and commodities over dirt and hard roads.

SAND SPRINKLERS IN INDIA RIDE ON THE ENGINES

2728 Among the many queer customs in India, the land of contrasts, is that of having natives ride on the fenders of the locomotives in some sections to sprinkle sand on the tracks. Lifting the heavy bags of sand under a blazing sun is such strenuous work that they have to be changed frequently, but they object to having the automatic sprinklers used, and declare this would leave them with nothing to do. As labor is so inexpensive in India, the railroads have con-



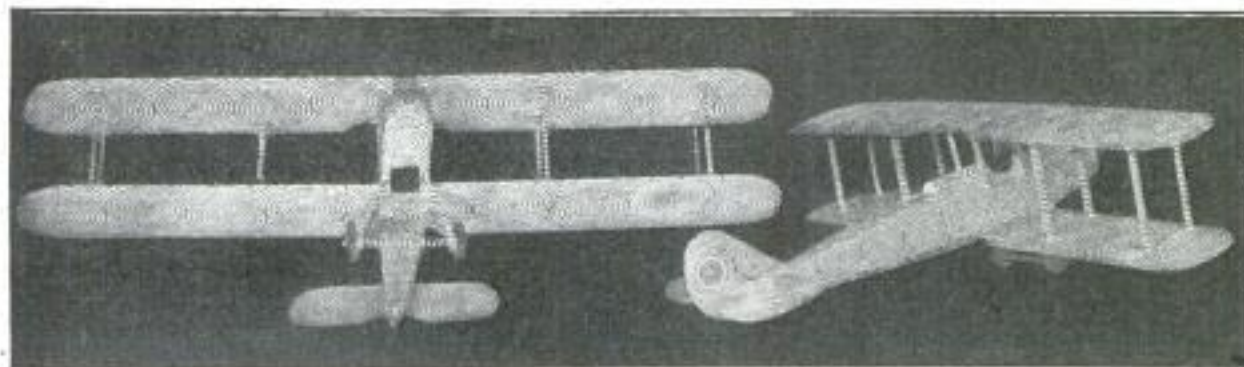
Primitive Way in Which Sand is Sprinkled on the Railway Tracks in Parts of India

tinued this primitive method instead of installing machines to handle the sand as is done in other countries.

DAZZLE-PAINTED AIRPLANE CONFUSES THE EYES

Having its wings painted in queer circular designs on the order of bull's-eye targets, makes the sight of a flying machine hard on the eyes. This new camouflage was tried out recently and was said to be a big improvement over that used

a poor target for an enemy, either in the air or on the ground. Previously army air craft were covered with silver foil so that they would appear to fade into the clouds, and, in addition, tinted with brightly colored squares and triangles to



Airplane with Its Wings Covered by Dazzling Circles Which, by Bewildering the Enemy's Sight, Enables It to Escape Unharmed in an Aerial Encounter

in the late war. The circles are grouped in such a way that they cause the eyes to become confused because of their tendency to follow the scrolled lines instead of taking in the airplane as a whole. It is claimed that it would make the ship

hide them when not in flight. Sometimes the under parts were painted to conceal them from watchers looking upward and the top would have an entirely different kind of design in order to deceive the hostile flier above.

2723

MEN COST LESS THAN GAS FOR PUMPS IN INDIA

Labor in India costs so little that instead of putting in devices that require steam or gas to keep them going, natives are hired to do the work of belts and engines. Near Madras there is a water well which is called upon to give a great amount of service to passing travelers. Notwithstanding this, the water is lifted by man power. Over the well a rude derrick of rough-trimmed poles has been



Labor Is So Cheap in India That Man Power is Still Largely Used in Preference to Machinery and Modern Devices

built. One of the poles is balanced on an upright, with one of its ends over the well opening. Attached to it is a bucket carried on a rope. Two men walking along this beam give it the weight necessary to raise the bucket. This method of securing water has been used in India for countless generations, the natives opposing any new idea that might rob them of work.

Artist: C. H. Underwood.
 Scramble.

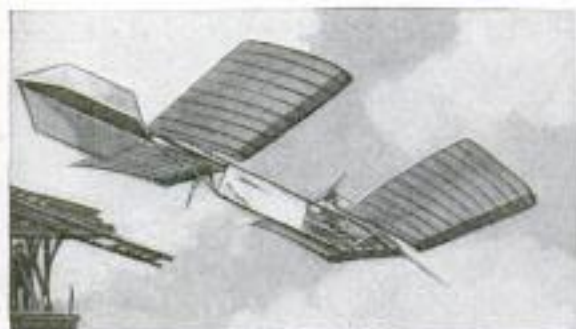
Underwood
Underwood
Copyrighted material



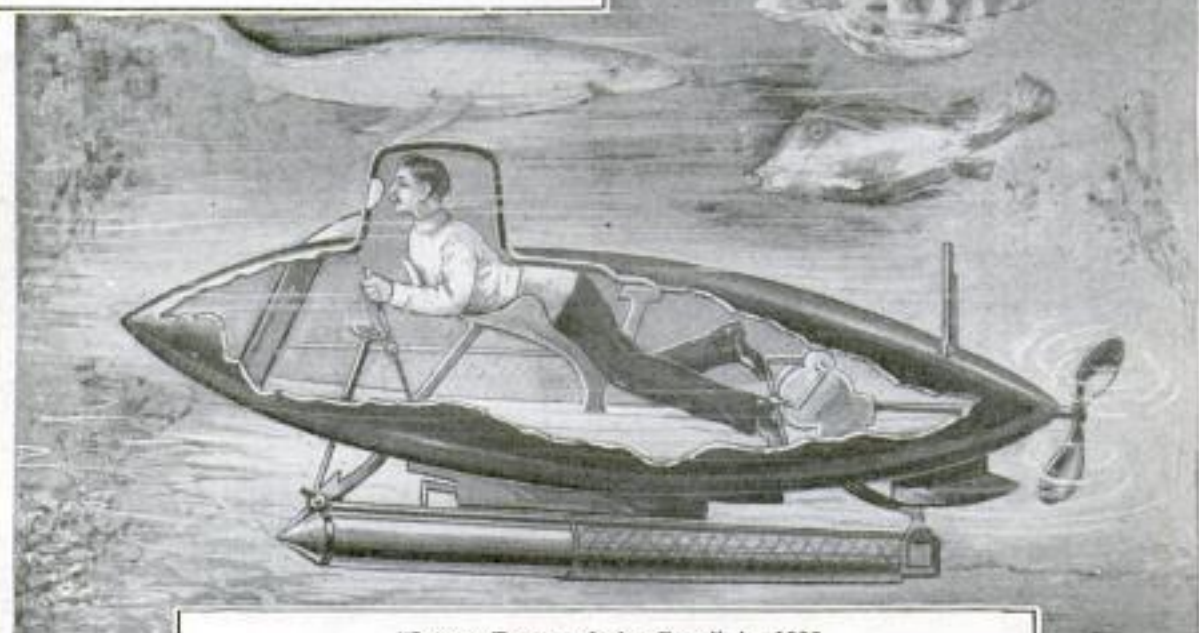
Making Mile in 63 Seconds

"While the machine refuses to fly, it readily sinks itself in the water, and, by adding cork, would make a good submarine. Built on the model of a bird, it partakes more of the characteristics of a fish."

1902 Comment on First Plane



Launching Langley's Air Craft



"Latest Terror of the Deep" in 1902

IN all the millions of years since the coming of man—ages spent in struggling up from the sea to the sands, fleeing before glacial drifts, battling ferociously against strange monsters and the terrifying forces of nature—no other period has seen such great advancement as the last 20 years, according to scientists.

In these two brief decades, human beings have cast aside the shackles binding them to earth and have penetrated into the sky above and the sea beneath. And yet, in 1903, Langley, now known as the "father of aviation," was being derided as an impractical dreamer following the failure of his first airplane and its fall into the Potomac River.

During the same year, according to the files of Popular Mechanics, an electric automobile established a record by covering a mile in 63 seconds, big Chicago hotels just began to install telephones in their guest rooms "to supplant messenger boys."

In addition, the British navy was experimenting with its first submarine, and a "terror of the deep," a submersible, operated by one man who worked the propeller with his feet, was being tested in the United States.

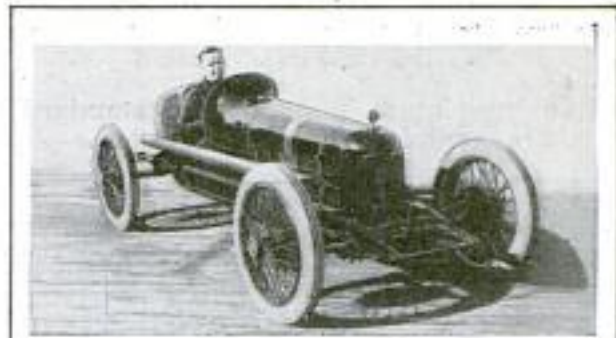
Seen as Promise of New Era of Wonders

AIRPLANES able to lift tons, like the giant "bomber" just built for the United States Army, were not even dreamed of, and automobiles able to maintain a speed well over a hundred miles an hour, were years in the future.

Although the French navy had drawn the plans of a submarine run by steam on the surface and by electric motors when submerged, inventors and marine engineers in 1903 never even contemplated the possibility of crossing the Atlantic Ocean in an underwater boat—a feat successfully accomplished during the war.

And yet the seed of the tremendous achievements which were to mark the next few years was there, for Popular Mechanics, in referring to a "sky cycle," a combination of a balloon and a bicycle, designed to carry one man, said: "It is by no means improbable that within the next ten years vehicles for aerial travel will be as common as automobiles today."

Viewing the future in the light of the accomplishments of the past, scientists are predicting a new era of even more wonderful achievements. Perfection of the submarine, airplane, and automobile all offer fresh incentives to the inventor.



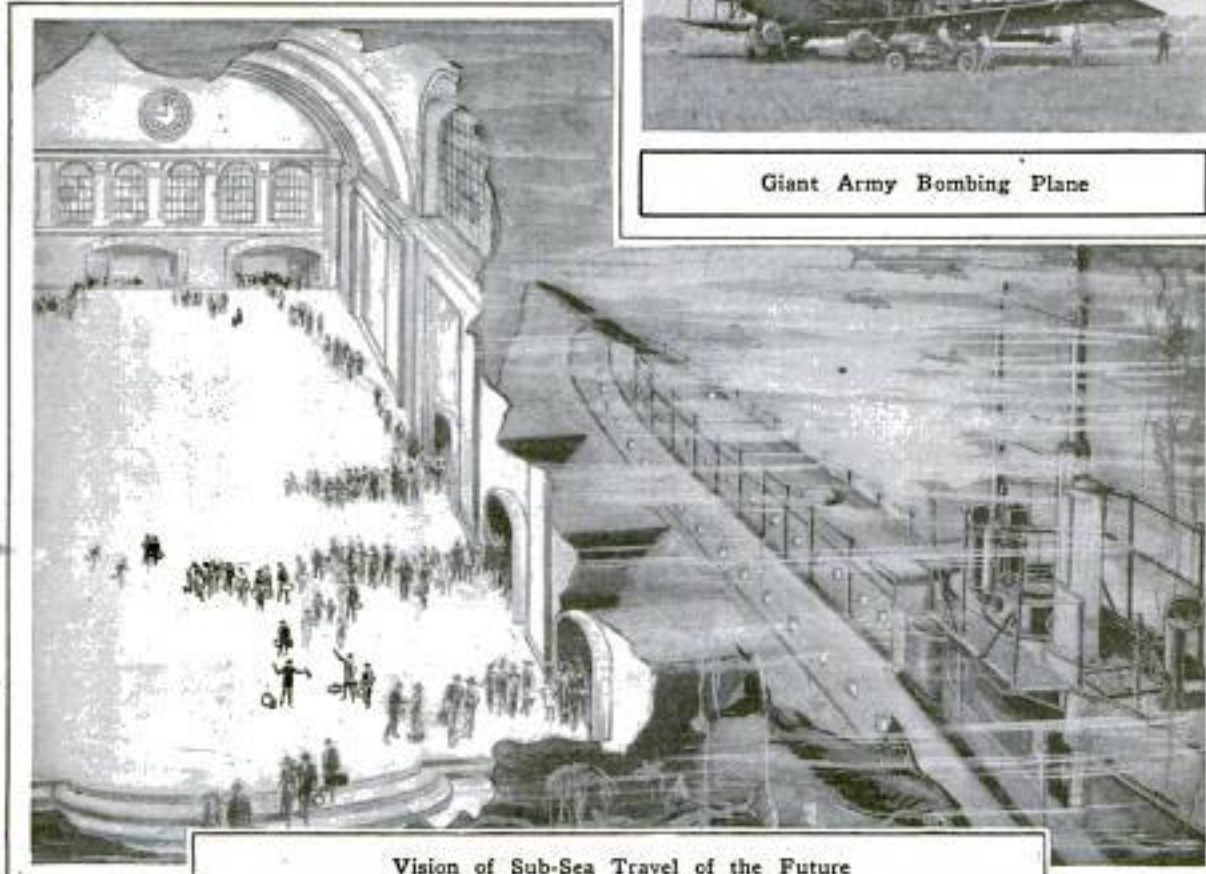
Racing Automobile of 1923

"Smaller motors, greater speed, lighter cars built of new alloys which will run 70 to 80 miles to the gallon of fuel—this is the automobile of the future and it will cost far less than anything known today."

Forecast of Future Motor Car



Giant Army Bombing Plane



Vision of Sub-Sea Travel of the Future

BABY MOVIE CAMERA TAKES FULL-SIZE PICTURES

Moving-picture films of the standard size are used in a small camera now on



Film Rolls That may be Carried in Pocket are Used in This Camera

the market. The magazine holds nearly 100 feet of film. That is enough to make several short scenes. Extra film, in rolls not much larger than a watch, may be easily carried. The exposed film can be removed and replaced with an unused roll in open daylight. To obtain the best results, the camera should be placed on a tripod. It is not necessary for the user to have a knowledge of developing and printing of film, because in most large cities there are studios where this is done at small cost. This movie camera, like those used by professionals, exposes the negative film. Before being shown on a screen it must be printed on a so-called positive.

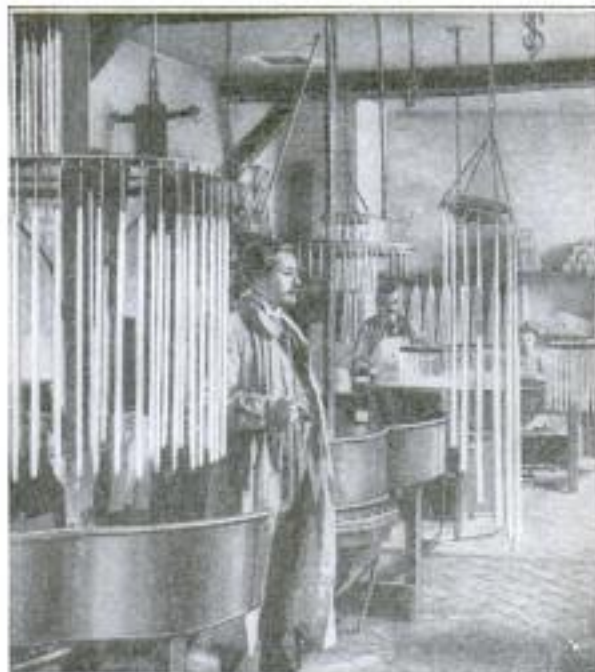
ICELESS BOX KEEPS FOOD COOL FOR THE MOTORIST

Automobile travelers and campers who are far away from any icehouse can supply themselves with cold water and keep foods cool, if they have the flax-covered cooling chest now on the market. Bags made of flax have long been used by the desert people to keep water cold. The flax allows tiny beads of the water to seep out through its pores and pass off into the air. This robs the wall of the chest of heat, and thus lowers its temperature. The cooling chest has a steel box inside a flax-duck cover. There is enough space between cover and box to

hold 4 gallons of water which is cooled by the evaporation. Food placed in the box will be kept cold by the water around it. Clamps are placed on the chest so that it can be fastened to the running board of an automobile.

MAKING TEN-FOOT CANDLES FOR USE IN CHURCHES

Though gas and electric light are generally used throughout the civilized world, the candlemaker is still busy at his trade. There is a shop in Europe where a large force of men and women is engaged all the time in making huge candles for use in churches and cathedrals and where great quantities of Christmas candles are made with machinery. Some of these church candles are 10 feet high. Although more than half a century has passed since candles for the home were made in kitchens, practically the same process is still used in this big shop. In some of the work of the candlemaker gas and electricity are



Where Gas, Which Replaced Candles in Home, Serves in Making Them for Cathedrals

employed where formerly everything was done by hand.

In order to establish closer contact with its outlying provinces, the Dominion of Canada may erect six radio plants in western Canada. The sites receiving favorable consideration are Forts Smith, Resolution, Simpson, Macpherson, and Norman, and Dawson City.

*Shown at International
Photographic Arts + Crafts
Exposition, New York*

*Stoll Mfg. Co.,
3272 Larimer St.,
Denver, Colo.*

ENGLAND'S KING AND QUEEN VISIT THE COLOSSEUM

Monuments to the engineering skill of ancient Roman builders—structures that have defied the destructive processes of time through more than 18 centuries—were viewed by the king and queen of England during their recent visit to Italy. The majestic Colosseum, begun by Emperor Vespasian and dedicated by Titus in 80 A. D., the greater part of which is still standing, particularly im-

pressed the royal party. Bound by metal clips, instead of mortar, many sections of the ruins stand as firmly today as when they were built. Ruins of the Baths of Caracalla, the Temple of Castor and Pollux, the Palace of the Vestal Virgins, and other buildings that constituted the old Roman Forum, bear mute evidence that ancient engineers knew how to build in a way that would defy the ravages of time.



COPYRIGHT, LONDON DAILY MAIL.
Rome's Colosseum, Which was Built About 80 A. D., So Strongly That the Greater Part of It is Still Standing, Viewed by the King and Queen of England on a Recent Visit to Italy

BURNING GAS TO MAKE ICE WITHOUT MOTOR 26/4

Burning gas to make ice sounds impossible, but that is what a device designed for use in connection with small refrigerators does. Placed in the basement, it will furnish refrigeration for three flats. The gas flame under a tank vaporizes a chemical that passes through several coils and extracts the heat from the refrigerators. Then it passes back to the tank, where it is again vaporized, and travels the same route as before. The

operation of the machine is automatic, there are no moving parts, and it is perfectly silent. Once set at the temperature desired in the ice box, it requires no more attention. Besides, as the refrigeration is perfectly dry, it prolongs the life of the ice box indefinitely and keeps food pure and sweet for a longer period than is possible with ice. As there is practically no loss of the chemical used, the machine continues to operate as long as the flame remains lighted, and there are no parts to oil or adjustments of any kind to be made by the user.

Common Sense Ice Machine Co.,
1874 W. 14th Chicago

Proper Gas Light & Coke Co. Agents Chicago

Copyrighted material

24 72

Courtesy Elgin National
Watch Co.

PIG'S BRISTLE TO WATCHES IS PROGRESS OF TIME

Like many of the marvels of civilization, the watch has become so familiar that its perfection passes almost unnoticed by those who fail to realize that it is one of the most extraordinary things made by human hands.

Since the first caveman took a rope of grass, tied knots in it at equal distances, set fire to one end and measured the passing of the day by the burning from one knot to another, the development of time-telling devices has been full of fascination.



First Watch

Centuries later, time was told by candles notched at regular intervals. In the thirteenth century a rude clock was evolved, taking its name from the bells ("glocken" or "cloches") used to strike the hours. It was 300 years more before the first watch came. It was as large as a saucer, varied more than an hour a day, and sold for about \$1,500 in our money.

Several generations then went by before the next radical innovation. This was the invention of a crude hairspring made of pig's bristle. Today this spring literally is as fine as a hair, and it is made by drawing steel wire through a hole in a diamond until it looks like a thread from a spider's web. A pound of steel used for this wire costs five or six dollars and makes eight miles of hairspring worth 62,000 dollars.

It requires 3,773 operations to make a watch containing 211 pieces, about one-third of which are screws. Some of these screws are so small that 20,000 will go into a thimble. Laid on a piece of paper, they look like gold dust or grains of pepper. Half a million of them will not weigh more than a pound. Scales to measure these screws are so delicate that they will weigh a pencil mark on a bit of tissue paper.

Jewels used for bearings are cut from

rubies. They are just rough pebbles to begin with. Then they are cut into pieces thinner than ordinary writing paper, shaped into circles the size of a pinhead, and a hole is drilled through the center of each. The pivots of the gears turn in these pierced rubies, which are required to withstand 18,000 blows an hour and over 150,000 beats a year from the movement of the balance wheel, which is audible as the familiar "tick-tock."

All of the driving force of the watch lays in the mainspring, which is about 2 feet long, and yet, if suddenly released, it can strike a blow strong enough to put out the eyes of the person handling it. If a spring breaks, the watch will stop at once, but just why it breaks is a good deal of a mystery. Strangely enough, the best springs are most liable to breakage, while a comparatively soft spring, which will not keep good time, will last almost indefinitely. The spring should be wound in the morning, not at night, as then it is less sensitive to the jars it encounters during the day.

Many curious superstitions have grown up about watches. One is that the hands should never be turned backward. Experts say, however, that this will not injure any timepiece except one that strikes. Another concerns the big, painted, wooden watch which often hangs as a sign in front of jewelers' stores. The hands almost invariably point to about 18 minutes past eight.

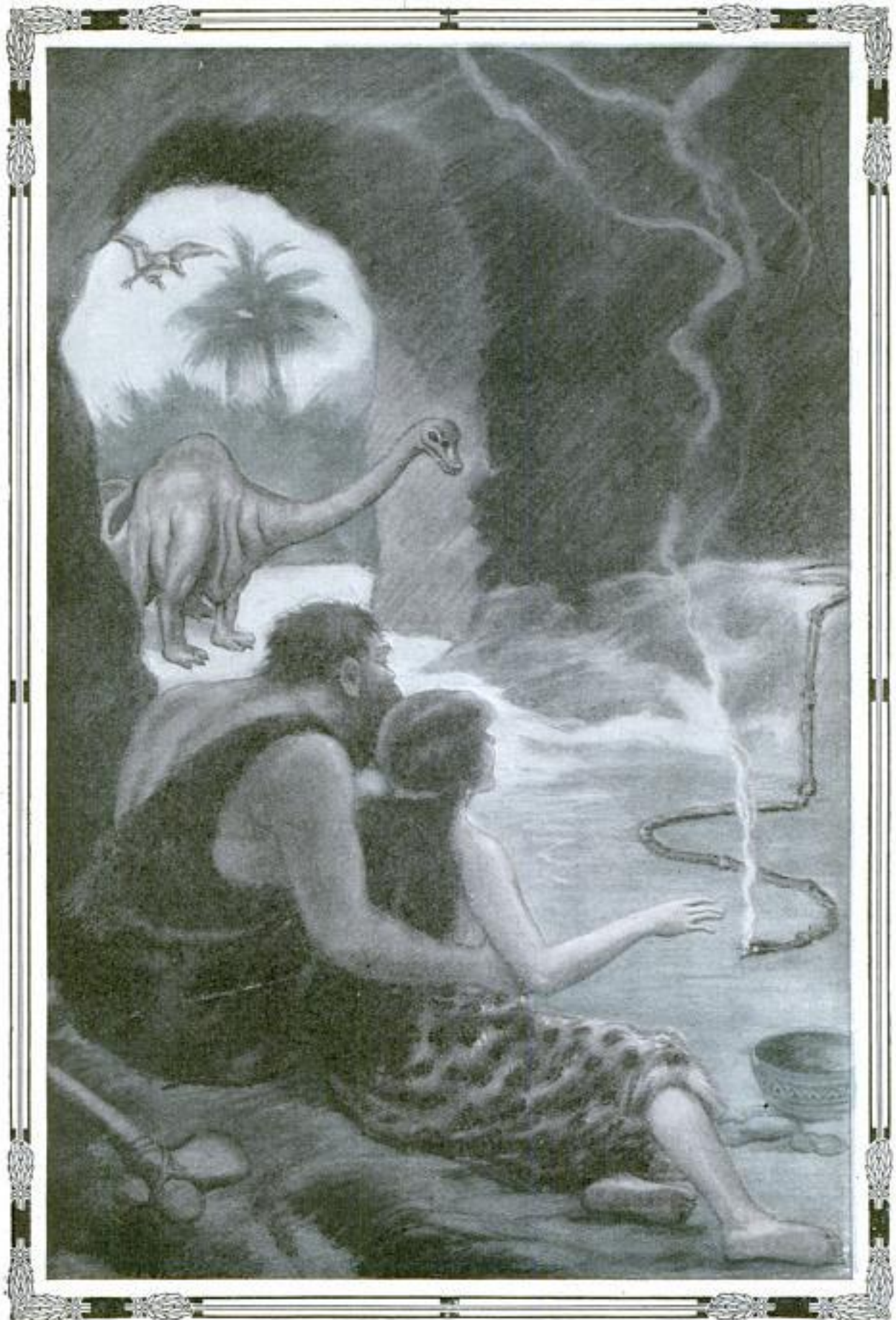
Some persons believe that this is done because that was the hour Lincoln was shot. Others say it was the time he died. Neither explanation is correct. In the first place, he was shot much later in the evening than 8:18, and he died at 7:22 in the morning.

The real reason for this custom is that this position of the hands leaves space for the store owner's name, besides giving a well-balanced appearance to the dial.

In cleaning watches a rare oil is used which comes from a cavity in the jawbone of the porpoise or the blackfish. Cape Cod fishermen bring in most of it. To be tested, the oil is taken up into Vermont, where the mercury goes far below zero in winter. The best grade is that which remains practically unchanged at these low temperatures. A single drop of this oil is enough to lubricate a watch for a year.



Ancient Clock



How Cave Dwellers, Countless Generations Ago, Kept Track of the Passing of Time by Watching the Slow Burning of a Knotted Rope Made of Twisted Grass

It required years of experimenting to develop this lubricant, as it was first used only in crude lamps.

At one of the great American watch factories, the time is kept on two master clocks sealed in air-tight cases. They rest on concrete piers to protect them from jars and are regulated by astronomers, who measure the time it takes the earth to turn on its axis. This turning is so regular that it does not vary even a hundredth of a second in a thousand years.

In Switzerland, long known as the watch center of the world, the making of timepieces was early developed as a household industry. Families specialized in making the different units, which afterward were sent to factories for adjustment and assembling. Now there are eight large factories in the United States, one of which alone turns out 1,000,000 watches yearly, approximately 8,000 timepieces daily, and the year's output is valued at about 15,000,000 dollars.

The most extraordinary of all the marvels in a modern watch is the balance. It is the heart of the watch. The adjustment of the balance wheel, and of the hairspring inside of it, is what makes a watch "keep time." Most watch trouble comes from some derangement of the balance.

After being wound into coils, the threadlike wire of which the hairspring is made is put into a chemical bath, from which it emerges looking like fine, brown hair. These coils are then tempered, or "blued," by being laid on a hot iron plate for a few seconds. Then they go to girl workers, who pick up each one with delicate tweezers, and fasten the end with a pin which is itself scarcely larger than a hair.

As to the balance wheel, the rim is formed by welding a circle of brass to the outer side of a circle of steel, the brass part being twice as thick as the steel part. This is done because brass expands more rapidly under heat than steel, so the brass is put outside and the rim is cut in two places, leaving open spaces.

Then, when the brass expands, the steel draws the free ends inward, keeping the wheel the same size. As there would be a variation of only a few thousandths of an inch anyhow, this is an

indication of the accuracy of adjustment required. In the rim of the balance wheel there are 26 holes. They are so small they look like mere black specks; yet each one of them is accurately grooved in a spiral thread to receive screws so small they are hardly visible to the naked eye.

At first, six of the little screws are put into six holes on each side of the wheel, twelve altogether. Then the wheel must be poised. To do this it is suspended between two small uprights with thin blades of garnet on top, and is made to revolve. If the wheel stops dead, the girl making the test knows that the weight of the wheel is evenly distributed around the rim. If it does not stop dead, but settles a trifle one way or the other, there must be a little extra weight somewhere, so other screws are substituted of slightly different weight, and this is continued until the wheel poises perfectly.

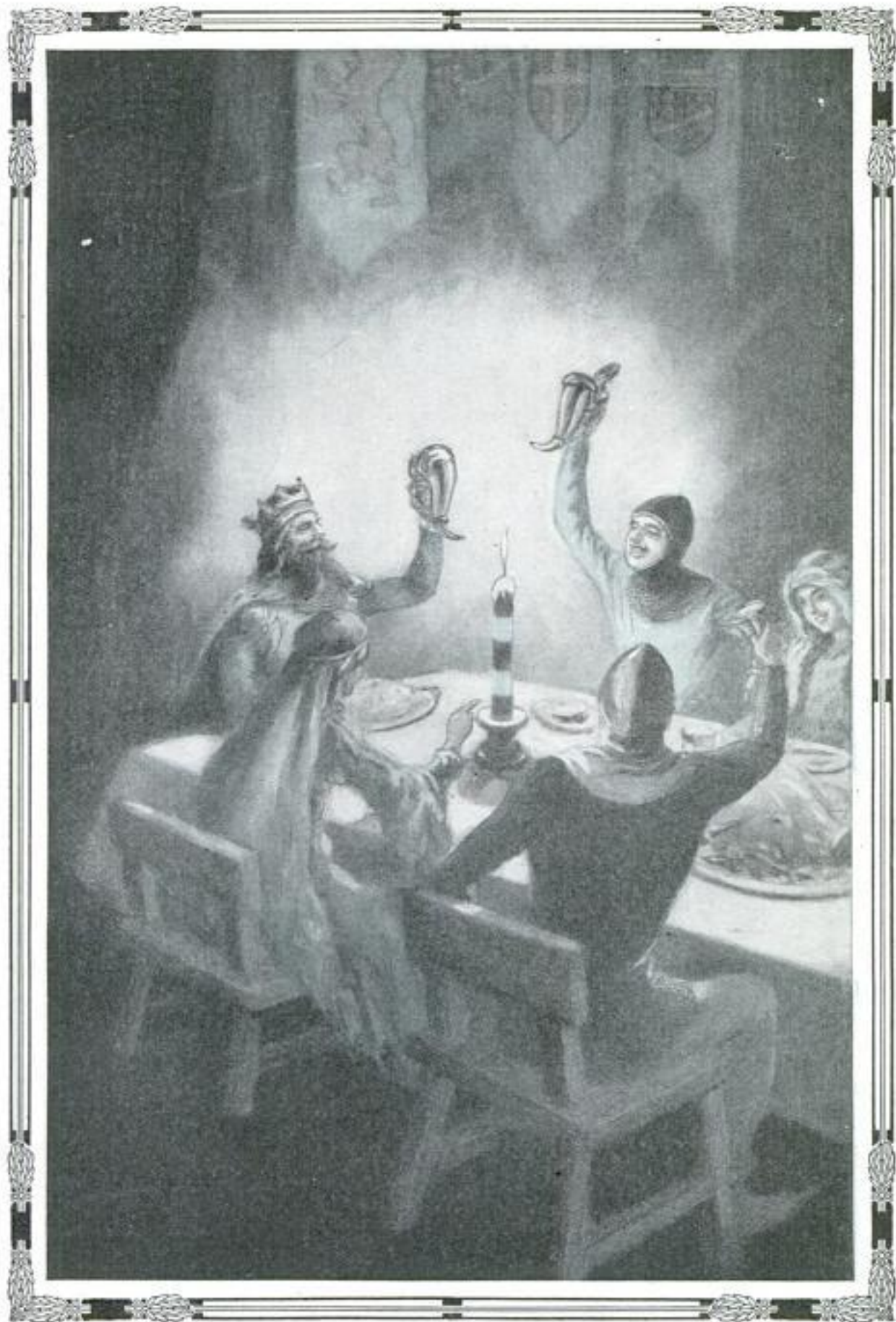


Time Ball

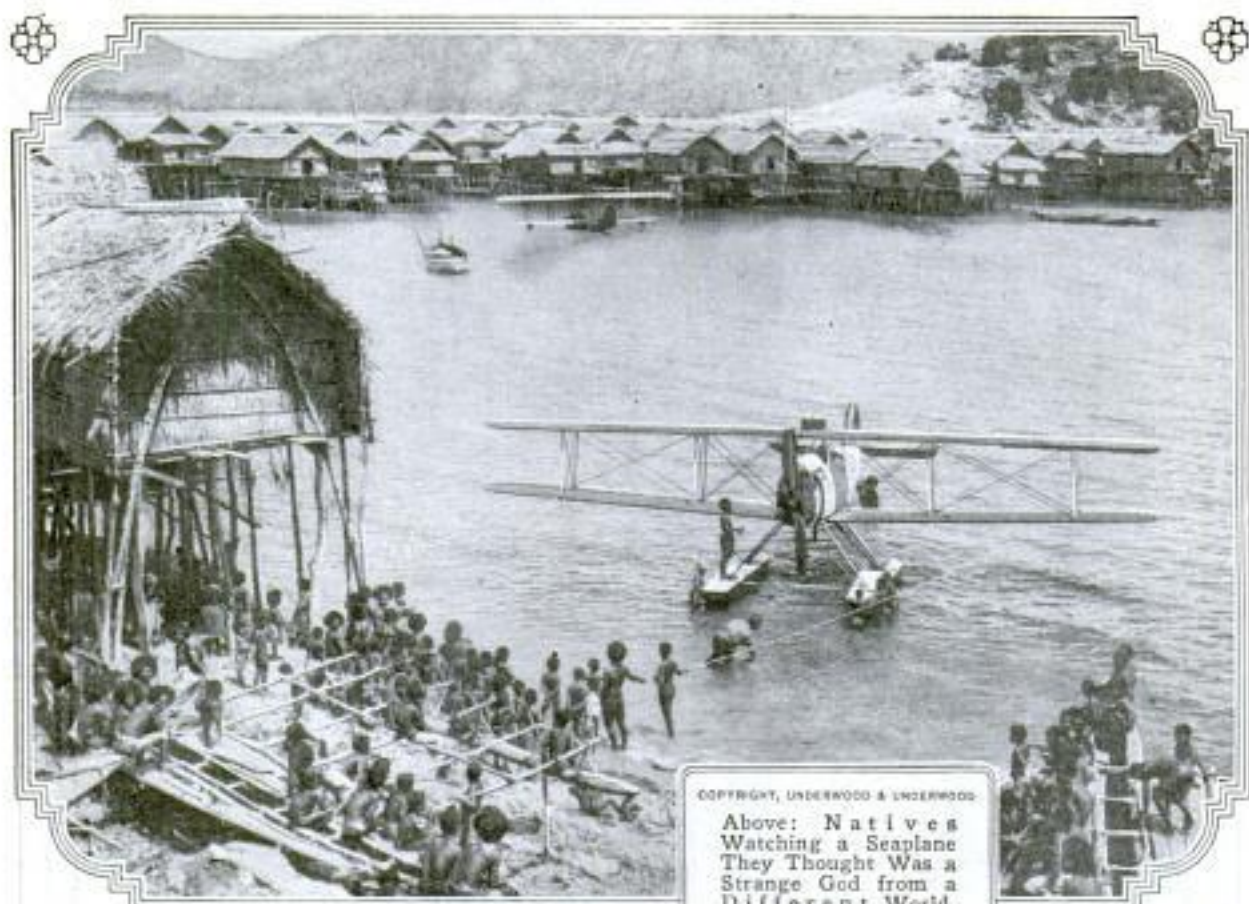
This process gives some idea of the accuracy necessary, but the process does not end here. After all of the parts of the watch are assembled, and the "movement" is ready to run, it is tested in various ways. A watch is expected to run the same, both summer and winter, so one of the tests is for temperature. The completed movement is kept running for 24 hours in an oven at a temperature of about 84 degrees; and then for another 24 hours in a box packed with ice.

If it is found to have gained, say two seconds at one temperature and to have lost five at another, that is considered a total error of seven seconds. The man who is "rating" the watch, takes out a pair of the little screws in the rim of the balance wheel and moves them to a hole or two farther along. Each of the twelve holes in the two sides of the rim has a number.

The watch rater may move the screws in the number eight holes to number five, and make a note of this change in his record book. Then he repeats the 24-hour tests at each temperature to see whether he has corrected the error. If he has not, he makes another change in the position of some of the screws, and tries the test again. But he keeps on until the watch runs the same at every temperature.

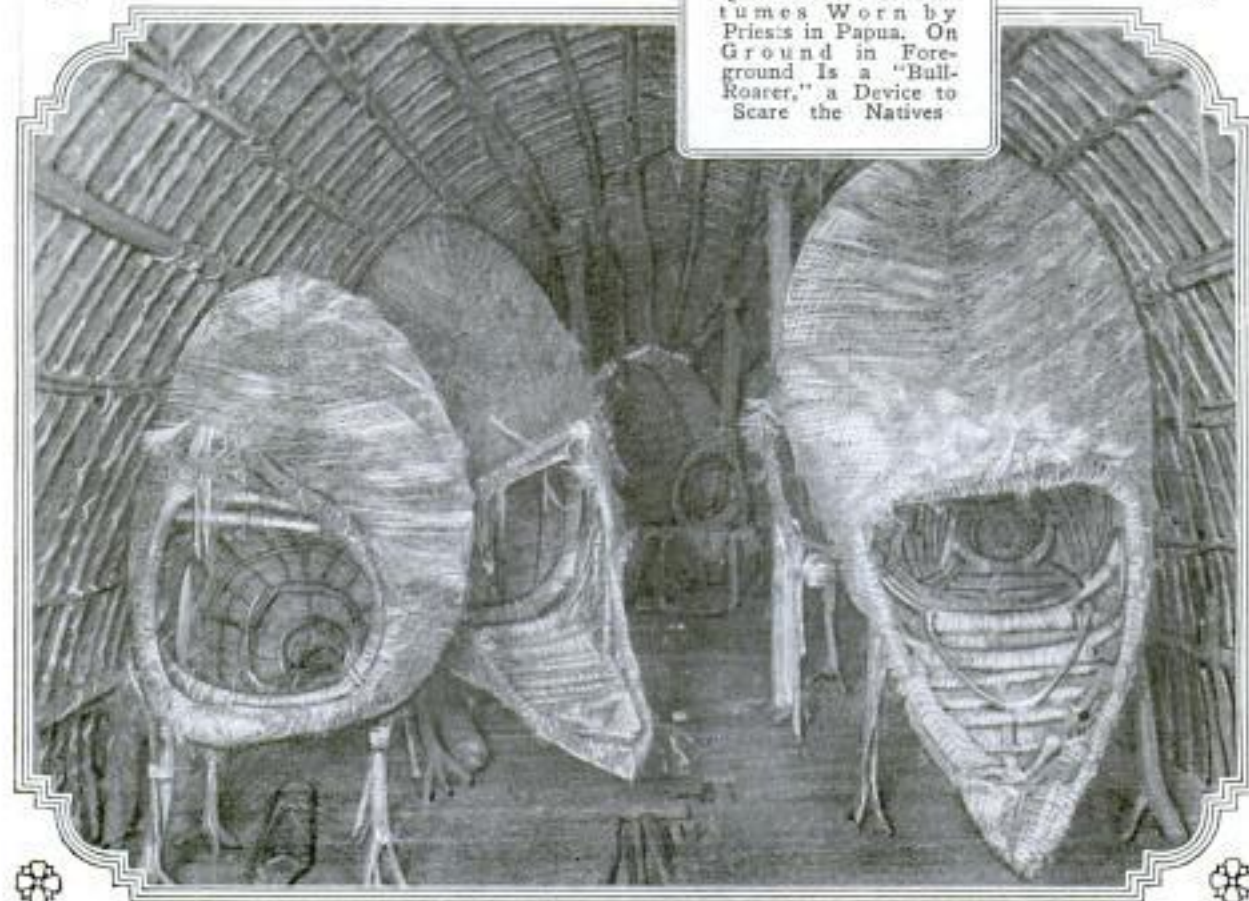


When Knighthood Was in Flower, the Time was Told by the Melting Away of Candles Which had been Notched to Represent the Hours of the Day



COPYRIGHT, UNDERWOOD & UNDERWOOD

Above: Natives Watching a Seaplane They Thought Was a Strange God from a Different World, When It Visited Their Shores for the First Time. Below: Queer Grass Costumes Worn by Priests in Papua. On Ground in Foreground Is a "Bull-Roarer," a Device to Scare the Natives



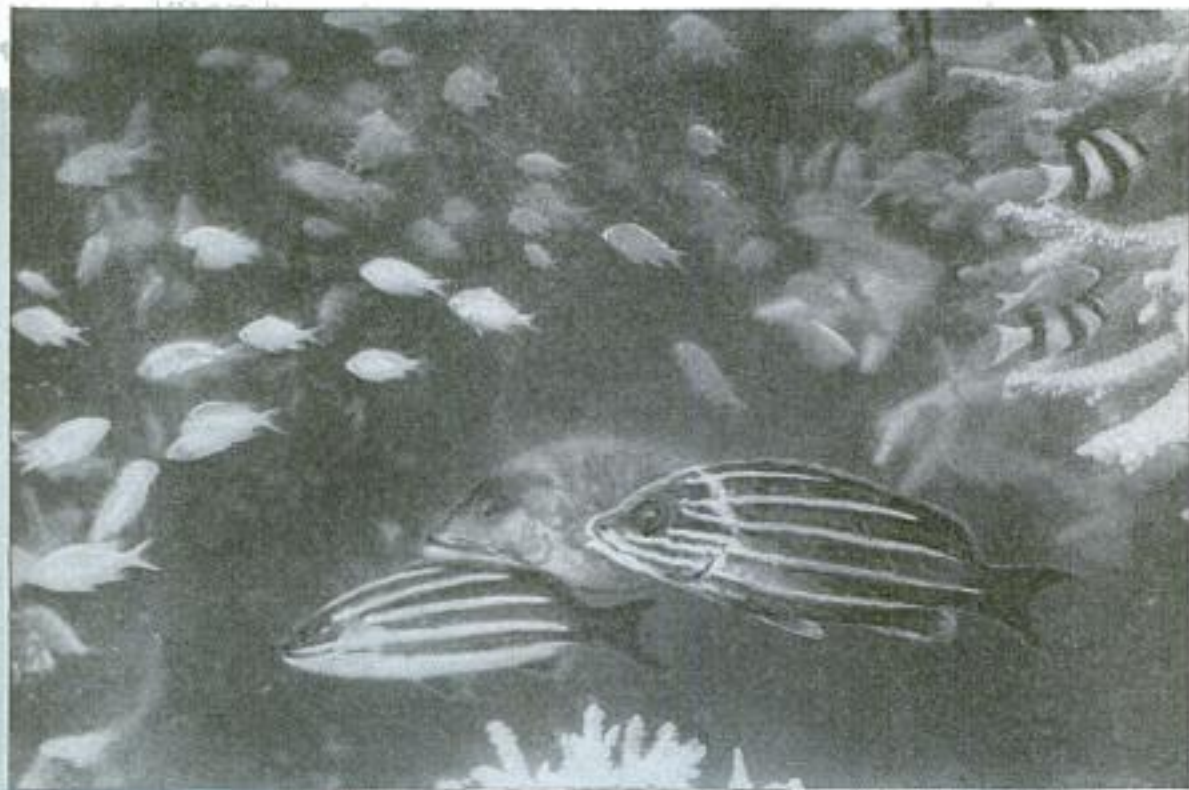
SKY VOYAGERS GREETED AS GODS IN PAPUA

NATIVES of Papua, in New Guinea, who were recently visited by airplanes, thought the machines were strange gods, and so, to pay their respects, they solemnly carried pigs in canoes to the floating seaplanes and placed them as an offering upon the broad wings.

They are a very superstitious folk who in these days of scientific wonders still cling to magicians, rain makers, and sacred amulets. Thunder and lightning, and storms are the fury of evil spirits who have been insulted and must be appeased, they believe. Fearing the dead,

where they dwell for a long time, hoping to throw their enemy spirits off the trail. On certain occasions priests don weird grass creations made to resemble alligators with open mouths, through which they make roaring sounds, believed by the terrorized people to be the voice of a dreaded spirit. These noises are produced by swinging so-called "bull-roarers," pieces of wood attached to string and swung round and round.

Boats made by the Papuans are much like modern airplanes, the great outriggers resembling somewhat the wings. Some of these boats are 50 feet long, and



COPYRIGHT, UNDERWOOD & UNDERWOOD

Strange Fish, Striped Like Zebras, Fleeing from Camera in Coral Bed: Remarkable Under-Water Picture Made by Scientist Visiting Papua

they cut pathways through miles of jungle to the open sea, so that the departed spirit can reach the water to bathe. Amulets are worn to bring success in war, in trading, hunting, fishing, or love.

These simple people believe that in them dwells a spirit that often goes abroad at night while they are sleeping, and that always roams the darkness after they have died. This ghost has great power over men, and at any time may return to plague those who have done it a wrong. When there is a plague, the Papuans flee the colony to the forests,

when lashed together they often have a width of 25 feet. When the visitors from a modern city reached this primitive place they were surprised to see community apartment houses, rudely made, but 500 feet long and containing quarters for scores of families. All houses are built on high piles regardless of their distance from the sea. In front of these homes the women cook while the men are out hunting.

Most of the heavy work is done by the women, who get their reward in beads and other bright body ornaments. The

St. Louis, Mo. City of the Future
New York City
London, England
Underwood in
Electricity Co
London

*Wahl. Henius
Institute, taken
over by
American Baking
Institute*

men wear very little. Sexes do not eat together. When friends meet, they do not shake hands, but they touch noses. In some parts of Papua acquaintances greet each other by pouring water on the head. The hair is bound with roots in tiny bunches; sometimes a young man has 700 such bunches on his head. They are called "frizzled-headed," which led to

the name of Papua. On ceremonious occasions Papuans show their fondness for music, using Pan pipes, flutes, and drums. Rarely is there singing. Living in ignorance of the outside world, they still use the bow and arrow in hunting, yet develop a race of men who are taller, stronger, and healthier than the average in civilized lands.

FIVE-STORY OFFICE BUILDING ONLY TEN FEET WIDE

2440

On a strip of ground only 10 feet wide, a London railway company has built one of the world's strangest structures—an office building so slender as to have the appearance of a blank wall. Standing as one of the architectural curiosities of the city, the five stories are ed on one

have the ap- blank wall. one of the tural curiosi- British capi- building is high. Bound- side by the



Office Building Which Looks Like a Wall, Built in London on Strip of Ground Only 10 Feet Wide

street and on the other by railway tracks, there was no possibility of obtaining a larger section of land, and yet the narrow strip was so valuable that it could not be allowed to lie idle. Located near London Bridge, thousands of sight-seers visit the structure, which is filled with business offices. Usually the impression is that it is a "spite" building, but, in reality, it resulted from the owner's desire to find some way to help pay his taxes.

LIQUOR PLANT NOW SCHOOL FOR TRAINING BAKERS

2578

Machines once used to test liquors are now, with a few changes, teaching bakers how to make bread and pastry in a trade school in the Middle West. The three-story building used by the liquor testers has been changed into a school for bakers, scientific devices in the laboratory formerly used for work with alcohol now serving students of the chemistry of baking, and the 5,000 books in the old liquor library being of value as texts on yeast and other products used by bakers. With very slight changes the pre-prohibition plant made a model college of bakers. In other parts of the country many similar incidents have resulted from the change of industry from a "wet" to a "dry" basis.

2412

LAMP-POST DIRECTORY MAKES HANDY GUIDE

Condensed city directories, clamped to lamp-posts at convenient points in Pacific-coast cities, are proving a source of relief to traffic policemen, who have heretofore been troubled many times a day by persons seeking information. The di-



rectories are housed in a cast - aluminum box, similar to a fire - alarm box, and contain upward of 50 aluminum pages, each 6 inches wide by 20 inches deep. The printed matter on the pages is weather-

proofed. A spring hinge keeps the door closed when the directory is not in use.

*South East + Chatham Railroad
London, England*

*On Torley St.
near London Bridge*

*Chas. J. Wright
General
Deliveries, Tacoma, Wash.*

2462 Built by J. H. Martin, Jr.
418 University St.
POPULAR MECHANICS 18
Seattle Wash.

MODEL OF MOUNT RAINIER IS EXACT IN DETAIL

Complete in every detail, even to small wild flowers and stunted evergreens, is a model of Mt. Rainier, the tallest peak in the United States, which has just been finished by a Pacific-coast artist. The model stands 14 feet high and is

and hills was obtained from Mt. Rainier, as were the larger evergreen trees. Smaller trees were made of yarn, while the blue of the ice fields and glaciers was made with colored paraffin. The model was cast in plaster and laid on canvas



Model of Mount Rainier, Just Completed by a Pacific-Coast Artist, Showing the Smallest Details: More than One and a Half Tons of Materials were Used

built on the scale of one to 1,000. Two months' work by the artist and a crew of assistants was required to complete the work. The rock used for the crags

stretched over a wooden frame. Colored lights give the effect of sunshine or moonlight when thrown against the scene, giving it a life-like fidelity to nature.

LIGHT FOUND TO BE ENEMY OF MUSEUM TREASURES

Museums of the future will have no windows, according to a noted scientist, who claims that light is the greatest enemy of natural-history collections. After a few days' exposure, it is declared, the lovely Luna moth fades, feathers of humming birds actually seem to disintegrate, and even some minerals are affected. This damage is attributed to the

ultraviolet rays from the sun, and all attempts to filter them out through frosted or colored-glass windows have proved unsuccessful. In many of the larger museums, the most valuable collections are now closely guarded in rooms into which no ray of sunlight is ever permitted to shine. Inspection by the public is allowed only under artificial light. Abroad, sealed vaults are used to store the relics and they are seldom brought forth to be shown to visitors.



Great Stone Face on Ancient Temple Hidden for Untold Ages in Jungle Wilds: Lured by Its Smile, Scientists have Labored in Vain to Solve the Mystery of the Race upon Whose Splendor It Gazed

GLORY OF LONG-LOST TEMPLE RESTORED

Jungle Splendor Tells Mute Story of Forgotten Race, Their Thousand-Year-Old Culture, and Wonderful Achievements

BY A. N. MIRZAOFF

TOWERING high above the surrounding jungle, an ancient temple has been restored by modern science to bear mute witness to the splendors of a forgotten city in Cambodia, French Indo-China. With miles of long corridors, a maze of marvelous carvings and bas-relief of rich and intricate designs, the temple combines in one solid mountain of carved stones French renaissance, Byzantine, Moorish, Hindu, and barbaric architecture.

Who were the architects, the draftsmen, the masons, and the slave laborers who piled this gigantic and bizarre mass of peaked towers, grotesque cupolas, hundreds of somber galleries, and thousands of steps and windings of the original temple, is a question which has not been answered. Some historians say the Hindus, while others claim it was a people subject to the Hindus. French scientists, however, have traced the date of the temple to about a thousand years ago. It was near a beautiful metropolis, known as Angkor Thom, or "Royal City."

This town was built in the form of a rectangular inclosure, nearly two miles in each direction, surrounded by walls from 40 to 50 feet high, and 50 massive towers decorated with the faces of ancient gods.

For hundreds of years these structures were lost in the thick and almost impassable tropical jungle. What was once the home of romance and Oriental splendor became the habitation of birds, beasts, and reptiles. Palaces in which kings had lived and died, stately columns and walls that had looked down on gorgeous gatherings, pavements which had resounded to the passing of mighty armies, crumbled slowly into dust, while those to whose genius they bore evidence vanished even from the pages of history.

After many decades of brooding silence, the ruins were discovered by Portuguese missionaries, but it was not until recent years that French scientists began delving among them in an effort to solve the mystery surrounding a forgotten race. Slowly the débris was cleared away and the reconstruction of the temple begun.

From the strange inscriptions and carvings covering the walls, efforts were

made to learn something of the customs of the former inhabitants. It was found that, besides the first city, the ruins contained another, known as Angkor Wal, both being subject to the Khmer kings.

Pieced together by learned men, part of the records related to the dancing girls attached to the palace of the kings. Only the most beautiful girls, some of them as young as six years, were brought to the rulers by their parents.

After the parents had been paid according to the age and beauty of their children, the girls were imprisoned in the palace and never permitted to see their fathers or mothers again. They were immediately taken charge of for training by teachers, themselves former dancers to the king.

Every effort was made to make the girls not only dancers but actresses and acrobats as well. They were required to express not only music, but sentiment of their bygone glories, while burdened down with a load of from five to six pounds of gold, silver, jewelry, and long, pointed helmets, emblematic of the great temple.

In preparation for this they were required to endure a long and painful period of training, the object of which was to make the body supple and to maintain a steadiness of arm and leg movements in order to follow the rhythm of tom-tom music.

Sitting opposite each other, one of the girls would turn back the fingers of a companion until all of the joints cracked, and then bend an arm backward over a knee as a branch is broken. The aim of this was to obtain suppleness of the joints.

These rites and the training that goes with them are still practiced by the Cambodian court.

With the restoration of the temple, the French scientists are continuing their excavations in the hope of more exact details of life in this mysterious kingdom, and the fate of the original race which flourished there.

As many of the products of these ancient builders are the result of lost arts, it is hoped that a more thorough search than has yet been possible will prove of great advantage to both science and the study of the human race.



Dancing Girls of Khmer Kings Who Never Gaze Again upon the Faces of Their Parents after being Given to Their Ruler, When Mere Children, for Years of Rigorous Training in Preparation for Careers



Ruins of Temple in Forgotten City of Ancient Cambodia Which has been Partially Restored by Scientists as Mute Evidence of the Splendor and Power of a Race That Vanished Centuries Ago

2421



Young Dancing Girls of the Khmer Kings being Presented with Jeweled and Golden Ornaments Worn during Their Efforts to Express the Spirit of Bygone Glories before Their Ruler

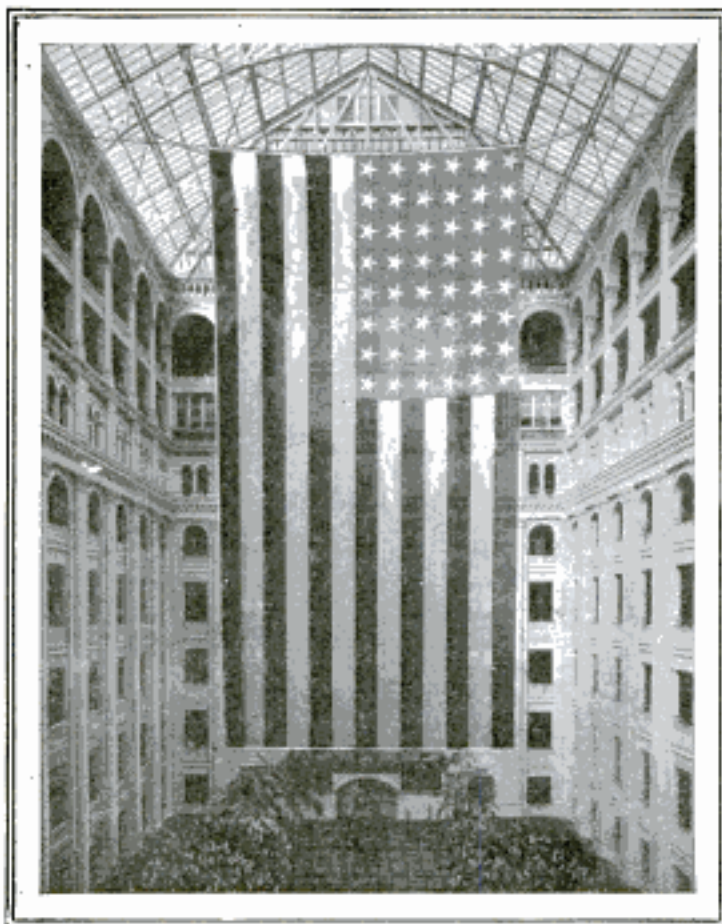
504
2549
Cmt Norman C. Mc Loud. 07.17.11. Paul St. Baltimore Md.

"OLD GLORY" TOO LONG, ITS SIZE IS CHANGED

STRANGE MYSTERY OF THE SEA IN SINKING OF STEAMER

"Old Glory" is to be changed. Science and art have tested the old flag and have decided that it is too long for its width. It is to be trimmed 1 inch for every 8 inches in length. This makes it about the same size as the one that was

What is regarded as one of the strangest mysteries of the sea resulted from the sinking of the steamer "Seaconnet" in which several members of the crew lost their lives. Survivors declared that the vessel did not hit the bottom, nor have



United States Flag at Post Office in Washington, Said to Be Largest Correct Emblem in Country

carried by Yankee troops in the American Revolution. It is the first change made in the flag since Arizona and New Mexico were admitted to the union more than a decade ago. Tests by art experts and government officials have been made on flag staffs of various heights. The starry field of blue and the seven red and six white stripes have not been changed, though. Except for the additional stars, it is the same emblem honored by the nation since the days of Washington. What is thought to be the largest correct flag in the country is at the post office in Washington, D. C. This hangs from the roof of the inner square and spreads over six stories. The length is 70 feet 4 inches, and it is 37 feet wide.

a collision, but that it simply sprung a leak, which they could not explain, and eventually foundered. They asserted they had seen no evidence before of weakness in the ship, and had every confidence in it. The captain said he had previously made two voyages across the western ocean in the "Seaconnet," which was formerly named the "Tuckahoe," on one of which he had successfully passed through 14 days of heavy gales

without evidence of any leakage. Seamen and naval experts have manifested much interest in the case, but have been unable to offer any explanation. On the books of the underwriters it has been entered as one of the unsolvable mysteries of the deep, as the examination of the survivors failed to yield any clue.

2561

TREE OLDER THAN ICE AGE MOVED FOR BUILDERS

One of the oldest living things in the world, a ginkgo tree, was recently uprooted and moved in a middle-western city to give space for a modern hotel. The tree was again planted. Two years ago when a large house on the lot was moved, the owner ordered that the build-

ing be cut into two sections so that the life of the tree would be spared. Tree experts say that the ginkgo is a living fossil, the only member left of a family of trees that lived when terrible winged lizards roamed the earth, long before an ice floe destroyed them. Today the tree is no longer to be found in a wild state, but it is grown in gardens in China, Manchuria, and Japan.

Marine Journal 5/19/23
S.S. Seaconnet

GERMS TURN CHINE GRASS INTO STRONG FABRIC



At Top, a Pile of Grass being Dried in Preparation for Putting in Tanks



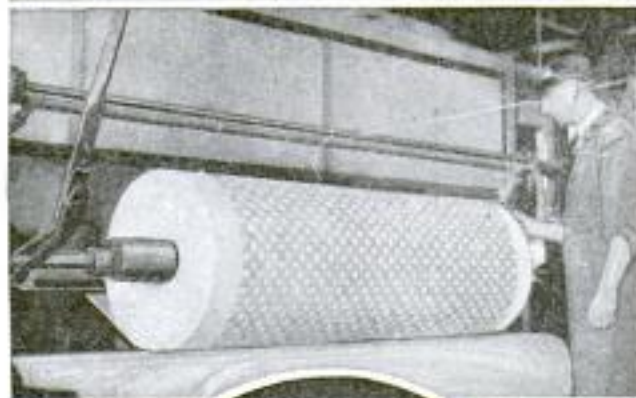
Above, Machine Breaking Tough Fiber of Grass So That Germs may Penetrate It

Great armies of germs, inhabitants of a world invisible to the unaided human eye, have been put to work turning out cloth and fabrics of various grades and textures for the use of mankind, according to the announcement of a California scientist.

After three days and nights of work the germs become so tired that they must be given a period of rest and food before they can continue their labors.

For hundreds of years these germs have been used in the process of changing flax and similar plants into cloth, but it was only recently that they have been intensively cultivated for this purpose alone, which has resulted in a great saving in time.

Previously, it required from three to six weeks to prepare the flax for weaving, but with the help of the armies of germs, this time has been cut down to from 60 to 96 hours. The germs often



Cloth on Way to Rollers and as It Looks Afterward

number as many as 2,000,000,000 to the cubic inch.

Under the old method, the flax was simply placed in tanks and the germs were slowly formed by fermentation. By the new process they are bred separately in tanks and then put to work in vast numbers converting the flax, being returned to the tanks for rest when they become tired.

The work of the germs is to rot the tough fibers of the flax or Chine grass, which is brought in great bales from China, until it is suitable for weaving.

After the germs have finished, the fiber goes to the looms, from which it comes forth as dress goods, table-cloths, towels, and other high-grade products. It is declared to be of superior quality and capable of withstanding the most severe service.

Rotted material remaining in the tanks has proved of value as food for cattle. Preparations are being made to apply the new process to the manufacture of cotton fabrics also.

Mr. California Fibre Co., Berkeley, Calif.

1051501

The Ever-Kleen, Clogline Co.

~~Clogline Co.~~ MECHANICS

195

CLOTHESLINES KEPT IN POST UNTIL THEY ARE NEEDED

By using a hollow iron post, a clothesline holder has been made that keeps the line out of the way when not in use. Each post carries four ropes which pull out and automatically return when released. The lines are easily pulled from the post and attached to any solid object. A tightener on the post prevents sagging. Always ready for use, the ropes are kept clean and out of the way, nothing being visible except the post. Less than a minute is needed to stretch the lines. Besides providing a clean clothesline, the holder adds to the neatness of a yard. When necessary, new ropes may be put in by removing a cover plate.

GIRLS' FACES "DONE OVER"

So-called "contortionable masks" have been used in the East to make 12 chorus girls look exactly alike. While every



Chorus Girls having Their Faces Fitted with Flexible Masks to Express Different Emotions

face appears similar, the masks are flexible so that any normal emotion may be expressed through them. In repose they may be made to represent beauty, sorrow, joy, or some grotesque character. Each one is molded to the face by a lengthy, secret process.

made by Alexander Hall.

MYSTERY RADIO STOPS

2718 LINE OF AUTOS

Wireless waves coming from an unknown station have been used to halt a large fleet of automobiles in Germany. All of the cars were equipped with magnetos, and started out together. The run was made at night and reached far out into the country. After traveling for some time, a short halt was made at a little village. Starting again, the line of machines suddenly came to a dead stop. Every driver believed something was wrong with his car and stuck out his hand as a signal to those in the rear. It soon became known that all of the automobiles in the line had stopped as though by magic, and could not be started. This strange accident proved to be a test which was being made from a big radio station whose location was kept secret. At an appointed time it had sent out the special waves that were caused by a powerful apparatus of new invention. These waves interfered with the magneto, which stopped the cars. The mysterious test will also be applied to airplanes, electric trains, and even submarine boats.

Detroit News

6/10/23 Copyrighted material

TORPEDOES TIED TO PLANES, LAUNCHED IN FLIGHT

Loading the seaplanes of the navy with giant torpedoes is a work calling for the utmost care. In transferring them to the flying machines they must be floated to a spot under the wings of the plane, from where they are lifted and tied to the framework. If the loading should take place in a rough sea much damage might be done by improper handling. The mechanism which causes the torpedo to



Passing Big Torpedoes to the Planes Has Excitement Enough for the Nerviest Sailor

explode when it strikes, is not fixed in position until it has been securely fastened, and is ready to be launched from the moving airplane.

Authority has been granted the regents of the Smithsonian Institution, by act of Congress, to prepare preliminary plans for a suitable fireproof structure, with granite fronts, for housing various valuable museum collections. The building is intended to hold the National Gallery of Art and the historical collections.

Pacific & Atlantic Photos

International Photos New York

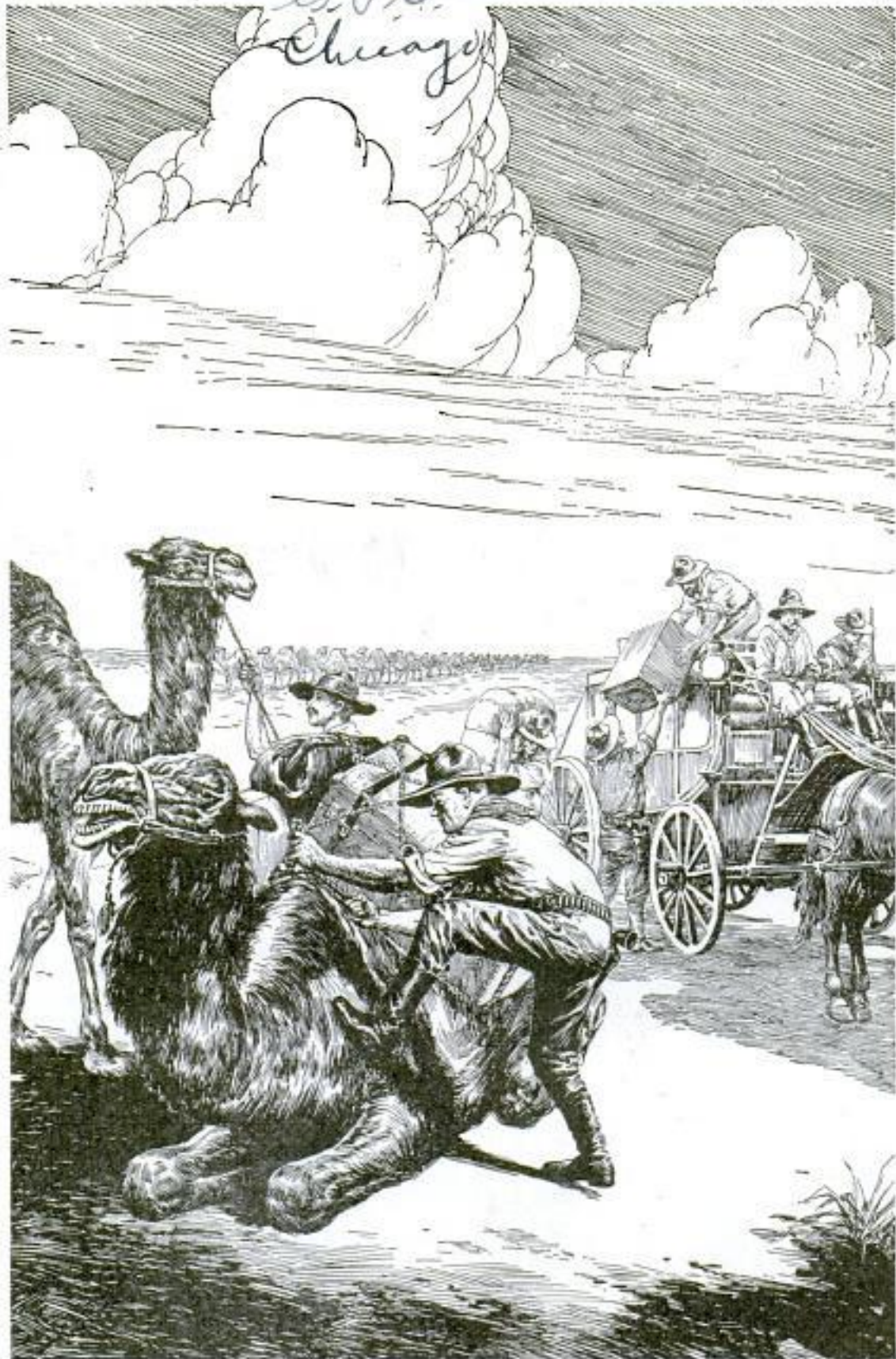
2703

2713

2718

Australasian Bureau October 5 '16

*Es. P. O.
Chicago*



Traveling over the Barren Plains of Australia Still is Done by Means of a Strange Combination of Vehicles. The "Ship of the Desert" and the Old-Fashioned Stagecoach Have Their Part in It

**STAGECOACH AND CAMELS
USED IN AUSTRALIA**

The interior of Australia covers so vast an area that only a small portion of it can be reached by those who prefer to travel only on railroads. In the early '50s an American started a line of coaches from Melbourne to Castlemaine. This was soon after gold was discovered. Since that time a network of coach routes has been built up, covering a large area. These link up the coast cities, situated on railroad lines, with the interior—the "back" country. A journey by coach is not always a pleasant experience in Australia. South Australia lays claim to the doubtful honor of what is called the "dead finish" in coach travel. This is a trip from Haddon Downs to Farina, some 404 miles, and the fare, one way, is \$50. It is not a "de luxe" journey, as may be judged from the time-table, which states distinctly that "Female Passengers are Not Carried." Nor is the coach used at all times by the travelers. One coach line notifies its passengers that they "must be prepared to travel the latter part of the journey on camels."

2667

**SHEARS AND RAZOR HEAVIER
THAN THEIR MAKER**

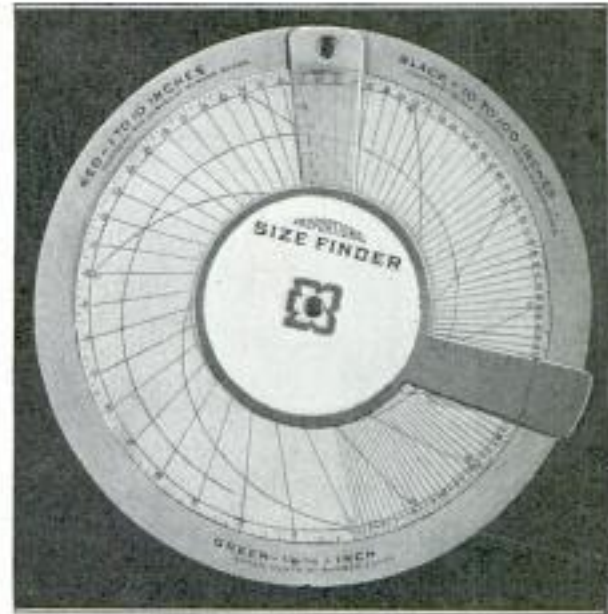
To draw attention to his store, a maker of cutlery has turned out a pair of scissors weighing 156 pounds and a razor that is almost as heavy. As in the regular articles, the razor blade can be pushed into the handle and the scissors can be opened and closed. The cutting edges have been finished off by grinding. Although they are only intended for exhibition purposes, both instruments are complete in every detail.



maker - H. Israel
Cutler of San Diego
Calif.

**SIZE-FINDING DIAL HELPS
ARTISTS AND PRINTERS**

If a drawing is 7 inches long and 3 3/4 inches wide, and the artist, or advertising



Size Finder That Tells, by Turn of Handle, Correct Figures for Reductions or Enlargements

man, wants to reduce it to a two-column newspaper cut, a size-finding dial recently invented will give the correct new dimensions by merely moving a handle on the scale. Correct proportions are found almost instantly with the dial. In the old way of figuring them out, much time is required. To make it easier to read the dial, measurements from 1/8 inch to 1 inch are shown on a green curve; fractions between 1 and 10 inches are found where the red curve strikes the outer runner edges of the dial, and black diagonal lines at the edge of the big circle are read for sizes between 10 and 100 inches. There is a special edition of the finder for printers, who often need to know proportionate dimensions under an inch.

**THREE DISHES FROM ONE
FOR KITCHEN OVEN**

One dish that serves three purposes—as a frying pan, a casserole, and a double roaster—is now being made of heavily tinned steel. A folding handle saves space in the oven. For the frying pan, the base of the new utensil is used. To make a casserole, the upper dish with cover is taken off the pan, and for a double roaster, the frying-pan base and the casserole dish are placed together, the handle being folded out of the way.

Montgomery
Ward & Co.
Chicago

Mr. Ralph Sandenberger
739.175 W. Jackson Blvd.
Chicago

New York City

2669 FIRE FIGHTERS IN AIRPLANE
SOAR OVER FORESTS

Carrying chemicals and emergency fire-fighting apparatus, an aerial fire truck is now in use in a west-coast city. Because of the speed and wide range of ac-



Two Aerial Firemen Ready to Answer an Alarm in Their Fast Airplane

tion of the airplane, it has proved of service in reaching distant places and

in soaring over forests to locate blazes that might develop to dangerous proportions. It may also be used along water fronts and to reach burning vessels. Only two men are in the plane—the pilot and an observer. Where a landing is possible near a fire, they use the apparatus aboard the aircraft in fighting it. If this is impossible, they carefully mark its position on maps, and report back to some point from which proper equipment can be sent. In addition, the airplane is of assistance in directing the work of fire fighters on the ground.

BRUSH FOR SUEDE SHOES

2534 PICKS UP NAP

Wire bristles in a new shoe brush for which a patent has been sought, are set in a curved fiber on a canvas base attached to the wood handle at both ends. These wires are all set at an angle, making their pull stronger one way than the other. This is being found of value in cleaning suede shoes because the bristles pick up the nap better than the other type of brush does.

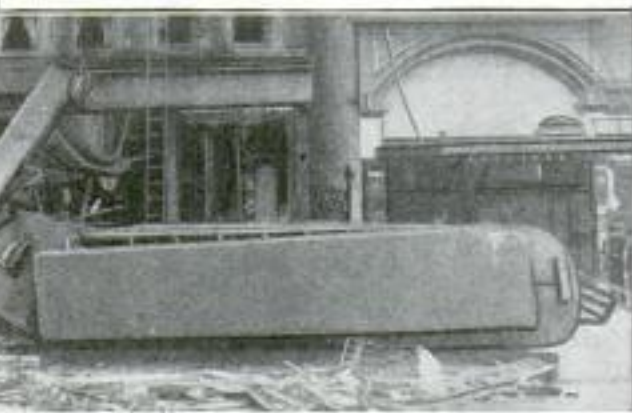
*E. S. Gilbert Mfg. Co.
Rochester, N.Y.*

2670

CAR WRECKS BIG BUILDING WHEN BRAKES FAIL



When the brakes failed on a steep incline, a street car in an eastern city recently plunged downward almost a mile, gaining speed as it raced along beyond control of the one-man crew, and finally sped across a sidewalk, killing a child and wrecking three stories of a building before it stopped. Five passengers leaped from the coach, but none was hurt seriously. The motorman-conductor explained that the power stopped when he was halfway up the hill and that the brakes failed to work. Dumping sand on the tracks was useless.



Building Wrecked by Street Car Which Plunged Almost a Mile down a Steep Incline After the Power had Failed and the Brakes Refused to Work

*Wide World Photos
New York City*

2563

POPULAR MECHANICS

199

RADIO ON MOTORCYCLE USED TO CATCH BANDITS

Radio-equipped motorcycles have been put into service in the East to cope with automobile bandits. Aerials in the form of a loop are attached to a sidecar which also carries the receiving apparatus. Two men are detailed to each machine, one to drive and the other to act as radio operator. By the use of the radio, police headquarters are able to keep in touch with each machine and direct its movements.

It has also been found of advantage to fit up the automobiles used by law officers with wireless. Where their work requires lengthy travel, it is often necessary that they be kept advised regarding the happenings in several neighborhoods at the same time.

Fire and police bureaus employ this means to report or send in alarms in cases of emergency. Where river and water-front patrols are used, the radio serves to get needed information from shore officers in the event that their aid is needed in locating the point of trouble.

TANK FOR TOY BALLOONS

Pressure tanks used to fill toy balloons with gas are so simple to operate that any boy can use them. Hydrogen is used instead of air, which gives the balloons greater buoyancy.

The Bastian-Blessing Co,
125 Austin Ave.
Chicago

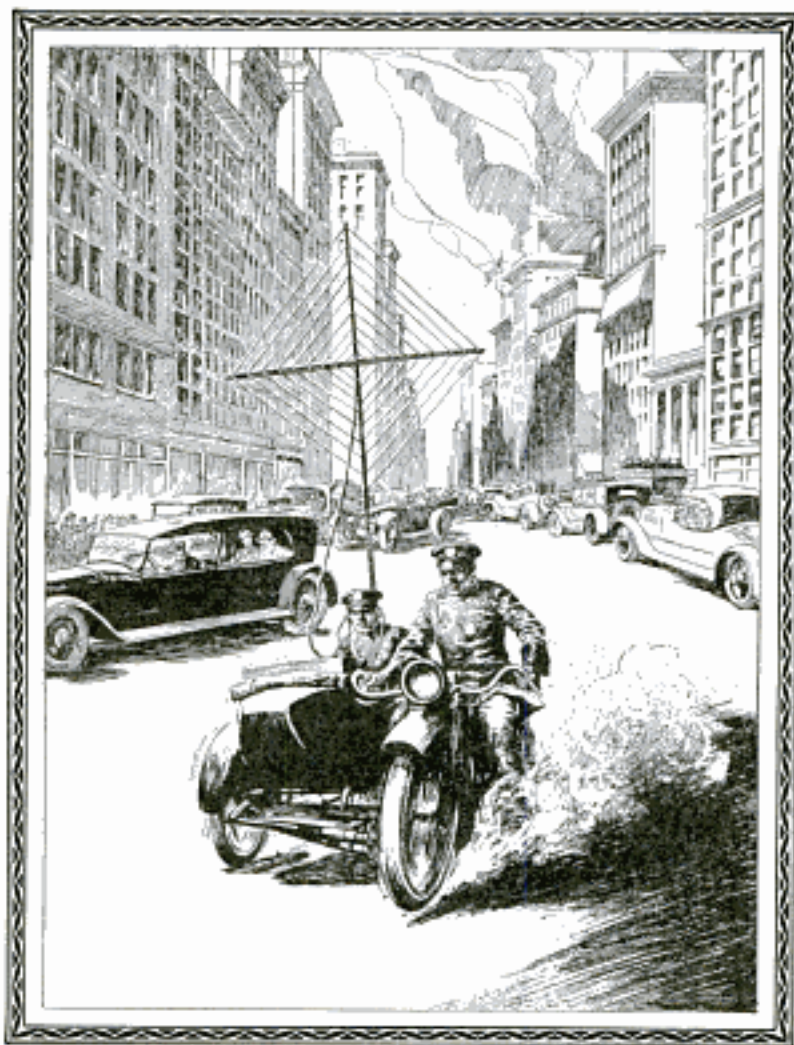
The Sphere

June, 1923

TIME AND BUGS ENDANGER ROOF OF WESTMINSTER

For many centuries a little wood-eating insect known as the deathwatch beetle, has been doing its best to destroy the large oak beams which hold up the roof of Westminster Hall in London. Millions of these tiny bugs were found in

the inside of the timbers when they were removed recently to be replaced. Only a few of the beams were harmed. Almost all of the wood work is still in good condition, though the joints which were held by oak pins instead of iron nails have weakened from the drying of years. Steel plates, bolted to the immense beams, now serve to give them the strength necessary to hold for many more years. Tie-rods of steel



Radio Outfit Mounted on Motorcycle Sidecar for Use of Police in Eastern City to Catch Criminals

have also been thrown across the high arch to keep it from sagging.

TOOL WEEDS FLOWERPOTS

A new garden tool is well adapted for work around rosebushes, small shrubs, and delicate plants. It is declared to be especially useful to florists and others in loosening the soil in the hothouse beds, and is small enough to weed a flowerpot. It has an extension handle, and, by lengthening or shortening, it may be adapted to the hand of a man or a small child.

Mr. R. W. Hales,
95 Springfield Ave.
Ridge wood, N. J.

ART OF ANCIENT MASTERS RIVALED BY WOMAN

Binding rare, old books and ancient manuscripts in covers specially made to correspond with the period of the book,



Fastening the Leaves of a Rare Volume before Placing about Them a Binding Made to Match

is the occupation of an eastern woman, who is thus preserving some of the world's most valuable manuscripts. After having determined the time when a work was done, she studies bindings of that period, and then makes a similar one. Recently she bound the "Book of Marriage," a hand-painted parchment volume done by nuns many centuries ago. So carefully was the binding made that few could detect any signs of modern craftsmanship. To properly rebuild the volumes requires intensive study of architecture, heraldry, art, and letters.

MAILMEN SLEEP IN PLANE AS RELIEF CREW WORKS

Two crews of mail sorters are to be carried in a giant airplane now being built in Europe. While one group works, the other men will sleep in comfortable beds as the ship races through space far above earth, a new giant of speed used to carry the post. It is said that this airship is to adopt every new idea of value that has been discovered in four years of commercial flying. When flying at night and in fog or cloud, an automatic

device will keep it in balance. Builders say that it will travel about 2,000 miles in a nonstop flight of 24 hours. In the mail chamber, under electric light at night, sorters will go over the mail as readily as they do on trains. There will be three shifts of men to run the plane, it is proposed.

MONSTER'S TEETH ARE FOUND IN A ROCK QUARRY

Workmen in a rock quarry on the bank of the Missouri River, in Iowa, have found what is believed to be the jawbone of a huge animal that lived before the stone was deposited there. Several gigantic teeth were still in place when the fossil was picked up, but the long burial has caused the bony matter to become soft and easily crumbled.

IVORY CARVING IN ALASKA BECOMING A LOST ART

Strange shapes and figures carved in ivory tusks taken from the walrus and other animals of the northern seas, have



This Is Kugruk, One of the Last Eskimo Ivory Carvers Left in Alaska

been highly prized by art collectors. Much of this ivory work was done by the Eskimos of Alaska. During the past few years the artisans who did this carving have almost all passed away, and very few of the others have taken it up. Among the Eskimos who still make these odd carvings is Kugruk, who lives in Alaska. Though not a young man, he spends his time cutting queer-looking pictures into such tusks as he is able to get from the sea animals he kills.

Miss Margaret H. Zahen Library Morgantown, West Virginia 33 E. 36 St. New York N.Y. 6/11/1923 2542

Port of New York, N.Y.

MOTHER'S HEAD IS BABY CART FOR AFRICAN FAMILY

Leaving their arms free for other work, many of the native African women carry their babies about snugly tucked away in small baskets balanced on their heads. In going through the bramble-covered paths of the wild country, there is less danger of having the child scratched by the tough briars and branches which the woman pushes from her path as she passes along. In their childhood these women are trained to balance heavy loads upon their heads, and long practice gives them the ease and grace of bearing for which they are known. The men, too, are taught to



COPYRIGHT, UNDERWOOD & UNDERWOOD
African Mother Carrying Baby on Her Head So Hands Are Free to Defend It

bear heavy burdens in the same way, and can transport tremendous loads for great distances without tiring. 2689

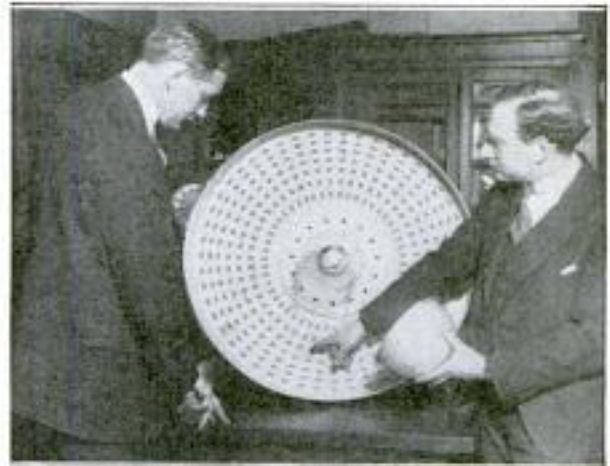
AIR ROUTES TO TROPICS

Airplane service between a city on the southern coast and points in the tropics to promote trade and to furnish a rapid carrier for passengers, is being considered. Quick delivery of goods would result, it is pointed out, and mail planes would save several days for merchants placing orders.

*Times-Picayune
6/10/23
New Orleans, La.*

2722
KING TUT'S WEALTH SORTED IN ARTIFICIAL DAYLIGHT

To protect the treasures found in the tomb of King Tutankhamen at Luxor, Egypt, an electric-light shade has been



COPYRIGHT, UNDERWOOD & UNDERWOOD
Shade That Will Shed Artificial Daylight over Treasures Found in Tutankhamen's Tomb

devised that will permit experts to examine fragile fabrics without exposing them to the harmful effects of open air or sunlight. The shade diffuses an artificial daylight that gives the correct color value. A series of reflectors throw the light in any direction. At present, the delicate fabrics and jewels are being examined under the light from ordinary electric bulbs, which makes it almost impossible for the examiners to distinguish the shades and colorings.

2757
SUB AS BIG AS LAKE SHIP LAUNCHED SECRETLY

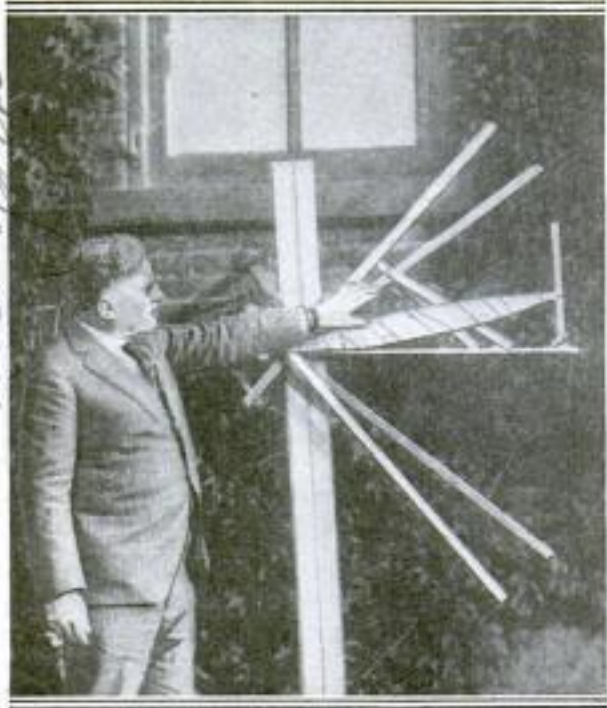
The recent launching of a submarine in England, said to be the largest in the world, was done privately, all approaches to the docks being guarded by special police. About the only fact that has been made known concerning the boat is that it displaces 3,600 tons. This is far greater than any other one known. After being launched, the giant boat, which is as large as the average lake freighter, was towed to an inclosed and guarded basin to be completed. Some of the submarines carry 12-inch guns. This one, though, is said to have even heavier pieces. It can cruise across the Atlantic ocean or move anywhere around Europe without refilling its supply of oil. On the surface it will make a speed about equal to the average ocean liner. Every improvement developed in the last 20 years has been utilized in building it.

*Chicago Tribune
6/17/23
Copyrighted material*

STICKS ARE USED IN TEST
OF EINSTEIN'S THEORY

2720

Looking like a bundle of sticks of different lengths projecting from a round plate, a machine has been made in the



Strange-Looking Device Made to Test Einstein's Much-Discussed Theory of Relativity

Easy to test Einstein's theory of relativity. It is said that the device is the most simple experiment along this line yet made, other scientists having used costly and complicated apparatus for the same

2691

GIRLS CARRY DAISY CHAIN ON COLLEGE CAMPUS



Graduation Exercises of an Eastern College are Marked by Carrying a Daisy Chain on Shoulders of Young Women, a Custom Started 30 Years Ago

purpose, but without entire success. Several expeditions of astronomers also have visited various parts of the world to make observations, but have not been able to obtain conclusive results.

SCIENCE IN HAIRDRESSING
IS AN AID TO WOMEN

2727

Almost every advancement of science has been made use of by women in their quest for beauty. This is particularly true in the care of the hair so that it may retain its softness and luster. Both electricity and gas are being used in drying machines and in permanent waving. In the olden days, hairdressing was considered an art and occupied hours of time. Today, by means of many efficient devices, it is done much more quickly, and without exhausting the patience of the subject.



COPYRIGHT, UNDERWOOD & UNDERWOOD

Underwood & Underwood
New York

Photograms, New York

CAN MOUNT EVEREST BE ASCENDED?

BY SVEN HEDIN

[Sven Anders Hedin, noted authority on those little-known lands, Tibet, Turkestan, Mongolia, and central Asia in general, has spent a great part of his life—he is now 58 years of age—in exploring these strange lands. These journeys, performed at times amid extraordinary hardships and always at the immediate risk of lingering and terrible death at the hands of savages or by starvation, have won for him high honors and a world-wide reputation and fame. A noted scientist, a daring adventurer, a fluent writer—he is author of numerous valuable and weighty books. Doctor Hedin is an honorary or active member of nearly every scientific society in the world; is a member of the nobility of Sweden, to which he was raised in recognition of his work by the king; is the bearer of honorary degrees from most of the famous universities of the civilized world; is the personal friend of potentates and rulers, and is now on his way to Asia for another daring journey through the wild interior where he has found strange buried cities, grotesque and terrible customs, and where he has several times been forced to travel long distances on foot without water or food when his parties have met with catastrophes.—Editor's Note.]

DURING the summers of 1921 and 1922 geographical and quite especially, mountaineering circles followed with intense anxiety the reports from two British expeditions, which, equipped in the most painstaking manner, consisting of expert leaders and trained assistants, strove with admirable perseverance to conquer the highest mountain on the earth and reach its summit.

Nobody has been able to watch this splendid expedition with any greater interest than I, who have myself for several years been doing active work in Tibet. At this particular moment an armistice, of brief duration, exists concerning conquering Mt. Everest, but it is interesting to make a brief survey of the situation and forecast as to the prospects of expeditions winning their way to the top of this great mountain.

In solitary majesty Mt. Everest raises its snow-topped brow on the border between Tibet and Nepal. From the south it is difficult to get a full view of this silent giant, as it stands partly hidden from the eye by a maze of mountains, themselves covered with eternal snow and ice.

When the celebrated botanist, Sir Joseph Hooker, in 1849, made his explorations in Sikkim, it was believed that the Kanchanjanga was the highest top of the Himalayas. But thereafter, in 1852, the trigonometrical survey of India discovered a peak higher than the rest and named it "No. 15."

As this top had been identified during the time when Sir George Everest was

surveyor-general of India, and after trying in vain to learn its Tibetan name, Waugh gave it the name of his predecessor, and up to this time the peak has borne the magic name of Mt. Everest.

Soon thereafter, however, the learned British resident in Nepal, Brian Hodgson, made the statement that Waugh had made an error; that the mountain had indeed a native name, Devadhunga. But later it was found that Hodgson, himself, had been mistaken about the peak. Hermann von Schlagintweit, when visiting Nepal in 1855, recognized the top which Hodgson had identified as Mt. Everest

and learned from the natives that the actual Tibetan name was Gaurisankar. This native name was also introduced into geographical literature and for several years Gaurisankar and Mt. Everest were thought to designate the same top. Only in 1903 did Captain Wood succeed in proving that the two names stood for two different mountains, which are 36 English miles apart. This correction was made in 1904 on all European and American maps covering Asia. We have also learned since that the Tibetan name of Mt. Everest is Chomolungma, or "The Mother Goddess of the Mountains."



Dr. Sven Hedin

For more than 40 years the daring project of an ascent of Mt. Everest has come up again and again. Douglas Freshfield and Lord Curzon had been endeavoring to realize this aspiration, but the expedition as planned had in 1905 been made impossible by the governments of Tibet and Nepal. When I, in

2692



Mount Everest—the Highest Peak in the World—Towering above Neighboring Giants of the Himalayas

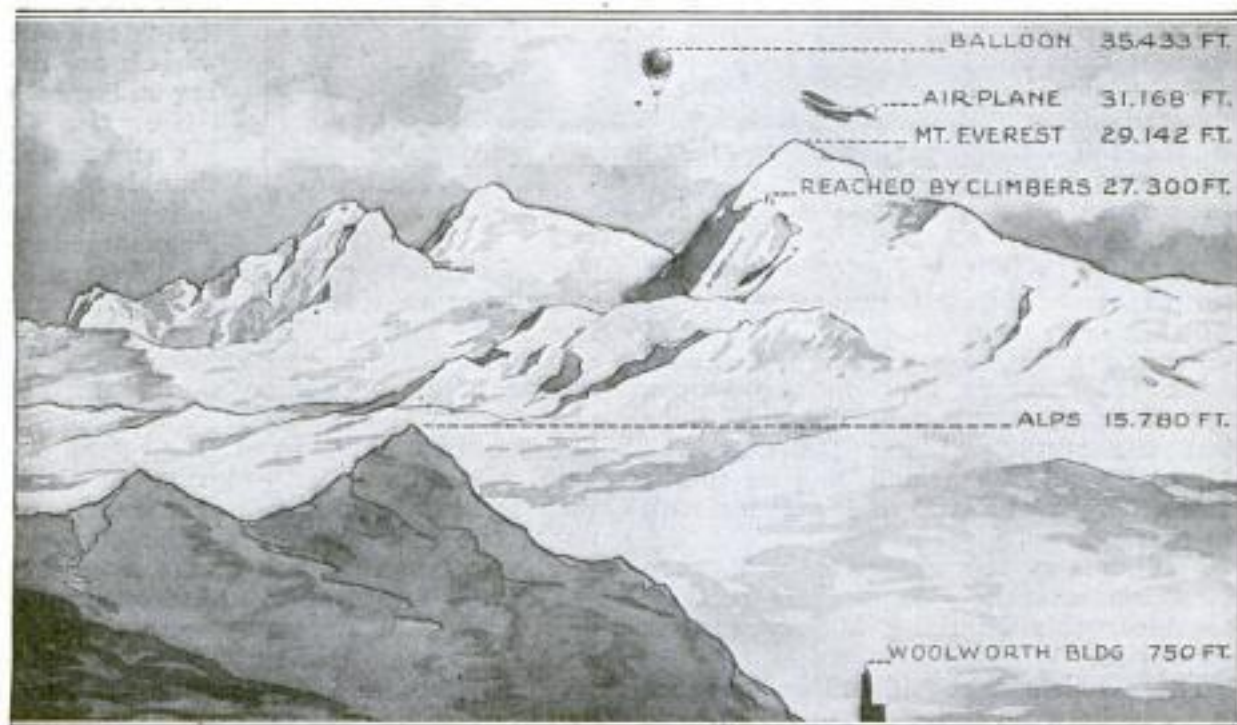
February, 1907, was at the Pass Ta-la in the trans-Himalaya district, 17,826 feet above the sea level, I was indeed able to see the chief chain of the Himalaya from afar.

The year before I had met Rawling in Simla. He then expressed a keen desire to try his strength on the monarch of the mountains. However, his wish, at that time and later, was coldly received by the government of India. After Rawling had fallen in the eleventh hour of the World War, Captain Noel in 1919 laid before the Royal Geographical Society a project to send out an expedition, in commemoration of Rawling, and to reach the top of Mt. Everest; but he also was unsuccessful in carrying the matter through.

A little later Colonel Howard-Bury, of the Royal Geographical Society, began to advocate the equipping of such an expedition. The heads of the society applied to the government of India. The answer was unclear, yet not absolutely refusing, and the permission of the Dalai Lama to enter Tibet was at last obtained. Moreover, there was appointed a committee consisting of three members from the Royal Geographical Society and as many more from the Alpine Club. The chairman was Sir Francis Younghusband, who was then the president of the first-named society. Lt. Col. C. K. Howard-Bury was selected as leader for the 1921 expedition. The funds necessary, which

were estimated at about \$48,000 for the two years together, were raised in a simple way. As leader of the mountaineering party Mr. Raeburn was chosen, who had won renown in his Kanchanjanga explorations. The remaining members were Messrs. Mallory, Bullock, and Wollaston, Majors Morshead and Wheeler, and Doctors Heron and Kellas. The last-named gentleman had in 1920 climbed the Kamet up to a height of close to 24,000 feet. He died before he reached Mt. Everest.

Younghusband laid stress on the importance of ascertaining whether human beings could live at a height of 29,000 feet; this problem had to be solved definitely. A hundred years ago it was thought that the Mont Blanc (15,780 feet) was the highest limit which might possibly be attained by man. Since that time the Andes, Caucasus, and some very high tops in the Himalayas were conquered, until finally the Duke of Abruzzi, in 1909, broke all former records by climbing Bride Peak in the Karakorum Mountains, a height of 24,606 feet. Between Pamir and Burma there are more than 70 mountain tops exceeding in height 24,000 feet, and over 1,100 tops exceeding 20,000 feet. But if these Englishmen succeeded in mounting Mt. Everest, the absolute height record which is afforded by our planet would be reached, and the essential spell of the record would be broken forever. For when once a man, risking



Unconquered Mountain Peak That has Defied All Efforts to Surmount Its Top, and How It Ranks in Altitude with Other Heights Which have been Reached by Man

his life, has succeeded in climbing the highest mountain top, all others, with whatever daring they may repeat the feat, are only anticlimaxes; the grand sensation is gone.

In the meantime the 1921 expedition carried through the preparatory work. Excellent maps were drawn, the finest photographs were taken, and many specimens of the flora of the mountains were collected, but 23,000 feet was the greatest height the climbers could reach. They arrived at the conclusion that the climbing would have to take place in May or early in June, before the southwest monsoon storms had broken out. It would be necessary to start from the Rongbuk Glacier at the northerly foot of the mountains and from there go up to the Chang-la or northern pass; this was to be the starting point of the climbing, properly so-called.

The report brought home by Colonel Howard-Bury in the fall of 1921, was not encouraging for those who were to try their luck the following year. He expressed himself thus: "Whether the task is capable of accomplishment, I will not attempt to say, though I should think the chances are, on the whole, against success." But he did not doubt that the record of the Duke of the Abruzzi would be beaten, and he thinks that a height of 25,000 or 26,000 feet will be reached.

Mallory was less skeptical; still, even from his utterances it is clear that he considers this climbing a very serious enterprise.

There exists a considerable difference in views between those persons who have actually attempted to climb the mountain and those who sit at home and study

their maps. Younghusband believed blindly in success. The president of the Alpine Club, Prof. Norman Collie, explained the unprecedented difficulties, not the least of them arising from the ultraviolet rays from the sunlight and the lack of oxygen.

After new and thorough preparations, the 1922 expedition left for Tibet, early enough so as to carry out its work before the monsoon storms broke. Now, Brig. Gen. C. G. Bruce was leader and chief. Among the others were noticed Mallory,

Finch, Somervell, and Major Norton. Unfortunately, the geologist of the preceding year, Mr. Heron, who had carried out the most significant work of all, was prevented from joining this time, so that the explorations commenced by him could not be carried to their close.

The Tibetans had expressed a desire that the "dragons which are living underneath the Holy Mountains" should not be disturbed. The Englishmen re-

warded the hospitality of the Tibetans by submitting to this wish in a chivalrous manner. Thirteen Europeans thus set out for one of the most notable and inaccessible Alpine regions found on our planet, not one of them being a geologist. Sport outdistanced science. Younghusband himself, in his program, admitted that scientific research was a secondary issue, and that first of all the aim was merely to reach the top of the mountain.

The new expedition did indeed accomplish great things from a mountaineering point of view. On May 21, 1922, Mallory, Norton, and Somervell reached a height of 26,800 feet, and had thus beaten the record of the Duke of the Abruzzi by 2,200 feet. From surveys, taken the



Pack Animals Used in Mountain Climbing Prefer Rough Footing on the Slopes to the Smoother Pathways

year before, it has been decided that the first calculation of 29,002 feet is too low and that the actual height of the mountain is 29,142 feet. From the point measured by Mallory and his associates there thus remained to overcome 2,341 feet before the summit would be reached.

A week later Mr. Finch and Major Bruce reached even a height of 27,300 feet. This was to be the climax for this year, and marks at the same time the highest spot to which man has ever risen on solid ground. What is still to be climbed is only 1,841 feet; that is to say, not quite so much as the height of two Eiffel Towers. But it must be remembered that this 1,841 feet must be overcome in an air more rarefied than anywhere else on our globe. To reach the greatest height possible, Finch and Bruce had also made use of oxygen-gas cylinders.

After the return to London, some of the members of the 1922 expedition declared that Mt. Everest could undoubtedly be ascended, but that all conditions would have to be just right in order to be successful. It would take at least four days of uninterruptedly good weather and the climbers would have to be under 30 years of age. In 1922 there were only two successive days of fine weather.

As to the last stretch to the top, Captain Finch said that at a height of 27,300 feet he had a fine view of it. It is a continuous mountain crest which extends to the very top. He is convinced that it can be taken by climbing. There exists, however, one very severe obstacle: the crawling up over the steep paths is not only exceedingly fatiguing in itself, but it also calls for the irksome work of chopping out steps at a height of over 28,000 feet.

On the ground of my own experience, gained by a stay in the mountains of Persia, Pamir, and Tibet, I had, even before the British expedition started out, become quite skeptical as to its success. There does exist a height limit beyond which a man's physical condition cannot possibly endure; this limit is marked by the rarefied condition of the air. It is true that the limit is not sharply drawn, but changes with different individuals.

Thus a trained Alpinist or airman can still continue to move around in a much thinner atmosphere than one new at climbing. However, it is easier to reach a height record in a balloon than when coming to the last stretch of a mountain climb. In ascents made in the free air, heights about 11,483 feet greater have been

gained than in those which took place on firm ground; this more favorable record is, of course, due to the fact that the muscular effort in climbing is enormous; in operating a flying machine, almost nothing. The flier is handicapped only by the immense speed with which he rises to great heights.

Experiences formerly undergone at dizzy heights reached in balloons did not augur well for the Mt. Everest expeditions. When Gaston Tissandier in April, 1875, made his celebrated flight, both his companions, Sivel and Croce-Spinelli, succumbed to the exertion, at a height of about 26,240 feet. They were simply suffocated through the lack of oxygen in the rarefied air; possibly their physical condition was not good enough, either.

But the leader himself, who presumably was better trained and whose power of resistance moreover was strengthened by ambition, bore the strain for 650 feet higher. And still he turned back from a point which was more than 2,000 feet lower than the peak of Mt. Everest. It is interesting to note that the record of Finch and Bruce, 27,300 feet on Mt. Everest, is about the same as Tissandier's 27,000 feet in the air. The Englishmen, however, were armed with oxygen-gas apparatus, while the Frenchman, very likely, was not.

With artificial breathing aids, it is possible now to rise a good deal higher in free-air balloons than the height gained by Tissandier. On July 31, 1901, Berson and Süring rose from Berlin to a height of 35,433 feet, which record probably has never been beaten. Notwithstanding the artificial-breathing means, both fainted long before they had reached their highest point. The self-registering instruments showed an air pressure of less than a fifth of what it was at the seaside. Berson has told me that consciousness gradually returned to him only after the balloon had dropped to where the air was thicker.

In the same way as miners and divers will reach rather quickly the limits below which no life can exist, owing to the excessive heat or water pressure, there is a height limit above which the breathing functions, with the burning process entailed by them, are no longer possible. It is clear that the layer of the earth surface, including the atmosphere, within which man can exist, will not exceed six miles in thickness. Underneath this thin layer which proportionately is not even as thick as the peel of an apple, earth hides its mysterious interior, and

beyond this layer spreads the infinite universe.

Nevertheless, however, trained Alpinists and sportsmen can, as above said, endure at the rarefied air pressure which exists on the summit of Mt. Everest. This fact has been directly proved during the preparations for the British expedition, by air-pump tests which reduced the air to a degree of thinness corresponding to a height of 29,500 feet. The men who went through the experiment even moved around and mounted and descended staircases, while carrying weights of different heaviness. Notwithstanding all this, Mallory, the most capable of all British climbers, seemed to feel skeptical about these experiments. In his opinion, experiments carried out in a laboratory with an air pump, however valuable they may be for fliers, cannot prove anything for mountain climbing, because they pay no attention to the body getting used to climates in different parts of the world, which has a very large bearing on endurance in foreign lands.

The balloonist is, during his entire trip, resting, and need not exert his heart more than usual. He can dress as warmly as he wishes and does not feel the slightest breeze, for he is always traveling at the same speed as the wind. With the mountain climber, on the contrary, muscles, lungs, and heart—in short, every part of the body—is placed under the most severe strain. Clothing must be as light as possible, so nothing that is heavy will interfere with the movements of the climber, yet it must not be so light that the wearer can freeze to death when the temperature is far below zero.

It also appears from the experience gained by the two Mt. Everest expeditions that the men who reached the greatest heights were overexerted and run down when they returned to closer layers of air. Some could no longer serve and at least one of them was compelled to travel back home. They reached their record heights in a condition of utter exhaustion; they had done everything within their power to gain the top. We must not only pronounce them as deserving the greatest gratitude of all geographers, Alpinists, and physiologists, but must also express to them our admiration for their unusual ability and courage.

The greatest of all the obstacles encountered by the mountaineer at great heights are the torments and exhaustion

imposed on him by the air in motion. Not only is it rarefied and therefore severe on the lungs, but these conditions are made still worse by the violent vibrations to which the atmosphere is subjected, because nothing is there to oppose the wild play of the winds. The traveler is, therefore, almost stifled, even aside from the merely mechanical interference which the wind opposes to his movements.

Thus the decrease in physical energy keeps growing steadily the higher the expedition is continued. At every new camping place the physical tiredness is greater than it was at the preceding station, and by the time the last stop is reached the traveler, if he has not broken down before, has certainly reached the maximum of exhaustion.

It should also be remembered how severe and never-remitting the attention must be on every step where the foot is placed. It is true that this effort after a while becomes a habit; yet it engenders a drowsiness and lowers the spirit. Over all is the snow; it covers the mountain crests and fills out deep hollows, affording perilous pitfalls. Again the unevenness of the ground will necessitate circuitous walks, long and tiring beyond description, which must be taken, yet lead to the gaining of not even a foot in height, sometimes indeed meaning a loss from the height already won. Slides covered with ice will present themselves, and it may be necessary to cut steps into this ice so as to be able to continue; all this must be done while steadily exposed to the peril of avalanches which may sweep the traveler away, or of snowdrifts which may bury him. All mountain climbers must be prepared to grapple thus with hostile nature; yet the greatest height in the Alps is only 15,780 feet, so that rarefied air will not be nearly as formidable an opponent there as on Mt. Everest.

Another distressing thing is that in a rapid ascension the mountain sickness will be experienced. When, on July 11, 1890, I ascended the Demavend in Persia, I felt a nauseating pain, an agonizing headache, a buzzing in my ears at a height of 10,630 feet, but no inconvenience after I had reached the summit, which is 7,382 feet higher.

On Mustagh-ata, in eastern Pamir, I had between Aug. 6 and 7, 1894, a frightful night at a height of 20,670 feet, although I had ridden up on a yak the entire way. And the really serious work starts above this height. When the Duke of the Abruzzi on July 18, 1909, mounted



Climbers, with Oxygen Helmets to Counteract the Effect of the Rarefied Atmosphere Found above the Clouds, are Forced to Hew Steps in Icy Mountain Side with Hand Axes

Bride Peak, he was forced to turn back at a height of 24,606 feet, although the top is only 25,028 feet and he had, therefore, come within 422 feet of his goal. This small distance of 422 feet proved to be harder to take than the 24,606 feet which he had behind himself.

The drives of Amundsen and Robert Scott for the south pole were almost comfortable journeys, and Alcock's flight over the Atlantic Ocean was a pleasure trip, compared with the climbing of Mt. Everest; and yet there seems hardly anything which limits man's energy and enterprise, and his eagerness to discover something new. Still, admitting all this, I must reiterate that a limit does impose itself somewhere.

In my opinion it will not be possible to reach the summit of Mt. Everest with the means we now have at hand; but it is believable that, as new inventions are being made from year to year, as meteorology will be better and better understood and become a guide in such undertakings, as improved oxygen-gas apparatus will become available, the dream of the mountaineer may become true.

Think of the possibilities afforded by the airplane! Even now it can carry us up to a height of 31,168 feet. If we succeed in building a flying machine, a helicopter, which at a given moment can rest

in the air and then slowly drop in a vertical direction, it will also be possible to unload passengers on the summit of Mt. Everest. Then, however, it would be no longer a victory of the noble sport which the Americans and British call mountaineering; it would be the triumph of aviation. From the viewpoint of a height record, it will be a trick destroying all the charm of mountain climbing.

In the meantime, however, the word stands: "Everest Unconquered!" In unapproachable majesty the hero is glancing down on the earth below, while the heavenly host of the monsoons are speeding over his brow in their whirling flight. Before the beams of the rising sun have touched any other point within view, the top of Mt. Everest is bathed in glowing gold and the evening glow is slowly dying away on its crest, while the lower peaks around the giant are already immersed in deep shadows. On silent, clear winter nights more stars are visible from that height than from any other point on earth, and they are sparkling with a sharper light, as they have to penetrate only a layer of very thin atmosphere. No other position on earth affords such an extensive horizon and no spot on the firm or flowing surface of the globe is so exposed, so solitarily grand as Mt. Everest. It is the outpost, farthest advanced, of earth toward infinite space.

**FLAME CUTS THROUGH STEEL
TWO INCHES A MINUTE**

With the flame of an acetylene torch, a 27-inch piece of rolled steel was cut in two recently in a western railroad



Cutting Through a 27-Inch Block of Steel with the Flame of Acetylene Torch

yard. It is said that this was one of the biggest tasks of cutting metal ever

done with the acetylene torch. Only 15 minutes were required. Hooded men did the work at the rate of nearly 2 inches in a minute. A comfortable temperature enjoyed in the United States is about 70°, but this steel was subjected to a flame so hot and powerful that it melted like butter a mass of metal strong enough to support a skyscraper.

**AIR BUFFERS GUARD PLANES
FROM LANDING SHOCKS**

To avoid the breaking of the underbodies of airplanes in landing, a system of pneumatic buffers has been invented in England. Although they do not change the appearance of the plane, it is said that they will prevent damage even when the machine is handled by an inexperienced pilot. In recent tests, a plane was driven full speed against the ground at an angle that would have broken the ordinary machine or turned it over. But, in this case, the buffers absorbed the shock without even bouncing.

Compressed Air Magazine June 1923

Pacific + Atlantic Photos Co. New York

270

2741

Bo... 1003

Copyrighted material

2482
SIGNS DIRECT, AND PROTECT LIVES OF, TOURISTS



Monument to Victim Serves to Warn Speeders



Roads Marked by State with Guiding Signs



Great Cross Tells Tourist of Hidden Danger



Skull and Crossbones Help to Halt Speeders



Route Numbers Are Aid in Using Guide Book

With the great increase in automobile-tourist travel, there is scarcely a road in the world or a dangerous curve or crossing which has not been marked with signs giving either directions or a warning.

As a result, many lives have been saved and long tours made easy for motorists. Even at night, the highways have been made safe by warning lights. To eliminate the possibility of any failure of the lights, one sign has been made with a red mirror which reflects back the rays from the headlights of an approaching car.

This form of sign also is clearly visible in the day, and the face of the mirror is covered by a wire netting to protect it from the stones thrown by boys. The mesh is small enough to stop any ordinary missile, but large enough so that it will not obstruct the light rays.

Another warning sign, often used, is the twisted wreckage of some car raised on a platform. In one case a sign was attached which read: "Look Out! Three Men Died Here!" Another said: "It's Better to Be Safe than Sorry! Drive Slowly."

On an eastern road a monument was erected at what was known as "Dead Man's Curve." It carried a skull and crossbones, and the inscription: "Fourteen Miles to the Nearest Hospital." Even the most heedless motorist, it was found, slowed down when he saw this graphic warning of hidden danger.

Near Cincinnati, a great white cross has been erected as a caution against reckless driving. It carries the name of a man killed in an accident and the offer of a reward of \$100 for information leading to the indictment and



Signs Used in Europe to Mark War Relics



Danger to Children Called to Drivers' Notice



Rail Crossings are Seen as Constant Menace



Many Huge Maps Give Directions to Tourists



Road and Routes are All Plainly Marked

conviction of the person responsible for the accident. At night the cross is illuminated.

Most of the signs, however, are designed only to direct the tourist, mark points of interest, and call his attention to scenic wonders. Besides merely giving directions and distance to the next city, many show great maps on billboards and point out camping sites.

Following the lead of America, most highways in Europe now are clearly marked, so that tours may be made by motorists without guides. An example of this is to be seen at Ypres, where one of the ruins carries the following inscription:

"This is holy ground. No stone of this fabric may be taken away. It is a heritage for all civilized peoples."

BABIES CHECKED IN LOCKERS BY BUSY MOTHERS

Due to the increasing civic demands made on the time of women, baby lockers have been installed in the new com-



Lockers in Which Babies are Checked While Mothers are Attending Community Meetings

munity hall of a California town for the convenience of mothers. Each locker is 18 inches high, 40 inches long, and 20 inches wide, with spring bottom. Doors, made of slats, are hinged downward and are provided with latches instead of locks. The hall is the social center of the community, and the installation of the nursery has enabled many parents to attend dances and social functions.

FREAKS OF ICE AGE CAUSE GOOD OR BAD CROPS

Ice, in some places more than a mile high, which moved over the Middle West some 50,000 years ago, is the underlying cause of the fertility of the region, according to scientists. It is explained that the glaciers cut down the hills, filled in the valleys, and ground up and mixed the rock, thus preparing the soil for the coming of man. Sections untouched by the glaciers, it is declared, are today less fertile than those which were once covered with ice. Pressure exerted by the

ice was so great that huge rocks were ground into powder, making a fertile soil for the raising of rich crops and fat cattle. It is estimated that the drifts extended as far south as the Ohio River, and that after they retreated for some unknown cause, much of this region was covered by an inland sea for many years.

FOLDING STOVE AND TABLE FOR SMALL KITCHENS

Designed for apartments where the kitchen space is small, there has been invented a gas stove that can be used as a table, and which can be folded back against the wall when not in use. When the table is folded, it extends only 7 inches from the wall. The stove has four burners and the top is large enough to hold any of the standard ovens. So that there will be no danger, a cover is fitted over the gas cocks to prevent them being accidentally opened. It is claimed that the table, which has an attractive



Stove Which may be Changed into Table or Folded against Wall

enameled top, will sustain a weight of 200 pounds. When folded against the wall, the entire device looks like a compact cabinet and gives no hint as to its purpose.

*Designed by Edna L. Cooper
Valley Center, San Diego Co., Calif.*

*News & Notes
Evanston, Ill. 6/5/23*

Inv. Charles W. Callahan, Welsbach Co., Worcester, Mass.

WRAPPING THE WORLD IN FURS

Part II

By T. WINFIELD THACKERY



AMID the brilliant throng of the beauty and fashion at Deauville, France; at Biarritz; at the Paris Opera; along that great boulevard, the Champs Elyseés, a sensation had been heralded. Mademoiselle Blank, the famed actress, had appeared in a coat trimmed with a "new" fur. The milliners and modistes are besieged by eager women demanding to be sold some of the identical trimming. What was it mademoiselle wore? The query flashed up and down the avenues, in the ballrooms, at the tea tables.

Then came the answer. It was monkey fur. Immediately the feminine cry goes up, "Give us monkey fur for trimming!" Within so short a time as six weeks, American women who follow the dictates of Dame Fashion are begging for monkey hair to deck their wardrobes. Soon the demand is world-wide. What happens?

Even the cave-man may have worn monkey fur. Certainly the native women and men in savage countries have worn monkey fur for ages as part of their very limited supply of covering.

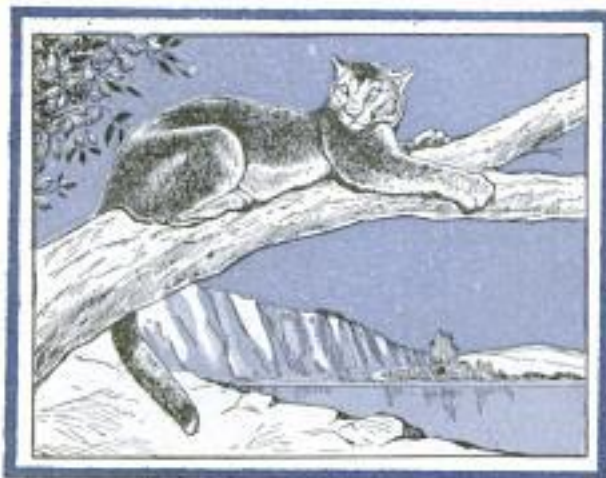
Answering the plea of the women, ruled by fashion, the fur buyers and hunters go after monkeys. They buy the furs from dusky native belles, who are thereby made richer but more lightly clothed. The monkey fur rolls into the market. The prices are good—only the monkeys suffer.

Then Madame X, the noted dancer and favorite of kings, appears in a white-fox coat of novel design. The women flock to the new standard. The coat maker, the furrier, the trapper is left with thousands of dollars' worth of monkey fur

on his hands and there are no buyers. Many firms go bankrupt. The only ones to benefit are the monkeys who were not killed during the fashion race.

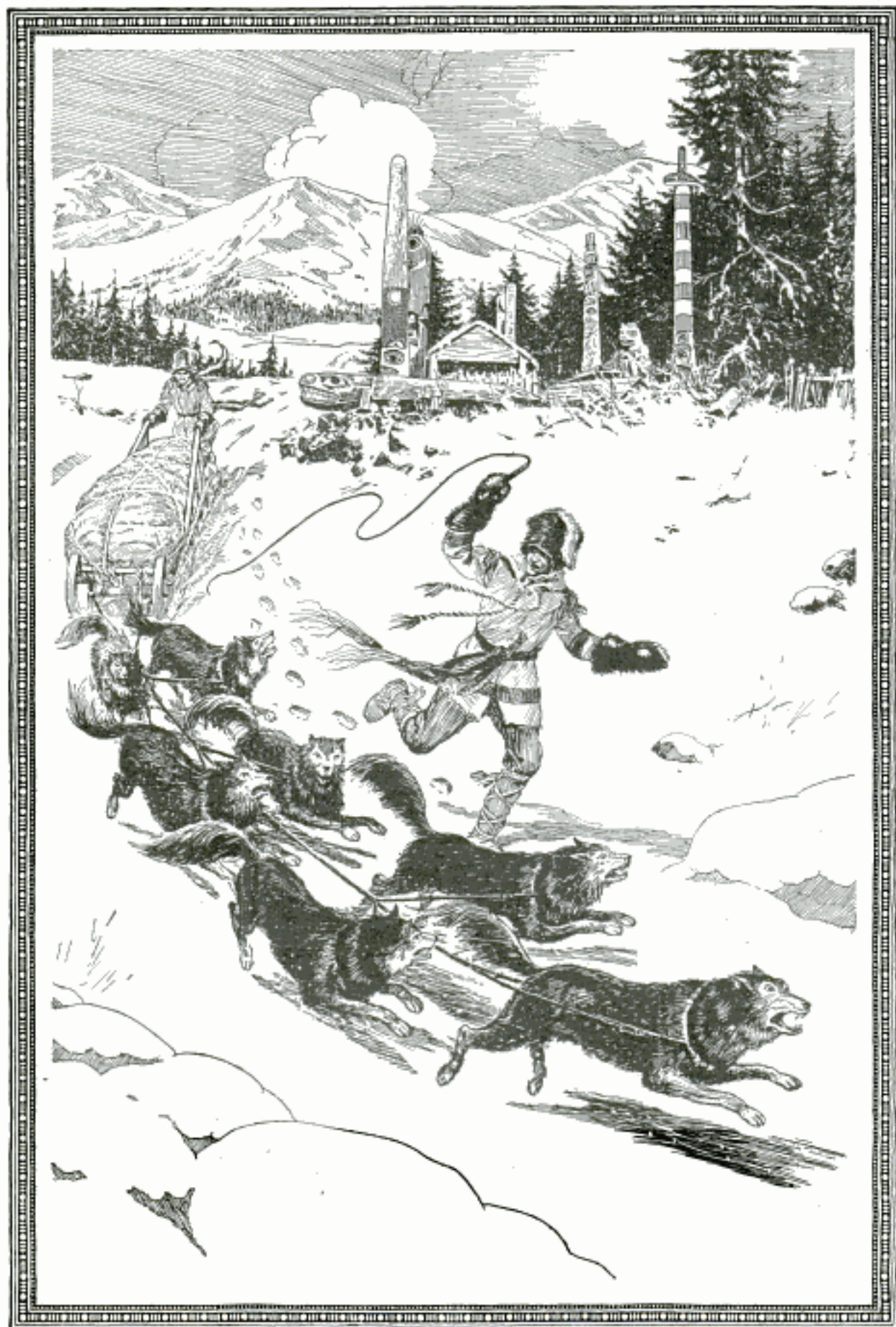
Again, fashion does not wait on shipments. A consignment of 1,000 fox skins has been three months on the way to London from the native wilderness where the animals were

caught. When it finally arrives, marten skins are in vogue. Of course, the dealers are loaded up with the wrong merchandise and suffer big losses. These are



The Puma

[This is the second of a series of three articles by Mr. Thackery, dealing with the absorbing subject of furs—where they come from, curious and interesting facts about the animals that bear them, and how the skins are prepared for the market. Mr. Thackery is a Chicagoan and director of the fur division of the largest retail store in the world.—Editor.]



Bringing Furs In from the Far North: An Alaska Scene, Showing in the Background the Ruins of One of Many Deserted Indian Villages Found in the Territory

some of the risks the fur industry faces.

Few realize the tremendous extent of the fur business today. It is estimated by Doctor Hornaday, of the New York Zoological Gardens, that 30,000,000 animals are killed every year to supply furs for the world. To bring it home, suppose every fur in your city or even in your neighborhood should suddenly become "alive" with the animal that grew it, snarling, snapping, running, leaping, fighting about the streets, in the homes, in the office buildings! The imagination hesitates to vision what the result would be. Yet all these "live" furs were "live" animals but a short time ago.



The Opossum

Just what the animal catch is each year cannot be exactly determined because of the time lost in shipments from the wildernesses, yet at two New York auctions 3,000,000 skins changed hands within 15 months. What the St. Louis market sells is also tremendous. In London, close to 4,000,000 pelts were sold in the same period, yet this did not count 18,889 house cats and other "domesticated" animals' furs sold in the period.

Where do all these furs come from? is the natural question. The answer is "From all over the world." From a district surrounding St. Louis for several hundred miles comes a great supply. From practically every state in the Union the trappers, professional and occasional, send in bales of furs every season. In each case the furs coming from the northern tier of the state are ranked the best. This is because the colder the climate the

heavier and thicker the fur must be to protect the animal that wears it. The heavier and thicker and better-quality furs thus originate in the north of each state, and consequently in the north of the country as a whole.

For instance, great quantities of muskrat may be caught in Louisiana, but the weather is so generally hot there that the animal does not have to grow very heavy fur to keep it warm. Therefore, the muskrats caught in the northern part of the United States and in Canada are more sought after and bring better prices.

Then the natural habits of the animals themselves have something to do with the supply. As an instance, rabbits have a tendency to multiply too rapidly every few years. This develops a skin disease among the little animals which so tortures them that they come out into the open, seeking relief, and become an easy prey to lynxes, wolves, foxes, and other animals that prey upon them.

This abundance of tainted food gives disease to the lynxes, foxes, and others, which results in a high death rate among them. The killing of the infected rabbits and the death of their captors mean only one thing — a serious shortage, amounting almost to a disappearance of these fur-bearers the succeeding season. Thus Nature, herself, serves to keep a balance in the fur market. However, the supply is bountiful if man, in his greed, does not violate game laws and engage in ruthless killings.

When we speak of having a mild or open winter in certain sections, the raw pelts will reflect that condition, and fur ex-



The Muskrat



The Lynx

perts, on examining the skins, can not only analyze the severity of the winter season, but name the district where the animal was trapped and the month of the year in which it was caught.

This seems marvelous at first glance, but it is, after all, not to be wondered at. Men who have been in the business many years—and to be a judge of raw furs one must have spent a long time in training—remember the character of the past winters. If they know the winter of five years ago was exceptionally warm, they know the furs caught that year will be light. Then, too, as we approach the poles, the character or color of the animals blends in with the scenery and is white, and as we approach the equator the tendency is reversed, and likewise their thickness of fur will be regulated by their range and the seasons of the year.

This brings us to the third factor in the fur industry, the first two being fashion and natural supply. The fur catch of the north, trapped in midwinter, must find its way to the world markets by travel on foot, dog train, rail, and boat, and consequently, many months, and in some cases a year, will elapse before collections from the far-north country are received and sold at auction in the metropolitan markets of the world. Furs in the early days were as valuable as money, and profits from the sale of furs reasonably assured, but of late years the fact of the long lapse of time being required to deliver pelts from the source to destination, makes the undertaking a most speculative venture.

Man, in seeking out furs, has gone to great lengths, and by so doing has advanced the prices of many common furs to the point where hunters and trappers stepped in and are likely to almost exterminate some kinds. Thus the muskrat, once considered as of no value on the

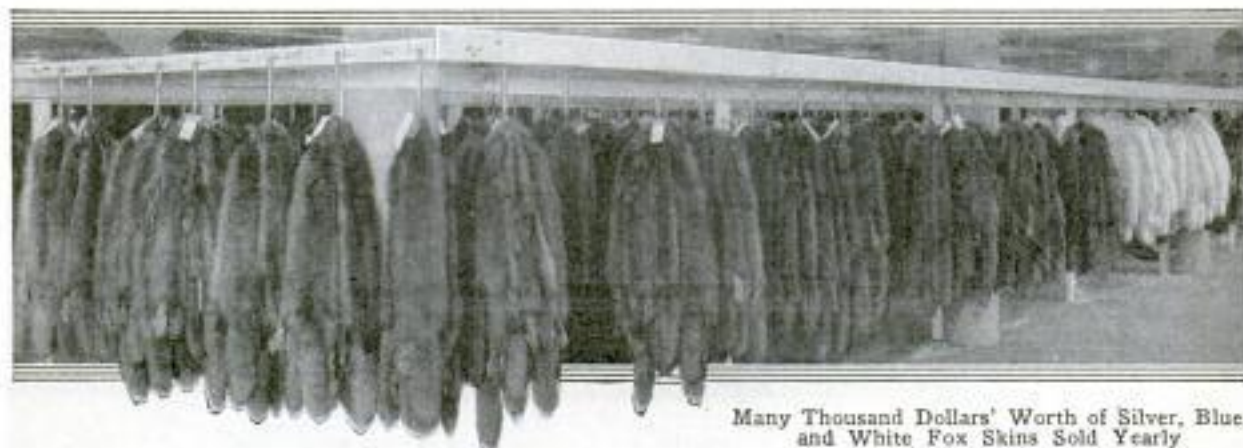
market, now is a big factor. Peak prices in 1913 for muskrat skins were \$1 each—in our fathers' day it was 25 cents. In 1920 muskrat skins brought \$6.80 on the open market. In the United States there are more muskrats than any other fur-bearing animal. This is the pelt which is used for the so-called Hudson-seal coats. So, too, has the skunk come into his own. His skin is sometimes known as the "civet cat." Twenty-five years ago he was safe. Today everybody wears his skin.

Occasionally, furs with names that were not on the passenger list of the Ark make their appearance. For instance, "nutria" began life as the hide of the coypu rat. Red or Siberian sable becomes "kolinsky," and although the European polecat may be that in life, he passes into furland as "fitch." The curious little Australian "bear," or koala, becomes the "wombat," and the striped skunk emerges a whit more attractive as a "civet cat." The domestic cat is completely concealed as "genet." Now and then some unscrupulous dealer takes a rabbit skin, worth 25 cents, dyes it rather well, and lo! it is "real" chinchilla, worth \$10 a pelt.

Among the more expensive furs we list the silver fox, the chinchilla, the ermine, beaver, Alaska seal, mink, the sea otter, and a few others of western-hemisphere stock. Tiger, leopard, Persian lamb, kolinsky, gray squirrel, and the like are from the Far East and Africa, and are also quite expensive. Rugs of tiger and polar bear used to be the fashion, but nowadays they are a drug on the market.

Silver-fox skins bring from \$500 up per skin at retail. Chinchilla coats sell as high as \$32,000. Alaska sealskin coats with, say, collar and cuffs of Hudson Bay sable, bring \$2,000 and up, for it takes six sealskins usually to make a coat.

The wearing qualities of these furs are



Many Thousand Dollars' Worth of Silver, Blue, and White Fox Skins Sold Yearly at St. Louis Auctions

not generally known. In this connection the natural otter skin used for men's collars is the best, and is rated 100 per cent in comparing this feature in all other furs of the world. Chinchilla, the delicate and beautiful little animal from the South American high altitudes, which is used to trim elaborate coats for evening wraps, ranks, mole excepted, the lowest in wearing qualities.

If it is asked how these animals are caught, the answer is, again, a difficult one to make. Men all over the world make a profession of catching animals in traps, pits, by shooting, and by poison bait. In the United States the trappers are in the majority. Sometimes they provide their own traps, sometimes the fur-buying company or the United States Government gives, or loans, or sells them traps. The government is the largest trapper, but confines its efforts to catching animals like lynxes or wolves, which destroy more game and property than they are worth as natural inhabitants of the land. The government sells all its furs through one company, whose operations will be discussed in the last article of this series. Habits of the animals also present a problem for hunters. As many know, the otter, aside from being "the playfulest critter on earth," is a great wanderer. He frequently travels as far as 15 miles in a night, is very clever in foiling traps, and is hard to catch. Foxes, due to many years of wariness, are likewise difficult to approach. Naturalists tell us that the apparently playful romping of young foxes, while their mother looks on and guards them, is really a device of nature to train the cubs in the art of self-protection. This time of cubhood is the only one in which the animal can safely experiment in self-defense, train itself in hunting, and learn the thousand and one other tricks by which

it often saves its life in later years. For the mother is watching, and failure to do a trick or fight well in cub battles then, does not mean loss of life as it would later.

Beavers are becoming quite scarce in these days and their skins correspondingly more valuable. The great skill of the animal as a builder is well known, his habit of only partly gnawing through the butt of a big tree and then waiting for the winds to blow down his "log" leading scientists to believe that he also possesses some reasoning power.



The Beaver

The mole, whose skin is so prized, is among the queerest of animals. Its ears have no "trumpets" or projecting parts, for they would be in the way when it digs through the earth. Its eyes are not of much use, so they are tiny, being but one-twenty-fifth of an inch in diameter. Its hair has not "set," that is it does not get disordered when it moves backward in its burrow, and so is easily kept clean. Further, it can dig through hard or soft ground with a swimming motion of its paws, or it can simply push its way through soft earth near the crust, or it can run on the surface at about $2\frac{1}{2}$ miles an hour, or it can trot along a burrow large enough. It can eat its weight in worms every day.



The Skunk

Though settlement of the country is fast curtailing the wildernesses which are the natural haunts of the valuable fur-bearers, trapping is still a very profitable pursuit and will continue so for many years to come. All accounts from the Canadian northland are to the effect that furs are pouring into the trading posts at a very heavy rate, and this season's catch bids fair to eclipse the very satisfactory one of last year. The pelts are of excellent and exceptional quality, and

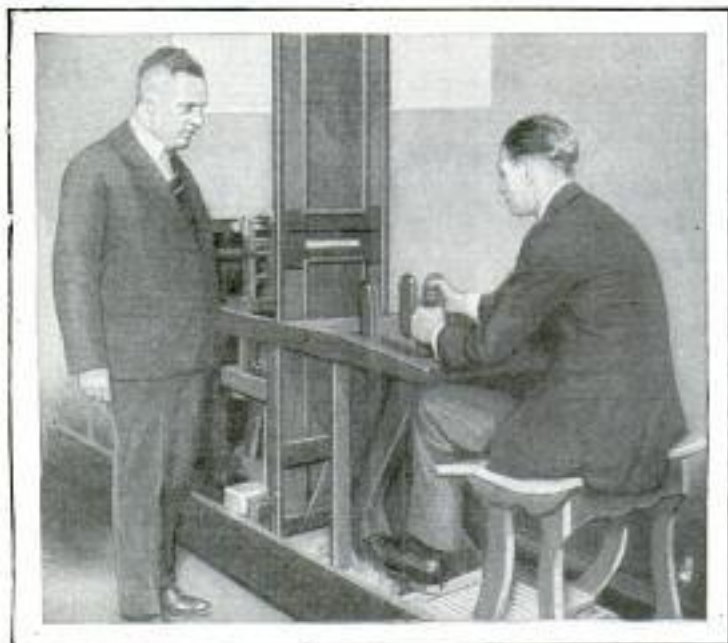
with a continuance of the profitable prices which prevailed at the fall sales, the total of peltry will be valuable.

Ans. Prof. L. J. Howard,
Northwestern University
218 **POPULAR MECHANICS**
Psychologist Evanston Ill

249

MACHINE READS CHARACTER OF PERSON USING IT

By watching hands and feet and the face, a professor in a middle-western university reads the character of persons sitting at an apparatus he devised to classify students.



Professor Watching a Student as He Pushes Pedals and Pulls Levers of a Character-Reading Machine

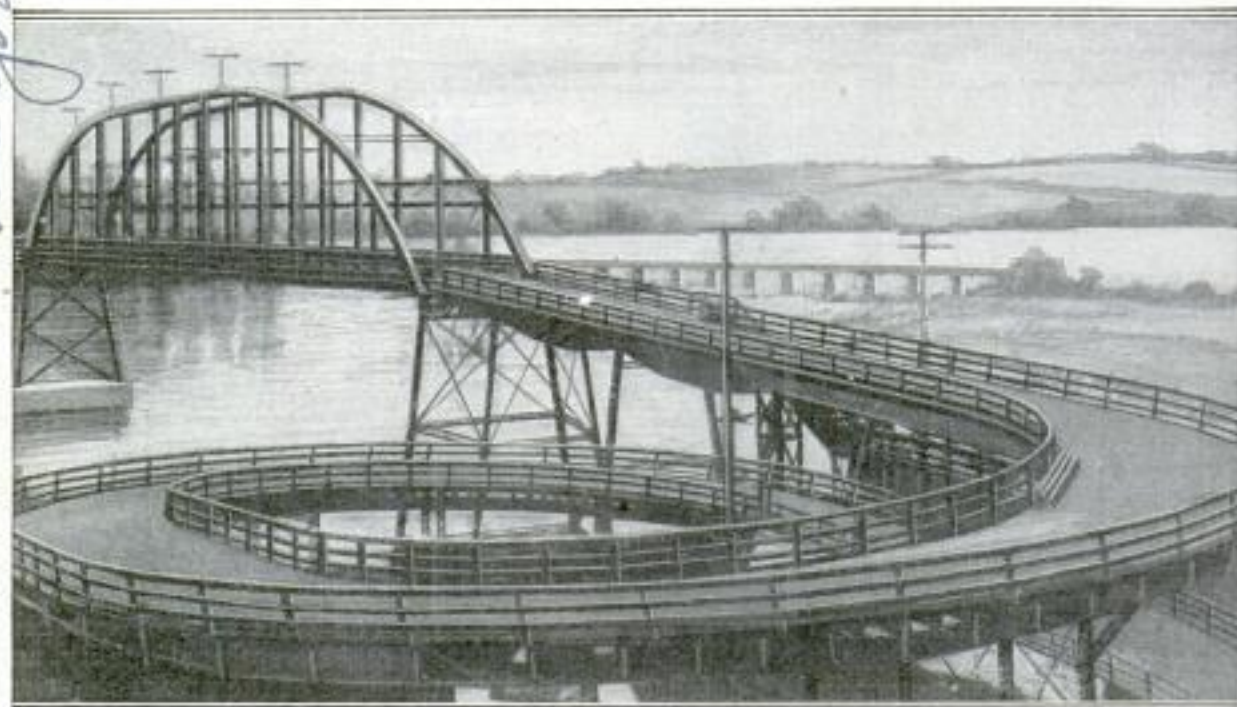
Seated at a bench, the subject is required to work a series of pedals and levers in response to signals. The idea is to act quickly. It is a test against time. The student who becomes nervous might not be a steady hand at the wheel of an automobile or as a motorman or engineer, the inventor thinks. When a person goes to the machine and sits down quickly, studies it out, and then works it right and fast, and smiles and is eager, the inventor believes such a man or woman is aggressive and is to be trusted. Some come to the machine feeling that it is silly. They perhaps make mistakes. They do not act quickly. They frown. They grit their teeth. They give up soon. Such persons, the professor says, are easily discouraged.

2463

SPIRAL BRIDGE MAKES QUEER ENTRY INTO TOWN

Spanning the Mississippi River at Hastings, Minn., is a bridge so high above water that the approach into town had to be built in the form of a spiral. It is a highway bridge, and was built on high

towers so that ships could pass under it. The business section of town is at a much lower level, and a queer-looking entry was decided upon to provide an easy grade from the bridge floor.



This Odd-Looking Bridge Is on the West Bank of the Mississippi River, at Hastings, Minnesota. It was Built on a Spiral in Order to "Ease" the Grade from the High Bridge Level in the Background

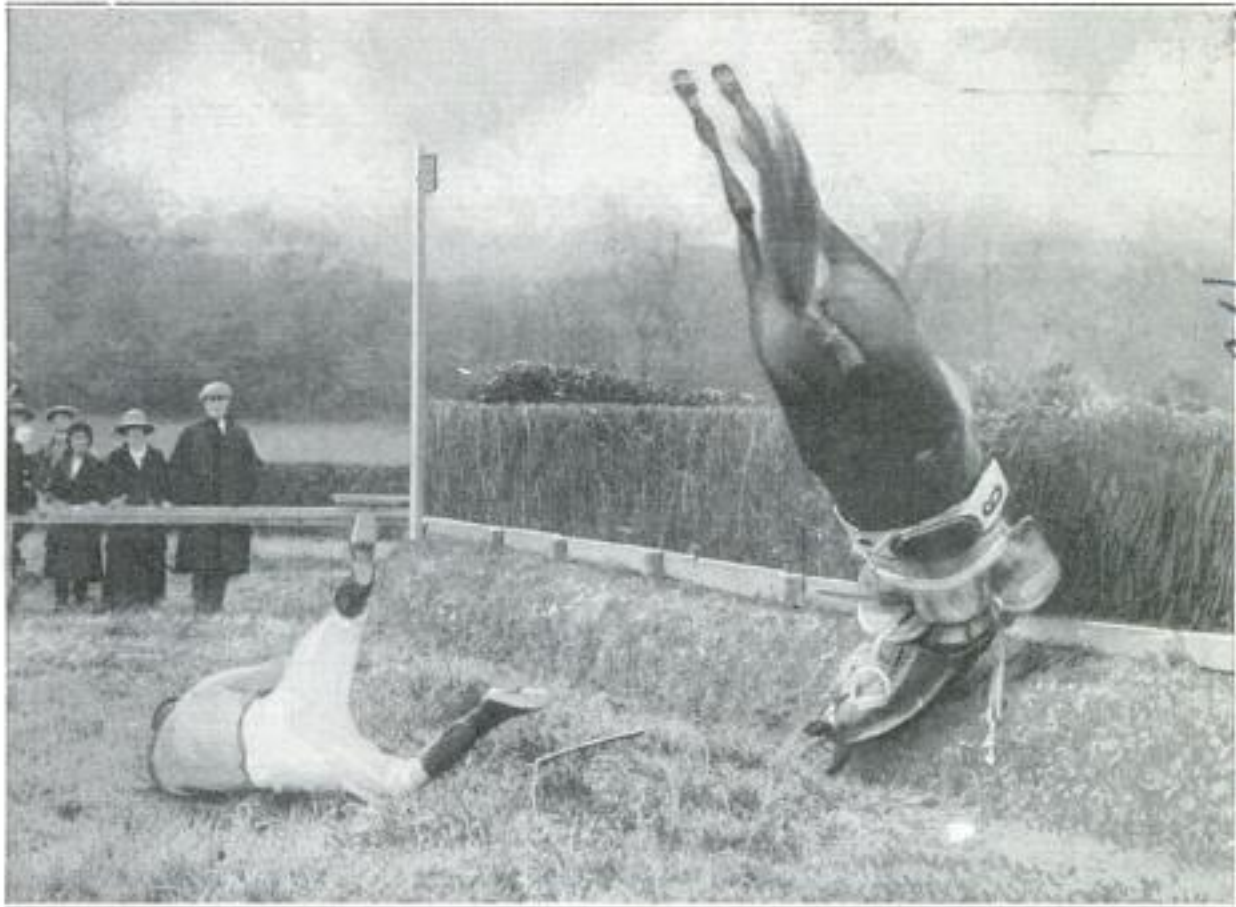
*Photograms 129 E. 87rd
New York*

**EYE OF CAMERA RECORDS
RACE ACCIDENT**

When the leading horse in a hunters' chase in England, tripped at the last barrier, a photographer was on hand and

**BIRTHDAY OF ELECTRIC CAR
FORTY YEARS AGO**

What is declared to be the fortieth anniversary of the first hydroelectric railway in the world is being celebrated



Rider Crashing to Earth as the Result of a Dramatic Accident, Which Took Place at a Hunters' Chase at Lingfield, England: Neither the Horse nor the Rider was Injured.

snapped the most sensational spill of the meeting. The photograph was remarkable because it caught both horse and rider as they pitched headlong into the turf.

**FEVER IN STORES OF GRAIN
TOLD BY ELECTRICITY**

Every year great quantities of stored grain are lost through fire caused by the action of the air on the living cells. To eliminate this danger, a device has been made in Europe which records the temperature and gives warning before it begins to burn. It has been found that corn left in elevators lives and breathes. It takes up oxygen from the air, which combines with the starch in the grain to form an acid. As the process continues, it results in fever and heat. Under the new plan, thermometers placed in the grain record its temperature on an electric drum at some central point.

in England. It was opened in 1883 and the length of the line was only eight miles. Electricity was generated by a waterfall and was conducted to open cars by a third rail. Later this was replaced by an overhead trolley. Repeated failures, constant breakdowns, and other great obstacles were overcome before the system became a success. In celebrating the anniversary, a replica of the original car, filled with a notable assemblage of engineers, made a trip over the same line.

MIRRORS USED AS SCARECROWS

Swinging mirrors hung in fruit trees have proved of value in frightening away birds. Fastened by a string, they move in the breeze, and the light of the sun is flashed here and there through the branches. If mirrors cannot be obtained, pieces of polished tin will answer the same purpose.

*Siemens Schuckert Werke
Berlin, Siemenstadt, Germany*

258
Inventor, Wm. A. Traill
Wide World Photos
Omt. Eden Liljegren
Hercy. 608 P. Stockholm
with a...

*Ans. Thomas Palmer
c/o Cranmer Co.
Union Bank Bldg
150 St. James St.
Vancouver, B.C. Canada*

POPULAR MECHANICS

TEMPLE MODEL SHOWS SKILL OF ANCIENT BUILDERS

Thirty years of research and study and six years' toil were necessary to construct what is said to be the first accurate model of the famous Temple of Solomon, built in about the year 1,000 B. C. The reproduction is the work of Dr. Baurut Schick, who has spent most of his life excavating in the ruins about Jerusalem, and it is now being shown in the principal cities of this country. The model is built entirely of small blocks

THERMOS HOUSE SAVES FUEL AND HELPS KEEP COOL

2576

Built like a thermos bottle, with cavities in the walls, a system of building construction has been patented by a western inventor which, he claims, will save 50 per cent of the heating cost as well as help to keep the home cool in summer. In a bungalow built on this plan there were double walls with a vacuum space between. Although it had no furnace, it was found easy to keep its six rooms warm in win-

*Brought to the country
St. Orange
207 Orange
N. F. Lees Co.,
view
Hards.
Crown. by J. F. Cranmer Co.
Vancouver, B.C. Canada*



A, Holy Place; B, Inner Court; C, tiles; F, Chambers of Priests; G, of Pharaoh's Daughter; J, Royal Palace; K, Throne of Judgment; L, Millo
Women's Court; D, East Gate; E, Court of Gen- Tower of Mea; H, Tower of Hananeel; I, House

and strips of wood, and is declared to be the best example yet shown of the architectural skill of builders who lived in Palestine 10 centuries before the Christian Era.

2600
MOVABLE ASH TRAY CLAMPS ON ARM OF CHAIR

Adjustable to any angle so that it is always in convenient reach and yet never in the way, an ash tray has been invented which fits on chair arm, table edge, telephone, or stands alone. For use in both office and home, it is claimed that it will not spill ashes, as it cannot be upset while in use. As it is suspended from the edge, it leaves the chair arm or top of a desk or table clear. The bowl is attractively finished in several colors.

Erection of a giant pipe organ, one of the largest in the world, is being planned for the so-called cathedral rocks in Zion National Park in southwestern Utah.

fer. In the summer, blankets were used in sleeping, although the outside temperature was 80 and 90 degrees. Also, a very even temperature was registered within the house throughout the changing seasons. The double walls, in addition, proved to be almost sound-proof. The cost of the building was said to be less than in other houses of the same size, and the time required for construction less. Fireproof shingles were used and the outside finished in stucco.

WRITING DESK CAN BE MADE INTO TABLE AS WELL

2547

By a simple pull forward on the folding leaves of a new combination writing desk, it can be turned into a solid, substantial table. As well as having the feature of being two pieces of furniture in one, the desk is easily folded up and can be stored in a small space. It is designed particularly for the occupant of the small apartment.

*Schimmel + Co.
Harbault, Minn.
Copyrighted material*

*Ans. Thomas Palmer
c/o Invermay Hotel
Vancouver, B.C. Canada*

place to

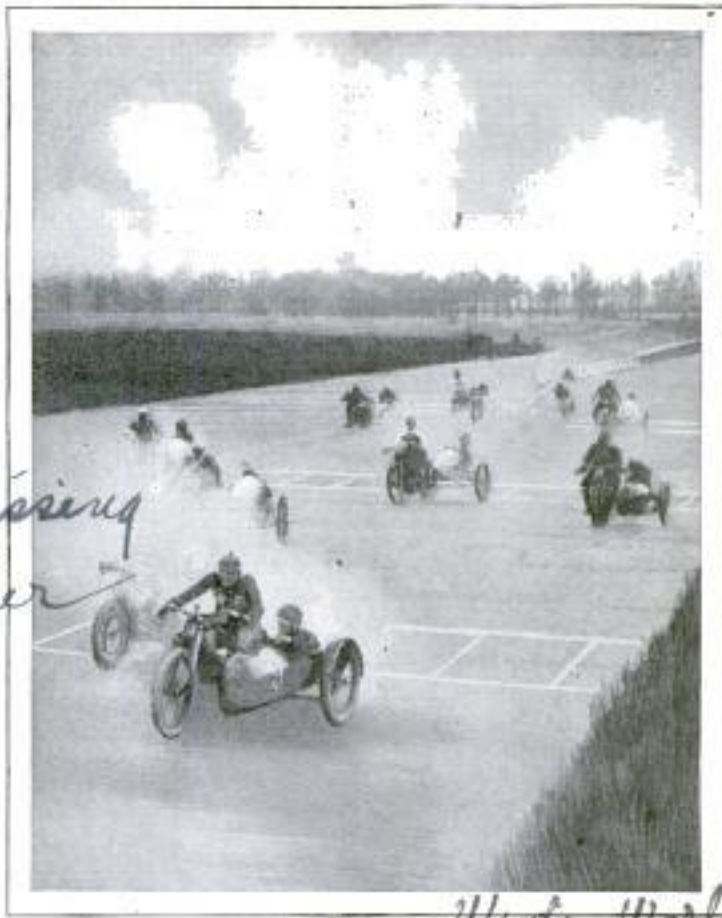
MOTORCYCLES IN RACE
ABROAD TO SHOW
ECONOMY 24 84

Because of the high cost of gasoline abroad, motorcycles with sidecars are being designed in Italy to compete with the automobile, which uses so much more fuel to travel an equal distance that thus far its use has been confined to the wealthy. In Italy, motorcycle races are being staged to show the economy, speed, and comfort of this form of transportation.

cards data missing

EXPLOSIONS TO AID
EARTHQUAKE STUDY
no number

Surplus explosives of the government, left over from the war, may be used as aids in the study of earthquakes. The idea is to cause miniature earthquakes, and take observations of the rate of vibration through different layers of the earth's crust. In the case of natural earthquakes, accurate measurement is obviously not possible.



Motorcycles with Sidecar Racing in Europe

*Wide World
(G. notes)*

24 95

MOVING GIGANTIC GAS TANK WITH HAND JACKS

Three hundred men, each at the handle of a hand jack, recently moved a huge gas-tank base, weighing 250 tons. The base was lowered in 40 minutes by the small army of men, who were placed with their jacks on every other big steel plate on the top and rim of the tank. Round and round the jacks they

went like horses in a treadmill, moving together when ordered by the foremen in the center. By their feat in a western city these men, who moved with small hand jacks a tank holding 10,000,000 cubic feet, have applied Archimedes' principle of "Give me a place whereon to stand and I will move the earth."



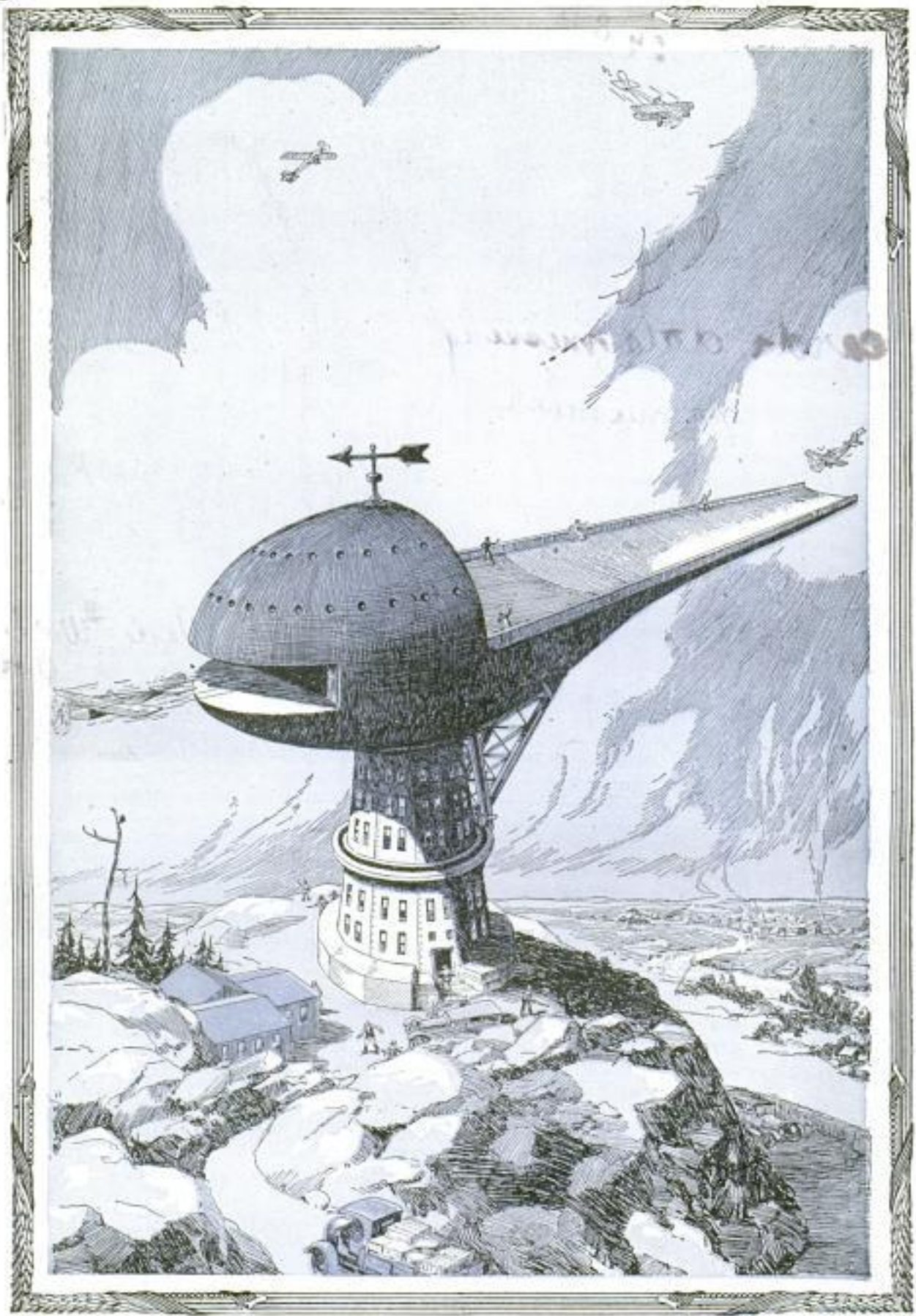
Lowering the Base of a Gas Tank in a Western City with 300 Men Using Small Hand Jacks: Forty Minutes were Required to Move This Tank, the Base Weight of Which Was 250 Tons

*International
newsreel material*

Germaniaer Landung

MOVABLE AIRDROME RAISED HIGH ABOVE EARTH
TO ASSURE SAFETY OF AVIATORS

2253



Hazards of Landing on the Ground would be Eliminated by Proposed New Platform on Top of Tower, So That It could be Turned with the Wind to Allow Aviator Best Position in Starting and Descending

*Ans James P. Lewis,
Hotel Lafayette*

POPULAR MECHANICS

Buffalo, N.Y.
**TURNTABLE AIRPLANE LANDING
HAS 500-FOOT RUNWAY**

Keeping pace with the rapid progress made recently in the development of airways, a landing stage has been designed that automatically heads into the wind and possesses other unique and practical features. This airplane landing can be set to remain stable in all light breezes, and then switch itself into automatic control at any predetermined wind speed. This feature is highly important, for the aviator must head into the wind to make a safe landing. Many risks are thus entirely eliminated when a pilot has the wind to land against at all times.

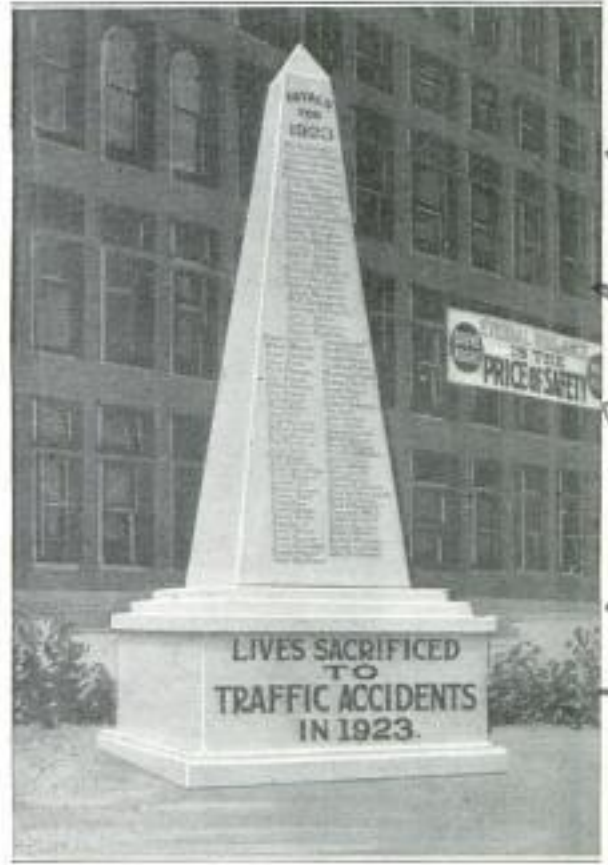
Another advantage lies in the fact that the plane is able to "hop off" into the wind from a standing start, at any required speed, according to wind conditions. The plane is restrained in stays in the starting room, its engines speeded up to the desired point, and then automatically released. As it rushes into the air its propellers lose no power, as they are turning at a speed which corresponds to the required starting speed of the plane. This condition is not always present when taking off from the ground.

"Streamlining" the body has been resorted to wherever possible, in order to keep the wind resistance low. In this respect the "take-off" portion of the airway resembles a huge whale. Considerable ingenuity has also been displayed in the development of the operating mechanism. The receiving controls for the landing of planes actuate a moving platform, so that an airplane will land, not with a shock, but with a gliding motion. Landing platforms are about 500 feet in over-all length, and from 60 to 80 feet wide. These dimensions, as well as the height from the ground, are variable for different localities and conditions. In cold regions a series of brushes will be provided to scrape the snow from the platform as it moves under them.

It would seem that this type of landing could be put to a variety of uses. A series of them along an exposed border would provide adequate and constant inspection service, and this application could also be made in coast-guard work. Equipped with radio, each would be in easy communication with any other, or with headquarters. The landings are also in position to serve as a refuge for airplanes in case of storm. Elevators inside the tower will convey passengers to and from the level to the platform.

**DEATH SHAFT IS WARNING
TO CARELESS DRIVERS**

Names of all who were killed by autos in a middle-western city during the first four months of this year are shown on a



Shaft Bearing Names of Those Killed by Autos, Erected as a Warning to Speeders

tall white shaft in front of the city hall where thousands of motorists see them daily and are thus reminded of the need for more care in driving. During one week of the drive every auto on the streets of the city was stopped for two minutes each noon and bugler policemen sounded taps for those who had died in auto accidents.

**RUGS MADE OF RUBBER AID
IN CLEANING FLOORS**

Rubber rugs are now being made. They look like rag rugs and are being used widely because they do not collect dust, can be washed without moving from the floor, can be mopped often without danger of losing their bright colors, and because they will not slide, even on slippery tile floors. The corners never curl up, and dust does not sift through to the floor. They are being made in many colors.

*The B. F. Goodrich
Co., Akron, Ohio*

*Ypsilanti Mich
Emb. Cyril E. Lamb
309 Ballard St.*

2242620



Colossal Monument to Express French Gratitude to America, Now being Built at the Mouth of the Gironde, Where First Troops from the United States Landed

POPULAR MECHANICS

FRENCH GRATITUDE TO U. S. SHOWN IN MONUMENT

Rising 325 feet above the earth, a colossal statue of France, scanning the horizon for the American ships, is being built on the cliffs at the Pointe de Grave, on the Gironde, where the first soldiers from the United States landed during the war. As an expression of France's gratitude, the foundation stone of the colossal monument was laid in 1919, on the anniversary both of the first battle of the Marne and of the birth of LaFayette. The general design, which has been altered considerably since its first conception, has been prepared by M. Bartholome and M. Andre Ventre, the latter the architect of the famous "Trench of Bayonets." A bas-relief at the base of the shaft will represent the arrival of LaFayette in the United States in 1777.

2596

NONSCUFF HEEL GUARDS SAVE SHOES IN CAR

As an aid to women who drive their own automobiles, a guard has been made of heavy leather to fit over the heels of high-heeled shoes by means of an adjustable strap. It has been designed to keep the heel from rubbing the floorboards of the car when the brake and clutch pedals are used. The guards are not unsightly and are easily attached.

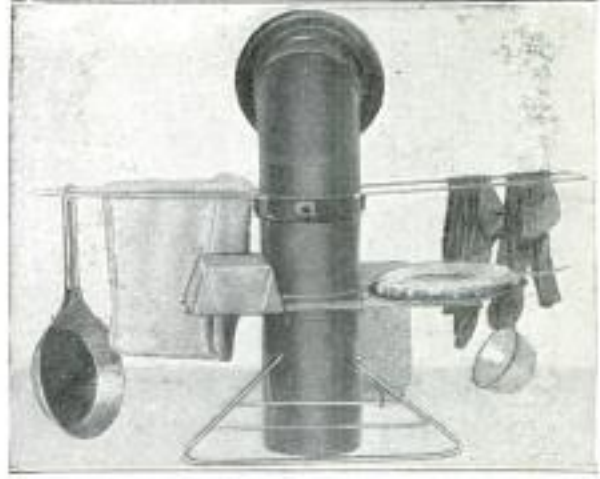
2490

TWO-COACH STREET CARS RUN ON THREE TRUCKS

When a number of old street cars became too costly to operate, the management of one western traction company increased their usefulness by lengthening their frames and joining them up in pairs. This resulted in a two-car train, having only three trucks. Two men operate the train where formerly it required four to run the two cars separately. The results of this arrangement have proved so satisfactory that the plan has been patented.

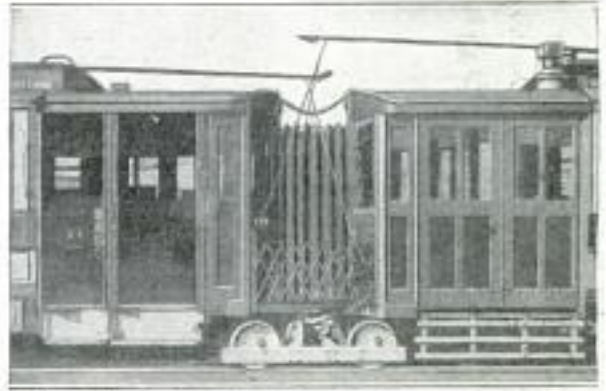
Worcester Mass
KITCHEN STOVEPIPE USED AS WARMING SHELF

How to make a stovepipe more useful has been solved by an eastern inventor who has devised a metal band to fit



Clothes, Pans, and Dishes being Dried and Warmed on Rack Fitted to Stovepipe

around the pipe. Wire holders are mounted on a ring fastened to the pipe. From these may be hung utensils, fabrics, or articles of clothing which are to be dried. Several bands may be fitted to the same pipe to act as plate warmers or merely as shelves. They are within convenient reach of the busy cook, and may serve to hold food removed from the stove.



Below, Two-Car, Three-Truck Train, and Above, a Close-Up of the Coupling



North Star Mfg. Co. Worcester, Mass. See also 225-900

Comd. Arthur J. Rowland, Educational Director, The Milwaukee Electric Railway & Light Co. Milwaukee, Wis.

PARKING SPACE FOR AUTOS IN SKYSCRAPER PLAN

Parking space for autos, with a reverse, double-spiral driveway that would permit motorists to drive their cars to



Proposed Skyscraper Cut Away to Show Double-Spiral Driveway in Center

any floor in the building, is provided in a plan for a 30-story skyscraper, which has been copyrighted by a western inventor. Tenants of the 3,000 offices in the building could leave their automobiles just outside their respective places of employment without fear of them being stolen. Another advantage, it is claimed, is the saving of time that is now spent in looking for a place to park. A driver, too, could leave his own garage in bad weather and remain in the car until he reached the door of his office.

The automobile drive to the 30 floors would be placed in the center of the building, circling with a gradual incline up to the roof, where an open-air auditorium, capable of seating 8,000 people, would be built. The roof area could also be used as a landing place for airplanes and dirigibles. A steel observation sta-

d no. Harry H Hill 2920 Wabash Ave, Kansas City, Mo (Patented)

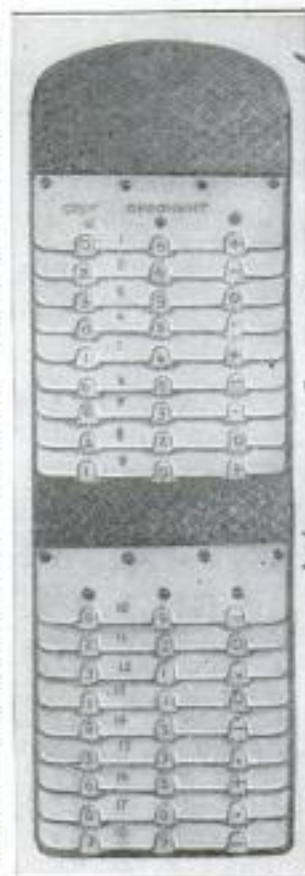
Patented by Mess H + R Crawford Ltd, Langollen, Wale

tion, resting on four supports, one at each corner of the building, is also included in the plans. At night the tower would be lighted and would house a large searchlight, to signal aircraft, and a radio broadcasting and receiving set.

From the street entrances to the top of the building, the driveway would be about two miles long, with an average grade of 3 per cent. In the center of the structure a sound chamber would be provided to eliminate noise and gases. Two cars abreast could drive up or down the spiral roadway. The entire building, it is estimated, would cost about \$15,000,000, but the driveway could be also adapted to hotels and large apartment buildings.

POCKET GOLF SCORER KEEPS TAB ON TWO PLAYERS

All nineteenth-hole arguments over golf scores should be eliminated by a pocket scorer recently patented. Built like a purse, it is easily carried, and enables a player to keep his own score and that of his opponent. The number of strokes and holes is recorded on movable disks and numbered strips of celluloid. The proper use of the device eliminates many disputes caused by faulty memory on the part of the players, and serves as a constant check during the progress of the game on both of the contestants.



Mess. H. & R. Crawford, Ltd. Langollen, North Wale

IRON SPRAYED WITH ZINC

As a covering for iron and steel to prevent rust, melted zinc is being coated on these metals in Europe. While at great heat and in a fluid state, the zinc is sprayed directly on the iron or steel. This is an inexpensive way to protect bars and rails from the injury done by air if they are not covered.

U. S. New York Schwab & Co

AGE-OLD WAYS OF MAKING IRON USED IN CHINA



How Natives in China, Using Only the Most Primitive Methods of Iron Making, Remove the Jars Containing the Metal from Crude Furnaces

What progress science has made in the making of iron or steel may be realized from the primitive methods still in daily use in China. Beginning at the mines, the only hoisting engine is a cheerful coolie, and the shafts are shallow. The ore is reported as being of rather

poor quality and it exists only in small deposits, usually no more than 3 feet thick. After being brought to the surface, it is hand-sorted, mixed with coal and then smelted in crude furnaces. It is three days before this part of the task is finished. Labor is so cheap



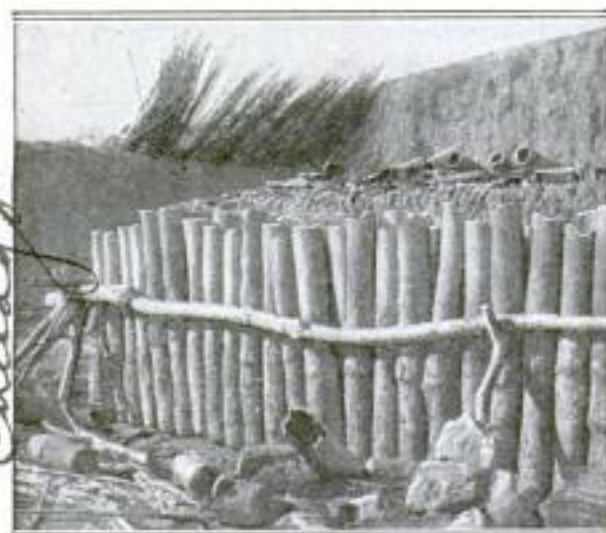
An Impressive Example of the Extent to Which the Small Jars Used in Making Iron have Accumulated through Years of Turning Out the Metal in China

Marine Journal
June 2nd
1923

and economy is so necessary that the jars which have been used are repaired and made to serve again. Some of the



Cheerful Coolies Are the Only Hoisting Engines Used in Mining Coal in China



Jars Used in Making Iron in China are Made to Serve a Second Time to Reduce Cost

coal becomes coke, and this is mixed with clay to make new jars.

SMALL SPRAY TURNS TUB INTO SHOWER BATH

So small that it may be carried in the pocket and attached to any water faucet, a socket has been invented to turn an ordinary tub into a shower, or needle-spray bath without the use of a cabinet or rubber curtains. As the nozzle turns in a rubber socket, it can be adjusted to any height desired so the water will not wet the hair. It is declared to be of special value to tourists, traveling men, and those whose homes are not equipped with stationary showers.

GREAT SHIP STEERS ITSELF WITH A "GYRO-PILOT"

2653 Navigated automatically and steered by a "gyro-compass" and "gyro-pilot," the steamer "Harry Luckenbach," a large freighter, has been used in a series of tests on the west coast. After the course has been set, the mechanical helmsman holds the vessel to it for periods of half an hour or more. Attached to the steam steering apparatus, the device is worked on the principle of the gyroscope. If the ship deviates from the course set, it will work the rudder to bring it back. As it serves as a constant check on the watchfulness of the pilot, it is claimed that the device will eliminate some of the dangers of navigation.

KNOTS TIED BY MACHINE STRAPPED TO HAND

2539 Tying a knot in yarn by hand takes only a moment, and is so simply and quickly done that any child can learn at once, but science, ever watchful for quicker and better ways, has made a machine to do it. It is a small apparatus, worn on the left hand, being held by a strap, as is shown in the top picture. Yarn is drawn over two hooks and the thumb presses a lever, tying the knot and trimming the ends, as indicated in the three lower pictures. With this hand machine the speed of spooling and winding is increased and the weaver can do more and better work because the knots are trimmed closely. Even the beginner always works a great deal faster with this device than by hand. When tying is done by hand, sometimes the yarn is soiled, but by machine this does not happen. This knotter is used in India as well as in the United States.



Mc Namara Trunk Works,
64 E. Michigan,
Chicago

Marshall Field & Co,
Chicago

Barber-Colman Co
Rockford, Ill.

SWIMMING ON FISH BOARDS
LATEST WATER SPORT 2635

Swimming with fish boards has given a new zest to water sports. Modeled after various kinds of fish, the boards are made of balsa wood, lighter than cork. Near the head on both sides are small holes in the board for the hands. The rider lies down, his head above that of the painted fish. By kicking, the swimmer can move along at a good rate of speed. The boards are made in many lengths and variously colored. It is said that they are of great assistance in learning to swim, and will easily support a weight of more than 200 pounds.

2548
FOLDING CHAIR AND TABLE
OCCUPY LESS SPACE

Something novel in a folding chair and table combination has recently been sent to this country from European shops. It



Left: Table Folded Away behind Chair; Right: Table in Position Ready for Use

can be used as a study or tea table, and when desired the table may be readily folded under and back of the chair. Besides being compact, it is of pleasing design, well suitable for the porch or inside use. The chair is upholstered in a flowered material.

HOME-RUN SLUGGERS' BATS
MADE IN SMALL SHOP 2624

To turn out a bat used by big-league baseball players takes about two years. Second-year growth of ash is used. It is specially prepared, sun-dried, and weather-cured. Then the wood is turned on a lathe to the size desired and carefully balanced so that the greatest amount of force may be used by the batter in hitting the ball. In a small eastern shop, many of these bats are made for some of the best-known players.

U. S. NAVY'S BIGGEST GUNS
GIVEN FIRST TEST 2403

Four of America's greatest naval guns—the 16-inch long-range rifles of the "Maryland"—have just been given their



Four "Aces" of the United States Navy's Long-Range Rifles, with a "Tar" in the Muzzle of Each Gun

first real test in target practice off Hampton Roads. The guns, which hurl a 2,450-pound projectile 38 miles, are 60 feet long, and are said to be the equal of the largest rifles of the British navy.

DOUBLE-HEAD SPARK PLUG
CLEANS ITSELF 2546

Of interest to motorists is a new spark plug that has two ends, each having two firing points. When one end is in use the exposed points act as an intensifier, as well as a trouble locator, thus serving to clean the working end. In case one set of points becomes damaged, the plug may be inverted and used as a regulation two-point plug. In this way a spare set of plugs can be carried under the hood, where they are always ready for use when needed.



Noniggratze Strasse 62

Berlin S.W. 4. Germany Atlantic Photo

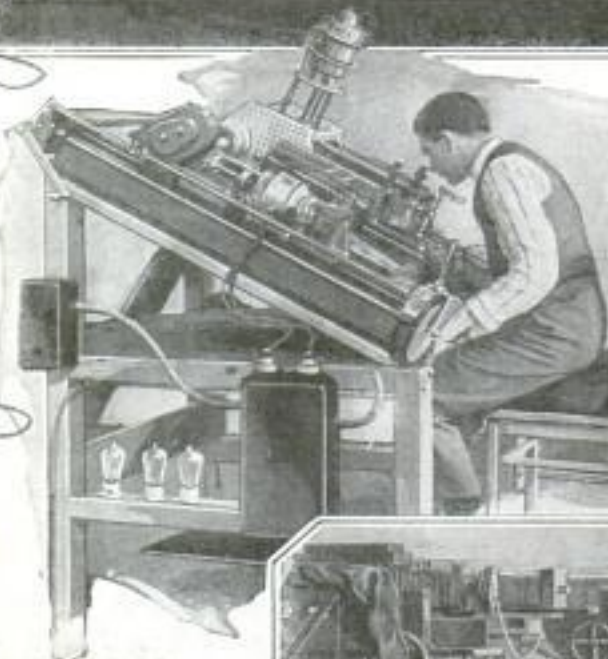
*Wm. J. Corcoran, d. d.
 308 First
 Cleardon. Emery*

*Photograms
 New York*

also see February, 1922-204

CAMERA AID TO SCULPTOR IN MAKING BUSTS

*Edmunds, nonlescumbey Place
Brighton, England*



Top, Bas-Reliefs, and, Below, Electrically Driven Drill Which Makes Them

Parallel Lines Thrown on Face of Subject That Aid in Making Bust

Two Cameras with Projector, in Center, That Throws Lines on Model in Chair

Only one sitting of a few seconds is required in making a sculptured model by the use of a photographic apparatus recently invented in the East. Less time actually is spent by the subject in posing for a sculpture than would be needed before the camera in making a portrait.

The development of this device, which combines the accuracy of the camera with the enduring, lifelike properties of sculpture, is hailed as the birth of a new art. Two cameras, set at different angles, are directed at the subject. A magic lantern throws an image of hundreds of straight lines on the face. In the photographs, these lines appear as curves, and aid the sculptor in making his model. Reproductions may be made

in any material. The process is known as "photo-sculpture" or "cameography." - It is like the method employed in surveying. Engraved upon the surface of a piece of glass are a series of fine parallel lines, spaced 150 to the inch. This is placed in the projector. Light from an arc lamp throws these lines on the image or subject from a distance of about 10 feet. If a solid object is placed at the point of focus, the lines will appear twisted when viewed from any position other than that occupied by the projector. Upon the distortion as recorded by the cameras, the subsequent operations depend, as they are used as a guide in making the carving. This is done by cutting a series of furrows which are parallel in plan, but follow the lines in the photographic record.

O. K. Machine Co.
Hart Wayne

POPULAR MECHANICS ²⁶²⁵
and

VACUUM HANDBRUSH IS RUN BY ELECTRIC MOTOR

Built like a carpet cleaner, a small vacuum handbrush has been made for cleaning clothing, upholstery, draperies, hangings, and furs. It is small enough to get into corners and remove lint and clinging hair. Weighing less than 3 pounds, it is driven by a small electric motor, and the dust is collected in a holder inside the handle. ²⁵⁹⁸

DIG HUGE BASINS FOR OIL THEY CANNOT MARKET

So rapid has been the development of the oil industry in many parts of the West that producers have been forced to dig huge basins in the earth to hold the output from their wells. Refineries have been unable to take care of the supply, and so the liquid wealth has been allowed to accumulate while more wells are being drilled all the time. Meanwhile, efforts are being made to construct storage tanks and pipe lines to handle the great output which means so much to automobilists generally. From above, the pools have the appearance of great mirrors that give back the reflections of the surrounding trees and oil derricks.

INDIAN'S KNIFE CARVES BEAR FROM TRUNK OF TREE

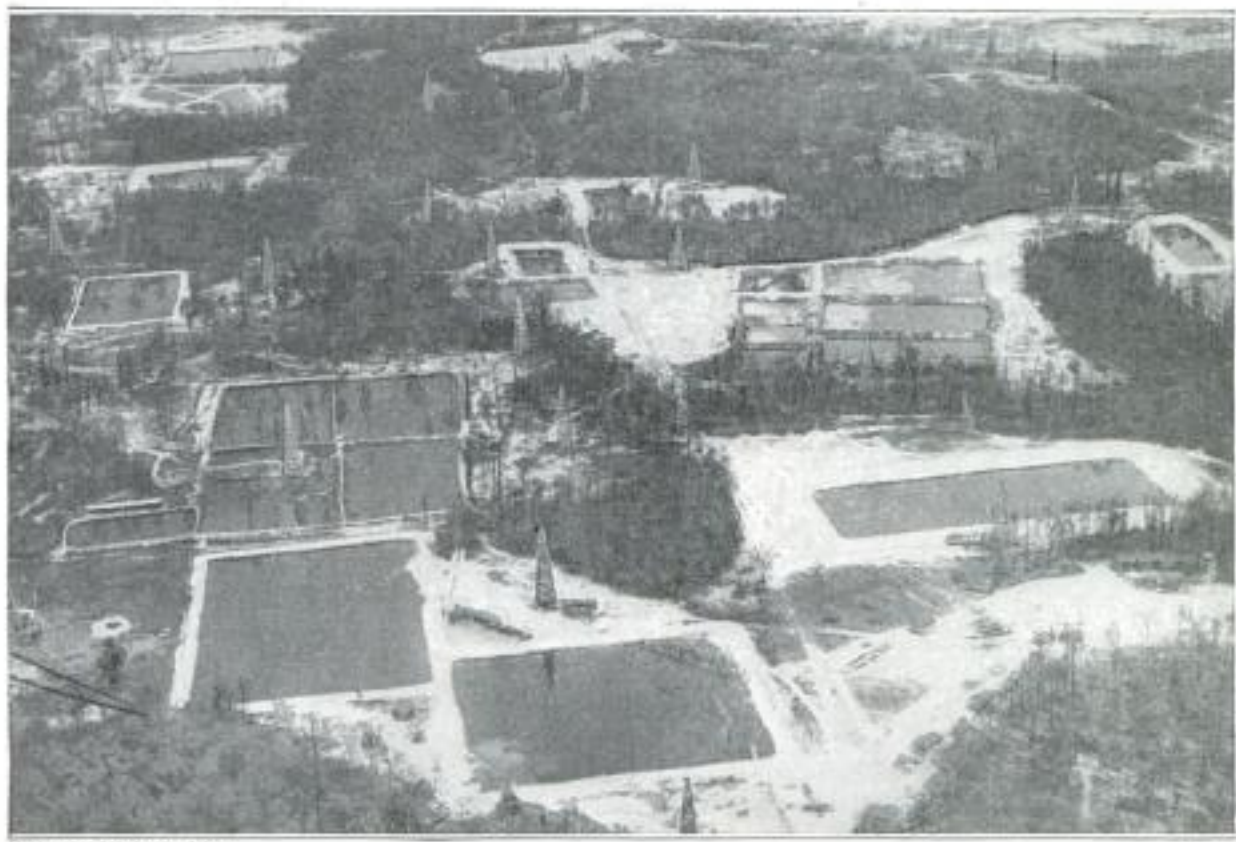
Using only a bowie knife, a deaf and dumb Blackfoot Indian has won fame by his carving of "The Grizzly in the Trap,"



Bear in a Trap Carved with Knife by Indian from Trunk of Tree

from a tree trunk. When exhibited in various parts of the country, the piece of sculpture won much praise. In making it, the Indian cut down a forest log and then whittled away until he had produced his masterpiece. The statue has obtained wide recognition for its creator.

International



COPYRIGHT, HAMILTON MAXWELL
Huge Open Tanks Holding Supply of Oil in Western Fields Where Pipe Lines and Closed Tanks are Not Built Fast Enough to Receive the Continual Flow of the Valuable Fluid

Ladel + Herbert
153 E. 42nd St
New York

Cont. George F. Paul 900
Ellsworth Bldg
Chicago

2575

CITY BURIED BY VOLCANO FOUND IN MEXICO

Near thickets of a tropical jungle in southwest Mexico, where ferocious wild beasts have their lair, engineers, looking for cement, have unearthed a prehistoric city buried centuries ago under a flow of lava from the seething caldron of Colima volcano, one of the most treacherous in America. Nooks containing strange pottery of a very old pattern were explored. Picture writing on the walls of several pyramids lost to the world for countless years, is being studied by learned men, who already believe that these discoveries indicate long ago Mexico was possessed

of a remarkable civilization. Work of great builders and skilled artisans was found in pyramids so high that their tops were not buried under a lava bed that covered everything else. They are gigantic structures, having an average thickness of 20 feet and bases that reach more than 40 feet beneath the gravel beds under the lava. Living quiet, peaceful lives, save for occasional periods when they are obliged to flee to the hills for refuge when the volcano discharges its molten streams, farmers there now are content in tilling a fertile soil.

234

CHAIR-FLOAT FOR BATHERS
MOVED BY PADDLING

Floating chairs, in which bathers may sit at ease and smoke or read newspapers while they dodge the summer heat, are



Bather Riding at Ease in Canvas Chair Hung from Life Preserver

popular at the beaches. They are made of balsa wood, which is lighter than cork, and are covered with heavy canvas. From the horseshoe-shaped float hangs a seat. The bather wades out to water above his knees, places his arms on the sides of the float, and is as comfortable as if he were in an armchair at home. Paddling with the hands moves the float in any direction desired.

CA saving of 50 per cent in fuel during the cold season, and 40 per cent in the hot season, as compared with ordinary locomotives, has been guaranteed by the makers of a turbine locomotive for the Argentine State Railways.

FOLDING LETTER IS USED
TO BRING BACK COINS

Three times the size of the ordinary postcard, a folding letter has been invented which may be mailed for a cent. One face is used for a forwarding address and three others for advertising matter. On the third fold an ordinary envelope is pasted, in which coins may be placed, safely protected by the stiff cardboard backing. This is addressed back to the original sender and may be mailed with a two-cent stamp.

SEE-YOUR-STEP UMBRELLA
HAS LIGHT IN HANDLE

No more falls or dangerous stumbles on dark, stormy nights, is the claim made for



those who will use a patented umbrella with a flashlight in the handle. Just a press of the finger and the rays of the light are thrown downward. When the umbrella is closed, it may be used as an ordinary flashlight. The handle is scarcely any larger than

that of an ordinary umbrella, and it comes in sizes that are suitable for the use of women.

See Step Umbrella Works
1828 Montrose Blvd.
Chicago

Co.'s Clear St. Taylor, Pa.
1926

Marshall Field & Co.,
Chicago

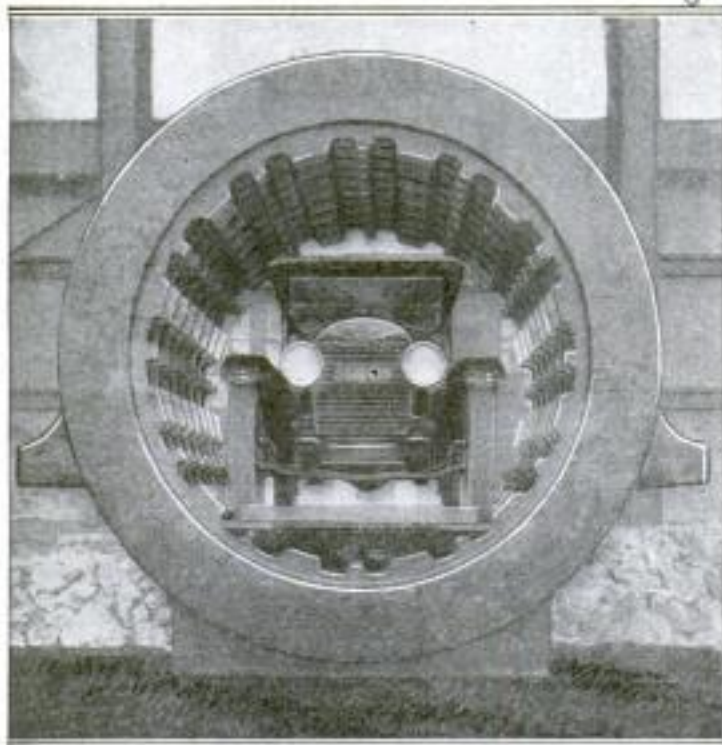


Colima Volcano in Mexico, beneath the Lava of Which Scientists have Found Towering Pyramids, Marvelous Pottery, and Traces of an Ancient Civilization Long Since Forgotten

Developed by Mr. Neuston, German
 engineer attached to Henry
 234 POPULAR MECHANICS
 Ford's personal staff

2543 **HUGE TURBINE CASTING SETS RECORD FOR SIZE**

What is declared to be one of the largest steam-turbine castings ever made has been turned out by one of the plants of a motor manufacturer. Designed by a European engineer, it is said to have a new arrangement of the blades. In the ordinary turbine, steam driving against the blades, much as water does against the paddles of a water wheel, turns the cen-



Automobile with Top Raised Easily Placed inside Outer Casting for Steam Turbine without Touching the Sides

ter shaft. How the new turbine differs from the usual practice has not been made public, but it is said it is so well balanced that a child can turn it when it is installed. The casting was made in one piece and is said to have established a new record for size. So large is the bore that an automobile may be driven through it with top up without touching the sides.

Duckways, 30 City Road

PAN FRIES WITHOUT ODOR AND SAVES GAS

2531 6 C London, Eng.

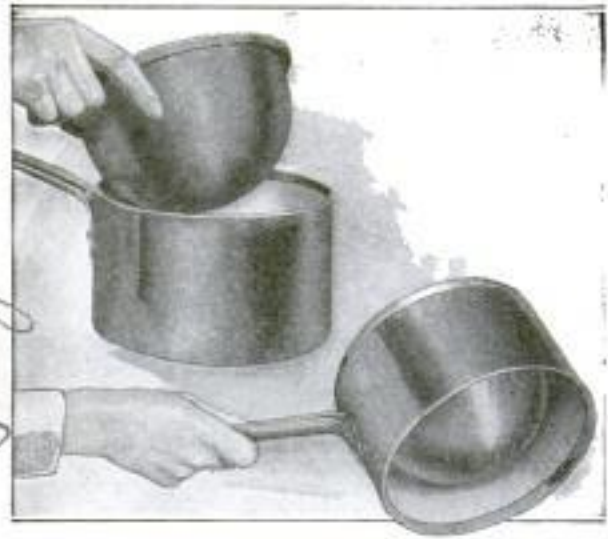
Odors of frying are not noticeable and a 25-per-cent saving in gas are two features of a new type of frying pan, made in two parts, that has been placed on the market in Europe. Because heat is trapped in asbestos-lined sides of the pan,

food as soon as it is placed in the pan, and so the cooking is odorless. Fat will continue to boil after the gas is turned off, it is said, because of the asbestos lining. It is also claimed by the inventor that several kinds of food may be fried one after the other, with no bad effect on the taste.

GOLD LURES ADVENTURERS TOWARD THE ARCTIC

2681

In a small schooner, with an auxiliary five-horsepower gas engine, two young Canadian adventurers recently left the comforts of home, passed through perilous ice fields floating down from Arctic regions, and sailed onward to newly discovered gold areas in the Far North, hoping to find fortunes under ice and frozen earth. A small boat was chosen for the trip because it is less dangerous to pilot through a sea of icebergs. Being only 35 feet long and drawing 4½ feet of water, it can keep well inshore where heavy fields of ice are not so menacing. The youths had planned to go on a steamer to the gold fields, but, because no one knew when the big boat would attempt the voyage, they cast their fortunes together and sailed away alone in their own little boat.



Odorless Frying Pan and How It is Taken Apart for Cleaning

the saving of gas is said to result. Heat of the fat in frying seals up the cells of

What a gem

Duckways
 30 City Road
 E.C.1, London, Eng.

Capt. J. V. Woodbury
 105 S. Park St
 Halifax, Nova Scotia

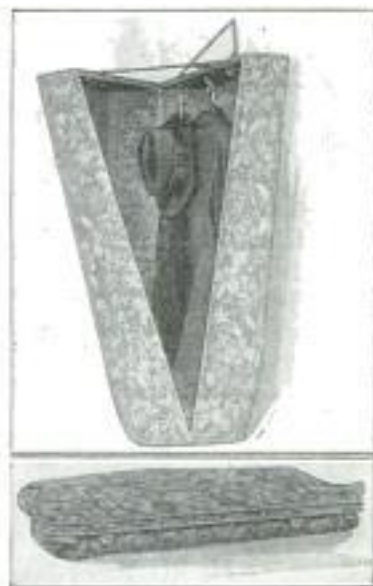
Milwaukee Motor Mfr. - H. S. Altman, 235
 Products Co. Inc. Elecho, Wis.
 POPULAR MECHANICS
 Milwaukee, Wis.
 AUTO CARRIER IS HIDDEN WHEN NOT BEING USED 2652
 MAKE CLOTHES CLOSET TO USE ON ROAD 2528

Instantly ready for service, but folded away on the running board when not in use, a rack has been devised for automobiles which does not mar the appearance of the car. Easily opened, roomy and rigid, it cannot be lost and may be used when needed the year round for sample cases, golf bags, and bundles. Slots are provided so that any luggage may be strapped to the rack, away from the body of the car. When not in service, it lies back out of sight and, being strongly built, adds to the rigidity of the running board.

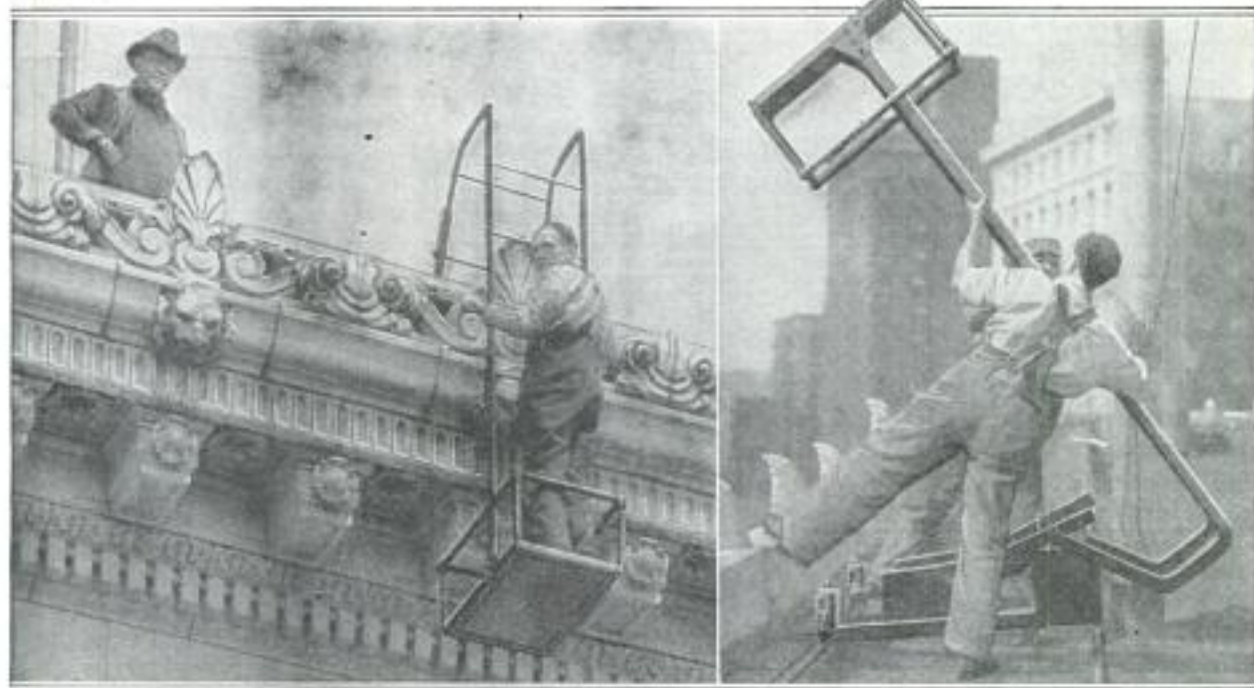
RAILWAY ON TOP OF BUILDING TO CLEAN CORNICES 2592

To aid in the work of changing cornice lights and keeping clean the terra-cotta façade of a western business block, a novel railway has been installed which reduces greatly the cost of this work and increases the efficiency of the janitors. Narrow-gauge tracks are laid along the sides of the structure. Upon these operates a three-wheel truck which has a short tower and a ladder which is suspended over the top of the building. The foot of the ladder contains a small cage in which the workman sits. A 200-pound counterweight maintains the balance of the device. By its use two men can do in two hours the same work that previously required ten.

For rooms that do not have clothes closets a novel dustproof wardrobe has been invented by a woman. It can be carried about and is large enough to hold hats, shoes, and other clothes. It can be opened and hung out of doors for an airing. The fabric body on the bottom acts as a weight. The top has metal fasteners that spread apart and fold. The covering is made to match the room where it is used. When not in use, it folds into small compass.



Encouraged by the success of an all-metal plane which carried eight passengers, German inventors are hard at work upon a huge airplane to weigh 1,000 tons. This plane will be designed to carry passengers across the Atlantic, and will have three hulls of light metal and a single wing.



Cage Run about Top of Building on Track to Enable Workmen to Clean Cornice Lights More Efficiently, and How It is Lowered into Position Wherever Desired

novelty Ornamental Iron Works
 Seattle, Wash.
 Copyrighted material

Emk. H. Page 232
 Gordon Henghe, Memphis Tenn
 Peoples

DEVIL DANCE CURES ILLS, ISLAND FOLK THINK

PLAGUE OF CATERPILLARS STOPS RAILWAY TRAINS

2663

2570

Devil dancers and witch doctors in certain south-Pacific islands are still leaders of natives in their districts, and at certain times they put on head masks of strange design to scare away evil spirits as they dance. American missionaries are helping to abolish superstitions, but in many cases they have not been able to convince the natives that the so-called devil dancer cannot really cure sickness by hopping up and down from one foot to the other. Efforts also have been made to persuade the islands' young men not to wear rings on their fingers and toes.



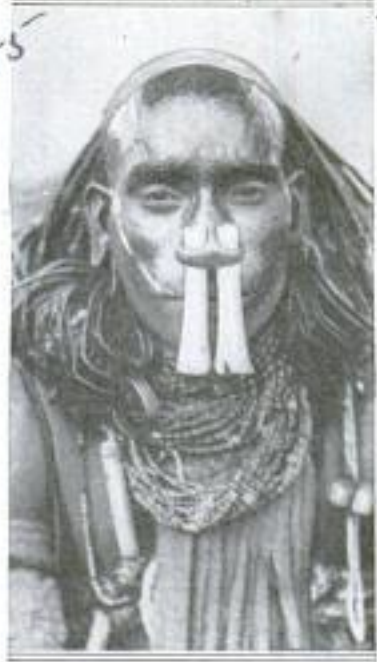
Science tried to battle against a plague of caterpillars that swept across the foothills of a western state recently, destroying crops in its wake and smearing railway tracks so thickly that traffic was halted at some points. Scientists, who organized an army of students with poison pots, electric flashlights, and chemicals, were practically helpless before this destructive army of swarming insects, and so nature helped. Flies overtook the caterpillars as they mounted the crest of the coast-range foothills and a battle followed. Hour

by hour the insect host was slain by the flies, while farmers aided by using long blowpipes to burn them. When the caterpillars crossed the plains they marched into towns, covering even sidewalks and railroad tracks an inch deep. As fast as they came, the flies laid eggs which hatched parasites that, in turn, killed off the invaders. Abandoning their man-made weapons, the scientific fighters watched nature take its course.

International Bureau of Montgomery, Ward & Co. Chicago

2655
IVORY SIGHTS ON GUNS FOR USE IN DARK

Ivory gun sights, one placed at the end of the barrel and the other in the center, are the latest improvement in the building of a shotgun. The small ivory rear sight, about midway between the end of the barrel and the hammer, and the large sight at the front, combine to correct twisting, one of the most common faults of novices in shooting. Another advantage claimed for the ivory is that the user can sight in the dark with greater accuracy. Hunters say that they are a great aid in teaching the beginner.



Strange Devil Dancers of South Sea Islands

2514
 To tell when the business man will return to his desk, a new device with the notice on a roller moved by a thumbscrew, has been patented. The user turns the dial on which is printed "Will Return," until the hour he chooses appears.

The Paul Raff Co., Inc.,
 605 Broadway, New York.

**AUTO BED TIGHT OR LOOSE
AT TURN OF HANDLE**

Easily carried in an automobile and wide enough for two persons, a bed has been built with a canvas cover which can be made as tight or loose as desired by turning a ratchet attached to the frame. Although designed for outdoors, it may be used in an emergency around the home. When folded up, it will fit on the bumper or running board of a car, and it weighs only 37 pounds.

**JAPANESE WOMAN ARTIST
PAINTS COURT LADY**

Under the title of "A Mad Court Lady of Old Japan," a painting by one of the most famous women artists of the land of the Mikado has been exhibited recently in the East. Almost life-size, the picture is worked out in all the gorgeous coloring of the Orient. Its air of mystery has proved effective in drawing the attention of the crowds, who never seem



Painting by Japanese Woman Shows "A Mad Court Lady" of the Orient

to tire of gazing on the long coal-black hair, partially closed eyes, and flowing draperies of the figure.

Under the lens of a microscope scientists now can cut a living human or other animal cell into two parts and study the divisions. Separating of these tiny units of life is made possible by an invention of a middle-western scientist. Glass needles are used in cutting the cell.

**"LITTLE PRINCESS" OF CIRCUS
IN RACE WITH GIANT**

Which is the most popular, a giant or a dwarf? That is the question in a



Circus Giant Holding Two-Foot-High Midget on Board While She Plays Piano

unique contest between a midget, only 2 feet high, and a giant, who towers 8 feet 1 inch. Both are members of a large circus, and ever since they have been together there has been a friendly struggle between them to see which attracts the larger crowds. So far, the circus goers have been evenly divided between the platform of the "little princess," who is 23 years old, and that of the giant. With the children, the giant seems to be most popular, while the older persons show more interest in the "princess."

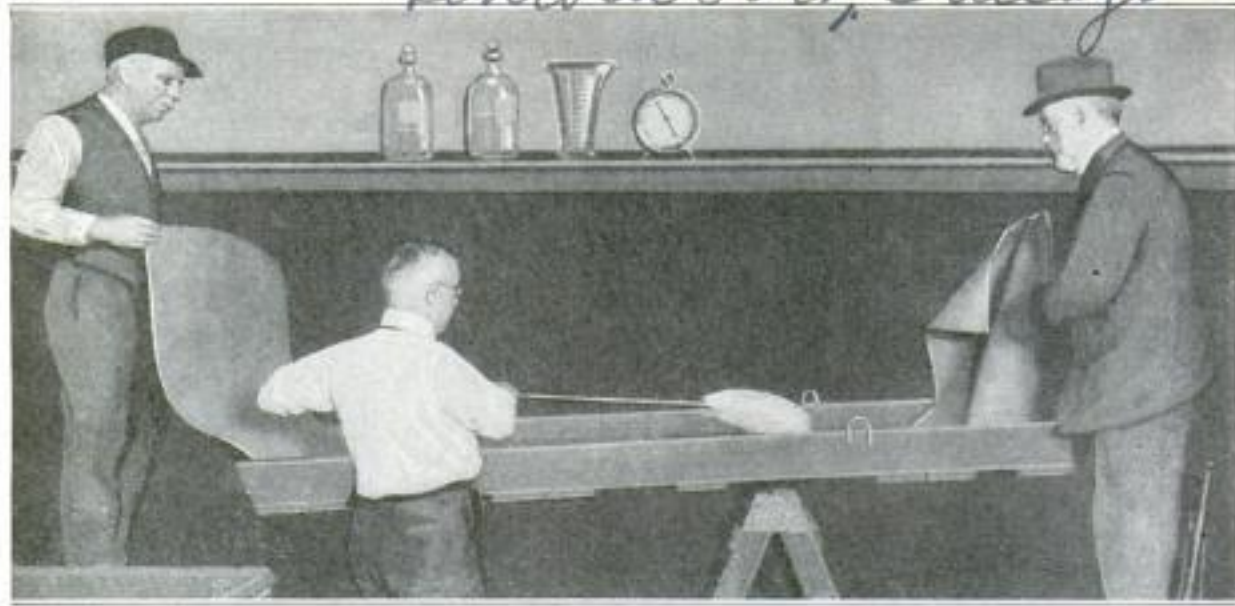
TENT PEG LIKE CORKSCREW

Shaped like a corkscrew, a tent peg has been invented which is easily put into the ground without the use of a hammer. The pointed end is pressed into the earth and the peg is turned by hand until it is in deep enough. It will stay set, even in the heaviest weather.

Montgomery Ward & Co.
Chicago

Frank M. Woodruff, Curator, Free
Natural History Museum,
POPULAR MECHANICS
Lincoln Park, Chicago

238
2604



Three Men Developing a Photograph about 30 Feet Long and 10 Feet Wide: The Sheets were Washed with a Mop in a Specially Built Tray

2604

HUGE PHOTO OF WILD LIFE NINETY-SIX FEET LONG

What is declared to be the largest photograph of the kind in the world is being completed by a middle-western museum after more than two years of work. At present the picture is 10 feet wide and 96 feet long, but when completed it will form a panorama 265 feet long. To complete the final picture, hundreds of smaller ones were taken over a stretch of territory covering 250 miles and extending through Indiana and into Illinois. For their development, the

photographs required a specially constructed tank, 7½ feet by 5 feet and more than a foot deep. This was rocked by several men, while a boy in boots spread the chemical used. When assembled, the pictures were tinted in natural colors to convey a realistic idea of the wild life of the region.

Barber shops in many cities of Europe do not use the striped pole, but instead a small brass bowl is hung over the front door. Most of the shops are for both men and women, the sections being divided by screens.



Section of Huge Panorama Photo of Wild Life Made in Two Years by Experts of a Museum: When Completed, It will Be About 300 Feet Long and will be Tinted in Natural Colors

2685 WOMEN FREED BY SCIENCE FROM HOURS OF TOIL

How much electricity has done in replacing servants and saving the amount of work once done by the housewife, is seen in some recent figures stating that in American homes there are now being used more than 20,000,000 electrical household appliances. The amount of time saved for the housewife by use of these inventions cannot be estimated, but it is asserted that the percentage of servants is now less than half what it was before electricity was harnessed for the home. Seven million electric irons are used in America. Nearly 4,000,000 vacuum cleaners do the labor of a broom and dustpan. Three million electric washers do in a few hours what, a decade ago, required an entire day's back-bending labor over a tub and washboard. One hundred thousand owners of electric dish washers keep their hands out of soapy water now, and more than four times that number do their sewing on machines run by motors. There are more than 100,000 electric ironers in use in homes.

2681 FOUR-SPRAY TAR SPREADER DOES WORK OF MANY

By the use of four sprays instead of one brush, the work of four laborers is being done with one road tar sprayer



COPYRIGHT, CLARKE & HISE Hand-Pumped Spray for Spreading Tar Does Work of Four Men and Saves Material

now used in Europe. The invention, made of gas pipe, simple to build, is pumped by hand and spreads tar evenly, sparingly, and quickly, on the same principle that a paint air brush works. The four nozzles are far enough away from the workman so that he will not have to walk through the tarred surface. Use of this sprayer also results in a saving of tar, it is claimed.

2640 FALSE ARM STEERS AUTO BY NOTCHED WHEEL

Cripples who have lost an arm can run autos by use of a special steering wheel and false arm, the invention of a former



Metal Arm That Enables Crippled Motorist to Drive Car through Traffic

soldier who has been granted a license to drive his clever device. The steering wheel is notched. A lever at the base of the artificial arm fits into the little gaps in the wheel, and thus keeps the front wheels under control. The natural arm can be used to work a signal, hand brake, or starter. A slight pressure on the stump, which fits into the upper case of the steering arm, will move the wheel. The lower part is on a hinge. This device is now being made for right and left sides. If it is attached to the right shoulder, the starter, hand brakes, and signals must be on the left side.

2588 LIGHT IN MIRROR AIDS IN SHAVING

By using a bull's-eye set in a shaving mirror hung over an electric light, an English inventor claims to have solved the problem of providing good vision without glare for shaving. The hole is normally at the bottom of the mirror. It may, however, be turned around to bring the light to the top for hair-dressing. The mirror will fit over any electric light and may be adjusted in any direction to suit the user.



Permy's Electric, Ltd 85 Newington St, London, England.

American agent. Mess. Mayer Bros + Brambley, 417 W. 23rd St. N.Y.C.

2496

HOW SCIENCE KEEPS ANIMALS HEALTHY IN ZOOS



Terrier on Running

Rides in Sidecar Board of Auto



Giant Deep-Sea Sawfish, 26 Feet Long and Weighing 3,240 Pounds, with Its Captor



Seven-Parent

Weeks-Old Hippo with Its Fond



Herd of Zebras, Known as One of the Shiest Animals of the Wilds, Snapped at a Water Hole in British East Africa: The Photograph was Taken at Long Range

Gathered together from every part of the world and kept in close confinement to which they are not accustomed, animals in the zoo present a real problem to science. Although their health is guarded closely, the temperature of their cages regulated to simulate the conditions under which they live in their native wilds, and their food carefully looked after, they often require the attention of doctors and even dentists. During the winter months, they become fat and sluggish. So, in the spring the amount of food given them is cut down until they regain their accustomed sleekness and vigor. One of the first signs of illness is the refusal to eat. This results in an immediate visit from the doctor and often the forcible use of medicine, which all animals dislike as much as most children. In many cases, fits of distemper and unusual restlessness have been traced to toothache. Sometimes the cavities are filled, but more often the tooth is extracted because of the difficulty of holding the animal quiet during a more lengthy session with the dentist. In general, all of the animals are more gentle when young. With advancing years they often become morose and sullen. Trainers seldom attempt to train a full-grown animal.

CHILDREN OF THE WILDS BROUGHT UP ON BOTTLES

Guarded as carefully as any human baby, it is often found necessary to separate little children of the wilds, who are born in captivity, from their parents. In such cases they are usually fed milk from bottles and are weighed daily to be sure the diet agrees with them. In other instances, they are turned over to a foster parent to be mothered. Deprived of their natural surroundings, they develop a real affection for their keepers, but seldom does this extend beyond their maturity, when their wild instincts become more fully developed. As babies, however, even the wildest animals are safe and often mischievous playfellows. Tiger cubs love to romp and play like kittens. Little bears, scarcely larger than rabbits, will gambol about in the sun all day long and then curl into furry balls in the corner of their cages. They usually are born during the winter months when their mother is hibernating, and at first are all paws and head. When spring comes, they are big enough to follow her about in search of nuts to satisfy their ferocious appetites. Because of their life in the open, they are said to be less troubled when young by sickness than human children, whom they resemble in many ways.



One of the Most Remarkable and Savage of African Birds, the Shoebill, in London Zoo



Three-Hundred-Year-Old Turtle being Coaxed to Pose for Its Photograph



How Tiger House Cat, Seven and One-Half Months Old, Takes Its Meals



Young Wild Rabbit, Half-Starved When Found, being Brought Up on Bottle



An African Explorer Feeding One of His Jungle Pets That Lost Its Parents

*Federal Rubber Goods Co.
Union + Perkins Sts
Akron Ohio*

POPULAR MECHANICS

242
2628

**CIGAR ENDS KILL INSECTS,
AND ASHES AID PLANTS**

When the average man has finished smoking his cigar or cigarette, he throws it away. But the saving person, who



Frugal Smoker Who Saves Ashes for Plant Fertilizer, and Butts to Kill Insects

wishes to get everything of use out of the tobacco, saves the ends and the ashes. The butts have been found to be of value in killing certain insects that harm plants, and the ashes make an excellent fertilizer, so plants will grow more healthy. Nicotine, too, is worth saving. In a city in Europe there is a man who collects ashes and nicotine which bring a very high price. Another frugal smoker even saves partly burned matches to use in starting grate fires.

**POLISH OR PAINT CARRIED
IN HANDLE OF BRUSH**

Greater economy and convenience are claimed for a brush that carries boot blacking, furniture polish, wood stain, or paint in its handle. The flow is controlled by pressure of the finger and thus is evenly and easily applied. It may be used for cleaning clothes, painting, shining shoes, furniture polishing, type cleaning, and many other purposes.



*A. S. Campbell Co.
East Boston, Mass.*

**RUBBER FOR SCRUB BOARDS
TO SAVE MUCH LABOR**

2618

On the same principle that the eraser on pencils rubs out marks on paper, a scrub board with a rubber face has been made to take out the dirt in clothes. The rubbing surface is heavy and resilient, so that it will not make the knuckles sore. It will not rust, crack, or break, and is claimed to last for a considerable time.

**COMPASS AND GRADE DIALS
MADE FOR MOTORISTS**

Following the trend of aviation, the compass has found its way to the automobile dashboard. With the vogue of touring and cross-country driving this is an added feature of great importance. Another interesting device for the motorist indicates accurately the steepness of the hill or the decline. This not only satisfies a natural curiosity but enables the driver to keep a dependable check on the performance of his engine. If a car that has been able to take a 20-per-cent grade easily suddenly shows a marked falling off in its hill-climbing ability, as attested by the indicator, remedies may be sought before the trouble leads to more serious consequences. It is also useful at night when the surrounding darkness hides the steepness of the grade from the man at the wheel.



Motor Life June, 1923

CORK WADS IN GUN SHELLS

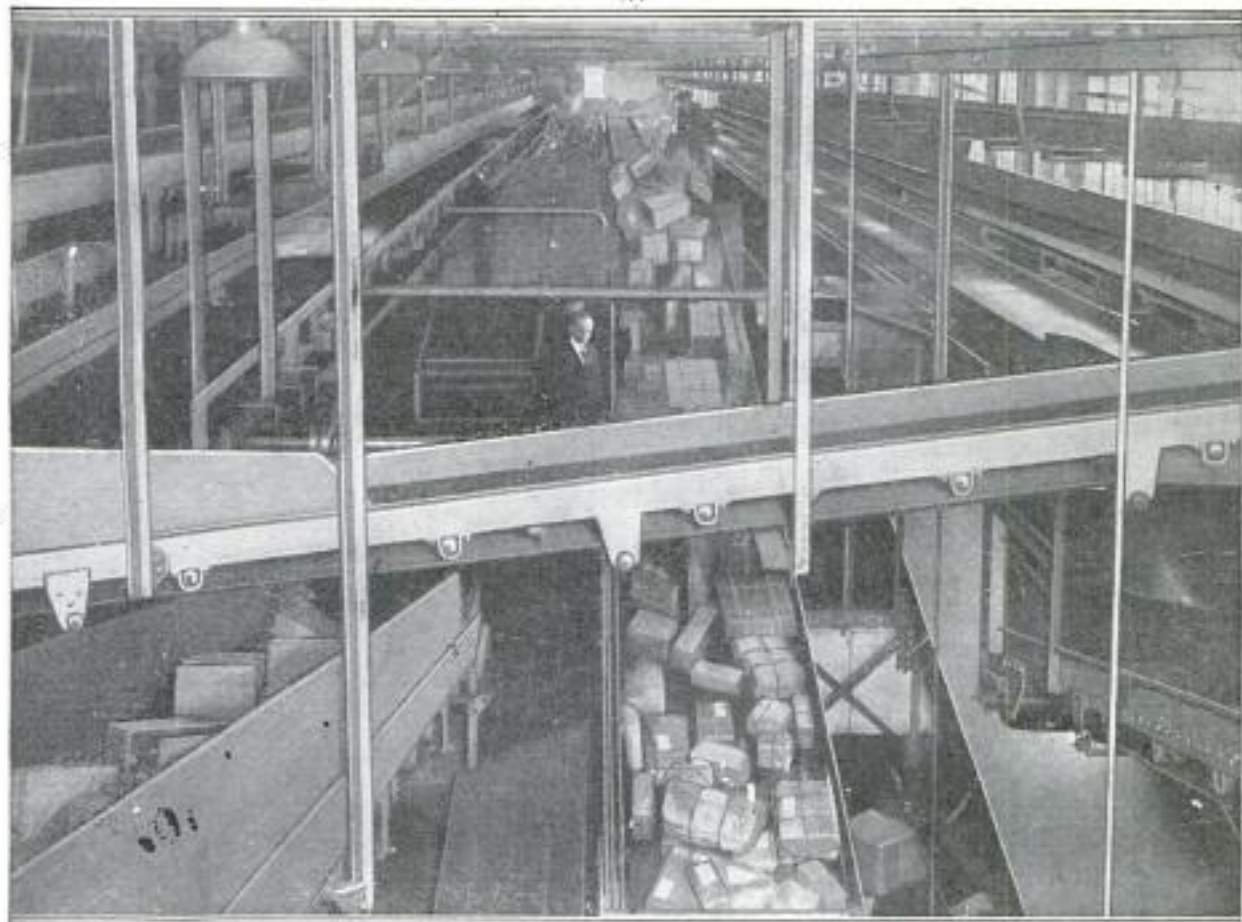
2654

Greased cork wads are being used in gun shells to give greater speed and driving power. Formerly all shells had felt wads between the powder chamber and the shot. The two advantages claimed for the greased cork are that about seven per cent greater velocity results and that the gun barrel is kept from pitting.

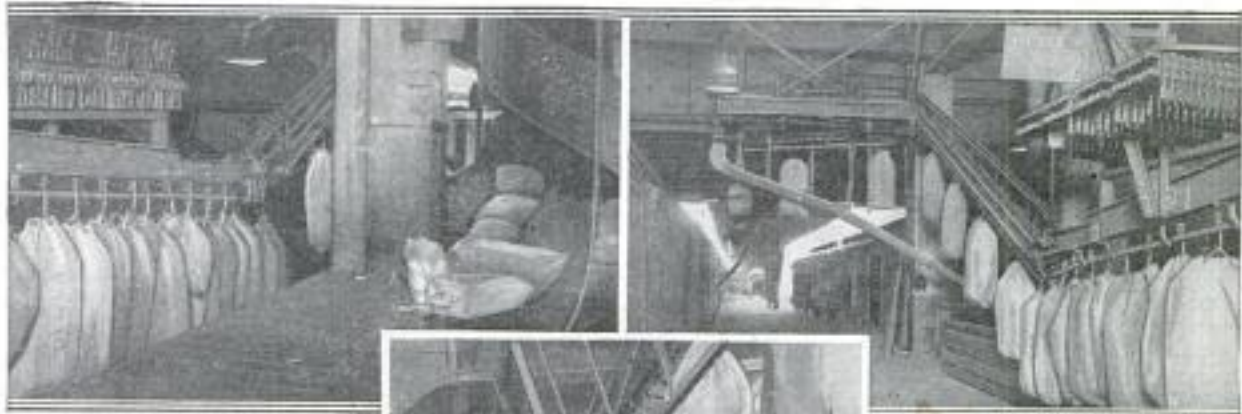
*Montgomery Ward
+ Co. Chicago*

2192

6,000,000 POUNDS OF MAIL HANDLED IN ONE DAY



Above: Mail Pouring through New Postal Station, Which is Equipped to Handle More than 6,000,000 Pounds of Incoming Matter Every Day. Below: Moving Platform, Endless Chains, and Automatic Chutes, Forming Great Interior Transportation System for Handling Letter-Filled Pouches



Every device known to science and engineering for handling mail has been used in a new postal station at Chicago. Endless belts, overhead carriers, moving platforms, and spiral chutes avoid delays and blockades. It is estimated that more than 6,000,000 pounds of mail can be received, sorted, placed in sacks,



and delivered aboard trains daily at the station. After the pouches are filled they are picked up on hooks attached to endless chains running along a loading platform. When the proper car is reached, the sack is automatically dropped. One chain, it is estimated, will handle 150,000 sacks daily.

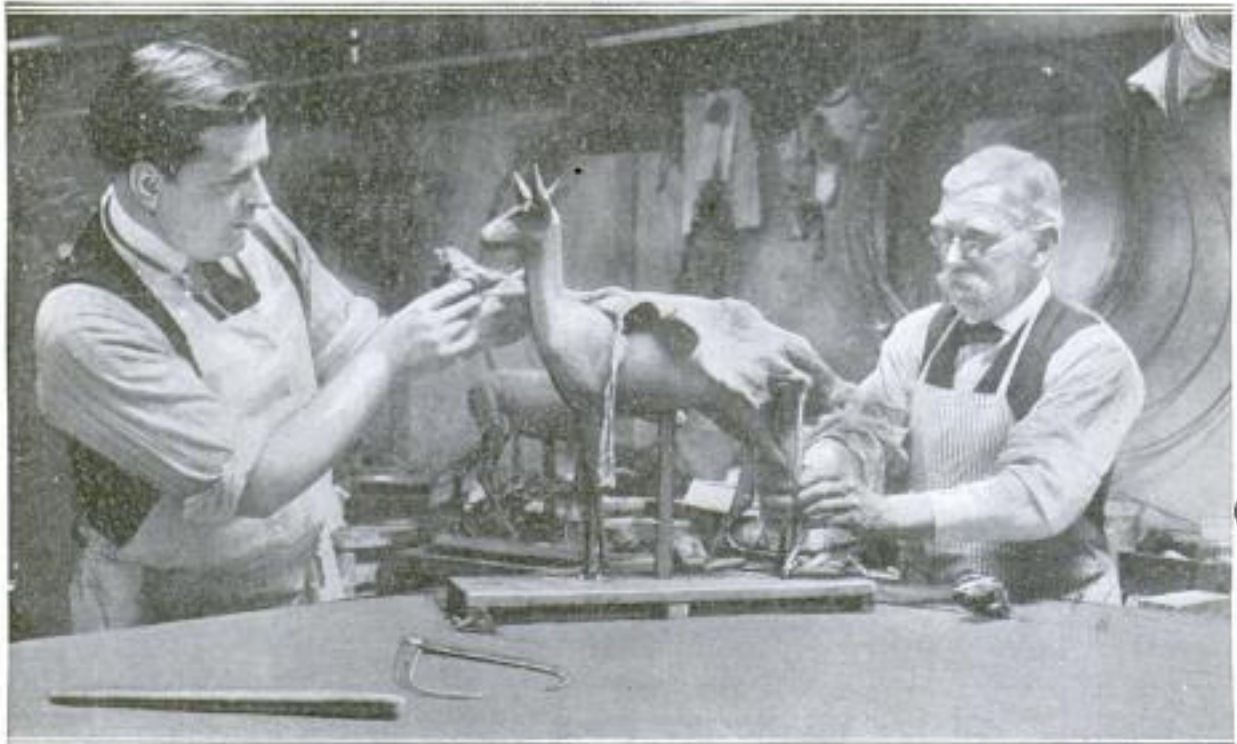
O. J. Madigan, Asst. Supt. of Mails, P. O. Chicago.

**"STUFFED" ANIMALS SO REAL
THEY SEEM TO BREATHE**

2427

"Animal architects" is the name that should be given to government taxidermists, for they build up, in lifelike

a contract but also to exploit the faster service, advertise rates, pick up shipments at points of origin, and deliver them for air transportation at main-line air ports. Regular commercial airplane carriers, under the plan, would fly day



Two Animal Sculptors at Work on a Small Model of an Antelope, Which Later will be Enlarged for Display in Some Natural-History Collection

form, the outer structure and clothe it with its own fur, or skin, so that it seems almost to breathe. Skill and patient labor work the miracle, for such it seems after the modern animal sculptor has turned a few bleached bones and limp bit of fur into an exact replica of some roving denizen of the wild. Although the art of mounting animals is almost 300 years old, it has been greatly improved by the government experts, who combine a knowledge of anatomy with that of modeling. New methods have supplanted the old process of "stuffing," and now the skins are put over hollow plaster figures. Several of the expert workers have been in the government service for more than 16 years.

and night, resulting in a great saving in time over even the fastest express trains.

**HOUR GLASS ON PHONE MARKS
TIME YOU TALK**

2479



Something new for keeping track of elapsed time at the telephone is an hour glass which is easily attached to the telephone post. When the glass is inverted, it takes five minutes for the sand to run through, so that a glance while

talking tells the speaker how much time remains for the conversation.

**AIR EXPRESS TO FLY BOTH
BY DAY AND NIGHT**

2560

To carry parcels and small packages, one of the larger express companies has announced that it is planning a regular airplane service between Chicago and New York. It was declared that this concern was not only ready to enter into

New York Times

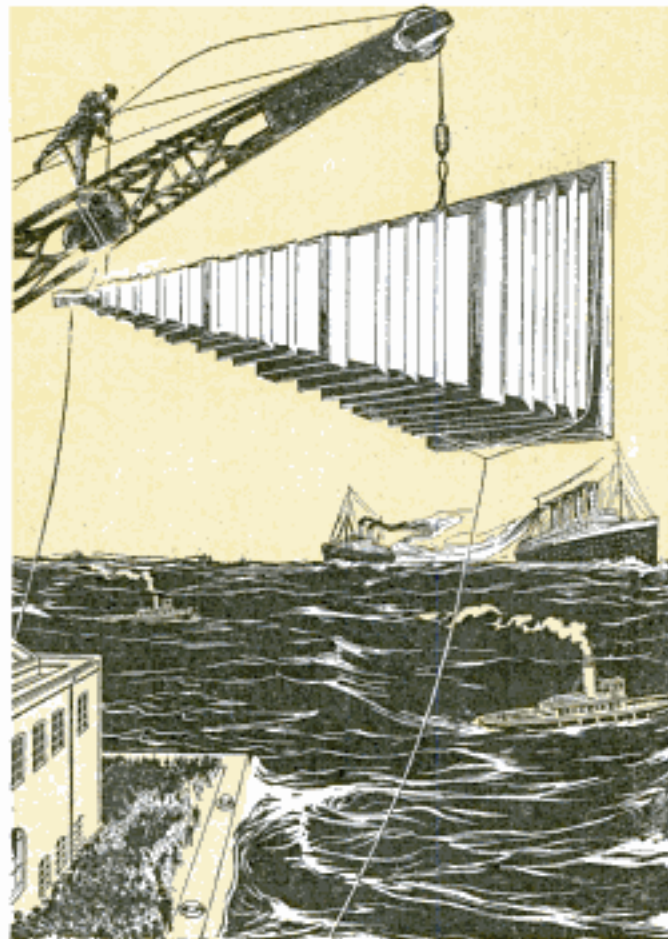
Holograms
Copyrighted material

*Advertising. C
Terre Haute, Ind.*

James Press Agency,
29. Fetter Lane.

POPULAR MECHANICS
London & C. 4, England
"LOUD SPEAKER" GUIDES
VESSELS TO PORT 2183
KITES AND RADIO AERIALS
SOURCE OF DANGER 2512

Marine engineers at an English port have devised a voice-amplifying apparatus which, it is claimed, greatly reduces the danger of accidents to large vessels approaching their docks in a busy harbor. Confusion of signals, sent out by wharf hands and tug-boat tenders, is a common cause of delay to steamers, and sometimes results in collision. With the new "loud speaker," a dock superintendent may throw his voice out over a long stretch of water to the helmsman of an incoming ship. Complete docking directions can be given in much less time than is required when whistles and bells are used. The amplifier is so large that a crane is necessary to swing it into position for use. An attendant, mounted on the hoist, points the instrument in the proper direction.



Huge "Loud Speaker" being Raised into Position by a Derrick So That Passing Vessel may be Hailed by Harbor Master

PUMP MAKES FIRE-FIGHTER
OF ANY AUTOMOBILE 2500

To help in fighting fires in small towns, a pump has been devised which may be placed on any automobile. Operated by the motor, it will throw between 200 and 250 gallons of water per minute, at 20 pounds pressure. The pump may be attached to the car in two minutes and may also be used on construction work or for irrigating. So powerful is the device that it will throw a stream 26 feet into the air.

Barton Products Co.
Jackson, Mich.

When Benjamin Franklin flew his kite he had the air all to himself. There were no electric wires to hinder him. But today the danger to boys who fly kites and build radio aerials has become so great that advertisements warning them have been printed in the East. One said that, while the youths can still have practically the entire sky to themselves for their sport, if they do not "send her up" near electric wires they will avoid three things — interruption to their kite-flying, stoppage of the telephone or light service, and the risk of grave danger from shock. Many complaints, it was said, had been received

of aerials being strung so near to power wires that a storm might cause them to come together with disastrous results. Wet kite strings, according to the experts, would carry enough current to cause a shock, and might even start serious fires by resulting in dangerous "short circuits" when wrapped about the wires.

TRAVELING SCREEN IS USED
2516 AS CLOTHES CLOSET

Made in sections so that it can be folded and carried as baggage, a screen may be used as a closet or to shut off part of a room. Brass hooks inserted around the inside are provided for hanging clothes. The panels open like doors and are fastened with a latch or hook.

Made by Mrs. Harriet Spofford
Blauvelt, Mass.

Advertisement in Baltimore Paper by the Leo & Electric Co., Baltimore, Md.

2528 DISHPAN RAISED TO AID
THE BUSY HOUSEWIFE

To do away with the bending which makes dishwashing such a disagreeable task, a clever inventor has designed



Removing Wire Screen from Bottom of Dishpan That Has Adjustable Legs

an elevating device consisting of a skeleton pan with a wire bottom. At each corner are bolts attached to legs which may be fixed at any desired height. A nut controls the height. The wire screen at the bottom of the pan is removable to aid in cleaning.

2420

2443 SWEDISH PROGRESS SHOW
AGLOW WITH LIGHTS

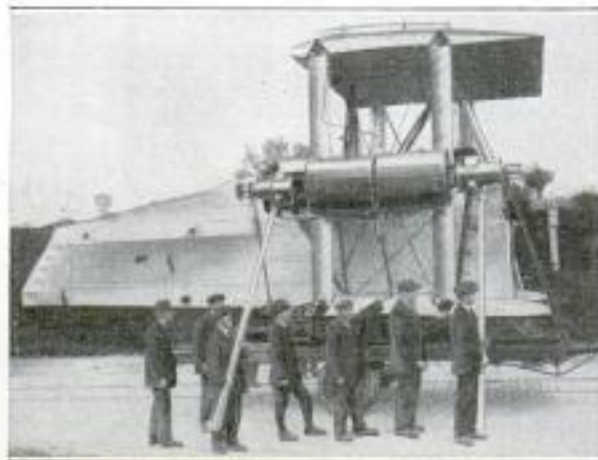
Thousands of electric lights that lend a glow to every part of the grounds have been installed in the Shrine of Sports and other buildings, as well as all of the walks and drives, at the Tercentennial, or 300-year anniversary exhibition, being held in Gothenburg, Sweden. The pleasing electrical effects bring out in sharp relief the artistic lines and architectural beauty of the structures, and it is said by those attending the exhibition that the night view is superior to that of the daytime. A small lake at the portal of the sports hall is surrounded by a light-festooned promenade. Each building is devoted to some branch of industrial, commercial, and recreational progress made by the country for more than three centuries, and many interesting memorials and trophies are on display. Practically all of the Scandinavian countries have joined with Sweden in the celebration.

Extending the application of raised characters which enable the blind to read, a French inventor has devised a thermometer for the use of the sightless. A pointer indicates the rise and fall of the mercury. The blind reader has only to feel with his fingers in order to "read" the temperature.

BRITAIN BUILDS MONSTER BOMBING AIRPLANE

Built entirely of steel, with bullet-proof engine housings and cabin, a monster bombing airplane has been completed and delivered to the British Air Ministry. The huge bomber, which was assembled in secret, is said to be the largest ever

built. It has four propellers, any two of which are capable of keeping the machine in the air if the other two are disabled. The armor plate in the plane is designed so that it will withstand machine-gun and shrapnel fire.



Left: Rear View of Great Britain's Largest Bomber, en Route to Airdrome. Above: Side View, Showing Armored Engine Housings

Napier-Boulton Prof. England
Norwich

New York City



Millions of Blazing Electric Lights Outline the Architectural Beauty of the Buildings of the Tercentennial Exposition in Sweden to Observe Three - Hundred - Year Anniversary; a Small Lake at the Entrance of One of the Halls Serves as a Mirror to Reflect Back the Lights in All the Colors of the Rainbow; in Another Structure, the Lights are Placed behind Towering Columns in Geometrical Designs So That the Building Has the Appearance of a Glowing Jewel, Guarded by Dark Pillars of Steel and Surmounted by a Crown of Fire

1st Lt. Eugene Stevens Sig. Corps

248 N. W. K., 1505 Central Ave. POPULAR MECHANICS

ARMY FINDS WAY TO KEEP ITS MESSAGES SECRET

2459

So small that it can be carried slung across a man's shoulder, a combined telephone and telegraph set has been de-



Telegraph and Telephone Set Built by Army Engineers to Send Messages without Detection

vised by U. S. Army engineers which makes it possible to send messages without fear of eavesdroppers. Known as the "buzzerphone," the instrument is so built that telephone and telegraph messages may be sent at the same time without interfering with each other. When connected to a line, it is impossible for



Batteries and Wiring Inside of the New Army "Buzzerphone" Devised to Defeat Spies

anyone to pick up the telegraphic signals by what the engineers call "inductance"—a favorite method of spies. Telephone conversations over the line, however, cannot be so safeguarded.

RACING AUTO TAKES GAS AND OIL "ON THE GO"

2358

While racing along at a speed of nearly 50 miles an hour to break a record, an automobile recently was supplied with gas, oil, water, and relief drivers without stopping the car during a 3,155-mile run made in 50 hours 21 minutes. Although three stops were made for tires during this time, the engine was kept going without pause. All the other supplies were taken aboard, without stopping the machine, from another car which ran alongside during the period of delivery.

COFFEE MEASURED BY SLIDE IN BOTTOM OF CUP

2519 Mr. C. E. Erickson

To use the right amount of coffee for one, two, three, or four cups, a tin cup with sliding bottom has been invented. When filled level with the top, there is enough coffee for four cups. A sliding base, moved from the handle, is pushed into the space marked for the other amounts. As this cup is marked from the bottom up, the user does not pour back and forth from the measure to the coffee can.



Mr. C. E. Erickson

Schuster + Sons, Col.

AIR SURVEY OF ALL ALASKA TO BE MADE BY NAVY

2550

Aerial maps of Alaskan territory will be made this summer by two naval planes carrying a full equipment of photographic material, mapping cameras, and special high-powered lenses for distance work. During the operation the planes will make their home on a warship anchored off the coast. It is expected that information of value to conservation and development projects will be obtained in this manner from the air in territory that is otherwise almost inaccessible. Aerial maps will be made by the planes, which will furnish information that would otherwise take months to obtain. It is also planned to make a survey of the Alaskan oil fields and of the seal herds in the near-by waters, and information of value to aviators will be sought.

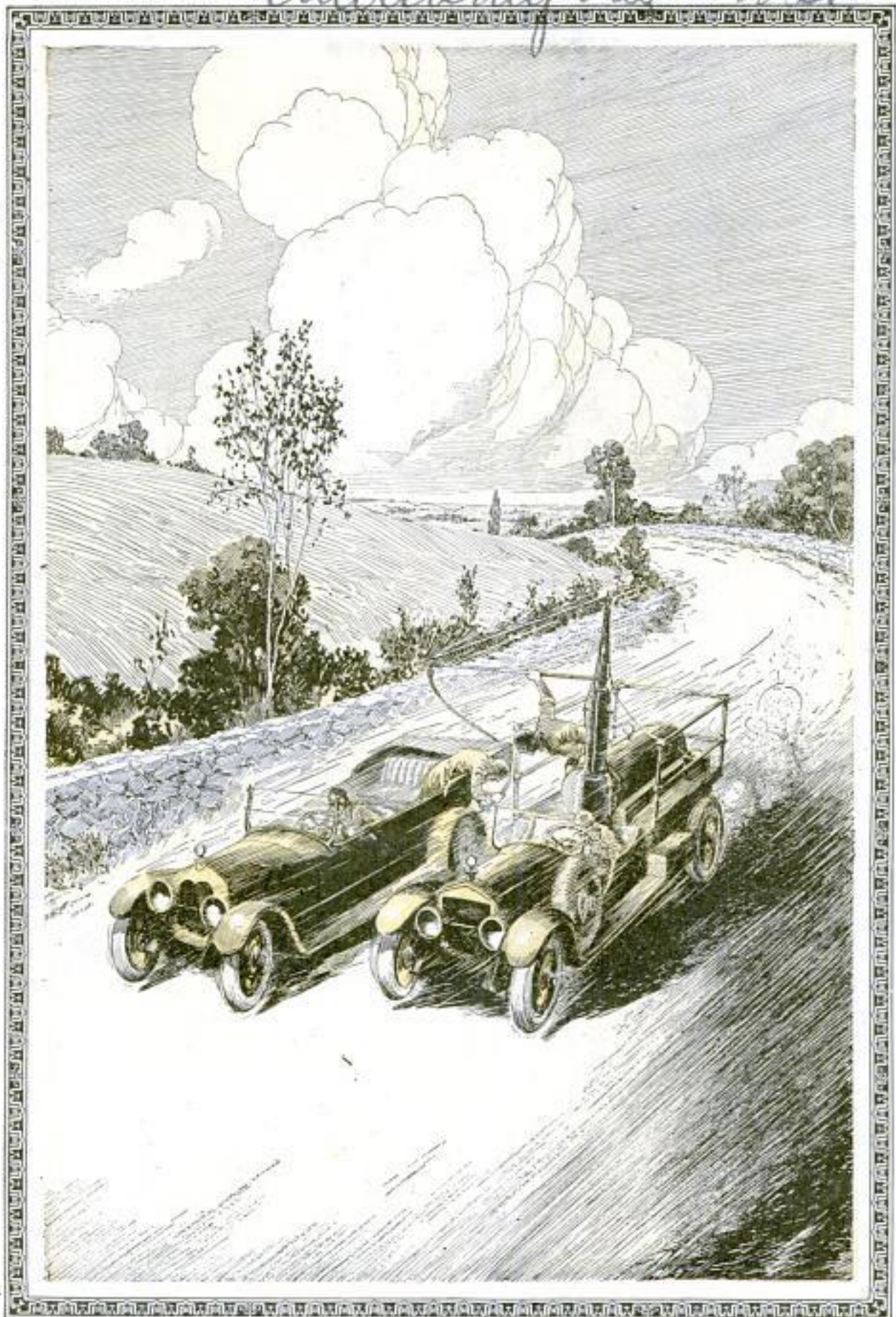
Army + Navy Journal. 6/2/23

Chicago
Philadelphia
London

2358 Innesberg Auto & Motors
Chicago
Indianapolis Ind

POPULAR MECHANICS

249



Record-Breaking Automobile being Given Gas, Oil, Water, and Relief Drivers, without Stopping the Machine, from a Supply Car Racing beside It during a 3,155-Mile Run

2441

(Mr. Litcher
% Auditorium Hotel
CHICAGO

TRUSTY PLOW SOON MAY BE ONLY A RELIC

BY FRANK RIDGWAY

Mr. Fletcher S. Hamshorn
705 Lowman Bldg, Seattle, Wash.



Rough Soil at Bottom of Picture Shows Condition of Ground after It had been Turned Over with an Ordinary Plow; That in the Distance Shows Effect of the Use of the Rotary

BY the side of the old spinning wheel and loom may soon be placed a duplicate of the modern moldboard plow.



Seed Bed after the Rotary Plow had Gone over the Stubble, Showing Absence of the Open Furrow

Rusty heaps of disks, harrows, rollers, and drags will be left in fence corners, for a new soil-milling machine has been invented by a Pacific-coast engineer to take the place of agriculture's symbol, the plow, and the long string of implements that follow it in making the seed bed.

Lacking a better term, the inventor calls his device a rotary plow, but it is more than that. In his imagination he

has put plows, harrows, disks, rollers, etc., into the melting pot, and, in reality, molded a single machine that does the work of all.

While the ordinary plow turns up or inverts the soil, this machine strikes downward with a series of obliquely set blades or shears. These saw their way through the soil with 24 shears striking the ground at the rate of 53 every second, pulverizing the dirt so finely that the clods can all be passed through a 1/4-inch mesh sieve.

No combination of implements in existence today, even with an endless chain of operations, could be put in a field and leave the ground in so good a condition



Rotary Plow Going over Field Covered with Sunflower Stalks 10 Feet Long

as does this machine, it is claimed. One trip thoroughly pulverizes the soil, makes it loose, aerated, and level, ready for the planter or drill. Furrows are done away with, the soil is powdered and piled up immediately back of the rotary drum, and then leveled by a trailing drag attached behind.

Vegetable matter, cornstalks, small-grain stubble, weeds, sunflower stalks, long tough stems of grass, cane stalks, and straw left on the surface of the ground from the previous crop, is chopped up into short pieces and uniformly mixed with the fine soil from the top to the bottom of the seed bed. In an oat-stubble field where the ground was covered with a 12-inch layer of fresh manure mixed with tough straw, the new plow chopped up the material into fine pieces and distributed it evenly throughout the seed bed, where it will ferment,



Drum Studded with Shears Which Make It Possible to Plow within Five Feet of the Corner Posts

unlocking the plant food that will soon become available for the next crop.

SLEEPING COACH FOR AIR OR RAILWAY SERVICE

Plans for an aerial Pullman which will run on ordinary railway tracks or may be attached to an airplane, are being examined by the British air-craft authorities. A great, slim, metal saloon, like a long, tapering Pullman car, is the basis of the idea. This coach would be covered with gleaming sheaths of light metal and would rest on a long framework with wheels to run along railway tracks. Having both day and night accommodations, it would be backed into a depot to receive its passengers. When they are aboard, an engine would take it to an airdrome outside a city, where it would shed its wheels and be attached to an airplane body. Landed at its destination, the flying car would go through another quick change and then be taken to a city terminus on railway tracks.

New York Times
5/15/23

WEATHER DIAL ON TOWER INSTEAD OF CLOCK

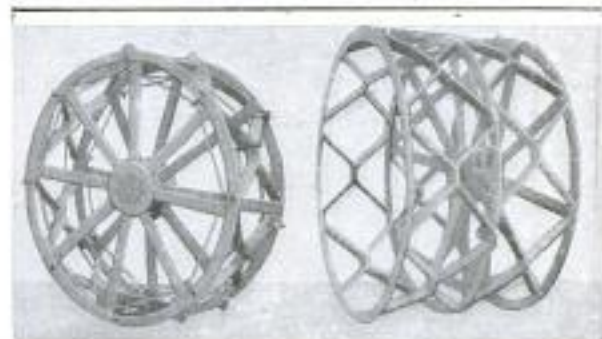
On the tower of a museum in a European city is a huge barometer, dial—18 feet across and with a gilded hand weighing 100 pounds. If the hand moves to the right, people know that good weather is coming, but, if it sways to the left, bad weather is on the way. Down on the main floor of the building are the parts of the actual barometer, from which the weather indications are transmitted by electricity to the dial.



*Emmet Peterffy, New York.
276 Fifth Ave.*

"SQUIRREL-CAGE" WHEELS USED FOR TRACTORS

Queer-shaped wheels have been devised for use on a tractor, which give it a better grip in soft ground or on steep grades. They look much like huge squirrel cages, and cannot fill up, as sand or mud will drop through them. A test was made, first with ordinary tractor



Skeleton-Tread Tractor Wheels Designed to Give Better Grip When Moving over Soft Ground

wheels, and then with the "squirrel cages," to find out which slipped the more in heavy travel. It was found that the ordinary wheels slipped more. The cage wheels also made better speed, both on level ground and on the slopes.

*Traction Wheel Corp.
82 Wall St. New York.*



Natives of Indo-China Raising Water to Their Fields with Buckets: Modern Irrigation Methods have been Unable to Overcome the Traditions and Displace the Crude Systems Used for Ages

International

Copyrighted material

2476

POPULAR MECHANICS

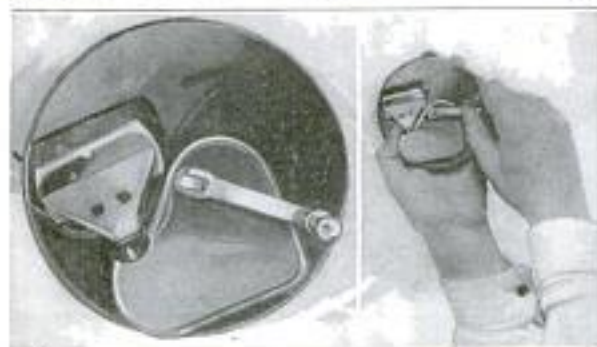
ANCIENT FARMING METHODS
USED IN INDO-CHINA

In a day and age when engineers of the western world are announcing plans for reclaiming millions of acres of arid lands through irrigation projects involving huge dams and the latest machinery, it seems almost incredible that in the remote sections of Asia human ingenuity has not progressed a single step from the crude methods used by the early Egyptians in raising water to flood their fields. Yet, in Indo-China, the most primitive of all ground-watering devices—buckets, suspended on strings between laborers—are being employed, much in the same manner as by the first tillers of the soil.

By means of this simple system, the natives are able to irrigate only a few acres of land each year, and this generally is devoted to the rice crop. Though there is a great waste of labor, these humble farmers are content to do as their forefathers have done for generations before them. While two men may operate a single-bucket device, in raising water from a river, the custom is to attach two buckets together and use four laborers, two on each side.

2491
RAZOR SHARPENER IMITATES
BARBER'S MOTION

Something new for those who use a safety razor is a sharpener which strops the blade with a motion similar to that used by a barber. After the blade is inserted, a crank is turned, causing the edge to come in contact with a revolving strop. At every second turn the blade is raised, and reversed before coming down to meet the strop again. A small lever clamps the blades firmly in the holder. Either single or double-edge



Turn of Handle Strops Razor Blades with Motion Similar to That Used by Barber

blades may be honed. When not in use the crank folds flat, giving the device a compact appearance.

Rhodes Mfg. Co.

1418

Pendleton Ave.

St. Louis Mo.

Cmt. A. Franklin
Mundorf, 1108

253

2489
Asheville, Kansas
LIFE-SIZE TOY ANIMALS
MOVE BY ELECTRICITY
City, Mo.

Life-size elephants, tigers, camels, clowns, and animals that move about almost as if they were living, are being



Making Life-Size Papier-Mâché Animals That Move in an Eastern Toy Shop

made out of papier-mâché in an eastern toy shop. Making these animated animal toys is a new business in which sci-



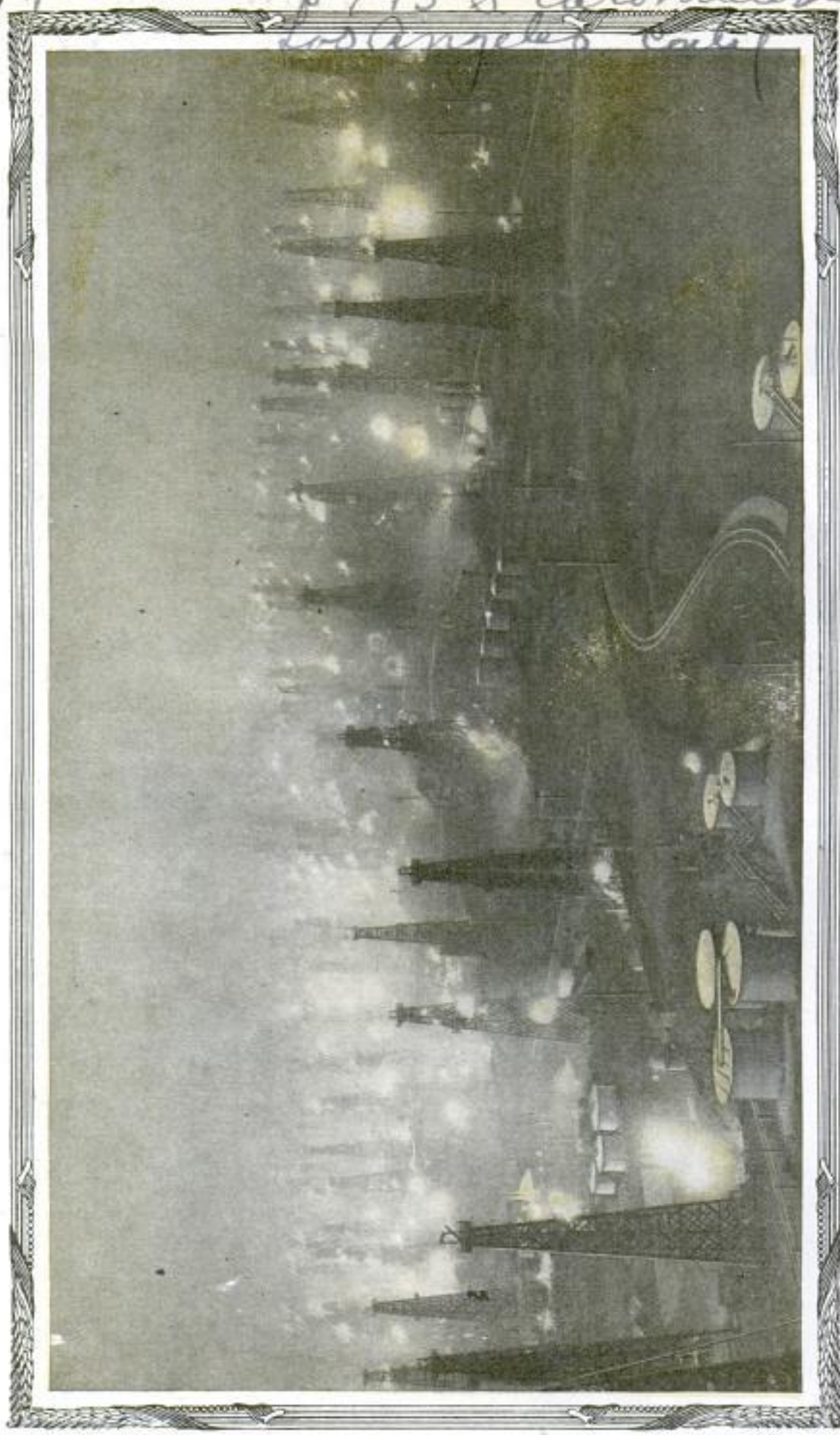
Putting Final Touches to Human Figures First Designed by Artist on Canvas

ence, art, and imagination are combined. The animals and clowns are first designed by an artist who paints figures on canvas. Paintings are copied by a sculptor who models in clay; casts follow. Molds are filled with absorbent paper and paste, and are baked 12 hours at a temperature of 200 degrees. The figures are then painted several times, equipped with electric motors, wires, and pulleys, and are then ready to perform.

☛ In the early '30s there were steam automobile busses in regular use in England. One was called the "Autopsy," an example of the grim humor of the time. This would indicate that the motor car is more than 90 years old.

2477

Photo by Aleyon Robinson
743 S Carondelet St
Los Angeles Calif



Flaming Forest of Derricks Turns Night into Day in Recently Opened Western Oil Fields Where Pumps are Now Drawing 10,000,000 Barrels of Liquid Wealth a Month from the Earth to Keep America Running on Wheels. After Darkness, the Glare of the Electric Illumination is Visible for Many Miles

2477

CITY OF FLAMING LIGHTS
BEACON OF WEALTH

Out in the Far West today oil lures thousands as a quick route to wealth, just as gold raised hopes of easy money in the hearts of those pioneers who, back in '49, made the great trek across unexplored country. Spots that three, five, or ten years ago were barren and deserted, places that were scorned as "No Man's Land," now are the Mecca of men who see possibilities of a "strike." Oil regions are humming with activity day and night. When darkness falls, a city of flaming lights appears, illuminating the sky for many miles around, firing the imagination and the enthusiasm of all who see it.

BINS UNDER TABLE TOP
SAVE BENDING

2520

Space for sugar, a flour bin large enough for a small sack, and a drawer



Sliding Porcelain Table Top Gives Easy Access to Many Bins Hidden below It

for knives, forks, and spoons, are covered by a sliding porcelain table top in a new labor saver for the kitchen. The table is the average height, 33 inches; the top slides back and forth, thus enabling the housewife to dispense with the bins usually placed below.

HEARING THROUGH A CANE
TO AID THE DEAF

2601

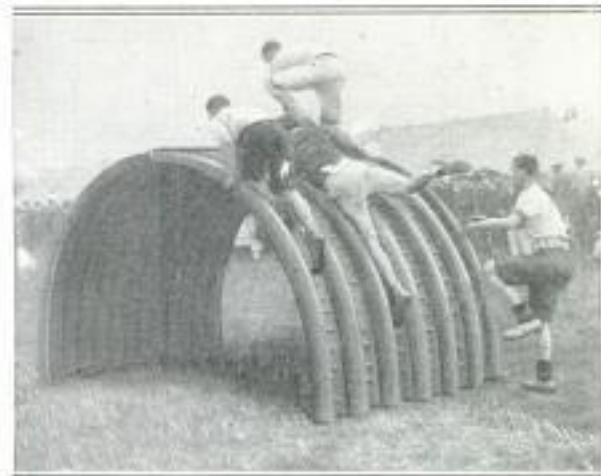
To aid the deaf, a cane with a fully equipped telephone system has been devised. In appearance, it is exactly similar to an ordinary walking stick, all of the instruments being concealed inside of it. In the knob, however, is a highly sensitive telephone receiver. One side of the knob is flat and perforated. This is placed against the ear when sitting at a concert or talking with a friend in the street. By turning a small silver screw, the instrument may be adjusted to the hearing capacity of the person using it. Electricity is supplied by three flashlight batteries in the neck of the cane.

Unable to locate maker or inventor

OBSTACLE RACE TO TEST
SOLDIERS' ENDURANCE

2483

Races form an important part of the training of soldier cadets in England. Difficult barriers are erected in the path



Huge Iron Half-Cylinder is Used as Obstacle in Race to Train British Soldiers

of the runners, who must display speed, strength, and climbing ability to get over them. One obstacle, used by the Royal Military Academy in a recent meet, was shaped like a half-circle, and was 10 feet high. Another, and even harder one to get over, was a series of two wooden



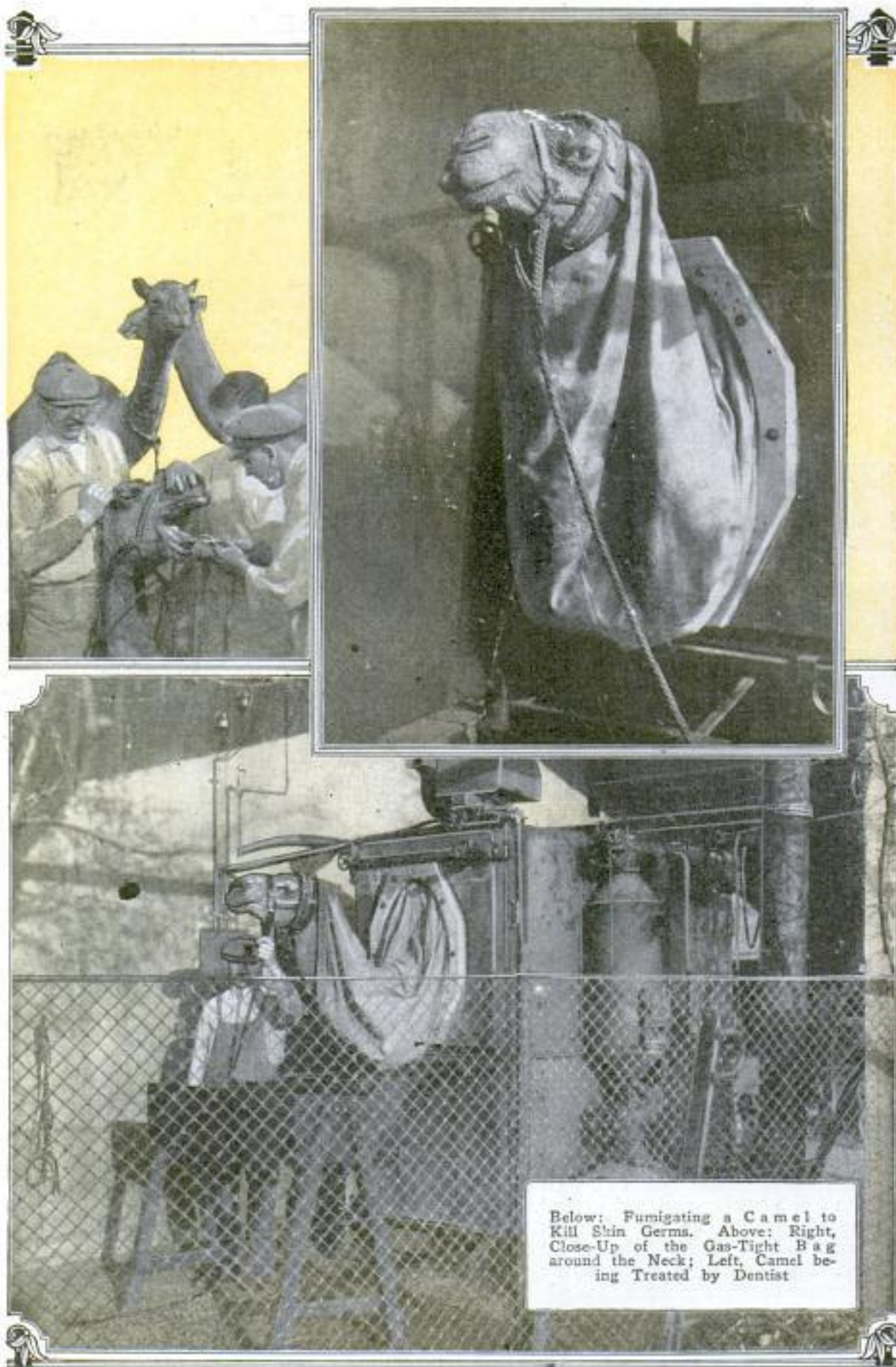
Long Boards in Form of Tent Top Fail to Prove Real Hindrance to Racers in England

gables, having smooth sides and steep angles, joined like the teeth of a saw.

To save time, a European inventor has devised a way of tempering saw teeth with electricity. It is said a skilled workman can temper 400 teeth an hour by this method. An increase of 20 per cent in output was noted in one sawmill where it was used.

L. W. J. Iserelops, Slutch Engineer, no other information

Bill
North Vernon
L. S. Coleman
Massachusetts



Below: Fumigating a Camel to Kill Skin Germs. Above: Right, Close-Up of the Gas-Tight Bag around the Neck; Left, Camel being Treated by Dentist

MEDICAL TREATMENT ENABLES CAMELS TO ENTER U. S.

American customs officials are vigilant in every corner of the globe to insure that no disease carriers, human or otherwise, are permitted to embark for the United States. A striking example of this alertness was afforded recently when a number of camels arrived at Hanover, Germany, from India. These animals were consigned to an American film company, for use in an Oriental scene. Upon examination, the American customs authorities refused to issue health releases for the animals, claiming that they were diseased. Dismayed at this turn of events, representatives of the shippers decided to consult a noted authority on animal diseases. After a thorough in-

spection, he undertook to put the camels through a rigorous course of health treatment. Each was placed in a specially constructed fumigating apparatus, resembling a furnace, in order to kill any skin parasites present. The long neck of the camel protruded through an opening in the chamber, and was enveloped in a gas-tight canvas sack, to which the fumigating gas also had access. Some of the camels required dental treatment, and were trussed up to permit a dentist to work on their teeth. An entire week was consumed in treating all the animals. At the end of this time they were pronounced to be in perfect shape, and a health certificate was issued.

LENS LOOKS INTO HEART WHILE IT IS BEATING

Looking inside the human heart without halting its beating, has been made possible with a surgical instrument known as the cardiscope. It is a metal tube, about the size of a pocket flashlight, one end of which carries a lens. A small electric-light bulb, fitted on a carrier, is placed against the surface of the lens. This illuminates the inner lining of the heart during an operation after a small opening has been made by the surgeon. By its use it is hoped to be able to cure common heart diseases.

ELECTRIC LIGHTS ON MAP MARK CITY'S GROWTH

Studded with small electric lights, a map, used during a recent exhibit in miniature of many of New York's attractive sights, showed the progress of the



Workmen Putting Finishing Touches on Illuminated Map Designed to Show Growth of City

city's growth. Mechanics spent many weeks on the wiring and placing of bulbs in order to make every detail of the work



Model of Great Bridge, Complete in Every Detail, Built for City's Jubilee Exposition

accurate, and were rewarded by having one of the most popular displays at the exhibit. A model of the Williamsburg Bridge, complete in all its parts, also was built for the show.

SCIENCE IN TRAFFIC RULES EXPLAINS RIGHT TURN

Why the order in traffic is to keep to the right has been explained by scientists as due to the fact that most people are right-handed and thus, because the right half of the body is kept a little forward in walking, it is natural to swing in that direction. So, turning to the left, as is the rule in many cities of Europe, is not the best way, it is reasoned. In fog, it has been found, a man is likely to walk to the right.

2829

MECHANICAL-DOLL SHOWS REVIVED IN EUROPE



COPYRIGHT, THE LONDON TIMES
 Operators, Concealed above the Stage, Controlling Wires That Cause Dolls to "Act" in Marionette Show

Mechanical-doll shows, similar to the "Punch and Judy" exhibitions of a generation ago, have been revived in Europe and are attracting a good following among the theatergoers of England and Italy. Known as "marionettes," these dolls are constructed in life-size and clothed to suit the production in which they are used. Wires, attached to the various joints of each doll, are controlled by operators, who are concealed above the stage. During the Middle Ages doll shows were staged by magicians, but their popularity gradually waned until in late years they were practically unknown. Whether the exhibitions will reach this country depends upon the reception they get in Europe.

9526
**HOLDER FOR HOT PANS
 PREVENTS BURNING**

Cooks who fear their hands will be burned in lifting hot pots and pans now are offered a safety device for handling dishes. Into narrow strips on both sides and near the top of a pan are placed holders with wooden grips. These serve as handles.

2418
**TWO-STORY HOUSE IS MOVED
 ACROSS 20-FOOT CAÑON**

How to get a large two-story house across a cañonlike street, 20 feet deep,



much-traveled boulevard and the moving operations had to be carried out with extreme caution. It required two days, the pulling being done by two mules with wire cables. A single false move would



Left: View of Two-Story House being Moved across 20-Foot Cañonlike Street, Showing Arrangement of Cribs. Right: Safely Across; Movers Bridged the Gap in Two Days without Hindering Traffic

was the problem of house movers in San Pedro, Calif., recently. The street is a

have toppled the house into the street, endangering the lives of passersby.

Cont. Maria O'Phillips St. San Pedro Calif.
 468. 20th St.

d w. Sydney R. Burnett,
c/o Robert Leeser
POPULAR MECHANICS
Altavista, Va.

**BABY CARRIAGE IS TURNED
 INTO ROCKER OR CRIB**

2515

Turning a baby carriage into a crib or a rocker by a flip of the handle is the feat accomplished by a Virginia inventor. With a frame in the form of a rocker, with wheels which may be raised or lowered, it can be used to rock a baby to sleep, or as a carriage, by the movement of a single lever.

2565

**NAVAL RADIO IS CONTROLLED
 BY PHONE SWITCHBOARD**

Using a switchboard much like that of a telephone operator's, through which different operators may be connected with any one of the several aerials, has aided the naval radio station at Washington to keep in touch with all parts of the world. For instance, an operator using a high aerial in sending to some distant point, may be switched to one with a smaller range when talking to a near-by station. This wireless station sends and receives messages to and from many European



Switchboard Used by Naval Radio Operators to "Plug In" on Different Aerials

countries, and handles government messages as well to United States warships, in whatever waters they may be.

2660

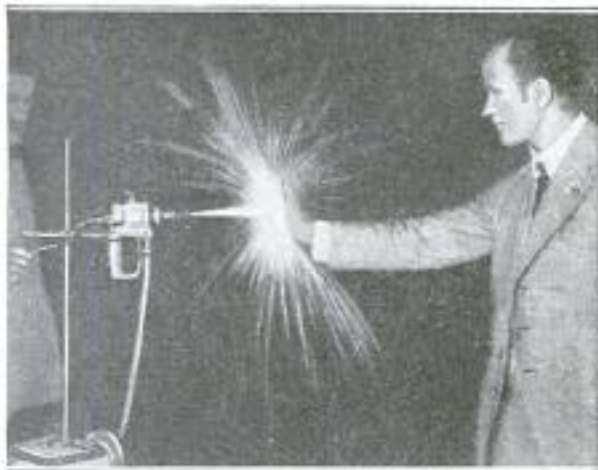
LEAKPROOF FLOWER BASKET

Moss-covered hanging baskets for plants or flowers are watered at the bottom through a small spout on the side, thus preventing leaking. The water fills a small pan at the base of the flowerpot. This is absorbed by the flowers. A large-mesh wire screening outside the basket holds the moss in place.

*Montgomery Ward
 & Co., Chicago*

**SPRAY OF MOLTEN IRON
 WON'T BURN HAND**

Not so many generations ago suspected criminals were forced to walk across a bed of hot coals in what was known as



Spray of Molten Iron So Fine It will Not Burn When Turned against Hand

a "trial by ordeal." It was contended that if Providence prevented their being burned, they must be innocent. To walk across blazing coals seems impossible, and yet recently a European inventor plunged his hand in a stream of molten iron without even being burned. Forced from a nozzle by air pressure, the white-hot metal was broken up into such small particles that it struck the flesh, cooled and fell away like dust, so rapidly that no injury resulted. When spraying from the nozzle, however, it looked like a small piece of fireworks.

2643

**SHOOTS HOLES IN STACK
 TO KEEP CITY LIGHTED**

When a storm bent a smokestack in a middle-western city recently, it became necessary at once to find some outlet for the smoke until the hanging part of the stack could be removed. To maintain the city lighting plant, use of this lone chimney for three boilers was imperative, so the top was riddled with holes with a shotgun. Smoke passed through these; a draft was created; the boilers continued to work, and the problem of keeping up electric current was solved. The man who used the gun got the idea from a custom of sending cannon balls through tanks of burning oil. His quick adaptation of this idea to the emergency he faced undoubtedly prevented the shutting down of many of the city's industries for several days.

Underwood & Underwood
Richmond, Ky.
Archives
Utilities Co.,
Richmond,
manager, George
c/o Kentucky

MACHINE-MADE HORSESHOES IN OLD SMITHY

Horseshoes are now made in a gas-heated apparatus that produces 60 per hour. The old hand rate was about nine



Machine That Turns Out as Many Horseshoes in an Hour as 12 Men

per hour for two men. The romantic clang of the smithy's hammer will soon be heard no more. The blacksmith of the future will not have the same need for large and sinewy hands. Science is replacing muscle with this invention of a European blacksmith that does many times the work of a smith and his assistant. One of the few uses for the muscular arm now is in swinging a mallet to punch holes in the shoes. The device is being improved rapidly, and soon there may be no more sparks from the familiar old anvil.

HOLLOW HAMMER HANDLE HOLDS SCREWDRIVERS

Three tools are placed within the handle of a steel hammer made by a middle-western manufacturer. A large screwdriver reaches from the head of the hammer to the end of the handle. Inside this screwdriver is another, and inside the hollow handle of that is a third. The hammer has both a flat and a rounded head.

Edelmann + Co, 461 E. Ohio, Chicago

LINCOLN AND GRANT BUSTS PUT IN HALL OF FAME

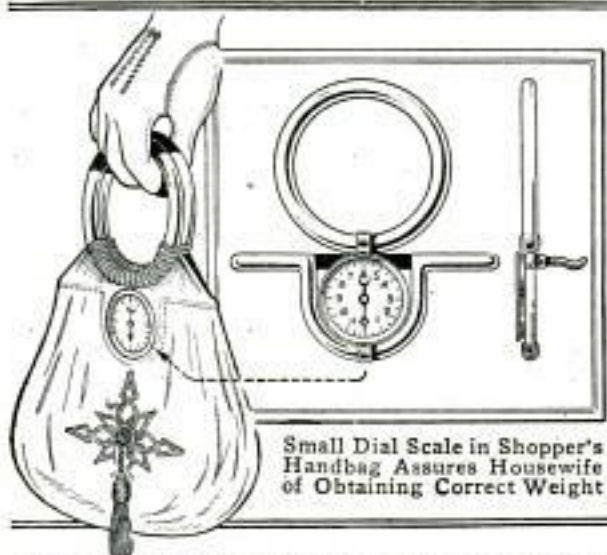
As they worked during their lives, so the busts of Abraham Lincoln and his victorious general, Ulysses S. Grant, have been placed together in the Hall of Fame of New York University. There, in cold marble, they face each other as they did so often during the critical days of the Civil War. With the likenesses of several other noted Americans, these busts were unveiled recently before a gathering of famous persons. A granddaughter of the martyred president was among those present.

POTATO GRATER ALSO SLICES BY CHANGING A TIN

Scratching of hands and slow work in grating or slicing potatoes are done away with by use of a new safety grater that can be used for both kinds of work. A small slicing tin is put in place of a grating tin to change the operation. Potatoes are put in a box with a bottom, that can be changed for slicing or grating, and a small block which is used by hand is also changed. Thus two kitchen utensils are made of one.

SHOPPING BAG HAS SCALE TO WEIGH CONTENTS

Thrifty housewives no longer have to rely on the accuracy of merchants' scales, since the invention of a hand or shop-



Small Dial Scale in Shopper's Handbag Assures Housewife of Obtaining Correct Weight

ping bag with a spring scale for weighing the contents. The dial is not large and is attached to the handle of the bag, which is made of leather or cloth, as the owner may desire.

Foreign Patent to change Copyrighted material

2626
Mfg. of a Mr. Fuller - in connection with South Metropolitan Gas Co.

2476

2536

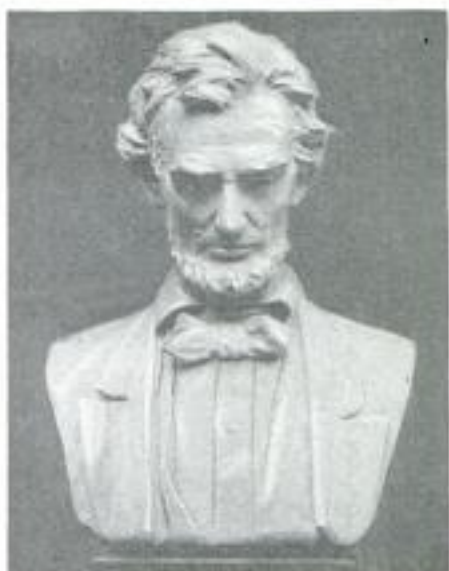
2552

2648

era mfg. Co., Junction, Wis.



Ulysses S. Grant



Abraham Lincoln



Henry Ward Beecher



Alexander Hamilton

Portrait Busts of Noted Americans Unveiled Recently at the Hall of Fame, New York University, and Procession of Notable Guests Who Took Part in Ceremony

25 40 LENS ON SUNDIAL SHOWS WONDERS OF NATURE



View of Moon through Garden Lens

To do for the eye what the phonograph and the radio do for the ear, a movable telescope attached to a sundial has been devised for gardens. Through its strong lens, always ready for use either day or night without adjustment, may be viewed an approaching airplane, a sparrow fleeing from a hawk, or any of the nearly in-



Beauty of Flower and Insect World Made Visible



Dial on Pedestal Also Tells the Time

visible wonders of nature. It requires no care or shelter. With the sundial attached to its base, the exact time is available on clear days. As the instrument is protected by a weather-proof cap, it may be made a permanent fixture in the garden or it may be detached easily and taken into the house. Besides being used for viewing near-by objects, the lens is strong enough to watch the movements of the moon, stars, and planets.

FREAK WEATHER OF WORLD EXPLAINED BY SCIENCE

Climatic conditions the world over are again attracting attention through the efforts of scientists to determine causes of oddities of the weather. Sun spots and the late breaking up of the ice floes have been given as possible explanations of the unusually cool spring. Reports show that similar conditions have been noticed on nearly all the continents.

Although weather is discussed probably more than any other subject, few persons realize that oceanic currents, mountain barriers, and atmospheric conditions may bring almost unbelievable climatic changes that violate all the accepted rules of geography. These factors make frosty blasts in the tropics, a cli-

mate in the Far North that is much warmer than sections several hundreds of miles south, and cause conditions changing what normally is the hottest and driest part of the earth, into one of the wettest places in the world.

For instance, in the Congo is found a contrast to the terrific dry heat of the Sahara Desert. Although seldom rising above 85 degrees, the heavy rains create so much humidity that the air becomes a veritable steam. Yet British East Africa, lying in the equatorial zone, with snow-capped mountains, enjoys a healthful climate because of its altitude. Barometric changes bring about the terrific monsoon rains of India, where in the summer Cherra Punji is deluged with 300 inches of rain. Frost is seen sometimes on July mornings in India, but the days are hot.

Cont. Alvah H. Pulver

Adelphi, N.Y.

SLEEPING PORCH IN TREE HAS WINDING STAIR

Like the South Sea islanders who built their homes in trees, an eastern man has constructed for himself a sleeping porch



Sleeping Porch Built in Tree is Reached by a Circular Stairway beside the Trunk

elevated about 10 feet above the ground. Entrance is obtained by a winding stairway decorated with strips of sapling. Practically the only modern touches to the place are glass windows and the tin roof and sides. Heavy trees protect it from the wind. Presenting a novel appearance, the house has attracted much attention, although in the summer it is almost hidden from view by the surrounding shrubbery. A heavy lock on the door, however, gives security to the occupant at night.

2599

FIVE-IN-ONE WRINGER MOP KEEPS HANDS CLEAN

Combining the advantages of mop stick, mop cloth, scrub brush, floor scraper, and mop wringer in one device, is the feat of an eastern manufacturer. Between the stick and the scrub brush a roller with a handle has been fitted. This carries a short belt of endless fabric. When used as a mop the cloth covers the bristles of the brush. In wringing it out, all that is needed is a turn of the handle. Thus one mop stick does the labor for which once five separate pieces were needed, and the user does not soil the hands.

Made in Worcester, Mass. Copyrighted material

The Himalaya Mountains form climate barriers that produce varied conditions in certain regions. In northwestern Tibet, August is the warmest month, yet frost can be expected every night. In some sections of Siberia, while temperatures as low as 83 degrees below zero have been recorded, conditions are healthful because it is dry. The Gulf Stream makes some countries warmer than other places many hundreds of miles south. The Alps block air currents in some sections and provide them in others, making climatic changes.

Elevations, oceanic currents, and atmospheric conditions violate some popular beliefs concerning weather in South America, where, for instance, Quito, lying on the equatorial line, has a mean temperature about 20 degrees lower than the west coast of the continent. From day to day here, in different seasons, there is less than one degree change in temperature.

Weather conditions in North America are probably less affected by such conditions than other parts of the world.

2567

TINY HOME IN MATCHBOX IS FEAT OF CARVER

As a novelty for children, tiny figures of people and furniture, whittled so small that an entire room's furnishing can be placed in an ordinary safety-match box, are being sold for charity in Europe. They are called matchbox homes. Each box contains a complete room. In a kitchen, for example, are placed a man and his wife, the woman churning



butter, the man sitting at a table eating, and a dog lying at the fireplace. The little models, made of wood and cut with a jackknife, are less than half an inch high.

In the past year Canada has exported fresh lobsters valued at nearly \$1,500,000 to the United States.

Made by Viennese re- in England.

Ent. Harold F. Hoopes (photos) 35 A Dearborn Chicago

Cmd. A. L. Krafft, Photographer

264

Plain Dealer
POPULAR MECHANICS
Cleveland Ohio

2554 "SHAVES" FACE OF CLIFF FIFTY TONS AN HOUR

To cut a rock composed of clay and mud and called shale, which is used to make brick, there has been built in a middle-western city a huge machine that

scrapes 50 tons per hour from the face of a cliff. Almost 100 feet high, it is said to be the largest machine in the world used for this purpose. It also loads small cars that carry the material to brick plants. The Indians long years ago cut shale from cliffs and ground it into a clay for pottery making. The rock splits like a shell, peeling off in layers. Rain and frost and snow will break up a deposit gradually but nature is not rapid enough for brickmakers who scoop up in one hour what natural forces would take years to do. Finely grained and uniform shale turns into slate after centuries under an enormous weight. Most shale cliffs are not steep but slope gradually backward from the base because of years of breaking up in rainy, cold weather. In time, shale changes into sandstone. This turns to limestone, next to iron stone, and lastly into coal. But man cannot wait for nature, and hence the invention of the shaver that cuts off enough shale in an hour to make bricks for a large apartment building. The city dweller does not realize that in the brick in his home there are fossil plants that were buried in shale many thousands of years.



Tower for Scraping 50 Tons of Shale an Hour from Face of Cliff

2659 FIVE DISHES FROM THREE IN NEW KITCHEN SET

Three pans, because of a new type of flange, now are made to serve for five kitchen utensils. They are three sizes of deep pans, the smaller fitting into the larger by the flange on the rim. By turning a pan upside down and placing it on a larger one, a cereal cooker is made. In a similar way, a double roaster can be devised from two pans. 2629

X-RAY BALKS SMUGGLERS' USE OF HUGE BALES

By enabling customs inspectors to see through heavy bales and boxes, an X-ray machine recently put into use in England has proved a terror to smugglers. It also has resulted in a great saving of time, as it makes it needless to unpack heavy

shipments in search of suspected contraband, such as liquor, being shipped to the United States. The machine is light and may easily be carried around the docks by one man. So quick is its action, that it will do the work of many men.



X-Ray Machine being Used to Look into Bale Suspected of Containing Contraband

*Mfr. Eagle Iron Works
Des Moines, Iowa*
*Montgomery Ward & Co.,
Chicago*

*Used by Callaway & Safety Co.
Brick & Tile Co.*

3542

Cmt. Charles W. Iseiger, Union
League Club, Posh & Taylor

San Francisco

Fighting Fire on the Right-of-Way

WITH thousands of lives and untold millions of dollars depending upon the keeping open of the great trans-continental arteries of travel and commerce, western railways maintain fully equipped fire departments to guard against destruction of their snowsheds over the mountains.

One road alone keeps four trains with steam up, ready for instant action at any hour of the day or night. Every device known to science is used to protect its 7,000 miles of track. Located at strategic points, these railway fire fighters keep ceaseless vigil over the lives and property entrusted to their care.

From vantage points in high towers, men with telescopes, field glasses, charts, and other scientific aids, scan the surrounding wilderness for the first gray puff of smoke which may herald disaster. One such tower is located on a mountain 7,860 feet above the sea level. From its windows are visible scores of miles of twisting rails protected by the snowsheds.

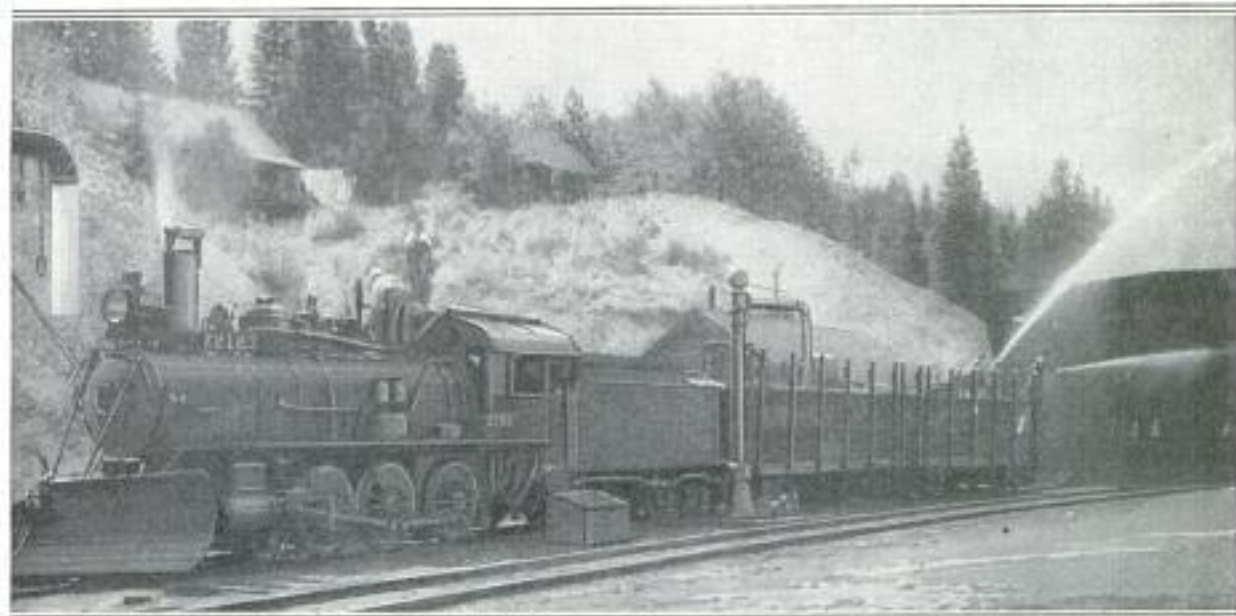
When the surrounding forest timber becomes dry the danger is greatest. Fires

so small that at the beginning they seem mere puffs of smoke, spread with lightninglike rapidity until miles of territory are covered by a roaring sea of flames that devours everything in its path.

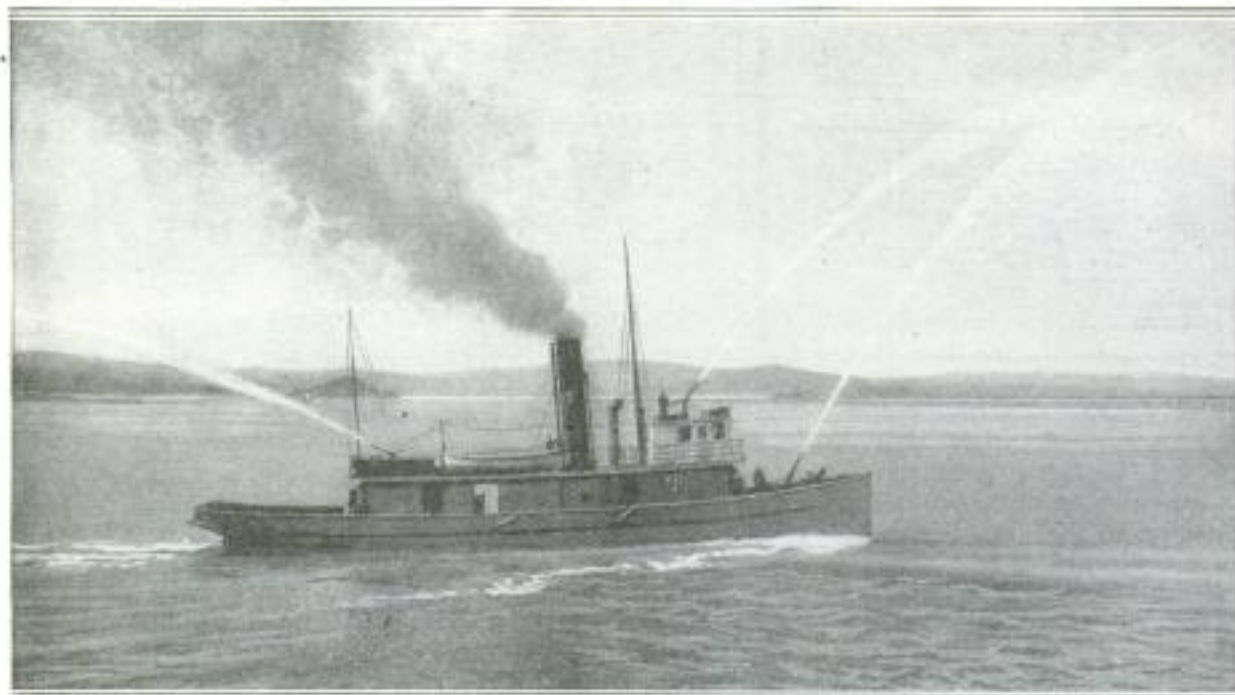
* In fighting such a fire, water is often not to be found and so is carried in great 25,000-gallon tanks on the trains, which can be made ready to answer an alarm in three minutes. Besides the trains, fire tugs are used to guard the terminals and their contents. Hose is carried on switch engines which are provided with water sprinklers.

Owing to the vigilance of these fire fighters and the completeness of their equipment, not a single case of serious damage by fire has been reported on one great railway system in the past year.

This road has fire chiefs, fire brigades, and fire companies. Its equipment includes a fire boat on San Francisco Bay, and several trains. In addition, fire hazards are reduced by burning the old lumber from shed repairs, brush, and other rubbish during the winter months when fire will not spread. Every nook and corner inside the sheds is combed for



Fire Train Fighting Flames Which Threaten Snowsheds Thousands of Feet above the Sea Level and Block Traffic: Four Such Trains are Kept Ready to Guard Miles of Track



One of the Railway Fire Tugs Used to Protect Terminals in Western Metropolis and Their Contents, Which are Often Valued at Untold Millions of Dollars

every unnecessary inflammable article and when found it is destroyed or disposed of.

With watchmen located in the sheds only, as was at one time the case, threatening forest fires could obtain considerable headway in the fire-shed district before discovered. Consequently search was made for a point which would give a bird's-eye view of the snowshed district. This point was found on the top of Red Mountain. Here a stone observatory was located, four miles from Cisco, Utah, and from this point watchmen, during the season of fire danger, keep a 24-hour vigil with telescope and charts, supplemented by field glasses.

The watchman's telescope is located in a bay window and has a range of 180 degrees, or a half circle. To the telescope is fastened a pointer which travels over a circular chart placed in the front of the telescope. On this chart are lo-

cated the milepost stations and other well established points in their relation to the sheds. On the window is a black line, the exact reproduction of the line of sheds.

When the watchman discovers smoke or sees a fire, he looks through his telescope and if the cross hair in it is on the line on the window and fire at the same time, he knows the blaze is in the sheds and with the aid of the pointer and chart determines the nearest point established on it. This information is telephoned to the telegraph operator at Cisco. The watchman can tell if the fire is above or below the sheds and even if the fire is not in the sheds, if it is anywhere in their vicinity, men are sent to investigate and prevent the flames from approaching nearer to the railroad property.

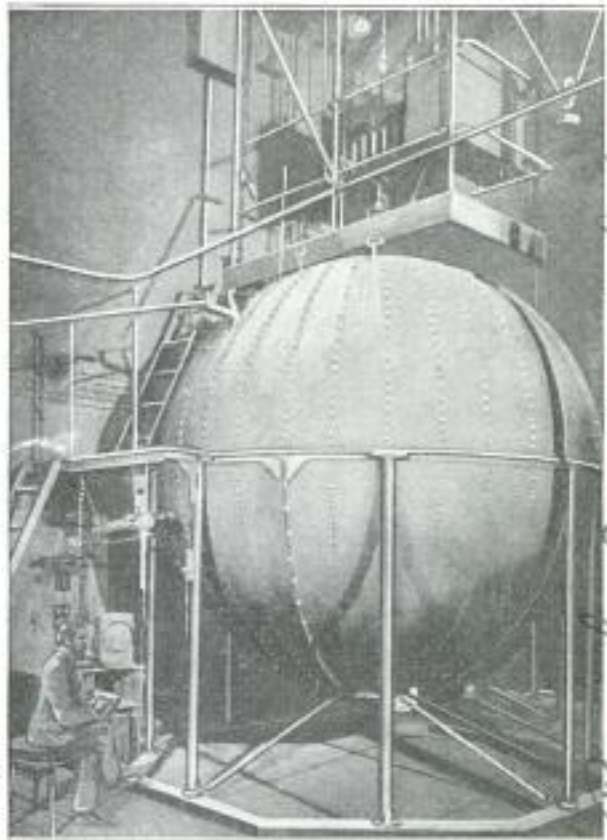
In addition to the watchman service just described there is an electric fire-alarm system with 42 fire boxes.



Hut on Lonesome Mountain Peak Where Watchers Keep Ceaseless Vigil over the Surrounding Territory to Report Fires So Small That at the Beginning They Appear as Puffs of Smoke

Photographs of thoughts are being made by a western research society, it is claimed. Objects upon which the subject thinks deeply for 10 minutes appear upon a film wrapped in a black paper, sealed in a yellow envelope, and hung 12 inches before the eyes. No camera is used. Persons holding strips of film to the forehead for 10 or 15 minutes obtain pictures of the objects or scenes upon which they concentrate, according to the scientists. In one test, recently made in the presence of several persons, a man wrote on paper the thing upon which he would think. He drew a rough sketch of the object and studied this five minutes. Then it was laid aside and he concentrated for 10 minutes on the photo plate suspended 12 inches from his eyes. He did not touch the plate, which was taken by three men to a dark room and there developed. A cross appeared. The paper written by the subject was next found to read, "I will think of a cross." This test has been repeated several times with success, the society reports.

For measuring the intensity of light, a European scientist has built a huge globe. This, he claims, is more accurate



Huge Globe and Platform That Enable Scientists to Measure Intensity of Light

**COFFEESPOT FOR CAMPERS
 —WON'T BURN HANDS** 2577

To aid campers, a coffeepot, intended to overcome some of the troublesome features of the ordinary one, has been



invented. With this utensil the hands cannot be burned because the handle, although folded when the pot is packed, is locked into position when in use. Another trouble with the usual camper's coffeepot is that the

spout and handle sometimes melt off when used on an open fire. This is not possible with the new type because the spout and sides of the pot are made of the same sheet of metal. The side walls are springy enough so the cover can be placed inside to aid carrying it. When the pot is tilted, the cover cannot fall off.

than the former method where only a disk of paper was used. In practice, it was found that the lights used did not shine as brightly or strongly in all directions. Therefore, to measure the light of a candle or lamp, it was necessary, under the old system, to take measurements in various directions. To avoid this loss of time, the sphere was devised, the light being placed in its center. As the walls are painted white, the reflection of the light is given back from every direction, and to obtain its intensity only a single measurement through a small window is needed.

METAL WREATHS FOR GRAVE

Metal floral wreaths for graves will keep shape and color even when exposed to bad weather for many years. They are in various shapes, sizes, and material. Clever workers with tin make some models that are excellent likenesses of real flowers.

Constructed by Prof. Edelbricht
 Breslau, Germany

Wm. J. Karno,
 2872 Hoyt Ave.
 Everett, Wash.

Montgomery
 Ward & Co.
 Chicago

Cent. H. C. Aldrich 205 W.
Waltham St.

268

POPULAR MECHANICS

2522

Delaware, Ohio
WORSHIP MONKEY IN INDIA AS FRIEND OF MAN

Monkeys are worshiped as gods in hundreds of temples in India. Great buildings are erected in their honor. Priests feed grain to them daily. They are always given good care even though there may be a great lack of food for human beings. This is because there is a belief that long ago an army of

yana." The Indian idea is that when Rama was roaming in the woods with his bride, the king of evil spirits came down, stole away the young woman, and took her to the island of Ceylon. A kind act which Rama did for the king of the monkeys led to an army of the animals going to the Indian shore near



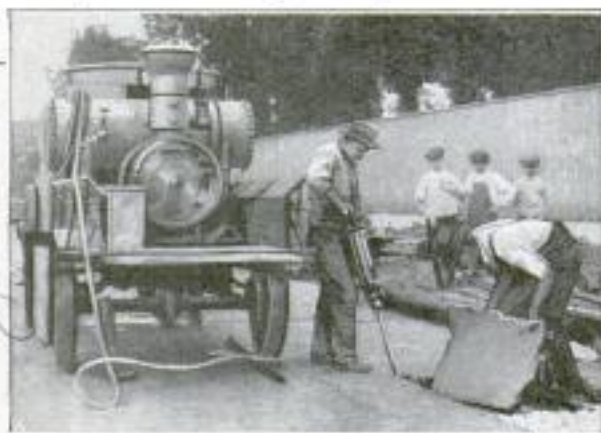
monkeys saved the life of Sita, bride of Rama, who was the hero of the great Hindu story of the gods, "The Rama-

Monkeys in India Fed and Housed by Priests Who Worship Them as Gods

Ceylon, building a bridge of stones, crossing over, giving battle to the evil spirits, and restoring his bride to him.

2616
**AIR STRONGER THAN BRAWN
IN BREAKING CONCRETE**

Back-breaking hand-sledging days of the gas man and street repairer are passing with the introduction of a new labor-saving device. By using an air com-



Air Hammer Doing the Work of Several Men in Opening Pavement for Street Repairs

pressor on an automobile truck, concrete-breaking hammers have been applied to opening streets and even basement walls. Three such hammers, it is estimated, can do in from 30 to 40 minutes what formerly took four men over four hours to accomplish. In use, the hammers cut away the asphalt or concrete in large slabs and then pound their way through the base to the earth.

2657
**TOOL OPENS ANY-SIZE CAN,
BOTTLE, OR FRUIT JAR**

Any-size can, fruit jar, jelly glass, or bottle can be opened with a self-adjusting wrench recently put on the market. No moving of parts to fit various sizes are needed. The opener is so designed that all the housewife does is to grasp the handles, and the notched edges of the opener will fit into position at once. There are no sharp points or edges, and the grip is so firm that a child can use it.

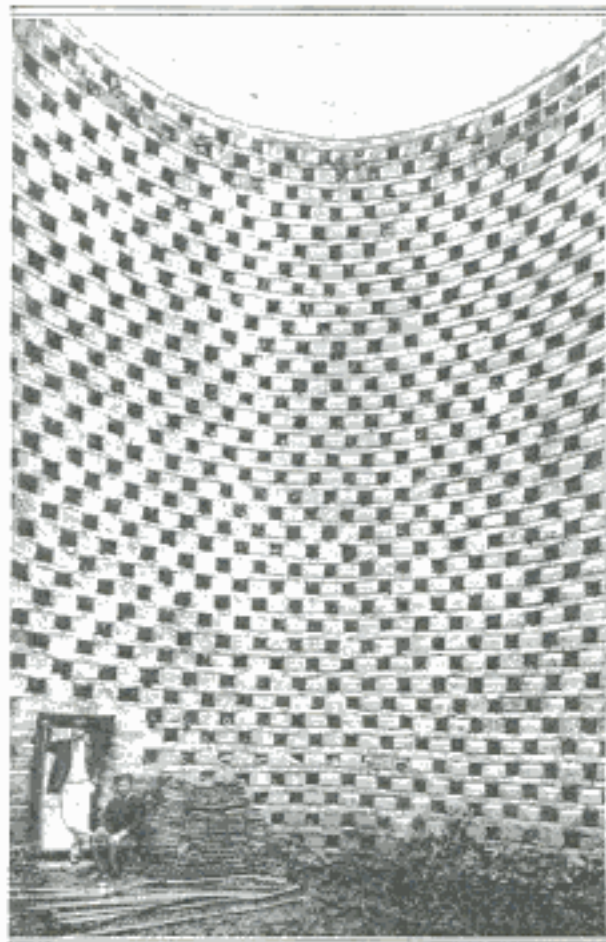
Price. 20c.
Marshall Field + Co.,
Chicago

Peoples Gas Club News
June 1923

Chas. William Thompson
c/o Comfort National
POPULAR MECHANICS
d'Escompte, Cherbourg 2662
OLD FRENCH PIGEON HOUSE
LOOKS LIKE A FORT *2607*

Homes for more than 5,000 pigeons are contained in a unique birdhouse at the ancient Tocqueville Chateau in France.

Solidly built of stone blocks, it has defied the passing years, and for decades has been the home of great flocks of winged messengers of the skies. During war times it supplied birds for army use in great numbers. In appearance it is like a fort or checkerboard, its odd design resulting from an effort to give its inhabitants plenty of light and air. Although all of the thousands of separate openings look exactly alike, their feathery occupants experience no difficulty in picking out their own niches from what, to the human eye, looks like a bewildering maze. At feeding time, the air is fairly filled with the rustle of wings as the birds flutter about the head of their caretaker.



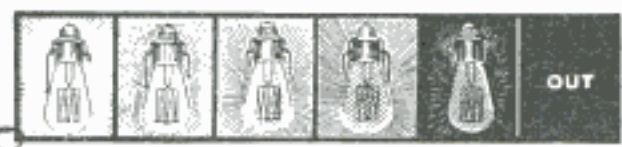
Birdhouse in France in Which Thousands of Pigeons Make Their Homes

RADIO SECRECY IS GAINED BY "SCRAMBLING" WORDS

Radio messages can now be sent which may be understood only by the person for whom they are intended. This is the result of an apparatus to distort, or "scramble," the words which are received on a special "set" designed to decode them. Heretofore, one of the greatest objections to the commercial use of the wireless has been the difficulty of guarding messages from eavesdroppers. Privacy in radio conversations is declared to have been assured by the new method. While it is not claimed that it is absolutely secret, it is said that messages sent by this system can be deciphered only by means of special apparatus not at the command of the ordinary amateur. Recent tests over a 30-mile stretch of water between the west coast and Catalina Island, are said to have been entirely satisfactory. The method was developed partly as a result of the post-war scarcity of cables for underseas use.

SIX CHANGES IN ELECTRIC LIGHT REDUCE COST

Six changes, from full to out, are provided by an electric-light socket that operates by the pulling of a chain. By turning it up or down, the light serves as a "nite-lite" after retiring, gives a subdued glow for reading, or a full glare



How Electric Light may be Turned Up or Down at Pull on Chain

when required. Its use is said to result in a saving of from 30 to 80 per cent in current.

BOAT PADDLE WHEELS ACT LIKE OARS ON RIVER

Designed to navigate crooked streams at full speed, a boat with two paddle wheels that act like oars so they do not lift the water, has been tested in the South. It is claimed that this results in a saving in fuel by allowing the water to run from under the vessel naturally instead of having it drawn up by the wheels which operate at an angle of 60 degrees from horizontal. Each wheel is run by a crude-oil engine. Easier steering is said to result, making the craft of special value in navigating shallow and winding rivers.

Sold by: - Commercial Edison

Edw. Capht. Fred. W. Blois. Engineers Bell Telephone Co. Pres. Arkansas. Louisiana Nat. Co. Monroe Chicago

Gen. A. Litz - \$1.25
Mfr. West & Co. Germantown, Philadelphia, Pa.

246²⁰9



Down but Defiant, Huge Moose Threatens Its Enemies with a Peeble Toss of Its Antlers



Long after Trip is Over This Prize Head will Serve the Hunter as a Reminder



Illustration by [unclear]

WITH the approach of fall thousands of sportsmen, who for 11 months of the year remain chained to office desks caught in the trammels of modern city life, are preparing to turn their backs upon civilization, adopt the up-to-date version of primitive life, and hie themselves back into the wilderness of the great North.

From the little log cabin on the shore of that pine-rimmed lake comes an irresistible "call of the wild," for the northern woods have a subtle magic all their own, and seldom relinquish their hold upon any man, once they have placed their lure upon him.

While the whole United States can boast only about 7,000 moose, the wilderness country of Canada is the native home of hundreds of thousands. In many sections, in all its essential features the forest fastness is today the same as it was in the dawn of history. For the "toter" of rod and gun, no rarer land exists. Here nature has left a vast sanctuary untouched by civilization's finger.

There is good moose hunting in practically every province of Canada, and, roughly, about 10,000 moose are killed each year. Of these it has been estimated that half are killed by visitors from the States, which, by way of comparison, is almost equal to the mature moose herd of the entire United States.

Although this may seem a heavy slaughter, yet far from being a danger of exhaustion to the herds, authorities of various hunting grounds advise that a killing of twice this extent might be made each year and the natural increase definitely offset any tendency to the extinction of the monarch of the Canadian fastnesses.

By the middle of August the migration to the North is well on. At this season, and more truly so in early September, the hardwood ridges are a riot of color. The yellow of birch and alder is relieved

here and there by the deep, rich green of pine, spruce, and balsam, plentifully dotted with the vivid red of the frost-crimsoned maples.

The lordly moose can be heard bellowing his hoarse challenge far and wide. The most exciting, though perhaps not the most sportsmanly method of hunting, can now be practiced, and the thrills experienced in listening to a moose coming to the call last long after the kill has been made.

Paddling quietly to some prearranged spot, just before sunset, keeping well in the long shadows, the guide moistens his lips and, raising the birch-bark horn, he sends forth the low guttural "Ooh-aah-uh," "Ooh-aah-uh"—seductive call of the cow—quietly at first, as some old bull may lurk in a near-by thicket, in which case

he would be likely to notice the deception, and crash off through the bush, spreading the alarm for miles. The call echoes through the forest stillness, and two minutes are then spent in straining to catch the faintest reply.

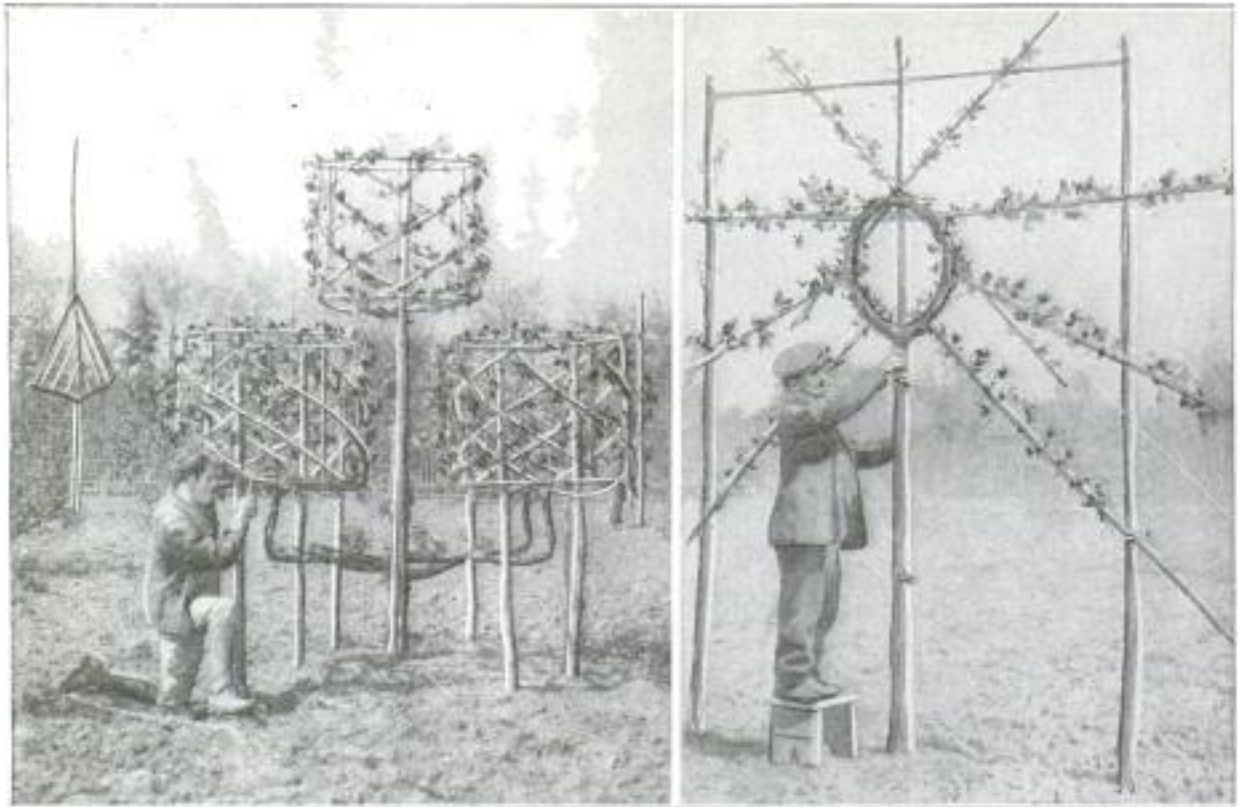
Minutes pass — and then comes a

strange sound, not unlike the distant bark of a dog. The guide creeps up quietly and whispers with suppressed eagerness: "Bull moose—him come." All is quiet, and it is nearly dark. The Indian, figuring the length of time it took the bull to reply, waits just that long before giving another call. This time it is answered sooner, and the direction of the approaching bull can now be ascertained by the occasional snapping of a branch, and when he stops, now and then, to thrash some unoffending bush noisily with his antlers.

Two hours pass and the moon is peeping over that balsam on the point, silhouetting its outline in bold relief against a silver background. The guide calls low and a quick answer comes from the moose. Standing full in the light of the moon, the animal offers a splendid target, and the first shot brings him down.



Riding a Swimming Moose: The Hunter Leaps to Its Back from the Canoe

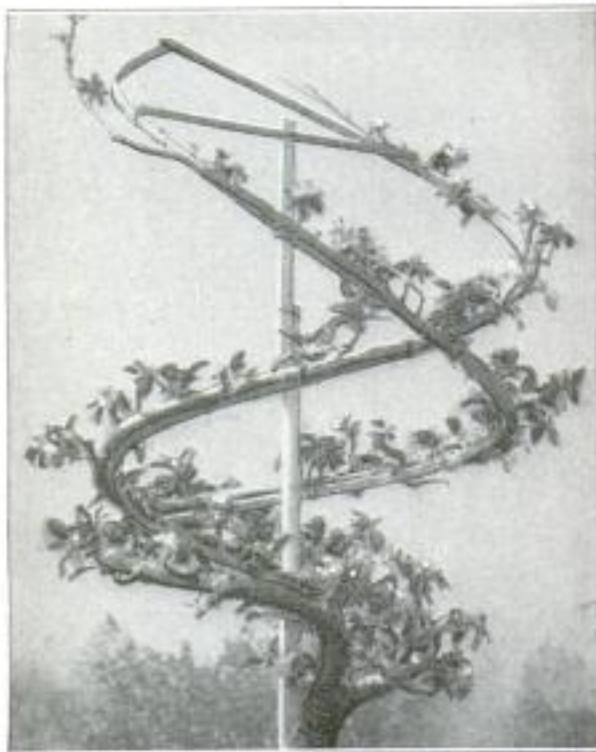


French Orchard Owner Training Limbs of Young Fruit Trees to Grow in the Form of Baskets and Circles without Cutting Down Fruit Yield

COPYRIGHT, CLARKE & HYSSE

261 FRUIT TREES ARE TRAINED IN MANY QUEER SHAPES

To satisfy a love of beauty, weird effects, and a keen sense of efficiency, a



Tree Limbs being Trained to Curve about a Post

COPYRIGHT, CLARKE & HYSSE

French orchard owner has trained his trees to grow in strange shapes without affecting their yield of fruit. By striving tirelessly for years, he has made the limbs assume the form of spirals, corkscrews, perfect circles, strange baskets, heart-shaped pyramids, and inverted cones. Taking as his motto the saying that, "As the twig is bent, so the tree is inclined," he has begun with the tender branches, shaping them in the way he desired as they grew. This has not interfered with the blossoms or the yield, although many of the limbs have had to be sustained with props while they were loaded down with fruit. Other trees have been dwarfed until the entire orchard presents a picturesque sight, making the beholder believe that he has wandered into a strange world.

2656 WASTEBASKET IN DESK

To save space in offices a wastebasket which fits into the desk has been invented. It hangs under the desk top in the place where a typewriter is sometimes placed. As it is made of metal, it is fire-proof, clean, always out of the way, and cannot be upset. The same type of basket is being made for kitchens, sewing rooms, bathrooms, and the home library. It is easily removed for cleaning.

Robinson Mfg. Co.
Sept. 11, Westfield Mass.

**NEEDLES AND FRYING PANS
SIZED BY NUMBERS**

2694

Numbers will serve to indicate the sizes of everything from tacks to frying pans under a new system of measurement being worked out by scientists. Many articles now in use are measured as they were when made by hand before machinery became known. Nails were sized by their cost back in the days when made by the smith. They were sold by the hundred and were given a size from the price which was paid for them. A 10-penny nail was called so because its price was 10 pennies per hundred. Under the new way of measuring, a series will start with a certain number, and the number for each larger size will be 60 per cent higher than for the preceding size. Thus, 10 will mean one size, and 16 will stand for the next larger size.

2615

**X-RAY LETTERS TO FIND
ANY MISSING CHECKS**

More than 6,000 letters a day are examined by a middle-western gas company to prevent the loss of any checks or

2622

valuable inclosures which may have been overlooked when the envelopes were opened. For this purpose a machine similar to the X-ray has been designed. Before the envelopes are finally destroyed, they are run down a glass-covered tobogganlike slope. Underneath is a powerful light which makes them perfectly transparent, and any inclosure can be detected instantly.



Girl Looking for Money and Checks in Envelopes Passing over Strong Light

THREE MILLION GUNS ON UNCLE SAM'S HANDS

More than 3,000,000 big and little cannons, rifles, machine guns, and other equipment won in the World War are proving a burden to the government. Every attempt to make a wholesale distribution of them to towns and cities throughout the country as war memorials,

has met with failure. No one, apparently, wants them, and now that Port Newark, N. J., where they are stored, is to be closed, their disposition has become a problem. It has been suggested that they be taken out to sea and sunk with appropriate ceremonies.



Some of the Cannons Won in the War Which are Proving a Burden to the Government: It has been Proposed That They be Sunk at Sea

Holograms, New York

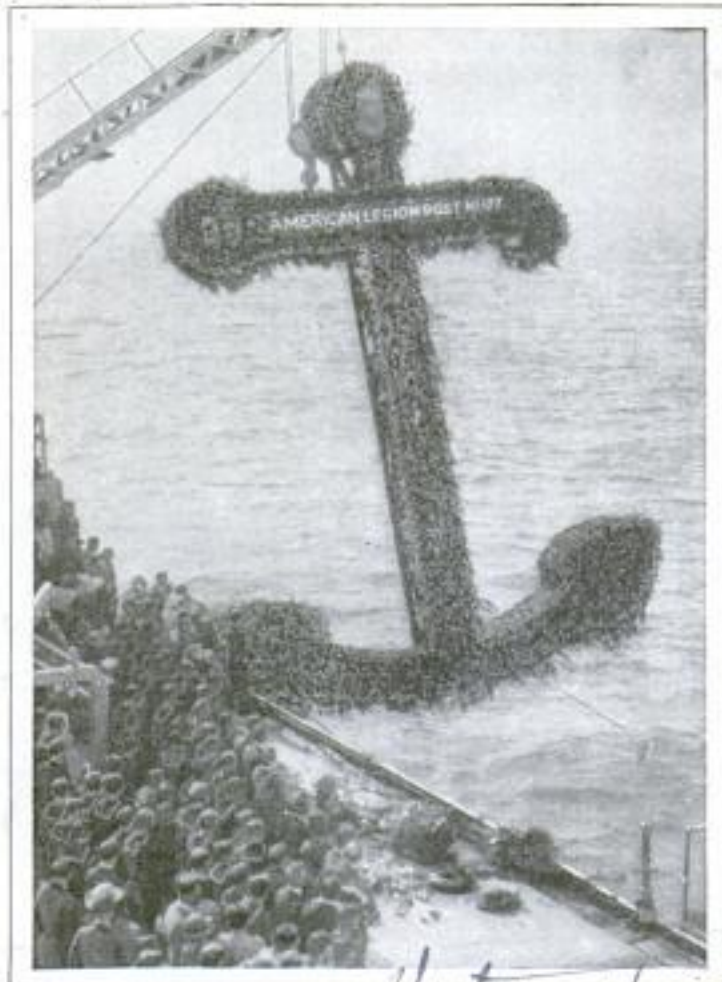
Copyrighted material

Chicago Ill.
Professors
Coke Co.

at Port Newark, N.J.

274
2571

DIP HUGE FLORAL ANCHOR AS TRIBUTE TO SAILORS



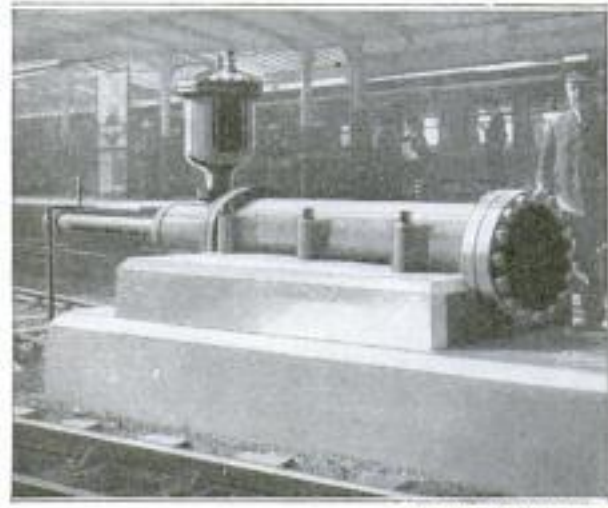
While officers, enlisted men, and civilians stood at attention on the U. S. S. "Nevada," a 40-foot anchor entirely covered with flowers was dipped into the ocean in memory of sailors who died in war. The anchor was lifted from the main deck by a huge crane and gently lowered into the water as a tribute from former soldiers and sailors. While the heavy guns boomed out a requiem and the ship's flags were dipped, members of a veterans' organization and the sailors dropped flowers and floral wreaths over the surface of the sea in memory of their lost comrades. Then the bugles sounded "taps," and the impressive service was ended. Civilians are seldom allowed on board a United States fighting craft, but on this occasion the rule was violated so that both present and former sailors might join in the ceremony, declared to have been one of the most impressive ever seen aboard a warship. After it was over, the ship returned to port with its flags still at halfmast.

Forty-Foot Anchor Made of Flowers Dipped into Ocean as Tribute to Heroes of the Sea

International

WATER BUFFER STOPS TRAIN WITH ALMOST NO JAR

In an underground railroad station in London there has been placed a hydraulic



Water Tank and Heavy Plunger Used to Stop Trains in the London Subway

lic, or water-power, buffer that, although weighing 7½ tons, will stop a pressure of 200 tons. On a recent test this buffer stopped a train running 10 miles an hour at a distance of 9 feet, without much shock to passengers or train. There is an extra-large reservoir of liquid for the giant plunger. Electric cars are used on the railway which is conducting the tests with the bumper. They sometimes have eight or ten coaches to the train, which must be stopped quickly.

AUTO OPENS FLOODGATES BY TURNING A WHEEL

On floodgates in the West, where 64 turns of the handwheel moved the gate only one inch, a light automobile engine is now being used. The four-cylinder engine and a few cents' worth of gasoline now do the work of several men in moving the five gates weighing two tons each. The engine is put in low speed to raise, and in reverse to lower them.

Big Horn flood gate

2553

COPYRIGHT, CLARKE & HYTE

Bill Arthur, U.S. Indian Service, San Xavier mission

**IRON USED TO FLOAT LOGS
OF HEAVY WOOD TO SEA**

2493

In logging timber tracts in South America and the West Indian islands, the heavier wood, which is not sufficiently light to float, has always proved difficult to move. One firm recently solved this problem by using "floaters," made of rust-resisting iron, by means of which the heavy timber was rafted down a river to the sea, where it went to a sawmill or was loaded on waiting steamers.

**TEACH BABY HOW TO STAND
WITH CRIB GUARD**

2536

To keep a baby from falling out of the crib or carriage, to teach the child how to stand, to prevent round shoulders, to make strapping needless, and to change the buggy into a bed, are some of the purposes of a new baby guard which has been invented by an eastern father.

The guards are made of metal and will fit any size buggy. They can be strapped to the buggy and are light and strong. In appearance the device looks merely like a small fence surrounding three sides of the carriage. It resulted from an accident when one of the inventor's children climbed to the edge of a baby buggy and fell to the sidewalk, but without serious injury.

*The Baby Guard Co.
W. 95th New York*

**MANY-PURPOSE GOLF CLUB
TO SUIT ALL PLAYERS**

2480



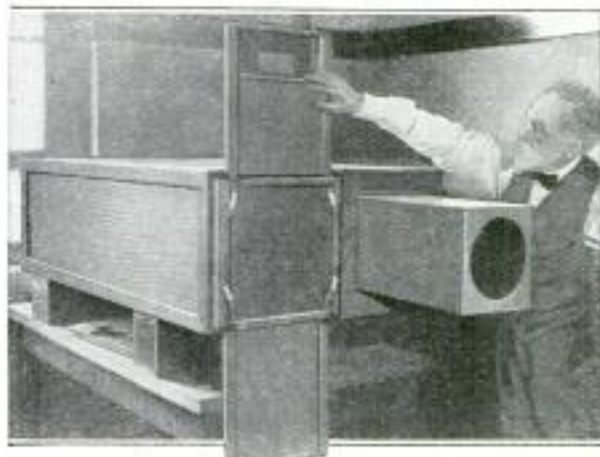
Golfers are now offered a putter which is adjustable to four positions. It can be used either right or left handed, as the player chooses. A half turn to the left loosens the shaft for setting, and a half turn to the right tightens it again. To adjust the head to any desired face, only a turn of the hand is necessary. It then locks itself in place. It may be used as a putter, midiron, or jigger.

the right tightens it again. To adjust the head to any desired face, only a turn of the hand is necessary. It then locks itself in place. It may be used as a putter, midiron, or jigger.

No information on maker

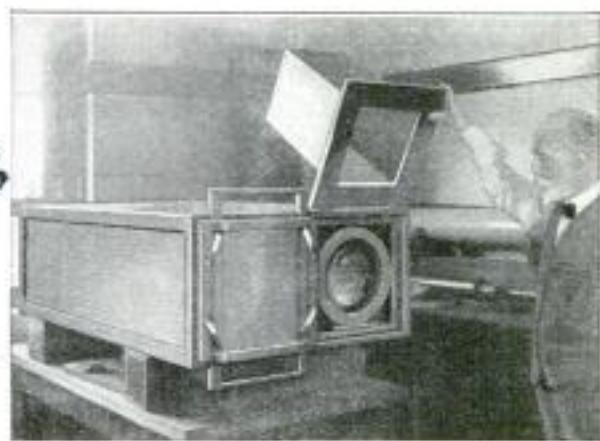
**U. S. BUILDS HUGE CAMERA
FOR LIFE-SIZE PHOTOS**

For the purpose of taking a life-size photograph, a camera as large as a carpenter's tool chest has been devised by



One of the Four Nine-Inch Camera Lenses Recently Built by Government Scientists

government scientists. Six feet long, the box is 4 feet wide and 2½ feet high, and is fitted with four lenses 9 inches in diameter. The chief advantage of the new



Combined Plate Holder and Shutter of Huge Camera for Life-Size Pictures

camera is said to be that the life-size photographs do not have to be retouched, as is the case when enlargements are made. The lens is left wide open when pictures are made. Two cardboard shutters are used.

2507

**ALUMINUM STAGE SCENERY
IS EASILY ERASED**

Aluminum stage scenery is used in Europe, it is reported, in places where wood is costly. The metal sheets are light and easy to move, and the designs on them can be easily erased when new scenes are to be painted.

*Brass World
May 23, 1923*

John Clacey, Bureau of Standards, Washington, D.C.

Emb. J. Cecil Alter 1103

276

Benton Blvd

POPULAR MECHANICS

Salt Lake City Utah

2191

GUARDING RAIL LINE OVER GREAT SALT LAKE



Where Operators Keep Ceaseless Vigil over the Lives of Untold Thousands of Passengers Who Ride on Trains Crossing Trestle over Great Salt Lake

One of the most important short stretches of steel highway in the country is the railway line across Great Salt Lake in Utah. Although only thirty miles in length, approximately 40,000 passenger trains, carrying something more than 2,250,000 passengers, and 90,000 freight trains or about 4,000,000 cars, have gone safely over the trestle without significant mishap since it was built twenty years ago.

Several acres of piling and other trestle timbers are kept afloat, while a motor boat and a pile driver are always ready

tions to traffic. Work cars also are provisioned and equipped for emergency use. These are merely safeguards, however, since no such grave emergency has yet arisen.

Extremely low speed is required of all trains on the trestle, since there must be no accident or damage to this most precious part of the transcontinental line. An electric signal is sounded in a central office the moment a train enters or leaves either end of the trestle. No engine may pass the station without permission, and when they are coming too fast the operator blocks the train.

Any sudden stopping of a freight on the trestle gives it a slight writhing motion, and the operators have become seasick. The same thing is true regarding passengers on the through trains.

WOOD STRIPS SAVE BREAKAGE OF DISHES

To prevent breaking of dishes on the sink, a set of wood strips is being sold. They are placed on the drain-

board, the bottom of the sink, and on the side, where a strong support holds them in position. They are made of a soft wood, so there is little danger of smashing china put on them.



Looking Toward the East from the Middle of Huge Trestle over Great Salt Lake

for use in case of damage by wind or flood waters to the structure. A train of cars loaded with rock, and another loaded with gravel, are under steam constantly to guard against any interrup-

Geo. B. Clow & Sons
544 S. Franklin
Chicago

Evanston Index
May 28 1923

**ICE FIELDS MAY RETURN,
SAY SOME SCIENTISTS**

2508

Scientists are viewing with interest the question of whether ice fields will again cover Canada and parts of the United States. Some have said this land now is in a period between visits of glaciers. It is known that there have been ages when ice fields covered this land, drew back, and returned again. This is seen by plants and animals like those of today found in rocks which show the scars made by the ice once present.

**ELECTRICITY FOR CAMPERS
FROM PORTABLE PLANT**

2498

To supply light and power for campers and others, a small, portable power plant has been made which can be run anywhere without building a foundation for it. The generator is operated by a one-cylinder, air-cooled, gasoline motor. Storage batteries give a reserve supply of electricity. It will start or stop at the touch of a button. Besides supplying light, the plant may be used for charging radio storage batteries, operating washing machines, churns, and cooking devices. It requires practically no care except regular quantities of gasoline and oil, and may be run by a child without danger.

**COFFEEPOT DRIP STOPPED
BY RIM IN SPOUT**

Every housewife can tell the story of the frequency with which clean tablecloths are soiled by drops from the spout of a coffeepot. In spite of every care, this is liable to happen with existing pots and pitchers. A German inventor comes forward, however, with a patented spout that prevents the drip from reaching the cloth. A flange catches the drop, as it runs down the spout, and turns it into a small reservoir near the body of the pot. When the coffeepot is again tilted for pouring, another flange leads the drop out over the top of the spout into the coffee being poured.



**RECORD-SIZE ELEPHANT TUSKS
FROM DARK CONTINENT**

2478

What are declared to be the largest elephant tusks seen in recent years were taken from the head of a huge beast



This Ivory Bower, Worth \$10,000, Arches over the Head of Mrs. Martin Johnson, African Huntress

Rilled in the wilds of British East Africa. They weigh about 365 pounds, and tower high above a man's head. Ivory from this section of Africa is specially valuable, and this pair of tusks is valued at \$10,000. Mr. and Mrs. Martin Johnson, hunters who spent two years in the African wilderness, are responsible for the catch.

**GIANT CLOCK HAS LETTERS
IN PLACE OF NUMBERS**

Of the many thousands of persons who pass it every day, few have noticed that the clock in the tower of the Wrigley Building, in Chicago, has no numerals on its face; nothing but 12 giant "W's" where figures are usually found. Watchmakers say people have become so accustomed to clock faces that all they notice in telling the time is the position of the hands. At a distance, the great letters on the face of the Wrigley clock look like mere black dots, so the average beholder takes it for granted that they represent figures. Closer inspection from the street level, however, reveals the self-deception.

Sims Magneto Co., N.Y.
East Orange, N.J.

Sims Magneto Co.
East Orange, N.J.

Emb. Brass
Patented
7/1/23
as used

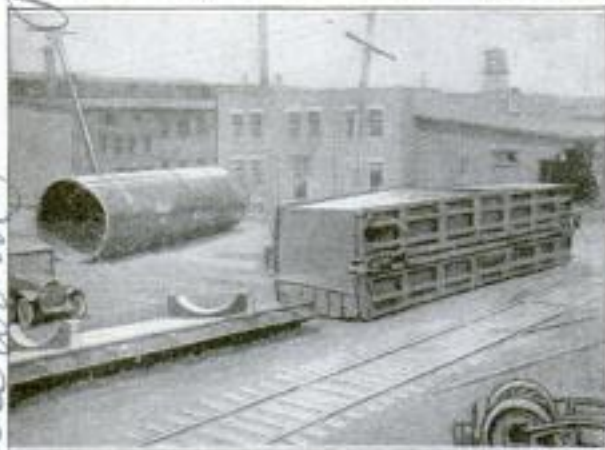
Cml. Harris Howell
Staff Photographer

278

POPULAR MECHANICS

The Milwaukee Leader, Milwaukee
2461 AS IT ROLLS OFF CAR

When a 50-ton drum rolled off a flat car, while being transported from a Wisconsin factory to the East, it upset the



Havoc Wrought by a 50-Ton Drum, Which Rolled off a Flat Car While Passing through Wisconsin City

train, snapped off a tree and telegraph pole, and damaged other property, before coming to a stop. The drum, which was 12 feet wide and 50 feet long, started on its tour of destruction as the train was going over a smooth stretch of track. Overturning cars smashed the sides of a warehouse and tore up the right of way for some distance.

SQUEAKS TELL STRENGTH OF ANY METAL

Stretching a metal until it squeaks and listening for the sound with a very sensitive telephone device will give a test showing how much strain that metal can

stand as a girder in a bridge or a rail in a railroad, according to tests at an eastern university. By this method all forgings may be rapidly tested before they are put into use. Several kinds of metals have been used in the experiments and it was found that squeaking, rasping sounds resulted from the grating of the molecules in the material when its breaking point had almost been reached.

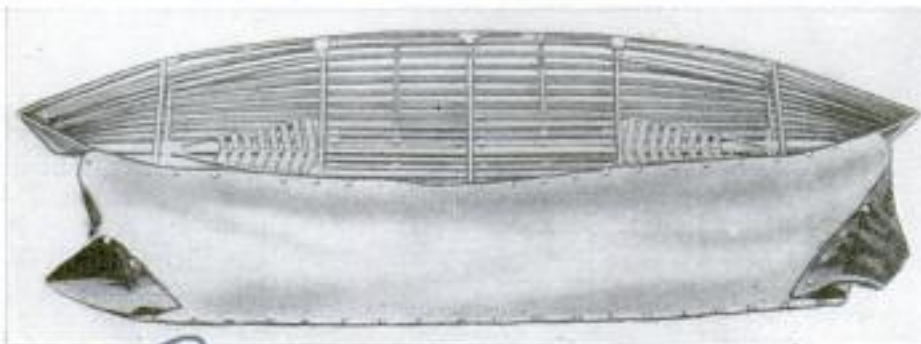
"TOP-O'-THE-WORLD" RACE
2456 BARS FREAK CARS

Automobile enthusiasts have hailed with joy the announcement that freak cars are to be barred from the race to the summit of Pikes Peak on Labor Day. No car weighing less than 1,600 pounds, without the driver, may enter the contest.

The course to the top of the mountain covers slightly more than 12 miles and is a double-track boulevard from 20 to 50 feet wide.

CLOTH-COVERED FOLDING BOAT SET UP WITHOUT TOOLS

Canvas covering that laces over spruce and aluminum ribs, fitted together without screws or bolts and without the aid of tools, features the construction of a folding rowboat now on the market. It contains no veneer or glued parts to be loosened by moisture. The boat can be quickly put together or taken apart, but will not fold up until the canvas is completely removed. Weighing only 65 pounds, it can be carried by two men, or on the running board of an automobile.



The Upper Left View Shows the Folding Boat Covered with its Coat of Canvas. At the Left, Covering may be Seen Partially "Buttoned," and the View Above Shows its Appearance after "Buttoning"

Racine Boat Co., Racine, Wis.

Copyrighted material

Cml. Paul H. Woodruff
Editor, Industrial Power
440 S. Dearborn / Chicago

Pikes Peak News Bureau
Colorado Springs, Colo.

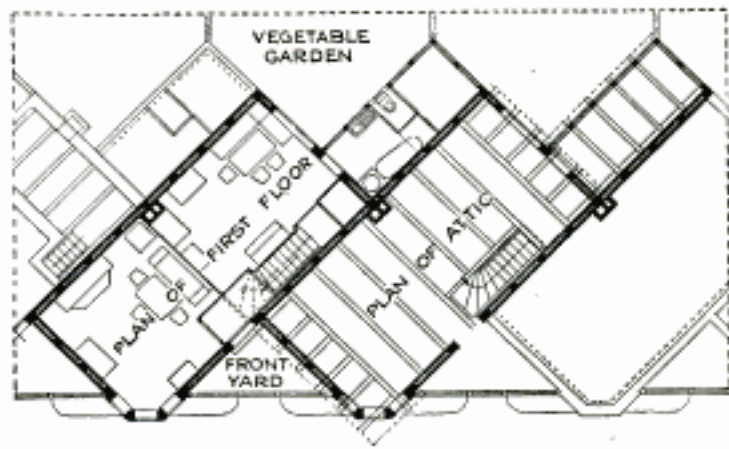
Techno-Photographisches Archiv
Berlin-Heid. au
 POPULAR MECHANICS
Handbergstrasse 62
Postfach 97 Germany



Small Dwellings Set at Angle to the Street to Give More Light and Air and Greater Security against Intrusion: Heat and Electricity are Supplied from a Central Plant

MORE LIGHT AND AIR FOR SMALL HOMES

Some of the disadvantages of small dwellings built in groups for the sake of economy have been overcome in Germany by placing the houses at an angle to the street to provide more light and air for each dwelling. Such groups are easily supplied with heat, electricity, and water from a single center. Under the German plan each of the houses has a little garden,



secure against the prying curiosity of neighbors and equally protected against intruders in the front and rear.

WOUNDED PLANTS ARE EASY VICTIMS OF GERMS

Tests designed to find a cure for a mysterious disease which has attacked plant roots, have been made at a mid-western university. Described as being similar to cancer in animals, the ailment, it has been found, gets into the soil and often causes the destruction of practically all of the plants in a nursery. So far, the only prevention found is to carefully examine all new shrubs for traces of the germs and to burn all infected ones. It is said that the disease either causes tumors or hairy roots to form and the plants become dwarfed and finally die. Much of the trouble is ascribed to careless handling, the germs entering through the wounds. Constant trouble is caused where grafting is poor, either through

loose wrapping or an incomplete covering of the juncture by wax. In one test, where the students jabbed tomato plants with a needle dipped in the germs, a cauliflowerlike growth formed on the stems.

FOG FORCES PILOT TO TAKE VOYAGE TO EUROPE

Dense fog over the entrance to New York harbor recently, resulted in the pilot aboard one of the great transatlantic liners being carried on to Europe. It was decided that it was safer to do this than risk an accident by trying to find the boat sent to take him back to New York. Pilots have been carried across the ocean because of rough weather before, but this was said to have been the first time it had happened because of fog.

Evansston Northwestern University
Prof. A. H. W. Park

Chicago Tribune
5/31/23

New York Times
5/11/23

2426 **CRIPPLE DRIVES HIS CAR
WITHOUT USING FEET**

It sounds impossible that anyone could drive an automobile on a busy street and through crowded traffic without once



Auto Equipped with Special Devices to Enable It to be Easily Handled by Man Who cannot Use His Feet

using his feet. Nevertheless, it is done by an eastern man whose legs and feet have been practically useless for years. Ingenious additions to the usual equipment have made this possible. Crutches held under his armpits are bolted to the brake and clutch pedals. By throwing one or both of his shoulders forward those important pedals are easily operated. The gear-shift and emergency-brake levers have been extended to bring them easily within reach of his hands. The accelerator pedal is attached to a wire running up to the steering wheel and ending in a loop. The pedal is worked by inserting the thumb in the loop, and pulling. He operates the self-starter with his right thumb.

2492 **"WHITE WAYS" HALT CRIME
BY FLOOD OF LIGHT**

When the caveman, having cooked his supper by fire, kept the flames leaping during the night to frighten away threatening wild animals, he did what a city does today when it turns its streets into "White Ways." According to recent figures gathered to show the effect of illumination in dispersing evildoers, well-

lighted streets are estimated to have reduced crime as much as 40 per cent. Centuries before there were any traffic problems, street lights were hung to protect wayfarers from thieves and cut-throats. First the naked torch, then the candle, then the oil lamps, then gas, and finally electricity have been used. In 1810, in London, constables testified that the gas-lighted streets they patrolled were freer of crime than unlighted thoroughfares. Forty years ago when electric street lighting was new, the same comparison was made between gas and electrically lighted streets in Boston.

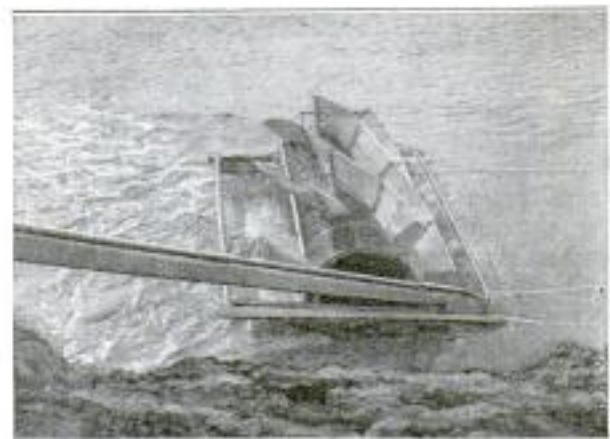
**CITRUS GROWERS USE GAS
TO PRESERVE FRUIT**

2458 Carbon-dioxide gas, first used in the citrus industry of Florida to color fruit, is now being employed as a measure for controlling stem-end rot. When the gas is applied to the fruit, the stems dry up and drop off, thus removing one of the principal causes of early decay. Gassed fruit keeps from 20 to 30 days longer than fruit that has not been treated.

New York Times 5/21/23

**FLOATING WATER WHEEL TAPS
CURRENT'S POWER**

2425 Requiring neither fuel, oil, nor care, a floating water wheel has been devised by a South African engineer for tapping power from a stream's current. The device is simple. As the current sweeps against the paddles they revolve the drum, generating enough power to operate a force pump. Cables are used to anchor



Floating Water Wheel Moored to Bank of River Acts as Pump

the wheel to shore. The outlet pipes deliver the water 210 feet away from the water wheel and about 50 feet above it.

*Dr. J. Van Nipert
c/o Herald Kretzschmar
Box 3306, Johannesburg, S.A.*

*Owner - John J. Lundberg
of East Greenbush, N.Y.*

Dr. W. Ser. Ernest A. Vuilleumier, head.
POPULAR MECHANICS

2393

POCKET GAUGE TELLS AMOUNT OF ALCOHOL IN LIQUID *2489*

Prohibition agents in an eastern state have been equipped with a pocket apparatus with which the amount of alcohol in any liquid can be quickly determined. Another advantage is that its size makes it easy for an officer to carry it about, concealed on his person. Tests indicate that the instrument is very accurate. For fermented liquors, such as beer, only 10 minutes are needed to find out their strength; while for distilled liquors, the percentage of alcohol can be found in two minutes. A small sample is sufficient to give accurate results.

SLIDE SAXOPHONE SPEEDS UP "JAZZ" MUSIC *2301*

Combining the trombone, Frisco whistle, and saxophone in one, a western manufacturer has designed an instrument which is much easier to play than the trombone. It has a range of several octaves, and can be tremoloed and slurred to produce "jazz" music and speaking effects. The new instrument speeds up dance and jazz music, is easy to learn, and costs but half as much as the trombone. Anyone of ordinary musical ability can learn to play it.



Dr. W. Ser. Ernest A. Vuilleumier, head.
Chicago
Dr. W. Ser. Ernest A. Vuilleumier, head.
Chicago

PATTERN OF WALL PAPER INSTANTLY CHANGED *2501*

As many as fifty designs of wall paper can be shown in a room within one minute by a device, similar to the magic lantern, made by an electrical company. Wall designs of various kinds can be displayed at will by merely changing the tinted glass plate of the projector which is concealed within the room. Colors can be shown to fit the taste of any housewife.

WEATHER PROPHET CLIMBS OVER 400 MILES

In completing his 700th ascent from a cabin in the heart of the Canadian Rockies to the summit of a mountain, a



Canadian Weather Prophet, Who has Climbed More than 400 Miles, Reading Instrument Records on Top of Mountain

weather prophet for the Dominion government has climbed a total height of more than 400 miles. He makes the trip every two weeks to read weather instruments, 8,000 feet above sea level. The combined altitudes of these many ascents total several times the distance to the peak of Mt. Everest, the highest mountain in the world.

WAR ON GAME-DESTROYING ANIMALS URGED *2494*

In an effort to protect game and birds, a nation-wide campaign has been begun to keep meat-eating animals and killer birds in check. Golden eagles of Alaska, it is said, take a heavy toll of mountain sheep lambs every year, while hawks destroy untold numbers of game birds. One hawk can kill 200 quail in a season, it is estimated. A game commissioner recently made an appeal to clubs and sportsmen to destroy lynx, bobcats, hunting house cats, red foxes, gray foxes, red squirrels, weasels, house rats, hawks, and owls.

Wide World Photos

York Times 5/24/23
New

Dickinson College

Dr. W. Ser. Ernest A. Vuilleumier, head.

Research Laboratories
General Electric Co.
Schenectady
24.

AUTOMATIC TOOTHBRUSH ATTACHES TO FAUCET

Care of the teeth is rendered easier by an automatic toothbrush which operates



Rotary Toothbrush, Which Attaches to the Faucet, is Operated Automatically by Water Power

on the same principle as the "buffer," used by dentists in polishing tooth surfaces. The brush is driven by a small water motor attached to the faucet, power being transmitted by a flexible cable. All that is necessary is to apply the paste to the brush, turn on the faucet, and the water does the rest.

NEW DIVING BELL WALKS ON SEA'S BOTTOM

Propelled along the bottom of the sea by four long arms, or legs, near its base, a new type of diving bell has been designed by a western engineer. Cylindrical in form, it is claimed that it will permit work at a depth of 750 feet. Powerful lights shining through heavily protected windows, illuminate the water for many feet. The arms and legs are operated by the diver within the bell. Weighing about a ton, the chamber is lowered over the side of a boat by a derrick, and communication with the surface is made possible by telephone wires. It is claimed that its use will afford greater freedom of action in working on wrecks at great depths.

MANY STRANGE ANIMALS IN PRIVATE ZOO

One of the largest private zoos in the world is the property of G. Tyrwhitt-Drake, of Kentish Pasture, Scotland. Among his remarkable collection are 50 horses, mares and foals of famous pure-blooded white stock, whose origin dates back to the time of Queen Isabella of Spain. In addition, there are many beautiful and rare specimens of yaks, leopards, lions, tigers, jackals, hyenas, antelopes, and white camels. They are tended by a small army of keepers, and there is a good-sized hospital for the isolation and treatment of sick animals. The owner takes special pride in his pet lion "Poilu," which was formerly the mascot of the 19th Army Division. "Poilu" is said to have been in the front-line trenches several times during the war, being wounded twice by stray bullets.

BELLOWS IN OVERSUIT HELP KEEP WEARER COOL

Something new in one-piece overalls has been patented for the use of workers and sportsmen. Made of tough khaki, the front half of the top opens like a coat, only the back being permanently attached to the trousers. By the movements of the body, the blouse effect at the rear acts as a bellows, giving a constant circulation of air about the upper



Work Suit Combines Comfort with the Greatest Possible Utility for Sportsmen and Toilers

half of the body. It is hung from both the waist and the shoulders.

Recognizing that water pressure upward, as well as downward, is a source of power, an inventor with vision has developed reaction-turbine units that can be mounted directly over an artesian well. They range in size from 150 to 2,000 watts and are direct-connected to electric generators.

Electrical World
10th Ave & 86th St
New York

not in J.C.C.
3/24/32

Mr. Alexander O. Tesch
Chicago

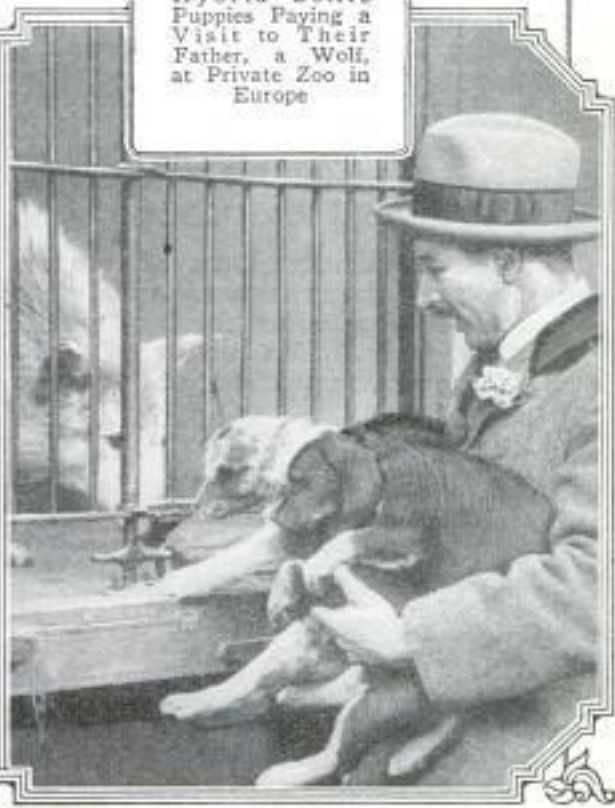
W. W. Stevenson, Chicago
Stanley & Co., 500

Name of inventor
not given



Bad - Tempered
Four-Horned Ram
Trying to Speak
Spanish to a
Young Persian
Llama. Below,
What is Claimed
to Be the Small-
est Donkey in
Europe, Perhaps
in the World,
Only 28 inches
in Height

Hybrid Collie
Puppies Paying a
Visit to Their
Father, a Wolf,
at Private Zoo in
Europe

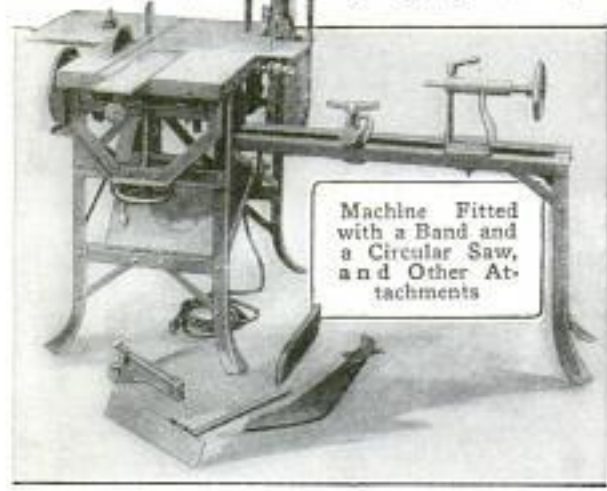


1540 Knoultan St.

WOODWORKING MACHINE HAS MANY CONVENIENCES

9 Cincinnati Ohio

Many conveniences are embodied in a new woodworking machine intended for light work. Both a band and a circular saw are provided, jointer and an bedplate, for accurately



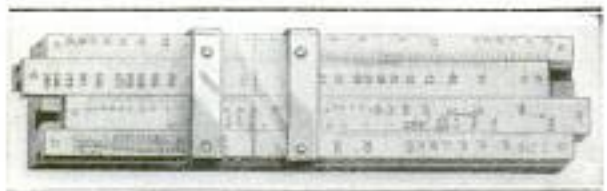
Machine Fitted with a Band and a Circular Saw, and Other Attachments

of cut. Another feature is the inclusion of a reversible spindle shaper, suitably mounted to accommodate various molding set-ups. A sanding disk is also furnished, 10 inches in diameter, accurately machined to a smooth finish. A wood-turning lathe attachment permits turning of stock up to 14 inches in diameter. The machine can be operated from line shafting, by a gas engine, or electric motor, and is suitably equipped with a 1/2-horsepower motor, lamp cord, and switch where current is available.

RAPID SCALE EASILY SOLVES HEATING PROBLEMS

28

There has recently appeared on the market a scale that makes possible rapid and accurate calculations for heating and ventilating work. The scale is in the form of the ordinary slide rule and has



A Slide Rule That Greatly Simplifies Heating and Ventilating Calculations

two slides and a single runner with a cross hair marked on the glass. One of the features is the ease with which the amount of radiation required to heat a

building of known dimensions can be computed. It will give values for hot-water systems, steam, vapor, and vacuum, and for either direct or indirect radiation. With it, the expansion due to change in temperature of a pipe and the heat lost in a pipe line of known length and diameter can be calculated.

MUD USED TO LUBRICATE OIL-WELL BITS

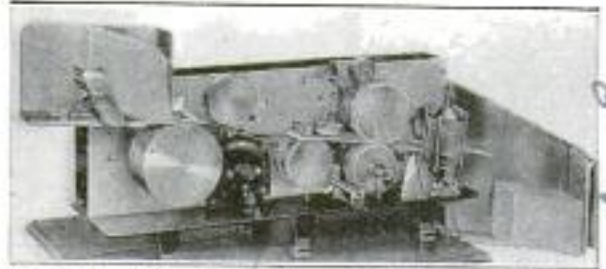
29

One of the most troublesome tasks of an oil-well driller is that of lifting the drill every four or five hours to refill the lubricator with oil, so that the rock bits will cut more easily. This trouble will be eliminated if tests now being made in an oil well prove that the forced circulation of mud in the hole serves the purpose as well as oil. It is claimed that the experiment thus far shows that the bits do not wear any faster with the mud than they do with oil.

Eng + Mining Journal Press 5/14/23

SEALER AND PERMIT PRINTER OF LARGE CAPACITY

A small, portable machine for printing postal-permit marks on envelopes has recently been placed on the market. The machine not only prints the permit marks, but automatically feeds, counts, moistens, seals, and stacks the envelopes, leaving the operator's hands free for loading and unloading the envelopes. The ma-



A Machine That Prints Permit Marks, Feeds, Seals, and Counts 12,000 Envelopes per Hour

chine is electrically operated, and has a capacity of 12,000 envelopes per hour.

The machine can also be used for imprinting second and third-class matter, and will imprint without sealing, seal without imprinting, or merely count the envelopes, as required. It is unnecessary to send the machine to the post office to be set for a designated number of impressions.

Whenever you find that you wish to know more about any article in the magazine, write our Bureau of Information.

Standard Envelope Mfg Co. Evereth, Mass. Sealer

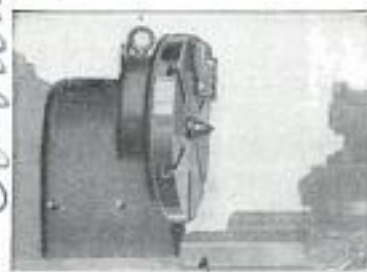
General Heating Supply Co. } Beltona Bldg
Attention Edgar A. Cline, } Kansas City

SMALL PLUNGER PUMP USES ELASTIC RING VALVES

A small high-speed plunger pump has been designed to use elastic rubber bands of circular cross section for suction and discharge valves. These are said to be noiseless in operation, unaffected by the speed of the pump, and easily replaced when necessary. This form of valve also allows for a large port opening which encircles the barrel of the pump, and thereby increases efficiency to a marked degree.

SUB-HEADSTOCK AIDS CUTTING OF LONG-LEAD SCREWS

Screws and worms with extra-long leads can readily be cut by means of a new lathe attachment. The mechanism consists of a gear reduction, driven from the nose of the regular lathe spindle, and furnished with a driving faceplate and a dead center. The frame is mounted on the ways of the bed, and is backed against the regular headstock housing. With the regular lathe gearing, screws with leads as long as 4 inches can be cut; screws with leads up to 12 inches long are cut by means of special change gears.



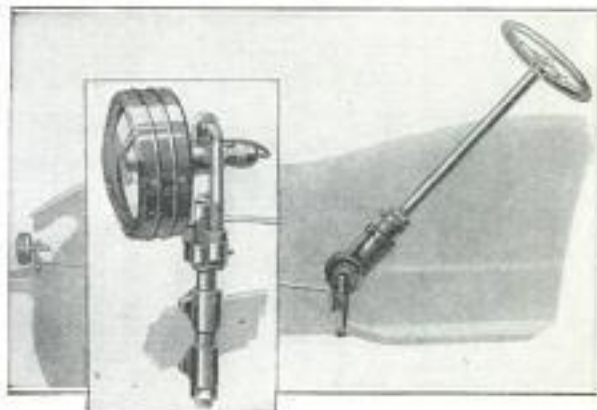
While the cutting of long-lead screws is the primary purpose of the attachment, it is also of value where work of extreme accuracy is to be turned, requiring the use of dead centers, and for forming cutters, etc., with wide tools, where exceptionally low speeds are required.

GREATER SPEED IS CLAIMED FOR SPIRAL-FLUTED TAP

A staybolt tap that has proved a success after most exacting tests is machined with spiral flutes. It is designed with a taper that has proved to have a distinct advantage over the common tapers, adding greatly to the life of the tool. The spiral flutes provide free cutting edges, thus enabling the tapping speed to be increased without increased friction. The results of the tests indicate that the new tap will do more work, in less time, than any other form of tap.

AUTO PILOT LIGHT TURNS WITH STEERING WHEEL

Responding to the slightest turn of the steering wheel, a small automobile pilot light provides constant illumination over

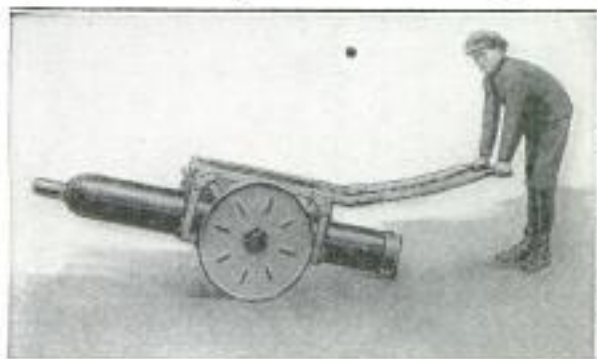


Pilot Light in Position on Car; Inset, Close-Up of Pilot Light

the spot where the wheels will pass. It is intended to be mounted at the front of the car near the road, and may be clamped to the bumper or frame bracket. The directing rod is connected to the steering arm.

HEAVY GAS TANKS CARRIED ON TWO-WHEELED TRUCK

Transportation of the heavy gas cylinders used in welding and refrigeration is greatly facilitated by the use of a new French two-wheeled truck. The truck is wheeled to the center of a cylinder, with the wheels straddling it, then the long handle is raised; this forces a pair of jaws, mounted at the front of the truck, to grip the cylinder firmly. The handle is next lowered, and a second pair of jaws, at the rear of the truck, grips the cylinder. The cylinder is now suspended



Raising Gas Cylinder from Ground with Carrier, Ready for Transportation

and ready to be wheeled away. One quarter turn of a small crank releases the cylinder, allowing it to slide to the ground.

Hendey Machine Co. Torrington Conn.

Cmt. E. Weiss, 80 Blvd. Juydan, France

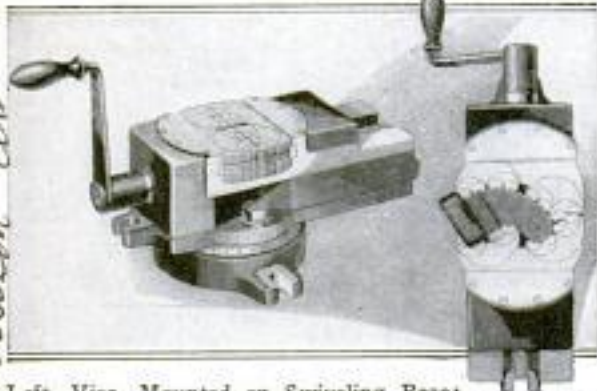
W. L. Zubaker & Bros. Co.,
50 Church St.
New York.

maker unknown
Copyrighted material

*Mantle & Co.,
190 7. Park Ave
New York*

**IMPROVED VISE THAT GRIPS
ODD-SHAPED PIECES**

A new type of vise, which is adapted for gripping work of any shape, has recently been developed. The main jaws of



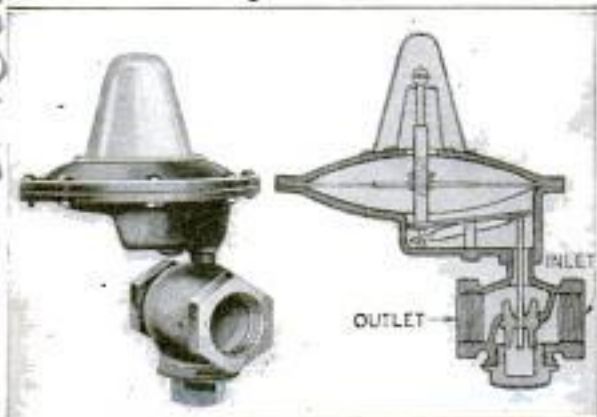
Left, Vise, Mounted on Swiveling Base; Right, Plan View of Vise Gripping Curved Bracket

the vise are semicircular in shape, and each contains two smaller semicircular pieces; these, in turn, are fitted with similar pieces, and so on, so that finally there are eight small jaws bearing on either side of the work. As all these parts can be adjusted independently, it is an easy matter to set them to conform to work of any shape, when, upon tightening the vise, the work will be held firmly at a number of points, and with no danger of distortion.

The vise may be used as a plain bench vise or fitted with a swiveling base for use on bench or machine, and will prove of great value in any machine shop, where it will eliminate many special fixtures.

**GAS VALVE AVOIDS DEATH
AND FIRE DANGER**

Because of the menace from fires and explosions caused by sudden reductions in gas pressure which extinguish the



This Valve Prevents Danger to Life Due to Pressure Drop in Gas Lines

lights and then allow the gas to flood a building or home, an automatic valve has been designed which cuts off the supply when the pressure drops. The valve then remains shut until it is opened by hand.

**SLIDING CYLINDERS FEATURE
NEW DIESEL ENGINE**

An engine that is different, in many respects, from any Diesel engine now on the market, has undergone experimental tests in England. The novel feature about it is that its cylinders move with the pistons, but through a much shorter distance or stroke. The result of the tests was so satisfactory that the builders are proceeding with the construction of a much larger engine.

It is claimed that the new engine has not only half the weight, and occupies about half the space of the ordinary Diesel engine, but has much fewer wearing parts, and that the engine could replace the ordinary steam engine in a ship and permit the entire boiler and bunker space to be used for the carriage of cargo.

**MICROMETER SNAP GAUGE AIDS
INSPECTION WORK**

Snap-gauge micrometers, that eliminate the necessity of providing a large number of solid snap gauges, are the latest aids to production and inspection work.

The tools resemble ordinary micrometers, but have double heads and anvils, each head being set to a standard and locked independently, on inspection work. On production work, the minimum-limit head can be set and locked, while the other is permitted to revolve freely, thus enabling the operator to measure the work as it progresses, and eliminating guesswork and loss of time.

The tool is made in three sizes, measuring up to 3 inches, and can be furnished with a convenient bench stand.



A piece of clear celluloid makes a fine substitute for the glass in a slide-rule runner, should the latter be broken. A light scratch, filled in with India ink, is used as an index mark.

*Sole distributors -
Montrose, New York
347 Montrose Ave New York*

*Seton Bros Shattuck
Albela*

*J. F. Shocomb Co.
Providence, R.I.
North Yorks Ltd*



All Shop Notes published in 1922, in book form—Fifty Cents—from our Book Department.

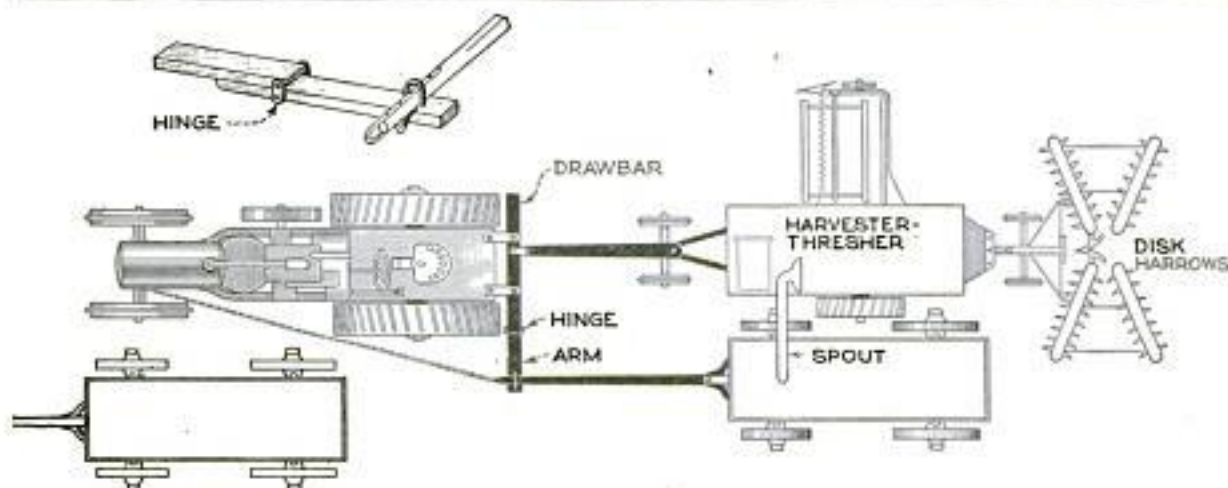
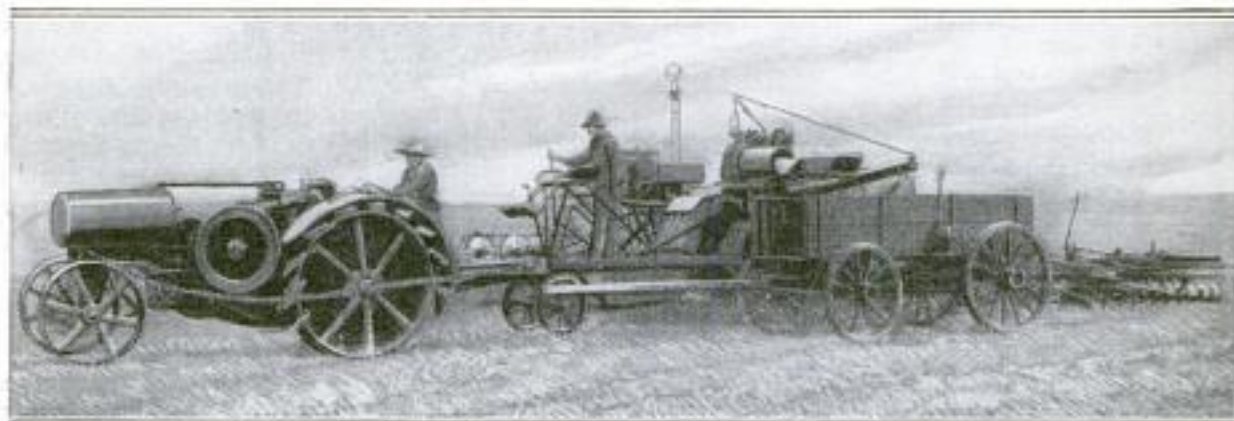
Attaching Wagon to Harvester-Thresher

BY GEO. G. McVICKER

WITH the speeding up of crop production, great improvements have been made in machinery for planting, tending, and harvesting, but many manufacturers, when building an implement, plan only for the operation of one particular machine at a time. This leaves it

the farmer had hoped to dispose of when buying his tractor, must be kept and used.

One western farmer has disposed of this problem in the following manner: The wagon that receives the grain is attached to the tractor by means of a hinged arm fastened to the tractor drawbar, as shown



Method of Hitching Wagon to Harvester-Thresher to Receive the Threshed Grain: Above, Photo Showing Outfit in Operation; Below, Layout of Tractor, Thresher, Wagons, and Harrow, with Detail of Drawbar Hitch

to the farmer to devise hitches that will enable him to use several machines together.

Harvester-threshers seem to be built with the idea in mind that horse-drawn wagons will be used to take care of the threshed grain, and hence the horses that

in the illustration. The hinge shown, which is made from short pieces of flat iron and iron rods, allows the arm to support the wagon tongue without the use of a tiebar. Into the outer end of the hinged portion, a large staple, is driven, just

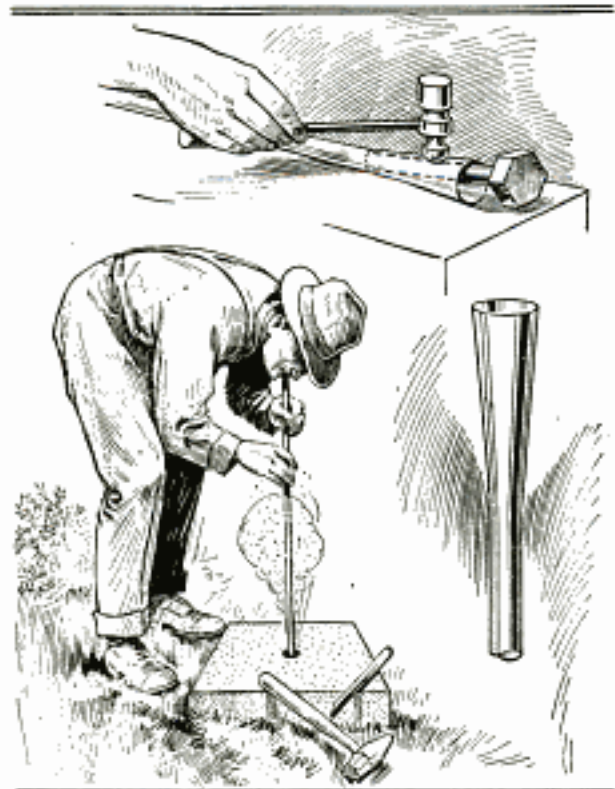
far enough to allow room for the wagon tongue to enter freely.

The wagon, when first hitched on, is connected close to the arm by means of the chain shown, the front end of the chain being attached to the tractor. This allows the rear end of the wagon to be filled; the chain is then let out a little more, allowing the wagon to fall back as the harvester moves forward. This is continued until the wagon is evenly filled.

The empty wagons are left in the position shown at the lower left, and, when one is ready to be hitched on, the chain is unhooked, the arm thrown up so as to pass the empty wagon, then dropped, and the wagon coupled on as before.

Cleaning Drill Holes in Rock or Concrete

When drilling holes in rock or concrete by means of a star drill, the dust that collects in the hole can be cleaned out



Blowpipe for Removing Accumulated Dust from Holes Drilled in Rock and Concrete

with a blower of the kind shown in the illustration. The blower is merely a length of $\frac{3}{8}$ -in. light brass tube, flared slightly at one end by inserting a hexagon-headed bolt or screw into it, and tapping the pipe with a hammer, as shown in the upper detail. After dropping the flared end down near the bottom of the hole, the dust is blown out quickly and

In the harvesting season in the central and western plains, the crop is not only harvested and threshed in one operation, but the seed bed is prepared, at the same time, by a disk harrow, attached to the rear of the combined machine.

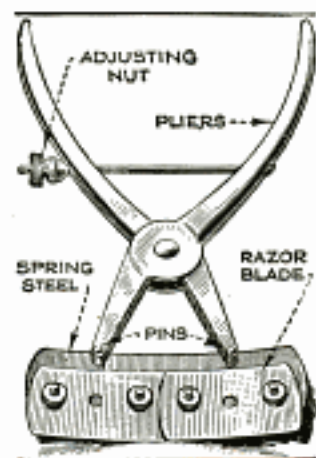
There is always a side draft in these large harvester-threshers, due to the cutter bar extending so far to one side. In attaching the harrow to the rear of the machine, the drawbar or hitch should be made adjustable, so that the harrow can be set sufficiently to one side or the other to counteract this side draft. This is particularly convenient when harvesting on sidehill fields, where the machine has a tendency to creep down.

thoroughly. It is necessary, of course, to keep the eyes closed while blowing, to keep out the dust.

In hard rock, when it is necessary to use water on the drill to keep it cool, the resulting "mud" in the hole can be picked out by gently tamping the blowpipe down, which will pack the mud in the end of the pipe. The pipe is cleaned by blowing, tapping, or by pushing a wire through it.—Dr. G. E. Abbott, San Diego, California.

Novel Skinning Knife

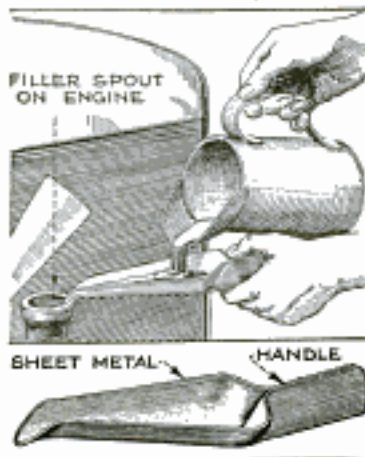
When skinning a beef carcass there are two dangers for the novice: one is cutting a hole in the hide, which decreases its value, and the other is leaving too much flesh on the hide, which causes a heavy dockage. A useful skinning tool, which eliminates much of this trouble, is shown in the illustration. It consists of a pair of ordinary 6-in. pliers with a hole drilled through each of the jaws, and in each handle, as indicated, the pliers being annealed for the purpose. A piece of spring steel, about 1 in. wide, is drilled and attached to the jaws by means of pins riveted loosely through the holes. Two safety-razor blades are attached to the spring by means of small bolts, fitted with thumbnuts; the cutting edges of the blades project about $\frac{1}{8}$ in. beyond



the edge of the spring, and the inner ends overlap, as shown. A small, long bolt, fitted with a thumbnut, is passed through the holes drilled in the handle, to complete the device. By slightly pressing the steel spring between the jaws and screwing up the thumbnut on the handle bolt, the blades will be bent in a curve to suit many parts of the carcass. The tool is manipulated with one hand, being pushed along with the protector next to the hide, and the separated part of the hide is held with the other hand.

Funnel for Filling Crankcase

The funnel illustrated has several advantages over many other types used for pouring oil into the filler spout on an automobile crankcase, as it has no restricted opening, and is independent of



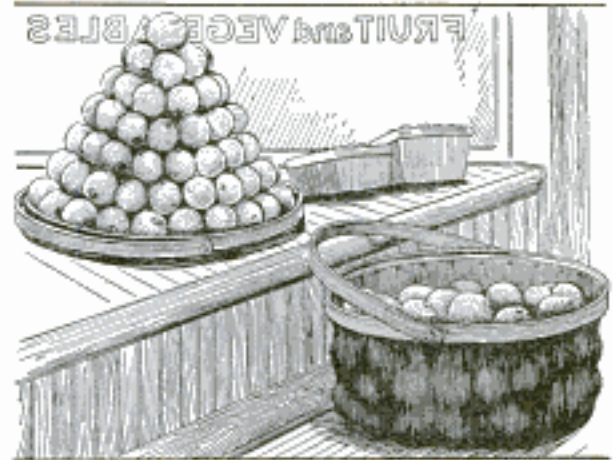
the measure. A number of funnels of this type, varying in size, are used in a gasoline-service station in Washington, D. C. They are made of sheet metal, such as galvanized iron, which is available almost everywhere and can readily be bent to the shape shown. The oil may be poured as rapidly as it can be taken by the filler spout on the engine. A considerable saving of time is effected by the use of these funnels, and they are cheap to make; for this reason particularly they are recommended for service stations.

Collapsible Baskets Simplify Fruit Display

The proprietor of a fruit store, who made a practice of changing the display in his show window every day, found that the fruit could be removed quickly, and without any danger of injury, by using collapsible baskets of the type illustrated. In addition to their usefulness in removing the fruit, these baskets also served to keep the piles of fruit intact, as the rims of the baskets supported the bottom layer of each pile.

Each basket consists of a cloth bag,

tacked to a barrel hoop, to which half of another hoop is riveted to serve as a handle. These hoops are covered with

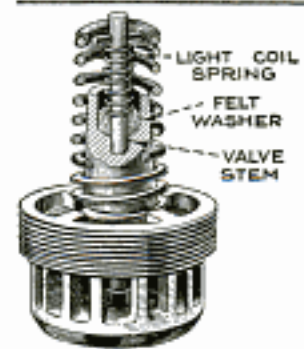


Collapsible Cloth Baskets Support Piles of Fruit in Show Windows and Facilitate Their Removal

colored crêpe paper to give them a neat appearance. When the fruit is displayed in the window, the basket is folded down neatly, as indicated, the fruit being piled inside of the rim. To remove the fruit, the basket is lifted and the pile is carried away. This method of removing fruit from show windows is especially valuable during winter, when the fruit must be removed every evening to prevent it from being injured by frost.

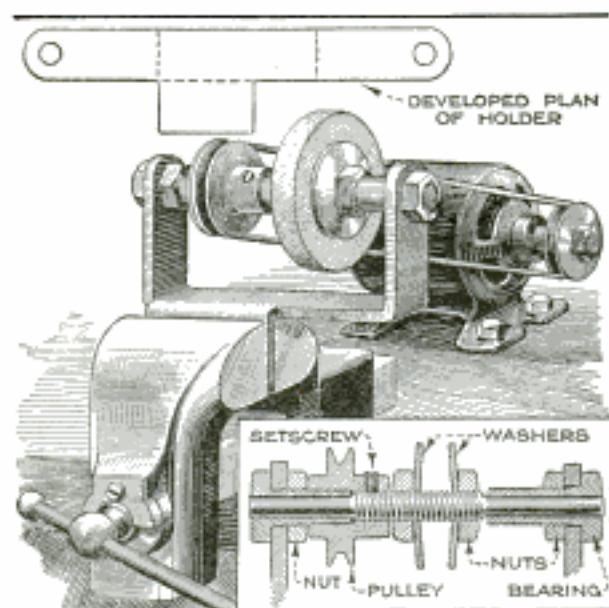
Curing Misfiring of Truck Engine

The erratic firing of a light-truck engine when running at low speeds, caused by the leakage of air around the intake-valve stems, was cured in the manner illustrated. The valves and cages were removed, and the upper end of the guide in each cage counter-bored, to a depth of $\frac{1}{4}$ in., with a drill bit $\frac{1}{4}$ in. larger than the valve stem. In the stuffing box thus formed, a couple of felt washers were placed, and a light coil spring put over them, and held in position by the mainspring washer and pin, forcing the felt tightly against the stem and shutting off all leakage. A few drops of oil were applied to the washers occasionally, to prevent wear of the guides and stems.—Maling C. Metzger, Silver Creek, Neb.



Vise Grinder of Simple Design

The simple grinder shown in the drawing will prove of convenience in a small workshop, where there is not enough



A Simple Grinder Held in the Vise Is of Considerable Advantage in the Small Workshop

space for a stationary grinder, or where a stationary grinder would not be used often enough to justify its installation. The holder that supports the spindle is made in one piece; it is cut from boiler plate and bent to the shape shown, leaving two lugs to carry the bearings for the spindle, and one for holding the fixture in the vise. A V-pulley and an emery wheel are mounted on the threaded spindle, and bronze bearings are threaded into the lugs and fastened by locknuts, as shown in the lower detail. An electric motor is fastened to the workbench behind the vise, the slots in the base of the motor permitting proper adjustment of the belt.

Removing Rock Coatings from Fossils

The delicate task of removing the final rock coatings from newly unearthed fossils has been much simplified by the research scientists of the California Academy of Science, who have successfully used for this purpose the unusual combination of the hottest flame known to industry, and a drop of cold water.

The new method not only facilitates what otherwise is a most difficult task, but it also reduces the danger of breaking or otherwise injuring the fossil during the final step of cleaning the rock coating from it. A fine jet of oxyacetylene flame, the temperature of which is about

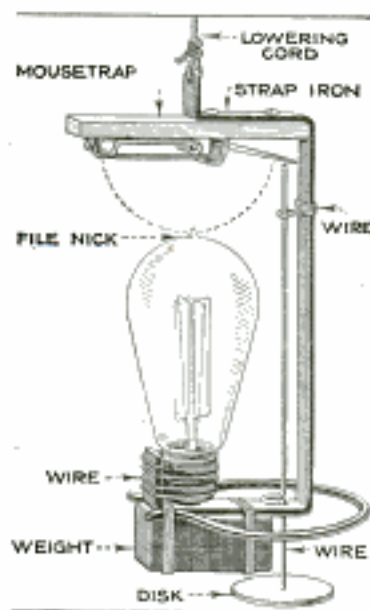
6,300° F., is directed upon the last of the rock coating remaining on the fossil. Immediately afterward, a drop of cold water is put on the heated spot. The heating and cooling takes place too quickly to cause expansion and contraction of the fossil underneath, so that only the outside rock cracks and breaks away, leaving the fossil itself uncovered and uninjured.

This method is especially useful if the fossil is irregular in shape. If it is large, the rock coating must be broken off in small pieces. The method bids fair to become the standard practice with fossil experts, because it reduces to a minimum the risk of damaging the fossils while they are being cleaned.—Roswell S. Britton, New York City.

Novel Sampler for Deep Wells

The device shown in the illustration was improvised to obtain samples of water from the bottom of a 160-ft. well. It consists of a frame carrying a burnt-out electric lamp, which is filled with water by having the tip broken off automatically when the device strikes bottom.

The lamp, and the mechanism for breaking the tip, are held by a strap-iron frame, bent to the shape indicated. A spring mousetrap is attached to the frame in an inverted position, so that its lever,

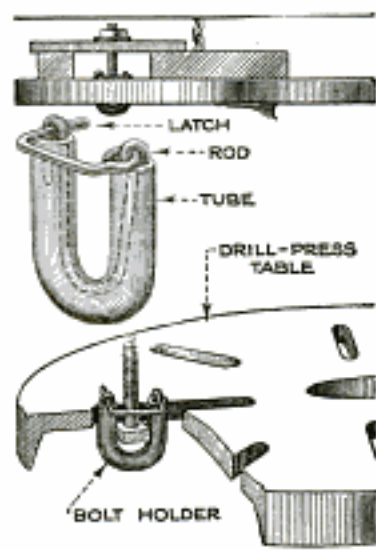


upon swinging around, hits the tip of the lamp, and breaks it off. The trap is tripped by means of a plunger, which consists of a length of wire with a disk soldered to the lower end, as shown; the plunger is pushed up and springs the trap when the disk strikes the

well. A weight is attached to the lower part of the frame to insure its sinking in a vertical position. A coil of heavy wire, attached to the lower end of the frame is used like a screw socket, the lamp being screwed into it. After the lamp is in position, a file nick is made in the tip to localize the break as much as possible. The water is quickly drawn through the small opening thus made, and the device is then raised to the surface where the water can be examined.

Drill-Press Bolt Holder

The holder shown in the illustration is handy when using bolts in the plain slots of a drill-press table. It not only keeps the bolts from turning when the nut is tightened, but also prevents the bolts from falling to the floor when the nut is removed. Some wire and a length of tubing are the only materials necessary

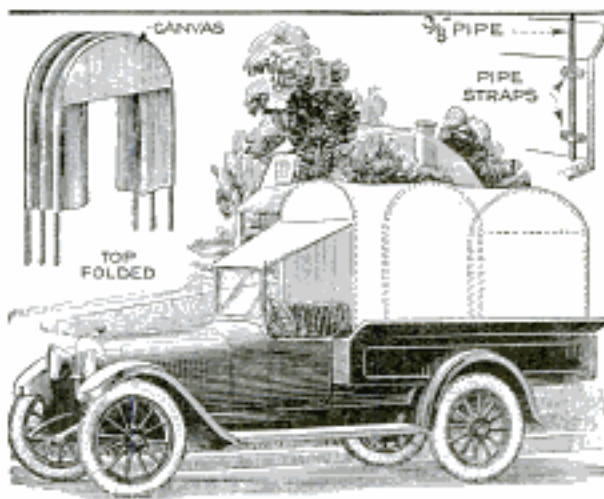


to make it. The tube is bent to the U-shape shown, but before doing so, a length of wire is placed in it; after the tube is bent this wire is looped over at both ends. A latch is next made of the same size wire and attached, care being taken to leave the eye large enough to allow the latch to swing in and out of the opposite loop. When using the holder, the U-shaped wire is pushed through the slot in the table with the latch thrown back. To lock the holder, and to keep the bolt in position, the latch is swung around and pushed through the wire loop. Where it is necessary to use a bolt continually in a plain slot, considerable trouble can be avoided by using this holder, as with it a bolt can be held just as easily in a plain slot as in a T-slot.

When milling operations are finished, the cutter should be removed from the arbor, cleaned and placed in a wall cabinet or drawer, where it is kept from contact with other tools.

Detachable Top for Open Truck

The drawing shows a simple detachable top for an open express-truck body. It consists of a heavy-canvas covering, held



A Canvas Covering for the Open Express Truck: It can be Attached or Detached in a Moment

by three ribs made of $\frac{3}{8}$ -in. pipe, bent to the shape indicated. Semicircular pieces of canvas are used at the ends of the top, and an additional flap covers the driver. The top canvas is attached to the ribs by strips of canvas, sewed across them, and, when the top is erected, the flap is attached to the edge of the windshield as shown. The ribs are held by means of pipe straps screwed to the sides of the truck body, two straps being sufficient for each leg. A canvas top of this kind can be conveniently carried in the truck body.

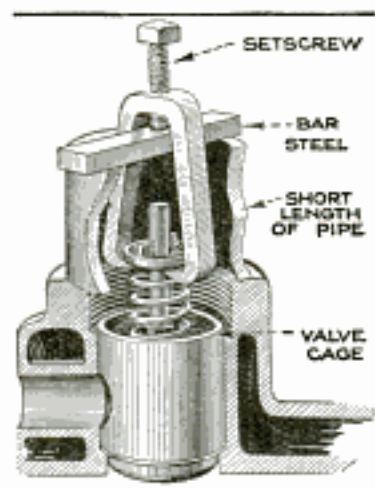
C-Clamps Support Ladder While Hanging Eaves Trough

When hanging an eaves trough, it is necessary to fit the upper end of the ladder with some attachment that will enable it to clear the trough. A simple and satisfactory attachment consists of two ordinary 4-in. C-clamps. These are fastened on the end of the ladder, as shown in the illustration, so that the thumbscrews rest against the first row of shingles.—W. B. Nicholson, Detroit, Mich.



Valve-Cage Puller

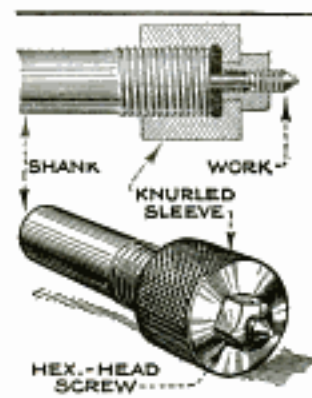
On engines having overhead valves, a common method of removing a valve cage is to pry it out. The disadvantage of this practice is that the valve is frequently bent, making necessary a tedious



repair job, or the renewal of the valve. To do the work without danger of injuring the valve, a simple cage puller of the type shown in the illustration has been found serviceable. It consists of a short length of pipe, with an internal diameter larger than the diameter of the cage, and a U-shaped steel rod, bent to form a hook for gripping the spring-retaining cap on the valve stem and fitted with a setscrew as shown. The hook is engaged with the cap and the setscrew tightened on a heavy steel bar placed across the pipe, releasing the valve cage from its seat without any danger of bending the stem.

Holding Small Screws in Lathe

Any lathe hand who has attempted to hold small, short screws in a small chuck or in a drill chuck, while machining them, will appreciate the advantages of the screw holder shown in the drawing, which will hold them firmly even where only two threads can be used to chuck them.



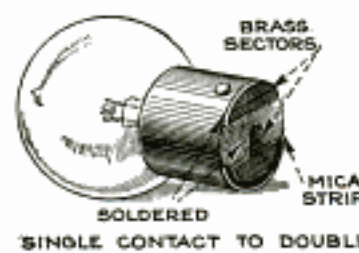
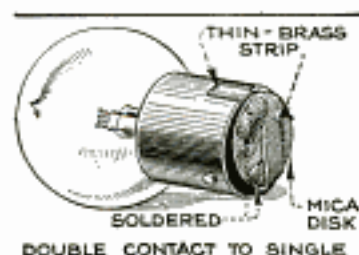
A short piece of cold-rolled steel, of suitable diameter, is either turned taper on one end, to fit the lathe spindle, or straight, to be held in a universal chuck; the other end is threaded, and a short length turned down to a small diameter, as shown. A knurled sleeve is then made to fit the threaded end, and is drilled and tapped, at its center, to fit a standard hexagon-head cap-

screw. Several of these capscrews are drilled and tapped, along their axes, to fit the various sizes of screws.

To machine a screw, the sleeve is screwed outward a few turns, the screw is placed in position, and the sleeve screwed inward, when the small-diameter nose of the shank butts against the screw, and locks it firmly. After machining, half a turn of the sleeve will release the screw, so that it can be unscrewed with the fingers.

Changing Base Connections of Bayonet- Socket Lamps

To adapt a double-contact automobile lamp for a single-contact socket, first see if one of the contacts makes connection with the lamp base. If so, well and good; if not, a connection must be made, which can be done with a drop of solder, or by means of a very thin-brass strip. A small strip of brass is soldered to the other contact, and doubled, as shown, so as to cover the center of the base; then



a mica disk is placed in the fold, and cemented in place with shellac.

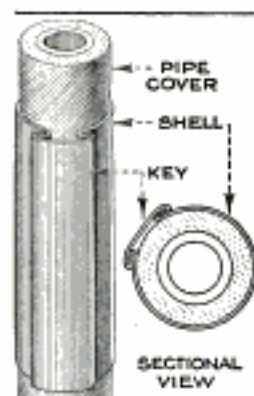
A single-contact base is adapted to a double-contact socket by filing the center contact down until it is nearly flush with the bottom, and soldering on a

T-shaped brass strip or sector, as shown in the lower detail, care being taken that the strip does not touch the base. Another brass strip, making contact with the base, is soldered opposite this, as indicated. A strip of mica, covering the arm soldered to the center contact, is then cemented in place. The sectors must, of course, be arranged in such a position with respect to the pins that proper contact will be made in the socket. —H. H. Parker, Oakland, Calif.

☐ Manganese steel is not susceptible to magnetism and cannot be magnetized; therefore, parts made from this material cannot be held on magnetic chucks.

Protecting Pipe Covering

The magnesia covering used on steam pipes has not much mechanical strength, as it is covered only by a thin layer of cloth, and hence does not offer much protection to pipes passing through floors,

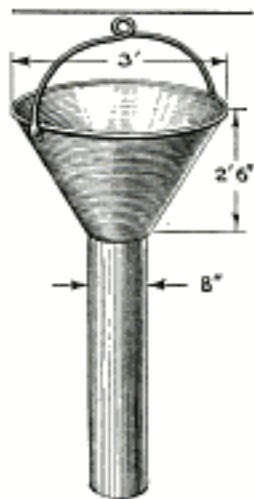


or along walls where they are likely to be struck by trucks or material. A good, substantial protection for the covering was provided, in one such case, by inclosing the covering, to a height of 6 ft. above the floor, with a stove-pipe-iron shell. The edges of the shell are crimped outward, so that a "key," made

from a narrow strip of the same metal and having the edges crimped as shown, can be pushed over the edges of the shell, to draw it tightly around the covering and lock it. Keys of the same size can be used with various sizes of shells, the latter being cut to suit the diameter of the pipes and their covering. After the key has been pushed into place, the seams are carefully pounded down with a wooden mallet.

Placing Concrete in Water

If concrete is emptied loose and allowed to sink through water, so much of the cement is washed away that the mixture is spoiled. In the absence of other means of depositing the concrete, the device shown, which is called a "tremie," can be used to advantage.



This device consists of an 8-in. galvanized sheet-iron pipe, reaching from the surface of the water to the point where the concrete is to be laid, a funnel with a bail being provided on the top of the pipe, so that it can be hoisted and lowered easily. In use, the pipe is completely filled with concrete, the bottom

end being held down to prevent the concrete from running out. When the pipe is full, it is slightly raised to allow the concrete to run out gradually.

Tool for Peeling Logs

Peeling the bark from logs is heavy work, and any tool that will simplify it is worth making. Such a tool is shown

in the drawing. It is simply an old hoe, with the neck straightened as indicated, and the blade formed slightly convex to fit the side of an average-size log; this is done by heating the neck and blade to a

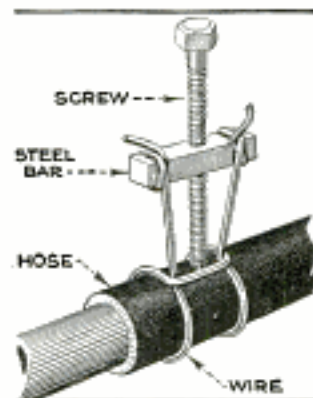


cherry red and then forging. The blade is sharpened, on the log side, with a file. In using this tool, the worker stands erect and can peel the log with surprising speed.—Jos. C. Coyle, Colorado Springs, Colo.

Wire Clamp for Garden-Hose Connections

The illustration shows a simple device for clamping rubber-hose connections with wire. The device consists of a $\frac{1}{2}$ -in. bolt, about 6 in. long, threaded its entire length and rounded at its end, to prevent injury to the hose. The bolt is screwed through a steel bar, drilled and tapped to fit and having notches filed around each end.

When using the device, a suitable length of galvanized-iron wire is bent to a U-shape, and wrapped around the hose in the manner indicated, the ends being drawn up tightly and wrapped around the notches in the steel bar. The bolt is then screwed down against the "bottom" of the U, until the wire is tightly drawn around the hose, after which it is only necessary to swing the tool over, thus bending the wire, and to cut off the ends about $\frac{1}{2}$ in. from the bend. A pair of pliers is used to clamp the ends down.—John H. Yeakel, Everett, Wash.





EQUIPMENT FOR AUTOMOBILE-TOURIST CAMPS

By A.J.R.Curtis and J.Tate

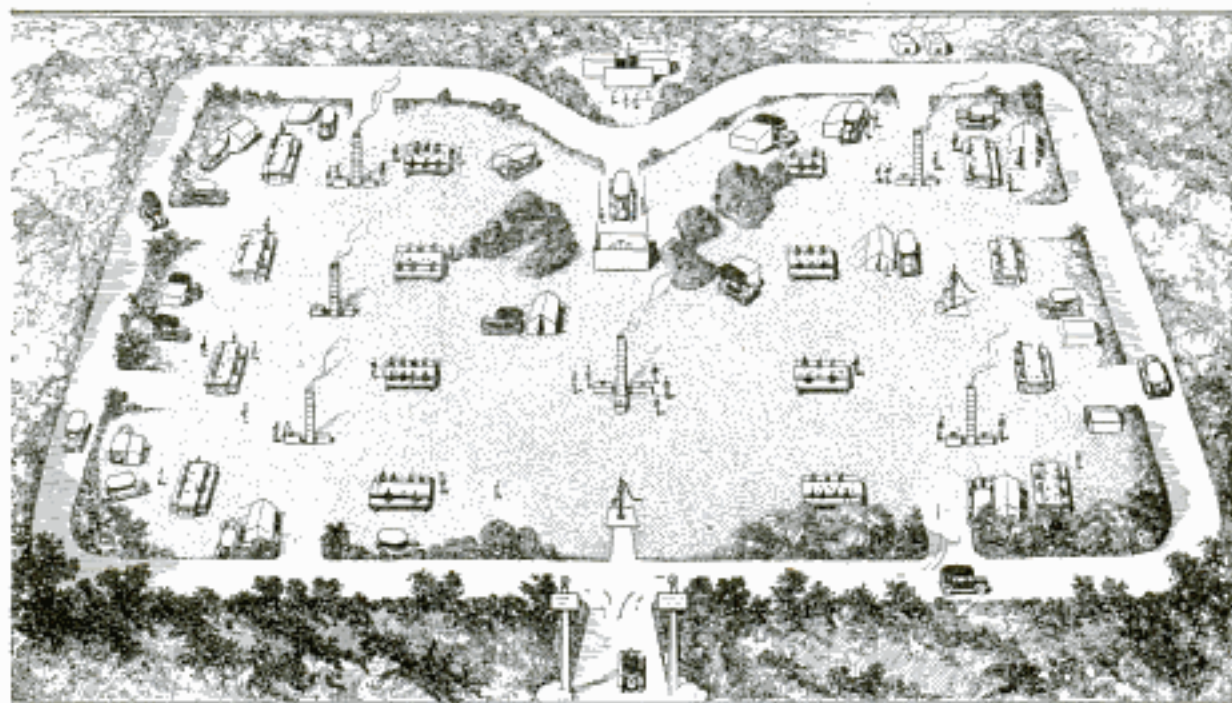
Part II—Vaults, Bath, Garbage Boxes, Incinerators, Washing Platform, and Fountain

THE equipment shown in the camp layout given in Part I, while quite suitable for a small village or town camp, cannot be expected to serve where a very large volume of tourist traffic is certain or expected.

The equipment shown in the layout below, however, should enable a city to cater to a large number of tourists without overcrowding. The arrangement of

to health, turning an outing for recreation into a period of exposure to dangerous germs. Where sewage systems are not available, a septic-tank system, or vaults such as shown in Figs. 11 to 19, should be installed.

The concrete vault proper is shown in Fig. 11, a section in Fig. 13, and a view of suitable forms in Figs. 15 and 19. The lower part of the vault is cast in place,



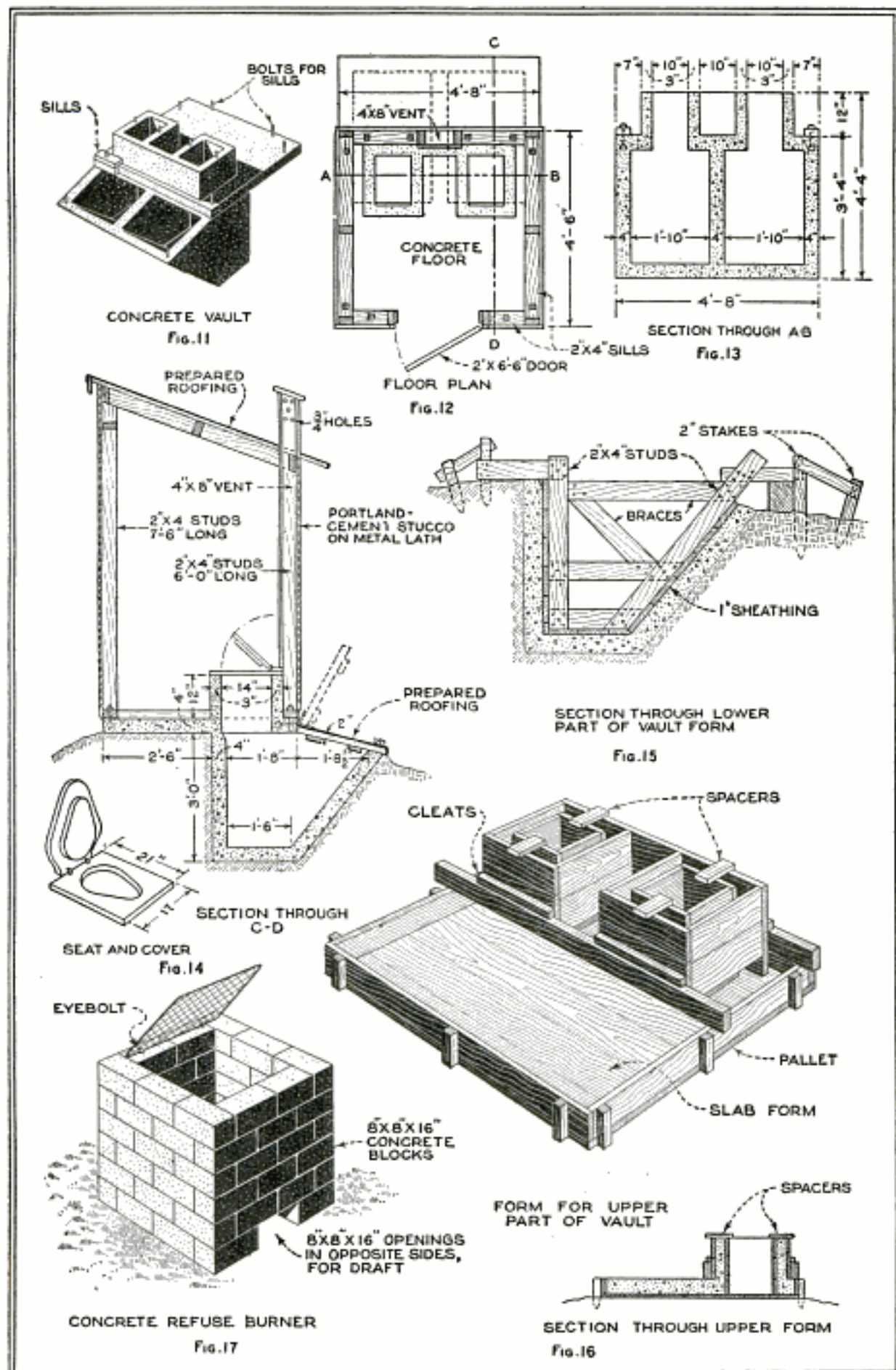
Suggested Layout for Automobile-Tourist Camp with Equipment for a Large Volume of Traffic: Toilets, Incinerators, Washing Platform, and Shower Bath may be Seen in the Background

the units, as in the smaller layout, is entirely suggestive, and will depend almost entirely upon the shape of the lot. In any event, garbage cans and incinerators should be placed a good distance from the tables, yet not so far that their use will be a burden, and therefore likely to be slighted.

Toilet facilities in most camps are so poor as to constitute the principal objection, by many people, to the use of such camps. This not only keeps many tourists away, but is a positive menace

as shown in Fig. 15. The form shown can be made of light lumber by anyone who can use hammer and saw, and need not be at all elaborate, so long as it is strongly enough braced to support the concrete; the layer of concrete forming the bottom is placed first, then the form is set in, braced in position, and the side walls poured.

While the bottom part is curing, the upper part may be made. A form that molds the slab floor and seat supports is shown in Fig. 19. This also need not



Figures 11 to 16 Show a Very Easily Constructed Vault for Toilet Purposes, Where a Sewage System is Not Installed, or Where No Disposal Field for a Septic-Tank System is Available. Figure 17 Shows a Simple Concrete-Block Refuse Burner or Incinerator

be elaborate, as it will only be needed for one or two pieces. When cured, the slab can be moved into position, and the joint between upper and lower parts made with neat-cement mortar.

The housing may be made of concrete, cement plaster on metal lath, brick, or wood, as convenient. The wood sills for the structure, if the latter is made of metal lath and stucco or wood, are attached to the vault by means of bolts imbedded in the concrete, as shown. The construction shown in the drawing is Portland-cement stucco on metal lath, with wood studs, vent, and roof, and serves well. It would perhaps be well to have this part of the work, or at least the plastering, done by a competent contractor. The concrete used is a 1:2:3 mix, and approximately 7 sacks cement, 13½ cu. ft. sand, and 20 cu. ft. pebbles will be required.

In order to keep the camp neat and orderly, refuse burners and garbage cans should be provided. The burners, or incinerators are best made of concrete blocks, 8 by 8 by 16 in. in size, as shown in Fig. 17. The draft openings are made simply by leaving one block out of the lower courses, on opposite sides. A cover, made of heavy wire netting, bound with ½-in. round-iron bar, should be provided, to keep charred paper, etc., from flying around the camp. The eyebolts for attaching the cover, are set into holes chipped in the blocks and filled with neat cement. Sixty blocks will be necessary for each burner.

The garbage cans, Figs. 18 and 19, are made in one piece of concrete reinforced with wire mesh, the walls being 2 in. thick. The forms for these need no description, as the method of making them is obvious. The bolts for the top covers and the clean-out door hinges are imbedded in the concrete when it is placed. A 1:2:3 mix is used here also; 2 sacks cement, 4 cu. ft. sand, and 6 cu. ft. pebbles being used for each container.

Where running water is available, an automobile-washing platform, shower bath, and drinking fountain will be highly appreciated.

The washing platform, Fig. 20, is merely a 10 by 18-ft. concrete slab, with a low curb on three sides, and a gutter, running to a sewer, on the fourth. Most cross-country tourists wash and lubricate their own cars, so a floor of this type will be well patronized. The floor should slope ¼ in. to the foot toward the gutter, but the curb is level all around; this, in a floor of the size specified, will make

the curb 1½ in. high at one end, and 6 in. high at the other. The slab itself is 6 in. thick. With what has been shown of form construction previously, no difficulty will be experienced in making this platform. The concrete used for the floor should be a 1:2:3 mix, while that for the curb should be 1:2½:4, the amount of material necessary being 31 sacks cement, 66 cu. ft. sand, and 10 cu. ft. pebbles.

The simple shower bath shown in Fig. 21 is another highly desirable feature. The walls are simply made of Portland-cement mortar, plastered on both sides of metal lath, and the frame is 2-in. angle iron, imbedded in the footings and braced by ½ by 1½-in. flat-iron bars, where necessary. The floor and footings are cast in one piece, and the floor beveled from the sides toward the center drain pipe, in the shower compartment, while the cement is still soft. The dressing compartment is fitted with a seat and clothes hooks. No top is necessary on the structure. The floor is made of 1:2:3 concrete, the footings of 1:2½:4, and the walls of 1:3 mortar; the material required is 35 sacks cement, 100 cu. ft. sand, and 38 cu. ft. pebbles.

The fountain shown in Fig. 22, while not essential, will prove of convenience. The water-supply and drain pipes are first placed and connected, and the slab and pedestal cast around them. Slab and pedestal can be cast all in one piece; note that a step, 8½ in. high, is provided on each side of the pedestal, for the convenience of children. The paneling on the sides of the pedestal is formed by means of blocks, tacked to the form sides, as shown in Fig. 9, Part I. For the fountain, 3¼ sacks cement, 6¼ cu. ft. sand, and 10 cu. ft. pebbles is necessary, a 1:2:3 mix being used throughout.

A camp provided with equipment of the type described in this article will be a credit to any community, and, as emphasized in Part I, will attract the better class of tourists, thereby benefiting local business.

When the volume of tourists has become large enough, it will pay to have an employe stationed at the camp to sell supplies, to keep the grounds clean, and to render service of one kind or another to the tourists.

ⓘ Sand or pebbles for concrete work must be clean. If coated with clay, for example, the cement cannot adhere to the surface, and thus cannot perform its binding function.

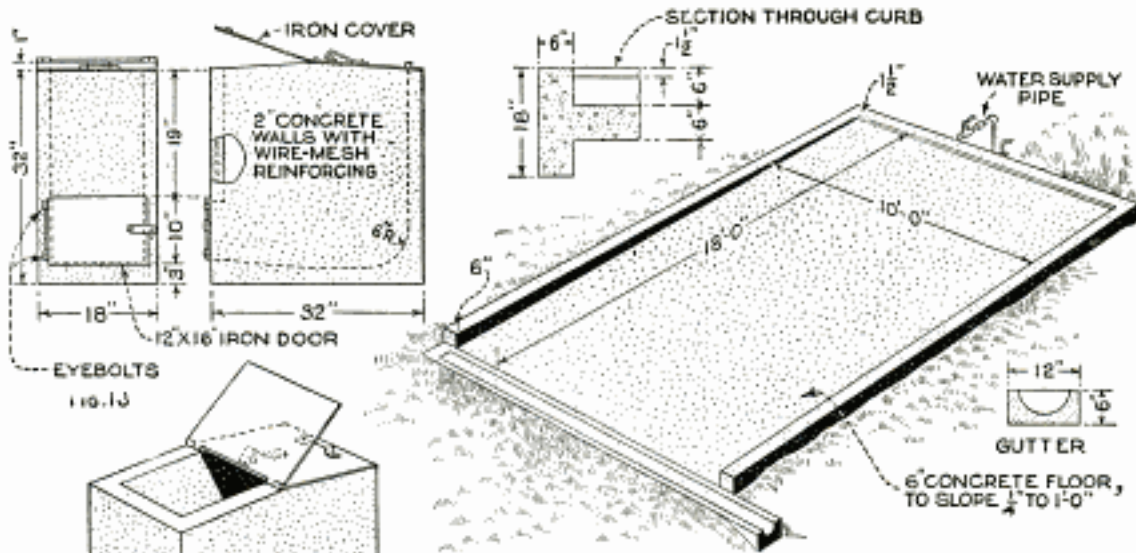
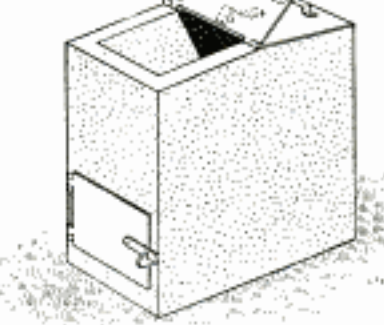
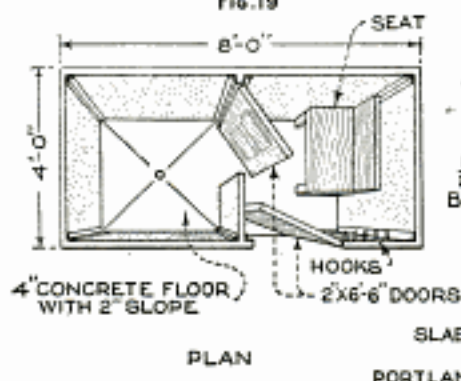


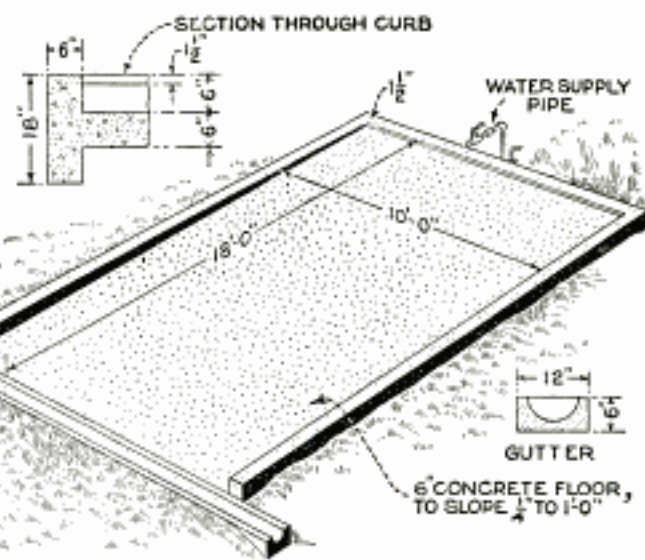
Fig. 18



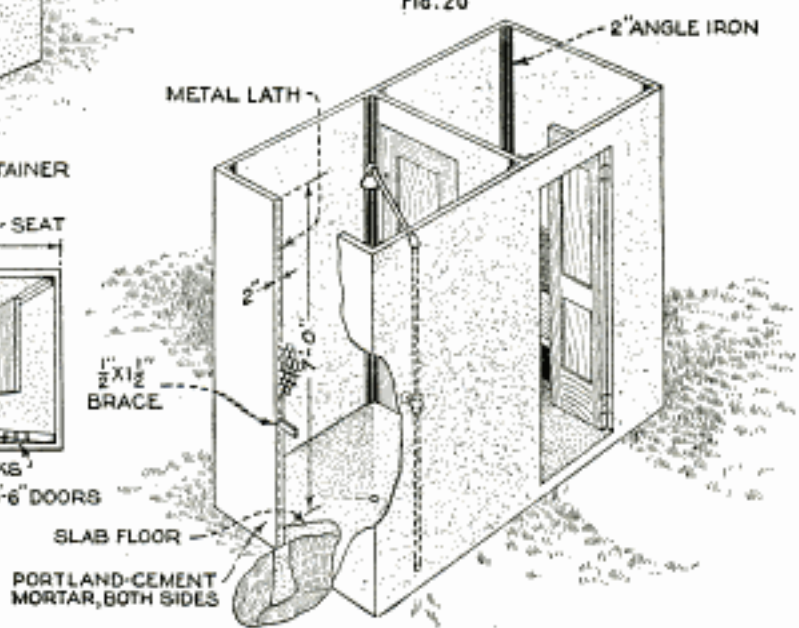
CONCRETE GARBAGE CONTAINER
Fig. 19



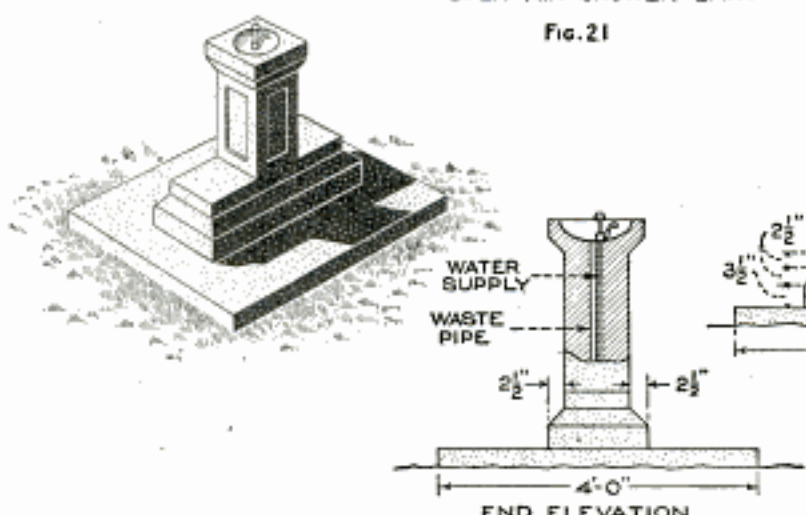
PLAN



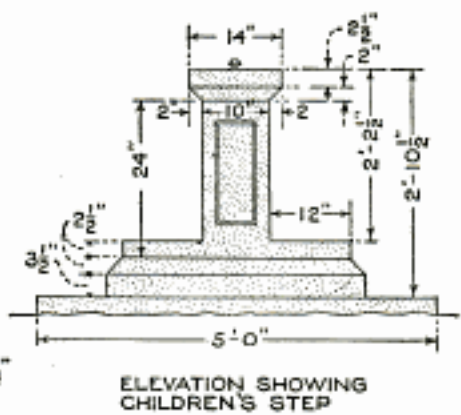
AUTOMOBILE-WASHING PLATFORM
Fig. 20



OPEN-AIR SHOWER BATH
Fig. 21



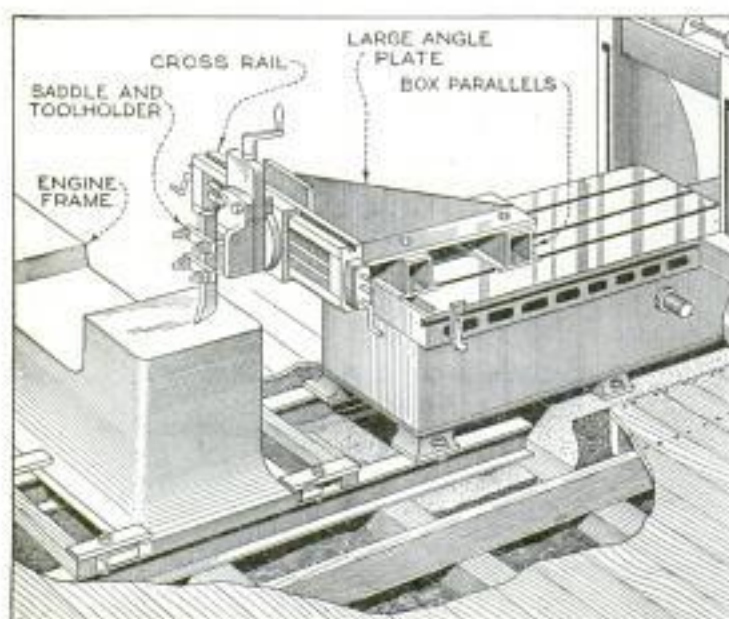
END ELEVATION
Fig. 22



Figures 18 and 19: Concrete Garbage Container, of Good Design, and Easily Constructed. Where Running Water Is Available, the Automobile-Washing Platform, Shower Bath, and Drinking Fountain, Shown in Figures 20 to 22, can be Provided, and will be Greatly Appreciated

Planer Converted into a Shaper

No matter how well planned and equipped a machine shop may be, there usually comes a time when the largest



An Attachment That Adapts the Planer to Operations on Work beyond the Capacity of the Housings

available machine is just too small for a big job. These big jobs must be done, and, rather than farming them out to another shop, the management orders the job to be done in some manner that calls for ingenuity. The arrangement illustrated for converting a planer into a shaper is an example. The work machined with this tool consisted mainly of large engine frames and roll housings, which were too long and heavy to pass through the planer housings.

The method used in converting the planer to its new use was quite simple. The planer cross rail was removed from its housings and mounted on a large cast angle plate as illustrated. This angle plate, with the cross rail attached, was then set up on box parallels and clamped to the table. The work was supported on heavy I-beams which were bolted to the lower flange or feet of the planer bed. Bolting the I-beams to the base of the machine in this manner made it necessary to remove about 3 ft. of the foundation. After the beams had been attached, they were leveled with the planer table and supported on timber sills. This arrangement for supporting the large work was made flush with the shop floor and formed a permanent addition to the planer equipment.

After the work had been leveled on the supporting steel beams, it was clamped in position. The saddle and toolholder were fed by hand, and were able to work over as wide a range as though mounted on the housings. The overhang of the cross rail was made as short as possible, the work being positioned close to the end of the planer shears. Considerable power is saved by this method of machining heavy work, as the weight of the cross rail and angle plate is negligible when compared with the weight of the job.

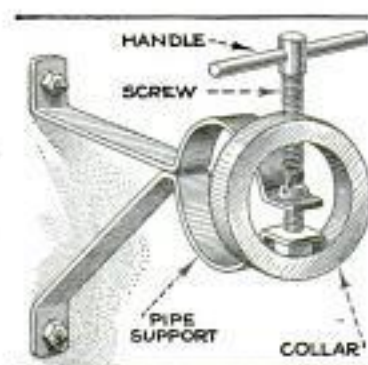
When the cross rail is mounted high, it is advisable to ballast the table with a few heavy castings in order to hold it firm.

Tightening Pipe-Line Hangers

A common hanger for supporting light pipe lines that are used in connection with exhaust fans, and for similar purposes, consists of a bracket made from two pieces of thin, flat iron, fastened at one end to the wall or roof, bent at the other end to inclose the pipe, as shown in the illustration, and fastened with a screw and nut. Anyone who has done the job knows how difficult it is to bring the ends of the bracket close enough to allow the screw to be inserted and the nut to be started, especially as the operator is nearly always perched on a ladder. On a lengthy job of piping, using these hangers, it was found that the tool shown in the drawing greatly facilitated the work.

To make the tool, a long $\frac{1}{2}$ -in. screw

was ground at one end to the shape of a screwdriver point, and a pin driven



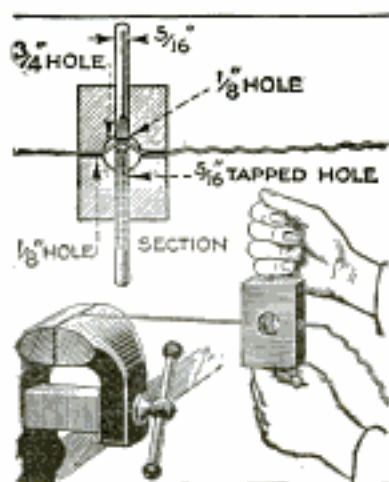
through the other end to serve as a handle. An old collar of suitable diameter was obtained, and the screw run into the $\frac{1}{2}$ -in. setscrew hole already in it. In use, the screw is turned back far enough to allow the collar to be slipped over the ends of the bands, and the small clamp screw is dropped into place. The $\frac{1}{2}$ -in. screw is

then run down until the screwdriver point engages the slot and drives the screw home. In this manner the ends are readily forced together, and when the screw projects through the bottom lug, the nut is slipped in place, the final tightening being done with a wrench after the tool has been removed.

A Good Wire Straightener

The making of an odd coil spring or two, in the small shop, is always more or less of an experiment, and often several springs must be wound before one suitable for the purpose intended is made. The tool shown in the illustration has been successfully used for straightening these scrap springs, to reclaim the wire for future use.

A rectangular piece of $\frac{1}{2}$ -in. steel is used for the body. A $\frac{3}{4}$ -in. hole is drilled in the center; a $\frac{1}{8}$ -in. hole in each side, for the wire; a $\frac{5}{16}$ -in. plain hole in one end, and a $\frac{5}{16}$ -in. tapping hole in the other, as shown. The plain hole is fitted



with a sliding handle, with a $\frac{1}{8}$ -in. hole drilled through it near one end, and a threaded $\frac{5}{16}$ -in. rod is screwed into the tapped hole.

To straighten out a spring, one end is held tightly in a vise; the other end is gripped in a pair of pliers, and the spring pulled out until the wire is as straight as possible. The handles of the tool are then adjusted until the hole in the end of the plain handle is in line with the $\frac{1}{8}$ -in. holes in the body, and the tool is pushed onto the wire and up to the vise.

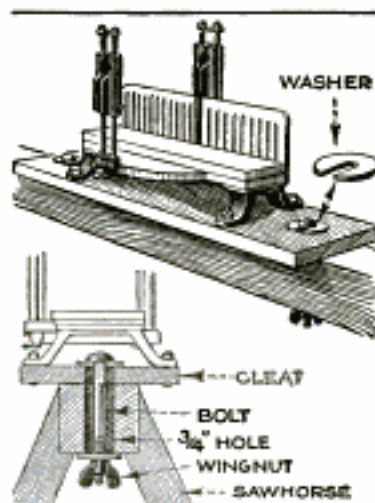
The threaded handle is then screwed in, until sufficient tension is put on the wire to straighten it, when the tool is drawn along as shown. To prevent the plain handle from falling out when the tool is not in use, a few punch marks may be made around the inner end, or a piece of wire put through the hole and the threaded handle screwed tight.

The edges of the holes are rounded to allow the tool to slide on the wire without cutting or scraping it.

Quick-Acting Miter-Box Clamps

The carpenter's usual method of attaching his miter box to a sawhorse has several disadvantages. It is generally necessary to nail cleats across the top of the sawhorse to provide a base wide enough for the legs of the miter box, which, in turn, must be screwed or nailed to the cleats.

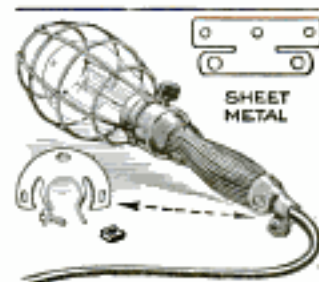
A better method was devised by a California carpenter, and is shown in the drawing. The miter box is screwed or bolted permanently on a board or cleat, and the cleat is clamped to the sawhorse by means of two carriage bolts, slipped through $\frac{3}{4}$ -in. holes drilled in both cleat and sawhorse. A slotted washer is slipped under the bolt head when the bolt is pushed in position from below, and the wingnut on each bolt tightened, clamping the miter box securely on the horse. To remove the miter box, it is only necessary to loosen the wingnuts so that the washers can be slipped out, and the bolts will drop out.



To remove the miter box, it is only necessary to loosen the wingnuts so that the washers can be slipped out, and the bolts will drop out.

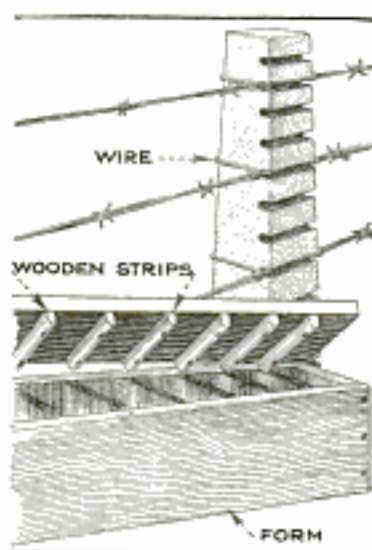
Clamp Protects Portable-Lamp Connections

Trouble is usually experienced with electric extension cords fitted with portable lamps of the type illustrated, as the cord is easily pulled out of the socket. This trouble can be overcome by fitting the lamp handle with a small sheet-metal clamp, the upper detail showing the pattern of the clamp and the lower detail how it is bent. A small bolt is fitted on the clamp proper, so that it can be tightened on the lamp cord. The other part is screwed to the end of the handle as indicated. With this in place, the part of the cord inside of the lamp holder will not be subjected to any strain.



Attaching Wire to Concrete Posts

A good method of attaching wire to concrete fence posts is shown in the drawing.

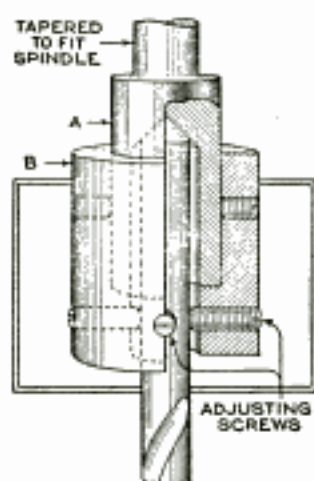


One side of the post, as far as it extends above the ground, has small grooves formed in it, about 2 in. apart. These grooves are made by wooden strips nailed to the face of the form in which the posts are made. The fence wire is

laid in the grooves as shown, and bound in place by a short length of wire, passed around the post and twisted around the fence wire.—Warner H. Ellis, Keenes, Ill.

A Milling-Machine Drill Chuck

In order to line up the point of a drill to a punch mark on the work held on the table of a machine, it is, of course,



necessary that the drill should run true. To obtain this accuracy, something more than the ordinary drill chuck is needed, for drills have a habit of running true in the shank but out at the point. This may be the fault of the drill, but is more often the fault of the chuck, which, unless it is

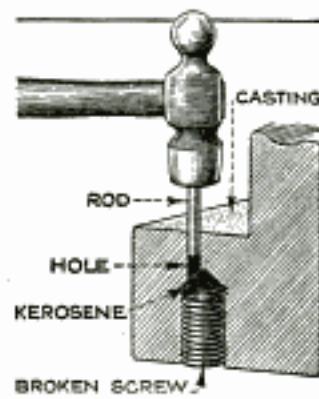
a new one, has a tendency to throw the drill point slightly out. To overcome this, the drill chuck shown was designed.

It is made in two pieces, the part A being turned to fit the spindle and bored out with a conical seat at the bottom. The sleeve B is bored at one end to slip over the inner piece, the opposite end being bored to the same size as the opening in A. The outer piece is bored and tapped to take four screws for truing purposes, and two setscrews to hold it to the shank. As shown in the drawing, several differ-

ent drill sizes can be held in the holder. In operation, the drill is pushed into the chuck until it rests in the conical seat provided for it, and the four adjusting screws are tightened to line up the drill approximately, after which the drill can be trued up as accurately as desired by loosening or tightening the screws after the manner of a four-jawed chuck.

Removing a Broken Screw

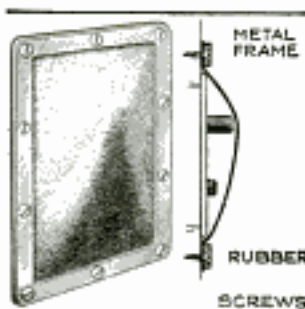
The removal of a broken stud or set-screw, that has rusted in place, usually requires considerable time and patience. Before resorting to annealing and drilling, the method shown in the drawing should be tried, if possible.



Invert the piece in which the screw is situated, and drill a small hole into the screw hole, as shown in the illustration. Fill this hole with kerosene and insert a short rod of the same size as the hole. By hitting the rod a hard blow, the kerosene will be forced around the threads, after which it is easy to remove the screw with a hammer and chisel.

Making Push-Button Switches Water-Tight

Push-button switches in exposed places can be protected from water by covering them with rubber, attached as shown in the illustration. For a single-gang switch, a rubber sheet, about 4 or 5 in. in dimensions, should be used. Such a piece can be cut from an old inner tube. The rubber is attached to the wall around the switch by means of a narrow frame, cut from a piece of sheet



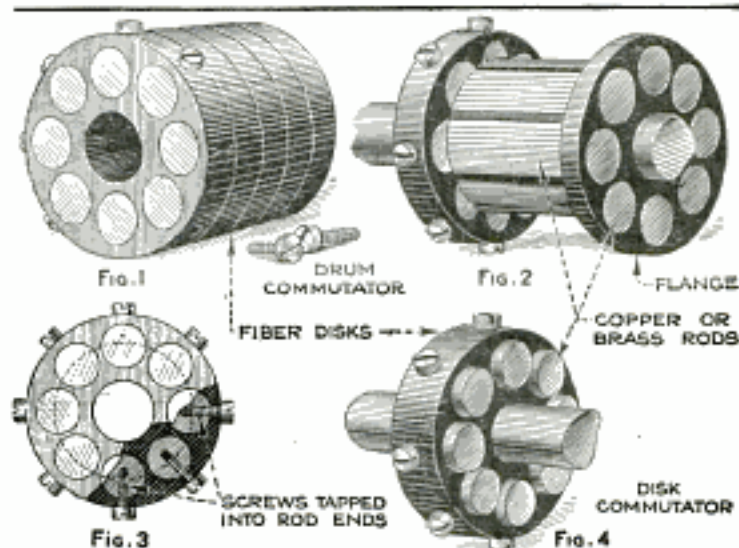
brass, and drilled to receive small brass screws. A snap switch can be protected in the same way, except that a larger sheet of rubber is required, to allow the knob to be grasped and turned.

Making Small Commutators

Drum commutators for small experimental motors and dynamos are usually made by driving a length of brass tubing over a fiber rod, fastening the ends with machine screws, and then cutting the tubing lengthwise into segments. A better method is to make up a fiber body, considerably larger in diameter than the finished commutator, by pressing together a number of thick fiber disks on a mandrel, the same size as the motor or dynamo shaft. Copper or brass rods are then driven into holes drilled lengthwise through the fiber cylinder, as shown in Fig. 1. The whole cylinder is turned down until the rods have been cut away to about half their diameter, as in Fig. 2, leaving a series of segments, separated by the fiber insulation, with a flange at each end. The diameter of the rods used for the segments is determined to a great extent by the number of segments necessary; the larger the number of segments the smaller the rods. Before turning down, each rod is drilled and tapped, through the fiber, at one end, and small brass machine screws are screwed in, to

hold the rods in place, and to serve as terminal fasteners for the armature winding, as shown in Fig. 3.

A disk-type commutator can be made in a similar manner and with less work. In this case the segments are round cop-



Figures 1, 2, and 3, Drum Commutator, and Figure 4, Disk Commutator, Made of Fiber Disks and Copper Rods

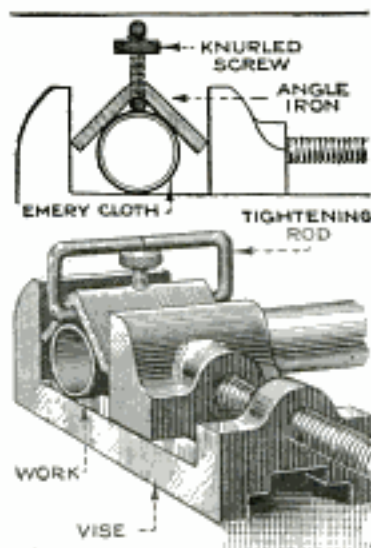
per or brass plugs, turned down for a portion of their length, and driven into holes drilled in a fiber disk as shown in Fig. 4; brass screws are used in this type also, to hold the plugs in place.

Holding Thin Tubes in Hacksaw Vise

Sawing thin tubing in the power hacksaw is always an awkward and time-consuming job, as the material must be

gripped tightly enough to prevent moving, yet without distorting it. The device shown in the drawing will simplify the work considerably, and will more than pay for the time spent in making it, whether this job be a "stock" one,

or only done from time to time. A piece of angle iron, rather shorter than the width of the vise jaws, is used for the



body, and is drilled and tapped, at its center, for a knurled-head screw. Next a length of small, round, cold-rolled steel is bent to form a rectangle, the length of which is sufficient to allow it to slip over the angle iron, while the width is a little more than the length of the knurled screw.

The method of using the device is as follows: The tube is first wrapped, the length of the angle iron, with emery cloth, folded back to back, so that the emery is on both surfaces. Then, with the screw backed out, so that the rod lies snugly against the iron, the angle iron is pressed down tightly on the tube, and the vise is closed on the iron. The tube is now held snugly without the pressure of the vise acting directly on it. To keep it from moving under the saw, the screw is tightened.

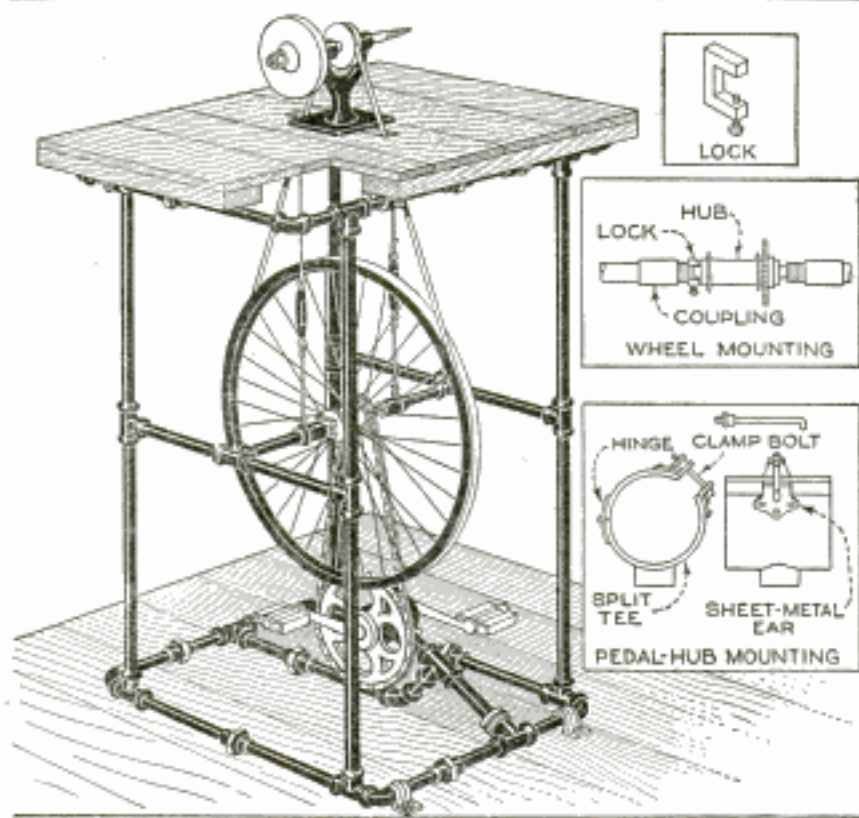
It is not necessary to loosen the vise each time the tube is moved forward, releasing the pressure on the rod sufficing to enable the tube to be moved. When the holder is not in use, the screw is backed up against the rod.—Harry Moore, Montreal, Can.

Foot-Power Grinder for Small Shop

By C. RABER

A FOOT-POWER polisher and grinder that can be used for sawing, and for driving a small lathe, as well as for grinding, in a small workshop, is shown in the illustration. The easy run-

The table consists of a frame, made of 2 by 4-in. stuff, to which a 1/2-in. top is nailed. The grinder head is bolted or screwed to the top so that a small V-pulley, mounted on its shaft, is exactly in line with the bicycle wheel. A belt is then passed over these two wheels, and the grinder is complete. The top should be securely attached to the frame, and the frame to the floor, by means of pipe straps.



Copying Newspaper Halftones

Many good photographers fail to get successful results when trying to copy pictures in newspapers or magazines. Success is assured if the directions given below are closely followed.

Place a piece of ground glass in a printing frame, ground side up. On this, lay a thin piece of clear celluloid and place the picture face down upon it. Fasten the back of the frame, and stand it on a table squarely in front of the camera.

Illuminate the picture from the front, to avoid reflections, but do not let the light shine into the lens.

Use a "process" plate, not the ordinary kind; this is slower in action, hence an exposure of about double the usual time must be made. Focus carefully and do not shake the camera during exposure.

The ground glass will eliminate the grain of the halftone and paper entirely. If the halftone screen is a very coarse one, it will be found better to reverse the glass, thus placing the ground side farther away from the face of the picture.

A Foot-Power Grinder Used in a Small Workshop: It is Also Used as a Buffing Wheel, a Circular Saw, or to Drive a Lathe

ning of the machine, and the convenience of the pedal arrangement, enable the operator to use both hands for the work.

The frame is constructed entirely of pipe and fittings, and the driving mechanism of bicycle parts. The pedal-hub mounting consists of a regular bicycle-pedal hub, held securely in a large tee, which is split and fitted with a hinge and clamp as shown in the lower detail. Crosspieces in the center of the framework hold the wheel in position so that the small sprocket on the wheel hub is in line with the large pedal sprocket. The method of mounting the hub is shown in the center detail. The ends of the spindle are carried in nipples on each side, and the lock shown in the upper detail is used to prevent the cone from being tightened by the wheel when the latter is turning. As the greatest strain to which this part is subjected is downward, supporting wires, fitted with turnbuckles, are connected to the pipe couplings and to the underside of the table, as shown.

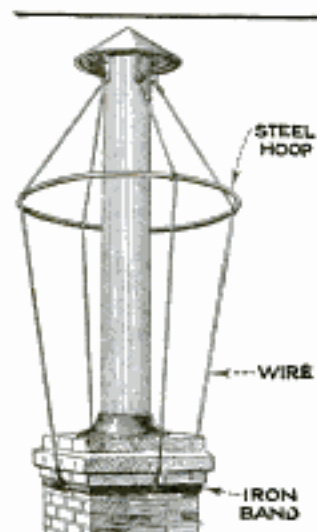
ⒸWhen examining the storage battery of a car to see if any water is needed, do not simply test one cell; examine them all. One of the cells may be cracked, and will require water oftener than the others. It is a good idea to examine a storage battery once every two weeks. In adding distilled water to the battery, always bring the level of the electrolyte 1/2 in. above the top of the plates.

Homemade Metal Lath

By using homemade metal lath on an outside stucco job, a considerable saving was effected. The price asked for regular metal lath by dealers was about 38 cents per square yard, while the homemade kind cost about 10 cents. Lengths of No. 8 galvanized wire were first tightly stretched over the wall vertically, spaced about 10 in. apart, and nailed at both ends; 2-in. mesh poultry netting was tacked over this, then lengths of No. 18 wire were laid horizontally, spaced about 4 in. apart, and nailed at the ends. The whole was stapled down well and the cement was applied in the usual way. —A. L. Neuenschwander, Miami, Fla.

Bracing Chimney Extension

A tinsmith who was confronted with the problem of erecting an extension on a low chimney, without attaching guy wires to the roof, braced the extension in the manner shown in the drawing.

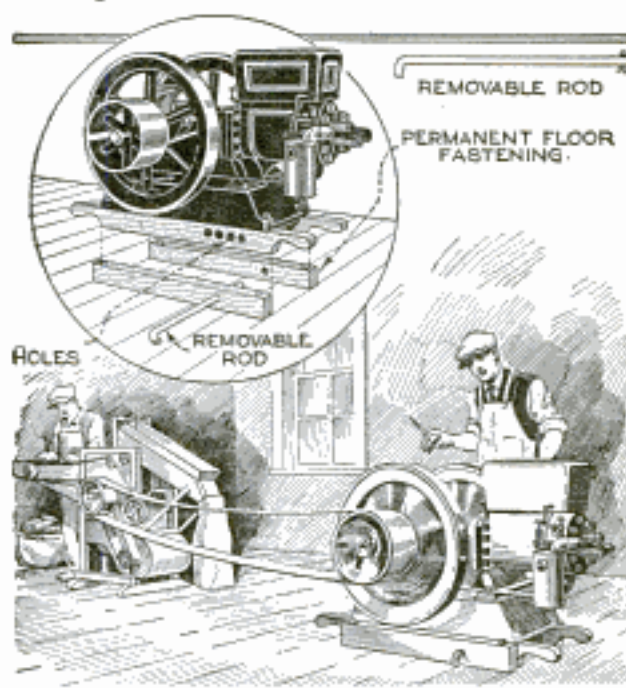


by wrapping each guy wire around it once. This bracing made the extension so strong that it has withstood the heaviest gales

Making the Farm Engine More Convenient

The problem of holding down a gasoline engine, without resorting to the usual method of bolting it to the floor, was solved by the portable and adjustable base shown in the drawing. Two heavy wooden beams are bolted to the underside of the engine, their ends projecting far enough to be used as handles. Two similar beams, somewhat shorter, are per-

manently attached to the floor so that those on the engine will fit between them. A removable rod is then pushed through holes drilled in all four beams, to lock them together and hold the engine down securely. One hole is drilled through each outside beam and a series of holes through the inner ones so that the two



A Base That Makes the Farm Engine Readily Portable, Yet Secure When in Use

base members can be locked together at different points, to obtain proper belt tension. Floor beams of the same type are attached near every engine-driven machine, so that, to attach the engine, it is only necessary to slide it into place and slip in the rod.

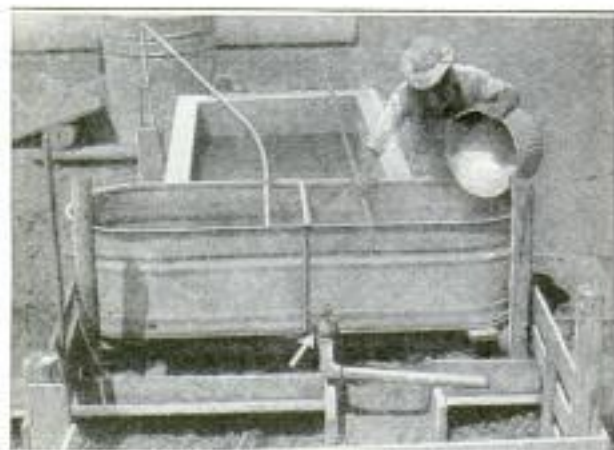
Flatiron Coil Used in Ignition System

A Wisconsin flour miller eliminated the use of dry cells for low-tension ignition on his stationary gas engine by substituting a flatiron heating element. By so doing he also avoided the expense of renewing the cells, which is incident to dry-cell ignition systems. The flatiron coil was connected in series with the 110-volt lighting circuit and the ignition circuit of the engine, on the positive side. The coil was suspended in the air, where it could not come in contact with any inflammable substance, as it became very hot when used for any length of time. Although a good, hot spark was provided with this arrangement, there was only a small current consumption, and there was nothing to get out of order easily.—Paul L. Fetherston, Jackson, Michigan.

Mixing Feed for Hogs

The novel method of slopping hogs shown in the photo is in use on an Iowa farm, and has been found a great time and labor saver.

The iron tank shown in the foreground



A Novel Method of Slopping Hogs: Both Troughs can be Refilled While the Hogs are Feeding

is placed at one end of the concrete watering trough, and can be filled with water from the pipe that supplies the trough. The tankage, shorts, or other ground feeds are mixed in the tank and enough water run in to make a thin slop. Then the valve indicated by the arrow is opened, and one of the troughs filled, whereupon the valve is closed again, the pipe swung over to the other trough, and this one filled. The valve and tank, and the inner ends of the troughs, are fenced in as shown, so that the hogs will not interfere with the filling operation, and the hogs are not turned into the yard until both troughs are filled, so that each one has an equal chance to get its portion of the feed.

Lubricating Derrick Sheaves

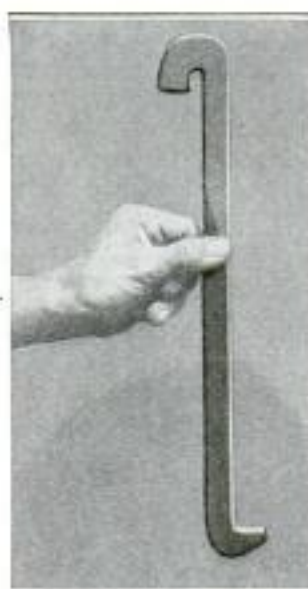
It is almost impossible to get the average derrick operator to oil the sheaves at the top of the derrick, as it is necessary to climb the mast. On an 80-ft. derrick we overcame this difficulty by running a $\frac{1}{4}$ -in. pipe along the mast to within a few feet of the top, and fitting a length of flexible metallic hose on the end to reach the center pin of the sheave. Metallic hose comes in sizes appropriate for this purpose, together with the necessary fittings, which are a solder nipple on one end and a $\frac{1}{4}$ -in. pipe-thread nipple at the other. At the bottom of the length of pipe, an elbow, taken from one of the popular high-pressure auto-greasing systems, was fitted. A good grade of grease,

that does not harden in cold weather, was used, the entire pipe being filled with grease by means of the high-pressure grease gun, so that at any time afterward, a push on the grease gun below forced the grease into the sheave pin. This method of lubricating has also been found practicable on all our clamshell buckets, and on the derrick engine. In places where the nipple was likely to be broken off, the old oil cup on the bearing was removed, and a solid plug was substituted for it. Another plug of the same size was drilled and tapped to take one of the grease nipples. When it was necessary to oil the bearing, the solid plug was removed, the one with the nipple screwed on, and the grease gun applied.—A. S. Jamieson, Springfield, Mass.

Enameled Ware Repaired by Brazing

Enameled ware can be repaired easily and permanently by brazing, the small tip of an ordinary welding or acetylene brazing torch being the most suitable to do the work. Remove all rust and dirt around the hole with hydrochloric acid, or with a piece of emery cloth. Apply heat, and melt the flux and spelter around the hole, spreading the spelter over the hole with an iron wire, flattened on one end. The spelter will unite with the enamel, making a permanent repair.—M. Van Slyke, Jacksonville, Fla.

A Handy Spike-Pulling Tool



It is frequently necessary to tap or remove spikes and other parts so close to the ground that there is not enough room below for the head of the hammer, to say nothing of the space required for swinging it. The tool illustrated will prove of considerable assistance in cases of this kind. The lower hook is inserted beneath the head of the spike to be drawn, and the hammering is done on the underside of the upper hook.—H. J. Engel, New Braunfels, Tex.



Making a Cycling Monkey

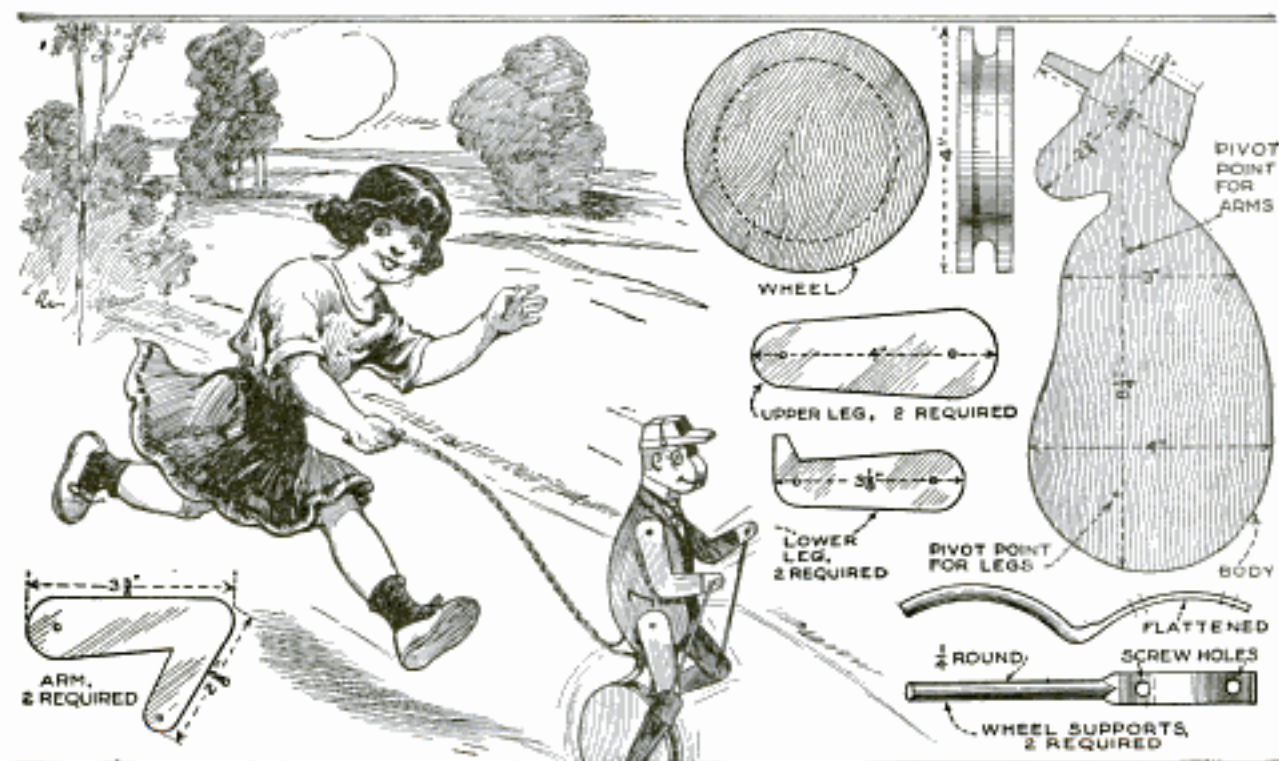
BY L. R. BUTCHER

A FEW ordinary tools and a little skill are all that is required to enable any boy to make the animated toy shown in the illustration; this will not only make a splendid toy for little brother or sister, but any boy, or group of boys, can make a sufficient number to earn quite a little pocket money, if the work is well done and attractively finished.

Any good soft wood, 1 in. thick, and free from knots or other imperfections,

used. Blue-annealed sheet steel is better for this purpose than galvanized iron, which does not hold paint well. Almost any kind of scrap metal can be used—strips cut from an old auto body, for example, are excellent for the purpose.

The wheel may either be made from one piece, 1 in. thick, or built up; the one-piece construction is the stronger, and should be used whenever possible. This is a wood-^{er's} job, but if no lathe



An Ingenious and Almost Unbreakable Toy That will Please Any Child: Nothing but Common Wood and Sheet-Metal Working Tools Are Necessary for Its Construction

can be used for the body. A vertical center line should be marked on the stock first, and all measurements for laying out the body made from this line. It is not at all necessary to follow these dimensions closely; the body can be made as much larger or smaller as desired, while keeping to the same general proportions.

Each arm is made in one piece, each leg in two, 20-gauge sheet metal being

is available, any woodworker will turn one out at very slight cost. The groove around the wheel accommodates the wheel supports; there is no axle.

Round iron or cold-rolled steel, $\frac{1}{4}$ in. in diameter, is used for the wheel supports. One end of each support is flattened and drilled for screws for attachment to the body, the remainder being curved to fit in the wheel groove.

The toy is assembled by first fastening

the wheel in place, allowing a slight play between wheel and supports. The wheel should be placed a little in front of the



center line of the body. The lower ends of the legs are then pivoted to screws driven into the wheel at a distance of $1\frac{1}{4}$ in. from the center, so that, when one leg is extended, the other is raised.

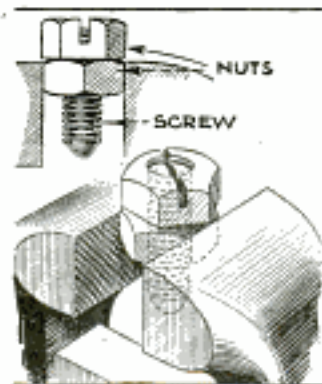
Ordinary tinner's rivets are used as pivots for the knee

joints, and screws at the points where the legs and arms are attached to the body. The end of each arm is linked, by a short piece of wire with an eye bent at each end, to the knee joint, causing the arms to move up and down as the toy is pushed forward. Two pieces of heavy wire, twisted together and attached to the rear of the body, form the tail and the handle to push the toy.

The maker may use his own taste in painting the toy, but whatever color scheme he decides to follow, the face should be strongly marked. The completed toy is very sturdy, in fact almost unbreakable, and will please any child.

Making Headless Setscrews

Headless setscrews can be made by the amateur mechanic by cutting off the heads of machine screws or capscrews,



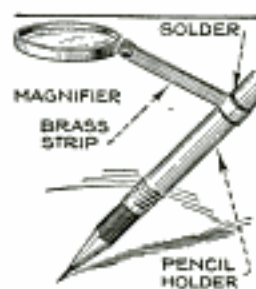
and cutting the slots with a hacksaw, but, unless some method of guiding the saw is used, it is difficult to make a neat job, especially in the smaller sizes. A fixture that eliminates this difficulty consists of a nut fitting the

screw to be slotted, and having a slot cut across it to a depth about twice that of

the desired slot in the screw. After cutting the slot in the nut, it is hardened. In use, another nut is first run onto the screw; the slotted one is then screwed down against the first, and tightened, the screw head coming about the center of the slot, and the nuts are then gripped in a vise, as indicated. A number of these fixtures, made for various sizes of screws, will be found to be of great convenience.

Magnifier for Close Work

Retouchers, artists, and draftsmen who need a magnifier while using a pencil, will avoid the inconvenience of using both hands by making the simple attachment shown in the drawing. Solder a short strip of brass to a pencil holder, or to a metal lead holder. Obtain a small high-power magnifying glass, and attach it to the brass strip by means of a screw, to allow adjustment. The result is a complete tool that can be held in one hand, the magnifier always being in focus for the work.

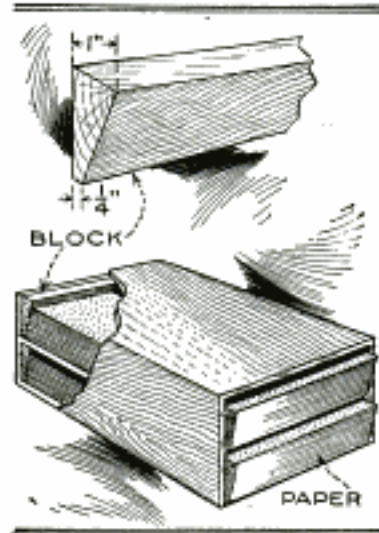


Improving Stationery Cabinet

Small stationery cabinets, used on many desks for holding typewriter and carbon-copy sheets, can be improved considerably

by gluing a beveled strip of wood to the inside of the back, in each compartment, as illustrated. This makes the top sheet of the paper project a trifle beyond the sheet below and so on, which enables one to pick

up single sheets without loss of time and without crumpling the paper. The wooden strips should, of course, be just wide and long enough to fit the compartments neatly.—Dale R. Van Horn, Walton, Neb.



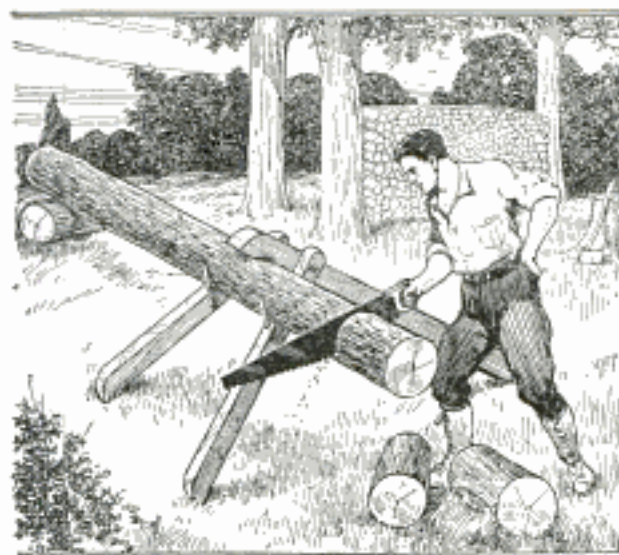
Renewing Scent of Cedar Chest

Moth balls or other highly odorous substances destroy the natural sweet scent of a cedar chest if used in it for any length of time, and they then seem to impregnate the wood with their own peculiar odor, which is very difficult to remove.

I have found that about the only way to remove these odors, and to restore the original cedar-wood smell, is to sandpaper the entire inside. In doing this the sandpaper is rubbed across the grain. It is advisable first to use a coarse grade of sandpaper, and if this leaves the surface too rough, to use a finer grade afterward. The treatment is effective on a very old cedar chest.—Rufus E. Deering, Clements, Kan.

Simple Jack for Cordwood

When sawing cordwood, it is usually found inconvenient to hold both wood and saw, especially when the lengths become short. This difficulty can be avoided by using a simple jack of the



A Simple Jack for Holding Cordwood: It Automatically Clamps the Wood to Facilitate Sawing

type illustrated. It consists of three heavy beams, pivoted together on a bolt near one end. The two outside beams are swung out in one direction and the central one, which is cut out to fit the logs, in the opposite direction, as indicated. Pins, driven into the outer beams, hold the cordwood up, and the upper end of the center beam clamps it down securely. By pushing the center beam in, the log may be slid along for another cut. As soon as the beam is released, the piece is again automatically clamped.

A Clothes Rack for the Closet

The capacity of a clothes closet can, in many cases, be doubled by the addition of the rack illustrated. A triangular



A Clothes Rack That can be Hoisted Out of the Way Increases the Capacity of the Closet

frame made of 1-in. material is provided with clothes hooks and suspended from the ceiling by means of a length of rope, strung over two pulleys screwed into the ceiling, one in the center and the other near the side. This rope is attached to smaller ones running to the sides of the frame. The latter is held at any desired height by hitching the lifting rope to a clothes hook or nail driven into the side wall. A knot is tied in the rope at such a point that it will stop at the first pulley and hold the rack in a position where the hooks can easily be reached from below.—Paul L. Fetherston, Jackson, Mich.

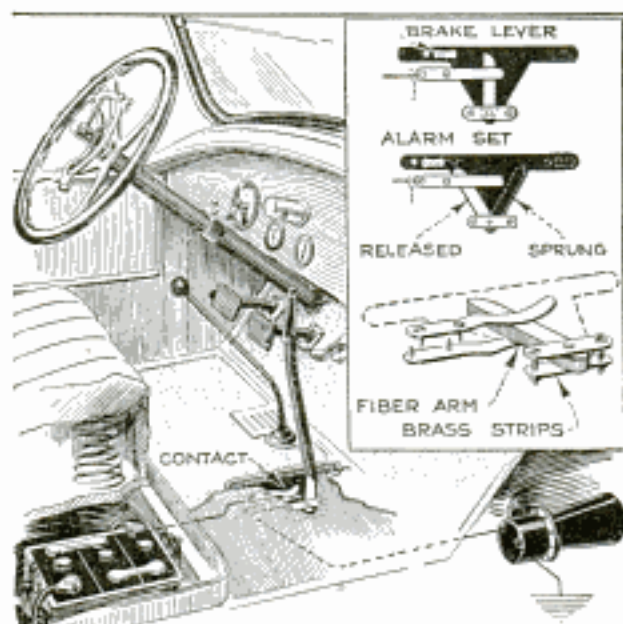
Removing Headlamp Rims

When it becomes necessary to remove automobile headlamp rims, it will frequently be found that they are so rusted that they cannot readily be turned by hand. This is due to the fact that insufficient "grip" is obtained because of the high polish of the nickel or enamel.

Before applying tools, which may mar the finish of the rims, apply a strip of friction tape around the entire outer edge, and try again. In most cases the rim will readily come off. After the rim has been replaced, the tape is removed, and the adhesive cleaned from the nickel or enamel surface with gasoline.—Geo. F. Aring, Dayton, Ohio.

Theft Alarm Safeguards Car

The drawing shows a simple theft alarm that can be attached to any car, and will, when set, sound the horn and keep it



An Easily Made Theft Alarm That Sounds the Horn When the Emergency Brake is Released

sounding, the moment the emergency brake is released. It consists of a switch having two spring-contact blades located in a V-shaped slot, cut in the floorboard at right angles to the brake-lever slot, and a movable fiber arm that is pushed between the ends of the blades, after the brake lever is pulled back, so that the lever cannot be moved forward without dislodging the arm and closing the switch. When the owner uses the car, he pulls the arm back, so that the brake lever may be moved past without disturbing it. This circuit, of course, is independent of the regular horn circuit.

Cleaning Light Silk Fabrics

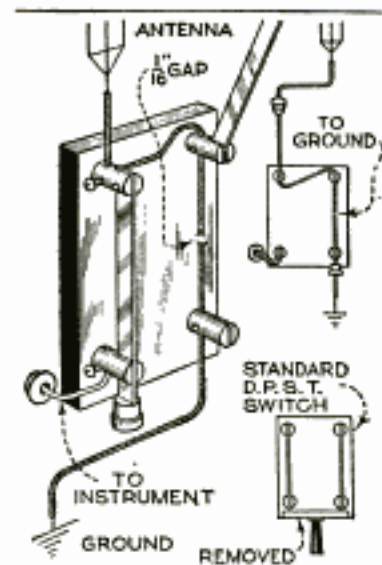
Georgette crêpes, crêpe de Chine, silk pongee, and other light silk fabrics that will not stand washing, are frequently dry-cleaned at home by washing in gasoline. If the soiled spots are caused by grease, oil, or other substances that are soluble in gasoline, this method is perfectly satisfactory. But when spots of sugar, candy, and ice cream are to be dealt with, as is frequently the case, gasoline cleaning alone will not suffice. Water must be used, but not without caution, for, when applied directly to the fabric, rings and discolorations are likely to result.

A method now practiced by many ex-

perienced cleaners can be imitated at home, and the garments can be cleaned without injury, if the following directions are carefully followed. Wash the garment carefully in gasoline as usual, then rinse in clean gasoline, and, without wringing, dip two or three times into a pail of clear soft water, to which has been added 3 or 4 oz. of vinegar. Remove quickly, shake out the surplus water, and hang the garment where it will dry in a short time. Do not allow heavy folds to form in the fabric, as the moisture will be retained in these too long. If hung on a line out of doors, where the wind will aid in drying, so much the better. The evaporating gasoline will carry with it the moisture.

Improved Ground Switch

An antenna should not be hooked up without a ground switch just because there is no single-pole double-throw switch at hand. A 100-ampere, or larger, double-pole single-throw switch will do quite as well. The only change necessary is the removal of the handle and the insulating crossbar, and the fitting of individual knobs or handles to each blade, so that they can be thrown independ-



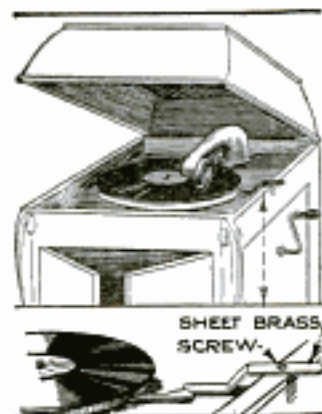
ently; composition caps of large binding posts are suitable for this purpose. To connect the switch in the circuit, the bared end of the lead-in wire is threaded through both pivot terminals. The ground lead is brought through the bottom post opposite the free end of the lead-in wire and is extended toward the latter as shown, allowing a $\frac{1}{8}$ -in. gap between the ends. This makes a good safety gap that will not interfere with incoming signals. The wire leading to the instruments is fastened to the remaining post, as shown. When receiving, the grounding blade is thrown open and the other closed; when idle, the positions of the blades are reversed.—E. J. Bachman, Fullerton, Pa.

Protecting Cucumbers from Beetles

City gardeners who have but a few hills of cucumber, watermelon, or muskmelon vines that are preyed upon by striped beetles, will find that a few moth balls, broken in small pieces and scattered around the plants, persuade the assailants to retreat to other regions.—C. M. Wilcox, Torrington, Conn.

Convenient Stop Lever for Phonograph

The phonograph stop lever illustrated can be operated when the top is down, eliminating the necessity of raising the top when no more records are to be played. The lever consists of a brass strip, about $\frac{1}{4}$ in. wide and 6 in. long, bent to the shape shown. It is pivoted on a small screw driven into the edge of the cabinet at the point indicated, one end of the lever projecting outside the cabinet, and the other end resting against



the trip that stops the machine, so that when the lever is pushed the trip is operated. The lever, if made of brass, can be given a fine finish by heating, and then dipping into nitric acid (poison).

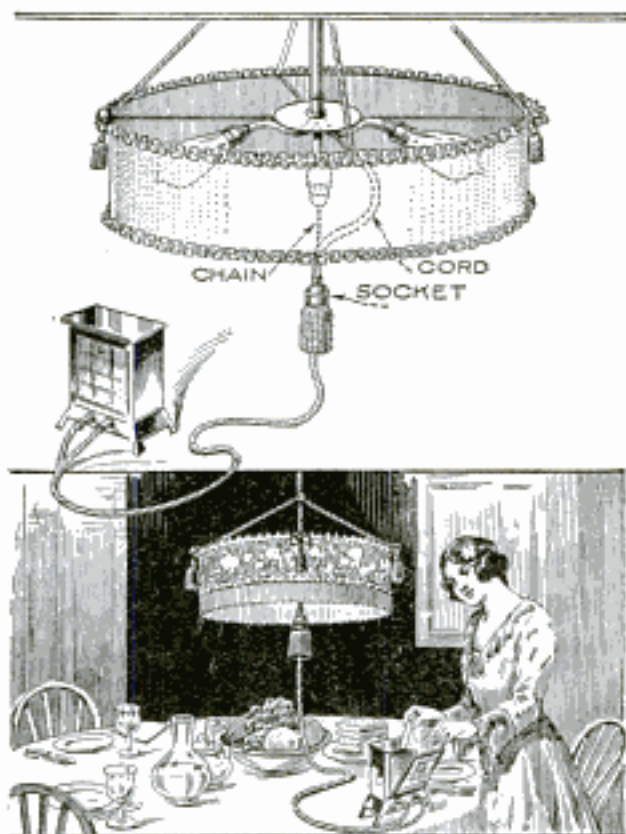
Mason Jar Used as Sap Bucket

Ordinary mason jars can be used to collect the sap when tapping maple trees, with the arrangement shown in the illustration. A bail to hold the jar is made of No. 8 galvanized-iron wire. This is made to fit inside the jar, and to spring outward against the neck as indicated. The bail is hung on the "tap" in the same manner as a regular sap bucket, notches being cut in the tap to prevent the bail from slipping off.—Harold Jackson, Kankakee, Ill.



Combined Tassel and Socket

Many women are making attractive silk light shades for the dining room, to be hung over the table instead of a glass



Convenient Method of Attaching an Extension Cord to a Lighting Fixture Having a Silk Shade

dome. It is desirable to have the bottom of these shades closed, but it then becomes a difficult matter to connect the extension cord of an electric appliance on the table unless the cord is run over the side of the fixture. This difficulty can, however, be overcome by letting through the center of the bottom a short length of portière cord, carrying within it an equal length of lamp cord, connected to one of the sockets inside. A socket, covered with a tassel to match the portière cord, is attached to the lower end of the lamp cord.

In cases where a pull-chain switch is used to control the fixture, the portière cord may be attached to it as shown in the upper detail, so that the tassel will then serve two purposes.—Ellis Levy, New York City.

☞ The most convenient place for a hand-operated horn on a truck is underneath the floorboards, so that it can be worked with the foot. An opening is cut in the boards so that the plunger will project above the floor.

BUILDING A CAMP CAR

By Ray F. Kuns

PRINCIPAL, AUTOMOTIVE TRADE SCHOOL,
CINCINNATI, OHIO

Part II

Interior Fittings

HAVING built and covered the frame, as detailed in the July issue, the construction of the berths and other interior fittings may be taken up.

At the front of the car, in Fig. 11, will be seen a duck-covered frame; this serves several purposes. When the car is closed up, ready for traveling, the back end of the frame rests on the top of the windshield, as shown in Fig. 13, protecting the berth from dust and dirt. When the berth is down, the frame forms the front wall of the sleeping recess. The frame is made of 1 by 4-in. poplar, and is hinged to a stout cleat in the "nose" of the car. The hinges are firmly bolted to both frame and cleat, as they carry part of the weight of the berth and its occupants. The immediate point that receives the weight of the berth is a cleat running across the frame, as shown in section in Fig. 13; and to keep the berth from slipping from this cleat, two

iron brackets, shown dotted, are screwed to it, and fit behind the berth frame. Most of the weight of the berth is carried by the cross member of the truss, shown in Fig. 13, just below the windshield.

The duck used to cover the frame need not run below the cleat just mentioned. The side rails project below this, and form convenient handles for lifting the frame. A grooved rail on the front of the frame fits over the top of the windshield when the car is closed.

The front berth, shown in Fig. 14, is



made from a discarded bedspring, the end angle irons of the bed being screwed or bolted to the endpieces of a 48 by 72-in. wooden frame. The endpieces of the frame cover the ends of the sidepieces, to prevent trouble due to the pull of the springs. The bottom of the berth is covered with duck, which may be paneled with lattice strips if desired.

The windlass-and-pulley arrangement for raising the berth is shown in Figs. 11 and 13. The pulleys are so placed that the small ropes running to the corners of the berth may be attached to a larger rope, which is run to the windlass. The latter is a length of 1/2-in. pipe, mounted in wooden blocks on the frame, and provided with a gear and dog for a ratchet. The pipe projects through the front panel board, and a

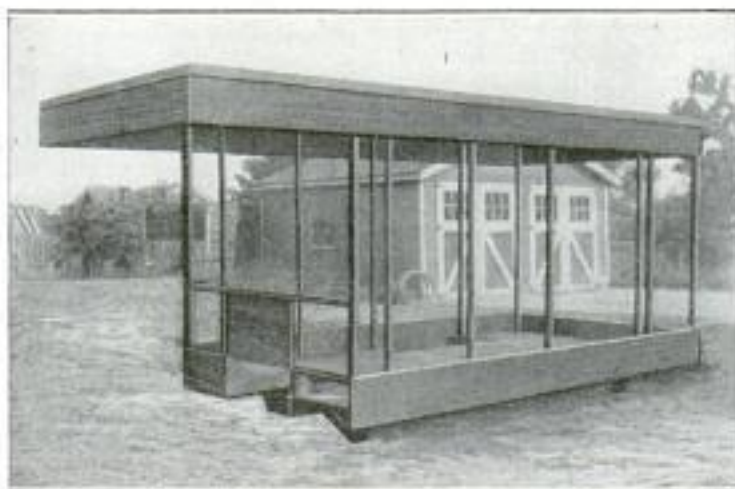


Photo Showing Body Framed, Ready for the Application of the Duck Covering

crank, fitted with a pin that engages slots cut in the pipe, is used to turn it. The crank is stored in the car when not in use. The gear is pinned to the pipe just inside the front post, and the pawl fastened to the post so that it will prevent the gear from turning backward, except when the pawl is raised. The ropes used at the four corners are medium-weight sash cord; the windlass rope is of the same type, but heavier.

The rear berth, shown installed in Fig. 12 and in detail in Fig. 15, is made from

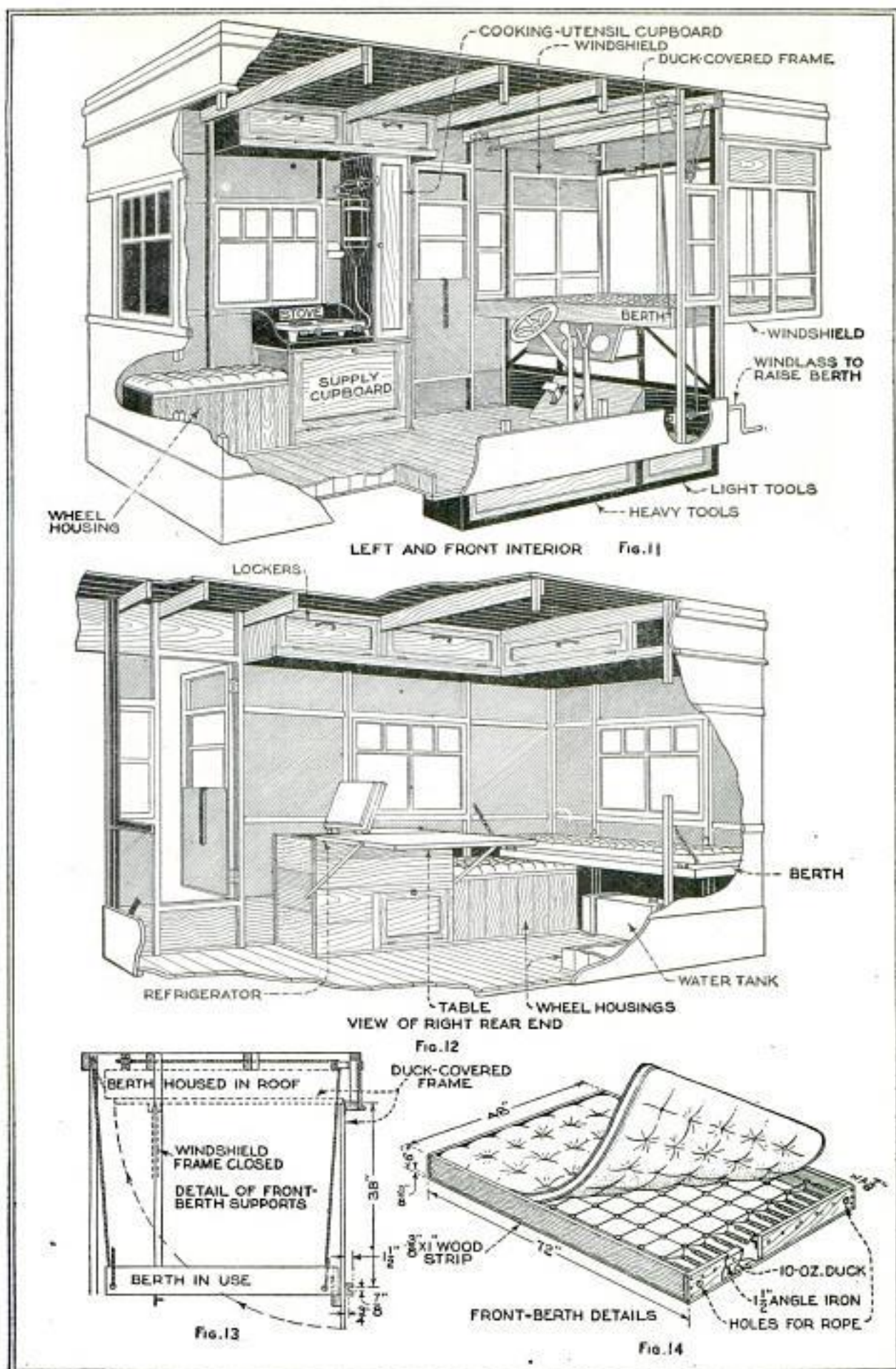


Figure 11, View of Left and Front Interior, Showing Location of Utensil and Supply Cupboards, Gasoline Stove, and Front Berth; Figure 12, View of Right Rear End, Showing Lockers, Rear Berth, and Refrigerator; Figure 13, Details of Front-Berth Arrangement; Figure 14, Working Drawing of Front Berth

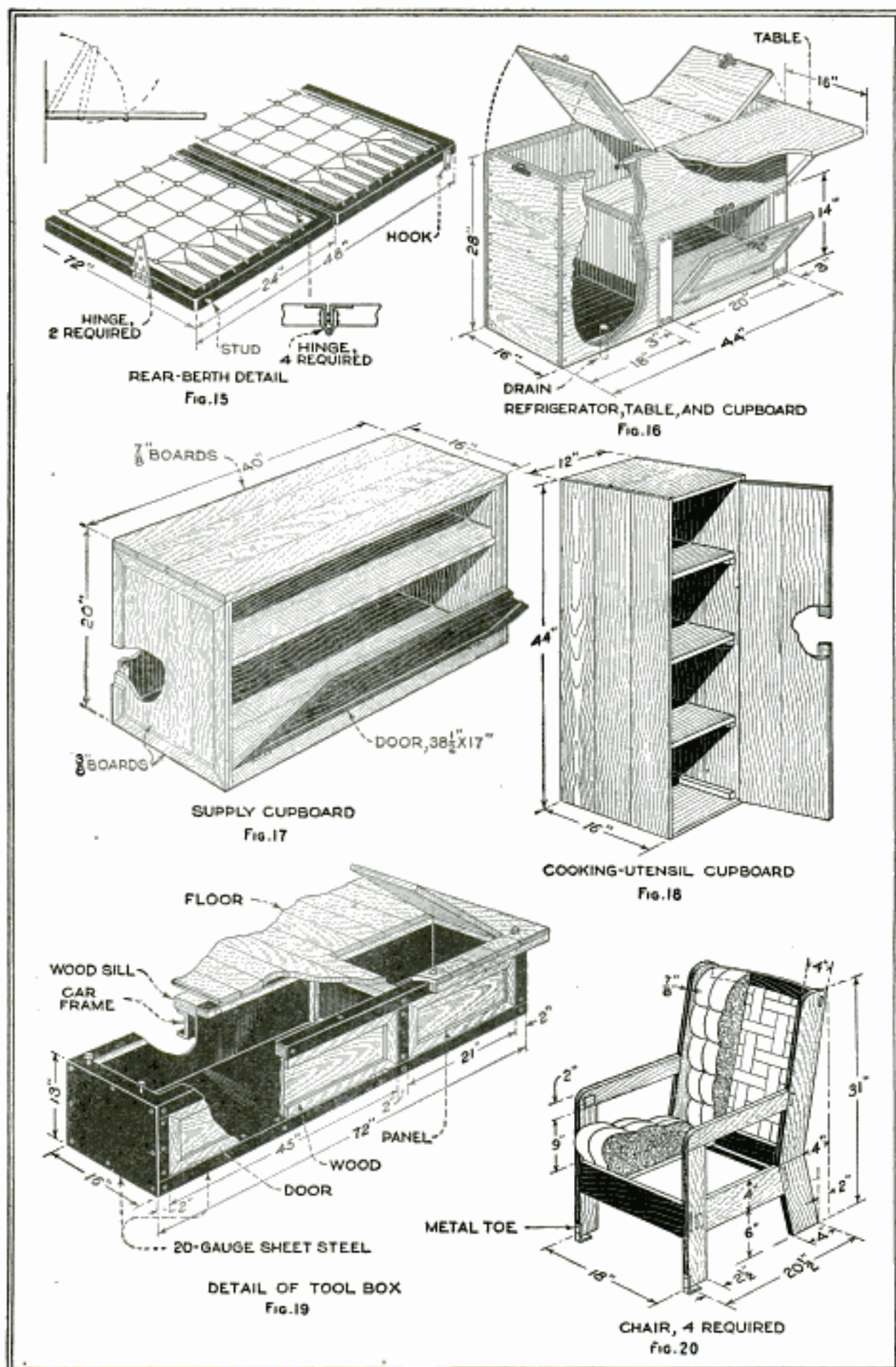


Figure 15, Details of Rear Berth; Figure 16, Construction of Refrigerator and Table; Figures 17 and 18, Supply and Cooking-Utensil Cupboard Details; Figure 19, Method of Making Tool Box; Figure 20, Framing and Upholstering of Chair, Showing Method of Fastening Chair to Floor

a so-called sanitary couch. All parts are discarded except those that can be used to make up the two light 2 by 6-ft. frames. After the frame pieces were cut to size they were welded together, although riveting will serve just as well. The springs were then fitted into each section, and the frames fastened together by means of four hinges, as shown in the detail. Two other heavy strap hinges were fastened to the berth and to the rear posts, as indicated, and hooks and studs fitted to secure the two parts together when folded against the wall, or when used at half width. The method of folding is shown in the upper detail. The half mattresses used are fastened to the frames by means of heavy cord. Two heavy chains, attached to the side posts, support the front of the berth, while allowing it to be doubled up when traveling.

The ceiling lockers are shown in Figs. 11 and 12. There are five of these, two at each side and one across the rear. The rear one is 12 in. wide, 3 ft. deep, and 6 ft. long, and easily contains all the spare bedding. The side lockers are not so large, and are used for clothing, and other articles in constant use. The method of framing the lockers is clearly shown in Fig. 6, Part I; each door is cut from a single piece of $\frac{3}{8}$ -in. lumber, and the edges bound with lattice strips. This makes a neat but light door. Thumb buttons or catches are used on the ends of each door to prevent rattling.

The combined refrigerator and table, Fig. 16, is made throughout of $\frac{3}{8}$ -in. soft wood. Wide boards were used so as to minimize the number of joints necessary. The entire box, with the exception of the small cupboard, is made with a double skin, $\frac{3}{8}$ -in. strips being used to separate the boards. The lids are of the same type of construction; this insures fairly good insulation. The ice is set in through the large top door, and rests on a slatted frame at the bottom, just over the drain. The ice compartment is lined with galvanized iron, and the drain pipe is run through the floor. A sliding shelf or rack (not shown) is also fitted in this compartment. The small cupboard is built with

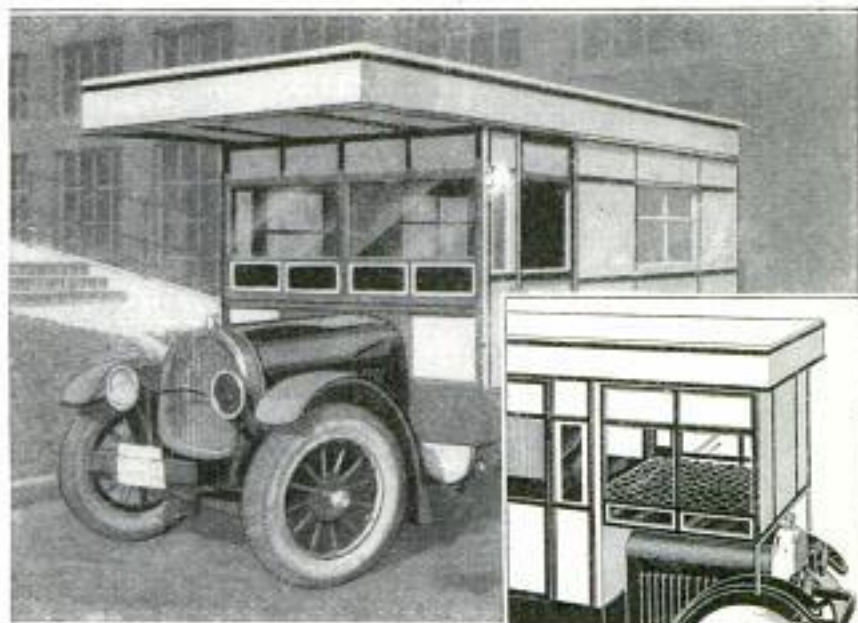
but a single thickness of lumber, and has no connection with the main compartment.

A table leaf is hinged to the front of the box, supported by two $\frac{1}{8}$ by 1-in. steel braces. The leaf itself is made from a single piece of $\frac{3}{8}$ -in. poplar, 16 in. wide, and is strengthened by three cleats.

The supply cupboard, shown in Fig. 17, is also made of $\frac{3}{8}$ -in. stock, except the top and shelves, which are made from flooring boards, to insure strength. The construction is clearly shown in the drawing.

The cooking-utensil cupboard is built to fit the space between the supply cupboard and one of the overhead lockers. Its position is shown in Fig. 11, and its construction in Fig. 18.

The gasoline stove is mounted on the supply cupboard, as shown in Fig. 11.



Left, Car Complete, Ready for the Road, with Berth Housed, and Windshield in Place; Right, Windshield Open, Berth Down, and Duck-Covered Frame in Position for Sleeping

This is the standard type used for home cooking, but several inches are cut from the bottom, and all joints carefully riveted. A vacuum tank is used instead of the reservoir originally furnished. Connection from this tank to the stove is made with $\frac{5}{16}$ -in. copper tubing; the supply line is connected to the rear gasoline tank, which is filled with high-test gasoline. A small vacuum pump is connected to the vacuum line at the top of the tank, and a few strokes of this will fill the tank with gasoline, so that no fuel is ever handled in open vessels to supply the stove.

The water tank, Fig. 12, is of 30-gal. capacity, and is set on the floor at the

rear of the car. A $\frac{3}{4}$ -in. pipe is run, under the floor, to the rear of the car, where it is fitted with a tee. The side outlet is fitted with a 16-in. length of pipe, the upper end being capped; this is the filler pipe. The other opening in the tee is fitted with a regular faucet; both filling the tank and drawing water are done outside the car. This tank may be made by anyone handy at sheet-metal work; it is made of 20-gauge galvanized iron, and is fitted with a center baffle plate, to prevent splashing. A pressure system, tried at first, proved to be too troublesome.

The tool box, Fig. 19, is made of 20-gauge auto-body steel, over a wood frame. The rear compartment, carrying spades, chains, rope, jack, etc., is reached from the outside. The front compartment, carrying small tools, is reached through a trapdoor in the car floor. In framing this box, the builder should remember that it is to be swung under the floor, and make the frame accordingly.

Four chairs are provided, one of which is shown in Fig. 20. They may be moved to any position desired, but to keep the driver's seat in position while traveling, as shown in the floor plan, Part I, it is furnished with metal toes on the front legs. These slip under staples or metal cleats on the floor, and make the seat quite secure. When the parts are framed and glued together, the webbing is nailed to the back; a small spring is then sewed on at each point where the webs cross. The springs are then tied in the usual manner, covered with burlap, the back padded with cotton batting or hair, and covered with material taken from an old touring-car seat. This can be secured at any car-wrecking house. It is also possible to cut sections of padding complete from old car-seat backs, and tack them in place. While this demands care, it is easier than building up the upholstery from the bottom.

The seat cushions may be made, in a similar manner, from old touring-car seat cushions, the upholstery material being first removed from the springs. A frame is then prepared that will fit loosely into

the chair frame, and the old springs are fitted into this, wired, and tied in place, and the upholstery replaced.

The wheel housings must be made very tight, and mounted snugly to the frame, to exclude dirt. They are made of 20-gauge metal, wood-covered if desired, and all joints should be seamed, crimped, and riveted. Felt strips are used in the floor and side joints, coated with gasket cement, and screws used to draw the housings tight. The metal housings are quite strong enough to serve as seats, and cushions can be fitted to them. Dimensions cannot be given that will suit all cars, but the housings shown are 13 by 15 by 42 inches.

Two gasoline tanks are carried, both mounted under the floor, outside the chassis frame at the left front corner. The forward tank is used almost exclusively for the engine, although both are connected so that either may be used if desired. The rear tank carries enough high-test gasoline for a month's cooking, and is connected to the stove as previously described. Both tanks are of 15-gal. capacity.

The construction of the remaining few fittings, such as the instrument board, folding steps, etc., can be gathered easily from the drawings. Many other fittings could be described, but as the necessity for these varies with the builder, they will be omitted. The painting and finishing, which is also a matter of individual taste, need not be entered into here.

To those who contemplate building such a car, however, the following figures will be of benefit. The cost will vary, of course, and some small items, not purchased, are omitted; the main items of cost are included, so that the prospective builder will have a good estimate of his probable expenditure. The tires purchased in this list were put on last season, and are apparently good for at least another season. It will be noted that—as is to be expected—the item of cost is greatest in the case of the chassis. As this item may vary greatly, it is hard to estimate costs. The reader will understand that no labor charges are figured.

BODY AND CHASSIS COSTS

Lumber	\$ 50.12	Used touring car.....	\$150.00
Duck	50.10	New wheels and rims.....	47.00
Glass	5.50	New tires and tubes.....	160.00
Paint	10.65	Steel	7.60
Steel	9.30	Materials for overhaul.....	28.05
Hardware	7.60	Shock absorbers	33.00
Shades	12.00		
Linoleum	14.00		
Stove and vacuum tank.....	11.00		
		Total.....	\$604.92

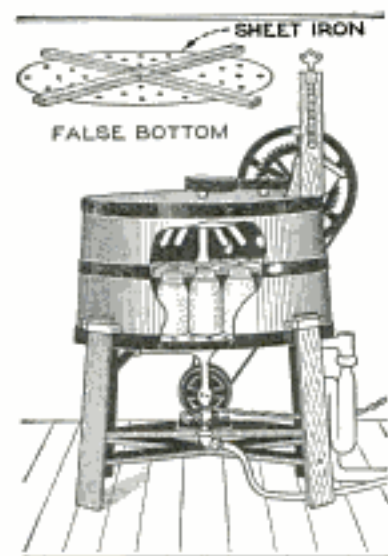
Cutting Brass Chemically

Brass can be cut in irregular shapes by a chemical process that is dependent on the amalgamating properties of mercury. The process will be useful when shears cannot be used, or when dies are too expensive.

Pencil in the design, then make a saturated solution of bichloride of mercury (poison) in alcohol, and use a fine brush to outline the design, avoiding overlapping of the pencil lines. After drying, the design should again be gone over with a sharpened stick dipped in nitric acid (poison). In a few moments the brass can be broken at the lines, like glass cut with a diamond.

Washing Machine Used for Canning

The illustration shows how an electric washing machine that has its own heater can be adapted to the canning of fruit or vegetables by the cold-pack method. A false bottom, about 19 in.



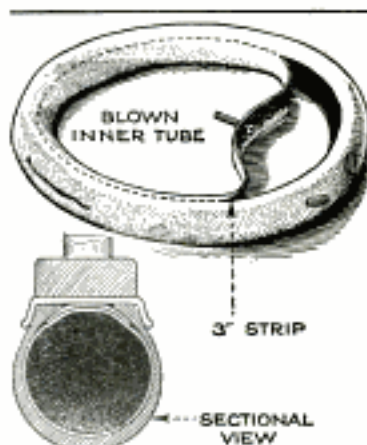
in diameter, is made of $\frac{3}{8}$ -in. sheet iron, wooden cleats being bolted on the underside, and a number of holes drilled through it to allow proper circulation around the jars. In a tub that is 12 in. deep and 22 in. in diameter—the usual size—about 30 quart jars can be accommodated at once.

Soft-Focus Effects Produced with Small Camera

Soft-focus effects can be produced with any ordinary small camera fitted with a single lens, by cutting out the hard-rubber diaphragm in front of the lens until it is the full size of the lens tube. This increases the speed of the lens about three times, and has the effect of making the rays of light strike the film irregularly, and produce a soft haziness that is very pleasing. The negatives will stand a great degree of enlargement.

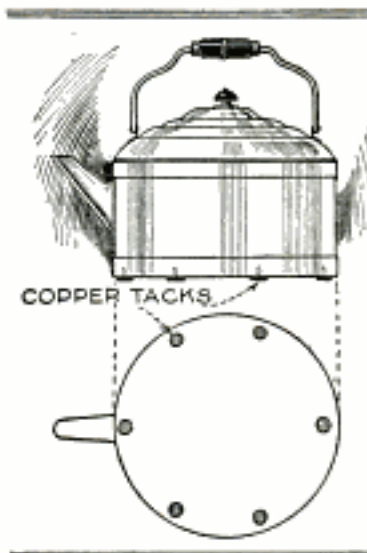
Protecting Inner Tubes from Rim Rust

Although occasional painting is an effective method of preventing rust on automobile-wheel rims, and thereby protecting the inner tubes, the paint soon wears off. A much better method is to use a continuous 3-in. rubber strip, cut from a discarded inner tube, and to place it between the rim and the inner tube, inside of the casing. The ordinary fabric flap is quite serviceable, if available, but is likely to absorb moisture, and thus cause rusting. Some motorists cement a rubber strip directly to the rim, and seat the casing beads against this, but the method shown is much easier to apply, and quite as effective.



Mending a Copper Kettle

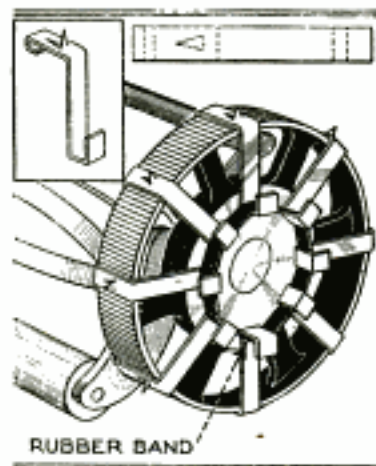
A copper kettle or pan usually wears through at the edge, owing to the constant moving on the stove. If merely soldered, the solder soon wears off, causing another leak. A better method of mending a kettle is to punch small holes in the bottom, around the edge, as shown in the illustration, and to drive copper tacks into the holes from the outside.



After the heads are sweated to the bottom with solder, the point of each tack is clipped off and hammered down. The heads of the tacks will take all the wear when the kettle is moved, and thus save the bottom of the utensil.—J. A. Stevens, East Boothbay, Me.

Nonskid Attachment for Lawnmower

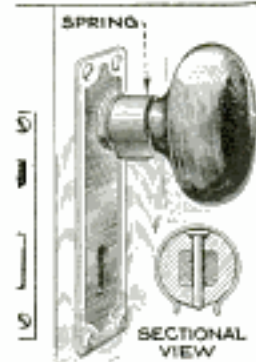
Where terraced fronts and other steep slopes are to be kept trimmed with the lawnmower, considerable difficulty is usually experienced in getting the machine to operate without skidding, especially if



the grass is tender or wet. This difficulty will be overcome by providing a pair of nonskid attachments, which can be made from heavy galvanized-iron strips and two heavy rubber bands. The iron strips are about $1\frac{1}{2}$ in. by 6 in. in dimensions and the rubber bands are pieces cut from an old inner tube. Each iron strip is placed on a solid block, a V-shaped cut is made in it, as shown in the plan view, and the "V" is bent out at right angles. The strips are then bent to the shape shown in the upper left-hand detail. Eight pieces are hooked over each wheel of the lawnmower, spaced equally around the rim. They are held in place by a rubber band that is snapped over the ends of the pieces near the center of the wheel. With these attachments in place, the mower will not skid.

Repairing a Door Knob

It frequently happens that a door knob comes off, because the screw that holds it on the lock shank becomes loose or stripped, and falls out.



If no screw that fits is available, the trouble can be overcome by using a short piece of a nail, held in place by a narrow strip of spring brass, bent to fit closely over the shank of the knob. If spring brass is not obtainable, ordinary friction tape or adhesive tape can be used instead. A pin, driven tightly into the hole, will also do the job, but is difficult to take out when it is necessary to remove the knob.

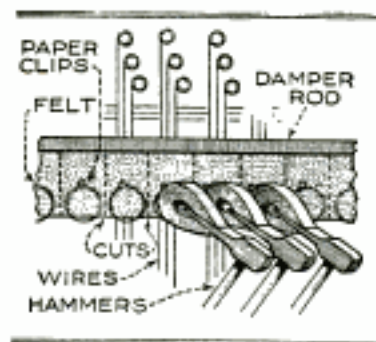
If no screw that fits is available, the trouble can be overcome by using a short piece of a nail, held in place by a narrow strip of spring brass, bent to fit closely over the shank of the knob. If spring brass is not obtainable, ordinary friction tape or adhesive tape can be used instead. A pin, driven tightly into the hole, will also do the job, but is difficult to take out when it is necessary to remove the knob.

Locking Folding Typewriter Desks

Some folding typewriter desks, after a period of use, develop unwelcome characteristics, such as closing up unexpectedly—after the manner of folding beds. This annoyance can be prevented by the use of an ordinary sash lock, which can be purchased for a few cents at any hardware store. One part of the lock is fastened to the shelf and the other part to the side of the desk, so that when the desk is open the lock can be closed. The part attached to the side must, of course, be out of the way of the shelf when this is swung around in closing the desk.—A. C. Cole, Chicago, Ill.

Banjo Effect on Piano

Many upright pianos are equipped with a practice pedal—the center one of the three—which lowers the damper rod and reduces the volume of the tone. This device, which is seldom used by the average pianist, can readily be converted into an inexpensive banjo attachment.



A number of cuts, as indicated by the dotted lines, are made in the felt strip attached to the damper rod, so as to make as many "tabs," or sections, as there are groups of wires, each tab covering one group of three. A circular wire paper clip is then pushed on the end of each tab so that, when the damper rod is lowered, the clip will come directly under the hammer at the point where the latter strikes the wires. This will give the effect of a banjo when the keys are struck.—G. R. Brown, Bridgeport, Conn.

Hose Protects Foal in Stall

Stable space on the farm is often so limited that it is necessary to keep a mare and her foal in the same stall. This is rather dangerous, however, as it frequently happens that the foal becomes entangled in the mother's halter rope, and is strangled. As a precaution against this danger, a Wisconsin farmer slipped a $2\frac{1}{2}$ -ft. length of heavy garden hose over the halter rope, tying a knot at the end of the

rope to keep the hose in place. When the rope is tied to the manger, the mare is not at all inconvenienced while feeding or resting, but the rope cannot loop, owing to the stiffness of the hose.—G. E. Hendrickson, Argyle, Wis.

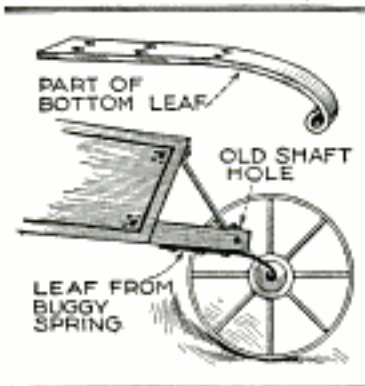
Increasing Power of Wagon Brake

When heavy loads are hauled over steep hills by wagon, it is important to have adequate brakes. A contrivance that greatly increases the power applied by the brake consists of a strong stick attached to the brake lever, as shown, and fitted with a small pulley near the top. A rope is passed through the pulley; one end of the rope is tied to the wagon, and the other end goes to the driver so that it can be pulled to operate the brake. In this way greater force can be applied with less effort than usual.—M. W. Lowry, Athens, Ga.



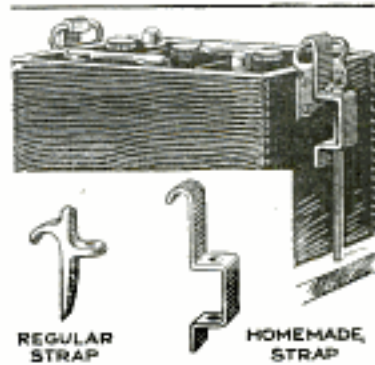
Equipping the Wheelbarrow with Shock Absorbers

The shocks suffered when pushing a wheelbarrow over rough ground can be largely eliminated by providing the wheel with shock absorbers made from buggy-spring leaves. The leaves used for this purpose have eyes at the ends; each is cut to a length of about 8 in., and has three or four screw-holes drilled through it. The eyes are reamed out so that they will accommodate the axle of the wheel and allow it to turn easily, and the springs are screwed to the underside of the wheelbarrow frame, the eyes being turned down.



Making Battery-Box Straps

When installing a new and different type of storage battery in an automobile, it may happen that the bolts used to hold the box in position are too short. Longer bolts can be used, in some cases, but these are not always easily obtainable. In this case, it is best to make a couple of new straps, from lengths of $\frac{1}{2}$ by $\frac{1}{8}$ -in. strap iron. They are bent to the shape indicated in the drawing, and holes drilled through them for the bolts. Straps of this kind can also be used when the regular ones are lost.—F. S. Root, Fall River, Mass.

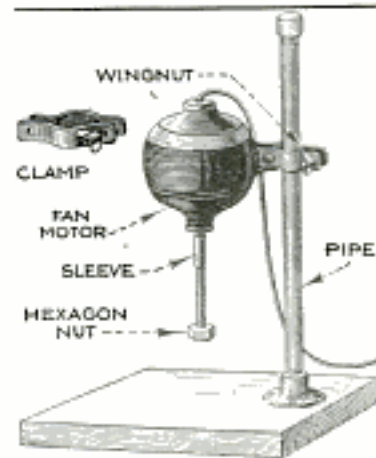


Homemade Electric Whipper

A homemade electric whipper, resembling those used on soda fountains, has been found useful as an egg beater, cake-batter mixer, and cream whipper. It consists of a small electric-fan motor, a length of $\frac{1}{2}$ -in. nickel-plated pipe, a clamp, and a hardwood base, arranged as shown in the illustration.

The length of pipe, which serves as a standard for holding the motor, is held by a floor flange, screwed to the base. The motor is fastened to the standard by means of a sheet-metal clamp, riveted to the motor, and clamped on the standard with a bolt and wingnut.

A short length of steel rod, of the same diameter as the motor shaft, is threaded on one end, a nut run on, and the end of the rod riveted over, to prevent the nut from unscrewing. The rod is attached to the shaft by means of a brass sleeve, made of tubing and soldered in place.—W. J. Laubenstein, Cleveland, Ohio.



RADIO-FREQUENCY AMPLIFICATION

By *F. L. Brittin*

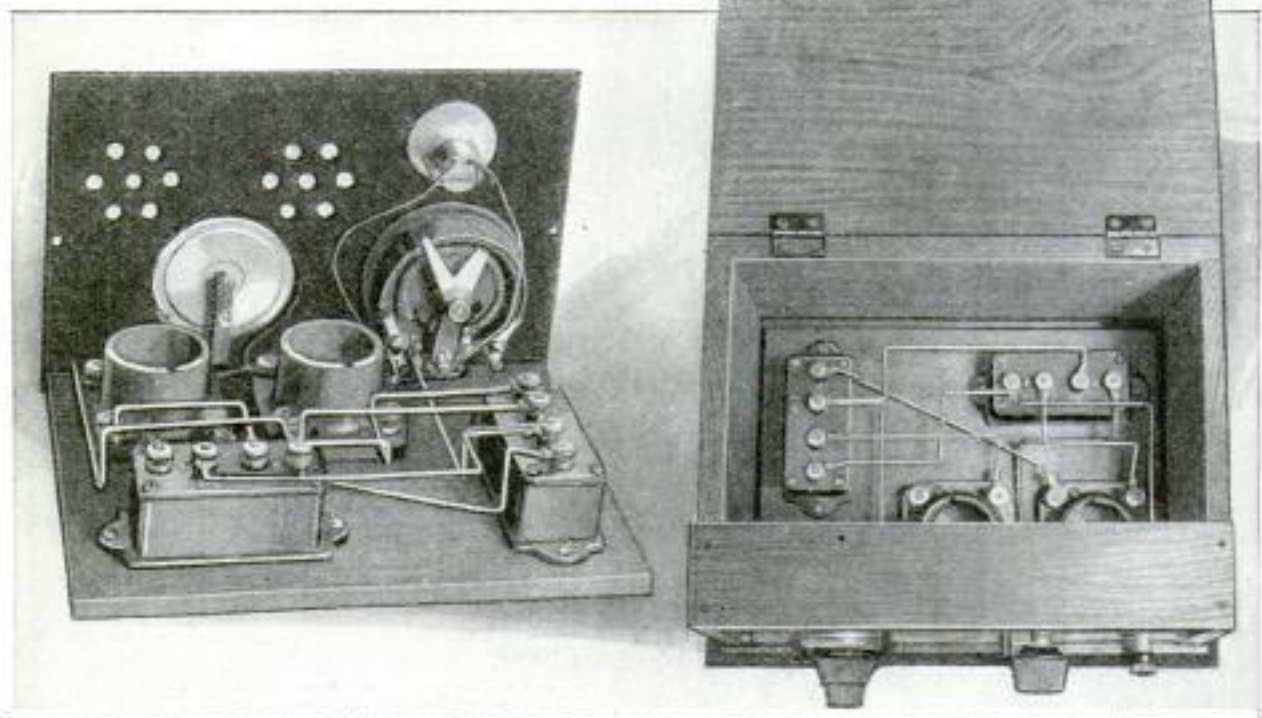


RADIO-FREQUENCY amplification can be added to any detector-tube circuit in a very economical and efficient manner by carefully following the directions given in this article. This process, as the name implies, is one of amplifying the signals at a receiving station while they are still at radio frequencies, and is therefore applied just before the signals reach the detector tube; this brings in distant stations, the signals of which are too faint to operate the detector tube.

In order to illustrate the method of adding the amplifier, the spider-coil receiver described in the March, 1923, issue

the spider-coil receiver and audio-frequency amplifier. Note, in the wiring diagram, Fig. 4, the two posts marked "output," or C and D; two posts are placed on the detector unit immediately below these, and jumper connections are used, as indicated in Fig. 5. From the posts on the detector panel, connection is made to the grid circuit.

Connections are made, from the posts on the left front of the panel, to the detector-unit A-battery, and from a post on the right-hand side, to the high-voltage positive terminal of the regular B-bat-



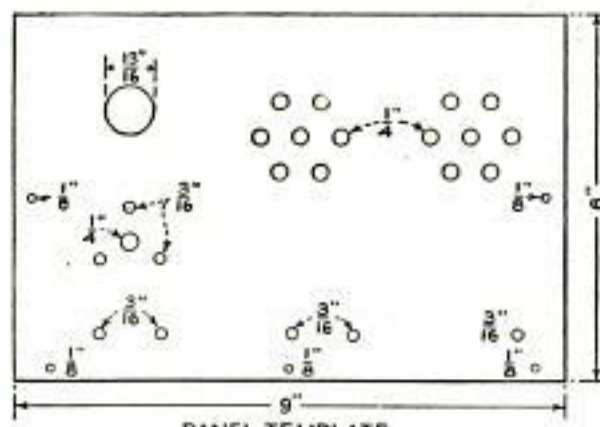
Left, Rear View of Complete Radio-Frequency Unit Removed from Cabinet; Right, Top View of Unit in Cabinet, with Lid Thrown Back to Show Wiring

has been selected; the same method can be followed, in any other tube circuit, by cutting the grid lead and connecting the amplifier as shown in the accompanying diagrams.

The template for the panel of the amplifier unit is shown in Fig. 1, and a photo of the front of the completed unit in Fig. 2. Fig. 3 shows the rear of the instrument, with all connections, and Fig. 5 how the instrument is set on

tery. The connections, as may be noted, are thus extremely simple.

The 1½-amp. ammeter shown on the panel is not essential, but is very useful for watching the amperage of the A-battery. Just below this instrument is a combination rheostat and potentiometer. The potentiometer was not used in this particular circuit, but was built in for use on other circuits; a plain rheostat is used on the second tube.



PANEL TEMPLATE
Fig. 1

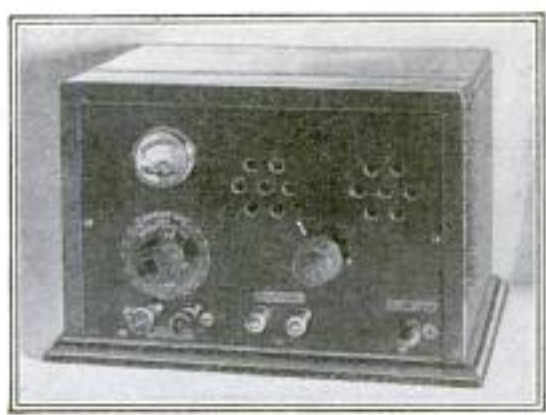


Fig. 2

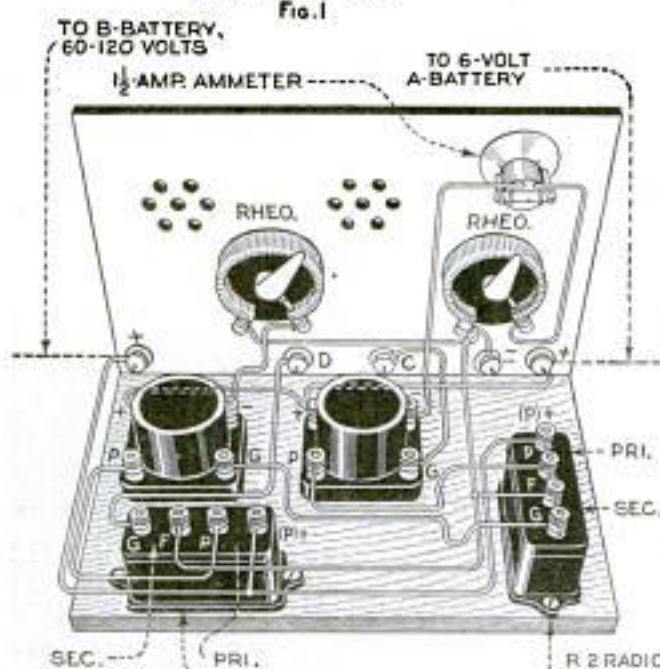


Fig. 3

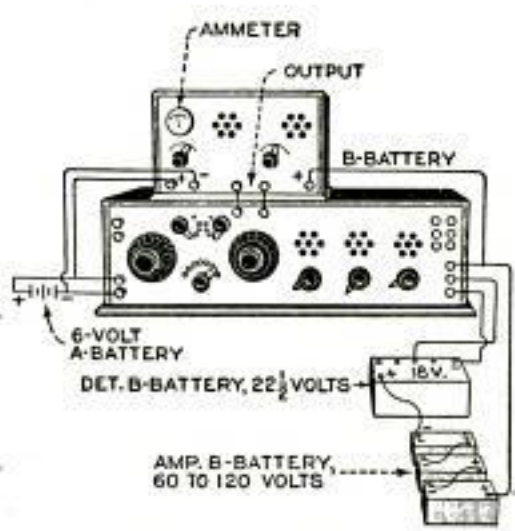
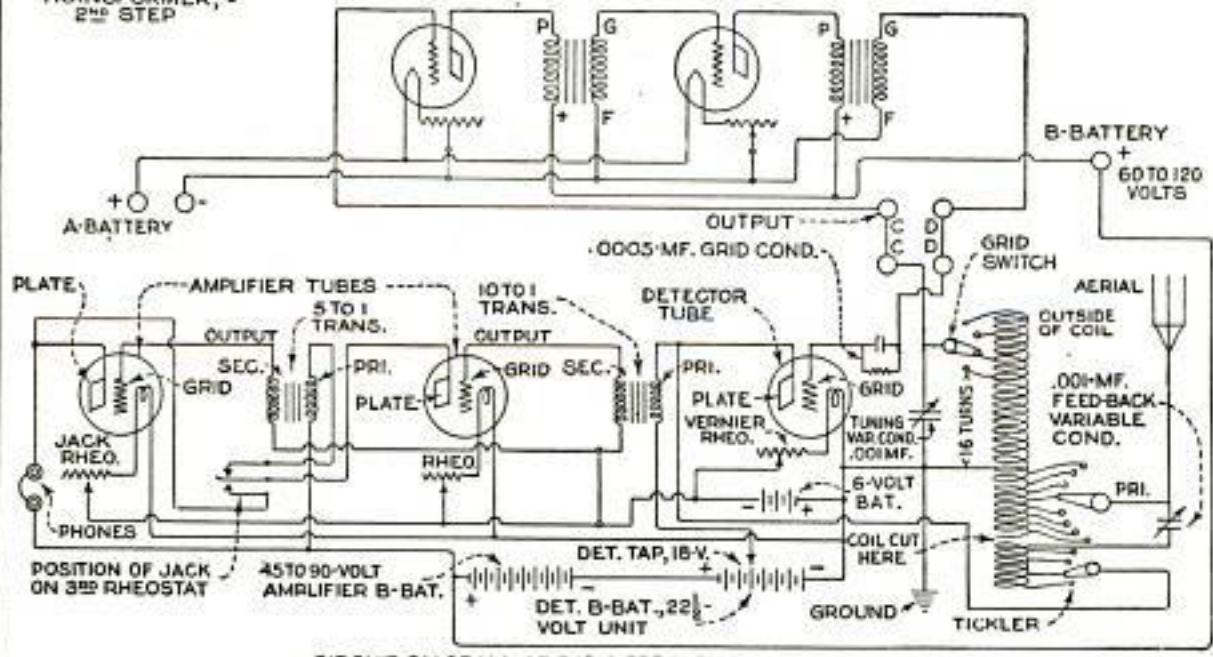


Fig. 5

R 3 RADIO-FREQUENCY TRANSFORMER, 2ND STEP

R 2 RADIO-FREQUENCY TRANSFORMER, 1ST STEP

ADDING 2 STEPS OF RADIO-FREQUENCY AMPLIFICATION TO THE SPIDER-COIL RECEIVER



CIRCUIT DIAGRAM OF RADIO-FREQUENCY AMPLIFIER
Fig. 4

Figure 1. Template for Drilling Panel; Figure 2. Front View of Complete Instrument; Figure 3. Rear View, Showing Connections; Figure 4. Wiring Diagram of Radio-Frequency Amplifier, Detector, and Audio-Frequency Amplifier; Figure 5. Instrument Mounted, and Connections to Batteries

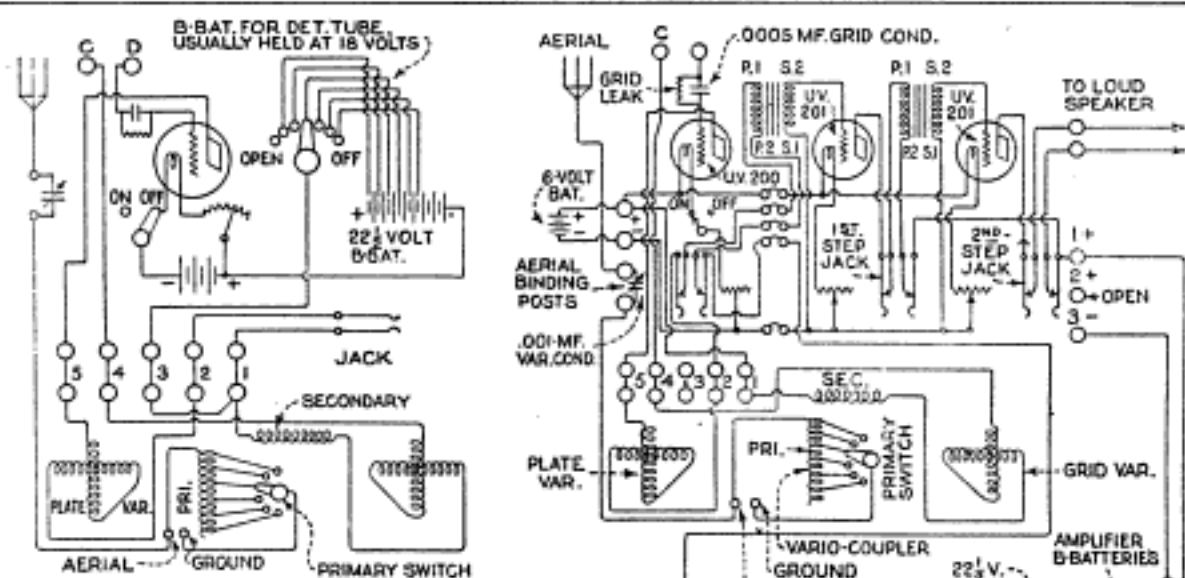


Fig. 6

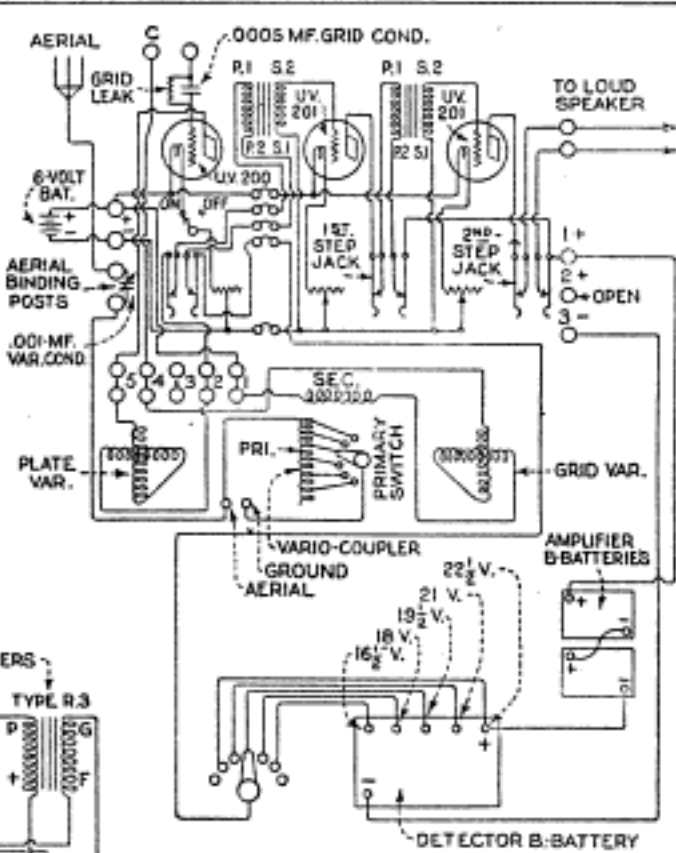
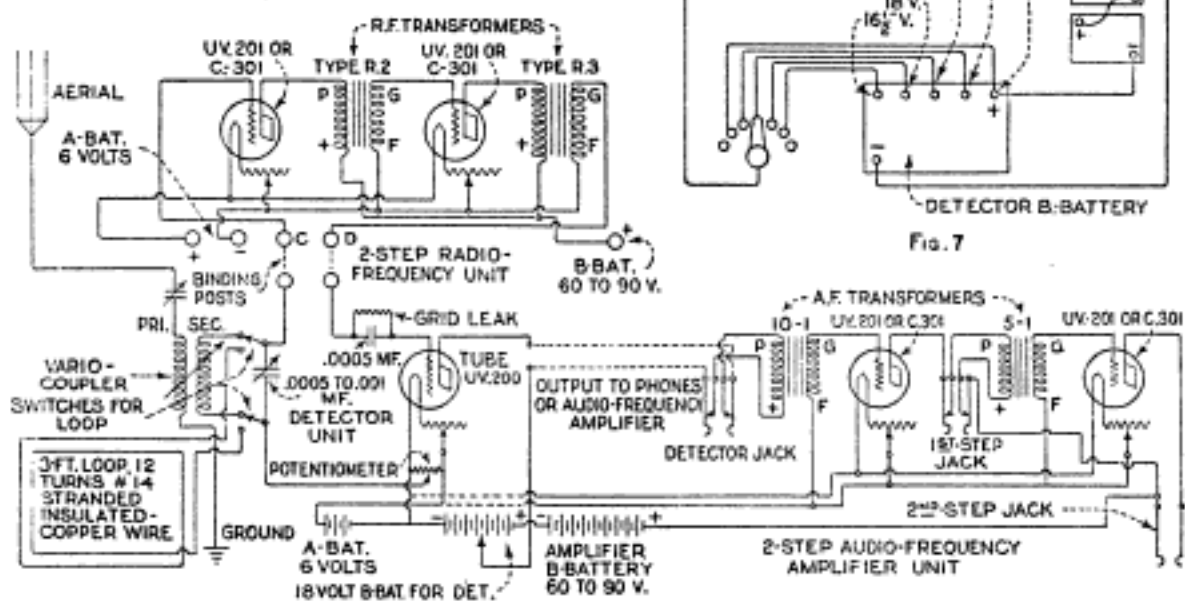


Fig. 7



METHOD OF ADDING 2 STEPS OF RADIO-FREQUENCY AMPLIFICATION TO ANY SIMPLE TUBE SET

Fig. 8

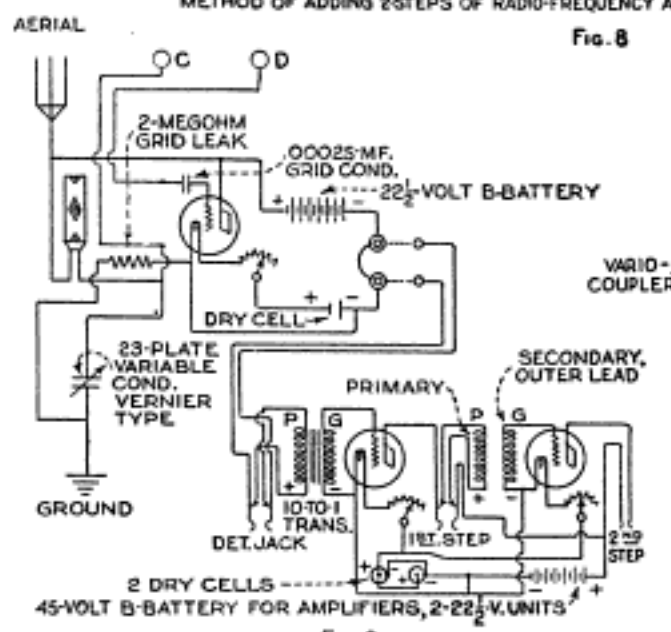


Fig. 9

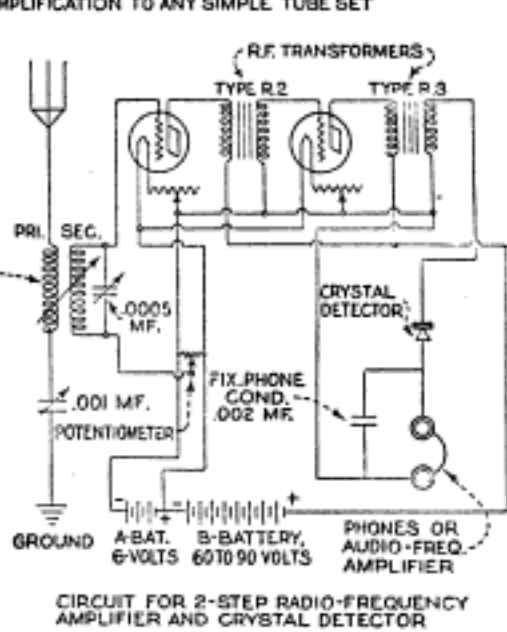


Fig. 10

Figures 6 and 7, Connections for Regenerative Receiver and Two-Step Amplifier, June and July Issues, 1922; Figure 8, Connections for Instrument Described in November, 1922, and Figure 9, for That in June, 1923; Figure 10 Shows Connections for Adding Amplifier to Crystal Detector

The transformers used were selected for their ability to bring in the distant stations; for the first step, the type known as "R 2" is used; for the second, the type known as "R 3." Each transformer has its "peak" at a different wave length, preventing interstage "howling."

Busbar wiring, of square copper wire, is used for the connections to the transformers, all leads being made as short as possible. The filament wiring for the tubes is No. 14 tinned-copper wire, covered with varnished-cambric tubing. The tubes used are either the "UV. 201" or "C 301"-type.

When wiring, note that the lead from the B-battery positive post* is taken to both the posts marked positive on the transformers. The post marked D, on the panel, is connected to the post G on the second-step transformer, and the post C, on the panel, to the grid terminal on the first-tube socket. The grid terminal on the second-tube socket is connected to post G on the first-step transformer; the plate post on the first-tube socket to post P on the first-step transformer, and the plate post on the second-tube socket to post P on the second-step transformer.

The rheostats are connected in the usual manner, except that the ammeter is in the circuit of the first tube. The use of the combined rheostat and potentiometer is advised with the circuits shown in Figs. 6, 7, 8, and 10, for best results. In these circuits, an extra binding post

must be placed on the panel of the radio-frequency unit, and one on the detector unit, for the potentiometer-lever connection. The potentiometer resistance unit is connected across the A-battery posts, and the lead from the lever connected, through the binding posts and jumper, to one side of the secondary of the vario-coupler.

Figure 6 shows the method of connecting the radio-frequency amplifier to the detector set described in our June, 1922, issue, and Fig. 7, a wiring diagram for the set described in July, 1923. In Fig. 8 is shown how radio-frequency amplification may be added to the set described in November, 1922, with the addition of two steps of audio-frequency amplification, and a loop aerial, if the latter is desired. Figure 9 indicates the method of cutting into the circuit of the dry-cell tube set described in the June, 1923, issue, and Fig. 10, how radio-frequency amplification may be used on a crystal-detector set. In the circuit shown in Fig. 9, where dry-cell tubes are used, two dry cells, connected in parallel, will be necessary for the radio-frequency unit, in addition to the dry cells already in use. These cells are connected directly to the A-battery posts. In this set, dry-cell tubes must be used, of course, instead of "UV. 201" tubes. These diagrams will enable all of our readers who have built these sets to connect the radio-frequency amplifier to them without any trouble.

MATERIAL LIST

1 bakelite panel, $\frac{1}{8}$ by 6 by 9 in.....	\$ 1.00	1 "R 2" transformer.....	\$ 5.00
1 cabinet, with separate base.....	3.75	1 "R 3" transformer.....	5.00
2 tube sockets.....	1.50	1 $\frac{1}{2}$ -amp. ammeter.....	3.00
1 rheostat and potentiometer.....	3.00	5 binding posts.....	.60
1 rheostat.....	1.10	3 $\frac{3}{8}$ -in. nicked wood screws.....
2 "UV. 201" or "C 301" tubes.....	13.00	2 $\frac{1}{2}$ -in. nicked wood screws.....

Replacing Reflecting-Camera Mirrors

Amateurs who are unfortunate enough to break the mirrors of their reflecting cameras find it hard to replace them, owing to the fact that the silvering is on the surface of the glass. Few workmen can silver these mirrors properly, or varnish the delicate surface to prevent tarnish.

An excellent method of replacing the broken glass is to obtain a piece of fine plate-glass mirror, and cut it to the proper size for the camera. Then soak the glass in denatured alcohol for at least an hour to remove the varnish on the silvered side, rubbing gently with the tips of the fingers until the silvering is

clean. Wipe off gently with absorbent cotton wetted with alcohol.

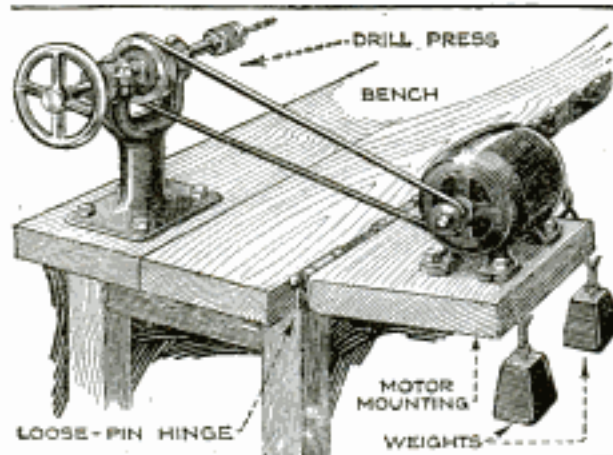
If the silvered surface is dull, obtain a small quantity of jewelers' rouge and polish the surface with this, rubbing lightly until an image is clearly seen on the surface. Then varnish with collodion or dilute negative varnish.

A method used by glass men to bring up the polish is to pour boiling water on the silvered surface; this can be tested on a small piece before trying a large mirror.—George Parke, Chicago, Ill.

☞ The luminous tip of an old watch or clock hand, applied to the indicator of a gasoline-tank gauge, makes the use of dangerous lights unnecessary.

A Universal-Motor Mounting

A small motor used for driving a drill press, buffing head, and several other machines, was attached to the portable

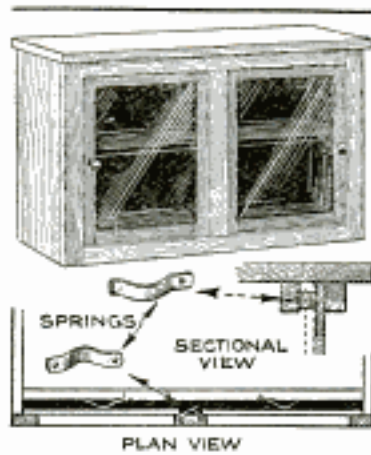


A Portable Mounting for Small Motor That Permits the Motor to be Used for Several Purposes: Loose-Pin Hinges Hold the Mounting in Place

mounting shown in the illustration. This consists of an oak board of suitable size, attached to the edge of the workbench by means of loose-pin hinges. The belt is slipped over the pulleys and suitable weights hung from the edge of the board to keep the belt at the proper tension. Wherever the use of the motor is required, hinge pieces of the same type are provided, so that the mounting can readily be attached to the bench or machine.

Novel Arrangement of Sliding Cabinet Doors

The drawing shows a novel sliding-door arrangement for cabinets. It differs from the usual kind in that the doors are in line with each other when closed, and thus present a much neater appearance



as indicated, and pressing against the door frame. These springs are screwed

than in the usual arrangement, where the edge of one door frame fits behind the other. The doors are kept in position snugly by means of flat springs located at the top and bottom of each door frame,

to rails running across the cabinet, behind the doors. Similar springs on the center rail, between the doors, force the door that is opened to slide behind the other. —Gordon H. Sears, Salt Lake City, Utah.

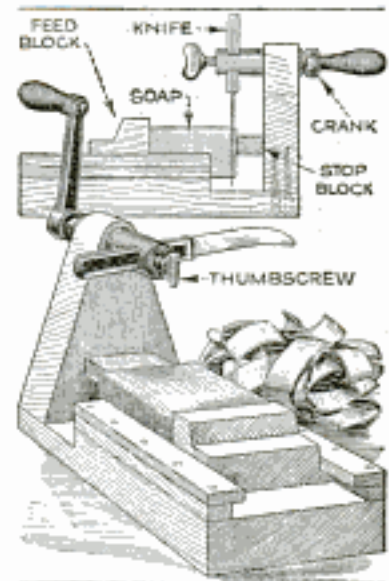
Mending Holes in Aluminum Vessels

A small hole in an aluminum vessel can readily be closed by mounting the vessel on a small anvil, shoe last, or some similar metal surface, and tapping gently around the hole with a light hammer. This will spread the aluminum sufficiently to close the hole. The pan should fit smoothly over the anvil, in order to leave as few marks as possible on the surface. If the pan is large enough, it can be hammered from the inside, the outside being placed on a flat metal surface.

Simple Soap-Chip Cutter

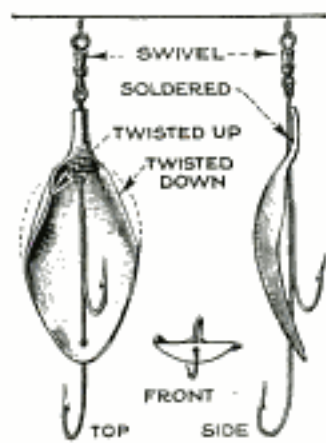
A handy contrivance for use in the kitchen is a soap-chip cutter of the type illustrated. It consists of a base, the construction of which is quite clear from the drawing, provided with a sliding block to feed the soap to the knife. A stop block, screwed to the head and projecting close to the knife

blade, determines the thickness of the chips. The whole device is made of wood, with the exception of the crank and cutter head, the latter being made of $\frac{3}{8}$ -in. cold-rolled steel, turned down at one end to fit the hole in the bearing, and having a slot and a thumbscrew in the end to hold a paring knife; the crank is either taken from a junk pile, or made of flat iron, and provided with a wooden handle. In use, the bag to be cut is inserted between the feed block and stop, and is pushed toward the head with the left hand, while the crank is turned with the right. The cutter may also be used for making potato and apple chips.—Frank N. Coakley, Buffalo, N. Y.



Making a Spoon Hook

A good spoon hook can actually be made from an ordinary spoon, with a rather small and shallow bowl, as shown in the illustration. Cut off the handle about $\frac{1}{2}$ in. from the bowl, and drill small holes through each end of the bowl, in line with each other. Then push the

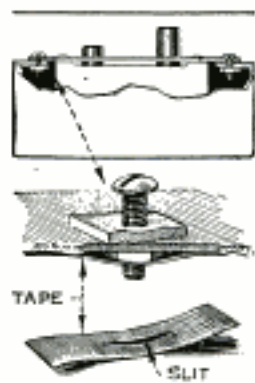


shank of a long hook through the two holes and point the barb of the hook toward the bottom of the bowl, leaving about 1 in. between the two. Solder a second hook to the shank of the first, inside the bowl, as indicated, the barb of the second

hook pointing upward and reaching nearly to the center of the bowl. Solder the short piece of the spoon handle to the shank of the long hook and attach a swivel to the eye. Twist one edge of the bowl down and the other edge up, and the hook is complete. Keep the outside of the bowl polished.

Tape Holds Inaccessible Nuts

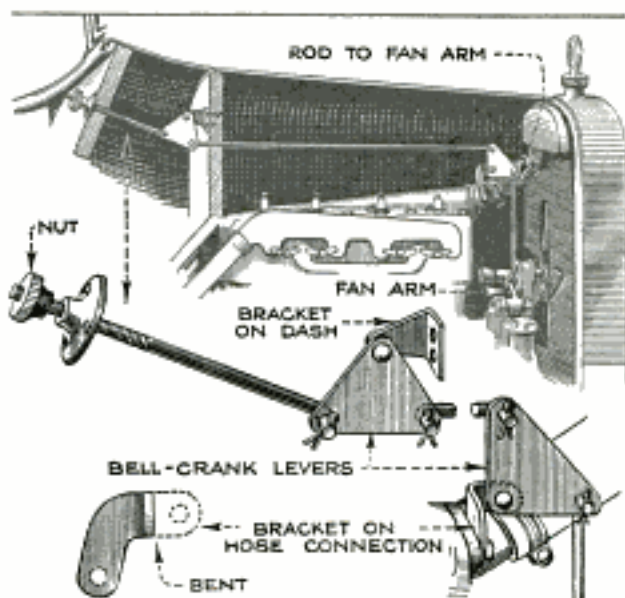
While installing a push-button switch, the writer was confronted with the problem of holding the small nuts in position while starting the cover screws. The switch plate itself closed the box opening, which made it impossible to hold the nut by hand or with any tool. The difficulty was overcome by using small pieces of adhesive tape to hold the nuts in position against the underside of the box top. A slit was cut in the tape to allow the screw to pass through after being started in the nut.



This simple kink will prove handy in many similar circumstances. The nuts should be tried on the screws to see if they fit easily. Ordinary friction tape may be used, but the adhesive tape used for mending purposes is much better.—Donald H. Palmetter, Port Huron, Mich.

Dash Control for Fan-Belt Tension

A cold automobile engine is wasteful of fuel, and erratic in operation when the throttle is partly closed. This may be



Above, Attachment Installed on Car; Below, Details of Bell-Crank Levers and Rods

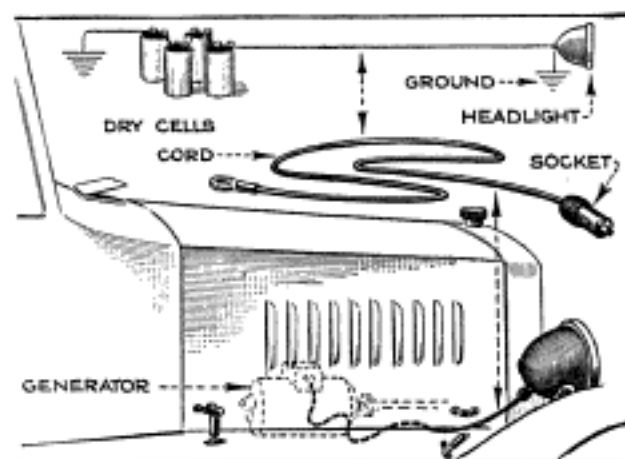
noticed particularly when starting the engine. The higher the temperature of the engine—within safe limits of course—the more economically and smoothly it will operate, even with the throttle nearly closed.

In the greater number of water-cooled engines, the fan draft through the radiator is excessive, and causes the engine heat to be undesirably low at normal speeds. The fan, however, can be slowed down or stopped entirely with the attachment shown in the illustration. The bolt holding the fan arm is loosened slightly, so that the arm can be raised or lowered easily. A short length of $\frac{3}{16}$ -in. iron rod is hooked around the arm, and runs vertically to a sheet-metal bell-crank lever, held by a bracket on the hose connection. Another rod connects this lever to a second lever attached to the inside of the dash, and a short length of threaded rod extends from the second lever through the instrument board, passing through a metal flange, as shown. A nut is screwed on the end of the threaded rod, and is used to raise or lower the fan arm, thus tightening or slackening the belt.

A radiator thermometer is used in conjunction with this attachment, so that the latter can be adjusted according to the temperature of the engine. The water will, of course, evaporate faster when the fan is slowed down, but it is an easy matter to replenish the radiator.

Emergency Lights for Auto

Four dry cells, and a length of lamp cord fitted with a plug at one end, make it possible to use the headlamps when



In Emergencies, the Headlamps can be Used by Connecting Them to Four Dry Cells or to the Generator

these fail owing to faults in the regular wiring. The upper detail of the illustration shows a simplified diagram for the connections on a car having a one-wire electrical system. A two-wire hook-up is similar, except that both sides of the battery are connected directly to the lamp. The exact method of wiring will depend, to some extent, on the way the headlamps are wired on a particular car, but the same general principle applies to all cars.

Another method of providing light, without the necessity of carrying dry cells in reserve, is a single connection run from the generator to one of the lamps, as the trouble usually lies in the wiring, the switch, or the fuses, and not in the generator. It is a matter of only a minute or two to raise the hood, and to make the connection to the generator.—G. A. Luers, Washington, D. C.

Repairing Loose Plaster Ceilings

A practical and permanent method of repairing a loose plaster ceiling, without much expense or labor, is to panel it with wooden strips. Quarter-round molding should be put around the corners of the sidewalls and ceiling, and thin, narrow strips of pine, or any other suitable lumber, used for the panelwork. These strips should be fastened to the joists with screws; nails do not hold well, and jar the ceiling when driven in. All cracks in the plaster should be filled, and the ceiling should be given two or three coats of paint. The panel strips may either be stained and varnished, or painted. This

makes a very neat-looking ceiling, and the work can be done for about one-quarter the cost of replastering.—Edgar Wright, Brookfield, Mass.

Campfire Photographs

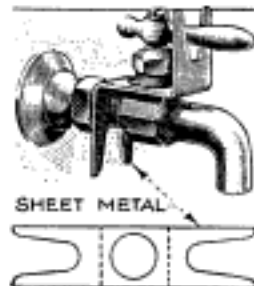
The most delightful period of a camping trip is when all the participants are gathered around the campfire telling stories. If a camera has been included in the pack, the scene can be perpetuated for future enjoyment, with the operator included in the picture.

Place the camera in position, locating the scene properly in the finder by means of a torch, held by an assistant at the edges of the field included in the picture. Set the focus at the proper distance, measuring with a rule to be sure of its exactness. Then open the lens shutter, which should be set for time exposure, and sit into the picture. All the persons included should take natural positions, and should not all face the camera. A teaspoonful of flash powder, or a small flash cartridge with the top off, is dropped into the fire from the end of a stick, to give the necessary illumination and to make the fire show up. Too much powder should not be used, as it will make too large a light, and great care should be taken when handling the powder. After the exposure, the operator may get up and close the lens, as the light of fire is too faint to affect the film.

Governing Flow of Faucet

In schools, factories, and public buildings, persons are often careless in the use of high-pressure faucets, splashing the floor or walls, and often leaving the faucet turned on "full bore," with the result that the waste pipe cannot carry the water away fast enough, and the basin overflows. The attachment illustrated will prevent this.

It is made of heavy sheet metal, cut to the shape shown, drilled at the center to fit the neck of the faucet snugly, then bent, and placed in position by removing the faucet handle. The faucet handle, when replaced, can only be turned a little more than the distance between the ears of the attachment, hence there is little danger of splashing or overflowing.



NE U. S. CRA.
NTER BRITI
ELICOPTER
ONDON, July
Press.]

OFFERS AND ANNOUNCEMENTS

NEW YORK ACADEMY OF SCIENCES OFFERS \$250 PRIZE FOR 1923

A prize, known as the A. Cressy Morrison Prize for 1923, is announced by the New York Academy of Sciences for the most acceptable paper on any scientific subject covered by the academy, or by any of its affiliated societies. These papers must be the result of original research, never previously published, and must be submitted on or before Nov. 1, 1923. They must be typewritten with all drawings, diagrams, tables, and photographs, ready for publication. The award will be made by the council of the academy. The prize may be divided between papers of equal merit.

REWARD OF \$5,000 FOR PREVENTIVE OF "Klieg Eyes"

Illumination experts and the medical profession in general are invited to devise a preventive for the affection known as "Klieg eyes," which afflicts motion-picture actors and others subject to the intense illuminating effects used. A prize of \$5,000 is offered for the discovery. The affection takes its name from the studio lamps used in taking interior views. The intense light stops the natural secretion that "lubricates" the eyeball, causing the eyelid to rasp upon the former, with an effect like sandpaper.

ELECTRIC MINE-LOCOMOTIVE PRIZE OFFER

In order to bring out a safer type of mine locomotive, a prize of £1,000 has been offered in England for the best engine of this class. It must be an electric machine, run with storage batteries, for replacing ponies used in deep and hot coal mines. The prize is open to the whole world, and working trials will be made of those machines selected for test.

PRIZE FOR LOW-POWERED AIRPLANE FLYING LONGEST DISTANCE

To encourage the development of small airplanes, a prize of £1,000 has been offered for the longest sustained flight made in a low-powered machine. The engine rating of competing planes must not exceed 7½ horsepower, and only one gallon of fuel may be carried. Not less than 50 miles must be covered under these conditions. The competition is open to the world, and will take place in England next September. A second prize of £500 is offered which is restricted to British competitors.

LARGE PRIZES OFFERED FOR VERTICAL AIRPLANE FLIGHTS

Various prizes, totaling £50,000, have been offered in England for the first flier who can raise his machine vertically in the air. The chief conditions are that the machine must carry a pilot, one hour's fuel supply, and 150 pounds of extra load. It must rise straight up from the ground for 2,000 feet, and then come down to the starting point without damage. Other tests require the machine to stay 2,000 feet up in the air without motion for a half hour. The prizes are open to the whole world, and entries must be received before April 30, 1924. Only one machine is barred, and that is now under construction.

YALE SCHOLARSHIPS, LOANS, AND AIDS HELP SELF-SUPPORT OF STUDENTS

Nearly one-third of the student body at Yale University is partly self-supporting. In order to assist the many students of limited means to secure an education, the university provides opportunities for self-support in various forms.

The most important are tuition scholarships and loans, which amount, according to the scholar's standing, to as much as 80 per cent remission of tuition. These are in three classes, namely, remissions of tuition to freshmen and sophomores whose classroom work and personal references fill the requirements of high character and personality; regional or family scholarships, maintained by alumni or other local associations; and prize scholarships awarded to upper-class men of marked scholarship ability.

Other forms of self-support open to students are: ushering, coat checking and ticket selling at athletic games, chapel services, concerts, and lectures; salesmanship of many kinds, from bookselling to life insurance; tutoring for both graduates and undergraduates; work for board, and work for room in New Haven; student agencies such as student suit-pressing clubs, student laundries, student bureau of accommodations, flower agency, picture agency, news stand, newspaper bureau, student typewriting, and others. The university also maintains a library from which textbooks are loaned to poor students free of charge, a loan furniture collection, and provides for the remission of infirmary charges.

SOAP CHEMISTS OFFERED FELLOWSHIP IN ANY UNIVERSITY

Candidates who possess the equivalent of a master's degree, and who wish to devote themselves to a purely scientific study of the cleansing action of soap, are given the opportunity of submitting their qualifications for an endowed fellowship in this work. The fellowship carries with it an allowance of \$2,000 per year, and the successful competitor will be permitted to work at any institution in the country which is properly equipped for a study of this character. Studies will be limited to the fundamental principles of chemistry, physics, and colloids connected with the cleansing action of soap.

CONTESTS PREVIOUSLY ANNOUNCED

Medals, Diplomas, and Money Awards: Announced August issue, 1921; awards offered by the Franklin Institute. The Franklin medal is for workers in technology; the Elliott-Cresson is for original research work and invention; the Howard N. Potts is for important development of previous discoveries and inventions. Each award consists of a gold medal with a diploma. There are also a silver medal, and a Certificate of Merit awarded for meritorious discoveries, and cash premiums for certain work in optics.

Best Treatise Regarding Immortality: Prize \$1,000; announced January issue, 1923; closes Dec. 1, 1923.

Awards to Further Science of Electricity: Medals and prizes, amounting in all to about \$20,000; announced February issue, 1923.

For Best Work by American Chemist: An annual award of \$25,000; announced February issue, 1923.

Names for Great Lakes Steamers: Two prizes of \$50 each; announced February issue, 1923; suggested names must be submitted before the opening of navigation season in 1924.

Motorboat Race, Miami Beach, Fla., to Havana, Cuba: Prizes \$10,000; announced March issue, 1923.

Essay on Economic Subject: Prize \$1,500; announced March issue, 1923.

Pulitzer Prizes, Columbia University: For best work in various literary and journalistic lines; announced April issue, 1923; nominations of candidates must be made before Feb. 1, 1924.

Scholarships for War Nurses and Ex-Service Men: Numerous scholarships provided at colleges and universities throughout the country under the will of the late La Verne Noyes; announced April issue, 1923.

Most Practicable Device for Recording Mine-Shaft Signals: Prize of £250, or about \$1,100; announced May issue, 1923; closes Sept. 30, 1923.

Prizes for Essays: Three yearly prizes of \$2,500, \$300, and \$200; announced June issue, 1923; for articles on subjects relating to business development and the modern trust company; closes August 31, each year.

Our Bureau of Information will furnish addresses and further details

Boys' and Girls' Short-Story Contest: Two first awards of \$100, and other prizes; announced May issue, 1923.

Greatest Benefit to Community Rendered by Women's Club: Prize, \$1,000; announced May issue, 1923; closes Sept. 15, 1923.

Endurance Prize for Aerial Engine: Prize, 1,000,000 francs (normally about \$200,000); an-

nounced June issue 1923; applications for privilege to compete should be in before Dec. 1, 1923.

Prizes for Essays on Purchasing Power: Three prizes of \$1,500, \$800, and \$500; announced June issue, 1923; closes Sept. 30, 1923.

Students' Essays on Municipal Government: Prizes \$250 and \$100 for postgraduates; \$100 for undergraduates; announced May issue, 1923.

SCIENCE NOTES FOR DAILY USE

2396 DEADLY CARBON-MONOXIDE GAS FROM ORDINARY GAS RANGE

Incomplete combustion of coal gas, natural or artificial, in domestic heating appliances, is the most frequent cause of carbon-monoxide poisoning, which often results in death. Since the pressure under which gas is delivered from the mains varies from time to time, the proper proportion of air to gas also varies in the burner. For this reason it is never safe to leave even a well-adjusted burner operating for any length of time without suitable ventilation. Devices of the so-called "smoke consuming," "odorless," and "chimneyless" type are thus not free from danger, unless provided with a flue. The latter has been found to be the safest accessory of the gas range and essential if all possibility of poisoning is to be avoided.

BOILED BUTTER HELPS FATTEN BABIES

Addition of boiled butter to the ordinary skim-milk dilutions fed babies would appear to be better for the infant than the use of cream, a recent medical report states. It is asserted that boiling the butter for five minutes over a slow fire drives off more than 50 per cent of the fatty acids in the product and the infant fed with the butter-skim-milk solution seems more free of digestive disorders than when fed cream. A number to whom it has been fed experienced a uniform gain in weight of from 1 to nearly 2 ounces a day.

TREATMENT OF CLOTHING WITH ARSENIC HELD DANGEROUS

In view of the fact that there is almost universal legislation now in force against the use of arsenical mixtures, except in minute quantities, in foodstuffs and wall paper, as well as other commodities, the recently inaugurated campaign for the use of that poison in treating woollens to make them moth-proof has met with opposition on the part of scientists. It is pointed out that using even a small quantity of arsenic in solution to prepare the cloth against insects before being made up into clothing would be a source of danger.

Clothes thus treated, when brushed, might throw off the arsenic compound, polluting the air even more than the forbidden wall paper. An infant might be poisoned by sucking a piece of cloth, and skin rashes might result from contact with the clothing.

KNOWLEDGE OF VITAMINES, ESSENTIAL TO GROWTH, ON INCREASE

Rapid strides in the development of present-day knowledge of the chemistry of foods brought with them the discovery of the vitamin groups, which are now known to be essential to body growth. The three distinct kinds already identified are the so-

called fat solubles, known as A; the water solubles, called B; and the antiscorbutic kind, known as C, whose assimilation prevents scurvy. Continued research along these lines has led to the practical identification of a fourth group, to be called D, which has antirachitic qualities; that is, tending to prevent the disease rickets, or inflammation of the spine, commonly called rickets. Food scientists believe that there are a great number of as yet undiscovered vitamin groups, each having certain health-essential attributes.

CHEESE NECESSARY TO A BALANCED RATION AND AIDS DIGESTION

The diet of the American, according to a writer on foods, is one-sided, consisting mainly of grains and meat products. These foods, although they are a balanced ration of carbohydrates and protein, are lacking in calcium and other minerals, which are essential to a fully balanced ration, and to the proper nourishment of the human body. These elements are present in cheese, which is therefore a rich, concentrated food to every one and especially as an item in the diet of growing children because of the calcium, phosphates, and the growth-promoting vitamin that are contained in it.

Contrary to the popular belief, cheese is easily digested, and in fact has a marked influence in helping to digest the entire meal. It remains a little longer in the stomach than do other foods, but digests very quickly in the intestines.

BRAIN UNHARMED BY RAYS THAT KILL TUMORS

Physicians of the Memorial Hospital for the Study of Cancer and Allied Diseases have discovered that X-rays and radium rays may be used to kill tumors of the brain without any great danger of harming the brain itself. Because of the delicacy of the brain tissues, it has frequently been impossible to operate for tumor in the head.

It is well known that X-rays and radium rays are likely to damage the flesh exposed to them. But the hospital scientists have now learned that the cells of the brain resist the action of the rays more strongly than the cells of any other part of the body. This makes it possible to inclose tiny bits of radium in a platinum capsule and insert them in the brain, the rays being strong enough to kill the tumor tissues but not strong enough to hurt the brain cells.

"MYSTERIOUS" CURE FOR SEASICKNESS IS SEAWATER

Passengers on ocean-going liners have heard rumors of it and some have had prescribed for them a certain "mysterious" remedy for seasickness, claimed to be sovereign. It now appears that the cure is simply a glass of seawater.

IN accordance with the editorial policy of this magazine never to accept compensation in any form for what appears in our reading pages, and also to avoid all appearance of doing so, we are obliged to omit the name of the maker or the seller of any article described. This information, however, is kept on file and will be furnished free, by addressing Bureau of Information, Popular Mechanics Magazine, Chicago. [Editor.]

127 Abbey Road,
Barrow in Furness
London, England

the
st th
in, an
d will
ange in
ns exce
far a
l sou
uncec
men
aract
scien
ing r
hich
ved
ent

subl
print
be e
h, a
gran
ist be
Sci
y oi
es
1876
b9b76
b82

29it
Jo7
6nto
1917

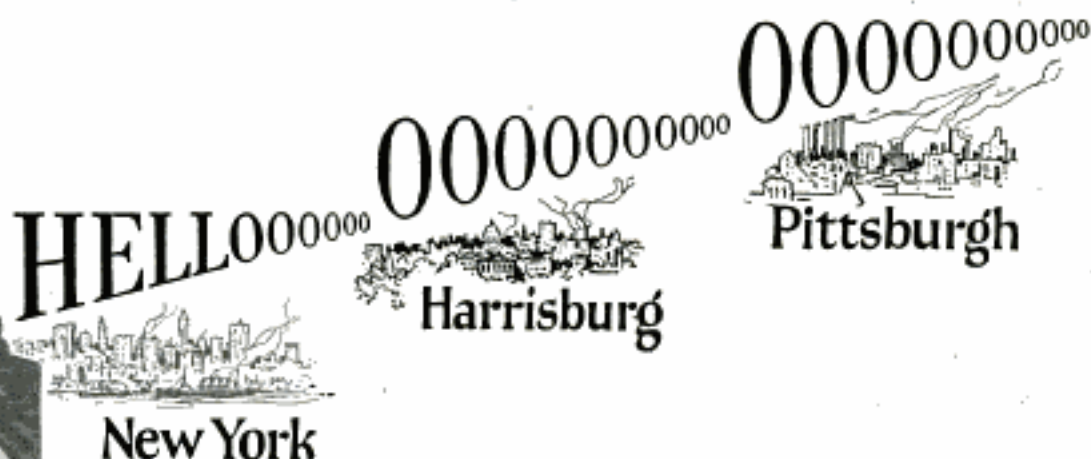


Diagram showing how the voice currents weaken in long distance transmission and are restored by "repeaters."

Mastering Nature's Forces

Without the telephone "repeater," the entire electrical power available on the earth would not be sufficient to make trans-continental speech commercially possible. The three thousand repeaters now in use on Bell System long distance lines have increased the talking range of every telephone by thousands of miles. By making possible the use of smaller gauge wires, repeaters have kept down the cost of equipment by millions of dollars.

The repeater is only one out of scores of scientific developments of equal or greater importance in the advancement of telephone service. Bell System progress has been a continual encounter with seemingly impossible barriers, and a continual

finding of new ways to overcome them. Each step in extending the range of speech has come only after years of study. Each important piece of telephone apparatus has had to be created for the need. Each working day this pioneering goes on. Nature is harnessed to a new duty and mechanical ingenuity improves the tools of service, as fast as science finds the way.

Not only is the Bell System daily conducting research within its own nation-wide organization, but it is studying the discoveries of the whole world of science for their possible application to telephone service. Only by such eternal vigilance has the United States been given the best and cheapest telephone service in the world.

" BELL SYSTEM "

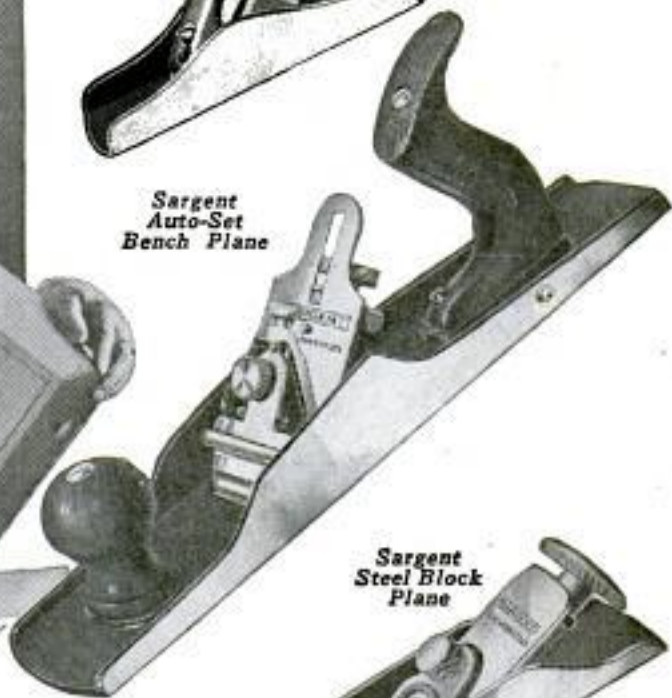
AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy, One System, Universal Service, and all directed toward Better Service



Sargent
Steel Pocket
Plane

Sargent
Auto-Set
Bench Plane



Sargent
Steel Block
Plane



These
SARGENT PLANES
belong in every workshop

PERHAPS it's a new radio cabinet nearing completion, or it may be only a bureau drawer that's been sticking! But whatever it is—if it's made of wood and needs smoothing or finishing—the Sargent is the plane that will do the job right, in a jiffy.

The Auto-Set Bench Plane makes shavings fly. With, against, or across the grain, it cuts the wood without hesitation. It is light, true, keen, time-saving—unsurpassed where the job is difficult.

The Sargent Steel Block Plane is particularly good for 'cross grain and end work because of the

low angle arrangement of cutter. It is light, unbreakable, indestructible, and a capable finisher.

And lastly comes *The Sargent Steel Pocket Plane*, so often called "the craftsman's pet." And a more practical and useful favorite never existed. It cuts like a veteran, is true as a watch, and in close quarters proves its great convenience.

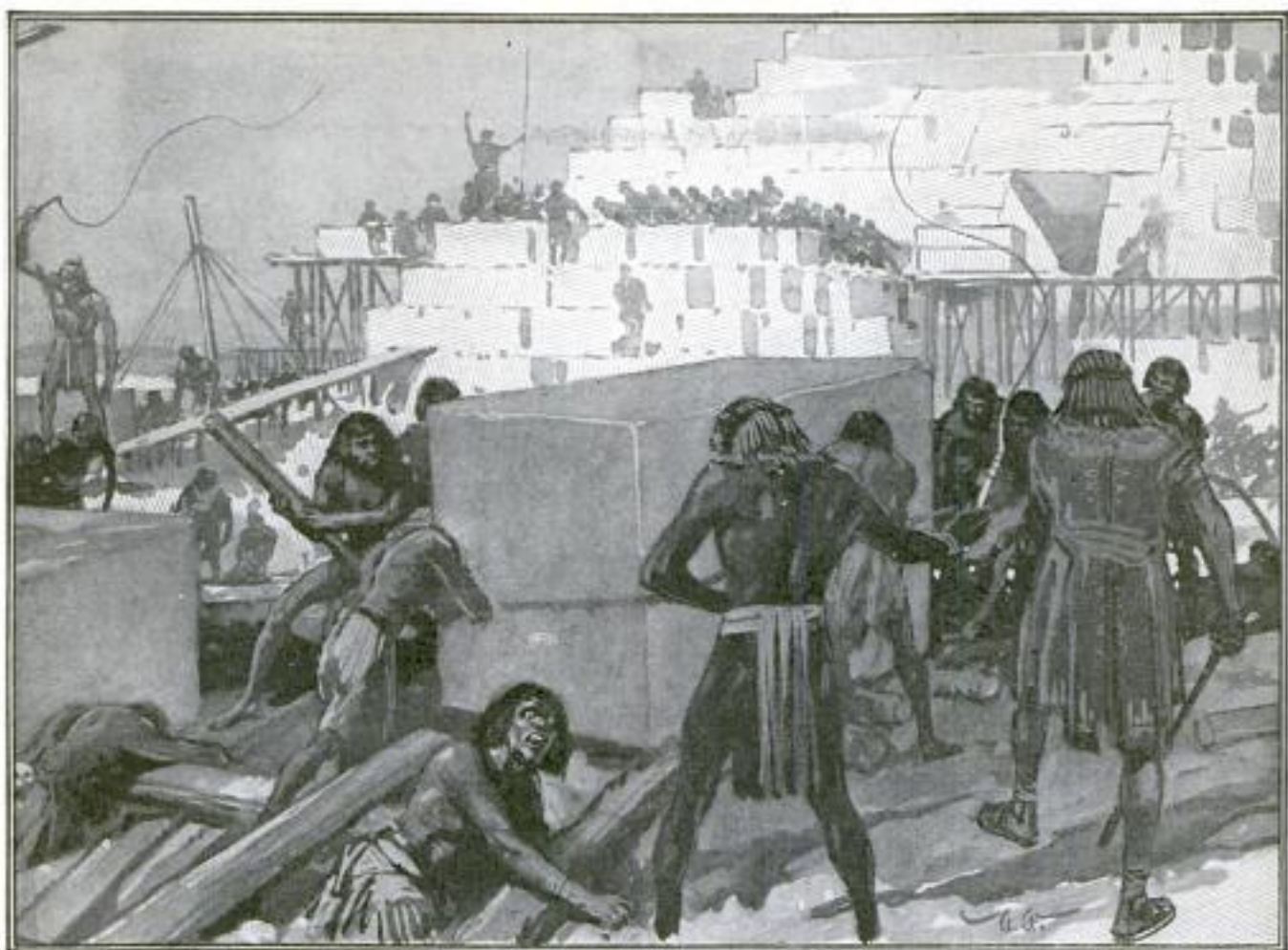
Your workshop is incomplete without these tools of the master craftsman. For detailed information concerning them and other kinds, write for the Sargent Book of Planes and see these models at any good hardware dealer's.

SARGENT & COMPANY
Hardware Manufacturers

49 Water Street

New Haven, Conn.

SARGENT
Tools & Hardware



Men died like flies



Wherever hard, grueling tasks can be lifted from human shoulders by electricity, human life is enriched. General Electric Company designs and manufactures machinery by which electricity is generated and put to work.

The Great Pyramid was built, according to Herodotus, by the bitter toil of 100,000 men for twenty years. Men died like flies.

The world *does* progress. A modern skyscraper goes up in a fraction of a year—workmen furnishing the skill and General Electric motors the muscle.

GENERAL ELECTRIC

Bench
Drill
No. 490
Price
\$17.00



Mr. Punch says:

"No man likes to go running around trying to find someone with a bench drill whenever he wants to bore a hole. Have your own drill."

When you want to drill metal

USE this Goodell-Pratt Bench Drill. The big feature is the intermittent friction feed. This can be set to regulate the proper pressure for the size drill-point you are using, thus minimizing the chances of drill-point breakage.

Has two speeds. You can change from one to the other by merely turning the shifter knob on the frame.

The chuck is all steel, with three jaws that hold drill-points of all sizes up to 3/8 in. diameter. Eight steel drill points from 1/16 to 11/64 inch are included with this bench drill.

All gears cut from solid blanks, carefully fitted to run smoothly. The adjustable table has a turned and polished top. Iron parts finished in red and black enamel, steel parts are polished.

Height above table 18 inches. Weight, 14½ pounds.

1499 other good tools

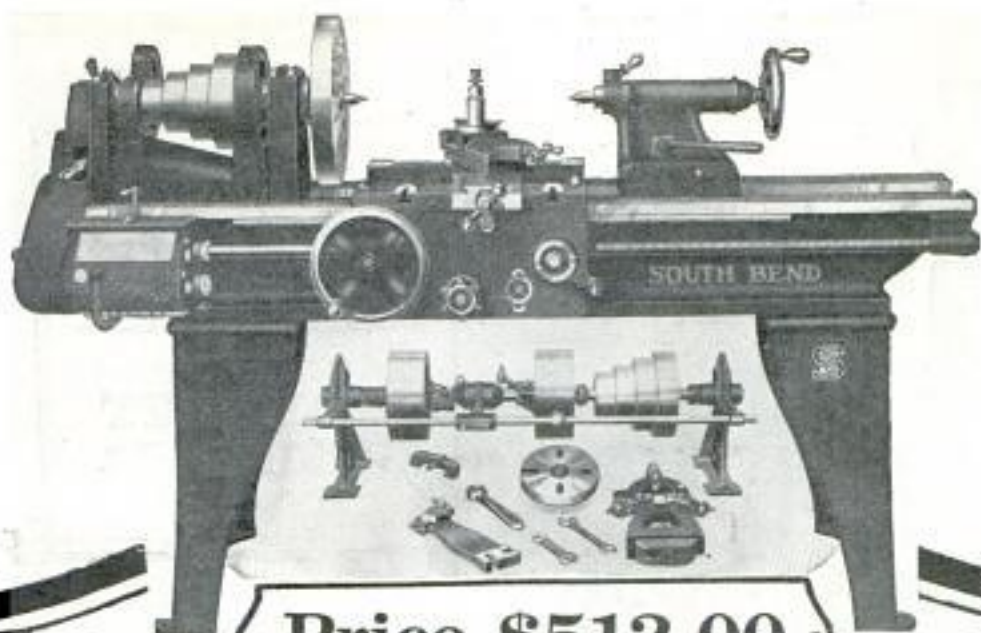
Among the 1500 Good Tools that Goodell-Pratt make are many that every amateur mechanic should own. Write for complete catalog that illustrates and describes the complete Goodell-Pratt line. It's free.

GOODELL-PRATT COMPANY

Toolsmiths

Greenfield, Mass., U. S. A.

GOODELL-PRATT
1500 GOOD TOOLS



Price \$512.00

16" x 8' Quick Change Gear Lathe

SOUTH BEND LATHES

for the MACHINE SHOP for MANUFACTURING for the TOOL ROOM

Over 30,000 Satisfied Users

SIZE	Standard Change Gear	Quick Change Gear
9" x 3' Lathe.....	\$ 211.00.....	\$ 241.00
11" x 4' Lathe.....	248.00.....	288.00
13" x 5' Lathe.....	304.00.....	354.00
15" x 6' Lathe.....	376.00.....	431.00
16" x 8' Lathe.....	452.00.....	512.00
18" x 10' Lathe.....	656.00.....	721.00
21" x 12' Lathe.....	933.00.....	1016.00
24" x 14' Lathe.....	1254.00.....	1353.00

Send for new Catalog No. 81, which gives prices on the entire South Bend Lathe Line
South Bend Lathes can be purchased from Machinery Dealers in all principal cities.

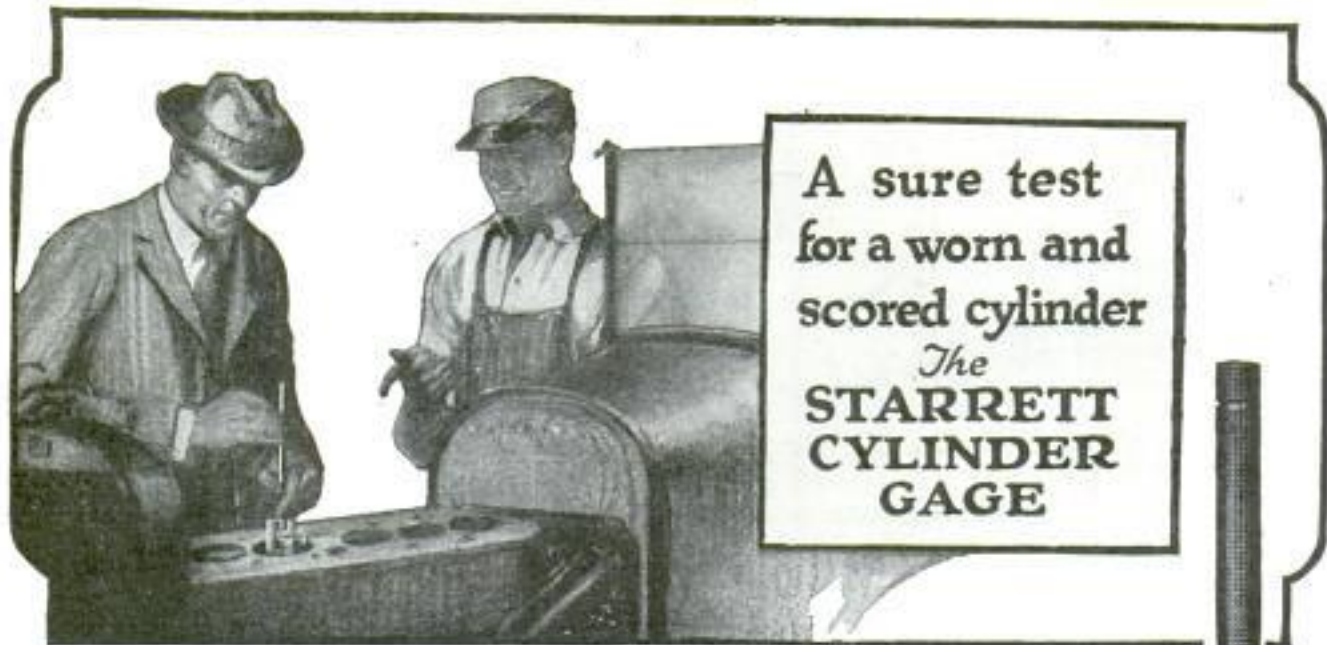
South Bend Lathe Works

555 East Madison St. South Bend, Ind.
New York Sales Room, 166 Centre St.

Established
in 1906



Lathe Builders
for 17 years



no wonder she won't pull!

CAR OWNERS—

Now you can KNOW when your cylinders are scored, tapered, or out-of-round. Ask the shop to test them with the Starrett Cylinder Gage. Slide this Gage up and down the cylinder *yourself* and prove to your own satisfaction whether your cylinders need attention.

This remarkable Gage is so sensitive that a variation of one-thousandth part of an inch is plainly recorded on the dial. Yet it is so simple and reliable in operation that *anyone* can use it and be sure of absolutely reliable results.

SERVICE STATIONS, RE-GRIND and RE-BORE SHOPS, GARAGES

This new Starrett Cylinder Gage will help you sell more service. No more difficulty in convincing the car owner of the necessity of truing up worn cylinders. No. 452 is designed on an entirely new principle—non-collapsible, easy to read and wonderfully accurate. *Let your customers sell themselves.*

Revised Supplement to Catalog No. 22 AP describes this new instrument. Write for free copy.

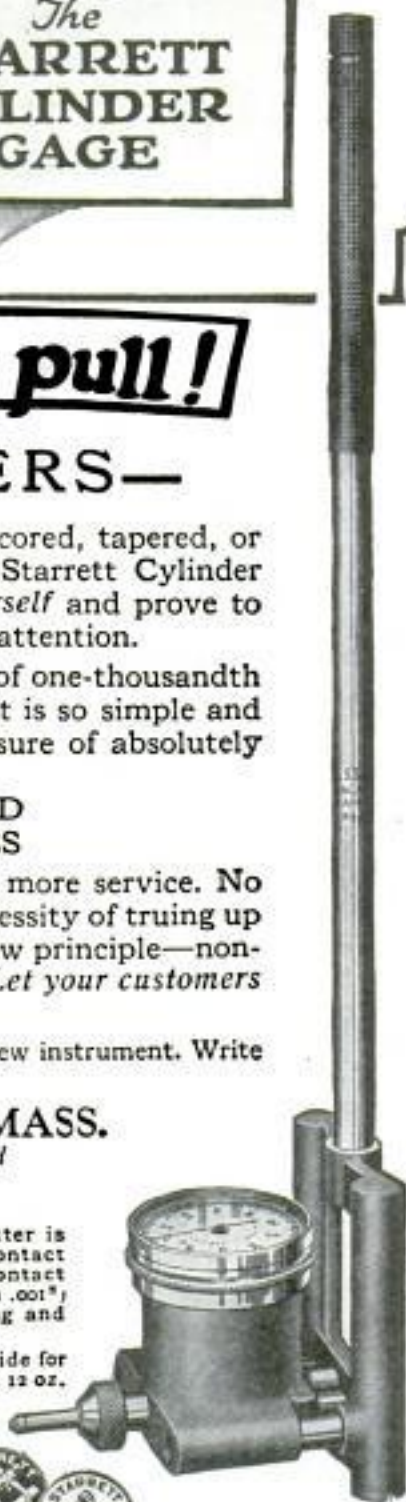
THE L. S. STARRETT CO., ATHOL, MASS.

The World's Greatest Toolmakers—Manufacturers of Hacksaws Unexcelled

STARRETT CYLINDER GAGE No. 452

Of rugged construction—has non-breakable crystal over dial. Litter is mounted on block moving at right angles to sled which has two-line contact points always in alignment with the cylinder walls. Two hardened contact points *independently* cause the hand to travel over the dial (reading in .001") and with a unique double spring action make the gage self centering and absolutely non-collapsible.

Two adjustable rods, which can be carried in the hollow handle, provide for diameters ranging from $2\frac{1}{2}$ to 6 inches. Gage is nickel plated. Weight, 12 oz.



5480

Use Starrett Tools



ONLY
\$ **3**
DOWN
and you
keep this
typewriter



DIRECT
to you
from our
Factory

Big Saving
In Price

Yes, we will ship you this
Genuine Underwood

Rebuilt in our own factory just like new for
ONLY \$3 down—NOT ONE CENT MORE

Until you have tried the machine 10 full days at our expense



Our Factory

EVERY MACHINE is fully guaranteed. New parts wherever needed. New enamel, new nickel, new lettering, new platen, new key rings—a complete, perfect typewriter. Impossible to tell it from a brand new Underwood either in appearance, durability or quality of finished work.

An up-to-date machine with two-color ribbon, back spacer, stencil device, automatic ribbon reverse, tabulator, etc. In addition we furnish **FREE** waterproof cover and special Touch Typewriter Instruction Book. You can learn to operate this Underwood in one day.

Big Book FREE

Our big handsomely illustrated catalog will be sent **free** on request. It tells you all about the advantages of owning a **STANDARD SIZE UNDERWOOD**; how and why this machine will last for years, saving many dollars not only in the purchase price but in its operation.

Send in the coupon and let us send you this beautifully illustrated book **FREE** without any obligation whatever.

Shipman-Ward Mfg. Co.
"Typewriter Emporium"
C-212 Shipman Bldg.
Montrose and Ravenswood Aves., Chicago

Write Right Now

and learn how it is possible for us to ship you this Underwood Typewriter upon our **free trial plan** and our **direct-to-you money saving methods**. Get the full details now—just sign the coupon and mail **today**. Get all the facts—then decide.

No Obligation

—to buy. You don't have to order. Just sign the coupon, send it to us and we will mail you our big catalog absolutely free.

Send the
Coupon
Today

**10 Days'
Free Trial**

You have ten full days in which to try the typewriter before deciding whether you want to keep it. Give it every test—see for yourself—make the Underwood prove its worth to you. Don't take our word for it—put the Underwood before you and see if you don't think it the greatest typewriter bargain ever offered.

You will be amazed at the liberality of our offer, the beauty and all around excellence of our typewriters.

typewriter offer except to sign and send in the coupon. There is no obligation.

This is the genuine Underwood Typewriter. We offer you the same three models of the Underwood Typewriter being made and sold by the manufacturers today. **Standard 4-row single shift keyboard**. Absolutely visible writing—the full line of typewriting is visible at all times. All the improvements and attachments that any high grade typewriter ought to have.

Big Saving to You

Our plan of selling to you direct makes possible enormous savings, which are all for your benefit. Send in the coupon and we will send you prepaid our big catalog, including "A Trip Through Our Factory." This shows how the Shipman-Ward Rebuilt Underwood is the best that can be produced at our Special Price.

don't have to do a thing to get our big **Free** catalog and complete details of our amazing

**FREE TRIAL
COUPON**

SHIPMAN-WARD MFG. CO.
C-212 Shipman Bldg., Chicago

Please send me **FREE**, all charges fully prepaid, your **BIG NEW** catalog of **UNDERWOOD TYPEWRITERS** and complete details of your **FREE TRIAL Offer**.

It is understood that I am under no obligation whatever and that this is to be sent without one cent of cost to me.

Name.....
Street.....
City..... State.....

Where no other could— “YANKEE” Ratchet Breast Drill

Works efficiently and quickly in the most cramped places. “Yankee” DOUBLE Ratchet keeps bit cutting *continuously* even if you can move crank only an inch either way.

Five adjustments: Plain Drill; Left-hand Ratchet; Right-hand Ratchet; DOUBLE Ratchet; Gears Locked.

Some other “YANKEE” Tools

Spiral Screw-drivers	Ratchet Hand Drills
Quick Return Spiral Screw-drivers	Ratchet Chain Drills
Ratchet Screw-drivers	Ratchet Tap Wrenches
Plain Screw-drivers, 1½ to 30 in. blades	Plain Breast Drills
Ratchet Bench Drills	Automatic Push Drills
	Push Braces
	Bench Vises, removable base

Dealers everywhere sell “YANKEE” Tools



Write for FREE Book

Illustrates and describes all the ingenious “Yankee” Tools for saving time and labor in metal-drilling, wood-boring and screw-driving. Send Postal today.



Ratchet Shifter

controls the 5 adjustments—

1. Plain Drill
2. Left-hand Ratchet
3. Right-hand Ratchet
4. DOUBLE Ratchet
5. Gears Locked

Drilling out stud bolt on clutch housing.

This lever controls the two speeds. Change instantly without removing drill from work.

No. 1555 (Illustrated.) Length 17 in. Three-jaw chuck for round shank drills up to ½ in. Two speeds.

No. 555 Length 18 in. Two-jaw chuck for round and squares up to ½ in. Two speeds.

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

“YANKEE” TOOLS

Make Better mechanics

Buescher-Grand

TRUMPET

Especially easy to blow, with an improved bore and new proportions. With the mute in, it blows so softly and sweetly that it will not annoy anyone. A splendid home instrument. Buescher-Grand Corset is exceptionally easy to blow, yet possesses a tone of wonderful volume. It is the same instrument with which the greatest cornetists of America have made their reputations.

Send today for Free Book, mentioning instrument in which you are interested.

BUESCHER BAND INSTRUMENT CO.
Makers of Everything in Band and Orchestra Instruments
2593 Buescher Block ELKHART, INDIANA



AGENTS

For the Biggest Money-Making Selling Proposition You Ever Saw

See Pages 126 & 127

Are You All Primed?

We can supply you with Masonic books of reference, study, history, etc. Also fine aprons, regalia, novelties, jewelry and supplies.

Send for Free Catalogue X

REDDING & CO.

Publishers and Manufacturers

Dept. 25 9 West 23rd Street, New York



Sent on Approval

No
Money
Down

21 Jewel Santa Fe Special

Without one penny of advance payment let us place in your hands to see, to examine, to inspect, to admire, to approve, a real masterpiece in watch creation.

Our determination to this year double our sales of the world famous *Santa Fe Special* and *Bunn Special Watches* prompts this matchless offer.

While other watch dealers are raising their prices, asking you for larger monthly payments, and making payment terms harder for you to meet, we are offering you our new model *Santa Fe Special*, no advance in price, no money down, easier terms and smaller monthly payments. WE realize the war is over and in order to double our business we must give you pre-war inducements, better prices, easier terms, and smaller payments.

Page 12 of Our Watch Book Is of Special Interest to You!

Ask for our Watch Book free—then select the watch you would like to see, either the famous *SANTA FE SPECIAL* or the 6 position *BUNN SPECIAL*, and let us explain our **EASY PAYMENT PLAN** and send the watch, express prepaid, for you to examine. **NO MONEY DOWN.**

REMEMBER No money down—easy payments buys a master timepiece—a 21-jewel guaranteed for a lifetime at about half the price you pay for a similar watch of other makes. No money down. A wonderful offer.

SANTA FE WATCH COMPANY

86 Thomas Bldg.

Topeka, Kans.

Home of the Great Santa Fe R. R.

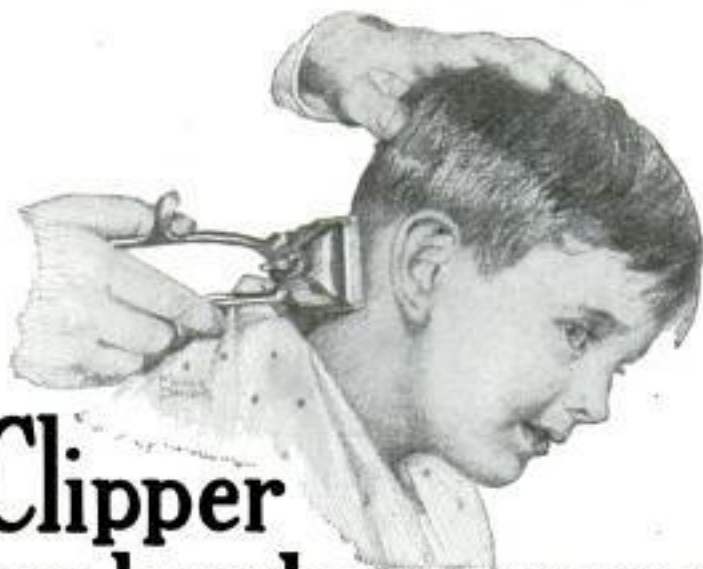
MAIL COUPON TODAY

SANTA FE WATCH CO.,
86 Thomas Bldg.,
Topeka, Kans.

Please send prepaid and without obligation your Watch Book free, explaining your "No Money Down" Offer on this *Santa Fe Special Watch*.

Name

Address



The Clipper your barber uses

Ask your barber what kind of clippers he uses and he will undoubtedly answer, "Brown & Sharpe".

For he has found that day-by-day, year in and year out, these clippers cut smoothly and accurately. They stay sharp. Some barbers are using today the Brown & Sharpe clippers they bought twenty years ago.

Mothers and fathers, too, are buying Brown & Sharpe clippers as the best kind for use at home. The simplicity and ease of operation make it possible for anyone to use them; for bobbed hair, Dutch cuts, for men who like to

keep their hair closely trimmed between trips to the barber—and wherever a good barber or hairdresser isn't quickly accessible.

* * *

At hardware, cutlery, barber supply and other stores you will find the four most popular sizes of the "Bressant" Model Brown & Sharpe clippers. No. 000 cuts hair very short—nearly as close as shaving, but without coarsening the hair as a razor does.

No. 00 cuts hair 1/64 inch long

No. 0 cuts hair 1/32 inch long

No. 1 cuts hair 1/8 inch long

The clipper your barber uses is the clipper to use at home.

BROWN & SHARPE Mfg. Co.

Providence, R.I., U.S.A.

The World's Standard **BS** Quality Tool Makers

AGENTS WANTED

To take orders for a leading line of engraved greeting cards. The attractive cards are easy to sell to friends and neighbors. Every call a sale. Boys can sell during vacation—men can take orders at work. Both make good money. Send for sample book.

SKILLKRAFTERS, Inc. 1729 Ranstead Street, PHILADELPHIA, PA.

THE SCREWDRIVER THAT HOLDS THE SCREW

As Good as a Third Hand in Assembling anything from a Watch to an Automobile



Appeals Especially to Radio amateurs and professionals. A wonderful (patented) Improvement.

Jobbers, Dealers and Agents. Favorable discounts
THE COBURN TOOL CO., 114 Bedford St., Boston

\$1.25

PILLIOD

Tool Cases Excel



Machinists, Tool Makers and Carpenters find them most satisfactory in construction, appearance, service and price. Immediate shipment.

Booklet describing 20 styles on request.

THE PILLIOD LUMBER CO.

Dept. 1 Swanton, Ohio

TAILORING SALESMEN

We Pay You Salary and Commissions

Greatest money-making line in America. Made to measure suits, overcoats, one price, \$33.65, express prepaid, all wool, all wool linings, hand tailored, finest workmanship. No extra charges for style or oversize. Bigger advance commissions, weekly salary besides. Protected territory. Apply at once.

GREAT WESTERN TAILORING CO.

837-841 W. Jackson Blvd.

CHICAGO, ILL.

DIAMONDS WATCHES CASH OR CREDIT



"SYLVIA"
Diamond Ring
Blue white, radiant,
perfect cut Diamond.
The ring is 18-K Solid
White Gold, carved and
pierced. Extra special
at \$100. Credit terms
\$2.50 A WEEK
Others at \$75,
\$150, \$200
up.

Genuine Diamonds GUARAN-
TEED

Our Diamonds are distinctive in their
brilliancy, blue white, perfect cut.
Sent prepaid for your Free Exam-
ination, on Charge Account.

Send for Free Catalog
Everything explained. Over 2,000
illustrations of Diamond-set Jew-
elry, Pearls, Watches, Wrist
Watches, Mesh Bags, Silverware.

**DIAMOND
Wrist
WATCH**



\$2.25 A Month

Cushion Shape
Gold filled, guaranteed 20 years. 15
Jewels, warranted. Ribbon bracelet
with gold filled clasp. Special **\$21**

Octagon, Tonsau, Cushion and other
shapes, in White Gold, as low as \$30

Our immense buying power for our Chain of Stores in leading cities and our large Mail Order House enables us to make lower prices than small concerns. We invite comparison. You will be convinced that you can do better with LOFTIS. Money back if not fully satisfied. **LIBERTY BONDS ACCEPTED**

LOFTIS THE OLD RELIABLE CREDIT JEWELERS
BROS & CO. 1827
Dept. C894
108 N. State St. CHICAGO, ILL.
Stores in Leading Cities

DIVINE RED DEVIL Water Motors



Simple—strong—durable. Wonderful little workers for all sorts of household and shop uses. Thousands in use. For all light power purposes. Attaches to faucet.

Two sizes: 4" — \$4.25
6" — \$6.75

The higher the water pressure the more work they do.
Send today for catalogue.
Divine Water Motor Company
Utica, N. Y.

LONG RANGE RIFLE

SINGLE shot hunting rifle of finest blue, case hardened steel, modelled after famous Springfield rifle. Bolt action, take-down model 36 inches over all. Front and rear sights; automatic shell ejector.

Shoots 22 calibre long, extra long and short cartridges. Special at \$6.95

\$6.95

PAY POSTMAN ON DELIVERY plus postage. Money back if Not Satisf'd.

CONSUMERS CO., Dept. 2-CB
1265 Broadway, New York

FREE Send for free catalog of other bargains in sporting goods.

New 300 Candle Power Lamp



THE DIAMOND LIGHT

Make \$60 to \$100 a Week
Introducing this wonderful new lamp. Gives soft, brilliant light; restful to eyes; ideal illumination.

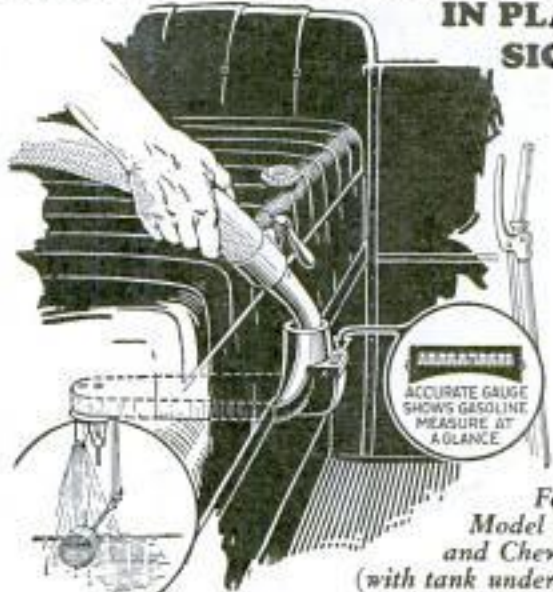
Burns Kerosene or Gasoline
Clean, odorless, economical. Burns 96% air, 4% fuel. Absolutely safe. Lights with match. 100 times brighter than wick lamps. Patented. Greatest improvement of age. Table lamps, hanging lamps, lanterns. Work all or spare time. You simply take orders. We deliver by Parcel Post and do collecting. Commissions paid same day you take orders. No experience necessary. Get started at once. Big season now on. Write today for catalog and special agents' offer.

AGENTS Send for **FREE** Offer

THE AKRON LAMP CO.
108 Lamp Bldg. Akron, Ohio

N - O - W

YOU CAN FILL YOUR FORD WITHOUT LIFTING CUSHIONS and Have a Perfect Gasoline Gauge IN PLAIN SIGHT



For All Model Fords and Chevrolets (with tank under seat)

The Kirstin Fil-O-Meter

A GASOLINE FILLER AND GAUGE COMBINED



The Kirstin Fil-O-Meter attaches like this on any Ford or Chevrolet tank in 10 minutes.

PRICE
\$5.00
Except Sedans \$6.00

Money Order, Check or Sent C. O. D.

With the Kirstin Fil-O-Meter in place the Ford or Chevrolet (tank under seat) fills like a regular car. No lifting cushions—no fuss, mess or inconvenience. An accurate gasoline gauge is always in plain sight, showing just how much gas is in the tank at all times. No more guessing or measuring with messy measuring stick.

ATTACH IN 10 MINUTES Without Help of Mechanic

Anyone can attach the Kirstin Fil-O-Meter in 10 minutes. No cutting or drilling in tank. Fil-O-Meter sets right in old tank cap opening. Then your Ford or Chevrolet fills outside the seat, taking full flow from the filling hose. **The Fil-O-Meter is out of the way.** Weighs less than 2 lbs., is strongly made of pure aluminum and will last a lifetime.

10 Day Money Back Trial

Order a Fil-O-Meter now. Put it on your car and try it 10 days. If not satisfactory, return it and your money will be immediately refunded. **Be sure to specify Year and Model of your car.**

MAIL THIS ORDER NOW

A. J. KIRSTIN CO., 11 First St., Escanaba, Mich.

Gentlemen: Please send me a Kirstin Fil-O-Meter for Ford, Chevrolet, year model with understanding that I will put it in use on my car and if not perfectly satisfied after ten days' trial I can return it and get my money back.

Money Order enclosed Check enclosed Send C. O. D.

Name

Town State

SALESMEN—DEALERS Do you want our big proposition?

Please Mention Popular Mechanics

A New Fuel for Ends Drudgery and



No more dirty, heavy coal and wood to carry and lift—no more clouds of ashes to breathe, or backbreaking scuttles to empty—no more fires to build, bank or watch—no more heating problems—no more cold rooms in Winter—no more frozen, bursted furnace pipes—no more suffering from lack of quick fires in uncertain Fall and Spring—and no more worries about coal shortages, poor quality or high prices. An amazing invention ends all this forever and makes any type of cook stove, heater or furnace, an automatic gas heater that can be regulated to any temperature by simply turning a valve.

St. Louis Man's Discovery Gives 3 Times Heat of Coal

NO longer is it necessary for any woman to give her best strength and energy in endless back-breaking servitude to a hot, mussy heater, cook stove or furnace. No longer is it necessary to pay exorbitant prices for coal and wood—or to face the uncertainty of actual coal strikes and shortages. The wonderful invention of Mr. B. M. Oliver, fuel expert of St. Louis, has now been perfected so that there is a model that can be installed in any coal or wood stove in one minute's time, and then actually

gives 3 times the heat of coal if wanted—or can be regulated to a tiny flame by the simple turn of a little valve. And at a cost any family can afford, any hot air, hot water or steam furnace can be converted into an automatic oil burning plant, without noisy motors, without electrical connections, without any moving parts.

AGENTS

I need more agents, salesmen and managers. Here is your opportunity to cash in on this nation-wide sweep of oil burners. Housewives everywhere are clamoring for this amazing new burner. There is a tremendous market for the wonderful new Oliver furnace burner, at one-third the price of other furnace burners. Oliver agents are making fortunes. F. W. Bentley, of Phila., says, "Ye gods, some seller. I made \$215 today." J. Carnegie, S. Dakota, writes, "Making \$1000 a month." A. M. Russell, Conn., \$258 per week. Mrs. Selder, Kans., made \$100 a month, spare time only in her own home. I want men and women of every type. If you want to earn \$40 to \$50 a week in spare time, write me. If you can give all your time as a salesman and want \$250 to \$500 a week write me. If you can swing a whole territory and want \$15,000 to \$50,000 and more a year, write me for sales plan and how you can get an exclusive franchise for your territory. But act at once if you want to "cash in" on this great new fuel. Write today for sales plan and free book "New Kind of Heat." Address me personally, B. M. Oliver, President, 2014-H Oliver Building, St. Louis, Mo.

Cheap, Clean, Simple

Mr. Oliver calls his invention the Oliver Oil-Gas Burner because it uses 95% air and only 5% oil (the cheapest fuel there is) turning them into an actual gas that burns with an intensely hot, clean flame. No wicks, no smoke, no odor.

Fits All Stoves Without Change

Mr. Oliver's wonderful invention is made in 16 models to fit any kind of cook stove, heating stove or furnace. No holes to drill, no bolts to fasten, no changes whatever. Simply sets in firebox. Absolutely safe. It lasts a lifetime.

Oliver Protects Your Home

You can absolutely depend upon your Oliver to heat your rooms in coldest Winter weather—gives 3 times the heat of coal or wood. Physicians recommend it as surest safeguard against chill, colds, pneumonia, influenza and other sickness. The even, steady, odorless, dustless heat protects your health. It saves its cost in cleaning bills alone. Every Fall we have a coal shortage which sends prices up sky high. But if you install this amazing new kind of heat you can snap your fingers at coal shortages, poor quality or high prices. Your Oliver burns the cheapest and most reliable fuel there is.

OLIVER OIL GAS

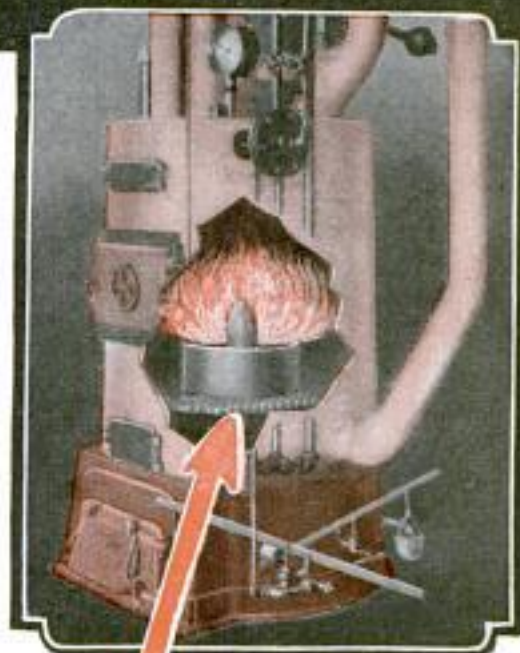
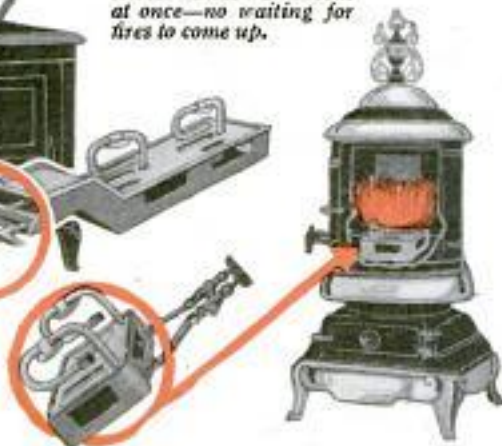
Furnaces and Stoves

Expense of Dirty Coal and Wood



Sizes to fit all heating stoves. Gives warm room at once—no waiting for fires to come up.

The Oliver burner makes any range a gas stove—on and off at turn of valve—much or little heat as desired.



No wonder housewives are clamoring for this wonderful device. No wonder we receive letters like these: Mrs. W. N. Spencer of Conn. writes "The Oliver in my heating stove works like magic. It is wonderful to have quick heat and no work." Mr. Elijah McCleave of Va. says "It works fine. All my friends want one. I will get their orders." A letter from Mr. S. K. Pedro of So. Carolina says "Beats all other burners seen in this county. A sensation." Mr. Geo. Flynn of Michigan writes, "It is cleaner, cheaper, hotter and steadier than coal or wood. Only costs me \$5 for two months."

Perfect Heating Guaranteed

Now, once and for all times, do away with household dirt and drudgery. The Oliver in your stove, heater or furnace saves hours of work, thousands of needless steps. Already Oliver burners are installed in over 150,000 homes. Their performance has been so thoroughly tested that Mr. Oliver will absolutely guarantee perfect heating for any Oliver burner you install.

OLIVER OIL-GAS BURNER CO.

2014-H Oliver Building

ST. LOUIS, MO.

Canadian Distributor, 2014-H Oliver Bldg., Toronto, Ont.

"Oldest and Largest manufacturers of Oil-Gas burners in the World"

BURNER

Coupon Brings Free Low Price Introductory Offer

Send immediately for the Free Attractive Booklet, "New Kind of Heat," which tells all about this amazing new invention, shows exactly how it works, and how it is different from all other burners. The coupon below will bring you this information absolutely free, without obligation. And if you mail the coupon at once you will be in time to receive Mr. Oliver's very Low Introductory Price. You should have your Oliver installed immediately. By acting quickly, by sending in your name at once you will be entitled to Mr. Oliver's Special low price whether you buy now or later. So get this coupon in the very first mail.



Fits all types of Hot water, Hot air or steam furnace without changes to your present plant.

It Brings Free Low Introductory Price Offer!

Oliver Oil-Gas Burner Co.
2014-H Oliver Bldg., St. Louis, Mo.

Gentlemen: Send me your free book, "New Kind of Heat" and your Special Low Price Introductory Offer. I am interested in a burner for

Coal Range Heating Stove (Steam) (Hot Water) (Hot Air) Furnace

Name.....

Address.....

City..... State.....

If interested in selling in full time or spare time check in square here.



Get This Wonderful Ring. If You Can Tell It From a Genuine Diamond Send It Back

These sparkling, beautiful CORODITE diamonds positively match genuine diamonds in every way—same blazing flash and dazzling play of living rainbow fire. They, alone, stand the diamond tests, including terrific acid test of direct comparison. Lifetime experts need all their experience to see any difference. Prove this yourself.

Wear a Corodite Diamond 7 DAYS FREE

Make this test. You risk nothing. Wear a genuine Corodite and a diamond side by side on the same finger for 7 days. If you or your friends can tell the difference, send it back; you won't be out a single penny. That's fair enough. If you keep the ring, price printed here is all you pay. No installments. Remember, Corodites alone have the same cutting as genuine stones.

No. 1—Ladies' Solitaire 14K Gold 8. Ring \$2.84
 No. 4—Ladies' Hand-Carved Basket Setting, plat. finish \$3.96
 No. 5—Ladies' Solitaire 14K Gold 8. Ring \$3.54
 No. 6—Gents' Massive Hand-Carved Green Gold Opal \$4.39
 No. 7—Gents' Heavy Becher 14K Gold 8. Ring \$3.68

Carat size gems. Beautiful mountings of new, modern design. Choice of gold or latest white-platinum finish. Unqualified 3-year guarantee. Hand some or leather case free with each ring.

SEND NO MONEY Keep your money right at home. Just send name, address and number of ring wanted and size as shown by slip of paper. (Slip and size as shown by slip of paper.) When ring arrives deposit amount shown above with postman. If you decide not to keep ring after 7 days' wear, send it back and your money will be immediately returned. Send today.

E. RICHWINE CO.
 19 West Jackson Blvd., Dept. 568, Chicago, Illinois
 Sole Importers Genuine Corodite Diamonds



California Bungalow Books

"Home Kraft" and "Draughtsman" each contain Bungalows and Two Stories. "Plan Kraft" Two Stories. "Kozy Homes" Bungalows, \$1.00 each—all four for \$3.00. De Luxe Flats \$1.00.

DE LUXE BUILDING CO.
 516 Union League Bldg. Los Angeles, Calif.

AGENTS: 90c an Hour



Introduce "Soderzeze." A new wonder. A pure solder in paste form. Works like magic. Stops all leaks. For mending water buckets, cooking utensils, milk pails, water tanks, tin roofs, everything including granite ware, agate ware, tin, iron, copper, zinc, etc.

QUICK SALES, NICE PROFIT

Everybody buys. Housewives, mechanics, electricians, jewelers, plumbers, tourists, automobilists, etc. No leak too bad to repair. Just apply a little "Soderzeze," light a match and that's

all. Put up in handy metal tubes. Carry quantity right with you. Write for money-making proposition.

AMERICAN PRODUCTS CO., 8680 American Bldg., Cincinnati, Ohio

MINT VENDING MACHINE

Pays \$10 to \$20 Day Profit

Pays Rent for Store Owner

Install one in your store or any public place and get this easy money. Requires no attention. Always works. Machine's profits pay the rent. Write us about rebuilt penny and nickel machines. Finished like new. In excellent running order. Pay their cost in 10 days.

Write or wire today for full particulars. \$25 down payment. Balance C. O. D. Export orders full down payment. Mints \$15 per case, 1,000 5 cent packages. Single boxes, 100 5 cent packages, \$1.50.

SILVER KING NOVELTY CO.
 400 Williams Bldg. Indianapolis, Ind.



A Summer Seller

Agents!
\$1.50
an hour
for full
or spare
time

IDEAL FIBER CUTTER

The Kitchen Convenience every housewife wants.

House-to-house agents average \$40.00 to \$100.00 weekly.

Write for free book, "Coining Cash," and read how other agents are making big money.

Don't put it off. Write at once. NOW!

M. H. TYLER Mfg. CO., Factory No. 2, Muncie, Ind.

FASTEN IT WITH AN AJAX EYELET FASTENER

Binds Paper, Cardboard, Leather, Cloth
 It Saves Time by Punching the hole, feeding the eyelet and clinching it in one operation. Order from your Stationer

Machine Appliance Corp.

Dept. P. M. BROOKLYN, N. Y.



Do Your PRINTING

Cards, circulars, labels, tags, book, menus, paper, Press, \$12, Larger \$35. Job Press \$150 up. Save money. Print for others. BIG PROFITS. All easy, rules sent. Write factory TODAY for press catalog, TYPE, cards, paper. **THE PRESS CO. D-37, MERIDEN, CONN.**

For 58 years these little marchers have led band instrument buyers to better quality and value!

Everything for the BAND PLAYER!

— from a drumstick to world's finest instruments! Used by Liberator, Army, Navy, Victor Record Makers. SEND FOR FREE CATALOG; mention instrument interests YOU. Free Trial! Easy payments. Sold by leading music merchants everywhere. Write TODAY!

LYON & HEALY, 73-74 Jackson Blvd., CHICAGO



Those who wear them say:
ERICKSON LEGS are Wonderful
 because they do not chafe, overheat or draw end of stump.



Established 1892

If you have had a recent amputation send for new booklet on TEST LEGS for beginners.
E. H. ERICKSON CO.
 38-A Washington Av. N.
 MINNEAPOLIS • MINN.





FROST
Extension
Cord

No 311
20 foot cord
\$2.25

RADIO

HERBERT H. FROST, Inc.
154 WEST LAKE STREET CHICAGO, ILLINOIS.
30 Church Street, NEW YORK

HERBERT H. FROST, Inc.
CHICAGO, U.S.A.

ELECTRIC SOLDERING IRON


EVERY RADIO FAN has been looking for this iron for both radio and home use. Operates on A. C. or D. C. current.

\$2.28

GUARANTEED one year. Sent anywhere in U.S. or Canada. Parcel Post prepaid on receipt of money order for \$2.28.

FANS Send 2c stamp for our list of RADIO BARGAINS

RADIO BARGAINS
17 N. LA SALLE ST - CHICAGO



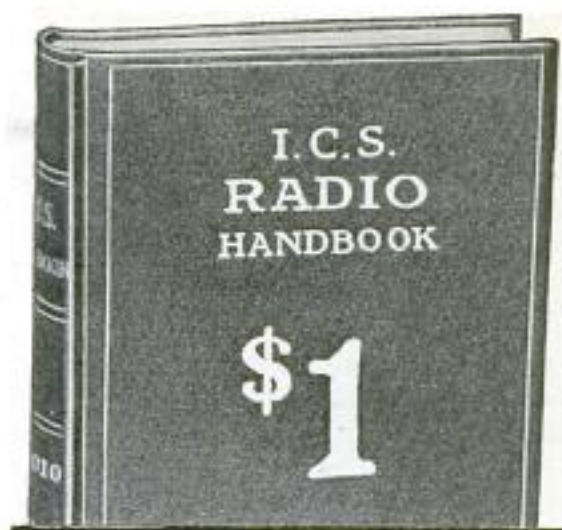
Makes Your Radio Set Work Better

Perfect reception can be had only when wire connections are soldered. **SOLDERALL** and a match make perfect joints—guaranteed equal to wire or bar solder.

At leading Jobbers and Dealers or sent postpaid for 25c a tube

SOLDERALL CO., Dept. P, Newark, N. J.

SOLDERALL
A Metal in Paste Form



Every Radio Fan Should Have This Book

LIKE a little radio encyclopedia, this I. C. S. Radio Handbook is packed with concise, sound information useful to everybody from beginner to veteran hard-boiled owl. It starts with simple explanations of radio phenomena and leads you along gently until you can understand the most technical diagram.

Price Only

\$1

562 pages
Pocket SizeCompiled by
HARRY F. DART
B.S. E.E.Formerly with
the Western
Electric Co.,
and U.S. Army
Instructor of
Radio.

You may dip into it at random, or hunt up special information you want, or read it right through. Different types of receiving and sending hook-ups are explained; proposed insurance regulations; lists of broadcasting stations; radio compass stations; interesting experiments; definitions; codes and symbols; technical data and thousands of suggestions for getting more pleasure out of radio.

A pocket course in radio!

Every page tells you something useful, and there are 562 pages; hundreds of illustrations and diagrams. It is the biggest dollar's worth in radio, and will save you from wasting money on things that don't work.

Send \$1 to-day and get this 562-page I. C. S. Radio Handbook before you spend another cent on parts. Money back if not satisfied.

— TEAR OUT HERE —

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 5538-D, Scranton, Penna.

I enclose One Dollar. Please send me—post-paid—the 562-page I. C. S. Radio Handbook. It is understood that if I am not entirely satisfied I may return this book within five days and you will refund my money.

Name.....

Address.....

Please Mention Popular Mechanics

This "UNITED" Audio Frequency Amplifying Transformer



is a little "gem" of radio engineering — magnetically shielded. Ratio 5 to 1 — a wonder-worker in producing loud, clear-toned signals, from any distance. At your dealer's, \$4.50.

"United" Variable Condensers have a new vernier dial assembly, original with us, that makes fine tuning a joy.

43 plate..\$6.50 11 plate..\$5.50 3 plate..\$4.75
23 plate.. 6.00 5 plate.. 5.00 Postpaid

Vernier alone; can be attached to any \$2.50 plate condenser by drilling one hole



Show this ad to your dealer and ask him to supply your needs at the above prices. If he cannot do so, remit to us direct, under our money-back guarantee and give us name and address of dealer you wish to favor.

UNITED MFG. & DISTRIBUTING CO.

9705 Cottage Grove Ave.
Chicago, Ill.

New York Offices
50 Church St.
New York, N. Y.

San Francisco Offices
709 Mission St.
San Francisco, Cal.

Rings Bells Without Batteries

Avoid the annoyance of having bells out of order. At a nominal cost you can install this little device which will ring electric bells, buzzers, annunciators, electric heat regulators, door-openers, etc., from the same current that lights your home.

ONLY
\$2.00

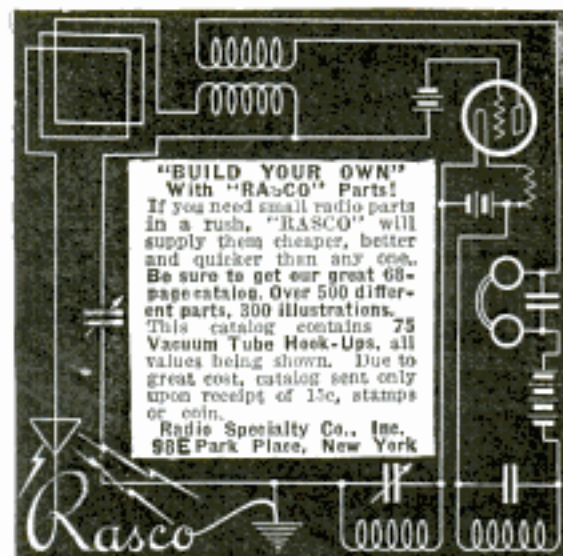
Canada
\$3.00

Bell
Ringer
Transformer

Air-Way

Connects direct to lighting-current, and eliminates forever the use of troublesome dry batteries. Does not use enough current to register on meter. Buy it from any electrical dealer, or we will send it anywhere postpaid upon receipt of price. Your money back if you are not satisfied.

JOEGER, DEALERS, AGENTS—Write for selling proposition.
AIR-WAY ELECTRIC APPLIANCE CORPORATION
Toledo, Ohio



"BUILD YOUR OWN!"
With "RASCO" Parts!
If you need small radio parts in a rush, "RASCO" will supply them cheaper, better and quicker than any one. Be sure to get our great 68-page catalog. Over 500 different parts, 300 illustrations. This catalog contains 75 Vacuum Tube Hook-Ups, all values being shown. Due to great cost, catalog sent only upon receipt of 15c, stamps or coin.
Radio Specialty Co., Inc.
88E Park Place, New York

Rasco

FREE RADIO BOOK

An easily understood explanation of Radio, written by Powell Crosley, Jr., President of Crosley Mfg. Co., Cincinnati, and The Precision Equipment Co., Cincinnati.

WRITE TODAY FOR THIS BOOKLET

Crosley Manufacturing Co.

815 Alfred Street

Cincinnati, O.



FREE Radio Catalog



Our big stocks of standard makes of radio sets, parts and supplies enables us to make prompt shipment from stock. Play safe—buy standard equipment from a reliable house. No cut price material.

Send \$1.25 for Univernier for close tuning—mention size of Condenser or Variometer shaft; \$2.00 for 6-phone plug

JULIUS ANDRAE & SONS CO.

In business since 1860

116 Michigan St.

Milwaukee, Wis



SIGNAL RADIO

Signal Radio Apparatus has long endured strenuous service by government, professional, and commercial users, as well as by beginners. Costs no more than experimental kind.

Send for Catalog.

SIGNAL ELECTRIC MFG. CO. 1910 Broadway
Menominee, Mich.

F-F BATTERY CHARGER

All TYPES But "B"
Charge AUTO
Batteries
Overnight
Right in
Your CAR

\$15



CHARGES
RADIO & AUTO BATTERIES.

CHARGES RADIO "A" & "B" & AUTO STORAGE BATTERIES at HOME overnight, for A Few Cents From Any 100 to 130 Volt 60 Cycle A. C. Lamp Socket, without Even Disconnecting Battery. F-F AUTOMATIC MAGNETIC TAPER CHARGE DESIGN made BATTERY CHARGING POPULAR. Eventually YOU WILL BUY an F-F CHARGER & The Sooner You Buy One, THE MORE YOU SAVE. A-B Charges All 6 Volt & up to 120 Volts Of "B" & Loud Speaker Storage Batteries In Series Inductively At Home Overnight. Disconnecting & Multiple Connections Unnecessary. Charging Circuits Separate. Nothing To Stop Over, Be Filled, Burn Out, Need Attention Or Cause Trouble. INFUSIBLE Rectifying Brushes Maintain Constant Efficiency Uninterruptedly. COMPLETE PORTABLE AUTOMATIC. No Skill Required. AMMETER Eliminates Guess Work. NOTHING Like It Made. Lasts A Lifetime. Leave Battery In Car, or Where Ever It Is; Screw Plug In Lamp Socket; Snap CLIPS on Battery Terminals. Turn Switch & Battery Is Charged In Morning. Charged Batteries Mean Fewer Expensive Replacements. It Costs Less To Buy An F-F CHARGER Than To Be Without One. INSIST ON THE F-F CHARGER. Built By A Master Of The Art In 7 TYPES. Thousands Sold Make Possible These POPULAR PRICES
Type 6 charges 6 Volt Battery At 6 amperes \$15 Type 12 charges 12 Volt Battery At 5 amperes \$15
Type B charges Radio "B" Batteries Up to 120 Volts \$15 Type A-B is a Combination Of 6 & B \$20
Type 186 charges 6 Volt Battery At 12 amperes \$20 Type 1612 charges 12 Volt At 7 amperes \$20
Type 1626 is a Combination Of Types 166 & 1612 and Charges Both 6 & 12 Volt Batteries \$28
Types B & A-B are RADIO Specials. Types 166, 1612 & 1626 are For Heavy & Rapid Charging. SHIPPING WEIGHTS Complete with AMMETER & BATTERY CLIPS 11 to 15 lbs. PURCHASE FROM DEALER: Mail Check, or WRITE us to Ship TYPE desired C. O. D. ORDER Now, or WRITE Immediately for Free Descriptive CHARGER Bulletins 24 & 24A.

FRANCE MFG. CO., CLEVELAND, OHIO.



'Read'em' Binding Posts

With knobs that won't come off

Anyone can "read 'em." All popular styles — Antenna, Ground, Fones, A and B Battery plus and minus—abbreviations of different names engraved on knobs. Ask your dealer for "Read 'em"—the kind for real Radio fans. If your dealer does not have them, write direct.

The Marshall-Gerken Co.
Manufacturers
Dept. H. Toledo, Ohio



SAVE 50% OF THE USUAL COST

Buy a World Battery for your Auto or Radio set, save the difference, and get a WRITTEN 2-YEAR GUARANTEE
Auto—6 Volt, 11 Plate \$13.25
Radio—6 Volt, 60 Amps. 10.00
(Other prices on request.)
Will ship C. O. D. subject to inspection or will allow 5% discount for cash with order. WRITE TODAY—NOW

WORLD BATTERY CO.
Dept. G, 1219 So. Wabash Ave., Chicago, Ill.

CHARGE YOUR BATTERY



(RADIO OR AUTO)
at HOME for a NICKEL
The HOMCHARGER

POPULARLY PRICED—PAYS FOR ITSELF
SEND FOR THE AUTOMATIC ELECTRICAL DEVICES CO.
FREE BOOK 129 W. THIRD ST.—CINCINNATI, OHIO

\$4.00 Adding Machine

The Gilson Adder will do your figuring easily, quickly and with absolute accuracy. Capacity 109,999,999 or \$1,099,999.99. It adds, subtracts, multiplies and divides and automatically carries from one column to the next. Made with aluminum case and steel operating parts, size 3 1/2" x 6" x 1 1/4". Written Two-Year Guarantee. Catalogue Free. Price, postpaid, \$4.00.

Your money back if you are not satisfied.
Gilson Slide Rule Co., Niles, Mich.



STROPS ANY SAFETY Razor Blade Perfectly 100 Shaves per Blade

Nickel Steel Stropper, Leather Strop and Hanger, all postpaid for \$1. Or C. O. D.
Money-Back Guarantee.

TOMSON STROPPER CO.
Dept. 1275, KANSAS CITY, MO.

Whittemore's Shoe Polishes



ARE SUPERIOR



This booklet "How to Select Safe Bonds" has been prepared from the long and successful experience of Geo. M. Forman & Co. Every investor should know the facts it gives about getting a higher yield with positive safety.

EIGHT WAYS

to Test the Safety of Every Investment

- 1 **Is Your Investment Protected By Property of Permanent Value?** "How to Select Safe Bonds" tells why investments should be protected by property having a permanent value well in excess of the amount of the entire loan.
- 2 **Does Your Claim Command Payment Before Other Obligations?** "How to Select Safe Bonds" tells what securities come before all others in obligation to pay promptly and fully.
- 3 **Has The Property a Sufficient Earning Power?** "How to Select Safe Bonds" tells why a safe property must have an annual earning power of at least two and a half times the total annual interest on the loan.
- 4 **Is The Property Adequately Protected By Insurance?** An important consideration, as fire often wipes out overnight a valuable property.
- 5 **Is It Properly Managed?** "How to Select Safe Bonds" tells why proper management is essential to insure prompt payment of interest and principal upon maturity.
- 6 **Is The Title Clear?** "How to Select Safe Bonds" tells a sure way of insuring against loss through faulty title.
- 7 **What Is The Moral Character Of The Borrower?** As important as proper management—explained in this interesting booklet.
- 8 **Who Offers The Securities You Buy?** "How to Select Safe Bonds" tells why even the experienced investor must depend for safety entirely upon the reputation and length of service of the Banking House offering the investment. It tells of the conservative policy of painstaking investigation and selection which has made it possible for George M. Forman & Company to sell bonds for 38 years without loss to a customer, large or small.

MAIL THIS REQUEST BLANK

Let "How to Select Safe Bonds" show you definitely how you can enjoy, with absolute safety, a larger income from your investment. Mail this request blank for your copy of this interesting booklet. No obligation.

George M. Forman & Co.

105 W. MONROE ST., CHICAGO

38 Years Without Loss to a Customer

George M. Forman & Company,
Dept. 448, 105 W. Monroe St., Chicago, Ill.

Please mail me, without cost or obligation, a copy of your booklet, "How to Select Safe Bonds." No collector is to call upon me.

Name _____

Address _____

City _____

State _____

Please Mention Popular Mechanics

Kingery Popcorn Poppers and Peanut Roasters

put you on the road to profit

Start in business for yourself without much investment, without stock to carry, without much effort. Profits are BIG—3½ cents on every 5 cent sale or 8 cents on every dime. Here's a wonderful opportunity which will pay profit-dividends every day.

You can do what others are doing. No experience is necessary—start your machine and keep it going. KINGERY MACHINES are complete in every detail. They keep on turning out the popped corn and roasted peanuts with very little attention on your part.

SEE WHAT ONE MAN DID

JAMES KIPWISS, P. O. Box 56, Waynesburg, Pa., writes: "Since I got your machine, in 15 days I have made \$327.50."

Kingery Popcorn Poppers and Peanut Roasters

fit in very little space. And the entire population is your market—young or old, everybody likes and buys popcorn and peanuts.

New Illustrated Catalog Free

Write for it TODAY. It shows all the new models and tells how easily you can buy a KINGERY on terms.

Dept. P. M.

KINGERY MFG. CO.

Cincinnati, Ohio



A Dollar's Worth for 7½ Cents

Cost U. S. Govt. \$24.50 | Costs You \$2.00



Brand new U. S. Govt. Marching Compass. A precision instrument. Easy to use. Solid bronze. Day and night Luminous dial with jeweled bearing. Focusing lens. Complete with full instructions, in plush lined leather case with belt loop, \$2. Postpaid in U. S.

A Real Bargain

BAKER & KIMBALL, Inc.
38P South Street Boston, Mass.

PAT. OFF.
Pepsodent
REG. U. S.
The New-Day Dentifrice

Prices Reduced



On All Standard Make
Typewriters
Lowest Prices in Years

We will ship any make you choose for one week's trial, Underwood, Royal, L. C. Smith, Remington, Oliver, etc.

Easy Terms Pay less than rent each month and own a typewriter. Guaranteed good as new. Perfectly rebuilt by experts—the famous "Young Process."

Send for our free trial offer and new low price list now. Write today.

Young Typewriter Co.

World's Largest Dealers in Standard Typewriters
654 W. Randolph St., Dept. 1108, CHICAGO, ILL.

Salesmen \$10 or more per day



N. F. BORN, VIRGINIA
Made \$204.00 last week selling direct to wearer our guaranteed, all-wool, tailored-to-measure suits and over-coats at

\$24.50 and \$28.50

Latest styles; finest fabrics; linings and trimmings High Grade serge or alpaca. Our 25 years experience, perfect equipment, organization, and financial strength enable us to turn out such Superior Garments that sales are easy and repeat orders sure. No experience necessary, we teach you how. Exceptionally Liberal Profits paid you daily at the time each sale is made. We deliver and collect. Complete, attractive outfit absolutely free to salesmen with acceptable references. Territory rapidly being taken up. Make application today for our Fall line—ready early in July.

INTERSTATE TAILORS
402 Pike St. Cincinnati, Ohio

Starting a Company?

Save expenses and taxes by organizing on the popular, COMMON LAW plan under a pure DECLARATION OF TRUST. No experience required to fill in DEMAREE STANDARD FORMS, issue shares and begin doing business at once. Genuine DEMAREE FORMS are nationally known, approved by attorneys, and utilized by successful concerns throughout the United States. Send for large, free pamphlet (D-53) containing valuable information that you may need. C. S. DEMAREE, legal blank publisher, 708 Walnut, Kansas City, Missouri.

\$25 A DAY
Selling Shirts

Large shirt manufacturer wants agents to sell complete line of shirts, pajamas, and night shirts direct to wearer. Advertised brand—exclusive patterns—easy to sell. No experience or capital required. Entirely new proposition. Write for free samples.

Madison Shirt Co., 503 Broadway, N. Y. C.

RAISE BELGIAN HARES
New Zealand Reds — Flemish Giants — American Blues.
BIG PROFITS, WE PAY \$1.50 TO \$8 EACH.
Also Cavies, Mink, Skunk, Fox, Muskrat, Etc.
Easily raised anywhere. 25¢ FREE!
page Catalog and Contract
Illustrated book "COMMON SENSE RABBIT RAISING," quarterly journal, and copy of America's leading small stock magazine, all for 10 cents. Address Outdoor Enterprise Co., 1005 E. Blvd., KANSAS CITY, MO.

"73 Years Young"

is my age writes H. B. Ruth, Colorado man, yet for years Mr. Ruth suffered with prostate gland disorder. "Used medicines with no avail—had about given up hope until a Doctor recommended your treatment," he writes.



Thousands of men like Mr. Ruth are finding renewed health and vitality thru a wonderful discovery that has brought the most amazing results in Prostate trouble, frequent nightly risings, sciatica, aches in back and feet and chronic constipation. Statesmen, Bankers, Lawyers, Doctors use and endorse this method. Yet you can use it right in your own home—no drugs, electric rays or book—a simple but quickly effective new hygienic principle. No matter what your age—or what you have tried, find out about this discovery at once. "Why Many Men Are Old at 40" is the **FREE BOOK** title of an interesting book that will be sent absolutely free. You may find relief from these distressing conditions the same as thousands of other men. Write at once to **THE ELECTRO THERMAL COMPANY, 2124 Main St., Steubenville, O.**



Try It In Your Own Home

You may now have any musical instrument for a week's trial in your home at our risk. No obligation to buy. Return the instrument at our expense at the end of a week if you decide not to keep it. The trial will not cost you a penny.

Convenient Monthly Payments

A few cents a day will pay. Special combination offers on complete musical outfits—velvet lined case, all accessories, self-instructor, etc.—everything you need at practically the cost of the instrument alone.

Send Coupon for New Catalog

Every known instrument illustrated, many in full colors. Also prices, easy terms and free trial blank. Catalog absolutely free. Write today.

The Rudolph Wurlitzer Co., Dept. C177
 117 East 4th St., Cincinnati — 329 S. Wabash Ave., Chicago
 129 W. 42nd St., New York — 259 Stockton St., San Francisco

Send me your new catalog illustrated in color with full details of Wurlitzer free trial and easy payment offer.

Name.....
 Address.....

(State instrument you are specially interested in)

WURLITZER
 200 YEARS OF MUSICAL INSTRUMENT MAKING
 Cincinnati Chicago
 New York San Francisco
 Copyright 1930, Rudolph Wurlitzer Co.

\$3 Cash Buys Typewriter



Balance Only \$5 Monthly
 Save 35 to 60% on all standard makes—Underwood, Royal, Remington, etc. Every machine thoroughly rebuilt and **GUARANTEED**. Try five days at our expense before you buy.

WRITE at once for Free Descriptive Circular and Special Low Prices.

5 DAYS FREE TRIAL

WYNN TYPEWRITER EXCHANGE 11 Reliance Bldg. Kansas City, Mo.

GUM 1¢ a pack

Chewing Gum 1¢ per pack
 Full size—5 stick packs—spearmint, peppermint and fruit flavors. \$5.00 for 500 packs. Suitable for Premium or Scheme purposes. Deposit required. Prompt shipments.

HELMET GUM MAKERS, Cincinnati, Ohio

away from home

the antiseptic germicidal liniment in one container is easiest to carry; dependable for a greater variety of emergencies; safe and pleasant to use and provides against the host's lack of necessary preparations. \$1.25 at druggists or postpaid. Liberal trial bottle, postpaid, 10c.

W. F. YOUNG, Inc.
 347 Lyman Street
 Springfield, Mass.

Absorbine, Jr.
 THE ANTISEPTIC LINIMENT



"Been on a vacation Bill?"

"No, Jim—I've stopped smoking. Gained six pounds in a week. You know how I used to smoke—a package of cigarettes and a cigar or two a day—it sure had some hold on me. But I'm cured—took a scientific home tobacco treatment—fixed me up in two weeks.

"Wasn't hard on me at all—noticed improvement the first day—I feel like a new man. It didn't interfere with my work—didn't leave any druggish after-effects—the money I saved in the last two weeks has paid for the treatment alone.

"Why don't you take it? It has cured men like you and me for over forty years—it is a doctor's individual prescription that sure fixes you up. Just send the coupon for full information NOW. No obligation. All correspondence is strictly confidential."

THE KEELEY INSTITUTE
 Dwight - - - Illinois

A Doctor's Prescription
 The Keeley Institute, Dwight, Ill.

Please send me, without any obligation on my part, your free booklet which will tell me how to rid myself of the tobacco habit.

NAME.....
 TOWN.....
 STREET.....STATE.....PM

**Safe
as
a
Candle**



Here's a new Blow Torch—at last *one* you need not be fearful of using. Even a child can use it without the slightest danger—because it's **SAFE—ABSOLUTELY SAFE.** Every home, workshop and garage needs it for its many handy uses; just as essential as hammer and nails; nothing else can take its place.

TURNER BLOTORCH

Burns kerosene or gasoline; only one opening (and that above fuel line) in its sturdy seamless brass tank; ejects flame 400° hotter than the torch you feared. Many other exclusive features promise quicker, better work. And great Turner production has made possible an unusually low price. Don't be without a Turner—get it *now* from your dealer, or direct.



Only \$8²⁵

THE TURNER BRASS WORKS
Industry Ave., SYCAMORE, ILL.

Is your car CRESCENT TOOL equipped?

Every owner of a well-equipped car likes to brag a little about its special features—the lighting system, bearings, ignition, axles, speedometer, and the rest. You will brag about the tools, too, when they are "Crescent."

Next time the question of a new car comes up, ask your dealer if the equipment includes genuine Crescent Tools.

Crescent Tool Co.
"The Crescent Wrench People"
Jamestown, New York



The Crescent Kit
—wrench, pliers,
screwdriver—At
garages or hard-
ware stores—

\$2.35

REGISTERED



TRADE MARK

The biggest little woodworker ever built!

Send for Bulletin
C.S. describing this
machine in detail.

You'll want this sensational Parks combination woodworker right away for your shop—includes 8-inch rip and cross-cut saw, 4-inch jointer, band-saw, borer, shaper, sander, and universal motor. Only \$195 complete! Lathe attachment only \$15 extra. First-class Parks angle-steel construction, all joints electric-welded. Steel table-top. The newest thing in small shop equipment. Guaranteed 10 years.

Parks "Cabinet
Shop Special"

\$195.00

as illustrated with
motor f.o.b. Cincinnati.

THE PARKS BALL BEARING
MACHINE CO.

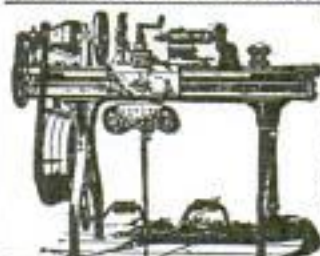
1500 - 1540 Knowlton St.
CINCINNATI, OHIO

Canadian factory: 200 Notre Dame East, Montreal, Can.



PARKS

WOODWORKING MACHINES



LATHES

9 to 18-inch Swing

List price \$165 and up according
to size. When ready to buy send
for Lathe Catalog and prices.

W. F. & John Barnes Co.

100 Ruby Street, ROCKFORD, ILL.



It is the well known quality of
CRESCENT machines that
justifies you in selecting one of
them each time you have need for
wood working machinery. The
CRESCENT line is better than ever
and will always give you satisfaction
in every particular. Ask today for
catalog of hand saws, saw tables,
jointers, shapers, planers, borers,
planers and matchers, swing saws,
disk grinder, cut off table, hollow
chisel mortiser, variety wood work-
er. Universal wood workers.

THE CRESCENT MACHINE CO., 93 Columbia Street, Leetonia, Ohio

\$25 A DAY Clear Profit



—every day you work. Make \$5,000 to \$10,000
a year in the Floor Surfacing Business with the
American "Universal" method. Work for your-
self. Experience, special training or large in-
vestment unnecessary.

New Field; Big Profits

Better floors are demanded everywhere. Ameri-
can "Universal" electric machine, doing work of
six men, assures **BIG PROFITS** in this
new uncrowded field. Every floor, —old or
new, —in town or city, is your prospect.
Work easy to get. Profit possibilities un-
limited. Positive guarantee and 5-day
trial offer protects you. Write today
for complete details.

**AMERICAN FLOOR
SURFACING MACHINE CO.**
523 S. St. Clair St., TOLEDO, OHIO

Genuine Aluminum Level

NOW ONLY **\$3.95**
DIRECT FROM FACTORY

Special limited offer introducing new genuine Aluminum Level. Highest quality. Not adjustable, always accurate. Light weight. Fine for over-head work. Wire bubble-markers. Easily read in poor light.

Two Year Guarantee
Split tubes protected by glass lenses. Broken glass replaced within 2 years. Glass lenses are removable.

SEND NO MONEY

Just send your name and address. Pay postman on delivery. Use it and try it 10 days. Send it back if you can purchase a better level for less or you are not entirely satisfied. 18" glass, \$3.95. 24", 6 glass, \$5.45. 30", 6 glass, \$6.95. 28", 6 glass, \$6.45. 30", 6 glass, \$6.95. Send Now.

MASTER LEVEL & TOOL COMPANY
5926-C Seminole Ave. DETROIT, MICHIGAN



Amazing Hand-Made Tools

Make \$20 Every Day!

That is a fact. Salesmen are making amazing incomes selling direct to mechanics, garages, shops, etc. These tools, put up in kits, are made by our famous Cornwell secret formula. Every tool guaranteed the finest made in the world. Salesmen make sensational demonstrations of chisels, wrenches, punches, bearing scrapers, etc.

You Take No Money Risk!

We take all the money risk. You make instant sales and big cash profits. Tools like these never made before. Repeat orders tremendous. You make big money the very first day.

Write TODAY—Get Sample Outfit

Write or wire for complete sales plan, describing tools, money-back guarantee and offering sample outfit. Don't delay! Territories closing fast.

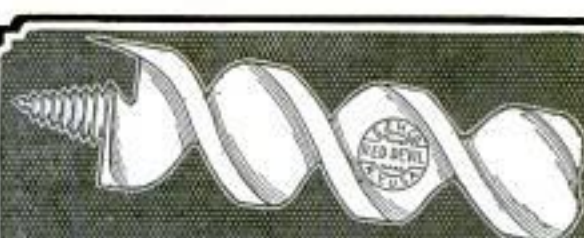
THE CORNWELL QUALITY TOOLS CO., Dept. 10, CUYAHOGA FALLS, OHIO

HANES ATHLETIC UNDERWEAR
is guaranteed absolutely—every thread, stitch and button. We guarantee to return your money or give you a new garment if any seam breaks.
Trade Mark P. H. HANES KNITTING CO. WINSTON SALEM, N. C.

ALVAN CLARK TELESCOPES
Famous throughout the world as the highest grade Astronomical and Terrestrial instruments. Now bringing to you at a reasonable price, these wonderful instruments—a source of pleasure and education—for the home—the school—the college. Send for circular and prices.
ALVAN CLARK & SONS CO.
Makers of the great "YERKES" and "LECK" Telescopes
55 Henry Street Cambridge, Mass.

TOOL CHESTS
for Machinists & Toolmakers
Every tool arranged in order. No up-to-date mechanic should be without one. A Gerstner Case costs no more than some tools, and will last a lifetime. Catalog free.
Gerstner Tools
717 Columbia Street DAYTON, OHIO

QUICK TO STICK—SOLD TO HOLD
AT ALL 5 AND 10 CENT STORES
IRON GLUE
10¢-15¢ SIZES
MCCORMICK & CO., Baltimore



"Red Devil" Rapid Boring Auger Bits are 33 1/2% easier boring, have 10% greater clearance, and bore with or against the grain of any wood. Style 2400—10/16 in., shown above, 75c.

"Red Devil" Tools Cost Less

—because they give unusual service and satisfaction long after others have outlived their usefulness.

The "Red Devil" trade mark stands for absolute dependability. It represents over a quarter century's experience and careful study built into each tool. It gives the tool user more for the money.

There is a "Red Devil" Tool for every purpose—

Pliers Hack Saw Frames Hack Saw Blades Glass Cutters Wrenches Chain Drills Snips Screw Drivers Auger Bits Cold Chisels and many others

Tell your hardware dealer to show you "Red Devil" Tools. If he hasn't all the above tools in stock, he will get the ones you want.

The "Red Devil" Mechanic's Tool booklet is a handy reference guide for users of good tools—send for it.

SMITH & HEMENWAY CO., Inc.
Manufacturers of "Red Devil" Tools
260 Broadway, New York, N. Y.

"Red Devil" Glass Cutters—the glaziers' standard tools of the world. "It's all in the wheel." Made in 40 styles. No. 024 shown below, 20c.



Please Mention Popular Mechanics

ATKINS

METAL CUTTING SAWS



Use
Atkins
"Non-Breakable"
Hack Saw
Blades

Cut Faster— Do Not Break

ATKINS AAA Non-Breakable Hack Saw Blades are made of selected steels, hardened and tempered by an exclusive gas and oil process which makes the cutting edge extremely hard and the back unusually tough and flexible.

This not only prevents practically all blade breakage, but makes them cut faster and easier.

You can reduce your metal cutting costs and avoid losses due to blade breakage by using Atkins Hack Saw Blades. Let us prove it. Tell us what metal you cut, enclose ten cents and we'll send you a sample blade that will give you remarkable cutting results.

No matter what wood or metal-cutting you do, there are Atkins Saws to save you time, labor and money. Ask for our free booklets on the saws you're interested in.

Get "Saws in the Shop" Sent You FREE



A 32-page book that's full of practical suggestions on metal-cutting, and general shop information. Every man who buys or uses saws will find it helpful. Just write your name and address on the margin of this page and mail it to us.

Do It NOW

E. C. ATKINS & CO., Inc.
Dept. P INDIANAPOLIS, IND.
Makers of "Silver Steel" Saws and Tools

Please Mention Popular Mechanics

Fix it with BERNARD PLIERS



Whatever
"IT"
May Be

In the home, office, factory, store, barn, garage, for machinery of all kinds, where there is twisting, or tightening or adjusting, or wiring, or cutting to do, let BERNARDS do it. Parallel jaws that grip like a vise, outside cutting blades that bite through wire, and compound leverage that multiplies the power make Bernards the king of tools.

Booklet "P" Free on Request.



PARALLEL JAWS

BERNARD PLIERS

Wm. SCHOLLHORN CO.
NEW HAVEN, CONN.



OUTSIDE CUTTER

"Interlox" Make Quick Measurements

accurately, whether inside or outside. Rule slides instantly—no annoying folding. Strong; brass-trimmed. Any length 2 to 8 feet. 20c per lineal foot. If not at dealer's, sent postpaid.

Master Rule Mfg. Co., Inc. 841-43 East 136th Street
NEW YORK CITY
Dealers and Agents: Request
Attractive Proposition.

Beautiful HOUSES \$900 and BUNGALOWS

CAN BE BUILT FOR AND UP
This and many others in my new book, Building Plans for Modern Homes, will save you hundreds of dollars. One of the most complete and comprehensive books of plans ever published by any architect. New edition just off the press. Nearly 500 floor plans and photographs of bungalows, Colonial houses, etc., costing from \$200 up; gives sizes and cost to build.



FREDERICK H. GOWING
ARCHITECT

111 Tremont St., BOSTON, MASS.

Sent postpaid for \$2.00

ANYONE CAN SOON LEARN TO OPERATE The MONARCH Jr. Lathe

The MONARCH Junior 9" Engine Lathe is so simple and trouble proof that the beginner can soon turn out finished work—it is so accurate and completely equipped that it is preferred by the expert.



MONARCH Jr.

\$245 9 in. Lathe—
2 1/2 ft. Bed—
with Beach Legs

SEND for Free Catalog of MONARCH Lathes which are built up to 30" swing
THE MONARCH MACHINE TOOL CO.
400 Oak Street SIDNEY, OHIO

W. L. DOUGLAS

SHOES ARE MADE BY SKILLED SHOEMAKERS

We have in our 116 stores a wonderful assortment of kinds and styles of high-class, stylish shoes, suitable for Men, Women and Boys in all walks of life. They are made of high-grade, selected leathers. Fine Calf and Vici Kid shoes are our specialty. The quality, style and workmanship are unsurpassed.



YOU CAN ALWAYS
SAVE MONEY BY WEARING
W. L. DOUGLAS SHOES
SOLD DIRECT FROM FACTORY
TO YOU AT ONE PROFIT



THE FINEST SHOES IN
THE WORLD ARE MADE
IN AMERICA. . . .
W. L. DOUGLAS SHOES
ARE LEADERS IN STYLE
FIT-WEAR-AND-COMFORT

If you have been paying high prices for shoes, why not try a pair of W. L. Douglas \$8.00 shoes? They are exceptionally good value. Frankly, is it not worth while for you to dress your feet in shoes that hold their shape, are easy-fitting, look well, wear well and are reasonable in price?

\$5. \$6. \$7. \$8. & \$9. SHOES

\$4.50 & \$5.00 SHOES FOR BOYS

For thirty-seven years W. L. Douglas name and portrait have stood for a high standard of quality and dependable value. For economy and satisfactory service wear shoes that bear this trade mark. Ask your dealer for W. L. Douglas shoes. Look for W. L. Douglas name and the retail price stamped on the sole. Refuse substitutes.

IF NOT FOR SALE IN YOUR VICINITY, WRITE FOR ILLUSTRATED CATALOG SHOWING HOW TO ORDER SHOES BY MAIL. POSTAGE FREE.

W. L. Douglas

President
W. L. Douglas Shoe Co.
128 Spark Street, Brockton, Mass.

TO MERCHANTS: If no dealer in your town handles W. L. Douglas shoes, write today for exclusive rights to handle this quick-selling, quick turn-over line.

ESTABLISHED 1876

MODELS 2.00 *Ingersoll* TO 10.00
RELIABLE WATCHES at LOW PRICES

REMINGTON
PORTABLE TYPEWRITER
Dealers and Branches Everywhere



SQUAB BOOK FREE!

Squabs are selling at highest prices ever known. Greatest market for 20 years. Make money breeding them. No mixing food, no night labor, no young to attend. Start small, grow big. Start now. Read how our customers sell squabs for \$12 a dozen. We have been established for 23 years. Better look into this. Let us send you, at no cost to you, our big, illustrated free book telling how to make money breeding squabs. Address

Plymouth Rock Squab Co., 624 H St., Melrose Highlands, Mass.

AGENTS 500% PROFIT
\$50-\$200 per week. Free samples **GOLD SIGN LETTERS** for store and office windows. Anyone can put them on. Big demand everywhere. Liberal offer to general agents.
METALLIC LETTER CO., 433B N. Clark, Chicago

FREE! Book of 3000 Bargains Diamond Watches and Jewelry

Wear it while
you pay



7-Diamond Solitaire Cluster, set in Platinum mounting. Resembles an \$850 solitaire. Only \$5 down and \$5 a month.

Bargains beyond your greatest expectations—designs that sparkle with beauty and originality—extra value almost unbelievable—all await you in this wonderful Book, published by the greatest Jewelry Credit House in the country. Every article is clearly illustrated, carefully described and fully guaranteed.

Use Your Credit-10 Months to Pay

We'll send you any article FREE for examination and approval. If completely satisfied, pay only 1-5 the price, then the balance in 10 months. Transactions strictly confidential. Guarantee Value Bond given with every Diamond purchased.

CAPITAL \$1,000,000

L. W. SWEET Inc., 1650-1660 Broadway, New York, Dept. 63-N



SAVE YOUR BODY

Conserve Your Health and Efficiency First
"I Would Not Part with it for \$10,000"

So writes an enthusiastic, grateful customer. "Worth more than a farm," says another. In like manner testify over 100,000 people who have worn it.

The Natural Body Brace

Overcomes **WEAKNESS** and **ORGANIC AILMENTS** of **WOMEN AND MEN**. Develops **erect**, graceful figure.

Brings restful relief, comfort, ability to do things, health and strength.

Wear It 30 Days Free at Our Expense

Does away with the strain and pain of standing and walking; replaces and supports misplaced internal organs; reduces enlarged abdomen; straightens and strengthens the back; corrects stooping shoulders; develops lungs, chest and bust; relieves backache, curvatures, nervousness, ruptures, constipation, after effects of flu. Comfortable and easy to wear.

Keep Yourself Fit Write today for illustrated booklet, measurement Blank, etc., and read our very liberal proposition.
HOWARD C. RASH, Pres. Natural Body Brace Co.
 223 Rash Building SALINA, KANSAS



For
Boys
and
Girls
Also

I Offer You
\$48 a Week and a **Quick** TOURING CAR

We want men and women as local representatives to demonstrate and take orders for Comer All-Weather Raincoats. New offer enables you to earn \$48 a week and Buick touring car. No experience necessary. Write quick.

Comer Mfg. Co., Dept. BW-59, Dayton, O.



FREE Book of Newest Styles just out. Women's, men's, children's clothing on credit and at bargain prices, less than cash prices everywhere. Very latest fashions; best materials. Open a charge account with us. Buy on credit and save money! Dress in newest styles. Send for Style Book absolutely **FREE** today! Elmer Richards Co., Dept. C177, W. 35th Street, Chicago.

This Beautiful
DIAMOND **\$2**
 DOWN



A real bargain, 7 blue-white Diamonds set to look like a brilliant \$700.00 solitaire. Dainty 18 kt. White Gold, hand made mounting. Gentleman's ring, same price.

10 DAYS' FREE TRIAL

Merely send \$2.00. Shipment made without "red-tape." Examine it—wear it 10 days. If not convinced it is the **Greatest Bargain in America**, return it and your \$2.00 will be refunded. If you keep it pay only \$5.48 monthly—a matter of a few cents a day—until the Special Bargain Price of \$56.72 is paid. Sold under a gilt edge Protective Guarantee. You get 5 per cent yearly dividend on this purchase—also a 5 per cent bonus.

Send for it today. Thousands of bargains at your disposal. Save one-third by writing to Dept. C177

J.M. LYON & CO. INC.
 2-4 Maiden Lane, New York

FREE Wonderful Book

Tells how to learn taxidermy—how to mount birds, animals, game- heads, fishes, tax skins. Learn by mail. A necessity for hunters and nature lovers. Best methods, quickly learned, very fascinating. Success guaranteed. Decorate your home and den with splendid art. Make big profits. Write today for this free illustrated, free book and our amazing offer.

Northwestern School of Taxidermy, C977 Elwood Bldg., Omaha, Neb.



GOV'T 7x7 TENT \$10



Made of 10-oz. Govt. white canvas. Wonderful value; poles \$1.50 extra. Write for **FREE** 2,000-article catalogue No. 58. **RUSSELL'S** 245 W. 42nd St., NEW YORK, N.Y.

TYPEWRITERS



\$50 buys a brand new Corona, the Personal Writing Machine. Latest model with many improved features. Write for free booklet No. 8. **Corona Typewriter Co., Inc.** GROTON, N. Y.

AGENTS—Here It Is

The New **Serenola**



Something new and different. Something you can sell easily and quickly. Orders waiting everywhere. Baird sold 23 in one week, his profit over \$150.

The **Serenola** is built in just like a suitcase. Carried with you anywhere. Does more than machines costing 5 times its price.

FULLY GUARANTEED

Get started at once. No experience needed. We deliver and collect. Pay you every day. Work full or spare time. Write or wire us for terms and territory.

PERRY-LUDLOW CO., S-1848, Dayton, Ohio



Harris Homes Beautiful PERMANENT BUILT

Your Home Is Within YOUR Reach
When You Buy From Us!

A mighty organization of thirty great departments ready to serve you. Managed by expert material buyers, designers and practical builders. We have vast stocks bought at huge quantity price savings which are now at your command. Our sole aim and purpose is—

To help you get a home that will prove entirely satisfactory at a price that will mean a substantial saving in actual dollars of your money.

The combined efforts of these great departments in experimenting and testing materials and methods of construction have produced for you a GUARANTEED home, expert machine cut, bundled and marked—the last word in building economy.

Not One Penny in Advance

So sure are we of the superior excellence of our material and our GUARANTEED Ready-Cut System that we will strip you any HARRIS HOME without the payment of one cent down. Our Plan Book explains our liberal terms fully.

FREE Plan Book

The latest edition is waiting for you, contains our FREE PLAN OFFER and photographic reproductions, with floor plans and specifications of 100 beautiful homes. Write for full particulars now!

Our Specialties: Guaranteed Ready-Cut Lumber, Mill Work, "Presto-Up" Bolt-Together Houses, Roofs, etc., etc., and Building Material of all kinds.

HARRIS BROTHERS CO.

Dept. PE-7, 1349 W. 35th St., Chicago

ADD TO YOUR INCOME \$5 TO \$10 A DAY MADE EASY

The New Improved Am. Jr. No. 2 Is A Wonder



Sharpens and stropps ordinary razors, Sharpens razor blades, scissors, etc.

Complete outfit for only \$95

AM. SHARPENING MACHINE CO.
Dept. 8, 184 Washington St., Chicago

Wrestling Book FREE



Learn to be an expert wrestler. Know scientific wrestling, self-defense, and jiu-jitsu. Develop an splendid physique, and have perfect health. Join this popular school and learn by mail. The famous world's champions—the marvelous

Frank Gotch and Farmer Burns

offer you a wonderful opportunity. Wrestling is easily and quickly learned at home by mail. Men and boys write now for splendid free book. Learn all the science and tricks. Be able to handle big men with ease. Accept this wonderful offer NOW. Send for free book today, stating your age.

Farmer Burns School of Wrestling, C-77 Ramez Bldg., Omaha, Neb.

Delivered to You Free

for 30 days trial on approval. You can have your choice of 44 Styles, colors and sizes of the famous RANGER Bicycles. Express prepaid, Factory-to-Rider Prices save you \$10 to \$25 on your bicycle.

12 Months to Pay if desired. Many boys and girls easily save the small monthly payments. Parents often advance first payment.

best quality, at factory prices, express prepaid, lamps, wheels and equipment, low prices. Send No Money, do business direct with makers.

Mead Cycle Company
Dept. A Chicago



Write today for free Ranger Catalog, factory prices and marvelous easy payment terms

Diamonds

Here at
60% of Market Price

Never in three quarters of a century have we offered such amazing bargains. Hundred of money-saving opportunities in latest Diamond Bargain List, equalling those shown here.

Here's why we can offer such remarkable values: This 75 year old firm—rated at over \$1,000,000.00 capital—the largest and oldest diamond banking institution of its kind in the world has made loans on Diamonds, Watches, and other jewels in excess of \$25,000,000.00.

Why Pay Full Prices Costs Nothing to See

Thousands of unpaid loans. Must sell now. Diamonds, Jewels, Watches and other Gems of unusual qualities—at an entirely different price basis—viz: loan values not market values. At our risk we send you any bargain you wish for absolutely free examination. No red tape. No obligation. Don't buy unless satisfied you can not match the bargain at 60 per cent more. Diamonds of desirable quality at \$225 per carat. Yes, some even lower priced—also, great gems obtainable at higher per cent—but proportionately low bargain prices. Our bargains have guaranteed loan values also, unlimited exchange privilege at full prices.

Latest List Diamond Loans

Send at once for latest list. Thousands of unpaid loans and other special advantage bargains described in full detail with exact weight, color, quality, etc. Get details of Free Examination offer. No obligation. List is free.

Mail Coupon Now



For Weddings, Graduations, Etc.

\$186
1-3/32 Ct.
Blue White

\$55
22 Ct. Show
Class Set

\$62
1/4 Ct.
White Gold

Only
Domestic
Post Office
Without obligation, send me free, your latest Bargain List of Diamonds, Watches and other jewelry.

Name.....
Address.....
City.....State.....

CAMERAS

Over a Hundred Styles and Sizes

Send for new 1923 illustrated catalog showing newest models and latest reduced prices.

IT'S FREE

10 days' free trial given

Seneca Camera Mfg. Co.
300 Central Ave., Rochester, N.Y.



Sell coal to your trade

IN CARLOAD LOTS

Earn week's pay in an hour

Washington Coal Co., Stock Yards Sta., Dept. AG, Chicago

Sideline salesmen wanted.

MAKE YOUR FORD INTO THIS SPORT CAR—SAVE \$50 to \$150 WITH Red-i-Kut

Life-Size Patterns \$6.40

Prove Red-i-Kut life-size patterns and pleasure kit—true instructions show you how you can easily convert your Ford into this FAST, SAUCY, SPORT Car as thousands have done, with easily obtained materials. No need to lay up the car. The "Pat" with pressed metal streamlines rear. Life-size patterns for each part of the body as you can't go wrong and easily save the small monthly payments. Parents often advance first payment. best quality, at factory prices, express prepaid, lamps, wheels and equipment, low prices. Send No Money, do business direct with makers.

"Red-i-Kut" Steel Set Complete for "Pat" \$9.31. Est. Net \$11.98 The Age of Fords—"I have finished my 'Pat.' It's some fun boat. I go where others can't go on low. I am so proud. I am called the 'Ace' of Fords, for I skip by them all kind of like a rabbit."—Carl Burdette, Columbia, Ky. "Beeg Lu" Underling, Fresno, Cal. "I'm cutting wind, \$7.81. Send 50 cents for new manual of other distinctive sport body patterns. From \$3.50 up—"Red-i-Kut" Steel, Underling Irons, "Rip" Toys and "Gaska" Windshields. Don't delay—Order Right Now. Kumpel Co., 29 N. La Salle Bldg., Guttenberg, Iowa



Roofing Book FREE



World's Best Roofing at Factory Price

Don't buy Roofing of any kind until you get our big Free Roofing Book, describing full line of Edwards Famous "Tightcoote" Galvanized Roofings, Sldings and Ceilings, and our lowest factory prices. Then see for yourself how much we save you by selling direct and saving you all in-between dealers' profits.

"REO" EDWARDS Metal Shingles

Absolutely rust proof. By our patented "Tightcoote" process, edges as well as sides of metal sheets are heavily coated with zinc—not a space the size of a pin point exposed to weather. Fire and lightning proof. Outlasts three ordinary roofs. Forever wind and weather proof. Need no repairs—and all roofing expense. Patent **INTERLOCKING DEVICE** makes water tight seams—all nail heads covered—no chance for rust or leaks.

EDWARDS Galvanizing Test

Edwards "Tightcoote" Galvanized Roofing can be bent, twisted or struck by lightning, and the galvanizing will not crack or flake. Bend it or hammer it—you can't loosen or scale the galvanizing. No other galvanized roofing can withstand this test.

Low Priced Garages

Wide variety of styles, all sizes of Portable Fireproof Metal Garages. Lowest prices ever made. Postal Brochure Big Garage Catalog free.

Write Today for free samples and proof that we can save you a lot of money on any kind of roofing, siding or ceiling you may need. Ask for Roofing Book No. 154.

THE EDWARDS MFG. CO.,
800-850 Pike St., Cincinnati, O.

FREE
Samples &
Roofing Book

FORD START HARD?



EASILY AND CHEAPLY FIXED WITH C-A Adjustable Center Bearing Cap

Corrects end-play and sets magnets for full efficiency without removing motor from car. Saves battery. Installed in few minutes. Guaranteed for year.

Ask your dealer or send prepaid for **\$3.75**
ADJUSTABLE BEARING CO., Dept. P, BRAZIL, IND.



MARVEL 8 PLY TIRES

GUARANTEED 10,000 MILES

IN WRITING!

Look at the section! Here's the only 8-ply tire at so low a price. More mileage built into these tires, so you will get 10,000 to 20,000 miles out of them on any kind of road!

No Money No Deposit

Sent to you for Free examination on request. Written Gold Bond guarantee with every tire. Better than Standard makes, but only half price. Brand New, direct from factory. Order today!

Pay on delivery plus express or parcel postage.

AMERICAN TIRE CO., 1461 So. Michigan Blvd. Dept. 102 CHICAGO

LOOK AT THESE PRICES!

SIZE	TIRE	TUBE
30x3 1/2	\$ 9.85	\$1.35
32x3 3/8	12.50	1.50
31x4	14.75	2.00
32x4	16.50	2.10
33x4	16.75	2.20
34x4	17.50	2.30
32x4 3/8	19.75	2.50
33x4 3/8	20.75	2.60
34x4 3/8	21.75	2.70
35x4 3/8	22.50	2.80
36x4 3/8	23.50	2.90
33x5	23.75	3.00
35x5	24.50	3.10

CAR OWNERS WANTED!

To use and introduce the greatest improvement in Inner Tubes since autos were invented. Air gauge in valve stem of every Tube shows at a glance through the Unbreakable Transparent Valve Cover amount of air in tires.



AIR-GAGE Heavy Duty Tubes

—sell on sight to almost every car owner because they save trouble, time, worry and expense. Add one-third to life of tires. Paul salesman make big profits selling direct to car owners. Our million dollar factory can use 500 more salesmen at once. Experience not necessary. Big illustrated Free Book tells how the Paul Plan will start you in this big money-making business without capital. Write for Free Book Today. **THE PAUL RUBBER CO.,** Dept. 25, Salisbury, N.C.

34 MILES ON GALLON OF GASOLINE



Wonderful carburetor. Reduces gasoline bills one-half to one-third. Increases power of motors 30% to 50%. Starts easy in coldest weather.

Sent on 30 DAYS' TRIAL

Fits any car. Attach yourself. **Fords make as high as 34 miles to gallon.** Other cars show proportionate saving. Send make of car.

Special 30-Day Trial Offer. Agents Wanted.

AIR FRICTION CARBURETOR CO., Dept. 3580 DAYTON, OHIO

Steady Work

in a fast growing business with Vanderpool Latest Improved Vulcanizer. Made in America.

Ask for Catalog

Vanderpool Co., Dept. 8P, Springfield, Ohio

F. H. DIBB, Agent for British Isles
26 Fairfield Rd. Winchester, England

You Can Save \$35.00



\$4.45 and up
Parcel Post Paid

Recover your old auto top frame yourself. Custom tailor made to fit all makes and models of cars. Any person that can drive

a car can put it on. Roof and quarters sewed together, with rear curtain, fasteners, welts and tacks complete. Give name, year and model number of your car and we will send you catalog with samples.

LIBERTY TOP & TIRE CO., Dept. E-7, Cincinnati, O.

Do You Get Dirty Working on the Car?

Clean Your Hands CLEAN with

GIT HAND PASTE

18 OUNCES

10¢ at F. W. Woolworth Co., McCrory and other stores



The
Prophy-lactic

Tooth Brush

Ask your druggist for "the brush in the yellow box"—he knows

Different from all others—the NEW BENJAMIN



AIR RIFLE

Made on a different principle from all other Air-Rifles. The Benjamin is really a strong air-pump used to compress the air in the air chamber to any degree of power desired. From one to six strokes of the pump give all the force necessary. Each additional stroke gives increased power. The Benjamin works on the same principle as all air-drills and air-hammers—with this difference:

You control the shooting force as you desire. Look at this block of hardwood. It shows how Benjamin power is regulated as you wish.

You can't have accidents with a Benjamin. It's safe, always, because you control the power. The Benjamin never loses shooting force, and has no springs to get out of order or shake your aim. Write us for an interesting folder about this wonderful air-gun.

If your dealer does not handle mine, send direct to factory.

(PRICE \$5)
POSTPAID
BENJAMIN AIR-RIFLE & MFG.
CO., 115 N. Broadway, St. Louis, Mo.

Pacific Coast
Representatives
TRAYER &
BOWER
Los Angeles
Calif., and
San Francisco
Calif.

Ask your
dealer for
demonstration.



AGENTS

For the Biggest Money-Making
Selling Proposition You Ever Saw

See Pages 126 & 127



INSYDE TYRES

Inner Armor for auto tires. Prevent blowouts and punctures. Double tire mileage. Easily applied to any tire between casing and tube. Details free. Agents wanted. Liberal profits. Amer. Accessories Co., Tire 216 Cincinnati, O.



MAKE A MOTOR CYCLE OUT OF YOUR BICYCLE

with a STEFFEY MOTOR ATTACHMENT. RELIABLE—ECONOMICAL—EFFICIENT. Easy to attach. Fits any wheel. Send stamp for circulars.

STEFFEY MFG. CO., Dept. P, 5025 Brown St., Phila., Pa.

SEND for the INTERNATIONAL CATALOG

FOR
FORD—
PRICES
FROM
\$37.85
UP.
Factory
to-
Con-
sumer
direct—
Pay only one profit.



Our net price list.
Full line of auto bod-
ies and acces-
sories for
Ford at
Wholesale
Prices.
Have big
margin on
bodies by
buying
direct from factory.

International Body Works, 214 W. Ohio Street, Dept. 7, Chicago, Ill.

EVINRUDE WILL

To insure delivery of a new
SPORT TWIN, order from your
dealer at once. Send for catalog.

EVINRUDE MOTOR CO., 207 Evinrude Bldg., Milwaukee, Wis.

BE OVERSOLD



Yes, Jack!

we're having a
vacation all summer!

"—now that we've bought our INDIAN
Motorcycle and side car.

"I had no idea that motorcycling *could*
be such fun, or so inexpensive.

"Think of all the new places we've seen,
the fresh air we've breathed—every eve-
ning, and all the week ends.

"Do you realize that, riding it to business,
you get home so much earlier, that we
have longer evenings?

"And we're paying for it so easily, too.
Only a little each week—and we are rid-
ing while we're paying."

INDIAN Scout, the most popular mid-
dleweight, \$250; electrically equipped,
\$285, F. O. B.

INDIAN Big Chief 74, ideal for heavy
duty side car work, \$345, F. O. B.

HENDEE MANUFACTURING CO.

SPRINGFIELD, MASS.

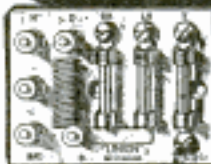
Ask your dealer—or write us, Dept. P-8, for
free booklet and easy, ride as you pay plan.

Indian Motorcycle

Please Mention Popular Mechanics

FORD OWNER AVOID FIRE! RISK!

A GROUNDED wire can't cause a fire that will destroy your Ford or the wiring system when your car is protected with a "Union" Fuse Block. The "ground" simply blows a fuse. After that it's easy to put your finger on the defective wire and repair the damage by replacing the blown fuse. Cost? A few cents.



"UNION" FUSE BLOCK

ends flickering lights from loose connections—and blown lamps from speeding motor. Permits use of standard single filament lamps for *bright and dim lights*. Easy to install. No extra wiring. If not at your dealer's, sent postpaid for \$1.50. Money back if not satisfied.

Write for booklet.

CHICAGO FUSE MFG. CO.

1503 West 15th Street, CHICAGO, ILL.
Eastern Branch: NEW YORK

Rider Agents Wanted

Select from the 44 Styles, colors and sizes of Ranger Bicycles. Ride and exhibit sample Ranger and make money. Delivered free, express prepaid, on approval. Factory-to-Rider prices save \$10 to \$25. 12 Months to Pay on any Ranger if desired. Boys and girls easily save the small monthly payments. Parents often advance first payment.



Tires best quality, at factory prices, express prepaid. Lamps, wheels and equipment, low prices. Send No Money, do business direct with makers.

Mead Cycle Company
Dept. 100 Chicago

Write today for free Ranger Catalog, factory prices and marvelous easy payment terms.

FAULTLESS AUTO PRODUCTS

Faultless Raceboat

Speed and Power Equipment



Send for our new prices on Bodies and Accessories.

AMERICAN TOP & BODY CO.

Adams St., Delphi, Ind.

Earn \$50 a day Selling men's gas-mack



Goodyear Raincoats

\$1.90 each, in dozen or gross lots. Sample sent upon receipt of \$2.15. Agents wanted (Write for our 6 best sellers).

GOODYEAR RUBBER M'FG CO.
Dept. A. 34 East 9th Street, New York City

Easy to Build this SHAW Cycle Car

Here's a REAL Automobile

with a Real Motor that any handy man or boy can build. The SHAW Speedster carries two passengers anywhere. Power supplied by famous 2 1/4 H. P. Shaw Motor. If you have a Shaw Motor get plans. If not, we supply everything.

Write for FREE particulars or send 25c (stamps accepted) now for Easy-to-follow plans. Write today!

Shaw Mfg. Co.
Dept. 3-1
Galesburg,
Kansas



SEND NO MONEY

Save 50%



20YR 14KT GOLD-FILLED CASE

A rare opportunity to buy this high grade watch 50% below cost. 12 size, thin model, 20 yr. 14kt gold-filled case. Beautiful dial. Handsomely chased border and back. Full jewel, well known ALERT movement. Regulated and adjusted to keep excellent time.

Order today. Send no money. Pay only \$6.80 on arrival. Satisfaction guaranteed or money back.

FREE: 14kt gold-filled Waldemar chain and knife if you order now. **Supreme Jewelry Mfg. Co.** Dept. 823, 134 Broadway, New York



Auto Supplies
Knowing HOW to buy is merely knowing WHERE
This is Chicago's Great Wholesale House.
AUTO SUPPLIES AND MOTOR PARTS
WHOLESALE ONLY
Dealers send today for this big money-saving book
ACTELL AUTO ACCESSORIES COMPANY
1501A South Michigan Avenue
CHICAGO

MOTORCYCLE BARGAINS

Save 25% to 65%

on Slightly used and Rebuilt Motorcycles, Side Cars, Johnson Motor Wheels, Evans Power Cycles, Bicycles. Send for Free Bargain Bulletin and Money Saving Message, listing hundreds of Bargains in used, rebuilt and new machines, supplies, accessories, etc.

AMERICAN MOTOR CYCLE CO.
Dept. 822 2047 W. Chicago Avenue, CHICAGO



AUTOMATIC TIMER

for Ford Cars—positively prevents all timer trouble—Automatically gives proper spark for all speeds—Does away with spark lever. Back-kick practically impossible—No more broken arms or ruined starting systems—saves gasoline, gives more power—easier starting—steadier pulling. Sold on money back guarantee—Every Ford owner will buy at \$8.50. Agents wanted. Big profits.

AUTO SUN PRODUCTS CO., Dept. 47, Cincinnati, O.



VITALIC Bicycle Tires

TRADE MARK REGISTERED
Tougher Than Elephant Hide

MOTORCYCLES

RELIABLE STANDARD MAKES that you can DEPEND ON.

Enjoy the glorious experience of going wherever you like—whenever you like. The price is within your means—35% to 50% less than others. These machines are slightly used, thoroughly overhauled or rebuilt.

Send for catalogue—**MYEROW BROS.,** 758 Columbus Ave., Boston, Mass.



"Lighting Fixtures"

READY TO HANG

(Direct from Manufacturers)

Completely wired, including glassware. New designs. Send for catalogue No 24. Send for DEALERS' proposition.

ERIE FIXTURE SUPPLY CO.
STA. A. ERIE, PA.





Breeze to the Beach!

RIDE away from the heat—out into the cool country—while the less fortunate swelter in town or trundle along cooped up in cars. A HARLEY-DAVIDSON will breeze you to your favorite beach, to picnic or summer cottage, to distant fishing grounds—in half the time and at a fourth the expense! Try it, and you'll agree that motorcycling is "the greatest sport on wheels".

Pay-as-You-Ride! Harley-Davidson dealers have an Easy Payment Plan. Ask yours about it. Enjoy a free demonstration ride. Write us for literature. No obligation.

HARLEY-DAVIDSON MOTOR CO.
DEPT. P., MILWAUKEE, WIS.

Harley-Davidson

The Motorcycle

*Money-making sales opportunities in open territory.
Write for particulars.*

YOU CAN MAKE Thousands of Dollars Quick

On This New Idea An entirely new field for men who want a legitimate substantial business. Anyone who will work can make thousands. The demand is tremendous. The market is enormous. You cannot scratch the surface in your territory in years. A most amazing money making proposition for agents and salesmen. Cash in on this new idea that everybody is waiting for. You not only make big money from the start but build a high grade pleasant profitable business that is

PERMANENT

Agents, salesmen, crew managers and distributing agents find in Surfex the proposition always hoped for, but scarcely expected to realize. Territories are being rapidly allotted. It is an easy business to get into. Immediate action will get you in on the ground floor.

CAR OWNERS

\$1 Bottle of Surfex will do a large car and is equally good for furniture, woodwork, bath tubs, etc. An occasional application of Surfex makes finish permanent. **POST PAID**

SURFIX

Liquid Glass Surfacer
SURFIX CHEMICAL COMPANY
Griswold & Atwater Sts. Detroit, Michigan

WHAT IS IT?

Not a polish. Not a wax. Not a varnish. It is Surfex chemically processed **Liquid Glass, Real Liquid Glass.** Think of being able to put a light film of glass on automobiles, furniture, woodwork, etc. that protects and preserves a finish by sealing the pores with liquid glass. Every car owner wants to keep the beautiful finish. Surfex does it. Twelve millions of more automobiles giving general satisfaction except the finish and Surfex makes the finish stand up and give lasting satisfaction. A Surfex surface can be washed with water and does not require polish. It improves the finish both in texture and in appearance and preserves and protects. Every home wants it to use on furniture, pianos, violas, white and other woodwork, bath tubs, windows, etc. We do not know of an item with such a tremendous waiting market. Write, wire or phone immediately. Ask Bradstreet, Duns or First National Bank Detroit about us.

The Standard "All-American" Transformers

Radio and Audio Frequency

now being used in radio sets manufactured by leaders in the industry.

These manufacturers have expended a great deal of time and money in the testing of transformers to give best results. They can not afford to take chances. Their preference of "All-American" Transformers is your guide to real satisfaction.

Ask your dealer to show you "All-American" Transformers.

Free Offer Book of Hook-Ups containing twenty-five successful circuits. Send 2c stamp to cover postage.



Radio Frequency Transformer



Audio Frequency Transformer

RAULAND MFG. CO.
200 No. Jefferson St., Chicago, Ill.

AGENTS

For the Biggest Money-Making Selling Proposition You Ever Saw

See Pages 126 & 127

SHOTGUN or RIFLE There's a remarkable gun value in a Stevens. Write for the interesting catalog describing our line.

J. STEVENS ARMS COMPANY
Dept. 550 Chicopee Falls, Mass.
Owned and Operated by the Stevens Arms Corporation

THE TRINITY LOUD SPEAKER

THE BEST YOU CAN BUY TYPE A1 with 21" Horn..... \$25.00 Literature
TYPE "B" for use with Phonograph 12.50 upon request.
TRINITY RADIO CORPORATION
168 Dartmouth St. BOSTON, MASS.

SEND  **No Money For This 3-Ft. Telescope** Brass bound in 5 sections. On arrival pay postman \$1.85 plus few cents postage. Guaranteed or money back!

FERRY & CO., Dept. 1776, 75 W. VanBuren Street, CHICAGO



I Need Branch Managers

LIGHTNING—WONDERFUL NEW ELECTROLYTE charges discharged batteries instantly. Eliminates old sulphuric acid method entirely. Dissolves sulphation. World has waited half a century for this invention. One gallon, retails \$10.00, free to agents. Lightning Battery Co., St. Paul, Minn.

PAPER MAGIC A new book by Houdini in which are described not only a large number of tricks with paper, but also the amusing and puzzling articles which may be made of folded paper and tearing of paper. Paper Puzzles are also included. 206 pages, 112ms. Price \$2.50, postpaid.
Popular Mechanics Book Dept., 200 E. Ontario St., Chicago

Now! Costs Less to Enter Profitable Butter-Kist Popcorn Business

BUTTER-KIST now offers a new and wonderful improved line of Popcorn Machines with the *right model, exactly suited to the requirements of your own business.*

And best of all—there's a beautiful, brand-new model that sells at *about half what former models cost!*

It's the Gold Mine—and it's a beauty. Mahogany-finished cabinet—gleaming glass sides—polished nickel parts. Takes up little room. Works automatically. Produces thirty 10-cent packages an hour. Has special compartment for peanuts—a chance for added profits.

A better machine in every way! Pops delicious corn economically. And pops it *under glass.* No springs. Noiseless. Every part is interchangeable. New and improved *revolving electric sign.*

Butter-Kist Popcorn *can* make big profits for *you.* H. C. Wallace writes: "In one year we made a gross profit of \$3484." Many are

making even more. And remember, out of every dollar's worth you sell, you keep 65 cents as *your profit!* The Gold Mine Model is your opportunity.

Write for the Butter-Kist Easy Payment Plan. Mail the coupon.

BUTTER-KIST Popcorn
"America's Oldest Treat"



HOLCOMB & HOKE MFG. CO.

World's Largest Manufacturers of Popcorn Machines and Peanut Toasters
2230 Van Buren Street • • Indianapolis

The coupon, filled in, offers you an easy road to big profits.
Obligates you in no way. Fill in mail TODAY.

HOLCOMB & HOKE MFG. CO.,
2230 Van Buren St., Indianapolis, Ind.

Please send me, without obligation on my part, your free Butter-Kist book. I also want the Location Chart which I will fill out and return to you.

Name _____
Street _____
City and State _____
Business _____

BUTTER

KIST

POPCORN AND PEANUT MACHINES

AUSTIN'S IDEAL COTTAGE STOVE

Burns Kerosene and Air

Every cottage is incomplete without one. No wicks to smoke up your house. No odor, more heat.

Made of sheet iron with cast iron top.

Two-hole top and warming oven.

Height, 47 inches over all. A regular stove—no makeshift. Order one today for your summer cottage.

PRICE

\$49²⁵

F.O.B.

CHICAGO

Terms Cash with Order

AUSTIN WELDING WORKS

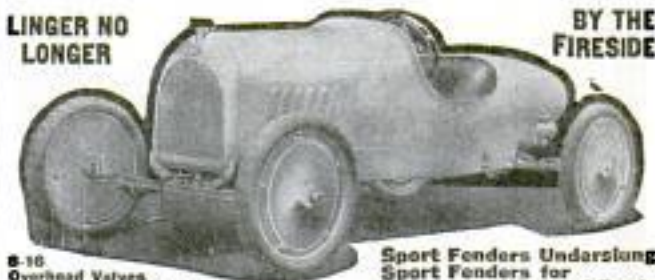
Dept. S, 551-553 W. Quincy St., Chicago, Ill.



JOY—ADVENTURE—ROMANCE

LINGER NO LONGER

BY THE FIRESIDE



8-16 Overhead Valves Selective Transmissions

Sport Fenders Underdrag Sport Fenders for Standard Fords

You must seek them out in the City's White Lights; under the Country's Blue Sky; by the Rippling, Murmuring Waters. Get Busy! Buy a Ford and equip it with a Beautiful FORD-SPEED Sport Body and find the road to Happiness. We offer nine smart models to choose from \$29.00 up. Full line Racing Specialties to help you go faster. Free Catalog.

This Month's Specials

	Price	Now		Price	Now
Discs, set of 3, flat	\$12.00	\$ 5.95	Underdrag Fenders	\$12.50	\$ 9.95
Power Feed Pump Oiler	18.00	7.50	Worm Steering Gear	30.00	18.95
Oil or 2 1/2:1 Gears	12.50	0.95	Crank Case Motor Arm Support	5.00	2.95

BATISFACTION OR MONEY BACK guarantee, 50% with order, balance on delivery R. S. FORD SPEED & POWER EQUIPMENT MFRS., 250 West 54th St., New York

SEND \$1.80

for this strength-tested, pocket-size 3-blade screwdriver

SIMORE AUTOMATIC MAGAZINE SCREWDRIVER

Any desired blade locks into position AUTOMATICALLY with a turn of the thumb. When finished, a thumb's touch releases the blade which instantly disappears in the handle.

CHANGES BLADES Instantly! -- Automatically

No loose blades - no lost blades. Once you use it - you won't be without it. SEND NOW money order or check for \$1.80.

Simon-Skidmore Mfg. Co.
Dept. 48 Santa Ana, Cal.

Guaranteed satisfactory or money refunded



AUTO OWNERS WANTED!



To use and introduce the **DIMPLED TUBE**

Outlasts four ordinary tubes. Overcomes friction heat, increases tire life 25% to 50%, is leak proof, prevents flat tires. **Big Money Maker** for agents, salesmen and garage men.

30 DAYS' FREE TRIAL

Two-Year Guarantee. Write today for special introductory offer and big money-making plan.

WOLVERINE CLIMAX CO., Dept. 102, Detroit, Mich.

Tobacco

Special Bargain Introductory offer on Kentucky's Finest Good Old Melon Sweet Green River Smoking Tobacco.

Two big 1-lb. cans, \$2.00 value for only \$1.00 postpaid. Satisfaction guaranteed or money back.

OWENSBORO TOBACCO CO., Dept. 130, Owensboro, Ky.

MOVIES In Your Home



Our marvellous, practical **Movie Machines** sell as low as \$5.00—and what's more, we have wonderful films at lowest prices—with a new film exchange service. **DON'T MISS THIS!**

Write NOW for Free Catalogue

PARAMOUNT MFG. COMPANY
Box 1371, Dept. M2, Boston, Mass., U.S.A.

Abcesses
Anemia
Asthma
Baldness
Bronchitis
Bunions
Catarrh
Colds
Dandruff
Ear Diseases
Eczema
Enlarged Prostate
Female Complaint
Goitre
Gout
Hemorrhoids

Hay Fever
Infantile Paralysis
Insomnia
Locomotor Ataxia
Lumbago
Nervousness
Neuralgia
Neuritis
Paralysis
Piles
Psoriasis
Rheumatism
Sciatica
Skin Diseases
Sprains
Warts and Moles

Renulife

Violet Ray

A modern scientific method of treatment for above ailments. Thousands of cases successfully treated. Reaches the source, treats the cause, stimulating, invigorating. Nature's way of helping you to get well.

Write for the Booklet, "Health."
Learn how electricity can relieve you.

Renulife Electric Company
814 Newberry Bldg. Detroit, Mich.

Please Mention Popular Mechanics

"TEAMING UP" WITH HIDDEN TALENT

The Broad and Helpful Plans of a Great Industry Give Recognition to Scores of Bright Minds in the Field of Practical Mechanics. The Nation the Gainer.

The PRESSED METAL T. E. C. was *right* in believing that the possibilities of American ingenuity in devising new and practical means to serve its own daily convenience is still an almost virgin field. Before the next generation we shall all be enjoying hundreds of economies and comforts now locked in busy minds and only awaiting the practical encouragement now offered by the PRESSED METAL T. E. C. in the most practical of ways.

We pay cash for every usable IDEA accepted by the Engineering Advisory Board of the Pressed Metal T. E. C.

You are invited to WRITE TODAY for full information in the

FREE Pressed Metal Booklet

32 pages with complete data sheet and scaled drawing paper.

The serious and responsible purpose of the Pressed Metal T. E. C. may be inferred from its personnel, which includes such concerns as

The Acklin Stamping Co.	Geuder, Paeschke & Frey Co.	The Metal Specialty Co.
The Bettcher Stamping & Mfg. Co.	The Globe Machine & Stamping Co.	New England Pressed Steel Co.
Boston Pressed Metal Co.	Hydraulic Steel Co.	Truscon Steel Co.
Detroit Pressed Steel Co.	Kales Stamping Co.	E. R. Wagner Manufacturing Co.
Detroit Stamping Co.	McDowell Manufacturing Co.	The Youngstown Pressed Steel Co.

Just remember that Pressed Metal is *anything* that can be produced by *stamping* from sheets of steel, brass, aluminum, copper or any other useful metal.

The FREE Pressed Metal Booklet Tells HOW TO CAPITALIZE YOUR MECHANICAL TALENT

or inventive genius—or maybe just your "good old common-sense." It tells all the conditions and the amounts to be paid for the successful ideas, and also how to protect yourself against misappropriation of your creative thoughts by others. WRITE TODAY. (A post card will do, but please make it easily legible so it can be properly filed and acknowledged.) "Every day lost is lost." Address

DEPT. **A** **PRESSED METAL** TRADE EXTENSION **COUNCIL**
27 QUINCY STREET, CHICAGO

Big Profits in 8 Hour Constant Potential Battery Charging

Start now making big profits charging batteries with **HB Constant Potential 8-Hour System**. No experience needed. **You Can Clear \$150 to \$300 Every Month**. HB outfit comes complete, ready to connect and operate. **New Built-in Patented HB Voltage Regulating Winding Absolutely Eliminates Reversing**. Saves current and labor, runs all night without attention.

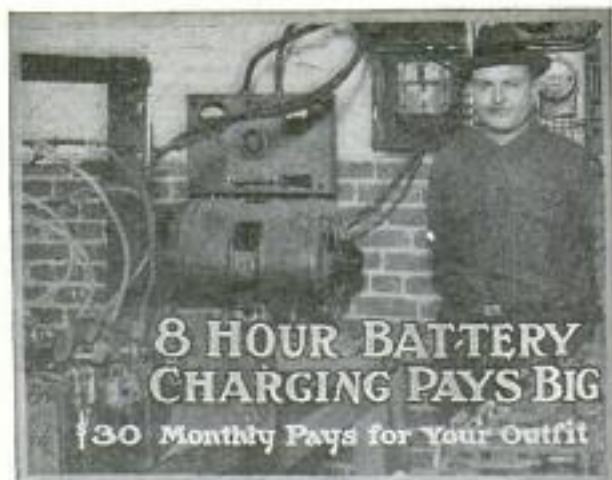
\$30 MONTHLY PAYS FOR YOUR HB CHARGER

Small cash payment brings your HB Constant Potential Charger. **Easy Terms of Only \$30 Monthly Quickly Pay Balance from Your Profits**. 30 Days' Free Trial on Money-Back Guarantee Lets You Try HB Outfit at Our Risk. Oversize HB construction insures 1/3 More Output Than Any Other Outfit of Similar Rating. Start now to make big battery charging profits.

Write today for information.

HOBART BROS. COMPANY Box MS TROY, OHIO

Small Cash Investment - Increased Profits Carry Balance



8 HOUR BATTERY CHARGING PAYS BIG
\$30 Monthly Pays for Your Outfit

Burning, smarting shaves ~how to relieve them

USE Ingram's Therapeutic Shaving Cream—it does away with irritation.

This cream has an exclusive medicinal property that soothes the sensitive skin—heals annoying little cuts—leaves your face smooth and cool. No need to use a lotion.

Get a jar from your druggist today—50c. If he is not supplied, send us 50c with his name and address. We will mail you a jar of Ingram's Therapeutic Shaving Cream, and a tube of Ingram's Zodenta for the teeth free.

FREDERICK F. INGRAM CO.
97 Tenth St. Detroit, Mich.
Also Windsor, Ontario



There is Comfort
In Every Jar

SEND NO MONEY



A limited quantity of Standard Make, high grade, fully guaranteed typewriters at lowest price ever offered.

FREE TRIAL

for five days in your own home. Easy monthly payments. No "red tape". Send today for free booklet of Valuable Typewriter Information, also Special Sale Details.

Smith Typewriter Sales Co.
300-360 E. Grand Ave., Chicago, Ill.

FREE —a book that tells how to get better results with radio tube sets. Address
WILLARD STORAGE BATTERY COMPANY
CLEVELAND, OHIO

Keep Carpenter's
on Hand
THE ORIGINAL
LIQUID COURTTM
PLASTER



15¢
at **DRUG STORES**

Soak a cut, a scratch, or a break in the skin beautifully, with a flexible, clean, washable covering. It assists in healing. Has many other uses in the home. If your druggist can't supply you, we will send you a liberal supply, postpaid, for 10 cents.
CARPENTER CHEMICAL CO.
Detroit, Michigan

Motor Campcraft

If you tour with your automobile, trailer or motorcycle, you will want this new book.

Written especially for motor campers and tourists, advising the best tours to take, necessities to be included and the easiest and most practical way to camp with a car.

Detailed information concerning camp paraphernalia, portable furniture—beds and stove, cooking and eating outfits, simple camp recipes, and suitable clothing to be worn.

Illustrated from the author's photographs demonstrating the various methods of pitching camp, and setting up the waterproof tent.

Motor Vagabondage De Luxe

Price, \$1.75 Postpaid

Popular Mechanics Book Department
200 East Ontario Street, CHICAGO



Ever
Get Stuck
On a Job?

SHOP NOTES FOR 1923

The latest volume of Popular Mechanics series of year books tells

544 Easy Ways to Do Hard Things

of daily use to every mechanic. Among the many useful articles are Shop Crane—Testing Motors—Power Hammer—Arbor Press—Air Compressor—Turret Lathe—Bench Punch—Concrete Mixer—Bench Grinder—Drag Saw—Concrete Tile.

224 Pages—436 Illustrations

Price 50 Cents, Postpaid

SHOP NOTES SET—comprising 14 of the volumes previously issued and including the latest or 1923 number—\$7.50 Prepaid.

Popular Mechanics Book Dept.
200 E. Ontario St. CHICAGO

13th Edition A NEW AND GREATER DYKE'S AUTOMOBILE ENCYCLOPEDIA

Entirely rewritten—rearranged and new illustrations from beginning to end. Mr. Dyke devoted almost two years of constant application to rewriting this book. We are confident that you will agree with us that it is the best book in the world today on the automobile, truck and tractor.

A PRACTICAL BOOK ON THE AUTOMOBILE FOR EVERYBODY

Over 1,200 Pages. Over 4,100 Illustrations
Over 14,000 Lines of Index

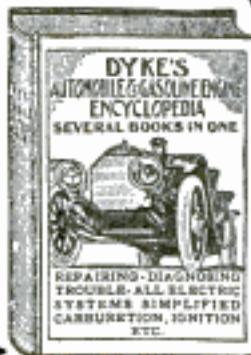
This book teaches the underlying fundamental principles of each and every part of an automobile—mechanical and electrical—in a simplified manner, and that is why the largest auto schools are using it as a textbook. Auto owners, students and repair men say that it contains the greatest array of automobile facts ever published in one volume.

This book will teach you to become an expert automobile repairman and also an electrical expert. You will understand fundamental principles, diagnosing troubles, testing, adjusting and repairing. If you were to purchase separate books on the subjects covered the lot would cost about \$21.00. The price of Dyke's book is

Cloth Binding, \$6. }
Flexible American } Postpaid
Morocco, \$7.50 }

Complete table of contents mailed
free upon request

Popular Mechanics Book Dept.
200 E. Ontario St., Chicago



Wear California's favorite outdoor shoe



Patents
Pending

Send for interest- ing style book of Outdoor Shoes for Men and Women

YOU will be thoroughly pleased if you select your Outdoor Shoe from our style book. Tens of thousands of men and women are wearing our "Buckstrips" and all are voluntarily praising our product. Our Style Book tells why each shoe is better for each sport or work. Rugged styles for Men—trim, smart styles for Women.

California's Outdoor men and women—whether for sport or work—consider "Buckstrips" a necessary part of their equipment. We have had 65 years of experience in pleasing these Western folks.

"Buckstrips" have exclusive patented features. A tough strip of leather is sewed around the vamp in moccasin style with strongest linen thread. Inside the regular vamp is a firm, soft leather lining, making a double vamp. This doubles the wear and helps keep out dampness. The "Buckstrips" also hold the shoe in shape. Long-lasting. Extremely comfortable. Unusually good looking. Made only by us. Prices \$6.50 to \$16.50.

BUCKHECT "Buckstrips"

Soles are tough oak tanned leather. Uppers are either chocolate colored, oiled storm tanned calfskin or of lighter glove-like leather where water resistance is not desired. Each heel layer is one piece of solid leather. Not guaranteed waterproof, but they are as much so as a leather shoe can be made.

Three thousand retailers sell our shoes west of the Rockies. If no dealer in your town carries Buckhect "Buckstrips" we will gladly fill your order and if shoes are not satisfactory they may be returned at our expense and money refunded.

*****MAIL COUPON TODAY*****

Buckingham & Hecht,
39 First Street, San Francisco

Please send me a copy of your new Style Book.

Name.....

Address.....

DESIRABLE EASTERN RETAILERS WANTED



THE PROPER AND MOST EFFICIENT WAY TO REPAIR FORD CARS TRUCKS AND TRACTORS

Here is a book that presents the information given in the Ford Service Course for Superintendents and Service Managers of Ford Agencies at the home plant in Detroit. It gives you information which cannot be secured otherwise outside the Ford plant. It describes for dealers, repairmen, garage mechanics and owners the proper and most efficient way to repair the products of the Ford factories.

Published April, 1922

FORD CAR, TRUCK AND TRACTOR REPAIR

By Alfred A. Good

Formerly Director, Ford Motor Company's Service School
250 pages, pocket size, flexible, 33 illustrations

PRICE \$2 POSTPAID

There have been a number of books written on the Ford car; but they only tell what the average Ford driver or mechanic already knows. This book gives you real practical information that shows you just how to locate troubles quickly and how to remedy them efficiently. It gives you a complete understanding of the mechanical principles underlying the operation of Ford cars, trucks and tractors—a thorough knowledge of the mechanical and electrical action of every unit of these machines—an explanation of how to get at the cause of the various troubles—and a step-by-step description of repair operations. The book covers the Ford car, truck and tractor in such a way that the mechanic who reads it is ready to answer any question concerning them which may be put to him by anyone.

Sent to any address postpaid upon receipt of price by

Popular Mechanics Book Dept.
200 E. Ontario St., Chicago



Free Trial

Easy Payments arranged if desired. Conn has been recognized supreme for half a century by the world's greatest artists. Write for details, mentioning instrument.

C. G. CONN Ltd.
831 Conn Building
Elkhart, Indiana

CONN
WORLD'S
LARGEST MANUFACTURERS
OF HIGH GRADE SAXOPHONES AND
OBOES



AUTO SUPPLIES and BEAUTIFUL BODIES at WHOLESALE PRICES

Big Free Catalog

Know the latest prices before you buy. Send for our illustrated price list. Every page is filled with bargains. We buy for cash—and sell for cash.

Save Money on Special Bodies

We carry a complete line of "Fidelity" Bodies for Ford and Chevrolet "490": at Bargain Prices: \$29.85 and up.

AUTO SUPPLIES FOR ALL CARS



Send for Catalog P

It shows over 3000 bargains in repair parts, tops, radiators and general accessories for Fords and other cars, all guaranteed standard quality.

Fidelity Bodies \$29.85 and up

For Fords and Chevrolet "490"

NEMCO BARGAIN SUPPLY HOUSE

37 N. Peoria St.

CHICAGO, ILL.

Our BUREAU of INFORMATION will answer all questions regarding articles in this magazine. Address Popular Mechanics Magazine, Chicago.

ONLY \$200 DOWN

10 MONTHS TO PAY

48.00 PER MONTH

4.60 PER MONTH

30 DAYS FREE TRIAL

LOOKS LIKE 1 1/2 CT. DIAMOND \$600.

Choose the ring you like best; give finger size, and send only \$2.00 deposit to show your good faith. We will send the ring without any delay or red tape. If you like it, pay only \$4.60 each month for ten months. Total price only \$48.00 for either ring. If you return it within 30 days, we will return your money.

THESE RINGS WORTH 50% MORE
Former price \$75.00. The sparkling, blue-white, perfectly cut, genuine diamond solitaire is set in an 18 kt. solid white gold ring. In the cluster ring, seven perfectly cut, blue white, genuine diamonds are set in solid platinum.

WRITE FOR JEWELRY CATALOG No. 1061
It brings a big jewelry store right into your home

STERLING DIAMOND & WATCH CO.
(Established 1879. \$1,000,000 Stock)

63 PARK ROW, Dept. 1061, NEW YORK, N. Y.

"Detroit" Belt Lacing Outfit

Cuts only 1/8 inch, outside the belt, is smooth, strong and flexible—easily and quickly applied. Same method used by 10,000 big factories.



Open Hook



Closed Hook

Complete outfit, lacing tool and big box of lacing

\$5

Price cut from \$8.50 to \$5.00
We pay postage
Money back if not satisfied

ASSORTED BOX
ASSORTED
\$1.50

WISE TOOL
\$3.50

"Detroit" Belt Lacing shows the least reduction of the belt strength, leaving the belt stronger than any other lacing in existence. "Detroit" Belt Lacing is the only machine closed wire lacing that takes a perfect staggered grip on your belt. Each hook has a prying strength of over 100 lbs. Hook's pat. reg. (with rubberized paper side strip) in 12 inch sections cut to any length without waste. Does not injure to belt. Does 84 inches of belt.

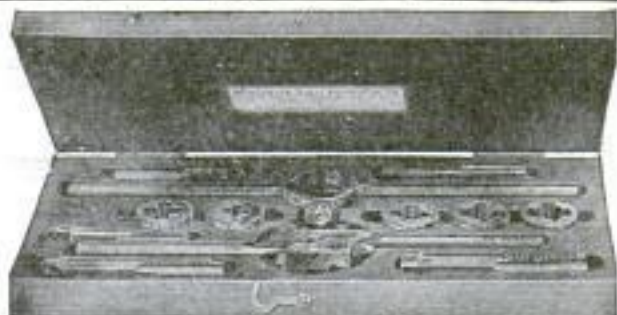
GUARANTEED

Lacing tool shown in view and box of lacing complete, postpaid, \$5.00
(Vise not included.)
Tool made to last a lifetime. Lacing always obtainable. Sold on money-back guarantee.

DETROIT BELT LACER CO., DETROIT, MICH.

NEXT
MONTH
WATCH

ERLA



5 SIZE AUTOMOBILE TAP AND DIE SET, ONLY \$3.00
DIRECT FROM THE FACTORY TO YOU!

Our No. 12 Automobile Set furnished in our highly finished chestnut box contains 5 each taps and dies (1-4, 5-16, 3-8, 7-16 and 1-2"), in the S. A. E. thread, 1 die stock, and one tap and reamer wrench.

Our No. 11 Set is the same as No. 12 except that the thread is U. S. S. instead of S. A. E. You are purchasing a splendid set at a very low figure. Send us your order at once and be one of our many satisfied customers. Let us also send you one of our circulars illustrating our full line of Handy Tools. WORCESTER STEEL PRODUCTS CO., Dept. T, 25 Union Street, Worcester, Mass., U. S. A.

IT'S SO EASY \$15 A DAY To Agents



You can easily earn \$15.00 a day or more taking orders from your friends and neighbors for our fine tailoring. Orders come easy when you show our swell samples, smart styles and EXTREMELY LOW PRICES. We show you how—you can do it easy—you don't need any experience.

OUR SWELL TAILORING is worn by snappy dressers everywhere and big money is earned yearly by men who send us these orders. WHY NOT GET YOUR SHARE OF THESE FINE CASH PROFITS?

Save \$5.00 to \$10.00

We sell our tailoring at lowest wholesale prices to men who recommend and boost us to their friends. Get our FREE SAMPLES and pick your fine clothes at a saving of \$5.00 to \$10.00 on every suit.

FREE! Write today for big sample outfit. It will be sent FREE.

Washington Tailoring Co., Dept. V345, Chicago, Ill.

Coal Bills Cut 20% to 50% By the CROWN Fuel Saver

More than 10,000 in use
and every one making good

The CROWN Fuel Saver is easily attached to any heating plant. Projecting thru the feed door of the fire box, it supplies a constant spray of superheated air (oxygen) to the surface of the fuel bed. The rich gases distilled from the overlying surface of coal, which in the ordinary fire box go up the chimney as "smoke," are converted by the CROWN into glowing, heat-giving flame.

The CROWN puts these ordinarily wasted gases or "smoke" to work. This makes a difference almost incredible—much less fuel consumed—less smoke—less ashes—uniform heat—and more of it.

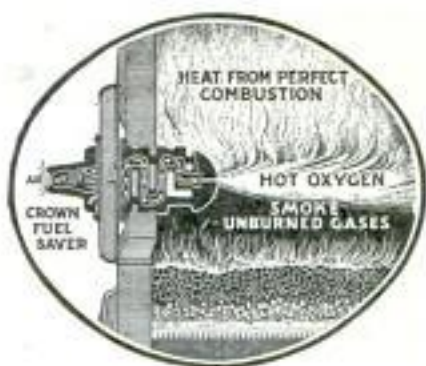
Don't throw money away. Investigate the CROWN. Write for booklet—"Making the coal bill look like 30 cents."

DISTRIBUTORS WANTED

The CROWN is the fastest selling specialty on the market. We have some exclusive territory open to live men who want to get into a big, profitable business for themselves.

Write for Special distributors' proposition, giving details regarding past business experience.

CROWN FUEL SAVER COMPANY
15 North 10th Street RICHMOND, IND.



Write us for details and price of CROWN. Give name and make of heating plant with approximate size of fire box.

The Crown Fuel Saver comes in 4 sizes, and is used on hot air, hot water, steam heating plants and low pressure power plants (up to 80 lbs. steam pressure). In successful use in Homes—Apartment Houses—Public Schools—Stores—Greenhouses—Factories—every place where hard or soft coal or coke is consumed as fuel.

Be An Automotive Electrician

Men are needed by the hundreds in the larger cities to take care of automobile electrical repairs. 78% of automobile repairs are electrical, yet only a few men are qualified to take advantage of the openings that pay from \$150 to

\$500 a Month

Now, by a new easy method you can learn this interesting work by a few weeks training in Chicago, or right in your own home. Write for particulars to Ambu Engineering Institute, Dept. 18-A, 2632 Prairie Ave., Chicago, Ill.

Collapsible Garment Hanger



This new, useful article is highly appreciated in every home or business place. A wonderful space saver, which relieves crowded places in closets, halls, offices, wardrobes and hotels. Holds four times as many clothes as one look and does not require any more space. Made of best of steel and lasts a lifetime. We also make a combination hanger for hats and garments. We

will appreciate your small order. Send for circular and prices.
B. D. GAUSE MFG. CO., Elkhart, Indiana

Put this
\$2 ELGIN WATCH
In Your Hands

No Red Tape, No Waiting

Simply send \$2.00 and receive watch. Full seven jeweled Elgin in stylish Octagon Case. Thin model, guaranteed 20 years.

30 DAYS' FREE TRIAL

Send only \$2.00 and watch comes charges paid. Carry for 30 days and if not satisfactory your deposit is returned. Pay balance \$2 a month for 10 months. Price only \$22.00. Send for FREE ROYAL BARGAIN BULLETIN, addressing Dept. 850.

ROYAL DIAMOND & WATCH CO.
35 Maiden Lane, New York



Easy to Play Easy to Pay

BUESCHER

TRUE-TONE SAXOPHONE

Saxophone Book Free

Tells when to use Saxophone singly, in sextettes or in regular band; how to play from cello parts in orchestras, and many other things you would like to know.



Easiest of all wind instruments to play and one of the most beautiful. You can learn the scale in an hour's practice and play popular music in a few weeks. You can take your place in a band within 90 days if you so desire. Unrivalled for home entertainment, church, lodge or school. In big demand for orchestra dance music. The portrait above is of Donald Clark, Soloist with the famous Paul Whiteman's Orchestra.

Free Trial! You may order any Buescher instrument without paying in advance, and try it six days in your own home, without obligation. If perfectly satisfied, pay for it on easy payments. Mention the instrument interested in and a complete catalog will be mailed free.

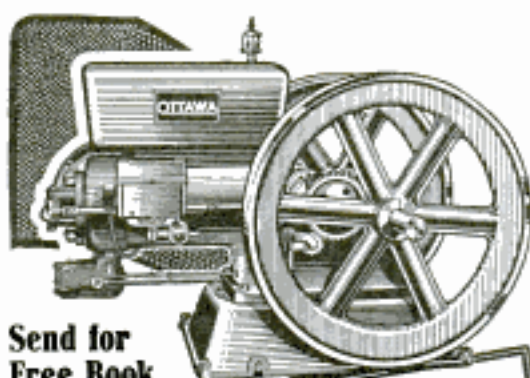
BUESCHER BAND INSTRUMENT CO.

Makers of Everything in Band and Orchestra Instruments
2588 Buescher Block Elkhart, Indiana

Buescher Band Instrument Co.
2588 Buescher Block, Elkhart, Ind.

Gentlemen: I am interested in the instrument checked below:
Saxophone.....Cornet.....Trombone.....Trumpet.....
(Mention any other instrument interested in.)

Name.....
Street Address.....
Town..... State.....



Send for
Free Book

**OTTAWA Prices
Save You More!**

If you are going to need an engine, send at once for Special Factory-to-You Sale Offer. All styles and sizes at wonderful money-saving prices. Send a postcard at once for full particulars!

Direct From Factory to You

All sizes — 1 $\frac{3}{4}$, 2 $\frac{3}{4}$, 3 $\frac{3}{4}$, 5, 7, 10, 12, 16, 22 H.P. Kerosene, Gasoline.

FREE! Send postcard today for new Free Book—"How to Know Better Engines."

OTTAWA MFG. CO.
534-K King St., OTTAWA, KANS.
Desk 534-K Maple Bldg. PITTSBURGH, PA.

**How to
KNOW
BETTER
ENGINES**

Custom-Made Tops Less Than Half Price

ASK US TO PROVE IT
You can attach them easily. Full instructions sent. Complete tops with beveled plate glass, tanks, fasteners and wells. Free delivery 1,000 miles. For all cars! special prices on Maxwells, Overland Fords, Dodges and Chevrolts. Describe your car. Samples and money-saving Bulletin free.
S-C PRODUCTS CO., 758 Nicholas Bldg., Toledo, O.



BUILD SHIP MODELS

Collectors pay thousands of dollars for certain models. Send 27 cents for simple blue print plans and instructions How to Make Pirate Ship Model. **MAAS & RICHTER, 423 Brumder Bldg., Milwaukee, Wis.**

ELGIN
"Napoleon"
Guaranteed
Gold Filled
Case Yours! \$5
clear profit every
sale, and you can
easily sell 3 to 5 a
day! You pay only
\$7.45, sell for \$12.45.
(Dealers ask \$20 for it).

**7 Jewels
Adjusted**

FREE! Gold-filled "Pocket-to-pocket" vest chain free with every watch.

Move-ment is high grade 7-jewel, adjusted, bridge model, set escape.

Case is genuine, thinnest model, guaranteed 14k gold-filled.

Agents Wanted!
Take orders, collect your profit, no waiting or delivering. Full instructions with your sample.

Send No Money! Pay agents' wholesale price, \$7.45 when delivered. We pay the postage. Not one cent for chain. Order today.

UNIVERSAL WATCH COMPANY
Dept. 240 1857 Armitage Avenue, CHICAGO

**GREAT
2 IN 1
LAMP**

**THE SECRET
of QUICK SALES**

Remove
Shade for
Outdoor
Use
—
300
Candle
Power



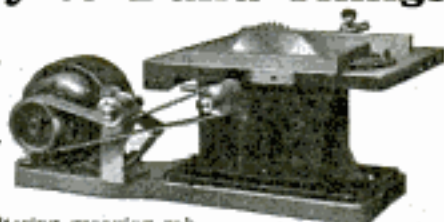
There's a way that brings quick and certain sales of our brilliant Combination Handy-Lite. It's building profitable business for our agents—in spare time. This lamp meets the demand for a light brighter than gas or electricity but needing no wiring or piping. Lights with match. Smokeless, compact, handsomely nicked, durable. Write for supreme selling secret and attractive agency proposition.

Burns 97% Air

ENTERPRISE TOOL AND METAL WORKS, Dept. 38
2441-9 No. Western Ave. CHICAGO, ILL.

It Is Easy to Build Things

WITH A
**Junior
Bench
Saw**



Does your ripping, mitering, grooving, rabbeting, tenoning, sanding, grinding and many other operations with surprising ease and accuracy. Top 10"x13". Saws 1 $\frac{1}{2}$ " stock. Dadoes $\frac{1}{4}$ "x $\frac{1}{4}$ ". Machine built entirely of metal. Driven by $\frac{1}{4}$ or $\frac{1}{2}$ h.p. motor. Portable. Attaches to any light socket. Extremely accurate. Descriptive circular tells many things of interest to workers in wood and soft metals.

W. & J. BOICE, Dept. F. M. 8, TOLEDO, OHIO

AGENTS WANTED

Agents and General Agents to sell patented home necessity. No article like it. A money saver.
FOUR SALES IN FIVE CALLS

Sells itself. Offers tremendous profit—\$900 a month or more to hustlers. Exclusive territory given to producers. Write today for details and territory you want.

SPENGLER-LOOMIS MANUFACTURING COMPANY
109 N. Wabash Avenue CHICAGO, ILLINOIS

SPORT BODIES for FORD and CHEV. 490 at \$34.50

Life-size paper patterns—You can build your own body at small cost. We are manufacturers and our quantity production enables us to quote exceptional low prices. Our unique shipping methods save you 73% in FREIGHT CHARGES. Send at once for free particulars on Central Bodies. Our Book: "HOW TO BUILD A FORD RACER" sent anywhere on receipt of 25c in cash or stamps. **WRITE TODAY!**

Central Auto Supply Co. Dept. 120 Louisville, Ky.



COPPER CANS

**SCREW TOP
Copper Tubing**

3 Gal., \$4.50	$\frac{1}{4}$ inch..... 10c ft.
5 Gal., 5.25	$\frac{1}{2}$ inch..... 15c ft.
8 Gal., 7.25	
10 Gal., 10.25	Unions
15 Gal., 15.25	$\frac{3}{8}$ inch..... 15c
	$\frac{1}{2}$ inch..... 25c

Larger sizes on request.
Postage and ins., 50c.

Send Deposit on C. O. D. Orders.

FREE—Write for our latest R-135 issue of Hagen's Specials; also catalog.
HAGEN IMPORT CO., of Penna.
42 N. 8th Street, Dept. M, Philadelphia, Pa.

**INLAND RUNNING BOARD
TIRE PUMP****WORLD'S EASIEST
AND EVERLASTING
FOLDS COMPACTLY****\$5.50; WITH \$6.50
GAUGE,**At your Dealer's, or prepaid by
**INLAND PUMP MFG. CO.
610 Reaper Blk., Chicago****Good Profits for
Demonstrator
Agents****EVEN** spare time
earns big money!
Never such a chance
to turn sport into profit!
You get a new demon-
strator at factory price.All year we send you prospects.
Only one agent in a locality—so write
today for reservation of territory. This is Ole
Evinrude's fast 3 HP light twin cylinder out-
board motor—sold only under name of "Els."
ELTO OUTBOARD MOTOR COMPANY

Dept. AA, Manufacturers Home Building, Milwaukee, Wis.

**"LYON BODIES" \$27.50
AND UP**

For Fords, Chevrolets and Dodges

**SEND
NOW
For Our
1923
"Book
of Bargains"**Containing a full line of bodies and accessories at
exceptionally low prices. Buy direct from the factory.**AUTO TIRE SALES CO., Dept. P 11 Body
1346 S. Michigan Ave. CHICAGO Division****MOTORISTS
SEND FOR THIS
FREE REPAIR BOOK**Tells how to make dozens of
motor and household repairs
easily, quickly and economically.

Write for this book and learn how

SMOOTH-ON CEMENT No. 1can save you many dollars. Sold by
Hardware and General Stores in 6-oz.
tins 30c (by mail, add 6c); also in
1-lb., 5-lb. and larger sizes.**SMOOTH-ON MFG. CO.
Dept. 37-14, JERSEY CITY, N. J.****SMOOTH-ON
IRON CEMENT****TIRE
AGENTS WANTED
\$4000 A YEAR****I'll Show You How to Make More Money
Taking Orders for Mellinger Tires**Without risking one cent, I'll start you as I have
started so many others in a business of your own. All
or part time. The **Mellinger Plan** is revolutionizing
the tire business. No capital or experience needed.**I Guarantee Your Profits**The Mellinger Plan literally guarantees your profits.
My **Big Free Book** tells you all about it. No matter
what you are doing, where you live, let me put
this remarkable money making plan in your hands.**12,000
MILES GUARANTEED!**
Lowest Wholesale Prices in America!Mellinger Super Quality Cord Tires, al-
ways considered the best cord tires made,
are now even better. The use of Ethyl-
cured Rubber gives marvelous tough
tread, wears down so slowly it reminds
you of steel, yet so pliable that it feels
like pure gum. Bead reinforced with
two chafing strips; combed Egyptian
cord; a double layer of cushion rubber;
cured 2 1/2 hours on air bags. These high
grade features on the **Mellinger Cord**
cost more, yet you pay less than for
ordinary unguaranteed tires and I give
a **Guarantee Bond for 12,000 miles.****FREE** For a little of your
time in showing and
recommending
Mellinger Tires, I
will make you a sur-
prising offer that will give you a set of
tires **FREE**. If you are in need earnest
I will send you the **Master Salesman
Kit**, containing everything. As one
Agent says, "It's like taking a prospect
through the Factory. The Kit sells the
prospect and I take the Order."**Positive Proof for You**Be the first from your locality to get the
Mellinger Plan and positive proof that
you can make big money. I say it's your
big opportunity—a big business—hosts
of friends and customers—I don't ask
you to risk one cent. Send the coupon
today. My **Big Free Book** explaining every-
thing will be in your hands in a few days.**Mellinger Tire & Rubber Co.
1707 Grand Ave.
Kansas City,
Mo.****Mr. B. L. Mellinger, Pres.,
Mellinger Tire & Rubber Co.,
1707 Grand Ave., Kansas City, Mo.**Without obligation, send me details of the Mellinger Plan, Free
Book and Wholesale Prices and how, without investing any money,
I can become your authorized agent.

Name

Address

Stop Those PUNCTURES

DON'T spend your money buying new tires. You can get double the mileage out of your old ones by simply injecting a 25c tube of Neverleak Tire Fluid into each tire. That's all that is necessary. You will find Neverleak Tire Fluid the best insurance you can have against trouble from destructive cuts, punctures and porous conditions. It makes your tires absolutely leak-proof. Just think of the trouble, delays and expense it will save.

NEVERLEAK TIRE FLUID

Heals Punctures on the Run

Neverleak is the old reliable tire fluid that has been giving satisfaction for over a quarter of a century. It never fails to do the work, and as it preserves both the rubber and fabric, it doubles the life of your tires.

Don't allow your dealer to sell you "something just as good," but be sure you get the original. Look for the signature on the yellow, green and white tube.

**Buffalo Specialty
Company**
104 Liquid Veneer
Building
BUFFALO, N. Y.



Please Mention Popular Mechanics



Ten years, and no breakdowns

That's the record which James Bishop's Auto-Wheel Coaster has made. Read what he says:

"I have had an Auto-Wheel Coaster for ten years. Have hauled heavy loads most every day on rough ground, but the wagon went through it all without a breakdown. Jas. Bishop, Knoxville, Tenn."

Auto-Wheel Coasters and Auto-Carts

Superior construction makes Auto-Wheel Coasters sturdy and dependable. Bolsters of hard maple will not collapse; far superior to steel construction. No springs to get out of order, no rattling as with steel bolsters. Other features: Mortised joints; self-contained roller bearings; hound brace; hand brake; special hub cap and locking pin; rubber-tired disc wheels (oversize tires on three largest), or steel-tired disc or wood spoke wheels.

Write for catalog showing all models of the Auto-Wheel and also all models of the Auto-Cart, the junior companion for little brother or sister. If you send names and addresses of three coaster wagon dealers in your town, telling which ones sell the Auto-Wheel, we give you a year's subscription FREE to the "Auto-Wheel Spokesman", a dandy little magazine for a boy like you.



Auto-Cart

Auto-Wheel Coaster Co., Inc.
North Tonawanda, N. Y.

BURN YOUR NAME ON TOOLS

WITH ARKOGRAF

Protect your tools from theft. Write any name, engrave any design on metal with electricity like writing on paper with pen or pencil. Complete outfit \$5.50, prepaid anywhere. Interesting descriptive circular free. Write today. Agents Wanted. Arkograf Pen Company, 1007 Veon Building, Portland, Oregon



Fibre-Lite Limbs

Easy Payments—Do Nature's Work.
AGENTS WANTED who use Artificial Leg. GOOD PAY.
FREE Fibre Sample. DESCRIBE STUMP TO
WORMAN CO. 252-P HENNEPIN AVE. MINNEAPOLIS, MINN.



MOTORCYCLES ONE YEAR TO PAY



Know the joy of owning—for business or pleasure—a Harley-Davidson, Excelsior, Henderson, Indian, Cleveland, or any other standard make; thoroughly rebuilt in our own factory.

Write for Free Bargain Bulletin and Easy Payment Plan.

HAVERFORD CYCLE CO., OF PENNA.
America's Largest Cycle House
Established 26 years
503 Market St., Phila., Pa., Dept. P. M.

OSTER

Bull Dog Die Stocks

make pipe threading a simpler proposition and eliminate much unnecessary bother and useless perspiration.

Here are the 5 Big Bull Dog Features responsible for accurate results, quick work and easy operation.

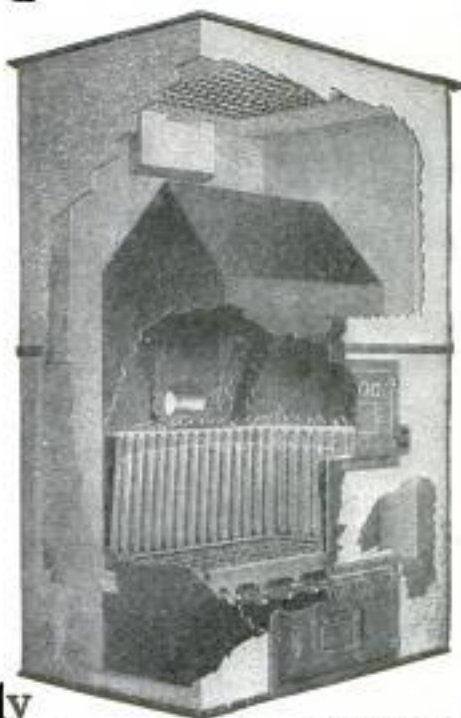
- 1 Self-locking, adjustable dies.
- 2 Self-locking, self-centering guides.
- 3 No unwinding after a cut.
- 4 Lever control—dies reset instantly to size.
- 5 No loose bushings or breakable small parts.

Ask your supply house or write for a descriptive Bull Dog folder.

THE OSTER MANUFACTURING CO.
2100 East 61st Place, CLEVELAND, OHIO



BULLDOG Pipeless Furnace



Only

\$10

Puts the
**BULLDOG
Pipeless
Furnace**
in Your Home!

Then Only \$10 a Month!

If you are even thinking of a furnace, write for our free catalog. The Bulldog is one furnace you must investigate. Heats without pipes! Comes completely erected. An extraordinary development in heating. Factory connections in both East and West. We ship from nearest point. Write for catalog before you forget.

Two Hours to Install

You do it yourself with nothing but a hammer and a saw. Rectangular shape (one of the common sense principles) allows passing through any door. Don't consider buying any furnace until you learn about the Bulldog!

Fits Any Floor Height

No matter what the depth of your basement or cellar may be—the Bulldog fits it. The adjustable casing (another common sense feature) takes care of this. When you read our catalog we think you will agree that this alone should be sufficient to influence you to choose the Bulldog. Mail this coupon TODAY!

Babson Bros.

19th and California Sts., Dept. C-135, Chicago

Without obligating me in any way, please send me your free catalog and \$10 down offer on the Bulldog Pipeless Furnace.

Name _____

Address _____

Clear-Tone
FOR
PIMPLES
Your skin can be quickly cleared of Pimples, Blackheads, Acne Eruptions on the face or body, Enlarged Pores, Oily or Shiny Skin. \$1,000.00 Cold Cash says I can clear your skin of the above blemishes. **FREE** Booklet—"A Clear-Tone Skin"—telling how I cured myself after being afflicted for fifteen years. **E.S. GIVENS, 129 Chemical Bldg., Kansas City, Mo.**

Great NEW
Invention for Seekers of
Health—Power—Beauty

Revitalize yourself! Bring back energy. Be wholly alive. Ecco Health Generator aids you to leave the lethargy and hopelessness of bad health behind forever. Yours for 10 days free trial.

FREE Trial  **Write for Free Book**

Write for free book that tells all about this great instrument that gives you Electricity, Violet Ray, Vibration and Ozone, the four greatest curative agents. Find out how you can have the Ecco for 10 days free trial. Write today.

Lindstrom & Company
442 N. Wells Street, Dept. C 135 Chicago

Please Mention Popular Mechanics

Copyrighted material



The Ideal Tube for the Call of the Open

ARE you spending your vacation in the North Woods—at the seashore—in one of our many great national parks, or are you motoring across country? In any event the new Cunningham dry battery detector and amplifier, type C-299, makes it possible for you to take a radio receiver, which will be light in weight, compact in design, and highly efficient in operation. It is the special filament in this tube, having a current so low that it may receive its supply from standard No. 6 dry batteries or even from ordinary flashlight batteries, that makes possible this new and interesting application of radio.

The receiving set you now have can be readily adjusted to use this new tube and be a source of use and pleasure on your vacation trip. In any event your dealer can give you useful suggestions for the purchase or construction of a highly efficient and practical portable set.

A Specially Designed Tube for Every Radio Use

Patent Notice: Cunningham tubes are covered by patents dated 11-7-05, 1-15-07, 2-18-08, and others issued and pending. Licensed for amateur, experimental and entertainment use in radio communication. Any other use will be an infringement.

E. J. Cunningham Inc.

Home Office: 248 First Street
San Francisco, Calif.

Eastern Representatives:
154 W. Lake Street
Chicago, Illinois

Please Mention Popular Mechanics

EASY FOR YOU TO OWN A FINE INSTRUMENT!

YEARs ago the famous King Brass Instruments were sold only for cash to famous musicians. But now due to our easy payment plan anyone can own one of these wonderful instruments.

SAVE MIDDLEMAN'S PROFITS

Simply order direct from the factory. You save middleman's profit—and you get a fine, new, sound-laboratory tested, acoustically perfect King Instrument. With it goes our guarantee plus free factory-service.

IT'S EASY TO OWN A KING

Rebuilt instruments, refinished to look like new, we sell for cash at low prices. New instruments on the easy payment plan. Thus it's "easy to own a King". Send for our latest complete catalog and list of special bargains.

THE H. N. WHITE COMPANY
5211-42 Superior Avenue Cleveland, Ohio



Used Motorcycles
\$40⁰⁰ and up
Bulletin
FREE
ALL MAKES
ASH MOTOR CORPORATION ROCHESTER, N.Y.

SELF-FILLING INK PENCIL "INDEPENDENT"

Meets all requirements. Self-filling, non-leakable, safety cap. Attached clip. Smooth writing gold style point.

Guaranteed Improved Fountain Pen. Eliminates fatigue. Promotes efficiency. Writes uniformly. A business necessity.

\$2 By Mail

Your Name in Gold—25 Cents Extra

AGENTS WANTED
J. C. ULRICH & CO., 161 Washington St., New York

Build Your Own PHONOGRAPH

IT'S EASY WITH OUR HELP

A few hours' interesting work saves over half and gives you a machine to suit your ideas. We furnish motors, tone arms, case material, blue prints and full instructions. Plays any record. Make fine profit building phonographs for your friends.

Write today for our **FREE** Blue print offer.

GET YOUR **RADIO SUPPLIES** FROM US

Choraleon Phonograph & Radio Co.
823 1st St., Elkhart, Ind.



SAVE
OVER
HALF

RAND McNALLY

Official Auto Trails Maps

America's Most Popular Road Guide



"The Key to the Painted Poles"

A SERIES of maps for the automobile tourists complete in every detail, convenient in size and thoroughly up to date. The marked automobile routes are featured with explanation of the markers. The motorist selects his route from the map, familiarizes himself with the style of the markers on the poles along the route and then follows the markers. He is assured of reaching his destination over the best and shortest road.

All the more important cities and towns are shown with population figures. The roads are clearly indicated and all actual turns and curves may be observed on the map. Mileage is

shown in figures which appear along the roads between the towns on the map.

This series is comprised of twenty-one separate maps, each covering an extensive touring district complete in itself. The maps are mostly 22x28 inches in size and are folded within the covers of the guide booklets which accompany them. The booklets are pocket size 4x7½ inches. They contain city maps showing the routes through the principal cities, lists of the better garages, hotels and service stations with rates, the motor laws of the various states, penalties, etc.

Because of their convenience, their accuracy, and the detail of the information which they present, these maps have become popular beyond all others.

Twenty-one touring districts each complete in itself:

1. Illinois.
2. Indiana, Western Ohio.
3. Michigan.
4. Eastern Ohio, Western Pennsylvania, Southeast Michigan, Southern Ontario, Western New York.
5. New York, Northern Pennsylvania.
6. New England.
7. Pennsylvania, Delaware, New Jersey, Maryland, Northern West Virginia.
8. Wisconsin, Northern Illinois.
9. Minnesota, Northwest Wisconsin, Eastern North Dakota, Eastern South Dakota.
10. Iowa, Northeast Kansas, Northern Missouri, Western Illinois.
11. North Dakota, South Dakota, Northern Nebraska, Eastern Montana, Eastern Wyoming, Western Minnesota.
12. Southern Nebraska, Southwest Iowa, Kansas, Northern Oklahoma, Northeast New Mexico, Eastern Colorado.
13. Montana, Wyoming, Eastern Idaho, Northern Utah, Northwest Colorado.
14. Washington, Oregon, Western Idaho, Northern California.
15. Northern California, Nevada.
16. Southern California, Southern Nevada, Western Arizona.
17. Southern Utah, Southern Colorado, Arizona, New Mexico.
18. Texas, Southern Oklahoma, Arkansas, Western Mississippi, Louisiana.
19. Southern Missouri, Southern Illinois, Southern Indiana, Southwest Ohio, Western Kentucky, Western Tennessee, Northwest Georgia, Northern Alabama, Northern Mississippi, Arkansas.
20. Southern Ohio, West Virginia, Virginia, Southern Maryland, Southern Delaware, North Carolina, Northern South Carolina, Northern Georgia, Eastern Tennessee, Eastern Kentucky.
21. Mississippi, Eastern Louisiana, Alabama, Georgia, Southern South Carolina, Florida.

Order by district number. Price, each, postpaid **35c**

Auto Trails Map of the United States

The entire United States in one map showing transcontinental highways with explanation of the markers. Size 42x28 inches, folded to pocket form with cover.

Price \$1.00 Each, Postpaid

Popular Mechanics Book Dept.
200 E. Ontario St. CHICAGO

To the man who loves to smoke a pipe —



Actual Size

THE ordinary pipe has certain disadvantages. At last, and for the first time in the history of pipe smoking, there is being offered to the pipe lover a pipe which is not only wonderfully sweet, cool and delightful to smoke but which absolutely overcomes all disadvantages.

The Sport-Briar

has created a sensation in Europe, the home of pipe smokers. While it has been on the American market only a short time we have received so many orders that we are nearly oversold. It is now available to you!

Some of the reasons a SPORT-BRIAR should have a place in the rack of every pipe smoker:

1. CAN BE THOROUGHLY CLEANED IN 30 SECONDS.
2. Smokes as well in rain or high wind as indoors.
3. Absolutely prevents the scatter of ash or spark, protecting your face, clothes and furniture!
4. While holding as much tobacco as the ordinary pipe, it occupies no more room in the pocket than a cigar.
5. Will not bulge the clothes.
6. Can be safely pocketed fully lighted!
7. Made of the purest, selected real French briar by the most skillful workmen in France. Mechanically it is a joy to see.
8. Smokes any kind of tobacco.
9. Its patented nicotine absorber (removable for cleansing) gives SPORT-BRIAR smokers the purest and coolest smoke in the world.

Money-Back Guarantee

There are always a certain number of "Doubting Thomases" in the world. To them we say — If, after you've tried a SPORT-BRIAR, you wish to return

it, we will return your money as fast as Uncle Sam can take it to you. You need state no reasons why. We know, however, that you'll be delighted with your purchase. Everybody is.

Canadian Distributors
British Canadian Agencies, Ltd.
58 St. Francois Xavier St.
Montreal, Canada



Mail the Coupon Today

THE SPORT BRIAR PIPE CO., SINGER BLDG., NEW YORK CITY

Gentlemen: Send me a Sport-Briar Pipe.

Regular Model, \$3.00 Super Quality Model, \$5.00
(Check model desired)

For which I agree to pay the postman when he delivers it to me.

Name.....

Address.....

City..... State.....

If you are likely to be out when the postman calls, you can save time by sending us the money with this coupon. Money back if not satisfied.

AGENTS WHAT DO YOU EARN NOW? We'll Double It!

Every wise woman wants a burner, which mixes one part of coal oil (kerosene) with TWENTY parts of FREE air and makes gas cheaper than city gas. Ends expense, dirt and drudgery of coal and gives 3 times the heat. Heats instantly at a twist of the wrist. Installed in a minute in any heater, range or furnace. Cuts housework in half.

Agents have cleaned up fortunes on very first kind of burner. Now latest discoveries cut out useless parts and make a better burner at a price every home can afford. Absolutely safe. Ironclad guarantee. 30 days' free trial. Just let your neighbors know about it and tell them the new price and orders fairly roll in.

Make \$50 to \$200

a week. Full or spare time. Personal co-operation. Write quick for exclusive territory and free sample case offer. Hurry.

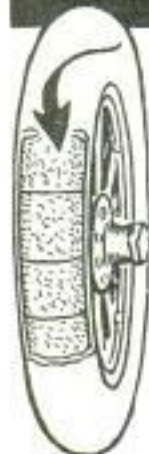


The biggest money-maker ever sold—some agents make \$200 a week

WADE HILL MFG. CO., Dept. 840, St. Louis, Mo.

CAR OWNERS SAVE MONEY

— Make Big Profits!



FOR ALL SIZES

Cut your own tire bills—and make good money selling National Tirefiller to others. A proven success for 12 years. Eliminates tubes, punctures and blowouts. Increases tire mileage 30 to 50% and still outwears several casings. Easily inserted; easy riding. Over 300,000 enthusiastic users. Big sales possibilities. Some good territory still open. Driver agents make good profits. Mail coupon today for proposition.

National Rubber Filler Co.,
232 College St., Midlothian, Texas.

Please send me your agent's proposition and full information on National Tirefiller.

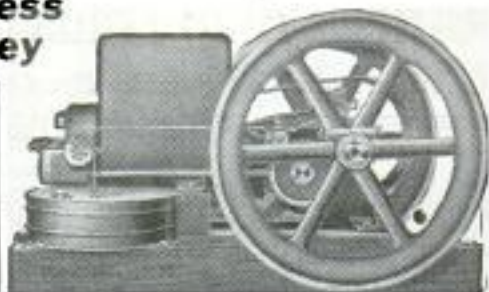
Name.....

Address.....

MAIL
THIS
Now

A BETTER Engine For Less Money

Only
Engine
Sold on
Lifetime
Guar-
antee



THE NEW WITTE

Throttling Governor

Easy to install—Easy to handle—Gives more power than rating—Increase or decrease speed at will—Run on cheap fuel, Gasoline, Kerosene, Distillate or Alcohol—Steady speed on variable load—Starts without cranking—So simple a boy can understand it.

Adaptable to any power job anywhere

Comes complete—Battery equipped. BOSCH Magneto at small cost extra. All other sizes and styles at proportionate low prices.

WRITE FOR CATALOG

WITTE ENGINE WORKS (Write Nearest Address)
1748 Oakland Avenue, KANSAS CITY, MO.
1748 Empire Building, PITTSBURGH, PA.
1748 Fremont Street, SAN FRANCISCO, CAL.

2 H-P. — Pulls 3
\$45.00
Per. \$48.50
Price \$57 At K. C.

3 H-P. — Pulls 4
\$69.50
Per. \$75.50
Price \$87 At K. C.

5 H-P. — Pulls 6½
\$99.00
Per. \$107
Price \$125 At K. C.

Moore Push-Pins
Glass Heads—Steel Points
Moore Push-less Hangers
To hang up things
Ask your dealer to show them.
Sold Everywhere 10¢ per packet
Moore Push-Pin Co.
Wayne Junction Philadelphia

Ford Car Goes 66 Miles on One Gallon Gas

OTHER MAKES DO EQUALLY AS WELL
WONDERFUL VAPOR HUMIDIFIER

One FREE to Car Owner to introduce. Give make.
WALTER CRITCHLOW, Suite A-331, 716 Madison, CHICAGO

Join us for Profits

Become one of the big, happy and prosperous group of live-wire hustlers who earn enough to pay for pleasures and luxuries above their everyday needs. If you put in your best ticks, we do the rest for you.

Sell Tailoring

Earn from \$75 up per week selling fine Gibson tailored all wool suits to wearer direct for \$31.50, over 100 styles all one price. Sell on sight. We pay biggest commission profits IN ADVANCE and tend to delivery and collections. Handsome big sample line sent you promptly, write today.

W. Z. Gibson inc
MERCHANT TAILOR

Dept. V-11 CHICAGO 161 W. Harrison

JOIN THIS FREE ASSOCIATION! FOR AGENTS



**Wear This
BUTTON**



Enjoy These FREE Benefits

1. The Agents National Clearing Association investigates manufacturers and their products for you. It protects you against injustice on the part of unreliable manufacturers.
2. It will analyze for you your own sales ability and will determine for you the lines you can sell the best.
3. The A.N.C.A. will survey your market for you—outline your campaign—build your selling efficiency.
4. The A.N.C.A. will round out your line for you—eliminate conflicting items from your line—Increase your sales percentage.—Reduce your competition with yourself.
5. The A.N.C.A. helps you in your actual sales by giving you a sales education absolutely free. It makes your business a dignified one. It creates a place for you in the best communities. Every buyer is glad to see a wearer of this button. The buyer knows that you are a reliable agent and that you sell the best goods only, or you could not be wearing this button.
6. In short, the A.N.C.A. creates MORE PROFITS FOR YOU, ABSOLUTELY FREE!

The Agents National Clearing Association

(Formerly Agents Co-operative Association)

is a free association of hundreds of thousands of agents. It is formed to benefit every agent—to show him how to sell goods better and to place before him better goods to sell. This Association has for its members not only agents, but it also has manufacturers of the best specialties on the market. Manufacturers are interested in getting reliable, well educated salesmen for their agents. We put you in touch with these manufacturers. And you, as agents, are interested in only the best selling items. Those items are produced by the many manufacturers in this association.

You can easily understand the benefits of an association of this kind—an association which brings together the best manufacturers and the best agents. This will result in better products being placed before you. You will sell more goods and make more money. Quick selling lines are placed before you immediately. Weak lines of goods are eliminated by this Association. You do not have to find out for yourself whether or not a line will sell. Your selling ability is increased. You make more money, at once.

EARN MORE MONEY!

The Agents National Clearing Association will not only place before you the best lines there are on the market, but it will give you, free of charge, a University Extension Course in agent selling, written especially for this Association by the best experts available. Your efficiency will be greatly increased. Your earnings will grow from the very start. All of this at no charge to you.

Be Recognized as an A.N.C.A. AGENT!

Wear the A.N.C.A. membership button. Wherever you go, this button will be recognized by everyone who buys goods of any kind. They will know at once that you are a reputable agent-salesman. You can exhibit your line with the confidence that you will be well received, recognized at once as a responsible man with an independent business. Think of the business that will come to you for being known as a member of a national association, recognized the country over by all classes of people. Think of the standing it will give you. No time lost in establishing yourself. By being a member of this Association, you are already established and recognized as a reputable business man. You have at once the trust of the entire community. Because your customers know you are a member of the A.N.C.A., they will buy your goods without hesitation. They know the goods as good. And they know you are good!

Look for This Emblem in the Advertisements of the Various Manufacturers

This emblem is our seal of approval on their product. No manufacturer can become a member of this Association until his product has first been investigated and has received the approval of this Association. Every manufacturer who is a member of this Association places this emblem in his advertising. Look for it through the magazines. The manufacturers have been investigated by the A.N.C.A. This emblem is your guarantee that the manufacturer is reliable and that his goods find a ready sale.



AGENTS NATIONAL CLEARING ASSOCIATION

(Formerly Agents Co-operative Association)

210 E. Ohio St., CHICAGO, ILL.

Without any expense whatever to me, please appoint me a Class B member of the Agents National Clearing Association. Send your booklet, "Agent Selling," and your questionnaire, so that I can fill it in, giving you my qualifications for agent selling. Please analyze my questionnaire and suggest the lines best suited to me. Also please enroll me as a student in your free University Extension Course in Agent Salesmanship.

Name

Street

City or P. O. Box State

\$5000⁰⁰ a Year to AGENTS



How \$53,000,000 Was Lost Last Year and How the



Stops the Loss

\$16,000,000 was lost on "raised" checks—made out away from the office. \$37,000,000 was lost on stolen or lost checks cashed through changing payee's name to "bearer" or "cash." Both kinds of loss prevented by the "Security." It is carried in pocket—always at hand. The revolving steel cutting wheel, concealed in cap, scores amount, name, date, number, etc., and fills the ridges with acid proof red ink. Absolutely defies crooks. Gives more complete protection than \$199 machine. This protection is free. For the Security—although 17 years of experiment have given it superior writing qualities—not in its more than other good Fountain Pens. Prices \$5 to \$5. Write quick if you want big money in your territory. Ask for agent proposition and figures.

SECURITY PEN CORPORATION

(Formerly, Kritikson Bros., Inc.)

Dept. 68, 910 W. Jackson Blvd., CHICAGO, ILLINOIS

This Check Protecting Fountain Pen Has Already Proved the Greatest Money Maker Ever Sold by Agents.

A dozen of these pens often sold in one office in a half hour. A hundred customers often found in a single office building. Nine men out of ten buy it. No competition. Not sold in stores. You have a monopoly.

Side line men make \$20 to \$35 a week. Full time men make \$75 a week and more. District managers make \$10,000 to \$25,000 a year. Write quick.

Prices \$3 to \$5



This Wonderful Little Quick-Heating "Electra Hot" Electric Soldering Iron \$2⁴⁰

Nichrome heating unit generates soldering heat in 1 1/2 minutes. Uses either A. C. or D. C. electricity. Cannot overheat.

Weights only 12 1/2 ounces, with cord and plug, and is only 13 1/2 in. long! Just the right tool for radio, auto-wiring and general soldering jobs. Gets into odd corners. Does not tire operator. Efficient as tools three times its weight.

SACKHEIM SUPPLY CO.
647 N. Clark St. CHICAGO, ILL.

SEND NO MONEY
Just write a letter or post card ordering an Electrahot at \$2.40 and pay the postman when he is delivered.

You're My Agent Now—

If you know anything at all about gasoline motors. Motor Masters prevent fouled spark plugs, save from 12 to 20% gas—and

BURN OUT CARBON WHILE YOU DRIVE —OR MONEY BACK!

This is MOTOR MASTER

Write and ask how to be our agent and get your free set of Motor Masters. Make big money. Some have made \$40 in one day!

Read our full page ad in July Popular Mechanics, p. 109.

Motor Master Corporation 646 N. Michigan Ave. CHICAGO, ILL.

NEED A BOOK

on some practical subject and ? don't know where to find it ?

Popular Mechanics Book Department maintains a service you will appreciate.

Send to-day for our valuable free catalog listing over 500 books on the following subjects:

- | | | |
|----------------------|--------------------------|-------------------|
| Agriculture | Glass | Photography |
| Architecture | Heating and Ven-tilation | Physics |
| Arts and Crafts | Hydraulics | Plumbing |
| Automobiles | Inventions | Poultry |
| Aviation | Iron and Steel | Printing |
| Blue Prints | Leather | Radio |
| Boats | Locomotives | Railways |
| Bookbinding | Machine Shop | Refrigeration |
| Books for Boys | Practice | Rope Work |
| Building | Masonry | Rubber |
| Business | Mathematics | Sheet Metal Work |
| Carpentry | Mechanical Engi-neering | Sign Painting |
| Cement and Con-crete | Mechanics | Soap Making |
| Ceramics | Metallurgy | Soldering |
| Chemistry | Millwrighting | Steam Engineering |
| Civil Engineering | Mineralogy | Surveying |
| Cleaning | Mining | Taxidermy |
| Compressed Air | Model Making | Textiles |
| Dictionaries | Motion Pictures | Tires |
| Drawing | Motorcycles | Toys |
| Electricity | Navigation | Tractors |
| Engraving | Paints and Paint-ing | Upholstering |
| Finger Prints | Pattern Making | Watch Repairing |
| Formulas | Patents | Water Power |
| Furniture Making | Photo-Engraving | Welding |
| Gas Engines | | Windmills |
| Geology | | Wireless |
| | | Woodworking |

If you don't find what you are looking for in the catalog, write us a letter explaining the particular subject you are interested in and we will tell you of any books that may be available.

POPULAR MECHANICS BOOK DEPT.
200 East Ontario Street, CHICAGO

Popular Mechanics Books

Each one of the following books has been published by Popular Mechanics and is characterized by the same careful editing and authoritative presentation of the subject matter as is the magazine itself. All are unusually good values for the prices asked.

- THE BOY MECHANIC—Book One**
480 Pages—700 Articles—800 Illustrations..... \$2.00
- THE BOY MECHANIC—Book Two**
480 Pages—1000 Articles—995 Illustrations..... 2.00
- THE BOY MECHANIC—Book Three**
480 Pages—800 Articles—802 Illustrations..... 2.00
- MISSION FURNITURE, HOW TO MAKE IT, Part 1**
128 Pages—30 Designs, Illustrated..... .50
- MISSION FURNITURE, HOW TO MAKE IT, Part 2**
128 Pages—32 Designs, Illustrated..... .50
- MISSION FURNITURE, HOW TO MAKE IT, Part 3**
128 Pages—36 Designs, Illustrated..... .50
- WOOD-WORKING FOR AMATEUR CRAFTSMEN**
128 Pages—125 Illustrations..... .50
- ARTS-CRAFTS LAMPS, HOW TO MAKE THEM**
96 Pages—16 Designs, Illustrated..... .50
- LAMPS AND SHADES IN METAL AND ART GLASS**
128 Pages—18 Designs—64 Illustrations..... .50
- METALWORK AND DETACHING—96 Pages—Illustrated**..... .50
- ELECTROPLATING—112 Pages—62 Illustrations...**..... .50
- PRACTICAL COURSE IN MECHANICAL DRAWING**
160 Pages—157 Drawings..... .50
- HEAT—128 Pages—Illustrated**..... .25
- KINGDOM OF DUST—128 Pages—40 Illustrations...**..... .50
- HOW TO MAKE DEVICES FOR OUTDOOR WINTER SPORTS—64 Pages—Illustrated**..... .25
- SHOP NOTES FOR 1923**
224 Pages—344 Articles—436 Illustrations..... .50
- SHOP NOTES SET—15 Vols**..... 7.50
- CONCRETE HANDBOOK**
96 Pages—173 Articles—138 Illustrations..... .50
- PATTERN MAKING—224 Pages—312 Illustrations...**..... 1.00
- POWER GAS AND THE GAS PRODUCER**
192 Pages—Illustrated..... 1.00

Above prices are postpaid

POPULAR MECHANICS BOOK DEPT.
200 East Ontario Street CHICAGO, ILL.

WE WANT AGENTS

To introduce the Milburn Puncture Proof Inner Tube. Mr. P. H. Milburn, of the Milburn Puncture Proof Tube Company, Chicago, after many years of practical and theoretical experiments, has perfected an inner tube which in actual test suffered the loss of NO AIR after being punctured as many as 500 times. Many users have run over 20,000 miles without removing a tire from the wheel. Milburn Puncture Proof Inner Tubes are made of the best quality live red gum rubber—especially built and air inflated. Milburn Puncture Proof Tubes cost no more than other ordinary tubes.



CAR OWNERS WANTED

To sell and demonstrate this wonder tube. Interests everyone immediately. Automobile owners buy on sight. It makes no difference what car they drive or what tires they use. Our salesmen are coining money on our "DIRECT FROM FACTORY" scheme of selling. Absolutely no competition. We control all basic patents. No capital required to start. Previous selling experience not necessary.

Earn from \$5000 to \$10,000 a Year



TESTIMONIALS

Convincing Statements from a Few of Our Agents

J. D. Cooper—"I have made 30,000 miles with my Milburn Puncture Proof Tubes and have not as yet removed a rim or casing and my casings are still in excellent condition."

J. C. Jerves—"I sold 50 Milburn Tubes in the first three days."

Chas. Cayton—"I sold twelve tubes yesterday in ten minutes."

L. S. Knapp—"My first few hours out I sold eight tubes, no trouble at all to sell them. The most wonderful tube on the market today, I think. I am hoping you will give me the agency for a big territory."

D. Edlers—"I have driven seventy-five miles in one of the 30x3 tubes and twenty were spike nails. It has gone above the test that you recommended to me it would do."

Earn \$5,000 to \$10,000 yearly or more. Get into business for yourself. Sell Milburn Puncture Proof Inner Tubes. Every car owner is a prospect. Your field is unlimited. Now is the season. Get in while it is good. Be independent.

FREE TUBE SPECIAL FREE TUBE OFFER

Send coupon or write today for special free tube offer and further details.

References, Industrial State Bank of Chicago, National Bank of the Republic, Chicago, Baker State Bank of Chicago.

Don't hesitate. Fill out the coupon and send it in or write and send name and we will send you all details. This is your opportunity so don't delay. Address

P. H. MILBURN, Pres.

Milburn Puncture Proof Tube Co.

**345 West 47th Street
CHICAGO, ILLINOIS**

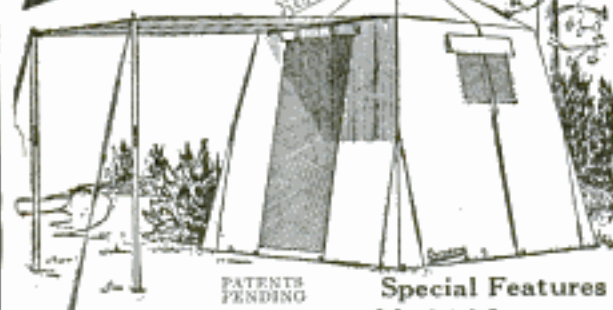
MILBURN PUNCTURE PROOF TUBE COMPANY
345 West 47th Street, CHICAGO, ILLINOIS

Address
City
State

Gentlemen: If the money making opportunity is as big as you claim, I am interested in getting the facts. Without obligation send me information about commission and price list (offer 10 Agents).

Outdoor UMBRELLA AUTO TENT

UNITED STATES TENT & AWNING CO.
PRODUCTS



PATENTS PENDING

Special Features

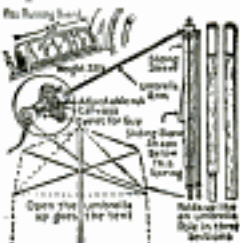
The Best Outing You Ever Had

Save hotel bills. Know the happiness and health of camping in secure comfort. Write for Free Book. The "OUTDOOR" is made of highest grade U. S. Army Shelter Tent Duck, absolutely water proof and mildew proof. Up or down like an umbrella. Center height, 8 ft.; at apex, 6 ft.; at rear of beam to 30 in. maximum headroom. Rear beam takes full sized double camp bed. Two windows opened or closed from inside. Made and guaranteed by the manufacturers of largest line of camping tents in the country and recognized leaders in the tent and awning world.

"Outdoor" Portable Cottages
Summer House—Lawn Cottage—Play House—Outdoor Sleeping—Exclusive construction features, also with wooden walls and kitchenette. Portable, yet substantial; convenient, economical.

Free Book of Camp Equipment
Give particulars of the "OUTDOOR" line. Write for it today. The "OUTDOOR" Tents and Cottages are up-to-date with new exclusive features. Don't confuse with ordinary tents. Samples of our tent cloth sent free.

U. S. TENT & AWNING CO., 213 N. Desplains St., Chicago, Ill.



Birds—Parrots—Goldfish Cages and Supplies

Extra fine Singing Canaries, Talking Parrots, other Birds and Fancy Fish. We also have a full line of cages, aquariums and supplies. Retail and wholesale. We ship anywhere.

Weather does not affect shipping. Send for our beautiful new free illustrated catalog in true color.

SAM MEYER & COMPANY

24 W. Washington St., Dept. 20, CHICAGO, ILL.



21 Jewel Burlington



Only \$1.00 Down

The 21-Jewel Burlington is sold to you at a very low price and on the very special terms (after free examination) of only \$1.00 down — the balance in small monthly payments. Send today for information.

Free Book Send for the most complete watch book ever produced. 100 designs and engravings beautifully illustrated in color. Write for it today, it is free. A letter or a postcard will do.

Burlington Watch Company 19th Street and Marshall Blvd. Dept. C-135 Chicago, Ill.

STOPS CARBON TROUBLES



Make \$75.00 to \$100.00 a week taking orders for AUTO-FIZIK, guaranteed carbon remover. Quick sales, big profits, good repeat business. Easy to demonstrate.

EASY NEW METHOD

Simply spray AUTO-FIZIK in cylinders, replace spark plugs, start engine and in 30 minutes carbon is gone. Cash in on this opportunity now to make big, easy money. Send no money for trial package; simply pay postman \$1.30 and few cents postage on delivery of can and sprayer. Money refunded if dissatisfied. Big profit agent offer included with your first order. **WRITE TODAY TO**

The Auto-Fizik Company 417 Franklin Street Dept. 100, Peoria, Ill.

FORD RUNS 57 MILES ON GALLON OF GASOLINE

A new automatic and self-regulating device has been invented by John A. Stransky, 164 Fourth St., Pukwana, South Dakota, with which automobiles have made from 40 to 57 miles on a gallon of gasoline. It removes all carbon and prevents spark plug trouble and overheating. It can be installed by anyone in five minutes. Mr. Stransky wants agents and is willing to send a sample at his own risk. Write him today—Adv.

\$38⁶⁵ **Remington No. 10 Typewriter**
Two dollars down, late model, all recent features, five-year guarantee, 30 day trial.
LINCOLN TYPEWRITER COMPANY
298 Broadway, Dept. 132, NEW YORK

Small Steam Engines and Boilers
Gas and Gasoline Engines
1/8 H. P. Up

Pumps, gears, model makers' supplies. Sent postpaid (2 dimes preferred) or 20c stamps.

Modern Engine & Supply Co.
334 Monadnock Bldg., Chicago

WHAT'S ? When the engine won't start—**WRONG ?** misfires—stops on the road?

The Trouble Shooter

Tells you in a minute What's Wrong and How to Fix It. Price 50 Cents, Postpaid.

POPULAR MECHANICS BOOK DEPT.
200 E. Ontario Street, CHICAGO, ILL.

Amateur Electrical

Experimenters

Here is the book you have been waiting for. It tells how to make things electrical, such as radio outfits, reading lamps, electric clocks, toasters and countless other useful appliances from materials easily obtainable. No previous electrical knowledge necessary. Clear directions, fully illustrated.

How to Make Things Electrical

427 pp. — 256 Articles — 353 Illustrations

4 1/2 x 7 Cloth

Price \$2 Postpaid



Popular Mechanics

Book Dept.
200 E. Ontario St., CHICAGO

AGENTS

With and Without Cars Make \$100 to \$250 a Week!

If you are making less than \$100 a week send for our offer and change your luck! SAAL Agents are no smarter, work no harder than others, **but they get the big money!** Every auto, truck, tractor—every piece of machinery can be lubricated **better** with HEAVY OIL. Grease, grease cups, greasing systems are now out of date. Biggest opportunity in 10 years—get in on it quick!

OUTFIT FREE! FOR AGENTS

We send you absolutely free a complete \$5 or \$5 Saal Outfit for your own car, or a sample to carry. We help you succeed. 6 factories and \$2,500,000.00 in resources back you to win!

Oil the Only 100% Chassis Lubrication

Heavy Oil, shot with a ton of force into steering, shackles and all chassis bearings, "makes cars ride better and last longer." Owners find SAAL Lubrication the cheapest insurance against depreciation and repair bills. Saal System costs about **half** the price of old-type grease Systems. Free trial offer gets 9 sales out of 10 calls.



A Business of Your Own Paying \$5000 and Up Without a Penny of Investment!

Get out of the small pay class. Be a success in life. We'll show you how to turn your time into \$5000 to \$15000 profits a year. Nothing to buy, no investment, no risk. No delivery or collecting. And you get your share in **cash** every day!



2000 lbs.
Hydraulic
Pressure

SAAL

Heavy Oil System



SAAL Heavy Oil System consists of "OIL SHOOTER" of simple, but patented design, which transforms the push of your hand on the plunger into 2000 lbs. of hydraulic pressure. **42 fittings** are supplied, more than enough for any car. Screw out grease cups, screw in fittings. No mechanic needed. **HOLSTER** supplied to carry OIL SHOOTER under hood, convenient to use. Motorists actually use SAAL lubrication because "it's a white collar job with service station results."

\$5⁰⁰
for
**FORD, OVERLAND
CHEVROLET
STAR, GRAY**

\$8⁰⁰
for
**ALL OTHER
CARS**

There's a golden prize of thousands of dollars in profits for the man in each locality who gets the right to sell SAALS. Be the **FIRST** to write—get the free book of facts, then decide. **Do it now!**

H. G. SAAL CO. Established 23 years
Dept. 501, 1800 Montrose Ave., CHICAGO, ILL.

Mail
Coupon
Today!
Don't
Wait!

H. G. SAAL CO., Dept. 501,
1800 Montrose Ave., Chicago

If the money-making opportunity is as big as you claim, I am interested in getting the facts so I can get a share of the profits selling SAAL SYSTEMS. Without obligation send me information about:

- Salary offer \$50 to \$150 a week.
 Commission offer \$100 to \$250 a week.
 Free Outfit offer to Driver-agents.
 Big profit offer to Dealers.

Name _____

Address _____



Standard "C Melody" SAXOPHONE

Learn to play Saxophone! The easiest instrument to learn, it is also the most popular! Pick out tunes in an hour, as quickly as with one finger on the piano. And there's no faster way to make extra money than playing Saxophone at dance or church or theatre. Makes you a social favorite, always welcome everywhere!

10 MONTHS TO PAY! The Standard "C Melody" Saxophone is the supreme grade "made in Elkhart." Choice of famous artists and teachers. The 1923 model with "beveled sockets" makes all other Saxophones "out of date." Sent to you for 6 days' trial, to prove to you its ease of blowing, simplified fingering and golden tone can't be equalled at any price. Complete 12 piece outfit direct to you from factory at only \$1 down and \$8.00 a month. Small first payment. Seasonal cut in price during this sale, no interest, no tax, not one cent extra!—Saxophone, \$10 case, self-instruction system, book of music, reed, strap, pearl keys, etc., everything you need. Quality that enables you to buy once for a life-time.

CATALOG FREE! Tells you how you can secure the greatest of Saxophones on easy terms at less than cash prices! Write today for this free book and complete information of our sensational offer! Standard Music Co., Dept. 1222 P. O. Box 503, Chicago

SAW 15 Cords a day, EASY!

—with the wonderful OTTAWA Log Saw. Saw more than 10 men—Save your back! Write for special offer, easy terms and new Free Book. Send postcard today.



OTTAWA MFG. CO.

1741-N. Wood Street
OTTAWA, KANS.
Boys 1741-N. Magee Bldg.
PITTSBURGH, PA.

One
Man
Log
Saw

RADIO PARTS

At wholesale prices.
Send for price list.

SYMPHER MFG. CO., TOLEDO, OHIO

Sell Suits Big Profits Boys Spare time or Full

You know 50 men or women who have boys between the ages of 8 and 18—ask them—they will tell you that they pay an awful high price for boys' clothes. They pay 4 profits instead of 1. They pay profits to the manufacturer—the jobber—the salesman and the retailer.

**Sell Suits Make \$25.00 to \$75.00
a Week—Easy**

Save the consumer 3 profits. Real \$15.00 boys' suits with two pairs of pants—\$8.45. Direct from factory. Guaranteed quality by a firm established 1886. Sales easy to make because of big savings. Spare time men add \$25.00 a week to earnings—full time men easily make \$75.00 or more.

**Sell Suits Direct from Manufacturer
to Consumer.**

Complete sample outfit—FREE. Actual samples of cloth—full illustrations of styles—everything necessary for you to take orders. You get your profit the minute you make your sale—we deliver and collect. Write for full information. Quick—get exclusive territory.

Prepare Now for Big Fall and Winter Sales

WRIGHT & CO., Dept. A 100, 500 S. Throop St., CHICAGO

AGENTS

For the Biggest Money-Making
Selling Proposition You Ever Saw

See Pages 126 & 127



THE New OLIVER 1923 SPEEDSTER

Send for 1923 Oliver Catalog Showing
New Standard three bank Keyboard.
THE OLIVER TYPEWRITER CO., Chicago

Mathematics Made Easy by ROPP'S CALCULATOR AND SHORT-CUT ARITHMETIC

Shows the Answer as Quickly as a Watch shows the Time to all Problems likely to occur in the Office, Store, Shop, Bank, Farm, or Factory.

Over 2,000,000
Sold
Explains and simplifies every principle in Arithmetic, Mechanics, and Mensuration.

**PRICES
POSTPAID**
Desk Size...\$1.50
Leatherette, Pocket Size...\$1.00
Pocket Size, Cloth...\$0.50
Pocket Size, Paper...\$0.35



PopularMechanicsBookDept., 200 E. Ontario St., Chicago

Hand
Forged
Razor Steel
Blades, No. 57



A GENUINE \$2 KNIFE
FOR
\$1.18 POSTPAID

Direct at Factory Prices

This \$2 KNIFE \$1.18 Postpaid
Hand Forged Razor Steel Blades
Handy shaped blade makes this knife best for mechanics, sportsmen and farmers; light but strong; re-sharpened easily. Stag handle. German silver finish; blades file tested, hand forged from razor steel and warranted.

Sample \$1.18 3 for \$3.00 Postpaid.

Send for our 100-page List and **FREE**

"HOW TO USE A RAZOR"
MAHER & GROSH CO., 106 A St., Toledo, Ohio

Speaking of Making Money



Our records, which are open to anyone, will prove that from
\$10,000 to \$25,000 PER ANNUM
 is being made by agents and distributors of

OXO-GAS Heating Appliances

*Oxo-Gas Is the Cheapest
and Most Efficient
Fuel Known to Science!*

THIS WONDERFUL INVENTION

converts any ordinary cook stove into a gas stove. OXO-GAS is made from kerosene and air. Cheaper, cleaner and more efficient than coal.

Send for Catalog

illustrating and descriptive of twenty different, distinctive designs of heaters for all purposes, including the WONDER RANGE—the big Summer seller—a complete modern gas stove that makes and burns OXO-GAS at a cost of less than

25c per Thousand Feet!

Exclusive territorial assignments will be made to responsible, energetic men of good standing in their own communities!



These two cuts show all there is to a complete outfit: The Heater, which is put in the stove, without making any alterations, and the tank to hold the oil. A small, flexible pipe conveys the oil to the Heater, where it is converted into OXO-GAS.



GLORIA LIGHT COMPANY 99 to 105 N. May St.
CHICAGO, ILLINOIS

1. OXO-GAS is made from Kerosene, Stanolin or Distillate.
2. THE VAPOR (4%) is mixed with air (96%).
3. THIS MIXTURE creates a non-carbon blue flame of high heating intensity.
4. WHICH HEATS indestructible perforated lava discs to incandescence, thus increasing the heat units of the fuel from 25 to 30% by refraction.
5. WILL OPERATE from eight to ten hours on one gallon of Kerosene, Stanolin or Distillate. Two gallons of kerosene (according to Government tests) will make heat units the equivalent of 1000 feet of city gas.
6. FIFTY GALLONS of kerosene equal to a ton of the best coal, a cord of wood or 25,000 feet of gas.
7. KEROSENE is the only fuel delivered anywhere in any quantity. The oil man can serve ten customers cleanly and efficiently while the coal man serves one.
8. OVER A MILLION Oxo-Gas plants are giving incomparable service to delighted users.
9. OXO-GAS appliances are absolutely guaranteed by a responsible corporation. References: Dun and Bradstreet Mercantile Agencies or any bank in the United States.
10. OXO-GAS is equally efficient Summer or Winter. An abundance of heat in the Winter. Cooler than any other method of cooking in the Summer, because the heat can be shut off instantly when not in use.

OXO-GAS is, in fact, the only logical substitute for the diminishing supply of coal with its consequent high price!

The Proper Finish Will Make Your Furniture Harmonize



Small odd pieces of modern furniture add greatly to the attractiveness of every home. You, yourself, can easily make them for your family. There is no particular trick to constructing porch swings, tables, telephone sets, etc.

The furniture, woodwork and floors of your home can be made to harmonize if a little taste is used in finishing them. You can easily refinish dingy, shabby, scratched wood. Our method involves practically no expense. All you need is a little time—a brush—and **JOHNSON'S WOOD DYE.**

Johnson's Wood Dye is very easy to apply—it goes on easily and quickly, without a lap or a streak. It penetrates deeply, bringing out the beauty of the grain without raising it—dries in 4 hours and does not rub off or smudge.



Johnson's Wood Dye

FREE-This Book on Home Beautifying

This Book tells how to finish wood in artistic stained and enameled effects. Gives practical suggestions on making your home artistic, cheery and inviting. Tells just what materials to use and how to apply them. Includes color card—gives covering capacities, etc. Use coupon below.

The
PROPER TREATMENT
for
FLOORS, WOODWORK
and
FURNITURE

S. C. JOHNSON & SON, P. A. S.
RACINE, WIS. (Canadian Factory—Brantford)

Please send me free and postpaid your Instruction Book on Home Beautifying and Wood Finishing.

The best dealer in paints here is.....

.....

MY NAME.....

MY ADDRESS.....

CITY & STATE.....

JOHNSON'S WOOD DYE has many uses, for both the artisan and amateur. *Architects and contractors* specify it for coloring woodwork and flooring in new buildings. *Painters and decorators* use it with equal satisfaction on new and old woodwork of all kinds. *Housewives* delight in it for doing over old furniture and for coloring reed and wicker baskets, etc.

JOHNSON'S WOOD DYE is made in fourteen standard shades—a few of which are:

129 Dark Mahogany	126 Light Oak
127 Brown Mahogany	123 Dark Oak
140 Early English	110 Bog Oak
131 Walnut	124 Golden Oak
125 Mission Oak	

All shades may be easily lightened, darkened or intermixed. Full directions on every label.

If you are building or remodeling you should have our book on Wood Finishing. It is chock full of valuable information. We will gladly send it free and postpaid. Use coupon at left.



Get This Big Book



Install Your Own PLUMBING AND HEATING



EASY AS A. B. C. Any handy man can cut the cost of a new heating plant or plumbing system in half. We show you how with simple diagrams and clear instructions. Installing plans FREE. We loan you the tools if necessary. Banish the coal bucket and the ash pan from your home. Enjoy clean, even, economical heat the new HARDIN-LAVIN Easy Way. Our "Handy Man" Book tells the whole story. Send coupon with 25c for your copy today.

50 Years and Million Dollar Plants behind our Guaranty

Every heating plant and plumbing fixture we sell bears our Diamond Label of Guaranty. Your protection and assurance of Grade A Highest Quality goods. What is in the background when you buy from us?

- Fifty years of service to economy buyers.
- Quality merchandise with exclusive features.
- Trained experts who help you plan.
- Personal interest in your needs.
- A guarantee of satisfaction or money back.



All Plumbing and Heating Cut to Fit at Factory

You save waste of labor, time, money and materials when you buy at wholesale from our Big "Handy Man" Plumbing and Heating Encyclopedia. Shows over 10,000 fixtures and supplies. Hot air, water or steam heating plants. Bath room outfits, plumbing goods and water supply systems.

BIG "HANDY MAN" BOOK

SEND for our Big, Instructive, Well-bound, "HANDY MAN" Book-Catalogue. Every home owner, contractor, farmer, mechanic and institution needs it. It combines our wholesale catalogue with many trade secrets, money-saving kinks, practical plans, diagrams, sketches, elevations, etc.

NO EXPENSE SPARED

This combination Catalogue and Encyclopedia represents many years' experience and expense in gathering the wealth of information it contains. To avoid sending so valuable a book broad-cast, we request a deposit of 25c (regular price 50c) to cover wrapping and mailing. This deposit refunded on first order.



HARDIN-LAVIN Steam Boiler



HARDIN-LAVIN Water Supply System



HARDIN-LAVIN Pipeless Furnace



HARDIN-LAVIN Hot Water Boiler

MAIL COUPON WITH 25¢ TO-DAY!

Send for this Money-saving Encyclopedia-Catalogue of Plumbing and Heating supplies, practical plans, and helpful hints. In it you will find the heating plant, bathroom outfit, or plumbing system that will give your home the comfort and convenience which is rightly yours.

PLANNING SERVICE FREE
We will give you FREE the benefit of our experience and suggestions in selecting outfits and systems, suited to your need. WRITE TODAY.

HARDIN-LAVIN CO.

Fifty Years in Business
4547-57 Cottage Grove Ave. CHICAGO



This Label Protects You

HARDIN-LAVIN CO.,
4547-57 Cottage Grove Ave., Chicago, Ill.
Gentlemen: Enclosed find 25c (15 regular price) for which please send me your Big, Complete, "Handy Man" Book-Catalogue, with special wholesale discount sheets. Also mail me your FREE Builders Service. I am interested in:

- Hot water heating plant
- Steam heating plant
- Hot air furnace
- Pipeless Furnace
- Water supply systems
- Plumbing systems

Name

Address

City State

Quality **HARDIN-LAVIN CO. CHICAGO.** Quality
50 YEARS at 4547-57 COTTAGE GROVE AVE. CHICAGO, ILL.

I Pay Your Railroad FARE



B. W. Cooke
President

Come to Chicago—the Electrical Center of the World—I pay your railroad fare from any place in the United States. Grasp this opportunity to see the country at my expense. Don't stick in one spot—travel—get experience. Come to Coyne—learn electricity in 3 months. Fit yourself for a big paying job. The largest electrical school in the country specializing in electrical instruction ONLY.

Learn Electricity in 3 Months

Get a complete training so you can make big money as Power Plant Operator, Superintendent, Telephone man, Construction worker, auto, truck or tractor electrician, battery man, radio expert, or you can go into business for yourself as electrical contractor, dealer, auto ignition or battery expert and make from \$3,000 to \$20,000 a year. Hundreds of our graduates today are making big money and you can do the same if you grasp this opportunity—act now.

Great Shops of Coyne

No books or useless theory. You are trained on \$100,000 worth of electrical equipment. Everything from door bells to power plants. You work on motors, generators, house-wiring, autos, batteries, radio, switch-boards, power plants—everything to make you an expert ready to step right into a position paying from \$45 to \$100 a week.

RADIO COURSE FREE. We include the following free with the regular course:

- (1) A complete course in auto, truck and tractor electricity and storage batteries. Greatest outlay of auto, electrical and battery equipment in the country.
- (2) Course in Radio—the marvel of the age. Constructing, installing and operating. Build your own wireless telephone set.
- (3) Life membership in the Coyne school. Stay as long as you wish and return for further training at any time in the future.

Earn While You Learn! We help students to secure jobs to earn a good part of their expenses while studying

Send this Coupon Today

B. W. COOKE, Pres.
Coyne Electrical School

1300-1310 W. Harrison St., Dept. C-135 Chicago

Dear Sir: Please send me free your big catalog and full particulars of your special offer of Free Railroad Fare and two extra courses.

Name

Address

Don't delay a minute—send that coupon *right now* for our big free catalog and full particulars of Free Railroad Fare offer. Remember this special offer is limited so act now!



COYNE
Electrical School

Endorsed by Electrical Industry

1300-1310 W. Harrison St., Dept. C-135, Chicago

Student winding a Stator