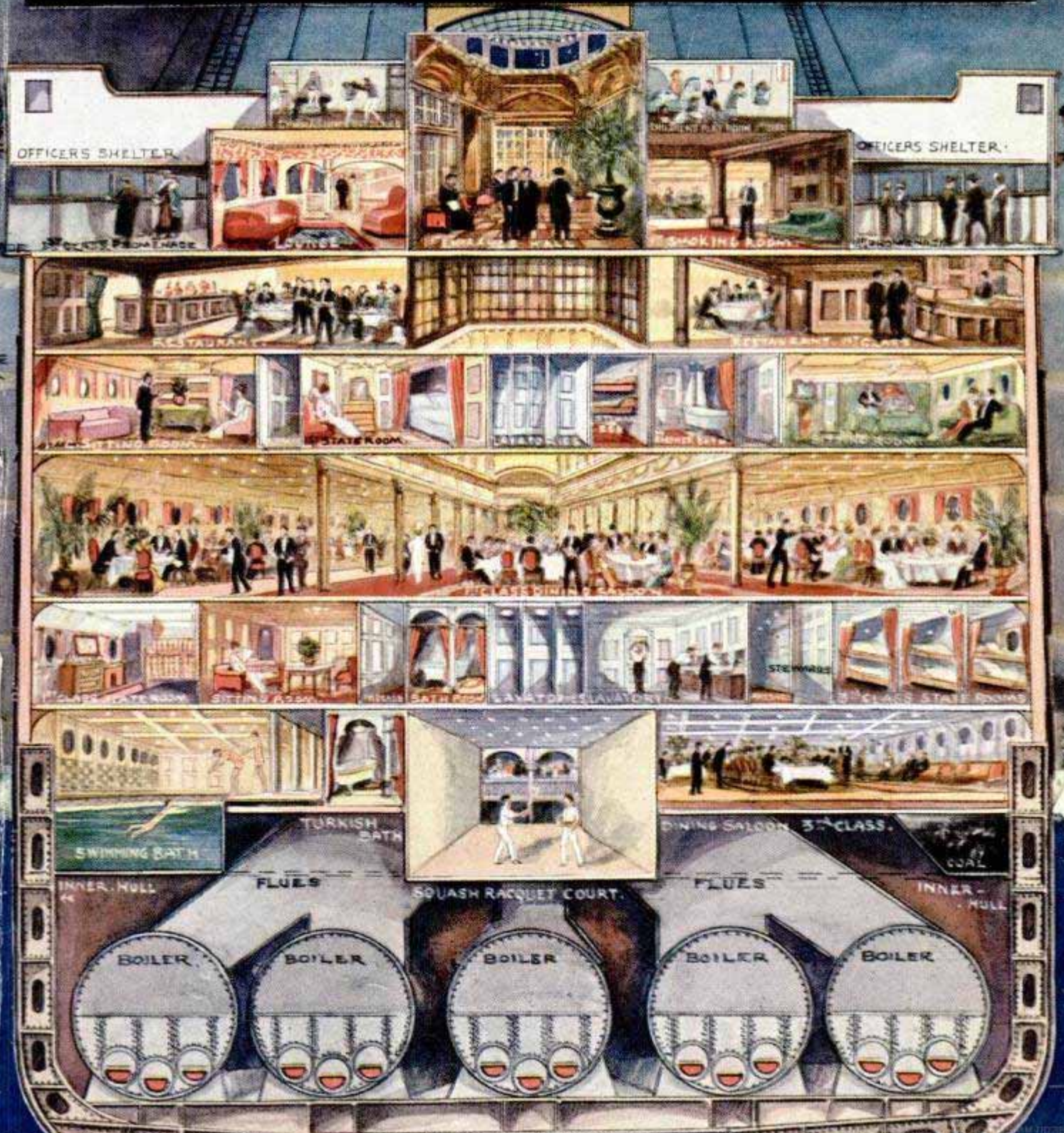


POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT



Material To Build This Home \$ **398**

35 to 50% Saved

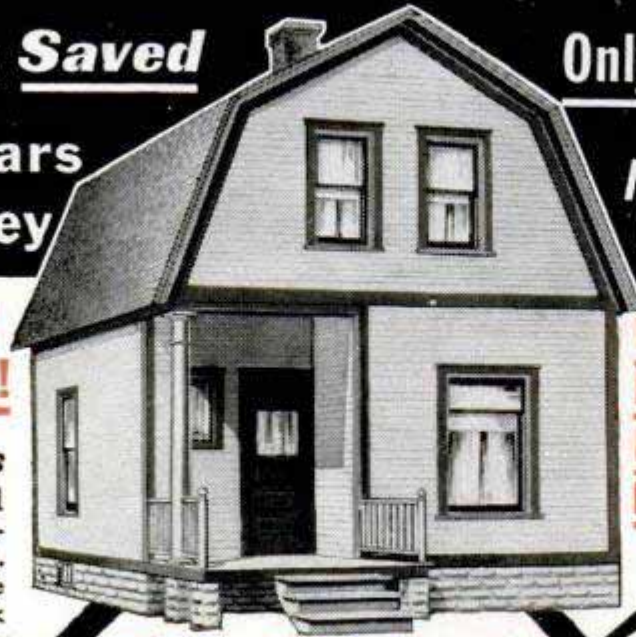
Only

Actual Dollars of Your Money

NO MONEY IN ADVANCE!

Be Convinced! Come to Chicago!

PROOF— that's what you want and we can convince you beyond all question of doubt. No where else can you see such a tremendous stock of building material — lumber, millwork, hardware, plumbing, heating, paints, etc. at lowest prices too. Our tremendous purchases place at our disposal every bargain worth having. Our ship-direct-to-you methods eliminate all in between profits—they remain in your pocket as actual dollars saved. This is just the basic principle of economy on the homes we sell. Step by step with this excellent beginning, our Architectural Department develops the completed house without waste or guess-work, using only sound and accepted standards of construction. Your own interests demand that you get these true economy facts from us without any delay.



35 to 50% Saved

This saving is yours. Let us ship you the required material without one cent down to build this or any other modern home in our Plan Book. Follow the home building course taken by our thousands of satisfied customers. The proof of which we will send you. You will get the best grade of building material you ever saw for the money. Our proposition is clean and straightforward. Remember, we don't want a cent until you have every piece unloaded, checked and inspected. Every statement we make is backed by a \$10,000,000 and unquestioned reputation of twenty years standing.

Standard construction. Double floor, double walls all around with paper between. Clear Red Cedar Shingles and Clear Red Cedar or Spruce Bevel Siding. Clear Oregon Fir porch columns, newels, rails, balusters and porch floor. No. 1 Y. P. Joist and studding. Clear Y. P. floor. Clear Fir door and window frames. "A" grade interior finish.

Just the same grade of material as that going into houses running into THOUSANDS OF DOLLARS.

Our Methods Revolutionize HIGH Prices

We started this business with an idea of selling merchandise at lower prices than any one. The rapid growth of our enormous institution will show how well we have succeeded; we specialize in building material lines. Our original methods have revolutionized high prices, and we sell direct to you, at the price you ought to pay, the material to build the home you have been dreaming of for years. Our proposition protects you in every way. We take all the risk. You take none. We guarantee safe deliveries and a big saving.

Perhaps you already have your plans. If so have our carpenter give you a bill of the material — send it to us and we can quickly name you a guaranteed freight prepaid price. We carry tremendous stocks here in our Chicago plant and also ship lumber from Seattle, Wash. for Western buyers and from Mississippi for Southern buyers. ALWAYS INSURING THE MOST DIRECT ROUTE AND THE LOWEST FREIGHT CHARGES.

Send the free coupon today!

\$10,000 Plan Book

A truly wonderful book which has cost us thousands of dollars to produce in its present state of perfection. Too good to give away indiscriminately. Sent absolutely free to prospective home builders in the United States. Mail coupon today. Sent to other points for 25 cents.

LIBERAL FREE PLAN OFFER

The object of this advertisement is not to sell plans. To save time, we will send a complete set of Plans, Specifications and descriptive Material List on the above house upon the receipt of a deposit of \$2.00 as evidence of good faith and name you a guaranteed delivered price. If the plans do not suit, return them and \$1.50 will be refunded.

SEND US THIS COUPON

OTHER FREE CATALOGS:

Building Material Catalog No. 104, Plumbing No. 137, Heating No. 140, Furniture and Rugs No. 134. The newest and latest features in each line at low prices.

Harris Bros. Co. D. D. 7

Send Plan Book.....

Also Send Catalog No.....

NAME.....

Town.....

County.....

MODERN PLUMBING and HEATING

A complete warm air heating plant, guaranteed efficient and high grade in every way for as low as \$67. Steam heating plant, \$134; hot water heating plant, \$154, all furnished complete under our binding guarantee. Do your own installing and eliminate the unnecessary expense of high-priced mechanics. You need no previous experience with the aid of our expert engineering service. We loan you tools required.



Bathtubs as low as \$13.00. Complete bathroom outfit, tub, toilet, wash stand, all complete..... **\$37.50**

Our plumbing materials are placed before our customers by the same well known price smashing methods as we employ in our modern homes. Astonishing values in high grade, brand new "A" quality plumbing at all times. Enameled

HARRIS BROS. CO. 35th & IRON STS. CHICAGO



Dancing to the music of the Victrola is the favorite pastime

The Victrola
illustrated
here is the
\$200 style

With a Victrola and Victor Dance Records it is easy to learn all the new dances.

The maxixe, hesitation, tango, one-step—you can enjoy all the modern dances in your own home with the Victrola.

"How to Dance the One Step, Hesitation, and Tango" is a new Victor booklet just issued—illustrated with photos of Mr. and Mrs. Vernon Castle (who use the Victor exclusively and superintend the making of Victor Dance Records) and 288 motion-picture photographs. Ask any Victor dealer for a copy, or write us.

There are Victors and Victrolas in great variety of styles from \$10 to \$200, and any Victor dealer will gladly play any music you wish to hear.

Victor Talking Machine Co., Camden, N. J., U. S. A.

Berliner Gramophone Co., Montreal, Canadian Distributors

Always use Victor Machines with Victor Records and Victor Needles—*the combination.* There is no other way to get the unequalled Victor tone.

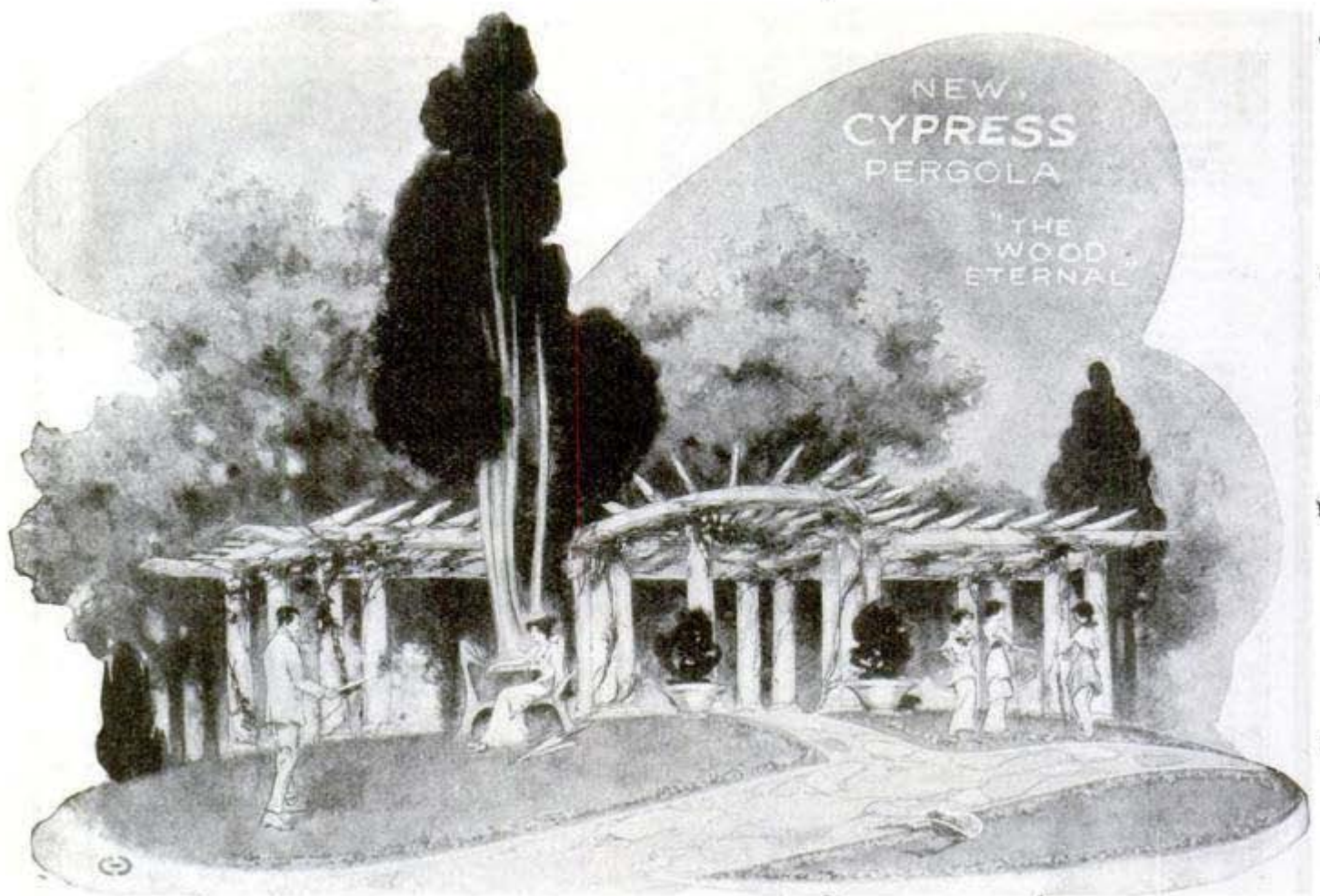


New Victor Records demonstrated at all dealers on the

This One



18E11-10K-RYW6



A Well-designed Pergola

is the finishing touch to the architectural and landscape perfection of elaborate grounds—it is “the one thing needful” to confirm the artistic character of a modest homestead—and it may be relied upon to redeem and beautify even the smallest yard, or one that is lacking in natural advantages.

CYPRESS, “the Wood Eternal,” is the pre-eminent pergola wood because “*CYPRESS* lasts forever”—DEFIES ROT-INFLUENCES which destroy most other woods—does not warp, shrink or swell like most woods—takes paint and stain perfectly but does not need either. (See Govt. Rept., Vol. 1)

Vol. 40 of the Cypress Pocket Library (entirely new) contains SKETCHES, DETAILED WORKING DRAWINGS (on sheet 24x36 inches) and FULL SPECIFICATIONS for erecting five new and original designs for beautiful and practical PERGOLAS and one COLONIAL ENTRANCE, all easily built and costing from a few dollars up to several hundreds. Not “stock patterns”—each was *SPECIALLY DESIGNED* for us. WRITE TODAY for **Vol. 40**.

NOTE—These plans are in no way similar to those in “Vol. 30”—they are new.

When planning a Pergola, Mansion, Bungalow, pasture-fence or sleeping porch, remember—“With *CYPRESS* you BUILD BUT ONCE”

Let our “ALL-ROUND HELPS DEPARTMENT” help YOU. Our entire resources are at your service with Reliable Counsel.

SOUTHERN CYPRESS MANUFACTURERS’ ASSOCIATION

1219 HIBERNIA BANK BUILDING, NEW ORLEANS, LA.

INSIST ON CYPRESS AT YOUR LOCAL DEALER’S. IF HE HASN’T IT, LET US KNOW IMMEDIATELY.

Please Mention Popular Mechanics

Popular Mechanics Magazine

6 N. Michigan Avenue, Chicago, U. S. A.

EDITED BY H. H. WINDSOR

England: The International News Co.,
5 Breems Bldg., Chancery Lane, London, E. C.

Australia: The Australasian News Co.,
126 William St., Melbourne

ISSUED MONTHLY

SUBSCRIPTION:

SINGLE COPY, 15 CENTS

In United States, and its possessions, Cuba and Mexico, per year, postpaid - - - - \$1.50
To Canada - - - - - 1.75
To all other countries in the Postal Union - - - - - 2.50

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

Entered as Second Class Matter Sept. 15, 1903, 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.

Copyrighted 1914, by H. H. WINDSOR.

The schedule of rates for advertising space in this magazine is based on a guaranteed circulation of 350,000 copies each month. Any issue where the actual number of copies printed and circulated is less than the guaranteed circulation, a pro rata discount will be allowed.

Contents for July, 1914

Advertising Pig for Window Display.....	74	Chuck, Big Magnetic, Holds Washers for Grind- ing	77
Aeroplane, Langley, Flies at Last.....	34	Church, California, Built Like a Bungalow.....	5
Aeroplanes, Diamond Cargoes to be Carried by.....	54	Church, English, Twisted Steeple on.....	12
Airman Killed While Looping the Loop.....	76	Cigar Beetles, Killing by Use of X-Rays.....	77
Aluminum, Nickelplating, Now Possible.....	66	Cistern, Resurrected, Surprises Villagers.....	84
Anchor, Sea, Has Lifeboat Attachment.....	1	Comment and Review, by H. H. Windsor.....	29
Ant Invasion, Southern Planters Fight.....	105	Concrete Pillar Surmounted by Crystal Globe... ..	96
Apartment Houses, Parisian, with Terraced Fronts	92	Concrete, Use Iron Dust to Harden.....	120
Arc Lamp, New, Provides Cold Light for Movies	72	Cross, Peruvian, Curious Embellishments of.....	85
Ash Cart, New, Dustless in Heavy Wind.....	31	Cruiser Home Ship for Summer Sailing.....	28
Automobile as a Road Roller.....	57	Curtain Rod, Swinging, Is Help to Housewives..	113
Automobile Bodies, Press for Shaping.....	58	Dining Car, Argentine, Equipped with a Piano..	98
Automobile—Combination Pleasure Car and De- livery Van	15	Dog Performs on Ropes with Master.....	103
Automobile Device Signals Driver of Following Car	114	Dump Cart, Steam, Recent English Invention..	24
Automobile Made into a Camp Outfit.....	105	Eggs, Wire Tongs Grasp Firmly.....	120
Automobile Takes Header over Embankment....	52	Electric Plant almost Runs Itself.....	108
Automobile Travels Through Deepest Sand.....	66	Engine, Broken, Welded Together.....	60
Automobiles Carry Flags for Safety at Corners..	71	Explosion of an Empty Gasoline Tank.....	105
Automobiles, Emergency Control for.....	103	Fence, Long Wire, Foils Smugglers.....	74
Automobiles, Hand Controlled Drive for.....	2	Fencing, Abandoning Barbed Wire for.....	61
Automobiles, Standard Gauge, for the South... ..	74	Fire Door, New, Worked by Foot Pedal.....	67
Automobiles, Steel Wheels for.....	4	Fire Escape, Portable, Runs on Trolley.....	114
Aviation—Beating the Birds at Their Own Game, by Lincoln Beachey	36	Fire Fighters, Device Supply with Air Through Hose	51
Balloons Prove Helpless as War Craft.....	98	Fire Kindler for Camps.....	110
Barges That Deliver Coal into Ship's Hold.....	78	Fire Tool Boxes, Forest Service.....	61
Barrels, Wooden, Government Tests.....	72	Fireplaces of All the World—VII.....	111
Belts, Machines for Splicing.....	107	Fires, Signs Beside the Road Warn Against.....	102
Bicycle Equipped with Dynamo.....	82	Fish, How Egyptians Obtain from the Nile....	104
Bird House De Luxe in California City.....	21	Fishing—Minnow, Live, in a Glass Tube for Bait	51
Boat—Freighter "W. Grant Morden" to Be Largest on the Lakes.....	69	Fishing—Rubber Guard Keeps Hook Free from Weeds	79
Boiler, Huge, Floating to a Steamship.....	103	Flatiron, Compact Self-Heating.....	120
Bridge Building, Novel Shift in.....	22	Florist, Cooling Room Valuable Aid to.....	80
Bridge, Butt Memorial, at Augusta.....	10	Flower Holder, Ornamental.....	104
Bridge, Pontoon, Towing Through the Canal....	94	Flying Boat, Novel Torpedo Body on.....	72
Bridges That Float Out of Way of Floods.....	58	Flying Boat Now Equipped with an Anchor... ..	66
Broiler for Camp Use.....	60	Flying Boat Repaired at Sea.....	100
Building, Old German, with Famous Clock.....	76	Fog Gun, Acetylene, Works Automatically.....	108
Building, Tallest in the South.....	26	Fruits, Canned, Automatic Cooker for.....	101
Buildings—City Beautiful Idea Pervades Wash- ington	69	Funeral Custom, Strange, of African Tribe.....	75
Calculating Machine, New, Easily Operated....	95	Garage, Parisian, Shows Advanced Construction	106
Calendar, Invariable, Practical Scheme for.....	114	Gas Mantle Gives Best Light for Microscope... ..	93
Canal, Dangerous Cape Cod Route Replaced by..	12	Golfing at Night in the Glare of Searchlights... ..	31
Canal in City of Canton, China.....	89	Harbor, Fresh Water, for Seattle.....	86
Carpenter, Egyptian, at Work.....	78	Headress of African Women, Baby Carried in..	98
Chickens, Electricity Promotes the Growth of... ..	95	House, Half of Saved When Store is Built....	32
Chimney, Novel Method of Bracing.....	86	House Plans	160
		Hydroplane, Air Propellered, of New Type.....	21
		Hydroplane, French, Makes Record Speed.....	57
		Hydroplane with Novel Gliding Planes.....	33

[\[Continued on Page 6\]](#)

Popular Mechanics offers no premiums; does not join in "clubbing offers," and employs no solicitors to secure subscriptions. It is for sale by nearly every newsdealer in the United States and Canada.

Contents—Continued

Ice, Hot Weather, Affords Skating in Summer..	70	Automobile Springs, Oiled Insert for.....	140
Jerusalem, Pulling Down the Walls of.....	52	Bails, Locking Vertically on a Glue Pot.....	123
Kapak Now Made into Sleeping Bags.....	32	Boiler Arch Forms Made of Metal.....	121
Ladders, Revolving, for Use in Picking Fruit....	4	Canoe, Log, How to Make.....	124
Lead Pencil, New, Always Has Sharp Point....	118	Carburetor, Feeding Moist Air to.....	122
Lifeboat, Self-Righting, of New Type.....	97	Chain Fastener.....	140
Lifeboat Which cannot be Sunk.....	118	Chuck Jaws, Copper Faces for.....	139
Lighthouse Lamp, New Type of.....	27	Church Pews, Sticky, Remedy for.....	130
Lightship with Iron Hull Has Long Life.....	58	Drawing Paper Holder and Cutter.....	134
Linemen, Protective Shield for.....	119	Drilling Holes in Wood with Nails.....	136
Locomotive, Gasoline, for Automobile Train....	112	Fire Extinguisher, Small.....	130
Locomotive, Powerful, with Novel Features....	20	Flue Cutter, Pneumatic Motor Driven.....	131
Locomotives, Electric, for the Panama Canal....	41	Foundation for Soft Ground.....	123
Mail Box, Rural, on an Old Pump.....	91	Fountain Pen, Preventing the Dripping of a....	140
Meats, Device to Aid in Cooling.....	120	Gauge, Adjustable Taper.....	132
Mexico, American Troops in.....	42	Gauge, Indicating Gasoline Tank.....	128
Motorboat, High Speed, with Exhaust Funnel....	80	Gears, Bevel, Safety Covering for.....	134
Moving Pictures, Gas Appliances Shown in.....	110	Hammer and Drift, Combination.....	129
Moving Pictures, Taking at the Bottom of the Sea.....	6	Horn, Homemade Automobile.....	134
Moving Pictures, Talking, Synchronizer for....	49	Key, Homemade Prest-o-Lite Tank.....	126
Novel and Practical Things for Daily Use.....	116	Keyways, Marking Parallel Lines on Round Stock for.....	140
Omnibus, Centennial, Still in Service.....	91	Mill, Split Hollow.....	128
Ox Wears Chunks of Wood for Blinders.....	100	Muffler, Gasoline Engine Exhaust.....	140
Panama Canal, Guarding Against Foreign Foes..	2	Nut, Locking with a Wrench.....	133
Panama Canal Locks, Strength of Chains for..	64	Nuts, Wing, Tapping.....	133
Paper for Making Money Carefully Guarded....	81	Paper Holder for a Paper Hanger's Pasting Table.....	121
Patents, Interesting New.....	158	Paper Punch, Homemade.....	131
Pearls, Farming for.....	113	Pattern for a Cored Piston.....	135
Phonograph the Universal Musical Instrument..	59	Powders, A Box to Hold.....	133
Photographs, Moving, Give Life to Likeness..	112	Ring Case, Lock for.....	129
Plow That Guides Itself.....	22	Saw, Crosscut, Starter for.....	126
Poles, Telephone, Testing for Resiliency.....	64	Scraper, Homemade.....	123
Pumping Plant, Large, for Egypt.....	102	Screen Door Hook, Attaching.....	126
Puzzle Pictures That Test Mental Fitness.....	118	Screws, Small, Cutting Off.....	127
Railroad Derailments, Short Tender Cause of..	110	Spring Threading Tool, Adjustable.....	129
Railroad, Inclined, New Design in.....	50	Switch, Electrical Lever, Cover for.....	127
Railroads, Government to Build in Alaska....	25	Switch, High Tension.....	122
Railroads, London's Underground, Ventilation of	112	Tack Heads for Imitation Rock Work, Covering.	137
Road, Winding, in the French Alps.....	100	Tanks, Wood Stave, Noncalking and Water-Tight Joint in.....	132
Sandals, Modified, Latest Fashion in Footwear..	54	Tape Holder for Electricians.....	130
Sands, Drifting, Encroach on City Streets.....	108	Thread, Left Hand, Cutting with a Right Hand Tap.....	130
Sanitarium Located in a Volcano's Crater.....	16	Tire Valve, Removing with a Cotter.....	133
Santa Fe, To Keep Old.....	61	Trapdoor Handle.....	136
Saw, Circular, Guard for.....	96	Truck, Pulling Out of Mud.....	121
Saw, Traction Wood, Made from an Old Auto..	86	Whiffletree, Spring, for a One-Horse Vehicle...	127
Sea Serpent Sighted in Michigan Port.....	15	Wire Size to Use in Direct Current Installation, Finding.....	138
Seeds, Planting by the Yard.....	110		
Shield, Paper Mask, for Physicians.....	64		
Ship Burns While Unable to Summon Help....	101		
Ship—Empress of Ireland Sinks in the St. Law- rence.....	35		
Ship—Russian Destroyer "Novik".....	70		
Ship—"Waterland," Docking, Proves Big Task..	38		
Ship, Waves Breaking over a.....	83		
Ships, Commercial, Navy to Establish Line of..	119		
Ships, Discarded, Strange Uses Found for.....	92		
Ships—The Great New Skyscrapers of the Sea..	17		
Shoe, Bathing, without Laces.....	71		
Sign, Grotesque, for Shoe Shining Parlor.....	70		
Sign, Novel Illuminated, of Concrete.....	88		
Signals, Warning, for Use on Automobiles.....	90		
Smokestack, Many Angled.....	27		
Statues, Marble, for the National Capitol.....	55		
Steel, Coating with Copper, New Process of..	85		
Stone, Big Block of, Moving along a Street....	67		
Submarine Disaster, Emergency Buoy Prevents..	72		
Swimming Pools, Ornamental Outdoor.....	14		
Table and Chair Combined for Lunch Rooms....	56		
Tent, Office, for Nation's Executive.....	41		
Teredos, Electrocuting, Saves Wharves.....	107		
Thermometer to Indicate Motor's Heat.....	120		
Time-Tables, an Adjustable Rack for.....	16		
Tire, Old, Used to Protect New One.....	101		
Toaster Turns Bread Automatically.....	23		
"Tower of Progress" Hub of Ideal City.....	49		
Track, Concrete, from Garage to Street.....	94		
Verse—Jim's Modern Courtship.....	115		
Vise, Bench, with Deep Jaws.....	88		
Watch Made for the Use of the Blind.....	27		
White Lead Dried without Danger of Poisoning.	90		
Windshield, Folding Glass, for Ship's Bridge..	54		
Wireless Mistake Causes Report of Shipwreck..	80		
Wireless Outfit, Portable, Used by the Army..	84		
Wireless Relay League is Being Formed.....	48		
Yachts—New Defenders of the "America's" Cup.	11		

AMATEUR MECHANICS

Aquarium, Overflow Pipe for.....	146
Bench Vise Nut, Broken, Substitute for.....	145
Box Corners.....	151
Bread Slicer.....	156
Cardboard Creaser.....	149
Chisel Holder for Whetting.....	155
Clamps, Small, for Grillwork.....	151
Curtain Fasteners, Roller.....	150
Drawer Catch.....	150
Drawing Circles on a Blackboard.....	150
Drawing Profiles, Aid in.....	152
Electrical Heating Apparatus for the Home. Part IV.....	147
Fiber Washers, Cutting.....	151
Flymobile, How to Make.....	141
Fountain Pen Filler, Substitute.....	157
Funnel, Automatic Valve for.....	155
Garment Hanger.....	156
Gauge, Depth, for Drilling.....	157
Hydroelectric Power Plant, Small.....	152
Mica Washers, Cutting.....	156
Mosquitoes, Trapping.....	145
Nails, Large, Drawing with a Hammer.....	146
Net, Homemade Landing.....	146
Oxidizing Black Iron, Simple Method of.....	156
Pantograph, Homemade.....	144
Paper, Small Piece of, Large Hole in.....	155
Pen Rack on an Ink Bottle.....	145
Post, Line, for Telephone Wires.....	151
Purse, Broken Ball Clasp, Repairing.....	154
Scissors Sharpener.....	145
Screw Plate for Wood Surfaces, Homemade....	150
Shades, Paper, for Electric Light Globes....	154
Spool Rack.....	146
Trick—Coiled Spring Wire Illusion.....	157
Trick, Die and Box.....	143
Wire, Small, Holding in a Vise.....	150

SHOP NOTES

Angular Cut, Special, Making.....	137
Ants, Preventing from Entering Lunch Pail....	123
Automobile, Locking.....	137



Never mind how STRONG You are What d'ye KNOW?

THAT'S the point—"What d'ye KNOW?" Today it's a battle of wits—and *brains win*. Muscle and brawn don't count so much as they used to.

In the conquest for good jobs and big salaries it's *brains*—not brawn—that win the day. "What d'ye KNOW?" is the one great question that draws the line between defeat and victory—between "wages" and "salary"—between *you* and the *Boss*.

What do *YOU* know? Are *YOU* so expert in some line of work that you can "make good" as a foreman, superintendent, or manager? If not, why don't you mark and mail the attached coupon and permit the International Correspondence Schools to show you how you *CAN* "make good" on a big job.

For more than 21 years the I.C.S. have been showing men how to do better work and earn bigger salaries. Every month over 400 students write of promotions or salary increases through I.C.S. training. What the I.C.S. are doing for these men they can do for *YOU*.

No matter where you live, how old you are, what hours you work, or how limited your education—if you can read and write and are ambitious to learn—the I.C.S. can train you in your own home, during your spare time, for a more important and better-paying position.

Mark and mail the attached coupon—it won't obligate you in the least—and the I.C.S. will show you how you can acquire this salary-raising ability by their simple and easy methods.

It will cost you *nothing* to investigate—it *may* cost a lifetime of remorse if you don't.

Mark and Mail the Coupon TODAY

INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 872-O, SCRANTON, PA.

Explain, without further obligation on my part, how I can qualify for the position before which I mark X.

Electrical Engineer	Civil Service
Electric Lighting Supt.	Railway Mail Clerk
Electric Car Running	Bookkeeping
Electric Wireman	Stenography & Typewriting
Telephone Expert	Window Trimming
Architect	Show-Card Writing
Building Contractor	Lettering & Sign Painting
Architectural Draftsman	Advertising
Structural Engineer	Salesman
Concrete Construction	Commercial Illustrating
Mechanical Engineer	Industrial Designing
Mechanical Draftsman	Commercial Law
Refrigeration Engineer	Teacher
Civil Engineer	English Branches
Surveyor	Good English for Every One
Mine Superintendent	Agriculture
Metal Mining	Poultry Farming
Locomotive Fireman & Eng.	Plumbing & Steam Fitting
Stationary Engineer	Sheet-Metal Worker
Textile Manufacturing	Navigation
Gas Engines	Spanish
Automobile Running	French
	German

Name _____

Present Occupation _____

Street and No. _____

City _____ State _____

We Assist Students Getting Actual Driving Experience



WOULD YOU GIVE 2 DAYS' PAY FOR A GOOD JOB IN THE AUTO TRADE?

THEN READ CAREFULLY

\$50 would not buy my course. After I got through Book 4 of instructions 13 and 14, 15 and 16, I had a job grinding valves. I did the job in four hours. Next day I put on four piston rings, which took six hours. These two jobs paid for my Course. I am now overhauling an engine for a party. I am not afraid to tackle any job now. If I get stuck I am sure I can find the remedy in the instructions. I knew nothing at all about an auto before, and I want to thank you for helping me.—Henry G. Ehredt, 523 E. 8th Ave., Homestead, Pa.

If we prove to you that we have started hundreds of others into the repair business and as chauffeurs—who had no previous experience and who knew no more about an auto than you do right now—you must admit we can do the same for you. Write me today—now—and let me prove it.

E. Dwyer, 31 N. Willow St., Montclair, N. J., 19 years old, receives \$25 a week and board.

Harry J. Herbin, Jamestown, Kans., was a farmer, but has doubled his income repairing and selling autos.

W. R. McClelland, Astoria, Ill., was an auto driver. Became professional chauffeur and more than doubled his salary.

Donald Stewart, Oakland City, Ind., became a chauffeur at \$25 a week.

H. M. Fewins and S. T. Slayback, both graduates, are now running a Garage and Repair Shop at Woodbine, Iowa.

And we could continue until we had filled this and several more pages.



Our book of testimonials, showing photos of students and their shops—free.

All the Result of the Dyke System

We can thoroughly train you. Open a repair shop or drive a car and make many times more than you are making now. Don't forget, we help you get your start with our *Employment Plan*, if you want it.

DYKE'S NEW IDEA OF TEACHING BY MAIL WITH WORKING MODELS

is something new. We use *real* working models—not just one, but *five*. On these models you get actual practice, see the actual operation and learn more than you could from the auto itself—it's easy and quick. You don't have to study hard with this system—we teach through the eye—a new idea. We are the originators of the system of teaching by mail with models. We also use charts—268 of them and a 16 page manikin. Our 40 instructions and Repairman's Instructions are simplicity itself—simple as A B C.

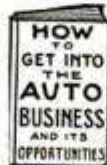
Our Employment Plan for Students

This represents years of work to provide something that no other school had, namely, a way for the graduate to get acquainted with auto and garage owners, to prove his ability and to immediately secure profitable employment.

Mr. Dyke has been identified as a pioneer inventor, supply man, etc., with the auto industry since its beginning. He originated the first auto supply co. and published the first book on autos in America. No other man with such experience is to-day teaching others. And all the experience and inside information of the auto business he has thus gained, is embodied in this *Employment Plan*.

WRITE TO-DAY for Details of Employment Plan and THIS FREE BOOK

It is instructive and interesting—does not cost you a cent and places you under no obligations whatever—You need it for your own sake, not mine. Don't wait—there's no profit in waiting—WRITE NOW and learn how you can obtain all this training for only \$15, if you act immediately.



DYKE'S CORRESPONDENCE SCHOOL OF MOTORING
Box 189, Roe Bldg. ST. LOUIS, MO.

NOTE—Beware of Imitators—Deal with the Originator

DELCO AND OTHER STARTING AND LIGHTING SYSTEMS. EXPLANATIONS SO CLEAR A CHILD CAN UNDERSTAND

\$250.00 A MONTH REPAIRING TIRES

Be first to enter this new big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Automobile business growing fast.

Each Auto Sold Means More Tires to Mend.
Enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnson, Tex., writes, "I made as high as \$18 profit in a day." Another man who bought a plant September, 1911, writes he has cleared over \$3,000.00. Be the first to start. Experience unnecessary. You learn quick. Simply follow directions. Business comes fast and easy.

Repair Tires at Home
Young men!—repair father's tires—get the money he pays garage man. Get the neighbors' work. Auto owners—repair your own tires—save money—have outfits for home use. Anyhow investigate. Send today for catalogue explaining wonderful money making possibilities in this field.

HAYWOOD TIRE & EQUIPMENT CO.
744 Capitol Ave. INDIANAPOLIS, IND.

This Bunch of Tires Will Make Several Dollars Profit

Put Yourself Where This Man Is.

40 ALPHABETS



13,500 Copies Sold
55c Postpaid

Send for New Catalog of Automobile and Motorcycle books FREE.

Spon & Chamberlain 123 P.M. Liberty St. NEW YORK, U. S. A.



New Illustrated Catalog MAGIC

PRICE 10 CENTS

SPECIAL THIS MONTH ONLY

Magnetic Cards FULL PACK 50 Cents

Prompt Shipments. Satisfaction Guaranteed. CHICAGO MAGIC CO., Dept. A, 72 W. Adams St., Chicago, Ill.

The Library of Original Sources

gives inside, rock-bottom facts on every subject. 10 magnificent vols. Great bargain. Small monthly payments. Send for information, UNIVERSITY RESEARCH Dept. G, MILWAUKEE, WIS.

CACHOO! Make the whole family and all your friends "just sneeze their heads off" without knowing why, with Cachoo, the new long distance harmless snuff. Sent anywhere for 10c. 3 for 25c. 1 doz. and special premium for 90c. AMERICAN SUPPLY CO., St. Paul, Minn.



1 Year to Get a Practical Electrical Education



In one year spent at this school you get a complete practical electrical education. You learn house-wiring, electric light and motor wiring, complete switchboard installation and wiring, armature winding, power plant operation and power transmission, complete telephone work from instrument setting to switchboard installing. This is one of the most completely equipped and largely attended electrical schools in the country.

Write today for **FREE** catalog

School of Engineering of Milwaukee Division 136 Milwaukee, Wis.



I WILL TEACH YOU LETTERING AND DESIGN

and guarantee to make you capable or money refunded. Signs, Show Cards, Poster Designing, etc., pay \$100 to \$300 a month. Competent graduates assured positions. No free stuff—no bargain offers. Write for booklet 30 and full information today.

The Rosing School of Lettering & Design
1900 Euclid Avenue CLEVELAND



Great Athletic Book 10c

Be strong and athletic. Learn wrestling, self defense, jiu-jitsu. Let **Farmer Burns, Mgr. Frank Gotch, World's Champion**, teach you. Great opportunity for young men. Makes you strong, healthy and skillful.

Send 10c for 32-page book showing great holds and tricks by Burns and Gotch. Only a few at this price. Don't delay—send at once—today.

Farmer Burns School of Wrestling, 1197 Range Bldg., Omaha, Neb.



DON'T TRY TO BE A CHAUFFEUR

or go to ANY SCHOOL to learn, or part with your hard earned dollars until you have read our valuable guide **FIRST**. It tells what you should **PAY** and what you should **GET**. Do not be deceived by schools which claim everything and give you nothing. **YOU CAN'T AFFORD TO SPEND ONE CENT TILL YOU GET OUR GUIDE**. It costs nothing and may save you many dollars. Write now for this **FREE BOOK**.

PRACTICAL AUTO SCHOOL, 68 Beaver St., New York



IF YOU STAMMER

attend no stammering school till you get my large **FREE** book and special rate. Largest and best school in the world curing by natural method. Write today

Lee Wells Millard, Pres., North-Western School, Inc.
2317 Grand Avenue Milwaukee, Wis.

BOOKS

World's best self-educational books. Agricultural, Electrical, Architectural, Mechanical, Automobiles, Aeronautics, Chemistry, Drawing, Natural

Sciences, Mathematics, Sociology, Engineering, Law, Medicine, Business, Art, Literature, Languages. Anything technical. Common or unusual. (Periodicals also.) Catalogs or lists 6c. Please explain fully subject or language interests you. **C. HIGENE CO., H2441 Post St., San Francisco**



200 Kinds Iron, Wood, Wire & Steel Puzzles

Catalog and sample 10c—3 leaders for 25c
WESTERN PUZZLE WORKS
St. Paul, Minn.



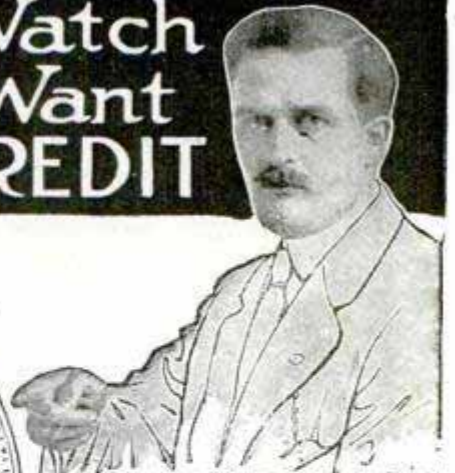
J-M ASBESTOS ROOFING

Never needs coating. An excellent fire protection. Write for illustrated catalog No. 71. **H. W. Johns-Manville Co., New York** and every large city

MODERN ELOQUENCE

10 beautiful, richly bound volumes, 300 after-dinner speeches, 150 great addresses, 60 popular lectures, 2000 short stories. Great Bargain, small monthly payments. Address, **GEO. L. SHUMAN & CO., Ohio Bldg., CHICAGO**

Any Watch You Want ON CREDIT



**WALTHAM
ELGIN
HOWARD
HAMILTON
ILLINOIS**

Sent on **30 Days Free Trial**

No Money Down

Express Prepaid in Advance by Me

You take no chances with me. I am "Square Deal" Miller and I trust the people. That is why I am doing the greatest Credit Watch, Diamond and Jewelry business in the country. Suppose you want any one of the country's best makes of watches? Name any one, I have it for you, No Money Down, Express Prepaid. **A Full Month to Carry it in Your Pocket** and the easiest of Long Time Payments. That's the test that tells. All these watches **Guaranteed 25 Years**

I Smash the Terms

No References Demanded

My terms are made to suit you. You get unlimited credit with no red tape, notes or collectors—no unnecessary detail

An "Open Charge" Account

the same kind of credit you get from your grocer. No matter where you live or what your income is, you can now own the finest watch, a beautiful diamond or any rare piece of jewelry and never miss the money.

Costly Catalog FREE

Send me your name and address on the coupon, a post card or letter, so I can mail you, Free and postpaid, the most beautiful catalog of its kind ever printed. I want you to have this book. It's a gem. It illustrates all makes of valuable **Watches, Elegant Genuine Diamonds** and a vast assortment of **Beautiful Jewelry**, all on the easiest and most liberal terms. Write for this book **today** and get a letter from me that will make you a friend of mine from the start. **Take My Word For It.**

Square Deal MILLER, Pres.

MILLER-HOEFER CO., 309 Miller Bldg., Detroit, Mich.

This Coupon Brings My Big FREE Book

SQUARE DEAL MILLER, Pres.
309 Miller Bldg., Detroit, Mich.

Dear Sir: Please send to me without cost or obligation your Big Book on all Makes of High Grade Watches, Genuine Diamonds and Jewelry, and full information on your Easy Payment, No Money Down and 30 Day Trial Plan.

Name _____

Address _____



\$4.50 Starts You to a Position Like This!

Be the Boss! Be the man who holds the big job and gets the big salary. Get into the profession of Electrical Meter Engineering—that is calling for men. On this great special offer you can now begin to get the training that will qualify you for the big job for only \$4.50. Pay the balance of our low tuition at the rate of only a few cents a day. Send the coupon now for the great special offer and big new book on Electrical Meter Engineering. Act quick. Write today.

High Salaries Offered

The demand for men exceeds the supply. The profession is only in its infancy. Big money is being paid. Big jobs are open everywhere. You can get one of them. We will help you. We will teach you to become an expert Electrical Meter Engineer right in your own home—during your spare time. Do not delay. Send the coupon.

Be a Meter Engineer

This fascinating profession is one of the best paid in the electrical industry. The Electrical Meter Engineer is the man who knows. He is paid for his brains—he is the man who tells the other fellow what to do. You can be one—a regular full fledged Meter Engineer within the course of a few months. You can be the man who gets the fat pay envelope.

Men Needed

The profession is only in its infancy. Very few men have the necessary training. You can get it. You can make your services in demand. We need more men. Give yourself a chance. \$4.50 starts you.

We Guarantee and agree to refund every cent you have paid us if, after you have completed the course of instruction, you are not absolutely satisfied in every way.

FREE Book Coupon

Send the Coupon For Big New Book

Put your name and address on the coupon or a letter or a post card and send to us today. Absolutely no obligations. We will send you absolutely free and prepaid the big new book on Electrical Meter Engineering and full particulars of this great special offer. Do not delay an instant. The first step toward realizing your ambition is to send the free book coupon. Act now.

Ft. Wayne Correspondence School
Dept. 119Y
Ft. Wayne, Ind.

Name.....
Address.....

Get This
2 Passenger
\$425 Roadster
FREE!



"Coeys Junior"
4 Cylinder
Water Cooled
Shaft Drive
Fully equipped

Write now for full particulars of this amazing offer. Think of riding around in this dandy little car. You can do it—yes, you can. Write now and learn how to get a "Coeys Junior" free and how you can

Make \$100 to \$400 Every Month

As an Auto expert. We teach you at home in a few simple lessons and qualify you for a highly paid position as Auto Salesman, Chauffeur, Garage Man, Repair Man, Demonstrator or Mechanic. You will know everything about an auto and can get your share of the millions of dollars spent each month building, selling and repairing automobiles. Write quick.

EXTRA!
To every person answering this advertisement we will give an opportunity to become local agent for the wonderful "Coeys Junior" car.

Full Information FREE
WRITE NOW!—Yes, get in touch with us at once. This wonderful offer is limited—may be withdrawn at any time—so hurry. Just say "Send me particulars of your Free Auto Offer." but do it NOW—right this minute—before you turn the page.
C. A. COEY'S SCHOOL OF MOTORING
712 COEY BUILDING
2010-12 S. Wabash Ave., CHICAGO, ILL.

LAW

Learn At Home Scholarships Now Open

Graduate correspondence students most successful at bar examinations. Our method of instruction same as HARVARD, MICHIGAN and other big Law Schools. GUARANTEE to coach FREE graduates failing to pass Bar Examination. Write today for special offer and catalog. (Sent Free). Offer limited—write immediately.

American Correspondence School of Law, Dept. 119Y Manhattan Bldg., Chicago

COPY THIS SKETCH

and let me see what you can do with it. You can earn \$20.00 to \$125.00 or more per week, as illustrator or cartoonist. My practical system of personal individual lessons by mail will develop your talent. Fifteen years successful work for newspapers and magazines qualifies me to teach you. Send me your sketch of President Wilson with 6c in stamps and I will send you a test lesson plate, also collection of drawings showing possibilities for you.

The Landon School of Illustrating and Cartooning
1438 Schofield Building, CLEVELAND, O.

"VITOLGY" HAND BOOK FREE!

Learn about this wonderful new science that is showing multitudes the way to freedom from Fear, Worry, Blues, Nervousness, Insomnia, Timidity, Dread. Learn the way to **Health, Power, Happiness, Success!** Vitology establishes tranquility, poise, reserve strength; cultivates your memory; makes you ambitious, courageous, powerful—all this and more may be yours through the study and application of this wonderful new science of mental and physical efficiency, and without the use of drugs, dieting or tiresome exercises. Write today for Hand Book No. 7—sent free and postpaid. Address

THOMSON SCHOOL, 703 Life Bldg., Kansas City, Mo.

LEARN TO WRITE ADVERTISEMENTS EARN \$25 to \$100 A WEEK

We can positively show you by mail How to increase your salary. BOOK MAILED FREE.


PAGE-DAVIS CO., 112 Page Building, Chicago, Ill., or 150 Nassau St., New York

DRAWING

Caricature, Cartoon, Comic, Commercial, Fashion, Newspaper and Magazine Illustrating taught by mail. Illustrated book 6c in stamps. **THE BOSTON SCHOOL OF DRAWING**, 755M Boylston St. BOSTON, MASS.

The University of Chicago

HOME STUDY in addition to resident work, offers also instruction by correspondence.

For detailed information address
22nd Year U. of C. (Div. 20) Chicago, Ill. 

ART Scholarships FREE
To Interested Readers of **THIS Magazine**

Given to demonstrate our exclusive methods in Drawing, Painting, Illustrating and Cartooning. Aid students in qualifying for Home Employment or Salaried Position. *We guarantee results.* List of Premium Outfits and full particulars **FREE**. Scholarship Awards limited, so write today

Art Annual included for 6 cents in stamps
FINE ARTS INSTITUTE, Studio 21Y, Omaha, Neb.



FREE BOOKS Choose One Or More

1. "How to Study Music"
2. "How to Study Law"
3. "How to Write Photoplays"
4. "How to Become an Auto Expert"
5. "How to Become a Stenographer"

Send us your name and address, and the book you want will be mailed to you free, by one of the reliable correspondence schools we recommend.

National Education Bureau, Box 77 PG, Chicago

SHORTHAND Now Taught By Mail

In 18 Easy Lessons! Positively guaranteed. System taught by us adopted by public schools in Boston, Denver, Buffalo, Omaha, Seattle and more than 2000 other cities. America's most popular shorthand because easy to learn, read and write. Complete stenographic courses by mail. Typewriters furnished. Low cost, easy terms. Write now for free book on big salaries and opportunities. Positions everywhere.

CHICAGO UNIVERSITY OF COMMERCE, Dept. 1037, Chicago, Ill.

YOU CAN LEARN THIS
NEWEST, HIGH-GRADE, MONEY-MAKING PROFESSION —by correspondence— in your own home. 1 or 2 hours a day qualifies as **Doctor of Physcultopathy** —the new DRUGLESS Healing science, recognized everywhere, by intelligent people, as superior to medicine. Pleasant, dignified, remunerative. Some earn \$5,000 to \$10,000 a year. Mastered in 32 easy lessons; then splendid field and incomes waiting. The GREAT MACFADDEN LIBRARY (10 vols.) FREE. Write today.

Macfadden College of Physcultopathy, Box 34, 4200 Grand Blvd., Chicago, Ill.



BE A DETECTIVE

Earn from \$150.00 to \$300.00 per month; travel over the world. Write

C. T. LUDWIG, 133 Westover Bldg., Kansas City, Mo.

LEARN WATCHMAKING AND ENGRAVING

Earn while learning. Most practical watch school. Individual instructions. Graduates in great demand. Book free.

Chicago School of Watchmaking, 63 E. Van Buren St., Chicago



MUSIC TAUGHT FREE AT YOUR HOME Write Today for our booklet. It tells how to learn to play Piano, Organ, Violin, Mandolin, etc. Beginners or advanced pupils.

AMERICAN SCHOOL OF MUSIC, 50 Lakeside Bldg., Chicago, Ill.

DOUBLE THROAT 10c New Invention. Fits roof of mouth. Greatest thing out. Astonish and mystify your friends. Make dogs or cats talk. Neigh like a horse, sing like a canary. Imitate any Bird or Beast of field or forest. Price 10c; 4 for 25c postpaid.

NEW VOICE CO., 311 E. 51st St., CHICAGO



Boy Craftsman

10c Tells how to make all kinds of Toys. New Book just printed. How to make Aeroplane, Canoe, Railroad Model, Talking Machine, Telephones, Balloon, Electric Motor, Bicycle Boat, Pocket Flashlight, and hundreds of other things. Fully Illustrated. Sent postpaid for 10c. 4 for 25c.

NATIONAL CO., 305 E. 51st St., Dept. 36, CHICAGO

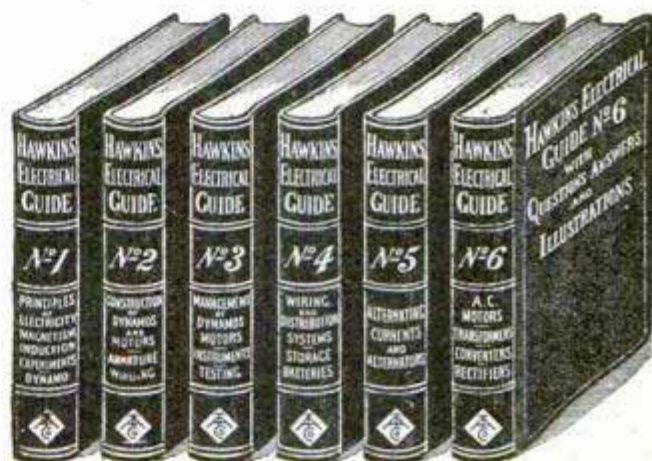


HAWKINS LIBRARY OF ELECTRICITY

In 6 Leather \$1 Pocket Books Price per Volume

Here is a set of books that no man in the ELECTRICAL FIELD should do without. This is the ELECTRICAL AGE in which we live; ELECTRICITY now controls more trades, directs more men, offers more opportunities than any other power that man has yet discovered. Do you wish to know the underlying principles of MODERN ELECTRICAL PRACTICE?

If so, **HAWKINS ELECTRICAL GUIDES** will give you the information. In reality they are a school within themselves, containing a complete study course with QUESTIONS, ANSWERS AND ILLUSTRATIONS, written in plain everyday language so that a practical man can understand the "HOW, WHEN AND WHY" OF ELECTRICITY.



"THAT'S JUST WHAT I NEED"

Read over the titles shown on the back of each volume, and note the scope of each book. They are handsomely bound in flexible black leather with gold edges and will readily go in the pocket. THEY ARE NOT ONLY THE BEST, BUT THE CHEAPEST WORKS PUBLISHED ON ELECTRICITY.

Each book is complete in itself and will be supplied \$1.00 per copy, but we believe that the complete set is the best bargain.

The books can speak for themselves and a careful examination, page by page, and illustration by illustration, will convince you of their big value.

If you will fill out the following coupon giving all the information requested, WE WILL SUBMIT THE SIX VOLUMES FOR EXAMINATION ON CONDITIONS NAMED.

FREE EXAMINATION OFFER

THEO. AUDEL & CO., 72 5th Ave., NEW YORK

Please submit me for examination **HAWKINS ELECTRICAL GUIDES** (Price \$1 each.)

Ship at once, prepaid the 6 numbers; if satisfactory I agree to send you \$1 within seven days and to further mail you \$1 each month until paid.

July, '14, Pop. Mech.

Signature

Occupation

Business Address

Residence

Reference



COME TO DETROIT THE AUTOMOBILE CENTER and LEARN the AUTOMOBILE BUSINESS

In one of the largest, best equipped and most reliable schools in the United States. We give unlimited practical instruction on everything pertaining to automobiles, including all Leading types of Electric Self Starters, which we have in actual operation on motors. Our Block test dept. has 12 motors, including 6 cyl. Loziers. Our equipment throughout is absolutely up to date. Detroit offers greater and better opportunities to automobile men than any other city in the United States.

Write for our monthly paper, the "Auto School News." It is free.

We have successful graduates in nearly every State in the Union.

Address Dept. P **Michigan State Automobile School**
THE OLD RELIABLE SCHOOL 11-13-15-17 Selden Ave., Cor. Woodward, DETROIT

SIT AT THIS TABLE AND EARN \$200 A MONTH



A Complete Drawing Outfit

Consisting of board, T-square, triangles, fine set of instruments, scale, tacks, pencils, rubber, curves, etc., for only **\$6.50**

INSTRUCTIONS IN DRAFTING FREE WITH EACH OUTFIT. The greatest draftsman on earth can use these instruments. If you have any mechanical or architectural ability, buy this outfit and learn to draw. There are many good positions open all the time for good draftsmen. If not perfectly satisfied return in ten days and money will be refunded. Send for Catalogue No. 4 at once. Instructions alone worth \$10.00.

THE T-SQUARE & TRIANGLE CO.

30 Clinton Street, NEWARK, N. J.

WHY NOT BE AN ARTIST?



STUDY drawing at home under Expert Faculty. We have successful students in every part of the world. **Turn your Talent into money.** Our Students are filling high salaried positions. 14 years successful teaching. Endorsed by high authorities. 18 Courses in Commercial and Illustrative Drawing, Teachers' Normal and Applied Art, Profit or Culture. **Thoroughly Equipped Residence School** Artist's Outfit FREE to Enrolled Students
SCHOOL OF APPLIED ART, 755 Applied Art Bldg., Battle Creek, Mich.

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.

Write Photoplays

I Guarantee \$10 for first one you write by my method. As former Scenario Editor I speak with authority. Use spare time at home to meet big demand for NEW IDEAS. Get \$10 to \$100 for each of your "happy thoughts." Special education not necessary. Send for free booklet, **Ebert Moore, Box 772 PG, Chicago, Ill.**

Sweeney Says: "I Can Teach You the Automobile Business in Six Weeks by Actually Working on and Driving Cars."



\$80 PER MONTH UP

IS EARNED BY If you drive, repair, sell cars, manage garages, or make **TRAINED MEN.** yourself a competent mechanic, no business in the world offers greater opportunities. Millionaires like Ford rose from the ranks.

THE SWEENEY SYSTEM OF PRACTICAL INSTRUCTION

has made this school one of the largest, finest, most completely equipped in the world. **WE TEACH EVERY BRANCH OF THE BUSINESS**—electric starters, traction engineering, trucks—every new development. We have turned out over **1900 Successful Graduates**

THERE IS NOTHING QUITE LIKE THIS SCHOOL IN THE WORLD **It Makes Young Men Successful.** Learn the opportunities before you.

Write Today For full information about this school, many photographs and full details about the opportunities in this business **FREE**

SWEENEY AUTO SCHOOL 1161 Fifteenth St., KANSAS CITY, MO.

GOV'T JOBS OPEN

THE NEW PARCELS POST demands the appointment of several thousand extra

Railway Mail Clerks, City Carriers, Rural Carriers, City Postal Clerks

\$800 TO \$2000 A YEAR, FOR LIFE

Rapid advancement to higher Government Positions. No "lay-offs" because of STRIKES, FINANCIAL FLURRIES or the WHIMS OF SOME PETTY BOSS. THE POSITION IS YOURS FOR LIFE.

Country residents and city residents stand the same chance for immediate appointment. Common-sense education sufficient. Political influence NOT REQUIRED.

Write immediately for schedule showing the places and dates of the coming examinations. Don't delay. Every day you lose means the loss of just so much coaching before the rapidly approaching examinations.

FRANKLIN INSTITUTE Dept. J-106, Rochester, N. Y.

FRANKLIN INSTITUTE
The Pathway to Plenty
Dept. J-106, Rochester, N. Y.

The coupon, filled out as directed, entitles the sender to free sample questions; a free copy of our copyrighted book, "Government Positions and How to Obtain Them," full list of positions obtainable and to consideration for Free Coaching for examination here checked.

COUPON

.. Railway Mail Clerk	[\$900 to \$1800]	.. Customs Positions	[\$800 to \$1500]
.. Postoffice Clerk	[\$800 to \$1200]	.. Internal Revenue	[\$700 to \$1800]
.. Postoffice Carrier	[\$800 to \$1200]	.. Stenographer	[\$800 to \$1500]
.. Rural Mail Carrier	[\$600 to \$1100]	.. Clerk in the Departments	
.. Bookkeeper	[\$800 to \$1800]	at Washington	[\$800 to \$1500]
.. Canadian Government Positions.		.. Isthmian Canal Clerk	[\$1200 to \$1800]

Name.....
Address.....

Use this before you lose it.

Write plainly.

700
Things
For
Boys
To Do



700
Things
For
Boys
To Do

THE BOY MECHANIC

The Ideal Book for the Wide-Awake American Boy

480 Pages—700 Articles—800 Illustrations—Cloth—Price \$1.50 Prepaid

All the things described in this volume have actually been built or experimented with by boys. The ideas contained in "The Boy Mechanic" would more than keep a boy occupied until he grows up and also be an incentive to original thinking and achievement.

The Most Interesting Boys' Book

Unlike so many other books of a somewhat similar nature, it is not confined to only one or a few subjects but describes 700 different things boys can make and do in the fields of mechanics, electricity, sports, arts and crafts work, magic, etc.

An unusually generous book; size 7 by 10 in. and 1½ in. thick; printed from large, clear type on high grade book paper and durably bound in cloth. Attractive four-color cover design.

Wholesome, Practical, Instructive

Besides telling how to make scores of things useful about the house, full and complete directions are given for constructing the following and hundreds of other things which appeal to the heart of every boy.

Many Electrical Appliances—Steam and Gas Engines—Turbines—Motors—Wireless and Morse Telegraph—Self-Propelled Vehicles—Toboggans—Ice-Boats—Canoes—Paddle Boats—Punts—Camping Outfits—Tents—Fishing Tackle—Magic Lanterns—Searchlights—Cameras—Telescopes—Gliders, Kites and Balloons—Electric Furnaces—Lathes—Pottery Kilns, etc.

Many hours of enjoyment are in store for the boy who becomes possessor of this book.

PRICE \$1.50, PREPAID TO ANY ADDRESS

Your book dealer will supply it or you can send direct to the publishers

Popular Mechanics Book Department
6 N. Michigan Ave., CHICAGO



Get Down off that Stool!

Don't wait until old age knocks you off. Look out for your future now. Break away from the years of drudgery, weary days, night work and small pay. Become a trained accountant—with an executive position and a salary of \$3,000 to \$10,000 a year.

Learn Higher Accountancy AT HOME

Get our free booklet "Ten Years' Promotion In One." Get it now. Don't be an ordinary bookkeeper all your life. Mail the coupon—find out the wonderful possibilities ahead of you—once you have the proper training. There are too many bookkeepers in the game—not enough trained accountants. We train you to fill one of the big positions. Just give us a little of your spare time evenings. Don't sacrifice your present position or income. The LaSalle Extension University Home-Study Course in Higher Accountancy is under the personal supervision of Wm. Arthur Chase, a nationally recognized leader in the field, Ex-President of the National Society of C. P. A. Examiners, former Secretary of the Illinois State Board of Examiners in Accountancy. The course was prepared under the leading experts of America. Covers everything you need to know.

Free Book Tells How

Don't wait till tomorrow. Don't put it off a single minute. By acting now you get this wonderful free book and the opportunity of taking advantage of our specially reduced rate—made for a short time for advertising purposes. Those enrolling now will receive without additional cost supplementary work in Business Organization and Management. Find out at once about this remarkable offer. Send Coupon below—today. Save yourself money by acting right now. LaSalle Extension University, Dept. 36 Chicago, Ill.

Take Your Place at This Desk!



Sign your name and address here—mail to the
LaSALLE EXTENSION UNIVERSITY, Dept. 36 Chicago

Name _____

Address _____



\$3,000

A Year to Fill This Chair

There's many a vacant chair like this waiting for you. I am training young men to fill them. Will you send your name to me? Many a man who has written to me now earns \$3,000 or more. The draftsman's training they got from me gave them the power to demand this price. There will be no obligations on you if you send me your name. Then I'll tell you just exactly how I train you personally.

Drafting

how I do it. For 20 years I have been doing the highest paid expert drafting work as Chief Draftsman of a large and well known Company. One day the manager said to me, "Why is it that there are not more high quality men like you? *I would pay thousands of dollars a year if I could get them.*" Right there I made up my mind that I would give to ambitious men the highest quality, personal instruction in the very things which had enabled me to earn my big salary. So the kind of training I will give you is the **practical** kind. The kind you need to hold one of the big paying positions.

I'll teach you drafting in your own home. I'll teach you personally—

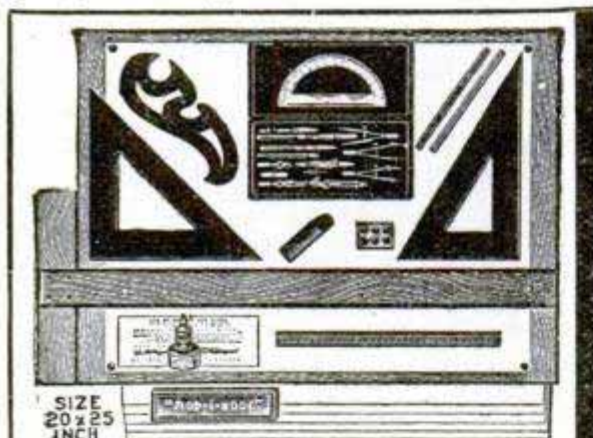
give you private instruction. This instruction is given to you by me. I make you see



I know what the big firms demand and this is what I teach you. I do it all during your spare time in your own home. Remember you get my personal training. Don't hesitate about sending me your name—just cut out the coupon below—write in your name and you'll hear from me at once.

Positions Open Right Now

Right now—this very minute—there are many positions open which pay \$3,000 and more per year to the right men who have learned drafting. There is lots of room at the top. I got there myself but have found all around incompetent men holding poor positions. They had not been trained right. The thing I want to do is to train you in the practical way you ought to be trained; to show you what to avoid and how to do things right. **YOU** can get into one of these chairs soon if you will merely send me your name on the free coupon below.



SIZE
20 x 25
INCH

This \$15.00
Draftsman's
Working Outfit

FREE

Chance to Earn Money

I have perfected a plan by which a few men who could not otherwise take up this practical, personal training can earn money to pay their way as they go along. Write for this plan today. Put your name on the coupon at the bottom and get it

in to me right away. If you have been one of those who have dreamed of the future of greatness and power, send the coupon.

I Guarantee

To instruct you until competent and in a position at a regular salary, paying from \$125.00 to \$175.00 per month and furnish you free \$15 Working Outfit at once.

\$3000 SALARY EARNING OFFER COUPON

CHIEF DRAFTSMAN,
Engineer's Equipment Co. (Inc.)
Div. 919Y CHICAGO, ILL.

Without any obligation to me whatsoever, please mail your book, "Successful Draftsmanship," and full particulars of your liberal "Personal Instruction" offer to a few students. It is understood that I am obligated in no way whatever.

Tear Off This Coupon and Mail Today

It will positively help you to find out all about the things which I can do for you. I will tell you what I have done for other men. Then you can make up your own mind about what I can do for you. I say I can put you into a chair paying a big salary. If you want to sit in this chair

Put Your Name Right Here

There are no obligations in your sending your name and address to me on this free coupon. Send it today. I will mail you absolutely free and prepaid my new book, "Successful Draftsmanship." This tells you about the wonderful opportunities there are in this great profession. About the big jobs that are open. The big future ahead for the man who gets in now and knows what to do. Now, the first thing to do. Send the coupon. Do it today.

Address **CHIEF DRAFTSMAN**

Div. 919Y, Engineer's Equipment Co., (Inc.) CHICAGO, ILL.

Name

Address

Please Mention Popular Mechanics

CLASSIFIED ADVERTISEMENTS

We have records to prove that a classified ad in these columns will find a buyer for almost anything which can be sold. Doubtless you have some article of value to some one else which you no longer need. Why not turn it into money?

Advertisements in this section, 15 cents per word, each insertion, minimum 10 words, payable in advance. To insure ads being inserted under proper classified head in the August issue, copy must reach this office not later than July 1st.

New York City, N. Y.

Popular Mechanics Magazine, Chicago, Ill.

Gentlemen: As to the results of my ad in your magazine, I can say that I am not only well pleased but also greatly surprised at the great quantities of replies I received. I have been an advertiser for many years and am well acquainted with the different magazines and papers, but when it comes to good results, I can sincerely say that your magazine beats them all. Even to this day I am receiving replies from all over, and from these I obtained many good customers. I am even compelled to increase my working accessories. Thanking you, I remain,

Yours very truly,
J. GRANDEFELD.

AUTOMOBILES

GET our latest bulletin of used cars. You will surely find one to fit your requirements. You can get from us good serviceable machines for \$400 and up. Let our reputation be your guide. Packard Motor Car Company of Chicago, 2371 Michigan Ave.

A WRITTEN guarantee for 5,000 miles without puncture. French and German motorists are getting 10,000 miles out of their tires by increasing them about one-half inch in size. In eight months 20,000 American motorists have followed their example. It's so easy you can do it in your own garage in thirty minutes, no matter what condition your tires are in. Send for free catalogue, sample and copy of guarantee. Colorado Tire and Leather Co., 1112 Karpen Bldg., Chicago, Ill., 1326 Acoma St., Denver, Colo.

AUTOMOBILE Instruction—\$55.25. Four weeks' course. Best equipped school in the country. Men enrolled from all parts of the U. S. Booklet P. M. on request. West Side Y. M. C. A., 318 West 57th Street, New York.

FOR Sale—Modern equipped, latest model White Steam Car, using gasoline or kerosene. Charles G. Pape, Fort Wayne, Ind.

A NEW technical automobile magazine illustrated, contains valuable information. Send for free copy. American Chauffeur, 851 Butler Bldg., Cincinnati.

FOR Sale—One 5-ton truck frame, one three-ton truck frame, ten automobile frames, 2 cyclecar frames. J. L. Lucas & Son, Bridgeport, Conn.

BANKRUPT sale new automobiles, \$75 up. 32-horse stationary gasoline engine, cheap. Wills Automobile Co., Canal Dover, Ohio.

CHAUFFEURS, before taking examination send one dollar for Questions and Answers. L. I. Lutes, Ex-State Examiner of Chauffeurs, Utica, N. Y.

AUTOMOBILES—Pleasure and commercial. Overhauled and repainted. From \$65 to \$500. Eureka Auto Co., Beavertown, Pa.

STANLEY Car Condensers, Distillate-Kerosene Burners, 526 Fourteenth, Denver, Colo.

JEWEL Runabout, bargain at \$125, or exchange for good motorcycle. A. A. Asaley, Blanket, Texas.

MODEL H, 5 Pas, White Steamer, A-1 condition. Leather top. Storm front. Chains, tools. Extra Flowmotor and Pilot-light. Cheap. \$450. H. S. Hall, 12104 Chesterfield, Cleveland, O.

FOR Sale—Light delivery car, 4 cylinder, and one 6 cylinder motor Pope motorcycle. H. N. Stackpole, Canaan, N. Y.

STEAM Car Correspondence School, 526 Fourteenth, Denver, Colo.

BROKEN Cylinders and Crankcases—Send them to be made good as new at fraction of replacement cost. Scored cylinders repaired, \$12. No new piston and rings required because bore is not enlarged. Where cylinders are worn (not scored from loose wrist pin), regrinding is the only remedy. We do it expertly. Write for complete information and estimates. Waterbury Welding Corporation, Waterbury, Conn.

GET in the Oxy-Acetylene welding business. Complete new outfit with instructions \$75. J. M. Shevlin, 340 Ellicott Square, Buffalo, N. Y.

PAINT Your Car Yourself—Save \$25 to \$75 by doing the work at home with the Arsenal system. Our big free booklet "The Car Beautiful" tells how. Send for it today. Arsenal Varnish Co., Dept. P, Rock Island, Ill.

FOR Sale: Wonderful opportunity. Type H, 46 hp. Lozier touring car. Never used. Favorable settlement on contract permits sale at absurdly low price. Absolutely new. Write E. Renz, 625 Locust St., St. Louis, Mo.

AUTOMOBILE SUPPLIES

NO More Blow-Outs. No More Punctures. Interlock Inner Tires make your tires twice as strong—give double mileage—prevent punctures, blow-outs and rim cuts. Make old tires strong as new. Write for booklet today. Splendid opportunity for live dealers and agents. Write us for proposition. Double Fabric Tire Company, Auburn, Indiana, 8 West 11th St.

WANTED—Parties interested in lowering fuel cost of operation of automobiles and trucks to secure particulars concerning Garbutt's Economizer. Sold on positive guarantee to give more mileage per gallon of fuel and increase efficiency of motor. Patent allowed April 17, 1914. A. G. Garbutt, Statesville, Ga.

MATHESON 40-hp. engine, clutch, transmission and other parts. Kaiser, 4461 Boulevard, Weehawken, N. J.

USE an Air-Friction 1914 Model "C." Increases power and economy of motor one-half. Absolutely impossible to choke or load. Uses distillate, gasoline or half kerosene with finest results. Starts easy in coldest weather. We fit all motors, guarantee definite results or refund money. Exclusive county rights. Liberal exchange on other carburetors or old-style Air-Frictions. The Air-Friction Carburetor Co., Dayton, Ohio.

RECTIFIERS for garages. All sizes. Charge one to eight batteries, \$12 upwards. American Battery Company, 1129 Fulton St., Chicago.

AUTOMOBILE cylinders reground and fitted with new pistons and rings for \$7 to \$11 per cylinder. Oxyacetylene welding at reasonable prices. The Crown Machine Shop, Crown Point, Ind.

PUNCTURELESS Tire for Sale. Read ad under "Patents for Sale."

EXPLOSION whistle, \$4.25. Powerful. Satisfactory operation Guaranteed. Agents write Buell Manufacturing Co., 1141 E. 46th St., Chicago.

FOUR cylinder motors, new, \$100; pressed steel frames, \$3; A. C. motors, \$20. Send for our Bargain Sheet, Auto Parts Co., 737 W. Jackson Blvd., Chicago.

I'LL Save You Money on Tires by my new co-operative plan. Dollars saved on every size. Printed guarantee of 3,500 miles actual service with every tire. Don't buy another tire until you get price list and new co-operative plan. It will pay you. State size. Write me today—Now! Manager Tuxedo Auto Tire Exchange, 896 S. Eighth Avenue, New York City.

WELDING Plants for \$50. \$10 cash with order, balance \$10 per month. Address Dept. D, Bermo Welding Apparatus Co., Omaha, Nebr., U. S. A.

GET our prices on new and used magnetos and coils of all makes. We repair any magnetos and our prices are the lowest. Work guaranteed. Pellets Magneto Exchange, 1606 Michigan Avenue, Chicago, Ill.

TIRES—3,500 miles guaranteed, and guaranteed tubes. 28x3, \$8.50, tube, \$1.80; 30x3, \$9.40—\$1.90; 30x3½, \$12.50—\$2.75; 32x3½, \$13.25—\$2.80; 34x4, \$17.50—\$3.90; 36x4, \$18.95—\$4.15; 35x4½, \$23.50—\$4.95. Non-skid 10% more; other sizes, prices accordingly. Write for bargain sheet, 10% with order, balance C. O. D. Examination allowed. Para Auto Tire Co., 1417 Michigan Ave., Chicago, Ill.

USE Hustler Valve Grinding Compound, 3 oz. 25c. W. I. Gregory, 136 St. Marks Ave., Brooklyn, N. Y.

AUTO Tires—Cut rates on best standard guaranteed firsts. Price list free. Address Wm. J. Serlin Co., 811 Woodward, Detroit, Mich.

TIRES—Guaranteed and second tires. Write for prices. We pay express. Sinsheimer, 1505 Michigan Ave., Chicago.

STORAGE Batteries Repaired and Exchanged. Meder-Staudt Company, Distributors of Witherbee Batteries, 1876 Broadway, N. Y. City.

FIX up your Automobile with Boyer's Air-Drying Glossy Re-Finisher and Color Finishes. All colors. Write us condition of your car. Boyer Laboratory Company, 9 West Michigan Street, Chicago.

FORD ACCESSORIES

AGENTS wanted where not represented to sell Ford Starters. This is a money-maker. Write for territory. The Motor Supply Co., 221 Seventh St., Milwaukee, Wis.

FORD Outfits—Seat covers, roadster \$8.80, touring, \$11.50. Electric light outfits, \$3.50. Magneto Horn, \$4.50. Brickell, Fairbury, Neb.

ACCELERATOR or foot throttle for Ford cars. Fits regular equipment. Agents and dealers wanted. Price, \$3. Send for circular. Miller P. Jones, 6042 Union Ave., Chicago.

\$28.50 BUYS new set Ford wire wheels. Also have second-hand Ford "T" parts. C. W. Vogt, Tampa, Fla.

FORD Valve Adjusters and Silencers \$1.50. Townsan Auto Spec. Co., Mitchell, S. D.

MOTORCYCLES, BICYCLES & SUPPLIES

SEND for latest Bulletin of real Motorcycle Bargains, used and slightly used, all makes, models and prices; if you have \$25 and really want a powerful Motorcycle, send for this Bulletin; hundreds of machines at all prices, new ones on easy payments; tell us what you want and how much you can pay; we can fix you up. Peerless Motorcycle Co., Dorchester, Mass.

1913 MAJESTIC De Luxe, \$90; reed body side car, run only about two miles. Price, \$40. Gilbert Harrison, Christopher, Illinois.

RIDE a motorcycle; fascinating, economical and healthy sport. Learn how to select a machine best suited to your requirements, and how to get the most enjoyment out of it. Get a copy of the Motorcycle Manual. Motorcycle construction and operation described; encyclopedia of 400 motorcycle terms; complete trade directory; license regulations of every state; 120 pages, magazine size; 25 cents postpaid. Motorcycle Manual, 51 Chambers St., New York.

FOR Sale—Used motorcycles of all makes, from \$60 to \$175. Write for list. Coleman's Motorcycle Shop, Akron, Ohio.

1909 YALE single; equipped; tandem. Bargain, \$75. John Alley, Lucasville, Ohio.

EXCELSIOR Twin, fully equipped. Lamp, Horn, etc., \$65. A Snap. Heitger Carburetors, new, \$3.50. Motorcycle Crank Hangers, complete, \$2.75. Grips, 20c. W. E. Wandssee Co., 129 Gratiot Ave., Detroit, Mich.

PIERCE 4-cyl., fine condition, \$55. Harry Swigert, St. Joseph, Mich.

FOR Sale—Excelsior Single Motorcycle Motor. Ray Sunderlin, 413 N. Santa Fe, Pueblo, Colo.

1913 TWIN Indians, \$140; other bargains of all makes. Treiber Motor Co., Elgin, Ill.

FOR Sale—Thor IV Motorcycle. Bargain. Walter Guinn, Perry, Iowa.

RARE opportunity in two-speed motorcycles. Four New Era two-speed motorcycles with magneto, 5 h. p. motor, foot and head control, \$25 to \$50, f. o. b. Chicago. Here is your choice. These are especially good for hills on account of the two speed. Also a few second-hand Harley-Davidson motorcycles, 1910 and 1911 models. From \$35 to \$50. C. H. Lang, 1704 Michigan Ave., Chicago.

M. M. MAGNETO Special, \$70. Guaranteed. A. Reid, Steele, N. D.

MOTORCYCLES Cheap. Big clearance sale of new and second-hand machines; ask for list "M" just out. American Motor Co., 2724 Michigan Ave., Chicago, Ill.

1913 \$285 READING—Standard and \$60 of equipment. 148 West 59th St., Chicago.

BICYCLES good as new, \$7.50 up. Tandems, \$10 up. Circulars free. McDougald, 1118 N. Clark St., Chicago.

MOTORCYCLES—I have the goods. Best models. Right prices. We can do Business. H. D. Kellogg, 38 Princeton St., Worcester, Mass.

BIG Drop in Motorcycle Prices. 100 different motorcycles, all makes, rebuilt and nearly new, \$30 up. All guaranteed. Send for free list. Western Supplies Co., 1350 Larimer St., Denver, Colo.

GET our catalogue of the best Motorcycle accessories. Guaranteed goods, low prices, prepaid shipments. Write today. Andrews Specialty Co., Rochester, N. Y.

SUPPLIES—Our big catalogue with prices lower than usual sent free to motorcycle owners. Meco, Hammondsport, N. Y.

DON'T buy a Bicycle Motor Attachment until you get our catalog and prices. Shaw Mfg. Co., Dept. 27, Galesburg, Kansas.

MOTORCYCLES; everybody rides them. Why don't you? You're next. We guarantee to save you \$25 to \$50. Kultures, Yales, Readings, Harleys, Excelsiors, Indians, Pierce, Curtiss, Henderson, Thors, Merckels, singles and twins, \$25 to \$100. Tires, \$4; belts, \$5. Buy direct; save dealers' profits. Deninger Cycle Co., Rochester, N. Y.

BIG bargains in second-hand motorcycles, \$25 up. Indians, Harleys, Thors, Excelsiors and Merckels. Write for descriptions. Howard A. French & Co., Baltimore, Md.

BIG bargains in good motorcycles we have taken in exchange on new ones. Send for special bargain list. Shaw Mfg. Co., Galesburg, Kansas.

\$50 TO \$150 buys the best Motorcycles, every make and model in our large stock—must be cleared. Half price. Send for list today. Brown Music Co., 9119 Commercial Ave., Chicago, Ill.

USED Motorcycles, Indians, Harleys, Pops, Thors, Excelsiors, Flanders, many others, \$40 up. Write for list. Hall & Gravatt, Atlantic City, N. J.

BATTERY Indian, \$35; Battery Harley, \$60; 1912 Magneto Harley, \$110; 1913 Yale Single, \$110; 1913 DeLuxe Twin 9, \$150; \$330 Excelsior Twin, \$115; Pierce Four Cylinder, \$140. Arthur Henderlong, Crown Point, Ind.

BARGAIN 2½ hp. Motorcycle, \$55. A. J. Gorkel, Baileyville, Kans.

50 MOTORCYCLES at your price. Hall & Gravatt, Atlantic City, N. J.

LARGEST jobbers of used Motorcycles in the world. Live agents wanted. Get list and proposition M12, Rebuilt Motorcycle Co., Chicago, Ill.

MY new money saving plan of buying a new or used motorcycle, free. Send stamp to cover mailing. Jones, 2722 Indiana Ave., Chicago.

CYCLECARS

CYCLECAR motors, friction drives, steering gears, wheels and all parts. Catalog free. Palmer Bros., Cos Cob, Conn.

A 4 CYLINDER Pierce Motorcycle Motor. Fine condition, \$50. A two cycle 3½x3½, air cooled, single cylinder motor. Good condition. \$25. Write for further information. B. Kietzman, Lakota, N. D.

AERONAUTICS

FOR Sale—Gnome seven cylinder Rotary Aero Motor, 50 hp., good running order. Albert Holz, 828 W. 5th St., Cincinnati, O.

WANTED—Partner with some capital, help me build and demonstrate new type self-balancing aeroplane. Address Lewis Johans, Shoreham, Vt.

HEATH Propellers for air, water and land; represents the survival of the fittest. Five years of propeller production proves perfection. Three stamps brings our propeller catalogue. Heath Aerial Vehicle Co., Chicago.

ROBERTS 6 cylinder 75 hp. aeroplane motor, in first-class condition. Equipped with latest type cylinders, propeller and radiators. \$925 f. o. b. Chicago. National Aeroplane Company, Machinery Hall, Chicago.

USED aeroplanes and motors cheap. All kinds. Bates, 104 Oak, Chicago.

GET the world's largest and most explicit Aeronautical catalogue, just off the press. Sent anywhere for 6 red stamps. Heath Aerial Vehicle Co., Chicago, Ill.

AVIATION Motors, all makes and h. p., from \$250 up. Complete aeroplanes, all types, from \$500 up. State your needs. Aero Exchange, 38 Park Row, N. Y. C.

CHICAGO Aero Works, 143 North Wash Ave. Stamp brings catalog.

COMPLETE Plan, drawn to scale, with precise instructions for building a Curtiss 3-foot Model Flying Boat, 25c. Other Plans: Bieriot, 15c; Wright, 25c; Nieuport, 25c; Curtiss Hydro, 35c; "Peoli" Racer, 25c. Set of six, \$1.25. 48-pp. Model Supply catalog, 5c. Ideal Aeroplane Co., 82½ West Broadway, N. Y.

BOOKS AND PERIODICALS

WORLD'S best self-educational books (also periodicals). Agricultural, Electrical, Mechanical, Automobiles, Science, Chemistry, Business, Art, Literary, Languages, Engineering. Anything technical, common or unusual. Lists, 6c. Explain subject thoroughly. C. Higene Co., J241 Post St., San Francisco.

SCIENTIFIC Laws of Memory, Success, Health and Personal Attractiveness, 50c. Popular Institute 74, Benton Harbor, Mich.

MODERN Dances—Best Instruction Book for beginners. 17 dances, fully illustrated, 25c prepaid. Danse Publishing Co., 500 Fifth Ave., N. Y.

READ "Cleopatra," 25c catalogue, 2c. Paul Duff, 2713 Mozart, Chicago.

MAGAZINES. Lowest rates guaranteed. Catalog free. American Magazine Agency, Box 1222, Atlanta, Ga.

DIETERICH'S 50 Perpetual Motions. Tells all about Perpetual Motions, illustrates 50 different forms. Tells about Patent Office Practice in regard to same. Very interesting. Sent by mail, postpaid, on receipt of 25c. coin or stamps. F. G. Dieterich, 662 Ouray Bldg., Washington, District of Columbia.

SEND stamp for our book "How to Make Patents Profitable." Benjamin & Bassett, 141 S. Dearborn St., Chicago, Ill.

BOOKS About Elevators—Circulars free. Morse, Union Place, Yonkers, N. Y.

ENGINEERS' questions and answers for license, by Hobson, for twenty-five cents, postpaid. Send stamps. Reilly's Book Store, Philadelphia, Pa.

HOW to Run a Lathe. A 50-cent book for 10 cents postpaid. S. B. Lathe Works, South Bend, Ind.

EDUCATIONAL AND INSTRUCTION

YOUR handwriting greatly improved by mail—short time, small cost. Journal free. Francis B. Courtney, Box A 492, Detroit, Mich.

DRAWING—New Book, second edition, self-instructor Newspaper Art. 50 cents (coin). Particulars for stamp. Edw. Goodnow Studio, Bellevue, Ohio.

LANGUAGES! Conversational use of 4,000 words in a short time. Easiest, quickest, best method for self-instruction in French, German, Spanish or Italian. Nearly a million successful users. Refer to any language student. Complete course, each language, including correction of lessons and exercises, 10 parts, \$5. Easy payments. Request particulars. The Rosenthal Method, 94 Putnam Building, 2 West 45th Street, New York.

LATEST in Mathematics—"Arithmetical and Geometrical Calculations by Cancellation." Thoroughly demonstrated by rules, diagrams and examples. Practical and scientific. Hydrostatics, hydraulics and machinery. Also involution and evolution. The students' and inventors' manual. \$1 postpaid. Address Herrick and Horton, Princeton, Ill.

SELF-TAUGHT German, French, Italian, Polish, Swedish, Spanish, Norwegian, 40c per book. State which language. Gurney Bros., N. Akron, Ohio.

BRIEFHAND, the only efficient substitute for stenography; a wonderful combination of longhand and shorthand; gives one a stenographer's speed while using long-hand characters. Invaluable for business and professional men and women, ministers, teachers, secretaries, clerks, students, boys, girls, everybody. A West Virginia mayor says: "I would not give it up for any system of shorthand used today." An Indiana minister writes: "I heartily commend it." A Boston corporation president "began using abbreviations within 24 hours." Other Briefhand writers say: "Exceedingly practical." "A simple and easily learned method; highly efficient." "A marvelous system." "Far superior to any other method," etc., etc. Our complete Manual of Instructions containing thousands of illustrations and abbreviations enables you to learn this wonderful system at home quickly. Regular price, \$2.50, but under our temporary introductory plan it will be sent postpaid for 50c. Order today. Premier Briefhand School, Washington, D. C.

SUCCESS in Business and Social Life made easy by our common-sense publications. Interesting samples 12c. Catalog gratis. Success Supply Co., 7P14, Hannibal, Mo.

FREE Mechanical Drawing Lessons; no strings attached. Write catalogue MP. TSq. Triangle Co., 30 Clinton St., Newark, New Jersey.

ELECTRICAL inspector for fire insurance companies. Good pay. Steady employment. All information in "Schoen's Manual of Electricity," by an insurance expert. Better than correspondence course. Price, postpaid, \$3.10. The Insurance Field, Louisville, Ky.

COLLEGE! Why not go? We can easily and quickly prepare you for entrance to a school of Medicine, Dentistry, Pharmacy, Bacteriology, Osteopathy, Law, Engineering, or a University. Investigate our New Method Residential and Home Study Courses; also Self-Help Plans. Send today for Booklet telling how to successfully prepare for 1914 registration. Brooks Classical School, Dept. P M, Schiller Bldg., Chicago.

500% PROFIT in ornamental casting of concrete, artificial marble, plaster, papier-mache, marble dust, imitation wood, soft metals, for manufacturing interior, exterior decorations, garden furniture, statuary, artistic homes, fountains, sanitary marble flooring, tiling, tombstones, cement caskets, stucco buildings, life casting, ornament copying, modeling, coloring, gilding, making elastic and rigid moulds, instructions complete \$1. Free: 200 illustrations beautiful art cast (mail address today), Mahler, 117 Russell St., Brooklyn, N. Y.

YOU can write 100 words a minute without knowing Shorthand. My new method, Abbreviated Longhand, Simpler than the simplest shorthand; tried and approved by thousands. Your money back if not delighted. Sample lesson 20c. Full particulars free. Write today, A. B. Weaver, Court Reporter, Dept. C., Buffalo, N. Y.

TRADE SCHOOLS

MAKE \$5 to \$8 a day as skilled Electrician, Plumber, Draftsman, Bricklayer, Moving Picture Operator. We teach you in short time at small expense, profitable trades. Free employment bureau places graduates in good jobs. Special limited offer now. Write at once for catalogue and full particulars—no obligations. Dept. 819 Y, Coyne National Trade School, 51 E. Illinois St., Chicago, Ill.

PAINTING, Decorating, Paper Hanging taught by actual practice. Free catalogue. Chicago School of Painting, 414 Dearborn Ave., Chicago.

TELEGRAPHY

TELEGRAPHY—Morse and Wireless—Railway Accounting (Station Agency) taught quickly. Railroad and Western Union Wires and complete Wireless Stations in school. Big demand. Positions secured. Living expenses low—may be earned. Largest and oldest school—established thirty-nine years. Investment, \$25,000. Correspondence courses, also. Catalogue free. Write today. Dodge's Telegraph Railway and Wireless Institute, 15th Street, Valparaiso, Ind.

TELEGRAPHY taught in the shortest possible time. The Omnigraph Automatic Transmitter combined with standard key and sounder. Sends you telegraph messages at any speed just as an expert operator would. Five styles, \$2 up, circular free. Omnigraph Mfg. Co., 41 G, Cortland St., New York.

PERSONAL

ST-STU-T-ERING or Stammering. Let me tell you, by mail, how I cured myself, after 30 years of misery and failure. Discovered a natural method which anyone can use—at home. Since then have won social and business success. Send me your address, in confidence. Walter McDonnell, Drawer F511, Station F, Washington, D. C.

WE can help an honest inventor to secure patent and manufacture invention on royalty basis. Royal Co., Steneck Bldg., Hoboken, N. J.

TATTOO marks removed permanently by absorption; wonderful secret formula at last; sure, easy; cost few cents. Big money removing for others. Full instructions \$1. Sterling Specialty Co., 231 Blvd. F, Denver, Colo.

FRIEND—Quit Tobacco Nature's safe way. I did. So have others. Quica, secret, pleasant, inexpensive. Free booklet tells how. J. Bradford, Asheville, N. C.

BROTHER—Accidentally discovered root cures tobacco habit. Gladly send particulars. F. Stokes, Mohawk, Florida.

PICTURES AND POST CARDS

POSTCARDS from everywhere. We promote knowledge, friendship from far and near. The club, "So different," membership ten cents. Foreign money accepted at rates. The Universal System Exchange, Box 121, Dept. A, Galveston, Tex.

POSTCARDS—Big Bargain. 99c per thousand. Gillett Co., Lebanon Springs, N. Y.

FAMOUS Kentucky views, 15-25c; 30-50c; 100-\$1.30. Harry Baker, Fristoe, Ky.

PHOTOS—Fascinating subjects. 10 for 25c. Duff, 2713 Mozart, Chicago.

WORLD'S Fair Views. 8 beautifully colored postcards, 10c. Hannah, 1190 Pine St., San Francisco.

REAL Photos, foreign models. Catalog and samples, 10c. De Vitto, (2) New Dorp, N. Y.

TWELVE beautiful California postcards, 25c. Songery, 1635 Maltman, Ave., Los Angeles, Cal.

START a postcard business of your own. 10 beautifully colored assorted cards and full particulars, 10 cents. Positively no trash. Walbrook Watch Co., Walbrook, Dept. M, Balto., Md.

FOOL your friends; a postal view of and mailed from New York, or Montreal, Canada with your name. Send ten cents. Heath, 372 East 148th St., New York City.

PHOTOS—16 Female Beauties, all different. Globe Pub. Co., Box L, Augusta, Mich.

FOUR full-length Cabaret Posters in colors, fourteen inches high and twenty illustrations, 10c. Gordon Art Co., New York City.

PHOTOS—"Beautiful Women." 24 beauty poses, 10c. Normal Specialty Co., 38, Englewood, Chicago.

FASCINATING Photos, very attractive, set. 25c. Catalogue 3c. Neopolitan Publishing Co., Sta. A, Los Angeles, Cal.

BETTER than "September Morn!" Two new pictures by same painter. These and "September Morn," silver quarter. Box 592 Minneapolis, Minn.

YOU'LL get cards from everywhere. Membership 10c. Idaho Card Exchange, Dept. K, Box 906, Boise, Idaho.

If you really want to exchange post cards, try our splendid club. Lists circulate in many countries. Membership, 10c. Halyon Club, Box 133, Erie, Pa.

RECEIVE pretty postcards from far and near, best club. Membership 10c. Jolly Card Exchange, Box 126, Decatur, Ind.

POST CARDS of Irish Scenery, Irish Antiquities, Killarney, Glants Causeway, Dublin, Round Towers, Etc. 50 all different \$1. Lighthouses, foreign and domestic, 50 all different \$1. Famous Liners, Cunard, White Star, etc.; 25 cards and 25 Lighthouse cards \$1. Send U. S. dollar bill or post-office money order. S. H. Strain, Light-house Mission, Belfast, Ireland.

NIAGARA Falls. Eighteen views, gorgeous tints. Send a dime. Thompson Co., Y. M. C. A., Niagara Falls, N. Y.

MAIL ORDER SUPPLIES

INCREASE your sales. Place your proposition before the readers of "Cartoons Magazine." 23,000 copies every month. Classified rate 2c per word. Mail in a trial ad today. Cartoons Classified Dept., 6 N. Michigan Ave., Chicago.

CAMERAS AND PHOTO SUPPLIES

YOU will never realize what good pictures are until you equip your camera with an Anastigmat Lens. Why don't you write for our descriptive matter? Labury Co., 305 North Fifth Ave., Chicago.

DEVELOPING and Printing—Good work with quick delivery at fair prices. Send negative for sample print and prices. John R. Smith, Provincetown, Mass., Box 343.

WE develop and print and do it right. Not a side line, but a business. Developing, 10c; prints on paper or postcards, 5c. Moser & Son, 26 Arcade, Cincinnati, Ohio.

AN 8x10 mounted enlargement from your film for 25 cents. Best materials used. Satisfaction guaranteed. H. E. Fry, Trenton, N. J.

"HAVE you any old picture of some loved one, that has become yellow with age. We can restore it to its original color, making it as good as new. Will never turn yellow again. Satisfaction guaranteed. Write your wants. Butler & Butler, 1701 E. 55th St., Cleveland, Ohio.

HAVE You a Camera? Write for Samples of my magazines, American Photography and Popular Photography, which tell you how to make better pictures and earn money. E. R. Fraprie, #22 Pope Building, Boston.

HEADQUARTERS for selling or exchanging Cameras of all kinds. Carry a full line latest Kodaks, Graflex, Premos, foreign Cameras. Write for big bargain list. Gloeckner & Newby Co., 171 Broadway, New York.

THE Tutthill way of Developing and Printing Kodak work gives satisfaction. All Hand work. Try it. Developing, 10c. Printing, 2c up. Tutthill Photo Works, Middletown, N. Y.

SPECIAL Offer during August. We will develop and print any size roll of films (six exposures), for 25c to introduce our new system of photographic finishing. 8x10 enlargements, 25c. Write for our new price list. J. L. Lewis, 522 Sixth Ave., N. Y.

SELL your Photographs to Magazines. There's a market for prints—make your camera pay. Instructions by an expert, with list of 39 buyers and prices paid, for ten cents. Don't wait—variation's coming. A. S. Dudley, Publisher, Box 775M, Philadelphia.

MONEY in Photography. \$4 daily at home with any camera. Photographer teaches "business" methods by mail. No tedious studies. Details free. Sample retouching lesson, 4c. Wells' Studio, 501 Broadway, East Liverpool, Ohio.

SPOT cash for all makes of kodaks, lenses, and cameras. Also liberal loans on same at low rate of interest. Cameras exchanged. In business since 1885. David Stern Co., Dept. M, 1047 W. Madison St., Chicago, Ill.

ROLL Film developed, 10c a roll. Packs 20c each; Prints, Brownies, 2c; 1a, 3x4, 3x5, and Post Cards, 3c each. Work returned next day. Postage paid. Kodak Film Finishing Co., 112 Merchants Station, St. Louis.

FREE Samples—Quick Way to Mount Photos. Full package and catalog, 10c. 1,000 Mounters, \$1, and 320-page Camera Catalog, Agent's Discounts and Photo Album Free—also Developing Table. Engel Co., 1456 Leland Ave., Chicago.

ENLARGEMENTS from negatives or photographs, 11x14, 50 cents; 16x20, \$1; 16x20, pastel in natural colors, \$1.98. Describe colors. Frank Brooks, Box 331, Rush Springs, Okla.

FILMS Developed, any size roll 10c. Prints, 2 1/4 x 3 1/4 to 3 1/4 x 4 1/4, 3c; 3 1/4 x 5 1/2 to 4x5, 4c. Post cards 4c. 8x10 enlargements, 25c. Photo supplies. Send negative for sample print and special offer. Thos. Grove, 1540 East 64th St., Chicago.

THE Best costs less. Write for special prices on Quality Kodak Finishing. Fawlers, Box 628, Portsmouth, Ohio.

RETOUCHING taught; we make it easy for you to learn at home. Dept. M, Y. & M. Retouching Co., Marshall, Mich.

BEST Photo Service in America. Films developed and printed speedily, satisfactorily and at moderate cost. Send trial order to Schaeffer Co., 8 W. Park St., Newark, N. J.

PHOTO Developing and Printing, films or plates. Very highest class of work at lowest prices. Send for free booklet of information and prices. W. W. Sweatman, Box 602, Portland, Maine.

ENLARGEMENTS for Amateurs and Tourists. The better kind, 8x10 size, 25c. Other sizes from 18c up. Send for attractive price list. Wilkes-Barre Photo Enlarging Co., P. O. Box 288, Wilkes-Barre, Pa.

FILMS developed, 6c, all sizes. Prints 2 1/4 x 3 1/4, 2c; 2 1/2 x 4 1/4, 3 1/2 x 3 1/2, 3 1/4 x 4 1/4, 4c; 4c doz. Post cards, 5c. 50c doz. Work guaranteed and returned 24 hours after receiving. Postpaid. Send negatives for samples. Girard's Commercial Photo Shop, Holyoke, Mass.

SAVE 40% on Photo Paper from factory, prepaid. "Instanto" has a sparkling quality no other gaslight paper possesses, quick printing, develops easy. Money back guarantee. Send 25c for 3 dozen postals or 4x6 size, price list and full directions. Photo Products Co., Dept. J, 6100 La Salle St., Chicago.

KODAK Films Developed, 10c per roll, any size. Prompt attention given mail orders. Prints, 2 1/4 x 3 1/4 to 3 1/4 x 4 1/4, 3c; 4x5 to 3 1/4 x 5 1/2, 4c. J. M. Manning, Box B, 1062 Third Ave., New York City.

WE buy, sell and exchange. Bargains in Microscopes, Telescopes, Binoculars, Cameras, etc. Bargain list sent. Kahn & Son, Opticians, No. 54 John St., New York. Established 62 years.

BIG Money Saved on Photographic Lenses and Apparatus—goods exchanged; repairing done. Ralph J. Golsen, 65 East 46th St., Chicago, Department P.

MOTION PICTURES

WRITE plots for picture plays. Easy and fascinating. Expensive correspondence unnecessary. Write for details of my correct professional instruction. Vernon Hall, Box 126B, Chicago.

MOTION Picture Films for sale, \$3 reel up. Send for large list. Box 417, Montpelier, Vt.

FOR Sale—Powers Picture Machine, complete, cheap. John Stafford, Harrisville, N. Y.

I GUARANTEE \$10 for first photoplay you write by my method. As former scenario editor, I speak with authority. Send for free booklet, "How to Write Photoplays." Elbert Moore, Box 772 PG, Chicago.

SCENARIOS and Stories wanted. Enclose postage. E. W. Meyer, Niles, Cal.

\$100 TO \$300 Weekly in Moving Picture Business. Easy payment plan, free catalog. Acorn Moving Picture Co., Dept. 13, 501 Morton Building, Chicago.

WE pay cash for photoplays and stories. You can write them. Stamp brings particulars. Story Revision Company, Box 450, Smethport, Pa.

MOTION picture plays wanted. You can write them. We teach you. No experience needed. Big demand and good pay. Details free. Ass'd M. P. Schools, 601 Sheridan Rd., Chicago.

WRITE Moving Picture Plays. \$50 each. All or spare time. Correspondence course unnecessary. Details free. Atlas Publishing Co., 304, Cincinnati, Ohio.

\$35 PROFIT Nightly—Moving Picture Business—small capital starts you, no experience needed. Teach you—furnish everything. Ralph J. Golsen, 65 E. 46th St., Chicago, Dept. M.

TO MANUFACTURERS

WANTED—Quotations from manufacturers of first-class household specialties, new labor-saving devices, articles selling readily by house to house canvass and adapted for selling by mail. Must be new and not sold in stores. Quote rock bottom quantity prices with full information. Chemical preparations, medical specialties or bulky goods not wanted. Specialty Mfg. Co., Syracuse, N. Y.

BUSINESS OPPORTUNITIES

If you live in a small town and have a little spare time, get our offer. Easy to make \$100 profit each season; still easier to get your own clothes out of the profit on a few orders. No extra charge for fancy styles, golf bottoms, pearl buttons, etc., makes sales easy. Write for free samples and our new offer. Knickerbocker Tailoring Co., Dept. 109, Chicago.

LET the parcels post help you. Add (\$15 to \$25 weekly) to your present salary or income. Start during spare time and build up a permanent mail-order business of your own. We show you how and help you make good. No canvassing. Experience unnecessary. The Parcels Post makes success doubly sure. Our new ideas and up-to-date plans bring the money. No so-called "Course of Instruction" to sell. We give that free. Write today. Address Pease Mfg. Co., Inc., Dept. A, 70 Broadway, Buffalo, N. Y.

SPLENDID paying business ready for refined, intelligent man or woman, over thirty years old, to take hold of as district agent. Large corporation. Products extensively advertised. Thousands use and endorse. Every home needs badly. Investment of \$17.50 fully secured. Position should pay at least \$2,500 yearly. Satisfactory references required. S. G. Hall, 196 Schiller Bldg., Chicago.

LEARN the Real Estate Business. Our complete instruction book teaches: Listing, Appraising, Management, Salesmanship, Insurance, Brokerage, Advertising, Renting Agency, Forms, etc. 121 subjects. Excels \$20.00 Correspondence Course. Buckeye Cover, 75c. Silk Cloth, \$1.00, postpaid. Realty Book Company, 5982 Euclid Ave., Cleveland, Ohio.

THE Magic Story contains the secret for the success of all worldly undertakings. Invaluable to anyone who wants to rise in the world. Price, \$1. Money back if dissatisfied. Booklet free. Agents wanted. F. E. Morrison, 8 St. James Building, New York.

SPLENDID weekly profits in spare time at home. Mail-order business; don't worry about capital. Boyd H. Brown, Dept. K, Omaha, Neb.

SHEKELS for Shackles. "Knowledge is Power," breaks the shackles—grasps the shekels. No sudden fortune. Steady growth—Success. Justa, Dept. F, 3921 Garfield So., Minneapolis, Minn.

LEARN to collect money. Good income; quick results. Send for free booklet, "Skillful Collecting." Collectors' Association, Long street, Newark, Ohio.

\$100 MONTHLY. Start a circular-mailing bureau. Spare time only. "Key" tells how. Sent for 10c silver. Hosford & Brackett, Leonardo, N. J.

MONEY—Spare time. No canvassing. Furnish us information. Markets waiting. Exceptional proposition. Particulars for stamp. "Nisco."—HDB—Cincinnati.

ASK Bode! Anything! Especially about the Mail-Order Business! Get particulars Now! Bode, 2881p Main, Hartford, Conn.

ADVERTISE—21 words in 50 good weeklies, \$1. Cope Agency, 3741 Olive St., St. Louis, Mo.

IF unsuccessful so far, catch up and beat them all. Make success sure. Write for book today. Santen, 4731 Mission, San Francisco.

I HAVE best proposition in U. S. for the right man with a few thousand dollars to invest and take an active part with me. W. L. McLaughlin, Consulting Engineer, Bentley, Ill.

MAIL Order Business—how to succeed—interesting, instructive articles every month by those who know, in "The Business Builder"—the different, distinctive magazine of mail-order and agency selling. 68 pages, standard magazine size. Sample copy, 10c, none free. The Business Builder, Randolph Rose, Publisher, 23 Rose Block, Chattanooga, Tenn.

WOULD you like to own a good-paying mail order business? We have a line that gets repeat orders all the time. You can start in spare time; invest a dollar or two a week and soon own a nice business of your own; write for particulars. Nadico, 1664 Belmont Ave., Chicago.

I MADE \$50,000 in five years with a small mail order business; began with \$5. Send for free booklet. Tells how. Heacock, Lockport, N. Y.

WE will start you in the cleaning and dyeing business, little capital needed, big profits. Write for booklet. Ben-Vonde System, Dept. C, Charlotte, N. C.

BREED Mink. Big returns. Particulars, stamp. George Norton, Pleasantville, N. Y.

KLENENE Kleans. A new idea. Safer, cheaper, better than gasoline. Send dime for sample and our profit-sharing plan. Gordon Walker Company, 5818 Wentworth Ave., Chicago, Ill.

MOTION picture plays wanted. You can write them. We teach you. No experience needed. Big demand and good pay. Details free. Ass'd M. P. Schools, 691 Sheridan Rd., Chicago.

IF you want facts instead of fancies about Patents, address Benjamin & Bassett, 140 S. Dearborn St., Chicago, Ill.

PATENTABLE Ideas Wanted—Send for 3 free books. R. B. Owen, 30 Owen Bldg., Wash., D. C.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

SILVERING Mirrors and Auto-trimmings. Plating tableware home. Plans free. Clarence Sprinkle, East Grant, Marion, Ind.

EVERY Advertiser Needs our New Advertising Rate Book. Lists 2,000 best advertising mediums in America. Gives circulation and rates. Contains special lists and advertising snaps, including "Ads That Pay," sent prepaid for 10c. Dearborn Advertising Agency, 521 Dearborn St., Chicago.

WE Sell Patents. Established 1900. If you wish to add a new product to your line, write us. Charles A. Scott Co., 596 Central Bldg., Rochester, N. Y.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order business. I furnish Formulas, Manufacturing Processes and Trade Secrets in all lines. Sold under positive guarantee; 18 years' practical experience. Revision and improvement of Formulas and Processes—reduction of manufacturing cost—utilization of waste materials, etc., a specialty. Booklet, Formula List, and Valuable Information Free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

SPARE Time Mail-Order Business. Complete trial outfits, free printed matter, envelopes, letterheads, circulars, mailing boxes, rubber stamps, etc., included. Guaranteed sellers. Small outlay. Particulars. Rollins, Box 5272, Boston.

WE start you in business, furnishing everything; men and women, \$30.00 to \$200.00 weekly operating our "New System Specialty Candy Factories," home or small room anywhere; no canvassing. Opportunity lifetime; booklet free. W. Ragsdale Co., East Orange, N. J.

A SUBSTANTIAL corporation wants reliable party to establish office and manage salesmen. Should pay \$5,000 to \$15,000 annually. \$500 to \$5,000 will finance business; you handle own money. References exchanged. Sales Manager, 406 Fisher Bldg., Chicago.

ANY man desirous of making more money can learn something to advantage reading "Booster"—devoted exclusively to Agents and all interested in the Mail Order business. Two months' trial, 10c. Booster Magazine, 361 Northwestern Building, Chicago.

MAIL Order Profits! Order-getting sidelines for mail trade dealers; popular priced. Connect with old established house, originators of lines with legitimate market. Investment very small. Bixby Publishing Company, Lock Box J134, Buffalo, N. Y.

BE our local representative; spare time; no canvassing; enclose stamp. Commercial Information Co.—PMC—Peru, Ind.

GET cash for formulas, names, ideas, information. Booklet for stamp. Information System, 216 Marietta, Ohio.

MR. Mail-Order Man: Get quick returns. Established corporation supplies fast mail-order sellers; factory prices. Classy proposition. Beginners or established firms. Copyrighted. Prospectus free. Mississippi Valley Co., Inc., Box M629 Pittsburg, Kans.

CORPORATIONS Organized! Bond Issues prepared and negotiated. Loans on Legacies, inheritances and Commercial accounts. L. N. Rosenbaum, 80 Wall Street, New York.

I'LL start a profitable mail-order business of your own, quickly, inexpensively, and sensibly, without advance payment. No success, no fee. Particulars free. "Expert" 220 Home Bank, Baltimore, Md.

OPERATE Hahn's Premium Machines. Boosters of ice cream, candy and cigars. J. Hahn, 1016 Germantown Ave., Philadelphia.

MAIL Order Men—Just what you have been looking for—real success for beginners—greater success for those established. Particulars free. Huntsman, 6045 Summer, Philadelphia.

MANUFACTURE and wholesale your own Perfumes and Toilet Articles. Protected territory. Samples and particulars, twenty-five cents. Bogue Commission Co., Marion, Indiana.

HOW to Succeed in a Mail Order Business. No fake outfits. Investigate. B. Newnam, Waukegan, Ill.

USE your spare time to build up a mail order business of your own. We help you start for a share in profits. 27 opportunities. Particulars free. Mutual Opportunities Exchange, Buffalo, N. Y.

I HAVE money to invest in manufacture and sale of good household article. Must be light weight, moderate price. Write me fully, stating manufacturing cost. M. Salem, 5603 Winthrop Ave., Chicago.

START big Business on small capital—A hurting stomach often causes other disorders such as bowel and liver trouble, etc. Stop that gigantic Doctor Bill and Patent Medicine Account. Test this Stefling Formula at our expense, recommend it to your friends, start manufacturing and net yourself the long profit. Best All-Year-Round business because stomachs go bad every day. Worth many times the cost for the benefit in your own case. Mail us \$1.00 at once and we will send the Formula immediately. Results guaranteed or money refunded. Formula for any purpose at 25c up. All sent on Money-Back plan. Consult us. Reference—First National Bank, R. D. Reeder, Box 281, Alliance, Ohio.

FOR ADVERTISERS

START an original mail-order business. Honest, independent. Small capital. New Methods. Sole Rights. Big money. R. Clement Moore, Business Specialist, New Egypt, N. J.

SUMMER Orders—Let us write a letter for you that will get them. Mutual Service Bureau, Box 848, Atlanta, Ga.

SANITARY Paper Drinking Cups—Samples upon request. Yarroll, New Britain, Conn.

30 WORDS in our 24-p. postcard magazine, 25c, 3 times, 50c. Display, 50c inch, 3 times, \$1. Elite Monthly, 3827 North Kenneth, Chicago.

ADVERTISERS—Special—5c per word places your ads in 133 different magazines. Regular price, 7c. Lists free. Kings Magazine, Box 13-P, Little Silver, N. J.

BARGAINS—15-word ad, one year's subscription 25c; extra words one-half cent. Guaranteed 25,000 circulation. Digest, Grand Rapids, Mich.

AGENTS WANTED

If you live in a small town and have a little spare time, get our offer. Easy to make \$100 profit each season; still easier to get your own clothes out of the profit on a few orders. No extra charge for fancy styles, golf bottoms, pearl-buttons, etc., makes sales easy. Write for free samples and our new offer. Knickerbocker Tailoring Co., Dept. 198, Chicago.

AGENTS Wanted—If you know a chance when you see it you'll see this one now. Big money—stylish, nifty clothes—little work—no experience or capital needed—can you beat that? We want agents everywhere to take care of our business in their localities and to advertise our nobby, nifty suits by wearing them. We furnish everything complete and charge nothing for agents' outfit. The swellest dressers everywhere are our agents and all we ask is that you tell people who inquire about your fine clothes where and how they can get them. You make big money—\$10 a day—without trouble. Just a postal brings you full outfit free. Big, new sample book of up-to-the-minute suitings sent so you can pick out your first suit; also measuring blanks and everything you need. We pay express on everything—not a penny for you to pay. Send quick before some one else gets the agency there—mail postal today to the American Woolen Mills Co., Dept. 714, Chicago, Ill.

WE want representatives in every town. Excellent opportunity to earn big income. Write at once for full particulars. Beardsley Specialty Co., Rock Island, Ill.

AGENTS: Our \$3.00 machines earn from \$10 to \$35 yearly for users. Sell 1 to 5 machines in every home, school, church, or place of business. Sell for \$1.99 cash with \$2.00 to be paid after the user is satisfied that it has earned him \$5.00. We want agents in every city and town. Big profits. Agents pay us 50 cents—balance when user is satisfied. Write today for proposition. Get the agency now. Hardware Specialty Mfg. Co., 4411 Ravenswood Ave., Chicago.

TAILORING Agents Wanted—For our Special Value Big 4 Union Label Line—Four prices only. Suits and Overcoats made-to-measure for \$15, \$20, \$25, and \$30. Thirty styles to sell at \$15. Lines are limited, and will consider only reliable parties, experienced in taking orders, who can assure at least ten orders per season. Swatch and Card Lines only. Nelson Tailoring Company, 241-243-245 West Van Buren Street, Chicago.

THE Wife's Friend—Portable Oil Gas Stove. No valves, wicks, wood, coal or ashes. Steady, intense heat; will boil, bake, fry, roast, cook anything; heat rooms; stores, etc. Simple, durable, saves time, labor, money. "Much cheaper, quicker, cleaner, than wood or coal."—S., Ludwig, Ill. "Safe and clean as a lamp."—Mrs. A. R. McClellan, Ill. "Baked pies, cakes and bread; never saw nicer baking done."—Mrs. O., Thompson, O. Agents making money. B. L., Heusted, Mich., "Out one day; sold 11 stoves." R. P., Adams, Ia., ordered 3 stoves, then 12. C. P., Schroeder, Conn., 40 stoves one order. Price, \$3.25 up. Not sold in stores. Show cylinder making gas—people stop, look, get interested—buy. Send postal. World Mfg. Co., 4746 World Bldg., Cincinnati, O.

MAKE Big Money at home or traveling, selling "Nelson's New Explanatory Testament With Notes," A Testament and Commentary in one volume. American Standard Version. The only one of its kind in the world. Everybody wants it. Beautiful full-page, authentic, colored illustrations. Imported Morocco binding, silk sewed. Exclusive Territory. Secure your territory at once, before it is taken. Thomas Nelson & Sons, Bible Publishers for over 60 years, 3815 Fourth Avenue, New York City.

YOU can earn \$20 weekly at start, \$75 weekly at end of first year. It takes no capital, no training, no special ability. We furnish everything. It's work you'll be proud of—No delvering—No collecting—Just take orders. Charlton Nursery Company, Rochester, N. Y., Dept. J.

AGENTS—Average \$5 to \$12 daily selling astonishing Aztec massage machine. New. Just patented. Different. No electricity or water power required. Nothing complicated. Affords exhilarating massage without cent expense. Lowest priced, but best outfit. Retail \$2.50, allowing you big end of profit. Particulars and "beauty" folder free. Aztec Remedy Co., Dept. 132, Toledo, Ohio.

WIDE-AWAKE, active agents or crew managers can secure special concession and reap the benefit from the best money-making agency proposition on the market by writing immediately for full particulars. Hugro Manufacturing Co., Chicago, Ill.

NO Outfit to Buy. No Experience Necessary. No collections to make. Year-round seller. Emmons high-grade Nursery Stock. 62 years in the business. We are growers, not jobbers. Satisfied customers everywhere. Commissions paid day orders received. If you mean business and want something worth while, drop us a line. Emmons & Co., Nurserymen, Newark, N. Y.

500% PROFIT selling our wonderful sign letters for office windows, store fronts and glass signs; resembles finest gold leaf; easily applied; samples free. Metallic Letter Co., 406 N. Clark St., Chicago.

VALUABLE Premiums and Big Profits to Agents selling our order getting line of Guaranteed Pure Aluminum Goods. Our \$200,000 capital backs you. Write today for territory. Wm. J. Dick, Mgr., Dept. L-21, 20 W. Lake St., Chicago.

PHOTO Pillow Tops, Portraits, Frames, Sheet Pictures, Photo China Plates. Rejects credited. Prompt shipments; samples and Cat. free to agents, 30 Days' credit. Jas. C. Bailey Co., Desk O-1, Chicago, Ill.

THEY Sell Themselves. Agents reaping rich harvest on new adjustable floor and wall mops, dustless dusters and other sanitary brush specialties. Write today. Silver-Chamberlin Co., Maple St., Clayton, N. J.

EVERY woman buys our Curtain Protector on sight. Keeps curtains clean and whole, with windows wide open. Sells 50c. Agents make big money. Free literature. Send today. Flexo Protector Co., Westminster Bldg., Chicago, Ill.

LIVE Agents. Our new Carpet Cleaning Machine, biggest improvement yet made in vacuum or suction cleaners. New type just out. No bellows. No electricity. Unequaled for speed and power. Low price. Exclusive territory. Feeny Mfg. Co., Dept. E-65, Muncie, Ind.

AGENTS—Hustlers Coining Money. Men and women wanted—all time or spare time. A real summer seller—concentrated soft drinks—7 kinds. Sells in homes, for church picnics, fairs, stands, etc. It's new—act quick—get your territory now—be ready for the warm weather. Write today. American Products Co., 3011 Sycamore St., Cincinnati, Ohio.

PERFECTION Ford Starters for Ford cars. Guaranteed to start any Ford car that is in running condition. Splendid proposition and inducement for state and county agents. The Perfection Auto Starter Co., 1461 Broadway, Denver, Colo.

YOUNG Man, would you accept and wear a fine tailor made suit just for showing it to your friends? Could you use \$5 a day for a little spare time? Perhaps we can offer you a steady job. Write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Co., Dept. 797, Chicago.

AGENTS Wanted—Selling \$1 patented metal attachable fan for sewing machines; exclusive territory. Three different complete sample sets, \$1. Attachable Fan Co., 555 Eddy St., San Francisco.

AGENTS—Splendid line quick-selling specialties. Sell business men only. Big profits. Pershing Mfg. Co., South Bend, Ind.

AGENTS—Get particulars of the best Self-Heating Iron on the market. Low in price—absolutely practical. Three sales a day means \$40 a week profit to you. Send postal today. C. Brown Mfg. Co., 2848 Brown Bldg., Cincinnati, O.

AGENTS—Both Sexes—We manufacture and control fastest selling household article ever invented. Connolly, 123 Liberty St., New York.

IF we had your address we'd send free sample and show you how to make \$25, not one week, but weekly. G. Mfg. Co., 20-H Warren St., N. Y.

AGENTS, sell while new this best model folding high-chair. Grandmothers and aunts where baby visits and mothers who take baby visiting, all want this, as fitting satchel or pocket. La Belle Trading House, Shadyside, Ohio.

AGENTS Wanted—Agents make 500 per cent profit selling "Novelty Sign Cards." Merchants buy 10 to 100 on sight. 800 varieties. Catalogue free. Sullivan Co., 1234 Van Buren St., Chicago, Ill.

THOUSANDS of Government Positions open to Men and Women over 18. \$90 month. Vacations. Short hours. Write immediately for free list of positions now available. Franklin Institute, Dep't G22, Rochester, N. Y.

AGENTS Wanted—To sell Hair Ornaments. Box 442D, Crescent Comb Co., Leominster, Mass.

AGENTS! Mail-Order Dealers! Something new! Carnation Ink Powder Perfumed, scents your letters. Splendid seller. Big profits. Sample pint, 10 cents. Carnation Ink Co., Coatsburg, Ill.

UTILIZE spare time operating Ball Gum Machines; small investment; big returns. Advance Machine Co., Ravenswood Station, Chicago.

A LIVE one—Burglar-Proof Key Lock, sells everywhere—140% Profit. Full particulars and sample, 25c. Your money back if not satisfied. William A. Loveland Company, Lumber Exchange, Minneapolis, Minn.

AGENTS: Something new; 80c profit every sale; 20 sales day easy. Particulars and samples free. Nelson-Ryan, Desk I, Trenton, N. J.

SELL Fountain Pens for us. Highest grade. Retail at popular prices. Good profits. P. Willard Pen Co., Bayonne, N. J.

WE have the four best auto accessories. Every motor owner buys. Quick sales. Big profits. Samples free to workers. Write today for territory. Wm. J. Dick, Mgr., Dept. L-23, 20 W. Lake St., Chicago, Ill.

\$200 GUARANTEE to deputies. Ask about our sick and accident insurance plan. National Benevolent Society, 527 Westover Bldg., K. C. Mo.

ABSOLUTELY New—Sight Spark Intense Meter shows spark plugs shooting. Increases power, saves gas, fires the dirtiest plug, locates trouble instantaneously. Goes on dash. Necessary on every automobile. Like speedometer. Big seller. Big profits. Will be sold in your territory. Are you the man? Doxey, 2132 Michigan Ave., Chicago.

FROM Dance Hall to White Slavery. 400-page, cloth book, illustrated, \$1. Immense sale. Experience unnecessary. Outfit free. Big money quick. Charles C. Thompson Co., Manufacturing Publishers, 1128 Wabash Ave., Chicago.

AGENTS make \$100 monthly selling our 500 handy household articles. Catalogue free. Scheff Company, Desplaines, Ill.

PORTRAIT Agents. For good, conscientious work, deal with artist direct. Write for prices. Charles A. Sweet, 520 New Era Bldg., Chicago.

AGENTS—Make big money calling on automobile owners. Get our proposition today. Berkshire Supply Company, Box 47, Station A, Boston, Mass.

AGENTS Wanted. If you can sell to Bands, Offices, Homes or Hotels, send 10c for samples, which you can put in vest pocket; sells at sight for 50c. Venus Co., 21 West Illinois St., Chicago.

AGENTS Wanted—Right here is the one big chance of your life. If you want to make good money—\$10 a day or more, as easy as rolling off a log, and get your swell clothes free besides, you can do it by acting as our agent. We are the biggest people in the business and want our agents to make big money and be nifty, stylish dressers. Send a postal today for free \$10 outfit, including a big book of nobby, suiting samples to select your swell agent's suit from. Then take orders from people who admire your nifty clothes. They come to you—not you to them. This is the way to get rich—the sure, easy way. Remember, you need no money—everything is furnished by us free. We pay express on everything. Just send a postal, but do it today. You can't get started too quick, making this big money and wearing these stylish clothes. Address card to Paragon Tailoring Co., Dept. 714, Chicago, Ill.

DON'T be an Agent—Own your own business. We furnish complete, practical, low price outfits for plating in Gold, Silver, Copper, Nickel, etc. We furnish recipes, formulas, trade secrets. Work easy, profit enormous. Send today for particulars. Gray & Co., Plating Works, 896 Gray Bldg., Cincinnati, O.

GENERAL Agents—Capable of calling on the big trade themselves and handling canvassers for the house to house and office to office business, to sell the newest electric specialty on the market; sold everywhere there is electricity, in the home, office, factory, store, hotel; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; shows how to use one light instead of two and get the same results; sells for \$2.50, \$3.50, \$5, and saves the purchaser an investment of \$25.00. Write for particulars. The Handy Light Co., 156 Handy Light Block, Cincinnati, Ohio.

200% PROFIT. You can't beat it. Sells everywhere. Free pocket sample. Our goods get the orders. Wm. J. Dick, Mgr., Dept. L-4, 20 W. Lake St., Chicago.

DRESS Goods Agents wanted to introduce our very complete Fall line of beautiful wool suitings wash fabrics, fancy waistings, silks, hdkfs., petticoats, etc. Up to date N. Y. City patterns. Finest line on the market. Dealing direct with the mills you will find our prices low. If others can make \$10 to \$30 weekly you can also. Samples, full instructions in neat sample case, shipped express prepaid. No money required. Exclusive territory. Write for particulars. Be first to apply. Standard Dress Goods Company, 109 7th St., Binghamton, N. Y.

AGENTS: Just the season for selling our wonderful Ventilator Window Locks. Fasten upper and lower sashes with grip of steel in any desired position. Price, only 25c. Protect health, save children, keep out intruders. Indispensable for homes, hotels, public institutions. One agent took \$6 orders first day. Others sell four to six dozen every day, steadily. Get our offer at once. Technology Sales Co., Inc., 32 Union Square, New York.

AGENTS: Clear 100% profit every sale. Wonderful new little article. Greatest seller on the market. No experience required. Our agents clearing \$50 to \$100 weekly. Write for my proposition today. Henry Marshall, 2127 Wabash Ave., Chicago.

AGENTS! Double your income! Treble your sales. The Agents and Mail Dealers' Magazine shows how to buy Right. \$2 articles cost you 30c; Quarter articles, 2c. Fifteen other rare bargains. It puts you next to original manufacturing plans, mail-order schemes with enormous profits, etc. Two big money-making issues for 10c. Agents' Magazine, 100 Franklin Building, Chicago.

WOULD you like to own a good paying parcel post business? We have a line that gets repeat orders all the time; you can start in spare time; invest a dollar or two a week and soon own a nice business of your own; write for particulars. Nadico, 1698 Belmont Ave., Chicago.

MAIL Order Outfits. Best Sellers. Very small outlay required. Free printed matter, Envelopes, Letterheads, Circulars, Mailing Boxes, Rubber Stamps, etc., included. Particulars. Rollins & Co., Dept. 54, Boston.

\$5 DAILY selling greatest needle assortment by clever distributing method. No talking or experience required. Particulars and sample, 4c. C. L. Winegar, Imp., Box 100, West Fort Ann, N. Y.

GOOD Profit selling our milk-bottle cap lifter and handle to dealers or consumers. Postal brings particulars. P. Simco, Rosebank, N. Y.

AGENTS wanted for Fireless Solder Cement; mends aluminum and all metals; can be applied cold or with heat; indispensable for household, automobiles and motorboats, neither heat nor water effect it. Send 12c for sample and agents proposition. Dexter and Halsey, 16 Exchange Place, New York.

AGENTS—To sell Ice Blankets for household use; will reduce ice bills fifty per cent. Sample, 15c. A. Morton, Arlington, N. J.

AGENTS make money selling our guaranteed Corn Remover; busy season now on. Gregoire Co., 563 Main, Manchester, N. H.

AGENTS—Our Big Offer—Business opportunities and six big money-making propositions, 10c. Kreo Company, Box 297, Yonkers, N. Y.

AGENTS wanted for our celebrated Ho-Ro-Co. Skin and Scalp Soap; perfumes; toilet articles; goods guaranteed; large profit. Hoppinger & Roth, 212 North 2nd, St. Louis.

GET cash for names, ideas, formulas, information. Booklet for stamp. Information System, 215 Marietta, Ohio.

WRIST Coin Holder: It is new and it fills a long-felt want. Send for free particulars. The Ready Change Co., 376 River St., Chicago.

MR. Mail-Order Man: Get quick returns. Established corporation supplies fast Mail-Order sellers; factory prices. Classy proposition. Beginners or established firms. Copyrighted Prospectus free. Mississippi Valley Co., Inc., Box N629, Pittsburg, Kans.

NEW Envelope Opener. Sells in every office. Fits vest pocket. No trash. Sample, 25c. Clifford, 162 West 34th, New York.

MINTON'S Iron rust, mildew and ink remover, vanishes stains like magic; retails 25c; profit 18c; 10c brings working outfit. A. Minton Co., 7002 Hamilton Ave., Pittsburgh, Pa.

AGENTS: Rich-looking Imported Rugs, 36x68 inches, sell quickly in nearly every home. Either write for descriptions and terms to agents or else send 98c for sample rug prepaid. A. Condon, Importer, Stonington, Me.

AGENTS—A free course in General Salesmanship is given to every man of our Sales Organization. This organization is a body of successful men selling the Handy Light, that unique electrical device which cuts the cost of electric lighting in half. Sells for \$3.50, is used in home, office, store, factory; weighs only one pound. Sold by demonstration. All agents furnished with well-planned methods for gaining interviews. A high-grade business for a man of ability and standing in his community. General Agents preferred. Inquire for our full proposition by addressing The Handy Light Co., 1104 Handy Light Block, Cincinnati, Ohio.

AGENTS—Electric Sign: Flashes changeable wording in radiant, sparkling beams of colored Electric Light. Outselling everything at \$10. Valuable exclusive territory. Sample free. Flashtrix Sign Works, Chicago.

AGENTS! Money-making proposition. Free. With "Hidden Wealth" and Gold and where to find it, 50c. Write now. Hidden Wealth Co., Box 343, Lead, S. D.

MAKE and sell your own goods. Manufacturing processes and formulas by expert chemists. Government information obtained. Formula Catalog free. B. Mystic Co., Washington, D. C.

AGENTS—Men and women, newest invention. Wing Self Heating Flat Iron; guaranteed, sells everywhere. Women delighted. Write for particulars. Wing Mfg. Co., 1608 Fulton St., Chicago.

We have a cracker-jack proposition for you. Household necessity of unusual merit. Everybody wants it. Logan Mfg. Co., 2313 Lyndale, Chicago.

AGENTS—Students and others: Our wonderful luminous Crucifix. Shines in darkest room. A great summer seller. Pioneer Portrait Co., 1259 W. 63rd, Chicago.

GOLD Sign Letters. Instructions for making \$1. Immensely profitable business. Sample free. Johnston Co., Quincy, Ill.

AGENTS, Mail Order Dealers, \$100 a month easy, the 1914 Adding Machine, \$5 delivered; guaranteed five years. Exclusive territory. Address, Phelps Company, Caro, Mich.

AGENTS make \$5 profit daily. Name Plates, House Numbers, Signs. Particulars free. Roscoe Lynch, Bausman, Pa., Dept. B.

"RICHARD" Knives sell in every family. Large profits. More agents, men and women, wanted. The Stephen Richard Co., Southbridge, Mass.

HOUSEHOLD Article, big profits. Sample to workers. Jacobsen Supplies, Racine, Wis.

400% PROFIT selling our repeat order Goods. Free Samples and Catalogue. Bencoma Co., 7938 Bennett Ave., Chicago.

AGENTS Wanted. New patent just from the United States Patent Office. Roller Top Drafting Table. Send for catalogue. A. C. Andrews, Inventor and distributor, 515 S. Maxey St., Sherman, Texas.

AGENTS, either sex, sell "Wonder Cloths," clean everything. Big profit. Motorists, housewives, mechanics your prospects. Send 10c for sample. Particulars free. Browne, 1734 First National Bank, Chicago.

SELL Safety Razors, 150% profit. Sample 15 cents. C. Beyen, Roselle, N. J.

FAN Motors operating by gas or gasoline. Write quick. Winfield H. Smith, Manufacturer, Buffalo, N. Y.

START a Mail Order Business, spare time, 300% profit. Instructions to manufacture 24 great sellers; also hundred opportunities for 10c. The Gerard Manufacturing & Pub. Co., 46 Murray, Quebec, Canada.

400% PROFIT selling our high-grade work. Samples free. Gordon Co., Northwestern Bldg., Chicago.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for \$3.50 and saves the purchaser an investment of \$25. Write for particulars. The Handy Light Co., 18 Handy Light Block, Cincinnati, Ohio.

AGENTS make good selling our patented household articles. Send for our illustrated catalog. Peter Van Woert, Oneonta, N. Y.

AGENTS would you take a steady job where you can clear \$20 to \$30 weekly to start and work up to yearly profits of \$3,000 or more? No experience required. Great crew managers' proposition. We manufacture. Middlemen profits saved. Get posted on our 1914 exclusive territory—business-building selling plans. Act quick. E. M. Davis, Pres., R64, Davis Bldg., Chicago.

AGENTS—\$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

AGENTS—250% profit. Wonderful little article. Sells like wildfire. Can be carried in pocket. Write at once for free sample. H. Mathews, 1962 Third St., Dayton, Ohio.

AGENTS and Salesmen wanted to sell Morthanqik Parcel Post Calculator. 100% profit. Every tradesman a customer. Pocket sample free. Morgan Mfg. Co., Dept. U, Newport, R. I.

AGENTS Wanted—Rocker Vacuum Clothes Washer—Not a funnel pounder. Sells \$1.50, sample postpaid, \$1. Quick sales, big profits. Money back if requested. Ingram Co., 2 Stone St., New York.

PORTRAIT Agents—Write for prices on Solar, Bromides, Convex Prints and Pillow Tops. We ship orders back promptly. Try us. Horne Copying Co., 113 S. Jefferson St., Chicago.

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, 15 cents. Pease Die Works, Dept. M, Winchester, N. H.

AGENTS—Salary or commission. Greatest seller yet. Every user pen and ink buys on sight, 200 to 500 per cent profit. One agent's sales \$620 in six days; another, \$32 in two hours. Monroe Mfg. Co., X6, La Crosse, Wis.

SANITARY Kitchen Aprons of waterproof cloth; agents. E. L. Co., 23 Columbia St., Boston, Mass.

SELL Dry Goods Remnants. Greatest bargains on earth. Remnant Store Co., Cincinnati, O.

AGENTS to take orders for Visiting and Business Cards; large profits; outfit free. Forman Printery, Waterbury, Conn.

ANYBODY can earn \$30 weekly selling our household and office specialties. Lake Shore Manufacturing Company, Michigan City, Ind.

AGENTS—500% profit, free sample Gold and Silver Sign Letters for store fronts and office windows. Anyone can put on. Big demand everywhere. Write today for liberal offer to agents. Metallic Letter Co., 406 N. Clark, Chicago, U. S. A.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R. Cincinnati, Ohio.

HUSTLING man under 50 years wanted in each locality. To join this Society and introduce our New Memberships. Part or full time—\$50.00 to \$500.00 monthly. Experience not required. Address, I-L-U, 2022, Covington, Ky.

\$50.00 A WEEK guaranteed selling Pure Spun Aluminum Cooking Utensils. We are manufacturers of the largest line in the world. First Aluminum Cooking Utensils made bears our trade-mark. Wanted live men at once for protected territory. Answer quick. Divn. PM. American Aluminum Mfg. Co., Lemont, Ill.

THE Fuller Dustless Mop and Furniture Duster are advertised in leading magazines. We need live representatives for unoccupied territory. These articles contain exclusive features. Fuller Brush Co., 55 Hoadley Place, Hartford Conn.

COST 1c, sell for 10c. Ready-made sign letters anyone can apply. Unlimited demand. Five samples, instructions, 10c. Particulars free. Everbrite Co., 982 Third Ave., New York.

AGENTS make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Dip Pen Company, Dept. 2, Baltimore, Md.

WE need live wire representatives for unoccupied territory to handle The Fuller Sanitary Brushes. Our product is nationally advertised and covers every need. Your territory is valuable. Write for particulars. Fuller Brush Co., 33 Hoadley Place, Hartford, Conn.

GENERAL Agents everywhere for our new "Sav-Ice" Cloth; especially prepared for preserving ice in refrigerators. Reduces ice bills one-half; exclusive territory to good, responsible parties. Harsch Mfg. Co., Box 634, Indianapolis, Ind.

HONEST man wanted in each town to distribute free advertising premiums; \$15 a week to start; experience unnecessary; references required. Address McLean, Black & Co., 11 S. Beverly St., Boston, Mass.

AGENTS: We want, at once, a man or woman, one capable of earning good salary, in every community where we are not represented. Write us. Sun Mfg. Co., 309 Dean Bldg., South Bend, Ind.

HOUSEHOLD necessity recently invented sells at 75c. Costs distributors 25c. Nothing like it on the market. Tested and approved by Good Housekeeping Institute. Get your territory now. Hugro Mfg. Co., Chicago, Ill.

WE have agents making \$200 weekly, selling our new specialty to merchants. Retails \$7.50, your profit \$5.00. No competition; exclusive territory. Samples and descriptive matter free. Sayers Co., 408 Olive St., St. Louis, Mo.

MAIL-ORDER Opportunities: 25 new Propositions. No competition! Make 95c profit on dollar order; complete outfit 10c. Mail Dealers Wholesale House, 521 Franklin Bldg., Chicago.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 305, Boston, Mass.

AGENTS make \$5.00 to \$10.00 a day on the start. Atkinson writes: "The best proposition I have found in my forty years canvassing." Permanent work. Household necessity. Saving 80%. Write today for General or Local Agents terms. Free sample. C. H. Stuart & Co., 16 Union St., Newark, New York.

BIG Profits for You! Manufacture Barley Crisp. New confection. 5c package costs you 1c. Machine, instructions complete \$7.50 prepaid. Send 10c for samples. Barley Crisp Co., 1605 Hyde St., San Francisco.

MEDALLIONS—300% profit. Make up your own goods and be independent. Catalogue free. Resag Co., 1205 Randolph St., Chicago.

AGENTS Wanted—Mechanics and shopmen make over \$100 a month in spare time selling transparent handled novelty knives and razors. Big profits. Sales easily made. Write for terms today. Novelty Cutlery Co., 67 Bar St., Canton, O.

YOU can make \$\$\$\$ as our general or local agent. Household necessity; saves 80 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. **J. Pitkin, 113 Redd St., Newark, N. Y.**

AGENTS—Sell the Primus, genuine Swedish wickless, coal-oil stoves. Smokeless, odorless. Twice the heat of gasoline at one-eighth the cost. No danger of explosion. Big profits. **James Anderson & Sons, Sidney, Ohio, American Distributors.**

AGENTS—Spare time, good, permanent income; repeat orders; hotels, restaurants, stores, etc. Write now. **Wrigley, 1328 Herald Square, New York.**

EARN \$50 to \$75 weekly. Complete plans, instructions only 25c. **Schutt, 3021 Walnut St., Chicago.**

HELP WANTED

YOUNG Man, would you accept and wear a fine tailor made suit just for showing it to your friends? Could you use \$5 a day for a little spare time? Perhaps we can offer you a steady job. Write at once and get beautiful samples, styles and this wonderful offer. **Banner Tailoring Co., Dept. 798, Chicago.**

\$75.00 MONTH paid Railway Postal Clerks. Thousands appointments coming. Apply **Franklin Institute Dept. G-21, Rochester, N. Y.**

GET a Government Job! See ad on page 28. Write now—today. **Patterson Civil Service School, Rochester, N. Y.**

SPLENDID weekly profits in spare time at home. Mail-Order business; don't worry about capital. **Boyd H. Brown, Dept. K, Omaha, Neb.**

YOUR Spare Time Worth \$60 Month? Address **Commercial Information Co., PMC, Peru, Ind.** Enclose stamp.

FREE Illustrated book tells of about 300,000 protected positions in U. S. service. Thousands of vacancies every year. There is a big chance here for you, sure and generous pay, lifetime employment. Just ask for booklet 8-29. No obligation. **Earl Hopkins, Washington, D. C.**

THOUSANDS Government Jobs open to Men and Women. Big pay. Write immediately for free list. **Franklin Institute, Dept. G-21, Rochester, N. Y.**

A MONEY Proposition—Co-operate with me in a profit-sharing mail-order business. Will place trial advertisement, furnish printed matter, goods to all orders and divide the profits. Particulars. Desk 153, **Hazen A. Horton, Tekonsha, Mich.**

BE a Detective. Earn \$200 monthly, positions open. A practical course in Detective Work taught by mail. **American School of Criminology, Detroit, Mich., Dept. F.**

WANTED—Men over 18 as Government Railway Postal Clerks. Commence \$900 per year. Parcel-Post requires hundreds. Details free. Write immediately. **Franklin Institute, Dept. G-21, Rochester, N. Y.**

LEARN the Real Estate Business. See advertisement under "Business Opportunities."

"GET the Position That You Want," is a guide that will tell you exactly how to find the opening and secure the position that you want. Mailed for 25c. Circulars free. **I. M. Cochran, Box 307, Bond, Miss.**

U. S. GOVERNMENT Jobs open to Men and Women. Over 15,000 appointments coming. \$75 to \$150 month. Life jobs. Pleasant work. Short hours. Vacations. Common-sense education sufficient. Full directions telling how to get position—free. **Franklin Institute, Dept. G-21, Rochester, New York.**

MONEY—Spare time. No canvassing. Furnish us information. Markets waiting. Exceptional proposition. Particulars for amp. "Nisco." **HDB, Cincinnati.**

RAILWAY Postal Clerks Wanted. \$75.00 month. Apply **Franklin Institute, Dept. -21, Rochester, N. Y.**

BE a Detective—Earn big pay. Easy work; Wonderful opportunities; Experience necessary. Write, **Fidelity Secret Service, ask A, Wheeling, W. Va.**

RAILWAY Postal Clerks Wanted. \$75.00 month. Life job. Write immediately for all particulars. **Franklin Institute, Dept. -21, Rochester, N. Y.**

YOUNG man without previous experience learn to care for and drive automobile. Address **Box 91, Utica, N. Y.**

HOME Work. Collect names for business concerns. Big demand. Booklet for stamp. **Formation System, 217, Marietta, Ohio.**

MAKE money writing short stories. Big pay. Free booklet tells how. **United Press indicate, San Francisco.**

FIREMEN, Brakemen. All railroads, \$120. Experience unnecessary. Send age, postage. **Railway Association, Dept. 298, Brooklyn, N. Y.**

THE Apprentice Department of the General Electric Company of West Lynn, Mass., offers excellent opportunities to Grammar School Graduates to learn one of the mechanical trades. Apprentices receive adequate wages from the beginning, both for shop and classroom work. Apprentices are admitted at all times. Write for illustrated catalogue. All applications should be sent to the Educational Department of the Company.

MOTION picture plays wanted. You can write them. We teach you. No experience needed. Big demand and good pay. Details free. **Ass'd M. P. Schools, 671 Sheridan Rd., Chicago.**

GOVERNMENT Examinations. Most thorough preparation; \$5; returned if not appointed; particulars free. **American Civil Service School, Washington, D. C.**

WANTED—Circular distributors; enclose stamp. **American Distributor Co., Blairsville, Pa.**

"MY Lady of Dreams," the coming big song success. A great song with an attractive title page. Ten cents in stamps or coin. **Marks-Goldsmith Company, Department D, Washington, D. C.**

BE a detective. Earn big money. Write **John J. Gilles, Licensed and Bonded N. Y. State Detective. Retired Member N. Y. Police Dept. 22 years Experience, 254 Huguenot St., New Rochelle, N. Y.** Investigation solicited.

WRITE Moving-Picture Plays. \$50 each. All or spare time. Correspondence course unnecessary. Details free. **Atlas Publishing Co., 3045, Cincinnati, Ohio.**

BE a Detective—Earn \$25 to \$75 weekly; chance to see the world with all expenses paid. **Loraine System, Dept. 304, Boston, Mass.**

GO on the Stage. Vaudeville career offered you. Experience unnecessary. Managers endorse my method. Instructive vaudeville book free. Write today. **Frederic LaDelle, Sta. 10, Jackson, Mich.**

WANTED—Distributors, Men and Women—to give away free pkgs. Perfumed Forax Soap Powders; no money or experience needed; good pay. **S. Ward & Company, 218 Institute, Chicago.**

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. **Voorhies, Desk C. R., Omaha, Neb.**

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. **G. F. Redmond, Dept. 306, Boston, Mass.**

WANTED experienced advertising manager for established rural magazine. Life position, good pay for right man. Must take interest in business. **A. H. Hartwig, Watertown, Wis.**

SALESMEN WANTED

RESIDENT Representatives to sell our Maroa System of Electrical Treatment to physicians and the homes where 110 Volt Alternating Current is used. Endorsed by physicians. From \$15 to \$125 capital required, depending on size of territory. An exceptional opportunity to rapidly develop a business of your own with small investment yielding large returns. Splendid sideline. **Maroa Manufacturing Co., Maroa, Ill.**

EXCEPTIONAL opportunity for side line specialty salesman, calling on Wholesale and Retail Drug, Department Stores, Automobile or Hardware trade. Patented, nationally advertised, guaranteed specialty. \$50 to \$250 per month easily earned. Give full particulars present line, territory, experience and references. Write at once for territory reservations. Address: **Sanitax Co., 2359 S. Wabash Ave., Chicago.**

WE'VE got a new product with new Sales Plans. Crew managers and live wire Salespeople. Will make you sit up and take notice. We've got the goods! Write **Toxal Chemical Company, 23 Devereux St., Utica, New York.**

SPECIALTY Salesmen—Something new—latest electrical wonder—substitute for medicine—High Frequency Violet Ray machine. Relieves chronic disorders due to faulty nutrition or poor circulation. Sells every home—massage or beauty parlors—Doctors—Dentists. No competition. Big money. Machine and results guaranteed. Good territory open. **Eastern Electric Company, Cleveland, Ohio.**

SALESMEN—We have some excellent territory open to salesmen of ability. This is a proposition that appeals to the best class of concerns. Sales are easy and your profits large. Write us today for catalog **P. M.,** covering the **Schick All-Steel Paper Baler, Davenport Mfg. Company, Davenport, Iowa.**

SITUATIONS WANTED

WANTED—Situation with agreeable, practical, reliable people of means, interested in co-operative and other business. Am agreeable, practical, reliable, sober, poor. Have knowledge and experience. Particulars exchanged. **G. A. Johnsrud, c/o W. B. Hackett, Route 1, Saginaw, West Side, Mich.**

FOR SALE

FOR Sale—Lumber yard for building trade. Established trade in the best city in the United States. Address **Warren Ross Lumber Co., Jamestown, N. Y.**

WOOD Sawing Outfit. Saw table with saws, double power splitter, shafting, belt-ing, pulleys, etc. **W. G. Snyder, North Adams, Mass.**

FOR Sale—General Store, \$3,500 stock, good buildings, 2 warehouses. Also 80-acre farm. **Sargent, Abrams, Wis.**

FOR Sale—Three volumes Concrete Engineering. Excellent condition. **H. Rustau, Buxton, Iowa.**

FOR Sale—Patterns and Drawings complete for wire-forming machines, Pillar and Open-back Presses. **P. O. Box, 808, Waterbury, Conn.**

FINE Typewriter, \$12.50; phonograph complete, \$10; guitar, mandolin, banjo, cheap. **Clifford Scott, Dumont, N. J.**

FOR Sale—McCreery's 3 1/2 hp. Vacuum Machine, no truck. Address **John Preslar, 114 S. Cumberland St., Dallas, Texas.**

ROOFING canvas painted one side; best made. **Otis, Columbia St., Boston, Mass.**

SHAPER—Stroke 16", Cross Feed 18 1/2". Vise opens 8". Complete with countershaft \$225. **Grammes Sons, Allentown, Penna.**

FIELD and Marine Day and Night Glasses with case, 25 mile adjustment, \$30 value. On approval, prepaid, \$6.50. **Ye Curiosity Shop, 20 So. Second St., Philadelphia, Pa.**

\$200 CHEMICAL laboratory, \$85. List free. **1228 Scribner Ave., Grand Rapids, Mich.**

WANTED

ARTICLES, newsy items and kinks wanted for a magazine. Illustrated, short, written in popular style. Liberal payment for those accepted. Send what you have to **J. L. Jones, 150 North Market St., Chicago.**

SALE OR EXCHANGE

5 GAS Floor Furnaces. One or all at factory price. Great heater for shops, etc. Address **218 S. Broad St., Grove City, Pa.**

GUNS, SPORTING GOODS, ETC.

OLD Pistols and Guns Wanted. Will buy or give in exchange almost any sort of modern revolver, rifle or shotgun. **Stephen Van Rensselaer, West Orange, N. J.**

MACHINERY, TOOLS AND SUPPLIES

15"x5 FT. 10" Wagner Engine Lathe, 3/4" Hol. Spin, Comp. Rest, 12" Four-Jaw Chuck, complete, good condition, \$155 cash. **Western Machinery Co., Cincinnati, Ohio.**

FOR Sale—2 lathes and 2 planers. **W. J. Ferrell, Barberton, Ohio.**

FOR Sale—Lighting plant, 6 hp. engine, 3 1/2 K. W. dynamo, first-class condition. Price \$350. **Novinger Bank, Novinger, Mo.**

FOR Sale—25 Lincoln milling machines, \$25 to \$100 each. **Lucas & Son, Bridgeport, Conn.**

HARRISON "M. I. P." Key Filing Machine enables a novice to make perfect duplicate keys for all pin tumbler locks. Every machine guaranteed. Price \$3. Special diamond-shaped files for making Yale keys, 4 for \$1. **Harrison & Co., 81 1/2 New St., N. Y.**

MOTOR driven engine lathe 16"x6", price without motor, \$90. Motor if desired. **W. C. Houghton, 141 St. Jerome Ave., Holyoke, Mass.**

CELLAR Drainer operated by water from city water pipes one inch size, \$4. **Frank C. Douds & Co., New Castle, Pa.**

PULLEYS, Gears, Sprockets, Shafting, Hangers; see page 124. **W. A. Jones Foundry & Machine Co., Chicago.**

CASH or Trade for Iron-working machinery, rim planer, shaper, spoke tension machine, gasoline engines, 22 hp. Truck. P. Decks Machinery Co., Racine, Wis.

FOR Sale—Almost new No. 30 Universal Woodworker, with or without engine. Write Box E, Orient, N. Y.

ATTENTION, Woodworkers—Replace plane handles. Indestructible light-weight ones. 1 prepaid 50c. Satisfaction guaranteed. Fultzfolk Co., 1304 Hendricks, Anderson, Ind.

OXYACETYLENE Welding Machine Manufacturers. Safety, economy, efficiency, simplicity. Full information on request. Delcampe Welding Company, Bridgeport, Conn.

REBUILT Leather Belting. Half the price, equal new in service, excellent appearance, all sizes, satisfaction guaranteed. Also new, 25% under dealers' prices. Canvas Thresher Belting. Fredrich Belting Co., Manufacturer, St. Louis, Mo.

VACUUM cleaner pumps, tanks, hose and tools for stationary plant for house, flat or wagon. Prices wholesale. Assemble your own machine. Saves half. Vacuum Supply Co., Ann Arbor, Mich.

HAVE for sale several sizes of lathes, milling machines, drill presses, punch presses, shapers, planers, boilers, steam engines, oil, gas and gasoline engines and wood-working machinery. Pinner, 122 Water St., New York, N. Y.

ENGINE Lathe, swings 9 1/2", takes 25" between centers. Complete set gears cutting all size threads 3" to 40", \$43.50. Grammes & Sons, Allentown, Pa.

HOW to Run a Lathe. A 50-cent book for 10 cents postpaid. S. B. Lathe Works, South Bend, Ind.

ENGINES AND MOTORS

GUARANTEED 60-cycle single-phase motors, 1/4-hp. Emerson, 1,150 speed, \$28; 1/2-hp. Holtzer Cabot, \$25; 3/4-hp. Wagner, \$38; 1-hp. Wagner, \$53; 2-hp. Wagner, \$67; Three-phase, 1/4-hp. General Electric, 1,200 speed, \$22; 1/2-hp. Westinghouse, \$22; 3-hp. Westinghouse, 1,200 speed, \$55. Motors bought, sold, exchanged. Guaranteed repairs. Hyre Electric Co., 613 So. Dearborn St., Chicago.

BARGAIN—9-hp. Otto Stationary Gas Engine. M. Treadwell, 2212 Greenleaf Ave., Chicago.

MOTORS—About 200 brand-new 60-cycle, single-phase, 110 V., Westinghouse motors, brand new, still in their original boxes. One 1/12 hp., \$11; one 1/10 hp., \$13.50; one 1/8 hp., \$15; one 1/6 hp., \$18; one 1/4 hp., \$20. Geo. Sachsenmaier & Co., 145 N. 3rd St., Phila.

THREE Horsepower Victor Gasoline Engine, good condition; price \$50. Write Diem & Wing, Cincinnati, Ohio.

NEW and second-hand engines for sale and exchange. Apply with stamps. B. W. Richardson, Peoria, Ill., R. 36.

FOR Sale—New 40-horsepower direct-current motor. Edison direct-current dynamo, 40 volts, 600 amperes. Fine condition. J. Buchel, Conti St., New Orleans, La.

6 1/2 HORSE Elevator Motor, 110 d. c., including controller. F. W. Bacon, Tiffin, Ohio.

COMPLETE Marine Engine and Outfit consisting 8-10 hp., 2 cycle, 2 cyl. Cushman engine, Baldrige gear, Detroit lubricator, rear starter, Atwater Kent ignition, auto controls, steering wheel and rudder. All condition. Bargain, \$165. Otto Merker, 1921 S. Central Park Ave., Chicago.

ONE Motor, 30 hp., 3-cylinder, in good shape, \$100. Louis Larson, Harmony, Minn.

FOR Sale at a Bargain. New 5x6 four-cylinder governor-controlled engine, fully equipped with carburetor magneto. Will sell for much less than cost. Fred Hanson, 570 Prior Ave., St. Paul, Minn.

COMPRESSION restored without rebor-ing. Motor boats, automobiles, pumping and agricultural engines. Wille Adjustable Piston Company, 1534 Fulton St., Brooklyn, N. Y.

REBUILT Engines—We have on hand a number of rebuilt "Buffalo" engines, guaranteed, at greatly reduced prices. Write for bargain list. Buffalo Gasoline Motor Co., 1293-1305 Niagara Street, Buffalo, N. Y.

CEMENT

IF you want the best information on cement and concrete construction, subscribe for Concrete-Cement Age, leading cement and concrete monthly. Sample copy, 10 cents. Yearly subscription, \$1.50. Concrete-Cement Age, 135 Newberry Bldg., Detroit, Mich.

ENGINE CASTINGS AND BLUE PRINTS

GASOLINE Engine Castings, with drawings. Cheap. Catalog for stamp. Novelty Manufacturing Co., 853 West 6th St., Cincinnati, Ohio.

FLOUR & FEED MILLING MACHINERY

SPECIAL bargains in second-hand Attrition mills, burr mills, crushers, corn shellers, bran dusters, dust collectors, purifiers, reels, double, single, 2 and 3-pair high roller mills, sieve bolters, receiving separators, scourers, etc. Write for description and prices. Sprout, Waldron & Co., P. O. Box 429, Muncy, Pa.

MANUFACTURING

WRITE for our proposition on Blanking and Forming dies and metal press work. Complete equipment for all work in any quantity. S. D. Childs & Company, Chicago.

WIRE Goods, all kinds, made to order. Cooley Mfg. Co., 533 W. Monroe St., Chicago.

BOATS AND LAUNCHES

FOR Sale or Charter—Steel Twin screw cruising power yacht; 98x16x5 ft. Recently built from our designs. Speed 14-16 miles; two 100-125-hp., 6 cyl., Standard motors. Two double and two single staterooms, bath and two toilets; forward deckhouse contains music and smoking room, dining saloon in after one. One of the finest seaboats of size afloat. Apply to Cox & Stevens, 15 William St., New York.

BUILD your own Steel Boat, from patterns, materials furnished, also completed boats. Catalogue free. F. H. Darrow Steel Boat Co., 512 Perry St., Albion, Mich.

FREE Booklet: How to make Gasoline Launches Silent and Increase the speed of engine. B. Cavito, 838 Kirtland Ave., Grand Rapids, Mich.

BLACKSMITHS

HERE is your opportunity to be an expert blacksmith without help. As life is short, get Toy's Modern Methods of doing hard jobs easy, forging and welding all kinds of steel solid. Also tempering all tools to a standard by colored charts. This is real plain information, not theory, all for \$1. Send for free samples first. W. M. Toy, Sidney, Ohio.

FOR THE SHOP

USE standard gear charts when laying out gear teeth; for particulars address J. Altman, 210 Baldwin Ave., Spokane, Wash.

ELECTRICAL

TRANSFORMERS, 100 watt, ideal for induction coils, miniature lamps, small motor and experimental work. Price, \$3.50. Bell-ringing transformers, \$2.50. Write today for details. M. C. Fenner, Paterson, N. J.

RENEW old dry batteries; 3 best methods with complete instructions, 20c. Guaranteed. Formula Bureau, 3311-E, Belleplaine Ave., Chicago.

50 LIGHT Dynamo, \$65, in payments of \$5 per month. Box 161, Troy, Ohio.

ELECTRICAL Apparatus for Exchange. List free. Seaco, York, Nebraska.

STAMP COLLECTING

PREMIUM to new applicants for approvals. References. Mrs. Oughtnid, 28 Lincoln Ave., Montreal, Que.

JOIN collectors' society. Exchange-Sell duplicates. Write Webb, Perry, Ohio.

DANDY packet 25 stamps, 2c. "Approval Packets." Hawkins, Raton, N. Mex.

FREE. Fine animal packet, 2c (stamp) postage. Lightbown Stamp Co., Palmerston Road, Southsea, England.

FOREIGN Stamps Free; 52 different foreign, including China and Venezuela, to all who apply for our high grade approval selections. Send two cent stamp for return postage. Edgewood Stamp Co., Dept. H, Milford, Conn.

100 DIFFERENT stamps, cataloging 2c and up, over \$2.00 catalogue, 10c. California Stamp Exchange, Ontario, Cal.

FOREIGN Stamps, Packet of 200, all different, for 10c only. Payn Stamp Co., 138 North Wellington St., Los Angeles, Cal.

STAMPS wanted from original sources of supply. Beebe, Yonkers, N. Y.

STAMP Album with 538 Genuine Stamps, incl. Rhodesia, Congo (tiger), China (dragon), Tasmania (landscape), Jamaica (waterfalls), etc., 10c. 100 diff. Jap. N. Zld., etc., 5c. Big list; coupons, etc. Free. We buy stamps. Hussman Stamp Co., St. Louis, Mo.

PACKET of 23 stamps; no two countries alike, 500 hinges. Set of \$1 and \$2 U. S. Rev., all for 5c. Mention paper. Miami Stamp Co., Toledo, Ohio.

25 DIFFERENT British Colonials to applicants for stamps on approval who send 2c postage. Nickles, Box 2466, Washington, D. C.

STAMPS—105 China, etc., stamp dictionary and list, 2c. Bullard, Sta. A Boston.

STAMPS, 100, all different, free. Postage 2c. Mention paper. Quaker Stamp Co., Toledo, Ohio.

24 VARIETIES Cuban stamps, 10 cents. List of 6,000 low-priced stamps free. Chambers Stamp Co., 111 P. Nassau St., New York City.

205 DIFFERENT foreign stamps, 10 United States, 60 Japanese or 50 Asiatic free. Remit 25c six months subscription. McKel's Stamp Weekly, Boston, Mass.

RARE COINS

\$4.25 PAID for 1856 Flying Eagle Cent. Hundreds of other Coins bought. Send 10c for buying catalog. A. H. Kraus, 294 Kraus Bldg., Milwaukee, Wis.

FOREIGN Coins One Cent Each. 10 different countries, 10 cents; 22 different, 2 cents; 75 different, \$1; 1,000 mixed, \$8. 20 different, Silver, \$1. 1,000 good stamps, 50c. Thomas Baldwin, 87 Nassau St., New York.

\$15 FOR Dollar 1858. We pay to \$1.00 for rare coins to 1909. Many very valuable in circulation. Get Posted. Send 4c for our large illustrated Coin Circular. It means much profit to you. Send now. The Numismatic Bank of Texas, Dept. 8, Fort Worth, Texas.

\$4.25 EACH Paid for U. S. Flying Eagle Cents dated 1856. We pay cash premium on hundreds of Old Coins. Send ten cent at once for New Illustrated Coin Value Book 4x7. It may mean your fortune. Clarke & Co., Coin Dealers, Box 15, 1 1/2 Roy, N. Y.

ALL for 30c. 10 coins of different countries; 3 Confederate notes; 1 coin catalog; 1 selling list; 1 arrow head; 1 lucky seal. C. J. Carey, New Rochelle, N. Y.

FORMULAS AND TRADE SECRETS

PRACTICAL Formulas for making Map Extract, Ink Powders, Metal Polishes, Buffing Compositions, etc. J. B. Dunningham, Chemist, Rochester, N. Y.

1,000 FORMULAS, recipes, 25c. 10 money-making secrets, 20c. How to resilver mirrors, transfer photos to glass, make printing cuts, rubber stamps, sneezing powder, itch powder, 10c each. Entire collection 50c. Formula Bureau, 3311-G, Belleplaine Ave., Chicago.

SILVERING mirror and 150 other money-making formulas and Digest, one year, 25c. Digest, Grand Rapids, Mich.

STOVE Polish—tested formula, \$1. Duplicate of the best seller. A. R. Cunningham, West New Brighton, N. Y.

1,000,000 FORMULAS, Trade Secret \$1.50. Ellemm, 667 Ocean, Jersey City.

THE art of silvering mirrors and 23 other money-making formulas, 10c. Worth dollars. Valuable mail-order literature free. Terry Supply Co., 2006 Whitis Ave., Austin, Texas.

ANY formulas you wish to know? Correspond with Information Bureau, 128 George Street, Brooklyn.

500 VALUABLE formulas and complete encyclopedia of everyday wants. The splendid book, 10c. H. Essex, Box 47, Baltimore, Md.

ATTENTION! Metal polish. Non-flammable. Will not settle. Costs 15c per gallon to make. Guaranteed formula, \$5.00. Expert, 721 East 161st St., New York.

WE analyze everything. Reliable formulas furnished. Investigations. D. Laboratories, 721 East 161st St., New York.

BUSINESS SERVICE

INCORPORATE. Our lawyers do the work, saving you time, annoyance and money in incorporating under the most liberal law of Arizona. Laws and forms free. Southern Securities & Investment Co., Box D488, Phoenix, Ariz.

SAFETY BLADES SHARPENED

DISGUSTED with "re-sharpening"? Want something better? Then let us re-edge your blades same way we edge new razors. Skilled blademaker's work, under a graduate engineer—gives smooth "new-blade" shaves—that's guaranteed. Send for Redge Process prices. Handy mailing case free. Parker-Warren Laboratories, 1433½ Broadway, New York.

SAFETY razors sharpened; two cents each. Guaranteed. Blade box free. Electro Stropping Co., 134 Shelby St., Detroit, Mich.

FOR MEN

BOW-LEGGED Men—Relief in Sight—Our New Invisible Guards make trousers straight and trim. Price, One Dollar. Suburban Supply Company, Department B, Logan Station, Philadelphia, Pa.

FOR Sale—40,000 pounds best leaf tobacco; mail stamps for samples. Anton Wavrin, Franklin, Ky.

SAVE money on shoes! Factory to feet. You save retailer's profit and get better shoes. Fit and entire satisfaction guaranteed or money back. Style book free. Pathfinder Shoe Co., Dept. P, Dudley, Mass.

FOR THE HOME

SHOE Polish Outfits Complete, cheap. Write for particulars. Sample tube polish 10 cents. A. D. Nye, 10525 Elk Avenue, Cleveland, Ohio.

PORTFOLIO of 100 designs drawn to scale easily understood. Attractive, usable, simple, modern furniture. \$2 postpaid. Saves the price on first piece of furniture you make. Crater & Hoyt, Grand Rapids, Mich.

LAMP Shade Frames, all descriptions, made to order. Cooley Mfg. Co., 553 W. Monroe St., Chicago.

DIAMONDS, WATCHES AND JEWELRY

MORO Gems—Look like Diamonds. 1/4 stickpin or stud, 25c coin. More's Jewelry Store, Blue Earth, Minn.

GAMES AND ENTERTAINMENTS

EVERYBODY likes our tricks. Five dandy samples and catalog 5c. Our fake money fools everyone. Flash a big roll. Make a hit. Fortune and catalog, ten cents. Gilnovco, 11128 Crescent, Morgan Park, Chicago.

MAGICIANS—We are headquarters for handcuffs, mail bags, strait-jackets, milk cans, and everything in the escape line. Large new catalogue, which also contains complete line of novelties, tricks, puzzles, free. Oaks Magical Co., Dept. 81, Oshkosh, Wis.

250 MAGIC Tricks with coins, cards, etc., 10c. Greenbacks, big bunch, 10c; 4—25c. Double throat, imitate dogs, birds, etc., 10c. Magic Bureau, 3311-G Belleplaine Ave., Chicago.

32 KANDY Kid Jokers—The greatest fun producers on earth. Absolutely new. Just the thing to catch the girls; only 10c. P. Rutland, 5633 Glenwood Ave., Chicago.

VENTRILOQUIST figures \$4.50 up. Magic tricks, etc. Big catalog, 2c. Old reliable dealer. Magic Parlors, C-64 Sabin, Providence, R. I.

FREE Catalogues, Magic, Cards, Tricks, Novelties, Books. De Vitto (12), New Dorp, New York.

MAGIC Catalogue. Best on earth; ten cents. Amateurs supplied as well as the Great Professionals. Chicago Magic Co., Dept. B, 72 West Adams Street, Chicago, Ill.

FREE! Challenge Handcuff Escape and Latest Catalogs. Douglas, Kiowa, Okla.

MAGIC pocket trick free. Worth 25c. With illustrated catalog of 250 tricks, puzzles, illusions for 6c. Stamps. Magic Co., Sta. 10, 249 West 38th St., New York.

MUSIC

RYANA, 12c. Our great Black Pansy March free for one or more names of popular music buyers or dealers. Catalog free. Lester Meixsell, Covington, Va.

"WILL You Remember Me?" Prettiest song out. 12c copy. Davis, 1217 E. Moyamensing Ave., Philadelphia.

PLAY Piano or Organ selections instantly without teacher, or \$1,000 forfeited. Astonishing particulars free. Musician Self-Maker, 2817 Lake, Chicago.

CLEANNOTE Pad saves tunes, talks. Improves tone. Lessens scratch. Trebles life records. 25c. Get circular. Agents wanted. Vox Humana Talking Machine Co., Nantucket, Mass.

"BIG Ditch Song"—Catchy, 25c. Songery, 1635 Maltman Ave., Los Angeles, Cal.

RAGTIME, Piano self-instructor, \$1. Ellem, 667 Ocean, Jersey City.

SHEET Music—Twenty-five classical or Song Hits for \$1. Oakwood Press, Newark, N. J.

MY Lady of Dreams, the coming big song success. A great song with an attractive title page. Ten cents in stamps or coin. Marks-Goldsmith Company, Department A, Washington, D. C.

TALKING Machines half price. Edison Standard and Amberol Records, 9c up. Victor Discs, 15c up. Prepaid anywhere. Ye Curiosity Shop, 20 So. Second St., Philadelphia, Pa.

THE MACROPHONE. Talks at a distant point as if you were there. Transfers your piano anywhere. 112 Cypress St., Brookline, Mass.

PIANOS AND MUSICAL INSTRUMENTS

VERY good violin, guaranteed to be worth \$100, for \$18, including expensive case and bow. Splendid chance to secure good violin cheap. Will send C. O. D. on inspection. Inquire Mayer, 802 Market St., McKeesport, Pa.

FOR Sale Quick—\$62 Jaubert professional mellophone; brass finish, leather case, both new. First \$45 takes both. E. G. Feik, Mendota, Ill.

DUPLICATORS AND DEVICES

THE Modern Duplicator, made without glue or gelatine, is the World's Standard. Fifty to seventy-five exact duplicate copies can be made from each one you write or draw with pen, pencil or typewriter. \$2.40 to \$6.00 according to size. Booklet Free. Purkin, Reeves & Co., Mfrs., 339 Fifth Ave., Pittsburgh, Pa.

HOW to get a Hektograph that will make 150 copies in 10 minutes; letter size, \$2. Write for circular. Hoyer Duplicator Co., 118 No. La Salle St., Chicago.

WIRELESS

WIRELESS Telephony; will work any distance to five miles. Send 25c for blueprint. Freeman, 2112 Canarsie Lane, Brooklyn, New York.

MAILING LISTS

DAILY service, 1914 automobile registrations for New York State at the rate of \$4 per month. Special lists of all kinds compiled. P. Donnelly, Box 180, Albany, N. Y.

60,000 ORIGINAL Letters, 1913-1914 date. \$1 a 1,000 or \$50 for the lot. Write quick. Clarke & Co., Coin Dealers, Le Roy, N. Y.

ANY Classification—anywhere. Mention kind wanted. "Nisco," SDB, Cincinnati, O.

FREE: Fifth annual Catalogue of Names and Addresses for Business and Mail-Order Men. Mid-West Specialty Co., Sedalia, Mo.

2,000 RURAL Names and Address, direct from 1914 Assessor Books, \$1. A.J.B., Box 207, Mohall, N. D.

FREE to business men, copy of our comprehensive "Silent Salesman." Contains over 2,000 different classifications of mailing lists with number and price of each list, and information every business man needs. Accept this free offer. Trade Circular Addressing Co., G 164½ W. Adams, Chicago.

TYPEWRITERS AND SUPPLIES

GOOD \$100 Remingtons and Smiths, \$15. Write quick. Hub Typewriter Co., 256 Devonshire St., Boston, Mass.

TYPEWRITER Bargains. All Makes, slightly used and rebuilt, lowest prices, bar none; satisfaction guaranteed. New appearance, perfect order. Typewriter Sales Co., Ferguson Bldg., Pittsburgh, Pa.

WRITE for our special circular "C" for the best offer ever made on typewriters. Young Typewriter Company, 62 West Madison St., Chicago.

ALL standard makes of typewriters. Big saving. Liberal guarantee. Catalogue, bargain list and valuable typewriter information free. The leading mail order typewriter house. A. E. Atchison, 110-112 No. LaSalle St., Chicago.

DON'T fail to get our bargain sheet before you buy that typewriter. The M. & M. Typewriter Co., 118-A, No. LaSalle Street, Chicago.

BICKENSDEFER No. 5 Typewriter, \$12.50, with leather traveling case. Visible writer, rebuilt, fully guaranteed. Cost new, \$45. Will ship C. O. D. Bickensdefer Co., 218 Wright Bldg., St. Louis, Mo.

PICK out your typewriter and pocket your saving. Typewriters rebuilt in our own factories and guaranteed for one year. Remingtons \$25 to \$65, Smith-Premiers \$23 to \$60, Underwoods \$35 to \$60, L. C. Smiths \$30 to \$50, Royals \$30 to \$40, Oliviers \$30 to \$40. We have all makes. Send for catalog, address of nearest branch office. American Writing Machine Co., Inc., 345 Broadway, New York.

PRINTING AND ENGRAVING

250 NOTEHEADS, 250 Envelopes and 250 Billheads, printed, for \$2.50, postpaid. Bryan Printing Co., 342 Warren Street, Hudson, N. Y.

1,000 GUMMED labels, 40c; 1,000 3x6 circulars, 80c; 100 letterheads, 100 envelopes, 100 return envelopes or business cards, \$1. No trash. Art Press, Norton, Mass.

50 VISITING Cards, 25c. Van & Hall, 210 N. Hope, Los Angeles.

WHITE BOND—500 letterheads and 500 envelopes, postpaid, \$2.25. Stenun Co., 3212 Marcy, Omaha, Nebr.

50 QUALITY wedding announcements, \$1.75 prepaid. "Aircraft," 1100 Harmon, Minneapolis.

PRINTING—500 either noteheads, envelopes, statements, cards, \$1; 1,000, \$1.50; 1,000 linen finish letterheads or envelopes, \$2.50; 1,000 typewriter letters, \$2. Samples, Model Company, Manchester, Iowa.

"U" NEED Printing—1,000 letterheads or envelopes, \$2.50. Blackledge Specialty Co., 1805 Reed Street, Philadelphia, Pa.

QUALITY Commercial Printing at lowest prices. Ask for samples. Hoyt Bros., Pittsfield, N. H.

DO Your Own Printing—Combine pleasure and profit. Book "How to Print," 15c. Cut Book, 10c. Catalogue free. Model Press, York, Pa.

1,000 A-1 LINEN Finish Letterheads, \$2; 5,000, \$7.50. Samples free. Good's Printery, Harrisonburg, Va.

STATEMENTS, billheads, tags, envelopes, 1,000, \$1.25 up. Samples free. Printer, 908 Walnut, Philadelphia.

1,000 3x6 circulars, best book paper; postpaid, \$1. Albers' Profit Sharing Printery, Emerald, Neb.

PRINTING Outfits \$15 up; type and material. List for stamp. Popular Bargains, Richland, Pa.

GUMMED Labels, 3,000, \$1. 38p. catalogue, 2c. MacTaggart, 1235 Arch, Philadelphia, Pa.

EMBOSSD Letterheads and Envelopes price of Common or Flat Printing. Send for samples. Turner & Dunlap, Wilkesbarre, Pa.

125 BOND Letterheads and 125 Envelopes, white, pink, blue or green, printed, \$1 prepaid. Samples. W. Kinnier, Box 206 Brooklyn, N. Y.

YOUR Name on 200 gummed labels, 10c. Starr Co., Clintonville, Conn.

DIGNIFY your correspondence, 100 letterheads and envelopes printed on excellent bond, \$1, prepaid. 500 letterheads or envelopes, \$1.50. 1,000 for \$2.50. Samples free. Proper printing. Robison Printery, Curwensville, Pa.

PRINTING Presses, type, supplies. Catalog free. L. M. Carroll & Co., 326 Madison St., Chicago.

1,000 PURPLE Multigraphed Letters, black heads printed and stock complete, \$2.75; 500, \$1.85. Specimens free. Perfection Letter Company, Muncie, Ind.

GOOD Printing at low prices, 1,000 good letterheads, envelopes, cards, billheads, labels, circulars, \$2.50. Samples free. Catalogues, booklets, and circulars our specialty. Ernest L. Fantus Co., 523 S. Dearborn St., Chicago.

GOOD Printing—Low Prices, 1,000 good letterheads, \$2.50; 1,000 envelopes, cards, statements, billheads, \$2. Samples. We print for others, why not for you? Thos. M. Weaver, Main and Kilbourne Streets, Bellevue, Ohio.

LETTER Heads, \$3 thousand. Send stamp for sample. Art Studio Co., Fairmount, Ind.

3x5 EXCELSIOR Printing Outfit, \$10. B. Kletzman, Lakota, N. D.

QUALITY Printing. 500 White Rag Envelopes, \$1; 500 Bond Letterheads, \$1.10. Send 2c for elegant samples. Tracey Printing Co., Tippicanoe City, Ohio.

FREE Fountain Pen with 500 cards, \$1.50 Postpaid. Rightway Card Printery, 5643 Page, St. Louis, Mo.

PATENT ATTORNEYS

INVENTORS, write for list of inventions wanted and book, "The Last Word on Patents." Manufacturers, write for patents procured by me. Prompt, reliable service. Sanders, 7 Webster Bldg., Chicago, Ill.

INVENTORS—Write for our Special offer securing patents. Send sketch for Free Search. Wm. N. Moore & Co., 702 Loan & Trust Bldg., Washington, D. C.

THE Patentome is free. An education in obtaining patents. Established 1865. Anderson & Son, Attorneys, 707 7th St., Wash., D. C.

"PATENTS and Patent Possibilities" is a 72-page treatise which tells all about patents, what to invent and where to sell it. It gives honest advice to inventors, and is full of valuable and interesting information. Write for it today! It is Free. H. S. Hill, 905 McLachlen Bldg., Washington, D. C.

PATENT your invention. \$10,000 offered for inventions wanted. Booklet and opinion free. Milo B. Stevens & Co., Established 1864. 685 F St., Washington; 353 Monadnock Block, Chicago.

PATENT what you invent. It may be valuable. Write me. No attorney's fee until patent is allowed. Estab. 1882. "Inventor's Guide" Free. Franklin H. Hough, 522 Loan & Trust Bldg., Washington, D. C.

ADVERTISE your invention. Why wait until patent is issued before making plans? Let us help you find your market. Direct Advertising Service, Peyton Annex, Spokane, Wash.

"WHY Pittsburgh Patents Pay?" Write International Patent Company, 6010 Jenkins Arcade, Pittsburgh, Pa.

VALUABLE Patents Procured. Experienced, personal service. Railroad, poultry, automobile inventions, my specialties. Lester L. Sargent, 716-a, Twelfth St., Washington, D. C.

FIND Out for Yourself what to invent and how to procure and sell a patent for the same. My book, "Inventor's Universal Educator," covers the matter from A to Z. 140 pages, elegantly bound. Also contains 600 mechanical movements and 50 perpetual motions. Price \$1.00, postage free. Money returned if not more than satisfactory. F. G. Dieterich, 651 Ouray Bldg., Washington, D. C.

FOR dependable advice about Patents, address Benjamin & Bassett, 140 S. Dearborn St., Chicago, Ill.

OFFICIAL Drawings Free. Patents procured or fee refunded. Expert services. Send sketch for Free search. The Patent Exchange, Washington, D. C.

PATENTS and Trade Marks, electrical and mechanical a specialty. Book Free. Joshua R. H. Potts, Patent Lawyer, 8 Dearborn St., Chicago; 805 G St., Washington; 929 Chestnut St., Philadelphia.

NO Attorney fees until patent allowed. Send sketch for free report. Books free. Frank Fuller, Washington, D. C.

PATENT Books Mailed Free—Showing 100 mechanical movements invaluable to inventors and mechanics—and telling what is patentable, how to obtain patent or partner, how to sell, etc. Free on request. Chas. E. Brock, 701 Eighth Street, Washington, District of Columbia.

PATENT your invention—Send sketch for free expert search and report as to patentability. Books on inventions and patents, and book of references from congressmen, manufacturers, bankers and inventors sent free. John S. Duffie & Co., 610 F St., N. W., Washington, D. C.

PATENTS that protect and pay. Advice and books free. Rates reasonable—highest references; best results. Watson E. Coleman, Patent Lawyer, 622 F St., N. W., Washington, D. C.

PATENTS build fortunes for you. Our free booklets tell how; what to invent, how to choose an attorney. Write today. D. Swift, 317 Seventh St., Washington, D. C. Established 1889.

PATENTABLE ideas wanted—Send for 3 free books. R. B. Owen, 30 Owen Bldg., Washington, D. C.

JOHN R. WOODWORTH. Registered Attorney. Wardur Building, Washington, D. C.

INVENTIONS Worth Thousands—Their value is governed by the strength of the patent. Get the advantage of our 39 years' experience in procuring your patent. Clients in your state. Write and send sketch. Louis Bagger & Co., 609 Barrister Bldg., Washington, D. C.

C. L. PARKER, Ex-member Examining Corps Patent Office, Patent Attorney, 910 G St., Washington, D. C. Inventor's handbook "Protecting, Exploiting and Selling Inventions," sent free upon request.

PATENTS—Herbert Jenner, patent attorney and mechanical expert, 606 F St., Washington, D. C. I report free of charge if a patent can be had and its exact cost. Send for circular.

PATENTS explained in my free books, telling what you should know—what to invent—what not to invent—how to sell your patent, etc. Write today, H. L. Woodward, 902 G St., Washington, D. C.

PATENTS Secured—Take advantage of my personal experience; send sketch or model. Get my free book containing 200 mechanical movements. W. N. Roach, Jr., 950 McGill Bldg., Washington, D. C.

H. H. HARRISON, Lawyer and Patent Attorney, 1662 Monadnock Block, Chicago, can best protect your ideas.

FOR INVENTORS

WANTED—An Idea! Who can think of some simple thing to patent? Protect your ideas; they may bring you wealth. Write for "Needed Inventions" and "How to Get Your Patent and Your Money." Randolph & Co., Patent Attorneys, 620 F St., Washington, D. C.

We can help an honest inventor to secure patent and manufacture invention on royalty basis. Royal Co., Steneck Bldg., Hoboken, New Jersey.

WANTED to manufacture Patents on small articles. S. Box 2142, Bridgeport, Conn.

INVENTORS: My patent made a fortune. Particulars free. Let me sell yours. Eugene Pearl, 23 Union Square, New York.

QUICK Cash for Patents. Yours may bring you a fortune. Write right now. Pat. Dep. Cooperative Salesman Co., Lincoln, Neb.

INVENTIONS developed by practical manufacturers. We have designed and manufactured the simplest and most complicated devices. References furnished. Russell Machine Co., 2322 Live Oak, Dallas, Texas.

PATENTABLE Ideas Wanted—Send for 3 free books. R. B. Owen, 30 Owen Bldg., Wash., D. C.

AN old established company dealing in labor saving devices suited for use in mills and factories wishes to consider handling new inventions. Have our own paid salesmen and twelve hundred active accounts. Address Box 106, Westfield, Mass.

WE'LL tell you without charge why your invention is, or is not, worth patenting. Benjamin & Bassett, 143 S. Dearborn St., Chicago, Ill.

INVENTORS—Our staff of skilled mechanics assist and co-operate with customers to develop and perfect inventions of every description. We build first-class demonstrative models, miniature or regular full-sized machines for inventors, promoters, patentees, salesmen, patent office and manufacturers. Electrical and mechanical experts. Scientific and experimental work a specialty. Write today for further particulars. Regal Model & Tool Works. "Chicago's foremost model and machine works." 122-128 S. Clark St., Chicago.

PATENTS without advance attorney's fees. Send sketch for free report. Books free. Frank Fuller, Washington, D. C.

PATENTS, Trade-Marks and Copyrights. Our handbook on patents will be sent free on request. All patents secured through us are described without cost to the patentee in the Scientific American. Munn & Co., Patent Attorneys, 359 Broadway, New York. Washington, D. C. office, 383 F Street.

WANTED good patents to develop on royalty basis. Address Gustav Franklin & Co., Dept. 22, Hartford Bldg., Chicago, Ill.

INVENTIONS Wanted to market on cash or royalty basis. Adam Fisher Mfg. Co., 61 Fisher Bldg., St. Louis, Mo.

PATENTS FOR SALE

MAKE an offer for patent. Force pump, double-acting continuous flow, unexcelled as a spray or high-pressure pump. Send for blueprint and description. Frank Johnson, 4 North Madison Street, Walla Walla, Wash.

FOR Sale, Royalty, most simple Automatic Brake for Talking machines. Write Box 215, Reno, Nev.

DOUBLE soap bubble pipe, bubbles will release and float, one within the other. Also combination hoe and shovel tool. Cash or royalties. Walter Lockhart, Hotchkiss, Colo.

ROCKING Bath Tub. Attach to any faucet. Used wherever there is no bathroom. Splendid for shower bath. Cheaply manufactured. U. S. and Canadian Patents. Particulars free. B. F. Rusch, 3033 Quinn St., Chicago.

PATENT, "Scale" for dealers and farmers. "Big thing in right hands." Dr. Garmon, Elmhurst, Cal.

FOR Sale or Royalty, automatic coat and garment holder. Pat. Big money maker. A. Johnson, 2455 Vermont Street, Quincy, Ill.

FOR Sale—United States and Canada. Patent Gas Furnace. Users pleased. California reserved. Geo. Sweet, 1935 Webster St., Oakland, Cal.

INCUBATOR Patent No. 1,058,852, outright or royalty. Will trade for runabout or cyclear. E. H. Blakeley, Ft. Scott, Kan.

FOR Sale—Patent No. 1,032,309, Headlight Adjuster for Motor Vehicles. Automatic. Requires no attention. For particulars write to P. N. Squires, Tekamah, Neb.

PATENT for Sale. Bed elevator, simple, everlasting. Insures perfect rest and comfort to occupant of bed. If properly managed will be installed in every house, hotel and hospital. Retail through agents or dealers. 200 per cent profit. Best offer takes it. W. W. Byrne, Lyman, Miss.

STREET Indicator—New, patented 1914. Wm. Porter, 633 Duff, Pittsburgh, Pa.

CANADIAN Patent—device opens cans instantly; used like biscuit cutter. Thos. Lecroy, Lonsdale, Ark.

FOR Sale—U. S. Patent, Burglar and Fire Alarm. Mrs. A. C. Thorbjornson, Powers, Mich.

\$500 CASH buys patent No. 666,212. Mole-trap. Investigate. A. B. Simmons, 1314 Napa St., Vallejo, Cal.

ERSKINE Stairway Ladder. Will let on the royalty basis. Reasonable sum on each one manufactured. John H. Erskine, Box 419, Charleston, W. Va.

NEW Improved Step-ladder. Unlike any other. Cannot collapse when in use. Most practical ladder to use, where others prove useless. Absolutely safe. Make offer. Information free. E. L. Whitehead, 609 Highland Av., Elgin, Ill.

TWO valuable U. S. Patents on Building Blocks. Great improvement in building. Can be manufactured cheaply. Big profit. Sell state rights or entire patent. Particulars free. G. M. Marshall, 273 York Ave., Winnipeg, Man.

AUTOMATIC Rataput, perfect rat destroyer, kills ten at one winding; absolutely reliable. Patent ready to issue. Will sell half or entire patent. Fortune in it. Investigation invited. J. A. Beverly, Topeka, Kan.

U. S. AND Canadian patents casement adjuster. Sashes open outward without disturbing screens. Novel, artistic and best. Box 539, Saranac Lake, N. Y.

FOR Sale or on Royalty, Spirit Level with reflectors. Every carpenter wants one. E. Axelberg, 712 3rd Ave., Hibbing, Minn.

PERMANENT Tire Repair for blowouts; applied anywhere on road; guaranteed 1,000 miles. Also punctureless tire. Both thoroughly tested, many cars. Patent, machinery, tools, patterns, vulcanizers, ready for business. \$10,000, part cash, balance arranged. Tire, 205 Lefferts Ave., Brooklyn.

THREE patents for sale. A hand bobbin cleaner device, No. 1,092,413, which is inexpensive to run. It is used by weavers. On file Series No. 835,278; A shuttle without gutter on side. No cut in threading an eye in bottom of shuttle. On file Series No. 835,277; A picker stick lug strap made of cotton bale hoops to replace leather and cotton straps, to reduce cost. Apply Joseph F. Vallanconot, 34 Concord St., Fall River, Mass.



Ingersoll

DOLLAR WATCH

The Watch
that made
the Dollar
famous - - -

Other Models \$1⁵⁰ to \$3⁰⁰
60 Thousand Dealers
throughout the U. S.
sell Ingersolls -
Look for the name
"Ingersoll" on the dial

ROBT. H. INGERSOLL & BRO., NEW YORK.

PATENT for sale. Clasp ready-made neckwear. Egberts, 1223 Wabash Ave., Chicago.

\$3,000 BUYS invention. Pipe wrench. Superior in appearance and efficiency. Construction simple. Ready seller. Frank Lagler, Coalinga, Cal.

PATENT for sale: New seed planter. Used with ordinary hoe. Will sell outright or royalty. Thomas H. Evans, c/o Jos. A. Booker, Att'y, Little Rock, Arkansas.

FOR Sale—Street Sweeper. New design. Best offer takes it. Particulars free. M. M. Nixon, Edenton, N. C.

FOR Sale. Latest improved "Jointer Guard," absolutely safe. B. A. Bishop, 5203 10th Ave., Birmingham, Ala.

FOR Sale, four patents pertaining to automobile accessories. All an improvement on existing devices. No changing to install. Address P. O. Box 288, Geneva, Ill.

FOR Sale or Royalty, Patent right 1,086,259; modern automatic unequalled sheet-metal Combination Animal Traps. Exclusive features, simple, durable, and effective with large and small animals, all kinds and sizes. Alive and uninjured. Price reasonable, specification for 10c. Casper Yost, Patentee, Danville, Ill.

FOR Sale. Patented Garment Hanger, that will hold the coat, vest, trousers, shirt, collar, necktie and hat. Best offer buys. Sidney C. Batson, Clarksville, Tenn.

EXCELLENT mail order novelty or premium specialty, costs 1/4c. Hugh G. Robinson, Gen'l Del., Portland, Ore.

IF you want to know why you cannot sell your patent, write Benjamin & Bassett, 140 S. Dearborn St., Chicago, Ill.

SELECTOR for party phone, or R. R. signal, will select from one to thirty. 2 wire, \$600 buys outright. Harry Blythe, 57 Byers, Denver, Colo.

SANITARY vending device for restaurants, saloons and business concerns. No competition. \$1,400 buys outright. Harry Blythe, 57 Byers, Denver, Colo.

MODELS AND MODEL SUPPLIES

A-1 EQUIPMENT for making inventors' working models; also making dies; stamping and forming; punch press work of every description solicited. Lowest prices. Send samples for estimate. Advertising Scale Co., Forrester, Ill.

INVENTORS: We manufacture metal articles of all kinds, to order. Also, special machinery, tools and dies, punchings, lathes and screw machine work, metal spinrings, castings, plating, wood and metal patterns, etc. Send sample for estimate and expert advice, free. The Eagle Mfg. Co., Dept. B, Cincinnati, O.

MODELS made for inventors; general machine work; designing and perfecting; developing automatic devices and machinery. In a position to do all kinds of light tool and machine work. Prices reasonable; estimates cheerfully given. Ideal Machine Works, 62 Ann Street, New York City.

FREE catalogue of model supplies. Castings, metal specialties on contract. North Chicago Tool Works, 15 Grove Ave., North Chicago, Ill.

INVENTIONS Perfected; Working Models Made; Dies, Tools, Special Machinery. Free Booklet. Black Diamond Mfg. Co., Cincinnati, O.

WE make working models for inventors; also dies and stamping of specialties, and carry a complete stock of brass gears and model supplies. Send for catalogue. The Pierce Model Works, 3405 Pierce Ave., Chicago, Ill.

EXPERIMENTAL Work. Models, instruments for indicating and recording pressure, speed, etc. Fine manufacturing. H. B. Ward, 237 Halsey St., Newark, N. J.

REAL ESTATE AND FARM LANDS

FLORIDA—Ten acres, Clay county, \$800. Three crops each year. Less labor; more comfort. Land enhances. Hallam & Co., Jacksonville, Fla.

CO-OPERATIVE Colony locating here. Co-operators invited. Edward Miller, Crystal Springs, Fla.

FORTY acres famous "Ocklawaha River" fruit and truck land; will trade for good Auto, or sell outright. Garland Kirven, Linden, Ala.

DAIRYING makes large profits in the Sao Joaquin Valley, California. One acre keeps a cow, and she earns you \$10 a month. Land at low prices on easy terms. Write for new book free. C. L. Seagraves, General Colonization Agent, AT&SF Ry., 1974 Ry. Exchange, Chicago.

CALIFORNIA—Wealth in Oranges, Lemons, deciduous fruits, hogs, alfalfa. Write California Home Lands Co., Trust & Savings Building, Los Angeles, Cal.

QUICK cash for property or business. Anything, anywhere. No agents. No commission. Write Dept. A, Cooperative Salesman Co., Lincoln, Neb.

TEXAS School Land Opening—Million acres, \$1.50 to \$5 acre, 5c acre cash, balance forty years; advance information and map, 4c postage. Buckingham Publishing Co., Dept. A-1, Houston, Tex.

TWO beautiful lots, Tacoma, Wash., \$400. Owner, 1100 Harmon, Minneapolis.

FOR Sale—Easy Terms—160 acre farm. Morton County, North Dakota, already under cultivation. Five miles from town with schools, stores, grain elevators, bank and all facilities. Chance for right person to make extremely profitable deal. For further particulars, write Mrs. Elizabeth Burt, Apartment E, 839 West End Avenue, New York City.

FARMS for sale or exchange anywhere in the U. S. or Canada, direct from the owners. State where you want to locate. Information free. American Investment Association, 37 Palace Bldg., Minneapolis, Minn.

MONEY-Making Farms, 21 States, \$10 to \$50 an acre; livestock, tools and crops often included, to settle quickly. Big Special Bargain List, free. E. A. Strout Farm Agency, Station 3043, 47 West 34th Street, New York.

BUY Land in Central Wisconsin; monthly payments if desired. New land in well-settled country, \$18 acre. Homemaker Land Office, Marshfield, Wis.

CASH for your business or property. Write me if you want to buy, sell or exchange any kind of business or property. Established 1881. Frank P. Cleveland, 1308 Adams Express Building, Chicago, Ill.

WRITE us before you buy or sell. Bargains everywhere. Inquiries daily. "Nisco" XDB, Cincinnati.

SELL your property quickly for cash, no matter where located. Don't pay big commissions. Particulars free. Real Estate Salesman Co., Desk B, Lincoln, Nebr.

FREE booklet about farms, homes. State Board of Agriculture, Dover, Del.

DOGS, BIRDS, POULTRY, PETS

FOR Sale—Dogs for all purposes; swine, rabbits, guinea pigs; young stock specialty; 10c for handsome catalogue of all breeds; price list poultry pigeons free. C. L. B. Landis, Reading, Pa.

POULTRY paper, 44-124 page periodical, up to date, tells all you want to know about care and management of poultry, for pleasure or profit; four months for 10 cents. Poultry Advocate, Dept. 3, Syracuse, N. Y.

NEWCASTLE Kennels, Brookline, Mass. Scottish terriers. Write us for pamphlet.

AIREDALE Terriers and Scotch Collies. State wants? Sales list free. Phil Savage, St. Charles, Ill.

GINSENG

RAISE Ginseng, most wonderful crop in the world. Room in your garden to grow hundreds of dollars' worth. No experience required. Write for free booklet. C. G. McBride, Mansfield, Ohio.

GINSENG roots and seed for planting. W. N. Long, Florence, Ky.

BIG Profits in home gardens. Plant Ginseng and Golden Seal. Small plot brings more money than many farms. Free booklet tells how. Rising Sun Ginseng Nursery, Box 225, Narrows, Ky.

MISCELLANEOUS

GENUINE Sioux Indian Beadwork and Curios, also Elk Teeth, Moccasins, Fobs, Belts, Hatbands, Pouches, Warclubs, Indian Costumes. Send 5c for price list. Lyon & Strong Curio Co., Gordon, Neb.

RUBBER Stamps. Twenty cents for first line, 10 cents for each additional; send for catalog. A. W. McCloy Co., Pittsburgh, Pa.

YANKEE Pocket Adder sent postpaid for 10 cents (silver). Leonard O. Smith, Islip, New York.

ELECTRIC Tattooing Machines, Supplies. Catalog Free. Rebec Manufacturing Company, Cedar Rapids, Iowa.

ICELESS Refrigerators keep milk, butter, without ice. Blueprints, instructions, 50c. No machining. Starco, Fullerton, Pa.

CUTS anybody can make. Simple Etching Process, \$1. Particulars, specimens, for stamp. M. Day, Windfall, Ind.

"GOOD Luck." Get good luck by wearing a gold, Good Luck, horseshoe watch fob. Not stamped, sheet-metal work. 50c. Wagner Specialty Co., 2170 Bailey Ave., Buffalo, New York.

ANYONE can renew old dry batteries at small cost with our method. Sold to readers of Popular Mechanics since 1910—this alone should convince you it's genuine. Complete formula and instructions, 25c. If dissatisfied, we'll return your quarter. Northern Supply Co., 154 Randolph, Chicago.

RESILVERING mirrors, renewing dry batteries and book filled with formulas and trade secrets, all 25c. Formula Service, 3311-G, Belleplaine Ave., Chicago.

GOLD, Gold Plating outfit; guaranteed, follow instructions. Send \$1 bill and get busy. Crandall Jewelry Co., Mankato, Minn.

LOOK! How to solder aluminum. Sticks to stay stuck. Simple and inexpensive. Full instructions, 25c. J. Eaton, 4512 Colorado Ave., Chicago.

SKELETON Keys—25c per set; special set, 50c. B. & F. Novelty Co., Box 237, Rock Island, Ill.

WE will mail you \$1 per set for old false teeth; highest prices paid for old gold, silver, platinum, old watches, broken jewelry, diamonds. Ohio Smelting & Refining Co., established 20 years. Dept. M, 612 Euclid Ave., Cleveland, O.

SELF-Winding Electric Clock Movements. Will run 12 to 18 months on two dry cells, indefinitely on bell-ringing transformer. Replace your bothersome key-wound "works" with an American movement, and throw away the key. Excellent for time switches and experimental work. \$4 each. Catalogue free. American Self-Winding Clock Co., 136 W. Lake St., Chicago.

GRANDFATHER'S Clock Works, \$5. Slightly shop-worn, quantity limited, others with chimes, all prices; also several nice Grandfather's Clock cases, exceptional bargains. Clock Company, 1673 Ruffner St., Philadelphia, Pa.

PATENTS build fortunes for you. Our free booklets tell how; what to invent, how to choose an attorney. Write today. D. Swift, 317 Seventh St., Washington, D. C. Established 1889.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

FLEXIBLE rubber stamps, rubber type, steel dies, metal badges, seals, stencils. Catalogue 10c. Buckeye Stamp Works, Market, Dayton, Ohio.

TOO LATE TO CLASSIFY

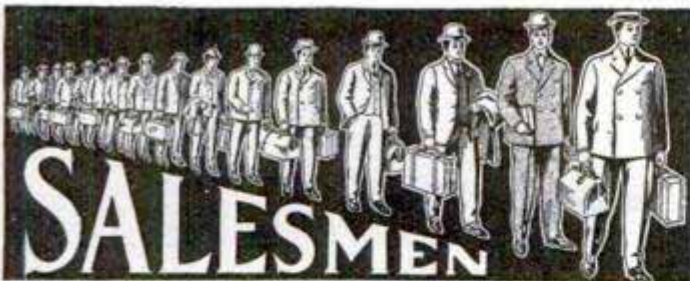
SLIGHTLY used transits for sale, \$65 to \$130; also 5-inch equatorial telescope, cost \$525, like new, \$260. Sprengnether Instrument Co., 205 Ozark Bldg., St. Louis, Mo.

**LEARN
PIANO
TUNING
At HOME**

Our patented TUNE-A-PHONE simplifies learning, removes guesswork, assures accuracy. Musical ear NOT required. We furnish Action Model & tools. Diploma granted. Guaranteed as represented. Write for FREE illustrated book. NILES BRYANT SCHOOL, 216 Art Inst., Battle Creek, Michigan.

**EARN
\$5
to
15
A DAY**

**WHEN YOU WANT ANYTHING AND DON'T
KNOW WHERE TO FIND IT
WRITE BUREAU OF INFORMATION,
POPULAR MECHANICS CHICAGO**



SALESMEN

Earn Larger Salaries Than Any Other Class of Men

We will teach you to be a high grade salesman, in eight weeks by mail and assure you definite propositions from a large number of reliable firms who will offer you opportunities to earn good wages while you are learning. No former experience required. Write today for particulars, list of hundreds of good openings and testimonials from hundreds of our students now earning \$100 to \$500 a month. Address nearest office, Dept. A21, **NATIONAL SALESMEN'S TRAINING ASS'N.** Chicago Kansas City New York San Francisco

DO YOU LIKE TO DRAW ?

That's all we want to know

Now we will not give you any grand prize—or a lot of free stuff if you answer this ad. Nor do we claim to make you rich in a week. But if you are anxious to develop your talent with a successful cartoonist, so you can make money, send a copy of this picture with 6c. in stamps for portfolio of cartoons and sample lesson plate, and let us explain. The W. L. Evans School of Cartooning 821 Leader Bldg., Cleveland, O.



\$3700 IN 3 MONTHS!



Made by one man writing moving picture plays. Literary experience unnecessary. \$25 to \$150 paid for each play accepted. My \$1 book sent FREE on 5 days' approval. Equal to \$30 course. Gives complete directions, model play, and list of buyers. My personal assistance FREE to purchasers. Send for this book NOW, and pay me if satisfied.

P. B. JORDAN, Editor
Dept. P Wilkes Barre, Pa.

CIVIL SERVICE

positions are in all parts of the country. Good pay, steady work, life positions, congenial surroundings, promotions on merit, short hours, annual vacation and sick leave with pay. Many thousands appointed yearly. Both sexes. No political pull. Nearly 300,000 classified positions. Common school education sufficient. Full information and questions used by the Civil Service Commission free.

COLUMBIAN CORRESP. COLLEGE, Washington, D. C.

Learn Watchmaking At Home



You can learn by our modern and original system of instruction every part of the Watchmaker's 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 watchmakers are always in demand and earn from \$20 to \$35 per week. For particulars apply to the Wisconsin School of Watchmaking, Stroh Bldg., Milwaukee, Wis.

GET \$25⁰⁰ AND OVER A WEEK

Be a CHAUFFEUR, EXPERT MECHANIC, AUTO SALESMAN

Over 300,000 automobiles will be built this year. This means a tremendous Spring and Summer DEMAND FOR EXPERT AUTO HELP. Send following coupon immediately.

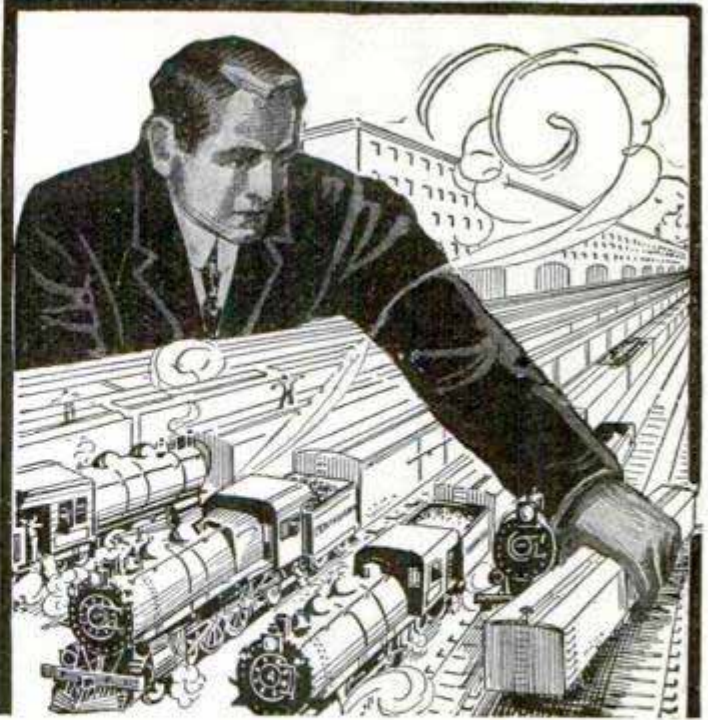
H 802
Franklin Institute,
Dept. H 802
Rochester, N. Y.

Send me, without charge, your copyrighted book, "How to become an expert at Automobile Operation and Construction," and free sample lessons from your Automobile Course.

NAME.....

ADDRESS.....

Use this before you lose it. Write plainly.



NEW JOBS NOW OPEN

Earn from \$35 to \$100 Weekly as a

TRAFFIC MANAGER

Modern transportation is a jungle of routes and rates calling for specialists who, like the pathfinders of old, have expert knowledge of the trails of traffic. How to route shipments to obtain shortest mileage and quickest deliveries and how to classify goods to obtain lowest rates are two vital factors in business competition. The man who knows how is so valuable to his employer that he commands respect and big remuneration.

Big Salaries Paid to Traffic Managers

Expert traffic managers command from \$2,500 to \$25,000 a year. Why not prepare yourself to fill one of these lucrative positions?

New and Uncrowded Profession

There are half a million LARGE SHIPPERS in the United States. Practically every one of them needs an expert traffic man, and this need is recognized as never before because of the recently enacted railroad rate laws and interstate commerce regulations. The demand for trained and efficient traffic men is many times greater than the supply. There's room for you.

Study Traffic and Interstate Commerce

Decide now to become a traffic man. Our Interstate Commerce Course enables you to study AT HOME, without leaving your occupation or sacrificing present income, and to become thoroughly versed and proficient in the strategy of shipping, including routes and classifications, interstate commerce rules and regulations, etc. The instruction is given by some of the biggest traffic managers in the country. The course is easy to grasp and thoroughly practical. Anyone with ordinary intelligence, with reasonable application, can master this new profession.

FREE PORTFOLIO Clip coupon below, sign and mail at once, and we will send you FREE, postpaid, a handsome portfolio containing complete information concerning the opportunities and requirements of this attractive profession. Get posted at once. Clip coupon.

LA SALLE EXTENSION UNIVERSITY, Dept. 37, CHICAGO

FREE PORTFOLIO

COUPON

La Salle Extension University
Dept. 37, Chicago, Ill.

I am interested in the new profession—Traffic Management. Please send me full information and Traffic Book, free of all cost.

Name.....

Occupation.....

Write Address on the Margin Plainly

Please Mention Popular Mechanics

Can You Accept a \$2,500 Job



Have you the training that is necessary to hold down a \$2,500 job? Have you the same knowledge as the man who gets the fat pay envelope? Salaries are paid to the men who know.

You can get just the kind of training you need to accept one of the big jobs. There are exceptional opportunities in the profession of Signal Engineering. Send the coupon for the book that tells you all about it.

Be a Signal Engineer

Be the man who gets \$2,500 a year. The most fascinating of professions. As a railroad man you travel from coast to coast without it costing you a penny. You can be the man who knows. You can be the man who tells the other fellow what to do. You can be the man who gets the fat pay envelope and free transportation.

\$2,500 a Year

Yes, that is what your salary will be when you are a full fledged Signal Engineer, \$2,500 a year to start. Many men making much more than that. Even while you are learning you can hold one of the positions under a Signal Engineer, paying you a handsome salary. Here is your opportunity. Send in the free coupon for full particulars.

More Men Needed

Railroads are constantly looking for competent Signal Engineers. There are not enough men to fill the positions. Thousands and thousands of miles of track are now being equipped with automatic signals. Hundreds of new positions will be open. **And there are no men to take them.** Here is your chance.

Free Outfit

If you will write at once we will tell you how you can get the big new Signal Engineer's outfit absolutely free. Send the free coupon for full particulars.

Send the FREE Coupon for Big New Book

FREE BOOK COUPON

Department of Signaling
Room 119Y
1810 Wilson Ave.
Ravenswood Station
Chicago, Ill.

GENTLEMEN: Please send me absolutely free and prepaid your big new Signal book. Also full particulars about your great special free outfit offer. It is distinctly understood that I assume no obligations of any kind.

Just put your name and address on the free coupon and send it in to us at once. Absolutely no obligations of any kind. We will send you the big new Signal book absolutely free. Tells you all about this most fascinating profession. How you can get into the \$2,500 class. The book is free. Get your name and address in at once.

Department of Signaling

Room 119Y
1810 Wilson Ave.
Ravenswood Station
Chicago
Ill.

Name
Address
Age Occupation

Please Mention Popular Mechanics



Learn a Paying Profession

that assures you a good income and position for life. For twenty years we have successfully taught

PHOTOGRAPHY

Photo-Engraving and Three-Color Work

Our graduates earn \$20 to \$50 a week. We assist them to secure these positions. Learn how you can become successful. Terms easy—living inexpensive. Write for catalogue—NOW!

ILLINOIS COLLEGE OF PHOTOGRAPHY, 999 Wabash Avenue, Effingham, Ill.

The New York Electrical School

teaches all branches of Electricity giving both theory and practice.

You Learn by Doing; guided by a staff of instructors who have done the work they are teaching you to do.

Our school is in session **summer and winter.** You can enroll at any time and start at once.

Write for our free catalogue illustrating the departments of the school and explaining our course.

44 West 17th Street, NEW YORK

ELECTRICAL ENGINEERING men with training are always in demand. Having trained over 2000 young men in the past 21 years in the fundamentals of Applied Electricity, The Bliss Electrical School, with its well-equipped shops and laboratories, is peculiarly well qualified to give a condensed course in Electrical

ENGINEERING

Including Mathematics, Steam and Gas Engines, Mechanical Drawing, Shop Work, and Theoretical and Practical Electricity, in all branches. Students construct dynamos, install wiring and test efficiency of electrical machinery. Course, with diploma, complete

IN ONE YEAR

For practical young men with limited time. 22nd year opens Sept. 23rd. Catalogue on request. 105 Takoma Ave., Washington, D. C.

EARN TELEGRAPH

Morse or Wireless. Also superior station agency course. Splendid opportunities. Demand greater than supply. Graduates assisted. We own and exclusively occupy two large modern buildings equipped with K. R. and Western Union Wires and Complete \$3000 Marconi Wireless Station. Oldest and largest school—est. 39 years. Investment \$25,000. Endorsed by Railroad, Wireless and Western Union Officials. Expert practical teachers. Living expenses may be earned. Tuition low. Easy payments. Catalogs Free.

Dodge's Telegraph, Railway and Wireless Institute
8th Street VALPARAISO, IND.

JEWELRY ENGRAVING

We teach you, by our new and original method of instruction, this clean, fascinating and profitable business right at your home, and furnish you all tools needed absolutely free. Write for free book to the

WISCONSIN SCHOOL OF ENGRAVING, Strub Bldg., MILWAUKEE, WIS.

GET A GOVERNMENT JOB

The Parcel Post is creating thousands of openings in Post Office, Railway Mail and Rural Carrier services. These are life jobs with big pay, short hours, annual vacations and no "lay-offs" or strikes. Civil Service Examinations are being held all the time. Our 64 page booklet tells how you can prepare for these and other "Exams" under personal supervision of former U. S. Civil Service Secretary-Examiner. Write for booklet today. It's free without obligation.

PATTERSON CIVIL SERVICE SCHOOL, 307 IRVING PLACE, ROCHESTER, N. Y.

SENT FREE



LAW

COURSE SENT FREE ON APPROVAL

Not one penny down. Get this greatest home-study course in law—consisting of a magnificent fourteen-volume law library, the most complete library of its kind in existence, and the first individual lessons; clear, comprehensive discussions of the law—in your hands positively free of charge, without any obligation whatever. We want you to see this course, examine it critically, put it to every test, compare it with other courses, before you even decide. Mail the coupon now—right now—to get the details of this startling offer—to find how you can, without risking a penny, get started right on your legal education.

Get Your Degree by Mail

No other school even dares to make an offer of this nature. They don't dare send out their courses in open competition with the LaSalle Extension University Course in Law.

We are authorized by the State of Illinois to confer on our graduates the degree of Bachelor of Laws (LL. B.). Our course prepares you to pass the bar examinations in any state. Should you fail to pass we guarantee to coach you without charge until you are successful.

In a recent Bar Examination at Lansing, Michigan, only six out of fourteen applicants for admission were successful and two of those who passed were LaSalle Students. Not one of the LaSalle students who entered the examination failed. Among the eight rejected, four were graduates of leading resident University Law Schools. These are some of the reasons why it pays us to send out our course on approval, without obligation. Satisfy yourself absolutely that this is the very best home-study law course offered by any school in the country before obligating yourself, before spending a penny.

\$100.00 Tuition Credit Free For a short time only, in connection with our free on approval offer, we are giving students the opportunity of saving one hundred dollars. Write at once for full particulars of this unusual opportunity.

Mail Coupon—Offer Limited

Send no money. Just your name and address on the coupon below, and we will forward by return mail full particulars of our remarkable free on approval offer and our wonderful free book "Guide to the Law", showing how to study law at home. This is the first time in history that a University Home-Study Law Course has been offered on approval; our course is the only one that will stand this acid test. Moreover, if you act promptly we will save you more than half your tuition. We are doing it for advertising purposes only and the offer is subject to withdrawal in a short time, without notice. So act now. Get all the facts in your hands—NOW. Simply sign and mail the coupon.

LaSALLE EXTENSION UNIVERSITY, Dept. 35, Chicago, Ill.

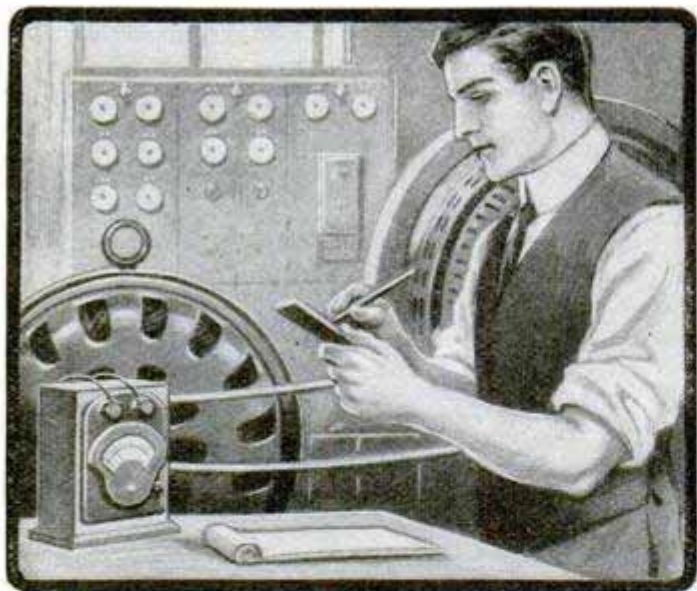
Coupon Brings Details—Tear Off and Mail

LaSALLE EXTENSION UNIVERSITY, Dept. 35, Chicago, Ill.

Please send me full particulars of your free on approval, without obligation offer, showing also how I can secure \$100.00 Tuition Credit free, and a copy of your free book "Guide to the Law".

Name _____

Address _____



Here's a Job For You \$175.00 a Month!

That's the salary YOU can earn as expert Electrician. Any one of the Profitable Trades taught by this School pays that much and more—Electricity, Plumbing, Brick-laying, Drafting and Moving Picture Operating. There is a greater demand now than ever before for skilled men. \$5.00 to \$8.00 per day paid at the start. Exceptional opportunities for starting a business of your own.

Learn In Three Months' Time

—by attending our day classes. Or if you wish to earn your way through School, attend our night classes. No previous training required. No needless theory. ACTUAL and PRACTICAL work done in the Schools. Expert Instructors. Tools FREE. Position SECURED for Graduates.

Mail Today

L. L. COOKE, Director
COYNE NATIONAL
TRADE SCHOOLS
Dept. 119Y, 51 East III. St., Chicago

Dear Sir:—Please send me your booklet "Trades that Pay" and full particulars of how I can become an expert and earn \$175.00 per month. Send everything FREE AND PREPAID. I assume no obligations.

Name

Address

FREE!

Mail coupon today for Free Catalog "Trades that Pay" and full particulars. Let us show you how to DOUBLE YOUR SALARY—how to become an expert in a few months time. Get the facts at once. Everything sent FREE.

L. L. COOKE, Director
COYNE NATIONAL
TRADE SCHOOLS
Dept. 119Y
51 East III. St.
Chicago



DO IT NOW
Litholia Colors
SHOW CARD WRITERS
EARN FROM
\$21 TO \$50 PER WEEK

LEARN ABOUT THE BEST COURSE IN SHOW CARD AND SIGN WRITING

IT IS FREE to those purchasing our assortment of "LITHOLIA" Ready-to-Use Colors. A great opportunity for ambitious persons, either sex, to earn \$31 to \$50 weekly, salary or in business for yourself. Our show card course is not a book of alphabets. It's a complete course in lettering compiled by an expert New York show card artist for us. "Litholia" is the only liquid pigment water paint ever made; used the same as cake, distemper or tube colors, but far superior to either. Lasts longer, more brilliant, always ready. Best for show card writers, artists, or interior decorators. Booklet, Circulars and Full Information FREE. LITHOLIA COLOR CO., 73 W. 23rd St., New York City

LAW STUDY AT HOME BECOME AN LL.B.

Only recognized resident law school in U. S., Conferring Degree of Bachelor of Laws—LL. B.—by correspondence. Only law school in U. S. conducting standard resident school and giving same instruction, by mail. Over 450 class-room lectures. Faculty of over 30 prominent lawyers. Guarantees to prepare graduates to pass bar examination. Only law school giving Complete Course in Oratory and Public Speaking. School highly endorsed and recommended by Gov. Officials, Business Men, Noted Lawyers and Students. Send today for Large Handsomely Illustrated Prospectus. Special courses for Business Men and Bankers. HAMILTON COLLEGE OF LAW, 405 Advertising Bldg., CHICAGO, ILL.

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



A GOOD POSITION

with UNCLE SAM is most desirable. Life positions, pleasant surroundings, good pay, steady work, short hours, promotions on merit. Both sexes. No political pull. Thousands of appointments yearly. Most thorough preparation \$5. Returned if not appointed. Full information and questions used by the Civil Service Commission free.

AMERICAN CIVIL SERVICE SCHOOL WASHINGTON, D. C.



Learn to Write

I can make a good penman of you at home during spare time. Write for my free book "How to Become a Good Penman." It contains specimens and tells how others mastered penmanship by my method. Your name will be elegantly written on a card if you enclose stamp.
F. W. TAMBLYN, 418 Meyer Bldg., KANSAS CITY, MO.



DO NOT STAMMER

My book, "How to Stop Stammering"—a treatise on "Scientific Talking and Psychic Training." School and circular literature FREE. M. L. HATFIELD, Prin. of The Pacific School for Stammerers, 1918 Grove St., OAKLAND, CAL.

BE AN ILLUSTRATOR
by mail how to draw for magazines and newspapers
Send for Catalog

Learn to draw. We will teach you
School of Illustration
112 Page Bldg.
Chicago, Ill.



LEARN JEWELRY ENGRAVING

in your own home. Earn \$20.00 to \$50.00 Weekly. Personal instructions. Write for free booklet. Chicago Engraving School, 612 Athenaeum Bldg., Chicago

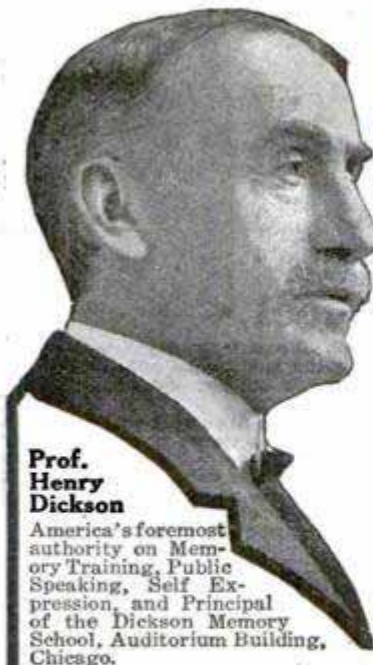
I Put Them There

Give Me Ten Minutes a Day and I Will Do the Same for You

Thousands of men and women have acquired an accurate, unfailing memory through my system of Memory Training. I have letters from men in nearly all professions and trades thanking me for being of great assistance to them. *Hundreds of them attribute their success and prosperity directly to my training.* These whom I quote below are but a few of them. I want to send you others.

You, young man in college, or you, ambitious worker taking a correspondence course—what good is your study doing you? *Be square with yourself. Are you able to remember what you learn?* If not, you owe it to yourself to train your mind so you can profit by what you learn. No education in the world can help you unless you have a memory—a well ordered mind instead of one that plays you tricks.

Take inventory of yourself. You feel that others do not give you credit for your real worth. There must be a reason. Can you think and talk connectedly or are you always saying things that leap out before you give them serious reflection? *Do You Know How To Think? If not, Learn Now!*



Prof. Henry Dickson

America's foremost authority on Memory Training, Public Speaking, Self Expression, and Principal of the Dickson Memory School, Auditorium Building, Chicago.

A Perfect Memory Means More Money

Yes, it means money to you every day of your life. My training will mean promotions, ability to see new opportunities, a real capacity to think out big problems.

There never was a big executive or great man in any line who did not have an excellent memory. If he did not have a *perfect memory* he would be taking orders—not giving them. Size up these big men. Why are they superior to you? Only in this—that they can think—they have perfect memories.



J. T. M., Stafford Springs, Conn., wrote: *"It has always been hard for me to get up before an audience and speak, but since practicing your exercises I feel quite at home."*

P. H. B., Alaska, wrote: *"I have been using the principles taught, during my selling and am surprised at the results, and I often smile when I have pulled off a sale I had not been sure of."*

STOP Forgetting



A business man wrote: *"Since commencing I can endure the grind of a ten-hour business day and come home feeling tiptop—not brain dusty and all in, as heretofore."*

The curator of entomology in a Public Museum wrote: *"The exercises are most excellent and have brought instantaneous results. Within the past week I have been able to memorize a goodly number of scientific names."*



I Can Train You To Remember Don't Overlook This Opportunity

By modern scientific methods the memory, like any other function, can be trained and developed. All successful men have well developed minds and memories. *I have made thousands of them successful.*

If you want to win in the fearful competition of today *you must train.* The sooner you realize this the sooner you start to advance.

When you start with my wonderful system you will be astonished at your progress—at your ability to think and remember. *You can have a perfect memory.* It will be a revelation to you, and your friends will also notice it. It will increase your value to yourself and to your employer. The man with a *perfect memory* becomes a dominant personality—a man to reckon with.

FREE—This Valuable Book "How To Remember"

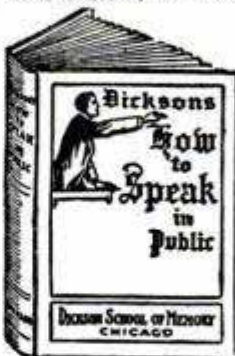
Simply clip the coupon—and mail it—or drop me a letter or postal *now.* You will receive my booklet by return mail.

How To Get Free Copy of this Valuable Book—"How to Speak In Public"

De luxe edition, handsomely illustrated, richly bound. Is exactly suited to meet the needs of the man or woman who desires

to be a successful public speaker. The price of this 1913 de luxe edition is \$2. I will, however, present a copy absolutely free to every student, who enrolls for my course of memory training within ten days after reading this offer.

Prof. Henry Dickson
Principal
Dickson School
of Memory,
705 Auditorium
Bldg., Chicago, Ill.



Send me free Booklet, "How to Remember;" also full particulars how to obtain a free copy of Dickson's "How to Speak in Public."

Mail Coupon Today

NAME.....

Street

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

The Burlington Special

19 Jewels Fully Adjusted

The Burlington Special

New Style (Thin Model)



Here is an Exquisite Design

Napoleonic Inlay Enamel Monogram

No Money Down!

The superb Burlington, encased in your choice of the exquisite new design cases, will be sent to you **prepaid**, without a penny down. See and examine the watch for yourself. Compare it with **any** watch you ever saw at **any** price. Then—if you are not absolutely satisfied send the watch back to us *at our expense*.

You risk absolutely nothing—you pay nothing—not one cent, unless you want this *exceptional* offer after seeing and thoroughly inspecting the watch.

If you decide to keep the watch, send us only a small deposit. The balance can be paid as you choose, in cash or at the rate of only \$2.50 a month. You get the superb Burlington at the **DIRECT** rock-bottom price—the same price that **even** the wholesale jeweler must pay.

New Ideas in Watches

On this great special offer you have some wonderful designs to select from—the latest triumphs of the master goldsmiths. Open face or hunting case, ladies' or gentlemen's sizes. **Block and Ribbon Monograms, Diamond Set, Lodge, French Art and Dragon Designs, Etc.** Our catalog shows complete illustrations.

New Book on Watches

Learn the inside facts about watch prices, and the many superior points of the Burlington over double-priced products. Just send the coupon or a letter or a postal. Get this offer while it lasts.

Burlington Watch Co.
19th Street and
Marshall Blvd.
Chicago, Ill.

Burlington Watch Co.
Dept. 919Y
19th St. & Marshall Blvd. Chicago

Please send (without obligations and prepaid), your free book on watches, with full explanation of your cash or \$2.50 a month offer on the Burlington Watch.

Name

Address

Please Mention Popular Mechanics

THIS \$2.00 BOOK OF Practical Electricity REDUCED TO \$1.00

38,000 engineers, electricians and students of electricity paid \$2.00 for this wonderful volume. You now have the opportunity of buying it at just half that price—\$1.00.

Good As A School

This book is a school within itself. It contains twenty chapters of valuable information—and teaches the fundamental principles of electricity including designing, operation and care of dynamos and motors.

Practical Electricity was written out of the day's work—the result of our eighteen years' experience, in repairing every possible kind of electrical machinery and apparatus.

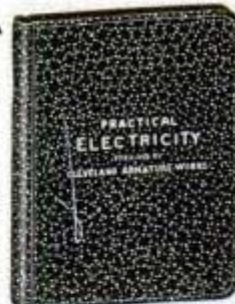
This book has helped boost hundreds of men to bigger and more responsible positions. In return for the electrical knowledge they secured from this book they boosted our repair business. We want to line up half a million more boosters—that's why we're cutting the price of the book in two.

MONEY BACK IF NOT SATISFIED

We couldn't begin to tell all of the points and merits of Practical Electricity. We would rather send you the book and let you see for yourself. Mail us \$1.00 to-day—and if you aren't perfectly satisfied, return it and get your money back. Order it now.

CLEVELAND ARMATURE WORKS
4734 St. Clair Avenue, CLEVELAND, OHIO

America's Greatest Electrical Repair Works



HOW TO TRIM SHOW WINDOWS

Shown in this new book. 150 complete windows for every season of the year illustrated by means of over 200 detail drawings and explained in 256 pages of text matter. Shipped prepaid for \$1.50. This is the 10th year for our

SCHOOL OF WINDOW TRIMMING



CARD WRITING AND ADVERTISING

Best paid and most fascinating professions in the world. A 120 page catalog FREE tells you all about it.

KOESTER SCHOOL, 306 Jackson Boulevard, CHICAGO

LEARN TO PAINT SIGNS and SHOW CARDS

I'll teach you personally by mail. Fourteen years' successful teaching. Big field for men and women. You can **EARN \$18.00 TO \$45.00 A WEEK** Crawford, B. C. writes: "Earned \$200.00 while taking course." Write today for catalog, samples, etc. **DETROIT SCHOOL OF LETTERING** CHAS. J. STRONG, Founder Dept. 207 Detroit Mich.



SHORTHAND IN 30 DAYS

Boyd Syllabic System—written with only nine characters. No "positions"—no "ruled lines"—no "shading"—no "word-signs"—no "cold notes." Speedy, practical system that can be learned in 30 days of home study, utilizing spare time. For full descriptive matter, free, address, Chicago Correspondence Schools, 969 Advertising Building, Chicago, Ill.

LEARN JEWELERS' ENGRAVING

A high salaried and easily learned trade, taught thoroughly by mail. We will teach the beginner better engraving than he can gain in years of rigid apprenticeship. We will also improve the skill of any engraver. Send for our catalog. The Engraving School, 112 Page Bldg., Michigan Ave., Chicago, Ill.

ARITHMETIC SELF-TAUGHT

A plain, easily-understood volume for all who have not had the opportunity of learning this subject thoroughly, or who have forgotten what they once learned. 257 Pages. Requires no teacher. This great little book sent postpaid for 60 CENTS. Stamps accepted, leather binding \$1. **GEO. A. ZELLER BOOK CO.** Est. 1870, 4473 W. Belle Place ST. LOUIS, MO.



9,059-Word Business Book Free

Simply send us a postal and ask for our free illustrated 9,059-word Business Booklet which tells how priceless Business Experience, squeezed from the lives of 112 big, broad, brainy business men, may be made yours—yours to boost your salary, to increase your profits. This free book deals with

- How to manage a business
- How to sell goods
- How to get money by mail
- How to buy at rock-bottom
- How to collect money
- How to stop cost leaks
- How to train and handle men
- How to get and hold a position
- How to advertise a business
- How to devise office methods

Sending for this free book binds you to nothing, involves you in no obligation; yet it may be the means of starting you on a broader career. Surely you will not deny yourself this privilege, when it involves only the risk of a postal—a penny! Simply say "Send on your 9,059-word Booklet". Send to SYSTEM, Dept. 81-7 Wabash and Madison Sts., Chicago



DO YOU WANT TO KNOW HOW TO DEVELOP VITALITY, ENERGY, ENDURANCE, NERVE STRENGTH, MUSCULAR STRENGTH PERFECT PHYSIQUE?

My FREE BOOKS, "The 'Whys' of Exercise" and "The First and Last Law of Physical Culture," tell you, if you are weak or underdeveloped, how to grow strong; if strong, how to grow stronger. They explain how to develop lungs and muscle, the strong heart and vigorous digestion—in short, how to improve health and strength internally as well as externally. Send TO-DAY—NOW—for these FREE BOOKS. Enclose 4c in stamps to cover postage.

PROF. H. W. TITUS, Department 125, 56 & 58 Cooper Square, New York City



HERE YOU ARE, BOYS

A medallion pin of Foxy Grandpa. Everyone will notice it on the lapel of your coat and try to get a closer look at it. All you have to do is press the bulb.—Foxy Grandpa will finish the job by squirting a fine stream of water over the inquisitive one. Will squirt 20 feet. Greatest joke out. Order one today and fool your friends. Price 15c. Foxy Grandpa and Hooligan both for 25c. 5 for 50c or 1 doz. for \$1.00. A beautiful fountain pen free with every \$1.00 order.

AMERICAN SUPPLY CO., 918 Union St., St. Paul, Minn.

FREE "Linene" COLLAR

Our free sample will prove comfort and economy. Send postal stating size and whether you want high or low collar.

REVERSIBLE COLLAR CO., Dept. U, Boston, Mass.

INSECTS

butterflies, etc. **WANTED.** Big prices paid. All have cash value. Hundreds bring \$1.00 to \$10.00 each. Rarities fetch enormous prices. I sell them to colleges and rich men, for collections. Simple. Interesting. Men. Women. Get market prices, valuable information, and complete book of beginners instructions. Send 2c stamp.

JAS. SINCLAIR, ENTOMOLOGIST, Dept. 6, Los Angeles, Cal.

Every Boy His Own Toymaker

Greatest boys' book ever written. Tells how to make a Steam Engine, Telephone, Magic Lantern, Boats, kites, balloons, electrical and mechanical toys, traps, fishing tackle. 200 illustrations; also catalog of 150 puzzles, Keller's Magic Ace Trick Card and "DOUBLE THROAT" warbler and bird call all for only 10c. WESTERN PUZZLE CO., ST. PAUL, MINN.

FREE

A 46-page free booklet of sample pages from **Ridpath's History of the World** will be mailed to all who send us their name and address. A postal card will do.

WESTERN NEWSPAPER ASSOCIATION, CHICAGO

LEARNED BY ALMOST ANYONE AT HOME SMALL COST

VENTRILOQUISM

Send today 2c stamp for particulars and proof.

O. A. SMITH, Room D 103, 823 Bigelow St., PEORIA, ILL.

Valparaiso University

(Accredited)

VALPARAISO, INDIANA

Founded 1873

One of the Largest Institutions of Learning in the United States

Thorough Instruction at Lowest Expense



Group of Valparaiso University Buildings Including the Departments of Medicine and Dentistry Located at Chicago

THIS INSTITUTION was founded with the idea of giving to every person, whether rich or poor, a chance to obtain a thorough practical education at an expense within his reach. That it is performing this mission is indicated by the numbers who avail themselves of the advantages offered.

Valparaiso University was founded with 3 departments, 4 instructors, and an annual enrollment of 210 different students. Now there are 29 departments, 209 instructors and an annual enrollment of more than 5000 different students.

The reason for this growth is in the fact that this University constantly increases its facilities, strengthens its courses of study and offers additional advantages without making the expense to the student any greater. The University is well equipped with buildings, libraries and laboratories for giving instruction in the following:

Departments Preparatory, High School, Education, Kindergarten, Primary Methods, Domestic Science, Agriculture, Scientific, Higher English, German, French, Italian, Spanish, Sciences, Classic, Engineering, Architecture, Manual Training, Expression and Public Speaking, Music, Fine Art, Law, Pharmacy, Medicine, Dentistry, Commerce, Phonography and Typewriting, Penmanship, and Review.

While the expense in all the Departments is exceedingly low it has not been made at the sacrifice of a high grade of instruction, but by applying business principles to

"The Cost of Living" so that the most satisfactory accommodations for board may be had at from \$1.80 to \$3 per week. Tuition \$20.00 per quarter of twelve weeks, or \$65.00 if paid in advance, for a year of forty-eight weeks. If the entire tuition is paid in advance for the year it includes all the departments, excepting Medical, Dental and private lessons in Music.

The total expense of board, tuition and furnished room for the regular school year (thirty-six weeks), need not exceed \$119.80; or for forty-eight weeks \$151.40.

For Free Catalog Address

HENRY B. BROWN, President or
OLIVER P. KINSEY, Vice-President

Box 7, University Hall, Valparaiso, Ind.

The Forty-Second Year Will Open Sept. 15, 1914

Please Mention Popular Mechanics



BULLETIN

NOTICE

W.J. Smith is promoted to Superintendent, effective immediately.

H.E. Brown, Pres.

“Wish I had his pull!”

Don't envy the "pull" of the man who gets ahead. It's been a "hard pull" for him, that's sure. The confidence of his employers has been won only after years of hard labor. Training, not pull, has earned Smith his promotion.

A "stand-in" with the boss doesn't amount to much these days unless you can back it up with real service. No man who pays out good money for wages is going to keep, much less promote, the fellow who fails to do his share—who makes no effort to progress. Study the men the boss favors. Aren't they doing a little more than they're paid for? Aren't they training themselves for something better in their particular lines?

Years of hard labor are no longer necessary to fit yourself for success. You no longer need to waste the best years of your life in disagreeable work at low wages, simply to get a start—to secure a foothold on the road to a better job and bigger pay. Young or old, the American School can train you, in a short time and in your own home, for the position you want.

Your Opportunity Coupon

Mark the position you want and mail the coupon now

- | | |
|--------------------------------|---------------------------|
| Electrical Engineer | Lawyer |
| Elec. Light & Power Supt. | Bookkeeper |
| Electrical Wireman | Stenographer |
| Telephone Expert | Private Secretary |
| Architect | Accountant |
| Building Contractor | Cost Accountant |
| Architectural Draftsman | Cert'fd Public Acc't |
| Structural Draftsman | Auditor |
| Structural Engineer | Business Manager |
| Concrete Engineer | Fire Ins. Inspector |
| Civil Engineer | Fire Ins. Adjuster |
| Surveyor | Fire Ins. Expert |
| Mechanical Engineer | Moving Picture Op'r |
| Mechanical Draftsman | Sanitary Engineer |
| Steam Engineer | Irrigation Engineer |
| Municipal Engineer | Textile Boss |
| Gas Engine Engineer | College Preparatory |
| Gas Tractor Engineer | Auto. Mechanician |

NAME

ADDRESS

Pop. Mech. 7-14

How the American School can advance you

For over fifteen years the American School has been training men for bigger jobs, giving them the "pull" that advanced them while other men stood still. It has prepared thousands for entrance into the big resident colleges. It has trained even more in all branches of **Engineering, Business and Law**, helping them to better jobs and bigger pay. If you want to get ahead, the American School will give you the training you need, no matter where you live or what you do.

Remember, it's training, not "pull," that counts. Promotion comes only to the trained man—the man who has fitted himself through study to hold a responsible, well-paying position. The American School offers you the opportunity of taking up the studies you require under ideal conditions—in your spare time and in the privacy of your own home. Not only this, but you can pay for your course as you progress.

Investigate your opportunity today. Fill in and mail the coupon now.

American School

of Correspondence, Chicago, U.S.A.

This school has no connection with any other school using the name "American"

Popular Mechanics Magazine

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 22

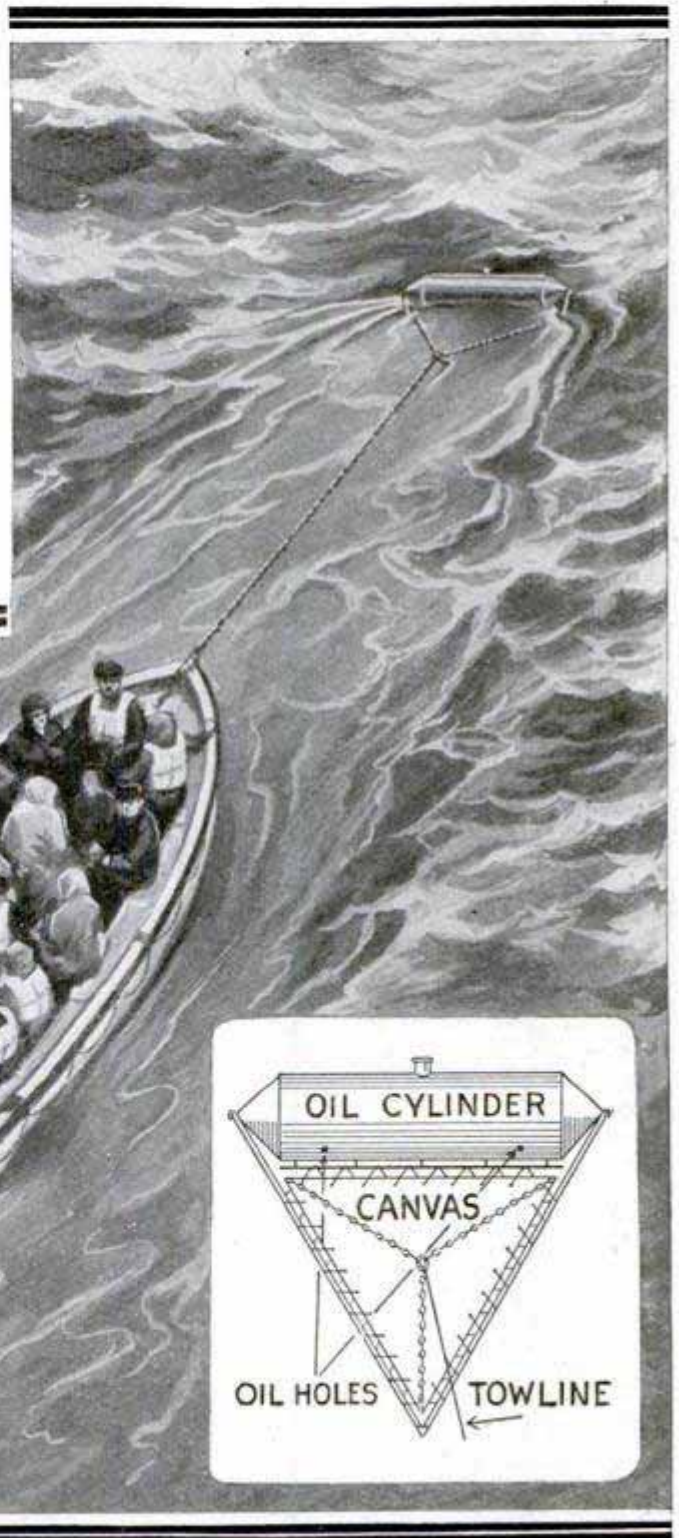
JULY, 1914

No. 1

Sea Anchor Has Oil-Tank Attachment

TO protect a lifeboat in a heavy sea, the familiar device known as a sea anchor, consisting of a triangular piece of canvas lashed to a rigid frame, has been improved by the addition of an oil tank. A cable or chain bridle is arranged to keep the lower point of the canvas triangle submerged, while oil oozing from holes in the bottom of the cylinder smooths down the waves and prevents "combers" from breaking and swamping the boat. As the anchor holds the boat head-on, the action of the wind and waves carries the oil-covered water past the boat. A number of these sea anchors are in use in the army transport service, while the lifeboats of some of the large pas-

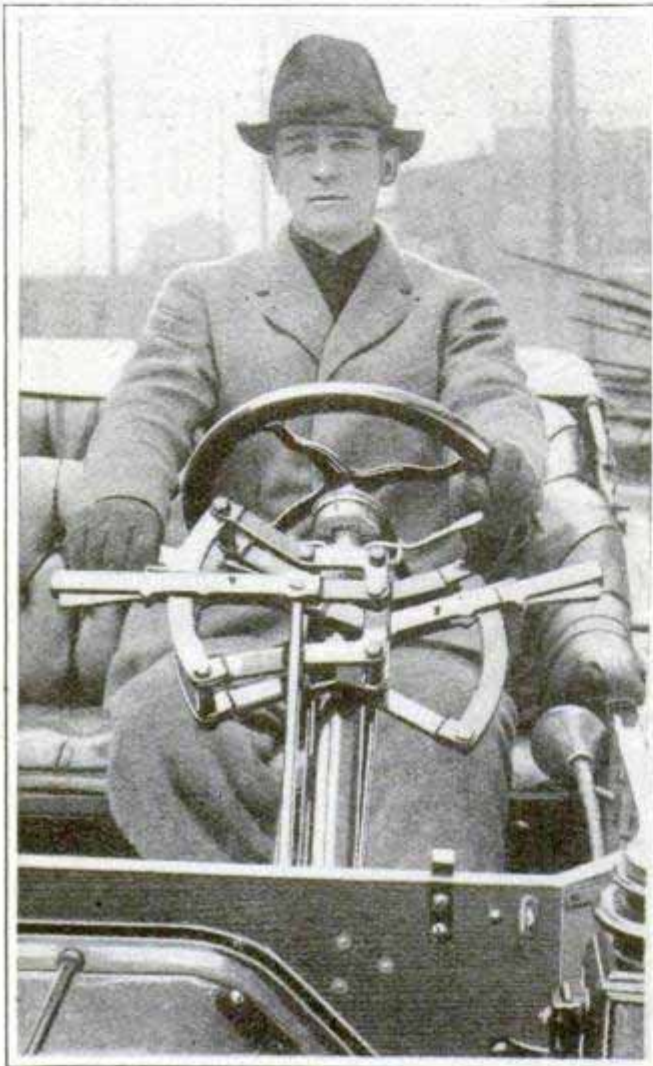
senger ships are being equipped with them. The device is patented.



Safety Device Holds Lifeboat Head-On to the Sea, and Pours Oil on the Waves

HAND-CONTROLLED DRIVE FOR AUTOMOBILES

To make it possible for persons who have lost their legs or whose lower



Hand-Controlled Device Attached to Steering Wheel: Driver's Right Hand Is on the Transmission Brake; Above and Just Ahead Is the Clutch; On the Opposite Side of the Column Is the Reverse Lever

limbs are disabled through accident or disease, to operate an automobile properly, a hand-controlled drive has been designed whereby the usual operations of transmission, clutch and reverse may be accomplished by the hands instead of by the foot levers provided on most cars. The device is constructed of aluminum, and consists of three levers and a frame attached to the steering column. From these levers three steel rods pass through the dash to bell cranks under the hood. The movements of the latter are communicated beneath the floor to the transmission case. The levers are self-locking in any position, and return to normal

when released by a slight pressure of the fingers. But little effort is required to move them, and one hand is always free for the steering wheel. The new device does not interfere with the pedal action, and a car so equipped may be driven by another person in the ordinary manner without touching the hand control. The device may be attached to any car.

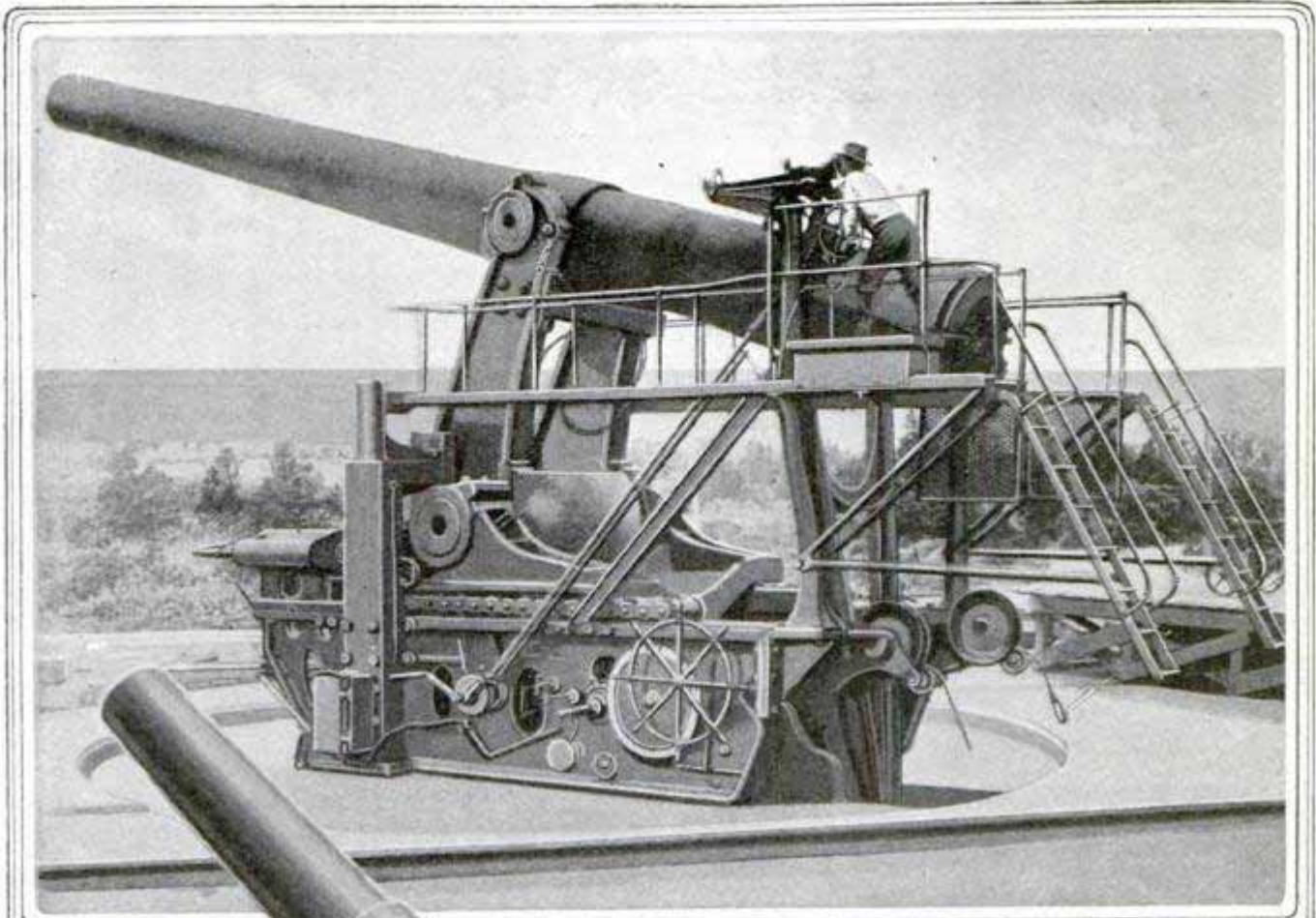
ELECTRIC LAMP LIGHTED BY WIRELESS

A specially designed electric-light bulb, constructed in accordance with the plans of Marconi, was illuminated by wireless waves supplied from a 100-hp. plant six miles distant, recently. The success of the experiment, which is not yet adapted to commercial use, is a forerunner, according to Mr. Marconi, of the use of wireless in both lighting and heating houses, as well as for giving a means of supplying power to aeroplanes in flight.

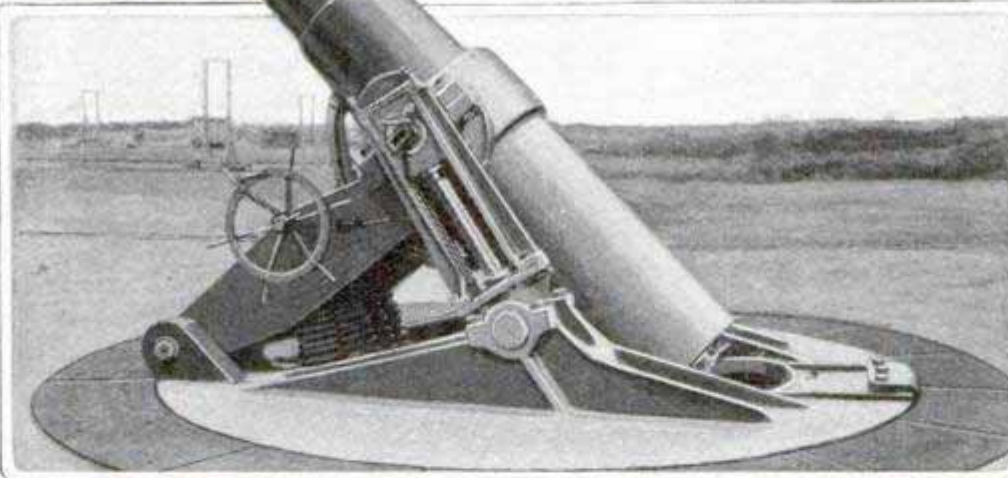
GUARDING PANAMA CANAL AGAINST FOREIGN FOES

In addition to the 12-in. and 16-in. coast-defense rifles, mounted on disappearing carriages, which will constitute the main defenses of the Panama Canal against attack from the sea, several of the newest type of seacoast mortars are to be placed in pits, from whence they can discharge shells without disclosing their own position. These new mortars, the most powerful ever built, have a range of 11 miles and can send a shell five miles high, to drop with terrific velocity on the deck of an enemy's ship.

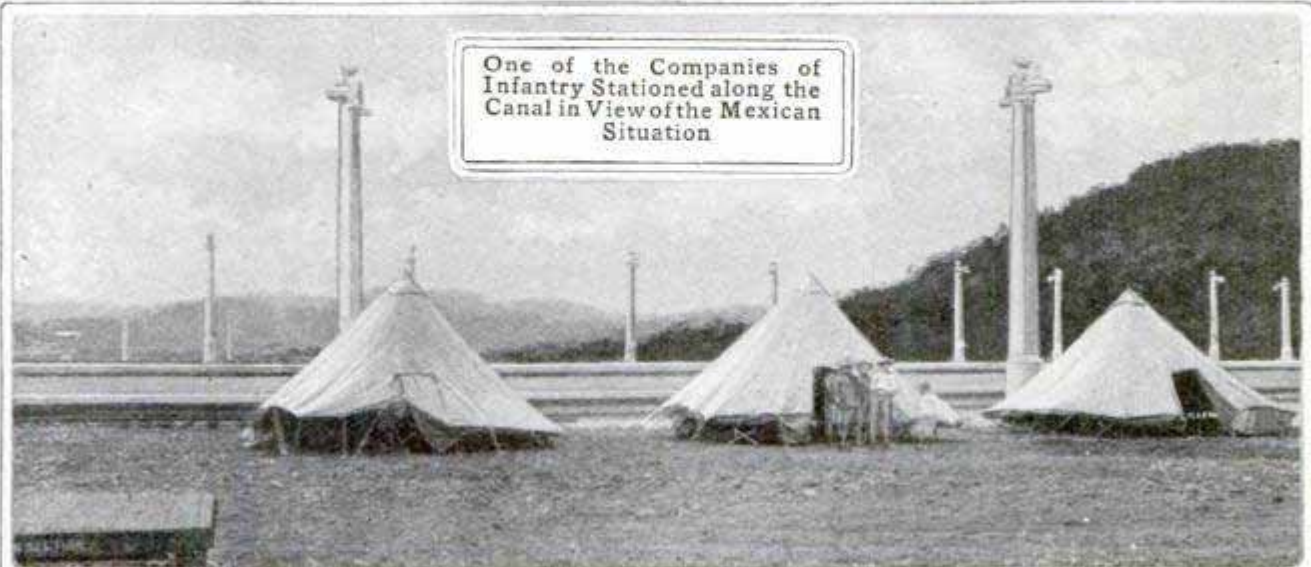
For the better protection of the locks against any foe that might attempt to wreck the gate machinery with bombs, or to plant mines in the ship channel, a detachment of the Tenth U. S. Infantry has been detailed to special guard duty. The soldiers live in camps at the different locks, two companies at Gatun, one company at Pedro Miguel and one at Miraflores, and maintain a constant patrol.



One of the Great 12-Inch Guns, Mounted on a Disappearing Carriage, to Guard the Panama Canal



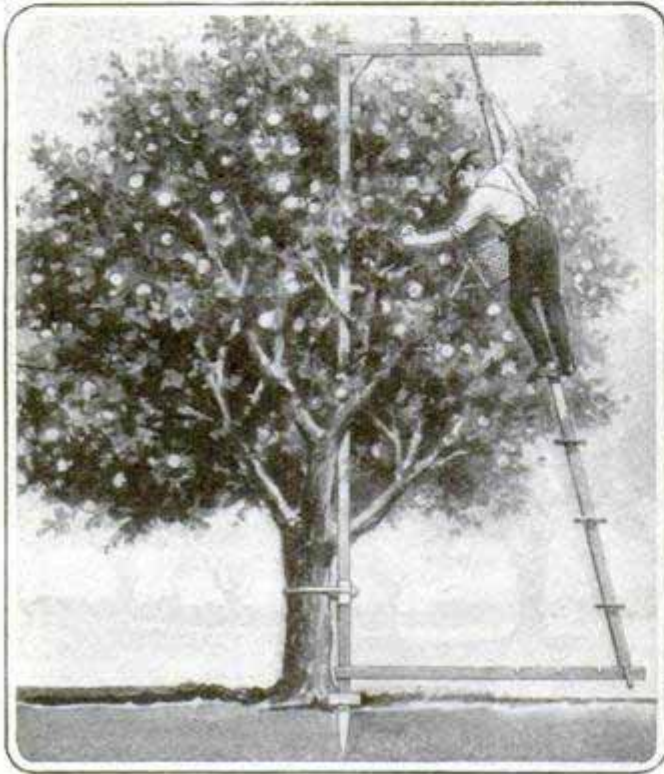
This Coast-Defense Mortar at Panama Is Invisible from the Sea, but can Drop a Shell on a Battleship's Deck at a Distance of 11 Miles



One of the Companies of Infantry Stationed along the Canal in View of the Mexican Situation

REVOLVING LADDERS FOR USE IN PICKING ORANGES

Ordinary ladders when used for picking fruit from a tree often damage the tree, and to overcome this a new form



Revolving-Ladder Support for Fruit Picking

of ladder has been adopted by some orange growers of California. A central shaft is lashed to the trunk of the tree, while horizontal arms are fitted at the top and bottom so that they may be swung about in all directions. Notches cut in the tops of the arms provide support for the rungs of the ladder at varying distances from the tree. With this device, every part of the tree may be picked without disturbing a branch.

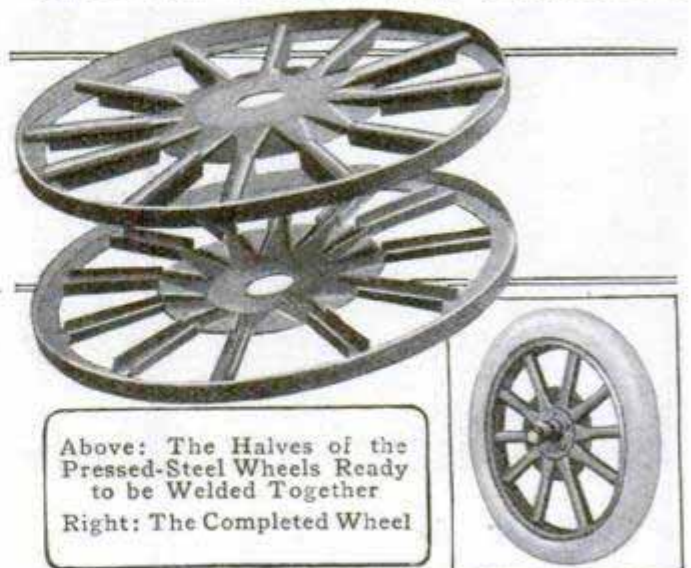
PROTECTING THE EYES FROM ULTRAVIOLET RAYS

A remarkable series of tests has recently been made to determine the best type of glass for the protection of the eyes from the injurious effect of ultraviolet rays in the industries. Industrial processes involving high temperatures and excessive amounts of light rays of extremely short wave lengths occasion eye troubles of more or less seriousness, and the use of clear or

smoked glasses does not afford relief. Photometric and spectrometric tests resulted in the adoption of a yellow-green glass as a standard, as it appears that such glass is opaque to short wave rays of the injurious class, while colors are distorted less by it than by any other tint or combination. Goggles equipped with this yellow-green glass have been prepared for use in oxyacetylene welding, in the steel and iron industry, and in glass blowing.

STEEL WHEELS FOR AUTOMOBILES

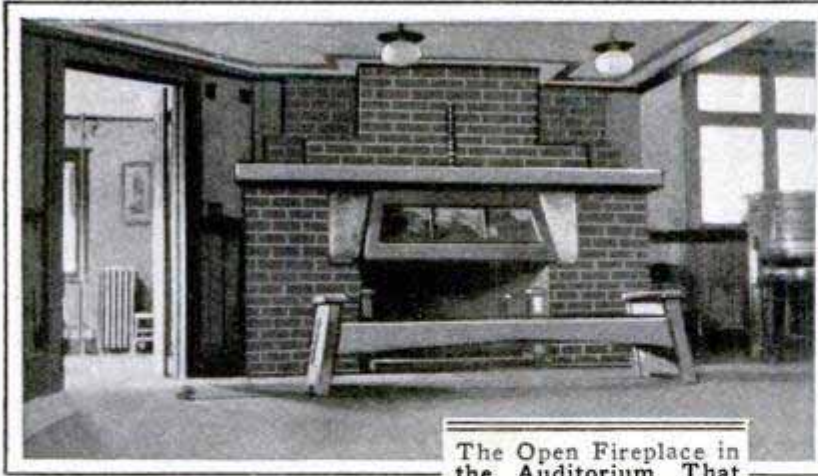
Pressed-steel wheels are being built for automobiles, which have great strength and no more weight than wooden wheels of the same carrying capacity. For vehicles weighing up to $1\frac{1}{2}$ tons, No. 18 gauge steel is used, and this is found to be heavy enough for larger cars, although a lighter gauge would doubtless be ample for the lighter varieties of touring cars. The sheet steel is pressed cold, the first impression merely outlining the spokes, while subsequent processes cut out the intermediate steel, and round the spokes for close fitting. The wheel is assembled, the "spider" is placed in the concave side of one of the stampings, and the spoke wings closed, forming a perfect interlock. The surplus material is removed from between the



Above: The Halves of the Pressed-Steel Wheels Ready to be Welded Together
Right: The Completed Wheel

spokes and the hub and rim added, while spot welding may be used between the spokes if desired.

CALIFORNIA CHURCH BUILT LIKE BUNGALOW



The Open Fireplace in the Auditorium That Serves as a Center for Informal Gatherings

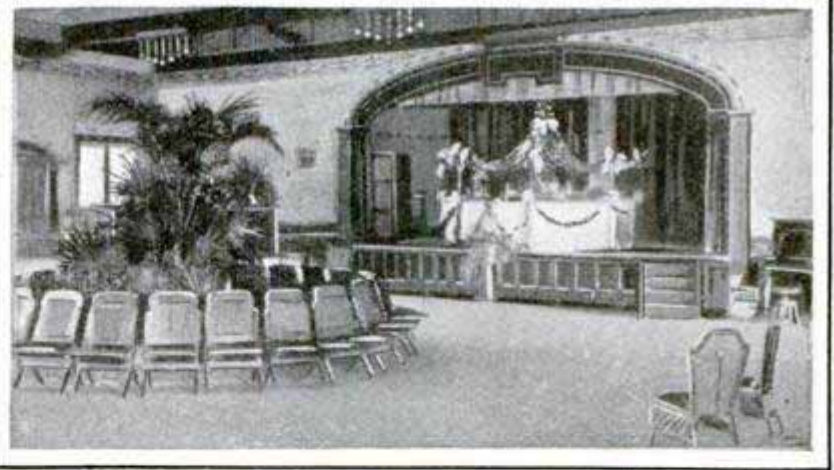


The Veranda of the Church



New Church in California City Has All the Homelike Features of a Bungalow

A church edifice, which has so little resemblance to the familiar house of worship that the average man would mistake it for a private home, has been built in Los Angeles. This church harmonizes well with its environment, having many of the features that make the Los Angeles bungalows so attractive to visitors. The broad veranda with its easy chairs at the entrance, the rose-covered pergola leading to the door, the grounds with palms and flowers—all these make the church inviting to people who are not attracted by the formality of the more conventional sacred architecture. Within, the customary rows of pews are lacking, while a massive fireplace, such as forms the heart of a home, is in the auditorium. The chairs in the auditor-



In the Auditorium Movable Chairs are Used in Place of Pews

ium may be set to face the pulpit, or they can be turned toward the small stage at one side, which is used for concerts or other entertainments. This gives a pleasant and homelike aspect to the place. Most of the windows are of medium size and of the design usually found in a modern bungalow, with the outer light softened by hangings of simple weave. The church cost about \$25,000 and is of timber and concrete.

TAKING MOVIES AT THE BOTTOM OF THE SEA

"Children of those who went down in the 'Titanic' may live to look upon an actual picture of that great steamship resting on the ocean's floor."—From Comment and Review, page 29

DOWN at the bottom of Nassau Harbor, in the Bahamas, the camera man for one of the big film-producing companies is photographing scenes that none but a few divers has ever seen, but which will soon be familiar to movie audiences all over the world. The wonderful coral reefs and luxuriant vegetation of the semi-tropical "sea gardens" may furnish the background for submarine "thrillers," beside which the popular cowboy dramas will seem tame and uninteresting. Even without a specially prepared and staged photoplay, these bottom-of-the-sea films are of absorbing interest. Curious tropical fishes, swimming freely and without restraint; Bahama "black boys" diving for pennies; sunken relics of sea tragedies of long ago—these are among the scenes that have already been "filmed." Some of these first movies ever made on the floor of the ocean are reproduced on three following pages.

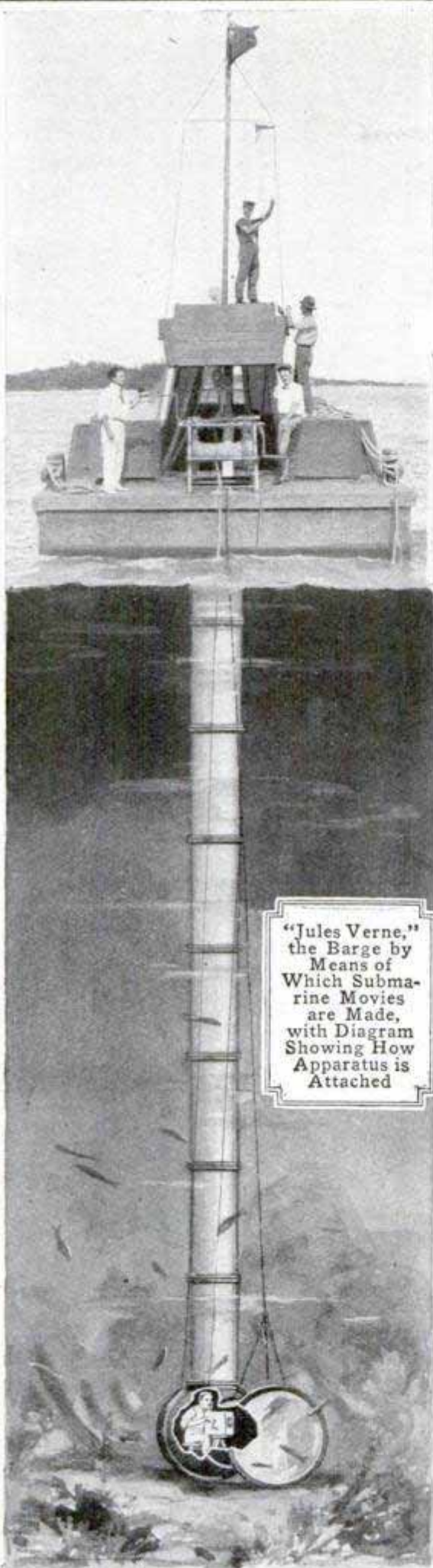
The device by means of which motion pictures are made under water is as simple as it is ingenious. The principal part of the apparatus is a spherical steel chamber, about 4 ft. in diameter, with a flaring extension which ends in a sheet of plate glass, 3 in. thick and capable of withstanding a pressure of 140 lb. to the square inch, which is equivalent to a water depth of 300 ft.

At the top of the submerged chamber is a manhole, just large enough to admit the operator and his camera, and leading from this up to the surface is a tube, built up of a series of collapsible sections of flexible material, each section having a metal ring at each end, which is bolted to the ring on the next section, thus making it possible to provide an open passageway from the surface to the operating chamber, to whatever depth the latter may be submerged. The tubing material is also able to resist a 140-lb. pressure.

A barge equipped with powerful hoisting tackle, and constructed with a well in its center through which the

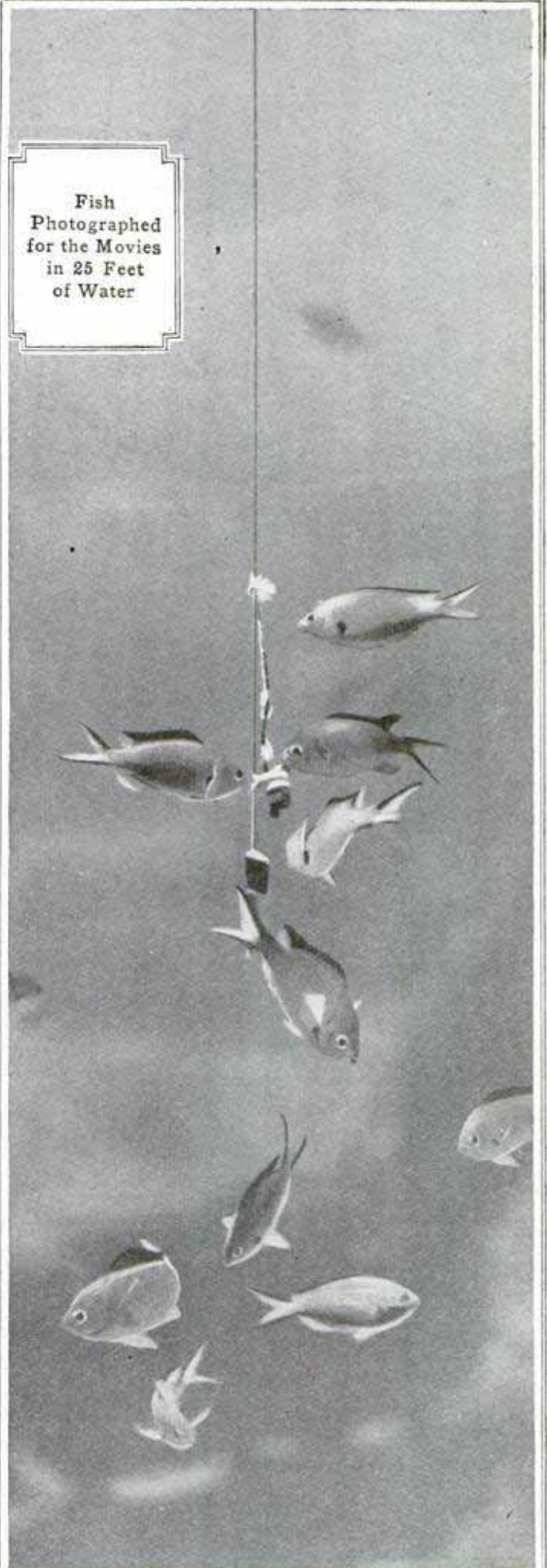
chamber may be lowered and the tube led down to it, completes the mechanical equipment for taking moving pictures under water. This barge has been appropriately named the "Jules Verne," in honor of the great French romancer whose story, "Twenty Thousand Leagues Under the Sea," furnished not only the inspiration for modern submarine navigation but many practical ideas that have since been utilized by engineers. Jules Verne's descriptions of life and scenes under water, while wholly imaginary, were based on deep study and wide knowledge of marine life and conditions, and many of his famous word pictures seem in a fair way to be transformed into real pictures.

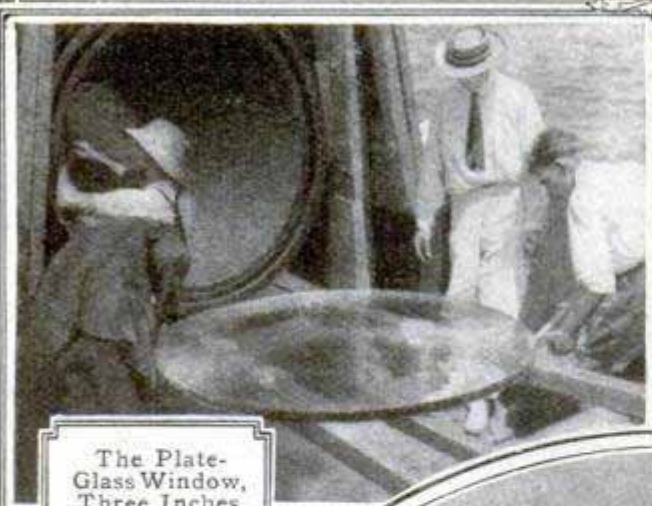
The harbor of Nassau, New Providence Island, was selected for the first underwater motion-picture work largely because of the remarkable clarity of the water. The bottom, of coral sand, is never muddy, but instead reflects the brilliant sunlight, producing conditions under which photographs can be made with exposures almost as brief as in the open air—a highly important requirement for the movies. Photographs made at 35 ft. depth, of divers plunging swiftly through the water, require an exposure of only $\frac{1}{100}$ of a second on a bright day. Nor is it necessary to bring the camera up close to the object photographed, even at such a depth. One of the interesting objects found by the camera when the first pictures were made was the wreck of a ship that had been sunk 50 years before. Nassau, as a neutral port close to the southern seaboard of the United States, was the favorite rendezvous and refuge for ships attempting to run the blockades established by the navy of the North during the Civil War and carry contraband cargo into Charleston, Savannah or Wilmington. One of these blockade runners, sunk in the harbor, lies in 45 ft. of water, and at a distance of more than 30 ft. photographs of it show up clearly, so transparent is the water.



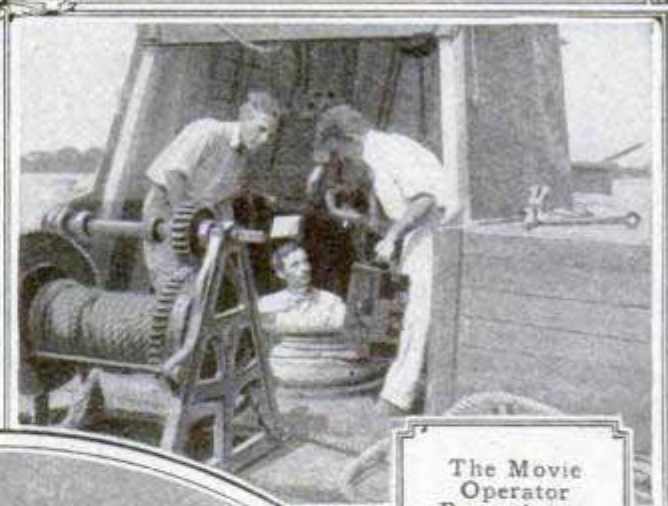
Fish
Photographed
for the Movies
in 25 Feet
of Water

"Jules Verne,"
the Barge by
Means of
Which Subma-
rine Movies
are Made,
with Diagram
Showing How
Apparatus is
Attached

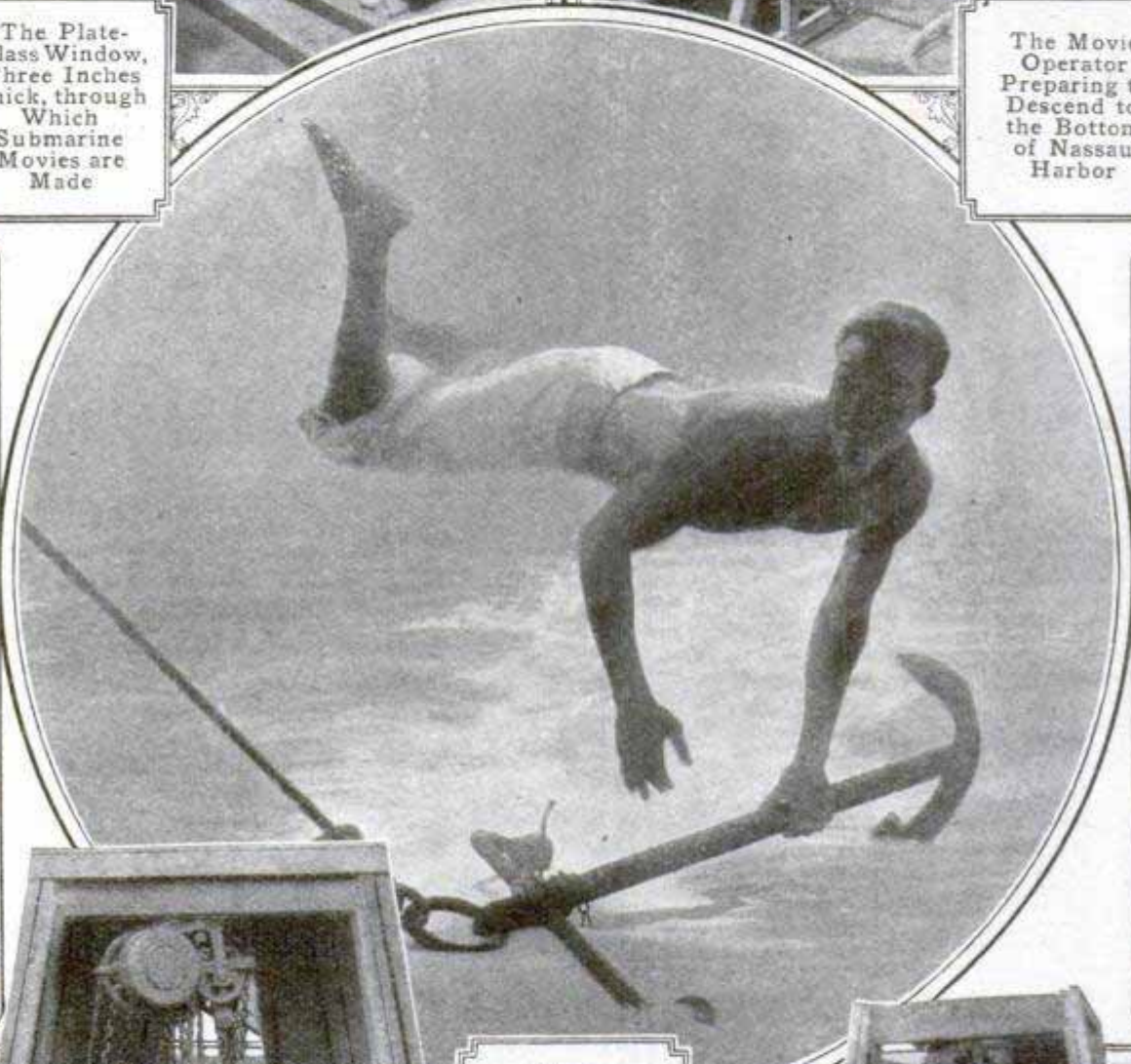




The Plate-Glass Window, Three Inches Thick, through Which Submarine Movies are Made

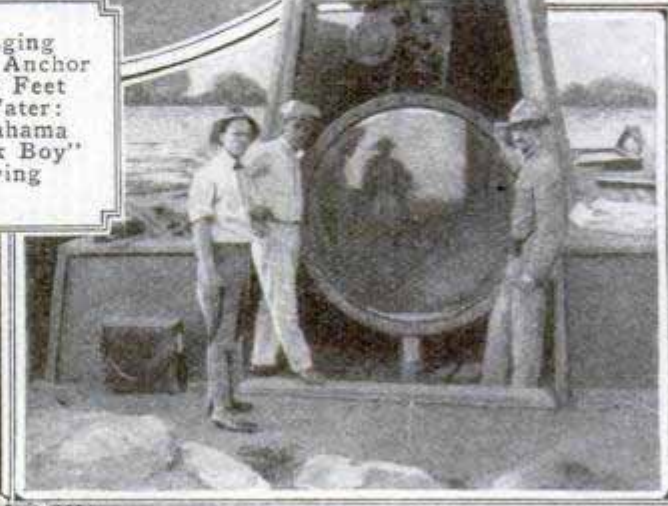


The Movie Operator Preparing to Descend to the Bottom of Nassau Harbor



Tackle with Which Operating Chamber is Lowered

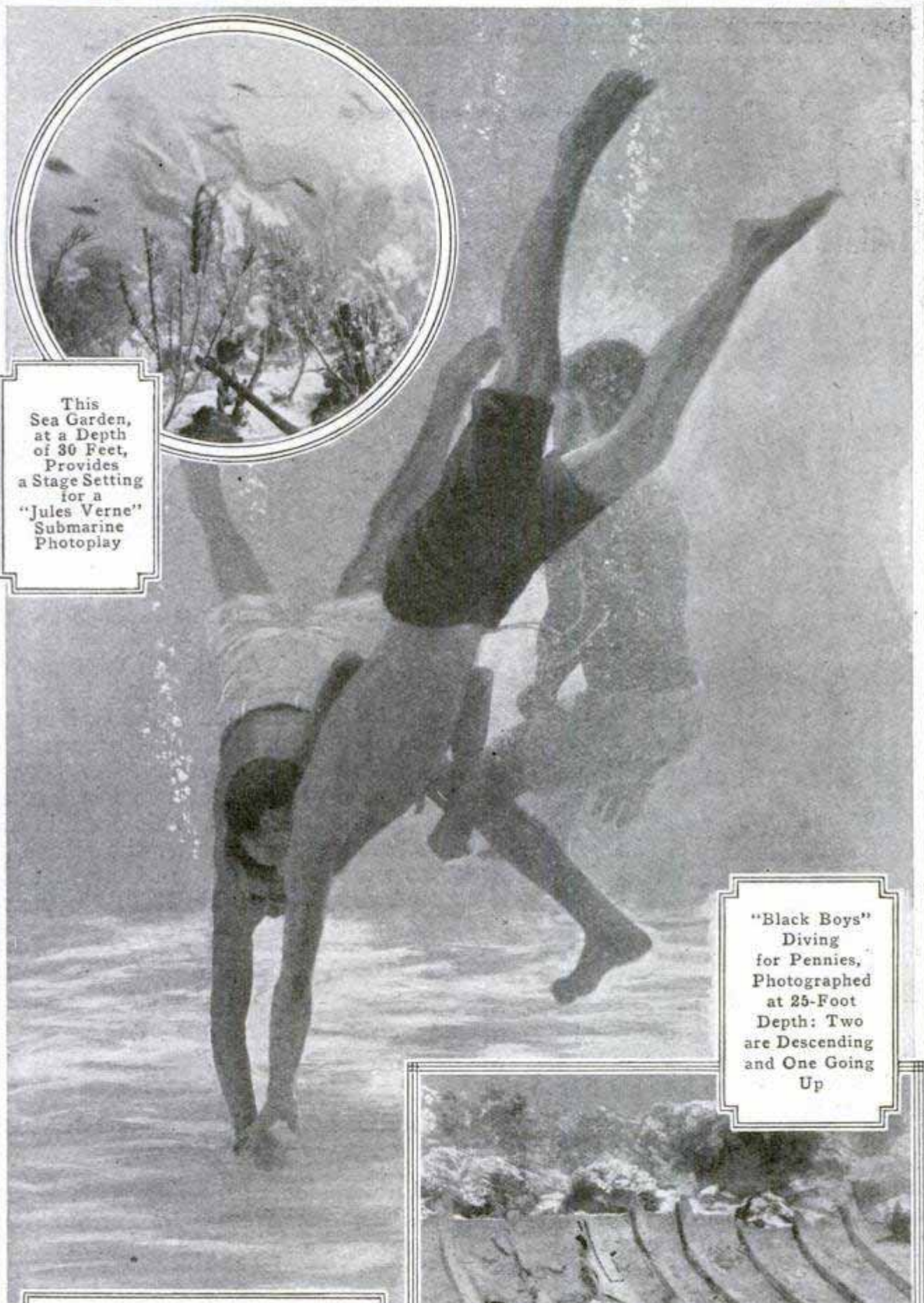
Clinging to the Anchor in 25 Feet of Water: A Bahama "Black Boy" Diving



All Ready to Lower the Operating Chamber

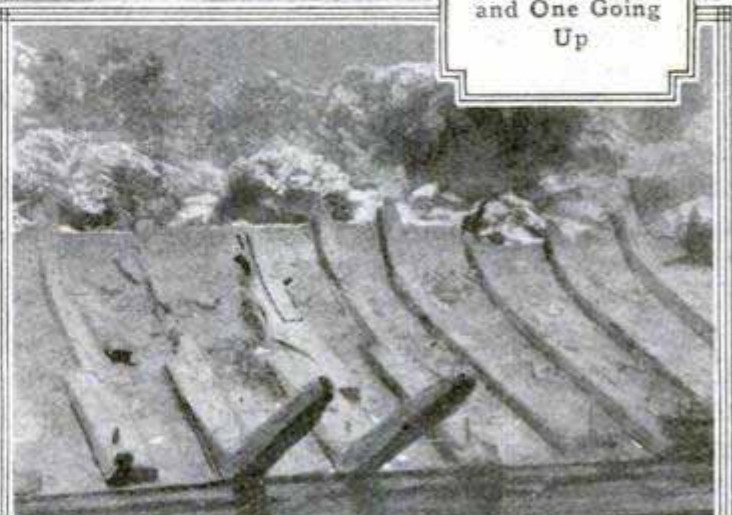


This Sea Garden, at a Depth of 30 Feet, Provides a Stage Setting for a "Jules Verne" Submarine Photoplay



"Black Boys" Diving for Pennies, Photographed at 25-Foot Depth: Two are Descending and One Going Up

The Wreck of This Civil-War Blockade Runner was Photographed at a Distance of 30 Feet. It Lies in 45 Feet of Water



BUTT MEMORIAL BRIDGE AT AUGUSTA



PHOTOS COPYRIGHTED BY INTERNATIONAL NEWS SERVICE

The Butt Memorial Bridge at Augusta, Ga.



The Memorial Tablet and Massive Wreath of Lilies and Rhododendron Leaves

In memory of Major "Archie" Butt, aide-de-camp to President Taft, who lost his life in the "Titanic" disaster in 1912, the citizens of Augusta, Ga., have erected a beautiful bridge, and placed upon it a tablet with an appropriate inscription, which was unveiled April 16, 1914. Major Butt was born in Augusta in 1865. After graduation he entered the army of the United States, being appointed aide-de-camp to President Roosevelt, and continuing that office under President Taft. Survivors of the "Titanic" disaster testified to his courage and self-sacrifice in the shadow of death. The tablet bears these words: "In

honor of Archibald Willingham Butt, Born in Augusta, Sept. 26, 1865, Graduated in the University of the South, 1880, Major in the United States Army, Trusted Aide-de-Camp of two Presidents. Major Butt went to his death in the steamer 'Titanic' after the rescue of the women and children from that ill-fated vessel, April 15, 1912. In memory of his noble and lovable qualities as a man, his courage and high sense of duty as a soldier, his loyalty and efficiency as a public servant, his fellow-citizens of Augusta dedicate this bridge. W. H. Taft."

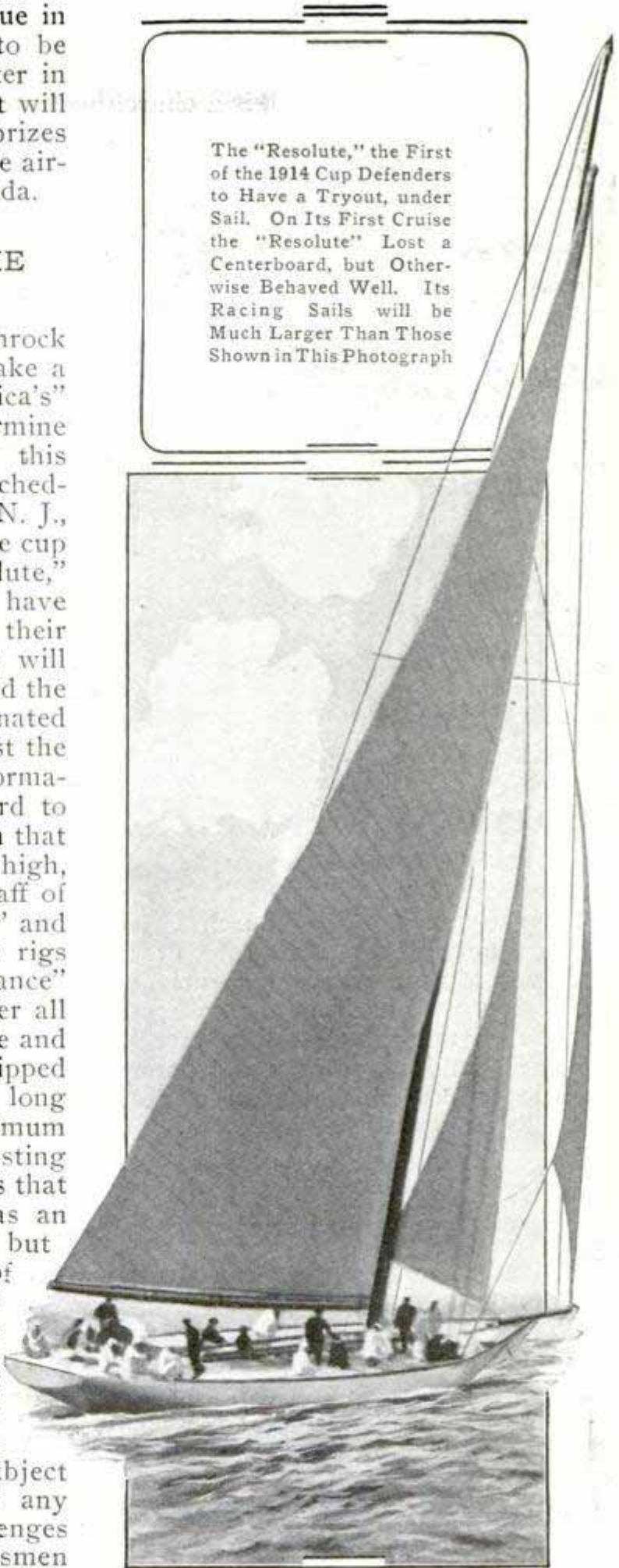
AEROPLANES SOON TO RACE TO BERMUDA

Arrangements are being made for an aeroplane race from New York to Bermuda, over a flying course of 700 miles, for prizes amounting to \$25,000. It is proposed that each aeroplane entering the race shall carry a wireless outfit having a range of at least 75 miles, as the airmen will have to fly over the sea for a long distance, without any land in sight. No date has been definitely decided upon as yet, but it is pointed

out that the flight will be of value in shedding light upon conditions to be met in the transatlantic flight later in the year. It is expected the flight will be made in June or July, and the prizes will be paid upon the arrival of the airmen in Hamilton Harbor, Bermuda.

NEW DEFENDERS OF THE "AMERICA'S" CUP

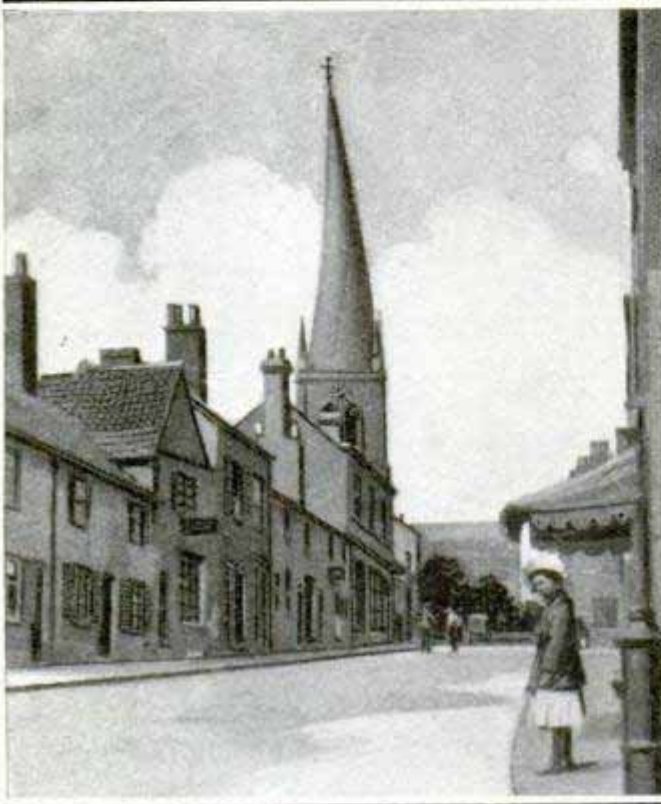
With his new yacht the "Shamrock IV" Sir Thomas Lipton is to make a fourth attempt to win the "America's" cup, and the races that will determine who is to have possession of this famous international trophy are scheduled to be held off Sandy Hook, N. J., in September, 1914. To defend the cup three American racers, the "Resolute," the "Defiance" and the "Vantie" have been built and are being given their preliminary trials. These boats will first engage in a series of races, and the winner in this series will be designated as the cup defender to race against the "Shamrock IV." Not much information has been given out in regard to any of these boats, but it is known that the "Resolute" has a mast 103 ft. high, a boom about 76 ft. long and a gaff of about 50 ft., while the "Defiance" and the "Vantie" have even loftier rigs than the "Resolute." The "Defiance" is reported to be 118 ft. long over all and to have an overhang both fore and aft of from 18 to 20 ft. It is equipped with a centerboard about 8 ft. long and lead keel, and has a maximum draft of about 22 ft. An interesting thing about the "America's" cup is that it was not originally intended as an important international trophy, but was the prize offered in a series of races of little more than local importance held at Cowles, Isle of Wight, in 1851. The cup was won by a New York yacht, the "America," and afterward given in charge of the New York Yacht Club as an international trophy subject to challenge by yachtsmen of any nation. Since then many challenges have been made by British yachtsmen in attempts to recover the cup.



The "Resolute," the First of the 1914 Cup Defenders to Have a Tryout, under Sail. On Its First Cruise the "Resolute" Lost a Centerboard, but Otherwise Behaved Well. Its Racing Sails will be Much Larger Than Those Shown in This Photograph

A TWISTED STEEPLE ON AN ENGLISH CHURCH

In Chesterfield, England, is a church the spire of which, no matter from what point of view seen, appears to be dan-



Spiral Spire on an English Church Appears Warped and Bent

gerously crooked. The church is located prominently, and the steeple is seen from almost every road entering the city, as well as from the railroad. In spite of appearances, the spire is safe and sound. A spiral construction was adopted and this makes it appear bent. In reality it is plumb.

A STREET CAR USED TO STRETCH WIRE FENCE

Land adjacent to a suburban street-car line, near Reno, Nev., was fenced quickly by utilizing one of the electric cars to stretch the wires, recently. The poles were placed in position, and the fencing, in sections, was then fastened to the posts, the car stretching it as needed, and the fence was completed as fast as the staples could be driven into the posts. The job was done in record time, as the car carried the material and men employed.

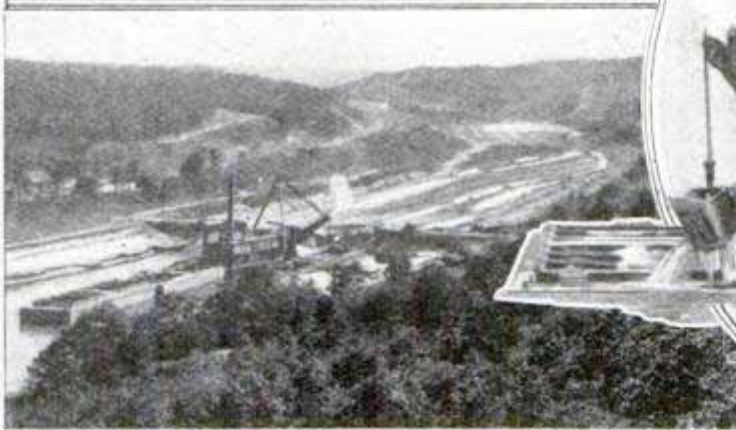
DANGEROUS CAPE COD ROUTE REPLACED BY CANAL

With the completion of the Cape Cod Canal during the present summer, an enterprise of the greatest importance to coastwise-shipping interests and one that has been proposed and surveyed repeatedly during the past 230 years will be brought to a successful conclusion. Although this canal is only eight miles long, it will be one of the busiest waterways in the world. It will shorten the distance between Boston and ports on the Atlantic coast south of Cape Cod by 70 miles, and, more important still, it will provide a sheltered inland waterway for the greater part of the coastwise shipping that is now compelled to take the "outside" route around the cape, past the treacherous Pollock Rip, and through Nantucket and Vineyard Sounds. The outside route is often called the "graveyard of ships," and marine history shows that it deserves the name. During the past 50 years an average of 35 ships per year have come to grief while sailing this route. Of these an average of 15 ships per year were a total loss, with an average loss of 12 lives per year. About 25,000,000 tons a year, or $2\frac{1}{2}$ times the annual tonnage estimated for the Panama Canal, now goes around the cape, and there is little doubt that practically all of this that is carried in ships of less than 25-ft. draft will in future pass through the canal.

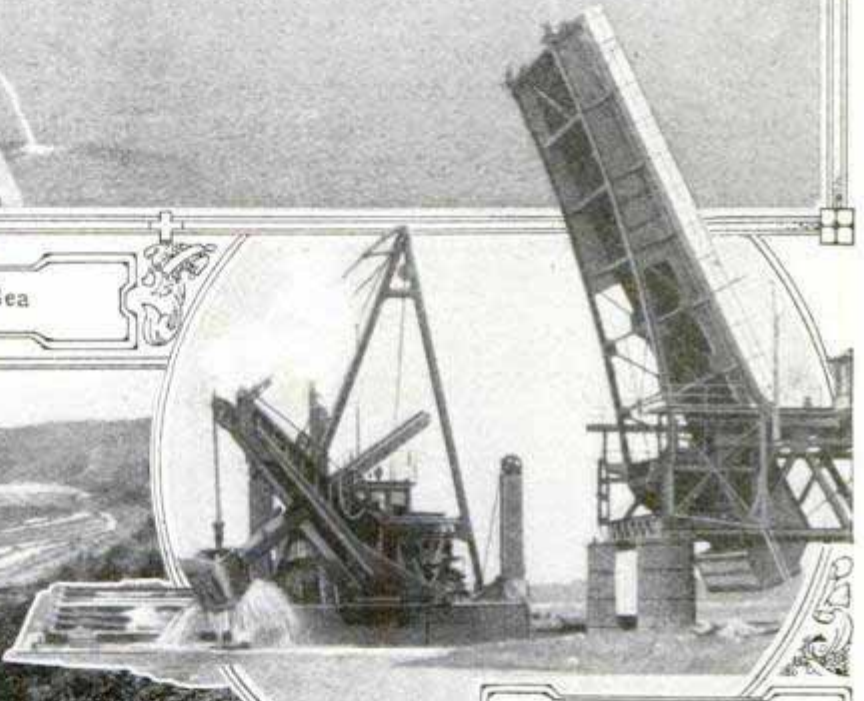
The canal runs from Cape Cod Bay on the north to Buzzards Bay on the south, and the total cost will be about \$12,000,000. The channel is 100 ft. wide at the bottom, with 30 ft. of water at high tide and 25 ft. at low tide. As an engineering undertaking, the work of construction has been comparatively easy, most of the excavation being in material that was readily handled by steam shovels or by dipper or suction dredges. On the Cape Cod end, deep water is reached within a half mile of shore, but in Buzzards Bay it will be necessary to maintain a channel out to a point about eight miles from shore.



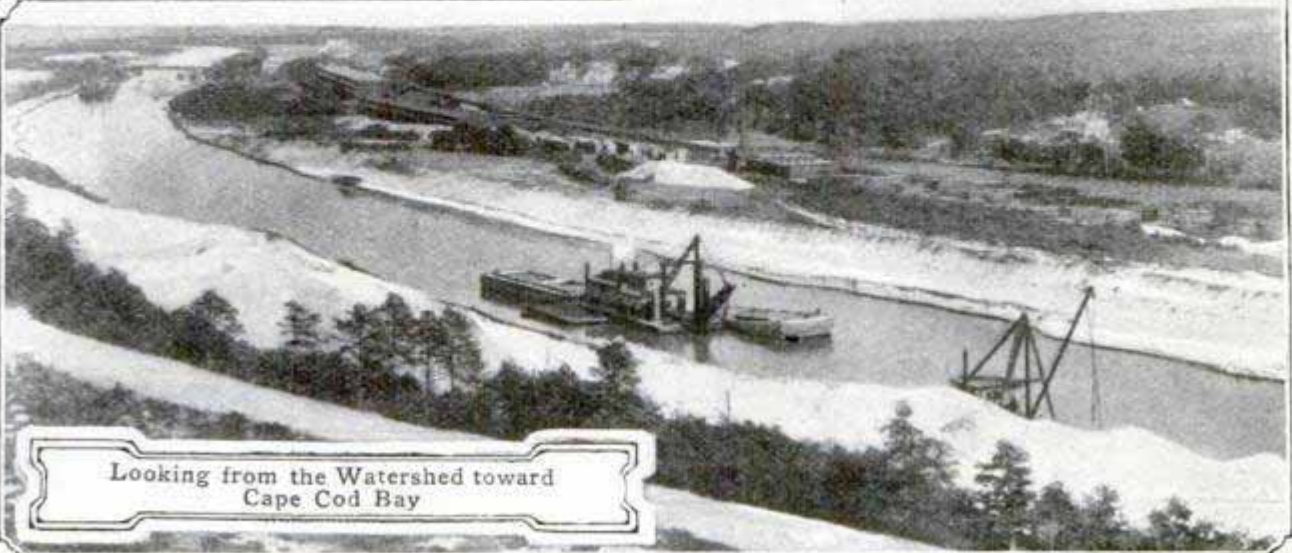
Where the Canal Meets the Sea



Location of Cape Cod Canal across the Watershed



The Only Railway Bridge over the Canal: Built for a Channel 160 Feet Wide



Looking from the Watershed toward Cape Cod Bay

There are several highway crossings requiring bridges, but only one railway crossing. The railway bridge is a permanent structure, and has been built for a channel 160 ft. wide, in anticipation of the time when the canal may be enlarged to allow the passage of battleships and the largest of merchant vessels.

FLYING BOAT USED FOR GLIDING OVER SNOW

The discovery made at Hammondsport, N. Y., last winter that a flying boat will glide over snow banks as well as on the water apparently marked the beginning of a new and exhilarating popular sport. The first attempt to put a flying boat to this use came about in a casual way. Experimental flights

had been planned for February, but by the time the machines were ready a cold snap had set in and the lake was frozen over and covered with a soft layer of snow 2 ft. deep. In order to carry out the experiments, it was planned to equip the machines with broad runners or skis, and while these were being made a flying boat was taken out just as it was and tried in the snow. To the surprise of every one concerned, it was found that the machine worked on the surface of the snow just as a hydroplane drives up out of the water when propelled at high speed. Aside from its value as a winter sport, this mode of high-speed travel is of interest at the present time because of the avowed intention of Amundsen and other explorers to try aerial locomotion in the arctic regions.

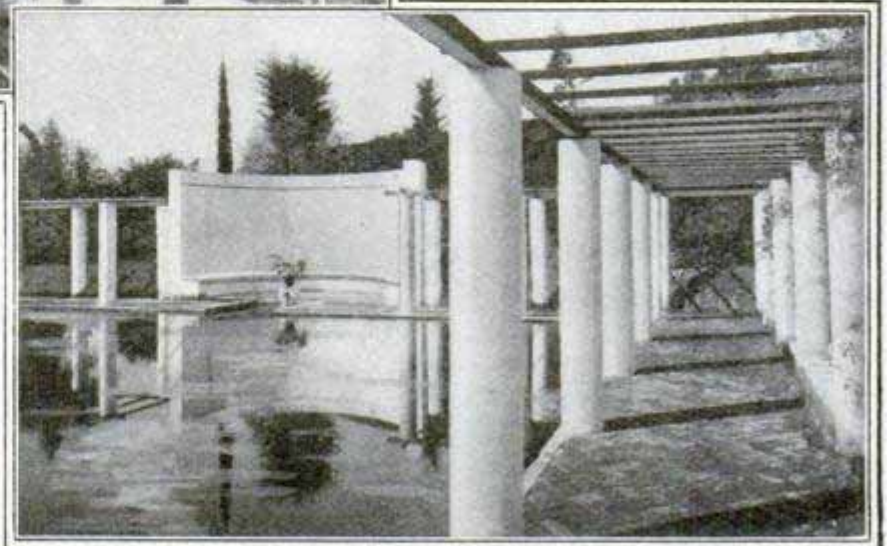
ORNAMENTAL OUTDOOR SWIMMING POOLS



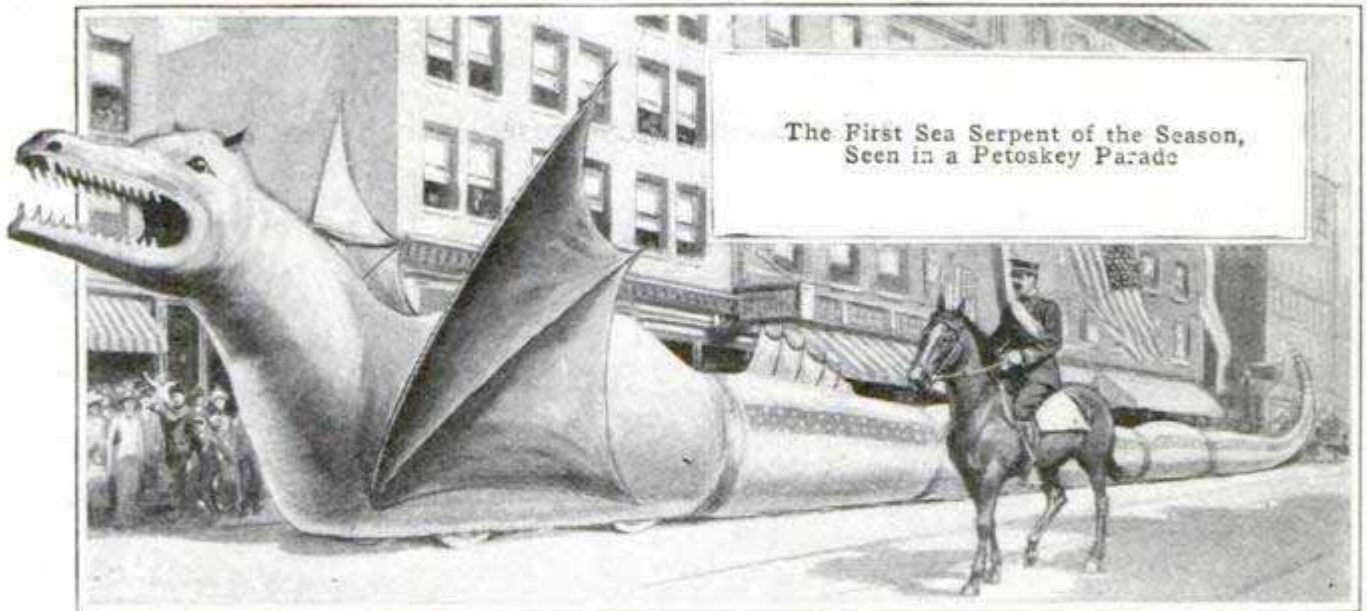
Ornamental Swimming Pool with Walk and Pergola

As an adjunct to a country house, or in the formal garden of a suburban residence, the ornamental swimming pool is, perhaps, one of the most charming accessories. Such a pool may be large or small, costly or inexpensive, as desired, but blends in with any land-

scape scheme and may be adapted to almost any architectural plan. The use of concrete lends itself readily to good effects at the minimum expenditure of money, and, when economy is no object, marble is by all odds the most beautiful material for both the pool and its



Another Pool, with Circular Inclosure for Fountain



The First Sea Serpent of the Season,
Seen in a Petoskey Parade

surrounding walks and pergolas. Fountains add much to the picturesqueness of the pool, whether as a slender jet or as a gushing flow of water, and yet the smooth surface of the pool, reflecting the surrounding columns, or the trees and shrubbery, gives always a charming glimpse from whatever viewpoint one may observe it. The pools are usually given a sloping bottom of concrete from 3 ft. at the upper end to 7 ft., or deeper, at the lower end. Often water is diverted from the garden irrigation reservoir to fill the pool, or its wastage may be used for that purpose, being led from the pool by concealed pipes to such fields as may need the water.

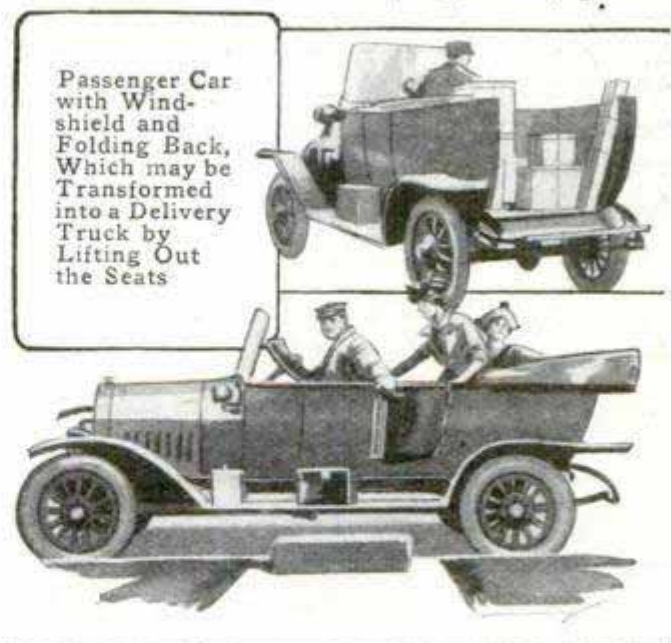
SEA SERPENT SIGHTED IN MICHIGAN PORT

A sea serpent, 108 ft. long by actual measurement, formed the principal attraction of a parade in Petoskey, a Michigan lake port. It was life-size, lifelike and lively, but it wasn't alive. It was built of hoops, lumber and wire and its skin was painted canvas, in six sections with hinged joints. Three automobiles carried this monster, and the manner in which they were operated gave a remarkably lifelike wriggling through the streets of the city. The head was a horrid affair, with a tongue, 7 ft. in length, darting in and out of the cavernous mouth, while smoke, steam, fire and water were ejected from

its nostrils in realistic fashion. The automobiles and their wheels were entirely concealed by the flowing curtains which formed a part of the serpent, and the uneasy gait, the convulsive throes of body and tail, and the flapping wings added greatly to the effect.

COMBINATION PLEASURE CAR AND DELIVERY VAN

A German automobile manufacturer has recently brought out a delivery car, which, used as a 30-hp. sporting phaeton,

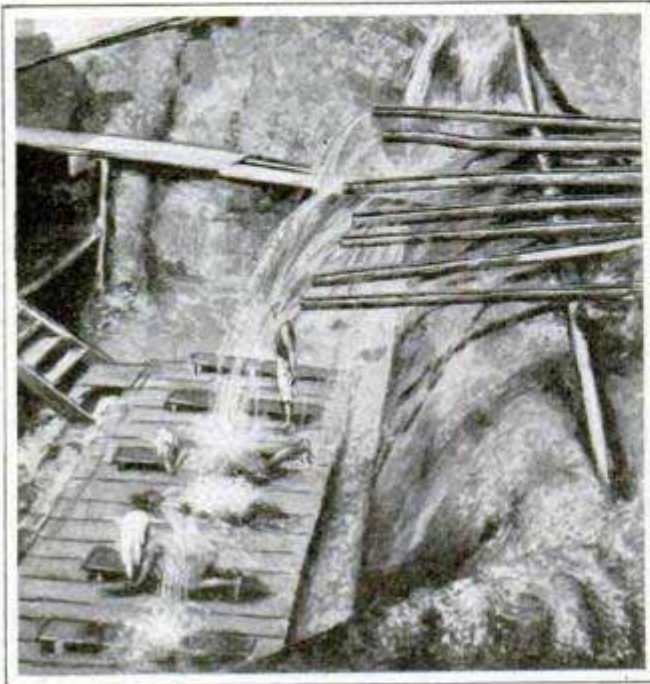


Passenger Car with Windshield and Folding Back, Which may be Transformed into a Delivery Truck by Lifting Out the Seats

ton, holds four passengers, but, by taking out the upholstering and removing the seats, is adapted to the transportation and delivery of merchandise. The transformation may be accomplished in a few minutes.

A SANITARIUM LOCATED IN A VOLCANO'S CRATER

Japan is a country of earthquakes, of volcanos and of subterranean activities, and abounds in hot springs which



Springs Warmed by Interior Fires Used in a Japanese Sanitarium

are utilized as remedial agencies for all sorts of human ailments. The sanitarium Nabori Betsu is located on the now wooded slopes of an extinct volcano, which, however, gives evidence of its activity by the outpouring from numerous hot springs. The baths connected with this sanitarium are of the crudest construction. As the illustration shows, the hot water is led

through rude wooden gutters over a dam upon a simple platform of plank, where the patients recline in various postures, each beneath his separate spout.

LEVEL OF THE CASPIAN SEA IS SINKING

Late investigation by experts in the employ of the Russian government has demonstrated that the surface level of the Caspian Sea is continually sinking, until now it is beginning to interfere with navigation. The cause of this phenomenon is traced to the diminishing inflow of water from the rivers tributary to the Caspian, especially the Volga, so that the evaporation from the large surface, more than 169,300 square miles, is greater than the influx of river water. A comprehensive study of the matter is being made by scientists.

AN ADJUSTABLE RACK FOR TIME-TABLES

A self-adjusting time-table rack has lately been invented in which partitions slide along a brass rod, each partition having a sort of spool attachment to keep it in position. By this means time-tables of various shapes and sizes are accommodated, or other literature kept at hand for the convenience of travelers or guests in a hotel.



A Rack for the Display of Literature or Time-Tables Adapted to All Sizes of Pamphlets

THE GREAT NEW SKYSCRAPERS OF THE SEA

WITH A COVER PICTURE OF THE "BRITANNIC" IN COLOR

WHEN the "Titanic" sank in mid-ocean in April, 1912, many thought that the catastrophe would put an end to the construction of larger steamships—that it was a demonstration that the limit of size in shipbuilding had been reached. Instead, however, of abandoning the big-ship idea, shipbuilders and the great transatlantic steamship lines, ever since the "Titanic" disaster, have been building even bigger ships than before. The lesson of the "Titanic" affair was not that the ship was too big, but that its construction was faulty and its lifeboat service inadequate.

Nearly every one of the important steamship lines is bringing out a larger vessel than it has ever before had in commission, all built since the "Titanic" sank. The huge "Imperator," for the past year the largest vessel that ever sailed the seas, was under construction before the "Titanic" disaster, but the Hamburg-American line, its owners, instead of being deterred in their project for still larger ships, proceeded at once with the construction of the "Vaterland," 950 ft. long and in every respect the largest structure that has ever been floated on the water of the ocean. It may be another year or two before a still larger ship is announced, but it is as certain as anything still in the future can be, that the day of the 1,000-ft. ship is close at hand. The White Star line, owners of the "Titanic" and its sister ship the "Olympic," recently launched at Belfast the "Britannic," the largest British-built vessel afloat, 900 ft. long, a cross section of which forms the cover design of this magazine. Longer, though smaller, is the new Cunard liner "Aquitania," measuring 901 ft. over all, which made its maiden voyage this summer. And while these three ships stand at the head of the list of modern skyscrapers of the sea, other steamship companies are building larger than ever before. The new North German Lloyd liner "Columbus," which has not yet made its first transatlantic voyage, is 775 ft.

long and by far the largest vessel this line has ever produced, while the Holland-America line, which heretofore has never displayed special interest in the mere size of its ships, is building at Belfast the "Staatendam," of 33,000 tons—a ship bigger by 50 per cent than the biggest ship afloat ten years ago.

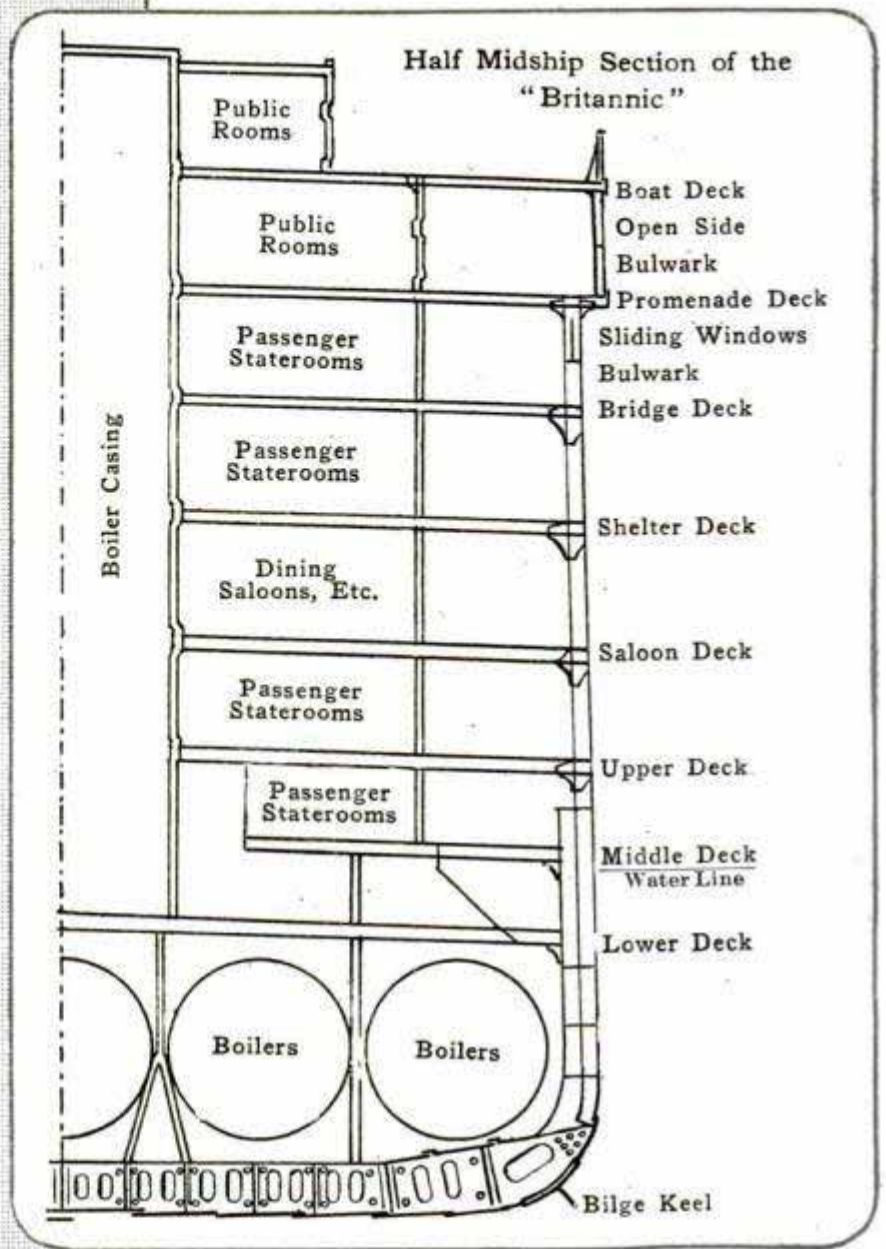
Such gigantic structures as the "Vaterland," the "Britannic" and the "Aquitania" are as far ahead of the "Savannah," the first steam-powered vessel to cross the ocean in 1819, as that was ahead of the first steamboat which John Fitch built and operated on the Delaware River in 1788. It was not until 1838 that steamships began to make regular trips between America and Europe, so that the development of the modern liner has really been a matter of only 76 years. The "Sirius," the ancestor of all the ocean liners of today, was 178 ft. long, 25 ft. beam and 18 ft. deep. Its displacement was 412 tons. Four hundred and fifty tons of coal, carried mostly on deck, furnished fuel for the ocean voyage, on which only seven passengers were carried, one of whom is still living.

Compare these figures with the statistics of the big ships of today. The 900-ft. "Britannic," for instance, has a displacement of 53,000 tons and burns more than 6,000 tons of coal each voyage to turn its 50,000-hp. engines which drive it across the Atlantic at a speed of 22 knots an hour. Even these latter figures are exceeded by the "Aquitania," which, though of slightly less tonnage, has 10,000 greater horsepower and can make a speed of 23 knots in all weathers. Like the "Vaterland," the "Aquitania" has four propellers, all driven by turbine engines. The "Britannic" has but three, a central propeller driven by an 18,000-hp. low-pressure turbine and two lateral propellers, each driven by a 16,000-hp. reciprocating engine.

The "Vaterland" has the largest passenger capacity of the new ships, being able to carry a total of 3,725 passengers in addition to a crew of 1,200. Of these,

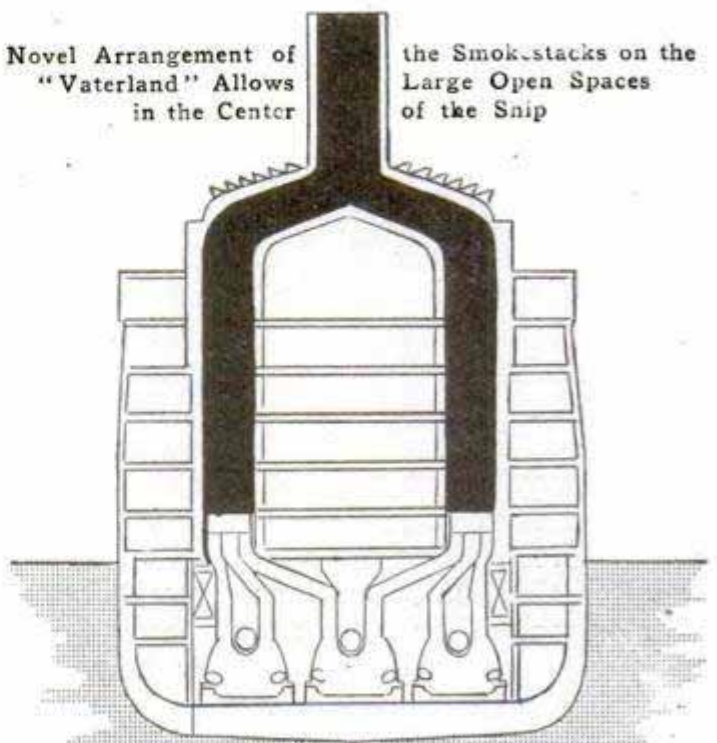
The Drawing Shows the Comparative Sizes of the "Vaterland" and the "Britannic." The Outside of the Heavy Black Line Represents the Profile of the "Vaterland"; the White Space, That of the "Britannic." The "Vaterland" Is 950 Feet Long, 100 Feet Wide and About 190 Feet from Bottom of Keel to Top of Funnel. The "Britannic" is 900 Feet Long, 94 Feet Wide and 180 Feet High. The Navigating Bridge of the "Britannic," the Highest Point Forward of the Funnels, Is 63 Feet above the Water Line

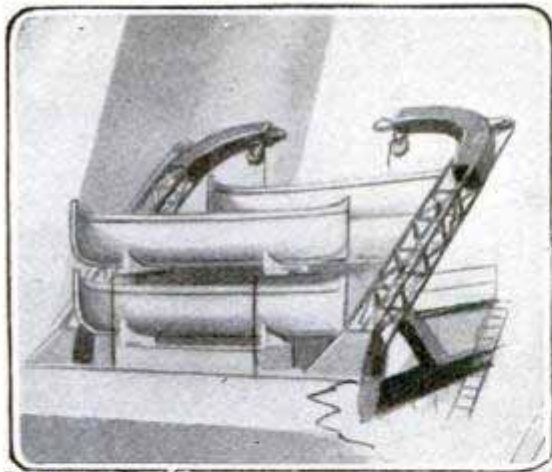
of the "Vaterland"; the White Space, That of the "Britannic." The "Vaterland" Is 950 Feet Long, 100 Feet Wide and About 190 Feet from Bottom of Keel to Top of Funnel. The "Britannic" is 900 Feet Long, 94 Feet Wide and 180 Feet High. The Navigating Bridge of the "Britannic," the Highest Point Forward of the Funnels, Is 63 Feet above the Water Line



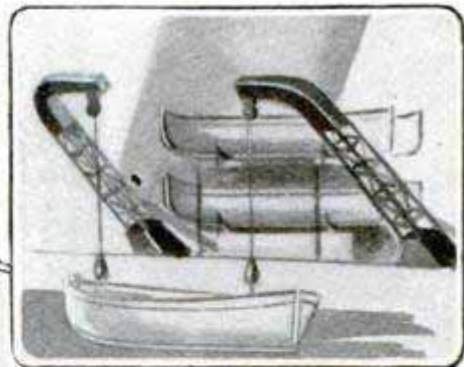
Novel Arrangement of "Vaterland" Allows in the Center

the Smokestacks on the Large Open Spaces of the Ship

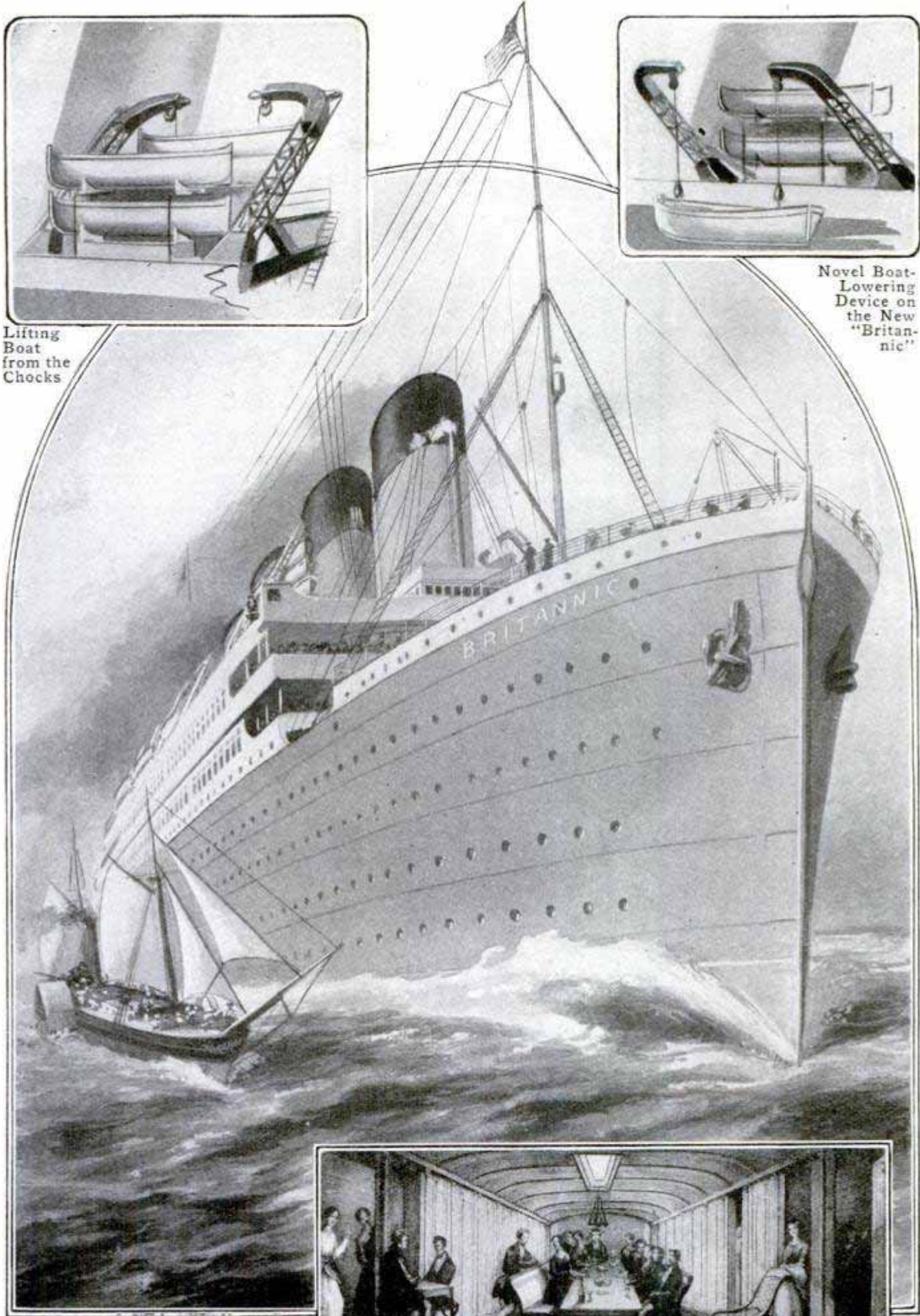




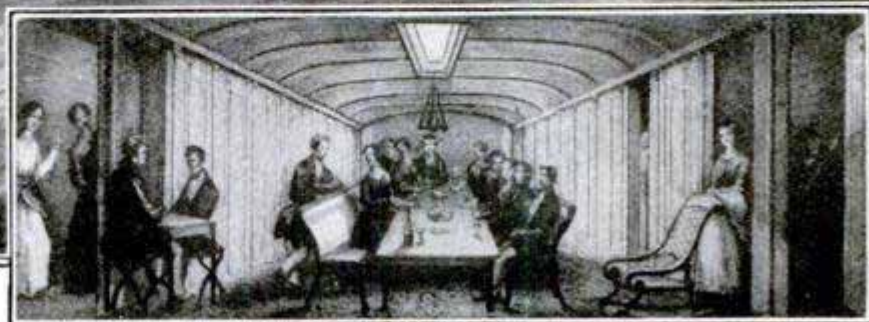
Lifting Boat from the Chocks



Novel Boat-Lowering Device on the New "Britannic"



The "Britannic," the Largest British Ship, Compared with the "Sirius," the First Liner to Cross the Ocean



An Old Picture Illustrating the Crude Passenger Accommodations on Ships of Fifty Years Ago

800 persons may be accommodated in the first cabin, 525 in the second cabin, 900 in the third cabin, and 1,500 in the steerage. The "Aquitania" can carry 3,230 passengers and the "Britannic" 2,600, while each carries a crew of nearly 1,000. Each of these great ships will make the passage between New York and its British port in less than six days, and the builders have applied in each of them, warned by the lesson of the "Titanic," the most modern inventions and methods for the safety of passengers and crew. The "Vaterland" and the "Britannic" are each practically two ships, one within the other, the inner hull being sufficient to float the vessel even should the outer skin be almost entirely ripped open by collision with an iceberg or a derelict. For 500 ft. of its length the "Aquitania" is also fitted with an inner hull, rising, like those of the other ships, well above the water line, while 16 water-tight bulkheads protect the middle of the ship against leakage at bow or stern. The wireless range of these big ships is in the neighborhood of 2,000 miles. Special auxiliary motors on the upper decks will make it possible, in case of accident to the main power plant, to keep the wireless going until the ship

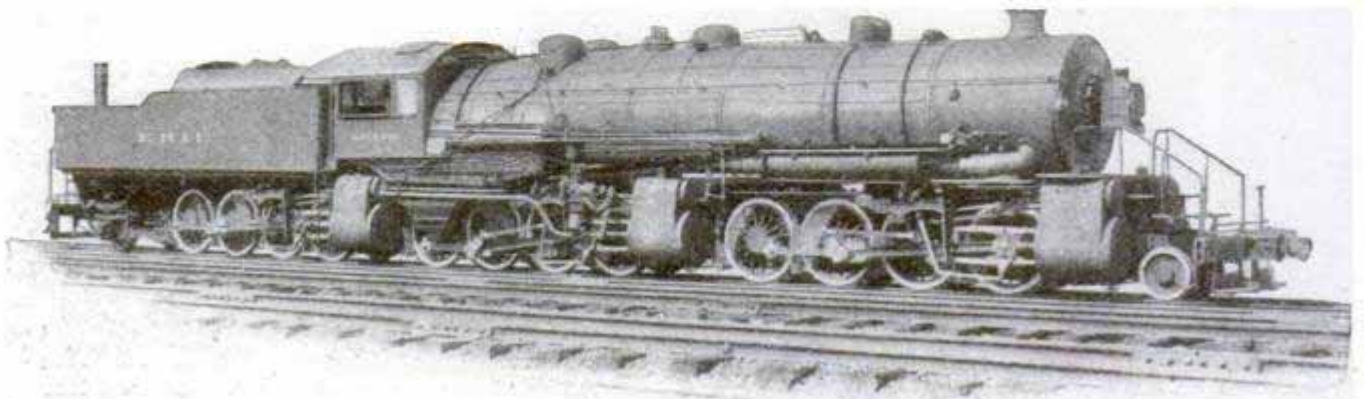
actually sinks. If, in spite of all precautions, either the "Vaterland," the "Britannic," or the "Aquitania" should sink, there are lifeboats on each of them sufficient in capacity to carry all the passengers and crew—a condition that did not exist on the "Titanic." The "Britannic" and the "Aquitania" each carry two motorboats of sufficient power to tow the other lifeboats for a considerable distance, those of the "Aquitania" being equipped with wireless apparatus of 1,000 miles' radius.

Each of these new ships is equipped with antirolling tanks, devices which utilize the water ballast to maintain lateral stability, even under adverse weather conditions. From the keel to the top of its funnels, the "Britannic" measures 180 ft., or the height of a 15-story building. The "Aquitania" is only a trifle less lofty, while the "Vaterland" extends still higher above the water line, only about 35 ft. of the total height of each of these sea skyscrapers being submerged when fully loaded. Completely equipped and ready for service, these three new leviathans represent a total investment of more than \$25,000,000—a sum that would have built a fleet of a thousand transatlantic steamships seventy-five years ago.

A POWERFUL LOCOMOTIVE WITH NOVEL FEATURES

What is probably the heaviest and most powerful locomotive in the world has just been built and placed in service on the Erie Railroad as a pusher engine. This locomotive is an articu-

lated compound with a total weight of 422½ tons, including the tender. It is capable of exerting a drawbar pull of 160,000 lb., a feature due mainly to the fact that a full set of drivers is placed under the tender and the weight of the tender is thus utilized for increasing the tractive power. In all, there are 24



This Locomotive Has 24 Drive Wheels, Weighs 422½ Tons, and is Capable of Exerting a Drawbar Pull of 80 Tons

drivers under this powerful machine, 16 of these being under the locomotive proper and eight under the tender. The wheel arrangement is classified in railroad parlance as "2-8-8-8-2," which means that there is a pony truck with two wheels at the front, followed by three sets of drivers with eight wheels each, and another two-wheel pony truck at the rear of the tender. Six cylinders, two to each set of drivers and all of the same size, supply the power. Two of these, the ones for the middle drivers, are for high-pressure steam, while the other four are for low-pressure steam, and it is this arrangement that is one of the most novel features of the design. Each of the middle cylinders receives steam direct from the boiler. The right-hand cylinder exhausts into the two cylinders at the front of the engine, while the left-hand cylinder exhausts into the cylinders under the tender. This results in a curious arrangement by which the steam from the front cylinders is finally exhausted up the stack in the usual manner, while the exhaust from the rear cylinders is discharged through a vertical pipe at the rear of the tender, as will be seen in the illustration. Other features of this locomotive are remarkable both in size and in design. The firebox is $13\frac{1}{2}$ ft. long, has two doors and is equipped with an automatic stoker, while at the dome ring the boiler has a diameter of $108\frac{1}{8}$ in. The total wheelbase is 90 ft. In this locomotive 90 per cent of the total weight is carried on drivers and is therefore available for tractive effort, while only about 65 per cent of the weight, including tender, is carried on drivers in the most powerful class of locomotive heretofore built.

AIR-PROPELLED HYDROPLANE OF NEW TYPE

Among the countless pleasure craft seen about Monaco, this new type of hydroplane attracted the most attention. It is a tractor, air-propelled, and mounted upon a flat body with peculiarly shaped bow, the stern being per-



Strange-Looking Craft Seen at the Monaco Races

fectly boxlike. The motor and propellers are mounted upon a trussed framework, securely bolted to the fore part of the boat, and there is a rudder both at bow and stern. The craft is designed to carry one passenger besides the pilot.

A BIRD HOUSE DE LUXE IN A CALIFORNIA CITY

An artistic bird house, of more than ordinary pretensions to architectural beauty, has just been completed by a 92-year-old citizen of Whittier, Cal. It



A \$700 Aviary at Whittier, Cal.

is a structure of reinforced concrete, 15 ft. high, and houses the pet canaries of this bird lover. The house is 8 ft. square, the gabled roof being supported by ornamental concrete posts, set with round stones, while lattice-work fills in the spaces between the columns. The floor is of cement, with a bathing fount in the center, while over the doors, which are of wire net, are semicircular panels of colored glass. The house is surmounted by a copper dome and flagstaff, and the ridges of the roof are decorated with a series of wooden rings in which are suspended a set of delicately toned brass bells, which, swinging to and fro in the breeze, touch the edges of the wooden rings, giving forth a soft tinkle. A clock is part of the equipment of this aviary, and above each door is a little window, from which, on the stroke of the hour, appear mechanical cuckoos announcing the time. The building is entirely the handiwork of the owner, who estimates the cost to be over \$700.

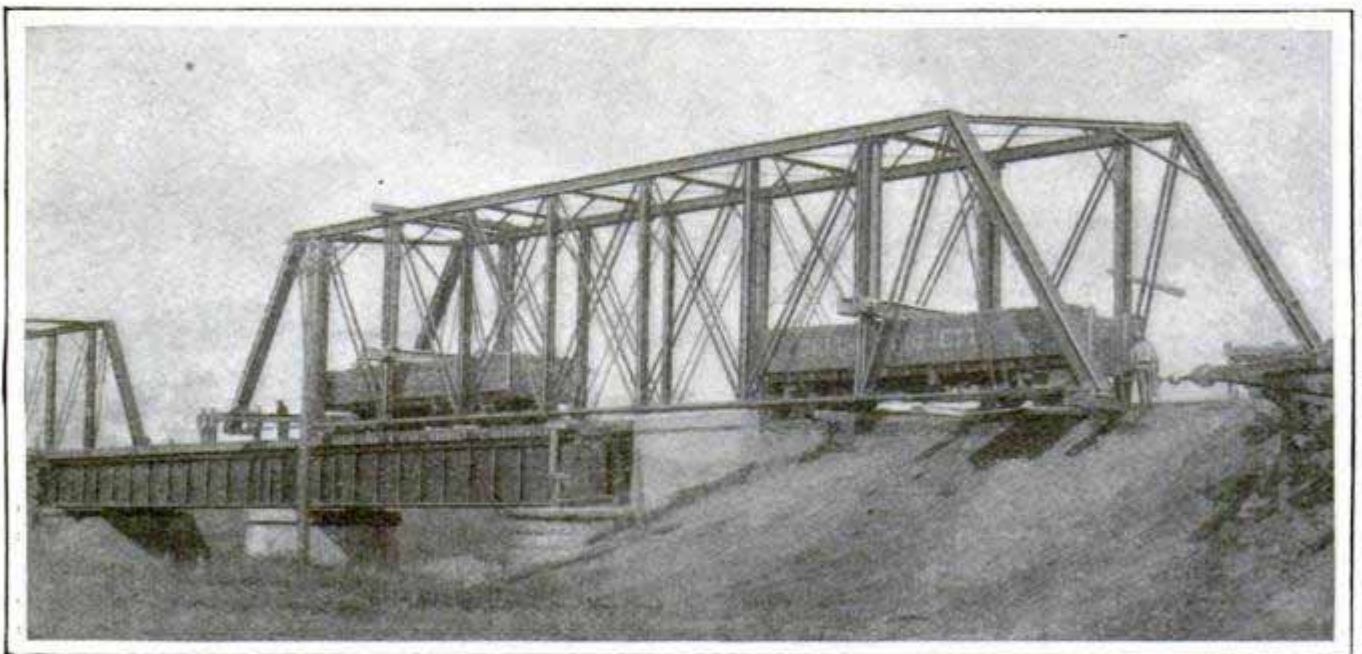
NOVEL SHIFT IN BRIDGE BUILDING

An old truss bridge was supplanted by one of the girder type on a Michigan railway recently, and the useless trusses removed quickly on gondola

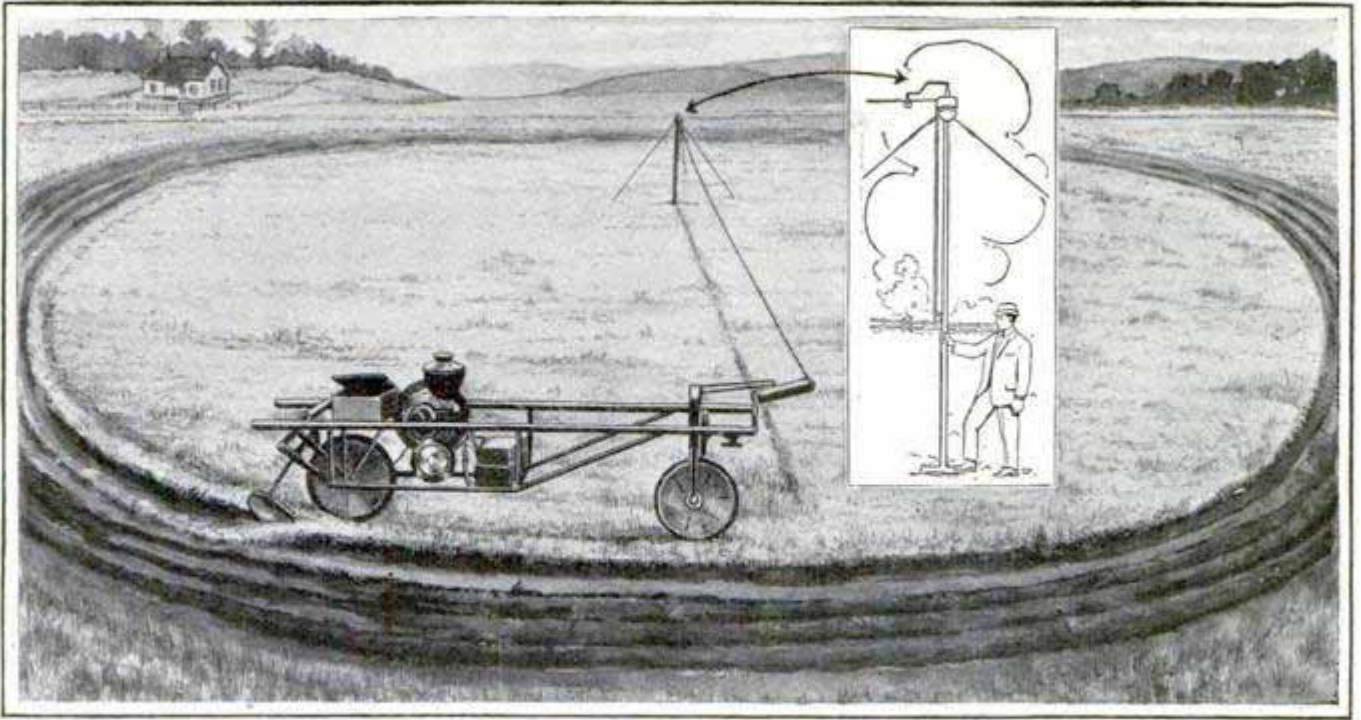
cars. After having relieved the old trusses by removing the floor system and dropping in deck-plate girders from the tracks, the trusses were supported upon two heavy gondola cars, one at each end of the truss, and then hauled out to solid ground. Only about two hours on the tracks was required for each span, to load, haul out and unload.

FARMING IMPLEMENT THAT GUIDES ITSELF

One of the latest innovations in farming implements is a gasoline-driven vehicle that guides itself around the field and needs no attention except to be started and stopped at the right points. This vehicle, which travels in a constantly narrowing circle, is so designed that any of the devices used in row-crop farming, such as plows, ridgers, cultivators or sprayers, may be readily attached to it, but in order to use the implement, it is necessary to abandon the usual rectangular form of field with straight rows and adopt a circular field with circular rows spiraling toward the center. The method is not adapted to big farms, but is intended for truck gardening and for farming on a small scale where the expense of employing an operator for the machine would be prohibitive. At



Hauling Away a Truss Span on Gondola Cars



This Plow is Automatically Guided by a Wire from the Post at the Center of the Circular Field and Needs No Attention Except to be Started and Stopped at the Right Points

the center of the field an iron post is erected and strongly guyed. At the top of the post is a drum, and from this a slender steel wire runs through a guide pulley and to the steering lever of the implement, which may be anywhere from twenty feet to several hundred feet away. At each trip of the vehicle around the field the wire winds once around the drum, and this guides the implement the width of one furrow closer to the center. This process is continued until the implement comes as close to the center as the guy wires will permit. The drum is then released so that it will revolve freely and the implement is run out of the field under hand steering, unwinding the wire as it goes. The implement has already been used successfully in working a circular field containing about seven acres.

NEW TOASTER TURNS BREAD AUTOMATICALLY

An electric bread toaster recently placed on the market is equipped with a frame by which the toast is turned automatically and without the necessity of touching it with the fingers. A frame controlled by a knob is placed

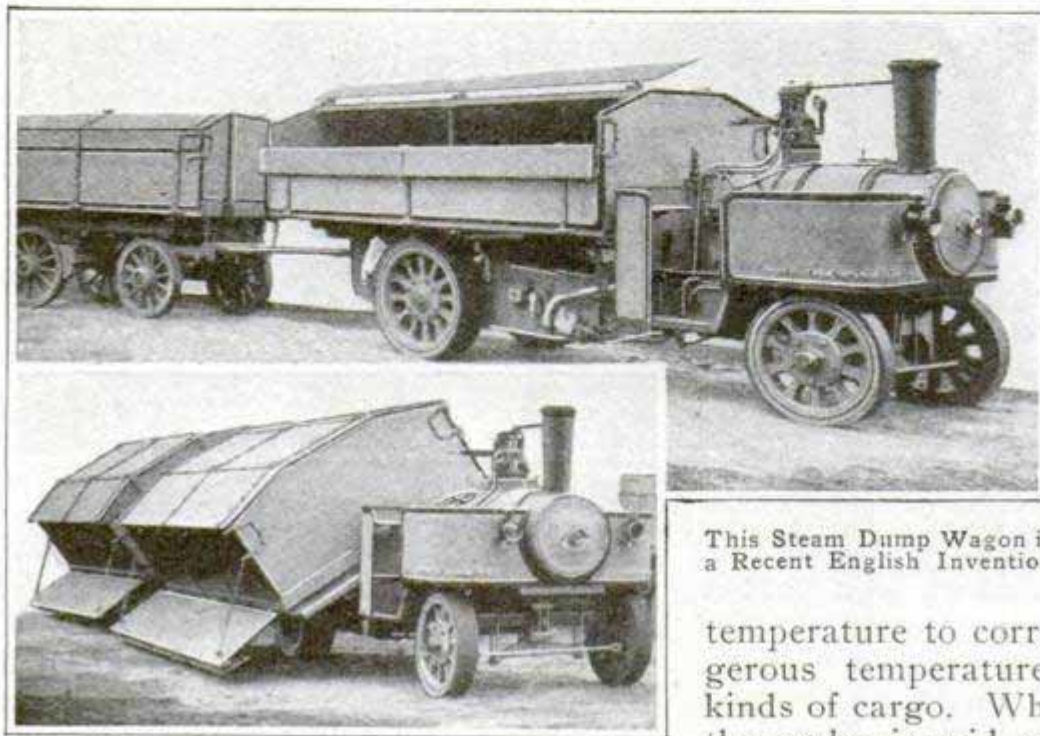
on each side of the toaster. The frame is first turned outward to a horizontal position, and with the bread laid on it is turned upward to the position required for bringing the bread close to the heated surface of the toaster. As soon as one side is toasted the frame



With This Toaster the Bread is Turned Automatically Without the Necessity of Touching It with the Fingers

is again turned outward, the lower edge of the bread slides on the frame, and the untoasted side of the bread

is presented to the heated surface when the frame is returned to an upright position. The whole operation is performed by a succession of right-hand and left-hand turns of the knob, which does not become hot.



The Traction Motor Also Operates the Dumping Apparatus, as Shown Here

STEAM DUMP CART RECENT ENGLISH INVENTION

A quick-unloading form of dump cart has recently been placed on the market by an English concern, which permits rapid disposal of dirt, ashes, and debris from wrecked buildings without rehandling. The cart is self-propelled, a steam engine furnishing the power, and, by suitable gearing, operating the dumping device. The box is covered, the sides opening to either side, as desired. A trailer may be attached to the cart and operated simultaneously by the same mechanism. The engine burns fuel oil, or may use coal if preferred, and is operated by one man.

Ⓒ Roads exclusively for automobiles are common abroad, but only two have been built in America: Pelham Parkway, in New York, and a road near Asheville, N. C.

NEW SYSTEM FOR FIGHTING FIRE IN A SHIP'S HOLD

An automatic system for fighting fire in the hold of a ship has been brought out in Sweden. The system

comprises a number of containers filled with compressed carbonic-acid gas, which are installed in the different compartments of the hold. These are provided with valves which may be set to open automatically at any desired

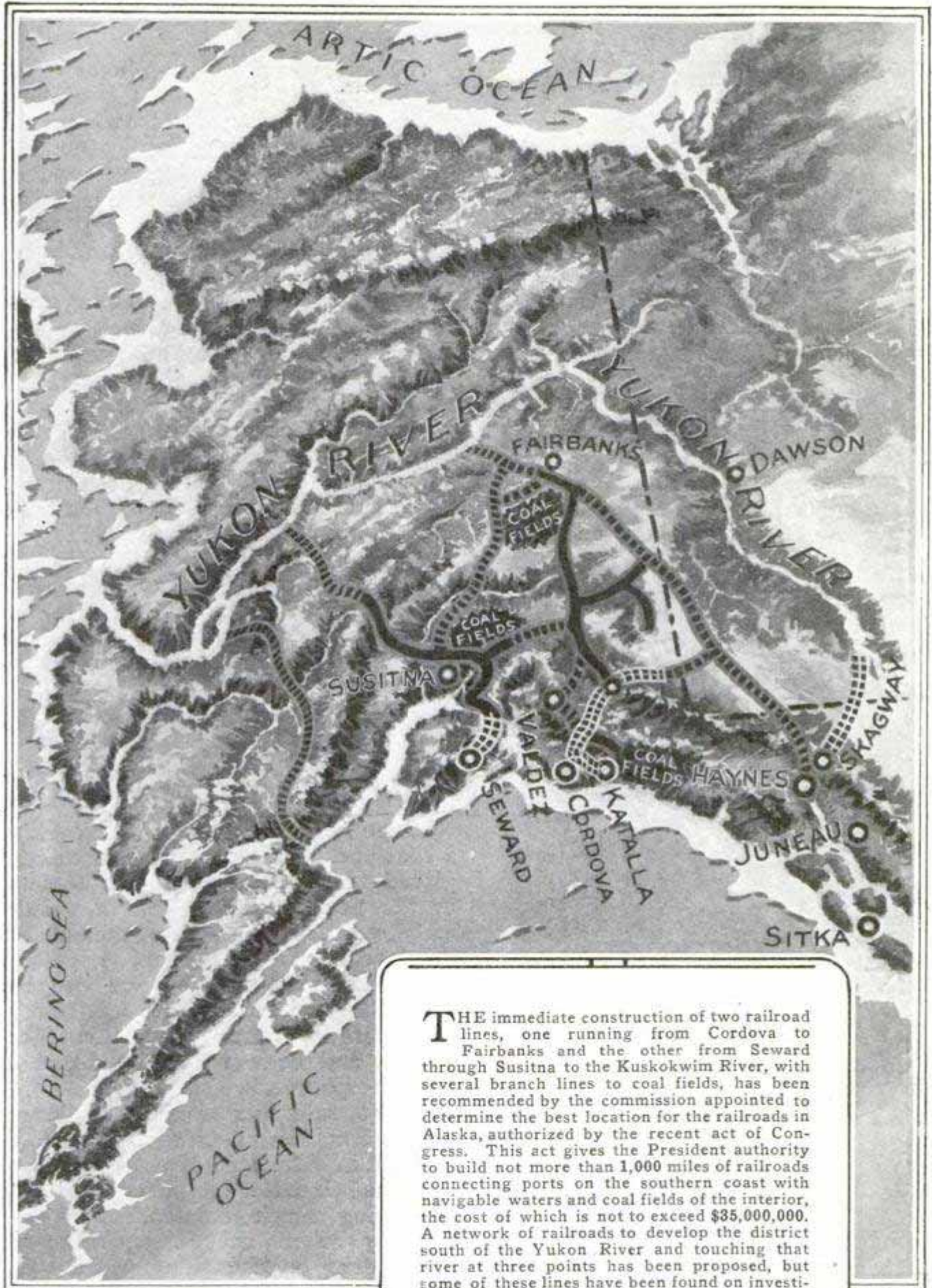
temperature to correspond to the dangerous temperature of the different kinds of cargo. When the valves open the carbonic-acid gas is released and the fire in that particular hold is smothered. To make the system effective it is necessary to close the hatches. In a test case a fire with inflammable material that had been soaked in benzine and then ignited was quickly extinguished.

USING THE PANAMA LOCKS AS DRY DOCKS




The canal authorities have found the chambers of the Gatun Locks to make admirable dry docks, and when the dredge "Corozal" needed docking, some weeks ago, she was placed in one of the upper locks and work done as needed. During this operation, the five submarines which had previously been docked in the same chamber, and were still on their especially constructed cradles in the lock, were submerged as the water was let into the compartment. They were carefully blocked in position before the water was admitted, so that they were not disturbed, and in addition, their ballast tanks were filled, which helped to steady them.

This Steam Dump Wagon is a Recent English Invention

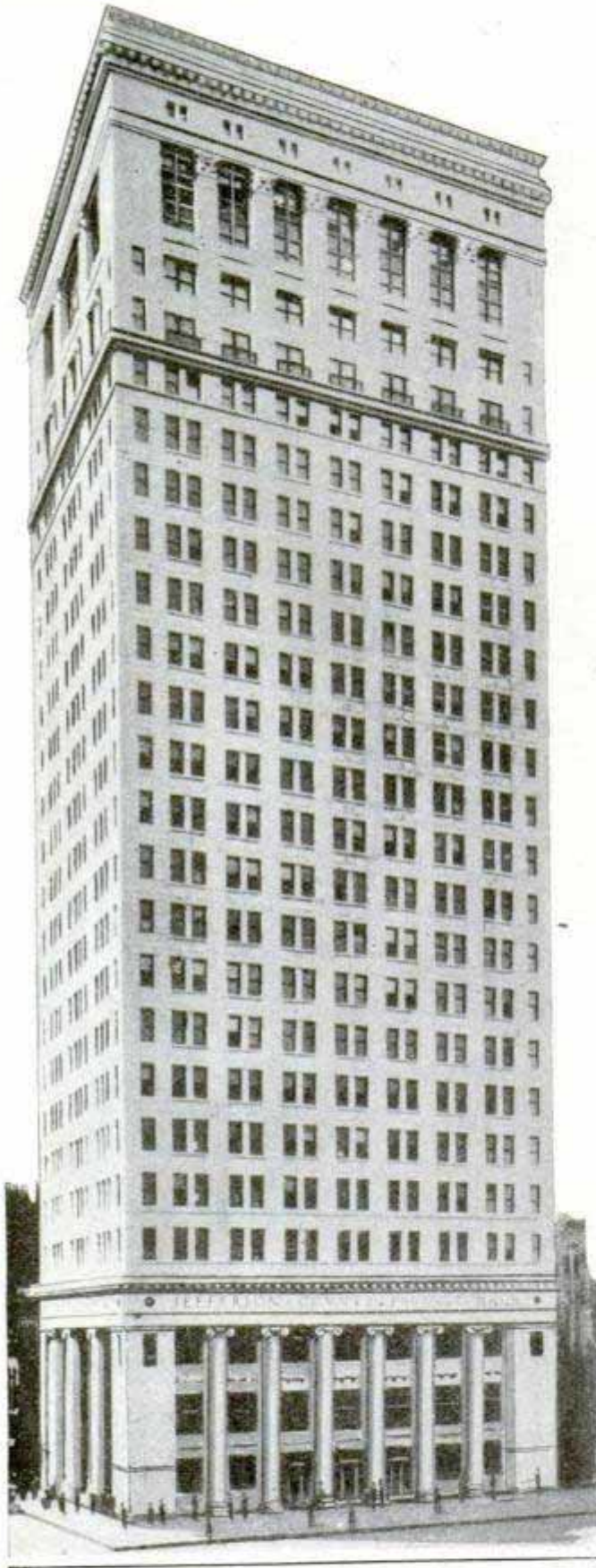
GOVERNMENT TO BUILD RAILROADS IN ALASKA



THE immediate construction of two railroad lines, one running from Cordova to Fairbanks and the other from Seward through Susitna to the Kuskokwim River, with several branch lines to coal fields, has been recommended by the commission appointed to determine the best location for the railroads in Alaska, authorized by the recent act of Congress. This act gives the President authority to build not more than 1,000 miles of railroads connecting ports on the southern coast with navigable waters and coal fields of the interior, the cost of which is not to exceed \$35,000,000. A network of railroads to develop the district south of the Yukon River and touching that river at three points has been proposed, but some of these lines have been found on investigation to be impracticable on account of the mountainous nature of the country. The two lines now proposed will reach a section rich in agricultural and mineral resources.

-  Recommended Routes
-  Investigated Routes
-  Present Routes

TALLEST BUILDING IN THE SOUTH



A Bank Building in Birmingham, Ala., Which is 322 Feet High from the Curb to the Highest Point of the Roof, and is One of the Three Highest Buildings West of New York

A 25-story bank building just erected in Birmingham, Ala., is the highest building in the South, and with the exception of a building in Seattle and one in Cincinnati, the highest west of New York. The height of this building, from the curb to the highest point of the roof, is 322 ft., and in addition to this, there is one full story underground. Every known means for making the building fireproof has been employed. Not only is there no combustible material in the structure, but steel doors glazed with pressed plate glass have been installed between the elevator lobby and office corridors on each floor. These will be open at all times except in case of fire, when they close automatically, confining the fire to the point of origin and allowing full use of elevators and stairs. The building is located at the highest point of the business district and will therefore serve as a landmark for the surrounding country.

PECULIAR ACCIDENT FROM COMMON CHEMICAL

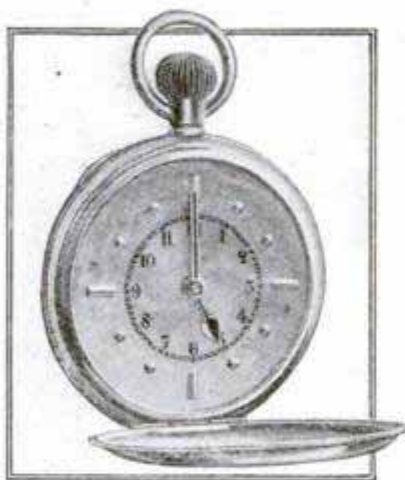
Recently a serious fire was started in a coat pocket of a man who carelessly placed two chlorate-of-potash tablets in the pocket with a box of safety matches. Brushing against the side of the door, he pressed the tablets against the coating on the outside of the match box, with the result that an intense fire was started in his coat pocket, and he was severely burned. Red phosphorus is used in the manufacture of safety matches and is placed on the box, instead of on the head of the match. The head of a safety match contains chlorate of potash, which, containing much oxygen, flares up strongly when rubbed against the phosphorus on the side of the box. Thus the careless practice of carrying chlorate-of-potash tablets, commonly supposed to be entirely harmless, in the same pocket with a "safety" box, may result in serious injury.

FIRST THEATER IN CEYLON

Although Ceylon is nearly as large as Ireland, and has a population of some 4,000,000, its principal city, Colombo, has never had a theater, the only amusement place in a city of over 150,000 being the public hall, corresponding to the town hall of an American municipality, or such tents as were erected by itinerant shows. A site in the business district of Colombo has been leased, however, and construction of a modern theater building is to be commenced at once. It is to be of steel, brick and reinforced concrete, with orchestra, dress circle and gallery, seating 1,000, and will cost, when completed, about \$40,000.

WATCH MADE FOR THE USE OF THE BLIND

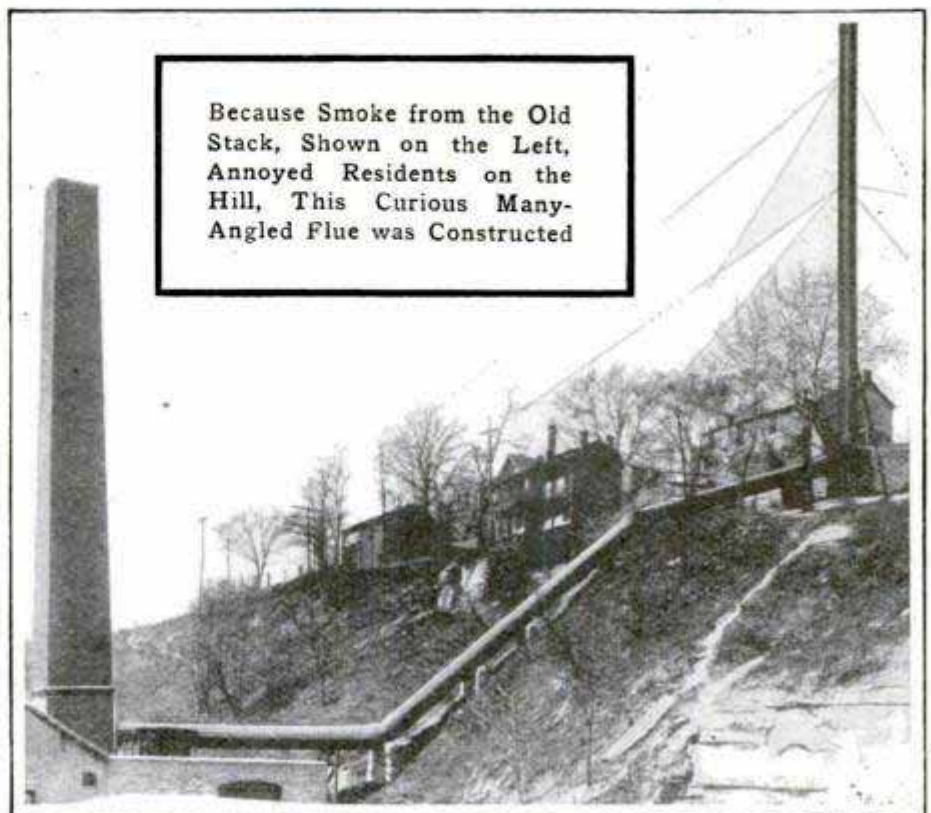
In order that the sightless may know the time accurately, a watch has been



constructed with raised dots and dashes on the dial. The hands are so made that touching them does not injure the works. This watch does not have a crystal, but is of the hunting-case type, the cover being released upon pressing a spring, flying open, and permitting the hands and face of the dial to be fingered by the blind.

MANY-ANGLED SMOKESTACK

A steel smokestack with many angles was built by the Keokuk Water

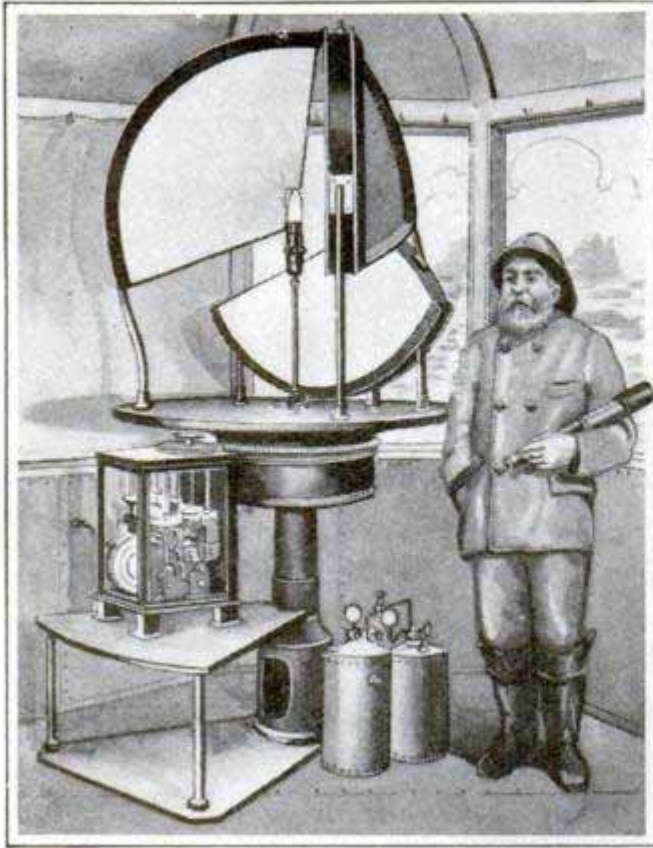


Because Smoke from the Old Stack, Shown on the Left, Annoyed Residents on the Hill, This Curious Many-Angled Flue was Constructed

Company in order that neighboring residences at the top of the bluff might be freed from the smoke which, from the brick stack previously used by the water company, formerly annoyed them. The engine house is built at the foot of a bluff 90 ft. high. Stone piers were built to carry the steel stack on its devious way to the summit, where the vertical stack begins. From the boilers the smoke is carried on a horizontal plane for 30 ft., then it mounts at an angle for 90 ft., and enters the tall stack vertically, leaving it 150 ft. above the summit of the bluff.

NEW TYPE OF LIGHTHOUSE LAMP

Two French engineers have devised a lighthouse lamp which uses metallic reflectors instead of glass lenses. They have demonstrated that yellow light reflected from gilt-metal surfaces has a greater penetration in humid air than light refracted by a lens. The light is produced from a gas mantle,

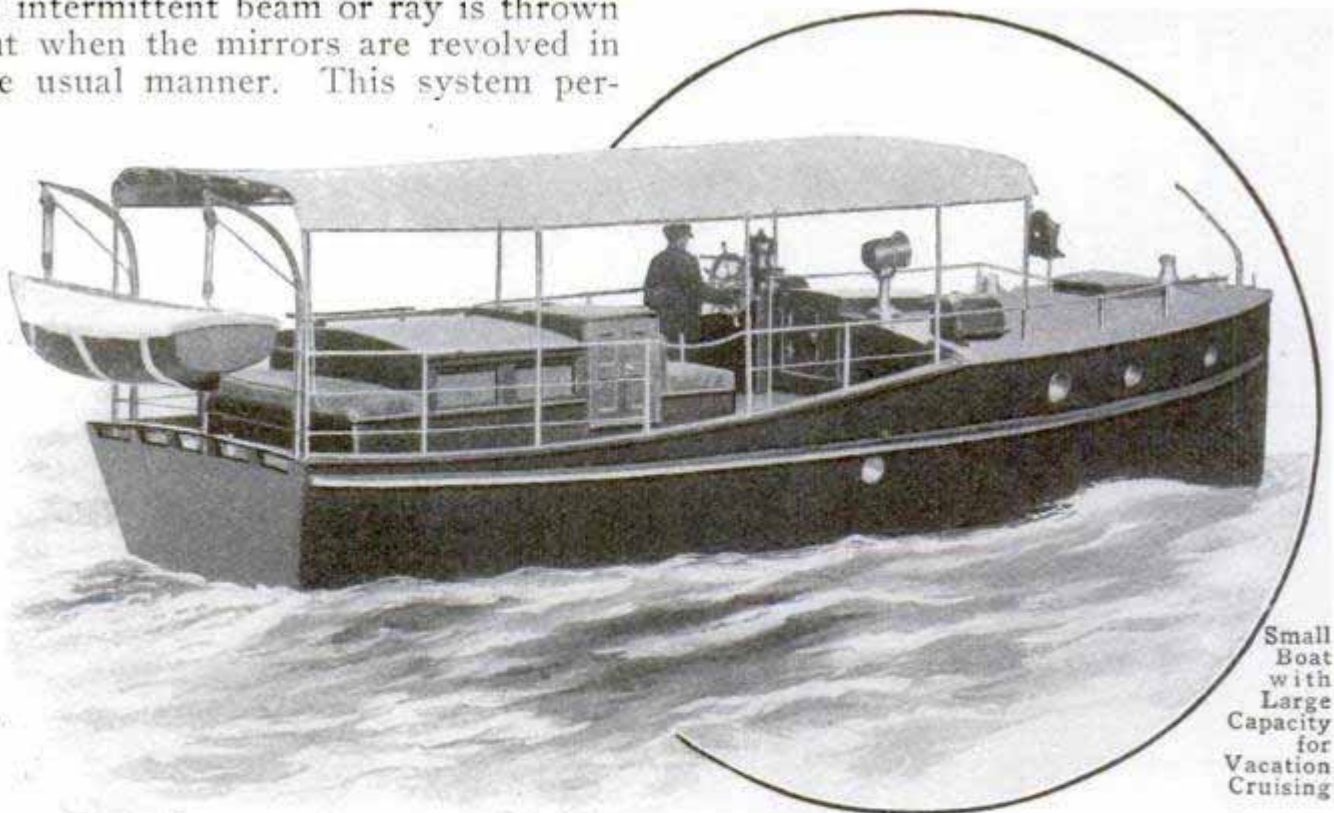


Lighthouse Lantern with Gilt-Metal Reflectors Which
• Throw Beam Far across the Wave

and is stationary, while around it revolve gilt-metal mirrors, sections of a parabolic surface, so arranged that an intermittent beam or ray is thrown out when the mirrors are revolved in the usual manner. This system per-

CRUISER HOME SHIP FOR SUMMER SAILING

An interesting type of water craft is that designed as a "home boat" by a Detroit naval architect, comprising a cruising capacity adapted for any summer-vacation period, with exceptional accommodations for the party. The boat is 34 ft. long and 11 ft. beam. A stateroom, $7\frac{1}{2}$ ft. by $6\frac{1}{2}$ ft., contains a double bed, with ample locker room, and connects with the main cabin, a room 9 by 10 ft. in size, on one side, and with a toilet room, $4\frac{1}{2}$ by 6 ft., on the other. The galley or kitchen is $5\frac{1}{2}$ by $6\frac{1}{2}$ ft., equipped with alcohol range and every convenience for cooking, and has a large hatch in the deck above for ventilation and light. These rooms have 6 ft. headway, and every inch of space is utilized. The main deck is 19 ft. long and is well protected by a railing, and may be covered with a canvas awning if desired. The engine room is amidships, within easy reach, the engine compartment being entirely separate and well ventilated. It is ar-



Small
Boat
with
Large
Capacity
for
Vacation
Cruising

mits such a sequence of interruptions that any desired number of flashes, long or short, within a specified time can be given.

ranged for the installation of a 20 to 30-hp. 4-cylinder engine, which will drive the boat at a speed of about 10 miles an hour.

COMMENT AND REVIEW

THE latest, and one of the most wonderful accomplishments ever made in photography, is the submarine work. The experiments were made at the Bermudas, where clear water and the natural light reflected by the white coral bottom make conditions favorable. Photographs taken at a depth of 80 feet are clear and sharp, and open up endless avenues in science and natural history. The special diving apparatus, cameras and submarine electric lights more than satisfied the hopes of their inventors.

Submarine Cameras

It will now be possible to bring to every moving-picture audience the movements and work of the diver who is sent down to inspect a sunken ship; and already plans are completed to photograph vessels which are known to have been submerged a century ago. For the present, 100 feet is about the limit of working possibilities, but having accomplished this, there is promise that cameras can be made to work at depths far below the limit of any living operator. If so, it will be some ingenious machine, almost humanlike in its operations, which is to bring from the depths a vision of what transpires in those vast regions of utter darkness and profound stillness. Of course, for such work artificial light is imperative.

It seems an impossibility—and is today—to attempt to photograph at depths of one or two miles, and yet what has been accomplished the past month was deemed equally unattainable a few years ago. It is unlikely, but by no means impossible, that children of those who went down in the "Titanic" may live to look upon an actual picture of that great steamship resting on the ocean's floor.

The mystery of old ocean has ever been as unfathomable as her depths, but to a knowledge of animal life in air and jungle there bids fair now to be added that unknown life, strange in form and action, which lives its life beneath the sea.



NOT long ago a manufacturing concern using great quantities of a certain kind of wood erected a splendid factory where the timber was handy. Thousands of dollars were spent in the latest machinery, and finally the plant started up. It had not run long, however, when the discovery was made that only a small part of the available wood was suitable for a first-class product, and that to remain there meant low-grade goods for all time to come. The necessary wood, moreover, could not be found within profitable shipping distance, and, as there was no other use for the buildings, a large loss was inevitable.

The Misplaced Factory

However, it was decided that rather than go on from bad to worse, it was better to take radical action, and a new location was found—this time the right one. The machinery was moved, and finally the satisfactory results aimed at were secured.

The management had the nerve to promptly acknowledge a fatal mistake, and lost no time in correcting it. The annual loss through

inefficiency, due to a failure to synchronize the proper man or machine with the work attempted, cannot be computed, and is the more regrettable when we reflect that every man and every machine has certain valuable possibilities.

It is not to be forgotten, however, that in moving the factory the management made sure they were landing in the right place.



RETURNING from a critical inspection of one of the great trunk lines of railroad in the West, a member of the party describes conditions which are not only unusual, but, in some respects, occur for the first time. The thousands of miles of track were found in excellent physical condition, but this vast machine of traffic was almost at a standstill. Two-thirds of all its locomotives were cold and dead, securely stored in lifeless roundhouses. This motive power is not in need of repairs. On the contrary, it is ready to go into action the moment steam is raised.

*Sleeping
on His
Arms*

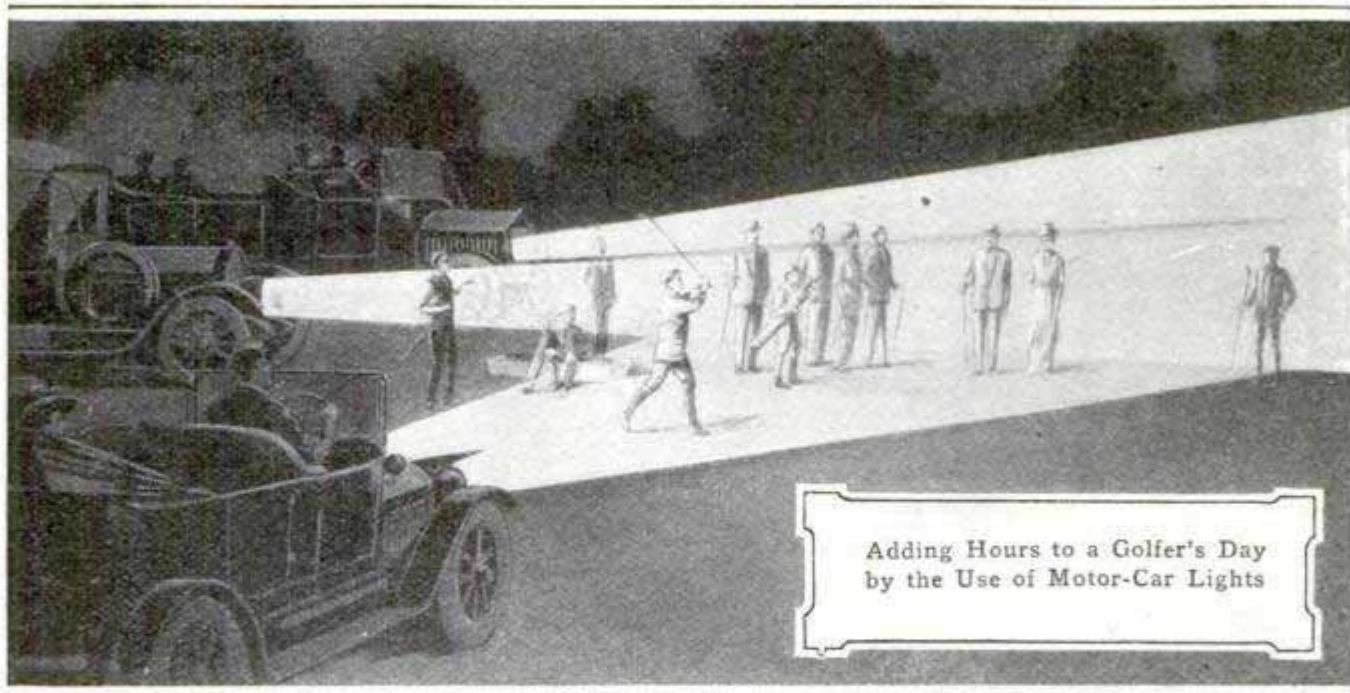
In the repair shops are hundreds of idle machines, with tons of tools, all in perfect condition and order, but silent because they are not needed. Out in the freight yards are miles of switch tracks, rusting for want of that wear which keeps them bright. On the main lines a freight train moves only at intervals of many hours. A giant sleeping on his arms.

Within the stores, in the towns along the line, the shelves are depleted and stocks at lowest ebb. Empty boxes fill otherwise vacant places and suggest merchandise which is not there. Only the smallest orders, barely sufficient to meet the consumer's wants from day to day, are handed the commercial travelers. Yet we are neither in the midst of panic, nor crop failure, nor war — not at this writing. What is true of the railroad system mentioned, and its towns, is a fair picture in many parts of the country.

This condition, dark as it appears, is far from being chronic, and is not without its compensation. It indicates a returning spirit of thrift, from which everybody had departed of late. Better empty boxes on the shelves than bills long past due which cannot be paid, and over-conservative business rather than wild inflation. Moreover, the near future is full of promise. No such bountiful crops have ever promised as this year. The tariff and the currency bill, however they may result, are at least settled. Even war with Mexico would furnish great stimulus to many lines of industry, and the banks are full of money which is in a condition of "watchful waiting." This country is so big, and has so many diversified avenues of production, that it cannot be held back much longer. People everywhere are not despondent, but confident, and when the tide turns, as it is bound to do soon, all signs point to a business and industrial activity which will come with the force of a tidal wave.

The giant has been sleeping on his arms, but there are signs of awakening; and when he does, refreshed and invigorated by repose, he will prove his strength, and gladden the hearts of men.

H. H. WINDSOR



Adding Hours to a Golfer's Day
by the Use of Motor-Car Lights

GOLFING AT NIGHT IN THE GLARE OF SEARCHLIGHTS

Golf enthusiasts begrudge every hour after sunset which keeps them from their favorite sport. An idea which originated in England and has been adopted by some American golfers involves the use of the headlights of motor cars, by which the links are illuminated. Four electric headlights are used, two being focused on the ball and two on the line of stroke. The course is easily seen for 150 yd., and little trouble is experienced from lost balls, except in case of very badly "sliced" or "pulled" drives.

TORPEDO NETS IN DISFAVOR IN NAVAL CIRCLES

The newer vessels of the British navy will not be equipped with torpedo nets, as it has been recognized that, except when the vessels are at anchor, the nets are of no protective value, the motion of the ship tending to force the lower edge of the net to the surface, leaving the hull exposed. Warships of the "Queen Elizabeth" class, now building, are constructed with the armor belt carried down from the water line, which has 13½ in. of armor plating, with a 3-in. steel protection to the keel.

NEW ASH CART DUSTLESS IN HEAVY WIND

Gathering up the ashes of a city without distributing a considerable fraction, through the agency of the wind, upon the streets and alleys, the walks and yards of the neighborhood, has always been a problem. A new ash cart, designed to overcome this great objection, is being tried out in New York City. It is covered with adjustable canvas flaps, so arranged as to leave less than a quarter of the top of the cart exposed, and by the use of



Copyright, American Press Association
This Ash Cart Doesn't Scatter Dust in the Wind

moderate care, the ashman is able to manipulate his cart so as to reduce the loss of ashes to a minimum.

HALF A HOUSE SAVED WHEN NEW STORE IS BUILT

Building operations often show much ingenuity in economizing space, but it is seldom carried to such an extreme



Part of the Old Home Sacrificed for Revenue

as is shown in this instance. A Detroit man decided to build a store on a portion of his home lot, but as there was not enough room for both the improvement and the house, he cut the latter in two, and built the store close up against the remaining portion.

CURIOUS METALLIC GROWTH ON ALUMINUM

That metals under some conditions appear to grow may be demonstrated by moistening the surface of a piece of aluminum with hydrochloric acid and, while it is still moist with the acid, rubbing on some mercury. In a few moments white stalks will be seen to rise up from the surface of the aluminum, looking like tiny asparagus shoots, and will grow to no small height. If one cleans off these strange growths they will again spring up in the same places, and will continue so to do until a hole is made entirely through the aluminum sheet.

KAPOK NOW MADE INTO SLEEPING BAGS

Sir Ernest Shackleton has adopted kapok, or llano silk, as the material from which the sleeping bags for his party will be made, for his exploring trip across the Antarctic Continent. Kapok has but one-sixth of the weight of cotton, and the fibers are so oily that it is quite waterproof. In a previous number of this magazine it was pointed out that the U. S. Navy Department was considering the adoption of kapok instead of cork in life-saving appliances, and recent tests in England have demonstrated that a mattress stuffed with kapok, which weighed only 10 lb., supported in water a man, weigh-

ing 200 lb., lying on it. Its availability for sleeping bags, and kindred accessories of exploration equipment, is freely admitted by authorities.

TURKEY TO INSTALL FIRST REGULAR AERIAL POST

A plan for installing an aerial postal service between Bagdad and Aleppo, in Asia Minor, is reported to have been sanctioned by the Turkish government, and if the plan goes into effect this will be the first regular aerial post ever established. The distance between these cities is 560 miles, and as the route lies across desert country it is expected that there will be some serious dangers in operating the service.

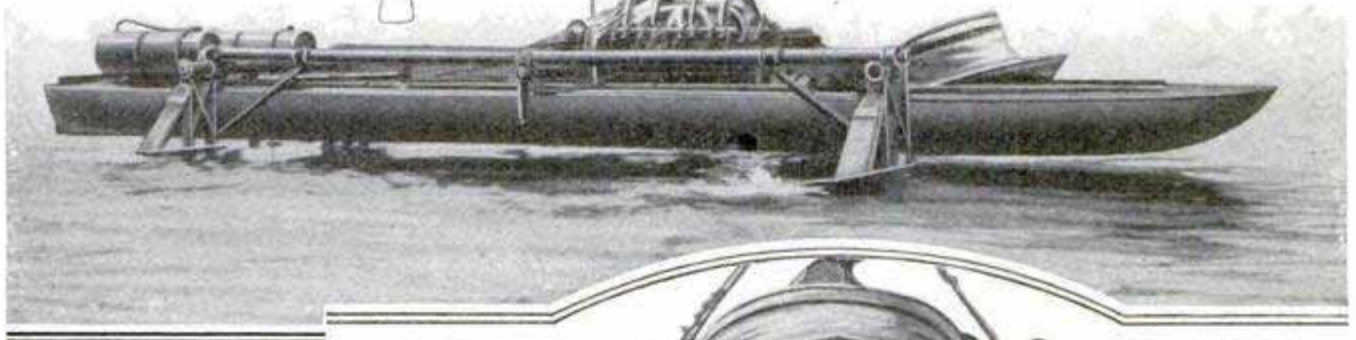
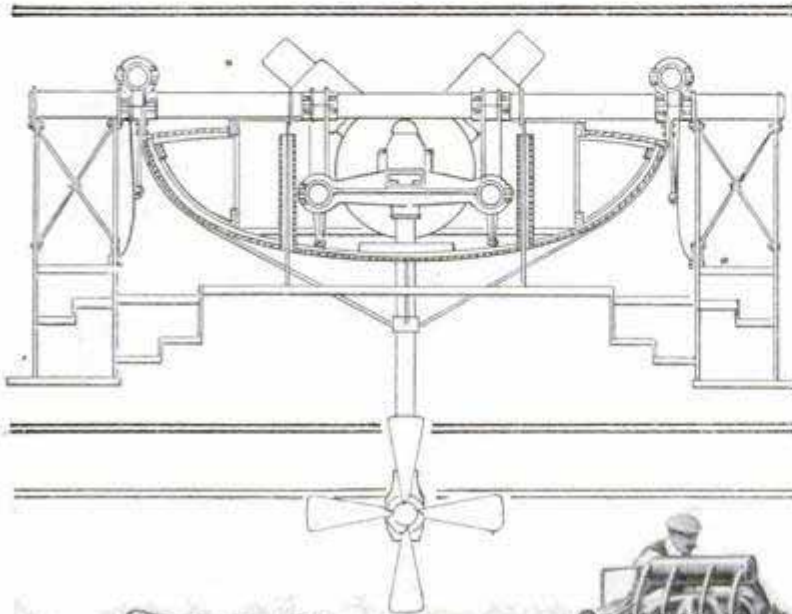
☞ In 1754 a monk planted two coffee seeds in a monastery garden in Rio de Janeiro, and from this beginning has grown Brazil's enormous wealth in coffee.

BOAT WITH NOVEL SYSTEM OF GLIDING PLANES

An invention that may bring about a revolution in hydroplane construction is a combined motorboat and

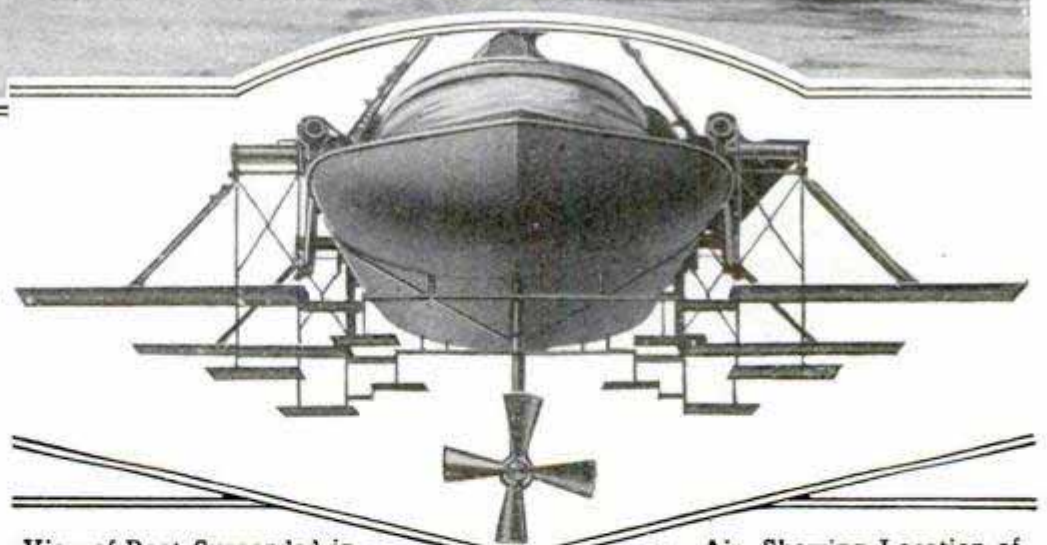
ordinary hydroplane have hulls so shaped that they drive up out of the water and skim the surface when driven at high speed, but a craft that glides on planes placed under and at the sides of the hull is something decidedly new.

The motor, propeller and planes are carried on a rigid steel frame that stretches over the hull and is stiffened by trusses along the sides, and to this frame the hull itself is securely attached. With this arrangement the severe vibration of the 100-hp. motor working at high speed, as well as the shocks received through the planes, are taken up by the frame, and not by the hull, as



At Top: Cross Section of Boat through the Forward Set of Planes

Below: Boat Driven at 25 Miles an Hour with Hull Lifted Clear of Water



View of Boat Suspended in Propeller and Arrangement

Air, Showing Location of and Bracing of Planes

glider that has recently been patented after having been subjected to preliminary trials. When run at high speed, the hull of this craft lifts out of the water and is supported by a system of water planes that act on the water in the same fashion that the wings of an aeroplane act on the air, while at low speed or with the craft at rest, the planes are submerged and buoyancy is supplied by the hull as in an ordinary boat. Both the flying boat and the or-

in a hydroplane. The planes, which are placed crosswise of the boat and have a pronounced slant upward toward the bow, are arranged in two systems, one near the bow of the boat and the other near the stern. Each system consists of a series of planes at different levels and placed at various distances from the center line, the arrangement being such as to steady the craft

when it is running at high speed and minimize the danger of upsetting. Just behind the forward planes, in a position to pull the boat instead of pushing it, is the propeller, which is placed low enough to be well submerged when the boat is riding at the highest possible level. To place the propeller in this position, two right-angle gear connections are necessary, one where the horizontal shaft of the engine connects with the vertical shaft extending down into the water, and the other where this vertical shaft connects with the horizontal shaft of the propeller.

So long as the boat is running at low speed, the entire weight is supported by the hull. As the speed in-

creases, the planes act more and more powerfully against the water, and first the hull and then the planes in succession lift above the surface, until, at full speed, the entire craft rides on the lowest planes with the hull suspended clear of the water and well above it. In one of the trial runs this feature prevented an accident that would almost certainly have wrecked an ordinary motorboat. While going at full speed the boat ran over a water-logged floating pile. The planes were crippled, but the hull was not damaged, as it was riding high enough to clear the obstruction, and the boat was floated to the dock for repairs. During the trial runs, the boat attained a speed of 40 miles an hour.

ORIGINAL LANGLEY AEROPLANE FLIES AT LAST

[For an account of the development of this first practical heavier-than-air flying machine, see Popular Mechanics Magazine for June, 1914.]

The Langley aeroplane, the famous flying machine constructed in 1903, made a successful flight on May 28, at Hammondsport, N. Y. With Glenn H. Curtiss as pilot, and in the presence of Dr. Chas. D. Walcott, Professor Langley's successor as Secretary of the Smithsonian Institution; Dr. A. F. Zahm, Recorder of the Langley Aerodynamical Laboratory, and a number of airmen, it was proved conclusively that the Langley machine was capable of flight, and that but for the accident which sent it plunging into the Potomac River on December 8, 1903, it would have proved its flying ability years before the date when the Wright brothers made their first public flight in a mechanically propelled aeroplane.

Instead of building a duplicate of the Langley machine, as had been first planned, the Smithsonian authorities and Mr. Curtiss decided to attempt a flight in the original machine. Moreover, in order to make the results of the test incontrovertible, it was decided to use the original engine built by Chas. M. Manly, which has been preserved in the National Museum. The skeleton frames of the original wings and rudder were covered with

new fabric, and for safety there were attached to the machine three pontoons, which increased the original weight about 340 pounds.

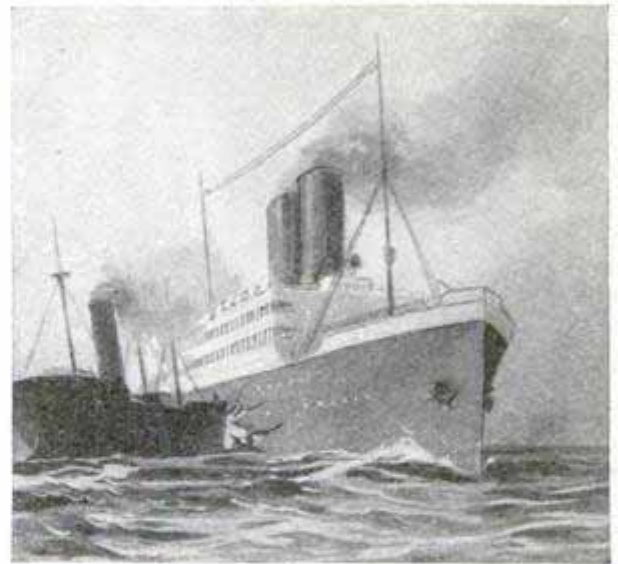
The first flight in the rehabilitated Langley machine was made from the water, exactly as though the apparatus were a flying boat. The machine lifted itself from the surface of Lake Keuka and flew at the height of a yard above the water. The flight was a short one, as a defect in the bearing of the left propeller shaft made it impossible to steer the craft in a straight line, and Mr. Curtiss had to turn shoreward and come down after flying but a few hundred yards. It was proved, however, that the original Langley machine would fly, and further tests were at once decided upon.

The engine used in these tests has five cylinders, developing a little over 52 actual horsepower, and weighing, with radiators, batteries, and 20 lb. of cooling water, only 207 lb., a little less than 4 lb. per horsepower. The complete machine ready for flight as originally built, weighed about 850 lb., including the pilot, and had a total supporting area of 1,040 sq. ft., or a total of 1.25 sq. ft. of surface to the pound.

SINKING OF THE "EMPRESS OF IRELAND"

In spite of the fact that the vessel was equipped with wireless, had more than enough lifeboats to carry all of the 1,437 persons on board, was built with watertight bulkheads, and had apparently every other modern facility for the safety of its passengers, more than 900 persons lost their lives when the Canadian-Pacific liner "Empress of Ireland," bound from Montreal to Liverpool, was rammed and sunk by the Norwegian collier "Storstad" on May 29, 1914, in the estuary that forms the mouth of the St. Lawrence River. This appalling loss of life was caused by the rapidity with which the ship filled and sank, the time being estimated at from 10 to 17 minutes, and in this brief period there was no time for launching the lifeboats or for any organized work of rescue.

The collision occurred at about 2 o'clock in the morning when the "Empress of Ireland" was only a few miles from shore, off Father Point, near Rimouski, Quebec, and was running at reduced speed on account of fog. The ship was struck amidships, the steel prow of the collier practically tearing off the side of the ship from that point back to the propellers, with the result that a deluge of water poured into the hull of the stricken ship. Almost immediately the propelling machinery and lighting plant were put out of commission, and so suddenly did the ship fill that hundreds of passengers were drowned in their berths or while groping through the darkened passageways. There was barely time to flash the wireless "S O S" signal a few times. This brought the "Lady Evelyn" and the "Eureka" to the scene, and these vessels picked up several hundred of the passengers and crew who were struggling in the water. The "Storstad," although greatly damaged, was able to keep afloat. The "Empress of Ireland" was a twin screw steamer, built in 1906, and was 550 ft. long and 66 ft. wide.



When the "Empress of Ireland" was Rammed by the "Storstad," the Steel Prow of the Collier Practically Tore Out One Side of the Stricken Ship, Which Sank within 17 Minutes of the Time of the Collision



Map Showing the Position of the Ship When Rammed by the "Storstad"

The "Empress of Ireland" as It Appeared Under Full Steam at Sea

BEATING THE BIRDS AT THEIR OWN GAME

BY LINCOLN BEACHEY

"With an engine of sufficient power an airman could fly a piano box."

ANY properly built biplane which has a light, powerful engine is stable when in the air, providing it is intelligently handled.

The chief reason I have been able to accomplish feats which other airmen never have attempted is the fact that I have had a good machine and have known how to fly it.

Give me a clearance of 500 ft. from the ground, a place to land, and then let things happen. If the aeroplane upsets or slides, or the engine dies, and the airman is not asleep, it may be righted with comparative ease.

The master of a good biplane should feel as completely at home in the air as any bird that ever flew. In my recent flights it has been demonstrated that a man-made machine is capable of things which no bird ever attempted. How many persons ever saw a bird try to loop the loop, do a backward spiral or revolve like a top and sail earthward, tail down?

It is true that my latest craft was built for the specific purposes to which it is being put. But for general flying a good biplane of the same fundamental type should be equal in stability. It is only touching the extreme to assert that with an engine of sufficient power an airman could fly a piano box. By that I wish to impress the statement that the airman of today has absolutely everything he needs with which to fight the laws of gravity. Because of this the aeroplane already occupies the place of a necessity, commercial and otherwise, for the present and future-day man. It is only a toss ahead to the time when the aerial express will be no more a novelty than overland limited trains are now.

My new machine which has accomplished hitherto unheard-of things,

such as flying at an angle of almost 90° , is the embodiment of many of my own ideas and the adaptation of the best principles of other successful biplanes. It is not unlike the miniature Curtiss type, but at the same time it is lighter, stronger, smaller and faster than any other practical craft in this country. In many of its qualities it is without an equal in the world.

The engine, which largely is responsible for the machine's success, is a Gnome single-valve, and weighs, exclusive of its mountings, 205 lb., which is 135 lb. lighter than the engine of the same power used in my previous machine. It will develop between 84 and 86 hp. and will give a speed of approximately 80 miles an hour. The most wonderful of its features is its ability for climbing, which will equal, if not surpass, that of its only rival, an English biplane. It will climb at an angle of 60° at the rate of 1,125 ft. a minute. At a lower speed it has pulled into the clouds at 85° . When I attempted to go absolutely straight up, or 90° , it slipped slightly.

The engine is a four-cycle, seven-cylinder, air-cooled one of the revolving type. It has but one valve in each cylinder; that for the exhaust. The gas enters the cylinder through the crankshaft, which is stationary, and through ports in the cylinder walls. Furthermore it is "fool-proof."

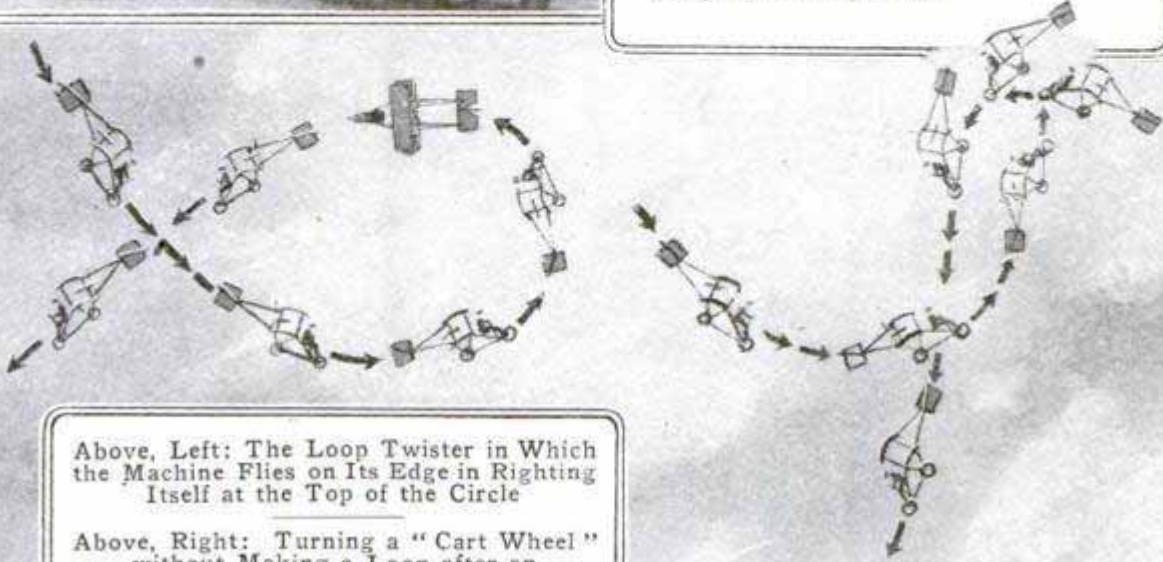
Eighteen feet covers the entire fore-and-aft length of the biplane, the wings of which are 21 by $3\frac{1}{2}$ ft., giving a surface area of only 147 sq. ft. The ailerons are of the usual form of construction, while the stabilizer is much smaller than that ordinarily seen, and the elevators considerably larger. I do not wish to comment upon the virtue of the stabilizer for biplane use, although I do believe that



Six Men Holding Down Air Craft While Engine is being Started Preparatory to Making Flight

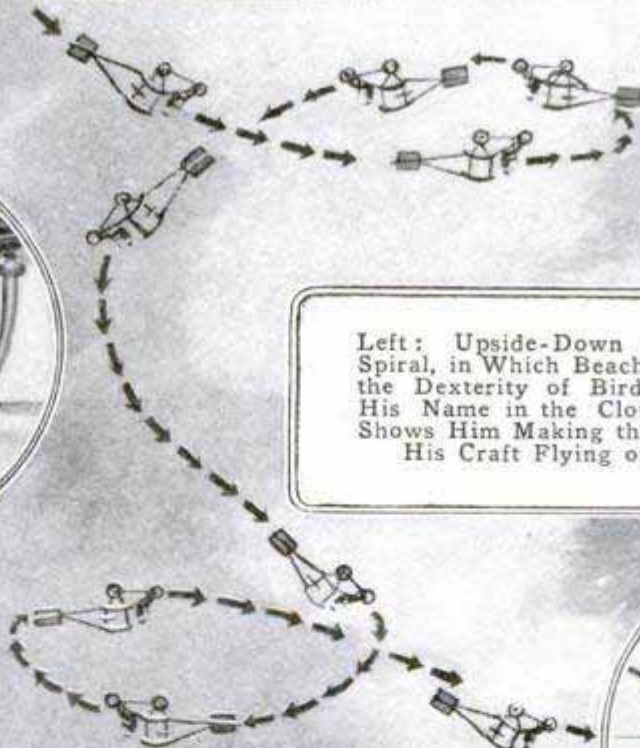
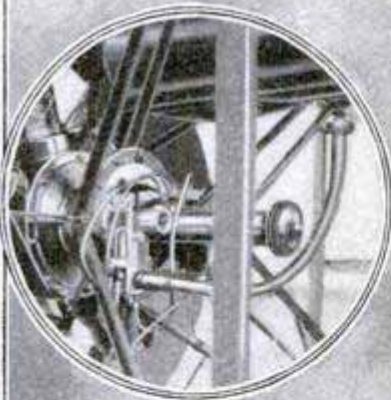


Lincoln Beachey



Above, Left: The Loop Twister in Which the Machine Flies on Its Edge in Righting Itself at the Top of the Circle

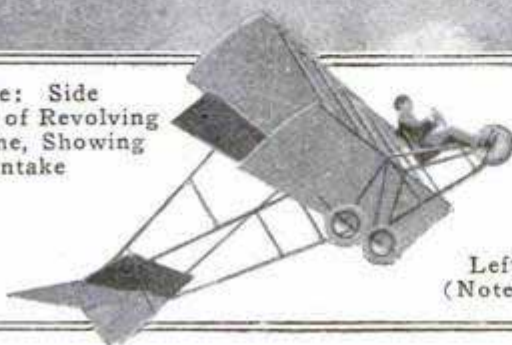
Above, Right: Turning a "Cart Wheel" without Making a Loop after an 85-Degree Climb



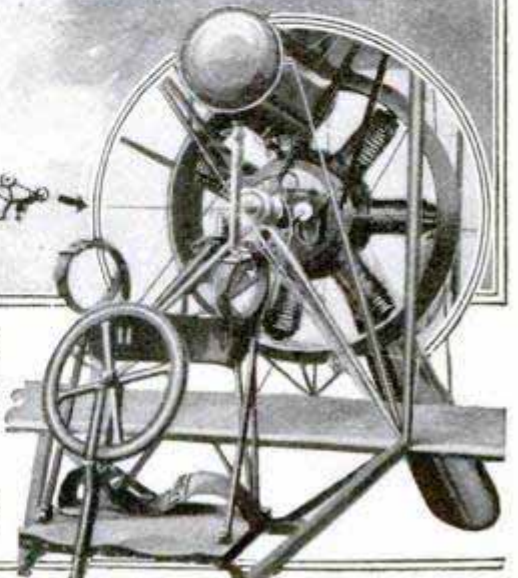
Left: Upside-Down or Backward Spiral, in Which Beachey Challenges the Dexterity of Birds by Writing His Name in the Clouds; Diagram Shows Him Making the First Letter, His Craft Flying on Its Back

Above: Side View of Revolving Engine, Showing Air Intake

Right: Front View of Engine and Also Seat, Showing Arm and Lap Straps for Airman



Left: Beachey Climbing (Note Short Tail Length)



the real stabilizer is the man. The tail of the machine was made short purposely for looping the loop. When I am at the steering wheel and the gas tank is filled, the total weight is only 725 pounds.

In my fourth flight with this craft, and without seriously contemplating what I was doing, I performed the first backward spiral ever accomplished. Fifteen seconds, approximately, were spent in the descent of 3,500 ft. The machine was upside down and under perfect control every foot of the way.

On the same day the cart wheel—which is not a loop but a simple turning of the machine from an inverted position to its natural angle, like the turning over of the hand—also was done without the slightest effort. Flying on my side, dropping, tail downward, in a spiral toward the earth, and

similar operations are demonstrative of the utter stability of the modern machine. Any of these things, two years ago, would have meant certain death to the flier. At that time there was not an airman in the world who could restrain a shudder if he thought his plane was about to overturn.

The loop twister, and the loop itself, are illustrations of my first point: that a good biplane can do anything, even things birds cannot do.

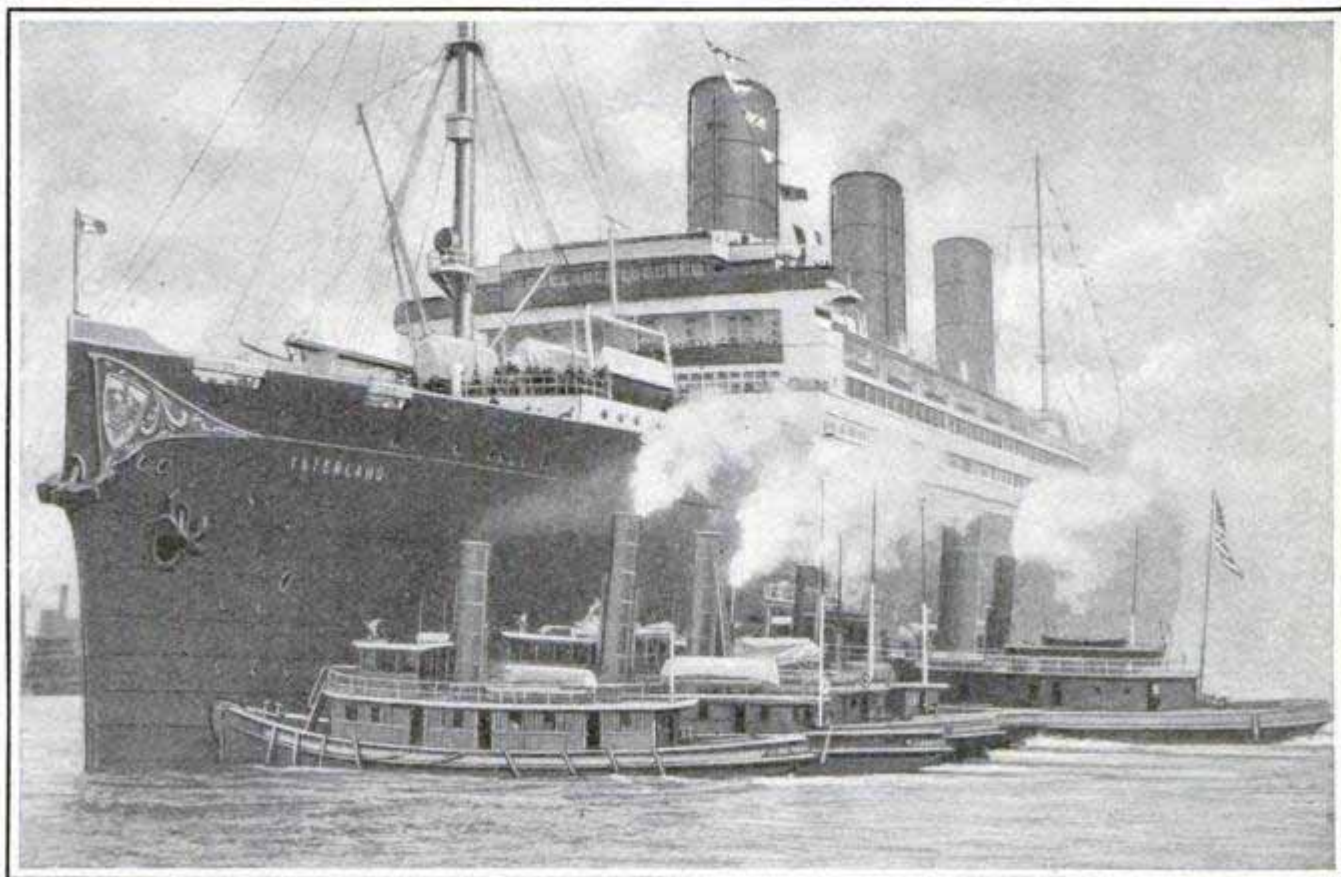
By unusual flying I am not attempting to curdle the blood of the world. Quite the contrary is my hope. The sole thing I wish to accomplish is to instill into the minds of the people of my own country the serious importance of the aeroplane, in order that the Federal government may awaken from its coma and see that this nation takes its place in the conquest of the air.

DOCKING THE "VATERLAND" PROVES BIG TASK

The new German steamship "Vaterland," after finishing its maiden voyage across the Atlantic, nearly proved too big to go among the crowded shipping of New York Harbor and get tied up at the dock safely. After reaching port the big ship was compelled to spend over three hours in futile maneuvering before being able to get into the slip at Hoboken. When the "Vaterland" entered the harbor it was met by an outbound tide, the effect of which was increased greatly by the current of the Hudson and by a wind blowing down the river. In spite of this there was no great difficulty, with 14 tugs nosing at the bow and stern, in getting the ship turned and headed for the slip, and the docking would have been completed without incident if it had not been for the interference of a tug with a tow of barges, all of which could have been stowed in the hull of the "Vaterland" without being particularly noticed, which was battling upstream against the wind and tide. As the "Vaterland" headed for the slip,

the tug with its tow drifted toward the big ship, and to avoid collision the engines of the ship were stopped. As a result all headway was lost and the ship, standing across the current, began drifting downstream. Several hundred feet below the dock are ferry slips where the depth of water is only 27 ft., and it was toward this part of the harbor that the ship drifted as the stern swung downstream. The draft of the "Vaterland" is 36 ft., and so near did the vessel come to going aground that the propellers were churning the mud at the edge of these shallows before the drift could be stopped and the ship brought under control. With the aid of 50 tugs the "Vaterland" was finally got into position again and warped into the slip. The ship had arrived off the dock at 9:45 in the morning and was made fast to the pier at 1:20 in the afternoon.

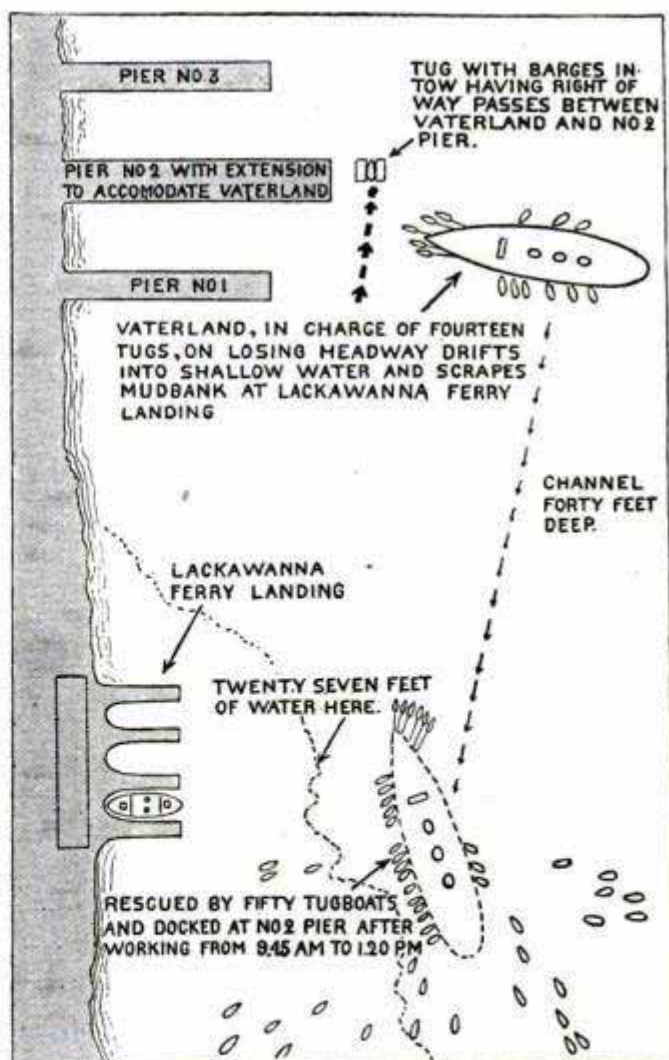
Five days later, when the "Vaterland" backed out of its berth for the return voyage, another accident was averted only by the power of its pro-



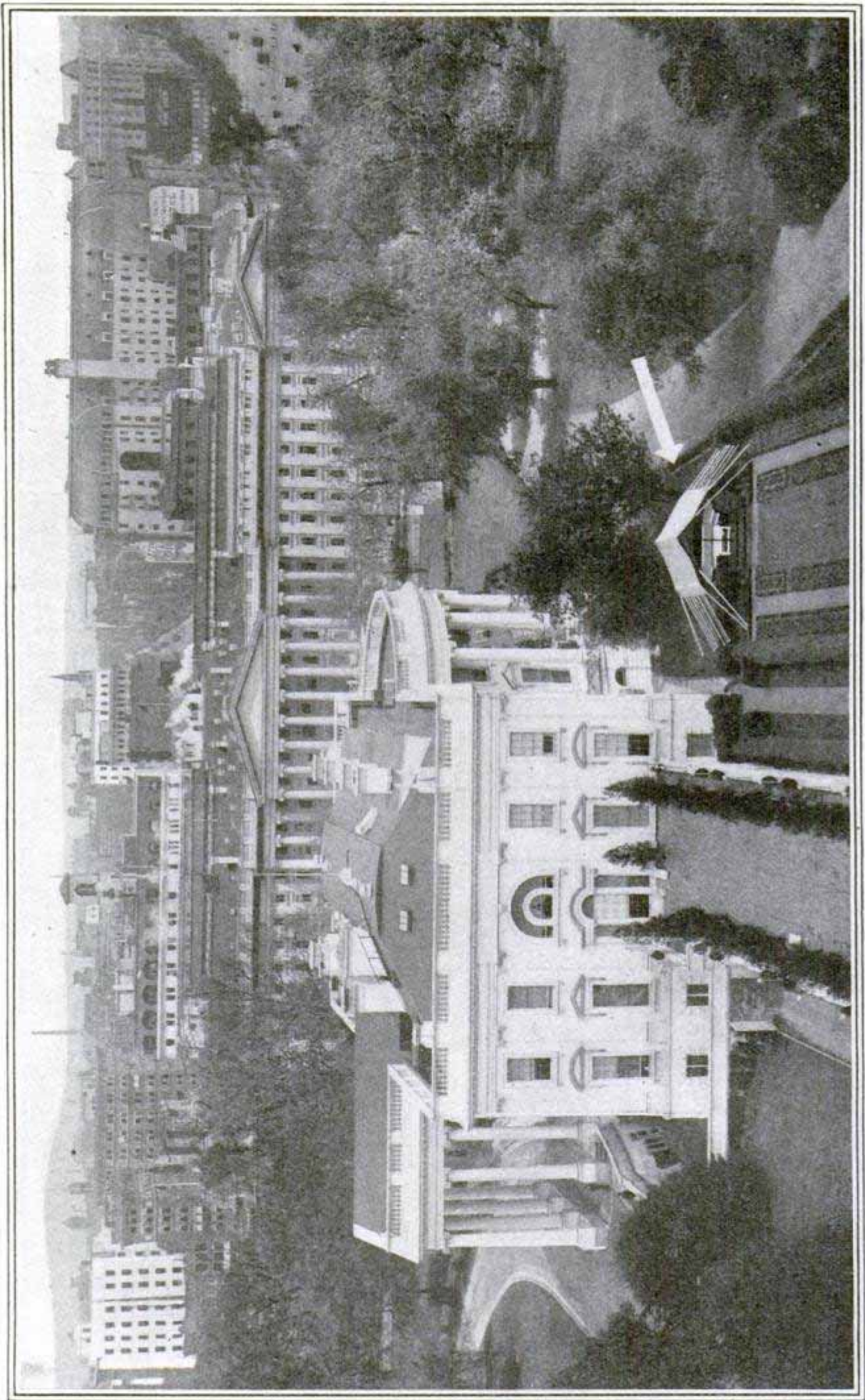
Tugs Nosing at the Bow of the "Vaterland" in an Effort to Get the Big Ship into Its Berth at Hoboken

pellers. With its 950 ft. of length and its immense bulk the ship could not be stopped in time to avoid backing into a slip on the opposite side of the Hudson, and the stern of the vessel as it drifted into the slip missed one of the piers by only 4 ft. The tugs proved powerless to control the ship and it was only after the propellers had churned the water so violently that a coal barge was sunk and a tug and several other barges nearly capsized that the "Vaterland" was straightened out and headed down the river.

What is believed to be the wreck of the balloon in which Professor Andree attempted to drift across the North Pole has been discovered in a forest in eastern Siberia. Believing that the prevailing winds would carry his balloon across the pole to a safe landing in America, Professor Andree ascended from Dane's Island, off the Spitzbergen, 17 years ago and was never heard from again.



Map Showing How the "Vaterland" Drifted and Nearly Went Aground before being Rescued by the Combined Efforts of 50 Powerful Tugs



Bird's-Eye View of Section of Washington Looking East over White House Grounds, with White House and President's Office Tent in the Foreground

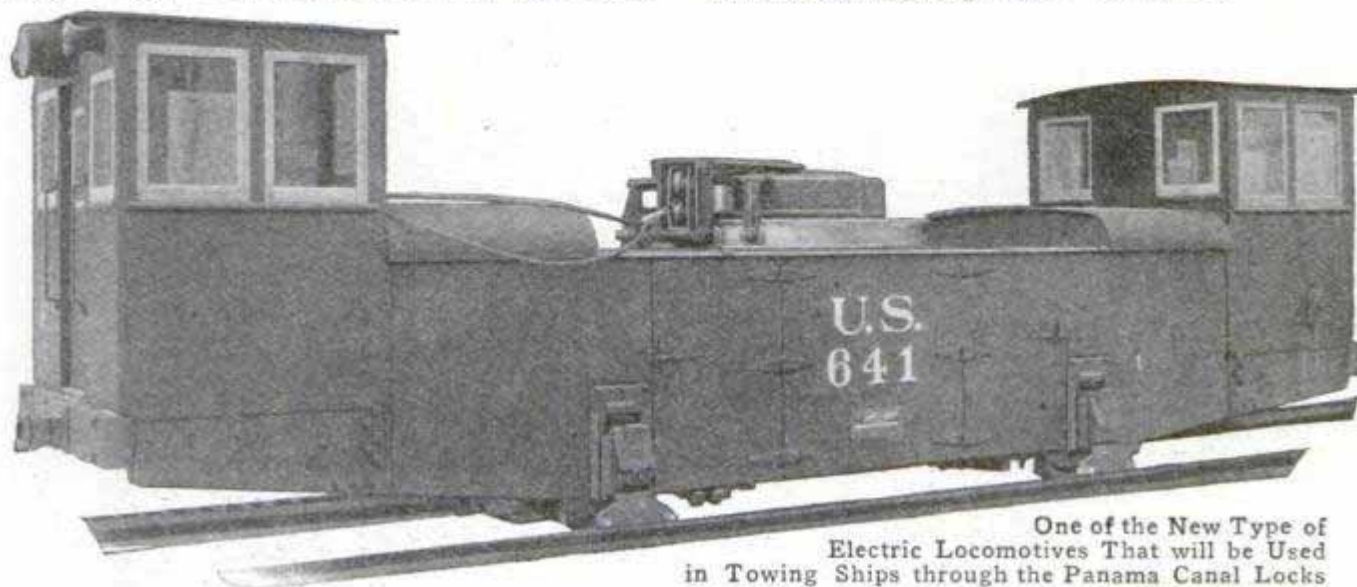
OFFICE TENT FOR NATION'S EXECUTIVE

For greater comfort during the heated term President Wilson has established his office in a tent erected on the White House grounds, and it is here that most of the business of the nation's executive is now being transacted. The tent is just south of the west end of the White House and overlooks the beautiful private grounds of the President, which extend for a mile south to the river. The accompanying view is taken from the roof of the State Department building and shows the office tent placed close to the corner of the White House, with the Treasury building and the business district of Washington beyond, and with Pennsylvania Avenue, the broad boulevard leading to the Capitol, at the right.

"ELECTRIC MULES" FOR THE PANAMA CANAL

Several of the 40 electric locomotives or "electric mules" to be used in towing ships through the locks of the Panama Canal have been delivered and are in service. The design has been considerably changed since the first plans were made. Each of these machines weighs 82,500 lb. and is capable of a tractive effort of 47,500 lb., and each is equipped with windlasses capable of exerting a pull of 25,000 lb. Four locomotives will ordi-

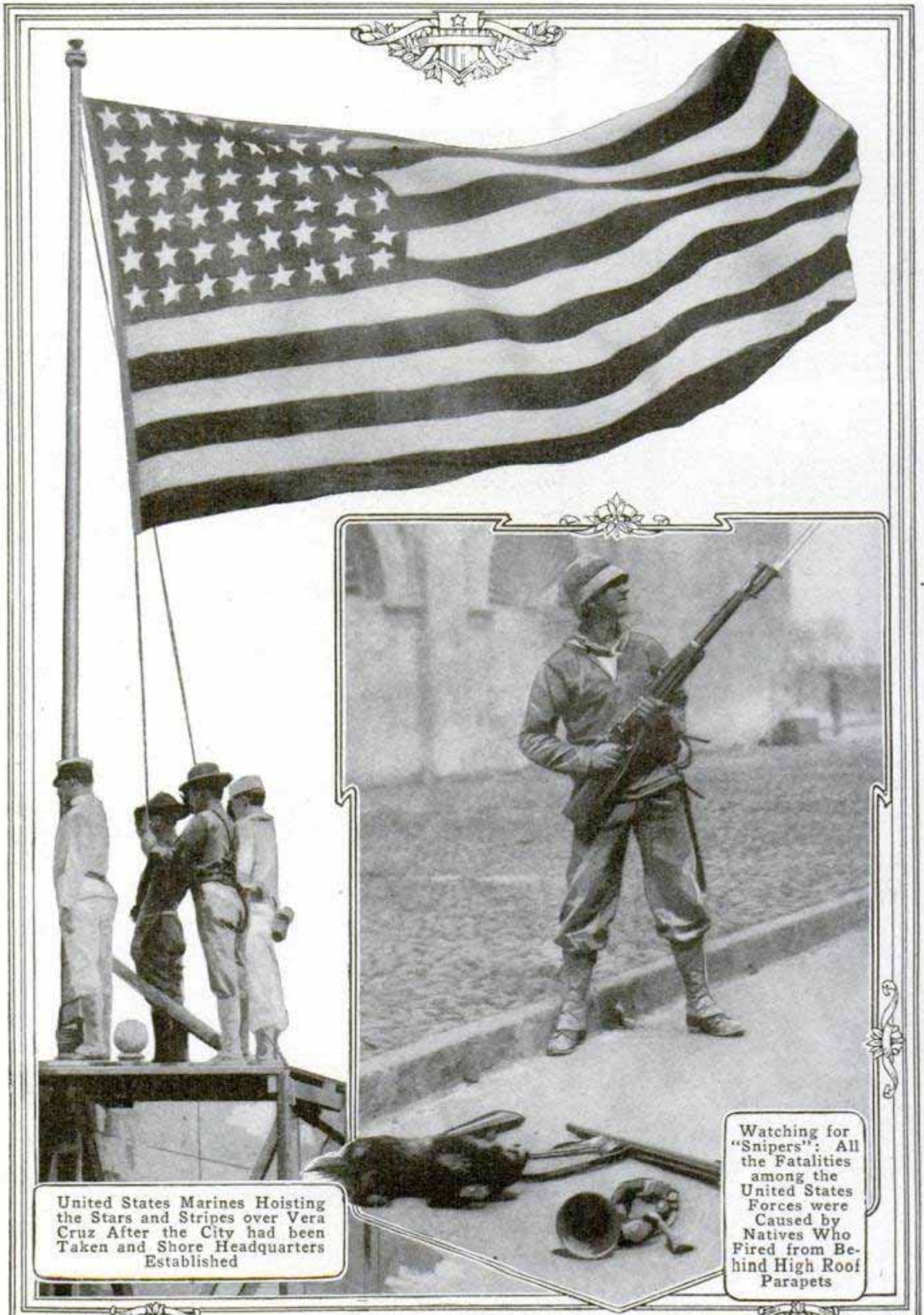
narily be used in hauling a ship through a lock, but in handling the largest vessels six locomotives will be required, two being attached in all cases to the stern, for steering the ship and acting as a brake on its movements. While towing or going up or down the steep grades between the lock levels, a locomotive will propel itself at a speed of two miles an hour by a pinion working on a rack rail, but when running idle, on level track, the pinion will be thrown out of gear and propulsion will be by ordinary traction methods at a speed of five miles an hour. One American warship, the cruiser "Severn," followed by five submarines, has already been towed through the Gatun locks by the electric locomotives. An interesting discovery in connection with the towing operations is the effect of the mingling of fresh water and salt water in the lower locks at Gatun and Miraflores. At the stage of a downward lockage when the water in the lower chamber has been brought to a level with that on the seaward side of the lock, more than half of the water in the chamber is fresh. When the gates are opened the heavier sea water thrusts itself in against the water in the chamber, causing a current opposed to the outward passage of a ship. This current, while of a pronounced character, lasts for only a short time and causes no inconvenience in the towing operations, except to necessitate greater caution.



One of the New Type of Electric Locomotives That will be Used in Towing Ships through the Panama Canal Locks

WHEN THE AMERICAN FORCES TOOK VERA CRUZ

SIX PAGES OF VIEWS SHOWING CONDITIONS, INCIDENTS, AND EVENTUALITIES ATTENDING THE UNITED STATES "PEACE CRUSADE" IN MEXICO



United States Marines Hoisting the Stars and Stripes over Vera Cruz After the City had been Taken and Shore Headquarters Established

Watching for "Snipers": All the Fatalities among the United States Forces were Caused by Natives Who Fired from Behind High Roof Parapets

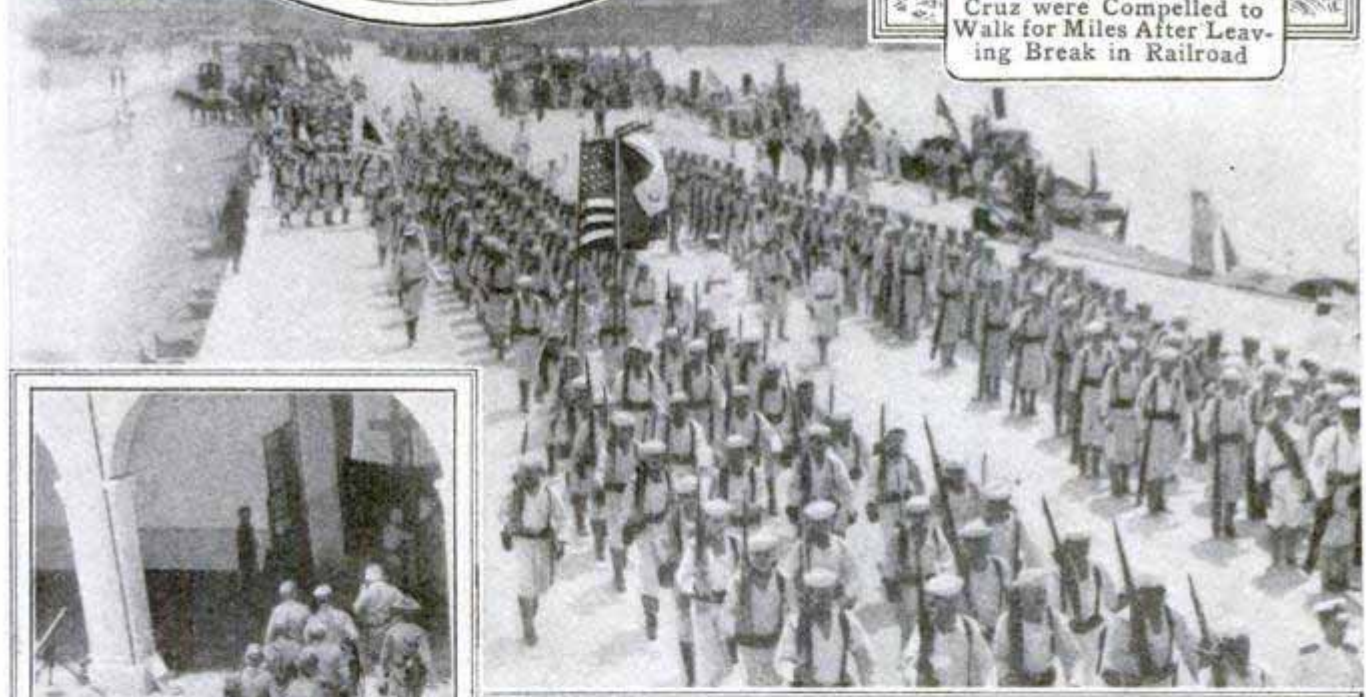
PHOTOS COPYRIGHT, UNDERWOOD & UNDERWOOD



The Last Stage in the Assault on the Naval Academy



Americans Fleeing to Vera Cruz were Compelled to Walk for Miles After Leaving Break in Railroad



Bluejackets Who Bore the Brunt of the Fighting When Vera Cruz was Taken Returning to Their Ships After being Relieved by General Funston's Troops



Bluejackets with Three-Inch Gun in Possession of School Building After Hard Fight

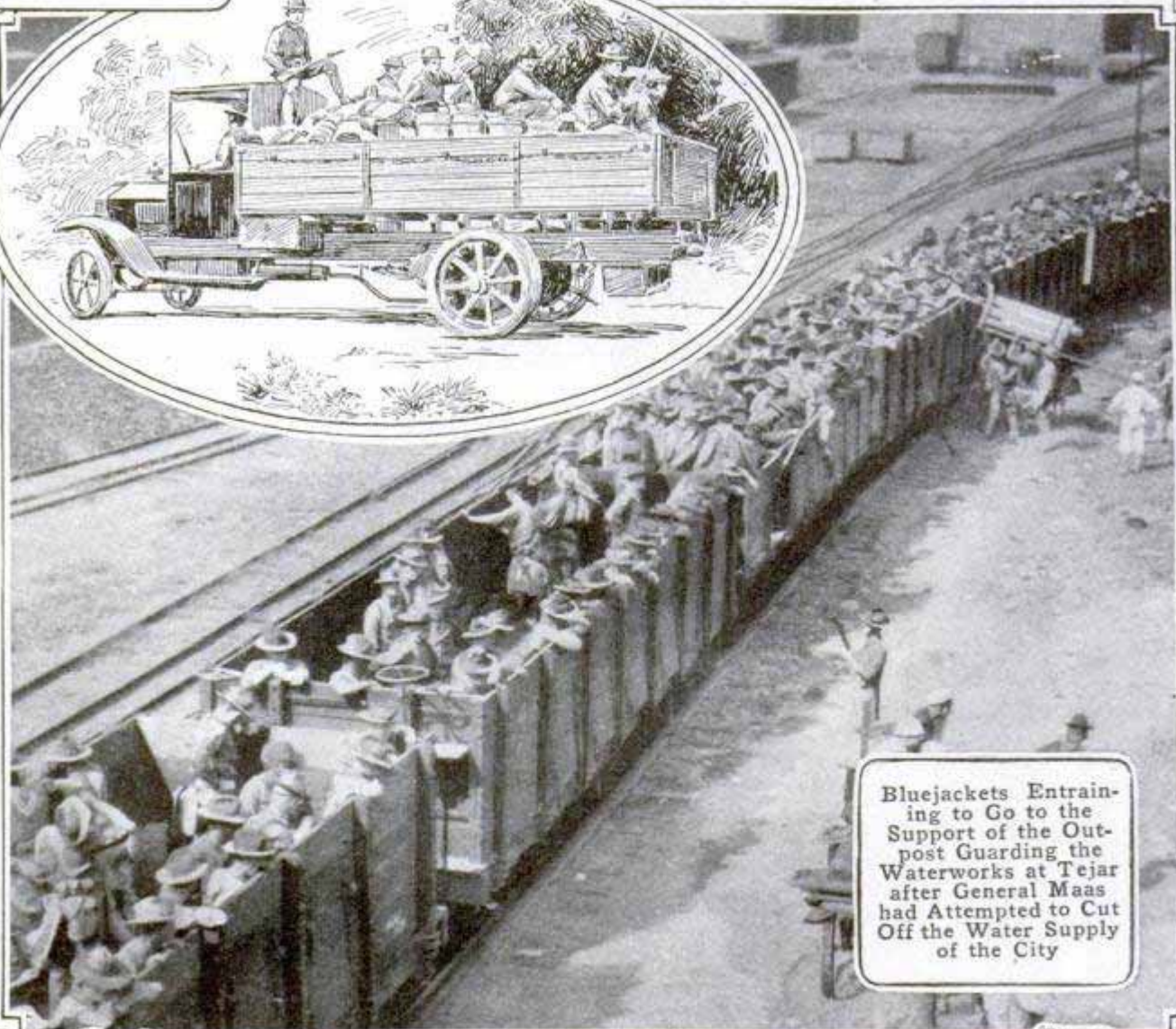
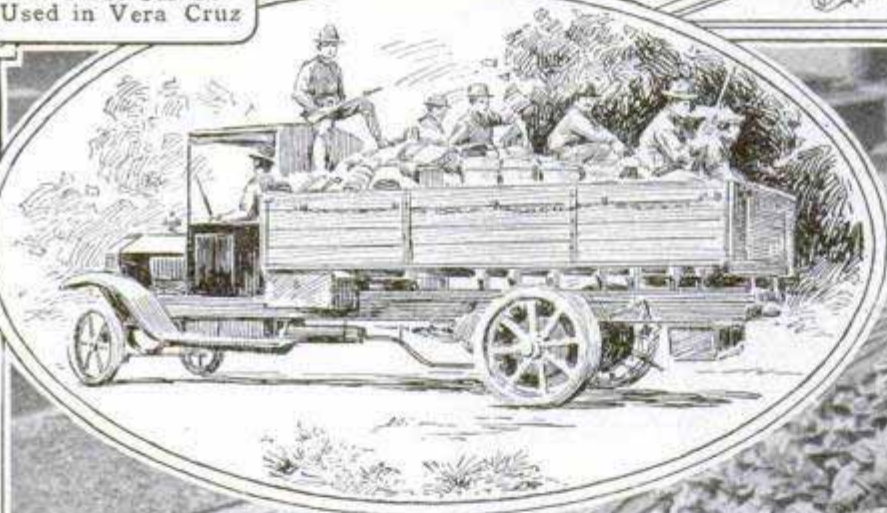


Intrenched in Rifle Pits and Supported by Field Guns, the Marines Presented an Impregnable Front against Assault by the Mexicans



Khaki-Clad Soldiers of the Fifth Brigade Marching through the Streets of Vera Cruz: Most of the Natives had Never Before Seen So Many Fighting Men Together

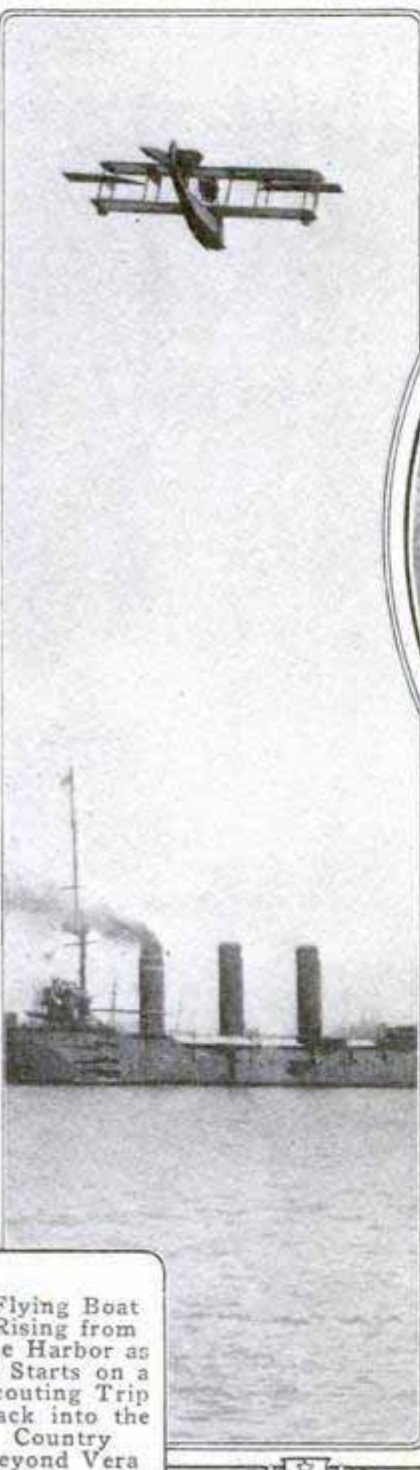
Supplies are Taken to the Outposts in Motor Trucks: This Sketch Shows the First Car So Used in Vera Cruz



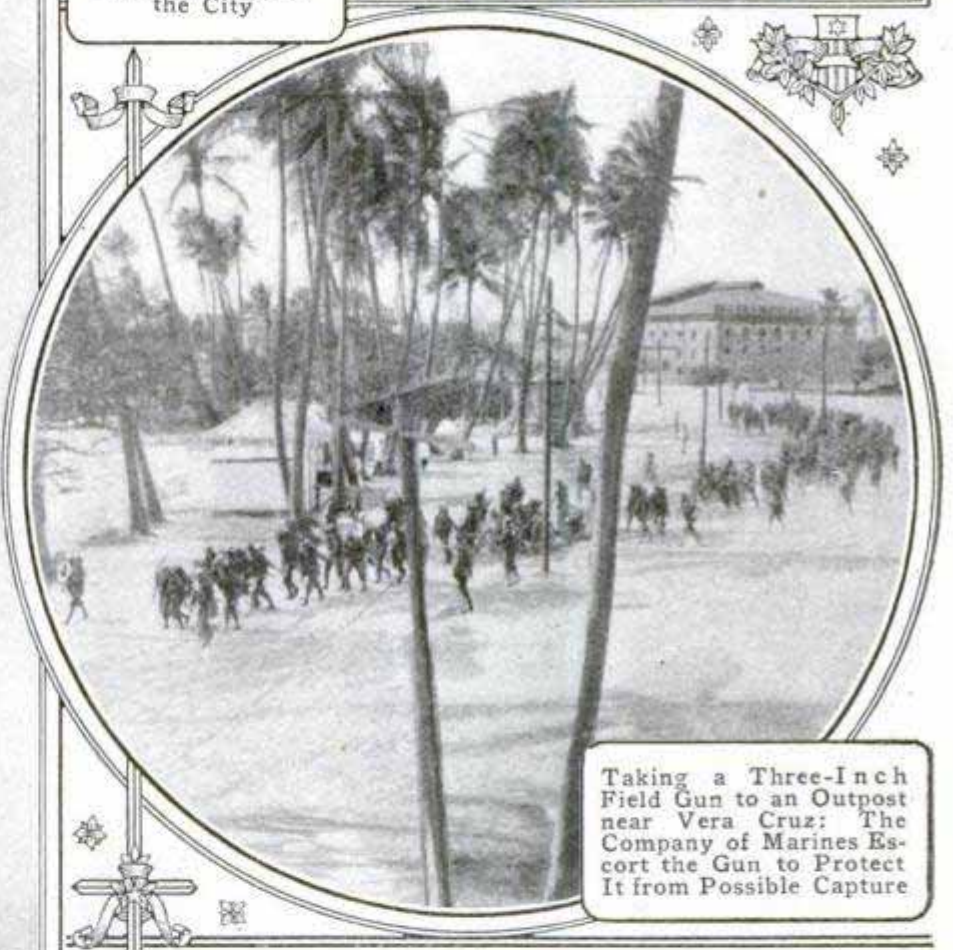
Bluejackets Entraining to Go to the Support of the Outpost Guarding the Waterworks at Tejar after General Maas had Attempted to Cut Off the Water Supply of the City



An Outlying Rifle Pit near Vera Cruz: Sentries Like These are Posted at Close Intervals around the City



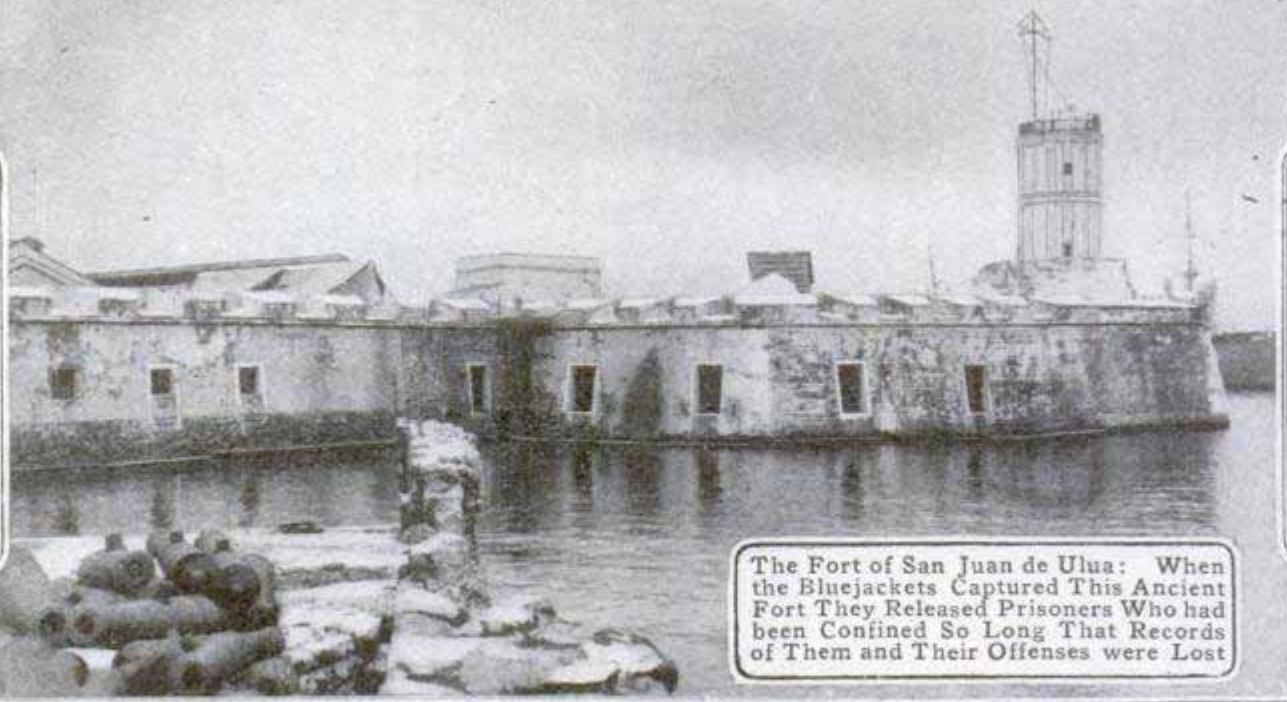
Flying Boat Rising from the Harbor as It Starts on a Scouting Trip Back into the Country beyond Vera Cruz



Taking a Three-Inch Field Gun to an Outpost near Vera Cruz: The Company of Marines Escort the Gun to Protect It from Possible Capture



Bringing in One of the Naval Flying Boats after a Long Scouting Trip: The Country for Miles Back of the City is Scouted Daily by These Craft, and All Bodies of Troops, Breaks in the Railroad and Burned Bridges are Located



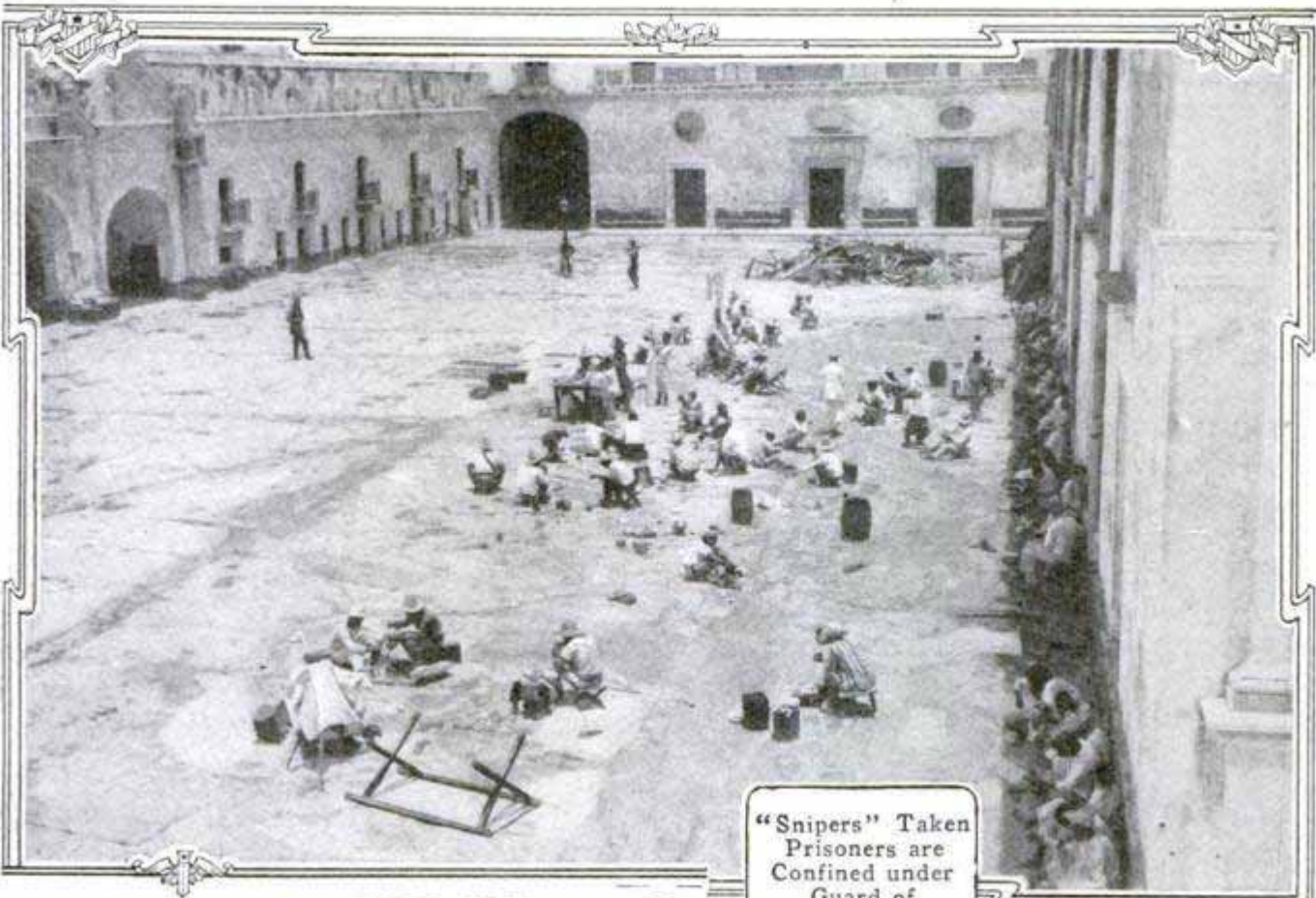
The Fort of San Juan de Ulua: When the Bluejackets Captured This Ancient Fort They Released Prisoners Who had been Confined So Long That Records of Them and Their Offenses were Lost



Conference of American and Mexican Officers beyond the Outposts at Vera Cruz



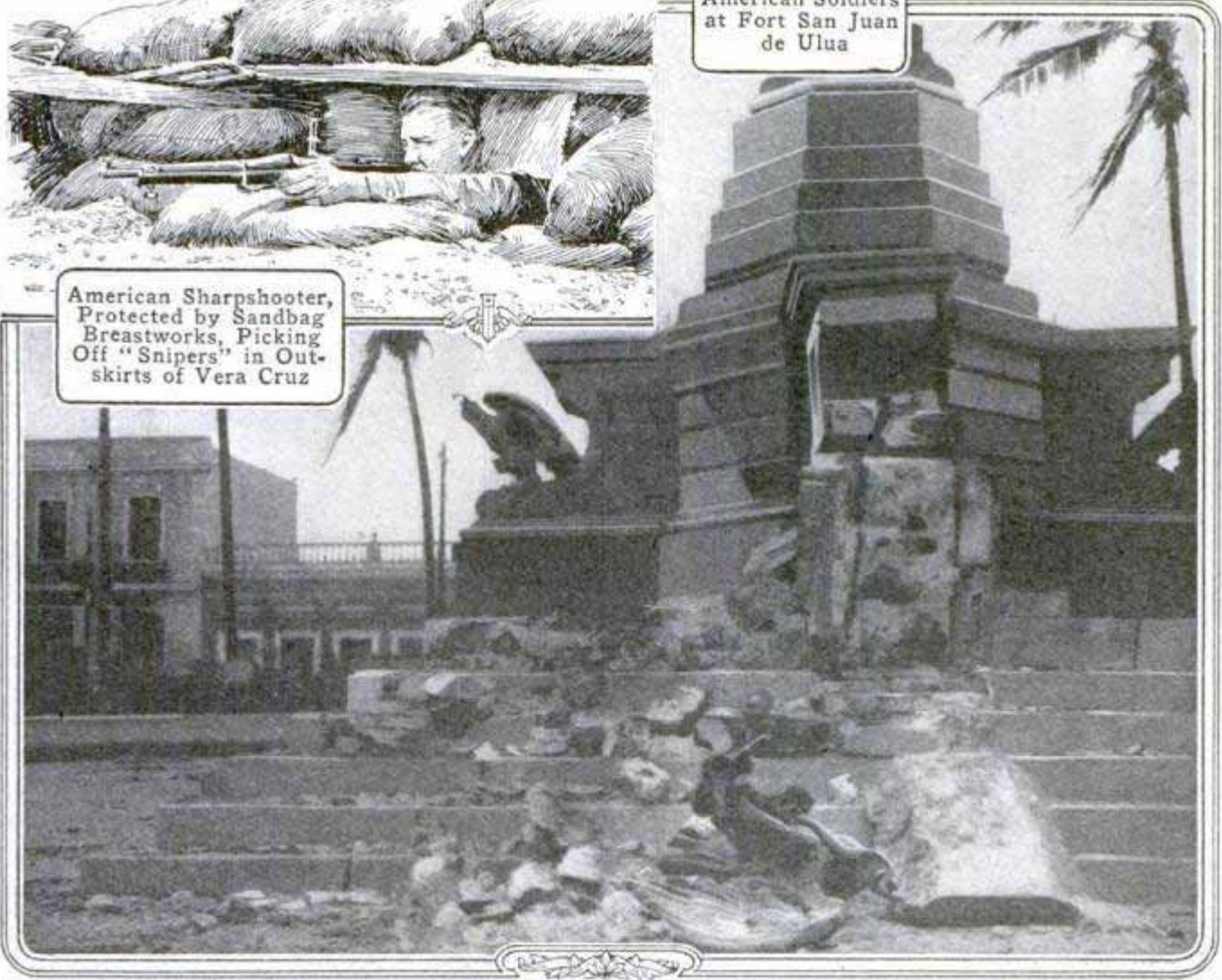
Mexican Artillerists Firing a Salute with a Small Field Gun: This is the Class of Soldiers Fighting Mexico's Civil War



"Snipers" Taken
Prisoners are
Confined under
Guard of
American Soldiers
at Fort San Juan
de Ulua



American Sharpshooter,
Protected by Sandbag
Breastworks, Picking
Off "Snipers" in Out-
skirts of Vera Cruz



How the Statue "Reforma," One of the Most Prominent Monuments of Vera Cruz,
was Damaged by a Shell Fired from the "Chester" during the Attack on the City

WIRELESS RELAY LEAGUE IS BEING FORMED

The latest development in amateur wireless telegraphy is the organization of a national relay league of amateur wireless-telegraph stations, which has been undertaken by the Radio Club of Hartford, Conn. There are thousands of licensed amateur wireless stations scattered all over the country and the intention is to bring the best equipped of these into a relay league which will make the transmission of wireless messages from coast to coast and between any two points on the North American continent possible without the intervention of any commercial institution. Members of the league are already exchanging messages between Hartford and Buffalo, N. Y., and relay stations have been arranged by which messages may be transmitted from Boston to Denver, being relayed at several points.

It is pointed out by the organizers of the league that up to the advent of wireless telegraphy it was necessary to rely upon either a telegraph or telephone company or the Federal government, for transmitting intelligence from one part of the country to another. The coming of wireless telegraphy has made it possible for the private citizen to communicate across great distances without the aid of either the government or a corporation, so that the organization of the relay league actually marks the beginning of a new epoch in the interchange of information and the transmission of messages.

BRITISH AIRMAN LOST IN ENGLISH CHANNEL

Gustav Hamel, a British airman who had planned to attempt the flight across the Atlantic in August and who had built a 200-hp. machine for that purpose, vanished after starting to fly across the English Channel on May 23, 1914. After flying from Villacoublay to Hardelot, a point on the French coast near Boulogne, Hamel ascended at 2:15 in the afternoon and started across the channel for Hendon, a sub-

urb of London. The machine in which he was flying was an 80-hp. monoplane, and he carried a supply of gasoline sufficient to last two hours. The aeroplane was not equipped with floats and would therefore sink the moment it touched the water, but as a precaution the airman wore a life preserver consisting of an inflated pneumatic tire. At the time of the flight there was a heavy rain falling, accompanied by mist. When the aeroplane failed to appear on the English coast, wireless messages were sent to all ships in the channel, and later, a cruiser and 11 destroyers were sent out to patrol the course of the flight, but no trace could be found of the missing airman or his machine.

"POTOMAC" RESCUED AFTER WINTER IN ICE FLOES

After being abandoned by its crew in the ice floes of the Gulf of St. Lawrence, during the severe part of last winter, the U. S. naval tug "Potomac" was remanned recently and taken to port safely. The rescue party was composed of the vessel's engineer, a consular agent, and a number of Newfoundland seamen. Heavy ice floes and gales were encountered by the schooner carrying the recovery expedition, which was obliged to make many detours during the three weeks' battle to reach the tug. The "Potomac" was caught in the floes while attempting to free several icebound fishing boats near the Bay of Islands.

Two "baby" railroads, the Panama Railway, 40 miles long, and the Tehuantepec Railway, 190 miles in length, stretching across the lower part of Mexico, last year carried \$130,500,000 worth of merchandise, unloaded at their terminals by United States steamers and reloaded at the other ends of the lines for shipment to different parts of this and foreign countries. New York exported \$84,000,000 of this, of which San Francisco was the destination for consignments amounting to about \$37,750,000.

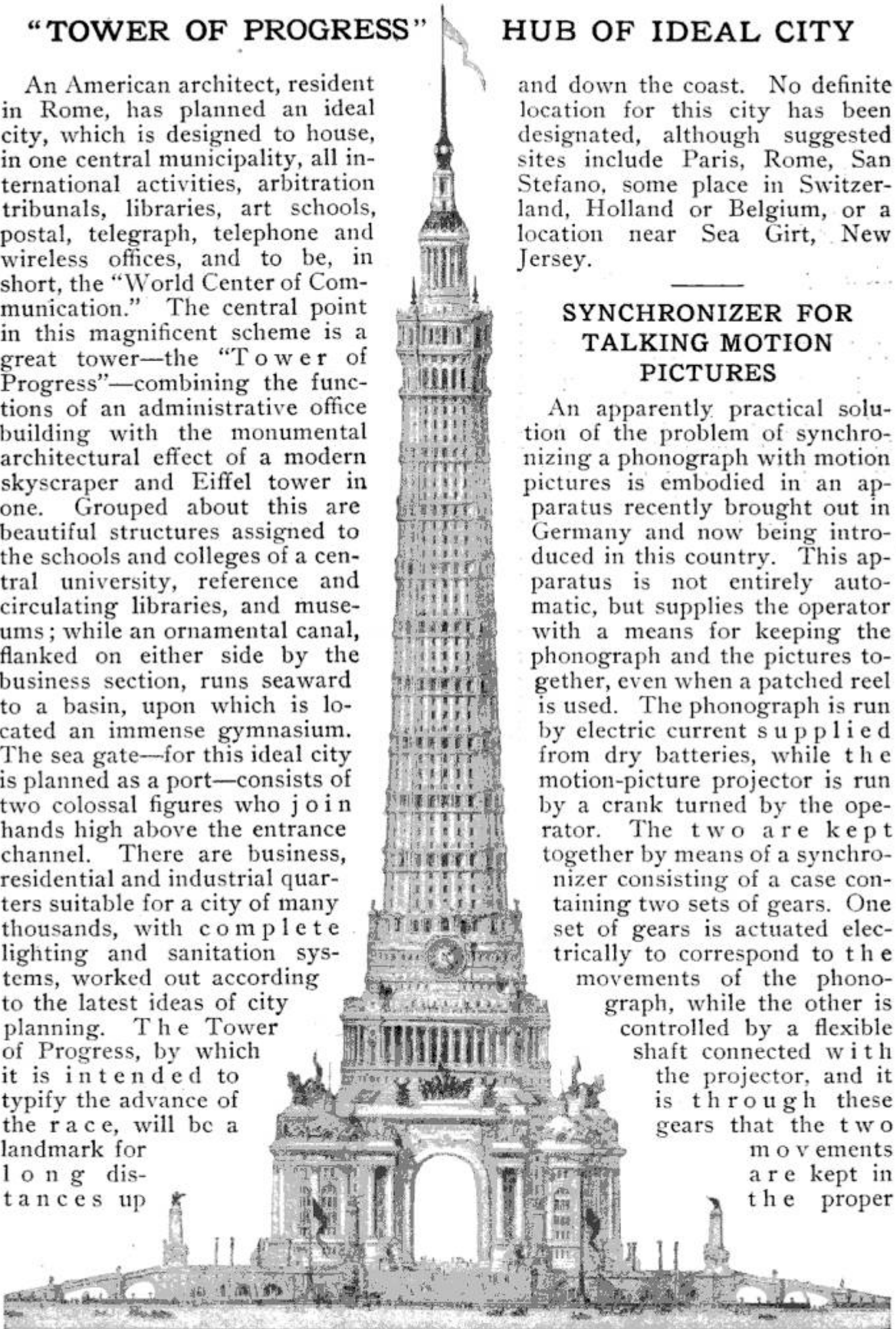
"TOWER OF PROGRESS"**HUB OF IDEAL CITY**

An American architect, resident in Rome, has planned an ideal city, which is designed to house, in one central municipality, all international activities, arbitration tribunals, libraries, art schools, postal, telegraph, telephone and wireless offices, and to be, in short, the "World Center of Communication." The central point in this magnificent scheme is a great tower—the "Tower of Progress"—combining the functions of an administrative office building with the monumental architectural effect of a modern skyscraper and Eiffel tower in one. Grouped about this are beautiful structures assigned to the schools and colleges of a central university, reference and circulating libraries, and museums; while an ornamental canal, flanked on either side by the business section, runs seaward to a basin, upon which is located an immense gymnasium. The sea gate—for this ideal city is planned as a port—consists of two colossal figures who join hands high above the entrance channel. There are business, residential and industrial quarters suitable for a city of many thousands, with complete lighting and sanitation systems, worked out according to the latest ideas of city planning. The Tower of Progress, by which it is intended to typify the advance of the race, will be a landmark for long distances up

and down the coast. No definite location for this city has been designated, although suggested sites include Paris, Rome, San Stefano, some place in Switzerland, Holland or Belgium, or a location near Sea Girt, New Jersey.

**SYNCHRONIZER FOR
TALKING MOTION
PICTURES**

An apparently practical solution of the problem of synchronizing a phonograph with motion pictures is embodied in an apparatus recently brought out in Germany and now being introduced in this country. This apparatus is not entirely automatic, but supplies the operator with a means for keeping the phonograph and the pictures together, even when a patched reel is used. The phonograph is run by electric current supplied from dry batteries, while the motion-picture projector is run by a crank turned by the operator. The two are kept together by means of a synchronizer consisting of a case containing two sets of gears. One set of gears is actuated electrically to correspond to the movements of the phonograph, while the other is controlled by a flexible shaft connected with the projector, and it is through these gears that the two movements are kept in the proper



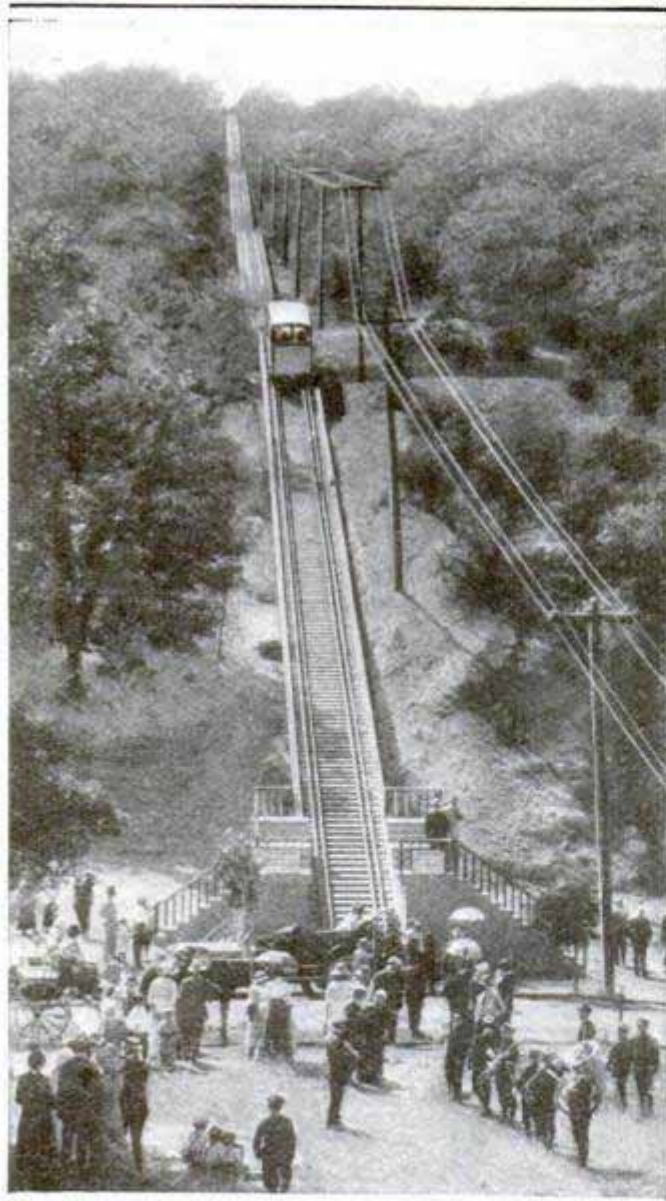
Copyrighted by Hendrik C. Anderson

"Tower of Progress," Central Feature of the "World Center of Communication" Planned as the Ideal City

ratio. On the front of the synchronizer case is a pointer and dial. If the phonograph is getting ahead of the pictures this pointer swings to the right, and if it is getting behind the pictures the pointer swings to the left. When the pointer is in an upright position the two are in unison, and the operator keeps the pointer in this position by speeding up the projector or slowing it down as may be required.

A NEW DESIGN IN INCLINED-RAILWAY CONSTRUCTION

There is an inclined cable railway in Marin County, California, which presents features in construction differing from usual methods. A counterweight car, attached to the cables

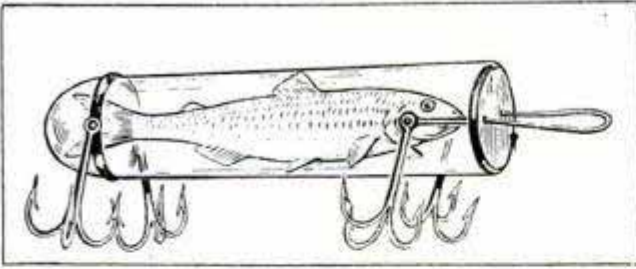


Hillside Cable Road Operated by One Man

hauling the passenger car, passes beneath the latter as they meet on the hill. Complete control of all operating apparatus is in the hands of the motorman on the passenger car, who is the only employe required to operate the system, and safety devices for stopping the car, if for any reason an accident should occur either to the cable, to the car or to the electric power plant, are provided. The control mechanism is actuated by trolleys, four of which, on the car, engage four wires supported by the railway trestle, terminating in the operating magnets on the control switchboard. The power house at the top of the hill contains an electric elevator engine of the traction type driven by a 30-hp. alternating-current motor, controlled from the motorman's operating handle in the car. The car and counterweight are carried by two $\frac{5}{8}$ -in. plow-steel cables, each having six strands of 19 steel wires over a core of hemp and showing a tensile strength of 36,000 lb. As the loaded car weighs but 6,000 lb., the margin of safety is high. The railway is 1,350 ft. long with a rise of 500 feet.

TESTING CRANK AXLES FOR DEFECTS WITH OIL

Kerosene is used in many European railroad shops for testing crank axles of locomotives, the process being extremely simple. Upon an engine being put into the shop for general repairs, the crank axles are thoroughly cleaned from grease and oil and given a bath of kerosene, after which they are wiped dry with clean waste or rags. Two pairs of wheels are then placed some little distance apart on a track, and rolled toward each other at moderate speed. The shock experienced when they come together forces out small particles of kerosene which may be secreted in minute cracks formed by crystallization or otherwise. Inspection after the impact reveals defects in the axles through beads of kerosene showing on the surface.



DEVICE THAT TAKES AIR FROM HOSE STREAM

A device designed to supply fire fighters with an abundance of fresh air while working in buildings that are filled with smoke or dangerous chemical fumes is said to have given satisfactory results in recent tests in a western city. It consists of an aluminum case which is attached to the hose nozzle and in which are three fans operating on one shaft. The water, as it leaves the nozzle, strikes the central fan and keeps all three of the fans whirling. A mist of air and water is taken from the stream by the fans in the sides of the case. This is condensed by the centrifugal action and the air is forced up the tube and fed to the

Fisherman can Use a Live Minnow All Day
by Means of This Device

A LIVE MINNOW IN A GLASS TUBE FOR BAIT

Of interest to fishermen is a novel contrivance recently patented for using a single live minnow for an entire day's fishing for muskellunge or bass. A strong, clear glass tube is equipped with metallic rings, to which are attached clusters of hooks, and a loop wire. A live minnow is placed within the tube, which is filled with water, and the fishline is attached to the wire loop. Upon casting the minnow into the water, the tube magnifies the minnow and attracts the large fish. Fresh water is constantly admitted into the tube, and the minnow is not injured, mutilated nor hurt in any way, no matter how many times it is cast. The glass tube, filled with water, is invisible the moment it is submerged.

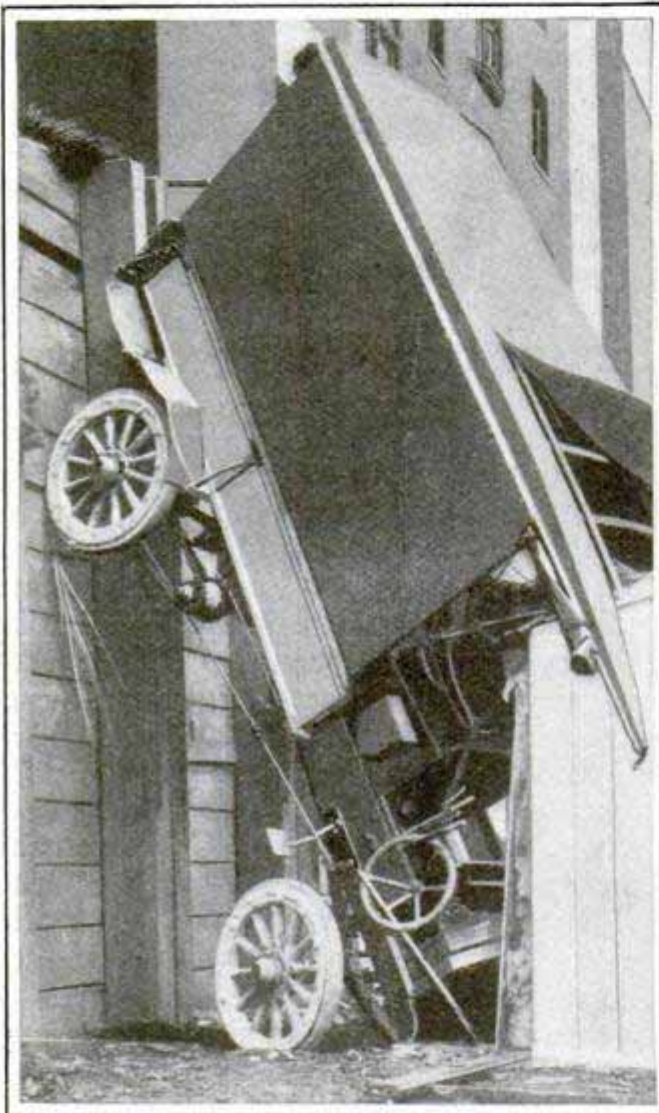


Hose Attachment
Supplies Firemen
with Abundance
of Air in Smoke-
Filled Buildings

mask over the fireman's face. It is claimed that an abundance of air for supplying two persons is obtained from the stream with this apparatus.

AUTOMOBILE TAKES HEADER OVER EMBANKMENT

The driver of a delivery truck in Seattle, under the impression that he had thrown his gear into reverse, in-



An Error in Judgment Gave this Automobile
a Bad Jolt

tending to back in a narrow street, started his engine, and an instant later found himself considerably shaken by a plunge into an adjoining lot, some 15 or 20 ft. below. He escaped with a few bruises and his machine, though wrenched, was not badly damaged.

☞The American naval station at Pago Pago, Samoa, is the latest outlying possession to be brought within radio communication. The installation was exceedingly difficult, as all the machinery had to be transported by native labor up the side of an almost perpendicular cliff.

LATEST TYPE OF GERMAN DIRIGIBLE

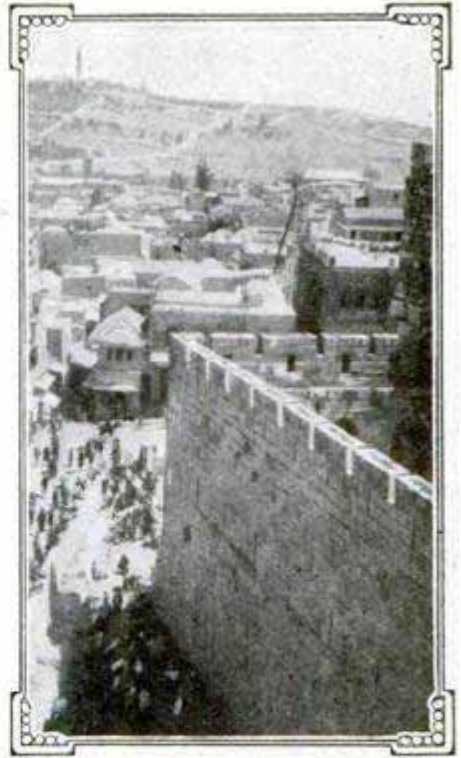
The latest German dirigible, just nearing completion at the Parsaval works, has a new type of gondola. Taking pattern from the submarine boats, the gondola is wholly inclosed, thus preventing a repetition of the disaster to "L-1" last year, when 13 lives were lost through the explosion of escaping gas into an open gondola. In the new type the motors are all inclosed and only the propeller left free, and if it should be necessary to descend upon the water, the whole gondola can easily be disengaged from the envelope.

PULLING DOWN THE WALLS OF JERUSALEM

The ancient city of Jerusalem, the "Holy City," is growing so rapidly that already there is a larger population without its walled center than within. This influx of population in recent years has caused great scarcity of water, and it was determined to equip the city, not only with a modern waterworks system, but likewise to install an electric-lighting and power plant and build a street-car system which will give rapid transit between the residence section and the business center and also connect with Bethlehem from Jaffa Gate. These improvements are already under way, and the old walls of Jerusalem, which have a circumference of nearly three miles, rising in places to a height of almost 40 ft., are now being offered by the government for sale as building material. Certain historic towers and a few isolated sections of the old walls may be maintained as mementos, if the efforts of a local society are successful. Ten miles to the north of the old city are populous Jewish colonies, with modern buildings, schools, and splendid residences. A trolley line will bring this district in close touch with the city, and another line, encircling the city, will make easily accessible such historic sites as the Tomb of the Kings and the Mount of Olives.



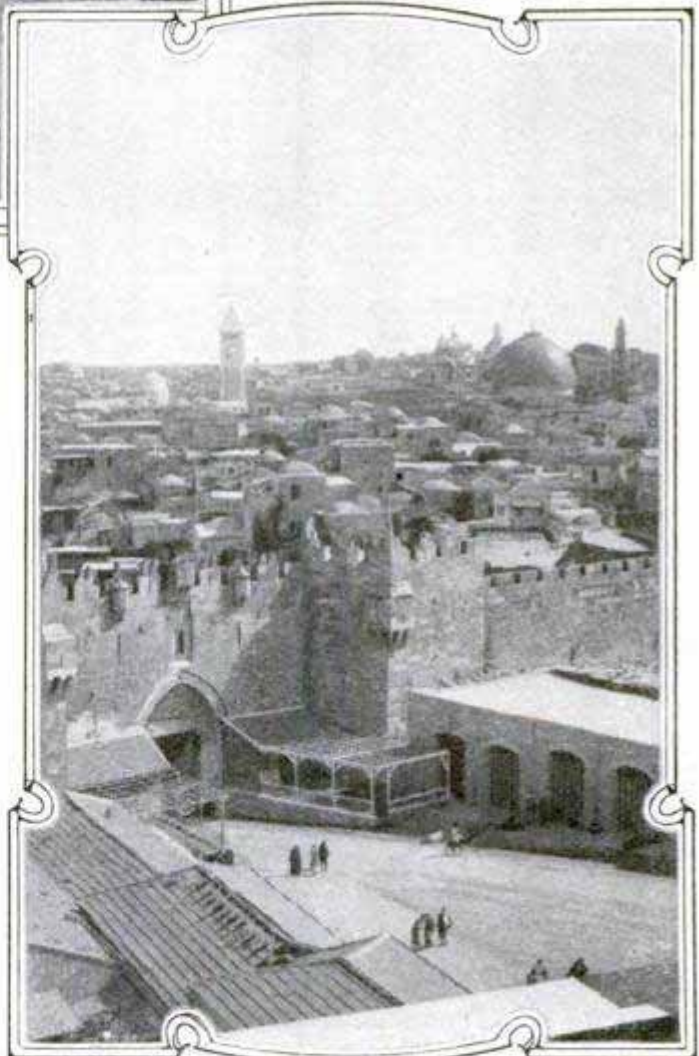
Ancient Walls, Towers and Battlements of Jerusalem, Soon to be Torn Down



One of the Old Walls Which must Come Down



Tombs of the Prophets in the Valley of Kidron, Past Which the Trolley will Soon be Running



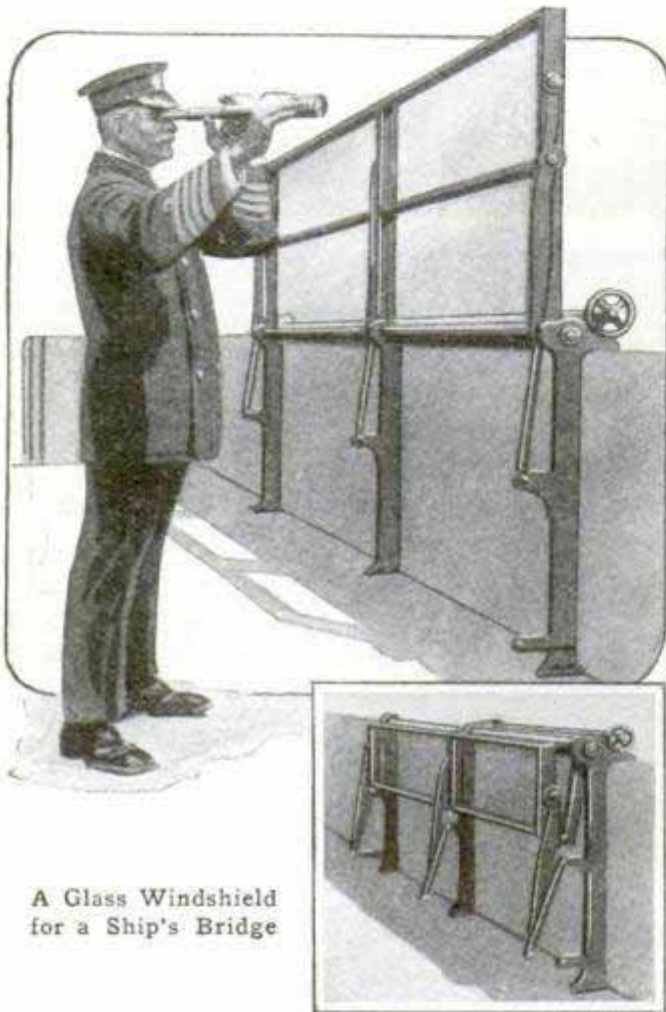
Damascus Gate, Looking over the Wall at the Domes and Minarets

PHOTOS COPYRIGHTED BY UNDERWOOD & UNDERWOOD



FOLDING GLASS WINDSHIELD FOR SHIP'S BRIDGE

The first glass windshield to be installed upon a ship's bridge is a feature of the new Liverpool freighter "Or-



A Glass Windshield for a Ship's Bridge

duna," built to ply between that city and South American ports. It is a double-folding wind screen, about 12 ft. long, designed to be bolted on the ordinary teak rail, with stanchions supporting it from the deck. The glass, which is $\frac{3}{4}$ in. thick, is hinged in double frames, operated by a handwheel at one end. The screen can be set at any angle and the top and bottom sections are worked independently, thereby deflecting the wind and permitting at the same time a clear aperture for observation. When not needed, the screen may be folded entirely out of the way beneath the rail.

CA new rubber compound of high tensile strength is made by the addition of vanadium oxide.

DIAMOND CARGOES TO BE CARRIED BY AEROPLANES

The use of aeroplanes for bringing diamonds from the mines to the coast is one of the features in the big developments in aviation now being planned for German Southwest Africa. This country is a difficult and dangerous one to traverse by land, not only on account of the jungles and other natural obstacles, but because of the robber bands with which it is infested. It is now necessary to send troops to guard each shipment of diamonds, and the aeroplanes, which will carry mail as well as diamonds, will be a saving both in time and money. In addition to this service the German government is arranging to establish an aeroplane service for scout work and other military duty in the interior, and with this in view, aeroplanes are being shipped to Africa and soldiers are being trained in the art of flying. An important part of the airmen's work will be the carrying of doctors about the colony, and with this means of transportation it will be possible for doctors to reach, within a few hours, remote villages that it now takes several days to reach.

MODIFIED SANDALS LATEST FASHION IN FOOTGEAR

The latest innovations in shoes for ladies' wear are mere adaptations of ancient sandals, but with high heels and a partial covering for the foot. Buckles of colored stones, ornaments of silver and enamel, and straps, ribbons and windings of brightly colored leather, silk, and even anklets of gold studded with gems are used in the endeavor to paint the lily. These new sandal-shoes are worn with or without stockings, in accordance with the moment's whim.



MARBLE STATUES FOR THE NATIONAL CAPITOL

The great Capitol at Washington has never been completed. That huge building whose corner stone was laid by the "Father of His Country," designed by Thornton, and pieced and patched for more than a hundred years, and even yet in the course of addition, extension and

Paul Wayland Bartlett, an American sculptor, born in New Haven, Conn., but long resident in Paris. He has just returned to America bringing with him the casts for the sculptures which are to



"Farmer with Ox"

"Peace Protecting Genius"

"Farmer, Harvesting"

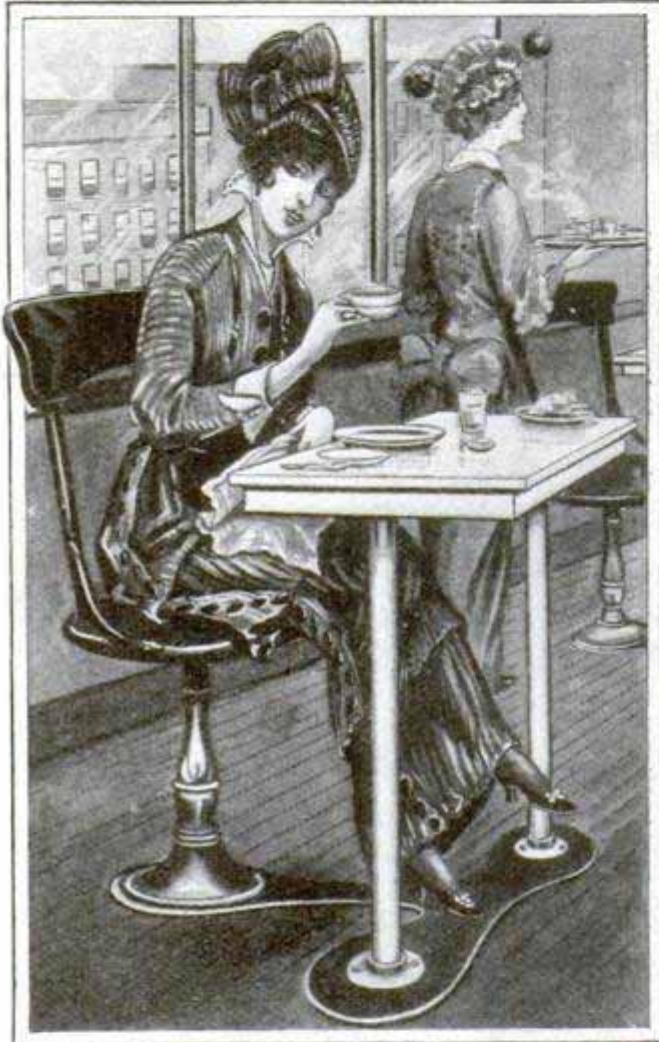
modification, may never reach that point where the builder can step back and say, "It is finished!" Since the construction of the wing of the Capitol building designed for the House of Representatives, the pediment of the west front has been devoid of ornament. In 1908 Congress authorized an appropriation, and in 1909 the contract for the statuary was awarded to

occupy the pediment so long undecorated. Photographs of three of these casts are given here, two representing the American farmer, and one, "Peace Protecting Genius."

☞The Motorboat Muffling Association of Boston, aided by a state police motorboat, is waging war on noisy launches.

COMBINED TABLE AND CHAIR FOR LUNCH ROOMS

An inventor has recently brought out an ingenious combination for use in lunch rooms, in a swivel chair, without arms, and a small table, the top of



Lunch Chair and Table in One Piece

which is covered with marble or enamel. Both table and chair are fixed upon a T-shaped base, the floor space of the combination being 29 by 32 in. The table top is of sufficient size, 12 by 26 in., to give ample room to place food conveniently without crowding.

INVENTIONS DEMONSTRATED BY MOTION PICTURES

Moving-picture films have recently been applied to the demonstration before the patent courts of the operation of complicated machinery. From the fact that few jurors are mechanically trained men, the intricate relation of

moving parts in an invention is exceedingly difficult for them to grasp, especially when only blueprints or drawings are submitted. But when the machine is seen in operation, or a film depicting such operation is shown, many obscure points are cleared up. Not long since, a motion-picture film of an automatic shoe machine was exhibited before a court, the process of manufacture from first to last being fully covered, and an especially valuable point made that, where in a factory the rapidity of operation was a bar to a clear understanding of the process, in the film the camera could be slowed down at such places, and the process studied at leisure. Then again the film, while clearly showing the method, was free from the distraction of the factory noise.

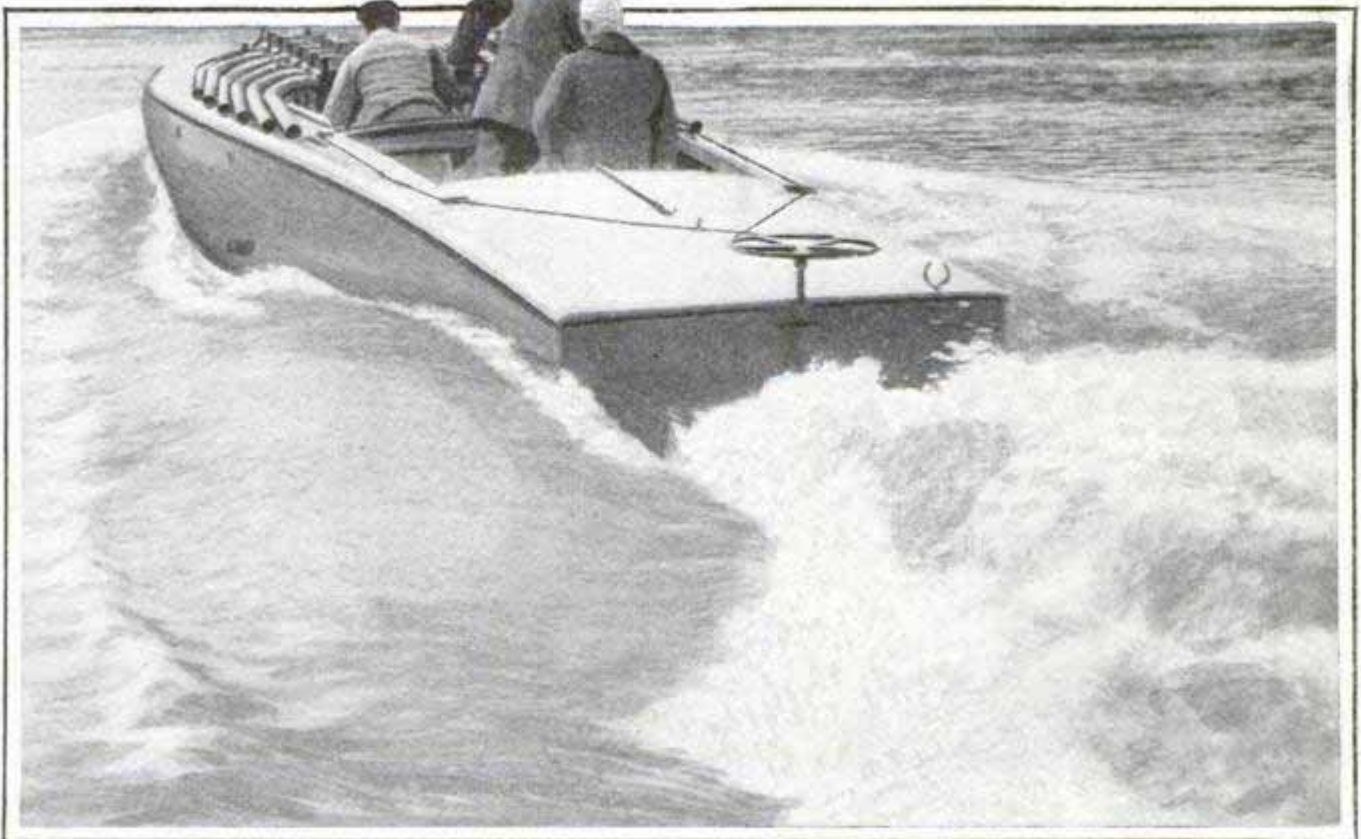
NEW NAVY DESTROYERS ARE NAMED FOR HEROES

The Navy Department has assigned names to six new torpedo-boat destroyers under construction. These boats are 1,000-ton vessels of the latest design, and are better and faster than any previously built for the United States. They are to carry the names of naval officers who have achieved distinction—"Tucker," "Conyngham," "Porter," "Wadsworth," "Jacob Jones," and "Wainwright." The first named, a boat which has heretofore been known at the shipyard as "No. 57," was named in honor of Capt. Samuel Tucker, a Marblehead, Mass., boy who ran away to sea at the age of 11 years, and shipped in the year 1758 on the British sloop-of-war "Royal George." At the age of 21 he had been in command of several merchantmen. The Revolution drew him back to America and he was sent to General Washington by Robert Morris, receiving a commission as captain at the hands of the "Father of His Country" in 1776. In command of the armed cruiser "Franklin," Captain Tucker captured many British ships, with stores and arms so much needed by the continental

soldiers. For this service he received the thanks of Washington and the army. Captured in the harbor of Charleston when that city surrendered to the British, Captain Tucker was soon exchanged and returned to his brilliant career of capturing privateers and other prizes. At the close of the War of Independence he retired from the sea and served as selectman of the town of Bristol, and was elected to the Massachusetts legislature. At the time of his death, in 1833, he was highest in rank of the surviving officers of the Revolution, with the exception of Lafayette. The other names were borne by officers who also served with distinction.

FRENCH HYDROPLANE MAKES RECORD SPEED

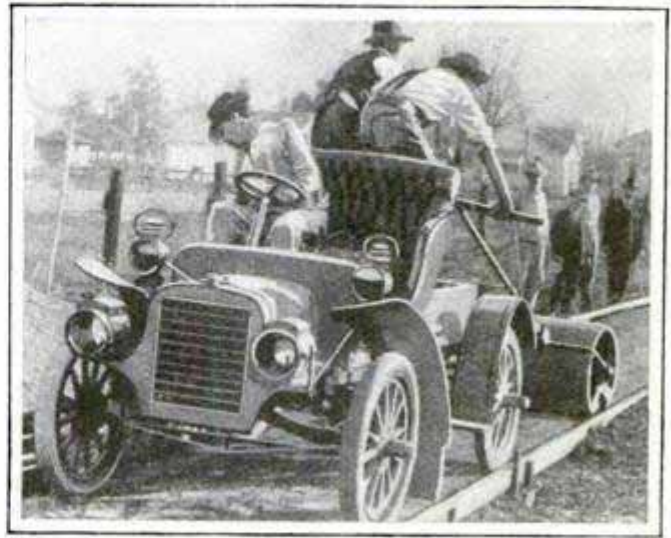
Over 49 miles an hour is the speed attained by the French hydroplane "Despujols" in a trial trip on the Seine recently, near Paris. This remarkable little boat, which carries three passengers, is equipped with engines of 400 horsepower.



Racing Craft Seen on the Seine Which Goes at Automobile Speed

CONTRACTOR USES AN AUTO AS A ROAD ROLLER

A California contractor who had a job of laying a long concrete walk

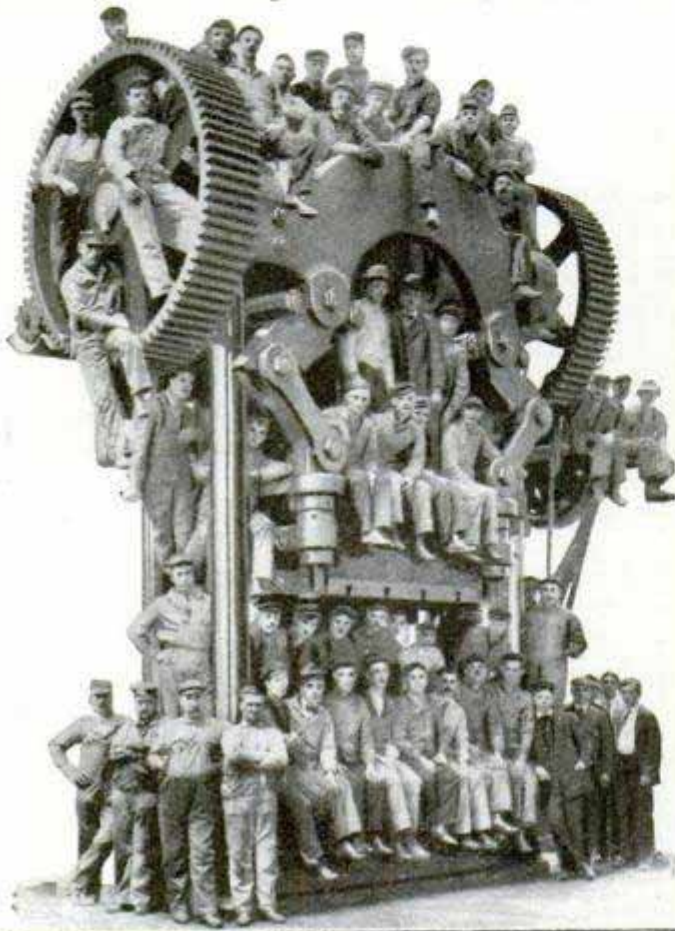


Automobile is Used as a Steam Roller by Western Contractor

saved time and money by propelling a small road roller by automobile power. The foundation having been properly prepared, he hitched up his little car to a heavy roller and speedily had his foundation ready for the concrete.

FASHIONING A CAR BODY IN TWO BLOWS

Most modern motor-car bodies are made from pressed steel, stamped to the desired shape. A stamping press



This Big Press Stamps a Complete Automobile Body Out of Steel in Two Motions

built in America and now on exhibition in England is so large that the body of a touring car can be fashioned complete in two impressions. More than 50 men can find standing room in and upon this big machine, which, by means of a double-action toggle device, is able to exert a pressure of 1,500 tons.

AIRMEN GOING HIGHER THAN EVER

The world's record in altitude flight, made by Legagneux last December, was broken by the German airman, Linnekogel, at Johannisthal, his barograph registering 20,660 ft. Legagneux's record was 20,170 ft. About the same time the new Zeppelin dirigible "Z-8" rose to a height of 10,053 ft., breaking the dirigible records for altitude.

BRIDGES THAT FLOAT OUT OF WAY OF FLOODS

A novel type of bridge has been developed by the Bureau of Public Works in the Philippine Islands for spanning streams, of which there are many in the islands, that carry just enough water to be unfordable at low water but are subject to extreme floods that carry down large quantities of brush and trees. Since funds are not available for building permanent structures that will resist these extreme floods, plans were made for a type of bridge that will wash out of the way when the stream is high and can be recovered and replaced on the pile bents after the water goes down. The pile bents are placed 20 ft. apart and are strongly built and capped to resist the floods, and the deck structure is simply laid on these bents without being fastened. In most cases the deck is in two sections, the cut being at the middle of the bridge. Running under each section and securely fastened at each panel are three cables that are anchored to "deadmen," placed well back from the shore. When the deck washes out, it simply swings downstream and is held by the cables until the flood recedes, when it is floated back and replaced on the bents.

LIGHTSHIP WITH IRON HULL HAS LONG LIFE

The first iron ship in the world is still doing service, having been built in 1842 by the famous old firm of Laird Bros., who built the Confederate cruiser "Alabama." It was used as a lightship for 57 years, and then, in 1899, converted into a wreck-watch vessel, and is still doing duty in that capacity. So successful was the wrought-iron hull in resisting the corrosive action of sea water, that the new lightship built for the Mersey Bar, at the entrance to the Liverpool Harbor, has its hull built of wrought iron instead of steel. The interior framing of the new vessel is of steel, but the hull plates are of iron.

ROUND-THE-WORLD WIRELESS FOR FRENCH COLONIES

Work is to begin in a short time on the construction of a round-the-world chain of wireless stations that will establish communication between France and all the French colonies. Most of the

PHONOGRAPH THE UNIVERSAL MUSICAL INSTRUMENT

In order to make sure that the records when completed will produce music in exactly the proper tempo for the popular dances, one of the large phonograph companies engages professional



Professional Dancers Serve to Indicate Proper Tempo for the Production of Phonograph Dance Records



Copyrighted by Underwood & Underwood

The Phonograph's Popularity among the Filipinos may be Inferred from the Expression on This Native's Face

stations will have a range of from 2,000 to 3,000 miles, but the intervals between the Marquesas Islands and Martinique and between French Indo-China and New Caledonia will require stations capable of transmitting messages over about twice these distances. Work on the construction of ten principal stations is now being planned.

dancers, who execute the steps while the band plays. The resulting dance records are shipped to every part of the world, for the phonograph has, in the space of a few years, become the one absolutely universal musical instrument. Its popularity among the savage Filipinos is no less than with the natives of Africa, India, China and South

America. Several large manufacturing plants devote their energies exclusively to the production of phonographs and phonograph records for the export trade.

A BROILER FOR CAMP USE

A recent patent covers a broiler made of wire, supported upon spindles stuck into the ground. The broiler is made



This Patent Broiler Helps the Camper

in two parts which open, admitting the placing of steak, game or fish in position for cooking. When the top part of the broiler is down, it may be locked in position, one of the handles being longer than the other and having a loop of wire placed in such position as permits it to be slid over the other or shorter handle. The two spindles have such looped hinges as permit freedom of action in arranging the food on the broiler, while keeping it from turning over until it is desired to cook the other side.

ART IMITATION DETECTED BY THE X-RAY

A German scientist who has made a special study of the penetration of X-rays through oil colors proposes that this test be applied to all art works of value, as the shadowgraph presents such distinctive and individual view of

the "interior" of a painting, that no imitation can possibly withstand the test. The shadowgraph of an oil painting is not dependent upon the surface colors of the picture, but upon the underlying colors as well, and the light distribution of the X-ray picture and that calculated from the surface colors reveals the inner composition of the painting. The investigator has thus been able to find in many well-known paintings the original outline sketch of the artist and his corrections, until the picture was given its final form and coloring, bringing into view in this way, the artist's manner of working. The signature of the artist has been clearly revealed by the X-ray in instances where it had been covered with pigment, in some paintings of obscure or unknown origin.

BROKEN ENGINE WELDED TOGETHER

When the single-cylinder motor of an automobile was broken in a smashup recently, it appeared that nothing except an entire new engine would benefit the car. However an oxyacetylene-gas welding machine was available, and, in the hands of a competent mechanic, every broken part was welded into place. No new parts were used, and the engine was soon in good running



Wreck of a Gasoline Motor of an Automobile

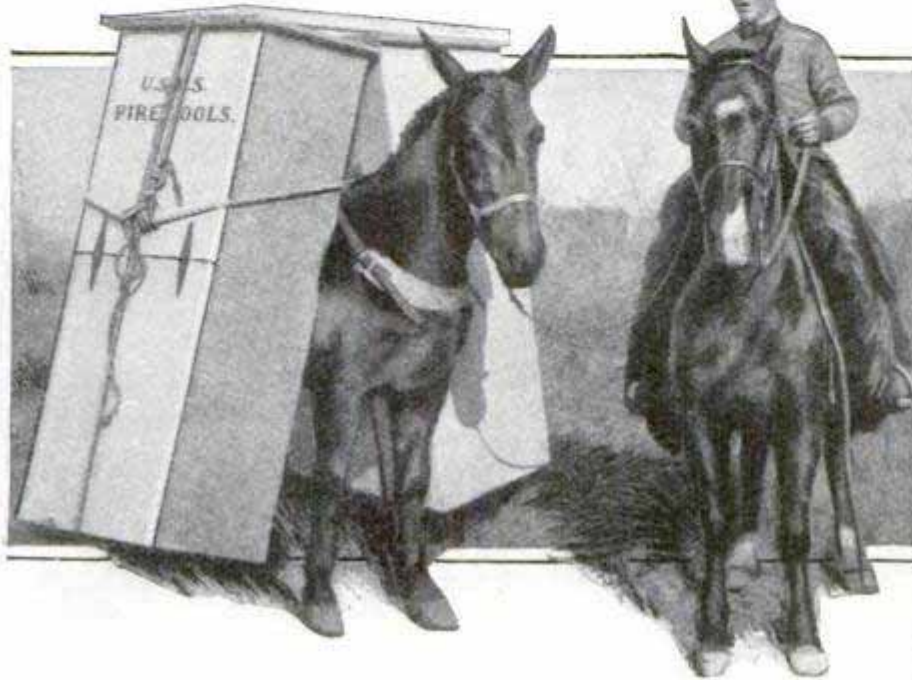
Same Motor after All Pieces had been Welded into Place by Gas Welding Machine



order again. The pictures show the problem presented, and the results achieved by the aid of gas welding.

FOREST-SERVICE FIRE- TOOL BOXES

The United States Forest Service posts tool boxes at various points in every National Forest Reserve for the convenience of its fire fighters. These boxes contain saws, axes, mattocks, shovels, and all paraphernalia used in



A Forest Ranger Taking Tool Boxes to Their Position
in a Colorado Forest Reserve

ABANDONING BARBED WIRE FOR FENCING

The use of barbed wire will be discontinued by forest officers in Oregon and Washington for fencing on the



fighting fires. They are carried over the mountain trails on the backs of mules, for wagon roads are few and far between. Few animals would be content to carry a burden like this, but the sturdy little mule shown in the photograph has lugged his unwieldy load many miles over a rough trail.

forest reserves. They insist that barbed wire has no advantage over smooth wire, that it injures stock and is more apt to be affected by soft snow and ice. Drift fences recently constructed of smooth wire are giving entire satisfaction and stockmen now say they will never use any other kind.

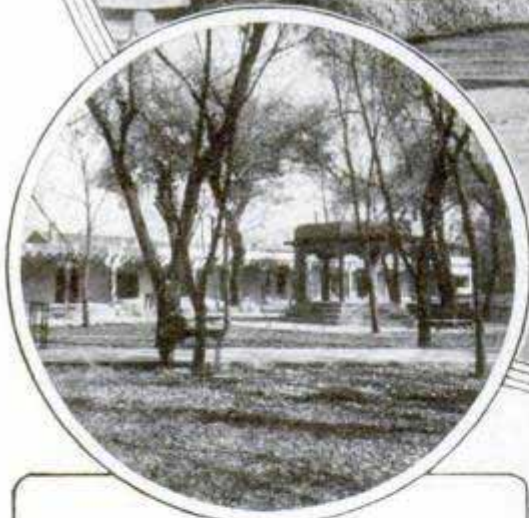
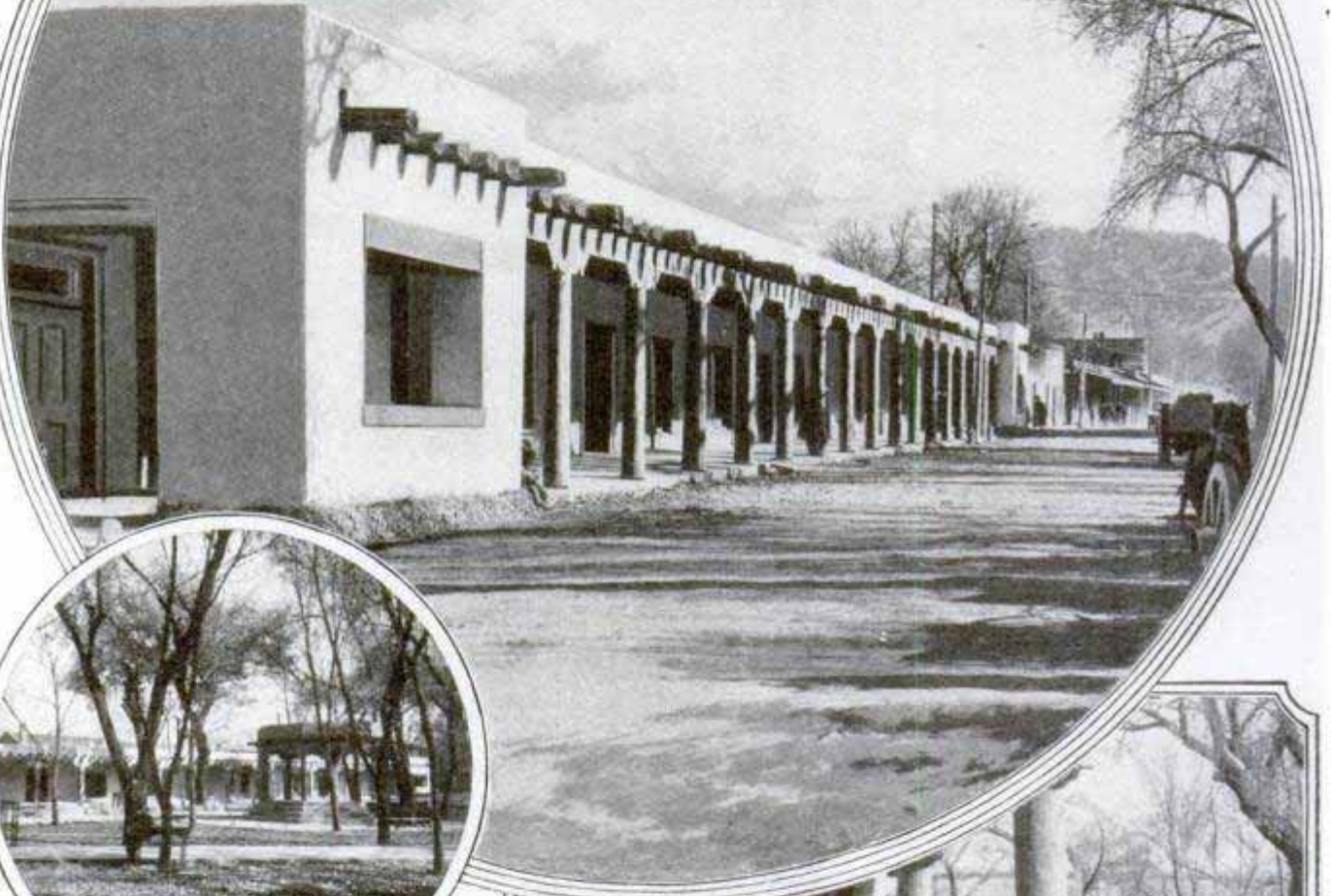
TO KEEP SANTA FE OLD IS AIM OF CITY PLANNERS

Santa Fe, the oldest capital in the United States, and the oldest city save one (St. Augustine) in the United States, is seeking to preserve its quaint and curious architecture of the early seventeenth century, its narrow streets and its general air of antiquity, even in these days of expansion and prosperity. Those having in charge the city planning of modern Santa Fe, recognizing the distinct advantages of preserving the old landmarks, restoring the ancient names of the streets,

and bringing back to the old adobe buildings the crumbling stone work and the rudely carved timbers which support the columns, have adopted as their slogan "Keep the Oldest Capital Old." Studies in archeology, careful search through the archives in the British Museum, the Library of Congress, and other authoritative sources of information, brought to light all sorts of interesting things about this old "Trail Town." One of the first steps was to give back to the streets

The "Palacio Real," Old Palace
of the Governors, Before and
After Reconstruction

The Semi-Inclosed Ends Are the
Remains of the Fortress Towers



Above: The Band Stand, Where the
Mexican Band Plays "La Paloma"
at Sunday Concerts

Right-Hand View: The Ancient
Plaza

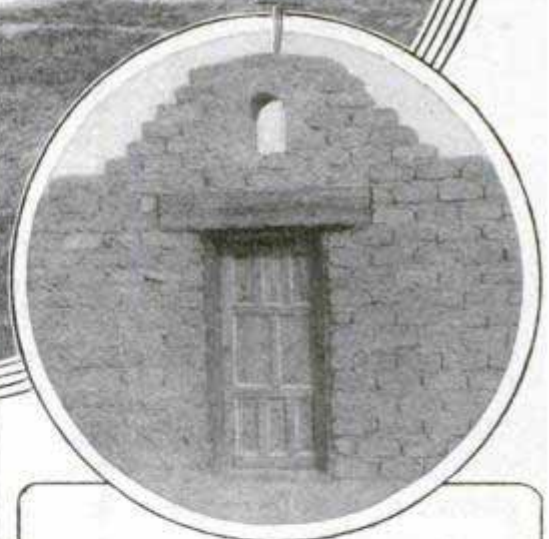
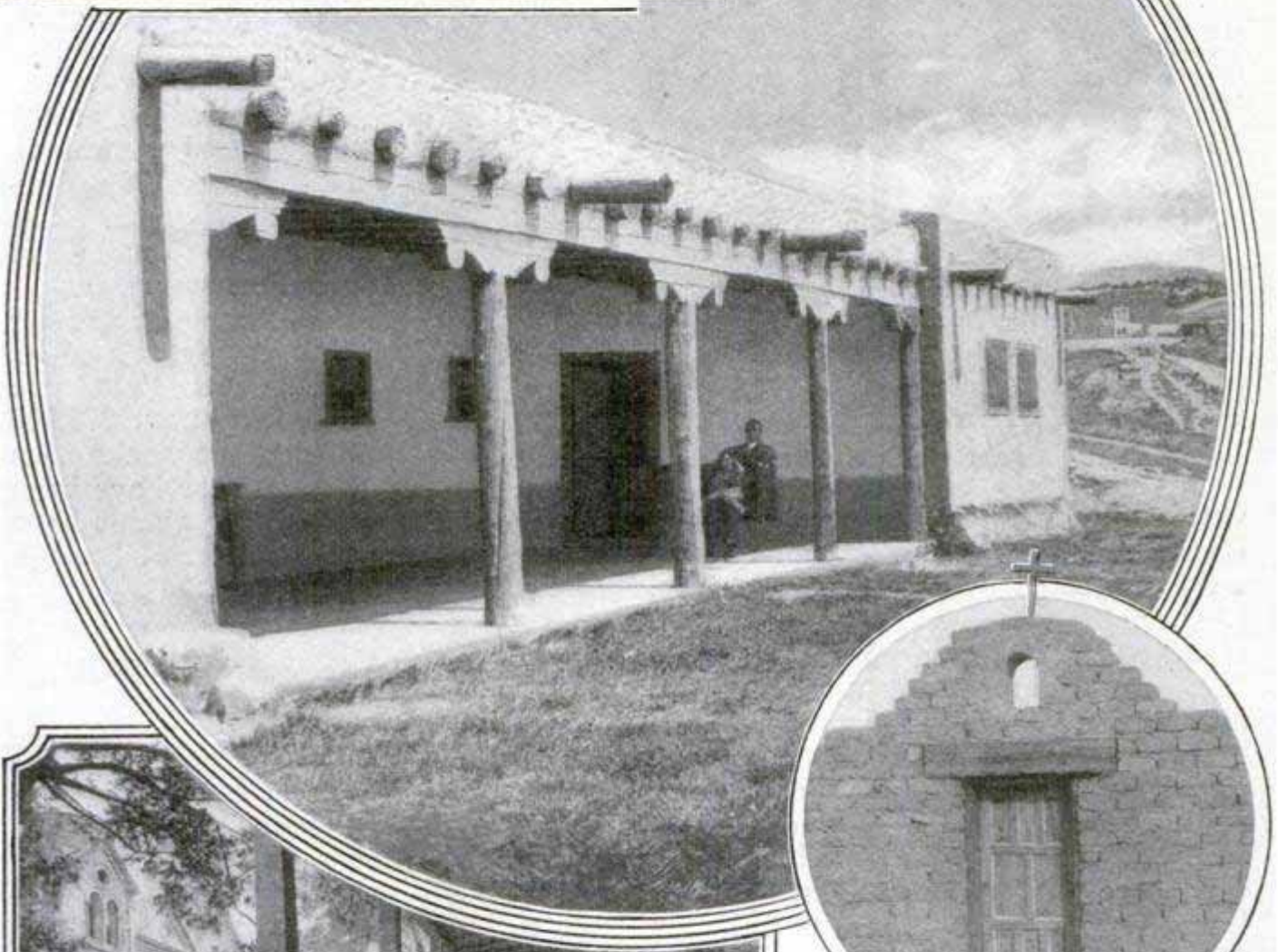


their old names. The Circle Drive is once more known as "Kit Carson Road;" Manhattan Boulevard took its original name, the "Santa Fe Trail." The "Palacio Real," the old, low adobe house, occupying the entire north side of the Plaza, where governors ruled in

vice-regal state, and which was once decorated with festoons of human ears, trophies of battles with the redskins, has been restored to something of its pristine simplicity. Albert Pike, the discoverer of the famous peak which bears his name, wrote that the Palacio

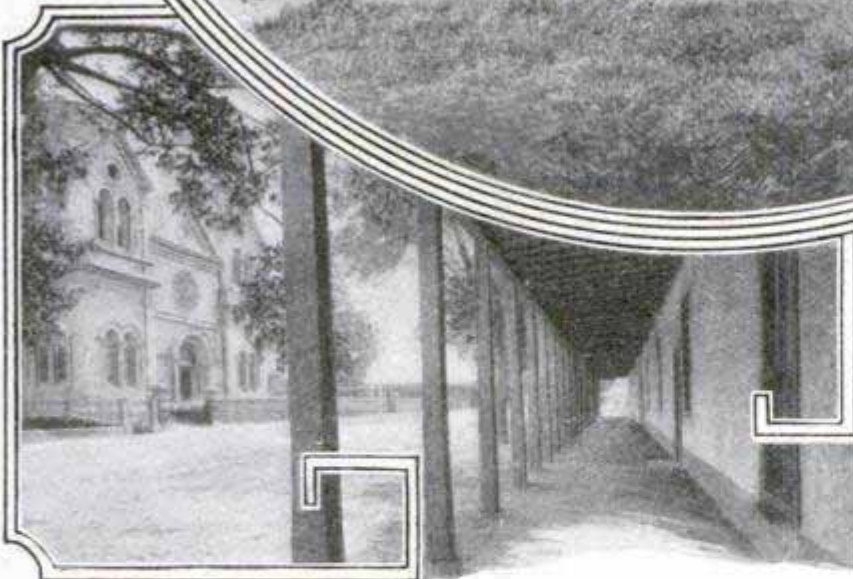


An Old Adobe Dwelling
Before and After Remodeling:
The Recessed Portals and Quaint
Capitals are Preserved, Giving
the Effect of Antiquity



An Old Gateway with Carved Door
and Mission Outlines

At Left; A Characteristic Long
Portal Running the Full
Length of the Block

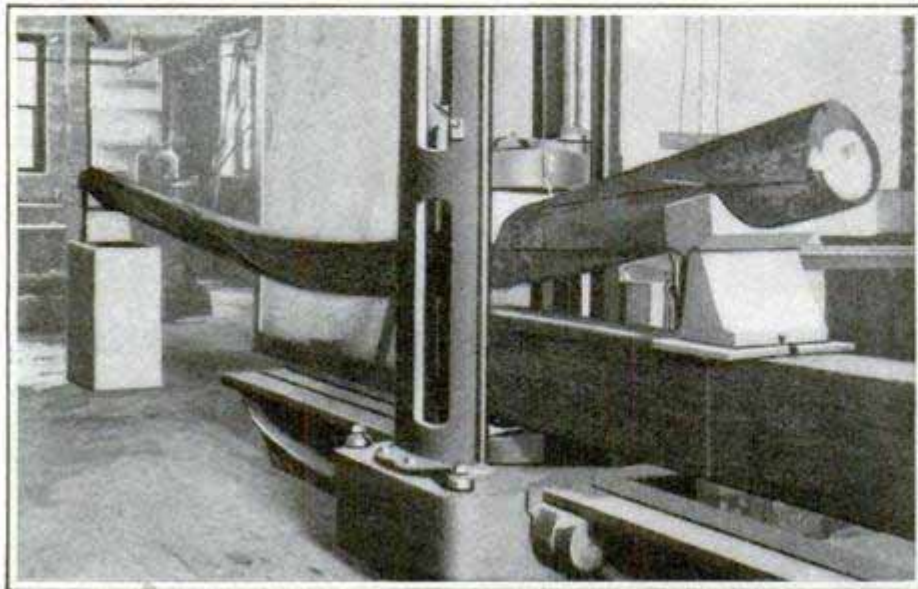


Real, or royal castle and fortress, was the only house in town with windows, and they were of mica. Here Pike was brought before the Spanish governor, here De Vargas was imprisoned, and here, in later years, Gen. Lew Wallace wrote "Ben Hur." By restor-

ing this old "palace" to its mud-walled simplicity, and tearing down the modern gingerbread decorations, the Board of City Planning succeeded in adding a picturesqueness very much in harmony with the idea of keeping the oldest capital distinctively old.

TESTING TELEPHONE POLES FOR RESILIENCY

Exhaustive tests are conducted by the United States Forest Service to determine the resisting qualities of



Testing a Telegraph Pole in U. S. Forestry Laboratory

various kinds of timber used for telephone poles. Poles of various kinds were subjected to enormous pressure, in specially contrived machines, which recorded the breaking point in pounds. The photograph shows a "lodgepole" pine being placed under tremendous pressure. This tree, which generally grows at high altitudes, shows more resiliency than any other kind of pine. The Indians used the small trees of this species for lodgepoles, or the framework of their tepees, and also as "travois," the Indian substitute for wagons. The large trees excel as telephone and telegraph poles on account of their straight grain and exceeding toughness.

WILL TUNNEL INTO MEXICO FOR RAILWAY LINE

What is said to be the only international tunnel in North America will be located on the new San Diego and Arizona Railway. Although the length will be but 620 ft., one end of the bore will be in Mexico and the other in the United States.

STRENGTH OF CHAINS FOR PANAMA CANAL LOCKS

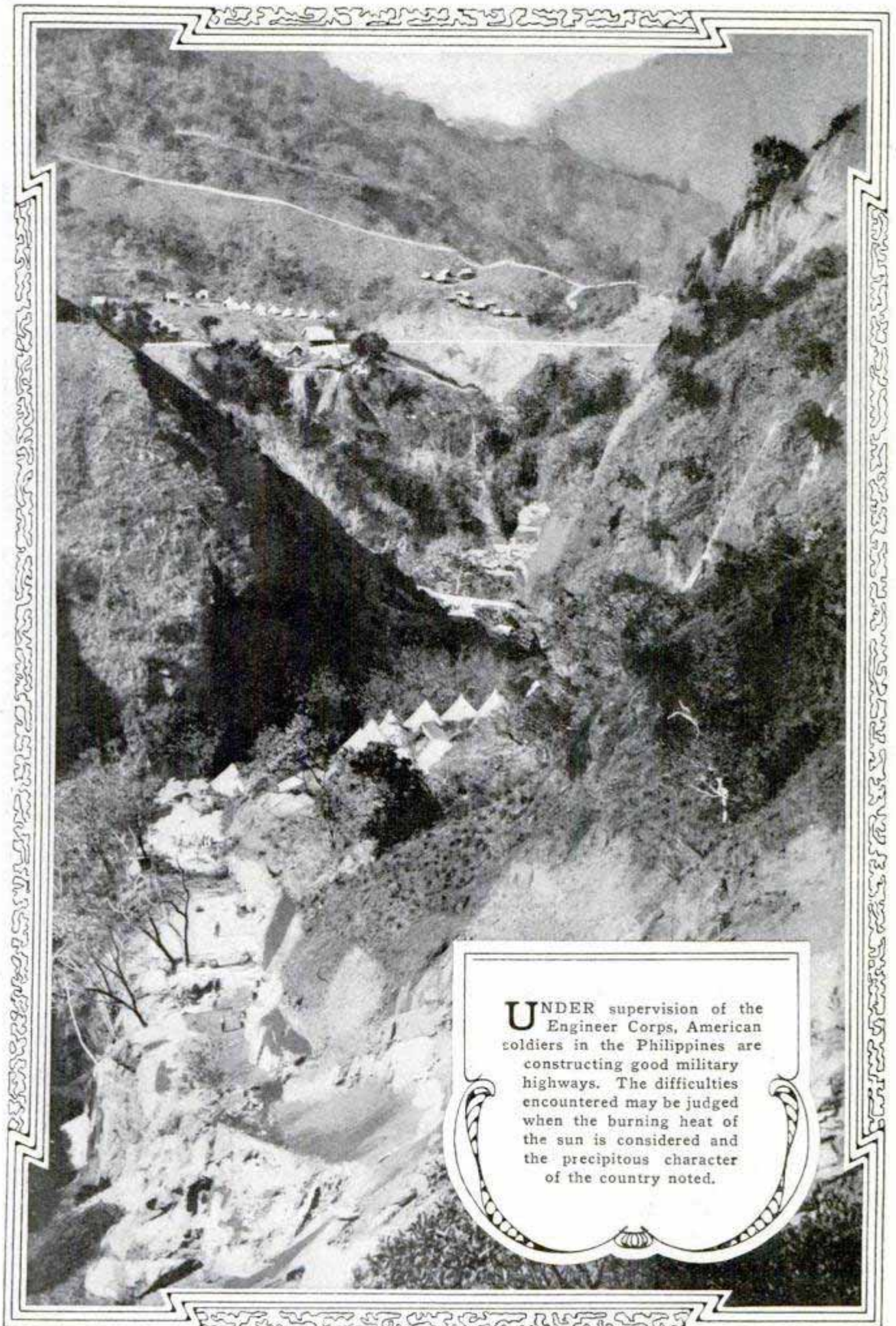
The chains that are to be stretched across the Panama Canal locks to protect the lock gates from ships that may get beyond the control of the electric towing locomotives are an innovation in construction as well as in canal operation, and considerable difficulty is being experienced at the Boston navy yard in making links of the required strength. The links are made of wrought-iron bars, 3 in. in diameter, and are 17 in. long and 10 $\frac{3}{4}$ in. wide. All links are tested to about 275,000 lb., and the weaknesses found so far have been mostly at the welds. The chains have an average length of 427 ft., and weigh 85 lb. to the foot.

PAPER MASK SHIELD FOR PHYSICIANS

For the protection of either the patient or the surgeon or examining physician, a simple protective mask or shield of paper has been invented by a German surgeon. It is attached by a gummed edge over the nose. The advantage of this form of mask over the usual oilcloth shield, is that it is used but once and then thrown away. Its cheapness and the fact that several may be carried by the physician without trouble adds to its utility.



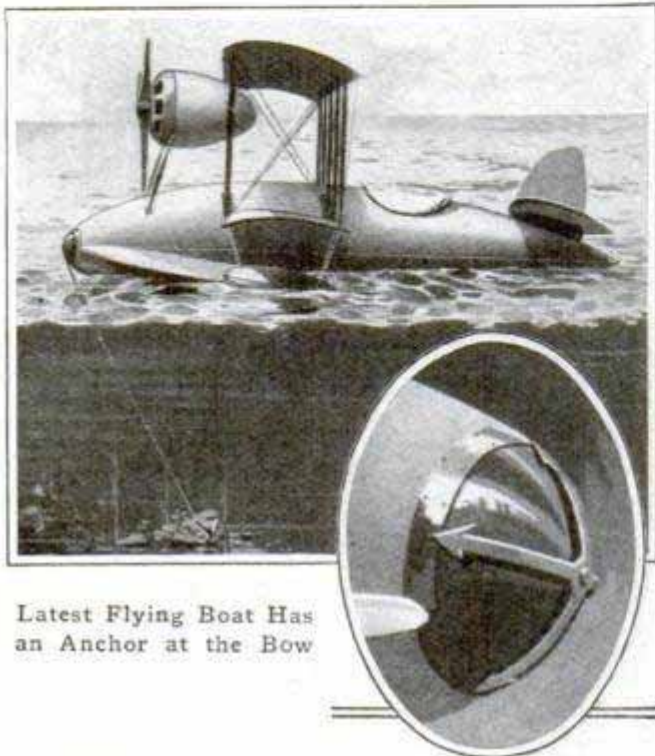
CA surveying party over the Siskiyou struck a 3-ft. gold ledge bearing high-grade ore.



UNDER supervision of the Engineer Corps, American soldiers in the Philippines are constructing good military highways. The difficulties encountered may be judged when the burning heat of the sun is considered and the precipitous character of the country noted.

FLYING BOAT NOW EQUIPPED WITH AN ANCHOR

The flying boat is developing under the stimulus of sport into a more permanent craft, one of the first evidences



Latest Flying Boat Has an Anchor at the Bow

of which is seen in the anchor with which a late model has been equipped. Through the nose of the boat a hawse hole is run, from which an especially designed anchor may be dropped into the water. The four prongs of the anchor are so shaped that they lie flat against the nose of the craft when held snugly in place during flight. The coil of anchor rope is carried within the forward compartment.

NICKELPLATING ALUMINUM NOW POSSIBLE

A scientist connected with the University of Wisconsin has demonstrated a method of plating aluminum with nickel by which firm adherence is secured. The largely increased use of aluminum in the trades has brought an increasing demand for a process whereby it can be electroplated, but heretofore experiments have met with but indifferent success. The deposit obtained by the new process has a dark-gray tone and the ware so treated may be bent, rolled and worked without

separating the nickelplating from the aluminum. A French scientist who has been studying the same subject offers an alternative method, in which the aluminum is first scoured with hydrochloric acid in a bath containing a certain proportion of iron, and is then placed in the nickelplating solution. The acid precipitates some iron on the surface of the aluminum, and this iron catches and holds the nickel.

AUTO TRAVELS THROUGH DEEPEST SAND

A device to aid automobiles in traversing sandy roads without trouble has been invented by a California man. It consists of an endless belt on adjustable rollers, and so arranged that the rear wheels run on the belt instead of on the ground. The rollers are attached to the side of the tonneau above the rear wheels, and to the bottom of the frame in front of the wheels. The forward rollers are held in contact with the ground by springs, which compress and allow the rollers to rise in case an obstruction is encountered in the wheel track. Supplementary to the device, the inventor attaches broad strips of belt fabric to the front tires, and thus equipped, declares his car can make 20 miles an hour over sandy wastes where an ordinary car would soon stall. The



The Wide Belt Prevents the Wheels from Sinking into the Sand

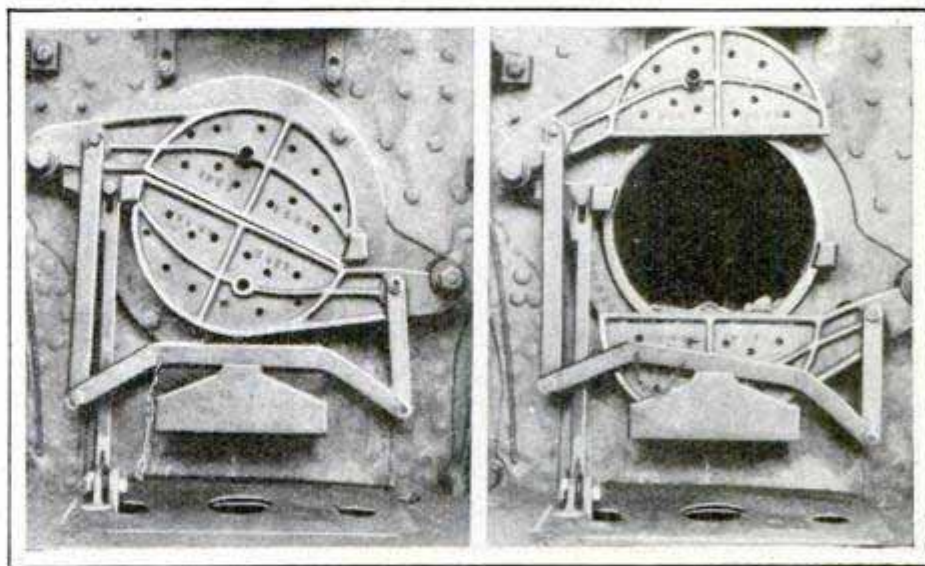
device is readily removed, only 15 minutes being necessary to put it on or to take it off. He has applied for a patent on his invention.

NEW FIRE DOOR WORKED BY FOOT PEDAL

A balanced fire door now being installed on the locomotives of a western railroad was invented with the idea of simplifying the work of the locomotive fireman. One of the essentials of good firing is that the door must never be open except at the instant when coal is being thrown on the fire, as any draft over the fire interferes seriously with the making of steam. With the swinging door, the fireman must rest the shovel as he swings the door open, cast the coal in quickly, and then swing the door shut.

With the new door, the fireman has only to rest one foot on a pedal as he swings the shovel, the door opens instantly, and then closes without further attention as soon as the pressure is taken off the pedal. This is all ac-

complished by a simple and ingenious system of levers. The door is made in two pivoted halves, one of which swings



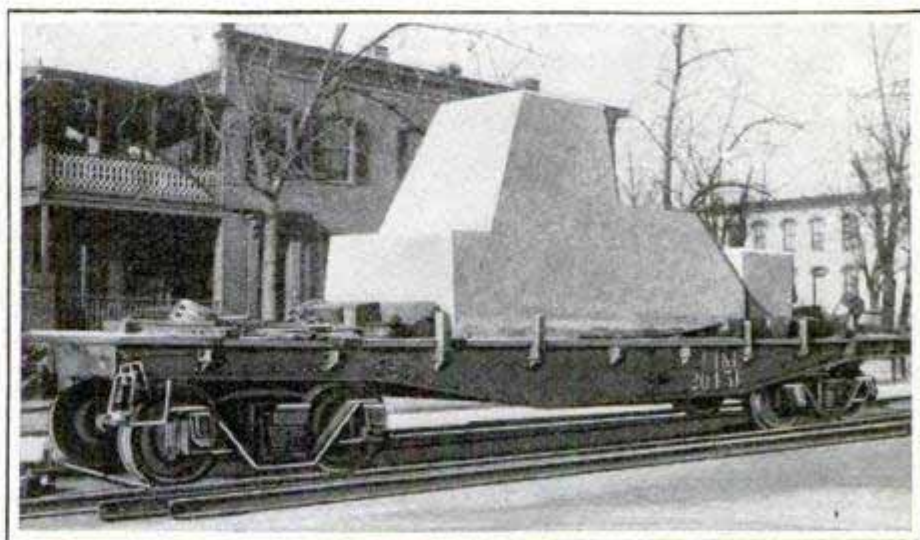
This Locomotive Fire Door is Opened by Pressure on a Foot Pedal, and Closes Automatically When the Pedal is Released

up and the other down. The upper half, while of exactly the same weight as the lower, has a slightly greater leverage, owing to the arrangement of the pivots, and the door stays closed automatically when left alone.

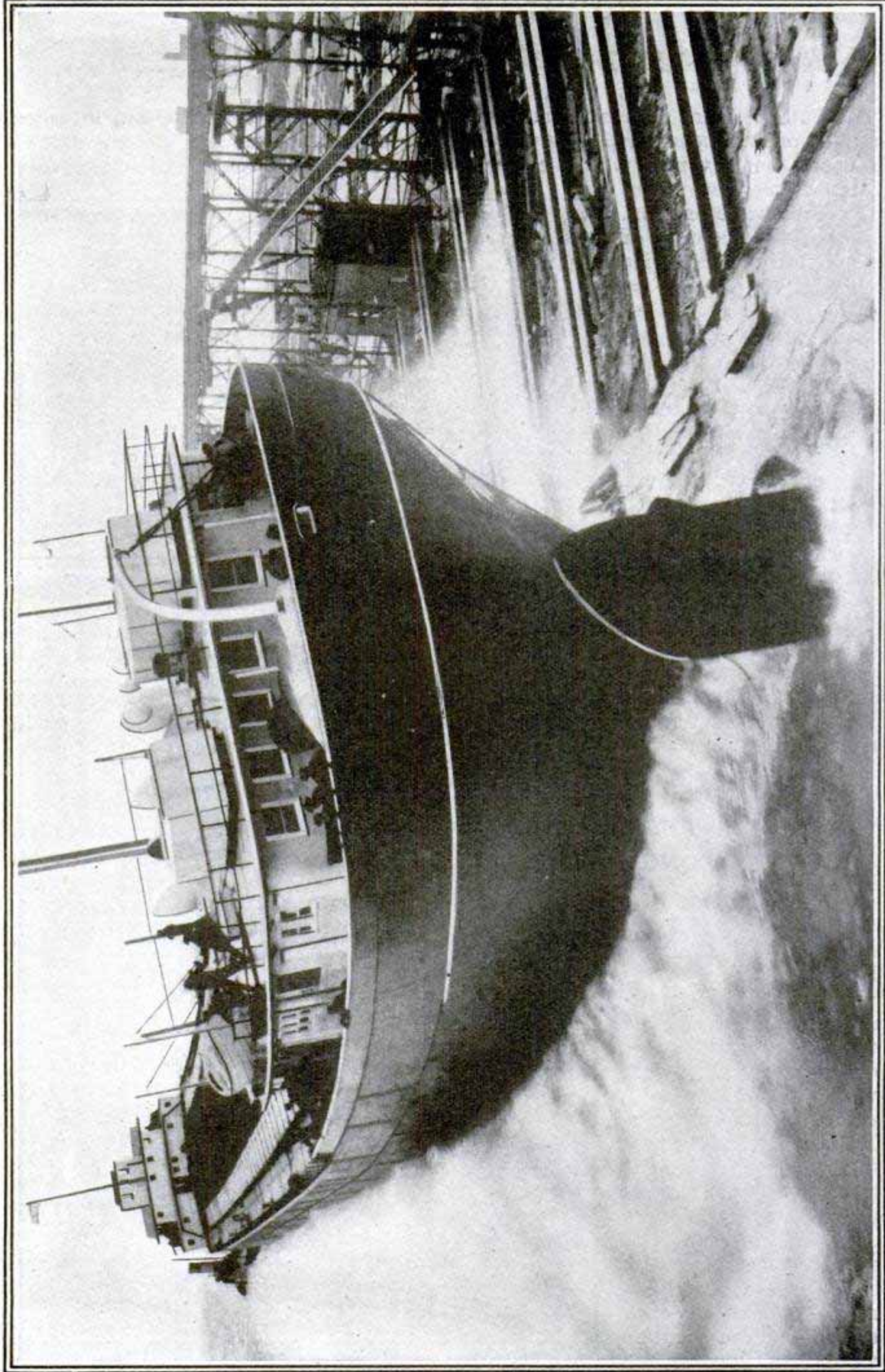
MOVING A BIG BLOCK OF STONE ALONG A STREET

A great block of Bedford stone, weighing 55 tons, was transported through the streets of Washington lately by an ingenious arrangement. No wagon or truck was heavy enough to handle this enormous block, which was destined to be placed in a new edifice 18 blocks from the terminal of the freight tracks. So two sections of portable rails were provided, fastened together laterally by steel bars with right-angled hooks at each end, and these sections were laid loosely on

the surface of the paved street. Block and tackle were used to drag the freight car off the regular railway track onto the temporary track and along the street, the power being several teams of horses.



Method of Hauling a Freight Car with Its Load along City Streets



The Launching of the "W. Grant Morden," the Largest Vessel Yet Built for Navigation on the Great Lakes, at Port Arthur, Canada

CITY-BEAUTIFUL IDEA PERVADES WASHINGTON

That private owners are catching the spirit of the "city beautiful," as exemplified by the magnificent public buildings of Washington,

architecturally in keeping with the highest ideals of city-beautiful planners. The photograph shows the new Scottish Rite Temple on the Ave-



Photo by Clinedinst, Washington

Fine Addition to Architectural Washington

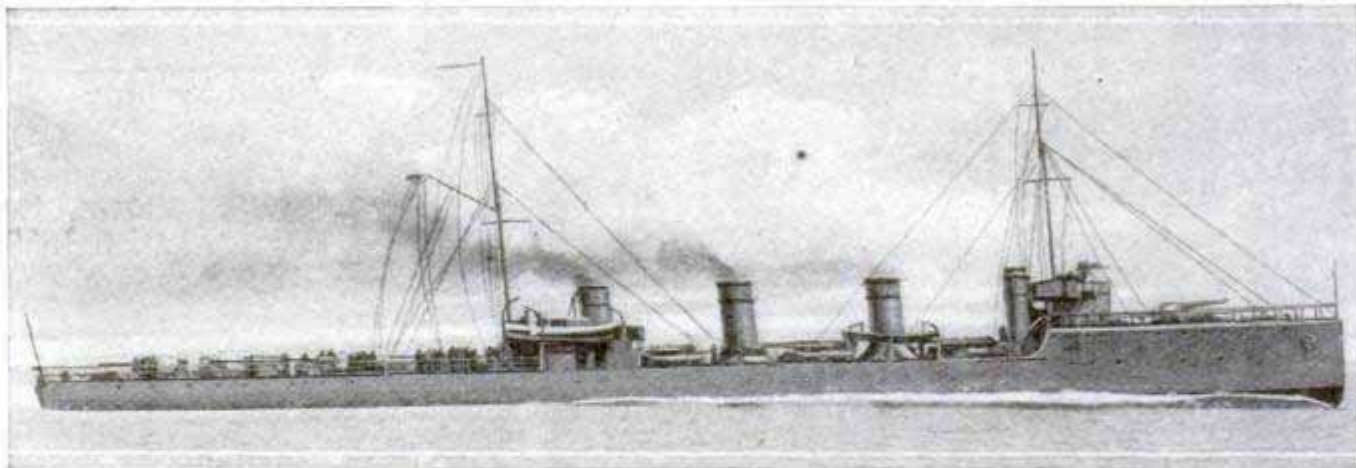
is seen in many new structures, notably the union railway station and a magnificent temple recently erected by a fraternal organization. These are

new of the Presidents, a long step in advance of former achievements, and a distinct addition to the many notable buildings of the Capital City.

NEW FREIGHTER WILL BE LARGEST ON THE LAKES

There was recently launched, at Port Arthur, Ont., the freight steamer "W. Grant Morden," with a capacity of 600 cars of grain in its hold. This latest type of vessel, the largest ever built for lake traffic, is designed for carrying bulk freight, and is 625 ft. in length, 59 ft. beam, and 39 ft. deep. It will have room for 535,000 bu. of oats, equivalent to 20 trains of 30 cars each. The cargo hold is 436 ft. in length, divided into six compartments by five solid-steel bulkheads, entrance being provided by 38 hatches opening from the deck, and placed 12 ft. apart.

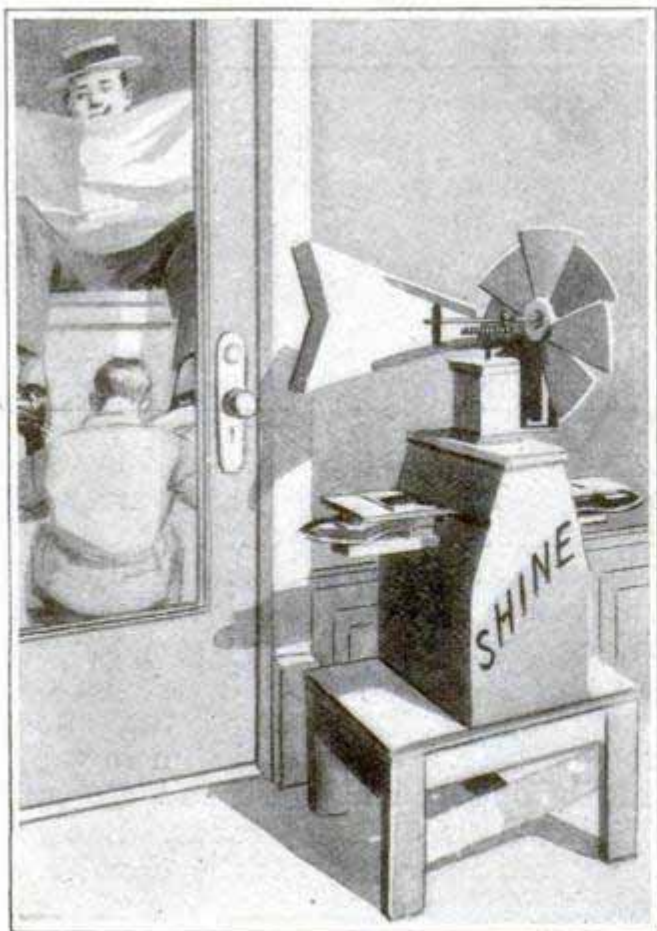
An engine of 2,000 hp. furnishes the power. The steering gear is arranged for steam or electrical control, the whistles are operated electrically, and the vessel is equipped with a large refrigerating plant, with capacity for two tons of ice a day. The spar deck is fitted up for passengers, the state-rooms being finished in mahogany, and dining room, baths and all connecting halls in hard woods. Shower baths are provided for the crew, and in every respect the safety and comfort of both passengers and crew have been looked after.



The Russian Destroyer "Novik," Said to be the Fastest War Vessel Afloat: On Its Trial Trip It Established a Record for Ships of Its Class by Making 37.3 Knots an Hour

GROTESQUE SIGN FOR SHOE-SHINING PARLOR

An ingenious street sign, built by a Kansas boy, seems to have all the features necessary for advertising shoe-shining facilities, with a little patriotic sentiment thrown in. It is a boxlike affair, 4½ ft. high and 2 ft. square at the base, surmounted by a windmill,



Grotesque Sign That Never Fails to Attract Attention to Shoe-Shining Parlor in Kansas Town

and painted in red, white and blue stripes, with the word "Shine" conspicuously painted in black. A shoe is placed on a ledge at both the front and the back, and over each shoe is a movable arm, run by the windmill, which works in and out in imitation of the process of shining the shoe.

HOT-WEATHER ICE AFFORDS SKATING IN SUMMER

A German patent has been issued to a scientist of Berlin for a special salt composition which behaves like ice under skates, sleighs and skis. Demonstrated on a rink in Berlin, scarcely anyone of the numerous visitors who ventured upon the smooth surface was aware of the fact that it was salt and not ice upon which he was enjoying himself. The composition of the salt is at present a trade secret, but the preparation is not affected by ordinary temperatures, and is melted and poured into blocks, which are combined so that any size smooth surface may be obtained. Under the action of skate blades, the composition acts like ice, and the feathery powder worn from the surface is swept off like snow, and can be used over and over again by melting it.

Investigation of the cost of the parcel post is being made by the counting of the parcels and a classification as to distances carried.

ADVERTISER USES TIMELY DISPLAYS

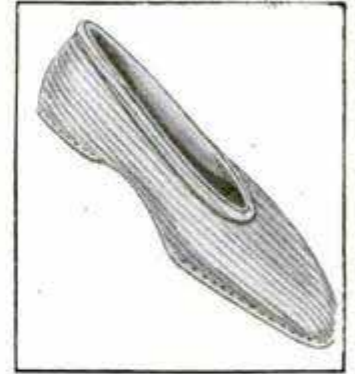
A company selling electrical cooking devices adopted an ingenious method of advertising its wares during recent months, by fitting up its windows with dainty dining-room equipment, the latest and most complete cooking appliances being given a prominent place upon the table. A lady in a becoming morning gown sat at the table during the rush hours, when thousands were passing the store on their way to work, and cooked appetizing breakfast dishes by electricity in plain view of the hurrying throng. Cereals and griddle cakes were cooked, lamb chops fried, biscuits baked and coffee boiled electrically, impressing upon spectators the advantages of this method of preparing food quickly, just at the time when their minds were more or less associated with the idea of breakfast. At night, when the same people were returning from their work, the food they had seen cooked in the morning was temptingly displayed beside the appliances used in cooking them, thus reiterating the advertising lesson, and telling the same story twice in the same day, but differently.

A STORAGE BATTERY SETS FIRE TO A BED

What might have been a serious fire occurred when an automobile owner, after removing the storage battery from his machine for the winter, placed it beneath his bed for safe-keeping. Unfortunately the bed was equipped with wire springs, and when the gentleman retired that night, his weight caused the springs to sag, and the wires, coming in contact with the battery terminals, caused a short circuit, setting fire to the mattress.

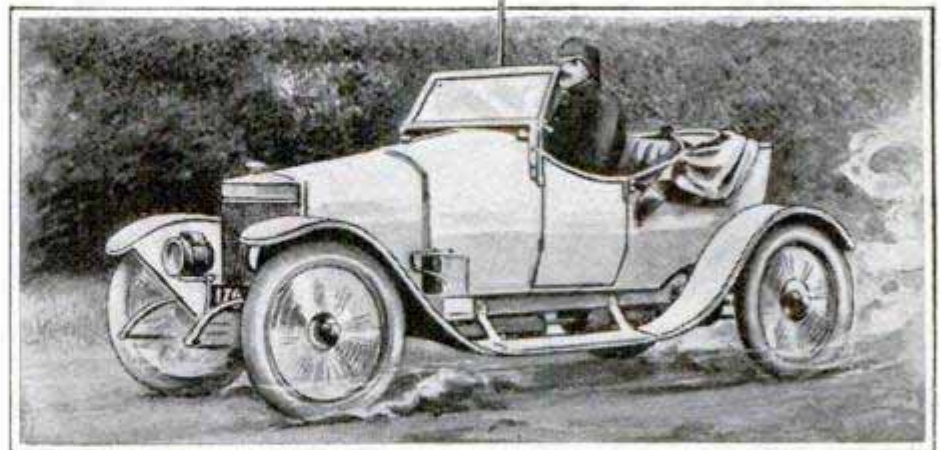
A BATHING SHOE WITHOUT LACES

The annoyance of untying wet shoe laces has militated against bathing shoes from time immemorial, but this ancient hindrance is obviated by a new type, just shown in advanced shops, where an elastic stockinette top makes it fit snugly over the foot. The new shoe is light in weight, but gives plenty of protection against the shells and stones of the beach.



CARS CARRY FLAGS FOR SAFETY AT CORNERS

To avoid the danger of collision with another car, some English motorists have equipped their cars with flagpoles. The pole is of such height that the flag can be easily seen by anyone on the other side of a hedge or other low obstruction at a corner. The plan is an effective one, although it is hardly likely to come into general use, as most motorists object to the unsightly appearance given the car, as well as to the continual flapping of the flag just above their heads.



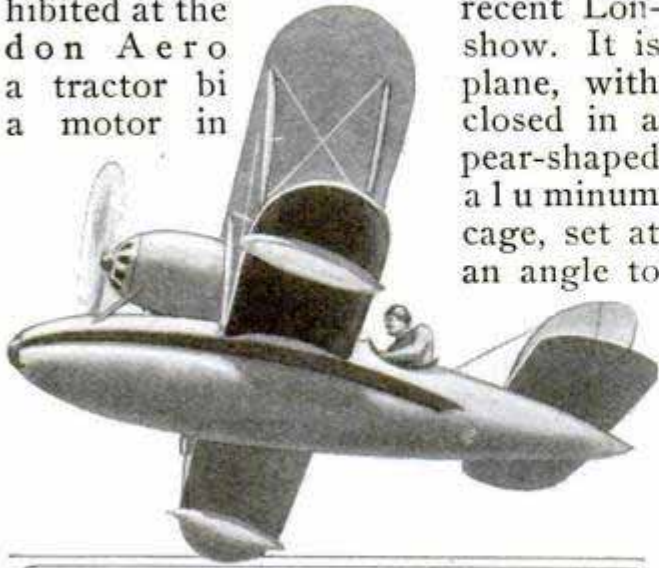
Courtesy of The Car

English Car with Flag That can be Seen over Hedge or Other Low Obstruction at Blind Corners

flapping of the flag just above their heads.

NOVEL TORPEDO BODY ON FLYING BOAT

A new species of flying boat, with a body shaped like a torpedo, was exhibited at the London Aero tractor bi motor in



recent London show. It is a plane, with closed in a pear-shaped aluminum cage, set at an angle to

Odd Craft Built by an English Flying-Boat Enthusiast, Which Has Novel Features.

the fuselage. The cigar-shaped body is made of laminated wood, with a horizontal fin running halfway back on either side. A cockpit for the pilot is set in the hull behind the planes. A three-bladed propeller, and a small cigar-shaped balancing float at either end of the lower plane complete this novel craft.

EMERGENCY BUOY PREVENTS SUBMARINE DISASTER

The Russian submarine "Mingoa" escaped a serious disaster recently by being equipped with an emergency buoy that not only shows the location of a sunken submarine but carries a telephonic apparatus enabling the crew to make known their plight to a vessel on the surface. The "Mingoa," accompanied by a tender, was maneuvering in the Baltic Sea off the port of Libau. Through some accident to the controlling mechanism, the submarine suddenly plunged under the water, throwing its stern high in the air as it went down. In a short time the emergency buoy came to the surface and

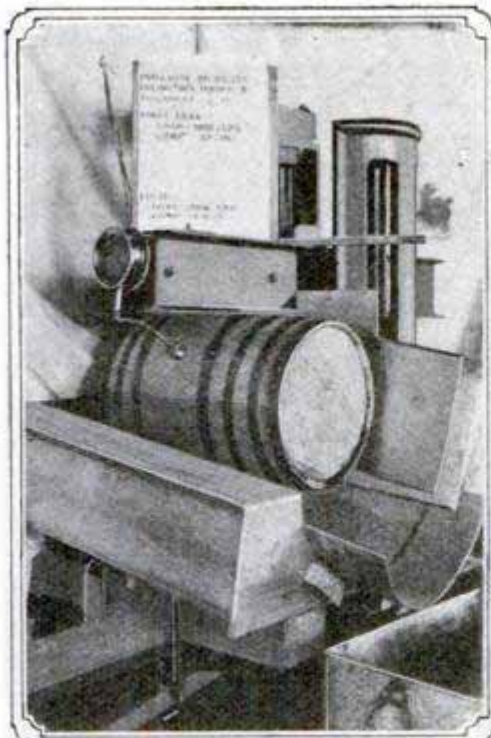
telephonic communication between the tender and the sunken vessel was established. The accident occurred at 3 o'clock in the afternoon, and it was midnight, or nine hours later, when the salvage ship that had been summoned succeeded in raising the submarine to the surface. Fifteen of the crew were unconscious and three were barely able to crawl when taken out. In order to rescue the last man on board—the cockswain, who was imprisoned in the conning tower amidships—it was necessary to raise the vessel well out of the water, a process that required three hours more. When finally released, this man, although he had been confined for 12 hours, was in the best condition of any of the crew.

A NEW ARC LAMP PROVIDES COLD LIGHT FOR MOVIES

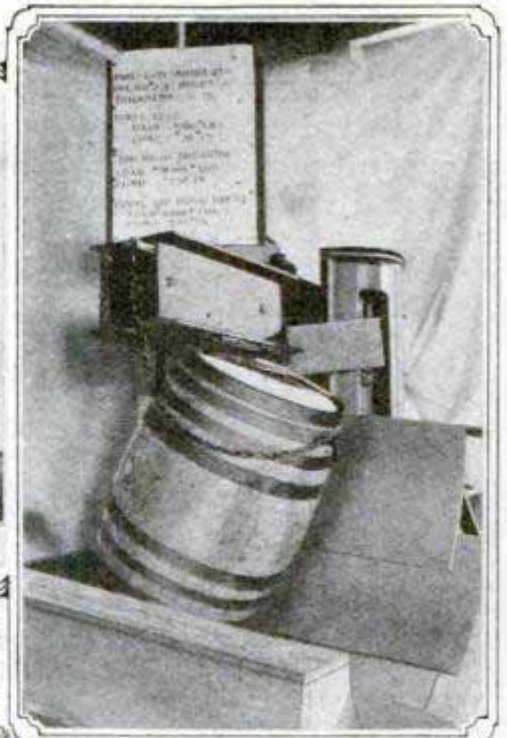
A new mercury arc lamp has been invented by some French scientists, which is designed to be submerged in water, giving practically cold light of high power. The mercury-vapor tube consists of an inverted U-form of quartz glass with electrodes of an alloy called "invar." This lamp is hermetically inclosed in a quartz bottle which, itself, is submerged in water. The wall of the bottle opposite the lamp is given a parabolic curve and covered with a reflecting material so as to condense the rays of light upon the object to be illumined. The lamp works with a direct current and is of 3,000 cp., making it available for picture projections, as well as for microscopical work, as in the latter case it does not dry up the preparations by its heat.

GOVERNMENT TESTS WOODEN BARRELS

Seeking positive data upon the safe transportation of dangerous liquids, government experts have recently conducted a series of tests to determine the most economical and efficient designs of wooden barrels in the laboratory of the Forest Service. These tests consisted in the application of external

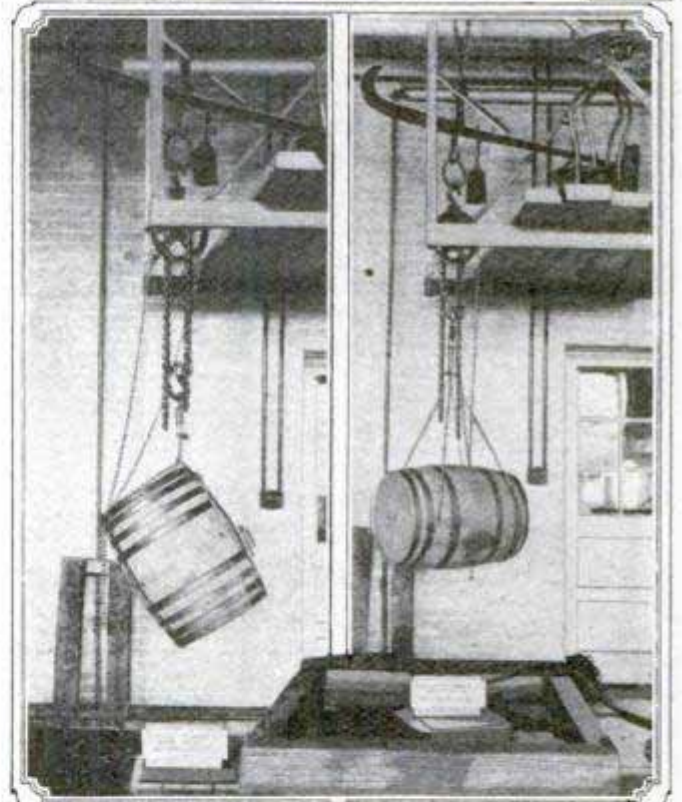


Testing for Side Strain

Testing a Barrel for
Internal Pressure
in the U. S.
Forest Laboratory

Diagonal-Pressure Test

pressure upon water-filled barrels, internal pressure, and dropping from a height in various positions. In some cases the barrels were laid on their sides, between flat surfaces, and subjected to graduated pressure, the resultant flattening of the barrel, the breaking or slipping of the staves or head, and the loss of contents through seepage or leakage being noted. In other cases the barrels were tipped, so as to rest upon the chime, or edge, and diagonal pressure applied. The dropping tests gave, possibly, the severest strain on the loaded barrel, and when it was allowed to fall on the edge, slipping of the staves and crushing of the head, together with slipping of the hoops, were the most frequent causes of failure. Internal pressure was obtained through ordinary hydraulic means, the highest registered being 38 lb. per square inch. In each kind of test the first evidence of leaking appeared as seepage through the pores of the wood at the chime. Slipping of the staves usually appeared at or immediately after the first leak. The diagonal compression test showed the inherent weakness of the heads, as did the drop test. From the results noted the authorities recommend such changes in the design of the barrels as



Dropping Diagonally

Sidewise-Drop Test

would strengthen the heads. Putting the hoops closer together and improving the head joints are also advised.

As damages for the illegal seizure by the United States of a Canadian ship during the War of 1812 an international tribunal has just awarded the claimant \$23,000.

LONG WIRE FENCE FOILS SMUGGLERS

From Lake Maggiore to Lake Como, along the frontier between Switzerland and Italy, the Italian government



This Wire Fence is Built to Beat the Smugglers

has erected a strong wire-mesh fence to prevent smuggling across the border. The fence is 13 ft. high, and is so connected with electric bells that warning is given immediately the fence is touched by anyone. Travelers say that the guards are kept in a constant state of excitement from the fact that boys on both sides of the border are "just boys," and cannot forbear setting the bells ringing just to see the fun.

AN ADVERTISING PIG FOR WINDOW DISPLAY

An advertising design attracting a good deal of attention in a meat market in Portland, Ore., consists of a pig



composed of hams and bacon wrapped in attractive packages. The head is of wood, painted, but the creature's legs and arms, its feet and body are bona-fide provisions. It is shown standing upright, with a commanding gesture. The component parts are fastened together with skewers and wire.

STANDARD-GAUGE MOTOR CARS FOR THE SOUTH

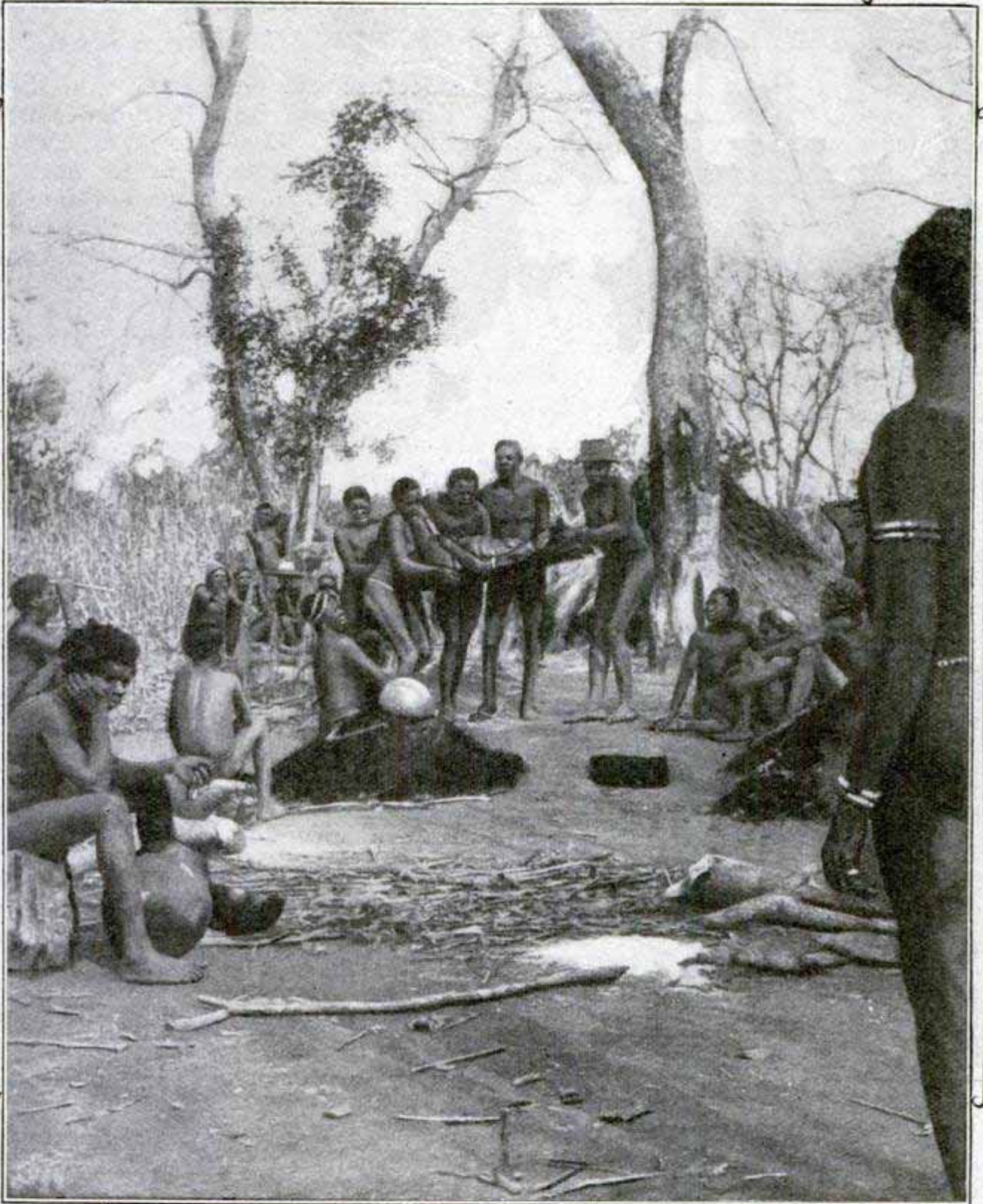
In accordance with the practice in vehicle treads that has been followed in the South for generations, motor cars built for use in that section of the country have heretofore been made almost universally with a wheel gauge of 5 ft. instead of the 4-ft. 8-in. gauge that is standard in the North and in Europe. With the good condition to which most of the important highways in the South have been brought in recent years it is now less important than formerly for motor cars to fit the ruts in the road and more and more cars for the southern trade are being built with the 4-ft. 8-in. gauge. The change is one that is welcomed by manufacturers and dealers, as it will prevent much confusion and will do away with the necessity for carrying double stocks of axles.

THE DEEPEST WELLS IN THE WORLD

At Czuchow, in the coal field of Upper Silesia, is the deepest well in the world. It has reached a depth of over 7,348 ft., a trifle under a mile and a half below the surface. America has three wells ranking next in order. That near McDonald, Pa., some 10 miles southeast of Pittsburgh, is 6,860 ft. deep; one in Putnam Heights, Conn., is 6,004 ft. deep, and one now being bored at Derrick City, Pa., has reached the depth of 5,820 ft. Although each of these wells is over a mile in depth, little that is new in geologic formation has been learned from the borings, as owing to the dip of the strata, many comparatively shallow wells have touched the underlying rock beds of very old formations.

Direct railway communication between Chicago and Alaska is a possibility, through the construction of a new line connecting the Grand Trunk Pacific with the proposed government railways in Alaska.

STRANGE FUNERAL CUSTOM OF AFRICAN TRIBE

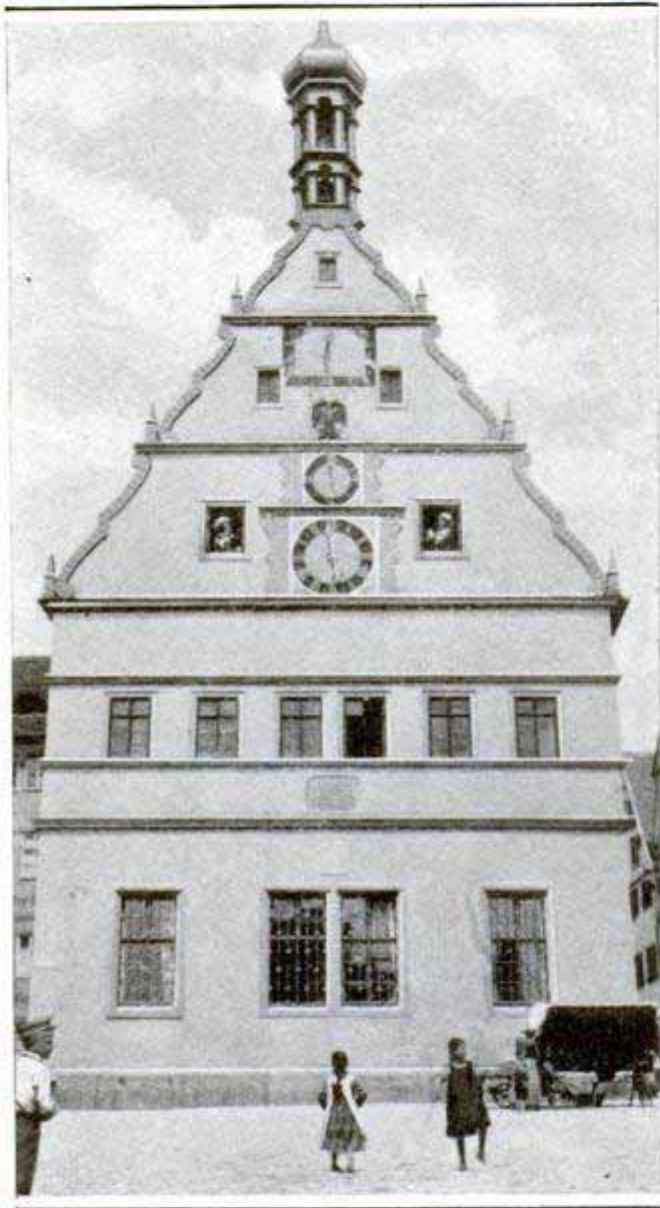


Courtesy of L'Illustration

A TRAVELER who had been exploring the country around the upper Shari River, near Lake Chad, one of the great African inland seas, came upon a most unusual funeral custom, and was fortunate enough to obtain a photograph of it. The corpse, carried by near relatives, is placed upright in a deep hole in the ground and covered with soil. The medicine man of the village then plants above it a poisonous weed, known as the Songo, much feared by the natives, and which the deceased is supposed to use in the next world to put into execution any acts of revenge not fulfilled in life.

OLD GERMAN BUILDING WITH FAMOUS CLOCK

The ancient city of Rothenburg, one of the oldest in Germany, has numerous quaint buildings, one of which, de-



Fine Specimen of German Architecture, with Queer Clock

picted in the photograph, is remarkable for the clock upon its façade. There are two dials, one showing the hours and the other the minutes. At either side are shutters, which fly open at the stroke of twelve, disclosing two mechanical figures dressed in the costume of long ago, who raise and lower beer mugs as if drinking a toast, keeping time to the strokes of the great gong. The clock is run by weights and is said to keep perfect time. It has been running since 1768.

A CURIOUS ERROR SENDS PERUVIAN BARK ASTRAY

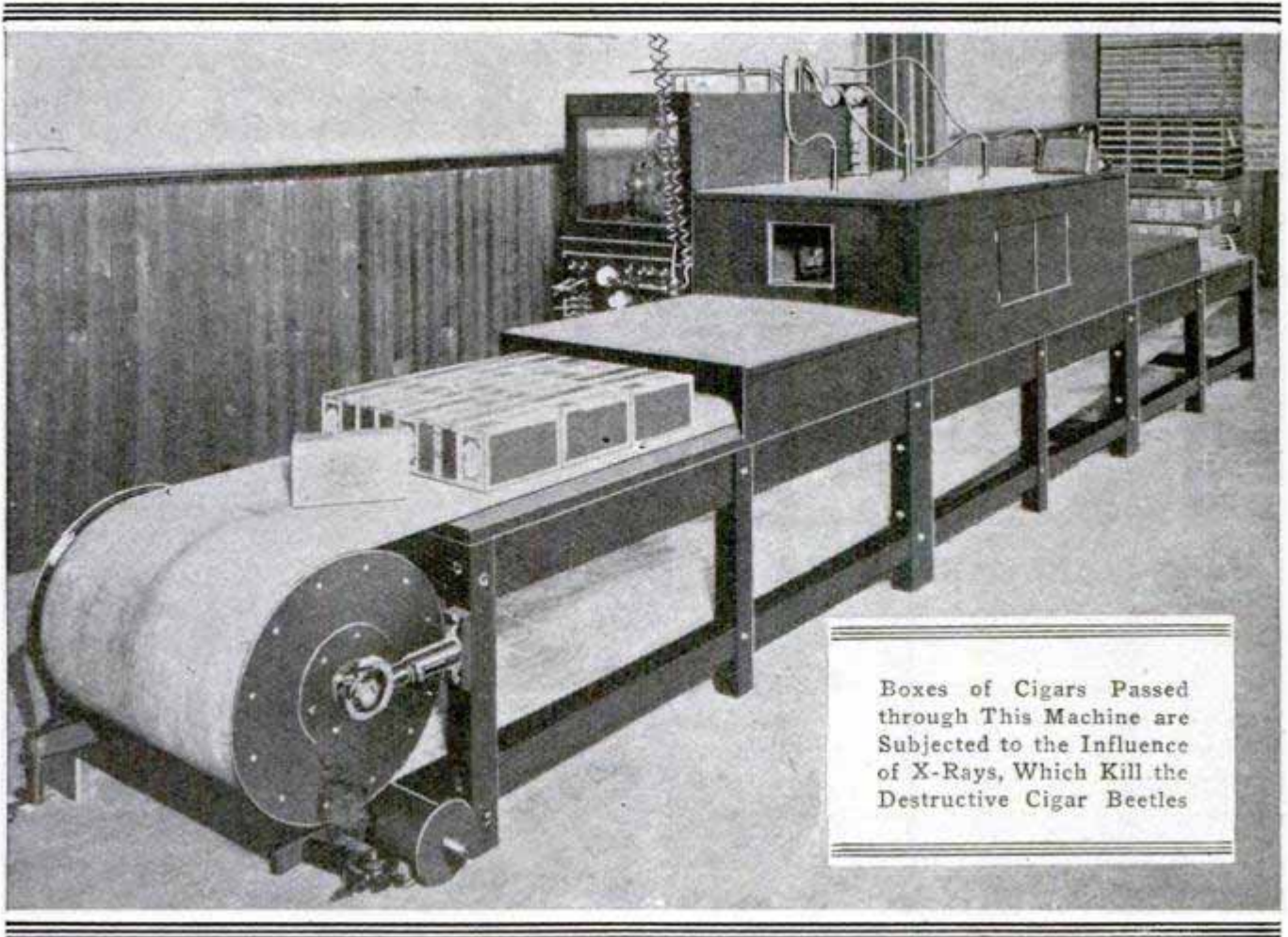
Because the manifest of the bark "King Alfred," from Peru, laden with nitrate, read "Charlestown, U. S. A.," the master brought it to port in Charlestown, Mass., instead of Charleston, S. C. Upon consulting his chart, the master found that the only Charlestown was near Boston, and took his vessel there. When the customs officials came to investigate they found the consignees were located at the South Carolina city, and informed the master that he had taken his craft a thousand miles out of its course. The voyage took 135 days, and only by offering the crew a bonus was the master able to take the bark to the original destination.

WIRELESS STATION HIGHER THAN EIFFEL TOWER

Recently the foundations were laid at Laeken, Belgium, for a new wireless station, the tower of which is to be 1,092 ft. high, which is 108 ft. higher than the famous Eiffel Tower in Paris, for years the highest artificial structure in the world. The members of the International Wireless Committee assisted at the ceremonies incident to laying the foundations of the new tower, which is to be used as headquarters for scientific observations and investigations in meteorology, and wireless telegraphy and telephony.

AIRMAN KILLED WHILE LOOPING THE LOOP

The first airman to be killed while attempting to emulate Pégoud's feat of flying upside down was M. Hanouille, who fell with his machine into the sea at San Sebastian, on March 16, 1914. The accident was apparently due to a collapse of the machine, which was old and had been badly used, and not to loss of control, as the machine was flying upside down when it fell. The airman was dead when picked up.



Boxes of Cigars Passed through This Machine are Subjected to the Influence of X-Rays, Which Kill the Destructive Cigar Beetles

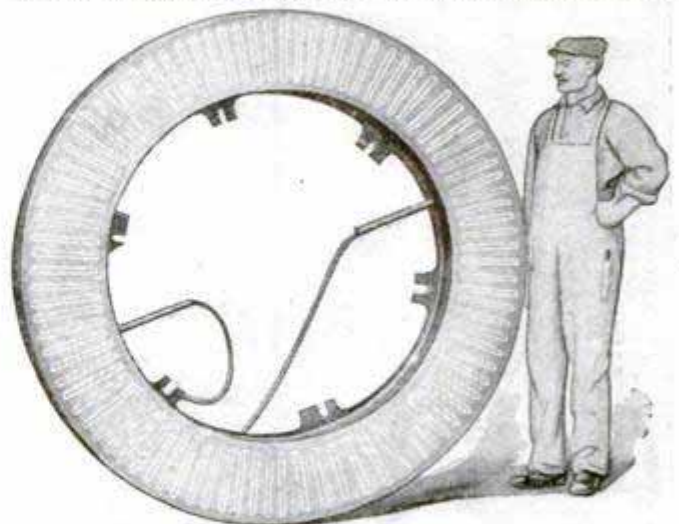
KILLING CIGAR BEETLES BY USE OF X-RAYS

In a former issue of this magazine a description was given of a method by which cigar manufacturers destroyed the small insects which bore holes in the finished cigar, the X-ray machine being utilized for the purpose. The photograph of the machine by which this is accomplished shows the cigars, packed in boxes ready for shipment, being run through a lead-lined chamber into which powerful X-rays are directed for five minutes. The movement into and out of the X-ray chamber is facilitated by a belt conveyor. By this process the insects and their eggs are killed, while the flavor of the tobacco is not impaired.

¶ In a recent report it is estimated that about \$10,000,000 is spent annually for organs in the American churches, \$30,000,000 for church-choir salaries, \$25,000,000 for organists' salaries, and \$7,500,000 for sheet music.

BIG MAGNETIC CHUCK HOLDS WASHERS FOR GRINDING

An exceptionally large magnetic chuck has just been completed by a Massachusetts firm, which will be used for holding a large quantity of 3-in. washers while they are being ground. This chuck is rotary, 70 in. in diameter,



A Rotary Magnetic Chuck 70 Inches in Diameter and its face is 11 in. across. There are 96 separate poles and 48 magnetizing coils, requiring 250 lb. of magnet wire

for winding, and the weight of the completed chuck is 2,400 lb. Rotary chucks of more than 44 in. in diameter are rare, but here the design called for a special horizontal mounting in a grinding machine, the work being fed to it through a chute, two grinding wheels doing the facing. A turn of the switch will instantly demagnetize the chuck, permitting the washers to be swept off while the chuck is rotating. The current for energizing this big chuck delivers 5,500 watts; that is, 50 amperes at 110 volts.

EGYPTIAN CARPENTER AT WORK

With rude equipment, the Egyptian carpenter is an excellent craftsman, turning out all sorts of cabinetwork in finished fashion. The illustration depicts one of these wayside carpenter and joiner shops which are always objects of interest to travelers. The object in course of construction is a "taaboot" or screw wheel for an irrigation ditch. In a late number of this magazine this form of water wheel was shown in use, being set on an incline, the lower end submerged in water, while a workman turns a handle

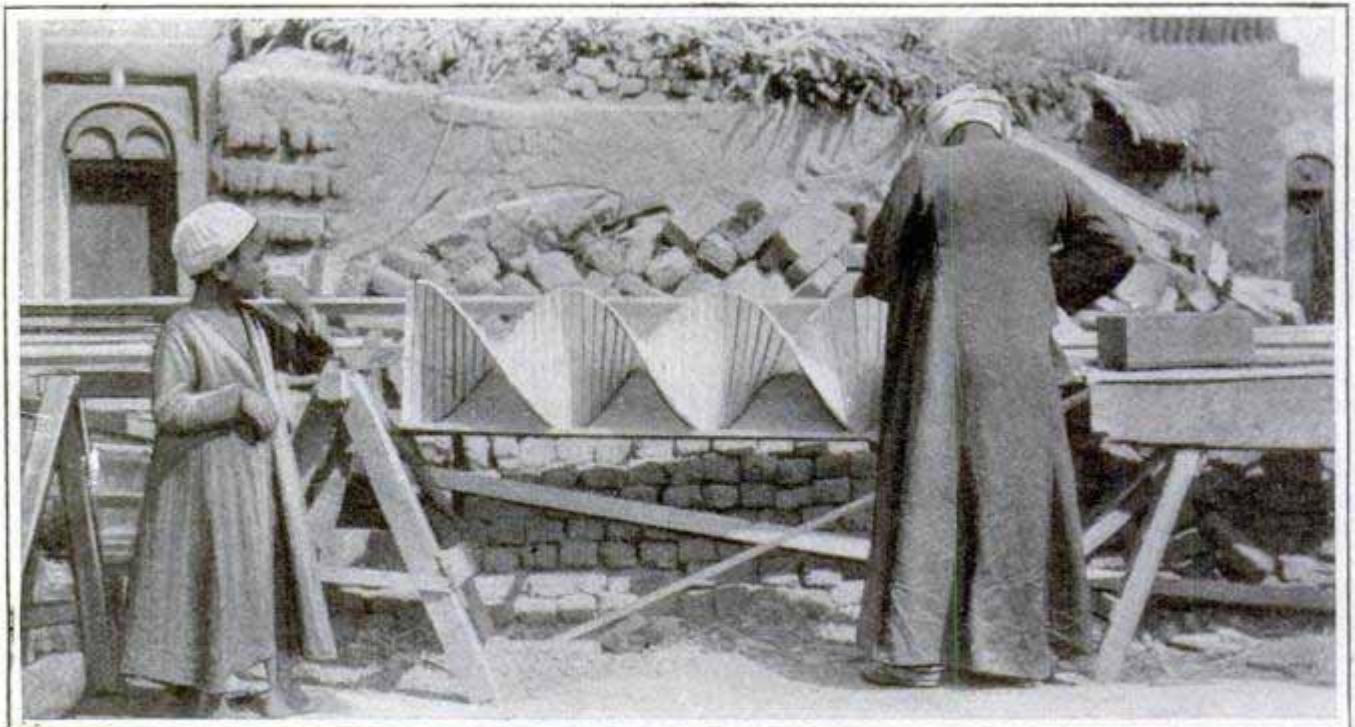
attached to the upper end, revolving the device, and literally screwing the water up out of the river, discharging it into the irrigating ditch.

AVIATION AND WIRELESS ON NEW FRENCH STAMPS

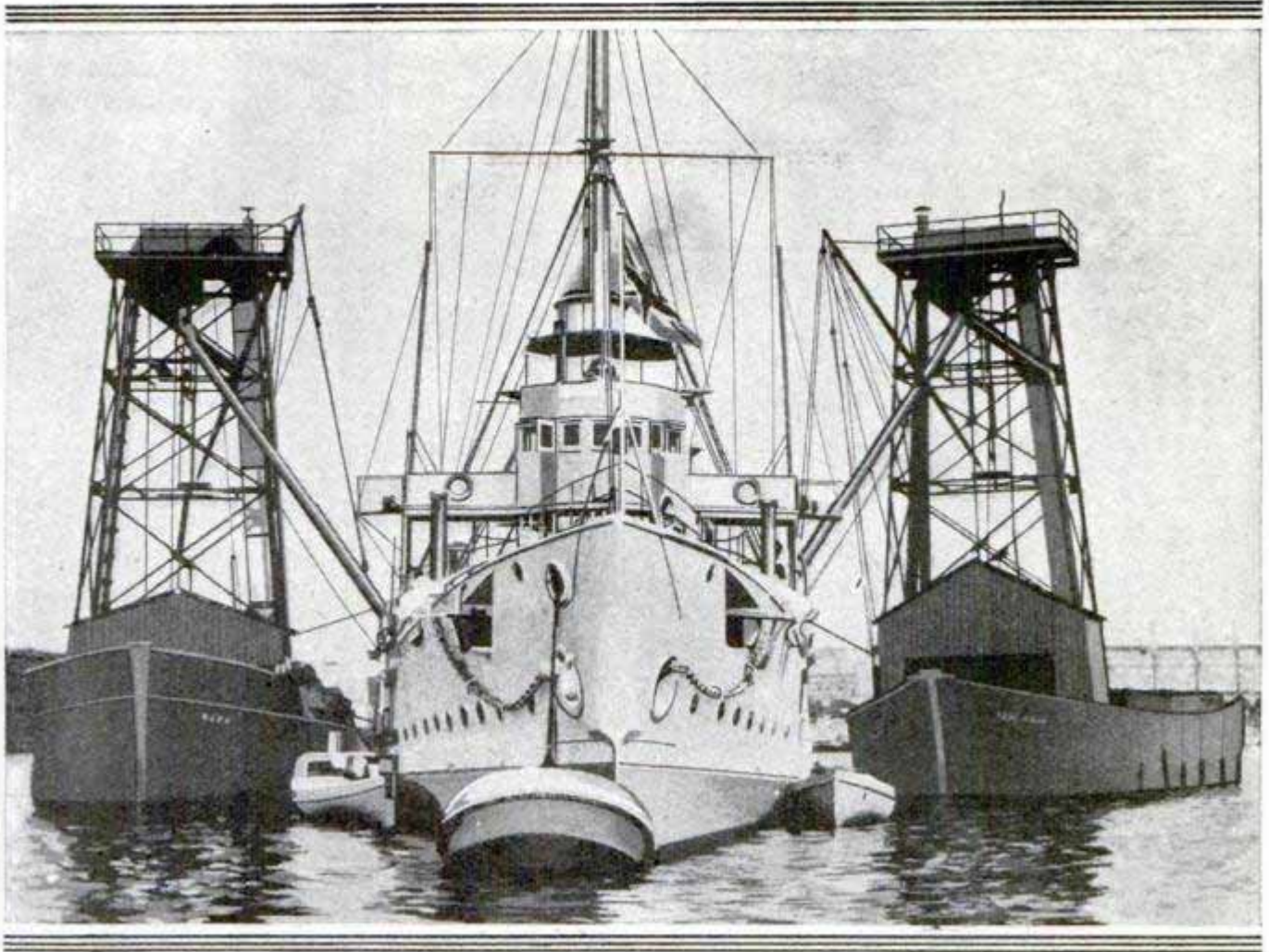
France will be the first country to recognize the science of aviation by picturing it on postage stamps. On a series of stamps soon to be issued there will appear an airman flying above the Eiffel Tower. Besides symbolizing the aerial post of the future, these stamps are intended to recognize the importance of wireless telegraphy by picturing the world's tallest structure which has been put to practical use as one of the most important wireless stations in the world.

BARGES THAT DELIVER COAL INTO SHIP'S HOLD

A recent development in ship-coaling equipment is a barge provided with machinery that elevates the coal and chutes it into the coal hatches of the ship without the necessity for further handling except that required for distributing it properly after it has been



An Egyptian Carpenter Making an Archimedean Screw for Lifting Water



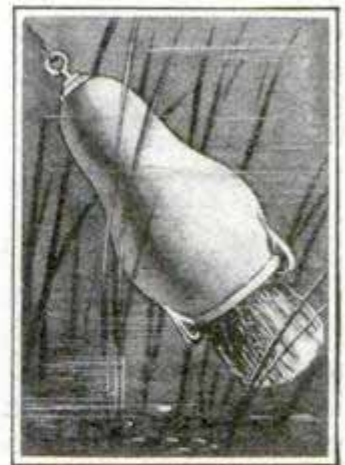
Two Barges Equipped with American Machinery Coaling a British Man-of-War in Liverpool Harbor

deposited in the hold. Most of these barges are made from rebuilt schooner hulls, with coal hoppers and conveying and elevating machinery added. Running lengthwise of the hull, and placed side by side in the center, are two apron conveyors, one for serving the coal hoppers on each side of the barge. Coal is discharged upon the conveyors through a series of gates in the hopper bottoms and is conveyed to an elevator at the end of the barge. From this point it is elevated to a hopper at the upper end of a pipe through which it is discharged by gravity into the coal hatches of the ship. Each barge is designed to handle 100 tons of coal per hour, but in some cases an average of 125 tons per hour has been maintained under service conditions.

☞ Bullets and cartridge shells picked up on the Balkan battlefields are being shipped to France, where they are melted and used for manufacturing purposes.

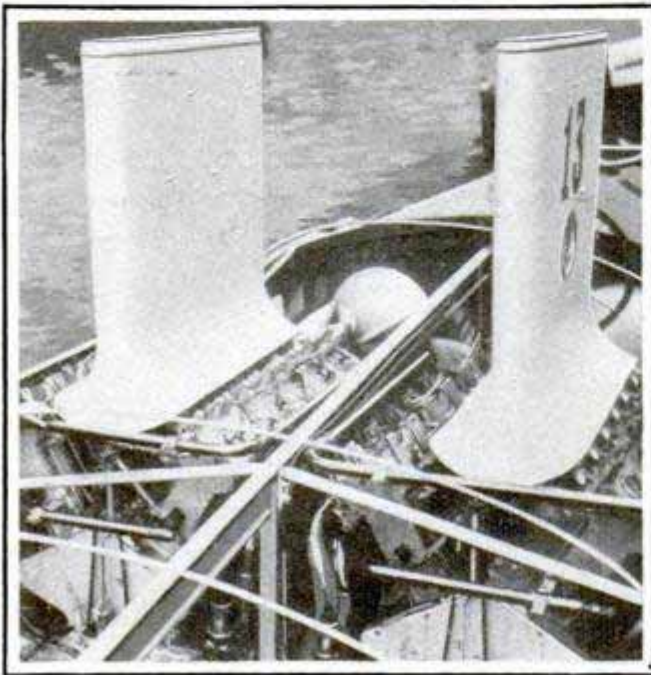
RUBBER GUARD KEEPS HOOK FREE FROM WEEDS

Nothing is more annoying to a fisherman than to find his hook constantly fouled with weeds, and relief from this condition is offered by a soft rubber nipple or guard which encircles the shank of the fishhook. It protects the hook in the direction in which the line is being drawn, yet when struck, collapses, allowing the hook to penetrate so that the fish is securely caught. This soft rubber guard is made in either white or red, and is so weighted as to make casting easy, and may be used for either reeling or trolling.



A HIGH-SPEED MOTORBOAT WITH EXHAUST FUNNELS

An interesting departure from established motorboat construction was observed recently at Monaco, where a



These Flat Exhaust Funnel Present Little Surface to the Wind

high-speed craft was equipped with two exhaust funnels. These were quite flat, rising from the tops of the engines, taking the escaping vapors from the motors, and presenting a very slight surface to the wind. The innovation excited comment among motorboat enthusiasts, as it tends to overcome difficulties encountered by the present type of exhaust pipes, which are sometimes submerged when the boat is going at full speed.

WIRELESS MISTAKE CAUSES REPORT OF SHIPWRECK

After all the rescue facilities available had been pressed into service to aid the steamer "Siberia," which had been reported as sinking off the southern coast of Formosa, that ship came safely into port and it was found that the report of the disaster was due to a mistake made by an operator in reading an indistinct wireless message sent out, not by the "Siberia," but by the "Persia," a ship sailing in the vicinity of the supposed shipwreck. Each ship

has a code name, consisting usually of three letters, for identification in wireless work. At regular intervals a ship at sea flashes its latitude and longitude, following this signal with its code name given twice. The code signal of the "Persia" is "M. B. S.," while the signal of distress is "S. O. S." In the international code used in wireless work these signals are as follows:

M (— —) B (— ...) S (...)
S (...) O (— — —) S (...)

With this comparison it is easily seen how one might be mistaken for the other if the signals were indistinct and were received in fragments. Evidently the operator of the receiving station missed the "M" and "B" of the code name when it was given the first time, but got the three dots of the "S." As the code name was repeated this was followed by three dashes, and through failing to notice the pause between the "M" and "B," the operator thought he had the letter "O." The final three dots of the "B" were mistaken for "S," and this completed the "S. O. S." signal of distress. The operator doubtless assumed that the ship was the "Siberia" from knowing the route and probable position of that vessel in sailing from Nagasaki to Manila.

COOLING ROOM VALUABLE AID TO FLORIST

Artificial cooling is an important factor in the modern florist shop, as by this means certain flowers desired for a particular date may be so regulated as to bloom just when required, without the danger of loss from premature blossoming or withering. Lilies of the valley are flowers lending themselves easily to artificial control. When the crowns of lilies are just starting to shoot, the plants are taken up and placed in a cold-storage room. Growth is thereby stopped and the flowers remain in the same condition until wanted. They are then taken out and placed in warm earth, when they burst into bloom very quickly. By this means lilies of the valley may be had for the table all the year round.

PAPER FOR MAKING MONEY CAREFULLY GUARDED

In constructing the new building for the United States Bureau of Engraving and Printing in Washington, provision has been made for recreation space for the employes on the roof, where it is planned to provide comfortable seats, luncheon tables, etc., as well as space for promenades and games. These provisions are necessitated because of the rule prohibiting employes from leaving the building or even entering the public parts of it between their arrival at work in the morning and their departure in the evening. This rule is only one of the many precautions the government employs to prevent the theft or accidental loss, not only of paper money, which is manufactured at the Bureau, but also of the special blank paper upon which money is printed.

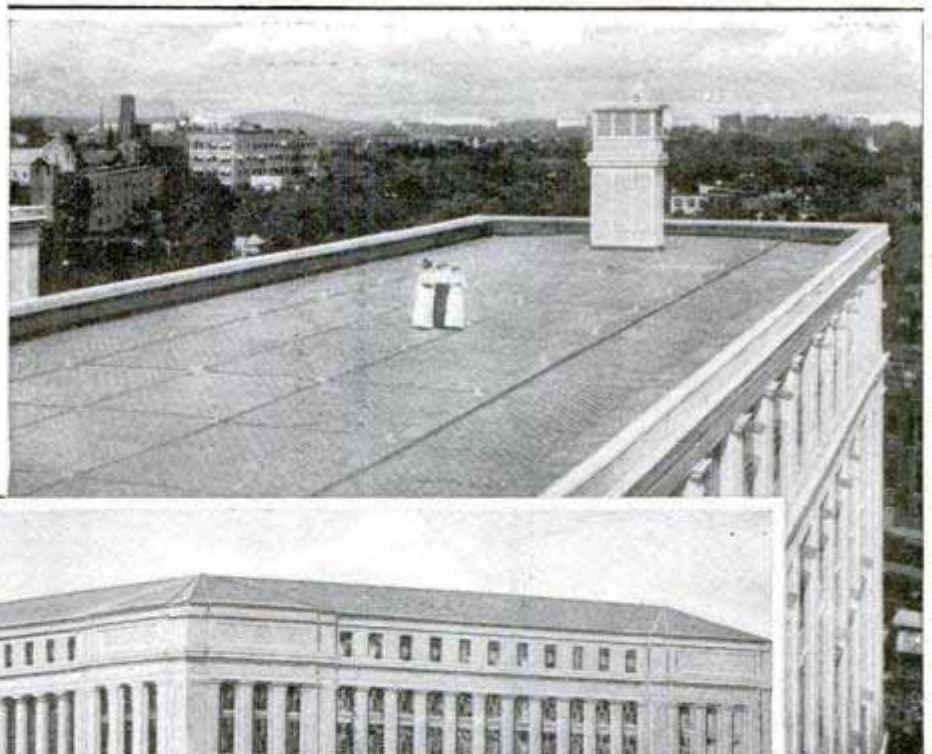
This paper is so valuable that the plain white sheets are counted, re-counted, checked, sealed and accounted for just as if they were money. Without a scratch or line upon its white surface, the very possession of a single sheet of this paper renders one liable to a fine of \$5,000, or to imprisonment for five years, or to both fine and imprisonment.

Made in but one mill, at Dalton, Mass., by a secret process, and under the strict supervision of government inspectors throughout

the entire process of manufacture, every precaution is adopted to prevent a single sheet from falling into the hands of unauthorized persons, who might use it illegally.

Until impressed by the engravings that convert them into money, these sheets are simply high-grade bond paper. Nothing but pure linen rags is used in its manufacture, and these rags are fresh, new and undyed. They are clippings from linen used in the manufacture of shirts, collars, lingerie, and such articles. Being pure white, no bleaching is necessary, and the fibers are spared the action of strong chemicals.

The rags are washed in flowing warm water until every trace of starch, size and filler is removed. They are then placed in a steam cooker, or digester, where they are boiled for a long time, and then pounded or beaten until they are reduced to a pulp. This pulp is then stored in filters from which the water drains off. From this



Recreation
Roof of
the New
Bureau of
Engraving
and
Printing

The New Building at Washington Where Money and Postage Stamps will be Printed

pile of long-fiber pulp a sufficient amount is taken for the day's work, put in grinding machines, where, mixed with pure water, the pulp is reduced to a uniform consistency, the flowing mixture being about 90 per cent water to 10 per cent fiber.

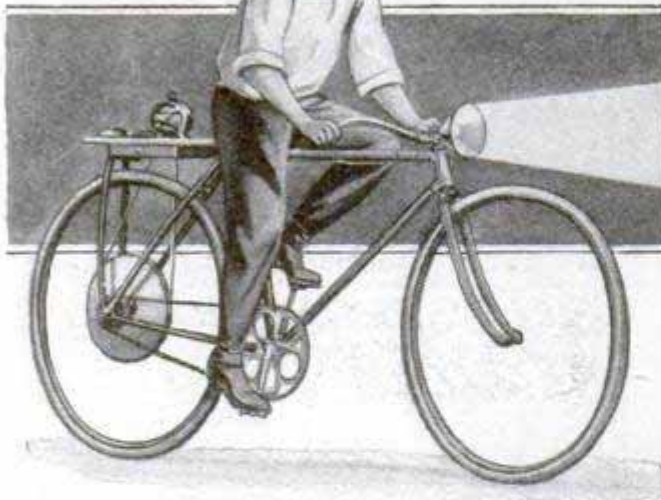
Thus far the manufacture of bank-note paper follows the accepted methods for the manufacture of any high-grade bond paper. At this point, however, begin the secret manipulations which increase its wearing qualities and incorporate the silk fibers, red and blue, which are characteristic of American paper money. The method by which these fibers are incorporated into the texture of the paper is one of the most carefully guarded secrets, known only to a very few trusted and bonded employes of the manufacturer and the government officials in charge of the work. There are two stripes, or

bands, of silk fiber, so placed in the pulp, at some stage of the process of manufacture, that all bank notes cut from the sheet will contain an approximately equal number of these distinctive markings, so disposed as to fall principally on the portions of the note not covered by engraving.

In their finished condition, the sheets, which are $8\frac{1}{4}$ by $13\frac{1}{2}$ in. in size, just large enough for four bills to be printed upon one sheet, are counted by employes of the mill, and then a check count is taken by a force of counters of the treasury department located at the mill. A thousand sheets are then counted, checked, and placed in a package which is sealed with the government seal, which is not broken until the package is delivered to the Bureau of Engraving and Printing, when the paper is again counted before any work is done upon it.

BICYCLE EQUIPPED WITH DYNAMO

Attaching a 30-in. pulley to the rear wheel of his bicycle, a San Diego man rigged a small dynamo on a board behind the seat, and runs a 6-volt,



Tiny Dynamo Supplies Headlight for Bicycle

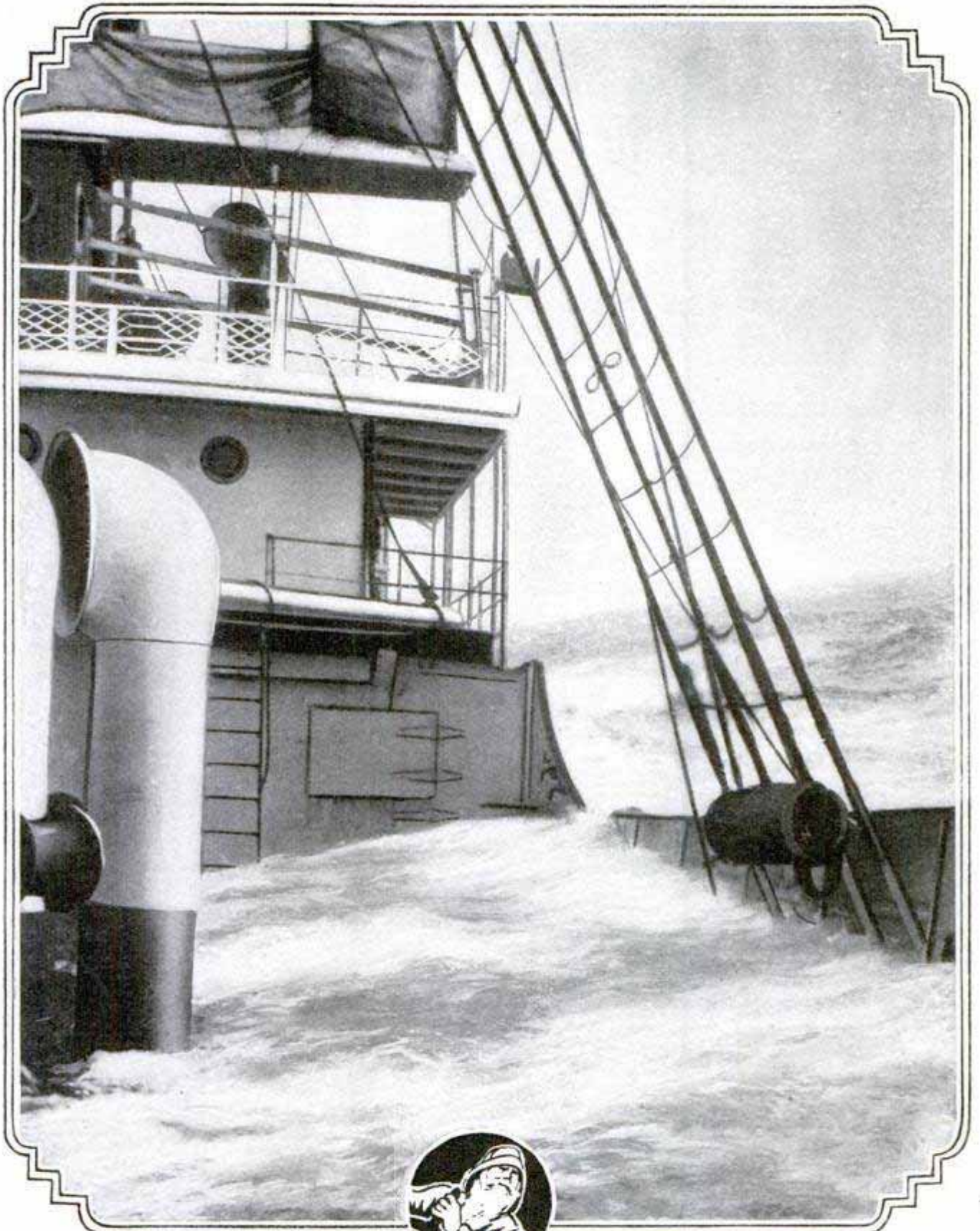
10-cp. lamp, with enough power besides to ring a bell whenever required. A belt connects the pulley wheel with two other pulleys on a countershaft, so sized as to increase the speed four

times. The dynamo attains a speed of 3,000 revolutions per minute when the bicycle is traveling at the rate of five miles an hour.

GOVERNMENT INSPECTORS TO WATCH WIRELESS

Sounding a note of warning, the Department of Commerce advises radio inspectors examining wireless apparatus on tank steamers or cargo vessels carrying gasoline or any explosive which might be ignited by electric sparks from radio outfits, to pay particular attention to the insulation of the antennae, and to metallic rigging or equipment of the vessel in which currents may be induced by the action of wireless. It has been found that, owing to faulty wiring and improper electrical equipment on some vessels, currents may be induced on the operation of the wireless outfit so as to cause sparks to jump between wires or across small gaps. The government hopes to reduce accidents by careful inspection.

WHILE THE STORM RAGES THE DECKS ARE AWASH



Copyrighted by International News Service

IT does not take a very heavy wind to send the spray flying across the decks of even a large steamer, while ordinary freighters and the smaller ocean-going passenger vessels frequently undergo such experiences as that depicted here. The sight of the main deck "awash," as seamen term it, is neither strange nor terrifying to the sailor, if the ship be staunch and the hatches tightly closed and secured, so that no water can pour through into the hold. It seldom occurs, however, that there is a photographer present on such occasions, as there was in this instance on board a West Indian liner bound across the Atlantic to England. The chief danger when a wave breaks over a ship in the open sea is that of carrying away the lifeboats or other movable objects, while all who venture on deck must use the life lines.

A RESURRECTED CISTERN SURPRISES VILLAGE

The town of Hardin, Illinois, was amazed recently, when a cistern, 8 ft.



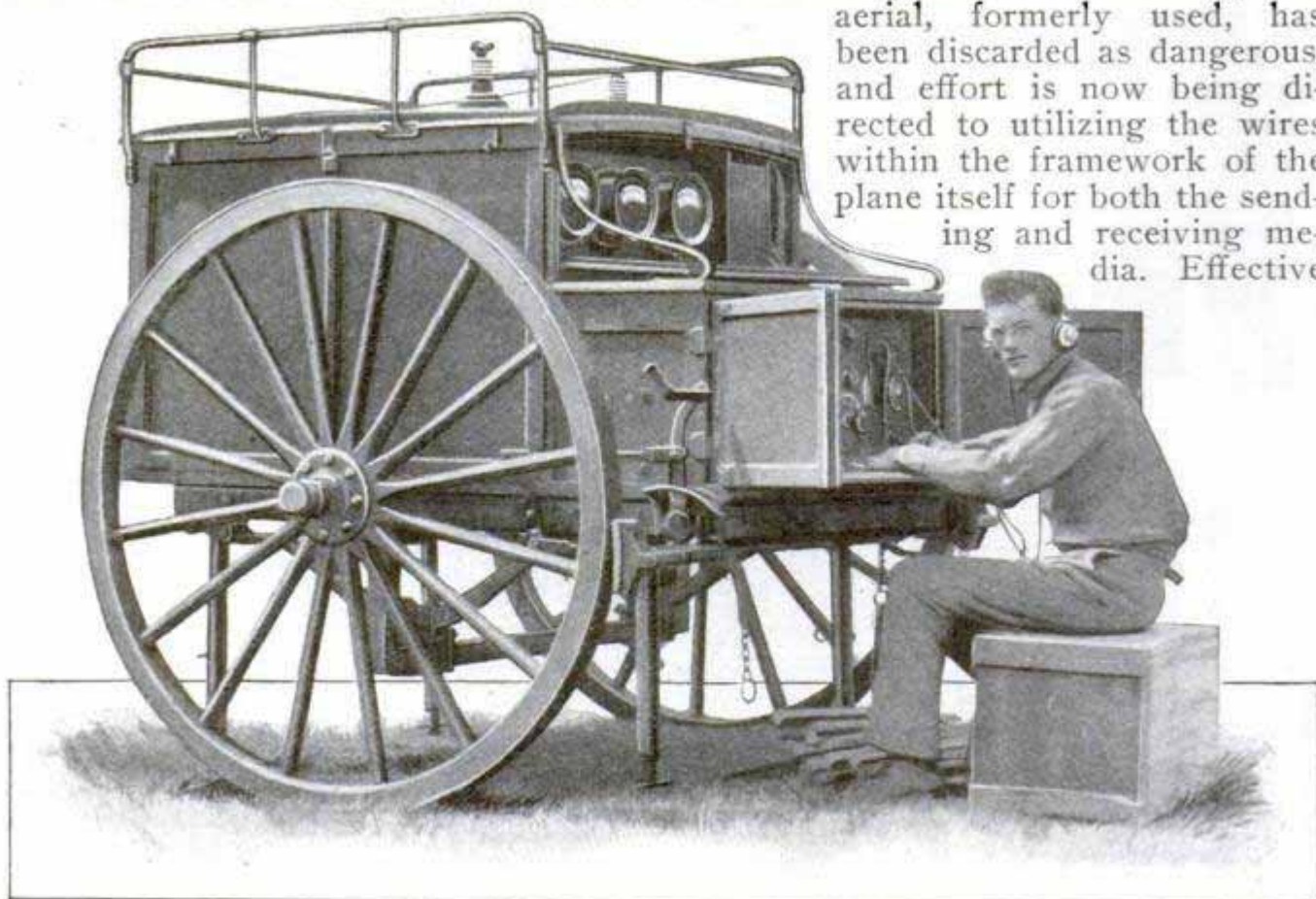
Cistern Floats Like a Cork in Waterlogged Yard

in diameter, rose bodily out of the ground, and within the space of an hour and a half stood 9 ft. above the

yard, of which for many years it had been an inconspicuous and quiet tenant. No earthquake shock had been noticed, and speculation as to the cause of the strange phenomenon was rife, until the suggestion was made that a remarkably heavy rainfall had so soaked the ground about the cistern, which was tight and almost empty, that it floated up into daylight.

PORTABLE WIRELESS OUTFIT USED BY THE ARMY

A very efficient portable apparatus for use by troops in the field has been adopted by the United States Army. It has a range of from 30 to 40 miles when used with an ordinary inverted-L radial, sending out a pure musical note with a frequency of from 500 to 750 sparks a second. It may be operated from a storage battery or, should that fail, a small dynamo can be operated by hand, supplying sufficient current for the proper sending of messages. Light outfits are now being built for use on aeroplanes. The trailing-wire aerial, formerly used, has been discarded as dangerous, and effort is now being directed to utilizing the wires within the framework of the plane itself for both the sending and receiving media. Effective



Field Wireless Outfit Used by United States Troops in the Field at Laredo, Texas

Copyrighted by International News Service

wireless apparatus is being used daily on foreign dirigibles, but in the matter of equipping aeroplanes, where every ounce counts, inventors are restricted to finding the proper combination of high efficiency with little weight.

NEW PROCESS OF COATING STEEL WITH COPPER

A new process of combining copper and steel, which provides an economical means of producing a homogeneous metal having a copper surface and a steel interior, has just been invented. A copper sheet is cut to the right size and shape and then bent and fitted into an ingot mold, after which the seam is welded by an acetylene torch. The tapered copper tube formed in this way is then filled with the molten steel. As soon as the ends have solidified enough to prevent the liquid metal in the interior from escaping, the mold is taken to the rolls. During the rolling, the ingot is gradually elongated and decreased in diameter, the gases that have collected in it being forced out at the sides through the plastic metal. As a result of this process a solid homogeneous mass of metal is formed that is free from blowholes and has an outer coating of copper thoroughly bonded with the steel.

REMARKABLE VOYAGE OF MOTOR SHIP "SIAM"

The ship "Siam," which is propelled by Diesel internal-combustion motors, using fuel oil, has just completed a voyage of 23,000 miles without refueling, and it is stated that at the end of this remarkable voyage there was still enough oil in the fuel tanks to have carried the vessel another 8,000 miles. The "Siam" first sailed from Borneo to Antwerp, Belgium, then to Copenhagen, Denmark, then around Cape Horn to a port in Chile, and from that point to San Diego, Cal. During the entire trip from Copenhagen to the Chilean port, a distance of over 9,000 miles, the motors were not stopped.

CURIOUS EMBELLISHMENTS OF A PERUVIAN CROSS

In front of a church in Peru stands a cross which in itself differs in no important respect from similar sym-

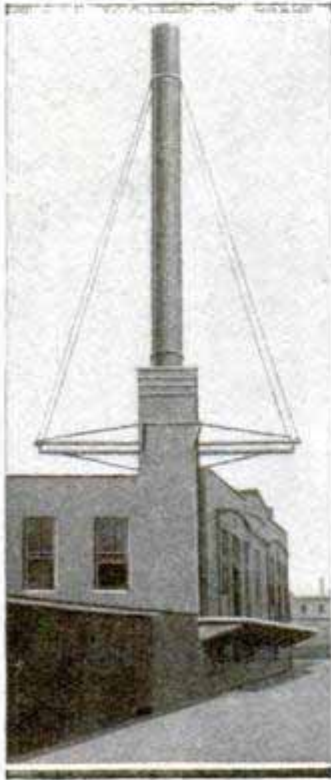


This Cross Bears Many Objects Not Usually Associated with Religion

bols elsewhere. But for reasons which are not made clear to visitors from other lands, this particular cross is hung with a variety of embellishments which do not ordinarily have a votive significance. Among the articles noted by a recent tourist, attached to this cross, are a ladder, a trumpet, a bag of gold, a figure of the sun in the style of the emblematic cartooning of the ancient Incas, a skull and crossbones, a crescent, a worn-out dress, a pennant, two lances, a hammer, a pair of tongs, three dice, a snake, an iron hook, a rooster and a pipe. The only explanation offered is that these have been placed on the cross at various times by pious persons who sought thereby to express religious emotion.

NOVEL METHOD OF BRACING CHIMNEY

A factory in Chicago, which faces on the one side a railroad right of way and on the other a street, could find no suitable anchorage for the guy wires on a tall steel chimney having a brick base. Two I-beams were built into the masonry, parallel with each other and running north and south, and two others, running east and west. From the ends of these beams, guy wires fitted with turnbuckles were connected to a collar on the stack. This construction resulted in octagonal bracing which has proved satisfactory.



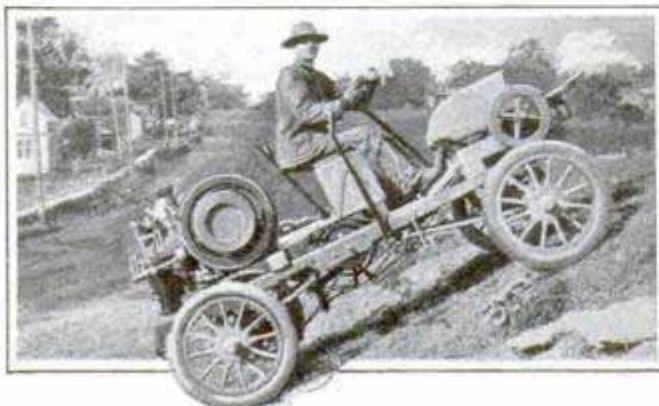
converted into a tractor, with a speed of some seven miles an hour. When the photograph was taken he was demonstrating that his traction wood saw was a hill climber as well.

REFRIGERATOR BARGES NEW TYPE OF CRAFT

For the transfer of perishable freight in New York Harbor, large barges, having provision for protecting the cargo from extremes of heat and cold, have been built. The barges are of the ordinary harbor type, scow built, with an extreme length of 90 ft. and a width of 30 ft. Ice boxes are placed at either end, the ice being taken in through the upper deck and drainage provided into the hold for wastage. Adequate ventilators permit the circulation of chilled air in summer, while a large stove, set on a concrete block, is provided for the winter season. The stove has a guard and sheet-iron frame attached to safeguard the cargo from fire. The barge house is nearly 11 ft. high, and the hold is 9 ft. deep. The barge captain lives on his boat, a cabin being built above the barge house for the accommodation of his family, and his business is to keep constant watch on the temperature.

A TRACTION WOOD SAW MADE FROM AN OLD AUTO

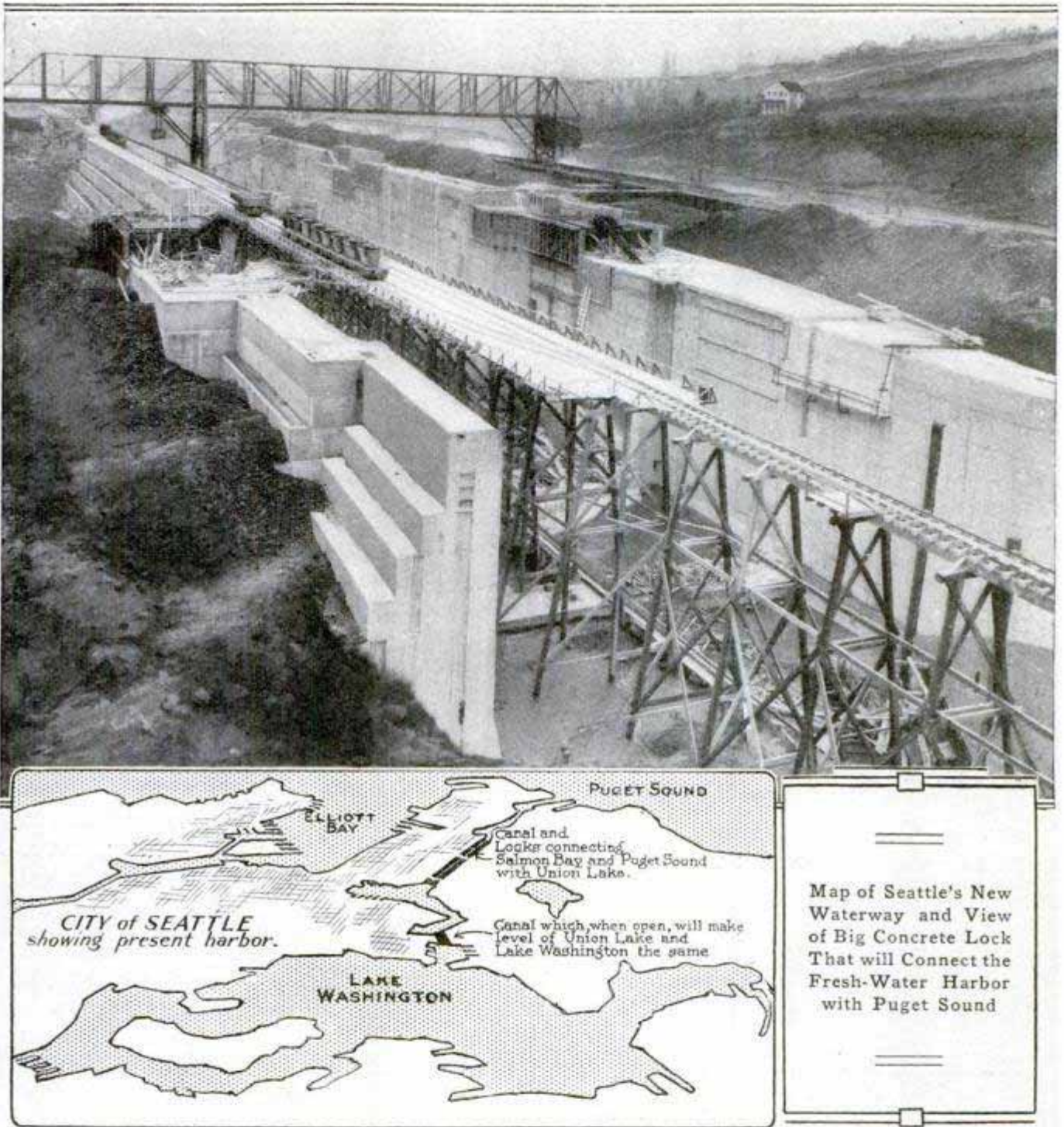
An ingenious Wisconsin mechanic overhauled an old automobile and by adding certain parts to it constructed a power wood saw, which has a capacity of five cords an hour, and also, by throwing in another clutch, could be



Portable Sawmill Made from an Old Automobile

FRESH-WATER HARBOR FOR SEATTLE

One of the most important of the many big engineering projects now being carried out on the Pacific coast is the construction of a navigable canal connecting Lakes Union and Washington with Puget Sound at Seattle, Wash. This work, which will cost a total of about \$3,000,000, is now so nearly completed that it is planned to open the waterway to navigation at the time of the formal opening of the Panama-Pacific Exposition in 1915. The opening of this canal will provide Seattle with a fresh-water harbor, and will make about 100 miles of shore line available for wharves and factories. It will also provide an outlet for Lake Washington and will prevent the annual overflow of the

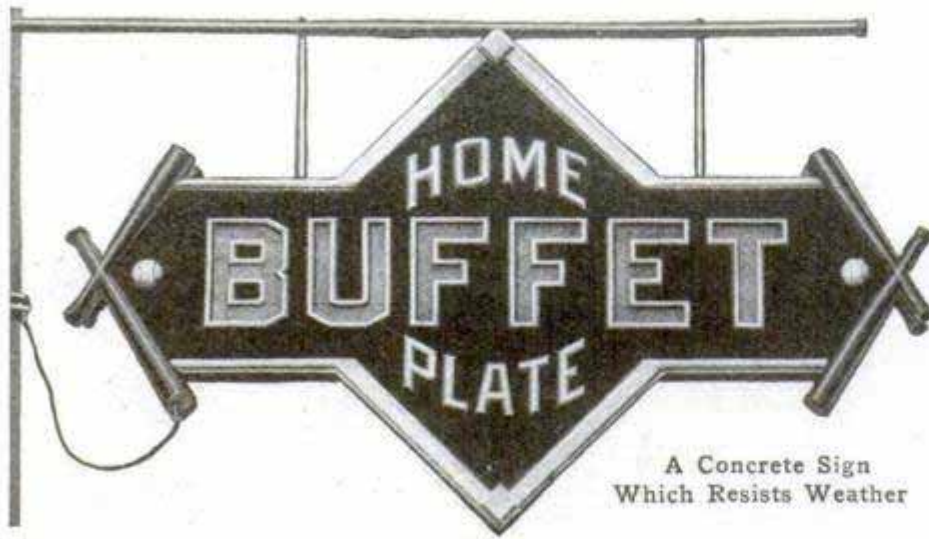


rich valleys lying south of Seattle. The water level of Lake Washington is about 8 ft. above that of Lake Union, from which it is separated by a narrow neck of land. Through this neck of land a canal, now temporarily closed by a gate, has been cut. When the work is completed, this gate will be removed and Lake Washington will be allowed to take the same level as Lake Union. The level of Lake Union is about 10 ft. higher than that of the sound, and this level will be maintained by the construction of a lock at the west end of Salmon Bay,

which is connected with Lake Union by the new canal. Two locks, built entirely of concrete, are under construction at this point. The principal lock, which is to be used by the largest vessels, is 850 ft. long, 85 ft. wide, and 55 ft. deep. Adjoining this on the south, is a lock 150 ft. long, 30 ft. wide, and 18 ft. deep, to be used in raising and lowering the smaller vessels. One of the indirect benefits resulting from the opening of this fresh-water harbor will be the facility afforded for clearing the hulls of sea-going vessels of barnacles.

NOVEL ILLUMINATED SIGN OF CONCRETE

Still another use for concrete has been found by two Florida men, who have produced a reinforced-concrete

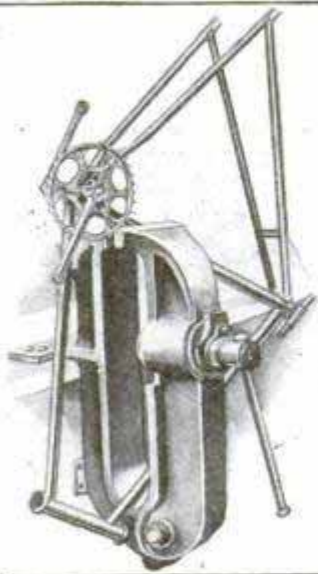


A Concrete Sign
Which Resists Weather

sign which, by means of glass letters, may be illuminated at night. The construction of the sign contains no unusual features, a proper mold being provided, and the color effects produced by tints mixed with the cement. A strong support is given and weather conditions leave the sign unaffected.

BENCH VISE WITH DEEP JAWS

A German manufacturer has recently put on the market a bench vise with extra deep jaws, to accommodate work which otherwise would have to be handled in special jigs. The outer jaw is hinged at the bottom, and the screw does not pass through both jaws, but its inner side is fastened to a U-shaped flange which is a rigid part of the other jaw. The tool is made in a number of sizes and is adapted to many uses.



BIGGEST SAILING VESSEL TO HAVE MOTOR ALSO

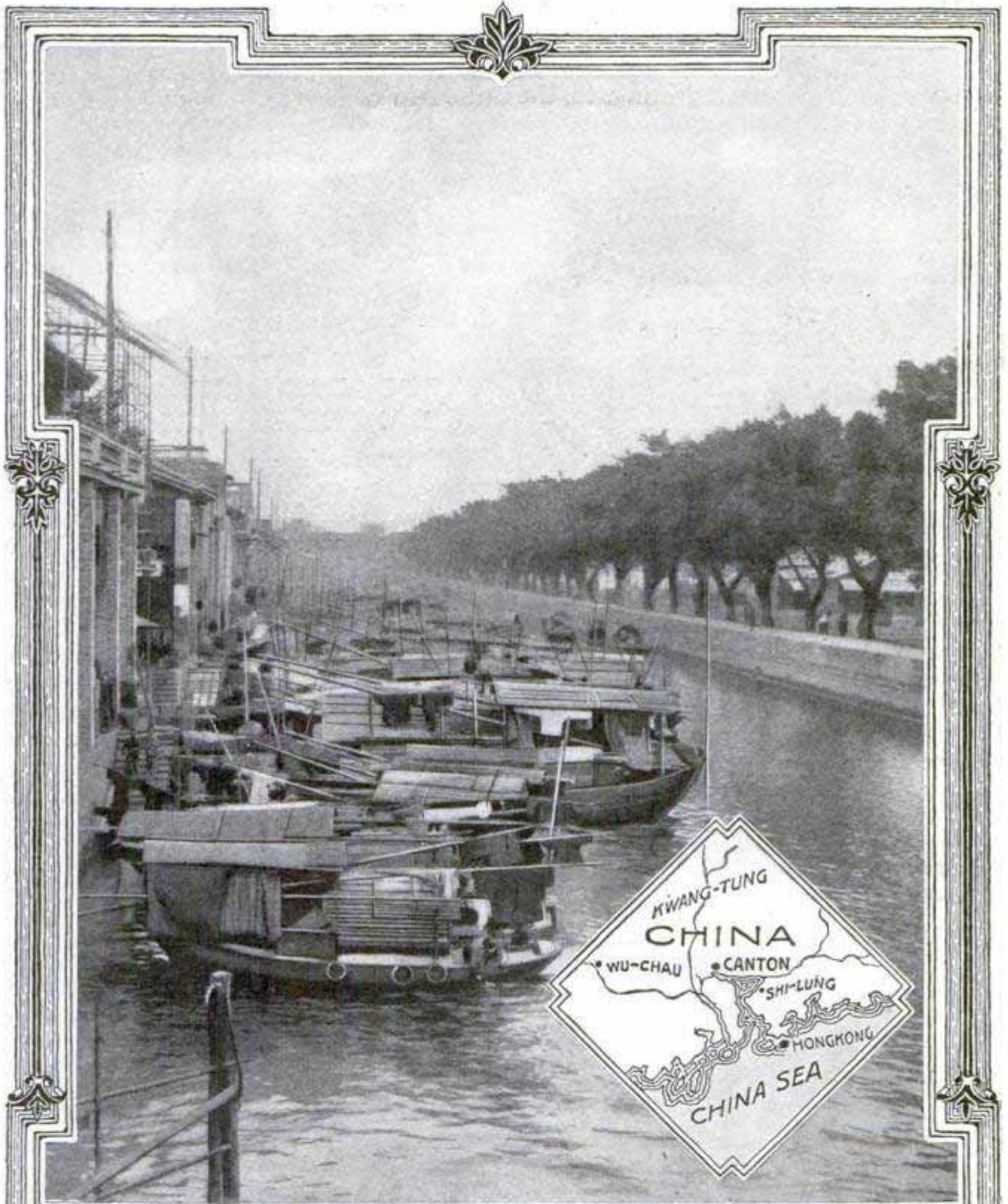
The advent of the large oil engine seems to have caused a revival in the building of sailing ships, paradoxical as it may seem. An order has just been placed with a ship-building concern of Leith, for a 6,000-ton four-masted sailing ship, in which an auxiliary motor of 600 hp. will be installed, by means of which a speed of eight miles an hour may be attained under power alone. The new ship will be 365 ft. long, with a beam of 55 ft. and a depth of nearly 30 ft. It will be used in the Asiatic trade, the motor enabling it to make headway during calms.

RIGHT WAY TO PRONOUNCE LOS ANGELES

Although Los Angeles is pronounced the most beautiful city in California by many travelers, the local Board of Education has decided to inaugurate a campaign of education by means of phonographic records, in order that the school children of the "Angel City" may learn to pronounce the name correctly. The records give the proper pronunciation thus: The "o" in Los is sounded between the "o" in "dose" and the "a" in "law," the "s" being sharply sibilant, as in "loss." The initial "A" is broad, the first syllable being given the sound of "ahn," while "gel," the second syllable, is pronounced "hel," with a short "e," the final syllable also given the short sound of the vowel, and the accent is placed on "An."

According to the census there are 86 women in Great Britain who are plumbers, 70 who are paperhangers, and four who are bricklayers.

ARTIFICIAL WATERWAYS IN MANY LANDS

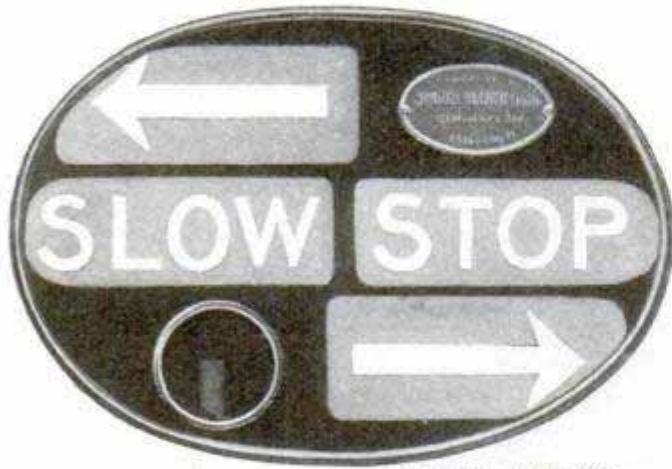


THE canal that separates the Chinese city of Canton from the section set apart for the dwellings and business establishments of Europeans is shown in this photograph. On the left, or north side, the native houses come down to the water's edge, while the native boats, moored to the bank, provide not only means of transportation but dwelling places for their owners. The trees on the right bank are an unusual feature in a Chinese landscape. They have grown up since the canal was constructed, in 1862, on the conclusion of a treaty between the British and Chinese governments, by the terms of which Canton was opened to the trade of the world. An island, 2,850 ft. long and 950 ft. wide, is formed by this canal and the Pearl River, the latter being the name given to the bay or estuary connecting Canton with the sea.

PHOTO COPYRIGHTED BY UNDERWOOD & UNDERWOOD N.Y.

WARNING DEVICE FOR AUTO PREVENTS ACCIDENTS

A mechanism for indicating to the driver of a following automobile which



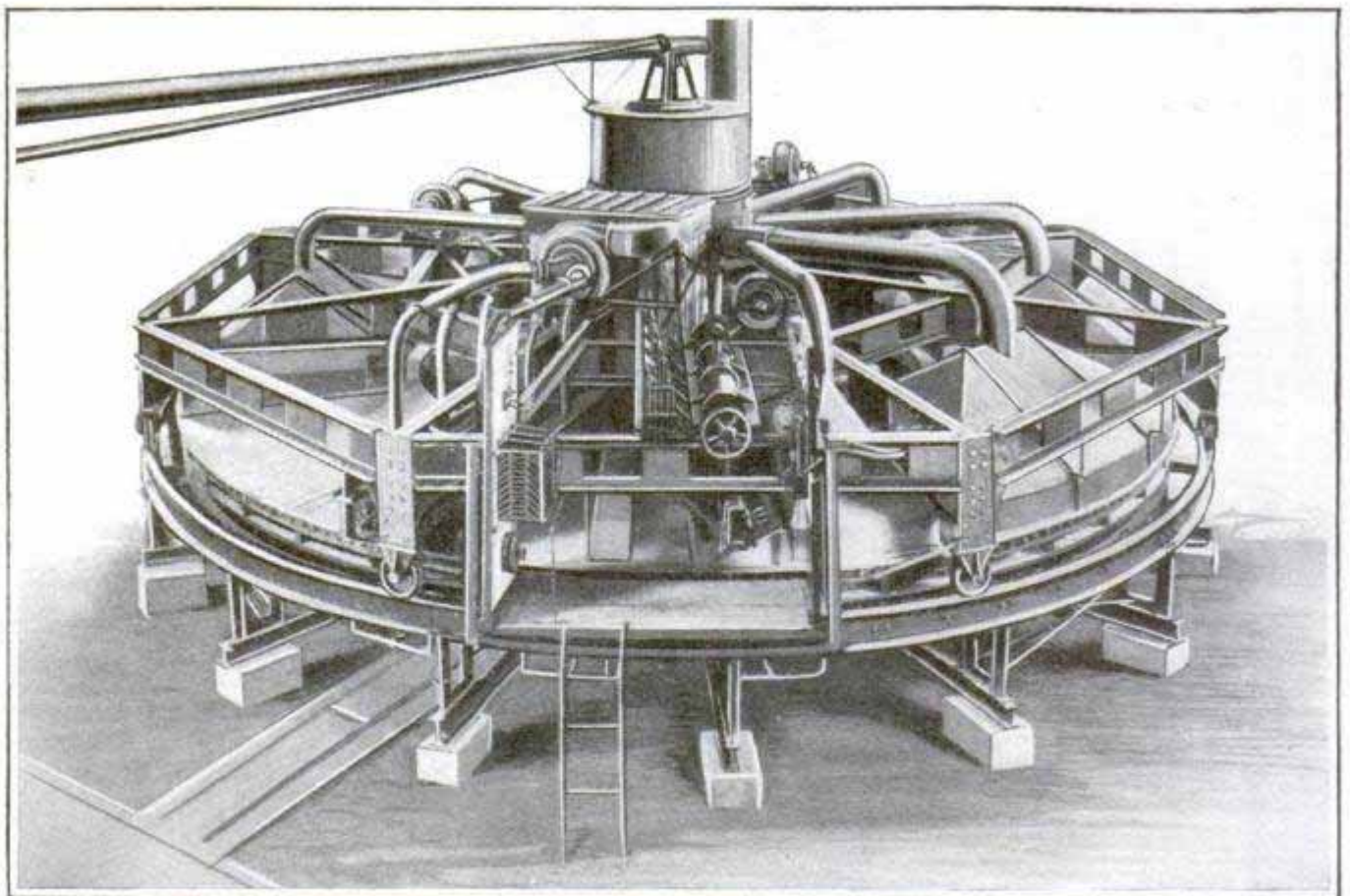
Courtesy of The Car
English Traffic Indicator for Automobilists

way the car ahead is to turn has been placed on the English market recently. The device is, of course, attached to the rear of the car, and provides four illuminated spaces besides the regulation lamp. Located on the steering wheel are two switches, each of which operates an electric lamp on the appropriate

side of the device, and the pressure of a thumb on one switch turns on the current in the corresponding space at the rear of the car. These spaces are of ground glass and have a white arrow on a red background, the illumination thus showing which way the driver intends to turn. The "slow" signal appears whenever the clutch is thrown out or the foot brake is set; the "stop" signal shows when the emergency brake is applied.

WHITE LEAD DRIED WITHOUT DANGER OF POISONING

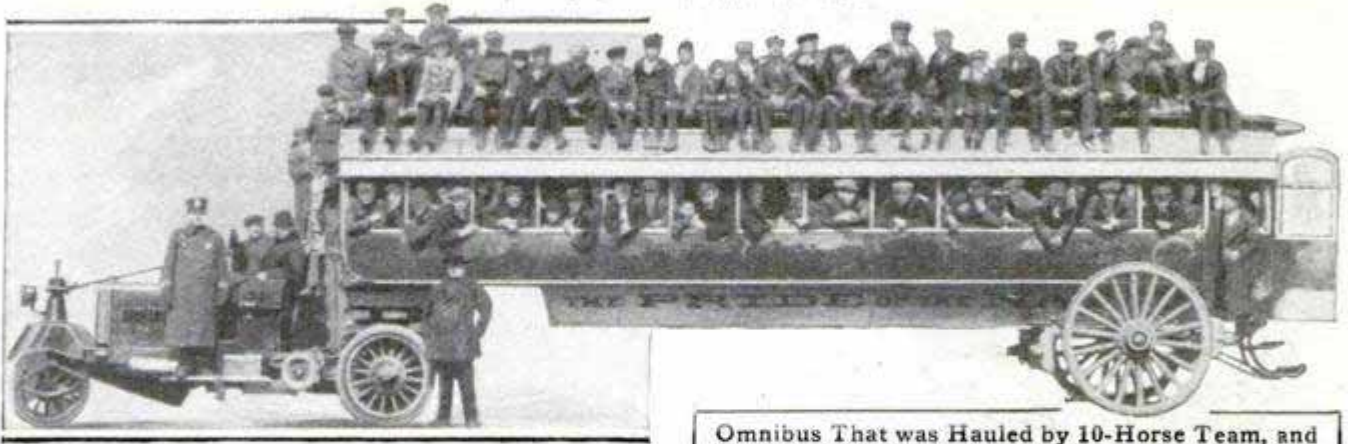
Workmen in charge of the drying of certain mineral sludges are often seriously affected through inhaling the dust produced in drying. These effects are particularly serious when white lead is dried. An apparatus suitable for handling sludges of all kinds has been invented and put into service in a white-lead plant. It is claimed for this that it not only prevents the escape of dust, but operates rapidly and economically. The white lead comes to



This Machine Automatically Dries White-Lead Pulp and Deposits It in a Closed Tank without Producing the Injurious White-Lead Dust

the machine in the form of a pulp which is 55 per cent water. It is deposited by a feeding device as a film

so well preserved that the owner expects to drive over the route of the Lincoln Highway to the Pacific coast



Omnibus That was Hauled by 10-Horse Team, and Carried Passengers to and from the Centennial Exposition in 1876, has been "Motorized" and will be Used at the Panama-Pacific Exposition

on the flat bed of the machine, and is then subjected to a temperature of from 300° to 350° F. The bed of the machine is stationary and forms the top of a series of heating sectors in which steam at high pressure is kept circulating. These sectors are insulated so that all the heat is radiated through the top. Over the bed are the feeding device, shown at the front of the picture, vapor-collecting hoods, and a sludge-removing device, which revolve as a unit around the center of the machine. By the time the sludge is reached by the sludge-removing device it is perfectly dry, and is scraped up and conveyed through pipes to a tank at the center. The vapor is carried through pipes to points outside the building.

CENTENNIAL OMNIBUS STILL IN SERVICE

An old omnibus that plied between the Centennial Exposition grounds and the City Hall at Philadelphia in 1876 has recently been "motorized" and is now in regular service for hauling excursionists in Brooklyn. This vehicle is capable of carrying from 60 to 100 passengers and was formerly drawn by a 10-horse team. In changing it to a power vehicle no alteration was made except to remove the front wheels and axle and rest the end of the omnibus on the rear of a three-wheeled tractor. In spite of its great age, the vehicle is

in 1915 and use it in hauling passengers between San Francisco and the Panama-Pacific Exposition.

RURAL-MAIL BOX ON AN OLD PUMP

An odd sight on one of the main roads of Kansas is a rural-mail box perched on a dis-used and dismantled pump at the roadside. The quaint spectacle attracts considerable attention from passers-by, for the pump, an iron affair such as is commonly used on a farm cistern, or near watering troughs, is minus a handle. The mail box, however, is at the right height for the convenience of the rural free-delivery service and the owner.



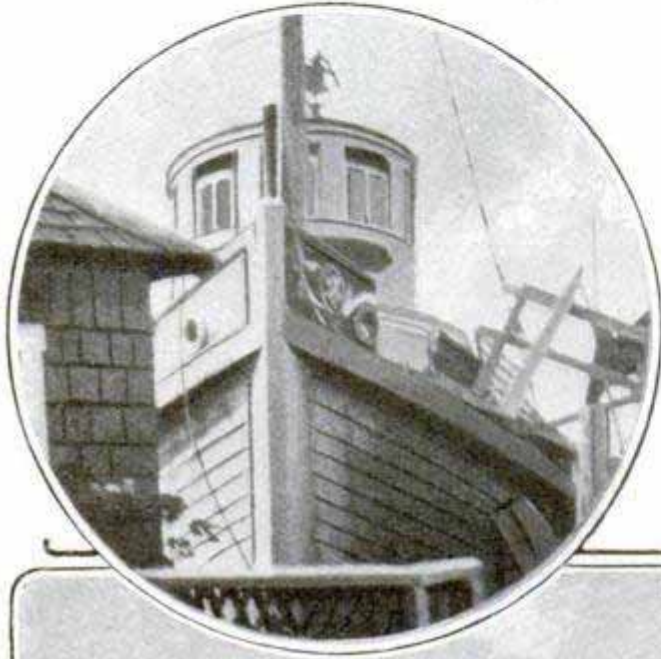
CA motor club with 500 members is a flourishing institution in Shanghai, China.

STRANGE USES FOUND FOR DISCARDED VESSELS

Old vessels that have outlived their usefulness at sea are sometimes turned to strange purposes ashore. The old tug "Warrior," well known in the old

PARISIAN APARTMENT HOUSES WITH TERRACED FRONTS

A curious form of apartment-house construction, designed to provide the greatest amount of light and air and to make possible the erection of higher buildings without violating the stringent height regulations in force in Paris, has been invented and patented by two Parisian architects. In that city the permissible height of buildings varies for streets of different widths, the requirement being that every part of the building façade must be kept back of a sloping line drawn toward the building from the opposite side of the street and forming a specified angle with the horizontal. For the widest streets this line limits the vertical height of a façade built on the street line to 65.6 ft., and any part of



Top View: Old Sailors Find Comfort in a Reading Room and Chapel Made Out of a Dismantled Vessel

Center View: Yacht Club Enjoys Commodious Quarters in an Old Ferryboat

days on the Pacific coast, is beached and used as a reading room and chapel for a sailors' mission at San Pedro. The old salts feel more at home in the craft than in any mere land chapel. A ferryboat, which, by miscalculation was made too big for its job, is stranded on the mud flats near San Diego, connected by a bridge with the land, and serves as headquarters for a yacht club. An old steam vessel, once in government service, is now used as a waiting room, a pier having been built around its upper deck.



Steamer Cabin Now Used as a Waiting Room Has a Pier Built about Its Upper Deck



Courtesy of L'Illustration.

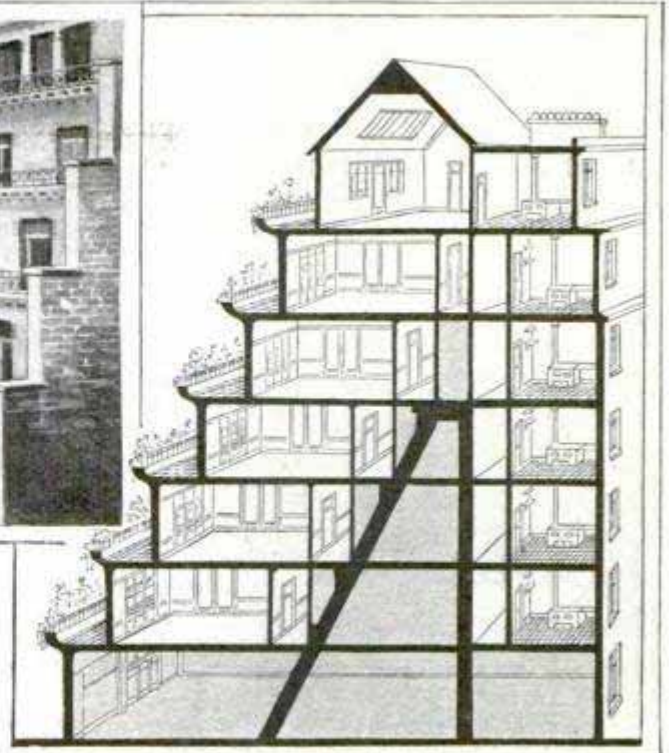
Apartment House in Paris, Built in Terraces for Providing Greatest Amount of Light and Air

the building higher than this must slope back parallel with the line.

The essential feature of the new construction is that the entire facade slopes back as a succession of terraces, and at such an angle as to intersect the limiting line several stories higher than would be the case with a vertical facade. The patented part of the construction is the steel framework, shaped like an inverted "V," which supports the middle portion of the building. To the front of this, in each apartment, are the living quarters, and at the rear are the kitchen and servants' quarters, the two parts being connected by corridors. All apartments have the same amount of floor space, the only difference being in the length of the corridors connecting the front and rear portions. The balustrades of each terrace are so arranged as to shut off the view of the terrace below while allowing an unobstructed view of the street. In the first house built according to this plan the first three stories have a vertical facade while the upper stories are terraced.

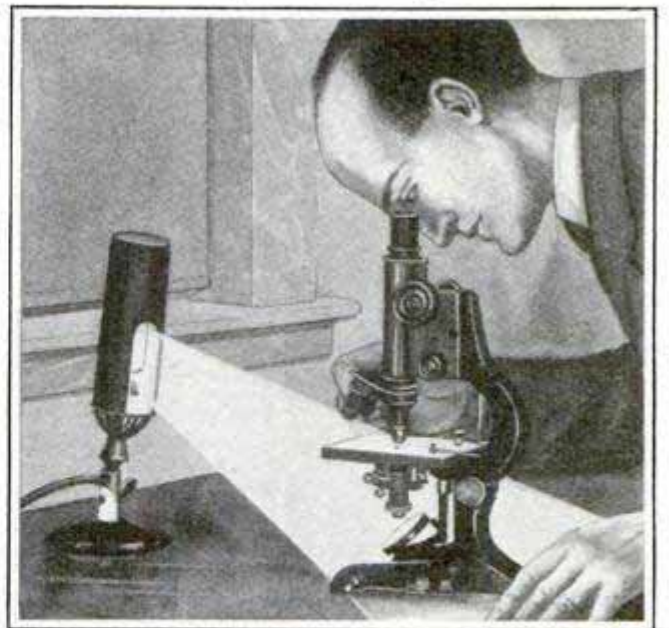
A GAS MANTLE LAMP GIVES BEST LIGHT FOR MICROSCOPE

A clear white light is necessary for successful working with a high-power microscope. Next to daylight from the north, experiments have demonstrated that the gas mantle gives the most sat-



Sectional Drawing, Showing Arrangement of Apartments, and Steel Framework That Supports Middle Portion of House

isfactory illumination. The mantle is mounted upon an ordinary burner, inclosed by an opaque chimney having a sliding opening through which the light is thrown upon the small mirror at the base of the microscope. The burner is so arranged that it may be tilted to the proper angle, permitting the microscope to be placed at the

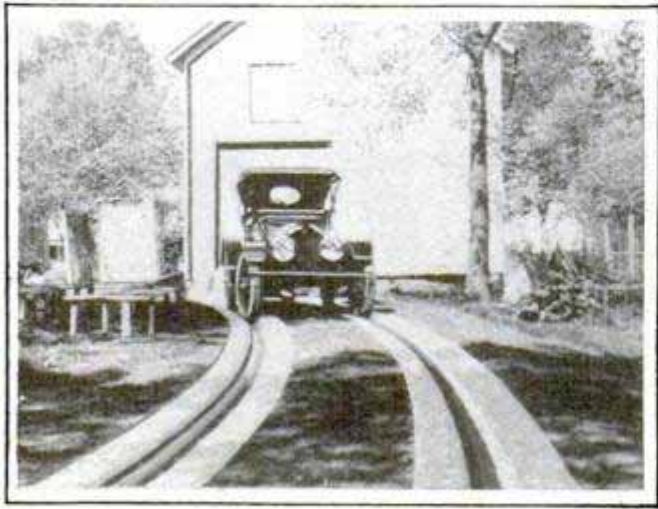


Little Gas-Mantle Lamp Gives Best Light for Microscopic Work

most convenient location on the stand or table, while the lamp is at sufficient distance to prevent heat or interference.

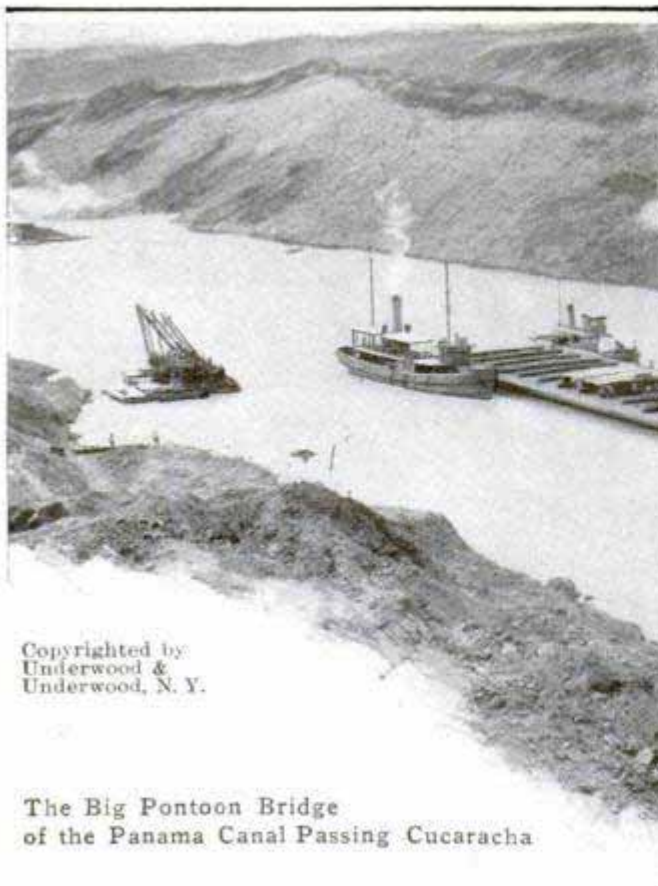
NEW CONCRETE TRACK FROM GARAGE TO THE STREET

Constructing grooved tracks fitted to the wheels of his automobile, a Wisconsin man has done away entirely



Grooved Tracks Make Garaging Easy

with muddy strips cutting through his lawn. An unsightly roadway through the rear of his lot, muddy in spring and fall and dusty in summer, is abolished, and the clean, trim appearance of the concrete tracks adds greatly to the attractiveness of the home. The concrete is laid upon a bed of cinders,



Copyrighted by
Underwood &
Underwood, N. Y.

The Big Pontoon Bridge
of the Panama Canal Passing Cucaracha

reaching below the frost line, and is substantially built. A strip of lawn between the tracks is kept closely cropped and looks like a strip of green velvet carpet along a hallway.

MAGNIFYING GLASS TO AID ENGINE INSPECTORS

An eastern railroad has adopted the suggestion brought forward by one of its engineers, that engine inspectors be given magnifying glasses, in order that they may the more readily detect such damage and imperfections on axles and wheels as flaws and cracks. In this is seen the practical value of the safety-first campaign, in that the suggestion came from an employe, and it is to be noted that the company suitably rewarded him by presenting him with an "honor button," and granting him a month's leave of absence with pay.

TOWING A PONTOON BRIDGE THROUGH THE CANAL

The Panama Railroad will cross the canal, at Paraiso, on a long pontoon bridge, which will be fastened to the east bank by means of huge hinges. When ships are passing through the canal, the bridge will be swung against the east bank, and pulled back into position after the vessels have passed through.

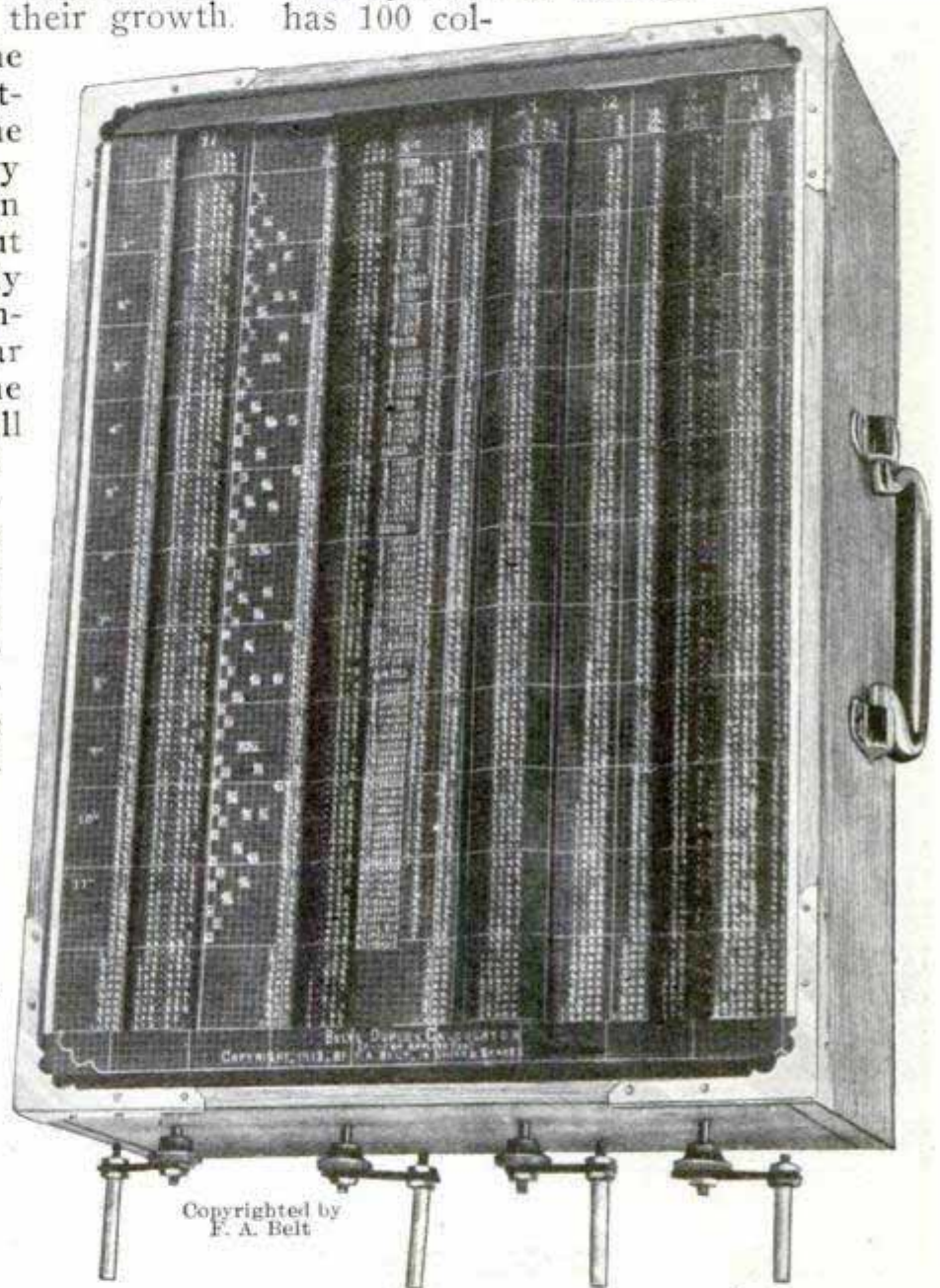
ELECTRICITY PROMOTES THE GROWTH OF CHICKENS

Experiments have been conducted for some time by an English expert in the electrification of small chickens, to discover whether the current exercised any influence on their growth. It is now stated that the results have been startling. Not only has the mortality among very young chickens been greatly decreased, but the birds grow nearly twice as fast when stimulated by the particular electric apparatus, by the use of which the food bill is cut in two. Special intensive houses are provided for growing the birds, and the electricity is applied by means of a combined high-frequency and positive apparatus, through a large coil of heavily insulated wire wound round each house in the form of a spiral. This produces a large and intense electric field. While the current is on, the birds are highly charged with electricity, but appear entirely unconscious of any unusual effect. The current is turned on for 10 minutes every hour from 7 a. m. till 6 p. m., and stimulates the chickens, enabling them to get largely increased weight from a given quantity of food.

NEW CALCULATING MACHINE EASILY OPERATED

A new calculating machine which has just made its appearance is not only adapted to all kinds of commercial and professional work, but is so simple in operation that its use requires

no mathematical ability other than that needed in setting and reading figures correctly. This machine has four cylinders, each controlled by a crank at the bottom of the case, and five panels carrying tabulations of figures. The cylinder at the left has 100 col-



Simple Machine with Which Many Kinds of Calculations can be Performed

umns of figures. In conjunction with the adjacent panel it gives the number of cubic feet in a beam of any length. This cylinder is also used for calculating board measure and for finding the cost of articles listed by the gross. The second cylinder multiplies any areas in square inches by linear inches, giving the result to the nearest thousandth of a cubic foot, and is also used for calculating prices by the gross and

for finding circumferences and circular areas. The third cylinder multiplies and divides whole numbers, extracts square roots and gives interest, discounts, etc. The right or fourth cylinder is used to multiply and divide fractions and to determine the foreign equivalents of moneys, weights and measures.

A MOST UNUSUAL LAWN ORNAMENT

On the sloping lawn of a country house near Los Angeles stands a most unusual ornament, a large globe of



crystal, supported upon a concrete pedestal. This shining sphere of glass acts as a mirror from any position the observer may take, reflecting the landscape with singular clarity. The concrete pillar upon which it is poised is hexagonal, some 4 ft. in height. As the summer sun glistens from the polished surface of the globe, it is

visible from long distances, and is a landmark in that section.

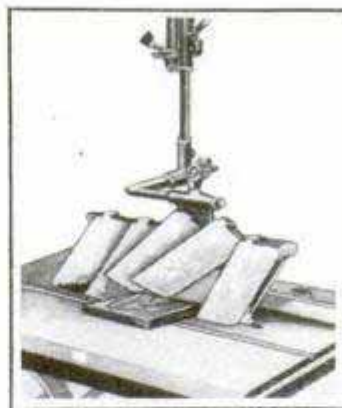
UNDERGROUND GALLERIES OF WELBECK ABBEY

On the coming of age of the Marquis of Titchfield recently, the famous underground galleries of Welbeck Abbey, in England, were thrown open and over a thousand guests were entertained under surroundings that suggested a scene in fairyland. This abbey, with its vast system of underground apartments and passages, is one of the wonders of England. The fifth Duke of Portland had a passion for privacy, and this underground sys-

tem is one of the undertakings on which he is said to have spent about \$35,000,000. The principal feature is the subterranean picture gallery, 160 by 64 ft., containing many priceless works of art and lighted by 12 enormous glass chandeliers. From the park entrance to the abbey there is an underground drive, $1\frac{1}{2}$ miles long, from which tunnels, having a total length of 11 miles, branch in all directions. Among the principal underground apartments are the riding school where Joseph Chamberlain once addressed an audience of 5,000 persons, a tanbark track, a quarter of a mile long, which is said to be the finest indoor exercise ground for horses in the world, and a "rose corridor," 150 yd. long. All the corridors and apartments are hung with tapestries, are well heated and lighted, and are richly decorated. Balls and banquets are held in three large apartments adjoining the picture gallery.

GUARD FOR CIRCULAR SAW HAS NEW DESIGN

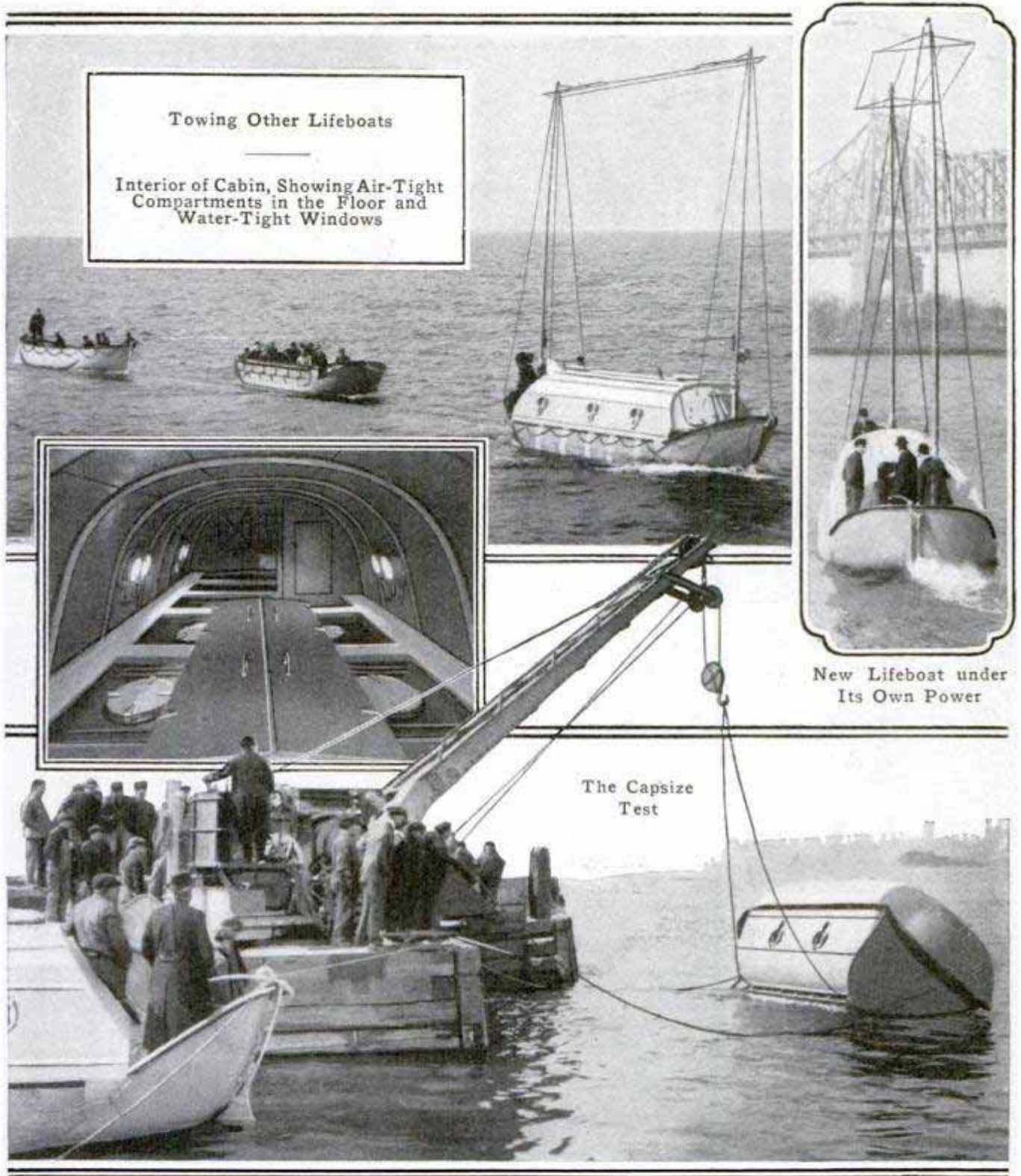
A self-adjusting safety guard for a circular saw has recently been invented which is made in sections, pivoted at



their upper end, so as to permit the passage of boards beneath, while preventing small pieces from being thrown back or the hand of the operator drawn into the saw. The last piece on the guard is

equipped on its lower edge with toothed points or dogs, arranged to engage a board as soon as it has passed through the saw and thus preventing it from coming back. The guard is arranged upon a bar, which may be adjusted to any desired height, or it may be locked out of the way when the saw is to be taken out for sharpening or change.

SELF-RIGHTING LIFEBOAT OF NEW TYPE



Photos by Edwin Levick

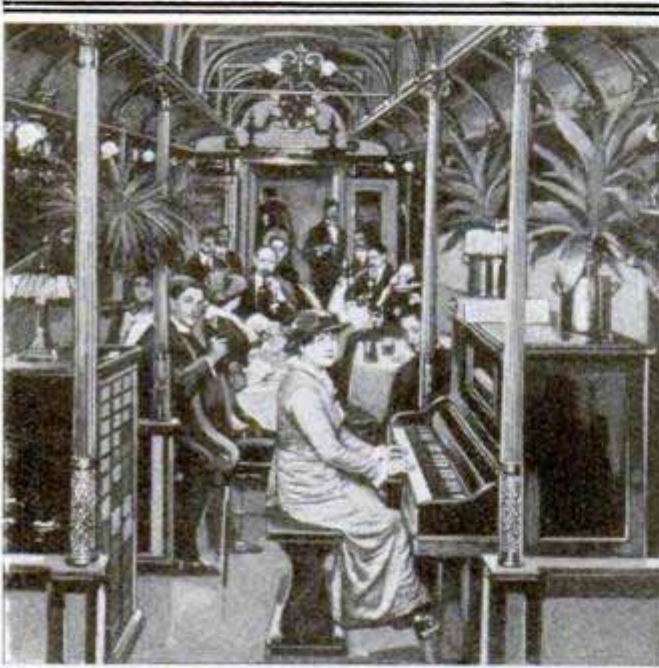
A new lifeboat designed to be both unsinkable and unsmashable adds to those most important features a wholly inclosed cabin. Water-tight iron doors and windows are provided, protecting passengers against dashing waves, and the danger that the boat may be upset or persons washed overboard in the heavy seas. In tests of

this type recently made off Sandy Hook, 50 passengers were carried in the cabin of the craft, and 17 hung on to the outside guard rail on one side, but the boat did not even list perceptibly. This boat is built in several sizes, the 30-ft. craft being equipped with a 24-hp. motor capable of driving the vessel six miles an hour, and a com-

plete Marconi wireless apparatus with a sending range of 75 miles. A line was put under the boat and it was pulled over, upside down, but immediately righted itself on the strain being removed, no water entering during the test.

AN ARGENTINE DINING CAR EQUIPPED WITH PIANO

The direct route from Buenos Aires to Asuncion, Paraguay, recently opened by the Central Cordoba Railway, is a



Interior of One of the Dining Cars on a Railway
of the Argentine Republic

model of modern railway service. The restaurant cars, besides being ornate, have palms and plants, electric lights in artistic fixtures, and, an innovation in railroading, a piano in each car, so that the passengers may enjoy music while dining. The same line is also equipped with private family cars, and on some of these pianos are installed, fitted with mechanical piano players, so that any member of the family may perform to while away the tedium of a long journey.

¶Through a law passed in 1616 and containing the maxim "The crown receives but does not pay duties or taxes," the city of Montreal, Canada, has lost its \$857,000 tax claim against the Montreal Harbor commissioners.

BALLOONS PROVE HELPLESS AS WAR CRAFT

The helplessness of a balloon in time of war as compared with other military air craft was demonstrated recently in a mimic siege of Frankfort, Germany. It was assumed that communication with the outer world had been cut off, and the attempt was made to carry messages over and beyond the enemy's forces by means of balloons, a thing that was done repeatedly during the siege of Paris in 1870-71. Eight balloons were sent up from Frankfort, and when they had reached a height of about half a mile a like number of biplanes were sent up to cross them in midair and thus demonstrate their ability to destroy the balloons in time of war. One aeroplane crossed four balloons in 1 hr. 16 min., another crossed seven in 1 hr. 45 min., while a third crossed seven in 2 hr. 59 min. Four balloons were captured by military motor cars as they landed, while the other four landed in safety beyond the enemy's lines.

USEFUL HEADRESS OF AFRICAN WOMEN

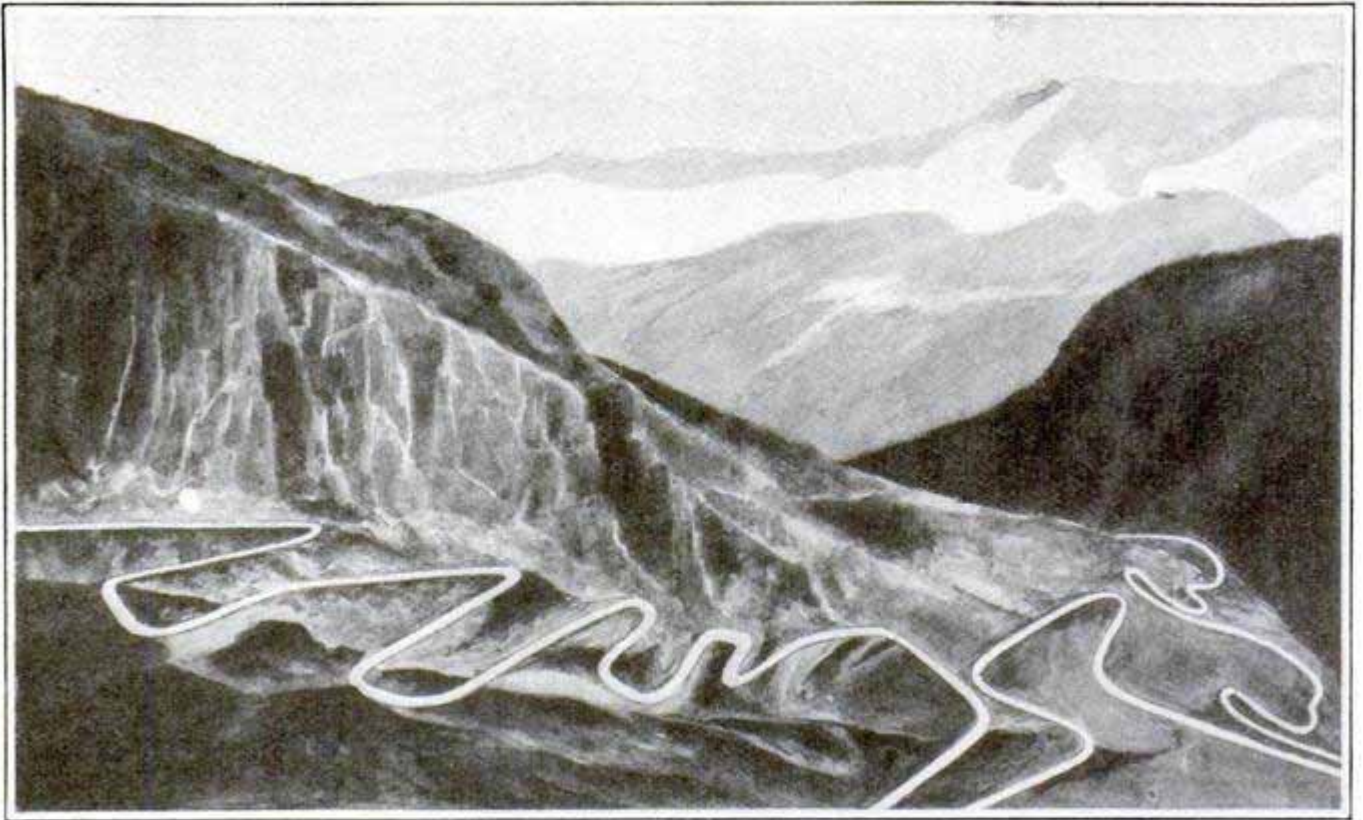
The married women of the Baralong tribe in Africa wear hats that are designed not only for ornament but for utility, as will be seen from the illustration on the opposite page. These women do the heavy work of the tribe. As the men object to doing the work of nurse maid, it is necessary for the mothers to take their children with them to the fields where they labor. South African women are capable of carrying heavy loads on their heads with perfect security, and when the baby goes with its mother it is carried in this basket-like hat. The hat is lined with the hairy part of an animal skin and the baby is as comfortable as any civilized baby in its modern bassinet or crib.

¶It is reported that 90,000,000 broom handles are used annually in the United States.



Headdress That Serves
as a Crib, Worn by
the Baralong Women
of Africa

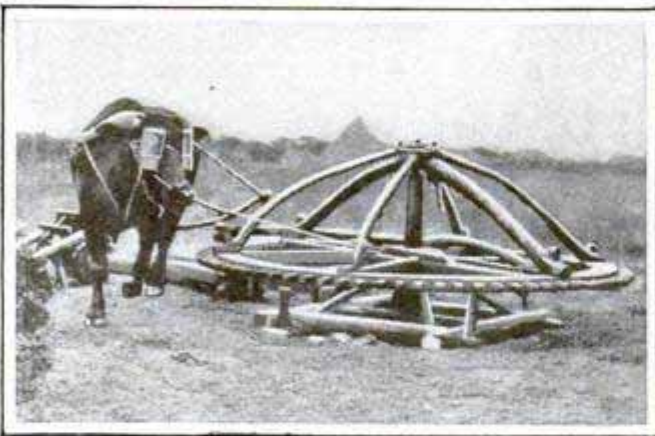
COPYRIGHTED BY UNDERWOOD & UNDERWOOD



A Trip through Cloudland on Motorcycles

OX WEARS CHUNKS OF WOOD FOR BLINDERS

Near Hongkong may be seen, on every side, the primitive water wheel used for irrigation throughout the entire Orient. Here the motor is an ox, and in order that the patient animal may keep everlastingly at it, he is blindfolded, the blinders in this instance being chunks of wood. What advantage is gained by using the



Chinese Irrigation Works Driven by Blindfolded Ox

heavy and cumbersome blocks of teak or bamboo as a blindfold is not apparent to the western mind, but their use is not unusual in China.

A WINDING ROAD IN THE FRENCH ALPS

European motorcyclists are to take part in an international six-day trial contest this summer in the French Alps, in the district surrounding Grenoble, which presents difficulties enough to test out the merits of their best machines. Remarkable winding roads reduce the steepness of the ascent, while they lengthen greatly the distance to be traversed. An altitude of 8,600 ft. is reached on Col du Galiber, where the mountain is pierced by a tunnel two-thirds of a mile long.

FLYING BOAT REPAIRED AT SEA

A Danish airman while making a 28-mile flight along the coast of Denmark in a flying boat, in which he carried two passengers, was compelled to light on the sea to repair a broken valve. In spite of the rough sea that was running this was accomplished successfully. During the flight the machine was in the air for 32 minutes, while one hour was spent in carrying out the repairs.

CITY'S GAS MAINS RUN UNDER THE SEA

The problem of distributing gas to the different sections of Kristiansund, a Norwegian city which is built on three islands far out in the sea, was solved by using seamless steel tubes, carefully tested and joined together and laid on the floor of the sea by divers. Extraordinary precautions were taken to avoid leakage, and provision made for siphoning off the condensation occurring in the mains, which at their lowest level are 85 ft. below the surface of the water. The gas plant lies on the shore about $2\frac{1}{2}$ miles from the city.

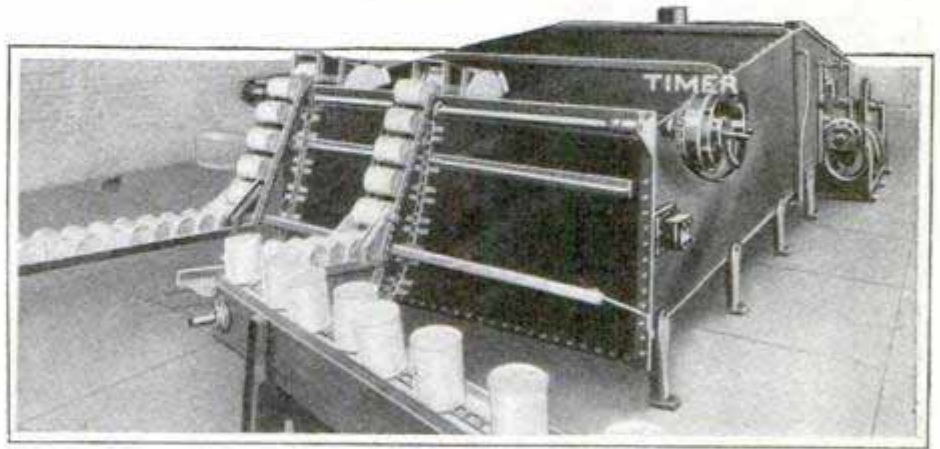
USE OLD TIRE TO PROTECT NEW ONE

By an arrangement of lugs fitted with rings which may be bolted into an old tire casing, English motorists save wear and tear on their new tires. The device, which has only recently been brought out, is designed to prevent the cover of the good tires from coming in contact with the road surface. Kept in place on the new tire by a chain of a particular design, old covers protect the new tires to such an extent that it is practically impossible for a puncture to occur. There is no creep, no wear, nor friction between the outer cover and the tire, and it is almost impossible to discover from the appearance that a discarded cover is being used on the wheel.



AUTOMATIC COOKER FOR CANNED FRUITS

A machine for cooking fruits and vegetables, employed in canneries, is of ingenious construction and design.

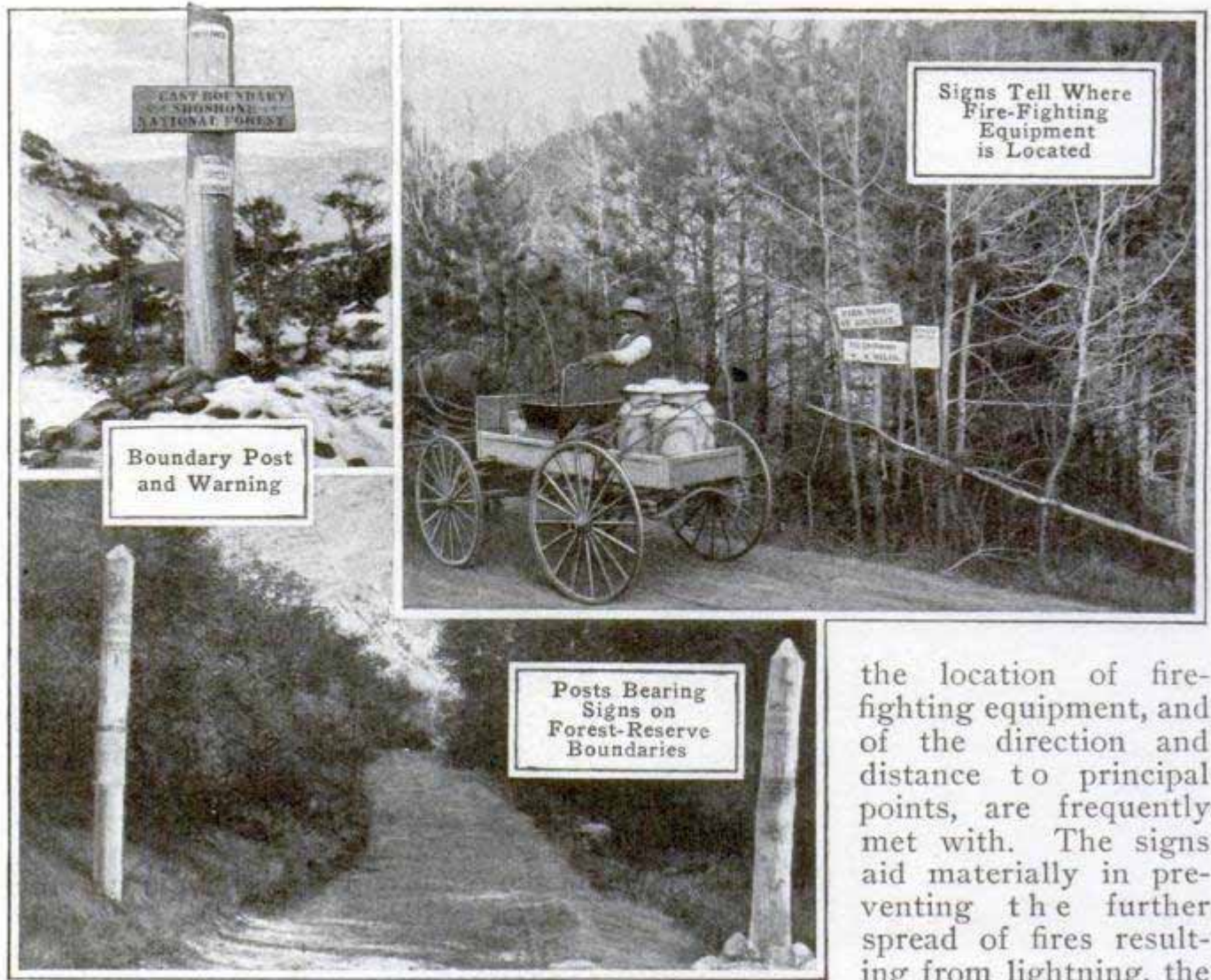


Machine for Regulating Cooking of Canned Fruit

The cooking is done after the cans are sealed and the cans are fed into the cooker and discharged from it automatically. A timing device is attached by which the cans are kept in the cooking bath, either of steam or hot water, for the required length of time, and the machine will handle one or more lots requiring different cooking periods, at the same time. The cans are constantly agitated while in the cooker, bringing every part of the can into direct contact with the heat.

SHIP BURNS WHILE UNABLE TO SUMMON HELP

With its wireless equipment put out of commission by an explosion, the Leyland liner "Columbian" was completely destroyed by fire on May 3, 1914, without being able to send out the call for help that might have brought a dozen vessels to the rescue, and the crew was compelled to make an unaided fight for life such as was a common incident of the sea before the invention of wireless. The ship was discovered, burning and apparently abandoned, over the Grand Banks of Newfoundland, about 300 miles from Cape Race, but the smoke was too dense for its identity to be learned. Before this, a faint call for help, that



was shut off suddenly before the name or location of the ship was given, had been heard by the wireless station at Sable Island, Nova Scotia. The burning ship remained a mystery for two days, when a boat carrying a part of the crew was picked up. It was then learned that a fire starting in the hold of the "Columbian" had been followed almost immediately by a series of violent explosions that wrecked the midship portion of the vessel and destroyed the wireless apparatus.

SIGNS BESIDE THE ROAD WARN AGAINST FIRES

The U. S. Forest Service has marked the boundaries of forest reserves wherever they are intersected by a public road. The signs are proving effective warnings against fires in western forests. Roadside signs telling of

the location of fire-fighting equipment, and of the direction and distance to principal points, are frequently met with. The signs aid materially in preventing the further spread of fires resulting from lightning, the cause of nearly half the

LARGE PUMPING PLANT FOR EGYPT

fires the Forest Service has to contend with.

The Egyptian government has placed a contract for an exceptionally large pumping installation which is to be erected near Baltim, in the delta of the Nile. The equipment consists of eight 400-hp. Diesel engines and six steam engines of 475 hp., each unit coupled direct to centrifugal pumps. This powerful battery is expected to deliver nearly 100,000,000 gal. of water an hour. The plant will also include a lighting station, repair shop and special devices for registering automatically the height and flow of water.

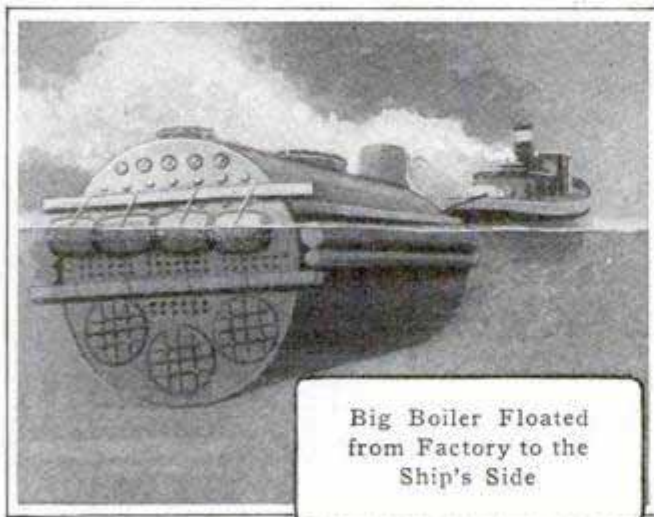
Two floating cranes for the Panama Canal are being built by a German manufactory.

EMERGENCY CONTROL FOR AUTOMOBILES

A device for stopping an automobile, which can be operated by a passenger in emergencies, such as the fainting or sudden disability of the chauffeur, has been patented by an English inventor. The invention permits the quick stoppage of the car, whether it is going forward or backward, without interfering, however, with the ordinary management of the automobile under normal conditions. Two friction wheels, which are normally held apart by a spring, may be shifted by a push button or by a lever so as to engage the rear wheel and drive a gearing, winding up a chain which pulls the brake. The mechanism is contained in a small case bolted to the frame of the car.

FLOATING A HUGE BOILER TO A STEAMSHIP

A 50-ton boiler was recently floated to a large French freight steamer from the boiler factory, as transportation by land would have been both costly and difficult. The boiler was first moved down to the water's edge on temporary wooden slideways, and, after being carefully braced with heavy timbers, a large number of empty barrels were attached, and the boiler was then towed

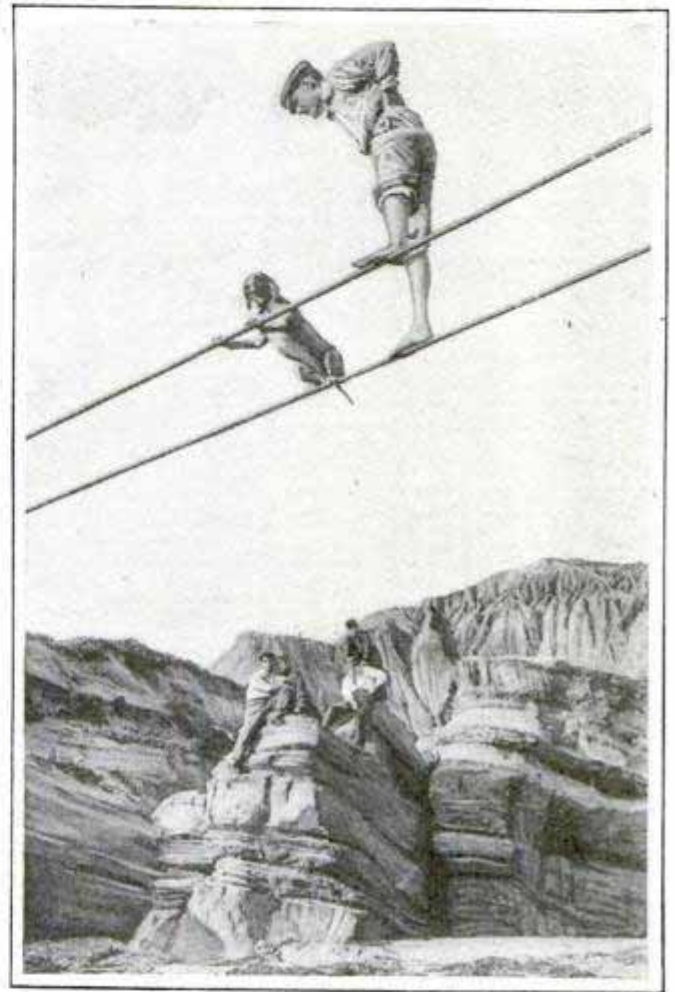


Big Boiler Floated
from Factory to the
Ship's Side

to the shipyard, where cranes were used to lift it in position in the vessel in the usual manner.

DOG PERFORMS ON ROPES WITH MASTER

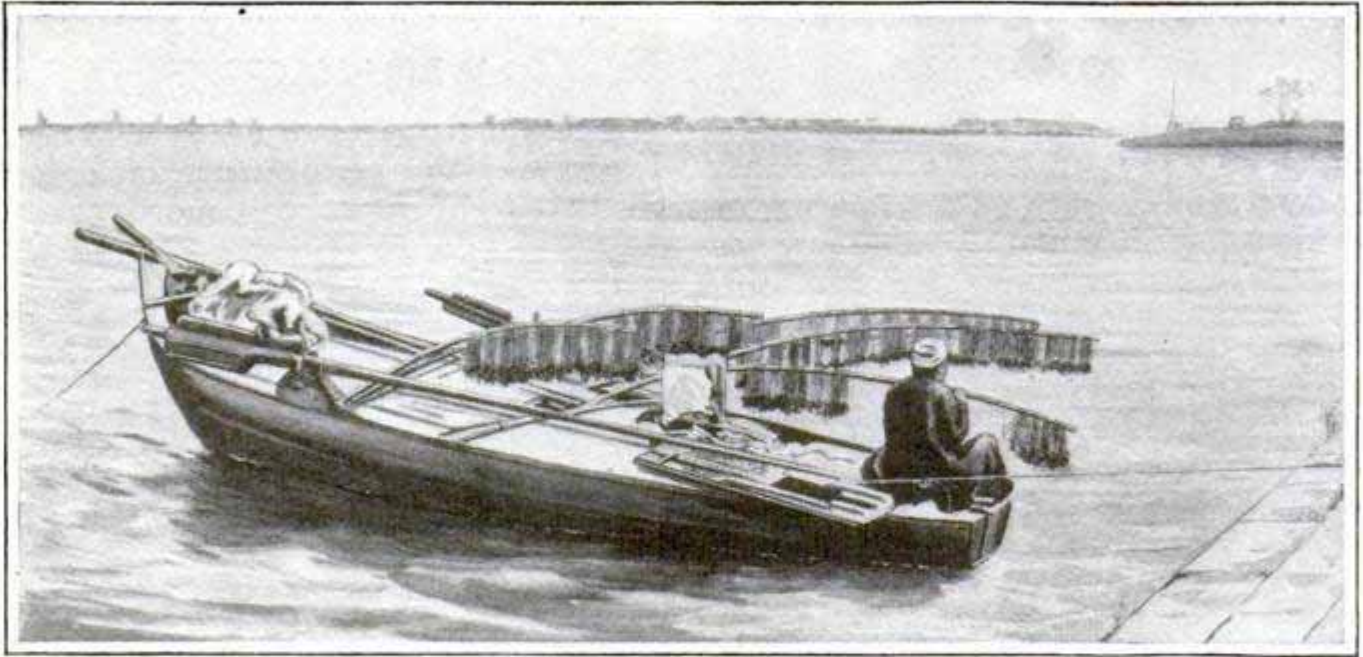
A strange sight at a beach near San Diego was the performance of a dog on two tight ropes suspended above



A Canine Tight-Rope Performer

the water's edge. Through patience and kindness his master had trained the animal to venture out upon the slender supports and, by carefully edging his way along, to traverse the distance between the posts. The man, who was barefoot, continually spoke to the dog, encouraging him, and the two proceeded slowly but safely to their destination. Although the dog showed no hesitation in entering upon the difficult journey, he was plainly glad when his feet once more touched the ground, showing his joy by eager barks and a frantic wagging of his tail.

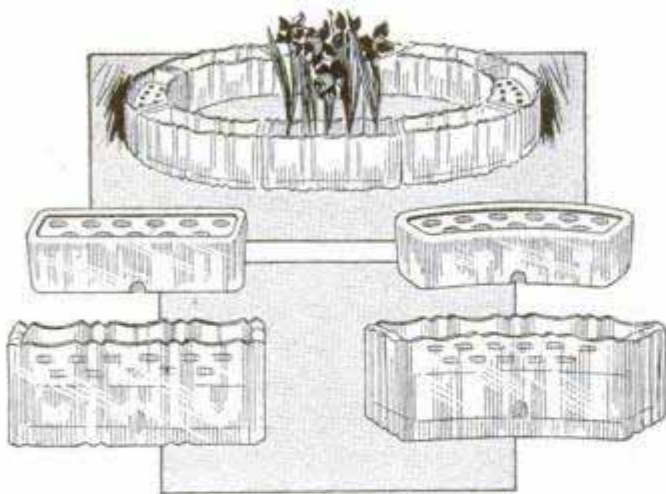
Efforts are being made in Congress to prohibit the purchase from foreign manufacturers of bunting used in making flags for the United States Navy.



Nile Fisherman Preparing for an Expedition

ORNAMENTAL CUT-FLOWER HOLDER

An unusually attractive table decoration is provided by a recently designed glass receptacle for holding cut flowers upright and in natural position on the table, giving the appearance of growing out of the water. The ornament is in two parts, the outer, a shallow dish, either circular or oblong, ornamented or plain, while the inner is removable, and is perforated, the stems of the flowers being stuck through the



Device Adds to the Beauty of Floral Arrangement

holes. Water is placed in the receptacle, and reaches the ends of the stems through the perforations, while the blossoms are not bunched or crowded, as is often the case in vases of the ordinary trumpet shape.

HOW EGYPTIANS OBTAIN FISH FROM THE NILE

The Nile, besides giving fertility to Egypt, tempering its climate, and promoting its commerce, is an inexhaustible reservoir from which the inhabitants draw no inconsiderable portion of their food. Fishing boats are seen continually, and although the fish caught around Cairo are very soft and flabby, with a muddy flavor, the natives show no disgust in eating them, even after they have reached a stage which Europeans would consider spoiled. The photograph shows a "feluka," as the native boats are called, in which a fisherman is preparing his hooks for tomorrow's catch. The long poles are not used in fishing, but merely employed while the hooks are being baited, bread or old meat being used for bait. The hooks having been baited, they are attached to lines and in the evening are put out in the stream with gourds for buoys. Some of the hooks are not baited, and many fish are caught on these when the lines are drawn in the next morning.

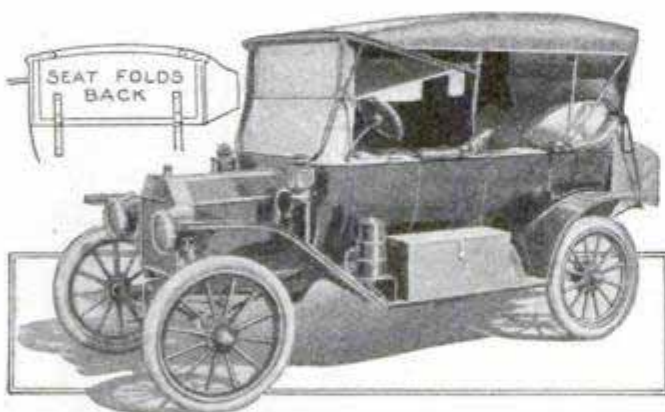
☐ A total of 219,618,014 cu. yd. had been excavated by the American forces at Panama on April 22, 1914, leaving 12,734,986 cu. yd. still to be excavated.

EXPLOSION OF AN EMPTY GASOLINE TANK

As some workmen in an English shop were engaged in welding a crack in an empty gasoline tank, using an oxyacetylene apparatus, a violent explosion occurred, blowing the top of the tank off and fatally injuring one of the workmen. Investigation demonstrated that the tank had been cleaned by simply rolling it up and down the yard, while steaming was the usual and proper method of cleaning these tanks. The amount of vapor left in the tank was sufficient, when ignited by the intense heat of the oxyacetylene flame, to cause the damage.

AN AUTO MADE INTO A CAMP OUTFIT

By unlatching the backs of the front seats, and lifting them out, and then laying extra cushions on supports and a light mattress over all, an automobile owner transforms his car into a camping outfit which he declares to be the equal of a summer cottage. A trunk rack is strapped on behind, wall pockets are buttoned on the rear curtain, and a shelf is combined with a covering for the windshield so that a place is formed for the clothing when retiring. Gas is piped into the car from the gas tank, and the side curtains are arranged to support mosquito



Convenient Arrangement for Long Cross-Country Tours in an Automobile

netting when needed. The berth can be made up and everything made snug for the night in very short time.

FOUR-WHEELED AEROPLANE FOR LOOPING THE LOOP

An odd-shaped air craft, having four wheels, two aloft and two below the plane, has been successfully tried out



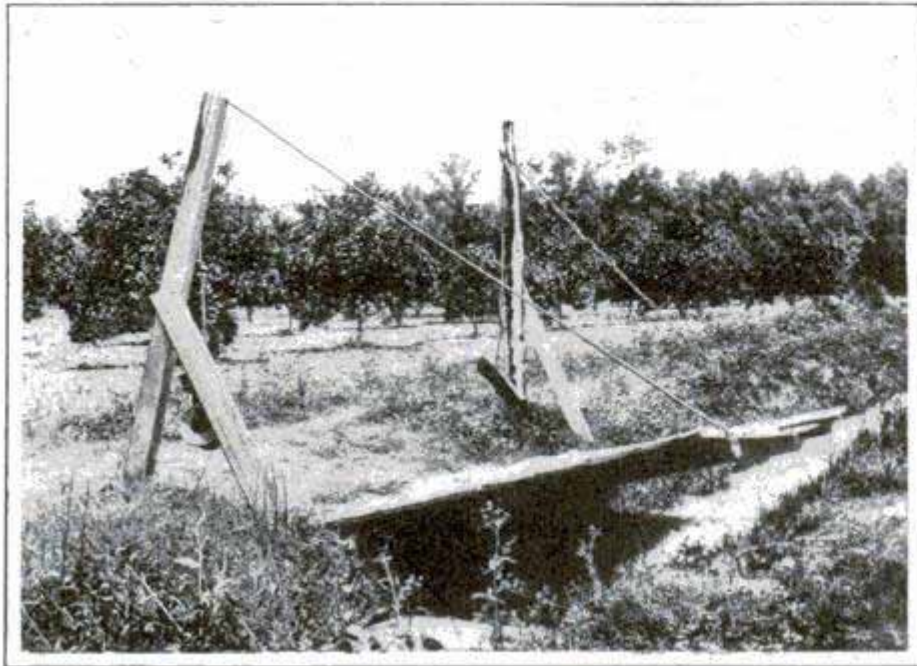
Novel Arrangement for Upside-Down Flying

in Germany. In upside-down flying, which is now the fad in aviation circles, there is still some apprehension of fatal accident should the plane not right itself when once reversed. The novel installation of additional wheels would seem to support the idea that a landing while upside-down might be effected in safety.

SOUTHERN PLANTERS FIGHT ANT INVASION

Orange growers and sugar planters of the southern states have been compelled to find a way of checking the inroads of the Argentine ant and of protecting their crops and orchards from destruction by these pests, which have lately found their way into the northern hemisphere. Many of the orchardists have resorted to the plan

of surrounding their farms with cement-lined trenches which are kept full of water. Across these miniature moats are thrown bridges which are hinged at one end like the medieval drawbridges, and so weighted that



Moat, Crossed by Crude Drawbridge, Protects Orchard from Invasion of Argentine Ant

when not in use the free end is raised above the bank of the trench, an arrangement that provides an effectual barrier against the ant invaders.

HARD TO PRODUCE THE "S" SOUND

There is one sound of the human speech which it is practically impossible to perfectly reproduce by mechanical means. It is the sound of the letter "s." Neither the telephone nor the phonograph renders it properly. Lord Rayleigh, an English physicist of note, was the first to observe this and to subject the phenomenon to scientific investigation. He found that to pronounce the sound "s" the muscles of the mouth must exert only a slight pressure upon the air, but at the same time the breath must be projected with such force as to produce not less than 1,000 vibrations of the air waves per second. This is a higher number than in the case of any other sound of the human speech.

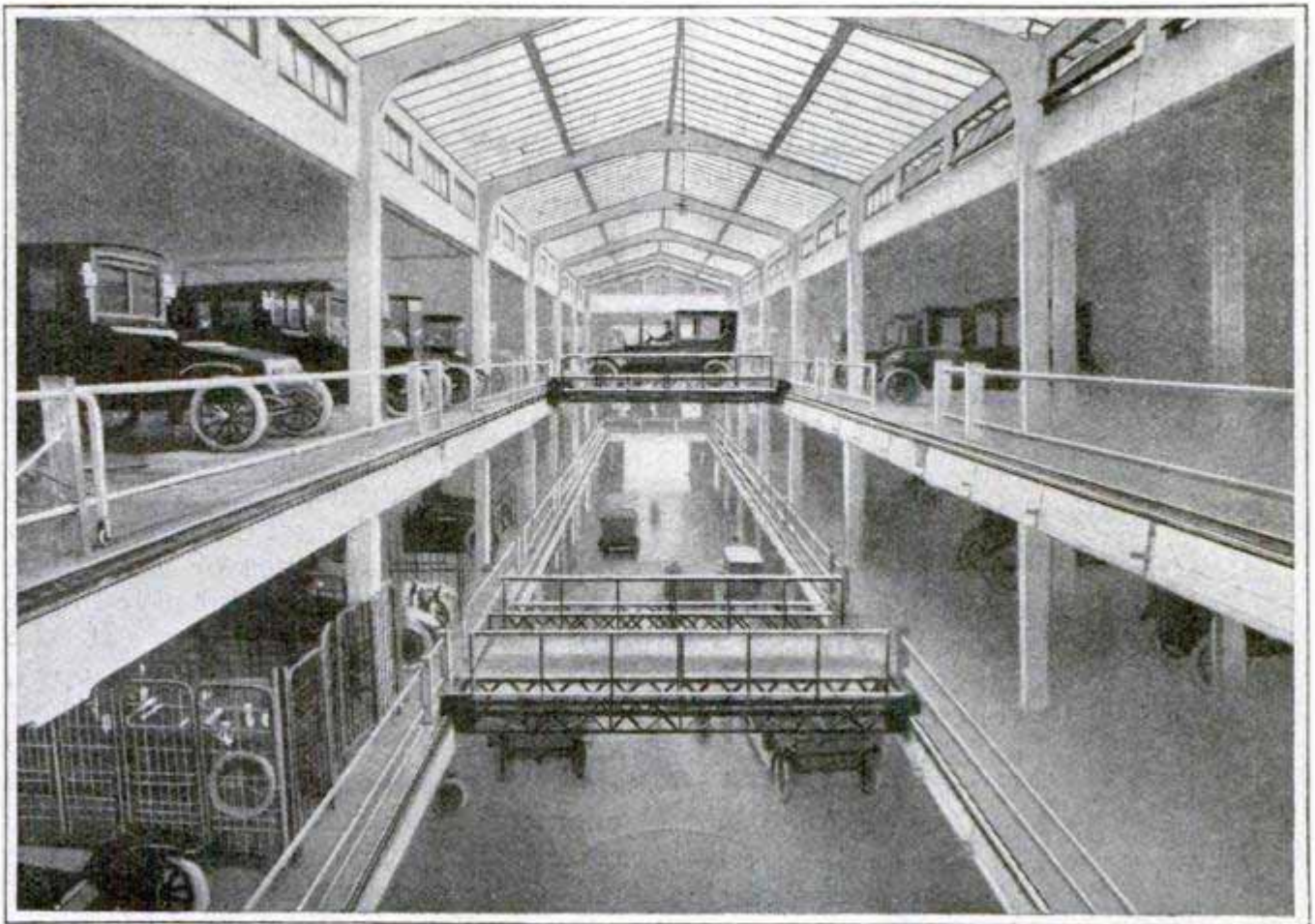
THE STRONGEST PAPER MADE

Paper so tough and light and impervious that it is likely to displace tinfoil in many of its common uses is now being manufactured. It is similar to artificial silk and is made in much the same way. Its manufacture depends upon the fact that any form of cellulose treated with caustic soda and carbon disulphide takes on the brilliant luster of silk. The same viscous substance, which is made into threads for artificial silk, can now, by a new process, be rolled into extremely thin sheets like paper. They are so extremely thin that 1,270 sheets, pressed tightly

together, make a pile only 1 in. thick. The sheets are colorless, insoluble in water or alcohol, unaffected by boiling water, and able to stand a temperature of 248 deg. F. The paper is impermeable by water, oils, and gases, and will not burn or explode. It can be softened and molded into cups or vessels of any shape. When ordinary paper is coated on both sides with thin films of this material it becomes a good substitute for tin and other metal foils, because it is light, clean, and free from oxidation.

A PARISIAN GARAGE SHOWS ADVANCED CONSTRUCTION

Ample light is obtained in one of the late garages erected in Paris by a central corridor extending up three stories, over which a glass roof is supported on steel framing. A movable bridge on each upper floor, running on a track at either side, permits the quick transfer of cars to and from the elevator, and an easy method of storing cars in appropriate sections. An-



Conveniently Arranged Garage Recently Built in Paris

other feature is the locked stalls in which the cars are placed, by means of which losses of spark plugs and other small accessories are avoided, and "borrowing" by busy chauffeurs discouraged.

ELECTROCUTING TEREDOS SAVES WHARVES

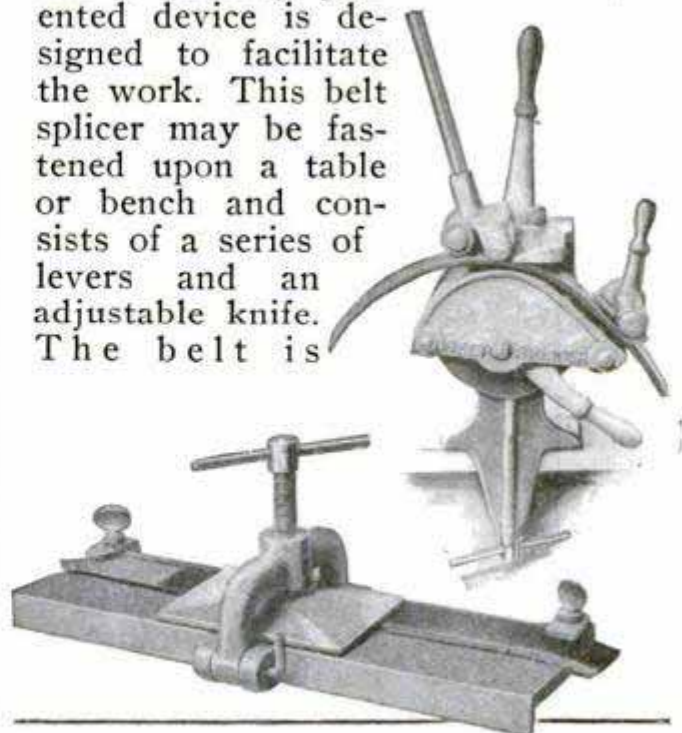
The boring insects—teredos—which cause enormous damage in the destruction of piles used in the construction of wharves in the north Pacific coast ports have hitherto successfully defied all attempts to eradicate them. A new method of destroying teredos is being tried in Seattle, where electric currents are turned into the piles infested with these insects. If successful, this will mean the saving of immense sums to individuals and companies maintaining docks and wharves on the coast.

Iron shavings in a wiry, fibrous mass are mixed with concrete and sand in France and used for surfacing roads.

MACHINES FOR SPLICING BELTS

Shops using leather belting often have occasion to splice belts quickly,

and a recently patented device is designed to facilitate the work. This belt splicer may be fastened upon a table or bench and consists of a series of levers and an adjustable knife. The belt is

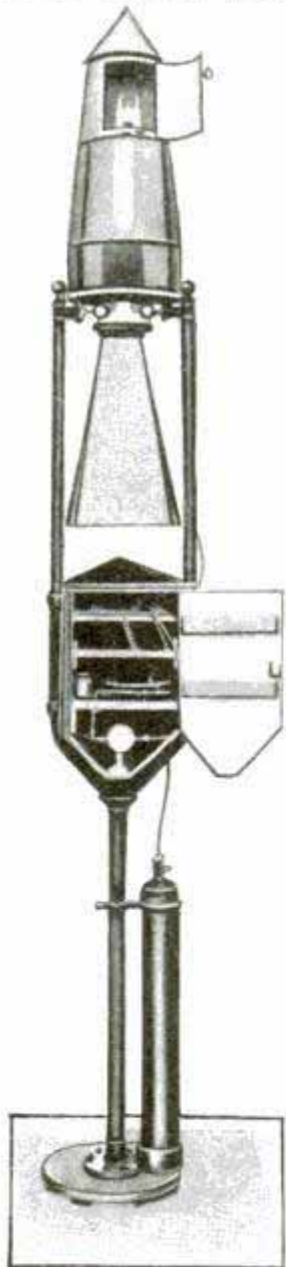


Belt Splicer and Glue Clamp for Making Belts Endless

placed in this machine and, upon adjustment, the movement of a lever will cut the belt over a drum on a prescribed slant. Both ends of the belt are then placed on the face of a glue clamp, another part of the outfit, and an iron plate, which may be previously heated to facilitate the drying of the glue, clamped down tightly after applying glue or cement to the cut surfaces of the belt. In a short time the spliced belt is ready for use.

ACETYLENE FOG GUN WORKS AUTOMATICALLY

A fog and warning signal, giving both visible and audible indication of



danger, has been invented and is now in use in the British Isles. It is called a fog gun and consists of an upright containing a receptacle for acetylene which is dissolved in acetone, and electrical means for producing a spark by which the released gas is ignited and exploded, producing a sound audible at a long distance. It is automatic, and once started goes on until stopped or until the acetylene is exhausted. By a simple adjustment the explosion may show a flashing light, and the gun may be controlled by wireless, through suitable apparatus.

⌈The excavation each year in anthracite coal mining in Pennsylvania is estimated as being

greater than the total excavation for the Panama Canal.

THIS ELECTRIC PLANT ALMOST RUNS ITSELF

An economical hydroelectric installation at Greenfield, Mass., needs the attention of an operator but three times a day, at shift changes at the main plant. A concrete gravity dam, with a 24-in. double-runner water-wheel, furnishes the power for a 100-hp., three-phase, 2,300-volt, squirrel-cage induction motor, controlled by a governor which keeps the load substantially equal all the time. The handling of the induction motor is so simplified that, at times of light load, the output of the generator is fed back into the main station bus. If the switch at the main station be open, the induction generator is no longer excited, but keeps on running just the same. When the switch is closed, the generator automatically becomes energized and picks up its share of the load. The operator stops on his way to work, reads the meters, looks over the machinery, observes the bearings and goes his way.

DRIFTING SANDS ENCROACH ON CITY STREETS

A San Francisco suburb has to fight against the encroachment of shifting sand, which threatens to overwhelm the streets of outlying districts. Pushing right up to the suburb's outermost row of flats is a sea of sand, restless, uneasy, almost volatile. Daily the contractors and builders dig foundations for new buildings a bit farther out toward the sea. Each night the sand drifts in, silently, inevitably, covering streets, burying gardens, submerging houses. Lamp-posts sink deep into the drifting sand which almost smothers them. Telegraph poles are gradually interred, until the children can swing from the wires. Over gardens the sea wind blows the sand. Doorsteps are covered half a foot deep each morning, and though the suburbanite may scrape and hoe and shovel as he will, nothing he can do can avail against the insidious advance of the



The Sand Sea Advancing upon

a San Francisco Suburb

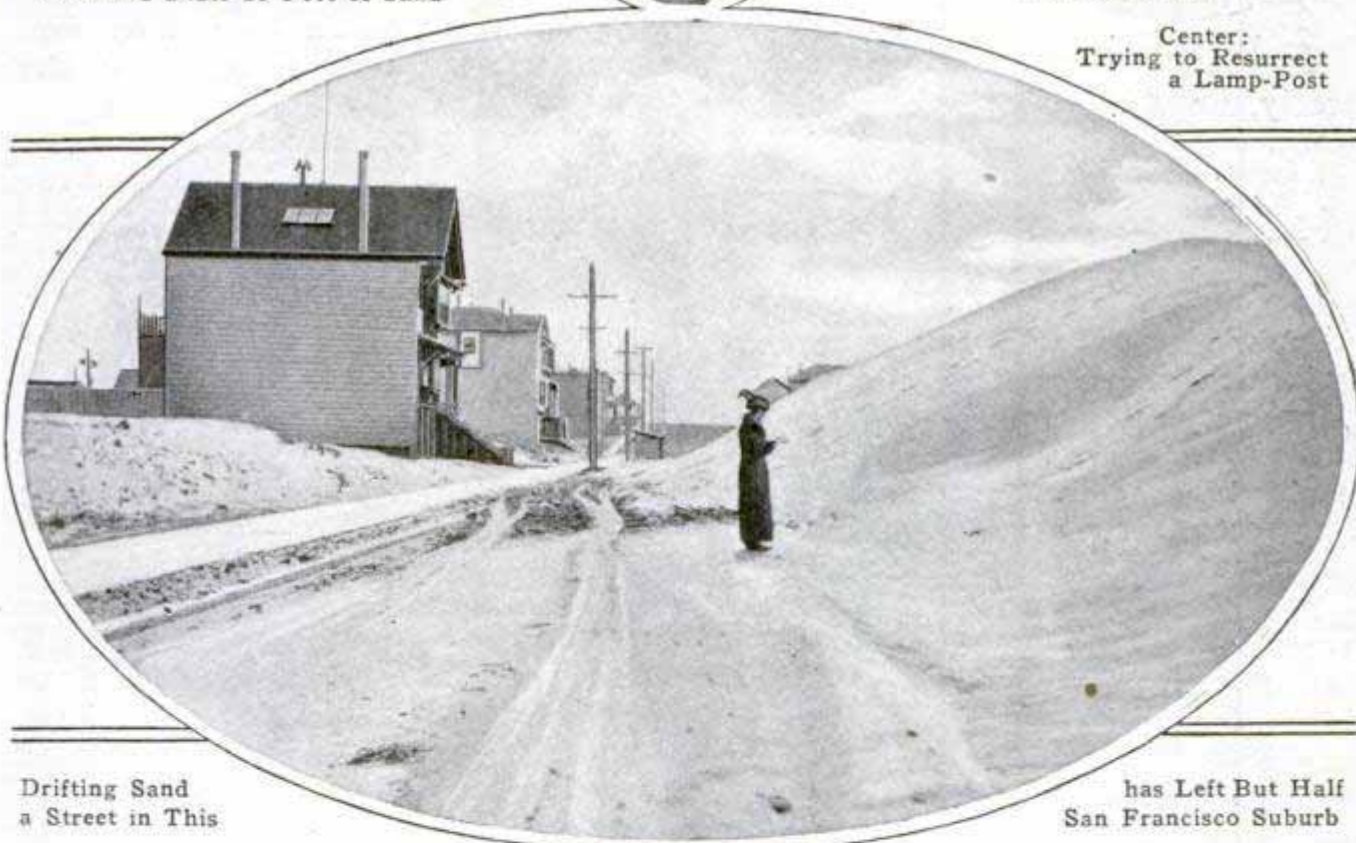


The Sidewalk in Front of This House is Buried under 10 Feet of Sand



House Overwhelmed with Sand and Abandoned

Center:
Trying to Resurrect
a Lamp-Post



Drifting Sand
a Street in This

has Left But Half
San Francisco Suburb

undulating, shifting, brown waves. The piling sands, shown in the photographs, have not been carried in overnight. It is a matter of weeks and months, but grain by grain it accumulates in drifts, waves and billows, until thousands of tons surmount

fences, obliterate yard lines, and make a desolate Sahara out of a suburban beauty spot.

☐ Motor omnibuses are to run between Bagdad and Beirut, Syria, a distance of over 500 miles.

CAMP-FIRE KINDLER DEFIES WIND AND RAIN

The difficulties encountered by campers in starting a fire in the rain and wind may be overcome by the use of a lighter, recently patented. Wire is twisted so that one end forms a ball, with a handle some 10 or 12 in. long. This is thrust into a receptacle containing kerosene or alcohol, and is withdrawn when saturated. Placed beneath a pile of twigs and sticks and touched with a match to it, the lighter burns

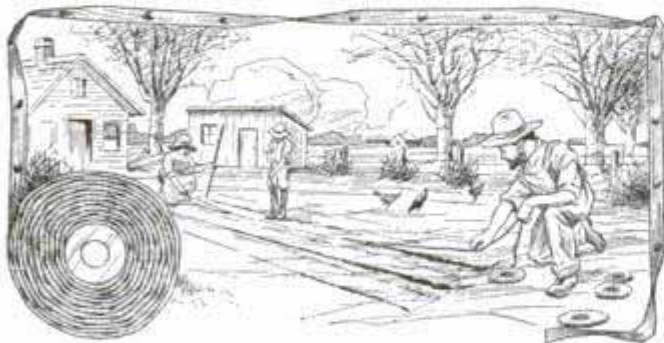


Device Makes Quick Fire for Campers

fiercely, until even damp wood is set ablaze.

PLANTING GARDEN SEEDS BY THE YARD

A new idea for amateurs in gardening, which might well be adopted on a large scale, is seen in a seed tape recently placed on the market. Inside a paper tape, selected seeds are placed at correct intervals and fastened with a fertilized paste. The tape is rolled



Seed Tape Saves Time in Making a Garden

in a coil, and in planting, the ground is prepared as usual, the tape placed in a shallow furrow and slightly cov-

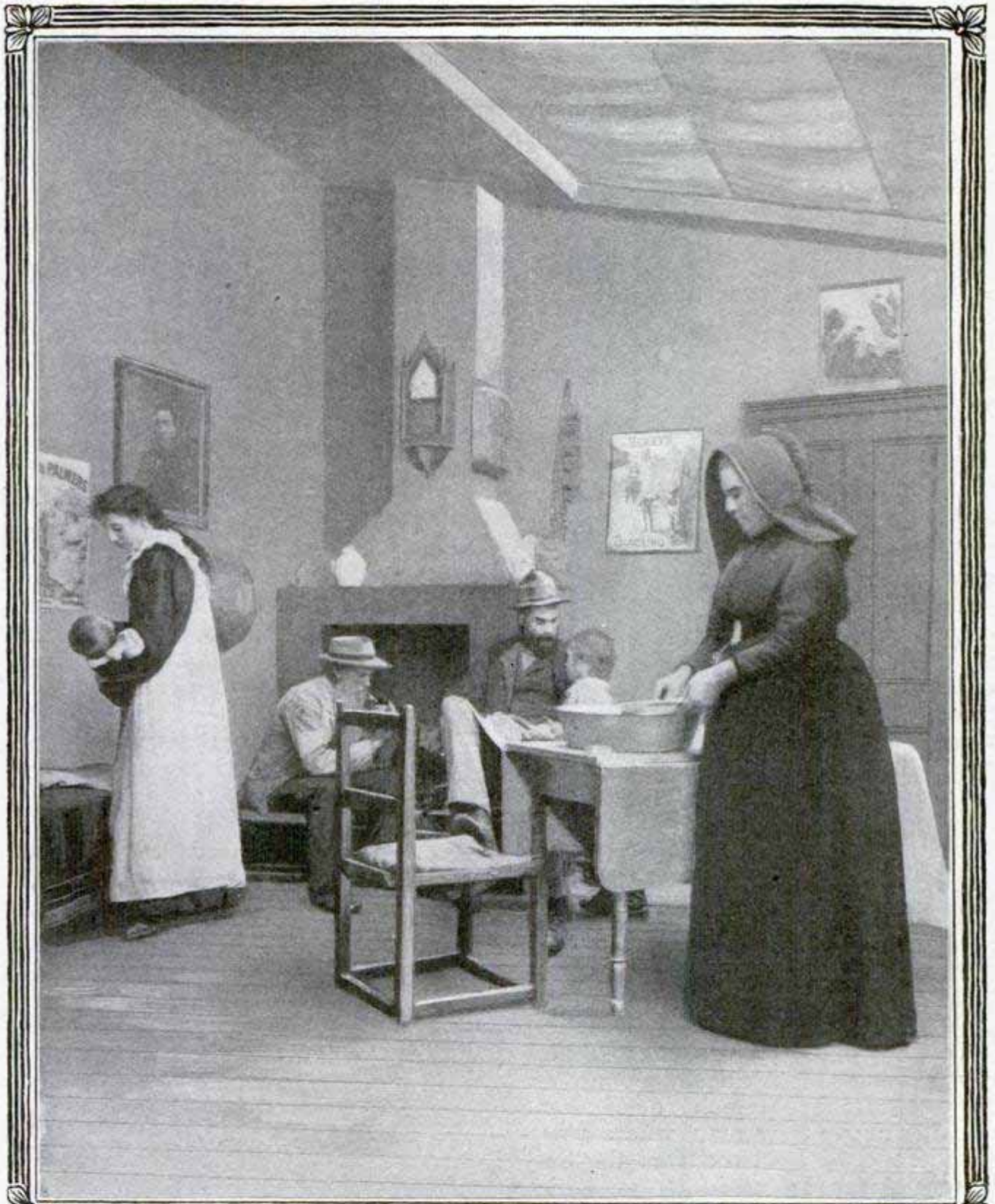
ered with fine dirt. If the ground is very dry, the garden is watered, and the seeds soon sprout. As they are at the right distance apart, no thinning out is required, and much hard labor and valuable time are saved.

SHORT TENDER CAUSE OF RAILROAD DERAILMENTS

That the "surging" of locomotive tenders has been the cause of a large percentage of unexplained railroad derailments is the opinion of railroad experts employed by the Interstate Commerce Commission who have investigated the subject. Curiously enough this surging, which is simply the plunging of the tender forward and from side to side, is most violent on straight track, and a light, well-surfaced curve often has the effect of preventing it entirely. The trouble is attributed to the short wheelbase of the tender combined with the high center of gravity and unsymmetrical loading caused by the water and coal. Lengthening the tender 6 ft. or more, which would make possible a considerable lowering of the center of gravity, has been suggested as the best cure for the trouble. It is estimated that something like \$100,000,000 would be required for making this change in all the equipment used on American railroads.

GAS APPLIANCES SHOWN AT THE MOVIES

The adaptability of the moving-picture film to the newer science of advertising is shown in a series of films which depict a modern kitchen, with gas range, water heater and various other kitchen conveniences using gas. The persons taking part in the play are shown investigating a new home, where all the labor-saving appliances using gas are conspicuous. There is nothing in the play which savors of advertising, but the publicity resulting from demonstrations of the latest and most economical devices in gas appliances is effective.



THE kitchen hearth is the center around which cluster the life and interests of the Dutch settler in South Africa. The name by which these sturdy pioneers are known, "Boers," signifies their occupation, as it is simply the Dutch word for "farmers." Fleeing from the Low Countries in the 16th and 17th centuries, the ancestors of the present-day Boers took with them to the southern hemisphere the domestic traditions and customs of their fatherland, which later immigrants aided in maintaining. This view of a Boer kitchen gives a clear impression of the simple life of the people who fought the British army so stubbornly.



MOVING PHOTOGRAPHS GIVE LIFE TO LIKENESS

A new development in the photographic art renders it possible for one to enter a studio and in five minutes have a picture taken on a card which, by proper manipulation, gives a pleas-

By moving this ruled screen, three pictures are taken on unexposed area. A suitably prepared piece of celluloid, ruled vertically, 66 lines to the inch, is then placed over the finished pic-



ing continuity of movement. The ordinary studio equipment is used with the exception of the plate holder which is a feature of the process. The plate is exposed through a piece of glass which is ruled vertically in such a manner that only one-third of the plate is exposed.



ture, and moved from side to side slowly. Only one-third of the picture is shown at a time, and owing to the optical phenomenon of persistence of vision, by which the image is retained on the retina a fraction of a second, the pauses between the pictures are bridged.

GASOLINE LOCOMOTIVE FOR AUTOMOBILE TRAIN

Touring automobile parties seeking Florida have long hesitated at the passage of the Altamaha delta, some 60 miles above Savannah, where a flatboat propelled by hand was the only ferry. After an accident, in which the flatboat sank with four automobiles on board, that particular mode fell into disrepute, and a Georgia railroad came to the rescue with a gasoline locomotive, with electric self-starter, air brakes, etc., capable of hauling three flat cars, each carrying four automobiles. It travels the track of a new line of railroad, traversing numerous bridges, but while lengthening the distance, shortens the time

from Darien to Broadfield, which formerly took several hours or all day, according to the state of the tide, to a trip of 18 minutes.

VENTILATION OF LONDON UNDERGROUND RAILWAYS

A new method of ventilating the underground railways of London is being installed at two of the stations. Heretofore the foul air has been withdrawn by exhaust fans, but under the new system air will be pumped into the tunnels day and night, forcing the foul air out. The air is first passed through a washing screen, is then humidified, and a quantity of ozone is added. It is supplied to each station at the rate of 25,000 cu. ft. a minute.

FARMING FOR PEARLS IS PROFITABLE

The recent decision of the U. S. Bureau of Fisheries to start breeding pearl mussels by artificial means in the valley of the Cumberland River, opens up to the public a new and very profitable industry. Investigation conducted over a long period by the scientific staff of the bureau has demonstrated that fresh-water pearls are produced by many varieties of mussels through the action of certain small parasitic worms, which bore through the shell and set up an irritation on the flesh of the mussel. In self-defense the mussel secretes an excess of pearl-forming material and encysts the parasite, a pearl resulting. Thousands of these fresh-water pearls have been carefully cut open by government investigators and within each one was found, when examined under a powerful microscope, the nucleus containing one of these little worms. Mussels breed rapidly, the eggs being cast in small packets, which after a few days break, and thousands of tiny larvae swim about, attaching themselves to the gills of fish, from which after 70 days they cast loose and sink to the bottom of the river, beginning there their life as shellfish. It is only necessary to obtain from the government a consignment of mussel eggs, distribute them in a stream well stocked with fish, and a natural mussel farm results. Then a number of mussels infected with the pearl-forming parasite must be obtained, planted in the bed of the stream, and the farm begins to be productive.

SWINGING CURTAIN ROD IS HELP TO HOUSEWIVES

A novelty which overcomes the objections often urged to casement windows, as being inconvenient unless the curtains are hung on the sash, is a swinging curtain rod pivoted at one end on small brackets fastened to the window casing. The free end is flanged and a slotted support is pro-

vided on the opposite casing, into which the flange fits, locking the rod. When it is desired to open the casement, or to wash the window, if of the ordinary type, the flanged end of the rod is lifted out of the slot with a stick, cane or other convenient article, and the rod, carrying the curtain, is swung easily to one side, leaving the window accessible and the curtain entirely out of the way, with no danger that it will be splashed or spotted by

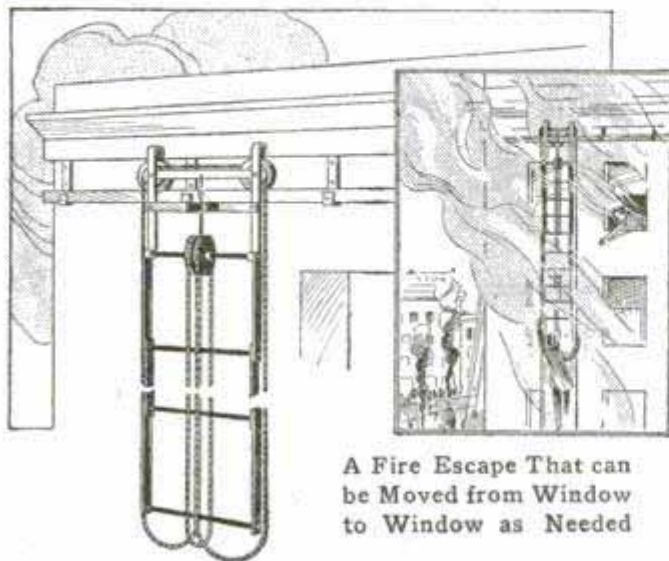


Novel Device Keeps Curtains Out of the Way When Washing Windows

the water. When the windows are washed or the casement closed, a touch of the stick will swing the curtain back into place again, where it is quickly locked into its support by lifting the end slightly and allowing the flange to drop into the slot. On wide windows the rods may be double, with the slotted supports fastened in the center, the rods swinging back at either side, or two sets of rods may be used, permitting the use of an outer curtain and an inner drape.

PORTABLE FIRE ESCAPE RUNS ON TROLLEY

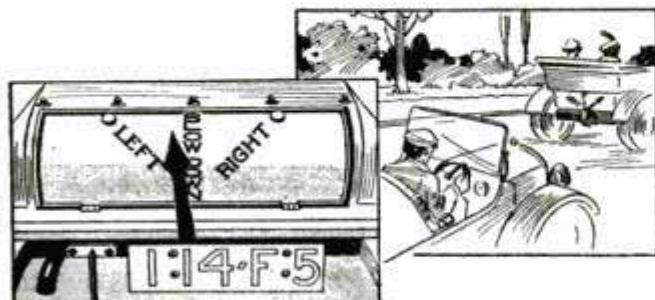
A recently patented fire escape, that can be moved from window to window of a burning building, consists of an



extension ladder suspended from trolley wheels which run on a suitable track permanently attached to the building, just below the roof cornice. A person standing on the ladder or on the ground can move the fire escape to any point where it is needed, and in the case of flames bursting out of a window, the ladder can be pushed aside so as to enable those on it to descend in safety.

DEVICE SIGNALS DRIVER OF FOLLOWING CAR

A simple and apparently effective device by which the driver of one motor car can signal the following car is



Simple Indicator by Which the Driver of a Motor Car can Signal the Car Behind

now being tested in Paris under the direction of the chief of police. It consists of a panel on the back of the car on which are the words "right," "left"

and "slow up." Over the panel swings a pointer which the driver controls by a lever and which is pivoted at a point under the number plate. If the driver intends to turn at the next corner he swings the pointer to the corresponding indication, and if he is going to reduce speed or stop he swings it to the "slow up" position. When the pointer is between words, as shown, it means that no indication is given.

PRACTICAL SCHEME FOR AN INVARIABLE CALENDAR

Among the many schemes for an invariable calendar the one just proposed by the International Association of Academies has the merit of being easily applied without too radical changes in the existing system. The division of the year into 12 months is retained, but all the quarters are alike. January and February each have 30 days, while March has 31 days. In like manner, the first two months of each of the succeeding quarters have 30 days each, while the last month has 31 days. In this way the 12 months contain a total of 364 days. The additional day required to complete the year is not a part of any week or month and is known simply as "New Year's Day." The extra day required to fill out a leap year will be placed between the last day of June and the first day of July, will be given an individual name, and will not form part of any week or month. Under this system, the first month in each quarter always begins on Monday, the second month on Wednesday, and the third month on Friday, and each month has the same number of working days. The 1st, 15th, or 30th of any month never falls on Sunday, while the 31st, which closes each quarter, always falls on Sunday. In connection with this calendar an effort will be made to establish a fixed date for Easter.

¶The "Lusitania" recently made a record for ocean travel by covering 618 miles in one day.

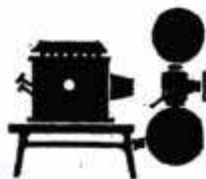


BY
FRANK H. WILLIAMS

As Bessie was a modern maid,
Jim wooed her in a modern way.
He'd wire his love to her each night,
He'd phone it to her every day.

And now and then, for extra zest,
In aircraft o'er her home he'd sail,
And from the clouds a note he'd drop
And hope she'd like its lovelorn tale.

Again by wireless he'd propose;
By gramophone he'd likewise pop.
(The records he would make himself
And ship them to her from his shop.)



A movie of himself he'd send,
Depicting him upon his knees,
His hands upraised imploringly,
The caption reading: "Wed me, please."



Flowers by parcel post he'd mail,
He'd woo her in his motor car,
A motorcycle ride he'd try
But feared she wouldn't like the jar.

Each new invention he would try,
He'd put each thing upon the job.
'I'm sure to win,' he told himself,
'She'll never take old-fashioned Bob.'

He thought he'd won, so to her said:
'Come, marry me, my darling queen,
Our honeymoon then can we spend
Within my new-bought submarine!'

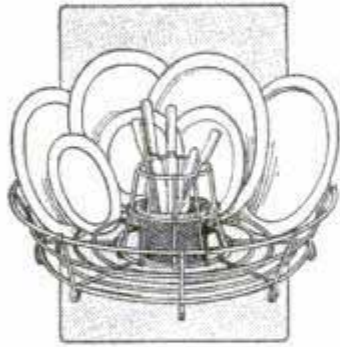


Bess smiled: "You're really much too late,
Despite your speedy modern way —
'Twas yesterday that I eloped
With Bobby in his one-horse shay!"



NOVEL AND PRACTICAL THINGS FOR DAILY USE

After the dishes are washed they are more easily dried if placed in a rack

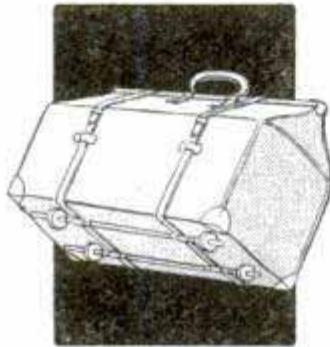


Wire Drainer Makes Wiping Dishes Easy

and very hot water poured over them. This is facilitated by a new wire drainer recently invented, which has a fine-mesh center compartment for knives, forks and spoons, while the dishes are stood on

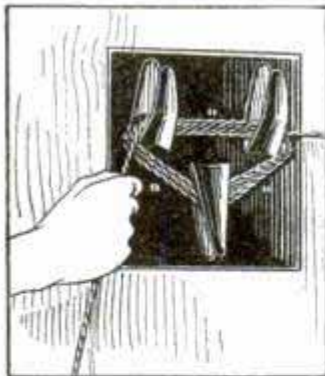
edge about the outer edge of the drainer, the curved wire bottom preventing them from slipping.

Returning from a journey, one often finds the bottom of a grip or suitcase worn and dirty. A



Rubber Disks Keep Grip Clean

French device prevents this by providing two wooden rods with stationary rubber disks at either end, the rods being fastened to the bottom of the grip or traveling bag by straps, which pass through

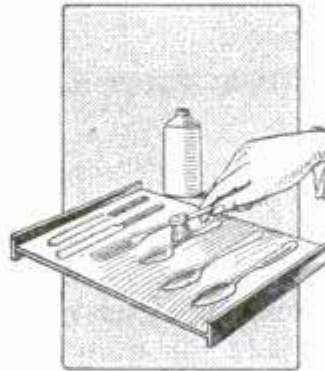


Toothed Plate Holds Clothesline Tightly

little metal sleeves on the rods. This keeps the bag off the floor, keeps it clean and takes up much of the wear.

A contrivance to fasten a clothesline quickly, holding it immovable, which yet unfastens instantly, is a recent invention of interest to housewives. It consists of a steel plate with screw holes for fastening to a post, with lips pressed out, over which the

line can be looped. This keeps the line from sagging when loaded with wet linen.

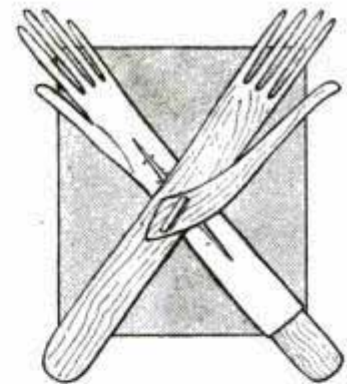


New Cleaning Board for Table Silver

which knives, forks and spoons fit, while a small brush, dipped in the polishing powder or paste, is manipulated with one hand. The board is of metal, light, cleanly and convenient.

Gloves which become soiled may be easily washed at home, and will not shrink or lose their shape if fitted over glove driers which are now to be found in the stores. This practical novelty is made in all sizes, and does not rust or stain the most delicate fabric.

The annoyance of rattling windows entails a nervous strain



Glove Driers Prevent Shrinking

which may be avoided by the use of a rattle stop, made of tempered steel, which fits in between the window and the casing, holding the loose sash firmly. It is a small device, but will put an end to a



Spring Clip Keeps Sash from Rattling

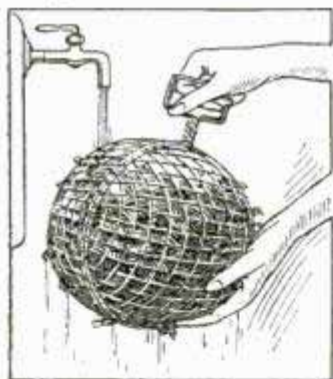
very common source of irritation in most households.

When a perfectly good teapot suffers an accident which chips or breaks the spout, the housewife is often loath to throw it away, yet it either cannot be used at all or proves a mussy affair in pouring. A rubber nozzle, just invented, makes the broken favorite still usable, yet does not in any way affect the flavor of the beverage. This contrivance may be had in two sizes, one of rubber alone for use on a chipped-lip spout and the other consisting of a rubber spout with a porcelain lip, for use where the spout is broken.



Rubber Nozzle Makes Teapot Good as New

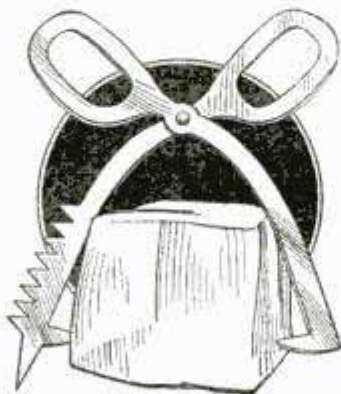
The removal of sand and dirt from the fresh leaves of lettuce and other greens used for salads is made more easy for kitchen maid or cook by the



Wire Cage for Washing Salad Greens

invention of a wire device, opening like two halves of a ball. The lettuce is placed within the washer, and the whole held beneath the faucet. In this way all impurities will quickly be washed out from

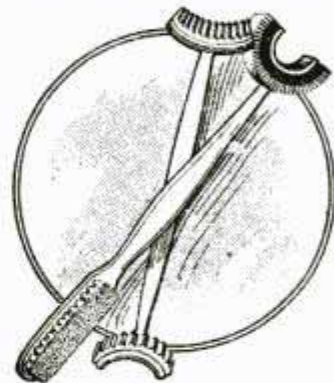
the leaves, while keeping the greens intact. A handy tool for the ice chest or refrigerator combines in one implement an ice saw, a pick and a pair of tongs. With this kitchen convenience, the problem of procuring suitable pieces of ice for the table becomes inconsiderable. As the new tongs are



New Ice Tongs Combine Saw and Pick

light and but 10½ in. long, they are easily used by anyone, and may be hung up by the refrigerator when not in use.

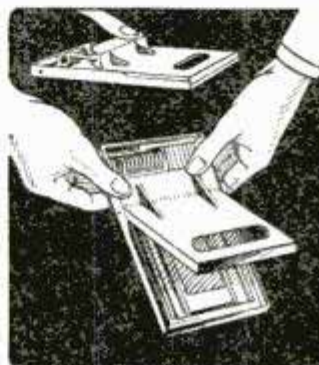
There has long been a demand for toothbrushes which would easily reach and thoroughly cleanse the inner surfaces of the teeth. For this purpose the old-fashioned straight toothbrushes are not readily available, and a new form



Curved Toothbrushes Reach Inner Surfaces

of brush has been devised with an ingenious arrangement of bristles on curved surfaces, adapted to perform the work in a more efficient manner.

Most mousetraps are difficult to set, and



Improved Mousetrap Won't Catch Fingers

are also difficult to separate from the dead mouse. A new trap is set easily by simply pulling back the top with the thumb. After a mouse has been caught, it may be released instantly by opening the top again with the thumb, there being no need of touching the mouse at all. It is impossible, with this trap, to catch the fingers while setting the trap.

A new stirring spoon has a straight edge along a portion of one side, enabling the cook to scrape cleanly the bottom of a skillet, or the sides of a pan or jar, while at the same time the spoon is not rendered a whit less available for stirring.



Kitchen Spoon Has One Straight Edge

NEW LEAD PENCIL ALWAYS HAS SHARP POINT

A novel self-sharpening lead pencil continually presents a new point when one is worn or broken. The pencil is

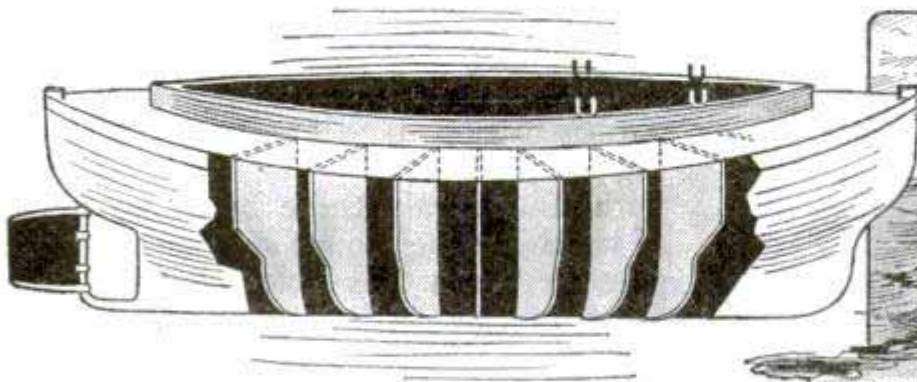


Plenty of Sharp Points Always Ready Here

hollow and filled with "points" of lead, each about half an inch in length, mounted in a tin holder. When a new point is needed, the old one is broken off by pressing against a hard substance, and with the nail of the thumb a new point is shoved into place. The filler holds 12 points, and may be re-filled.

LIFEBOAT WHICH CANNOT BE SUNK

In the effort to evolve the "unsinkable" boat, an English naval engineer has produced a craft which has successfully resisted every attempt to sink it. It is built of steel, 30 ft. long, 6 ft. deep and 10 ft. wide. The craft is really



Thirty-Foot Steel Boat Which Proved Itself Nonsinkable and Noncapsizable

two boats, one inside the other, the inner one being only 5 ft. wide, although nearly as deep as the outer

one. A tight deck covers the open space between the two hulls, and this space is divided into a number of water-tight compartments. Tests in which a majority of the compartments were filled with water failed either to sink the boat, capsize it, or render its propeller inoperative. It is contended by its inventor that a full-size ship could profitably be built on the same general plan, much of the space in the compartments being utilized for cargo, and that such a vessel could not be sunk by any collision with rocks, icebergs, or other vessels.

PUZZLE PICTURES TEST MENTAL FITNESS

One of the tests applied to immigrants at Ellis Island whose mental fitness is questioned by the immigration authorities consists of cut-out puzzle pictures, which they are required to assemble. These pictures are of different grades, some extremely simple, others more complicated, but all based upon trying out the reasoning faculties, and testing the perseverance, judgment, sense of form, attention and coördination of the immigrant. Children of the age of three and upward, adults whose mental growth has not kept pace with their bodily development, and defectives of every type classify themselves by the errors made in putting together figures of

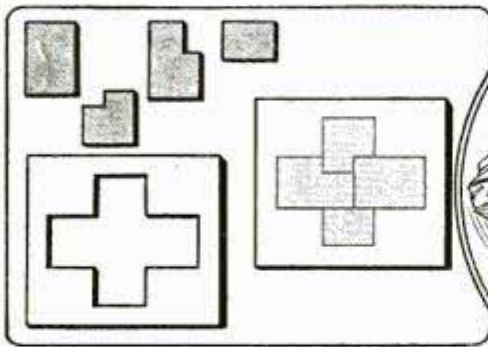


Courtesy The Engineer

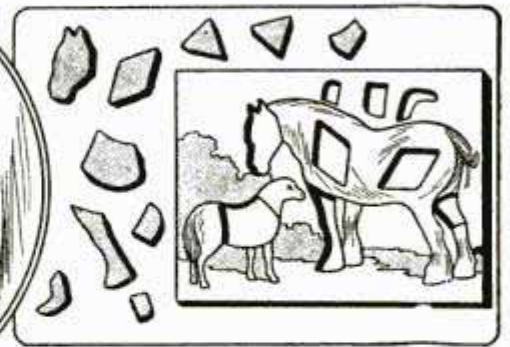
animals, faces, and geographical and geometrical figures adapted to their age. The time required to perform the

test is a measure of their mental strength. Careful record is kept of every attempt, and if improvement is

able for carrying bulky freight without interfering with their military value, but that they could easily be



This Test with Blocks must be Correctly Performed by a Ten-Year-Old Child in Ten Minutes



Adult Immigrants are Expected to Correctly Place the Pieces in This Puzzle Picture in Two Minutes

shown in the second or third trial, the subject is given credit. Full allowance is made for the effect of the strangeness of the procedure, environment and persons, and the natural bashfulness attendant upon such unwonted effort among strange persons. The immigrant is given the benefit of the doubt and every opportunity afforded him to solve his problem in the shortest possible time. If he fails, a simpler test is submitted until he places himself by his proficiency in a definite class, demonstrating clearly his admissibility or that he is so mentally defective that his unfitness might make him a charge upon the community.

NAVY TO ESTABLISH LINE OF COMMERCIAL VESSELS

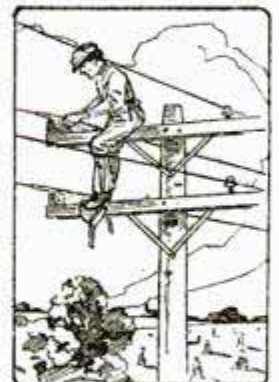
A decided innovation is contemplated in the bill recently introduced in Congress authorizing the establishment of a government line consisting of naval vessels for carrying passengers and freight between New York, New Orleans, and Valparaiso, Chile, by way of the Panama Canal. Seventeen cruisers have already been selected for this service, if it is established, and it is suggested that these be commanded by retired officers of the navy. The secretary of the navy has reported that the cruisers could carry only a small number of male passengers, probably 15 or 20 each, and that they would not be avail-

equipped for carrying cargoes of about 150 tons composed of express and freight in medium-sized parcels. It is planned to use the navy yards at New York and New Orleans as docks and terminals in inaugurating the service, and until the traffic warrants the renting of other terminals.

PROTECTIVE SHIELD FOR LINEMEN

Working on or near live wires is an extra-hazardous job, and many are the fatal or serious accidents which have been occasioned thereby. A protective shield of insulated material has been placed on the market for use by linemen, enabling them to work among live wires with less danger of shock. The shield is flexible, and so con-

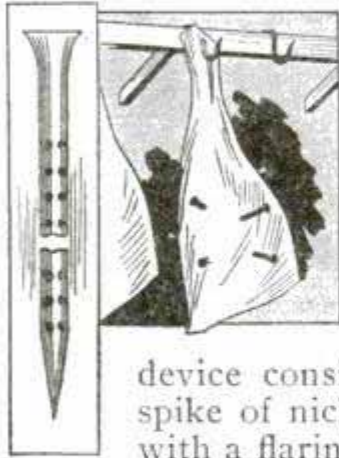
A Novel Protective Device Which Lessens the Peril of Live Wires



structed that the ends may be placed about the wires while the middle portion hangs down on either side. Tested to insulate against a current of 30,000 volts, the device affords protection against accidental electrocution.

DEVICE TO AID IN COOLING MEATS

An English inventor conceived the idea that meats might be more readily



cooled if a hollow perforated tube of suitable metal could be inserted into the bulkier portions of the piece, thus permitting the escape of interior heat. His device consists of a hollow spike of nickel, perforated and with a flaring top.

THERMOMETER TO INDICATE MOTOR'S HEAT

As a safeguard against overheating their engines, many automobilists are using on their cars a small radiator



thermometer to tell them when the motor is running hot or the water is low in the radiator. The thermometer is mounted on a small metal disk which screws into the radiator

cap where the driver can always see it. When the red liquid in the tube rises above 130, a good average engine temperature, it passes in front of a hole in the disk so that it can be more readily seen.

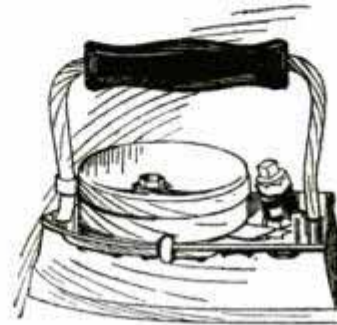
USE IRON DUST TO HARDEN CONCRETE

A new hardening material, just introduced in England for use with concrete, consists of 95 per cent of iron dust, or iron flour. From 15 lb. to 25 lb. of material to 100 lb. of dry cement is the proportion used, and the addition of two parts of sand to this mixture makes the top coat, applied to a thickness of about one inch. This top

dressings, when applied to a floor, is said to make it hard and durable, waterproof and not slippery. It is claimed also that this material is valuable where new concrete is placed next to old concrete, making it adhere firmly.

A COMPACT SELF-HEATING FLATIRON

A self-heating flatiron, burning gasoline, to be used in homes that are without gas or electricity, has just been



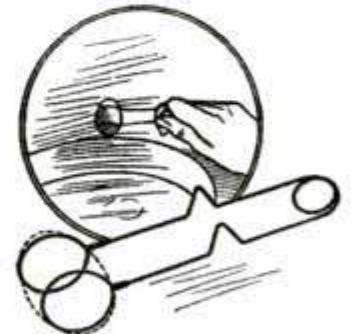
brought out. Its advantages over the older gasoline irons are greater compactness and simplicity, and a device for regulating the amount of heat. A small

circular tank under the handle supplies gasoline vapor to a burner which spreads the flame over the entire bottom. The control valve to regulate the temperature is directly under the hand and a small slide on top makes lighting easy. A wooden handle takes the place of a cloth holder.

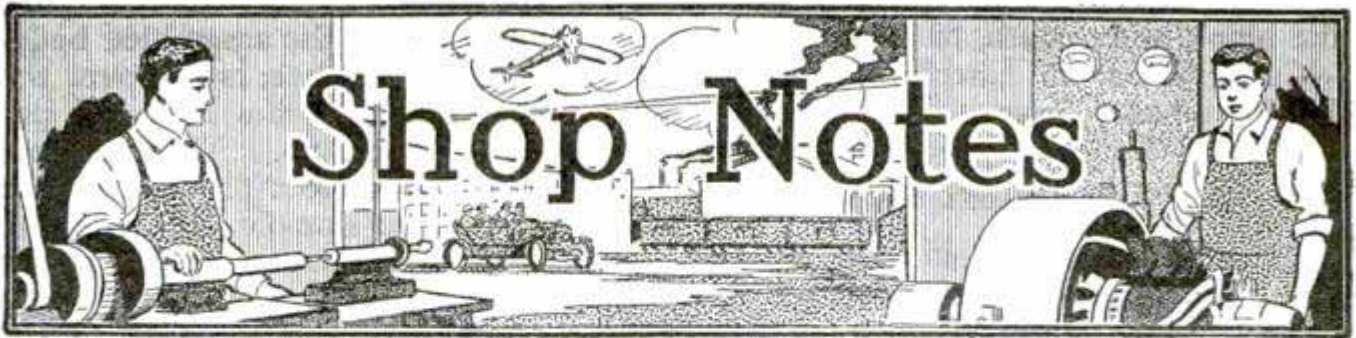
WIRE TONGS GRASP EGGS FIRMLY

A not unusual catastrophe occurs when freshly boiled eggs are taken from the hot water and, by reason of their fragility

and the discomfort of handling them, are dropped to destruction. A recent patented device is simple in the extreme, consisting of a wire,

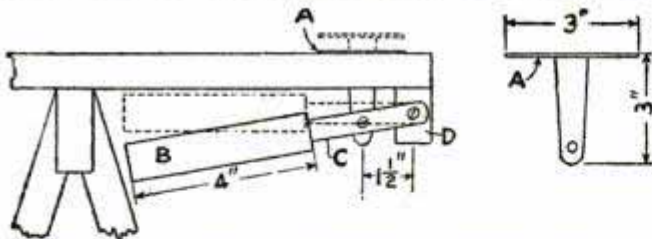


bent to give a spring, and looped at the ends. An egg may be readily grasped in the boiling water and safely lifted with these tongs.



Paper Holder for a Paper Hanger's Pasting Table

Paper hangers have considerable trouble in keeping paper from curling and rolling when matching and cutting the lengths on the table. The illustration shows how a holder can be made for each end of the table. The holders are placed near the edge so that they can be operated with a finger. The holder A is cut to the dimensions shown from a piece of $\frac{1}{8}$ -in. sheet steel. A piece of pipe, B, is fastened to a lever, C, which is loosely bolted to A and D. The pipe is weighted so that it will pull the holder down on the ends of the paper firmly. The bar C is hinged to the block D, which is fastened to the under side of the table



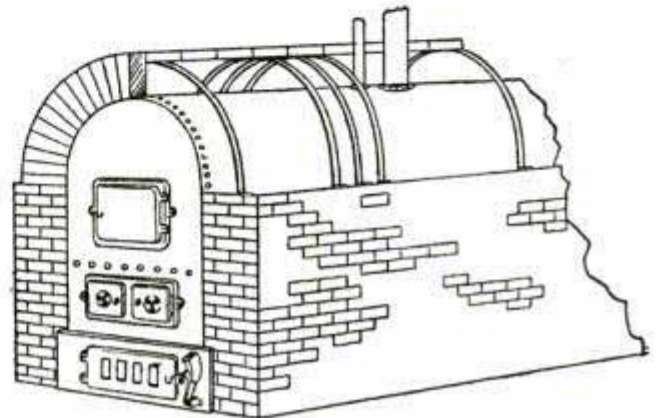
The Holder Grips the Ends of the Paper Lengths As They are Cut from the Roll

top. The device can be operated with one finger while pulling the strip of paper into place.—Contributed by J. V. Loeffler, Evansville, Ind.

Boiler-Arch Forms Made of Metal

An excellent substitute for the wood arch supports in building an arch over a tubular or firebox boiler is a form made of old carriage tires. These can be procured cheaply from a carriage shop. Cut and bend them to the shape of the arch and turn each end out to make a rest to set on the side walls.

These are placed 6 in. apart for the entire length of the boiler, and the bricks can be laid on them neatly. This saves

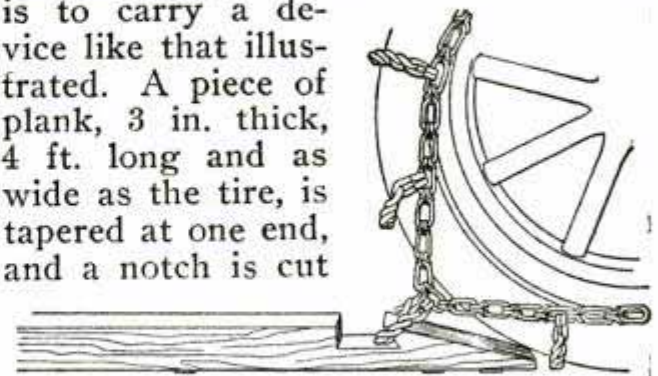


The Tire Metal is Easily Shaped and Makes a Better Arch Than Wood

burning out the forms, as is necessary when wooden supports are used.—Contributed by John F. Vidler, Portland, Ore.

Pulling Truck Out of Mud

One of the best methods I have found for getting out of mud holes and slippery places with a motor truck is to carry a device like that illustrated. A piece of plank, 3 in. thick, 4 ft. long and as wide as the tire, is tapered at one end, and a notch is cut



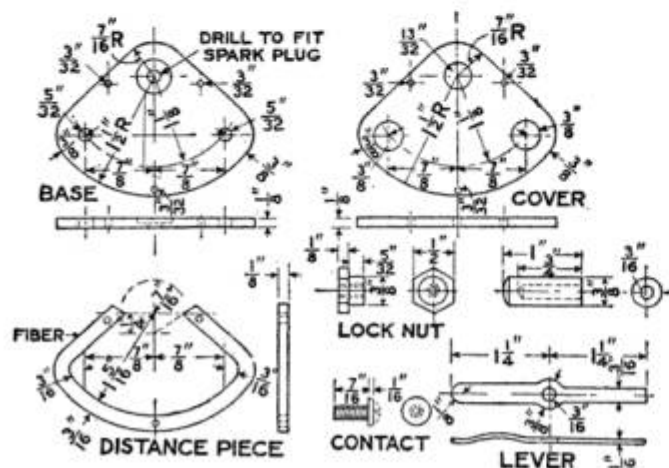
The Pull of the Tire Chain will Draw the Plank beneath the Wheel

crosswise with the width at the end of the slope. The notch takes the tire chain, and when the power is applied, the chain draws the plank under the

wheel. Iron bars are fastened across the plank underneath, to strengthen it. —Contributed by Harold A. Hawes, E. Weymouth, Mass.

A High-Tension Switch

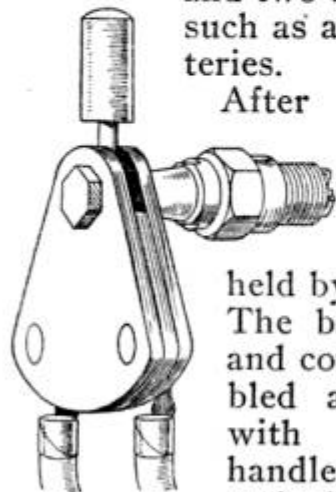
In order to make use of a battery and jump-spark coil for starting a gasoline engine equipped with a high-tension magneto, it is necessary to have some kind of a high-tension



The Parts are Composed of Fiber and Brass Which are Well Insulated to Prevent Shocks

switch. The sketches show such a switch, which is absolutely shock-proof and at the same time very easily constructed.

Referring to the sketches, it will be seen that the base, distance piece, cover and handle are made of red fiber; the lever is of spring sheet brass; the lock nut, of hexagon brass bar, and the contacts are round-head machine screws. The only other material required is some $\frac{3}{32}$ -in. copper rivets and two brass terminal nuts, such as are used on dry batteries.



After making the parts shown the contacts are put in place in the back where they are held by the terminal nuts. The base, distance piece and cover are then assembled and held in place with the rivets. The handle is put on the lever and held with sealing wax. To place the switch on the en-

gine, the terminal nuts on the spark plug are removed, the assembled body, with the lever in place, is put over the terminal screw and the lock nut put on and tightened up. All that now remains is to connect the cable from the magneto to one contact and the high-tension cable from the coil to the other.

To operate, throw the lever to the battery side and start the engine in the regular way. After the engine is up to speed, throw the lever over to the magneto side. To stop the engine throw the lever to the center position.

In testing the spark, move the lever over until there is about $\frac{1}{16}$ in. between the lever and the contact and turn the shaft over. If it is well adjusted, a spark will be seen through the observation holes in the cover.

With this switch in use it is impossible to injure the magneto by accidentally running the battery current through the magneto, and at the same time the battery is always available for starting or running in case of anything going wrong with the magneto. —Contributed by J. R. McCallum, Lansing, Mich.

Feeding Moist Air to a Carburetor

Finding that the carburetor of the automobile I was driving gave better results in wet or damp weather, I made an attachment to feed moist air to it to produce the same results. A sleeve of fine wire netting, 4 in. long, was made to fit tightly over the auxiliary air intake, thus extending the intake about $2\frac{1}{2}$ in. The screen was covered with an ordinary round lamp wick and the whole then covered with a sleeve of thin sheet iron, to hold the wick in place and to force the air to be drawn through the front opening.

The base and burner of an old lamp were procured and the base was filled with water and fastened to a bracket. The wick of this burner was attached to the wick of the sleeve. The wick in the lamp siphoned the water to the wick in the sleeve, thus keeping it damp all the time, and the air drawn

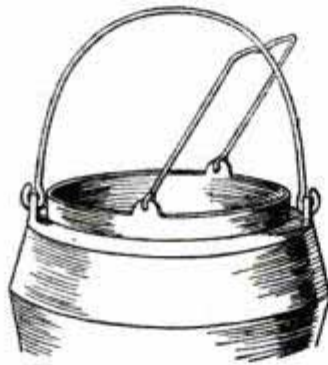
into the auxiliary air intake must absorb a portion of it before entering the carburetor.

The wick in the lamp base can be raised out of the water in damp weather to get the same results. The evaporation of water is so small that it is only necessary to fill the lamp base once in about three months.

While this arrangement may not save any gasoline, the motor shows but little carbon deposits, while, with the usual method, I had to scrape carbon every three months.—Contributed by Walter Broeker, Chicago.

Locking Bails Vertically on a Glue Pot

A very effective method of keeping the bails of the glue pot in an upright position is to bend the one on the inner glue receptacle square at the upper part and make a slight bend in the straight length to catch on the bail of the outer water can, as shown. This will prevent them both from falling down and from getting too hot to handle.



Preventing Ants from Entering Lunch Pail

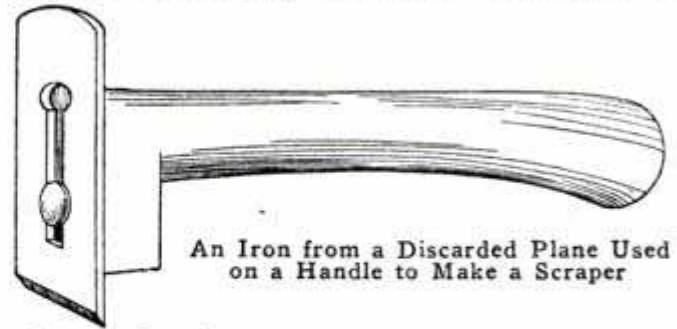
Being troubled with ants getting into my lunch, I provided a hanger to keep them out. This hanger, as illustrated, consists of a can having a wire run through it and oil placed on the inside. The wire is soldered where it passes through the can bottom. It is simple to make and is an absolute protection for the lunch.



—Contributed by C. R. Van Keuren, Famoso, Cal.

Homemade Scraper

An excellent scraper for rough work may be made from a bench-plane iron in the following manner: Procure a

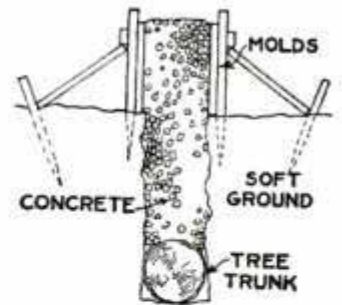


An Iron from a Discarded Plane Used on a Handle to Make a Scraper

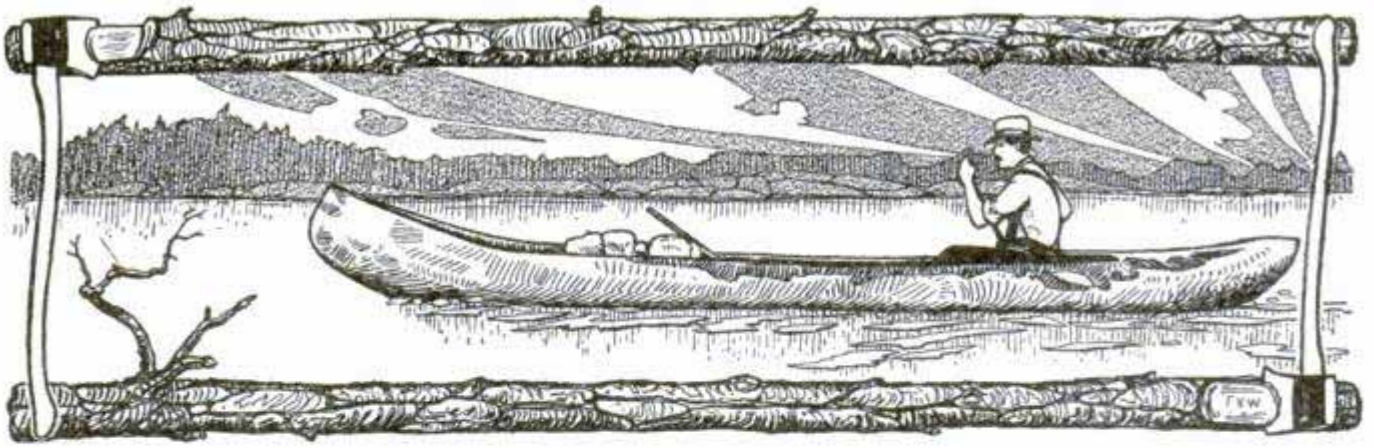
piece of oak or any good hard wood, about 1½ in. thick, 3½ in. wide and 10 in. long, and shape it as shown. The long portion should be rounded and smoothed with sandpaper to form a handle for the scraper. Bore a hole for a ⅜-in. bolt at the place indicated in the sketch. The plane iron is fastened to the handle with a bolt.—Contributed by L. G. Burnand, Lyons, Iowa.

Foundation for Soft Ground

A contractor secured a job of building a one-story factory building on some filled-in land that formerly was flooded once each year. The filling consisted of refuse, such as ashes, bricks, etc., about 12 ft. deep. To procure a solid foundation a trench was dug, a little deeper than required, and trunks of trees, from 12 to 14 in. in diameter, were laid in the bottom. The concrete wall was made on top of the tree trunks. If, for any reason, a part of the ground gave way, the tree trunk would span the space and hold the weight, thus causing no uneven settling of the building.—Contributed by Joe V. Romig, Allentown, Pa.



ⓄWhen a screwdriver slips from the screw slot, dip it in fine emery and it will hold.



How to Make a Log Canoe

By G. O. SHIELDS

Persons traveling in the wilds often need boats to carry them and their outfits. The folding canvas canoe is popular and useful for such purposes, but that adds to the burden of the journey and can be eliminated if the traveler knows how, and if he travels in a timbered country.

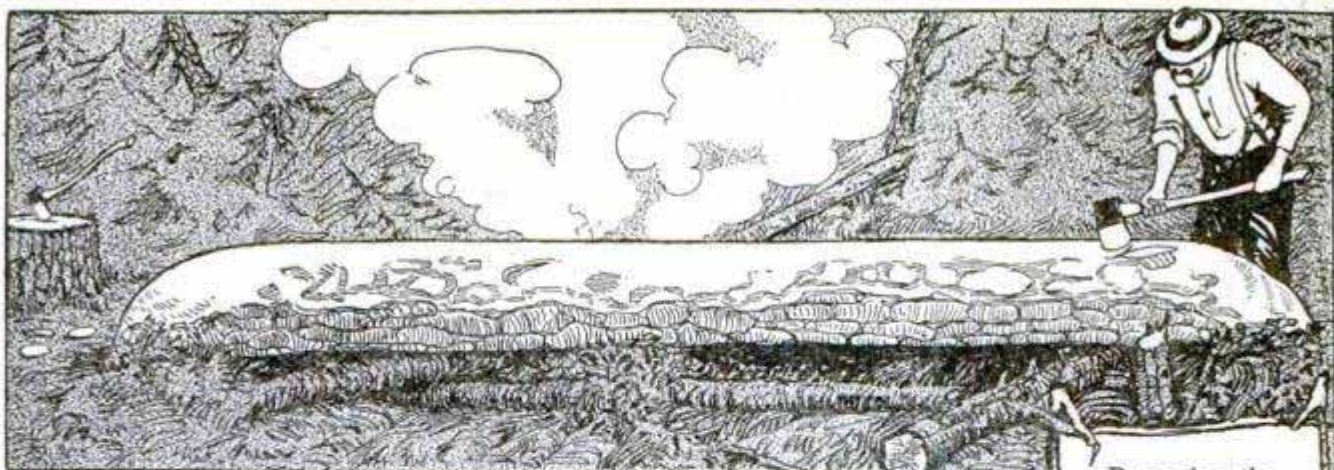
Anyone who is handy with an ax can in two days fell a tree and dig out a canoe large enough to carry two men and a 30-days' supply of food, clothing, blankets, arms, ammunition, etc. In other cases a canoe is very handy where a camp is located near a lake or stream, and if campers only knew how easy it is to make a log canoe, more of them would be built and used. To make such a canoe means some hard work, but that is good for any person, especially those who have been shut up in an office.

The canoe illustrated was made at a camp among some lakes in Canada. Most of the forests in the region had been killed by fire, but fortunately there was a small patch of green spruce at the upper end of the upper lake where a few good-sized green trees were to be found. These were looked over the second day after arriving, and a tree, 26 in. in diameter at the butt, was picked out, which was straight as an arrow and free from branches up to about 30 ft. The next morning this tree was cut down and a log, 16 ft. long, cut off from the butt end. One side of the log was hewed off, and a flat, smooth surface, 16 in. wide, was made for the bottom. Be-

ginning about 2 ft. from each end, the log was rounded off from the bottom surface to the bark on the opposite side. This gave the curves for the bow and stern of the canoe.

The log was then turned over, and the bark was trimmed off on each side to a line that would give the canoe a depth of 16 in. The mark was made with a line dusted with charcoal, and the wood was notched down to it. This was a more serious undertaking than that of hewing and facing the bottom, for it meant the removal of a larger quantity of wood. About 2 ft. of solid timber was left at each end of the log, for bulkheads. This gave an open deckway of 12 ft. The notches were cut about 2 ft. apart, from the top of the log down to the charcoal line on the sides. When these notches were all sunk, the next thing was to split out the surplus wood. For this purpose a number of wedges were made from a small dead spruce, then an ax was driven into the end of each block, at intervals, from the top to the bottom, until the block started to split slightly, then a wedge was placed on each side of the block and driven in carefully with the poles of the axes. The blocks were easily removed in this manner.

With the entire top portion of the log removed, the excavating and removing of the wood from what was to be the interior of the canoe was begun. This required careful work, to prevent cutting through the shell and causing the canoe to leak. The axes were used



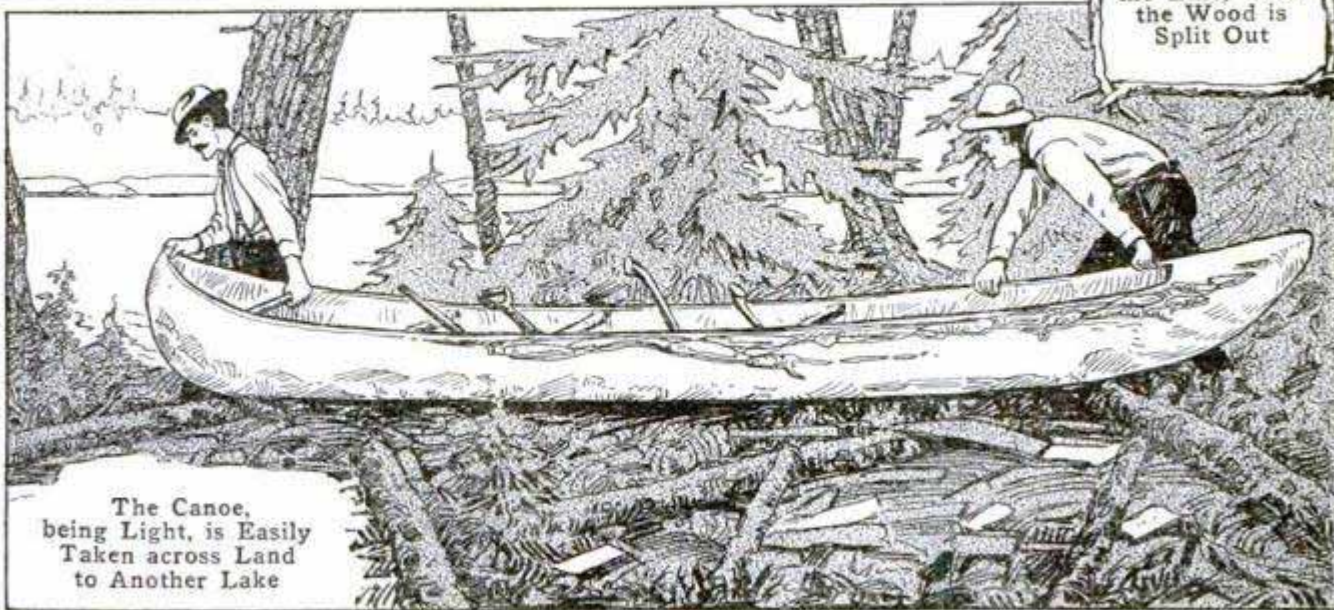
Removing the Bark from the Part to be Used for the Bottom



The Log is Lined and the Ends Left Partially Solid for Bulkheads



Notches are Cut in Log Down to the Line, Then the Wood is Split Out



The Canoe, being Light, is Easily Taken across Land to Another Lake

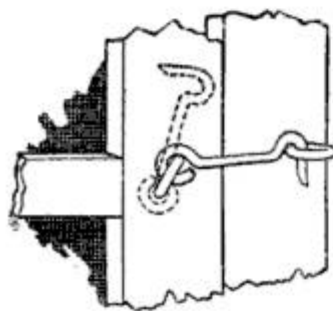
to remove most of the wood, but occasionally an adz came in handy for removing some pieces for close work. The surplus wood was gradually removed until the sides were thinned down to $\frac{3}{4}$ in. and the bottom to $1\frac{1}{2}$ inch.

The thickness of each side and of the bottom was gauged with an awl having a file mark on it. This was driven in here and there from the outside, until the mark came flush with the surface. If the point showed through the inside, it indicated the

proper thickness. It was an easy matter to plug these holes so that they would not leak. The inside as well as the outside was dressed with a jack plane. Three dry sticks, cut a little longer than the width of the boat, were inserted at intervals to spring out the sides of the canoe. When in place, a 20-penny nail was driven through the gunwale and into the end of each stick on both sides. These sticks prevented the wood from warping inward as the timber seasoned. A paddle was made from a dead pine, 6 in. in diameter.

Attaching a Screen-Door Hook

A hook placed on a door casing for the screen door with the screw-eye in a horizontal position is likely to drop in

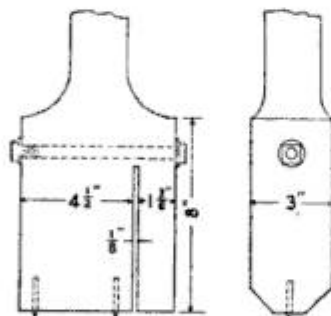


the way of the door and hold it open. A simple remedy for this is to turn the screw-eye until it stands in an almost perpendicular position. This insures a

free swing of the hook in fastening as shown, but prevents it from turning over into the way of the door.—Contributed by F. R. Ritchie, Akron, Ohio.

Starter for a Crosscut Saw

Starting a crosscut saw in the grain of wood is a difficult thing, and if accurate work is wanted, a starter should be provided. A very good starter, and one that will hold the saw at true right angles to the piece to be sawn, is shown in the sketch. It consists of a piece of wood, 3 in. thick, 6 in. wide and about $1\frac{1}{2}$ ft. long. A saw cut is made in one end, located as shown. The cut should be a little deeper than the widest part



of the saw. The other end of the wood is shaped into a handle. A bolt is placed through the wood above the slot to prevent splitting. Two spurs are fastened into the end as shown.

In use, the saw is placed accurately on the line, the guide slipped over the saw back, and the spurs are pressed into the wood. It is impossible to make a slanting cut or for the saw to slip from the line.—Contributed by J. L. Bayley, Ione, Wash.

Homemade Prest-O-Lite Tank Key

If the key is lost from a prest-o-lite tank one can be easily shaped from a cotter, as shown in the sketch. The eye of the cotter is shaped square by driving it on a square-pointed tool. The spreading end is fitted with a small piece of wood for a handle.—Contributed by H. M. Smith, Douglasville, Ga.



A Mottled Surface on Casehardened Articles

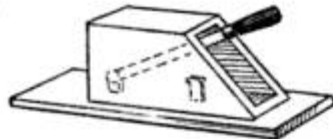
When casehardening with cyanide, a very pretty mottled effect can be produced by heating the piece, or pieces, to a bright red and then dropping them, one at a time, into water flowing at a good rate. The air bubbles give the effect. The bubbles can be made in the water by using an air hose, opening in the bottom of the vessel.

Removing a Gummed Connection on a Bottle-Capping Machine

While endeavoring to remove a heavy brass connection on a bottle-capping machine, I found it so tightly gummed that it resisted all efforts to remove it with a large wrench. To start it with a chisel or hammer would have ruined the connection, and I tried heat, but having no blowtorch handy I poured a very strong and fresh lye solution in a can drawn up over the connection. In addition to expanding the metal, the lye worked its way in and acted as a dissolvent on the gummed deposit in the threads, so that the part was finally removed without defacing it.—Contributed by James M. Kane, Doylestown, Pa.

Cover for an Electrical Lever Switch

The closing of an electrical lever switch at night or in a dark place is apt to give one a shock which may be



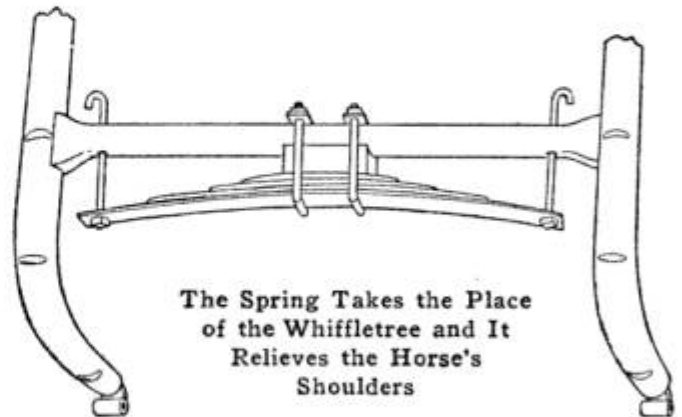
very dangerous at times, if the handle is missed and the open contacts touched with the bare hand. I covered my lever switch, as shown, and it is now impossible to touch any part of it except the handle.—Contributed by George M. Crawley, Jr., Newark, N. J.

Producing a Second Crop of Strawberries

After strawberries have finished bearing or when nearing the end of the bearing period, they can be induced to produce a second crop in the following manner: Provide a metal ring, 1 ft. in diameter and about 5 in. high, for each hill. The ring can be made of stovepipe iron, and if well painted, will last a long time. The ring is placed over the hill and water is poured in to fill it. To water the plants without the ring will not produce results.—Contributed by J. W. Banholster, Gresham, Ore.

A Spring Whiffletree for a One-Horse Vehicle

A whiffletree that will relieve a horse's shoulder of jerks and sudden jars when drawing a load is shown in



The Spring Takes the Place of the Whiffletree and It Relieves the Horse's Shoulders

the sketch. It is easily made of an old wagon spring and is fastened back of the crossbar of the shafts. Two rods, with ends formed into hooks for the traces, are run through holes in the crossbar and made fast to the spring.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.

Cutting Off Small Screws

Several hundred fillister-head screws of a special length were wanted quickly, and having on hand a quantity of screws, $\frac{1}{8}$ in. longer, it was desired to make use of them. To handle

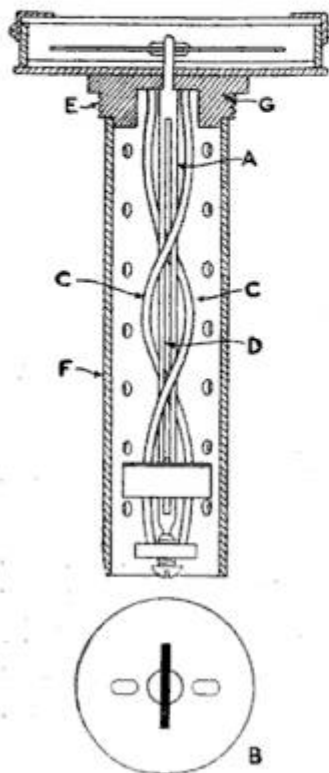


these small screws did not appear an easy matter, but it was made so with the use of the holder shown. A $\frac{5}{8}$ -in. rod was drilled out at one end to $\frac{3}{8}$ in. in diameter, then a collar of $\frac{3}{8}$ -in. stock was made to slip in it freely, and a hole drilled in it centrally for the screws. Each screw was inserted in the collar and the collar dropped into the hole of the rod with the screw end projecting. It was now easy to grind the end off level with the collar end.—Contributed by Donald A. Hampson, Middletown, N. Y.

☞ Equal parts of raw linseed oil and vinegar, thoroughly mixed, make a good restorer for linoleum.

An Indicating Gasoline-Tank Gauge

The gauge shown in cross section consists of a vertical shaft, A, which is free to turn and has a needle, or indicator, mounted on its upper end that moves over a graduated scale, giving a direct reading in gallons. The movement of the vertical shaft is controlled by the height of the liquid by means of a float.



The float is made from a piece of cork, mounted on a thin piece of sheet brass, shown at B. It is given a rotary motion by means of two small rods, C, bent into the form of a spiral of a little over one turn and passing through the two slightly oblong holes in the sheet of brass. This rotary motion of the float is transmitted to the vertical shaft by means of a piece of steel wire soldered across the center opening in the sheet of brass and passing through the slot D in the vertical shaft.

It must be borne in mind that the float and all parts that go inside the tank must be so dimensioned that they will pass through the opening in the tank. The opening might be provided with a threaded collar, soldered or brazed to it, so that the head of the gauge may be threaded as shown at E, to permit its being easily removed for repairs or inspection. The case in which the indicator or needle is mounted has a glass cover. The paste-board scale is fastened in the bottom of this case by means of some shellac, or glue, and afterward marked.

A tube, F, is fastened to the piece G, to prevent sudden surges of the liquid in the tank from damaging the

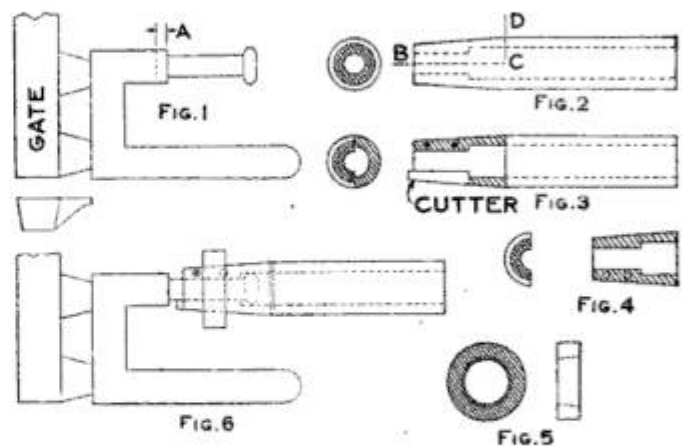
device. This tube, of course, should have numerous perforations in the side, so that the liquid may rise and fall freely within it.

After the device is completed and placed in the tank, it is calibrated as follows: Pour measured quantities of liquid into the tank and proceed to mark the position of the pointer on its scale for the various quantities of the liquid.

A Split Hollow Mill

After I had made a set of 24 brass castings, as shown in Fig. 1, my customer desired a change which consisted in cutting off the shoulder, at the point A, $\frac{1}{8}$ in., to make the round part longer. To make this change conveniently without removing the gate, a split hollow mill was made in the following manner: A piece of brass rod, $\frac{5}{8}$ in. in diameter and 3 in. long, was procured, and a $\frac{1}{4}$ -in. hole drilled centrally through it. Then the hole was enlarged in one end with a $\frac{3}{8}$ -in. drill for a length of $2\frac{3}{8}$ in., and the end with the $\frac{1}{4}$ -in. hole was tapered on the outside for 1 in. in length.

After these operations the piece was cut through on the dotted lines from B to C and D to C, as shown in Fig. 2. On one face of the remaining half two $\frac{1}{16}$ -in. pins were fastened so that they projected $\frac{1}{8}$ in. A steel blade for a



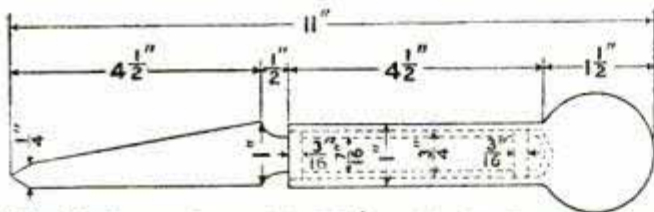
Details of the Parts, Showing the Construction of a Mill for a Special Work

cutter, having the thickness of the metal removed by the saw cut, was soldered to the opposite face, as shown in Fig. 3. The part removed, Fig. 4,

was put back in place and held there firmly by means of a ring, Fig. 5. Two holes were drilled in this piece, of such size as to permit the pins to slip into them freely. The mill as it is used is shown in Fig. 6.—Contributed by Stephen Bona, Union City, Conn.

Combination Drift and Hammer

The tool illustrated takes the place of a drift and hammer, and the combination can also be used as a center punch. The drift is forged from tool steel, and the shank is turned to fit loosely in a hole bored in the handle, which is also made of steel and has a ball formed on the end. A small collar is shrunk on the shank end, the outside diameter fitting the hole in the handle snugly, and another collar is pinned in the hole, at the handle end, with its inside diameter snugly fitting the shank. The hole in the handle should be bored out with a bottoming tool to make a flat bottom. The end



The Workman Loses No Time with the Combination Drift and Hammer, As They are Always Together

of the sloping part can be pointed for use as a center punch.

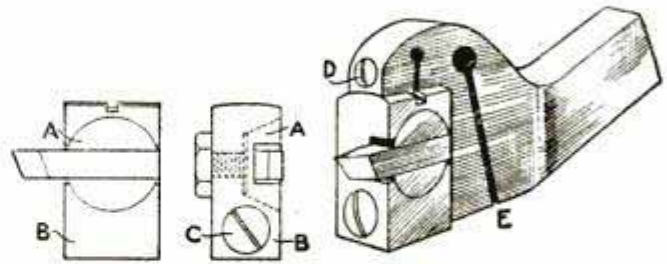
To improve the appearance, the ball can be polished and the straight part knurled. The end of the shank in the handle should be hardened to prevent its being burred over. A smart blow of the handle will remove a drill tightly fitting the socket. It only requires one hand to drive the drift, while the drill can be held in the other.—Contributed by V. S. Denison, Sandusky, Ohio.

An Adjustable Spring Threading Tool

The threading tool illustrated is especially constructed for fine work, as it will not "dig" in and spoil the thread. It is made of tool steel throughout.

The cutter holder A is a bolt having

a conical head, which serves the two purposes of holding the cutter and of permitting adjustment. The block B, in which the cutter holder is fitted, has a groove in its curved upper part

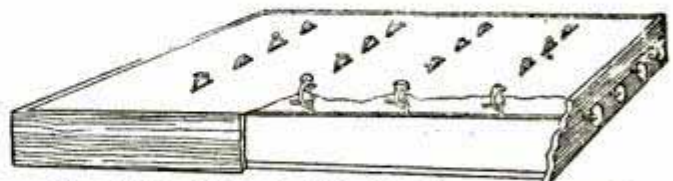


A Spring and Adjustable Lathe Threading Tool for Fine Tool-Room Work

to admit a clamping projection on the shank. The block revolves on the screw C, thus making it possible to adjust the cutter vertically, and is clamped when set with the screw D. The slot E makes a spring of the metal at the upper end, which will prevent the cutting tool from digging into the work.—Contributed by J. W. Eagan, Syracuse, N. Y.

Lock for a Finger-Ring Case

It is a very easy matter for a thief acting as a prospective customer to take a ring out of the display tray without being seen. The illustration shows a safety device to prevent such a theft. From all appearances the ring case is the ordinary kind, but a wire slide is provided for each row of rings and a hook for each ring is fastened to the wire slide. When the wire is pushed in at the end of the case all rings are locked in their receptacles. The ends of the wires may be concealed so that a quick movement of



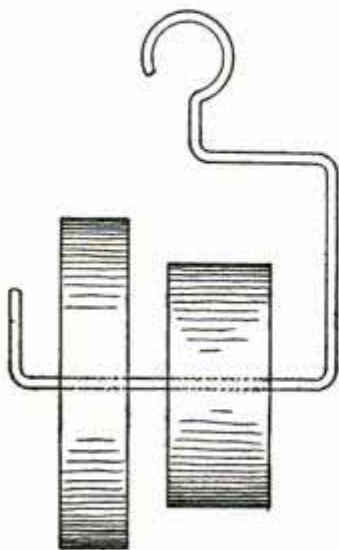
Each Ring is Locked in Its Place and cannot be Removed without being Released

the hand will release a ring without the customer noticing it.—Contributed by Francis Chetlain, Chicago.

¶ If dry cells run out quickly, examine the wiring system for a short circuit.

Tape Holder for Electricians

A piece of wire, bent as shown in the sketch, makes a handy tape holder for electricians and linemen.



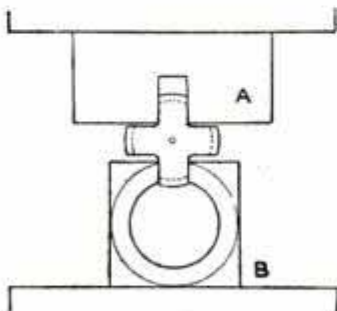
The tape is placed on the large hook and the small hook caught into a belt loop, or other convenient place. Different widths of tape can be carried on one holder.—Contributed by Patterson Merrill, Chicago, Ill.

Remedy for Sticky Church Pews

Sticky church pews are caused by bad atmosphere, due to poor ventilation, more than to the character of the varnish, as a cheap varnish is usually, though not always, a quick and hard drier. Fish oil in the varnish, or resin oil, will cause stickiness. Varnishing over greasy seats is another cause. Apply two thin coats of brown shellac varnish where the original coating has failed to dry hard and ventilate the room well and often.

Cutting a Left-Hand Thread with a Right-Hand Tap

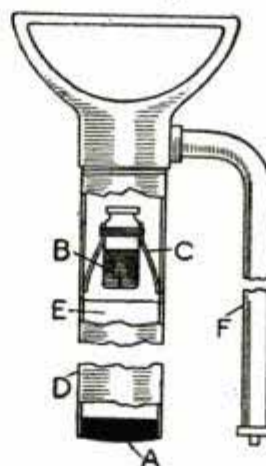
When it is necessary to cut a left-hand thread and no die is at hand, a very good thread can be made with a right-hand tap in the following manner: Cut a notch in a piece of metal to admit one of the flutes in the tap, as shown at A, then procure a blank nut that will receive the rod to be threaded snugly and cut a slot in one of its sides



to admit the opposite flute, as shown at B. The threads on the flute should extend in the nut for their full depth. Slip the rod, or bolt, to be threaded in the nut the full depth, then draw the vise jaws together, to press the threads of the tap lightly into the metal, and turn the bolt to the left, at the same time giving it a slight downward pressure to start it in the proper pitch. After a few turns, the pressure is not necessary. The feed on the vise jaws is continued until a full thread is cut.—Contributed by F. A. Dowler, Lawrence, Kan.

A Small Fire Extinguisher

Having need on several occasions for a small fire extinguisher for my laboratory, I devised an extinguisher which costs very little and is easy to make.



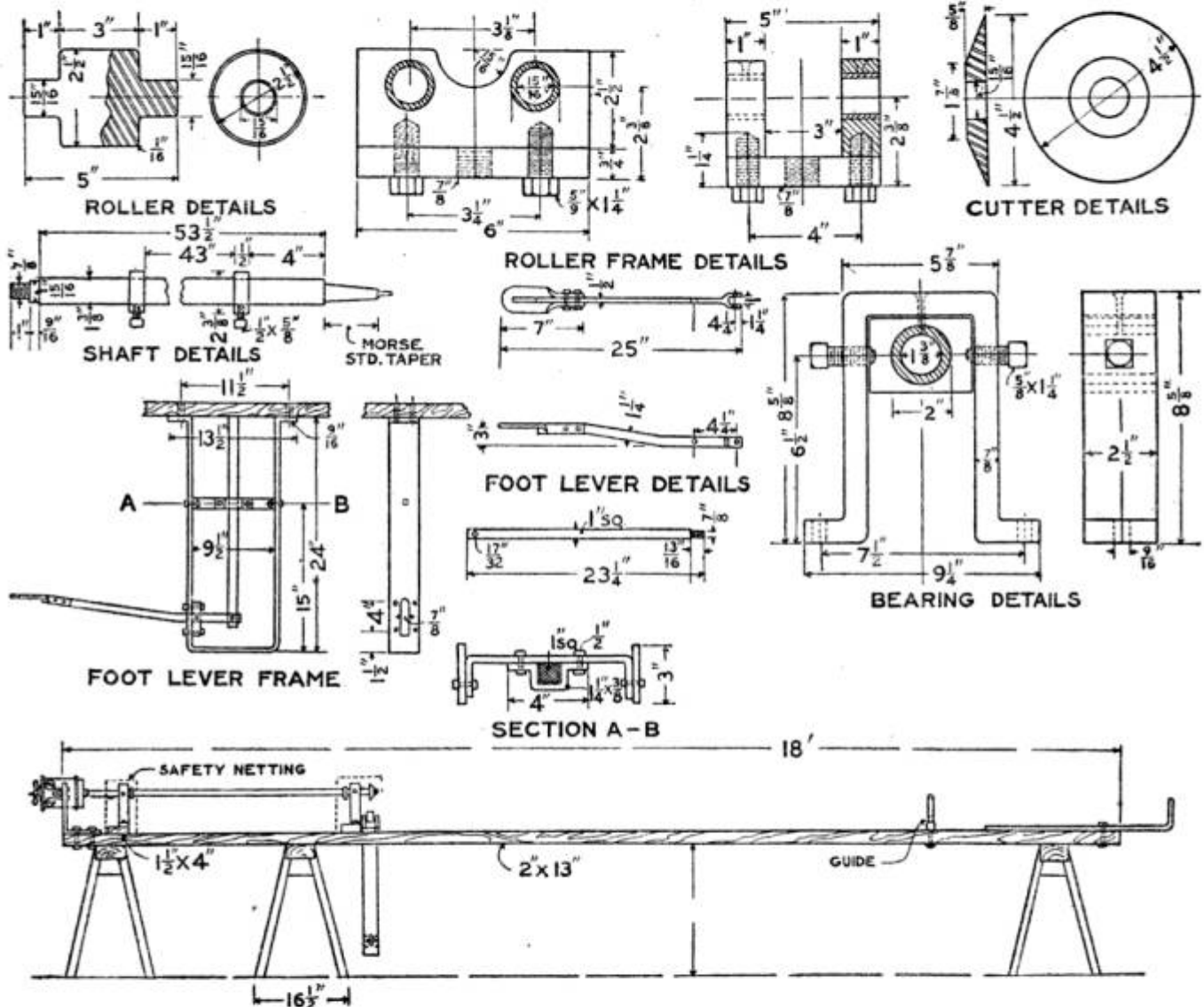
An old bicycle pump, the handle and plunger of which were discarded, was used as the body of the extinguisher. The hole A, through which the plunger passed, was stopped with sealing wax. The small bottle B, which is held in position by two small steel springs, C, made fast to the bottle with a small wire, is half filled with concentrated sulphuric acid. The pump barrel D is filled with a strong solution of baking soda, E. When the pump is inverted the acid acts on the soda solution, thereby forcing a stream of fluid through the tube F with considerable force. At one trial I found that the liquid was thrown 20 ft. The extinguisher contains enough fluid to put out any small-sized fire.—Contributed by Ellis S. Middleton, Washington, D. C.

ⒸClean a dirty crack of a casting with a piece of caustic, and a weld can be made at once. Be sure to handle the caustic with care.

Pneumatic Motor-Driven Flue Cutter

The cutting of flues in a great many small and moderately equipped shops is often an expensive job. The limited number of such jobs undertaken would, as a rule, not warrant the purchase of special equipment for this purpose and, therefore, the work is performed with hand tools, which, in

holding irons, is a cheap and efficient source of power in any shop having compressed-air facilities. As the device is light and portable, it can be moved close to the job and thus eliminate a great deal of extra work in handling the flues. It is also convenient when it is necessary to cut flues of varying lengths for irregular flue sheets. The cutter can be used on



Detail of the Parts for the Construction of a Homemade Machine for Cutting Flues, Pipe or Any Light Tubing, the Power being Furnished by a Pneumatic Motor

most cases, is uneconomical from the viewpoint of both the shop owner and the customer.

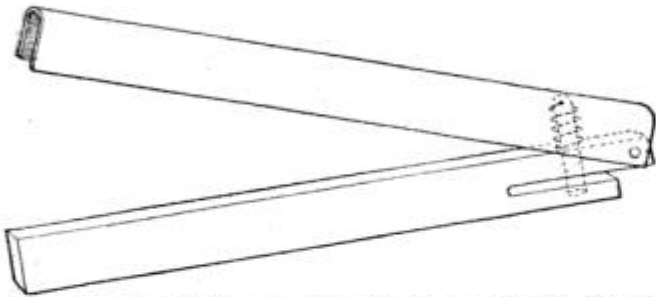
The sketch is descriptive of a simple flue cutter, the parts of which are easily and cheaply made in any shop. The power is furnished by a pneumatic motor of almost any kind, the tool-shank recess slipping over one end of the cutter shaft turned to take it. The motor, when secured by suitable-angle

pipe and almost all kinds of other light tubing.—Contributed by F. W. Bently, Milwaukee, Wis.

Homemade Paper Punch

The need of a special paper punch of heavy construction brought about the making of the one shown in the sketch. It consists of a solid piece of steel, a sheet-metal handle and a steel

punch. The solid piece of steel is slotted at one end to admit the thickness of the paper or cardboard, and a hole is drilled through the metal at



This Manner of Construction Makes a Paper Punch That will Stand Hard Usage

right angles to the slot. A tool-steel rod, snugly fitting the hole, is hardened and ground sloping on the end to be used for cutting, and the opposite end is made round.

A piece of sheet steel is bent in a V-shape and hinged to the slotted end of the solid steel, as shown. Before hardening the steel punch a small hole is drilled near the round end. A small coil spring is then slipped over the punch and one end is fastened in the hole. Pressure on the handle drives the steel punch through the slot and the paper inserted in it, and upon release of the pressure the spring draws it back together with the handle.—Contributed by Victor Arkin, Chicago.

Noncalking and Water-Tight Joint in Wood-Stave Tanks

A good way to insure an absolutely water-tight fit between the edges of two boards in constructing a water tank or vat is as follows:



A



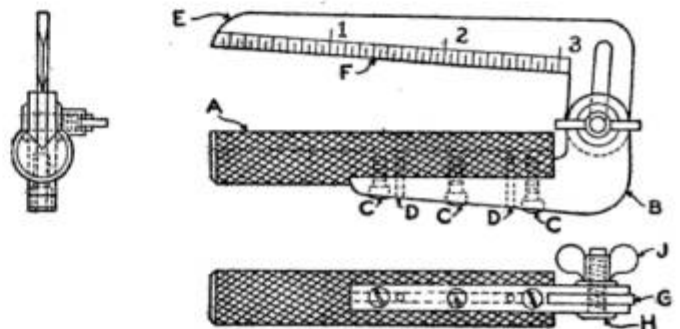
B

about 6 in. long. Lay the iron on the board edge in the center and drive it into the wood to make a depression. Make this depression for the full length of the board, as shown in the cross section A. Plane off the raised portions to the level of the bottom in the depression. When two boards thus

treated are placed edge to edge and drawn up with bolts, an absolutely water-tight joint is made without calking of any kind. The moisture will cause the compressed wood in the center to swell, as shown at B, and completely close the joint.—Contributed by J. G. North, Mountain View, Cal.

An Adjustable Taper Gauge

The illustration shows a design of an adjustable taper gauge which is handy within its limits for reproducing taper pins, lathe centers, arbors, collets, and other tapered work of which duplicate pieces are required. The body A, which is made from a piece of tool steel, finished to $\frac{9}{16}$ in. in diameter, is $3\frac{1}{4}$ in. long and knurled



The Gauge can be Set for Any Taper, and Aids in Making a Perfect Fit

for its entire length. A V-slot, 90-deg. included angle, is milled lengthwise in the body A, and a flat place is finished for the piece B, which is held to the body by screws, C, and dowel pins, D.

The blade E is a piece of flat ground stock, $\frac{3}{8}$ in. thick and finished to the desired shape. The under side, at F, is beveled on both sides to $\frac{1}{8}$ in. in thickness at the edge, and is graduated its entire length, thus making it convenient in measuring the length of the taper. The end of the blade E, containing the elongated opening, is fitted in the slot G milled in the piece B, and is held in any desired position by the clamp screw H and wing nut J. With the use of this gauge, the cut-and-try method of fitting to a taper hole is eliminated, as the slightest error can be detected by holding the gauge to the light.—Contributed by E. P. Fickes, Dayton, Ohio.

Ridding a Pantry of Ants

To rid the pantry of a swarm of ants, a neighbor filled a sponge with sugar and placed it on a shelf among the sweet stuffs. When the holes in the sponge became full of ants, the sponge was thrown into a pan of boiling water, and the ants were soon exterminated.

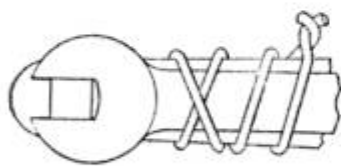
No doubt other insects, not too large to enter the holes in a sponge, could be exterminated in the same way, providing the sponge were soaked with something they like.—Contributed by Joseph Patterson, Detroit, Mich.

To Prevent Unlawful Use of a Fire Escape

To prevent the students of a school from stealing out by means of the fire escape a novel scheme was applied. Some tar was procured from a local gas company, and the railings and stairway were painted with it. The result was that the students after descending presented such an appearance that stealing out was not tried a second time. The tar remained in a moist condition quite a while and acted as an excellent preservative for the metal without preventing the use of the escape in case of an emergency.—Contributed by Geo. W. Gering, Annapolis, Md.

Locking a Nut with a Wrench

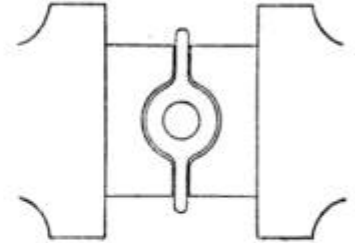
The lock nut on the adjusting screw in the end of the exhaust-valve lever on a 100-hp. gas engine broke so that the screw worked loose and turned out far enough to make the timing of the valve too late. The



screw was put back in place, a wrench was put on the head and the handle bound to the lever with copper wire. In this way the run was finished without a shutdown.—Contributed by Earl Pagett, Coffeyville, Kan.

Tapping Wing Nuts

In tapping wing nuts, provide a holder as follows: Procure a square or hexagon nut having a hole $\frac{1}{16}$ or $\frac{1}{8}$ in. larger than the outside diameter of the wing-nut body. Saw the nut in two and use it in the vise jaws as shown.—Contributed by John P. Kolar, Ithaca, N. Y.



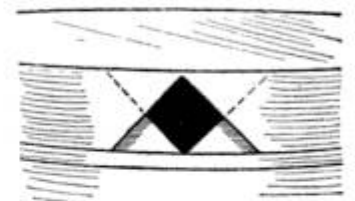
Removing Tire Valve with a Cotter

Where a valve cap is lost on a pneumatic tire the valve may be easily removed by the use of a small cotter. The cotter is placed in the valve, as shown, and turned with the fingers. In case of a tightly fitting valve, insert a nail in the eye of the cotter for a handle.—Contributed by M. B. Schweiger, Kansas City, Mo.



A Box to Hold Powders

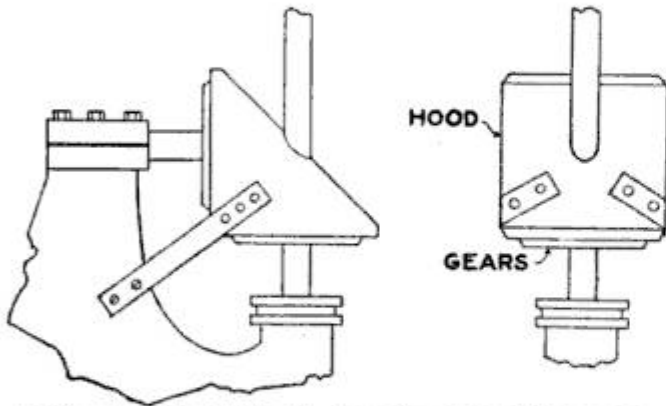
The mechanic's receptacle for holding any one of the powders, like emery or borax, that are occasionally used by him consists of a small pasteboard or metal box. I find one of the handiest receptacles for any powder is a tin can, with close-fitting cover, prepared as follows: A V-shaped notch is cut in the cover, and one in the can, in opposite directions. A slight turn of the cover makes an opening which can be increased in size up to the limit of the cuts. When not in use, the opening is easily closed by turning the cover.



CA pair of canvas gloves on the hands is better than a rag for washing a vehicle, as difficult parts and spokes may be easily reached.

Safety Covering for Bevel Gears

Bevel gears are the most dangerous, because on account of their shape they are more difficult to protect. They are



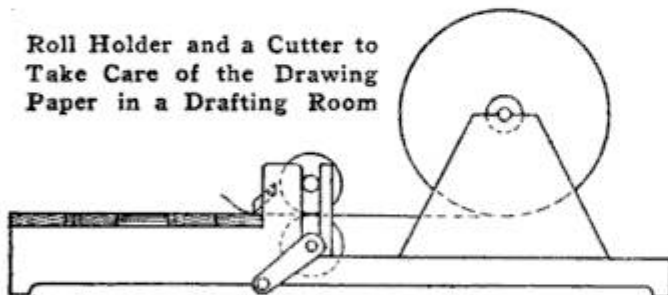
A Hood of Sheet Metal, Covering Bevel Gears on a Machine, to Protect the Workman

especially hard to safeguard where used on a shaft that extends both ways from the horizontal gear. The sketch is descriptive of a hood for covering such gears. The hood consists of a cylindrical piece of sheet metal, cut at an angle of 45 deg. at both ends so as to present a triangular form. The hole for the shaft should be so large that the shaft cannot touch the hood; the latter being anchored with supports which are shaped to suit the conditions.

Drawing-Paper Holder and Cutter

The illustration shows a device that I am using in my drafting room for holding and cutting drawing paper. The paper used is 36 in. wide. The small rolls of the device are about 3 in. in diameter and 36 in. long. A piece

Roll Holder and a Cutter to Take Care of the Drawing Paper in a Drafting Room



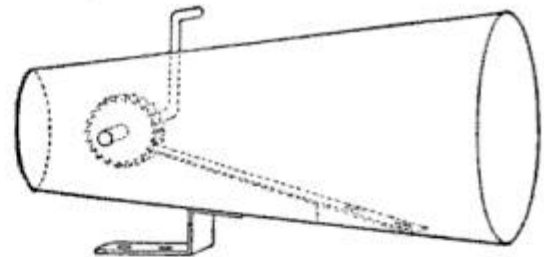
of sandpaper, about 12 in. wide, is glued around each end of the lower roll and one piece around the center of the upper one. The weight of the upper roll keeps the paper in firm contact with the lower roll, which is

turned by means of a crank at the end. The end of the paper feeds out on the cutting board where a hardwood flapper is provided for the paper to pass under and which serves as a cutting edge.—Contributed by C. L. Orcutt, Akron, Ohio.

Homemade Automobile Horn

A simple automobile horn that can be easily made and will give good results is shown in the sketch. The horn part is cut from sheet metal, and when complete, it should be about 8 in. long, 2 in. in diameter at the small end and 3 in. at the large end. Make a notched wheel from hard wood, about $\frac{3}{4}$ in. thick and $1\frac{1}{2}$ in. in diameter. Holes are punched through the metal of the horn near the small end, and a piece of wire is run through them for an axle. The notched wheel is fastened to the wire in the horn. The end of the wire on one side is formed into a crank.

A strip of thin wood, $\frac{1}{2}$ in. wide, is



The Notched Wheel Causes the Wood Tongue to Vibrate and Produce a Loud Tone

fastened in the horn in such a position that its free end will touch the notched edge of the wheel. To prevent the axle from slipping endways, a washer is fastened to it on each side of the horn, or a little lump of solder will do. A quick turn of the crank will produce a loud sound, similar to that of an automobile horn. A bracket is fastened to the outside to provide a means of attaching it at a convenient place on the automobile.

ⒸPneumatic tires should be large enough for the vehicle and for the load they are to carry. It is better to use tires that are over-size than those that are too small.

Pattern for a Cored Piston

By J. A. SHELLEY

The castings for hollow, or cored, pistons do not vary much in design, but there is enough difference in the means used in building them to claim the attention of every one interested in patternmaking.

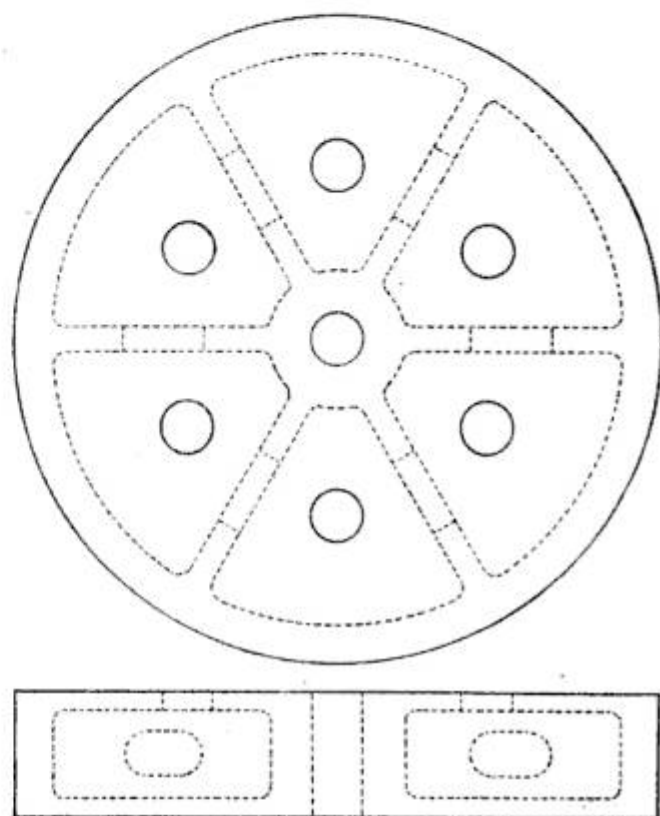
The best means is, of course, the use of a properly made pattern and core box, and these will be first considered in the construction of a standard pattern and core box for a 24-in. piston, shown in the illustration.

The constructive features of this pattern are shown in the sectional layout. The outside, or rim, is built of segments with the top and bottom heads recessed into it. These heads should be made of strips, 3 or 4 in. wide, with a space of about $\frac{1}{16}$ in. between them. They should be connected by a good strong piece, running across the spaces. This is to stiffen the pattern and provide a foundation for the rapping and the lifting plates.

The strips forming the heads should be first sawed to the proper diameter and then glued together with a $\frac{1}{16}$ -in. piece between each strip, at the ends. When the glue has dried, plane one side, or surface, of each head perfectly true, then true up a faceplate of suitable size, and fasten one of the heads to it with screws. Rough-turn the edge of this head and fit the segment course No. 1 around it, then fasten with nails and glue. Face this off and apply course No. 2. This course should cover No. 1 and lap over on the head the same distance. Courses No. 3 and 4 are next applied, but before the course No. 5 is put on insert a stiffening piece and plane it off flush with course No. 4. The course No. 5 is then put in place, and a recess is turned to receive the bottom head. The head is cut on a band saw, to fit the recess, and then fastened with screws, or nails and glue.

Two prints will be required to carry the center core, one straight, on the

nowel, and the other tapered, on the cope side. The prints for carrying the compartment cores should be placed

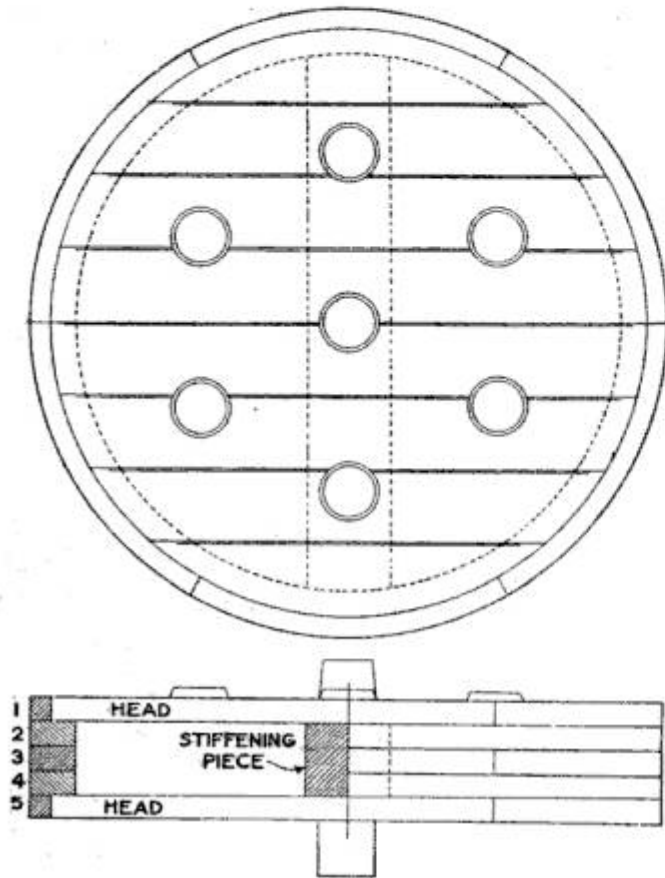


Layout for a Large Cored Piston from Which a Pattern is to be Constructed

on the cope side and need not be over $\frac{1}{2}$ in. in height. Hanging these cores in the cope does away with the necessity of using chaplets and enables the molder to vent these cores through the top of the mold. This makes a very substantial pattern which will stand a lot of hard usage.

Where only two or three castings are required, a pattern of much cheaper construction will answer just as well. In making a cheaper pattern, the heads should be constructed the same as for the standard pattern and securely nailed to three pieces, to keep them the right distance apart. The outside, or rim, of the pattern is made of narrow pieces of $\frac{7}{8}$ -in. material, nailed to the heads. These pieces should be cut the exact length, to correspond with the depth of the pattern, but in nailing them in place, it is not necessary to be careful about the joints between the

pieces. A little truing up with the block plane may be necessary to finish, but if the heads have been carefully laid out and sawn, and the strips are



The Pattern as It is Built Up with Heads and Segments for the Rim

parallel and of equal thickness, the usual allowance for machining should be enough to correct any slight inaccuracies in the pattern. The prints for carrying the center core are used on this pattern, but those for carrying the compartment cores are not used, the molder locating and setting the cores in place by measurement.

The core boxes for both patterns are substantially the same, the only difference being in the length of the pipe-tap core where it cuts through the cope. This difference is due to the fact that one pattern has prints to carry the cores and the other not. The compartment box takes in a whole section and has half of the dividing ribs in each side. These dividing ribs are made in halves, the parting being through the center of the openings connecting the compartments. The bottom halves may be fast in the box, but the top halves must be loose so that the core can be taken out. A

point to bear in mind in making these boxes is to make the distance somewhat short in spacing off from the center of one rib to the center of the next, otherwise the molder will be obliged to file the ends of the cores to get them in place.

Drilling Holes in Wood with Nails

A number of small holes of special size had to be drilled in some thin strips of hard wood, but drills of the proper size were not at hand, nor could they be obtained quickly. A way of making the holes with nails was tried out with good results in the following manner. The heads of the nails were cut off; the ends were flattened and pointed slightly as on a flat drill, and the nails were then used in the same manner. They did the work nicely, as the material was not over $\frac{1}{8}$ in. thick, but not so quickly as a drill.

Another time small holes were required in a set of lead-composition letters, to fasten them on wood patterns. The letters were only $\frac{1}{4}$ in. high, and consequently the body was narrow. Small nails, as described, were used to drill these holes.

A Trapdoor Handle

Wishing to have a handle for a trapdoor that would not be above the floor level, I made one as shown in the sketch. A $\frac{3}{4}$ -in. hole was bored, about $\frac{1}{8}$ in. deep, in the door where the handle was to be placed.



In the center of this hole another hole was bored, large enough to permit a chain, 5 in. long, to slip in it. On the upper side a button, such as used on uniforms, was secured to the chain end, and on the under side a weight was hung. The door is easily drawn up by lifting the button and grasping the chain.—Contributed by Wm. Trilling, Chicago.

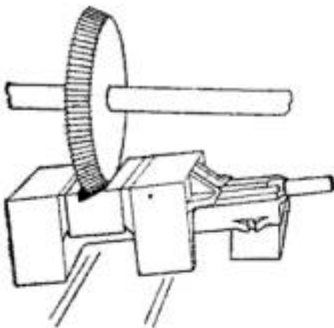
Cooling Air Entering Window Exposed to Sun's Rays

Many shops and factories have windows exposed to the sun's rays and the bricks on that side of the building become heated during the day and in turn heat the entering air, raising the temperature several degrees. A way to cool the bricks is to run along the tops of the windows a water pipe having small perforations made at each window opening. When the water is allowed to run through the pipe slowly, the bricks are moistened and this moisture rapidly evaporates, cooling the air so that it enters the building moist and at a reduced temperature.—Contributed by Loren Ward, Des Moines, Iowa.

Making a Special Angular Cut

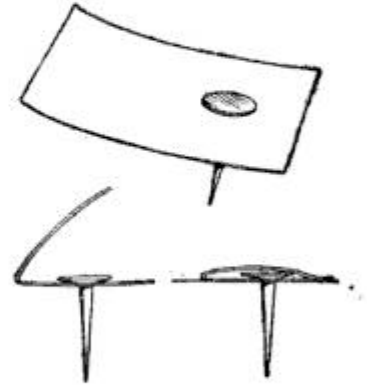
A number of special steel pieces were to be cut across their surfaces at an angle of 70 deg. Cutters for the milling machine were available with a 60-deg. angle, but none of 70 deg. As no more such pieces were to be made, it was a question whether it would pay to purchase a cutter having the right angle, to alter an old one, or to plane the pieces instead of milling them. It was finally decided to do the work as follows:

The pieces were first clamped in the Miller vise, and a 60-deg. slot cut through them, then a shim was placed under one edge of the vise and the pieces were rechucked. The machine was set carefully so that the points of the cutter lined up with the extreme depth of the old cut, and the work was finished by passing the cutter over the face the second time. Raising one side of the vise made the cutter take off the angular side of the cut and increased its slope from the straight side which was a part of the original cut.



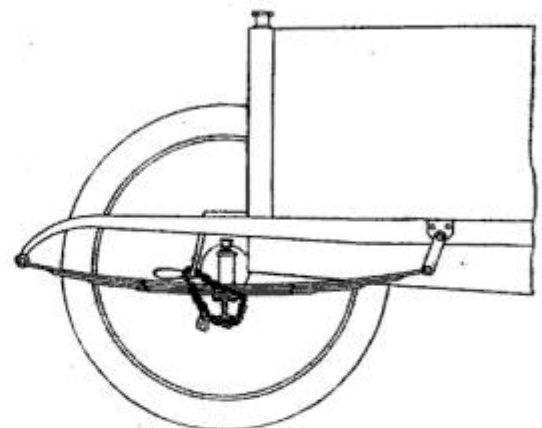
Covering Tack Heads for Imitation-Rock Work

Sometimes paper is used to build imitation-rock work for temporary decoration, etc. If the paper is heavy, it often tears away from the tack; and if it holds, the tack will show. A remedy for this is to slip a piece of the same kind of paper on the tack, paste it on the under side and drive the tack, then press the extending end down over the tack head after pasting the upper side. The piece of paper prevents the tearing of the heavy paper and effectually conceals the tack head.



Locking an Automobile

The ordinary automobile may be safeguarded from theft as follows: The starter crank on almost all automobiles is from 5 to 6 in. in front of the axle. If a length of steel chain is passed around the axle and over the handle of the starter, then drawn taut



The Engine cannot be Started Until the Chain and Lock are Removed from the Crank

and the ends joined with a padlock, the engine cannot be cranked without removing the chain.

CA little kerosene, poured into a box before running in the babbitt, will prevent the explosion that sometimes occurs.

Finding the Wire Size to Use in Direct-Current Installation

The selection of the proper-size wire to use in conducting electricity between two points, a known distance apart, is governed by the current-carrying capacity, as established by the American Institute of Electrical Engineers, and by the voltage drop to be allowed when the circuit is carrying its full-load current.

The following simple formula, in combination with Ohm's law, is used in calculating the proper size of wire to use, so that the voltage drop will not be greater than the allowable value; and if the size of wire thus determined is capable of carrying the current, as determined from the table of current-carrying capacities, the calculation is complete. If the size of wire determined by calculation will not carry the current, then the size of wire, as given in the table of current-carrying capacities, which will carry the current, must be used.

$$R = \frac{K \times L}{C. M.} = \text{Resistance} \dots \dots \dots (A),$$

in which K equals the resistance per mil foot and depends upon the kind of wire used, and its temperature. It is equal to 10.7 for copper under approximate working conditions; L equals the length of the wire in feet; and $C. M.$ equals the area of the wire in circular mils, which is equal to the diameter of the wire in mils multiplied by itself (the mil is .001 in.).

Ohm's law gives the relation between the current in a circuit, the drop in voltage over a certain portion and the resistance of the same portion, and is usually written in the following form:

$$\text{Current} = \frac{\text{Drop in voltage}}{\text{Resistance}} \dots \dots (B)$$

The above may be changed to read as follows:

$$\text{Resistance} = \frac{\text{Drop in voltage}}{\text{Current}} \dots \dots (C)$$

Now, if the full-load current the wire is to carry is known and also the al-

lowable drop in voltage, the resistance may be determined by dividing the drop in voltage by the current, as indicated in equation C. The resistance thus determined can then be substituted in equation A, and the required value of $C. M.$ calculated. The equation A may be changed to the following form which is perhaps a little simpler:

$$C. M. = \frac{K \times L}{R} \dots \dots \dots (D)$$

Since R equals volts lost divided by the current, equation D may be written in the following forms:

$$C. M. = \frac{K \times L \times \text{Current}}{\text{Volts Lost}} \dots \dots (E)$$

$$\text{Volts Lost} = \frac{K \times L \times \text{Current}}{C. M.} \dots \dots (F)$$

$$\text{Current} = \frac{\text{Volts Lost} \times C. M.}{K \times L} \dots \dots (G)$$

In the above equations, L is the length of the conductor in feet, which is twice the length of the circuit.

Equation E gives the value of the circular-mil area of a conductor to carry a certain current with a certain loss in voltage, the length of the circuit being $\frac{L}{2}$ feet.

Equation F gives the value of the volts lost in a circuit, $\frac{L}{2}$ ft. in length, carrying a known current and composed of a conductor of known circular-mil area.

Equation G gives the value of the current a circuit, $\frac{L}{2}$ ft. in length, will carry when the circular-mil area of the conductor is known and also the allowable volts lost.

Example: What size wire will be required for a 10-hp., 110-volt direct-current motor, located 200 ft. from the switchboard with an allowable loss in voltage of 4 volts? The voltage at the board is 115 volts and the efficiency of the motor is 85 per cent.

Solution: Since the motor has an efficiency of 85 per cent, its full-load input will be $\frac{100}{85}$ of 10 or 11.76 hp. One horsepower is equal to 746 watts, so that the watt input will be equal to

11.76×746 , or 8,773 watts. The voltage at the motor will be equal to $115 - 4$ or 111 volts, and the current input will be equal to the watt input divided by 111, or $\frac{8773}{111} = 79.03$ amperes. Substituting, in equation E, this value of current, the voltage loss, which is 4 volts, and the value of L, which is equal to twice the length of the circuit, or 400 ft. in this case, one obtains:

$$C. M. = \frac{10.7 \times 400 \times 79.03}{4} = 84,562$$

The diameter of the wire is equal to the square root of the value of the circular-mil area, which gives 291 mils. A No. 1 gauge wire has a diameter of 289.3 mils, so that if a No. 1 wire will carry 79.03 amperes, it may be used and will meet all the requirements. The allowable current a No. 1 rubber-insulated wire will carry, as given in the table, is 100 amperes, so that this size may be used.

If the length of the circuit had been 100 ft. instead of 200, the value of the circular-mil area calculated by means of equation E would be 42,281, and the diameter would be 205.6 mils, which corresponds to a No. 4 gauge. The allowable current-carrying capacity of a No. 4 wire is only 70 amperes, so it would be out of the question to use that size. A No. 3 will carry 80 amperes and it must be used.

It is apparent from the above that when the circuit was 200 ft. long it was the voltage drop that determined the size of wire to use, while with the circuit 100 ft. in length it was the current-carrying capacity.

The value of the voltage drop for a circuit 100 ft. long, composed of No. 3 gauge wire and carrying 79.03 amperes, can be calculated by substituting in equation F which gives:

$$\text{Volts Lost} = \frac{10.7 \times 200 \times 79.03}{52,630} = 3.21 \text{ volts}$$

The above calculations do not take into account any overload the motor might be called upon to carry which would require an increase in the current-carrying capacity of the leads.

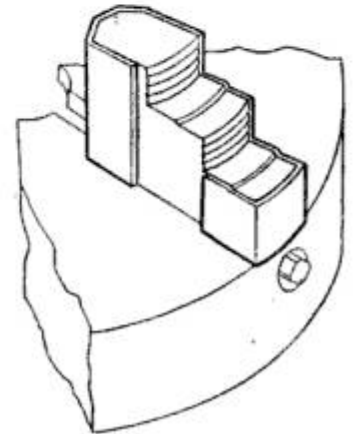
The underwriters require the current-carrying capacity of the wire to be 25 per cent greater than the full-load current of the motor.

Calculations for lights are identical with the above, so that no examples need be given.

Copper Faces for Chuck Jaws

It is often necessary to rechuck finished work in a lathe, and to prevent the jaws of the chuck from marring the finished sur-

faces it is necessary, of course, to place contact strips of some soft material between the jaws and the work. Anyone who has ever tried to get such strips hurriedly in place



knows that it is quite a provoking task. The sketch is descriptive of a form set of strips which can be quickly slipped over each individual jaw and which are so shaped that they will stay in place regardless of the jaw's position. These strips save the lathe man's time and patience, and take up little space on the tool rack.

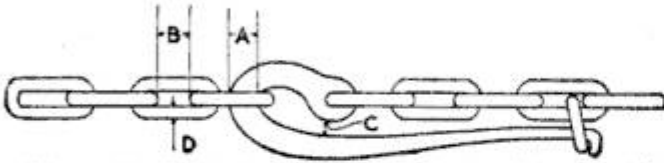
Re-Marking Steel Squares

Desiring to make the marks on a steel square black, I proceeded as follows: Some white-shellac varnish was rubbed into the marks with a piece of clean cloth, and the surplus on the surfaces was wiped off; then, after drying for a few minutes, lampblack was rubbed into the depressions with a stiff brush. When thoroughly dry, the surface was polished. This gave clear black lines on the scale.—Contributed by F. H. Tillotson, Chicago.

☞ A cloth used for straining purposes can be held on a pail rim with clothes pins.

A Chain Fastener

By those who use a chain, the hook shown, to make adjustable lengths, will be appreciated. The size of the



When the Hook is Placed in a Link of the Chain It is Held Solidly

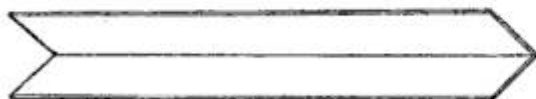
hook will depend on the size of chain, the thickness at A being slightly less than the distance B, and the space C a trifle larger than the diameter D. The eye of the hook may be fastened to the chain with an extra link welded together or attached with a slit link.—Contributed by D. B. Templeton, Bayonne, N. J.

Preventing the Dripping of a Fountain Pen

Frequently it is necessary to use a fountain pen that is almost empty, and at such a time one is troubled with the ink dripping from the pen. The reason for this is that the additional amount of air in the pen is expanded by the heat from the hand, thus forcing the ink out when the pen is held in a writing position. To avoid this, clasp the pen in the hand and hold it in an upright position until it has become warmed by the hand and the air expanded and a portion passed out of the pen. Then the writing may go on without the troublesome drip.—Contributed by Bert H. Stanley, Portage, Washington.

Marking Parallel Lines on Round Stock for Keyways

Parallel lines may be easily marked for keyways on round stock by the



The Rule Adjusts Itself to Round Stock with the Edges Parallel to the Length

following method: Cut a piece of sheet metal 2 in. wide and about 1 ft. long, and bend it in the shape of the

letter V, carefully making the edges parallel and free from roughness. This will make a ruler which fits the shaft closely and can be slipped to any position, and the lines drawn along either edge will always be parallel with each other and with the axis of the shaft.—Contributed by Geo. Parke, Chicago.

Gasoline-Engine Exhaust Muffler

A shop using a small gasoline engine for power was located near an office, and the exhaust annoyed the occupants of the latter. As the shop was to be moved in a short time, the owners did not care to purchase a muffler. The sharp report of the exhaust was temporarily muffled by using a forked pipe on the outlet.

A piece of pipe, 5 ft. long, was procured and its circumference divided into four equal parts. Lines were drawn on these marks lengthwise of the pipe and slots cut for almost the entire length, only allowing a sufficient solid and threaded end to be turned into the exhaust opening of the engine. The exhaust then resembled the exhaust of a steam engine.

Oiled Insert for Automobile Springs

The leaves of automobile springs soon become dry and develop a squeak which is very annoying. An easy and effective manner to remedy this trouble is the following: Obtain some fine bronze-wire mesh and cut it into strips the same length and width as the leaves of the springs. Fill the spaces between the wires with hard oil or grease by placing the screen on a flat surface and using a putty knife or a flexible strip of steel to spread the grease. Take the springs apart and build them up again, inserting the greased mesh between the leaves. This will stop all squeaking and produce easier riding for a long time.

CA squeaking door hinge should be lubricated with graphite and a drop of oil.



How to Make a Flymobile

By EDWARD SIEJA

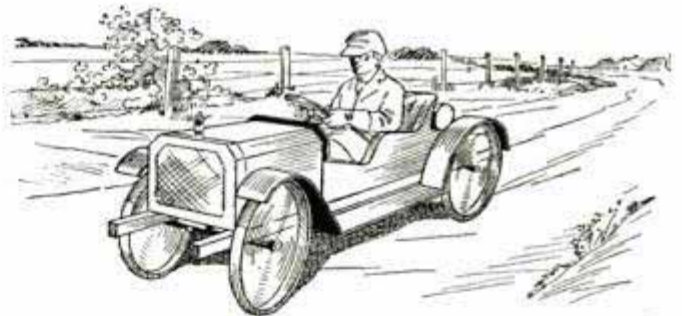
The boy owning a pushmobile, or even a power-driven auto car, is often very much disappointed because motion soon stops when the power is not applied. The car illustrated is of a little different type, being equipped with a flywheel that will propel the car and carry the rider a considerable distance after stopping the pedaling. The flywheel also aids the operator, as it will steady the motion and help him over a rough place or a bump in the road.

The main frame of the flymobile is made up of a few pieces of 2 by 4-in. timbers. The pieces A are 6 ft. 4 in. long, and the end crosspieces B, 24 in. long. These are jointed, glued and screwed together, as shown in Fig. 1. The frame that supports the driving parts consists of a piece, C, 6 ft. 2 in. long, and a piece D, 2 ft. 11 in. long. These are fitted in the main frame and securely fastened to the end crosspieces B. Two other crosspieces, E and F, are used to strengthen the driving-parts frame.

The entire hanger G, with its bearings, cranks and pedals, can be procured from a discarded bicycle and fastened to the piece C; the barrel holding the bearings being snugly fitted into a hole bored in the piece with an expansive bit. The location will depend on the builder and should be marked as follows: Place the hanger on top of the piece C, then put a box or board on the frame where the seat is to be and set the hanger where it will be in a comfortable position for pedaling. Mark this location and bore the hole.

The transmission H consists of a

bicycle coaster-brake hub, shown in detail in Fig. 2. A split pulley, J, 6 in. in diameter, is bored out to fit over the center of the hub between the spoke flanges. The halves of the pulley are then clamped on the hub with two bolts, run through the holes in opposite directions. Their heads and nuts are let into countersunk holes so that no part will extend above the surface of



The Flymobile is a Miniature Automobile in Appearance and is Propelled by Foot Power

the pulley. The supports for the hub axle consist of two pieces of bar iron, 4 in. long, drilled to admit the axle ends, and screws for fastening them to the frame pieces C and D. This construction is clearly shown in Fig. 2.

The arrangement of the coaster-brake hub produces the same effect as a coaster brake on a bicycle. The one propelling the flymobile may stop the foot-power work without interfering with the travel of the machine, and, besides, a little back pressure on the pedals will apply the brake in the same manner.

The flywheel K should be about 18 in. in diameter with a 2-in. rim, or face. Such a wheel can be purchased cheaply from any junk dealer. The flywheel is set on a shaft, turning between the

pieces C and D and back of the coaster-brake wheel H. Two pulleys, L, about 3 in. in diameter, are fastened to turn with the flywheel on the shaft and are fitted with flanges to separate the belts. The ends of the shaft should run in good bearings, well oiled.

Another pulley, M, 6 in. in diameter, is made of wood and fastened to the rear axle. An idler wheel, shown in Fig. 3, is constructed of a small pulley, or a large spool, attached to an L-shaped piece of metal, which in turn is fastened on the end of a shaft controlled by the lever N. The function of this idler is to tighten up the belt or release it, thus changing the speed in the same manner as on a motorcycle.

The elevation of the flymobile is given in Fig. 4, which shows the arrangement of the belting. The size of the pulleys on the flywheel shaft causes it to turn rapidly, and, for this reason, the weight of the wheel will run the car a considerable distance when the coaster hub is released.

The rear axle revolves in bearings, half of which is recessed in the under edges of the pieces A while the other half is fastened to a block, screwed on

fastening them to the pieces P and Q, as shown. These pieces are hinged with strap iron, R, at one end, the other end of the piece P being fastened to the crosspiece F, Fig. 1, of the main frame. The lower piece Q is worked by the lever S and side bars, T. A small spring, U, keeps the ends of the pieces apart and allows the free turning of the axle until the brake lever is drawn. The lever S is connected by a long bar to the hand lever V.

The steering apparatus W, Figs. 1 and 4, is constructed of a piece of gas pipe, 3 ft. 4 in. long, with a wheel at one end and a cord, X, at the other. The center part of the cord is wound several times around the pipe and the ends are passed through screweyes in the main frame pieces A and attached to the front axle, which is pivoted in the center under the block Y. The lower end of the pipe turns in a hole bored slanting in the block. A turn of the steering wheel causes one end of the cord to wind and the other to unwind, which turns the axle on the center pivot.

The wheels are bicycle wheels, and the ends of the front axle are turned to

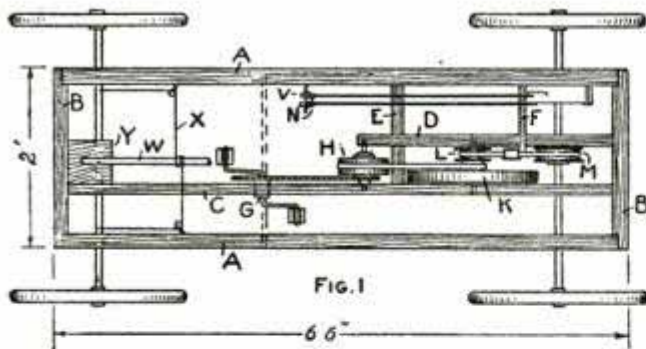


FIG. 1

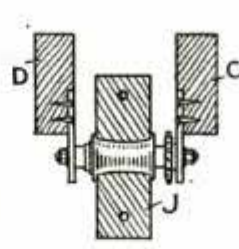


FIG. 2

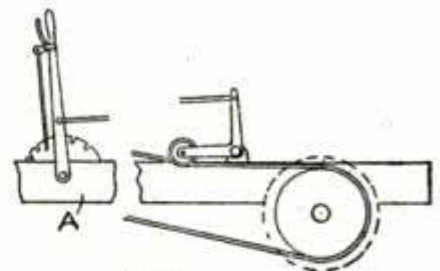


FIG. 3

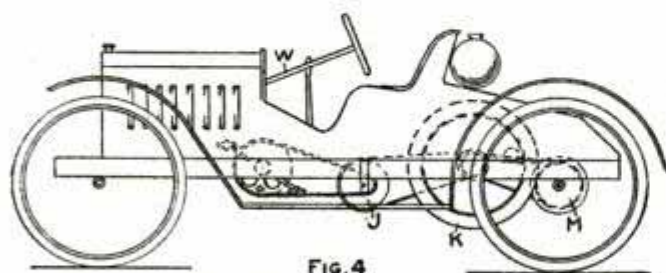


FIG. 4

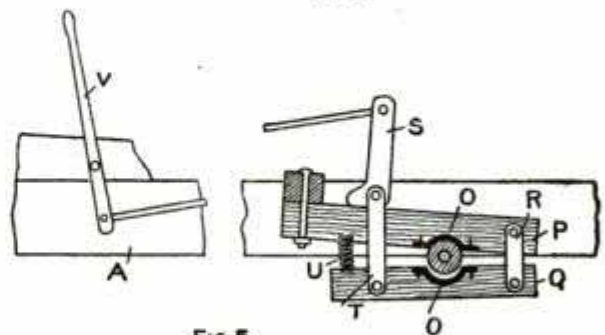


FIG. 5

Plan and Elevation of the Flymobile, Showing the Location of the Working Parts, to Which, with a Few Changes, a Motorcycle Engine can be Attached to Make It a Cyclecar; Also Details of the Brakes, Belt Tightener and Coaster-Brake Hub

over the axle. A simple brake is made as shown in Fig. 5. Two metal pieces, O, preferably brass, are shaped to fit over the shaft with extending ends for

receive the cones and nuts, instead of using the regular hub axles. The ends of the rear axle are turned to closely fit the hubs after the ball cups have been

removed. A large washer and nut clamp each wheel to the axle so that it will turn with it.

The body can be made up as desired, from sheet metal, wood, or cloth stretched over ribs of wood, and painted in the manner of an automobile. A tank and tires can be placed on the back to add to the appearance. Fenders and a running board can be attached to the main frame.

With the addition of some cross-pieces in the main frame at the front and a motorcycle engine fastened to them so that the driving sprocket will be in line with the sprocket on the coaster hub, the builder will have a real cyclecar.

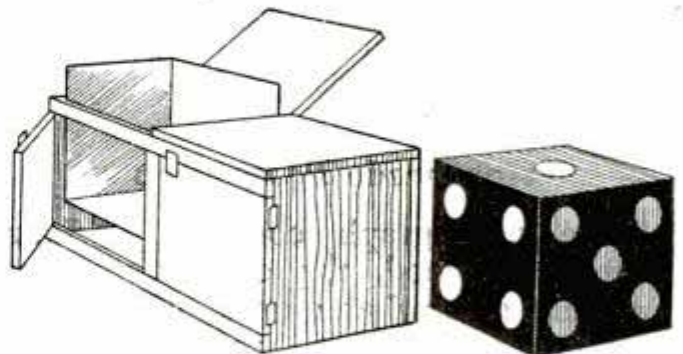
The Die-and-Box Trick

The die-and-box trick, so often performed on the stage, is a very interesting and mystifying one. The apparatus, however, is simple, consisting of a box, die, a piece of tin in the form of three adjacent sides of the die, and a hat. The die and box are constructed entirely of wood, $\frac{1}{8}$ in. thick, and the piece of tin can be cut from any large coffee can. The box is closed by four doors, as shown in Fig. 1, two of which are $2\frac{3}{4}$ in. square, and the others, $3\frac{1}{8}$ in. by $3\frac{1}{4}$ in. The first two are the front doors and are preferably hinged with cloth to the two uprights A and B. Small pieces of tin are fastened on the doors at C and D, to provide a means to open them. The other doors are placed on top and are hinged to the back, as shown.

The die is 3 in. square on all sides, and is constructed of two pieces, 3 in. square; two pieces, $2\frac{3}{4}$ in. by 3 in., and two pieces, $2\frac{3}{4}$ in. square. These are fastened together with $\frac{1}{2}$ -in. brads. The tin, forming the false die, is cut out as shown in Fig. 2, and is then bent on the dotted lines and soldered together on the joint formed by the two edges E and F. All parts should be painted a dull black with white spots on the die and false die.

The trick is performed as follows:

Procure a hat from some one in the audience and place in it the die with the tin false die covering three sides of the block, at the same time telling the audience that the block will be caused to pass from the hat into the



With the False Die in Place It Appears as If the Box Were Empty

box, the latter being placed some distance away. Inform the audience that it would be more difficult for the die to pass from the box into the hat. Remove the tin piece from the hat and leave the die, holding the surfaces of the false die toward the audience. This will give the impression that the die has been removed. Set the hat on the table above the level of the eyes of the audience. With the back of the box toward the audience, open one top door and insert the tin piece in the right-hand compartment so that one side touches the back, another the

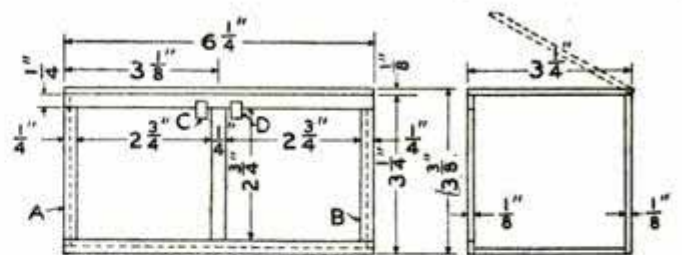
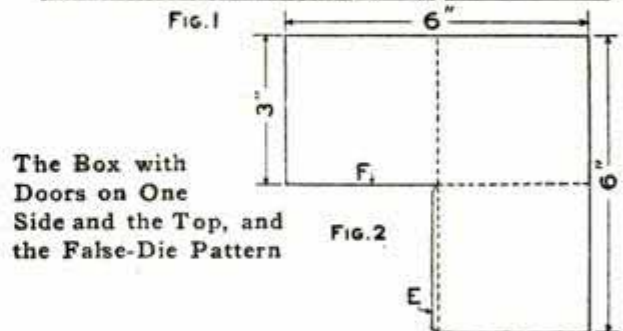


FIG. 1



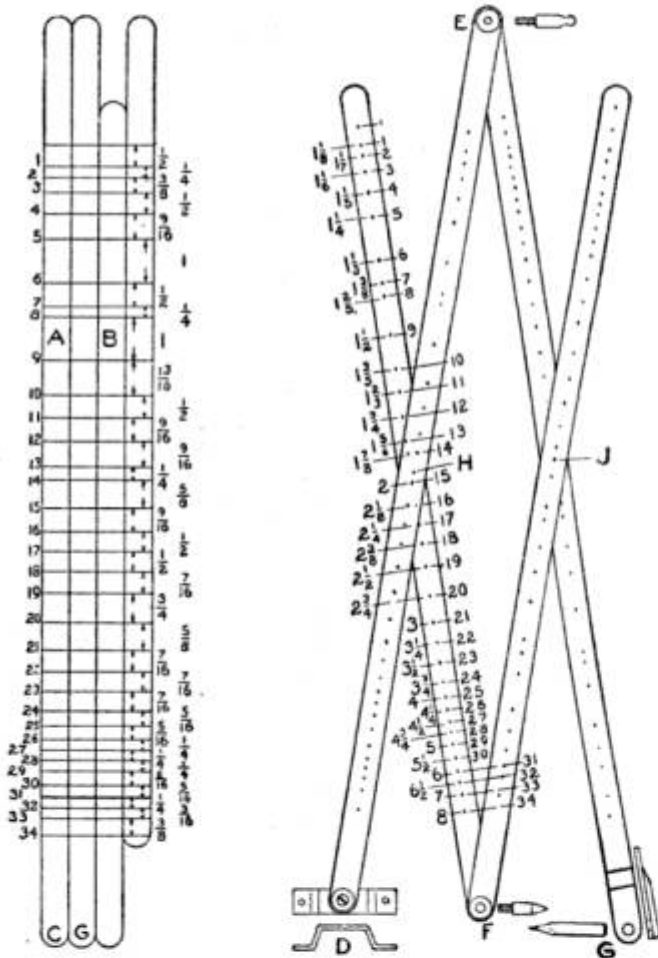
The Box with Doors on One Side and the Top, and the False-Die Pattern

side and the other the bottom of the box. Close the door and open the two doors of the opposite compartment which, when shown, will appear to be empty. Tilt the box to this side and open the doors of the side opposite to

the one just opened, which, of course, will be empty. This should be done several times until some one asks that all doors be opened at the same time. After a few more reversals and openings as given, open all doors and show it empty, then take the die from the hat.—Contributed by Harold L. Groesbeck, Salt Lake City, Utah.

Homemade Pantograph

The pantograph consists of four pieces of wood, the dimensions depending somewhat on the size of the work to be drawn. A convenient size for ordinary drawing and enlarging is



A Picture can be Enlarged or Reduced by Setting the Screweyes in the Holes Designated

constructed of four pieces of hardwood, preferably maple, $\frac{3}{16}$ in. thick and $\frac{5}{8}$ in. wide, two of them $20\frac{3}{4}$ in. in length and the other two, $18\frac{3}{4}$ in. long. These are planed and sanded and the ends cut round.

All four pieces are laid flat on a level board or bench top with their edges together so that the edges of the two

longer pieces make right angles with a line drawn tangent to their ends. One end of one short piece is placed flush with the lower ends of the two long pieces, and one end of the other short piece flush with the upper ends, as shown. They should be clamped down solidly to keep them from moving while laying off the divisions. Light lines are drawn across their faces as designated by the dimensions. On these lines and exactly in the center of the pieces make small marks with a pencil point. Through the pieces A and B holes are drilled to snugly receive the body of a small screweye. The other two pieces are drilled with a smaller drill so that the threads of the screweye will take hold in the wood.

The end C of the piece A has a metal stand made of brass as shown at D. This is fastened to the end of the wood with a small bolt. The hole should be a snug fit over the body of the bolt. The lower ends of the brass are drilled to admit thumb tacks for holding it to the drawing board.

The joint at E is made of a suitable binding post that can be procured at an electrical shop, the shank below the two joined pieces to be the same length as the height of the metal stand D. The end should be filed round and polished so that it will slip over the board or paper easily.

The stylus or tracing point F is made of another binding post, in the same manner, but instead of a rounding end a slightly blunt, pointed end is filed on it. The end of the piece G is strengthened by gluing a small block of the same material on both upper and under side. A hole is then made through them to receive a pencil rather tightly.

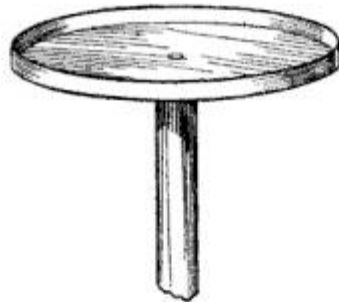
The holes, as will be seen, are numbered from 1 to 34. At the crossing of each pair, H and J, the screweyes must be set in the holes numbered alike on both pieces of each pair. This will insure the proper working of the parts. The other numbers designate how much the instrument will enlarge a picture or reduce it. On the pair

not numbered in the sketch the numbers run in the opposite direction.

The end C is fastened to the left side of the drawing board, the picture to be enlarged is placed under the stylus or tracer point, and the paper under the pencil point G. Move the tracing point over the general outline of the picture without making any line before starting, so as to make sure that the paper and picture are located right. It is then only necessary to take hold of the pencil and move it over the paper while watching the tracer point to keep it following the lines of the picture. To make a reduced picture, the original is placed under G, the tracer point changed to G and the pencil to F.

Trapping Mosquitoes

Mosquitoes that light on the ceiling may be easily destroyed with the instrument shown in the sketch. It consists of a cover, such as used on jelly glasses, nailed to the end of an old broom handle. A little kerosene oil is placed in the cover and the device is passed closely beneath the location of the mosquitoes. They will be overcome by the fumes and drop into the fluid as soon as it comes under them.—Contributed by J. J. Kolar, Maywood, Ill.



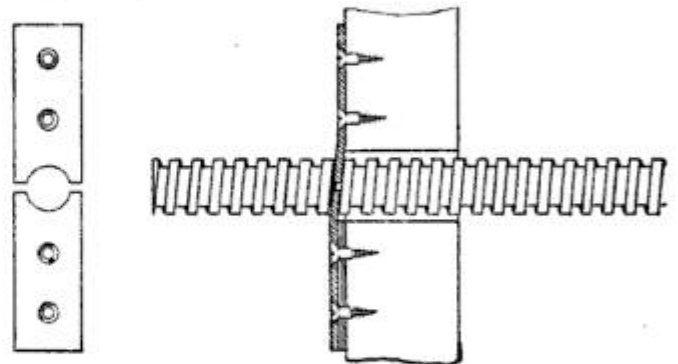
Pen Rack on an Ink Bottle

A piece of wire, about 1 ft. long, is bent into the shape shown and slipped over the neck of the ink bottle. The ends forming the loop around the neck should fit tightly. The upper part of the wire is shaped to hold the penholder.—Contributed by W. A. Saul, E. Lexington, Mass.



Substitute for a Broken Bench-Vise Nut

It is frequently the case that the nut on a bench-vise screw breaks from being subjected to a too violent strain. If



Two Pieces of Strap Iron Shaped to Fit the Square Thread Make a Good Substitute Nut

one is working in a place where a new nut cannot be obtained, the broken part may be replaced by the substitute shown in the sketch. Any piece of strap iron may be used, and with a round file and a drill the two pieces can soon be made and attached to the bench with screws or bolts. A slight twist of the shaped ends is necessary to make them fit the angle of the thread.—Contributed by Oscar M. Waddell, Lamedeer, Mont.

Scissors Sharpener

Procure an ordinary wood clothespin and drill a $\frac{1}{8}$ -in. hole through its blades, then insert a piece of hardened $\frac{1}{8}$ -in. drill rod, which should be a driving fit. In using this device, take the scissors and attempt to cut the steel



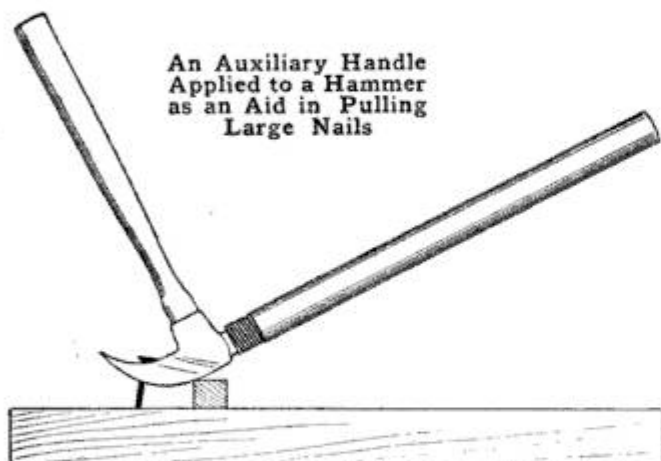
In Attempting to Cut the Hardened Steel Pin the Edge is Drawn Sharp

rod. Do this three or four times and a good cutting edge will be obtained.—Contributed by Wm. J. Tolson, Lyons, Iowa.

☞ An imitation-gold color may be made with flake white, ground in varnish and tinted with a touch of vermilion. When striping or lettering is done with this, it will have the appearance of real gilding work.

Drawing Large Nails with a Hammer

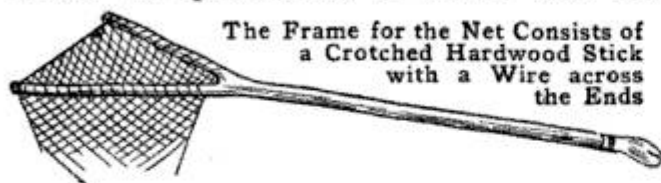
In drawing some very large nails one day I found that the strain was too much for the hammer handle and



I devised the arrangement shown in the sketch. A 2-ft. length of a suitably sized pipe was slipped on the face of the hammer head and used in connection with the hammer handle. A block was placed under the hammer head, and the nails were pulled without any strain on the wood handle.—Contributed by Clarence P. Smith, Salem, Virginia.

A Homemade Landing Net

While out trout fishing one day I broke my landing-net frame and being far from any place where a new one could be procured, I made one for



temporary use as shown. A small hardwood crotch was selected and the arms trimmed down to about 1 ft. long; then a piece of copper wire was stretched between the ends. This made an equilateral triangle of about 1 ft. to each side. To this I fitted the net. This worked so well that I decided to keep it, and the bark was removed from the wood and a coat of varnish applied. On the end of the handle a piece of leather was fastened so that it could be hung on the button of my coat.—Contributed by E. Everett Buchanan, Jr., Elmira, N. Y.

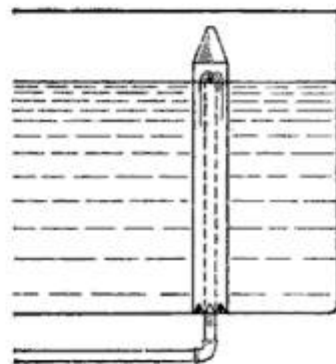
Safe Way to Fire Skyrockets

In celebrating the national holiday I desired to fire some skyrockets with the least possible danger of getting burned. To do this, I procured a paste-board tube of sufficient length to admit the rocket, and cut a small hole in its side at the location of the fuse. The tube was placed in an upright position for firing. This not only gave protection, but a longer flight was obtained and the course could be controlled.—Contributed by D. R. Green, Waterloo, Iowa.

Overflow Pipe for an Aquarium

Having an aquarium which is supplied with water from a filter, I desired to let the old water out first at the overflow.

This was accomplished by using an arrangement made of zinc, as shown, with a vent hole in the top and notches at the bottom. This tube was placed over the overflow pipe so that the vent hole was 2 or 3 in. above the top of the pipe. This caused the water to enter through the notches at the bottom of the pipe, then pass up the tube and into the outlet pipe. This arrangement will always keep the fresh water at the top.—Contributed by Hy Manz, Belleville, Ill.



A Thread-Spool Rack

A wire about 15 in. long, fastened to the wall with a couple of screweyes, makes a very handy place for spools of



The Spools are Easily Kept in Order, and the Thread Ends cannot become Tangled

different sizes of thread. The spools are placed on the wire with the thread ends hanging down.

Electrical Heating Apparatus for the Home

By ARTHUR MOORE

PART IV—An Electric Glue Pot

A cross section of the completed glue pot is shown in Fig. 1, and it consists of the following parts: An inside vessel, A, which is to hold the water to be heated; a heating element, B, placed outside the lower portion of A and under its bottom; an outside containing vessel, C; a subbase, D, and a special connecting plug and terminals for the heating element.

The inside vessel is about 4 in. in diameter and 4 in. deep. It is made of thin sheet copper or brass, and the joints are brazed or soldered. The outside vessel is about $1\frac{1}{4}$ in. larger in diameter, thus making a space of $\frac{5}{8}$ in. between the two all the way around. The depth is about $1\frac{1}{2}$ in. greater than the inside vessel. A bottom is provided for the outer vessel, as shown at E, and is fastened in place with four small brass screws passing through the wall of the vessel into projections on the piece E, which are bent down at right angles to it and so located as to make the space $\frac{5}{8}$ in. between the bottoms. Projections are provided around the lower edge of the outer vessel and bent out at right angles to its wall to provide means of attaching it to the subbase, as shown at F. The outer vessel may be made of sheet copper or brass, but common sheet iron will do as well, as it does not come in contact with the liquid.

The support G for the inside vessel is made from a piece of sheet brass or copper, at least $\frac{5}{32}$ in. in thickness, and is formed into the shape shown. The metal around the inside of the opening is turned down to make a smooth edge. The outer edge is also turned down to fit over the upper end of the outside vessel like a cover. The joint at H is soldered, or, better still, brazed. The ring or support G is fastened to the outside vessel by means of several screws around the edge, as at J.

The subbase D is made of sheet iron

in rectangular form. The corners are shaped as shown in Fig. 2, and the sides are bent down on the dotted lines. A small rivet, placed through the holes K, will hold the ends of

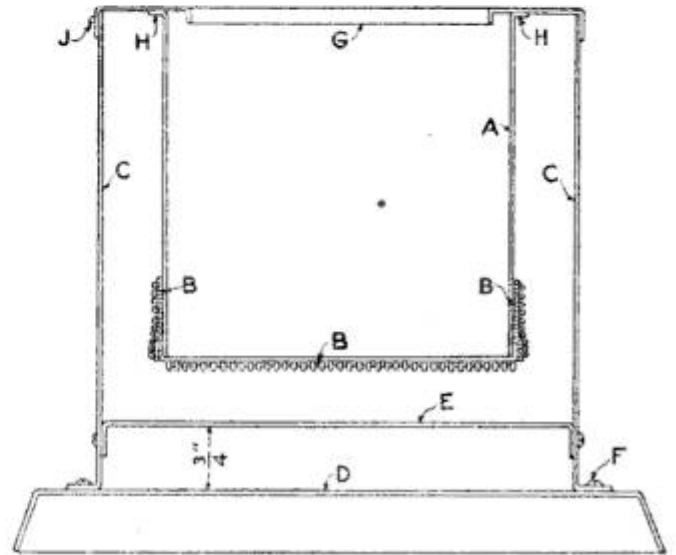


FIG. 1

The Heating Element is Placed around the Lower Part of the Water Vessel

the sides. Several holes are drilled through the center of the subbase D to provide proper ventilation.

The construction of the heating element makes it possible to obtain four degrees of heat, and for this reason three terminals must be brought out from the heating element to provide the proper connections. The three terminals are made as shown in Fig. 3. They are located in a convenient place on the outside case, preferably near its bottom and opposite one of the corners of the subbase. A rectangular notch, about $\frac{3}{4}$ in. wide and 3 in. long, is cut in the edge of the lower end of the outer containing vessel, with its smaller dimension parallel with the axis of the vessel. A piece of metal, at least $\frac{1}{16}$ in. thick and $\frac{3}{4}$ in. wide by $4\frac{1}{2}$ in. long, is obtained and bent into the form shown at L. This piece is fastened directly back of the slot in the outer containing vessel with two screws in each end. Three pieces of

$\frac{1}{8}$ -in. brass rod, threaded at one end, are used for the terminals and are fastened to the piece L with small nuts, as shown. The terminals must be well insulated from the support with mica

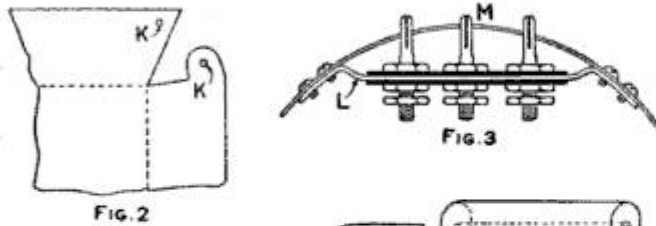


FIG. 2

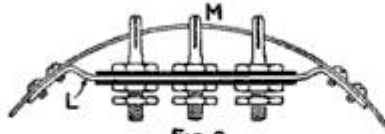


FIG. 3

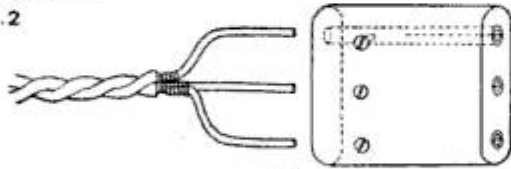


FIG. 4

The Corner Construction of the Subbase, the Three Terminals, and the Plug Connections

washers and bushings. An extra nut is placed on the back end of each terminal so that it can be used as a binding post. The outer ends are rounded and a groove is cut in each to make a perfect contact in the plug openings, and for their easy entrance.

The plug is made of insulating material not affected by heat, such as asbestos, 2 in. square by $\frac{5}{8}$ in. thick. Three pieces of thin brass tubing, having an inside diameter that will fit snugly over the terminal rods, are placed in three holes drilled through the insulating plug, as shown in Fig. 4. These holes are evenly spaced, the same distance apart as the terminal rods, and holes are drilled at right angles to them in the side of the plug for machine screws, as shown. These screws serve the double purpose of holding the tubes in place and clamping the ends of the leading-in wires. The brass tubes should be slotted on the ends where they admit the terminals.

Procure a piece of duplex insulated wire of a length to suit conditions and connect it to the plug as follows: Remove the outside braiding and insulation from one end for about 4 in. Connect a short piece of wire of the same size as used for the conductors to the bare end of one conductor wire close to the insulation. This joint should be well insulated and a wrapping of waxed twine placed around all three

wires for a short distance. All three ends should be made the same length, the strands composing each wire soldered together and the broken end of the insulation fastened in place with some strong thread wrapped around it. The bare ends are then fastened into the brass-tube ends in the plug with the screws. Keep in mind that the middle tube and one on the outside are connected together and not the two outside ones. The corners of the block or plug are slightly rounded, for the sake of appearance, and the plug is then anchored to the duplex conductor end. A piece of heavy cord is bound to the duplex wire with waxed twine, and the free end of the cord is anchored to an eyelet or a small hole drilled into the insulation. The opposite end of the duplex cord is fitted with a plug.

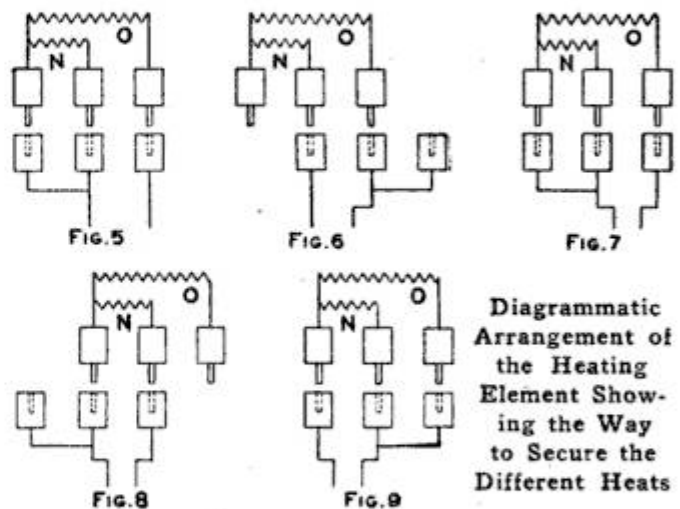
The plug is now marked, so as to determine the portion of heating element in circuit, as follows: Place an arrow on the outer vessel directly above the center terminal M, shown in Fig. 3. Make sure that the inside connections of the heating element are identical with those shown in Fig. 5. When the plug is in the position shown in Fig. 6 make a mark on it directly opposite the arrow and stamp the numeral 1. Do the same for each of the three other possible connections, stamping the numerals opposite the arrow. If the markings are made in any other manner, the results obtained may be far from what is wanted.

The heating element is made up in two parts to correspond to the resistances N and O, Fig. 5. Procure two pieces of nichrome resistance wire, one No. 26 gauge, 22 ft. long, and the other No. 28 gauge, 20.5 ft. long. A piece of mica, .003 in. in thickness and 2 in. wide, is placed around the outside of the lower portion of the inside vessel and 10 turns of No. 28 gauge wire are wrapped on it, beginning at the lower part and spacing the coils about the width of the wire diameter. Cover these coils with a piece of mica, .002 in. in thickness, and wind on the remainder of the wire in the reverse

direction to the first coils, so as to make it noninductive. Cover this with a layer or two of mica and bind it with wire at several places.

Cut from a piece of mica, about .01 in. in thickness, a disk having an outside diameter a little less than that of the inside vessel and drill a large number of small holes in it. Roughen or nick the edge of this piece of mica and wind the No. 26 gauge wire around the disk, keeping the various turns parallel with each other and uniformly distributed over the entire disk. The ends of the winding may be anchored by passing them through small holes drilled in the edge of the disk. Put the inner vessel in place and fasten it. Remove the subbase and plate E, shown in Fig. 1, turn the device upside down and pack asbestos around between the inside and outside vessels up to and even with the bottom of the inner vessel. Place a sheet of .002-in. mica over the bottom of the inner vessel and lay the circular winding in place. Connect one of the terminals of each of the two windings together and then provide three asbestos-insulated copper conductors to lead to the terminals shown in Fig. 3. Three holes are drilled in the piece E to accommodate these leads. Place a second sheet of mica over the heating element and fill the remaining space with asbestos, so that the circular

heating element will be held firmly against the bottom of the inner vessel when the piece E is fastened in place. The leads are fastened to the terminals, and the glue pot is complete.



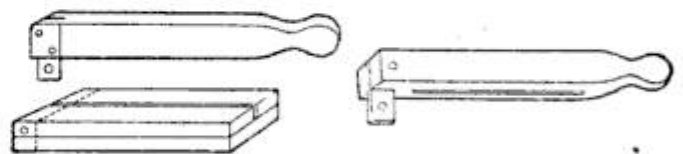
A suitable vessel to put the glue in may be obtained at most any hardware store.

A diagrammatic representation of the heating element is shown in Fig. 5. With the connections made as shown in Fig. 6, the two resistances are in series; as in Fig. 7, the resistance O alone; as in Fig. 8, the resistance N alone is in the circuit, and as in Fig. 9, the resistances are in parallel. If the resistances N and O are made unequal, which they should be, there will be a different value of resistance in the circuit for each of the four connections.

A Cardboard Creaser

A simple apparatus for creasing thin cardboard or heavy paper in a perfectly straight line without broken edges is described in the French magazine *La Nature* as follows: On a base of convenient dimensions are fastened two pieces of wood, well smoothed and of equal thickness, so that there remains a slot, about $\frac{1}{8}$ in. wide, between them. At one end a hole is bored through these pieces for a shaft on which the "creaser" will turn. The "creaser" is made of a piece of wood somewhat longer than the baseboard so that a handle can be formed at one

end. At the other end it is slotted for a piece of metal, perforated for the shaft and fastened with two pins or rivets, as shown. On the under side of the creaser a stiff steel wire is fastened so that it coincides with the slot.

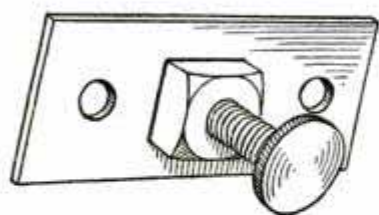


The Wire on the Creaser Presses the Paper into the Space between the Two Wood Pieces

The wire is fastened by heating the ends red hot, bending them at right angles to the main part and driving them into the creaser.

Homemade Screw Plate for Wood Surfaces

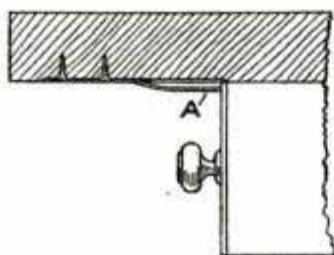
A hinge wing, having the pin socket cut off, makes a good screw plate to attach to a wood surface. The central



screw hole is drilled out large enough to admit the bolt to be used, and a nut is soldered over it. A small recess can be cut into the wood to receive the nut, so as to make the surface flush.

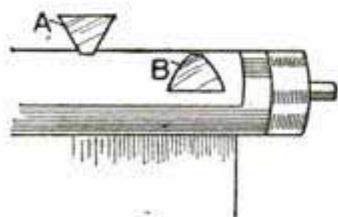
A Drawer Catch

A drawer catch that is easily made and which will be found difficult for children, or in fact anyone, to open, until they have been shown how, is illustrated herewith. The spring may be made of hard brass or steel, about .02 in. thick. A groove should be cut in the under side of the table top to let the spring in, so that the drawer may slide under it freely. To open the drawer, press the spring at A, at the same time pulling on the knob. When the drawer is pushed in the catch closes automatically.—Contributed by E. Dickey, Bloomington, Ohio.



Roller-Curtain Fasteners

Occasionally a window blind pulls loose from the roller and, in the absence of the regular curtain tack, the following method was tried out which proved to be efficient. A few pieces of tin were cut from a discarded vegetable can and shaped like a glaziers'

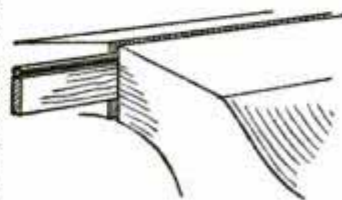


point as shown at A. These pieces were forced through the curtain and into the roller, leaving enough of the tin projecting to turn down and clamp the blind to the roller as shown at B. This kind of a fastener holds the blind securely and leaves no objectionable projections.—Contributed by John M. Pipp, Muncie, Ind.

point as shown at A. These pieces were forced through the curtain and into the roller, leaving enough of the tin projecting to turn down and clamp the blind to the roller as shown at B. This kind of a fastener holds the blind securely and leaves no objectionable projections.—Contributed by John M. Pipp, Muncie, Ind.

Holding a Small Wire in a Vise

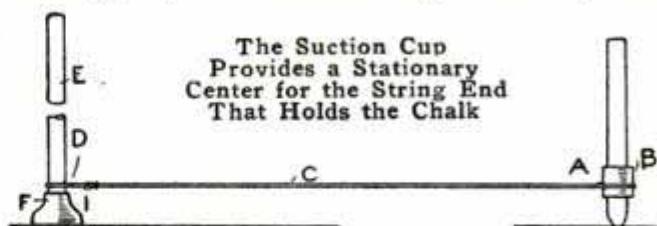
When filing a slender piece of wire or strip of metal, just place a piece of soft wood, a little thicker than the wire, under it as shown, then close the vise jaws, compressing the wood until the metal is held firmly. The projecting piece of wood allows the thin metal to be worked in a manner not possible if the metal is secured in the vise without any support.—Contributed by James M. Kane, Doylestown, Pennsylvania.



When filing a slender piece of wire or strip of metal, just place a piece of soft wood, a little thicker than the wire, under it as shown, then close the vise jaws, compressing the wood until the metal is held firmly. The projecting piece of wood allows the thin metal to be worked in a manner not possible if the metal is secured in the vise without any support.—Contributed by James M. Kane, Doylestown, Pennsylvania.

Drawing Circles on a Blackboard

An instrument for drawing circles on a blackboard is made of the following material: A short piece of rubber tubing, A, of a size to slip over a piece



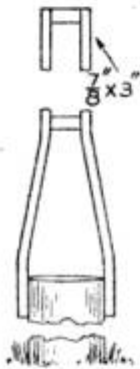
of chalk, B, is tied to a string, C, of the right length for the radius. The other end of the string is attached to a wire loop, D, that fits over a standard, E, provided with a rubber suction cup, F. The loop on the standard allows the chalk to travel around the center. The string can be taken up, to draw circles of varying size. The suction cup will hold the standard on the surface of the blackboard at any place where it is set.—Contributed by E. L. Hartlett, Wausau, Wis.

Cutting Fiber Washers

Different-size washers can be made from fiber $\frac{1}{8}$ in. thick easily and quickly with a brace and bit. Select a bit for the size required and bore until a light shaving is taken off, then turn the fiber over and insert the point of the bit into the hole bore in a like manner. The projecting cutters for cutting the outside circle of the hole will cut from both sides and a washer the size of the bit will drop out. The size hole desired can then be made in the washer.—Contributed by Thos. Hamernik, Chicago.

Line Post for Telephone Wires

In constructing a home telephone or telegraph line the expense of poles is one of the largest on the list. If a land-dividing fence is running in the right direction, this one item can be considerably reduced by making extensions on posts in the fence at intervals, as shown in the sketch.



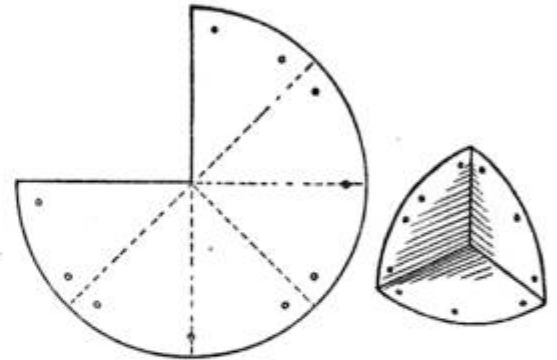
The extension consists of two strips, $\frac{7}{8}$ in. thick, 3 in. wide, and of a length to place the line above any obstruction. The strips are nailed to the top of the fence post on opposite sides, and the extending upper ends are drawn together and pieces nailed between them. The extension made in this manner is quite stable and will not cost as much as poles.

Cement to Mend Broken Dishes

An excellent cement for broken dishes, glassware, and, for emergency, in mending a broken eyeglass, is made of thick shellac. Carefully coat the broken edges with the shellac and then heat the article, as much as it will stand, to dry the shellac thoroughly. Broken dishes put together with this cement will hold indefinitely, as the shellac will not absorb moisture.—Contributed by J. A. Brooks, Denison, Texas.

Box Corners

Sheet metal of about No. 20 gauge is used in making the corners. A circle, $3\frac{1}{2}$ in. in diameter, is drawn on the



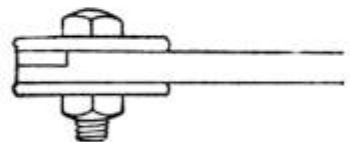
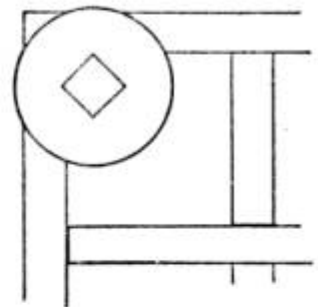
The Sheet Metal is Cut Circular, a Part Removed, Then Bent to Fit the Box Corner

metal and then cut out as shown on the full lines, taking out one-quarter of the disk. The metal is then punched or drilled around the edge for screws or rivets, and bent on the dotted lines.

Brass, copper or steel can be used, as either of these metals will make a neat corner when fastened in place.—Contributed by H. O. Chamberlin, Malden, Mo.

Small Clamps for Grillwork

In making up grillwork for a hall clock I used clamps made of ordinary short carriage bolts with two large washers on each one. The bolts are much cheaper than clamps, and the grill intersections demand quite a number of joints to be clamped at one time. The application of the bolt is clearly shown in the sketch.—

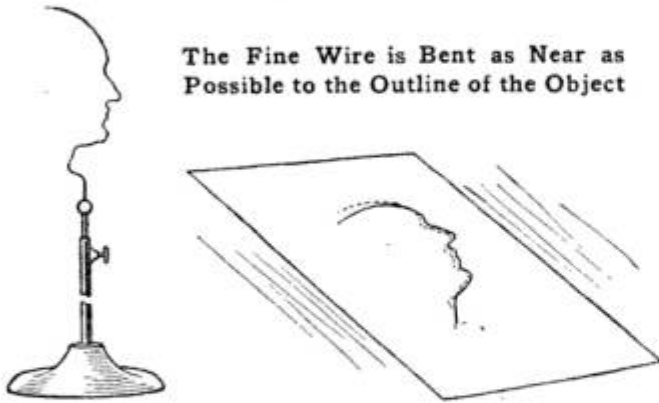


Contributed by Louis H. Frost, Syracuse, N. Y.

Every 25 sq. ft. of average surface that is not too absorptive will require 1 oz. of bronze powder in liquid to coat it.

An Aid in Sketching Profiles

The means usually employed by most beginners to obtain the correct outline of an object, such as tracing or



a pantograph, make them dependent on mechanical help rather than train the eye to form and proportion a drawing correctly. The device shown not only greatly assists the beginner, but actually trains him toward a point where he can dispense with any such device and correctly sketch by free hand. It also has the effect of encouraging the beginner, because his first efforts will not be complete failures, as is usually the case.

The device consists of a rather fine wire bent in the shape of a human profile and supported on a stand or base. The stand may be dispensed with, however, and the wire held in the hand. In use, it is placed near the model or person whose profile is to be drawn; then, after closing one eye, it is set at a position where it will cor-

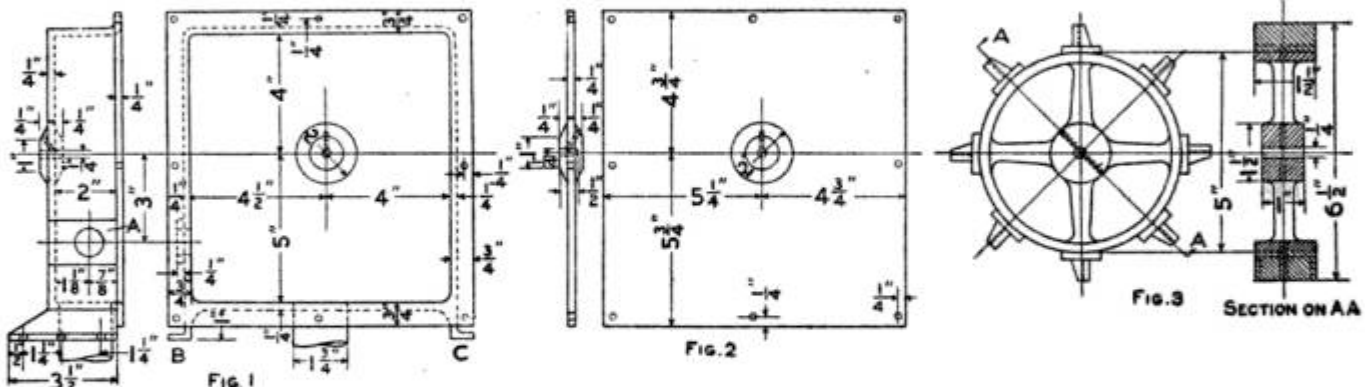
head may recede from the wire at the top, or the nose may have a different slant or shape.

The paper on which the drawing is to be made should have a faint outline drawn by laying the wire upon it and marking around it with a soft pencil. Having noted the variations between the wire and the features, proceed to draw the profile, observing the same variations, and when the sketch is completed, erase the faint outlines. Then compare the drawing with the model without using the wire, and make final corrections. The dotted line indicates the outline to be erased.

The drawing may be made larger or smaller than the bent wire, but the outline on the paper must be kept in exactly the same proportion. It is not necessary that the wire be bent so that it represents perfect features. With the use of this device one forms a habit of comparing and proportioning, which applies to the correct sketching of all objects.—Contributed by Will L. Burner, Columbus, Ohio.

A Small Hydroelectric-Power Plant

Wherever a water pressure of over 30 lb. is available a small hydroelectric-power plant will produce sufficient electric current for any light work, such as charging storage batteries, operating sewing and washing ma-



Layout for the Casing, Cover and Wheel for the Construction of a Hydraulic Motor That will Drive a Small Dynamo, to Produce Current for Experimental Purposes, to Charge Storage Cells or to Run Electric Toys

respond to the features of the model. This enables one to note the variations between the wire and the model's features. For instance, the fore-

chines, toys, etc. The design is for a 6-in. hydraulic motor of the Pelton type, which will operate well on almost all city-water pressures, and at

80 lb. will drive a 100-watt generator to its full output.

The castings may be procured from any foundry cheaply, so that these parts need not trouble the builder. The patterns can be constructed easily and are not so complicated that they will tear the molds when being removed. They are made from well seasoned white pine, $\frac{1}{4}$ in. thick. Fill in all sharp corners with small fillets. All the patterns should taper slightly from the parting line.

The motor casing is shown in Fig. 1. It is made with a wide flange so that the cover plate can be bolted to it. The lug A is to give additional strength and thickness to the side so that it may be drilled and tapped for the nozzle. The legs B and C are for bolting the case to a base or support. The outlet pipe is of lead, $1\frac{3}{4}$ in. outside diameter, and the hole for it in the case can be either drilled or cored. Solder the pipe flush with the inside of the casing. Drill and tap the holes around the flange for 8, 32 bolts. The shaft hole must be drilled very carefully. Drill $\frac{1}{4}$ -in. holes in the feet. The oil holes are $\frac{1}{8}$ in. in diameter. File the surface of the flange smooth and also the inside shoulder of the bearing lug. Drill and tap the nozzle hole for a $\frac{3}{4}$ -in. pipe thread.

The cover plate is shown in Fig. 2. This is bolted to the casing with 8, 32 brass bolts, $\frac{1}{2}$ in. long. The holes for them are drilled $\frac{3}{16}$ in. in diameter. A shallow hole, for the end of the shaft to fit in, is drilled in the lug, as shown.

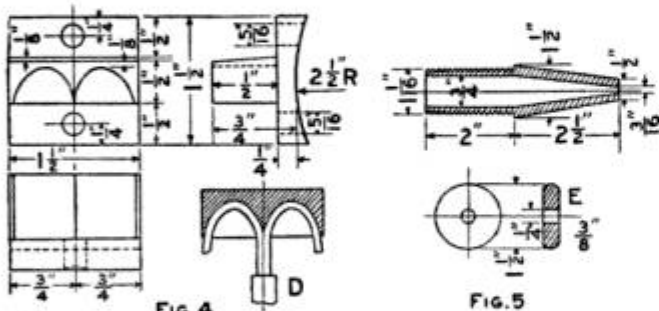


FIG 4
The Best Shape of the Buckets to Take Up the Force of the Water

It does not pass all the way through the plate. File the inside face of the lug smooth and also the edge of the plate where it joins the casing.

The wheel, with brackets attached, is shown in Fig. 3. This style of wheel need not be followed out closely. Bore the hub centrally for a $\frac{1}{4}$ -in.

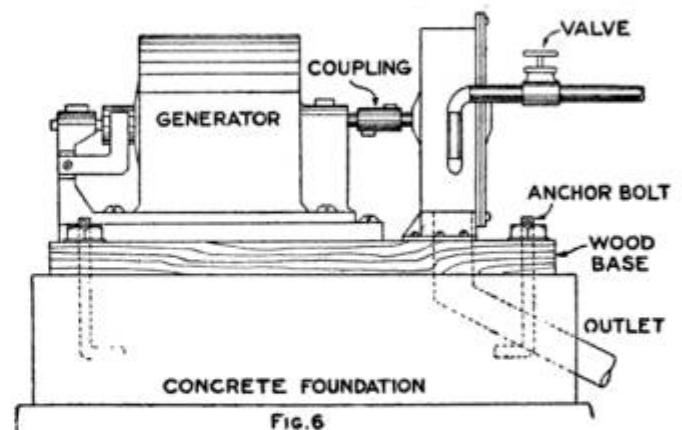


FIG. 6
The Motor as It is Coupled to Drive the Dynamo, and the Water Connections

shaft and fit in two setscrews. Drill and tap the rim for the buckets with a $\frac{1}{4}$ -in. standard tap. The buckets must be evenly spaced and bolted on to make the wheel balance.

The buckets are shown in Fig. 4. They may be cast from iron or bab-bitt. The sharp ridge in the center provides for a deviation of the water jet as it flows on the bucket. The ridge divides the bucket into two equal lobes which turn each division of the jet through almost 180 deg., using all the kinetic energy in the jet. This is shown at D. The dividing ridge must lie in the plane of the revolution, so that each bucket will enter the center of the jet. The buckets being evenly spaced on the periphery of the wheel, only one at a time receives the force of the jet, the one in front and the one behind clearing the jet.

The nozzle is shown in Fig. 5. It can be made of iron or brass. The inside gradually tapers from $\frac{3}{4}$ to $\frac{3}{16}$ in. It has a $\frac{3}{4}$ -in. pipe thread and is screwed into the hole in the case from the inside and is secured with a lock nut. Enough additional threaded portion is left protruding to allow the supply pipe to be connected.

When assembling the motor, fasten the wheel to the shaft with the two setscrews, and place a metal washer, E, on each side of the wheel. Place the wheel in the casing and screw the

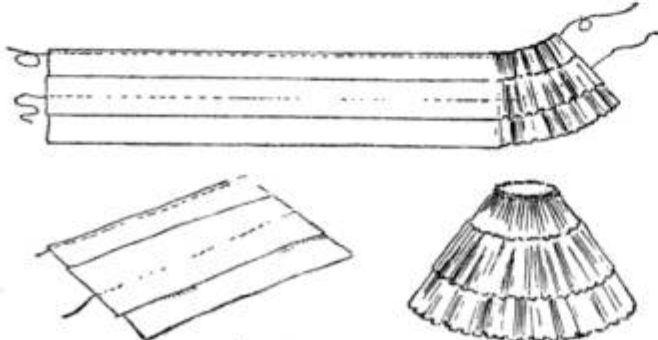
cover plate in place. A thin rubber gasket should be placed between the cover and the casing to provide a water-tight joint.

The general arrangement of the plant is shown in Fig. 6. The motor and dynamo are mounted on a heavy wood base, which in turn is firmly bolted to a concrete foundation. Level

up the two machines by the use of thin washers on the bolts between the base and machine. A heavy sleeve and set-screws are used to connect the two shafts. The connection to the water supply is made with $\frac{3}{4}$ -in. pipe, with a globe valve in it to regulate the flow of water. Any dynamo of about 100-watt output can be used.

Paper Shades for Electric-Light Globes

The appearance of an electric-light globe can be very prettily improved by making a shade of crêpe paper of any



Two Pieces of Crêpe Paper Stitched Together and Ruffled, to Make a Fancy Electric-Light Shade

desired color for each one. Canary-colored crêpe produces a soft, mellow effect. Pale blue, yellow, red and, in fact, all the colors can be used, making a very pleasing variety.

The body of the shade is made of a piece of paper about $5\frac{1}{2}$ in. wide and $3\frac{1}{2}$ ft. long. The width will vary with the length of the globe to be covered, and it is best to have it full, as the edge can be trimmed even with the lower end of the globe afterward. Another piece of the same color is cut $2\frac{1}{2}$ in. wide and of the same length. This piece makes the ruffle.

The smaller piece is placed on the larger centrally, and both are stitched together with a running stitch, using a needle and cotton thread. A plain running stitch is also made $\frac{1}{4}$ in. from one edge of the larger strip. The material is gathered along both threads. This operation makes the material shrink in length. Wrap it around the globe, pulling the threads taut so that the ends of the paper will just meet. Tie the threads and clip off the extending

ends. If the paper extends beyond the end of the globe, trim it off with the shears. Ruffle the two edges of the narrow strip and the lower edge of the larger one. This operation is simply stretching the edge of the crêpe to cause it to stand out.—Contributed by Jas. A. Hart, Philadelphia, Pa.

Renewing the Markings on Graduates

Graduates that have been in use a long time, especially for measuring alkalis, become unreadable. The graduations are easily restored in the following manner: Moisten a small piece of absorbent cotton with a solution of white shellac, cut in alcohol. Rub this well into all the etched parts and allow to dry for about two minutes, then rub in a fine whiting or litharge with an old toothbrush. If red is desired, use rouge; if black is preferred, use lamp-black or powdered graphite. When dry, wipe off the excess pigment with a cloth moistened in alcohol.—Contributed by A. C. Norris, Rockford, Ill.

Repairing a Broken Ball-Clasp Purse

Having occasion to repair a purse of the ordinary ball-clasp kind where one of the stems was broken off and lost, I first had some trouble in finding a way to repair it. I started to take off the remaining stem in an attempt to replace the locking device with another kind, and in bending it down toward the opposite side, I hap-



pened to close the purse and found that it locked just as well as if there had been two balls on it. I have since repaired two other purses in the same manner and found that they worked well.

The idea is to bend the remaining clasp over until it is low enough to come in contact with and to spring over the other side, thus giving the same snap and holding qualities as before.—Contributed by W. C. Loy, Rochester, Ind.

Automatic Valve for a Funnel

Where liquid is run through a funnel into an opaque bottle or earthen jug, the filling cannot be watched, and



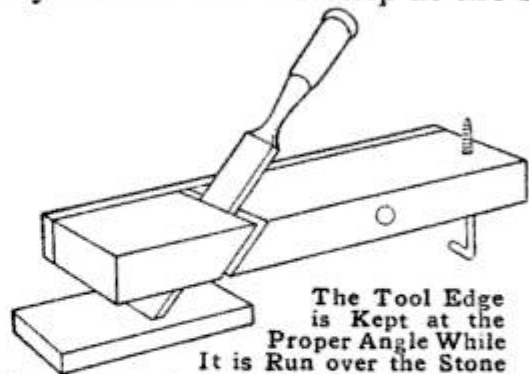
if not watched constantly, the vessel will overflow. This can be obviated by applying the automatic valve to the funnel stem, as shown. A washer support is soldered or otherwise fastened in the upper end of the stem, or at the base of the sloping part, and a

crossbar is fastened to its upper surface across the hole. The crossbar is centrally drilled to receive a small rod or wire, to which is attached a valve that will cover the hole in the washer. A cork is stuck on the lower end of the rod. The location of the cork on the rod should be at a point a little below the level to which the bottle or vessel is to be filled.—Contributed by H. W. Hilton, Hopington, B. C.

Chisel Holder for Whetting

To obtain the proper slope and apply a fine cutting edge, the plane iron or chisel must be held at the proper slope while grinding, and especially so when whetting. The illustration shows a holder to keep the iron or chisel at the proper slope. It con-

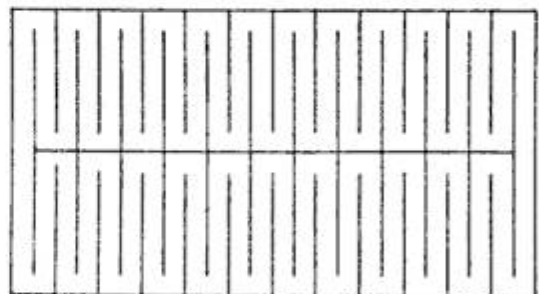
sists of a block of wood with a sloping cut at the right angle to make two pieces. One of these pieces is permanently fastened to the strip at the back,



while the other is held with a bolt passing through a notch in the strip for adjusting or clamping. The rear end of the back piece is fitted with a large screw hook or L-hook to provide a slide to keep the rear end of the holder at the right height. The iron or chisel is inserted between the sloping edges of the blocks and clamped in place, then the L-screw is adjusted for height to secure the proper angle on the stone. It is then only necessary to move the block and tool back and forth over the stone.

A Large Hole in a Small Piece of Paper

It would seem impossible to cut a hole in a piece of paper, 2 in. wide and 3 in. long, large enough to allow a person's body to pass through it, but if carefully cut as shown by the lines in the sketch, one will find with surprise that the paper can be extended so that the feat is easily accomplished. Make the cuts about $\frac{1}{8}$ in. apart and

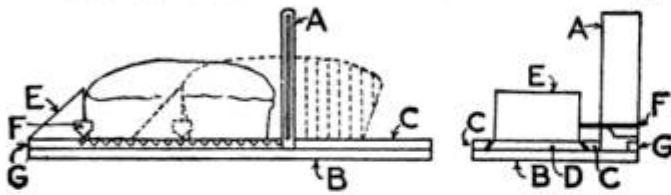


The Slits Cut in the Paper Allow It to Expand Several Times the Size of the Original

these will allow the paper to expand several times its size.—Contributed by H. Martine Warner, E. Orange, N. J.

A Bread Slicer

This bread slicer is made of $\frac{1}{2}$ -in. wood with dimensions to suit the size of loaves to be cut. The vertical piece A has a slot in which an ordinary



The Loaf is Pushed under the Knife Equal Distances in Cutting the Slices

bread knife will pass easily, and is mortised into the base B. Two guide pieces, shown by the letters C, permit the bottom board D to slide lengthwise of the base. The guides and bottom board have sloping edges in the manner shown. A triangular block, E, is fastened to one end of the bottom board, which, measured from this block, should be long enough to receive the loaf to be cut. The base B is then made twice the length of the bottom board.

A small spring, F, is attached to the triangular block E, and a V-shaped block is fastened to its outer end to engage the notched rack G which is screwed to the base. The notches in the rack are evenly cut and the distance from center to center of each notch should equal the thickness it is desired to cut the slices.

In operation, the left hand is placed on the triangular block, and the spring F is worked with the thumb as the loaf is pushed forward one notch each time a slice is made. The knife, operated by the other hand and guided by the slot in the vertical piece A, will cut the slices evenly.—Contributed by John V. Loeffler, Evansville, Ind.

Simple Method of Oxidizing Black Iron

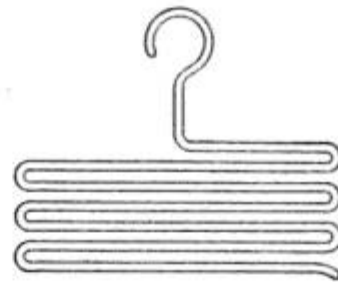
Desiring to produce an oxidized-copper finish on the heads of some black-iron bolts that I was using to assemble a fumed-oak rocker, I hit upon the following simple and effective method:

Twisting up some old copper wire

into a small coil, I placed it in the bottom of a tumbler and just covered it with a mixture of equal quantities of nitric acid and water. This I allowed to stand for 24 hours. Taking an ordinary file, I made a few bright spots on the head of each bolt, then dipped a piece of absorbent cotton in the solution and rubbed it over the head of the bolt, following it with a piece of absorbent cotton dipped in shellac. As a result the bright spots took on a rich copper plate, while the black parts were not changed. The shellac served as an efficient lacquer to prevent the copper plate from tarnishing.—Contributed by W. H. Hegeman, Northwood, Iowa.

A Garment Hanger

A very convenient hanger for trousers or skirts can be made of a $\frac{1}{4}$ -in. rod bent as shown in the sketch. The



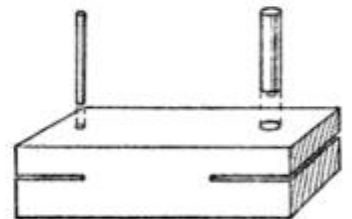
hem of the trousers at the bottom is inserted in the space between the bends, and a skirt is hung by the band at the waist in a like manner. The

bends shown will hold five garments, but any number of bends can be made as desired.—Contributed by V. S. Denison, Sandusky, Ohio.

Cutting Mica Washers

Wishing to make some mica washers for a small spark plug and finding them exceedingly difficult to cut without a punch, I made

one as follows: I procured a small piece of steel, $\frac{5}{8}$ in. square, and drilled a hole,



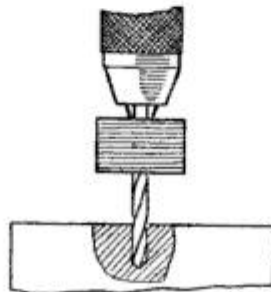
the size of the outside of the washer, in one end, and in the other, a hole the same size as the hole in the washer. A slot was then sawed in each end of the block

through the hole to insert the sheet of mica. For the punches I used drill rod. The large one had a pilot turned on the end to fit the smaller one.

In punching, I made the small holes first, then placed the sheet mica in the other slot, set the pilot of the large punch in the small hole, and drove the punch through. This made a washer with a perfect hole and very smooth edges.—Contributed by C. E. Norcross, Newport, Del.

A Depth Gauge for Drilling

A gauge for drilling to a given depth from the face of the work is made by cutting a small block of wood of a thickness which must be measured, and running the drill through it, allowing the block to climb all the way up until it rests against the chuck. For instance, if it is desired to run a series of holes $1\frac{1}{4}$ in. deep from the face of the work, and other means of gauging are not available, place the drill in the chuck and measure the extending length. If this distance happens to be $2\frac{1}{2}$ in., procure a block that is $1\frac{1}{4}$ in. thick, run the drill through it and let it remain on the drill against the chuck. Drill into the work until the block touches the surface, and all the holes will be of even depth. For absolutely accurate and severe service this will hardly do, but for temporary, approximate work, or for drilling in wood, it is a good method.—Contributed by Donald A. Hampson, Middletown, N. Y.



Coiled Spring-Wire Illusion

Form two coils of spring wire, each made of two strands of $\frac{1}{32}$ -in. wire and coiled on the rod or shaft at the same time. The coils are drawn out with pliers, as shown in the sketch. Run the end of one double wire coil into the end of the other for about three

coils. These ends should fit tightly together. Take hold of the coils between the thumb and fingers of both hands, allowing the joining coils to be seen between the hands. Draw the hands



The Coiled Wires When Turning Give the Appearance of Coming Apart Where They are Joined

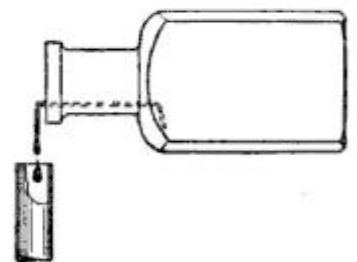
apart as if drawing the coils out, and instead of the wires coming apart as expected and as it appears to the eyes, the fingers will slip along the wires, causing the coils to turn without any real change in their relative position.—Contributed by Harry Slosower, Pittsburgh, Pa.

Carrying a Liquid-Filled Tray

Many times while finishing a photograph, one may wish to carry a solution-filled tray from one place to another, which may result in a spill of some of the liquid. If the tray contains hypo, this spilling or slopping will produce disastrous results, as the liquid, dried out, leaves a powder on the floor which will be carried as a dust in the air and be deposited on or into other trays or chemicals. If a tray is to be carried, set it into a large bowl or washbasin partly filled with water. This will keep the tray on a level and prevent spilling.—Contributed by E. H. Nahm, Cleveland, O.

Substitute Fountain-Pen Filler

It often happens that there is no filler at hand when a fountain pen is empty. A substitute filler can be quickly made, for an emergency, of a toothpick as shown. Soak the toothpick in water and bend it to fit the bottle neck. By turning the bottle carefully the ink will flow over the toothpick and into the pen.—Contributed by Robert C. Kyle, McMinnville, Ore.



INTERESTING NEW PATENTS



FIG. 1

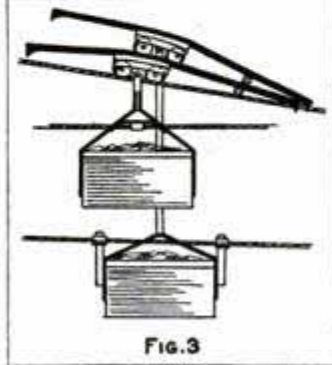


FIG. 3



FIG. 5

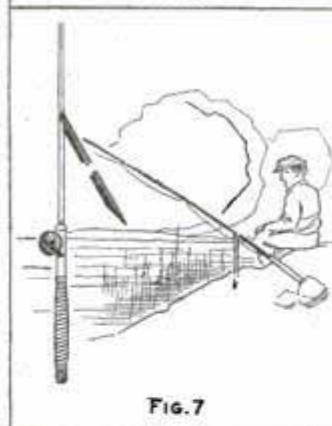


FIG. 7



FIG. 9

REVOLVING SWING (Fig. 1)—The frame from which the swing is suspended is provided with wheels running on a circular track, the track being securely attached to a porch ceiling or other overhead support. By a slight pressure of the feet the swing can be made to face in any direction to suit the convenience and comfort of the user.

FUNNEL WITH AIR VENTS AND STRAINERS (Fig. 2)—Small tubes in the wall of the funnel permit the air to escape from the vessel to the open air without interfering with the flow of liquid. The funnel is provided with sloping partitions in which are wire-mesh strainers, and at the junction of the partitions is a V-shaped space in which the residue is deposited. Near the top is a groove into which a wire ring fits closely, designed for holding in place a sheet of chamois skin when gasoline or similar liquids are to be strained.

NOVEL TRAVELERS FOR AERIAL ROPEWAY (Fig. 3; British patent to an Italian)—The purpose of this invention is to enable two buckets to pass each other when operating on the same ropeway. On top of each truck is a curved rail which is so shaped that one truck will mount and pass over the other. The buckets are suspended from opposite sides of the ropeway, and, as a further precaution against collision, the upper bucket is provided with a curved rod that acts as a shield.

FEEDING BASKET FOR BIRDS (Fig. 4)—This device consists simply of a metal basket with means for attaching to a tree or post. The front is made of coarse wire mesh through which the seed or other food may be reached by the birds, while the bottom plate is provided with a number of openings for inserting the ends of perches.

WEED-POISONING DEVICE (Fig. 5; British patent)—This device is apparently intended for killing weeds that cannot be easily uprooted. Poison in powdered form is placed in the tubular body, which is kept closed ordinarily by the pressure of the spring blade against the opening at the lower end. When the blade is inserted a slight bending movement draws the blade away from the opening, permitting the poison to fall into the cut in the weed.

FILTERING DRINKING CUP (Fig. 6)—The cup is divided into two compartments by a vertical partition and is provided with a hinged lid designed to close either compartment. The lower end of the partition is made of porous material, while one compartment is partly filled with filtering material. Water is placed in one side and is allowed to filter through to the other.

SUPPORT FOR FISHING ROD (Fig. 7)—This simple device consists of a light metal stake which is attached by a pivot to the rod and is designed to take the place of the ordinary forked stick. The rod is balanced in position by the weighted handle, while the side of the stake is recessed to fold compactly against the rod when raised.

CLOTHES POUNDER (Fig. 8)—The essential feature of this device is the manner in which water is kept circulating through the soap receptacle in the bottom of the central compartment. On the downward stroke the water is forced through this receptacle and into a conical cavity above, and when the pressure is released, the air, which has been compressed by this action, forces the water downward and into the tub.

SEARCHLIGHT FOR OBSERVATION CAR (Fig. 9)—The light is mounted in such a way that it can be swung freely in a horizontal or vertical direction, and is evidently intended for use on mountain railways.

ADJUSTABLE FOOT REST FOR SCHOOL DESK (Fig. 10)—The height of the foot rest is adjusted by placing the upright supports in a vertical or an inclined position. This is accomplished by attaching the diagonal bar at the proper bolt hole in the horizontal bar connecting with the desk standard. The horizontal bar is also adjustable for height, as shown.

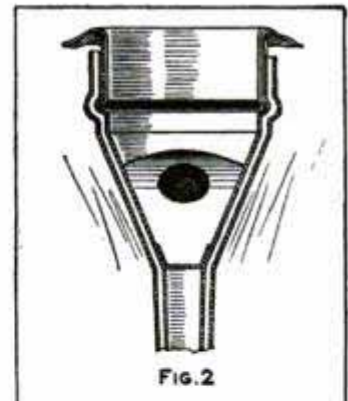


FIG. 2



FIG. 4

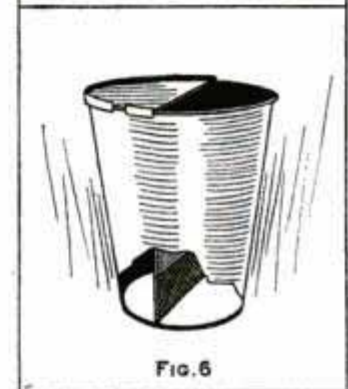


FIG. 6

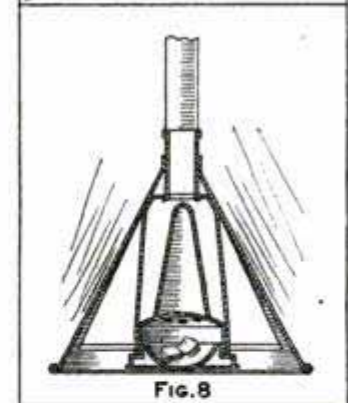


FIG. 8



FIG. 10

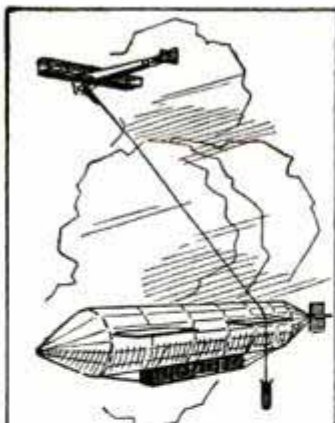


Fig. 11



Fig. 13

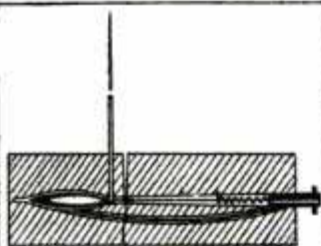


Fig. 15



Fig. 17

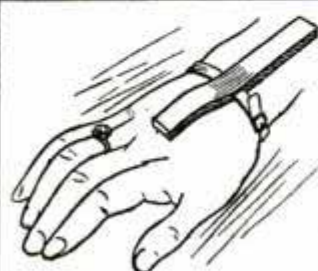


Fig. 19

BOMB FOR AERIAL WARFARE (Fig. 11)

—The bomb is carried at the end of a cable and is so made as to explode when drawn up against an airship or other object. It is raised and lowered by a reel, the object being to trail it across and destroy an aeroplane or dirigible flying at a lower level.

RECORDING AND SIGNALING DEVICE FOR RESTAURANTS (Fig. 12; British patent)

This curious device is provided with means for signaling the number of customers at a table, for summoning the waiter, and for recording the growth of each customer's bill. When the waiter is wanted, the top indicator is illuminated by an electric switch thrown by the customer. Checks are deposited by the waiter in the disk below this indicator, and when paid, are dropped into a filing cabinet below.



Fig. 12

CASTER MOUNTING FOR METALLIC FURNITURE LEGS (Fig. 13)

The bottom of the angle-iron leg is cut at the angle, the two parts are bent together in a horizontal position, and an opening is formed for inserting the shaft of the caster. At the proper height, a tongue is cut in one side of the angle, and is bent to a horizontal position. In this an opening is formed for receiving the top of the caster shaft.

STEERING WHEEL FOR RIDING PLOW (Fig. 14)

The steering wheel is guided by a cross-arm secured to the top of the shaft, and each end of this crossarm is connected with a fulcrumed treadle at the rear of the machine. The treadles are so placed as to furnish convenient foot rests.

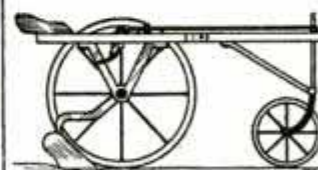


Fig. 14

NEEDLE THREADER (Fig. 15; American patent to a German)

The needle is inserted into the large vertical opening, while the thread is inserted into the vertical slot at the right of the needle. Pressure on the push button at the right causes a wire attached to it to engage the thread and pass it through the needle hole into the jaws of pincers located in the large cavity at the left, the pincers being operated by a wire passing from the push button through the curved lower channel. When the needle is withdrawn, the end of the thread is held by the pincers until the pressure on the push button is released.

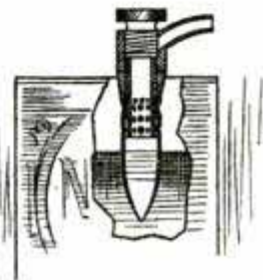


Fig. 16

COMBINED CAN OPENER AND FAUCET (Fig. 16)

This device consists of an ordinary faucet to which is attached a tube having a series of cutting blades at the end for cutting out a disk of the tin. When the cutting is completed the faucet is forced down until a tight fit is obtained through the action of the beveled shoulder.

ROPE CLAMP (Fig. 17)

The upper end of the hook consists of converging walls having channeled inner faces, while the outer faces of the wedge-shaped piece have corresponding channels so that the rope is held firmly between the two parts. Owing to the action of the wedge, the clamping is most secure when the load is heaviest.

FIELD GLASSES WITH MIRROR ATTACHMENT (Fig. 18)

Convenience in watching air craft is apparently the purpose of this curious invention, as it permits an observer, while standing upright, to make observations in any upward direction. The mirror is provided with a clamp for holding at any desired angle.



Fig. 18

WRIST SUPPORT FOR PIANO PLAYERS (Fig. 19)

This device, when strapped to the back of the hand with the end just back of the knuckles, holds the wrist rigid and in a high position while allowing free movement of the fingers.

MATCH SAFE AND CIGAR LIGHTER (Fig. 20)

The tubular space supplies a shield for lighting a cigar in the wind, the match being ignited by abrasive materials as it is thrust through the opening of the cone-shaped end. The upper portion is pierced with openings for admitting air, while the space between walls in the lower portion is formed into a match safe by walls running lengthwise of the tube.



Fig. 20

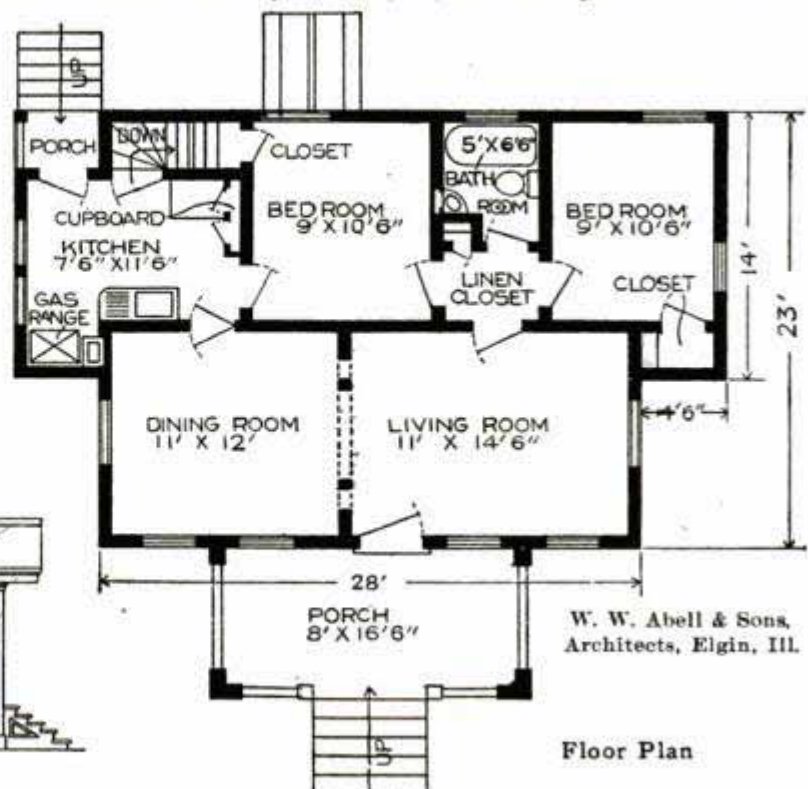
COMPACT AND INEXPENSIVE SUBURBAN COTTAGE



THIS five-room cottage, with its novel and effective arrangement of floor space, is of a type particularly suited to the requirements of a suburban location where an attractive but inexpensive house is wanted. It is a one-story structure with basement and with attic space large enough to meet the usual storage requirements. The walls consist of wood frame with cement-plaster covering laid on metal lath. The total cost, including heating plant and lighting facilities, was about \$2,500.

The width of the house, exclusive of the porch, is 23 ft. and its greatest length is 37 ft. This restricted area has been utilized to the utmost in producing an arrangement that is both convenient and attractive, and in which, apparently, not a foot of space has been wasted. The living room and dining room are given the prominent place at the front of the house. These rooms are separated only by an arch, and practically form one large room extending across the front of the building and overlooking the front porch. The entrance to the building is through the living room. The dining room is connected directly with the kitchen, while the bathroom and the two bedrooms are reached from the living room through a small vestibule that may be used as a linen closet. The plan of the house is unusual in having the rear portion longer than the front, the additional length being 9 ft. divided into two projections of 4½ ft. each. By a skillful overlapping of the corners formed by these projections, space for a closet in one of the bedrooms and for the gas range in the kitchen is obtained without encroaching on the rectangular area of these rooms. The house is heated by a furnace located in the basement, which is reached by an outside stairway as well as by a stairway leading from the kitchen.

Practically no decoration is used on the exterior, but owing to the arrangement of line and mass, and particularly to the treatment of the roof, a general effect of an unusually attractive character has been secured.





HY-RIB ROOFS
PACKARD MOTOR CAR CO.



Unseen Strength

In concrete roofs and floors, in plaster ceilings and partitions, in stucco walls and sidings—for countless structures of every size and kind, from silo to factory building, from residence to skyscraper—Hy-Rib is the unseen strength.

HY-RIB

is a steel sheathing, combining in a single unit, lath, studs, reinforcement and forms. Hy-Rib construction insures permanence, fireproofness and economy. Its use is simplicity itself.

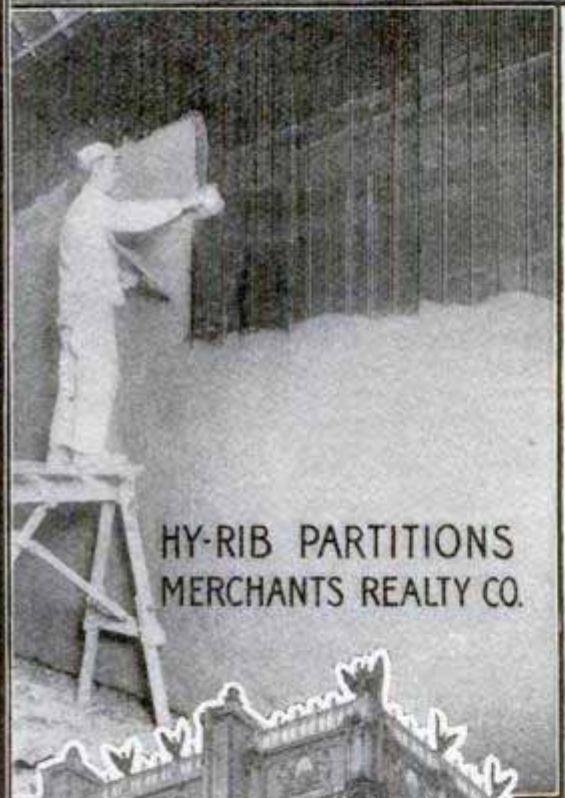
The easily handled sheets are fastened to the supports, and the plaster or concrete is applied. All forms are eliminated.

No matter what you intend to build, it will pay you to learn about Hy-Rib. Write for Hy-Rib Handbook—Free.

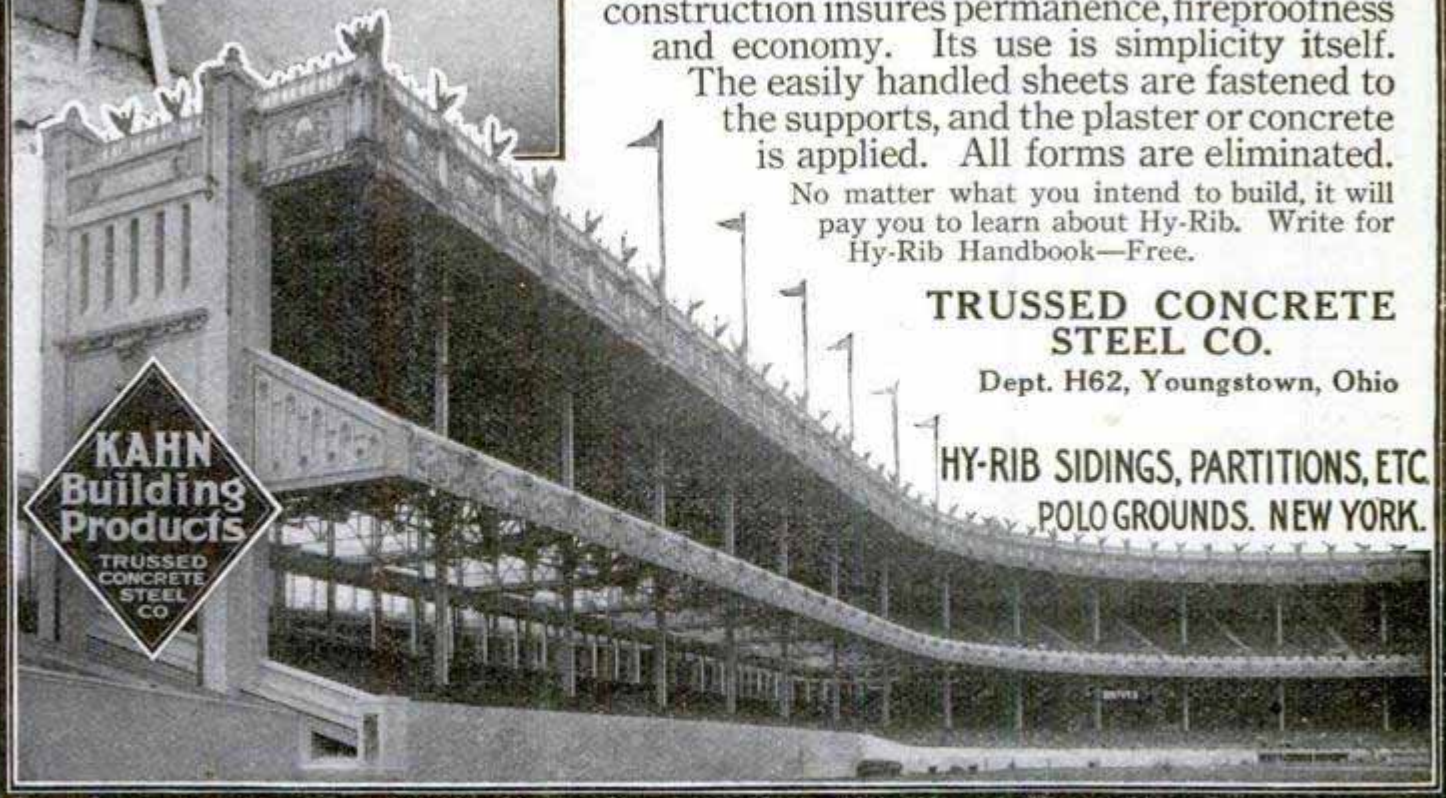
**TRUSSED CONCRETE
 STEEL CO.**

Dept. H62, Youngstown, Ohio

HY-RIB SIDINGS, PARTITIONS, ETC
POLO GROUNDS. NEW YORK.



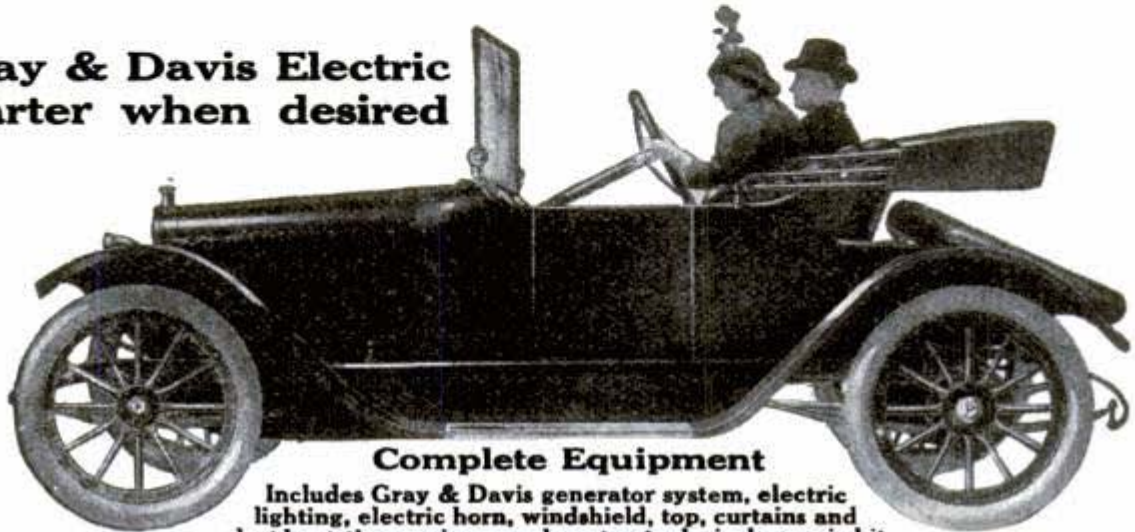
HY-RIB PARTITIONS
MERCHANTS REALTY CO.



YOU said it would come—
a powerful, light, \$**495**
stylish, quality car

PARTIN-PALMER "20"

**Gray & Davis Electric
Starter when desired**



Complete Equipment

Includes Gray & Davis generator system, electric lighting, electric horn, windshield, top, curtains and dust boot, tire carrier, speedometer, tools, jack, repair kit

What you get for your \$495

Four-cylinder water-cooled 22 horsepower motor, 56-inch tread, 96-inch wheelbase, shaft drive, full-floating rear axle, annular ball bearings, I-beam forged front axle, streamline body, 3-4 elliptic springs, 3 speeds forward, sliding gear transmission, running boards, wood wheels.

**Extraor-
dinary
value** This car will be a
revelation to you.
No other car at
anywhere near the
price offers you a full-floating
rear axle and such extraor-
dinary value throughout.

For pleasure or business this handsome, high-grade car has no equal—it is built to meet the demand of the thousands—at a popular price.

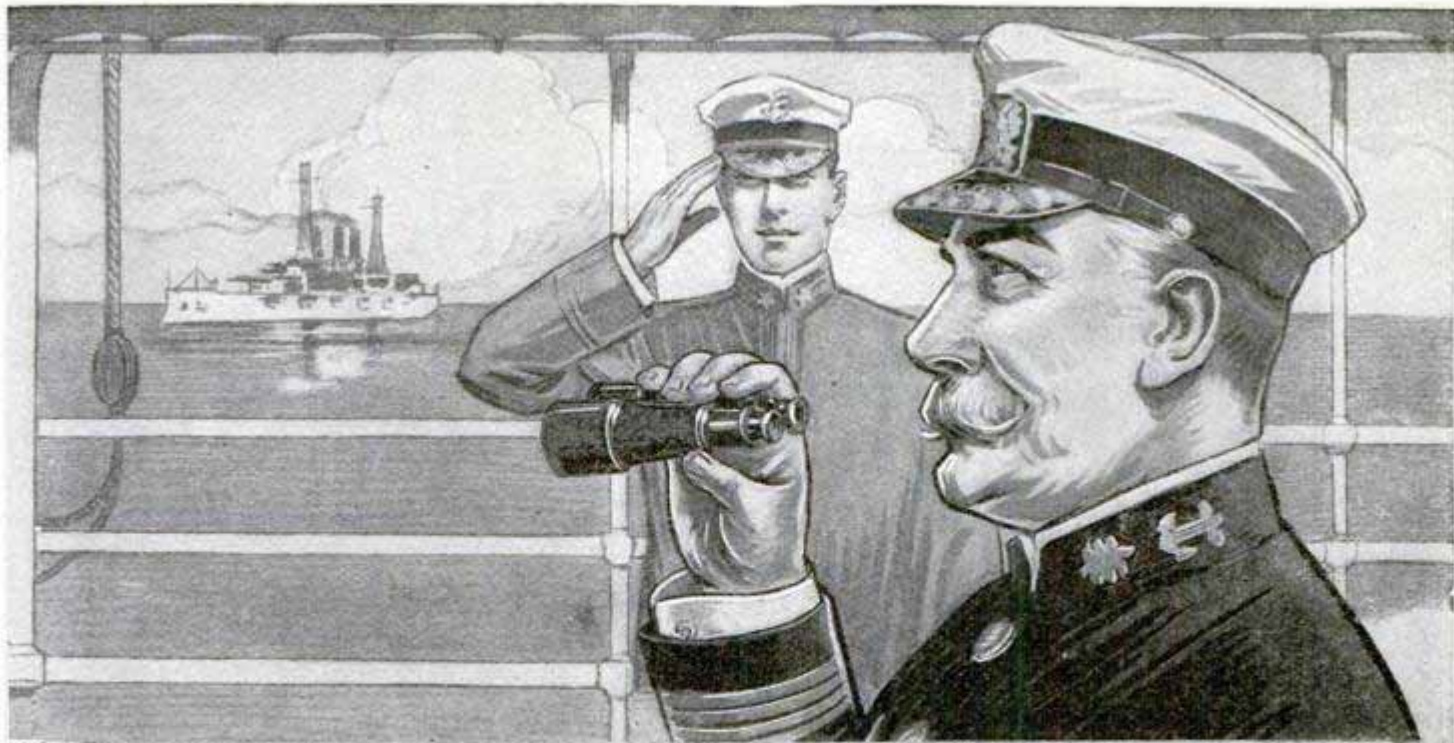
Builders of the famous \$975 Partin-Palmer "38," 6 pass., 115-in. wheelbase. Write us and we will arrange for a demonstration.

**Agents
wanted** If you are looking
for a car for your
own personal use—
investigate the Partin-Palmer
"20" before you buy.

If you can prove to us that you are a live agent—looking for a quick, easy, immediate seller, don't delay—wire, phone or write to our General Sales Manager, C. C. Darnall, for Exclusive Territory and Special Introduction Offer—HURRY.

Everybody who reads this announcement—prospective buyer or dealer—is urged to write at once for our booklet, "The Proof"—it will save you \$200 at least.

Partin Mfg. Co. Dept. F
29 South La Salle St., CHICAGO, U. S. A.



Spick and Span is the Navy Man

Alert, neat and efficient—that is why, when he is on duty and wants to enjoy his tobacco, he gets it in its most efficient form.

He chews "PIPER." Its use isn't conspicuous, but it is right *there* all the time, giving him a rich tobacco *satisfaction*.

PIPER Heidsieck

CHEWING TOBACCO — Champagne Flavor

has come to be a great favorite with American men of brains and energy, partly through the convenience of its use, partly through the wonderful enjoyment it brings the user.

Many men are placed in positions where it is impossible for them to smoke. "PIPER" solves that problem for them.

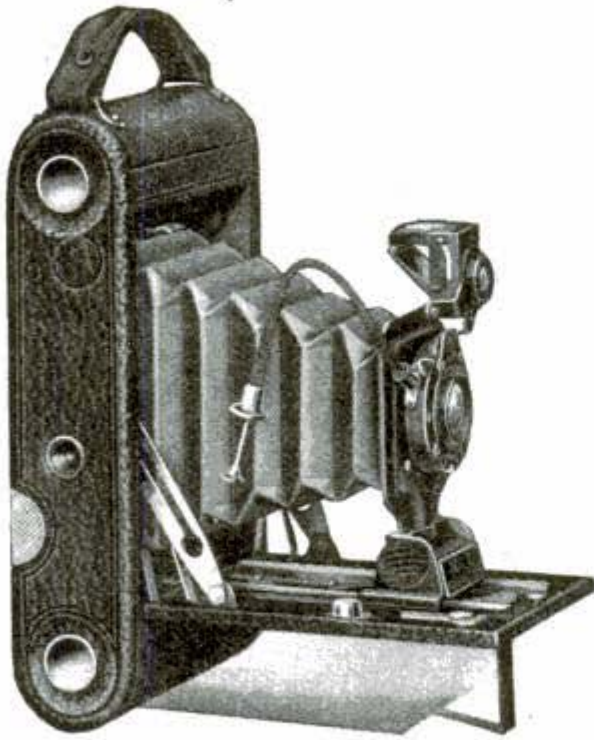
As to "PIPER's" unique superiority—it is due to two distinct features. The world-famous "Champagne Flavor" of "PIPER" has added a *rich and wine-like* tang to the tobacco which is supremely delicious. The tobacco itself is the *finest* of the *choice crops*, selected by *experts*, and blended into the *perfect plug*.

FREE

Send 10 cents and we will send a full-size 10-cent cut of "PIPER" and a handsome leather pouch FREE, anywhere in the U. S. Also a little folder telling about PIPER Heidsieck tobacco. The tobacco, the pouch and mailing expenses will cost us 20 cents and we are glad to spend the money to get you to try "PIPER." We know that once you have started, you will become a permanent friend of this wonderfully wholesome, healthful and satisfying tobacco. In writing please give name of your tobacco dealer.

Sold by dealers everywhere, in all size cuts from 5c up

THE AMERICAN TOBACCO COMPANY, Room 1168, 111 Fifth Avenue, New York City



The New Kodak Jr.

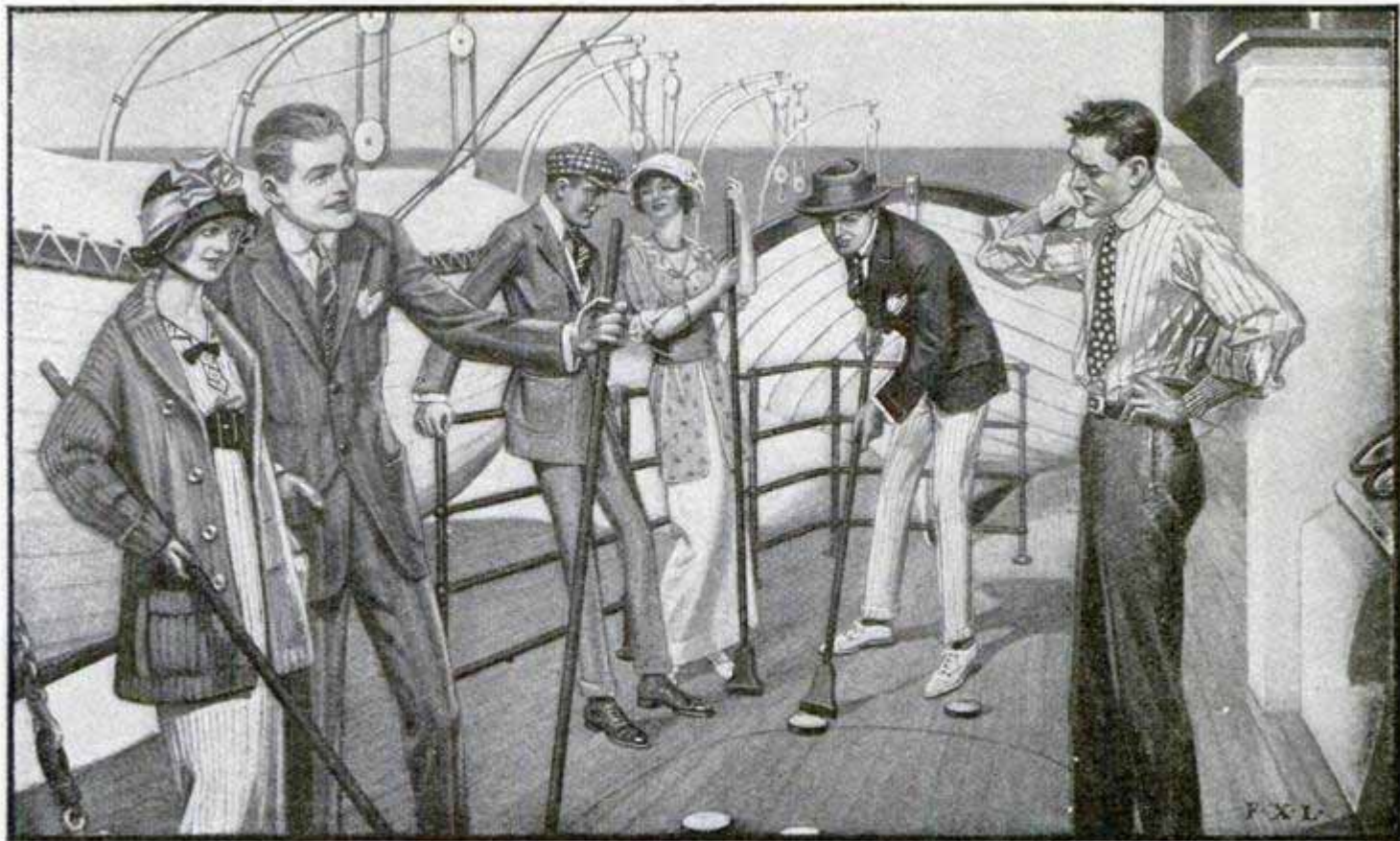
*With all
the Kodak
refinements*

EASY to operate, and so thin and compact that it is pocketed without inconvenience. Equipped with new Kodak Ball Bearing shutter with cable release, for time and bulb exposures, and for speeds of $\frac{1}{25}$ and $\frac{1}{50}$ with No. 1, and for $\frac{1}{25}$, $\frac{1}{50}$ and $\frac{1}{100}$ of a second with No. 1A. New style back, easily removed for quick reloading. Choice of meniscus achromatic or Rapid Rectilinear lens; has automatic focusing lock; collapsible, reversible finder and two tripod sockets.

No. 1, size of pictures, $2\frac{1}{4} \times 3\frac{1}{4}$ inches, meniscus achromatic lens,	\$ 7.50
Ditto, with Rapid Rectilinear lens, - - - - -	9.00
No. 1A, size of pictures, $2\frac{1}{2} \times 4\frac{1}{4}$ inches, meniscus achromatic lens,	9.00
Ditto, with Rapid Rectilinear lens, - - - - -	11.00

Catalogue free at your dealer's or by mail.

EASTMAN KODAK COMPANY, ROCHESTER, N. Y., *The Kodak City.*



There's "An Ocean Of Comfort" In B. V. D.

You wear a *coat* and a *smile* with B. V. D. On land or sea, in city or country, outdoors or in the office, B. V. D. takes the bite out of the "dog-days". *It keeps you cool.* Being loose-fitting in drape, it lets invigorating air at your pores. Being light-woven in fabrics, you hardly feel that you have it on. If you dance, B. V. D. leaves you arm, leg and body-free.

For your own welfare, fix the B. V. D. Red Woven Label in your mind and make the salesman *show* it to you. If he can't or won't, *walk out!* On every B. V. D. Undergarment is sewed

This Red Woven Label



(Trade Mark Reg. U. S. Pat. Off. and Foreign Countries)

B. V. D. Coat Cut Undershirts and Knee Length Drawers, 50c, 75c, \$1.00 and \$1.50 the Garment.

B. V. D. Union Suits (Pat. U. S. A. 4-30-07) \$1.00, \$1.50, \$2.00, \$3.00 and \$5.00 the Suit.

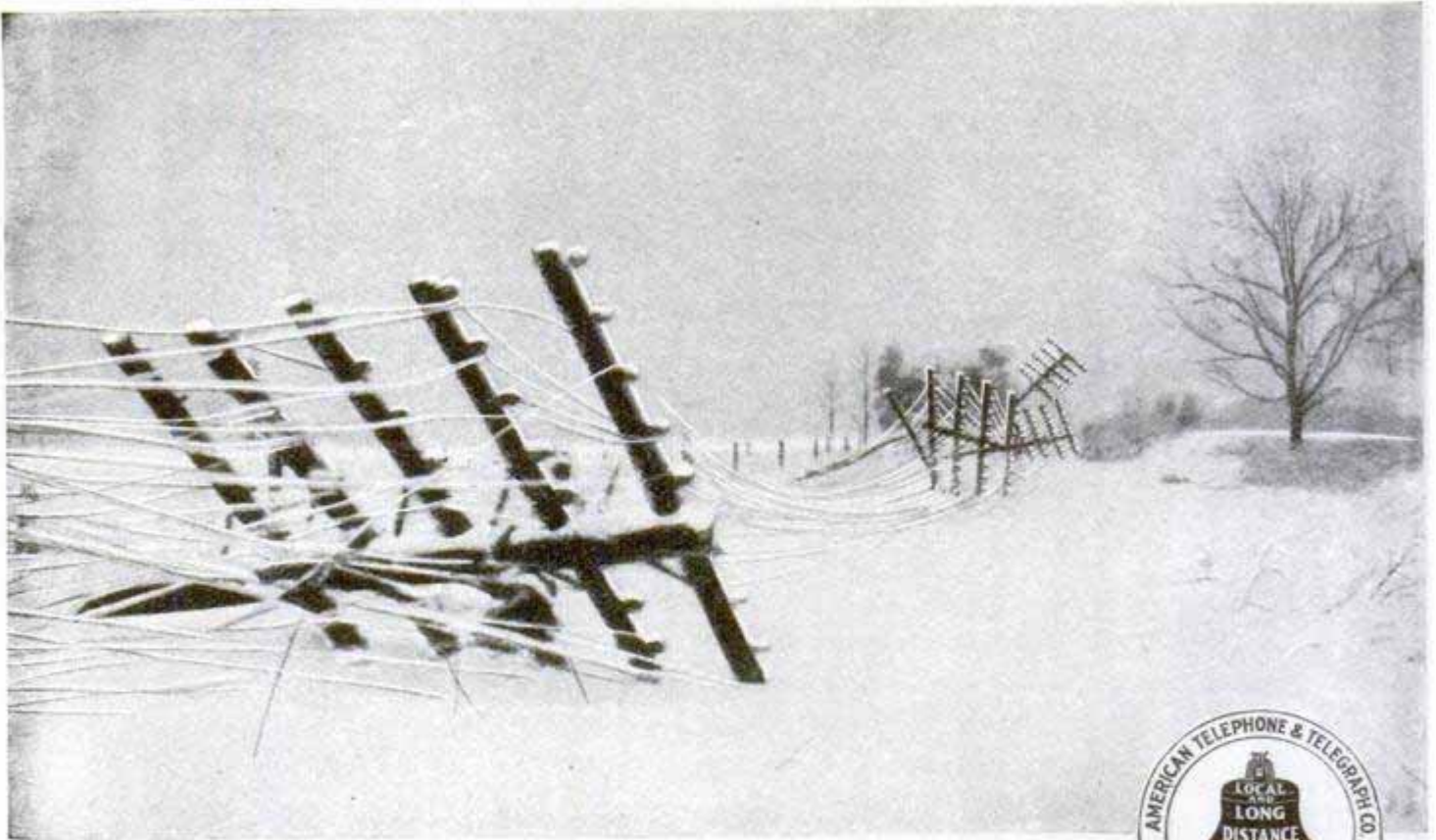
The B. V. D. Company,
New York.

London Selling Agency: 66, Aldermanbury, E. C.

*Copyrights U.S.A. 1914 by
The B.V.D. Company*

Please Mention Popular Mechanics





The Telephone Emergency

THE stoutest telephone line cannot stand against such a storm as that which swept the Middle Atlantic coast early in the year. Poles were broken off like wooden toothpicks, and wires were left useless in a tangled skein.

It cost the telephone company over a million dollars to repair that damage, an item to be remembered when we talk about how cheaply telephone service may be given.

More than half of the wire mileage of the Bell System is underground out of the way of storms. The expense of underground conduits and cables is warranted for the important trunk lines with numerous wires and for the lines in the congested districts which serve a large number of people.

But for the suburban and rural lines reaching a scattered population and doing a small business in a large area, it is impracticable to dig trenches, build conduits and lay cables in order that each individual wire may be underground.

More important is the problem of service. Overhead wires are necessary for talking a very long distance. It is impossible to talk more than a limited distance underground, although Bell engineers are making a world's record for underground communication.

Parallel to the underground there must also be overhead wires for the long haul, in order that the Bell System may give service universally between distant parts of the country.

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

One Policy

One System

Universal Service

Please Mention Popular Mechanics



The Gasoline Toll Gate Does Not Stop You in a Saxon

Saxon owners are saved the annoyance and expense of frequent stops to pay toll at the gasoline stations. The occupants of the light but sturdy Saxon drive by in comfort while many a touring party in a big, heavy car is held up for fuel replenishment.

Thousands of owners daily find the sturdy Saxon the most economical car they ever drove; they consider it the most economical car of standard design in the world—to buy and to run.

A Year's Service in a Month

And the Saxon saves you money every day you drive it. Here are some economy records from a test made in Detroit representing the equivalent of a year's service. Note them carefully:

135 miles a day for 30 days.
 30 miles to the gallon of gasoline.
 200 miles to the quart of oil.
 Half a cent a mile for fuel; one-fourth of a cent a mile per passenger. All the original tires good for from 2,000 to 5,000 miles more of service.

SAXON

A Good Low Priced Car

Similar records of gasoline and tire economy are reported to us by owners and dealers all over the country. No wonder Saxon owners say, "It's cheaper to drive a Saxon than to use street cars—especially when you consider the time saved."

Business Men: Let the Saxon Save You Time and Money

Not only does the Saxon give pleasure and health at moderate expense—to those who don't want to pay an extravagant price for a car; to those who already own a big car; to those who need a car for summer vacation use. *Its wonderful economy is a reason also for using it in business.*

More than 3,000 Saxons have been delivered and they are universally making good. Good and good-looking, satisfying to the eye and to the pocketbook, a saver of time and a saver of money—the Saxon commends itself to everyone who can use an automobile for business or pleasure.

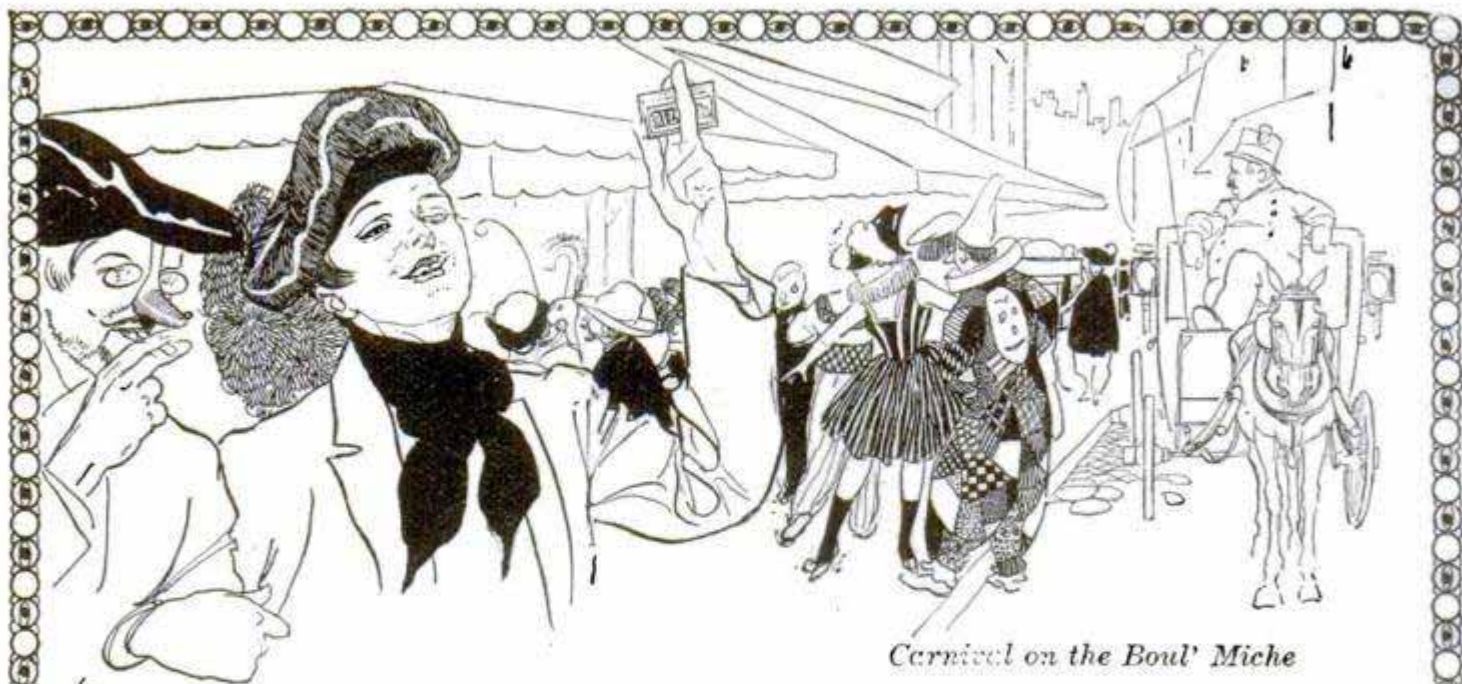
Order Your Saxon Now

Saxons are selling fast—faster than we even dreamed they would. It must be a case of first come, first served. So the only way to avoid being one of the disappointed is to see your dealer and order now.

Catalog and dealer's name on request.

Saxon Motor Company, Detroit

Address Dept. J.



Carnival on the Boul' Miché

to **CIGARETTE-TIME IS ALWAYS CARNIVAL-TIME**

In truth, the one thing that man has fashioned for his universal delight—for his hours of gaiety and leisure, for his pleasuring, his contentment, his comfort and his gusto of living . . . is his cigarette.

Voici la mode: Make your own cigarettes from the golden grains of your favorite tobacco, wrapped always in

RIZ LA

(Pronounced: REE-LAH-KROY)

FAMOUS CIGARETTE PAPERS

These papers add the touch of the exquisite to the now fashionable rage for rolling your own cigarettes. They are so thin . . . so strong . . . so light . . . so odorless . . . so tasteless . . . so pure!

Made from the finest linen-flax, perfected at last through long years of experimentation by the members of the La Croix family, the papers Riz La Croix have achieved the ideal . . . the *best* cigarette papers *in the world!*

There are 15,000,000 books of Riz La Croix papers sold annually in Paris.

90,000,000 sold on the Continent; 60,000,000 sold in this country.



FREE

Two interesting, illustrated Booklets—one about RIZ LA CROIX Cigarette Papers, the other showing how to "Roll Your Own" cigarettes—sent anywhere in U.S. on request. Address The American Tobacco Co., Room 1184, 111 Fifth Ave., N.Y.



Healthful Sleep

Sleep is the slowing down of all the organs of the body; Nature's period of rebuilding. Loss of sleep means drawing on the reserve forces of the entire human system. The soothing qualities of

ANHEUSER-BUSCH'S
Malt-Nutrine

are due to the tonic properties of Saazer Hops. Malt-Nutrine is a combination of the soluble extracts of the choicest Saazer (Bohemia) Hops, and the best Barley the earth produces. When taken before retiring it promotes healthful and refreshing sleep.

For sale by all druggists and grocers

Malt-Nutrine, when mixed with milk or sparkling water, makes a most palatable and healthful drink.

Malt-Nutrine declared by U. S. Revenue Department a pure malt product, not an alcoholic beverage. Contains 44 per cent malt solids — 1.91 per cent alcohol.

ANHEUSER-BUSCH · ST. LOUIS, U. S. A.

Booklet 7 (beautifully illustrated) sent free on request



To the Man Who is About to Buy a .22 Calibre Rifle

PROBABLY you have already decided on a Remington-UMC. If not—let these facts be your guide in making your selection. The growing preference among seasoned sportsmen is more and more for Remington-UMC Arms and Ammunition—in the .22 calibre as well as in the high power arms.

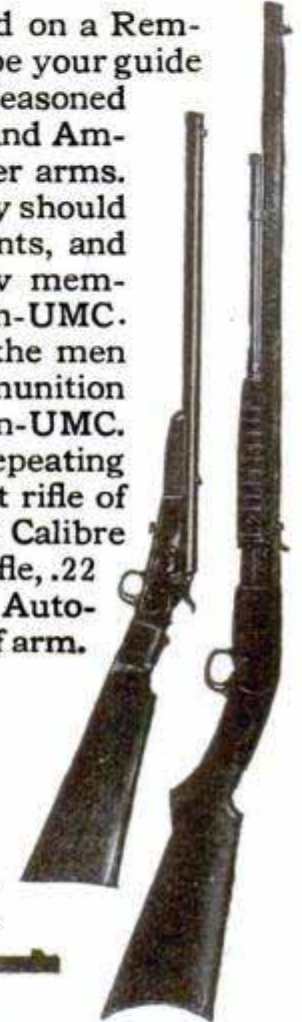
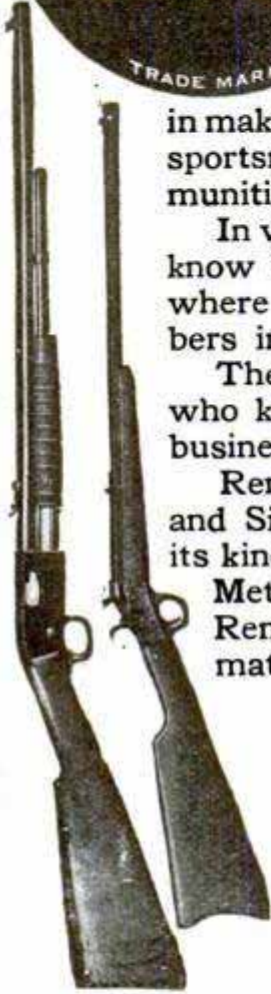
In view of their experience, it is to be expected that they should know the facts about arms and ammunition refinements, and where to find them. By far the larger number of new members in the shooting fraternity are adopting Remington-UMC.

The alert dealers in every section of this country—the men who know what is going forward in the arms and ammunition business—are making a strong feature of Remington-UMC.

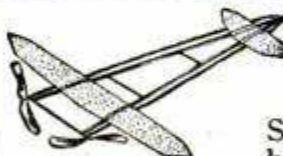
Remington-UMC .22 Calibre Rifles are made in Repeating and Single Shot Models—each recognized as the finest rifle of its kind in America. Nine kinds of Remington-UMC .22 Calibre Metallics—B.B., C.B., .22 Short, .22 Long, .22 Long Rifle, .22 Remington Special, .22 W. R. F., .22 Extra Long, .22 Automatic Rifle. The ammunition that flatters any make of arm.

Go to the dealer who displays the *Red Ball Mark* of Remington-UMC—the Sign of Sportsmen's Headquarters. He sells the Remington-UMC arms and ammunition you ought to have.

Remington Arms-Union Metallic Cartridge Co.
299 Broadway, New York City Windsor, Ont., Canada



To keep your gun cleaned and lubricated *right*, use Rem Oil, the new powder solvent, rust preventative, and gun lubricant.



MODEL AEROPLANES

Send 2c postage for Complete handbook of Models and Supplies

1914 Champion Racer
Designed by Harry Schultz,
Model Editor of Aeronautics
You build it . . . \$2.50
We build it . . . \$7.50

WADING RIVER MFG. CO.
WADING RIVER, N. Y.

RAISE GUINEA PIGS

We furnish stock, show you how, buy all you raise. Big demand, thousands needed yearly. Inexpensive to keep, easy to raise, very prolific, more profitable than poultry. Market assured. Particulars Free.
CAVIES DISTRIBUTING CO., 720 W. 74th St., Kansas City, Mo.

Bausch and Lomb BALOPTICON

THE PERFECT STEREOPTICON
Bausch & Lomb Optical Co., 576 St. Paul St., Rochester, N. Y.

Furniture On Credit

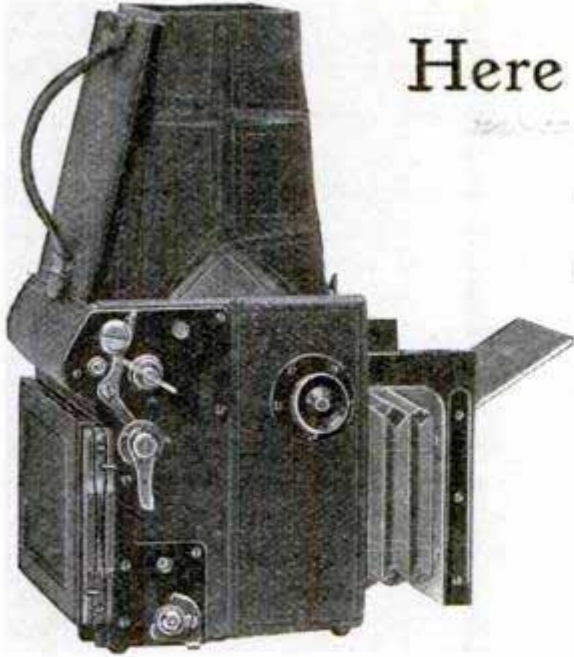
Write for Mammoth Bargain Book picturing 4,918 articles
SPIEGEL, MAY, STERN CO.
1089 West 35th Street, Chicago



Amazing Profits In Mushrooms

Anybody can add \$8 to \$40 per week to their income, in spare time, entire year growing mushrooms in cellars, sheds, barns, boxes, etc. I tell you where to sell, at highest prices.

Free Illustrated Instruction Booklet
HIRAM BARTON
Desk 2, 329 W. 48th St., New York



Here is a small, high-grade,
high-speed, reflecting
CAMERA, that will
make the kind of
pictures you have
always wanted.

The Auto Graflex Junior

With *f.* 4.5 lens (B. & L.-Zeiss Tessar Series Ic or Cooke Series II) \$66.00

With *f.* 6.3 lens (Zeiss Kodak Anastigmat) 53.50

With this camera you can make snap shots on dark or cloudy days, or even indoors. On bright days, when the sun is shining, you can make exposures as short as 1-1000th of a second, if you wish. And there is no uncertainty. When you look into the focusing hood you see the image right side up, the size it will appear in the finished picture up to the instant of exposure. There is neither focusing scale nor finder.



Size of picture made with Auto Graflex Junior

Our 64-page illustrated catalogue shows the way to better pictures.

May we send you a copy?

Folmer & Schwing Division

Eastman Kodak Company

Rochester, N. Y.

TYPEWRITER SENSATION!

2 DOLLARS A MONTH



Free Trial

Buys a Genuine Standard

No. 6 Remington Typewriter and at \$70.60 less than the original price.

Never before has anything like this been attempted. Dealers get \$3.00 a month rent for this make of machine, not nearly as perfect as the one we will send you, and you pay only TWO DOLLARS A MONTH AND OWN IT.

A Guaranteed Typewriter \$29⁴⁰

Perfect machines only, complete outfit, nothing extra to buy, no strings of any kind to this offer. Just think of buying such a typewriter for \$7.40 down and \$2.00 a month. Cash price \$28.30. Thousands of people have paid \$100.00 cash for Remingtons. This typewriter built the reputation of writing machines in the business world. It's standard; as fast as the fastest operator; so reliable and strong the shrewdest business men choose it above all others; so wonderfully simple a child can operate it with half an hour's practice and rapidly attain speed. Comes to you with two color ribbon, complete operating instructions, tools, waterproof cover, practice paper, carbon paper, universal keyboard arrangement, everything ready. It runs beautifully. Writes as perfect and clean-cut a letter as quickly and easily as any typewriter bought for \$100.00. It's wonderfully simple; it's strongly built and will give you years and years of honest service and complete satisfaction.

Send the Coupon and We Will Ship You this Well-known Typewriter

When the typewriter arrives, deposit with the express agent \$7.40 and take the typewriter three days and try it. If you find it to be the best typewriter you ever saw, satisfactory in every respect, keep it and send us \$2.00 each month, until our special price of \$29.40 is paid. If you don't want to keep it, return it to the express agent, and he will give you back your \$7.40, and return the typewriter to us. We will pay the return express charges.

You won't want to send this machine back after you have seen it and tried it. You can't imagine the perfection of these machines till you see one, and the price is \$70.60 less than the catalogue price, and it is guaranteed just as if you paid \$100.

Only 200 orders will be filled on this offer. Act today to be sure

This coupon states the terms. Fill it out, send it now, today. You can't lose, and it's the greatest economical typewriter opportunity you will ever have.

COUPON

HARRY A. SMITH, 231 No. Fifth Ave., CHICAGO

Ship me a No. 6 Remington, f. o. b. Chicago, as described in this advertisement. I will pay you the \$22.00 balance of the special \$29.40 purchase price, at the rate of \$2.00 per month. The title to remain in you until fully paid for. It is understood that I have three days in which to examine and try the typewriter. If I choose not to keep it I will carefully repack it and return it to the express agent. It is understood that you give the standard guarantee for one year.

Name.....

Address.....

Popular Mechanics, July

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 nearly seventy years, enables us in many cases to advise in regard to patentability without any expense to the client. Our Hand-Book on Patents is sent free on request. This explains our methods, terms, etc., in regard to *Patents, Trade Marks, Foreign Patents, etc.*

All patents secured through us are described without cost to the patentee in the SCIENTIFIC AMERICAN.

MUNN & COMPANY

SOLICITORS OF PATENTS

359 BROADWAY, NEW YORK
and 625 F STREET, WASHINGTON, D. C.

WHY LINEN IS COSTLY—Flax is as cheap as cotton, or cheaper, wages in the linen industry average less than two-thirds of those paid in the cotton industry, and yet finished goods made from flax average much

Guaranteed Used Pianos

A large number of fine instruments at exceptional bargain prices, many like new, exchanged for Kimball Player Pianos, thoroughly overhauled and guaranteed to be in splendid condition in every way.

Examples: Schaefer Upright \$140 Hallet & Davis \$190

Briggs Upright \$ 70 Hinze Upright \$ 145 Kimball Upright \$ 220

Colby Upright \$ 90 Fisher Upright \$ 165 Steinway Upright \$ 275

Emerson Upright \$ 110 Whitn v Upright \$ 185 Kimball Upright \$ 275

Decker Bros. Upr't \$ 135 Chickering Upright \$ 175 Knabe Upright \$ 175

We ship anywhere to reliable people on easy payment terms. Write Today For Complete List, Prices, and Terms and Beautiful Illustrated Musical Herald FREE, and catalogue New Kimball Pianos.

W. W. KIMBALL COMPANY, 129B Kimball Hall, Chicago, Ill.



NEW Edison Phonograph and Records Now Shipped FREE

Try it in your own home. Entertain your family and your friends. Send it back at our expense if you don't want to keep it. Terms as low as \$2.00 a MONTH for a genuine Edison Phonograph at ROCK-BOTTOM prices and without even interest on monthly payments. Send today for new Edison book—it's free.

Our Edison Catalog Free Send a postal or a letter at once, for our new Edison catalog and particulars of this liberal trial offer. No obligations whatever. Do not delay an instant. WRITE TODAY SURE.

F. K. Babson, Edison Phonograph Distr., 119Y Edison Block, Chicago, Ill.

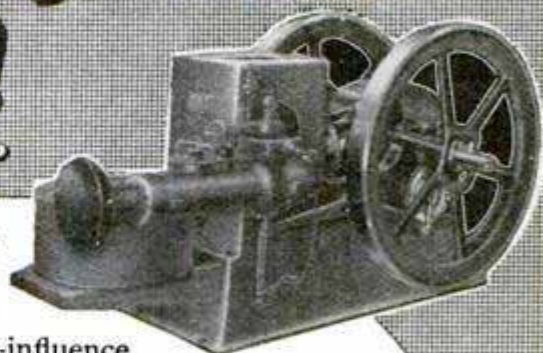
If You Knew The Real Quality of My Engines As Well As You Know The Price

You'd Buy One QUICK!

**KEROSENE, DISTILLATE,
GASOLINE & GAS**



Because, horsepower for horsepower, the price of a WITTE is considerably lower than that of any other strictly high grade gas engine.



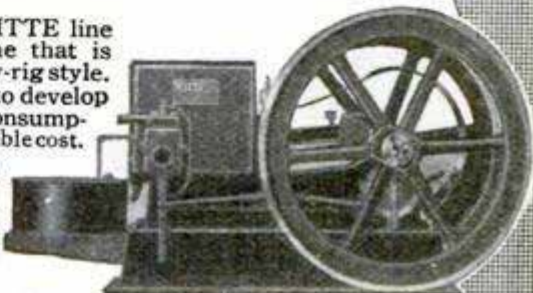
**WITTE Kerosene
Engine—Stationary**

But there are other considerations besides price—influence in the purchase of an engine—its adaptability to your particular needs—the cost of operating—the ease of starting and running it—its strength and durability—these are a few of the things you want to be sure about when you buy an engine.

No matter what kind of work you have for an engine to do, in the WITTE line of Kerosene, Distillate, Gasoline and Gas Engines you will find one that is exactly suited for that work, either Stationary, Portable, Skidded or Saw-rig style.

Whatever size or style of WITTE Engine you select, it is guaranteed to develop steady power with a liberal surplus over its regular rating on small fuel consumption. Every WITTE Engine gives the utmost power-service at the lowest possible cost.

The WITTE is so simple in construction that you can easily understand, start and run it, whether you are experienced with an engine or not. It is strong and durable—no other gas or oil engine has outlasted the WITTE. It has always proved itself dependable and has set the standard of engine quality for 27 years. Today my engines are better than ever—and the price is lower.



**WITTE Gasoline and Naphtha
Engine—Stationary**

Note These New WITTE ENGINE Prices

**2 H.P. \$34.95
8 H.P. 139.65
22 H.P. 399.65**

**4 H.P. \$69.75
12 H.P. 219.90**

**6 H.P. \$99.35
16 H.P. 298.90**

Portable and Saw-rig styles priced proportionately lo.v.

Direct from Factory to User on 60 Days' Free Trial

5 YEAR GUARANTEE

Compare these prices with prices quoted by anybody else. You'll notice a big difference in favor of the WITTE. And why? Because I have manufacturing advantages, including free gas for fuel, and recently I have invested many thousands of dollars in specially designed machinery of the latest types for a more rapid production of my engines. These increased factory facilities have made possible my present reduced prices while still maintaining the well-known WITTE quality.

Compare also my liberal selling plan with that of others. I'll give you a full 60 days' trial of any WITTE Engine you select to prove that it is all I claim for it. Under my plan you are sure of knowing what any engine ought to do, besides knowing what my engine can do, before you finally decide to buy.



WITTE Engine—On Skids



Let me send you, FREE, a copy of my new Engine Book—

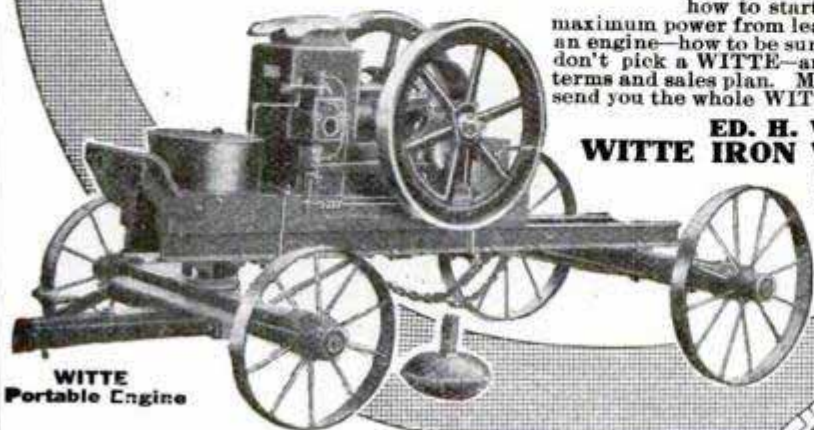
the finest in the business. It explains all. Tells how to start and run an engine—how to get maximum power from least amount of fuel—how to judge an engine—how to be sure in your selection even if you don't pick a WITTE—and all about my liberal easy terms and sales plan. Mail coupon today and I will send you the whole WITTE story by return mail.

**Mail This
Coupon
Today**

**ED. H. WITTE
WITTE IRON WORKS CO.
1746 Oakland Ave.
Kansas City
Mo.**

**ED. H. WITTE
WITTE IRON WORKS CO.
1746 Oakland Avenue
KANSAS CITY, MO.**

With no obligation on my part, I should like to receive your latest and finest Engine Book, with your new Liberal Selling Plan.



**WITTE
Portable Engine**

Name

Address

Please Mention Popular Mechanics

THE "WATER WAY"

D & C

LAKE LINES



"MACKINAC ISLAND IS CALLING YOU"

Where the waters of Lake Michigan meet Lake Huron, lies this historic summer resort of the north country. It was never so beautiful as now. The cool breezes, the beautiful scenery, the primeval woods, and smiling waters with rowing, sailing, fishing, bathing, golfing and sight seeing, furnish endless amusement for every minute of your stay. First class hotel accommodations and boarding houses at reasonable rates. For recreation and rest, Mackinac Island is the ideal spot.

THE COAST LINE TO MACKINAC—SIX TRIPS WEEKLY

from Detroit to Mackinac Island. Special Steamer, two trips weekly from Cleveland direct to Mackinac Island making no stops en route except at Detroit every trip. This is a particular steamer for particular people. No extra fare charged, and sale of tickets limited to sleeping capacity of steamer. Direct connections at Detroit with Coast Line Steamers.

Your Railroad Tickets are available for transportation on D. & C. Line steamers between Detroit and Buffalo or Detroit and Cleveland, either direction. Information regarding routes and rates furnished on request. For illustrated pamphlet and Great Lakes map, write including two cent stamp to

Detroit & Cleveland Navigation Company
26 Wayne Street, Detroit, Mich.

Phillip H. McMillan, *President* A. A. Schantz, *Vice-President and General Manager*
L. G. Lewis, *General Passenger Agent*

All D. & C. Steamers arrive and depart from the New Third Avenue Wharf, Detroit

"I believe it to be the best medium-priced Cornet ever produced and that it is fully equal to the majority of high-priced instruments of other makes."—Jules Levy, Jr.

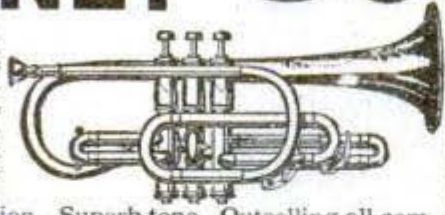
LYON & HEALY

50 years the leading house

American Professional CORNET \$30

Made in the U. S. from the crude metal to the finished product. The last word in cornets. The perfect realization of the best American workmen's conception. Superb tone. Outselling all competitors. Sent on Free 6 days' trial. Our Big New Band Catalog now ready. Contains remarkable values in hundreds of styles of instruments. Write for copy. (202)

LYON & HEALY, 37-42 E. Adams Street, CHICAGO



FREE to Hunters and Trappers
Fine Taxidermy Book Now Free! 48p. with hundreds of photos of mounted birds and animals. Learn this profession. Save your trophies. Decorate your home and den. Great value to sportsmen.

Learn to Stuff Birds animals, game heads, tan furs, make rugs and robes. Quickly learned by men and boys. Big Profits from spare time. Intensely interesting. **INVESTIGATE! Write Today for Free Book.** Only a few free—so rush.

Northwestern School of Taxidermy, 119 Yelwood Bldg., Omaha, Neb.



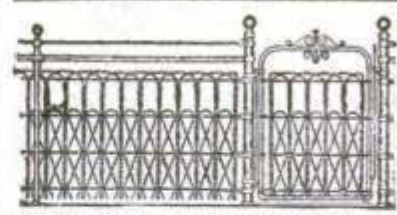
higher in price than finished cotton goods. Manufacturers state that this is due to the fact that flax is a



MAKE BIG INCOME

Men and Women can do this all the year at home growing mushrooms in cellars, stables, sheds, boxes, etc. Crop sells for \$50 to \$1.00 a lb. \$20.00 a week easily made. Great demand, markets waiting. **Start Now.** Write for big 32 page Free Illustrated Booklet and learn how to do it.

NAT'L SPAWN CO., Dept. 12, BOSTON, MASS.



DWIGGINS LAST LONGER FENCES COST LESS

Greatest values ever offered in fences and gates for lawn and cemetery, farm, field and poultry yard. **WRITE TODAY FOR FREE CATALOG AND PRICE LIST**

DWIGGINS WIRE FENCE CO., 237 Dwiggins Ave., Anderson, Ind.



3 YEARS TO PAY

Meister Piano 30 days free trial in your own home
\$1 A WEEK or Price \$175.00
\$5 A MONTH
No cash payment down. No interest—no extras. Piano stool and scarf free.

ROTHSCHILD & COMPANY
Dept. T16 CHICAGO, ILL.



"AMERICAN" Key Cutter

ADD TO YOUR INCOME With little effort you can make \$5 to \$10 a day

The "AMERICAN" is the only machine on the market (barring none) that sharpens, hones, and stropps razors, sharpens all kinds safety razor blades, scissors, clippers, pocket knives, surgical instruments, etc. No previous experience required. **REMEMBER THE "AMERICAN" Key-Cutter is a little wonder. Cuts Square, Angular or Round slots.**

AMERICAN SHARPENING MACHINE CO. (Inc.)
Dept. 7 184 W. Washington St. CHICAGO

"AMERICAN" Sharpener



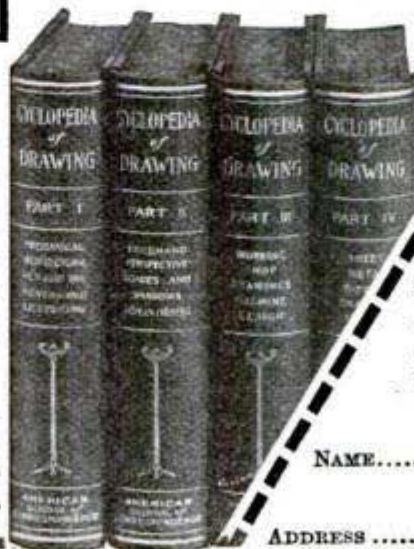
Become An Expert Draftsman

Learn Mechanical, Structural or Architectural Drafting by Mail

Absolutely the greatest drafting offer ever made. Read it carefully. Then investigate. Sign and mail the coupon at once. Here is your opportunity to get the training you need to hold down a good job and earn big money—\$100.00 to \$250.00 per month paid to expert draftsmen. Our easy, practical method will teach you ARCHITECTURAL DRAFTING, STRUCTURAL DRAFTING or MECHANICAL DRAFTING in a few months. You will receive expert individual instruction in the course you select. All drafting instruments and materials supplied absolutely free of charge. Also big four volume Cyclopaedia of Drawing sent free if you enroll now. Drafting is the foundation of all engineering professions—Learn drafting if you are ambitious to be an engineer. Prepare yourself for a real man's work. And remember—this great special offer is made by the greatest non-resident educational institution in the world—a school whose guarantee is backed by sixteen years of successful teaching by correspondence.

FREE

This \$20.00 Cyclopaedia of Drawing also included absolutely free in this special limited offer. Four big volumes as illustrated below. The only work which thoroughly covers MECHANICAL, STRUCTURAL and ARCHITECTURAL DRAFTING. Worth many times \$20.00 to any drafting student. Not only will you receive the best expert instruction, but you will have these books handy for reference at all times—they will answer all your questions authoritatively and promptly. Just think of it—four big volumes bound in half red morocco, gold stamped, 1,720 pages, 7x10 inches, 1,037 illustrations, page plates, diagrams, designs, etc., and the handsome \$20.00 Draftsman's Outfit. All free if you enroll now under this special limited offer.



FREE OFFER COUPON

A. S. of C.

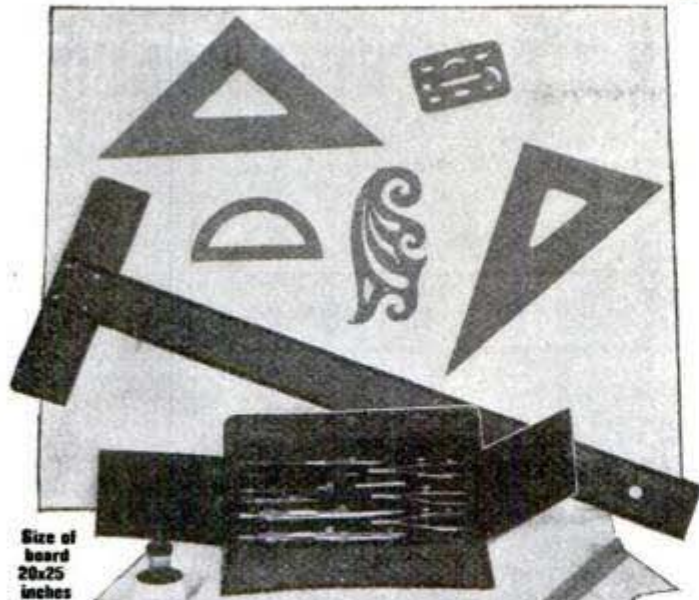
Gentlemen:—Please send me full information about the course checked below, also further particulars regarding the drafting outfit and library sent FREE with this course.

-Mechanical Drafting
-Structural Drafting
-Architectural Drafting

Pop. Mech. 7-14

NAME.....

ADDRESS.....



Size of board 20x25 inches

FREE \$20 Outfit
FREE \$20 Library

This \$20 Draftsman's Outfit as illustrated. Imported German silver drawing instruments in morocco case; 20 x 25 inch drawing board; ebony lined mahogany T-square; transparent triangles; German silver protractor; French curve; triangular boxwood scale; waterproof ink; pencil; erasers; shield; pencil pointer; handmade drawing paper and thumbtacks. Instruments guaranteed accurate—made by largest and most reliable manufacturer. This handsome, expensive outfit free to you if you enroll now!

SALARY GUARANTEE

THE AMERICAN SCHOOL OF CORRESPONDENCE GUARANTEES that you will receive an increase of fifty per cent over your present salary within three years from the date of your enrollment; or, failing in this, the School guarantees to refund to you the full amount paid for your course. Back of this guarantee stands the American School—for more than fifteen years the foremost educational institution of its kind in the world. A school that has succeeded because it has been true to its principles of giving its students the instruction for which they enrolled.

Just Mail the Coupon

Accept this great offer now—today! It never has and never will be equalled. You get the \$20 Drafting Outfit and the \$20 Cyclopaedia of Drawing absolutely free of charge. Don't miss this opportunity. Your future success may depend upon whether you fill in and mail the coupon. It will only cost you a stamp to investigate. It may mean success and a big future for you.

American School
of Correspondence. Chicago, U.S.A.

\$1500⁰⁰ MADE IN ONE MONTH WITH A "LONG" CRISPETTE MACHINE

That's what Mr. Eakin made—paid his last \$10 for rent of a store window—at the end of 30 days had \$1500 in the bank—today he is independent. A Crispette machine and Crispettes did it.

Mr. Perrin, Cal., took in \$380 in one day—every nickel brought him almost 4c profit.

I am looking for other men who want a business of their own. I want to start them in the business that made me rich. If you go about it right you can make as much money as I have.



H. W. EAKIN who made \$1,500 in one month.

I Want You to Come to See Me at My Expense

Up to 300 miles I'll pay your traveling expenses if you buy. I want to meet you face to face

and show you the wonderful possibilities in the Popcorn Crispette business. I'll teach you how to start—show you how to make Crispettes by my special secret formula.

I'll show you records of success of other men that will thrill and inspire you. I'll read you letters of users that will take your breath away.

400% Profit

Every nickel you take in nets you almost 4 cents profit.

You can make lots of money this summer at fairs, parks, circuses, summer resorts, then next winter rent a window as Mr. Eakin did, or a small room and keep on making money. It's a great business—an all year-round money maker.

FREE—My book "Dollars & Sense" 48 pages illustrated, complete information and story of how I built my business. Write for it. Read it, then come to Springfield.

W. Z. LONG, 928 High St., Springfield, Ohio

There is room for one of these Crispettes Machines in every city and town of 500 population in the U. S.



\$100.00 a day can be made with this machine

THIS BUNGALOW \$900 CAN BE BUILT FOR

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. Fifth edition just off the press. One hundred and fifty floor plans and photographs of bungalows, etc., costing from \$250 up; gives sizes and cost to build. Sent postpaid for \$1.00



FREDERICK H. GOWING ARCHITECT
18 Tremont St., BOSTON, MASS.



EXTRAORDINARY OFFER —30 days (one month's) free trial on this finest of bicycles—the "Ranger."

We will ship it to you on approval, freight prepaid, without a cent deposit in advance. This offer is genuine.

WRITE TODAY for our big catalog showing our full line of bicycles for men and women, boys and girls at prices never before equalled for like quality. It is a cyclopedia of bicycles, sundries and useful bicycle information. It's free.

TIRES, COASTER-BRAKE rear wheels, inner tubes, lamps, cyclometers, equipment and parts for all bicycles at half usual prices. A limited number of second hand bicycles taken in trade by our retail stores will be closed out at once, at \$3 to \$8 each.

RIDER AGENTS wanted in each town and district to ride and exhibit a sample 1914 model Ranger furnished by us.

It Costs You Nothing to learn what we offer you and how we can do it. You will be astonished and convinced. Do not buy a bicycle, tires or sundries until you get our catalog and new low prices and marvelous offers. Write today.

MEAD CYCLE CO., Dept. W 108, CHICAGO, ILL.

much more difficult fiber to manufacture than cotton, as it takes many more operatives and a much longer time to obtain the same output; the first cost of a factory is much greater, and bleaching and dyeing are much more elaborate and costly operations.

Throw away your suspenders

Loosen your belt till it feels perfectly comfortable. Support your trousers without strain, pull or discomfort with the

Invisible TROUSER BELT

Worn inside the trousers, where it holds the garment snugly, uniformly, securely, without binding and without making its presence felt. Trousers cannot sag or slip; shirt can't climb up. No interference with deep breathing. Automatically adjusts itself to every movement of the body. Ask your dealer. Silk \$1. Lisle 50c. Prepaid. Order today. Kokomo Belt Co. 100 Main St. Kokomo, Ind.



Shipped FREE! Superb Wing Piano

Yes, we will ship absolutely free to you a highest grade Wing Piano or Player-Piano DIRECT from our own factory all freight prepaid. Your choice of 38 new art styles on four full weeks' Free Trial in your own home. At the end of 4 weeks, if you wish you may return it at our expense. You alone are the judge. No money down—no security—no obligations whatever.



One of 38 Styles

Rock-Bottom Offer

You will be amazed at our direct-from-our-factory price on the famous Wing, guaranteed for 40 years. Small monthly payments or cash if you prefer, but first 4 weeks absolute free trial.

Write Now

For "Book of Complete Information About Pianos" sent free and postpaid. It tells all the secrets of piano making and piano selling. Its 136 pages show you how to judge piano quality and prices. We will also send our catalog of newest art styles in Wing Pianos. Write Now.

WING & SON (Established 1868)

Wing Bldg., 13th St. & 9th Av., Dept. 119Y, New York, N. Y.

Inventors! Send for these Remarkable FREE BOOKS, Today

Complete and full information about patents, everything the inventor or manufacturer should know, has been included in these books. Never before has such an inexhaustible fund of valuable information been at the inventor's disposal. Regardless of the fact that the compilation of this information cost us thousands of dollars, we will send to all interested persons, any or all of these books, entirely without charge or obligation.

"Millions In Patents"

This volume, 192 pages, tells the story of the romance of invention. The brain of the inventor is the magician that has made the ancient fairy tales come true. Millions have been paid for a hook, fortunes have come from a toy. Read "Millions In Patents," and you will realize that this country and all the nations of the world are ready to enrich you beyond your wildest dreams if you can contribute one useful or amusing thing.

"What Is a Trademark?"

It is not an exaggeration to say that billions of dollars have been made out of trademarks, labels and copyrights. He who can fashion a trademark or design a label which will make a product stand out above all similar products, is indisputably a genius for whose brains the world offers almost unlimited money.

"Foreign Patents"

A good invention is bought not by one country but by the world. "Foreign Patents" shows you how the inventor may be paid by other countries and other peoples, as well as by this nation, for his ideas and his inventions. It explains how we, through our representatives in the capitals of the world, maintain for your benefit an endless chain of opportunities which, if you take advantage of them, will girdle the earth and make of your product an agent that may bring back to you rich rewards.

"Inventions Needed"

This book, 256 pages, lays before you a description of the active and profitable field of invention. It tells you the inventions the world needs today, the devices manufacturers are seeking for their business, the ideas for which the public will pay big money. It gives great men's ideas of the most important things needed in inventions now. Science is the key to wealth, and this key can be turned best by the inventor. This book tells you why.

"How to Get Your Patent and Your Money"

The man who invents needs the co-operation of the man who invests. This book, 132 pages, is a guide to the inventor. It describes, according to the teachings of our experience and the lessons of men made rich by patents, how the inventor may secure money, the right amount of money, for the device which his brain has constructed. If you have invented something and desire to learn what it will cost you to get your patent and what you must do to find your market, read this book.

"Special Bulletin of Patent Buyers"

This bulletin, 64 pages, contains copies of hundreds of letters from wealthy men who are seeking to purchase patents. Next to the idea of the invention itself, the most valuable thing to the inventor is a hint of where there is a man ready to buy the invention or to finance the inventor so that his device can be readily marketed. We act as intermediary, without one cent of charge, between the man who invents and the man who invests.



We Secure Reliable Patents, Trade Marks, Copyrights, On Most Liberal Terms Ever Offered

Send Model or Sketch and description of your invention for Free Search of the United States Patents

Rejected and Difficult Cases are Our Specialty

RANDOLPH & CO.
600 F St., N.W., Washington, D.C.

RANDOLPH & CO., WASHINGTON, D. C.

Gentlemen: Please send me, without obligation on my part, the books indicated on margin of this coupon. (Write on margin of coupon, names of books desired.)

NAME

STREET

CITY

STATE

WANTED IDEAS



Inquiries from Manufacturers and Other Buyers of Patents
Who Are Looking for Good Ideas

Protected by Owen Patents

Are constantly being received. Hundreds of ideas are wanted—a market exists for them to-day. YOURS may be one of them. Send for my free books and see for yourself—read the requests for inventions protected by me. Many are simple. You can help supply this demand.

As soon as my clients' rights are protected I aid in every practicable way, **without charge**, to sell. Their **applications** are advertised free—their patents are called to the attention of the proper prospective buyers—every necessary thing is done. Get my booklets and see.

THESE ARE FREE

You will incur no obligation by writing me. A simple request will bring them to you—the finest, most reliable and instructive patent books published. A postal will do.

"Successful Patents"—a 72 page guide book, tells how to proceed; describes my advantageous business methods; gives references, testimonials, etc.

"Stepping Stones"—gives hundreds of hints of inventions wanted; articles from interviews of noted authorities; tells the truth about prizes for inventions.

"Patent Promotion"—tells you how to sell; why some inventors fail; discusses the value of your idea; how I aid my clients; manufacturing aids furnished you; recent successful patents, etc.

You will also be sent from time to time, as new inventions are wanted, full information concerning them. Only in this way can you keep up to date.

Write for These To-day—Advice costs nothing. All communications confidential. I secure patents or receive no compensation. Your work will receive my personal supervision—but my fees are no higher than others.

Results Speak Loudest—But Here Are Some References

Columbia National Bank,
Washington, D. C.
National Locktile Co.,
Washington, D. C.
The Carnahan Press,
Washington, D. C.
Lightning Gun & Cycle Works,
Oklahoma City, Okla.
Antholene Mfg. Co.,
Hutchinson, Kans.

National Rack Co.,
61 Hannover St.,
Boston, Mass.
The C. J. Loftus Co.,
13 Spring Common,
Youngstown, Ohio
Whitehead Hosiery Mills,
Burlington, N. C.
Dickinson Mfg. Co.,
Des Moines, Iowa.

A LARGE NUMBER OF OTHERS IN MY BOOKLETS.

Search of Records

Send sketch or model of your invention for free search of Patent Office Records and report on patentability.

RICHARD B. OWEN 9-303 OWEN BLDG.
WASHINGTON, D. C.

Inventors submitting their inventions to me are protected in a tangible manner until their applications are filed.



Patents

Trade Marks and
Copyrights Secured
or Fee Returned

Special Offer—Free Search of Patent Office Records

Send us a model or sketch and description of your invention, and we will make a *Free Search* of the *Patent Office Records* to ascertain if it is patentable. If we report the invention patentable, we will guarantee to obtain a patent or return our fee, and furnish a certificate of patentability backed by a bonded contract to that effect. **This Certificate of Patentability will protect the inventor and serve as proof of the invention until the case can be filed in the U. S. Patent Office.**

Obtaining Assistance for Inventors

Our certificate is of great assistance to inventors who require financial aid to obtain patents.

Our Five Books Mailed Free

(SEE COUPON BELOW)

to any address. Send for these books—the finest publications ever issued for free distribution.

How to Obtain a Patent

Our illustrated eighty-page Guide Book is a book of reference for inventors, and contains 100 mechanical movements illustrated and described.

Money in Patents

Tells how to invent for profit, and gives history of successful inventions.

What to Invent

Contains a valuable **LIST OF INVENTIONS WANTED** and suggestions concerning profitable fields of invention; also information regarding prizes offered for inventions, among which is

Prize of One Million Dollars

offered for one invention, and \$10,000 for others.

Patents That Pay

Contains letters from our clients who have built up profitable enterprises founded upon patents procured by us; also endorsements from prominent inventors, manufacturers, Senators, Congressmen, Governors, etc.

We Advertise Our Clients'

Inventions Free

In a list of Sunday newspapers with two million circulation, in manufacturers' journals and in the *World's Progress*. Sample Copy Free. We save you time and money in securing patents. After the patent is granted we assist you **TO SELL YOUR PATENT**.

Foreign Patents

WE HAVE DIRECT AGENCIES IN ALL THE PRINCIPAL FOREIGN COUNTRIES and secure FOREIGN PATENTS in the shortest possible TIME and at the LOWEST COST. Write for our Illustrated GuideBook on Foreign Patents, sent free to any address.



VICTOR BUILDING

Our new \$200,000 building opposite U. S. Patent Office
SPECIALLY ERECTED by us for OUR own use

WANTED NEW IDEAS

Send for **LIST OF PATENT BUYERS** who consult us when purchasing patents. Contains requests from **MANUFACTURERS, MAIL ORDER HOUSES and PROMOTERS** for patents secured by us, and suggestions as to New Ideas they wish to purchase. We invite manufacturers and promoters to address our Sales Department regarding the purchase or leasing of a number of meritorious patents secured by us.

REFERENCES

Second National Bank, Washington, D. C.; Union Savings Bank, Washington, D. C.; Chamber of Commerce, Washington, D. C.; Pitner Gasoline Lighting Co., Chicago, Ill.; R. G. Dun & Co., Washington, D. C.; Smethport Glass Co., Smethport, Pa.; The Melvin Gauge and Signal Co., Scranton, Pa.; M. Winter Lumber Co., Sheboygan, Wis.; National Savings and Trust Co., Washington, D. C.

FREE COUPON!

VICTOR J. EVANS & CO., Patent Attorneys

NEW YORK OFFICES: 132 Nassau St.

PHILADELPHIA OFFICES: 1429 Chestnut St.

Main Offices: 724-726 9th St., N. W., WASHINGTON, D. C.

GENTLEMEN: Please send me FREE OF CHARGE your FIVE Books as described above.

NAME..... ADDRESS.....

Wanted—Inventors —or Men with the Inventive Turn

The whole world wants the inventor. To the intelligent inventor it gives its richest prizes. Westinghouse, Marconi, Edison, were all once beginners, like you. The average man of their time thought everything had been invented that could be invented. If you have an inventive mind, their success may be yours. The world wants your work.

To meet the demand for a square, fair deal for small inventors, two young men, G. H. and H. C. Chandlee opened a little office twenty years ago in the Stead Building in Washington. They believed that thousands of men were being shut out from big opportunities because of the huge fees charged by most patent attorneys.

They said: "We will stand by the

small inventor. We will keep faith with him. We will advertise, secure a large volume of business, charge small fees and make our money through the greater number of cases we handle."

The plan succeeded. Now Chandlee & Chandlee give employment to nearly 100 people, including many registered attorneys, and large manufacturing concerns, knowing that they have secured valuable and well-protected patents for their clients, solicit their services, both in the obtaining of patents and in the purchase of patents, to be manufactured on a royalty or bought outright.

Chandlee & Chandlee have built their business in the very shadow of the patent office. They have learned by long practice not only

How to Obtain Patent Protection at Small Cost

but also how to assist their clients in the sale of their inventions—a double service. Hosts of successful inventors owe their start to the good work done for them by Chandlee & Chandlee. These young men, now grown to middle age, to knowledge and to success, are serving splendidly the men who are beginners, as they were once beginners.

The Big Thought

And the big thought back of Chandlee & Chandlee is that they want to make inventors. They want inventors to work intelligently along right lines. They believe that the field for great and even startling successes and profits is greater now than ever.

And so out of their knowledge of what succeeds and what makes money, they have prepared two books—

"What to Invent" and "How to Obtain a Patent"

These two books cover the field. They tell just what inventions are wanted and just what must be done to obtain patent protection. They have started many inventors on the right track and have made inventors of many men who had simply the untrained inventive faculty.

You May Have These Books Free

Write your name and address in a letter or on a postal card and they will be sent you free. Or, if you have already invented something, send a rough sketch and description of it for a free report as to patentability. Do it now.
Address



CHANDLEE & CHANDLEE
1009 F. Street, Washington, D. C.

Here's the best made .22 Rifle in the world!

It's the only .22 repeater made with the dependable lever action—like a big game rifle. It has better weight, better balance, greater stability than any other .22. It's guaranteed in accuracy and reliability; handles rapidly. It gives 25 shots at one loading.



Model 1897
.22 Calibre
Repeating
Rifle

Shoots .22 short, .22 long, and .22 long-rifle cartridges without adjustment.

For rabbits, squirrels, hawks, geese, foxes, for all small game and target work up to 200 yards, just get this *Marlin*.

It's a take-down rifle, convenient to carry and clean. Has tool steel working parts that cannot wear out. Beautiful case-hardened finish; superb build and balance. Ivory bead and Rocky Mountain sights; the best set furnished on any .22. The solid top and side ejection mean safety and rapid, accurate firing.

Ask your dealer—or send us 3 stamps postage for new big catalog of all *Marlin* repeating rifles and shotguns.

Marlin - The Marlin Firearms Co.
65 Willow Street New Haven, Conn.



BRASS GEARS

Cut by an entirely new process. The most accurate made and at prices that cannot be equalled by others. Every gear has a hub, center painted ebony black, edges turned true, highest grade red brass, and much heavier than others. We carry the largest stock in the world and every gear listed is always shipped on date of order.

SEND FOR CIRCULARS

CHICAGO STOCK GEAR WORKS
16 S. Fifth Av. Chicago

Active Powers of Inventive Genius



INVENTORS Our Brain Belongs to You. Our Ideas Are Free of Charge.

All we want in return is to build your model, special machinery, dies, tools and jigs to manufacture sheet metal goods, etc. We are expert mechanics, over thirty years experience and have one of the best equipped shops in the country. Ask for Booklet No. 17. Consultation free. Experimental work strictly confidential.

A. NACKE & SON
236-242 S. 9th St., Philadelphia, Pa.

STAMPINGS Metal spinnings and stampings a specialty.

All sorts of die work and metal patterns. Manufacturers of patent specialties and novelties. Can get out samples at moderate cost. Experts in black enameling. Prices reasonable. Prompt delivery.

THE STANDARD SPINNING & STAMPING CO., Toledo, O.



Models and Supplies

We make working models of any description and material, also dies, tools and sheet metal stampings. Send your drawing or sample for estimate. Write for catalog of gears and model supplies.

The Pierce Model Works, 3405 Pierce Ave., Chicago, Ill.



MECHANICAL SUPPLIES AND MATERIAL of all kinds. EXPERIMENTAL AND LIGHT MACHINE WORK to order.
132 MILK STREET, BOSTON

PRINCE ALBERT the national joy smoke

No. 57 33c



PATENTS

C. L. PARKER
Formerly Member Examining Corps, U. S. Patent Office
PATENT LAWYER
210 MCGUIRE BLDG.
WASHINGTON, D. C.

Patents, Trade Marks, Copyrights, Patent Litigation
Handbook for Inventors, "Protecting, Exploiting and Selling Inventions" sent free upon request.

For Interesting and Valuable Information about **PATENTSWANTED** and bought by Manufacturers, send 6 cents postage for large illustrated paper *Visible Results and Terms Book*.
B. S. & A. B. Lacey, Dept. Y, Washington, D. C. Estab. 1869.

PATENTS

THAT PROTECT AND PAY
BOOKS, ADVICE AND SEARCHES FREE

Send sketch or model for search. Highest References. Best Results. Promptness Assured.

Watson E. Coleman, Patent Lawyer 624 F Street, N. W. WASHINGTON, D. C.

PATENTS THAT PAY

\$575,000 Made by our clients. We Sell Patents. 127 Page Patent Book—"What and How to Invent—Proof of Fortunes in Patents."—FREE.
Just Across Street from U. S. Patent Office.
E. E. VROOMAN & CO., Pat. Attys., 871 F St., WASHINGTON, D. C.

Send for FREE BOOK { WHAT TO INVENT
WHAT NOT TO INVENT
HOW TO SELL YOUR PATENT
Copies of nearest Patents and report in every case without charge
H. L. WOODWARD, 9th and G Sts., WASHINGTON, D. C.

PATENTS

NO PATENT—NO FEE
Searches, Advice and Pat. Office Rules Free
Clements & Clements, 704 Colorado Bldg., Washington, D. C.

A Genuine \$2 Knife for 83c

THIS KNIFE HAS BRAINS IN IT. Equally good in the Shop, the Farm, or Forest; light but extra strong; resharpened easily. Stag handle, German silver finish; blades file tested, hand forged razor steel and warranted. Sample 83c, 3 for \$2, postpaid. Choicest Pearl, \$2 each.
Send for 80-page Free List and "How to Use a Razor"
MAHER & GROSH CO., 106 A St., Toledo, Ohio

Utility makes Charming Interiors



YOU can have beautiful rooms without the dust, dirt and muss of lath and plaster. It is a quick, simple and inexpensive job to use Utility-Wall Board with flat tone tints or calomine. Any person handy with hammer, saw and nails can easily apply this ideal substitute for plaster.

UTILITY the only 5-ply wall board

Think of the five layers of tough fibre board, cemented into one permanent sheet with hot asphalt under tons of pressure—thoroughly moisture proofed outside. We use five layers because it gives us that much more strength than the usual two or three layers. Utility can be nailed direct to studding and joists. The first cost is the whole cost—never cracks, checks, chips or jars loose.

Free Samples and Book

Send today for our book "Utility Interiors" and samples. Both Free.
THE HEPPES CO., 4516 Fillmore Street, CHICAGO, ILL.

Manufacturers also of Flex-a-Tile Asphalt Shingles, Asphalt Paint and Asphalt Roofing in any Finish.

LEARN TO PITCH



Lessons by "MATTY," ED. WALSH, "DOC" WHITE, WALTER JOHNSON, "NAP" RUCKER, "SMOKY JOE" WOOD.

PITCH THE FADEAWAY, SPITTER, KNUCKLER, SMOKE BALL, etc.

Clearly described and ILLUSTRATED by 56 Pictures. Entire COURSE OF LESSONS SENT POSTPAID for **50 cents.**

J. C. DORN, 721 S. DEARBORN ST., DEP. 108, CHICAGO, ILL.

Paddington Pants-Presser



Works While You Sleep

Three articles in one:

Pants Presser, Stretcher and Hanger. Absolutely perfect pressing over night. Examine before paying. If our claims fail, return it at our expense. Price \$3.50 and \$5.00. *Booklet on request.*

C. Paddington Sales & Mfg. Co., 244-46 E. 52nd St., New York



3 CUSTOM SHIRTS FOR \$5.00

I make shirts that fit you, because I make your shirts from your measurements and guarantee to take them back if they do not satisfy you.

I send you 100 samples to select from

I send you measurement blank with rules. I send you the finished shirts express prepaid. No ready-made shirts in my shop, but facilities for quick delivery of the highest grade of custom work. Write for my samples. (Higher priced fabrics, too.) Summer samples now ready. No agents.

CLARENCE E. HEAD (Master of Shirteraft), 110 Cayuga St., Ithaca, N.Y.



STEEL Shingles



**Cost Less
Last Longer
Won't Burn
Won't Rot
Outlast Your House**

Far outlast ordinary wood shingles, prepared paper, composition or corrugated steel. Come in big sheets. You can lay 100 at a time with only hammer and nails. No painting, no extras, no tools, no expert workmen needed. Put on over old roof if you like.

No Chance to Rust

Edwards famous "Tightcote" process means each sheet is dipped in melted zinc after cutting. Galvanized, edges and all. Rust can't get a foot-hold. Then a close-fitting overlap protects each nail-hole. Known as Edwards Interlocking Process. Protected by costly patents. \$10,000 Guarantee Bond against lightning.

Factory Prices — Freight Prepaid

Because of our immense output and by shipping direct to you from factory, we are able to quote prices so astoundingly low that you can now buy Edwards Steel Shingles at LESS COST than best wood shingles! We pay freight. Write us.

Get Edwards Offer Now!

Won't cost you a cent to find out. May save you \$30 to \$50. Write for Big Special Offer and Book No. 750. Give size of your roof if possible.

The Edwards Manufacturing Company
700-750 Lock Street CINCINNATI, OHIO

THE WORLD'S SHIPBUILDING IN 1913—Lloyd's summary of the world's shipbuilding output for 1913 shows that 737 vessels with a tonnage of 2,203,529 were built in the United Kingdom. In other countries, 1,193 vessels, representing a tonnage of 1,806,262, were turned out. The world's output totaled 1,930 vessels, their tonnage being 4,009,791. The United Kingdom launched 58 per cent of the total merchant tonnage. The year was one of unprecedented activity, the highest individual increases being: Italy, 100 per cent; Austria-Hungary and

BRASS AND STRINGED AND INSTRUMENTS

Biggest line of band and orchestra instruments for band and home use. Cornets, trombones, clarinets, drums, violins, guitars and all wind and stringed instruments. Send for a free catalog of any instrument you may want—we can save you money. We give you a fifty lesson certificate FREE with each instrument. Write today mentioning instrument in which you are interested.

JENKINS MUSIC HOUSE, 40 Jenkins Bldg., Kansas City, Mo.

Drink Pure Water

Safeguard your home against the dangers of impure, polluted city water. Attach to your faucet the

CRYSTAL FILTER

Guaranteed to purify the water as fully as the most expensive filters. Anyone can instantly attach. No tools needed. AGENTS WANTED.

Crystal Filter Co., 1009S S. Wabash Av., Chicago

Pay as You Wish

We'll send you a genuine Lachnite for you to wear for 10 full days. If you can tell it from a real diamond send it back at our expense. Costs but 1-30th as much. If you decide to keep it pay only a few cents a month. Write for catalog.

Genuine Lachnite Gems

keep their dazzling fire forever. Set in solid gold. Cut by world renowned diamond cutters. Will stand fire and acid tests. All kinds of jewelry at astounding low prices. Easy payments. **WRITE TODAY.**

H. Lachman Co., Dept 119Y12N, Michigan Av., Chicago



ELGIN

17-Jewel
Only \$9⁷⁵

Think of it! Only \$9.75 for a genuine 17-jewel Elgin! Sold to you on terms on a great sweeping watch offer. Write at once for our new catalog and Special Bulletin, showing not only this splendid opportunity but, hundreds of other big jewelry offers.

Monthly Payments

Only \$1.00 per month and you can become the owner of a genuine Elgin 17-jewel watch—\$1.00 down and \$1.00 a month—total price of \$9.75.

DIAMONDS

Pure color flashing stones now offered along with our other jewelry opportunities. Here is a resplendent, solitaire, genuine diamond ring; selected, glittering, pure colored diamond, in 14 karat gold ring. Sold to you on the easiest terms—only a small amount down, then a very small payment each month.

No. A104
14 karat solid gold ring, set with Men's round Belcher style perfectly cut diamond.
\$6.25 down, \$2.50 per month. Price **\$34.50**



Free Trial We give you a positive 30-Day Free Trial on any article bought from us, 30 entire days to make up your mind whether you wish to keep it. And if for any reason you are not satisfied return to us and we will return every cent you have paid most cheerfully.

Big Jewelry Book FREE!

Send today for our big jewelry catalog and special 30-Day Bulletin. These show the most remarkable offers all sold on terms of \$1 a month and up.

STRAUS & SCHRAM, Inc. Dept. 86Y 35th Street Chicago

France, 59 per cent each, and Denmark, 57 per cent. The tonnage reported from the United States, 276,488 tons, was nearly 8,000 tons less than that of the previous year.



Do Your Printing!

Cards, circulars, books, newspaper. Press \$5, Larger, \$18, Rotary \$60. Save money. Big profit printing for others. All easy, rules sent. Write factory for press catalog, TYPE, cards, paper, outfits, samples, **THE PRESS CO., Meriden, Conn.**

I BUYS THIS PRINTING PRESS

The "Ideal" is an absolutely practical printing press, suitable for store, office or home. It's a wonder—always ready for work. Save dealers' profits. Write for a copy of our free catalog of printing presses and supplies.

IDEAL PRESS CO., 2011 N. Lawndale Ave., Chicago, Ill.

EASTMAN Film and CUT PRICES

Kodaks at

We are the only firm in the world cutting Eastman's Restricted prices.

Film Developed Ten Cents Per Roll

JACKSON & SEMMELMEYER, 44 South Wabash Ave., Chicago, Ill.

184 E. Colorado St., Pasadena, Calif. } Send to our } 913 State Street }
Pasadena, Calif. } nearest address } Santa Barbara, Calif.



\$2⁰⁰ and you get this **Superb Cornet**
An astounding offer. This Triple Silver Plated Lyric Cornet will be sent to you for only \$2.00. Pay the balance at the rate of only 10c a day. Free trial before you decide to buy.

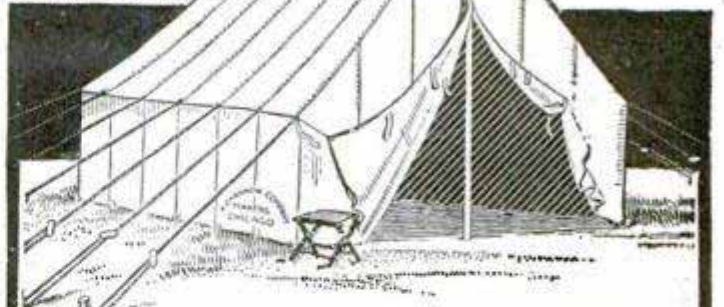
WURLITZER FREE Band Catalog!

Send your name and address and get our big 250-page Band Catalog. Buy direct from the manufacturer. Rock-bottom prices on all kinds of instruments—easy payments. Generous allowance for old instruments. We supply the U. S. Gov't. Write today for Free Band Catalog.

THE RUDOLPH WURLITZER CO.
Cincinnati, Ohio Dept. 119Y Chicago, Illinois

Go Camping This Year

Send Today for Free Camp Guide



\$5⁹⁰ Special Bargain Price on this Splendid Army Style 7 by 7 ft. Wall Tent—Complete

Right now—if you order quick—you can get this splendid wall tent all complete, with poles, ropes, pins, etc., for only \$5.90. Order one now. There never was such a tremendous bargain offer before on a tent of anything like this size and quality. A regular big camping tent. The style the U. S. Government and National Guards have adopted. Made of 8-oz. white duck—a cracker jack of a tent for camping or outing. Go camping this summer. It is the ideal way to spend your vacation. Thousands of people all over the country are now sleeping outdoors in tents to grow healthy and strong. Don't delay. Remember it is a very special offer. If you want one of these tents order direct. But even if you don't order one now, send the coupon today and get a copy of the *Free Camp Guide*. It's a great book to have. It tells you everything about camps and camping—everything you want to know.

Special Complete Outfit Offer

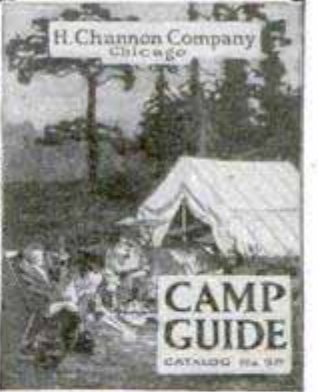
Send the coupon today and learn about the great special offer being made to readers of this Magazine. Learn how you can get a complete camping outfit. Everything you need—at a remarkably low reduced price. Don't fail to learn about this.

1914 Camp Guide Free

Send coupon today for the new 1914 Camp Guide. It will give you all the latest information about camps and camping. Tells you how to prepare for trips. What to take along—also expert advice on hunting and fishing. Tells you how you can get rock-bottom prices direct from manufacturer, on everything you need. Send the coupon TODAY—now.

H. Channon Company
Market and Randolph Sts.

Dept. 119Y Chicago



Send This Coupon Today

H. Channon Company
Dept. 119Y Market and Randolph Sts., Chicago

Please send me the new 1914 Camp Guide and full details of your tent and camp outfit offers.

Name

Address

Please Mention Popular Mechanics

GET THE PRICE!



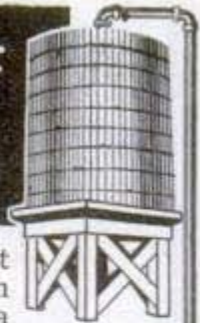
*This Lathe
is a
Wonderful
Value!*

YOU COULD search over the whole country without finding a Lathe so perfectly fitted for your uses as the "SEBASTIAN." It is unequalled for **Garage Work** and for **Automobile and General Repair Work:**

Send for Catalog
A Card Will DO

The Sebastian Lathe Co.
107 Culvert St., CINCINNATI, OHIO

**Water Without
Pumping
Plenty of It Too**



ABSOLUTE reliability, low first cost, and no need of attention and repairs are the requisites of a perfect water system. Engines are often a source of annoyance, windmills depend entirely upon the wind, and hand pumping is enough to drive anyone off the farm. Be absolutely free from all water supply troubles—install a

RIFE RAM

Any stream in your neighborhood having a fall of three feet or more and a supply of three gallons or more per minute, will operate it. The Rife Rams vary in size from a machine for one family's use to a city water system. Thus you can co-operate with your neighbor if there is no stream on your farm.



REMEMBER:—Low First Cost—No Repairs for Years—No Freezing—No Fuel—No Labor are the high qualities of the Rife Ram. No skilled labor required to install it. Over 11,000 in daily use. Satisfaction guaranteed. Write today for catalog and

Tell Us Your
Water Supply
Conditions

and we will send free estimate on your requirements.

Rife Engine Company 3131 Trinity Building
New York City

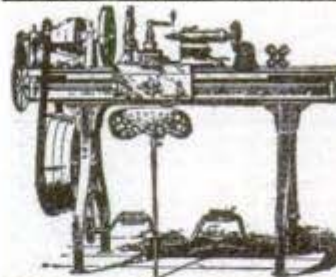
MAKING SPECTACLES—Spectacle-lens glass comes from Europe, but the making of the blanks into finished lenses is all done in this country. This includes heating and curving between dies; grinding, drilling, and mounting. Gold-filled frames are largely used, nearly a million dollars' worth of gold being used a year for this purpose by one firm. The term gold-filled is somewhat misleading; merely reversing it explains both the material and the process. Filled gold, as it might well be called, consists of a gold shell filled with an alloy of base metal.

LATHES

9 to 13-inch Swing

List price \$75 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.



**Jones Machine Moulded
PULLEYS
and GEARS
Clutches, Sprockets
Shafting and Hangers**

THE LARGEST LINE OF
Power Transmitting Appliances
IN THE COUNTRY

SEND FOR GENERAL CATALOGUE A 18
W. A. JONES FOUNDRY & MACHINE CO.
1400 North Ave. CHICAGO

DO YOU HAVE KNIVES TO GRIND, SILVER TO POLISH, SMALL TOOLS TO OPERATE, WASHING MACHINES OR WRINGERS TO RUN? LET THE RED DEVIL

DO YOUR WORK

Attached to any water faucet will develop up to 3 Horse Power according to size of pipe and water pressure. Only perfect small motor made. Improved bucket wheel construction.

6 in. Motor for Mechanics and Tradesmen. Washing Machine, 1/4 H. P. on 1/2 in. pipe, 80 lbs. water pressure; 1 H. P. on 60 lbs. pressure, 2 in. pipe. Net price \$5, cash with order.

No. 1492—4 in. Motor for grinding, polishing, fans, sewing machines; for Doctors, Dentists, Druggists, etc., with emery, buffing wheel, silver polish and pulley, \$3.

No. 1493—4 in. Motor and pulley only \$2.50, cash with order.

Money back for any reason. Order your motor from dealer or from us. Send your water pressure and size of supply pipe. Active Agents wanted. Catalog free.

Only Motor to do this work



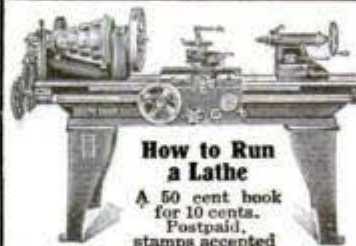
DIVINE WATER MOTOR CO.
DEPT P. UTICA, N. Y.

South Bend Lathes

For the Machine and Repair Shop

11 inch Lathe Complete,	\$100.00
12 inch Lathe Complete,	125.00
13 inch Lathe Complete,	165.00
16 inch Lathe Complete,	200.00
16 inch Lathe Complete,	250.00
18 inch Lathe Complete,	300.00

Straight or Gap Beds. Send for free catalog giving prices on entire line.
SOUTH BEND MACHINE TOOL CO.
423 Madison St., South Bend, Ind.



How to Run a Lathe

A 50 cent book for 10 cents. Postpaid, stamps accepted

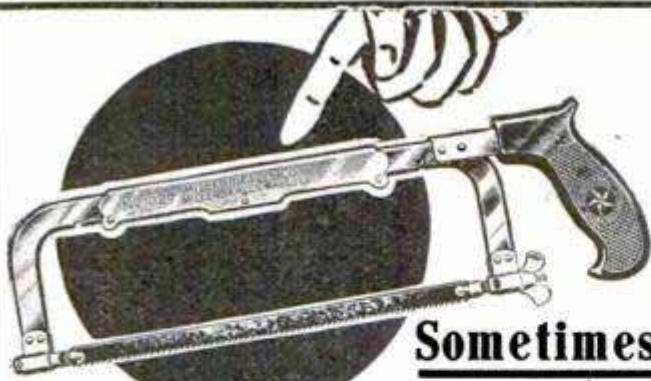
Crescent WOOD WORKING Machines

Always satisfy those particular users who want the best

Ask for our 144 page catalog telling about our splendid line of Universal Wood Workers, Band Saws, Jointers, Planers, Disk Grinders, Swing Out Off Saws, Planers and Matchers, Shapers, Borers and Variety Wood Workers.

THE CRESCENT MACHINE CO.
93 Columbia St. LEETONIA, OHIO





Sometimes You Want to Cut Metal

Now and then you would find it very handy to be able to cut metal quickly and easily; to shorten a screw or bolt, for instance, or to shape out a piece of sheet steel for a repair job. You can do all this sort of work very handily with our new

STAR Hack Saw Frame No. 1027

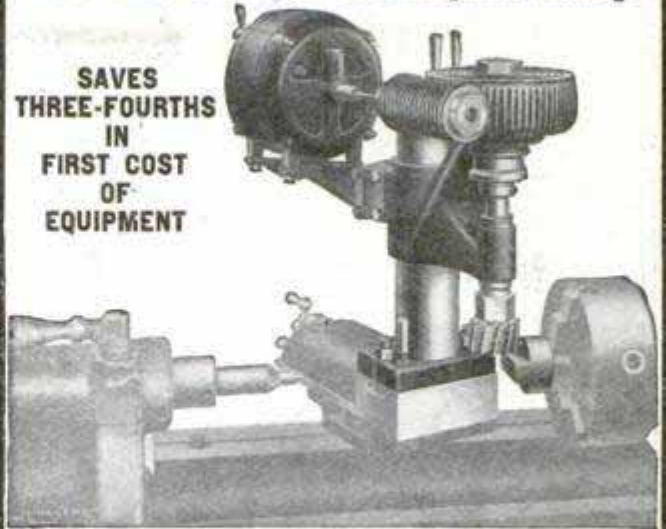
The frame with the "pistol grip." The shape of the handle gives you the positive grip you need to work easily and maintain perfect control of the frame. It's a big improvement over frames made with the usual straight handle. In other respects, too, this Frame excels. Has a forced, extensible back for blades from 8" to 12" and may be faced in four directions.

Ask your Dealer, who probably carries Millers-Falls Tools and the "pistol grip" Hack Saw Frame. If he doesn't, write us and we'll send you the name of a Dealer who can take care of your needs; New Catalogue on request.

MILLERS FALLS CO., Millers Falls, Mass.

A Big Money Maker for the Garage or Repair Shop

SAVES
THREE-FOURTHS
IN
FIRST COST
OF
EQUIPMENT



A Lathe Milling Attachment

that can be attached to any lathe and that will do all classes of milling work, such as *Woodruff Keyseats, Keyways, Surface and End Milling, Sawing, Slotting, etc.*

Motor can be connected to any lamp socket—any current

JUST THE TOOL NEEDED IN THE PRIVATE GARAGE

Write today for Circular P21

The Cincinnati Pulley Mch. Co.
Cincinnati, Ohio

GASOLINE SOLDERING IRON BLOW TORCH

Talk About Heat!



Address Dept. 1. EMMELMANN BROS. MFG. CO., INDIANAPOLIS, IND., U.S.A.

GROBET SWISS FILES



Are the standard of excellence in files, and have been for over 100 years. We send post paid as an introducer 48 files especially adapted for tool makers and machinists on receipt of **\$5.00**. This is a chance to get a set of files you'll appreciate and we'll get future orders.

MONTGOMERY & CO.

111 Fulton Street NEW YORK CITY

THE UNION Combined Punch Shear and Rod Cutting Machine

Hand Operated

A very useful machine for any place where metal is worked.

MADE IN THREE SIZES

No. 1. Bench Machine (see cut)

No. 2. Medium size, for Tool and Machine Room

No. 3. Large size, for heavy, powerful work.

SEND FOR CATALOGUE

Union Manufacturing Co.
P. & S. Dept., New Britain, Conn.
26 Cortlandt St., New York



No. 1 or Bench Machine

The IRWIN Bit Reg. U.S. Pat. Office

"Stamped on the shank of every genuine IRWIN BIT."

"IRWIN"—A Bit of Perfection

A Bit of toughest steel for the tough, knotty jobs. Trip hammer forged out of one solid piece of steel and tempered to perfection.

If "IRWIN" is stamped on the shank—that bit is bound to be a crackerjack—the best that money can buy. For years it has been the acknowledged leader. Take no chances but insist upon getting the genuine "IRWIN" from your Hardware Dealer.

THE IRWIN AUGER BIT COMPANY, Wilmington, Ohio



The Big Push

in tight corners, and places where you can't turn a bit-brace.

A quick driller; the handiest tool a man can have on outside work, about the garage—or for repairs on autos and light machinery. There's a wide range of usefulness in this ingenious "Yankee." It's "just the thing" for driving *heavy* screws; for tapping; for quickly running up nuts on bolts. Compact in form, strong, durable, simple to use. Just push!

Be your own "helper" with

"YANKEE" TOOLS

Make Better Mechanics

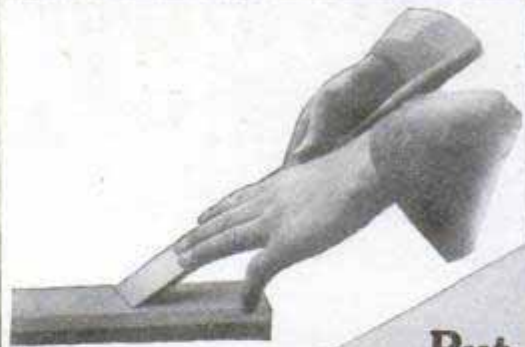
This "Yankee" Push Brace No. 75 holds all usual drills and bits with square shanks, and all the smaller tools used in a bit-brace. Length closed 16¼ in., open 23½ in. Drop forged and hardened steel jaw chuck. Nickel plated. Finished inside and out with "Yankee" care, "Yankee" precision.

"YANKEE"
Push Brace No. 75
Price, \$2.80

Your Dealer Can Supply You

Write for "Yankee" Tool Book"—free—for mechanics and householders; or "Yankee" Tools in the Garage," free, for motorists.

North Bros. Mfg. Co.
PHILADELPHIA



Put a Carborundum Sharpening Stone Under Your Edge Tools

TWO or three strokes and you know that you have a stone that is different—a stone that really cuts clean and quick.—Carborundum Stones will not fill or glaze if properly used.

**They Will Last Almost
as Long as a Tool Itself**

Use Carborundum Stones in your workshop, in the household—wherever tools are to be kept keen and smooth-edged.

Ask your hardware dealer, or send direct for booklet giving details of the Ten Thousand Dollar Prize Business Idea Contest of the Rice Leaders of the World Association, of which the Carborundum Company is a member.

One of your business ideas may win one of the big cash prizes

**The
Carborundum
Company**
Niagara Falls, N. Y.





Tools that Every Man Needs

Every man likes to work with tools, whether he earns his living with them or not. Many of our tools are useful not only to the skilled mechanic, but to the man who works about his home on conveniences or on his own inventions. Take for instance work on furniture and fine wood work. You'll find that the



Starrett Scraper

will put a smooth, satiny finish on any kind of wood. Ball and socket handle connections permit work in corners and narrow places. The blades are sharpened on four sides, giving eight cutting edges. Slip-on handle permits instant change from edge to edge and gives perfect protection.

Send for big, new free catalog No. 20AP describing the other Starrett tools for various purposes.

Our tools are sold at all good hardware stores

The L. S. STARRETT CO.
THE WORLD'S GREATEST TOOLMAKERS
ATHOL, MASS.

42-258



LIGHTING SYSTEMS IN EGYPT—Hollow-wire kerosene lighting systems and air-pressure lamps are used largely in Alexandria, Cairo, and in the smaller towns

THE SPEEDY STITCHER

SEWS LEATHER LIKE A MACHINE

Price \$1.00



Send for terms to Agents

Automatic Awl Co., 26 Hermon St., Worcester, Mass.



Portable Cases

FOR TOOL MAKERS AND MACHINISTS

Twelve styles, felt lined drawers, solid brass trimmings, best of material, beautiful finish, low prices, satisfaction guaranteed. Ask for booklet of cases built for service.

The Pilliod Lumber Co.
SWANTON, OHIO

Ask about our 3,000 R. D. Tools

"Red Devil" Glass Cutters

"It's all in the wheel"

For 3 2c. stamps we will send any glazier 1 No. 024 Glass Cutter.

SMITH & HEMENWAY CO.
150 - 152 Chambers Street, New York, N. Y., U. S. A.

Williams' "Big Ten"

"EXTRA CAPACITY" SET, "BIG TEN"



This excellent "Garage Set" with capacity for 78 most prominent Nuts and Screw sizes in U. S., A.L.A.M. and S.A.E., etc., standard openings provides for maximum service conditions. (Read table)

Send for dependable Tools Catalog

Number	For U. S. Standard				For A. L. A. M. Std. Nuts & Cap Screws	For S. A. E. Std. Nuts & Cap Screws	For Set Screws
	For Nuts Diam. Bolts		For Cap Screws Diam. Sew.				
	Small Head	Large Head	Small Head	Large Head			
721	1/8		1/8	3/16			
23	3/16	1/4		5/16			
725A			1/4	3/8			
27	5/16	3/8					
729			7/16	1/2			
731B		1/2	9/16	5/8			
32	7/16	9/16					
33C				3/4	3/8 & 1/2	3/8 & 1/2	1
737		3/4	7/8	1	1/2 & 3/4	3/4 & 1	1 1/2 & 1 3/4
38	5/8	7/8			1	1 1/2 & 1	

J. H. WILLIAMS & CO.

Superior Drop-forgings

47 Richards St., BROOKLYN, N. Y. CITY 32C So. Clinton St., CHICAGO, ILL.

Please Mention Popular Mechanics

Five Rules interchangeable in one holder



A handy set of steel rules for measuring recesses, keyways, etc., where the ordinary rule cannot be used. Rules are securely held in split chuck, adjusted by nut at top of barrel and can be set at various angles to suit the work. They are sold in all good hardware stores.

Send for catalog No. 25 showing complete line

BROWN & SHARPE MFG. CO.
PROVIDENCE, R. I., U. S. A.



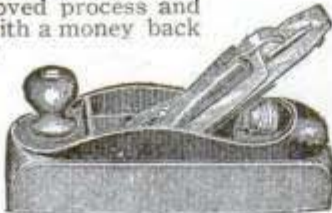
"Ohio" Edge Tools

are made from specially selected tool steel, by careful and skillful workmen. They are tempered by the most improved process and are sold with a money back guarantee.

Insist on "Ohio" Tools when buying Planes, Chisels, Drawing Knives, Auger Bits, Screw Drivers, etc.

CATALOGUE FREE

OHIO TOOL CO. (Dept. 3) Charleston, W. Va.



BENCHES

For the Shop and Home Use

Many designs shown in our catalog. The best of material and construction is used, making our benches the highest quality.

Grand Rapids Hand Screw Co.
1620 Front St., GRAND RAPIDS, MICH.



of Egypt. The hollow-wire system is readily adapted to the lighting of cafés and cook shops, which form so large a part in the life of the Arab and Levantine.

YOU OUGHT TO HAVE ONE OF OUR Insured "Vandor" Hammers

— Drop forged from Vanadium Steel, tempered in oil and Warranted for a Lifetime. Will "bite" and draw a



headless nail, that defies the claw of an ordinary hammer. Sent Postpaid anywhere on receipt of \$1 and Dealer's Name. State whether wanted for light, medium or heavy work.

VAN DOREN MFG. CO., Dept. 10A, CHICAGO HEIGHTS, ILL.



Tool Cases for Toolmakers and Machinists.

Keep your tools orderly arranged in a Gerstner Portable Tool Case. There's a place for every tool in one of the felt lined drawers. Every up-to-date mechanic needs one and you'll find our Cases the best built, neatest and most practical on the market. We guarantee to please or refund all money.

Gerstner & Sons

Write for our free booklet

Mrs. of Mechanics' High Grade Tool Cases
818 Columbia St. DAYTON, OHIO

SQUARE HOLE DRILL

A new, simple and practical tool, just perfected



**FOR WOOD
METAL
MARBLE**

Fits chuck in any brace, drill press, or lathe motion drills a square hole at one operation. Made of high grade steel, fully guaranteed. Sizes 1/8 in. to 1/2 inch in sixteenths. When ordering state size and kind (whether for wood, metal or marble.)

BARNETT TOOL CO.

1690 Hyde St., SAN FRANCISCO

PRICE \$1
per set of Drill and Guide, delivered anywhere

6 Heads-1 Handle



You Need This KIT Multiple-Head Plier

If you are a mechanic, a farmer, or automobile owner; if you do your own repair work about the house—here is the plier you need. The KIT Plier has a special head for each kind of work—heads quickly changed. A pair of handles and six heads in set. Jaws can be combined—making 15 different tools,—tinman's snips, pincers, pruning shears, punches; flat nose, cutting and gas pliers, alligator wrenches, pipe wrenches.



KIT Price Multiple-head \$3.50 Plier per set

Every KIT head inspected and tested at the factory and absolutely guaranteed. Being made in separate sections—exactly the right tool-steel is chosen for each part. The tool-steel in jaws is carefully tempered for hardness and toughness. KIT heads will not bend, break, crack, chip or turn on the edges. Handles are strong and resilient. A convenient tool—saves carrying 'round the weight of 15 handles. Light, convenient, compact. Handle and six heads—in either chest or tool roll. Farmers' Kit, Auto Kit, or Mechanics' Kit. Price \$3.50.

Ask your dealer; if he won't supply you, we will, on receipt of price, delivery prepaid.

Write for unique Free booklet—describing this convenient tool, and the many uses you will find for it, due to its extraordinary adaptability to handle all kinds of plier jobs.

CURRIER-KOETH MANUFACTURING CO., Coudersport, Penna.

LARGEST TRAWLER IN THE WORLD—The steam trawler "Maroc," recently built in England for a French fishing company, is the largest in the world, says the Fishing Gazette. The vessel has an over-all length of 175 ft., 29-ft. beam, and a gross tonnage of 634 tons. It is equipped throughout with electricity, and will accommodate a crew of 48 hands. A new feature in this trawler is a spacious chamber, insulated with cork, which will keep the fish in good condition for a long time.

THE MASTER SLIDE RULE,



the only RULE in the WORLD whereby inside measurements of doors and windows, etc., can be taken rapidly and accurately. Also superior to any other rule for outside measurements of walls and ceilings, etc., as it can be extended and closed instantly. **MECHANICS, BUILDERS, AND ARCHITECTS, TRY ONE TODAY! DON'T WAIT.** Ask hardware dealer for it. On receipt of 15 cents per lineal foot, a 4, 5, 6 or 8 foot rule will be sent to you prepaid. Large profits to agents. Write for circulars and particulars. **DAHL MFG. CO., 51-A East 42nd St. NEW YORK CITY**

TOOL SHARPENING EASY WITH



Quick work. **LUTHER HUMMER**
No water needed. **TOOL GRINDER**
draw temper. Steel shafting like automobile. Dust-proof bearings and gears. Perfect lubrication. Patented tool rests. Write for free booklet.

LUTHER GRINDER MFG. CO.
946 Point Street MILWAUKEE, WISCONSIN

\$1.00

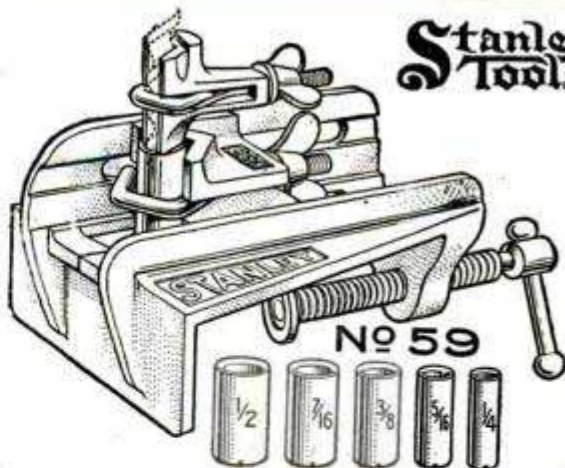
Postpaid

Myers' Wonderful Sewing Awl

sews leather, canvas, shoes—anything, heavy or light. Complete repair shop in itself. Saves many trips to town. Mends harness, saddles, wagon covers, blankets, buggy tops, belts, etc. Can't get out of order. Original and only awl with diamond point full grooved needle to protect the thread. **BIG MONEY FOR AGENTS.**

C. A. MYERS CO., 6339 Lexington Ave., Chicago, Ill.

Stanley
Tools



Stanley Doweling Jig

A new and most unique tool that will enable the user to bore dowel holes in the edge, end or surface of work with the greatest ease and with absolute accuracy.

A tool that will immediately commend itself to Carpenters, Cabinet Makers, Pattern Makers,—in fact to every artisan or amateur who has occasion to do any kind of doweling.

A postal brings you a special circular containing complete description and showing various forms of work in which the Jig will be found of great assistance.

Address

STANLEY RULE & LEVEL CO.
NEW BRITAIN, CONN. U.S.A.

FREE



A Handful of Pipe-Threading Facts

Free to the man who wants the Facts about pipe-threading — four simple, straightforward books.

OSTER PIPE-THREADING TOOLS

These four books show you How to Cut the Cost of Pipe-threading, How to Thread Pipe Easier, and Where to Find the Tool that fits Your Needs. Just use the coupon and mention your trade or line of business.



The Oster Mfg. Co.
2100 East 61st St.
Cleveland, Ohio

THE OSTER MFG. CO.
2100 East 61st St., Cleveland, Ohio
Kindly send me without charge your "Handful of Pipe-Threading Facts."

Name.....
Business.....
Address.....
City.....State.....

Please Mention Popular Mechanics

No Plates—No Films New Camera Just Out

Here at last is the very Camera the world has waited for—just the camera you have always wanted. No experience needed to make pictures with our sure-shot picture-taker. This new, amazing invention enables any man, woman—yes, even children—to make finished post card photos in one minute. Think of it! Finished pictures made in a minute's time—taken and finished right on the spot.

The "Mandel-ette"

A new one minute camera. Gives all the joys of picture-taking without the usual labor and expense. Does away with films and plates—trays, tanks and trouble. No inconveniences. No fuss or muss. The "Mandel-ette" cuts down the cost of making finished pictures to one-tenth of what it costs with the ordinary camera. No developer worries. No usual expensive camera accessories. The greatest camera invention of our age. Your vacation is not complete unless you have a "Mandel-ette." Use it for all occasions. You simply can't afford to be without it. Read this

Special Money Back Offer

We are the inventors and manufacturers of the "Mandel-ette," patterned after the famous "Mandel" Camera. We sell it direct to you at rock bottom price. We want everybody to own a "Mandel-ette" so we make you this special money back offer. Order your outfit right from this ad; make pictures with it by following our simple instructions, and if you find that the "Mandel-ette" will not do everything that we claim for it, send it back and your money will be refunded. Isn't this a fair offer?

\$5.00 Complete Outfit Free Book

(Add 50c for Parcel Post)

This outfit includes the Mandel-ette' Camera and everything that is needed to make 16 finished post card photos. You begin making finished pictures as soon as outfit arrives. No waiting. If you want a tripod, send \$1 additional. Extra post cards, 25c per package of 16. Send postal or express money order, draft or personal check. Don't wait. Order your outfit right from this ad. Do it now.

Write for this book. Learn all about this new and wonderful process of taking and finishing pictures in one minute. Realize what a big advantage the "Mandel-ette" gives you over the ordinary camera. Consider the time and money you can save. You can make money too by selling these one minute pictures. Each finished picture costs you 1 1/2 c, sells for 10c. Big profits and great fun await you. Order the "Mandel-ette" whether you want it for pleasure or profit, or send for the book today.

THE CHICAGO FERROTYPE COMPANY

A381 Ferrotpe Bldg. Chicago, Ill. or Dept. A381 Public Bk. Bldg. 89-91 Delancey St. New York, N.Y.



This wonderful camera makes pictures DIRECT ON POST CARDS without films, plates, printing or dark room. Camera weighs about 24 ounces and measures about 4 x 4 1/2 x 6 inches; size of pictures, 2 1/2 x 3 1/2 inches. Loads in daylight with 16 or 50 cards at one time—no dark room necessary. Universal focus lens produces sharp pictures at all distances. Perfect working shutter. Combined "3-in-1" Developer eliminates any other solution. Pictures develop automatically in less than a minute—can't over-develop. Plain instructions with each outfit enable you to begin making pictures the very hour outfit arrives. SEND FOR THE OUTFIT TODAY.



\$4 Per Month! FREE TRIAL!

Genuine Oliver Visible Typewriter. We sell direct; save you agents' commissions and expenses. Ship on approval. \$4 per month if you keep it. Send for free booklet. See how you save \$41.50 on a high-grade machine.

Typewriters Distributing Syndicate
166-T18 N. Michigan Boulevard, Chicago



Red or Black "Vulcan" Ink Pencils

The ONLY perfect, non-leakable ink pencils at moderate prices.

\$1.00 post-paid

TWO SIZES,
4 1/4 and 5 1/2 inches
Extra Size, 8 inches
(Black Only), \$1.25.
Liberal supply of ink free with retail orders.
AGENTS WANTED
J. C. ULLRICH & CO., 27 Thames St., NEW YORK

The "SANITARY" ERASER

Handy - Practical - Economical - Always Covered

O



K

THE SANITARY ERASER receives, at its open end, a strip of rubber 3/8 inch thick, of a width and length that of the holder. By slight pressure at the loop end, clean rubber is fed down until used; its narrow edge allows a letter or line to be erased without injuring another. Two rubbers of best quality are made; one for typewriter and ink, one for pencil.


Handsomely finished; Easy to Operate and "They Always Work" EVERYBODY should have this NEW ERASER, Price 10¢.

Refills, Typewriter and ink, or Pencil, 5¢ each. Your Stationer.

O.K.
TRADE MARK
REG. U.S. PAT. OFFICE

When ordering by mail, state whether Typewriter and ink, or Pencil, enclose 2¢ extra for postage. Booklet of our 3 "O.K." Office Necessities Free. The O. K. Mfg. Co., Syracuse, N. Y., U.S.A.

STUFFED WAR HORSE OF NAPOLEON FITTED WITH NEW TAIL—Napoleon's famous charger, Vizier, having worn out a third tail since his master's death, has just been supplied with a fourth flowing appendage for the benefit of this year's tourists. Vizier, except for his tail, is an "authentic" war horse ridden by Napoleon. After death he was stuffed and placed among the Napoleonic collection in the Musée des Invalides, and is



Your Choice, 3000 Typewriters

Underwoods, \$30; Oliviers, \$25; L. C. Smiths, \$15; Remingtons, \$12; Royals, \$24; and other makes as low as \$10. Every one perfect and guaranteed two years. Expert repairing. Free trial.

ALL MAKES TYPEWRITER COMPANY, 150 Ashland Block, CHICAGO



TYPEWRITERS ALL MAKES

All the Standard Machines SOLD or RENTED ANYWHERE at 1/2 to 3/4 M.F.P.'S PRICES, allowing RENTAL TO APPLY ON PRICE. Shipped with privilege of examination. Write for Illustrated Catalog L.

TYPEWRITER EMPORIUM, 24-26 W. Lake St., CHICAGO

WRITE 600 WORDS WITH ONE DIP

Why use ordinary pens with the never ending dip—when One Dip Pens make every penholder virtually a fountain pen? Agents Wanted. Send 10c for Sample Package.

One Dip Pen Co., 34 Daily Record Bldg., Baltimore, Md.

EVER NEED DUPLICATES



of form Letters, Price Lists, Bills, Invoices, Drawings, Menus, Reports, anything? Then take advantage of our offer of ten days' trial, without deposit, and become one of thousands of satisfied customers who will agree that DAUS IMPROVED TIP TOP DUPLICATOR with "Dausco" Oiled Parchment Back negative roll, is the simplest, easiest and quickest method of duplicating on the market. 100 copies from Penwritten and 50 copies from Typewritten Original. If you have tried other duplicators without success, you will be more than pleased with ours. Complete Duplicator, cap size (prints 8-4 x 13 inches) . . . **\$5.00**

FELIX A. L. DAUS DUPLICATOR CO., Daus Building, 111 John St., New York

BUY YOUR FURNACE \$10 DOWN \$10 A MONTH



Our monthly payment plan of selling direct saves you the dealer's profits and excessive charges for installation. The

Jahant Furnace

with the patented "Down Draft System" is best for residences, schools, hotels, churches, etc. Saves 1/3 to 1/2 in fuel bills. Install the Jahant yourself. We send complete outfit, freight prepaid with special plans, detailed instructions and all necessary tools for installation. Satisfaction guaranteed or money refunded. Thos. J. Flaherty, Hamilton, N. Y., writes: "Best Furnace made. Had no trouble to install it. Had it up and fire started in 12 hours."

Write for Free, Illustrated Book

THE JAHANT HEATING CO.
20 Main Street AKRON, OHIO

This No. 1 Jahant Down-Draft Furnace (weight over 1000 lbs.) as it stands \$48.00 each, delivered east of Omaha and north of Ohio River.

Save 1/3 to 1/2 on Fuel Bills

Make \$15.00 to \$35.00

Per Day With Our Latest Invention, The Wonderful Ever-Ready Camera



Makes 9 styles single or group pictures direct on post cards or tintypes without use of films or negative. NO EXPERIENCE NECESSARY. Complete picture finished, toned and fixed in 30 seconds. HERE'S AN OPPORTUNITY TO GET

OWN with a VERY SMALL INVESTMENT and BECOME INDEPENDENT. BIG MONEY. At carnivals, summer resorts, parks, picnics, anywhere. BIGGEST MONEY-MAKING PROPOSITION in the WORLD. Photos cost you from 1 to 2 1/2 cts. and sell for 10, 15 and 25 cts. each. **WRITE TO-DAY FOR FREE PROPOSITION & CATALOGUE.**

THE NEW YORK FERROTYPE CO.

Dept. Y39, No. 168 Delancey St., NEW YORK, N. Y. Dept. Y39, No. 1126 S. Halsted St., CHICAGO, ILL.
Largest Manufacturers and Distributors of One Minute Picture Machines and Supplies in the World. Established 1902.



CHAUFFEURS-OWNERS-BEGINNERS Send FREE copy of the new Instructive, Technical Auto Magazine, contains 40 illustrated pages of valuable information. **THE AMERICAN CHAUFFEUR**, 612 Butler Bd. Cincinnati, O.

I WILL START YOU

earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. REDMOND, Dept. 306-A, BOSTON, MASS.

Artistic Coloring

Hard—soft wood, floors, furniture, etc.

JOHNSON'S WOOD DYE

17 Standard Shades

Johnson's Prepared Wax

Unsurpassed finish and polish for pianos, automobile bodies, etc. Ask for free book "Proper Treatment for Floors, Furniture, etc." S. C. Johnson & Son, Racine, Wis. "The Wood Finishing Authorities"

BUILD A 3FT. CURTISS FLYING BOAT

We have accurate scale drawings and knock-down parts of all man-carrying aeroplanes for class-room demonstrations, exhibition purposes, etc. Students of aeronautics, everyone with an inquiring turn of mind, should construct one of these fascinating models. **PRICES OF 3-Ft. MODEL SCALE DRAWINGS**—Curtiss Flying Boat, 25c; Newport Monoplane, 25c; Bleriot Monoplane, 15c; Wright Biplane, 25c; Curtiss Convertible Hydroaeroplane, 35c; Cecil Peck Champion Racer, 25c. Complete Set of Six \$1.25 Postpaid. 50 pp. Ideal Model Aeroplane Supply Catalog 5c. IDEAL AEROPLANE & SUPPLY CO., 82-88 West 87th St., N.Y.

Hartman Will Trust You

Rock Bottom Prices

Furniture, Carpets, Rugs, Etc.

Easiest Terms—Hartman's credit terms easiest, most liberal ever offered. No security—no notes—no mortgage. Free from all objections. At the end of a month you may return anything unsatisfactory. Hartman refunds your money including freight.

FREE—Big Bargain Book Over 8,000 bargains. Write today for FREE copy.

HARTMAN FURNITURE AND CARPET CO.

3945-47 Wentworth Av., Chicago



19 Jewel

Burlington

\$2.50

a Month



Write today for our great offer on the master timepiece—adjusted to the second—adjusted to positions—adjusted to isochronism—now sent direct to you without a penny down. If you decide to keep it, pay only the rock-bottom direct price (the same price that even the wholesale jeweler must pay) either for

cash or at the rate of only \$2.50 a month.

Write For Special Offer!

Send us the coupon below—or a postal for the most sweeping direct offer. We will tell you why we have chosen this superb model, this ultra fine watch which we will ship everywhere on approval. We want you to see and examine the Burlington. Find out for yourself what a magnificent timepiece it is—and at a price which must surprise you.

New Ideas in Watch Cases
Block and Ribbon Monograms
—Diamond Set—Lodge—French Art—Dragon

The Burlington in the U. S. Navy

Every fighting vessel in the U. S. Navy has the Burlington Watch aboard. Several ships have over 200 Burlingtons aboard and many over 100. Timepieces which are absolutely accurate are essential on warships.

The constant vibration, the extreme heat in the boiler rooms, the cold salt air and the change of climate from the Arctic to the Tropical are the most severe tests on a watch. If a watch will stand up and give accurate service aboard a man-of-war it will stand up anywhere. That is why we consider the wonderful success of the Burlington in our Navy the greatest victory that the Burlington ever has won.



Mail Coupon For Free Watch Book

Learn the inside facts about watch prices, and the many superior points of the Burlington over double-priced products. Just send the coupon or a letter or a postal. Get this offer while it lasts.

Burlington Watch Co.
19th Street and Marshall Blvd. Dept. 119Y Chicago, Ill.
Please send me (without obligation and prepaid) your free book on watches, with full explanation of your cash or \$2.50 a month offer on the Burlington Watch.

Burlington Watch Co.
19th St. and Marshall Blvd. Dept. 119Y Chicago, Ill.

Name.....

Address.....

AGENTS

SALESMEN
MANAGERS
YOUNG OR OLD
NEW BUSINESS



NEW BUSINESS JUST OUT

DROP THE DEAD ONES. AWAKE! START WITH THIS NEW INVENTION, THE 20th CENTURY WONDER

Get started in an honest, clean, reliable, permanent, money-making business. Sold on a money-back guarantee

The Blackstone Water Power Vacuum Massage Machine
For the Home. No Cost to Operate. Lasts Life-Time

LISTEN No Competition, New Field, New Business. Price within reach of all. That's why it's easy to sell. Endorsed by Doctors and Masseurs. Removes Wrinkles, rounds out any part of the face or body, brings back Nature's beauty. Almost instant relief can be given all kinds of pains. A demonstration convinces the most skeptical person. Sales easily made.

Read On! What Others Do, So Can You.

Parker writes, sold eight machines first day. Margwarth says, I am making \$19.00 per day. Schermerhorn, eight dozen machines first month. Shaffer writes, am selling four out of five demonstrations. Vaughn, orders one dozen, four days later wires "ship six dozen by first Express." Lewis, sells four first hour. Men, women, everybody makes money. No experience necessary. Protected territory to active workers. We own all patents. Big book entitled, "The Power and Love of Beauty and Health" Free. Investigate now, today. A postal will do. A big surprise awaits you. Address, BLACKSTONE MFG. CO., 910 Meredith Bldg., Toledo, Ohio

AGENTS

GENERAL AGENTS
ROAD MEN
MAKE MONEY HERE
Start Now - Today



We Loaned Money

Yes, thousands of dollars on magnificent diamonds listed in our FREE Bargain Bulletin. Write for it today—the prices will astonish you.

See This! No. 347714. $\frac{1}{2}$ - $\frac{3}{4}$ kt. blue-white perfect cut quality diamond solitaire, set in lady's regulation ring, shipped for free examination. Try to match it \$70.00. Guaranteed cash loan \$28.00. Our unredeemed price \$35.45.

Money Back Guarantee We pay expressage and run all risk of pleasing you in the examination. Money back if unsatisfactory to you—though always exactly as represented. Rated over three quarter million dollars.

Write Today for Free Bulletin

Send at once for our latest Bargain Bulletin, giving startling prices on diamonds, watches and other jewelry. Your money's worth plus 75 to 100 per cent on unredeemed pledges. Write today sure.
Jos. DeRoy & Sons 119 Y DeRoy Bldg. Pittsburgh, Pa.
Smithfield Street
Only Opposite Postoffice Over 60 years same location

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.

H. 559 BARCLAY, DENVER, COLO.



I will send as long as they last my 25c. book,

"STRONG ARMS"

for 10c. in stamps or coin

illustrated with twenty full page half-tone cuts showing exercises that will quickly develop, beautify, and gain great strength in your shoulders, arms and hands without any apparatus.

MUSCLE BUILDER

A steel spring exerciser with a complete course of twenty-four selected exercises for developing all the muscles of the body. It is equal to any \$3.00 exerciser. My price for a short time only, \$1.00.

PROF. ANTHONY BARKER

641 Barker Bldg.

110 West 42nd Street, NEW YORK

Deafness



Perfect hearing is now being restored in every condition of deafness or defective hearing from causes such as

Relaxed or Sunken Drums, Roaring or Hissing Sounds, Perforated, Partially Destroyed Drums, etc.

Wilson Common-Sense Ear Drums

"Little Wireless Phones for the Ears"—require no medicine but effectively replace what is lacking or defective in the natural drums. They are simple devices, which the wearer easily fits into the ears where they are invisible. Soft, safe and comfortable to wear at all times.

Write today for our 168 page FREE book on DEAFNESS, giving you full particulars and plenty of testimonials.

WILSON EAR DRUM CO., Incorporated

1013 Inter-Southern Building LOUISVILLE, KY.

Erickson Legs and Arms

Legs that do not chafe, overheat or draw end of stump.

SOLD ON EASY TERMS

Erickson Artificial Limb Co., 17 Wash. Av. N., Minneapolis, Minn.



SEND FOR CATALOG

one of the objects which attract most attention from visitors. Of the three tails that have already disappeared at the hands of souvenir hunters, despite the vigilance of his guardians, it is believed at least two are in America.

TOBACCO HABIT BANISHED

In 48 to 72 Hours Yes, positively permanently banished almost before you know it. Pleasant, easy to take. Results quick, sure, lasting. No craving for tobacco in any form after first dose. Not a substitute. Harmless, no poisonous habit forming drugs. Satisfactory results guaranteed in every case or money refunded. *Tobacco Redeemer* is the only absolutely scientific and thoroughly dependable tobacco remedy ever discovered. Write for free booklet and positive proof.

NEWELL PHARMACAL CO., Dept. 25, ST. LOUIS, MO.

Here's Health

and Power, Vim and Vigor

All yours! Strength that is more than mere muscular strength. The strength, health, power and vigor of youth is now within your reach through the White Cross Electric Vibrator. Be strong—be healthy. Enjoy things the way you used to. You can be strong and healthy if you will.

White Cross Electric Vibrator

With this machine in your home you can give yourself the same treatments for which specialists receive \$3 to \$5. Can be connected up as easily as an electric lamp. Or if your home is not wired for electricity, it will run perfectly on its own batteries.

Write Today for Big Free Book Just your name and address on a letter or post card is enough. We will send you absolutely free and prepaid, our new book, "Health and Beauty." It tells you all about vibration and our special 60 day price reduction offer. Write today.

Lindstrom-Smith Co., Dept. 119Y, 1100 S. Wabash Ave., Chicago



SPECIAL!



Standard of the World. Endorsed by Government and Railway Officials. Harris-Goar's enlarged Easy Credit Plan now enables you to own one of these superb Elgin Watches without missing the money.

17-Jewel Elgin

Now, during this Special Sale, is the time to buy this elegant 17-Jewel Elgin. Factory tested and fitted in a 25-Year Gold-Filled Case.

No Money Down \$2.00 a Month

Because we want to prove to you that the great volume of our business enables us to save you nearly half on this \$20 Elgin. **SPECIAL \$12⁷⁵**


3 Fine Books FREE! MR. HARRIS wants to send you his three latest BOOKS FREE—one the story of "The Diamond," its discovery, where and how mined, cut and marketed; the other, "Facts vs Buns," or all about the Watch Business, both at home and abroad, also our Big Free Watch and Diamond Book.

You do not pay a cent until we have placed the watch in your own hands for approval—no security, no interest, no red tape. Write today for **BIG FREE CATALOG.**

HARRIS-GOAR CO. Dept. 1305
Kansas City, Mo.

APPLIED ELECTRICITY

FAMOUS \$35 SET



NOW \$19.80—\$2 A MONTH

Greatest reference work on electrical subjects ever published. Most exhaustive electrical cyclopedia of modern times. 7 big books written by 32 famous experts; 3200 pages, 2600 illustrations, full page plates, diagrams, simple explanations, etc., with hundreds of valuable facts and figures. Bound in half red morocco, gold stamped.

Books that will settle every electrical problem which daily confronts the power engineer who must rely on his own experience. Now at the lowest price ever made.

Big men in the electrical field everywhere recognize these as the standard works on the subject. They have been the making of hundreds of successful electrical engineers.

SHIPPED FREE To prove to you what these books will do for you right in your own work every day, we will trust you seven days before you spend one penny. We will pay the express. They must make good with you or we take them back at our expense without question or annoyance. On receipt of coupon below we ship the entire set to you at our risk for absolutely free examination.

Read These Subjects Carefully—

Elements of Electricity—Electrical Measurements—Underwriter's Electrical Requirements—Theory, Calculation, Design and Construction of Direct Current Generators and Motors—Types of Generators and Motors—Management of Electrical Machinery—Electric Lighting—Alternating Current Machinery—Power Transmission—Electric Railways—Self-Propelled Railway Cars—Trackless Trolleys—Power Stations—Switchboards and Switching—Storage Batteries—Applied Electro-chemistry—Electric Elevators—Electric Welding and Heating—Wireless Telegraphy and Telephony—Land and Submarine Telegraphy

Free \$12.00 Consulting Membership

Our staff of 32 electrical experts answer every question you want to ask on electrical subjects absolutely free for a full year to every holder of a set of these books. This privilege has always cost \$12.00 and men tell us it is worth twice that amount in settling one problem alone. You get this service free if you buy the books after examination.

This means \$15.20 saved if you act now. Read the coupon carefully. Then fill it out and mail today. The books will reach you promptly—express paid by us. After seven days send us \$2.00; otherwise, notify us for their return.

Don't wait. You take no chances whatever. It costs nothing to inspect and you are nothing out if you do not care to buy. Mail the coupon today.

FREE COUPON

Worth \$15.20 to You

American Technical Society

Please send me Cyclopedia of Applied Electricity for seven days' free examination. If I keep the books I will send \$2.00 within seven days and \$2.00 a month until \$19.80 has been paid, when \$35 books and \$12 consulting membership will be mine. Otherwise I will notify you and hold books subject to your order. Title not to pass until fully paid.

Pop. Mech. 7-14

AMERICAN TECHNICAL SOCIETY
Chicago, U. S. A.

NAME.....
ADDRESS.....
As I have had no previous dealings with you, I refer you to

SAFETY FIRST

Yale Electric Lantern



and Combination House Lamp, Search and Flash Light. This is NOT a Toy. Turn a switch and you get a flood of light! The safest, handiest, most simple all-around light for autoists, campers, sportsmen, merchant, farmer, etc. Eliminates: Filling, matches, oils, grease, smoked chimneys, trimming of wicks and other troubles. Always ready when wanted.

Introductory Price \$3.50 A sample will be sent by prepaid parcel post on receipt of remittance of introductory price. Order sample and agents' proposition now—be the first. Sold on money-back guarantee. A big money-maker for agents. Agents Wanted Everywhere. YALE MANUFACTURING CO., 20-22 So. Clinton St., Chicago

1900 Motor Washer

Electric or Water Power

on Free Trial to Readers of Popular Mechanics

Reduce household expenses by using this great laundry outfit. Cuts cost of washing to 2 cents per week. Write for Free Book, giving full details, to

1900 WASHER CO., 6154 Court St., Binghamton, N. Y.
Address Canadian 1900 Washer Co., 355 Yonge St., Toronto if you live in Canada

KEROSENE AND GASOLINE



LIGHTING SYSTEMS

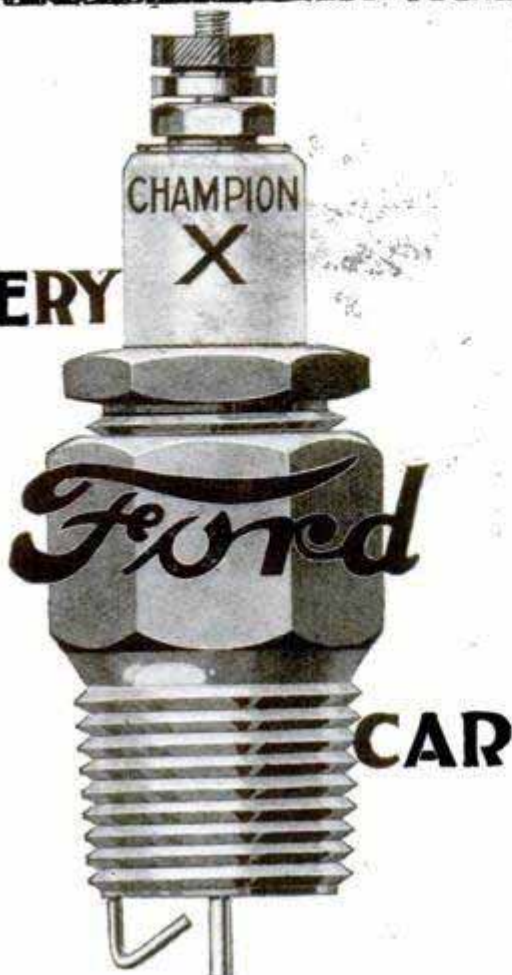
WIZARD LIGHT Burns Kerosene and Gasoline

Lamps constructed to burn kerosene are an achievement surpassing all other known methods of artificial lighting, while the cost of operating is very small and about 1-9c per hour.

Our gasoline lamps are the most perfect and up-to-date, while certain styles can be lit with an ordinary match, like city gas. For complete illustrated catalog and agency, address

THE NAGEL-CHASE MFG. CO., 148 E. Erie St., Chicago

EVERY



is shipped from the factory equipped with

Champion "X" Spark Plugs

Every Ford—every Overland—every Studebaker, Metz and Maxwell—every single car produced by 48 other leading manufacturers—all are *factory equipped* with Champion Spark Plugs.

These makers have chosen "Champions" in order to give you a car whose motor operates at top-notch efficiency. Keep it operating so by re-equipping with "Champions."

Your dealer will tell you which Champion Plug to get for your automobile, motor truck, motorcycle, cycle car, motor boat, aeroplane or stationary motor. See him.

Champion Spark Plug Company

Largest Manufacturers of Spark Plugs in the World.

R. A. Stranahan, Pres. F. D. Stranahan, Treas.

408 Avondale Avenue, TOLEDO, OHIO

What Men Know of Motorcycle Tires

In 4 Years One Has Out-Distanced All

In 1910 the first Goodyear Motorcycle tires were sold. In 1911 the output multiplied itself by 32. In 1912 sales were 139 times greater than in 1910. The 1910 figures were multiplied by 183 in 1913.

For this tremendous gain there is but one answer—super-service proved by these thousands of tires.

3 Out of Every 4

That is the number of new motorcycles that will be Goodyear-equipped in 1914. What better evidence could there be of the superiority by which men have come to know and prefer Goodyears?



GOOD YEAR
AKRON, OHIO
Motorcycle Tires

Remember, too, that Goodyear Motorcycle tires have won and held every world's record for speed and durability. It is not enough simply to make a good tire. There must also be the Goodyear knowledge by which these tires can excel under every road condition.

Rival makers say "Just as good as Goodyears." But the evidence gives you the facts.

Goodyear leadership has been won in the realm of automobile tires. These men meter their mileage. And the same successful factors of leadership now come to you in these Goodyear Motorcycle tires.

What motorcycle tire, then, offers you more than Goodyears? What man can make a better motorcycle tire than Goodyear—based on actual records?

And when you consider that Goodyears cost you no more than other standard makes, why should you take chances?

Made with a thick, anti-skid tread. Made with a special fabric to prevent tread separation. Made to hold forever the place they hold today.

There is a Goodyear dealer in your town. Ask him for our new book, which pictures and describes the making of Goodyear motorcycle tires—or write us today. [1632]

The Goodyear Tire & Rubber Co., Akron, O.
Toronto, Canada London, England Mexico City, Mex.

DEALERS EVERYWHERE

Branches and Agencies in 103 Principal Cities
Write Us on Anything You Want in Rubber

The New
ARROW

1914
Model



New Motorcycle Type

Remarkable new improvements make the 1914 "Arrow" a positive wonder for speed, comfort and easy riding. Makes bicycle riding like coasting all the way. The smartest looking bicycle ever built. Latest Eagle easy motorcycle saddle—new Departure coaster brake—special motorcycle pedals—motorcycle handlebars with long rubber grips—imported anti-friction chain—reinforced frame—beautiful finish. All sizes for boys, men, and women. Don't fail to learn about this great new motorcycle model.

Wonderful Offer

Write today for the low direct offer we are making on the splendid Arrow Bicycle. Get our free catalogs. For only a very, very small amount down we will ship direct to you the elegant Arrow, built to last a life time. Pay for it while you ride—a little each month. Enjoy the pleasure of the bicycle while paying.

Write Today! Right now, and we will send you the announcement of this remarkable new motorcycle type "Arrow," with full details of machine and astonishing bed rock direct offer. Send a postal now with your name and address. **TODAY SURE.**

ARROW CYCLE CO.

Dept. 119Y, 19th St. and Cal. Ave., CHICAGO, ILL.

PENNSYLVANIA Oilproof VACUUM CUP TIRES

RECORD-BREAKING SILVER PRODUCTION IN 1913—According to the preliminary estimates of the U. S. Geological Survey, the domestic silver production in 1913 amounted to 67,601,000 fine ounces, valued at \$40,864,871. This was the greatest output, although

Delivered TO YOU FREE
on Approval and 30 Days Trial



SEND NO MONEY but write today for our big 1914 catalog of "Ranger" Bicycles, Tires and Sundries at prices so low they will astonish you. Also particulars of our great new offer to deliver you a Ranger Bicycle on one month's free trial without a cent expense to you. It's absolutely genuine. **BOYS** you can make money taking orders for bicycles, tires, lamps, sundries, etc. from our big handsome catalog. It's free. It contains "combination offers" for re-fitting your old bicycle like new at very low cost. Also much useful bicycle information. Send for it. **LOW FACTORY PRICES** direct to you. No one else can offer such values and such terms. You cannot afford to buy a bicycle, tires or sundries without first learning what we can offer you. Write now.

Mead Cycle Co., Dept. W108, Chicago, Ill.

Smooth Riding on Rough Roads



That enviable pleasure of comfortable motoring—regardless of how rough the roads, or how fast you drive, is yours, made possible by

Road Smoothers

Quickly applied to your Ford Car

It's a combination of a helical spring to take up the shock, an air-chamber to check the rebound and anti-side motion links that prevent side rocking and consequent skidding turning corners. No wearing parts means no friction—no oiling—no trouble.

Taking the Bumps is the hardest kind of work. That is why in K-W Road Smoothers are found—no cheap castings, but instead—high grade drop forgings, electric smelted chrome Vanadium steel springs, the best of workmanship, and the K-W quality that makes possible our broad guarantee.

\$25 SET OF FOUR
ONE FOR EACH WHEEL

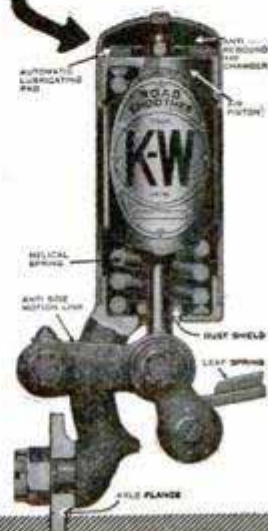
SOLD BY RELIABLE DEALERS Everywhere

The principle is right—the design is right—the workmanship is right—and the price is right.

BEWARE OF IMITATIONS

There is only one Road Smoother—Don't confuse with ordinary shock absorbers or auxiliary springs. Look for the name—K-W Road Smoother.

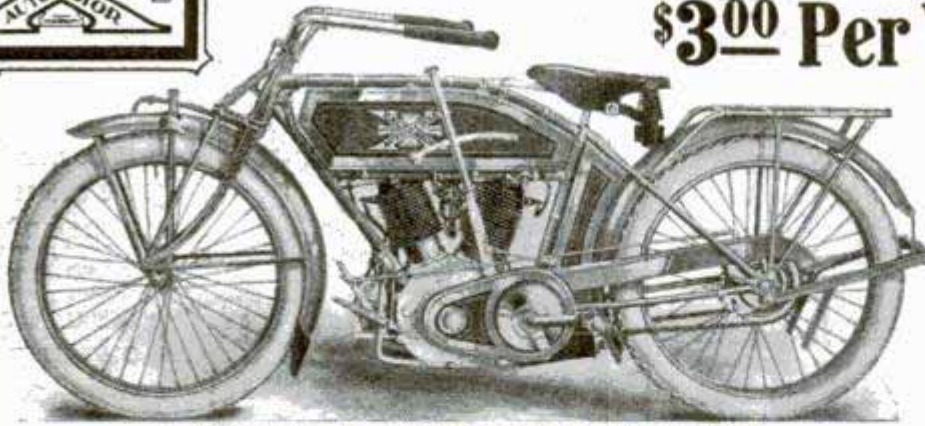
Write for booklet,
"Taking out the Bumps"



TRADE MARK
THE K-W IGNITION CO.
287 CHESTER AVE. CLEVELAND, OHIO, U. S. A.



\$3⁰⁰ Per Year



MODEL 7. TWO SPEED. \$260.00.

**Average Cost
of Upkeep of
80,000**

**EXCELSIOR
AUTO CYCLES**

The reliability and serviceability of a motorcycle are best indicated by the cost of repairs and maintenance.

During 1913 there were 80,000 Excelsior Auto Cycles in use and the total receipts of our repair department, including every repair part sold and all factory repair work done, was for the same period approximately \$240,000 or \$3 for each Excelsior Auto Cycle in use, many of which had been in constant service for over six years.

This is not only positive proof of the remarkably low cost of maintenance, but forcibly indicates the reliability and dependability of the machines.

Another point: a machine that requires less than \$3.00 per year for replacements can have spent but little of its time undergoing repairs; further proof that the Excelsior Auto Cycle is found on the road and not in the repair shop.

While economy of operation is merely an incident, it can be attained only through conditions that provide every other quality that is desirable in a motorcycle and is a clear explanation of why

THE EXCELSIOR AUTO CYCLE ALWAYS MAKES GOOD

Seven models for 1914, all of the same standard quality, at prices ranging from \$190.00 to \$290.00

See the dealer or write for catalog

Excelsior Motor Manufacturing & Supply Co.
2202-2250 South Union St., CHICAGO



for Motorcycles

**“My Lighting System
Must Be as Sturdy as
My Motorcycle!”**

You wouldn't buy a motorcycle unable to stand hard usage on rough roads—liable to fly to pieces whenever it tipped over.

Use the same good common sense in buying a lighting system.

We back up the safety, saving and satisfaction of Prest-O-Lite with a genuine money-back offer—you can try it 30 days FREE if you wish. Insist upon the same guarantee before you accept any other system.

Remember!

We have told you the story of vibration and its effects on batteries, and other delicate apparatus. Experience has already proved it. Your safety is too important to risk on taking chances. Prest-O-Lite is simple—safe—trouble proof.

How About This?

Ask the dealer to drop a toy storage battery three feet on the pavement and see what happens. Then you'll see what happens if your machine takes a spill. Some riders have found this out by costly experiment.

In first cost and operating expense, Prest-O-Lite costs far less than any other system of brilliant lighting. It is solid, substantial, takes no power to operate. It is the most convenient system you can use. Any dealer who is offering a combination of equipment will include Prest-O-Lite if you insist. If you know the facts you will insist.

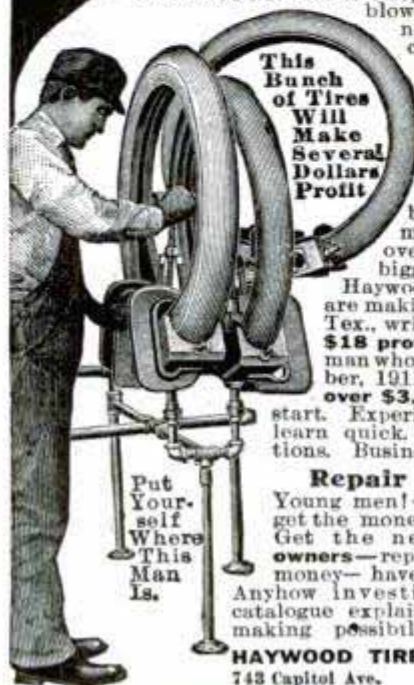
Write your name and address below the dotted line and mail it to us for complete information on motorcycle lighting.

(205)

THE PREST-O-LITE CO., Inc., 265 Speedway, Indianapolis, Ind.
Please send facts on motorcycle lighting to—

\$250.00 A MONTH REPAIRING TIRES

Be first to enter this new big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Automobile business growing fast. **Each Auto Sold Means More Tires to Mend.** Enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnson, Tex., writes, "I made as high as \$18 profit in a day." Another man who bought a plant September, 1911, writes he has cleared over \$3,000.00. Be the first to start. Experience unnecessary. You learn quick. Simply follow directions. Business comes fast and easy.



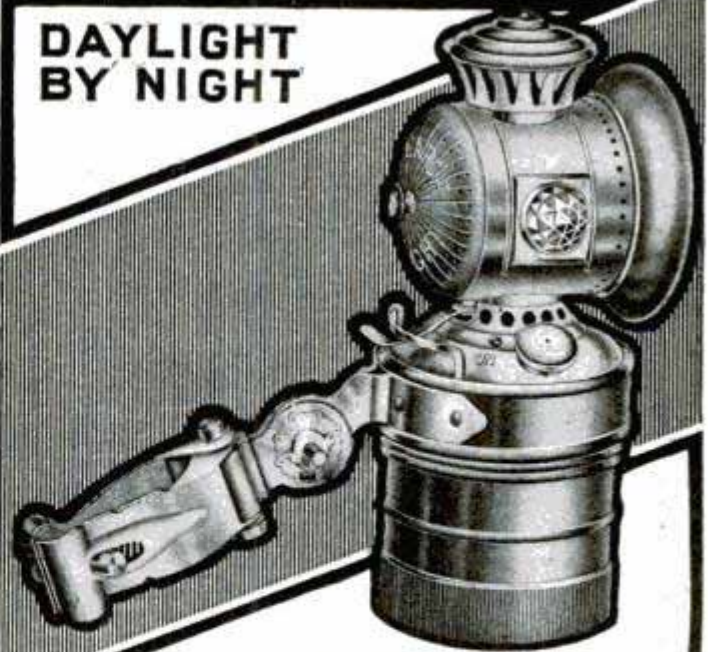
This Bunch of Tires Will Make Several Dollars Profit

Put Yourself Where This Man Is.

Repair Tires at Home
Young men!—repair father's tires—get the money he pays garage man. Get the neighbors' work. **Auto owners**—repair your own tires—save money—have outfits for home use. Anyhow investigate. Send today for catalogue explaining wonderful money making possibilities in this field.

HAYWOOD TIRE & EQUIPMENT CO.
743 Capitol Ave. INDIANAPOLIS, IND.

DAYLIGHT BY NIGHT



A "Search-Light" Gas Lamp for Your Bicycle

This lamp burns gas—makes its own gas, and positively will not jar out. It burns with a clear, penetrating light and illuminates the whole road.

Handsome nickel-plated, has red and green jewels, universal bracket, can be adjusted to any angle, and attached to either head or fork. Ask your dealer. If he's sold out, write us.

Get a "Bridgeport" pump for your wheel. Send for new catalog.

BRIDGEPORT BRASS COMPANY
P. O. Station K BRIDGEPORT, CONNECTICUT

ORBIN Bicycle and Motorcycle BRAKES

WRITE FOR CATALOGUE.
THE CORBIN SCREW CORP'N
The Amer. Hdqrs. Corp. Succ. New Britain, Conn.

not the greatest value, since domestic silver production began. The highest market value of the domestic silver produced in any one year was reached in 1891, when it was \$57,630,000 for 58,330,000 ounces.

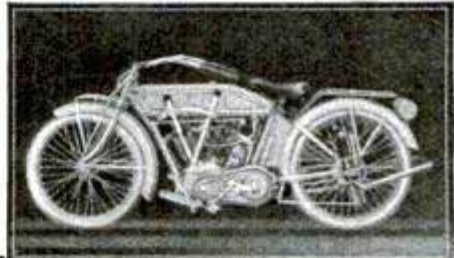
Garage \$49.50

Genuine "Edwards." Ready-made, fire-proof garages. Quickly set up any place. Direct-from-factory prices—\$49.50 and up. Postal brings illustrated 64-page catalog.



THE EDWARDS MFG. CO., 320-370 Eggleston Ave., Cincinnati, Ohio

The Marvelous Pope Two-Speed Motorcycle



Pope Model R-14. The Motorcycle without an equal. A two-speed machine of wonderful strength, flexibility, and ease of operation. 15.4 h.p. Pope Overhead Valve Engine. Pope celebrated rear spring suspension. Extra heavy and wide Renold chain transmission; Eclipse clutch. Positive gear change; automobile type, perfectly balanced; splendidly equipped. Price \$285. Other models from \$150 up. Write for catalog.

THE POPE MANUFACTURING CO.
16 Cycle Street Westfield, Mass., U. S. A.

NEVERLEAK

Keeps your tires air tight. Prevents leaks and preserves the rubber. Makes your tires wear twice as long. No bother; no expense; no delays.

Used Everywhere

For twenty years. The one, reliable, time-tested preparation. 25c a tube—enough for one tire. Get the genuine. Sold by all dealers and repair men.

HEALS PUNCTURES
BUFFALO SPECIALTY COMPANY
Buffalo, N. Y.



Don't Throw Away Your Worn Tires



For over three years French and German motorists have been getting from 10,000 to 15,000 miles out of their tires by "half-soling" them with Steel Studded Treads.

In eight months 20,000 American motorists have followed their example and are saving \$50. to \$200. a year in tire expense.

We ship on approval without a cent deposit, **prepay the express** and allow you to be the judge.

Durable Treads double the life of your tires and are sold under a **signed guarantee for 5000 miles without puncture.** Applied in your own garage in thirty minutes.

Special Discount offered to motorists in new territory on first

shipment direct from factory. A postal will get full information and sample within a week. **State size of tires. Don't wait—write today.** Address nearest factory office.
THE COLORADO TIRE & LEATHER CO.
1124 Karpen Bldg. Chicago, Ill. 1324 Acoma St., Denver, Colo

Limited

Motorcycles for Particular People



FOUR MODELS

TWO SPEED, planetary type,
no stripping of gears.

Mechanical FOOT STARTER,
great advantage to the side
car user.

Ask for literature and dealers' proposition

Feilbach Motor Company
1180 Holton St. MILWAUKEE

MAKE YOUR BIKE A MOTORCYCLE

at a small cost, by using our
attachable outfit. Fits any
Bicycle. Easily attached. No
special tools required.

Mr. Collins of Kentucky writes:

"Motor Attachment received O. K. and I
cannot say too much for the SHAW 2½ h.p.
motor. If I could not get another, \$100.00
would not take it off of my frame. It is the
attraction of the road. Last Sunday I
rode it about 20 miles with no trouble at
all. Also, pulled a hill 1 mile long on trip
with all ease."



FREE BOOK Write today for bargain list and
free booklet, fully describing
the SHAW Bicycle Motor Attachment. Motor-
cycles all makes, new and second-hand, \$35.00 up.

SHAW MANUFACTURING CO.
Dept. 6 GALESBURG, KANSAS

Why were 139% more

UNITED STATES MOTORCYCLE TIRES

Sold in 1913 than in 1912?

**MAGNETISM NOT A RECOGNIZED SCIENCE
IN FRANCE**—A French "miracle worker" was re-
cently prosecuted by a local medical society for illegal
practice of medicine. His method was to make mystic
passes over empty bottles brought by his clients; he
then said the bottles were "magnetized," and instructed
the patients to fill them with water and drink a glass
before each meal. Marvelous results would follow the
treatment. The amusing part of the incident lies in the
fact that the wizard was acquitted by the court on the
ground that magnetism is not yet a recognized science.

The Electrically Equipped *Indian Motorcycle*
With Cradle-Spring Frame. Send for Free Catalog.
Hendee Manufacturing Co., 818 State St., Springfield, Mass.

Build Your Own Cycle Car!

Why not? You can do it and save money. We built one—tested it
for over 3,000 miles—averaged 20 miles per hour over all roads—
made 40 miles on good road. Would you like a set of working draw-
ings and instructions, with prices of parts, if you want to buy them?
Address "Cyclecar," 1101 Fourth Nat'l Bank Bldg., Cincinnati, O.



Morgan Gas Lighter

Factory Representatives wanted everywhere to
handle our Auto and Hardware Necessities.
Unusual Contract. Large Profits. Increasing
Demand. Write today, letter—no postals—
Exclusive Territory. Samples. FREE SALES-PLANS!

Morgan Rolling Wedge Spring Leaf Opener

Only instantaneous spreader on market. For lubricating Wagon,
Auto, or any spring. Real Opportunity for Hustlers. Immense
field. Popular Prices. Millions will be sold. All our Specialties
carry Money-Back Guarantee. Write Now to

MORGAN MFG. CO., Bellevue St., Newport, R. I.



\$40 Motorcycle

We have the largest line of
new and used Motorcycles in
the country at the lowest
prices. We also have a thor-
oughly equipped repair de-
partment and are in position to
furnish repairs for any
machine. Send us your machine to be overhauled. We
pay cash for second hand motorcycles. Send for Catalog.
HARRY R. GEER CO., 888 McLaran Ave., ST. LOUIS, MO.

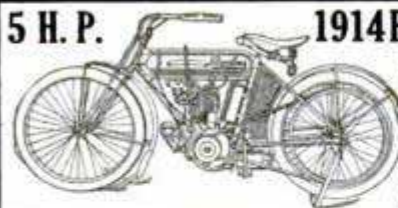


A LADY

can take off or put on a tire of a
Ford Car in two minutes with the
Magic Clincher Tire Tool
PRICE \$5.00

MAX MACHINE CO., Clinton, Mass.

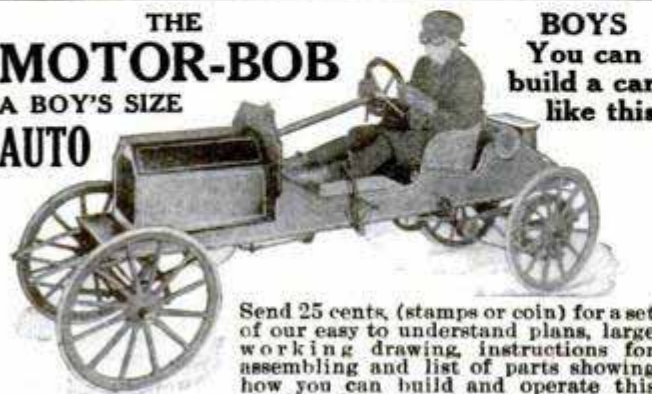
5 H. P. 1914 Peerless Motorcycle



With Free Engine Idler and
 Bosch Magneto, together
with the best there is in
motorcycle construction—
Power, Silence, Endurance,
and those Wearing Qualities
so essential for low cost of
maintenance.
5 MILES FOR ONE CENT
Agents Wanted—Liberal Discounts

PEERLESS MOTORCYCLE CO., 179 Huntington Ave., BOSTON, MASS.

THE MOTOR-BOB A BOY'S SIZE AUTO



BOYS
You can
build a car
like this

Send 25 cents, (stamps or coin) for a set
of our easy to understand plans, large
working drawing, instructions for
assembling and list of parts showing
how you can build and operate this
wonderful little real gasoline auto.

Simple design, practical and lowest possible cost.
THE IDEA SHOP, Dept. I, BUFFALO, N. Y.

\$100 Brings This Complete Home Lighting System



Startling Offer!

Send Coupon for Details. At last you can get this perfect, time tested Ann Arbor Lighting System on a new "no risk" plan which means absolute satisfaction before you pay. This extremely liberal offer is made to enable you to install this clean, brilliant light in your own home on a free trial.

The Famous Ann Arbor Lighting System

has made good in thousands of homes where it has been put to the test. It is inexpensive to install as well as to operate. The Ann Arbor System gives perfect light at the lowest cost.

Brilliant Light in Every Room

The light produced by the Ann Arbor System is wonderfully soft and restful and yet remarkably brilliant, flooding every corner of the room. Cheer and comfort are essential to perfect home life. Nothing makes the home attractive, cheerful and comfortable day or night like good, clean light.

Costs Practically Nothing to Operate

Besides giving clean, safe and satisfactory light, the Ann Arbor System furnishes the cheapest lighting service in the world. The cost per candle power of light is way below electricity, gas or kerosene. The saving goes a long way toward paying the small cost of installing.

SUPERIOR MFG. CO., Ann Arbor, Mich.

The Complete System Sent for Only \$1

That's all you need pay down. We ask this just as an assurance of good faith. We ship the outfit direct to you and you can set it up and try it out in your own home. We don't get our money unless you're absolutely convinced that the Ann Arbor System is just as perfect and economical as we say it is.

Send Coupon Today for Free Book and Catalog

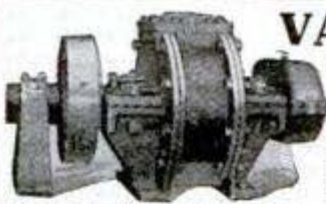
Get the facts. We have a beautifully illustrated booklet "Night Daylight" telling all you want to know. Don't put up any longer with dirty, smelly, dangerous kerosene lamps. This is the Safety First age—the modern age. Get an Ann Arbor System—beautify your home and insure the safety of your family and property. The cost is low, the upkeep practically nothing, and our special offer makes it easy for you. Send today for full information regarding this special offer. Mail coupon now.

FREE COUPON

Superior Mfg. Co., Dept. 317, Ann Arbor, Mich.

Please send me at once your free illustrated booklet, "Night Daylight," and details of your remarkable free trial offer.

Name.....
Address.....



VACUUM PUMPS Tools, Hose and Parts

for cleaners at wholesale. Electric or gasoline power. For stationary, house or flat machine or wagon outfit. Our pumps rugged, will stand any wear. Assemble your own machine. Saves half. Dept. E.

VACUUM SUPPLY CO., Ann Arbor, Mich.

This 64-Page Free Catalog

Saves You 25 to 50% on Furniture

Come-Packt Furniture, sold direct from factory to home on a year's trial, saves you 25 to 50%. Home Furnishing Department helps you make best selections. Money-Back Guarantee. Write for Catalog today.

COME-PACKT FURNITURE CO. 701 Fernwood Ave. Toledo, Ohio



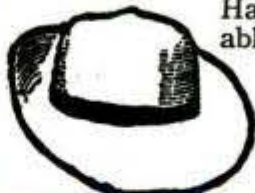
SALESMAN WANTED

We want a good man to represent us in every territory—a man who feels that he is capable of earning \$2,500 to \$5,000 a year. This is a high class proposition with unlimited opportunities. No experience is necessary, but we want only men who are willing to work—men who are full of energy and ambition. We offer you 150% profit—one sale a day earns you \$90 a week. Some of our men now running four to six sales a day. The possibilities are simply wonderful. No risk. No investment required. Sample at actual wholesale price. Earnings commence immediately. Write for full particulars.

SWEDISH RHYTHMIC VIBRATOR CO., 141 Vibrator Bldg., 215-231 Schiller St., CHICAGO, ILL.

COOL AS A DROP OF DEW

Porto Rican Straw Hats



Hand-woven, soft, durable, comfortable. Good as a Panama, but cooler, lighter, more stylish. Direct from maker to you, \$1.50 postpaid. State size and send money order. Money refunded if not satisfactory.

Martin Lopez & Co. SAN GERMAN PORTO RICO
References—Bank de Economias, San German

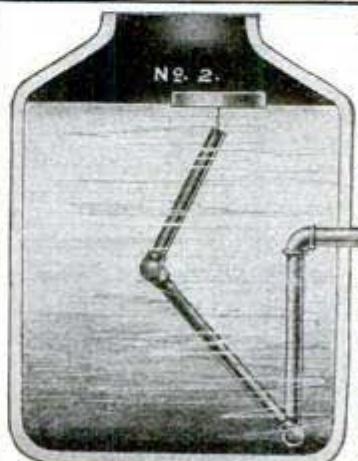
New Book for the Deaf FREE

Write today for the newest and best book on deafness ever published. Mailed free. Your name on a postal will do. Tells in simple language, with pictures, how deafness is caused, how it develops, how its progress can be checked and the ability to hear restored unless the parts are completely paralyzed. Explains the merits and powers of all known hearing devices for the deaf.

Is your hearing defective? Don't lose it! Is it gone? How do you know? Perhaps you can restore it.

Write Now Don't fail to send today for this free Book on Deafness—complete, authentic. No obligations. Write now while this offer lasts.

MEARS EAR PHONE CO., 119Y Monolith Bldg., NEW YORK

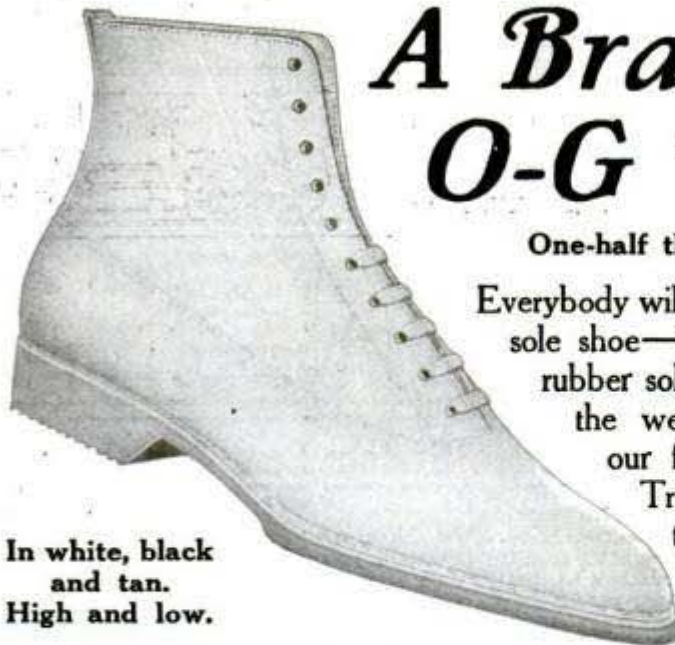


The Floating Intake!

This new invention is made entirely of brass and copper with free action ball joints; will get the cleanest water in cistern or well, as it receives the water always near the center of cistern or well and at any number of inches below the surface of water that the operator may desire—where the cleanest and purest water always is found. Can be placed when cistern is empty or full of water.

AGENTS WANTED

The Float Intake Company, No. 410 Superior Bldg., Cleveland, Ohio



In white, black
and tan.
High and low.

A Brand New Idea O-G "Pussyfoot"

One-half the weight of an ordinary shoe

Everybody will want to wear this light rubber sole shoe—it's a new process of making rubber soles—flexible and comfortable—the weight is minimized. Made on our famous new O-G Indian last.

Try on a pair whether you want to buy or not. It's something *entirely new and different.*

\$5

Delivered Free anywhere in the United States upon receipt of price.

Wear O-G SHOES and be happy

BOOK OF THE O-G BOOTERIES. We want to place this handsome booklet in every American home where fine footwear is appreciated. Send for your copy—it's **FREE.**



O'CONNOR & GOLDBERG

Mail Order Address:

Dept. A, 205 S. State St. (Republic Bldg.), Chicago, Illinois

30 Days
Free Trial—
Freight Paid

Direct to you at factory prices. Keeps food pure, sweet, wholesome. White enamel inside and out. Revolving shelves. Adopted and used by U. S. Gov't.



White Frost Refrigerator

Easy payment plan. Enjoy its goodness while paying for it. Guaranteed 25 years. Write today for free catalog. METAL STAMPING CO. Dept. 774, Jackson, Mich.

EFFECTS OF WAR—When war breaks out in any quarter of the world its effects may be felt in strange quarters. The Russo-Japanese war resulted in a corner in camphor, as the Island of Formosa is about the only place where that substance is produced in marketable quantities. And now the effects of the Balkan war are



EVERYTHING in Guaranteed Plumbing and Heating Supplies at wholesale. Our \$200,000 establishment behind our Guarantee. Send for complete CATALOG 61.

J. HARDIN CO., 30 years at 4533-35-37-39-41-43 Collage Grove Ave., CHICAGO

AGENTS WANTED

EASILY EARN \$10 A DAY

No selling experience necessary. Just demonstrating what iron will do. Every housewife will buy. E-Z Sad Iron only iron combining heat regulation and Spring Cushion Handle. Makes its own heat—runs 4½ hours without attention. Write for territory, no matter where you live.

ENTERPRISE TOOL & METAL WORKS
Dept. 15, 126 S. Clinton St., Chicago



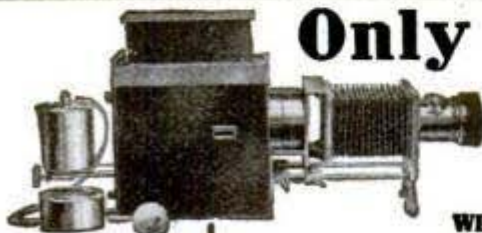
\$10 A DAY EASY!

AGENTS WANTED

Fifty cents (in quantities) buys a full size compressed air clothes washer. Weighs only two pounds. Women grab it at \$1.50; 200% profit. Thoroughly cleans tub of clothes in three minutes. Washday no longer dreaded. Mrs. Marrick earned \$90 first three weeks. A 14-year-old Kansas boy made \$55.40 outside school hours during September. Send for catalog today and get your county right, which is free. Wendell Washer Co., 335 Oak St., Leipsic, O.

Only \$36.00 The Wonderful ILLUSTRATOR LANTERN

With our improved famous ALCO RADIANT LIGHT.



This new 1912 Model has many improvements and double brilliancy. Write for illustrated circular of this and Lanterns of all styles and lights at bottom prices. **IF YOU OWN A LANTERN** we should have your name to mail to you our regular announcements of new slides and lecture sets. 75,000 Lantern Slides to rent. **POST CARD MAGIC LANTERN** reflects image of postcard or any other picture or object. Prices, \$2.75, \$12.50, \$25.00, \$60.00, express paid.

WILLIAMS, BROWN & EARLE, Inc., 918 Chestnut St., Philadelphia, Pa., Lantern Dept. 20
Engineering, Microscope, Optical, Scientific, Photo Lantern Slide Supplies

Can You Stand Prosperity?

Engesser writes: "I have just returned from a mill town 'Glenn' and in eight hours made \$42.50." With a

DAYDARK PLATELESS PHOTO POST-CARD MACHINE

Earn big money at home, traveling, at fairs, on streets, taking, finishing and delivering 3 photo post-cards a minute—all done with the Daydark.

NO EXPERIENCE NECESSARY

Be independent—be prosperous. Write postal to-day for **Free Catalogue**, sample post-card showing fine work this machine does and Free trial offer.

DAYDARK SPECIALTY CO.
702 Daydark Bldg. St. Louis, Mo.



FREE TRIAL 10 DAYS PREPAID

"Picture" Your "TAKE QUICK" Vacation with a OUTING CAMERA

Every spot you visit, everyone you meet, any subject, any place, any time—**instantaneously**. No experience needed. **Anyone** can take clear, sharp, **finished** post card pictures, 2½x3¼; also photo buttons in 1 minute on the spot.

FINISHED MOUNTED PICTURES, 2c EACH

If you never took a picture before, you'll surprise yourself with a "Take Quick." Not a toy, but a perfect camera; cheaper, quicker, more interesting. Be sure and write today for free illustrated circular D.

FREE

INTERNATIONAL METAL & FERRO COMPANY, CHICAGO, ILL.



TO-DAY I MADE \$35.23

With My Camera Taking Pictures—A. I. Shinnbaum. You can do even better. Write for our **New Proposition and Catalogue**, explaining fully how, without any former knowledge or experience, hundreds of young men everywhere are making big money. **Don't Miss This Opportunity of Becoming Independent Financially.** Send today for Full Particulars.



The Jamestown Ferrotyping Co., Dept. Y-40, 1126 S. Halsted St., Chicago, Ill.

WE START YOU IN MOTION PICTURE BUSINESS

A Postal Card or Letter is all that it costs to learn how we do it. Many of our clients whom we started

WITH SMALL CAPITAL

are among the most successful exhibitors in the country. The business is just at the height of its prosperity—its profits are now the greatest—you can't fail to get your share if you start at once. **\$35 to \$50 and More Daily Profit.** Write today for our Plan & full Details.

ATLAS MOVING PICTURE CO.
Room 230, 508 South Dearborn Street, Chicago, Illinois

WIN NEXT \$1,200

We tell you how; \$40,000 already won by ten inexperienced people. Stoneman received \$1,200 one month; \$15,000 to date; Korstad \$2,200 in two weeks; Schleicher \$195 first 12 hours. Strange invention, startles the world. Gives every home a bathroom with hot and cold running water for \$6.50; abolishes plumbing, water works; self-heating; little wonder Hart sold 16 in 3 hours, \$5,000 to date; Lodewick 17 first day. Credit given; investigate today. Beat others to exclusive sale; means fortune.

ALLEN MFG. CO., 3649 Allen Bldg., Toledo, Ohio

Wide Awake AGENTS!

Make **BIG Money** Be Your **Own Boss**



You need no experience. Our line sells itself. We have the most complete, fully guaranteed, line of knives, razors, strops and cutlery specialties. **Golden Rule Knives are hand forged, made of genuine English razor steel.** We will put any photo or lodge emblem on one side of the transparent handle and name and address on the other. Write for catalog and terms—exclusive territory.

Golden Rule Cutlery Co., 552 W. Lake St., Dept. 116, Chicago

MODERN AMERICAN HOMES

FREE

THIS PLAN BOOK

VALUE \$5.00

Here is your chance to secure absolutely **Free of Charge** the most complete and up-to-date plan book ever published. No carpenter or contractor who wishes to be familiar with the latest in building construction—no man who is contemplating erecting a home—can afford to be without it. This great new plan book, "**Modern American Homes**," contains plans and specifications for 168 different structures, including excellent exterior and interior views, detailed estimates, etc. Designed by the leading architects of this country. Includes city, country and suburban homes, bungalows, farm houses, summer cottages, tent houses, camps, garages, apartment houses and various public buildings. 224 pages, 9½x12¼ inches, and 426 illustrations. Printed on heavily enameled paper and substantially bound.

The Cyclopedia of Architecture, Carpentry and Building



consists of ten massive volumes; 4,760 pages, 7x10 in.; 4,000 illustrations, full page plates, building plans, diagrams, etc.; hundreds of valuable tables and formulas; carefully cross-indexed for quick, easy reference.

This work covers everything in the building professions, from the first rough sketch of the architect to the acceptance of the finished structure. It includes wood, stone, steel, and reinforced concrete construction; estimating and contracting; a study of the Greek and Roman Orders; interior finishing and decorating; and modern house lighting and sanitation.

Partial Table of Contents

Mechanical, Freehand, Perspective and Architectural Drawing, Lettering, Pen and Ink Rendering, The Orders, Superintendence, Strength of Materials, Masonry, Reinforced Concrete, Carpentry, Steel Square, Stair-Building, Hardware, Steel Construction, Roof Trusses, Practical Problems, Estimating, Contracts, Specifications, Building Law, Sanitation, Sheet Metal Work, Electric Wiring and Lighting.

We'll Send the Plan Book FREE

With every order for a Cyclopedia we will include the Plan Book, absolutely free of charge and send you the Cyclopedia and the Plan Book, express prepaid, for seven days' free examination. You keep the books a full week—examine them thoroughly at your leisure—and if they don't meet with your expectations they may be returned at our expense. Remember—the complete set—Cyclopedia and Plan Book, are sent free upon receipt of the coupon below and we pay express charges both ways if they are not satisfactory.

Another Free Offer

With each set is included a year's Consulting Membership, regular value \$12.00, entitling you to the free advice of a corps of Expert Architects. This will give practical help in handling your difficult building problems. This service alone is worth more than the first cost of the books.

AMERICAN TECHNICAL SOCIETY, CHICAGO, U. S. A.

FREE PLAN BOOK COUPON

AMERICAN TECHNICAL SOCIETY, Chicago, U. S. A.

Please send Free Plan Book, also Cyclopedia of Architecture, Carpentry and Building for seven days' examination. I will send \$2.00 within seven days and \$2.00 a month until I have paid \$24.80 for Cyclopedia (Plan Book included free), or notify you and hold books subject to your order. Title not to pass until fully paid. Pop. Mech. 7-14

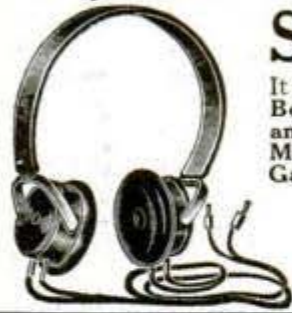
NAME

ADDRESS

As I have had no previous dealings with you, I refer you to

Send for Copy of Our New Wireless Manual P1

It contains 96 pages and tells how to erect and maintain wireless telegraph stations. Shows a number of diagrams. Has the Morse and Continental Telegraph Codes. Illustrates the best instruments to use; tells what they are for and how to use them. Do not wait until some other time, but sit down now and send your name and address, and get one. It costs you nothing.



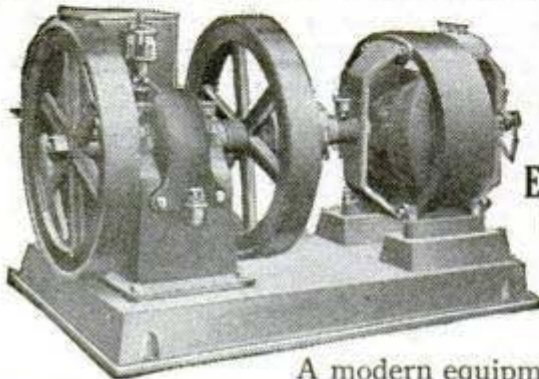
Send for Our Pocket Catalog P26

It contains 212 pages, with over 1,000 illustrations and describes in plain, clear language all about Bells, Push Buttons, Batteries, Telephone and Telegraph Material, Electric Toys, Burglar and Fire Alarm Contrivances, Electric Call Bells, Electric Alarm Clocks, Medical Batteries, Motor Boat Horns, Electrically Heated Apparatus, Battery Connectors, Switches, Battery Gauges, Wireless Telegraph Instruments, Ignition Supplies, etc.

It Means Money Saved to You to have our Manual and our Catalog when you want to buy

MANHATTAN ELECTRICAL SUPPLY CO.

NEW YORK, 17 Park Place CHICAGO, 114 S. Fifth Ave. ST. LOUIS, 1106 Pine St. SAN FRANCISCO, 604 Mission St.



LIGHT YOUR HOUSE WITH ELECTRICITY

Put in a Direct Connected Gasoline Engine and Dynamo.

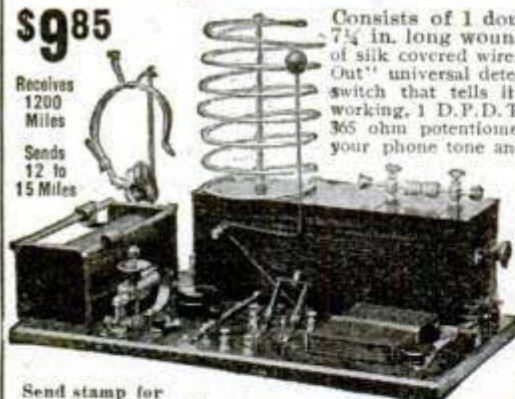
A modern equipment at small cost for farm and house lighting and small isolated plants. Dynamo has an output of 42 volts, charges the battery during the day, and 32 volt lamps are used to light the house. Operation steady and quiet. Write for circular.

THE CARLISLE & FINCH CO., 244 East Clifton Ave., CINCINNATI, OHIO

A Complete Wireless Station

\$985

Receives 1200 Miles
Sends 12 to 15 Miles



Consists of 1 double slide tuner 7 1/4 in. long wound with 160 feet of silk covered wire. Our "Don't Jar Out" universal detector, 1 buzzer and switch that tells if your detector is working, 1 D.P.D.T. aerial switch, 1-365 ohm potentiometer — it increases your phone tone and distance 30%, 1 fixed condenser, 1 standard wireless key, 1 spark coil guaranteed to give 1 1/2 inch spark, 1 helix & cord, 1 machine turned spark gap, 1 flat 8-plate condenser, 1-1000-ohm double pole receiver and cord, 1 nicked headband, 6 insulators & diagram.

Send stamp for bulletin "P" for other remarkable values. Nichols Electric Co., 1-3 W. B'way, N.Y. New Address

ELECTRIC HOME, FARM, STORE, THEATRE & TOWN LIGHTING PLANTS. Water Wheels. Engines Fan & Power Motors. Dynamos. Batteries. Ozone & Massage Machines Carriage, Bicycle, Hunting, Fishing, Flash & Motorcycle Lights MOTION PICTURE THEATRE COMPLETE EQUIPMENTS START YOU with BIG PROFITS. Cat. 3 cents OHIO ELECTRIC WORKS, CLEVELAND, OHIO



EXPERIMENTERS

This is the **Experimenter's Reference Book**

It's the latest edition of the famous Amco Catalogue, 128 pages, fully illustrated, complete description and prices of the latest electrical and experimental apparatus — Storage Batteries, Rectifiers, Transformers, Induction Coils, Wireless Apparatus, Lamps, Flashlights, Meters, X-Rays, Books, Tools, Electric Railways, Steam Engines, Water Motors, Dynamos, Motors, Telegraphs, Telephones, Electrical Supplies, Model Aeroplanes, and Parts for building your own apparatus. 4c in stamps will bring you this wonderful book. The best catalogue of Wireless Apparatus, etc., published.

ADAMS-MORGAN CO. "The Experimenter's Supply House" Box 72 M, Upper Montclair, N.J.



DUCK'S BIG 325 PP. ELECTRICAL AND WIRELESS CATALOG



Mailed for 8c, stamps or coin, which you may deduct on first order of \$1.00. Great cost of catalog and low prices prohibit distribution except to those really interested. Most elaborate catalog of its kind published. Is practically a text book on wireless and electricity. Contains 125 pages wireless insts., numerous diagrams, hookups, etc. 15 pages telegraph insts., 42 pages motors and dynamos. 150 pages electrical supplies, embracing everything electrical.

THE J. J. DUCK COMPANY
Arcade Bldg. Toledo, O.

ELECTRIC LIGHT PLANTS

Complete gasoline engine, dynamo, switchboard and storage battery \$240.

Agents wanted. American Battery Co., 1139 Fulton St. Chicago (Estab. 1889.)

FREE GRAPE FRUIT AND ORANGE TREES to all who reserve one of our choice Citrus Fruit and Truck farms near Tampa, Fla. Sold on our special terms of only 3 1/2 cents per acre per day in tracts of 10 acres or more. This small investment buys you independence and a future. See our ad on page 167, May issue of Popular Mechanics, or write today for large free illustrated book on Florida land.

NORTH TAMPA LAND CO. 836 Marquette Bldg., Chicago, Ill.

being felt by those who were far remote from the strife. The smoker who will have nothing but Turkish cigarettes has found that his tobacco costs him more. Attar of roses is largely a production of Bulgarian rose gardens and Bulgaria was too busy last year to attend to the garden.

Winger's Wireless Telegraph Charts

Make code easy to learn—impossible to forget. Wireless amateurs claim to have learned in 1/2 the time usually required. The rhythm sings its way into your memory. We are the people who put the "ode" into the c(ode). Large size 11x18 1/4" for your station, size 3 1/2 x 5 1/2" for the pocket. Two for 35c postpaid. Singly, 20c each postpaid. Continental or Morse — please say which. No stamps accepted—send either money order or coin. Orders for wireless material \$1.00 or over, acknowledgment will be made on fibre card containing Continental Code. Our wireless printed matter along with 35c order. Otherwise wireless catalogue is 2c.

WINGER ELECTRIC & MFG. CO., 711 S. Dearborn St., CHICAGO, ILL.

WE SAVE YOU MONEY

Vibrators, Motors, and Elec. Supplies. Students, Engineers and School Supplies

on everything. Engineering, Surveying and Astronomical Instruments of Precision. Electrical Specialties and School Supplies. Architect's and Draughtsmen's Materials. Drawing Room Furniture. Adding and Calculating Machines. Machinists' Tools and Measuring Tapes. Electrical Vibrators. Oscillators and Electrical Supplies. Richardson's Direct Reading, Adding, Subtracting and Electrical Slide Rules. Winslow's Concrete and Strength Computing Slide Rules. Johnson's Patent Computing Slide Rules. Pocket Rules. **We Pay All Delivery Charges.**

Write us for prices and circulars of what you want. No order too large or too small to receive our prompt attention. **ZIMMERMAN ENGINEERING & SUPPLY CO., Ft. Wayne, Ind.** Consulting Engineers, Machinery and Boiler Inspections. Patent Work a Specialty



Voltamp Motors "Little Dickie" Prepaid \$1.10

Special Offer, 30 Days This perfect Motor with Switch and "Motor Hints" mailed anywhere in U. S. or Canada on receipt of \$1.10. Every boy and grown-up should have the new VOLTAMP Catalog,—just the book for the experimenter. Wireless, Telegraphs, Telephones, Motors, Dynamos, Transformers, Rectifiers, Miniature Railways and Parts, Raw Materials and hundreds of others. Sent only for 6c in stamps or coin. Largest Electrical Mail Order House in U.S.

VOLTAMP ELECTRIC MFG. CO., Baltimore, Md.

Popular Educational Food Campaign

Brinkler Proves that SUCCESS is more a matter of Meals than of Genius

Success calls for industry, endurance, mental and physical efficiency. Scarcely the strongest will can propel a sluggish, devitalized, ailing body and clouded mental faculties to activity.



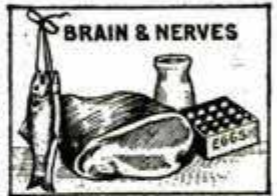
G. H. BRINKLER
Food Specialist

Efficiency from MEALS!

Efficiency, Brinkler has discovered, directly depends on the right meals! The busiest worker, with little or no time for recreation, CAN keep himself in the pink of health and the prime of fitness. Simply by knowing how to eat the ordinary foods in correct quantities and combinations! Brinkler, the food expert at Washington, with twenty years' experience and research in dietetics, has proved his ability to advise a food system suitable to the mental and physical needs of each individual.

How to Increase Brain Power

Efficiency in brain-power is gained through meals comprised chiefly of lean meats, poultry, game, fish, dairy foods, fresh vegetables and juicy fruits. These "maximum efficiency brain meals" enable a person to double the brain power and nerve energy to meet extraordinary stress in work. The different meals promoting efficiency in work of different professions are charted by Brinkler. Eat according to this new brainy dietary system and you make your work easier: Increase your earning capacity through the greater efficiency gained.



BRAIN & NERVES



MUSCLE & BONE

Tomatoes, Lemons, some fruits are solvents; Green Vegetables are laxatives; etc.

Health Without Drugs

Along with increased mental efficiency, come physical development, vigor and health—without drugs. Aged persons have eaten the vital nerve-feeding foods specified (lean meats, fish, white of eggs, curdled eustard, etc.) and the senses become more alert, the eyes strong and clear, and an increased bodily and mental activity. You will find a "first aid to the ambitious" in "The New Brainy Diet System"—sent for 10 cents.

"The lists of daily foods which increase brain power, promote longevity, clear congested liver, etc., are worth untold dollars."

Do a genuine service to your sick friends by sending their names also. Address

G. H. BRINKLER, Dept. 16G, Washington, D. C.

G. H. BRINKLER
Food Specialist

Dept. 16G, Washington, D. C.

I enclose 10c for "The New Brainy Diet System."

Name

Address

CUT OFF AND MAIL

Be Your Own Boss

Do as many others have—Operate a Kingery Peanut Roaster and Corn Popper. Over 30 styles. Liberal terms, excellent profits. Kingery's book of possibilities and No. 41 catalog tell you all about it.

KINGERY MFG. CO., Pearl, east of Broadway, Cincinnati, Ohio

BARODA Flash Like Genuine **DIAMONDS**
at 1/50 the cost—IN SOLID GOLD RINGS

Buy the Baroda for a Diamond

It is the stone nearest a diamond at a price which saves you money. An actually mined stone with lasting fire and brilliancy. You must see it to appreciate it, as thousands of buyers have since 1906. Costs nothing to see. WRITE FOR CATALOG TODAY.

BARODA CO., DEPT. N5, 1460 Leland Ave., Chicago

Hello Boys!

Do You Know thousands of boys like you are having barrels of fun with this toy? Parents give some, many boys "save up" and buy themselves. Can't you get in on this good time? Get now

The Mysto ERECTOR

Make lots of Toys

FREE BOOK My free, 24 page book, in two colors, describes this wonderful toy, its NEW MOTOR, girders, wheels, etc. **HURRY!** Send postal now. Ask about prize contest. Give dealer's name. Address A. C. Gilbert, Pres., **MYSTO MFG. CO., 53 Foote Street, New Haven, Conn.**

HONEST MAN WANTED

in each town for special advertising work; \$15 a week to start; experience unnecessary; references required.

McLEAN, BLACK & CO., 18 E. Beverly St., BOSTON, MASS.

Regular Price **\$1.25** **THE RAPID VACUUM WASHER**

The only Washer with Automatic Suction

Sold on 30 days' trial.

Washes everything from blankets to fine laces. Tub of clothes washed in 5 to 10 minutes. A child can operate it.

AGENTS WANTED. Special price on sample postpaid. Write for terms and trial offer.

STEWART-SKINNER CO., 26 Cherry St., Worcester, Mass.

AGENTS Get the Money

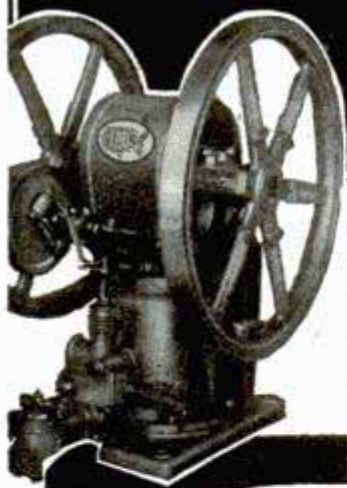
Other fellows are making barrels of money—selling our Concentrated Soft Drinks—greatest summer seller ever introduced. A great repeater, too—one trial and they come back for more. So good to drink—so easy to make—just add sugar and water. Many kinds—orangeade, cherry, grape, etc. Small bottle makes 32 glasses. Guaranteed pure.

Enormous Demand—Big Profits

Easiest seller you ever struck—No experience needed—To show it is to sell it. Everybody wants it—every home, fair, lawn fete, picnic, etc. is a sure customer. Small package—light and convenient to carry. No large investment needed. Biggest opportunity ever offered for making money quick. Hurry up—Don't waste time—send us a postal card TODAY.

THE AMERICAN PRODUCTS COMPANY
2049 Sycamore St., Cincinnati, Ohio

100% PROFIT



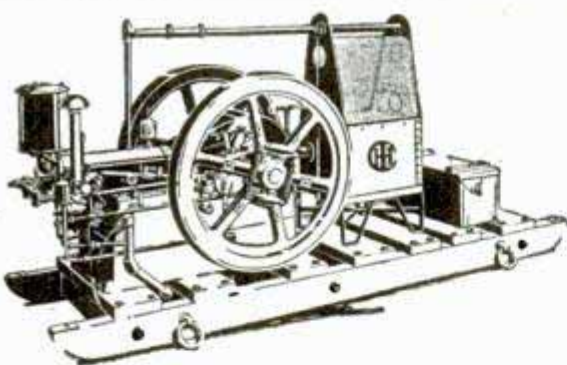
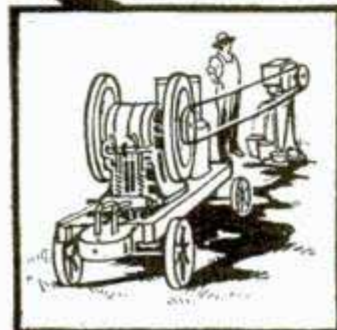
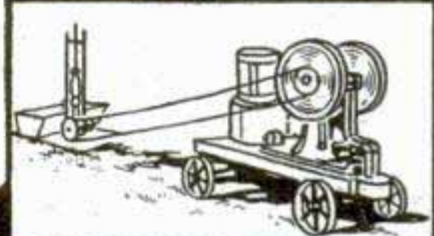
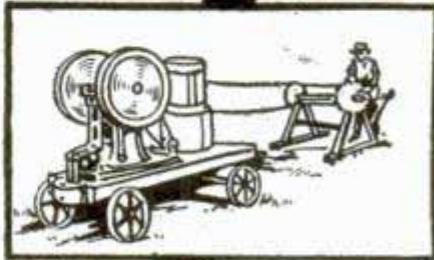
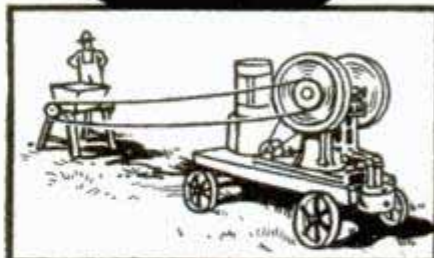
Any Size **ONLY \$5** DOWN-**One Year to Pay**

Here is good news for engine buyers everywhere. You can now get one of the famous guaranteed U. S. Single or Double cylinder engines direct from the factory, on easy payments of only \$5 down and \$3 a month. In this way you won't feel the cost at all. You use the engine for all kinds of power work while you are paying for it. You let it earn its own cost and more before you pay. Write for our big free Catalog Folder today and pick out the engine you want to try for 30 days at our risk. Ten popular sizes to choose from. All guaranteed 5 years — and backed by 62 years' manufacturing experience. We pay return freight charges if you are not pleased.

U. S. ENGINES

are made in sizes from 1 1/4 h. p. to 18 h. p. and in both single and double cylinders. Burn Gasoline, Kerosene, Gas or Distillate; have inverted cylinders, guaranteed to give double the power of other engines of same weight; are easiest to move from one job to another; take up least space; start easiest and run with greater smoothness, saving violent vibrations and wear and tear on machinery. Crank shaft is above cylinders giving perfect lubrication by gravity. Every part easy to get at for adjustment without taking engine apart. Don't buy any gasoline engine until you get our Free Catalog Folder quoting low easy-to-pay factory prices. Write today.

U. S. ENGINE WORKS 3712 Ogden Ave. CHICAGO



What Is Engine Satisfaction?

To have your I H C engine responding steadily and reliably with ample power at any and all hours, when your less wise neighbor has long cast his, bought at the same time, into the scrap heap, and to have perfect repair part service backing you in case of accidental breakage at critical moments—that is what is called engine satisfaction. That is a part of the kind of service you get when you have an

International Harvester Oil and Gas Engine

to furnish your power. In every conceivable line of power use, engines from the complete I H C lines are furnishing most satisfactory power to scores of thousands of users. They are simple, sturdy, and reliable. If service and economy count with you, buy an International Harvester engine.

You will find many styles and sizes — vertical, horizontal, stationary, portable, skidded, air cooled and water cooled, from 1 to 50 horsepower sizes. They operate on the most convenient fuel—gas, gasoline, kerosene, naphtha, distillate or alcohol. Our catalogues will at least interest you. Write for them.

International Harvester Company of America
(Incorporated)

16 Harvester Building CHICAGO U S A

NEW USES FOR ELECTRIC FANS—When first introduced, small electric fans were mainly used for creating a cool current of air in confined rooms and areas. In recent years, however, new fields of usefulness have been discovered for the handy appliance. Thus, for instance, chocolate makers use them in dealing with rush orders. As soon as the chocolates and bon bons are dipped, they are placed on long trays in front of a row of fans, which render the confections ready for packing in a fraction of the ordinary time required. Electric fans are also being largely used for the rapid drying of

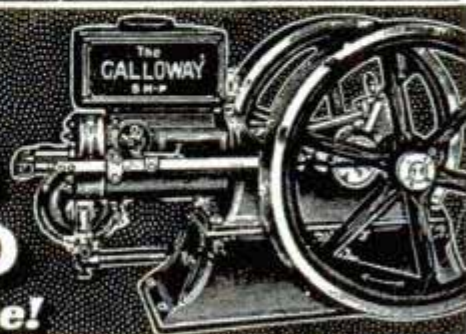
FREE TRIAL 30 DAYS BESSEMER KEROSENE ENGINE

Success with cheap kerosene or coal oil absolutely guaranteed. Try before you buy. Most economical, reliable and durable engine made. So simple and easy the wife or boy can start and run it. People everywhere throwing away their old engines, buying Bessemers and making money by it. Get one for yourself. Be ahead of your neighbors. Runs fast or slow. Will do a dozen things at once. Wonderful beyond belief. Pays for itself in fuel saved. For special discount write at once.

The Bessemer Gas Engine Co., 121 Lincoln Ave., Grove City, Pa



\$50 to \$300 SAVED
Just Write!



Get my prices—my new offers—get them right away. If you're going to buy an engine I'll put \$50 to \$300 in your pocket sure. All the dealers' profits cut off—you get them. You buy direct from my big factory.

Satisfaction guaranteed or your money back with 30 Days' Free Trial out word Any size from 1 1/4 to 15 H.P. Galloway Engines will run on gasoline, kerosene, naphtha, distillate, natural gas or motor spirits. Write for my Big Engine Book and Special Offers today.
William Galloway, Pres., WILLIAM GALLOWAY CO.
965 Galloway Station, Waterloo, Iowa 565

WATERLOO BOY TRACTORS GASOLINE ENGINES CREAM SEPARATORS



Waterloo Boy Farm Tractors, Engines and Separators are the best for the money the world has ever produced. Any one of these machines will increase the production of your farm at a big saving in labor.

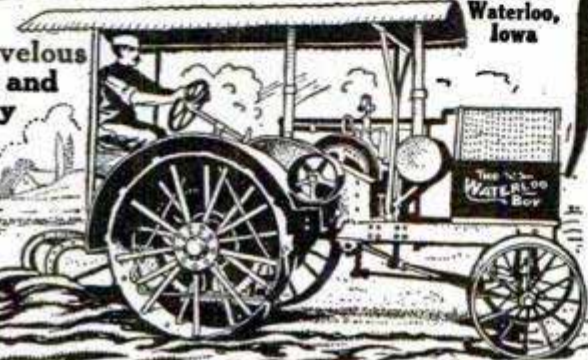
Our light Farm Tractor is a wonder. It turns short and will go anywhere you can work with a team. Our tractors sell at such reasonable prices that you cannot afford to be without one.

All Our Machines are Sold Under Our Strong Five-Year Guarantee

Write today for our catalog and let us tell you about our tractors, engines and separators.

Waterloo Gasoline Engine Company
Waterloo, Iowa

This Marvelous Tractor and Plows only \$1,050.00



photographic prints. Nowadays press photography has to be carried on with such celerity that the time available for drying purposes has to be cut down to a

HUNTERS—TRAPPERS

If you want an ideal lamp for night fishing, trapping, hunting or for work about farm or machinery, send to-day for a



BALDWIN LAMP

Projects a 14 candle power light 150 feet. Burns Acetylene Gas. Weight 6 oz. Height 3 1/2 in. Can be carried in hand or worn on cap or belt, leaving both hands free. No oil, soot or glass. Absolutely safe and simple. Fifty hours' bright light costs 25c. Useful as well during Automobile repairing. Catalogue free and instructive booklet, "Knots and How to Tie Them" mailed on request.

At all dealers or by mail prepaid, \$1.00

JOHN SIMMONS CO., 162 Leonard St., NEW YORK CITY

2 H.P. AMERICAN \$38

Marine Motor only

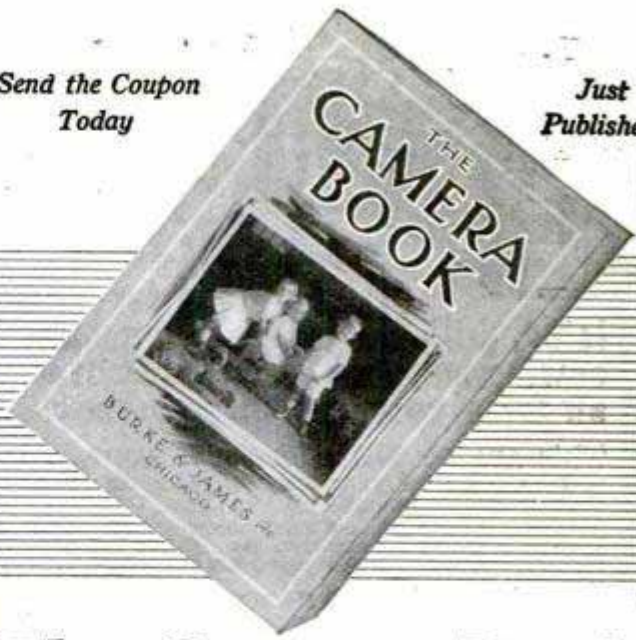
Just the thing for the average family launch. It's compact, easy to install, easy to operate. Women and children can run it with perfect safety. No cams, gears or springs to get out of order or need adjusting. Runs in either direction. Has wide range of speed. Can be furnished for gasoline or kerosene. To start, simply turn on fuel and switch, rock the fly wheel and away you go. We also build other sizes up to 30 h. p.—one to four cylinders. Every one is of such perfect design and made of such good materials that we guarantee them for life. You take no chances with an American. Send for beautiful, new catalog today.

American Engine Co.
414 Boston St.
Detroit, Mich.



Send the Coupon Today

Just Published



The Camera Book FREE

Put your name and address in the coupon, send it in to us and get "The Camera Book" absolutely free. Everybody interested in photography should have it. You will find that it contains a wealth of information and a host of suggestions that you cannot afford to miss. Write for it today. It's free. Your name and address on the coupon or on a letter or a post card is enough.

Ingento Cameras

Are truly master cameras in every sense of the word. They are built by master camera builders and are the result of 25 years of research and study. Now fitted with genuine Acutic lenses—so simple that a child can operate them, but so optically perfect that skilled operators prefer them. Every Ingento is backed by an ironclad unlimited guarantee.

\$2.00 and We Will Ship You the Great Ingento Outfit for Personal Examination.



Just think of it. For only \$2.00 we will send you a genuine Ingento Outfit consisting of camera, films, etc., etc., all ready to take pictures 2 1/2" x 4 1/4" for only a \$2.00 deposit. Satisfy yourself that the Ingento is the greatest camera value in the country today before you decide to buy. Then if you are not absolutely satisfied, send it back at our expense. If you decide to keep it, pay only the balance of the rock bottom price. Send the coupon.

Films Developed FREE

On this great special offer we develop the films included with the outfit absolutely free. Send the coupon for full particulars.

Burke & James, Inc.
Mfrs. Cameras & Supplies
Dept. 119Y
240-258 East Ontario St.
CHICAGO, ILL.

Send the Coupon

Put your name and address on the coupon or on a letter or a post card now and get "The Camera Book" absolutely free. We will also send you full particulars of this great special offer and tell you exactly how you can have an Ingento of your own. Act now. Send the coupon while this offer lasts.

GENTLEMEN:—
Please send me free your new Camera Book and full particulars of special offer made here. Also tell me more about Ingento Cameras and the wonderful Acutic Lens. It is distinctly understood that I assume no obligations of any kind.

BURKE & JAMES, Inc.
Mfrs. Cameras and Supplies
Dept. 119Y
240-258 E. Ontario St.
Chicago, Ill.

Name

Address

Dealer's Name

Please Mention Popular Mechanics



**ONLY \$15.00 FOR THIS
3/4 H.P. ENGINE**

Height of engine 15 inches;
weight of engine 45 lbs. Can be
carried in a suit case.

**Just the thing for running a
lathe, drill, saw, washing machine, fan,
sewing machine, ice cream freezer, auto
air pump, vacuum cleaner, horse clipper.**

This engine fills a long-felt want, a small
power engine for the workshop, doing the work of an
electric motor for one-third the cost.

No workshop is complete without power and no workshop can
afford to be without power when the EMPIRE can be purchased
for almost nothing. A child ten years old should learn to oper-
ate it in thirty minutes.

DESCRIPTION

The EMPIRE is a two-cycle, jump spark engine. Is made along simple and
practical lines so that it is not difficult to handle. The crank shaft is made of
best drop forge steel. The piston has two rings, being also made of the best
obtainable material. The fly-wheel and pulley are cast in one piece and are
keyed to the crank-shaft with a Woodruff key. The water hopper is of ample
capacity to keep the engine at the proper running temperature. The fuel is
kept in the base of the engine and is mixed with the lubricating oil, this doing
away with unnecessary sight-feed oils, at the same time insuring proper
lubrication. The speed is variable, from 300 to 1000 R. P. M., and can be
changed while the engine is in motion. Engine shipped complete, including
batteries, spark coil and all equipment necessary to operate.

GUARANTEE

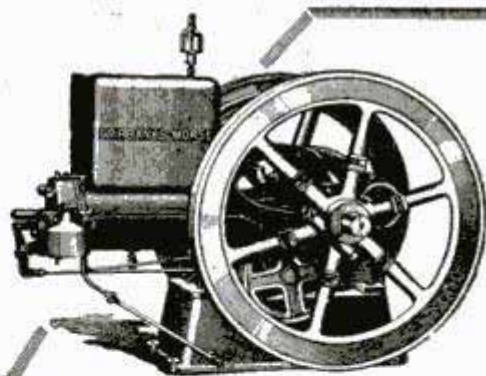
We unconditionally guarantee that every pound of material used
in the EMPIRE 3/4 H. P. is free from defect in material or work-
manship, and will replace any time within three years from date
of purchase any parts showing defect from either cause above
stated.

OUR PROPOSITION

We will ship one of these engines complete upon receipt of \$15.00,
money order or bank draft, to any address, or will make a time
proposition as follows: \$10.00 money or bank draft with order,
and \$2.00 per month for five months, or \$20.00 in all.

This \$15 price is special and holds good for a limited time
only. Better order today. Exclusive agency given to live wires

EMPIRE NOVELTY CO., Dept. A, Waterloo, Iowa



2, 4
and
6 h. p.

**Save Money by Using
Kerosene**

A gallon of Kerosene or low grade distillate
will do the work of a gallon of gasoline in this
oil engine. Plenty of power to saw wood, turn
grindstone and other light machinery.

Fairbanks-Morse Oil Engines

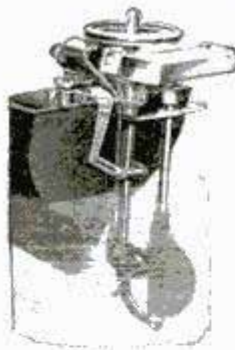
are built first of all for reliability. Extremely simple.
No batteries required, as magneto supplies spark, even
at starting. Throttling governor keeps speed steady
under wide changes of load. Engine needs little
attention. Every one guaranteed.

Write for Catalog 30S449

Fairbanks, Morse & Co.
Chicago, New York, San Francisco
and many other cities

Waterman PORTO Does It

Makes any boat a motor boat. 1914 Model, 3 H. P.
Weight 59 lbs. Sold direct from Factory to you,
freight paid. Save Agent's profit.



The Waterman PORTO is the original outboard
motor. 9th year - 25,000 in use. Guaranteed
for life. Fits any shaped stern; has Carburetor—
not "mixing valve"; 3 Piston Rings instead of
1; Removable Phosphor Bronze Bearings; Solid
Bronze Skeg, protecting 10 1/2 x 16 in. Propeller.
Steers by rudder from any part of boat. Water-
cooled Exhaust Manifold; Noiseless under-water
Exhaust; Bronze Gear Water Pump; Spun-copper
Water Jacket; any ignition equipment desired.

DEMAND these essentials
in an out-board motor, or you
won't get your money's worth.

Write Today for FREE Engine Book.

WATERMAN MARINE MOTOR CO., 230 Mt. Elliott Ave., Detroit, Mich.

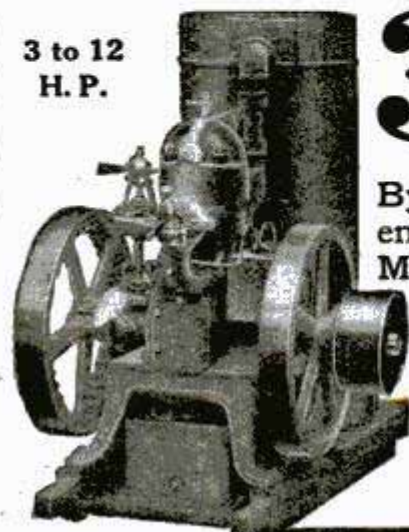
minimum, a result which is served by the use of the
fans. In the bottling department of a New York firm of
chemists, a room is equipped with long tables on which
bottles are ranged in open rows, each displaying a fresh
and, as yet, moist label. Maintaining a vigorous cir-
culation of air, a number of fans hum away on neighbor-
ing brackets and dry the labels in a very short time;
the installation having proved extremely satisfactory.



**Light
Weight Cushman
All-Purpose Engine**

4 cycle, 4 H. P. Weight 190 lbs. A wonder
helper, famous for its great power in light
weight. Convenient to handle—fits in any-
where—adapted to all duties. The Original
Binder Engine. Also double cylinder specialty
engines for all power work, 6 H. P. to 20 H. P.
Throttle governor, Schebler carburetor.
Catalog free.
Cushman Motor Works, 900 N. 21st St., Lincoln, Neb.

3 to 12
H. P.



34c

**Runs this 6 H. P. Engine for a
10 hour day on KEROSENE**

By means of the patent throttle you can run it as a 4 H. P.
engine for 23 cents a day, or as a 2 H. P. for 12 cents a day.
Many other strong points; force-feed lubrication; uniform speed;
sight-feed fuel supply; automobile muffler; no cranking; runs
either way; uses any fuel oil satisfactorily. And it's **Guaran-
teed for 10 Years.** Write for catalogue and 30 days' free trial.

WE PAY THE FREIGHT

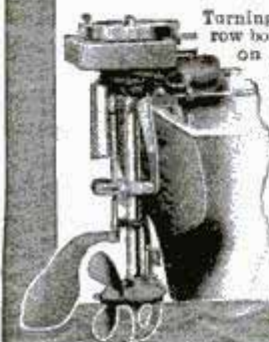
ELLIS ENGINE CO., 65 Mullett St., Detroit, Mich.

"We're Having The Time of Our Lives"



WE'RE enjoying thousands of new boating pleasures every day with our common row boat and the best, simplest, sturdiest little row boat motor—the

Portable
Caille
Boat Motor



Turning two thumb screws attaches it to any row boat. Weighs but 55 lbs. Runs 7 to 9 miles an hour or slow enough to troll. Steers with our patented folding rudder. Supplied with batteries or reversible magneto. No extra charge for underwater exhaust. Send for catalog giving details. Sold by leading sporting goods and hardware dealers.

We Also Build

marine motors from 2 to 20 H.P. If interested, ask for our Marine Motor Blue Book.

The Caille Perfection Motor Company
World's Largest Builders of Two-Cycle Marine Motors
1418 Caille St. Detroit, Michigan



DO YOU KNOW—

That we have brought out a new High Speed "Buffalo" Model—Four cylinder, 16-20 h.p.; bore, 3 $\frac{1}{4}$ " stroke, 5"; speed, 800 R.P.M.; weight, 525 lbs.; all working parts enclosed; constant level splash lubrication. Write for details.

BUFFALO GASOLENE MOTOR CO.
1293-1305 Niagara St. BUFFALO, N. Y.



GET THIS CATALOG
FULL OF VALUABLE INFORMATION TO EVERY
BOAT OWNER ON

RACING PROPELLER WHEELS,
REVERSE GEARS AND
MARINE ACCESSORIES

LARGE CATALOG FREE. SEND TODAY

MICHIGAN WHEEL CO.

1139 MONROE AVE. GRAND RAPIDS, MICH.



\$130 The Greatest Motor Boat For The Money Ever Built

MULLINS 16 foot special steel launch affords the pleasures of motor boating, and provides a safe, seaworthy, dependable motor boat, with graceful lines and beautiful finish—**Absolutely Guaranteed Against Puncture**—Safe as a life boat, with air chambers concealed beneath decks in bow and stern—Can't warp, split, dry out or rot—No seams to calk—No cracks to leak.

MULLINS \$130 Special Launch is equipped with 2-Cycle, 3-H. P. Ferro engines, that can't stall—Speed 8 1-2 to 9 miles an hour—One man control—Fitted with MULLINS silent under-water exhaust.

This 16 footer seats 8 people comfortably—has 4 foot beam and 11 foot 4 inch cockpit—Positively the greatest launch value ever offered. Write today for beautifully illustrated motor boat catalog, containing full particulars.

THE W. H. MULLINS COMPANY

151 Franklin St. Salem, Ohio, U. S. A.
THE WORLD'S LARGEST BOAT BUILDERS



MULLINS STEEL BOATS CAN'T SINK

Home Billiards!

This Puts All Hearts On Spring Heels

Was it mother's sly idea to open the home to the Brunswick Baby Grand Table? Did she aim to dismiss dull care from father's brow? Or was it her plan to keep the boys home nights? Both of these things have happened. And mother chuckles suspiciously and refuses to be interviewed.

Thousands of wholesome families now know the fuller joys of home life together. Now they are playing real Billiards and Pocket Billiards. For Brunswick Tables give them the thrilling grown-up game—not a childish makeshift.



Brunswick Baby Grand Pocket or Billiard Table

The most popular "baby" in America—slightly smaller than a full sized table yet with all its scientific playing qualities. Made of beautiful San Domingo Mahogany, genuine Vermont slate bed, celebrated Monarch quick-acting cushions, accessory drawer to hold entire playing outfit.

Other styles of Brunswick Home Billiard and Pocket Billiard Tables include "Convertible" Library and Dining Tables and Davenport that fit in any cozy home. Have all the utility of furniture and give you these royal games besides!

Playing Outfit FREE

Cues, Balls, Rack, Bridge, Brush, Chalk, Cover, Markers, Book "How to Play," etc., included with every table without extra cost.

This is our offer and with no strings attached. Yet we also give you a year to pay.

CLIP AND MAIL FOR FREE BOOK

or write us if you prefer

THE BRUNSWICK-BALKE-COLLENDER CO.
Dept. 1B, 623-633 S. Wabash Ave., Chicago

Please send me free color-illustrated book—

"Billiards—The Home Magnet"

picturing and describing all Brunswick Home Tables, together with factory prices, terms and easy-purchase plan.

Name

Address

Please Mention Popular Mechanics



The Seal of Safety
at Sea

"Electrically Started"

You can now have your Scripps motor equipped with a powerful, electric self-starter.

As you will see in the illustration, this starter has not been simply "glued on," like many so-called installations are. It has been carefully designed for us by the Rushmore Company, and our castings have been altered to accommodate it.

With a gearing of $7\frac{1}{2}$ to 1, it will spin one of our Model H, 4-cylinder motors more than 160 r. p. m. Furthermore, it will start the motor "on the magneto," and with the throttle wide open. Even with the gearing mentioned, it has more than enough power to overcome any adverse starting conditions.

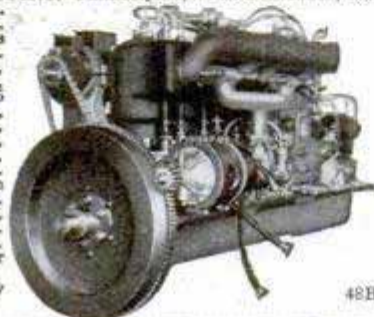
When the marine motor starts, the driving gear of the electric starting motor is thrown out of mesh, automatically disconnecting the device.

This new starting system is simple and satisfactory—an installation selected after two years of exhaustive experimental work, as one which can be depended upon to fully live up to Scripps requirements of reliability and service.

The 1914 Scripps Motor Book tells you in detail all about 17 different models, including 1, 2, 4 and 6-cylinder types, semi-speed, medium duty and extra heavy duty. You will be interested in the new kerosene and distillate motors, and other vital improvements. Write for your copy, to-day.

SCRIPPS MOTOR COMPANY
637 LINCOLN AVE. DETROIT, MICH.

New York, Bowler, Holmes & Hecker Co., 221 Fulton St. Chicago, O. L. Cosgrove & Co., 215-219 Englewood Ave. Philadelphia, W. E. Gochenaur, 631 Arch St. St. Louis, Mo., Chas. J. Pettit, 1860 N. Market St. Jacksonville, Fla., Gibbs Gas Engine Co., Foot of Main St. Seattle, Wash., S. V. B. Miller, 72 Marion St. San Francisco, Cal., Ellery Arms Co., 583-585 Market St. Los Angeles, Cal., Marine Engine & Supply Co., 831 S. Los Angeles St. Duluth, Minn., Kelley Hardware Co., 118-120 West Superior St. Toronto, Ont., Schofield-Holden Machine Co., 2 Carlow Ave. Montreal, Quebec, W. E. Baker, Forum, Edg. Atwater St. Winnipeg, Man., D. A. Ross, New Orleans, La., Arthur Davie, 130 Chartres St. EXPORT OFFICE—17 Battery Place, New York City.



48B



This Canoe Makes any Stream a Summer Resort

For restful, peaceful, hot weather comfort just paddle your "Old Town Canoe" into any of those cool, shady nooks that line the shores of every lake and stream. Vacation trips—fishing, hunting, camping and picnic parties are all more pleasurable with an

"Old Town Canoe"

It won't leak or absorb water—made of tough cedar specially treated and canvased. It is strong and safe—swift and graceful. 2000 in stock—agents everywhere. Our catalog will tell you more—write for it.

OLD TOWN CANOE CO.
1367 Middle Street,
Old Town, Maine, U. S. A.



This Boat
Paid Him
\$516.00 In
63 Days

Then
He Sold It
At a Profit
of **\$153.75**

Mr. D. H. Durgin, of Blue Creek, Wash., whose boat is illustrated here, writes: "I made this boat pay me \$516.00 in 63 days and then sold it for \$250.00. I built it after a Brooks Pattern and it cost me only \$96.25 complete.

Build Your Boat By The Brooks System

and save a big part of the price. It's simple and easy work—anyone can do it. We send all parts—you simply put them together, guided by full size patterns and illustrated directions. The Brooks System brings a beautiful cruiser, a speedy motor boat, a family launch, "V" bottom, sail boat, row boat or canoe—any style boat within the reach of anyone.

Write today for Free Boat Book

and see the fine models that you can build easily in spare time. \$2 and up buys complete set of patterns. Only \$35.00 buys complete knocked-down frame for 23-foot power boat with complete patterns to finish. Book tells all. Write for it today.

BROOKS MFG. CO., 8207 Rust Ave., Saginaw, Mich.
The Largest Plant of its Kind in the World
Originators of the Pattern System of Boat Building

Please Mention Popular Mechanics



CANOE \$18 AND UP ROWBOATS \$18 AND UP

FISH AND HUNTING BOATS \$18. KAYAK \$22. BOATS FOR DETACHABLE MOTORS. MOTOR BOATS with or without engine, 16, 18, 20, 22 and 24 ft. Catalog Free
Thompson Bros. Boat Mfg. Co., 95 Ellis Ave., Peshigo, Wis.

Toledo MARINE MOTORS

"Nothing Cheap but the Price"

3 H. P. 1 cyl. complete	\$ 65.00
6 H. P. 1 " " "	84.00
6 H. P. 2 " " "	125.00
12 H. P. 2 " " "	160.00
18 H. P. 3 " " "	250.00

Fully guaranteed by a responsible concern. 2 cycle, 2 port, $3\frac{1}{2} \times 3\frac{1}{4}$ and $4\frac{1}{2} \times 4\frac{1}{4}$. Send for free catalog "C."

THE UNIVERSAL MACHINE CO., Pike Ave., Bowling Green, O.



NORTHWESTERN "GIANT" MARINE ENGINES

For Fishermen, Guides and Boat Liveries and those who want absolute reliability.

7 H.P. develops actual 9 H.P.

The Most Compact Marine Engines in Existence of medium weight, moderate speed and a very modest price. The standard 2 cycle engine of the world. Planhard carburetor, spark and waterproof commutator. Patented gas-tight bearings, flange couplings, magneto with storage battery, sight feed oilers, etc. 2, 4, 7, 10 and 18 H. P.—Prices \$50 and up. New 1914 catalog in colors. Hundreds of engines on hand for immediate shipment. Get the agency in your town.

NORTHWESTERN MOTOR CO., 774 Spring St., Eau Claire, Wis., U. S. A.





AT LAST

The Right Principle

A Portable Gasoline Marine Engine that can do things—go anywhere a boat can be rowed—in water as shallow as will float the boat.

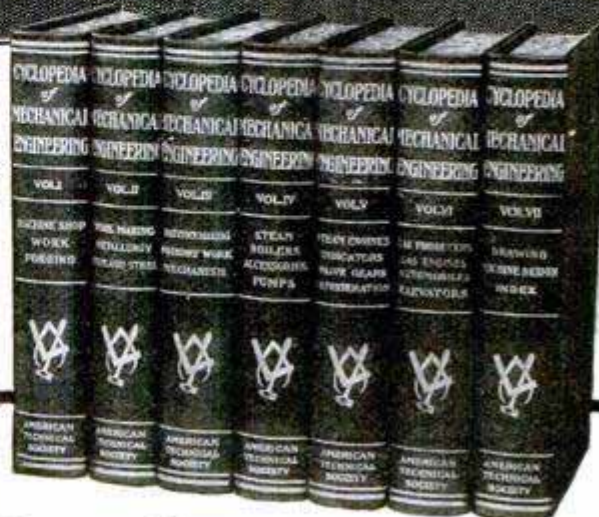
Most outboard motors heretofore had a constructive weakness which prohibited their use in very shallow water or where there were weeds—usually requiring at least a foot of water under the boat.

The Strelinger Portable Boat-Drive overcomes this difficulty. The propeller can be raised and lowered at will; instantly, avoiding all obstructions with perfect control. Motor is detachable, in three parts—engine, propeller, shaft and fuel tank. The weight is equally distributed, making it easy to carry, yet quickly attached to any boat. It may be used as a stationary engine.

2 to 5 horsepower, \$60 to \$120
Write for agents' special prices

Strelinger Marine Engine Co.
200 Woodbridge St. W. Detroit, Mich.

MECHANICAL ENGINEERING



Famous \$35.00 Set—Now \$19.80
\$2.00 a Month

Mechanical Engineering, Gas Engine Operation, Modern Shop Practice—the whole subject covered by experts from A to Z in this great big seven volume Cyclopedia. Everything you want to know on the subjects mentioned below is treated in simple, non-technical language by men who are not only expert engineers themselves, but great teachers and writers. The full, complete \$35.00 edition, for a short time at \$19.80—\$2.00 a month.

SHIPPED FREE Here's our offer: We'll ship the entire seven volumes free, express paid, merely at your request on coupon below for seven days' free examination. If you like the books, pay only \$19.80—at \$2.00 a month. Otherwise we'll take them back without charging you one cent.

Subjects Thoroughly Covered

Machine Shop Work—Vertical Milling Machine—Motor-Driven Shops—Shop Lighting—Forging—Electric Welding—Tool Making—Metallurgy—Manufacture of Iron and Steel—High-Speed Steel—Flaws in Castings—Electric Lifting Magnets—Magnetic Clutches—Making a Machinist—The Ideal Foreman—Pattern Making—Foundry Work—Automatic Coal and Ore Handling Appliances—Machine Parts—Construction of Boilers—Types of Boilers—Boiler Accessories—Steam Pumps—Air Compressors—The Steam Engine—The Steam Turbine—Indicators—Valve Gears—Refrigeration—Gas Producers—Gas Engines—Automobiles—Elevators—Sheet Metal Work—Practical Problems in Mensuration—Mechanical Drawing—Drafting Room Organization—Machine Design, etc.

3,092 pages, 7x10 inches; 2,327 illustrations, full page plates, diagrams, etc.; hundreds of valuable tables and formulas; carefully cross-indexed for quick, easy reference. Bound in half red morocco, gold stamped.

FREE!! \$12.00 Consulting Membership

Every man who takes advantage of this offer now gets absolutely free our complete consulting membership, under which our entire staff of engineers answers all questions and solves all your engineering problems a whole year absolutely free. One question answered may be worth more than the whole price of the books. Usual price \$12.00—now free with the books. Fill out and mail us this coupon. Books go to you at once, express paid. Our liberal offer protects you. You take no chances. You are not bothered. If the books cannot sell themselves to you strictly on merit, don't keep them. But first inspect them. Mail the coupon today.

FREE COUPON

Worth \$15.20 to You
American Technical Society:

Please send me seven volume set Cyclopedia of Mechanical Engineering for seven days' free examination. If I decide to buy, will send \$2.00 in seven days and balance \$2.00 a month until \$19.80 has been paid, when \$35.00 books and \$12.00 consulting membership will be mine free. Otherwise will notify you and hold books subject to your order. Title not to pass until fully paid.

NAME.....
ADDRESS.....
As I have had no previous dealings with you, I refer you to

American Technical Society
Chicago, U. S. A.

Pop. Mech. 7-14

Please Mention Popular Mechanics

The 300th anniversary of the granting of the first general charter for commerce, by the States General of the United Netherlands, to what is now New York City, fell on March 27, this year.



WATKINS' SPECIAL MOTORS

3 H. P. Single Cylinder . . . 30 lbs.
6 H. P. Double Cylinder . . . 60 lbs.
12 H. P. Four Cylinder . . . 100 lbs.
A strictly HIGH GRADE Motor that will give CONSTANT and EFFICIENT service. Especially adapted for CANOES and LIGHT BOATS. Aluminum base, copper water jacket, steel shaft, bronze bearings.

THE WATKINS MOTOR CO.
837-839 West Sixth Street CINCINNATI, OHIO

VIM MOTORS

5 to 55 h.p. 3 kinds
Speed—Regular—Heavy Duty

Strong, neat, simple—absolutely dependable. Wins your enthusiastic confidence. Accessible. Built to last a life time. Heavy brass fittings. Non-back-firing. Double lubrication.

VIM MOTOR CO.

1, 2, 3 and 4 Cylinder
Use Gasoline or Kerosene

Your boat will provide exhilarating and healthful recreation—equipped with a VIM. It's the old boatman's choice. Read 27 reasons why in "Boating Facts"—our new free book.

107 Water Street
SANDUSKY, OHIO

Rest! While the "RED-E-MOTOR" Does the Work

Everyone can use a "Red-E-Motor" for power, as it is designed especially for small jobs.

Made in sizes from one-fourth to one horsepower they are the most adaptable and the only sensible engine to use for driving washing machines, separators, churns, railroad velocipedes, etc., and connected direct to a dynamo they form a perfect electric lighting set. They are safe, sure and serviceable; strong and inexpensive. Made water or air cooled in various styles.

Send for Catalog 14B—it tells all about the "Red-E-Motor."

ELGIN WHEEL & ENGINE CO., ELGIN, ILL.



THE Row Boat Engine THAT IS Mechanically Better

At Last! The right idea in portable motor construction. A brand new principle—no gears used.

The Gray Gearless not only makes a motor boat of any row boat, but it makes a **better motor boat**—a dependable motor boat—does anything that any portable motor will do and **does it better**. Attaches with two thumb screws—runs all day on a few cents' worth of gasoline. Clean—simple—sure—safe. Has **more power, less weight, fewer parts, longer life**, steers easier and gives your boat greater speed. Our literature gives you the **inside facts** about portable motors—and a pictorial demonstration of Gray Gearless superiority.

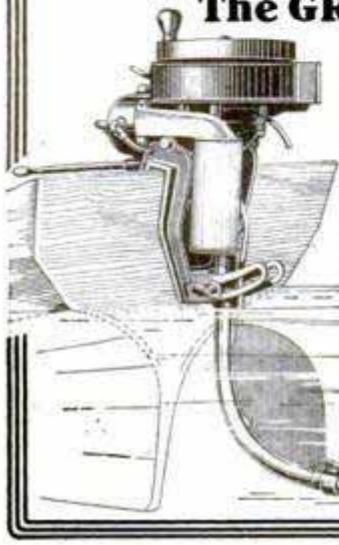
The GRAY GEARLESS Detachable BOAT MOTOR

is the **right** engine to carry with you on that vacation, hunting, or fishing trip, because it can be absolutely depended upon.

Engine shipped complete, ready to run in either fresh or salt water. Packed in a permanent, easy carrying case. Built by the largest marine engine builders in the world and backed up by a guarantee that assures lasting satisfaction.

MAGNETO In addition to our regular ignition equipment we can furnish either Bosch High Tension Magneto or Elkhart Magneto. See your nearest hardware or sporting goods dealer or any Gray agent. If your dealer is not yet handling the Gray Gearless, we can make immediate shipment direct from factory.

Gray Motor Company
7806 Gray Motor Bldg.
DETROIT, MICH.



MARINE AERIAL

ROBERTS

AUTOMOBILE STATIONARY

The Motors That Never Backfire

In Which Motor Are You Interested?

The Roberts Motor Co., 419 Columbus Ave., SANDUSKY, OHIO

EVINRUDE

The Evinrude Detachable Rowboat Motor makes any rowboat a motorboat in less than one minute. 1914 models equipped with Built-in Reversible Magneto, Maxim Silencer, Compensating Device, Shock Absorbing Device and other exclusive features. Illustrated catalog sent free upon request.

Evinrude Motor Co., 238 M St., Milwaukee, Wis.

MOTOR-BOAT \$91.00

A complete 14 ft. V-Bottom Family Launch with a 2 1/2 H. P. engine all ready to run. No excuse for not having a Power Boat of your own.

Send for Special Bulletin No. 13

VALLEY BOAT & ENGINE CO.,
Saginaw, Michigan

See Yourself in Motion Pictures

A New Invention
ENABLES YOU TO MAKE AND SHOW Motion Pictures of yourself, family, friends, sports, travels, or anything that interests you

FOR PLEASURE OR PROFIT

\$39.00 Cash
Also on easy payments
Your old camera taken in trade

No Experience Necessary—
As Easy to Work as a Kodak

Our "Vista" combines a perfect Motion Picture Camera, taking standard size films—a Projector—still Camera—Printer—Stereopticon and Enlarging Machine.

Send for descriptive catalogue No. 5—A 400 page book, 80 illustrations—free with each camera

MOTION PICTURE CAMERA CO., Inc., 5 West 14th St., New York
Importers and Mfrs. of motion picture apparatus

FIRE! FIRE! FIRE!

What of it? You are protected if provided with the **CHIEF'S EXTINGUISHER**. Lowest in price; Non-freezing—Non-leaking; Liquid will not injure skin or fabrics; No mechanical moving parts; No compressed air; Will extinguish gas, gasoline, electrical short circuits, and is perfect for motor boats, camps, autos, and should be in every home for general use. No re-filling or attention until liquid has been used on fire. Delivered prepaid at \$3.50 in either nickel plate or polished brass finish. Limited number of agents wanted. Send your check or money order to

The S-M Sales Co., 6 Beacon St., Boston, Mass.

New 1914 Model SEND NO MONEY

Just send your name written plainly on a postal card and learn by return mail how to get the best Vacuum Cleaner on the market, *without costing you one cent!* We are putting them out for demonstrating purposes. Guaranteed 5 years. Reliable, live agents wanted everywhere. Write today to

Warner Vacuum Cleaner Company, Dept. 80, Muncie, Ind.

\$54.75 Freight Paid

THE NEW ROWBOAT MOTOR

A brand new member of the famous L. A. family. The fruit of 8 years' marine motor experience and sold direct from factory on

30 Days' Free Trial The popular outboard style of motor is now, for the first time, offered for sale at a popular price. You can enjoy all the pleasures of motor-boating this summer—such a summer as you never had before. The L. A. is light as the lightest, strong as the strongest, with many exclusive refinements. It drives a rowboat 8 miles an hour, or slow enough to troll. Instantly attachable—instantly removable.

Order today, sending \$64.75, and motor will be sent, freight paid. Try it 30 days. Send it back at our expense if unsatisfactory. Fully guaranteed. Send for L. A. catalog and post yourself on this popular motor at a popular price. Magneto equipment at slight additional cost.

LOCKWOOD-ASH MOTOR CO.
776 Horton St., Jackson, Mich.

Save The Dealer's Profit



The
"Clipper" Belt Lacer
TRADE MARK LACE IN THREE MINUTES
 Has Made Good

It will also help you make good. Just tell your boss of its advantages, and ask him to write for a 30 days' free trial with full return privileges. After he sees the increased belt efficiency—you'll be repaid.

Don't put it off. Tell your boss today.

Send for our story, "How Scotchie Made Good." Real "Hot Stuff."

Clipper Belt Lacer Co.
 1032 Front Ave. GRAND RAPIDS, MICH.



**YOUR PICTURE IN A POSTAL CARD
 IN ONE MINUTE**

The pictures are developed, toned and finished in a single developing solution. No experience is necessary. Price of machines \$7.50 and \$15.00—circulars describing our machines sent free. We are also headquarters for supplies for all minute picture machines.

AMERICAN MINUTE PHOTO COMPANY
 Desk A 96, 2214 Ogden Ave., Chicago, Illinois
 The largest manufacturers and distributors of minute picture machines and supplies in the world.

Cut Your Coal Bills 1/2 to 2/3

You can do it with a Williamson Underfeed furnace or boiler. And over 25,000 users have proved it. With the Underfeed, you can use cheap slack soft coal or pea and buckwheat hard coal and secure better, even heat than from highest-priced coal, with no smoke, soot, smell, clinkers and dirt. Adapted to warm air, steam and hot water. Write for full information. It will pay you well.

THE WILLIAMSON HEATER CO., 241 Fifth Street, Cincinnati, Ohio
 Formerly Peck-Williamson Co.

MONEY IN MUSHROOMS

**Add \$10 to \$50 a Week to Your Income
 Grow Mushrooms**

at home in your basements, barns, sheds, etc., without interfering with your regular occupation. Small beds, 5 x 10 ft., costing practically nothing to start, often produce 60 to 100 lbs., selling at 50c to \$2.00 a lb. Your whole family can help in raising them. Others are making money growing mushrooms. Why don't you? My illustrated booklet telling how to start how to sell, etc., sent free. Write today.

A. V. JACKSON, Falmouth Mushroom Cellars, Inc., 196 Gifford Street, Falmouth, Mass. The largest modern mushroom farm in the world.

The "Safety First" Sign

in buying shirts is the Signal Trade-Mark—always look for it. For your money's worth get the \$1.00 Signal Coatshirt. Has many exclusive features. Ask your dealer. If he hasn't it, send us his name and your size, and we will express one C. O. D. Return at our expense if not satisfactory. Style folder and sample swatches sent free. Write today. *Union Made.*

Hilker-Wiechers Mfg. Co., 1254 Mound Ave., Racine, Wis.



**Use This
 Genuine Folding
 Naco Camera
 10 Days
 FREE**

**NO
 MONEY
 in
 Advance**

By our remarkable free trial offer—the first and only offer of its kind ever made—we make it easy for every one—for you—to now own a high-class Camera—to share in the great pleasure that a Camera gives—to take pictures for profit, for fun, for study, for education. If you aren't delighted with it—wild about it—return it at our expense and trial will cost you nothing.



NO RED TAPE

Send no money—no security—no guarantee—we trust you. You risk absolutely nothing. This is a liberal, broad, tremendous offer—no red tape—no delays. We will send you Parcel Post prepaid our genuine Folding Naco 3-A, the Camera with a National reputation. Use it 10 days at our risk—see what wonderful pictures it makes—note what a

Remarkable Camera

it is—note the wonderful, rapid, symmetrical lens, Naco automatic shutter, brilliant reversible fender, that works either horizontally or vertically, two tripod sockets and improved spool holder for either six or ten exposures. Takes pictures 3 1/4 x 5 1/2 inches—Post-Card Size

EASY TERMS

If at the end of ten days you want to keep this celebrated Camera, send us \$2—that's all—as first payment, and \$2 thereafter for nine months—\$20 in all. This famous Folding Naco 3-A sells for \$20 cash the world over, but we alone let you have it at the same price on easy monthly payments. No other firm makes such an offer—this is your only opportunity to get a standard, high-grade Camera on easy payments.

SPECIAL Film Offer

Greatest offer known—you will need one or more rolls of film to try out this camera, so we make you a big special offer. Send 50c with Coupon below and receive with Camera a roll of film that will take six pictures. After you have taken the pictures send roll and WE WILL DEVELOP and PRINT them FREE.

SEND Coupon NOW

If you've never owned a Camera you don't know the great pleasures awaiting you if you send the coupon at once. Don't miss this big opportunity. I will send \$2.00 as first payment and \$2.00 per month for nine months. If not satisfied I will return it within 10 days at your expense. (I enclose 50c for special film offer.)

National Camera Co., 1424 Chestnut Street, St. Louis, Mo.

Name.....

Address.....

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

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

National Camera Co., St. Louis, Mo.
 Send Naco 3-A Camera for 10 days free trial. If satisfied, I will send \$2.00 as first payment and \$2.00 per month for nine months. If not satisfied I will return it within 10 days at your expense. (I enclose 50c for special film offer.)

1424

How to PITCH The "Fade-away"

By **CHRISTY MATHEWSON**

of the New York Giants

FREE

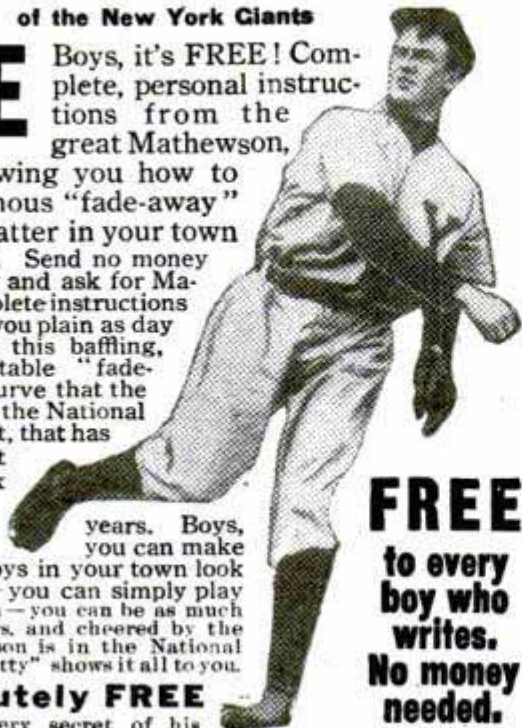
Boys, it's FREE! Complete, personal instructions from the great Mathewson,

himself, showing you how to pitch his famous "fade-away" so the best batter in your town can't hit it safe. Send no money — simply write and ask for Mathewson's complete instructions — he will show you plain as day how to throw this baffling, puzzling, unhitable "fade-away" — the curve that the best batsmen in the National League can't hit, that has won the pennant for the New York Giants three consecutive years. Boys, with this curve you can make all the other boys in your town look like monkeys — you can simply play horse with them — you can be as much feared by batters, and cheered by the fans as Mathewson is in the National League. For "Matty" shows it all to you.

All Absolutely FREE

He explains every secret of his pitching to you — how to stand, how to grip the ball, how to "wind-up," how to let it go. Photographs of every move make it all plain as A-B-C, so anybody can master this great curve at once and become the pitching hero of his town, the boy whose team is bound to win. It doesn't cost you a penny — the complete instruction is free, just for selling a few papers. Don't wait a day to learn how to throw the "fade-away," get it first and put one over on the other boys. Send no money — simply write and say "send on the papers to sell and give me free, Mathewson's complete instructions."

Address, **W. D. BOYCE CO., Dept. 391, Chicago**



FREE
to every
boy who
writes.
No money
needed.

Bright and Clean—Just Like New!



YOU can keep nearly everything in home, office or store always perfectly oiled, "clean as a whistle," polished bright as new and as free from rust and tarnish as the day it was bought.

Try **3 in One** for sewing machines, clocks, cameras, typewriters, furniture, bathroom fixtures, electric fans, lawn mowers, guns, fishing rods and reels, etc.

Three sizes—10 cts.—25 cts.—50 cts. Sold at all good stores. Library Slip with every bottle.

FREE Write for generous sample and Dictionary —FREE!

3 IN ONE OIL CO.
42CNM. Broadway, N. Y.

Tailoring Salesmen WANTED

We want live, energetic hustlers, men who can make good; who are ambitious to start in a business of their own. No canvassing; no experience required; no capital necessary. We furnish everything to start. Hundreds are making from \$100 to \$200 per month and expenses. We guarantee absolute satisfaction and take all the risk. We are one of the largest woolen mills in the country and positively have the only up-to-date, high-quality, low-priced tailoring on the market.

A great many of our men are making from \$25 to \$50 Every Week

We furnish a complete agents' outfit, consisting of large sample book (not a folder), order blanks, tape measures, advertising matter—in fact everything essential to the conducting of a high-class tailoring business.

Write today for this big outfit It is sent express prepaid. Drop a postal and say "Send me your agents' outfit." We will start you at once on the road to Success. Be sure and write today.

DANIEL WOOLEN MILLS, Dept. 16, 300 Green St., Chicago



Over 80,000 in Use

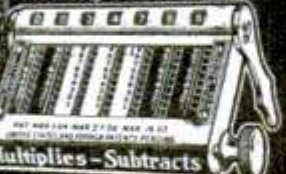
Mostly sold by recommendation. For Personal Desk or General Office.

It checks mental calculations. Handsome Morocco case free. Buy Thru Your Stationer. Write for 10 day trial offer.

E. Bancher, A. A. M. Co., 115 W. Broadway, New York City

Agents Wanted

Golden Gem \$10



Multiples—Subtracts

WHEN YOU WANT ANYTHING AND DON'T KNOW WHERE TO FIND IT
WRITE BUREAU OF INFORMATION,
POPULAR MECHANICS CHICAGO

Small Engines

Our 1/2, 1 and 1 1/2 H. P. Gasoline Engines for Farm and Shop are the best small engines made, because we specialize on them. The "SIEVERKROPP" at \$19.50 will run a washing machine, grinder or any small machine. Buy one for your Boy! Shipped on trial. Send stamp for Booklet and Special Offer.

Sieverkropp Engine Co., 1224 18th St., Racine, Wis.

Shipments of anthracite from Pennsylvania in 1913 totaled 60,069,628 tons, or 5,459,050 tons more than in 1912.

A good shave is a "running start" on a good day. Good lather means real comfort.

Colgate's Shaving Lather
Stick — Powder — Cream

Plentiful—luxurious—lasting. Softening—soothing—sanitary. Send 4 cts. for trial size of your favorite method.

COLGATE & CO., Dept. 81, 199 FULTON ST., N. Y.

BRAND NEW TYPEWRITER

A remarkable typewriter, carried in grip or o'coat pocket. Visible writer. Std. keyboard. Does all work \$100 machines do. Over 35,000 in use.

Bennett Portable Typewriter \$18

Sold on money-back-unless-satisfied guaranty. Wt. 4 1/2 lbs. Carrying case free. Home use, business or trips. Send for catalog and Agents' Proposition. CHAS. M. BENNETT CO., 1307 Cedar St., Harrisburg, Pa.

ON APPROVAL —



Cut the Cost of Building

Send this Coupon Today

Save a third on the cost of building—send coupon for catalog today. Over 100 designs, dwellings, bungalows, cozy cottages. Aladdin houses are shipped by fast freight from our mills in five states—no costly freight. Get the Aladdin catalog today.

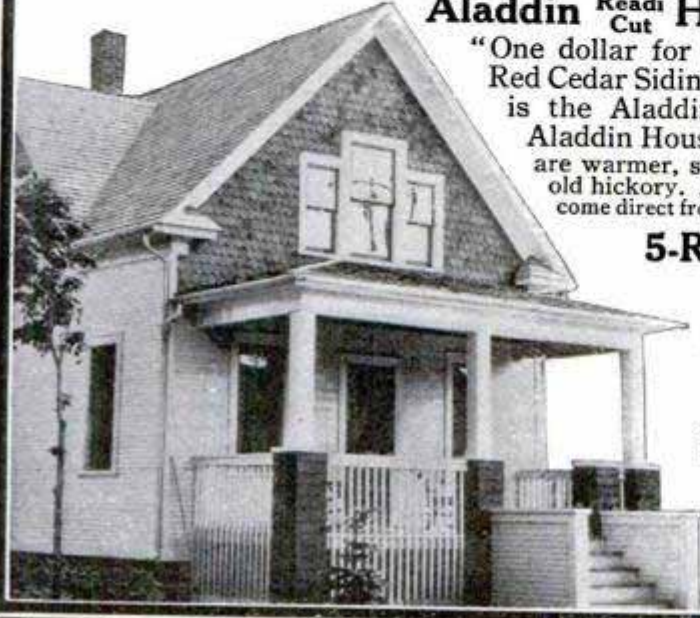


North American Construction Co.
186 Aladdin Ave., Bay City, Mich.
Send me immediately your catalog No. 180

Name.....
Street.....
City.....
State.....

Aladdin ^{Readi} _{Cut} Houses, Buildings \$137 to \$5000

"One dollar for every knot found in our Red Cedar Siding shipped from Bay City," is the Aladdin guarantee to you. Aladdin Houses have better lumber, are warmer, stronger—are as sturdy as old hickory. Aladdin Read-Cut Houses come direct from the maker—no middlemen.



5-Room Aladdin Read-Cut House \$298

Complete material for five-room year round Aladdin Read-Cut House, \$298. Price includes everything—shipped same day order is received.

What You Get for the Aladdin Price

All lumber cut to fit—no waste. Price includes everything. All lumber cut to fit, shingles, windows glazed, lath and plaster or plaster board, hardware, locks, paints for two coats, inside and outside, complete instructions. Send above coupon for catalog today.

North American Construction Co.
186 Aladdin Ave. Bay City, Mich.



Successful transmission of the singing voice, but not the words sung, has been effected from the station at Laeken, near Brussels, Belgium, to the Eiffel Tower, 225 miles away.

MAZDA

Found only on electric lamps made in accordance with MAZDA Service.

"Out of Sight"



The Tie Holder with the Invisible Clasp. Everyone should wear an "Out of Sight" tie holder—it fastens under the tie and holds it in the correct position—in the center of your shirt. Just the thing for the new wide ties they're wearing. Will wear for a life time, because it's **GOLD PLATED—SATIN ROMAN FINISH**. Can't break or lose its "spring."
SEND TODAY—25 cents in silver; we'll mail one to you at once and make you a special proposition.
BROMM NOVELTY JEWELRY CO., Dept. P. M., AURORA, ILL.



See It Free

A Piedmont Southern Red Cedar Chest protects furs, woolens and plumes from moths, mice, dust and damp. 15 days free use in your home to prove its beauty and money-saving value. Makes ideal birthday, wedding or Xmas gift. Shipped from factory at low factory prices. Write today. Freight prepaid. Write for free book and all particulars today.
Piedmont Red Cedar Chest Co., Dept. 56, Statesville, N. C.

Book Free—Write for 64-page illustrated catalog and book, "Story of Red Cedar." Postpaid free to you. Write today. Freight prepaid. Write for free book and all particulars today.



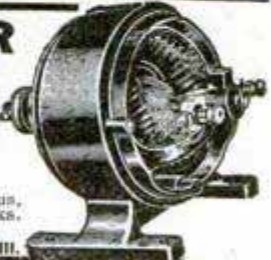
AGENTS 125% Profit

A Brand New Self-Heating Iron Patented. No Competition
Women everywhere want a safe self-heating iron. Low price means quick sales. Write quick for terms. Big profits. Your territory is open.
FREE SAMPLE to workers
FAULTLESS IRON CO. 1848 Lane St. DAYTON, O.

Electric light for farms, churches, etc. Any size plant. Price \$265 and up. Universal Lighting System is simple, safe, economical and gives a brilliant light.
Universal Battery Co., 3411 S. LaSalle St., Chicago
We manufacture all kinds of storage batteries for the trade.

DYNAMO-MOTOR

As a dynamo it will operate induction coils, light lamps, charge storage batteries, electroplate, etc., makes an ideal machine for experimenting. As motors they will operate heavy models, emery wheels, and other useful appliances.
18 watt dynamo-motor \$3.00
24 " " " 3.85
40 " " " 5.25
Send 2 cent stamp for catalog of wireless apparatus, trains, electrical supplies, novelties, tools and books.
LOOMIS ELECTRIC COMPANY
1427 N. Artesian Ave. Chicago, Ill.



Put Building Profits in YOUR Pocket



YOUR HOME—SHIPPED READY TO ERECT

Materials all sawed and worked to fit. Plans to show you how to put them together. Skilled labor unnecessary. Every piece of material used in Lewis EASY-BUILT Homes is cut to exact size in our mills—fits in its place accurately. Saves you time, worry and work besides cutting the cost way down. If you are going to build, send for the Lewis EASY-BUILT Home Book. Learn all about Lewis Service. See for yourself the big saving by building a Lewis Home. Write for this book today.
LEWIS MANUFACTURING COMPANY, 1219 LaFayette Ave., BAY CITY, MICH.



DO YOU LIKE TO MAKE THINGS?



This new book

AMATEUR MECHANICS No. 5

tells how to make scores of interesting and practical devices and is similar in style to Nos. 1, 2, 3 and 4 previously issued.

It contains

334 Articles—272 Illustrations—128 Pages

Size 6½ x 9½ in.—Paper

Price 25 Cents, Postpaid

These are only a few of the good things:

Aeroplane Kite—Amateur Mechanics' Combination Lathe—Lawn Tennis Marker—Electric Anemometer—Playground Ferris Wheel—Novel Wind Vane—Camp Provision Box—Wind Vane with Electric Indicator—Hand Drill Press—Dry Cell—Picture Frame and Triangle Clamp—Enlarging Photographs—Wet Battery—Electric Furnace—Electric Shaving Mug—Electric Lamp Flasher—Combination Lock—Multiplying Attachment for Camera—Electric Score Board—Galvanometer—Paddle Wheel Boat—Electric Time Light.

For Sale by Newsdealers or the Publishers

Popular Mechanics Book Dept.
6 N. Michigan Ave., CHICAGO

ARE YOU IN NEED OF ? SEND FOR
Mechanical ? Popular
Information • Mechanics

FREE CATALOG

500 LATEST AND BEST

Mechanical Books

ON 100 DIFFERENT SUBJECTS

MAILED UPON REQUEST BY

POPULAR MECHANICS BOOK DEPT.
6 N. Michigan Avenue, CHICAGO

COMPLETE DIRECTIONS

FOR MAKING

96 ARTICLES OF MISSION FURNITURE

are given in our three books on this subject.

Price \$1.50 per set or 50c per single volume postpaid

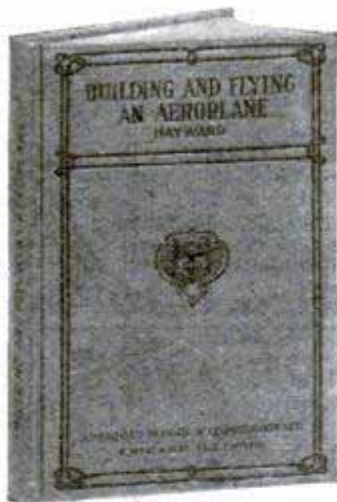
Complete list of designs in each book sent upon request.

POPULAR MECHANICS BOOK DEPT.
6 N. Michigan Ave. CHICAGO



Building and Flying an AEROPLANE

By CHAS. B. HAYWARD



A PRACTICAL Handbook covering not only the building of small models, but of full-sized gliders and machines.

The author has followed, in both biplane and monoplane models, the well-known types of Curtiss and Bleriot, choosing each as the simplest representative of its class in matters of construction and design. Detail drawings are given, with dimensions of all parts, the methods of shaping the struts and ribs, the form of running gear, the form and size of ailerons and rudders, the stretching of the fabric, the mounting of the motor, and assembling of the complete machine. The general instructions for flying, in so far as they can be given, are carefully laid down; the method of making a start; the conditions under which flights should be undertaken;

methods of control; banking on the turn; and what to do in case of failure of any part or the stopping of the motor.

The article on Accidents and Their Lessons has been given principally with the idea that every young operator should realize the fatal results of foolhardiness, lack of experience, and poor building, and should correct these shortcomings as far as possible. It is hoped that the book may not only be of invaluable assistance to the amateur builder, but may also be the means of turning into safer and more established paths the too confident inventor who might be tempted to follow his own ideas in an untried field.

160 pages, 5½ x 8½, fully illustrated with detail drawings. Price \$1.00 postpaid to any address.

POPULAR MECHANICS BOOK DEPT.
6 N. Michigan Ave., CHICAGO

10,000 Practical Recipes

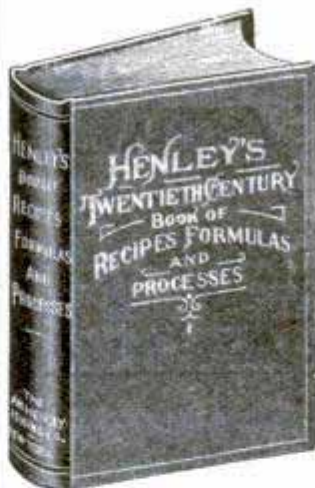
HENLEY'S

Twentieth Century
Book of

Recipes, Formulas
and Processes

Edited by

GARDNER D. HISCOX, M. E.



Contains over 10,000 Selected Scientific, Chemical, Technological and Practical Recipes and Processes, including Hundreds of So-Called Trade Secrets for Every Business.

This book of 800 pages is the most complete Book of Recipes ever published, giving thousands of recipes for the manufacture of valuable articles for every-day use. Hints, Helps, Practical Ideas and Secret Processes are revealed within its pages. It covers every branch of the useful arts and tells thousands of ways of making money and is just the book everyone should have at his command. A book to which you may turn with confidence that you will find what you are looking for. A mine of information up-to-date in every respect. Contains an immense number of formulas that everyone ought to have that are not found in any other work.

Send for descriptive literature including list of principal contents.

Price, Cloth Binding \$3.00, Half Morocco Binding \$4.00, prepaid to any address.

Popular Mechanics Book Dept.
6 N. Michigan Ave., CHICAGO

PEERLESS — FOR ALL PURPOSES PORTABLE POWER

WITH FLEXIBLE SHAFT

**Grinding,
Buffing, Drilling,
Boring, Polishing, Sawing**

Open Type

This Portable Power Machine is adapted to 101 purposes requiring portable power. Saves time—saves money.

Operation—Machine consists of a revolving tool holder driven by flexible shaft from electric motor.

Motors—One-quarter to one horse power. Alternating and direct current, open or enclosed type. Speed five hundred to thirty-five hundred revolutions per minute.

Shafting—Constructed so as to reduce the back lash per foot to greater degree than any other shaft now on market.

Casing—Steel casing on Shaft very rigid, yet flexible, can be bent to any position.

We Make Any Special Attachments that may be used for Grinding, Polishing, Buffing, Drilling, Cutting Down Welded or Brazed Joints, and many other similar purposes.

Enclosed Type

MACHINE SENT ON 10 DAYS' FREE TRIAL

WRITE TODAY FOR DESCRIPTIVE CIRCULAR AND PRICES

**UNITED
MANUFACTURING
COMPANY**

1051 Commerce Trust Bldg.,
Kansas City, Mo.

Mineral waste in the United States is estimated by the Bureau of Mines at \$1,000,000 a day.



QUICK MONEY Growing Mushrooms

Send for the great new book, "Truth About Mushrooms," free. Add \$10 to \$70 a week to your income. Small capital starts it. Demand exceeds supply. Grow in cellars, sheds, boxes, etc. Now is best time. Bureau of Mushroom Industry, Dept. 177, 1342 N. Clark St., Chicago, Ill.

BUY PLUMBING and HEATING SUPPLIES



at WHOLESALE Will Save You 30%

Don't pay retail prices. Full stock on hand for prompt shipment. Send for free catalog.

B. P. KAROL, 768 to 772 W. Harrison St., CHICAGO

\$3000 FOR YOU



**Exclusive
Territory.
100% Profit.**

That's the money you should get this year. I mean it. I want County Sales Managers quick, men or women who believe in the square deal, who will go into partnership with me. No experience needed. My folding Bath Tub has taken the country by storm. Solves the bathing problem. No plumbing, no water works required. Full length bath in any room. Folds in small roll, handy as an umbrella. I tell you it's great! GREAT! Rivals \$100 bath room. Now listen! I want YOU to handle your county. I'll furnish demonstrating tub on liberal plan. I'm positive—absolutely certain—you can get bigger money in a week with me than you ever made in a month before. I KNOW IT!

TWO SALES A DAY—\$300.00 A MONTH

That's what you should get—every month. Needed in every home, badly wanted, eagerly bought. Modern bathing facilities for all the people. Take the orders right and left. Quick sales, immense profits. Look at these men—Smith, Ohio, got 18 orders first week; Meyers, Wis., \$250 profit first month; Newton, California, \$60 in three days. You should do as well. 2 SALES A DAY MEANS \$300 A MONTH. The work is very easy, pleasant, permanent, fascinating. It means a business of your own.

Little capital needed. I grant credit—Help you out—Back you up—Don't doubt—Don't hesitate—Don't hold back—You cannot lose. My other men are building houses, bank accounts, so can you. Act then, quick, SEND NO MONEY. Just name on penny post card for free tub offer. Hustle!

H. S. Robinson, Pres., 431 Factories Bldg., TOLEDO, OHIO
Canadian Branch—Walkerville, Ont.

Demonstrating
Tub Furnished

FOLDED



No Electricity—No Springs—No Batteries

This New Thermo Fan is operated by the rapid expansion of compressed air consuming less than one ounce of alcohol per hour. Costs less than ½ cent per hour to operate and holds sufficient alcohol to run 10 hours. It

\$12⁵⁰

drives the 14-inch fan blades rapidly, producing a pleasant, cool and comfortable breeze instead of that harsh, fierce blow produced by the electric fans. Runs quietly and so simple in construction there is no trouble or nothing to get out of order. Can be operated indoors, outdoors or any place; no wiring or attachments needed. No winding springs or troublesome batteries. Just the fan for residences, summer homes, camps, restaurants, hotels, drug stores, boats or any other place wanting solid comfort. Placed on your dining table keeps off flies, on the porch blows away mosquitoes, in the bedroom gives you sleeping comfort. There is no fan like **The Thermo Fan** for the price, **\$12.50**. We have improved the Thermo by enlarging the fan blades to 14 inches, which gives excellent results. Entire machine is finely oxidized and ornamental. Stands 15 inches high, weighs 8 lbs. Send us your order today and be prepared for solid comfort during those hot days and nights. References: Waukeo Savings Bank.

Complete with
14-inch fan blades

Thermo Engine Company Office and Factory **Waukeo, Iowa**
now located at



Great Inventions of the Day

Perfection never seems to be attained. The telephone, the automobile, the phonograph, and wireless have witnessed wonderful progress in the last five years. But perhaps the latest and most revolutionary invention, in the business world at least, is that of the new folding

CORONA Typewriter

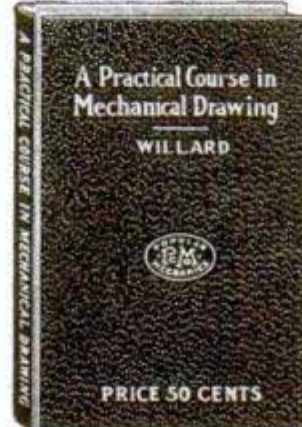
Heretofore standard machines have been more or less office fixtures, on account of their bulkiness and weight, but by the use of aluminum and a folding carriage the weight of the Carona Typewriter has been reduced to 6 lbs. and its size (when folded) to 3¼ x 10½ x 9".

The traveler is thus enabled to carry his typewriter along without any inconvenience—and for the Author, Teacher, Student, Doctor, Druggist, or in fact any man who has writing to do a Carona will save its cost in but a short time. The price too is revolutionary, it's a great deal less than that of most other standard machines.

Write for full information and booklet No. 50
—it is well worth while reading, even though
you may not wish to purchase immediately.

Carona Typewriter Co., Inc., Groton, N.Y.
141 West 42nd Street at Broadway, New York City

YOUNG MAN! LEARN DRAFTING



ONE of the most practical subjects of study today; an essential in most lines of engineering; indispensable in many occupations and often the secret of successful advancement; of no less importance to the farmer than the mechanic. There is bound to come a time when you will feel the need of the ability to "lay out" something in accordance with the rules and conventions used in the drafting profession.

Individual Study

may be successfully engaged in with the aid of our new enlarged edition of the book

A Practical Course in Mechanical Drawing

By WM. F. WILLARD

(For several years instructor in Mechanical Drawing at
Armour Institute of Technology, Chicago)

160 PAGES — SIZE 5x7 — 157 DRAWINGS — CLOTH COVER

Price 50 Cents, Postpaid

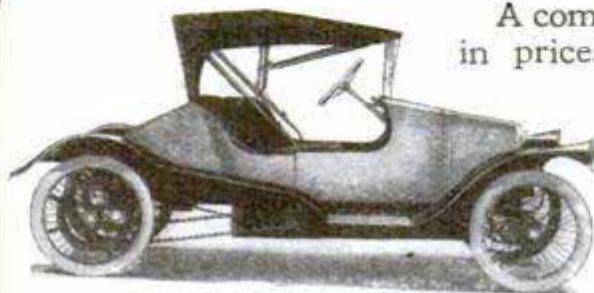
There has been a real need for a book of this kind, as it clinches each problem in the mind of the student by giving the practical application of that problem to every day practice in some phase of the world's work. It meets every modern requirement and is in advance of any other work on the subject. Excellent for use in shop classes, trade or high schools. *A complete detailed description of the contents of this book sent free upon request.*

Order of your Book Dealer or direct from the publishers

POPULAR MECHANICS BOOK DEPT.
6 N. Michigan Ave., CHICAGO

WANTED DEMONSTRATOR AGENTS WANTED

FOR THE "SAGINAW" CYCLECAR, \$395



A complete little automobile. All equipment included in price. Nothing more to buy. We want live representatives in every county in the Union.

This is a new game with lots of money for earnest, ambitious men. Sell the finest cyclecar on the market.

Ask for Our Demonstrating Agency Proposition.

EVERYBODY CAN AFFORD A CAR AT THIS PRICE

VALLEY BOAT & ENGINE CO., Ortman Street
SAGINAW, MICHIGAN

Here's a Saw That Needs No Set

This new Simonds Saw gives a cut which is almost as smooth as if sand-papered—the sides of the cut are finished by the saw. It runs with more freedom and ease than the ordinary saw—with great speed and trueness.

SIMONDS Special Ground—NO-SET HAND SAW

Blue Ribbon No. 51

For finishing almost any kind of work, for quick cutting any kind of dry wood, you need this saw, no matter how many saws you now own.

It is a most beautiful and workmanlike tool, with a Simonds special crucible steel blade, straight back, four brass screws and large hand hole in a carved and polished apple-wood handle. Price, \$3 each. If your dealer doesn't have it in stock, we will send it charges prepaid on receipt of price.

Simonds Mfg. Co. (Founded 1852) Fitchburg, Mass.



According to a recent report of the geological survey of Canada the province of Alberta alone possesses actual anthracite reserves amounting to 668,000,000 tons; bituminous, 3,209,000,000 tons; semibituminous and lignites, 384,908,000,000 tons; while probable reserves amount to—anthracite, 100,000,000 tons; bituminous, 194,883,000,000 tons, semibituminous and lignites, 491,271,000,000 tons.

WRITE NOW for your copy of our free, illustrated catalog describing the four models of this powerful, speedy and dependable detachable row-boat motor—the motor you'll be glad to own.

Wisconsin Moly. & Mfg. Co. Dept. L. MILWAUKEE, WIS. **Wisconsin Detachable Row Boat Motor**

ASTOUNDING BARGAIN!

10¢

10¢

In order to get you acquainted with us, we will for a limited time send **prepaid** this high-grade compass, warranted to be accurate, for the ridiculous price of **10c.** This compass sells everywhere for 25c. It measures 1 1/2" in diameter, glass cover, nickel plated band, dial in two colors. Instructions tell how to use this instrument for orientation purposes, telling polarity of magnets, tells if an electric wire is "alive" or "dead," making a voltmeter with this compass, etc., etc. You cannot afford to be without this wonderful little instrument, AND at no extra charge we will send you absolutely free our famous comprehensive electrical cyclopedia No. 12 containing over 450 illustrations and over 1600 electrical apparatus and supplies. Book contains 16 page "Treatise on Wireless Telegraphy" also 16 page copy of the new magazine "The Electrical Experimenter."

Ask for our **FREE** 160 page "Wireless Course" in twenty (20) lessons.

If you don't wish the compass send 3c. postage for the electrical cyclopedia.

Electro Importing Co., 233A Fulton St., N.Y.C.

"Everything for the Experimenter"

10¢

10¢

Ford Owners! \$15 Equips Your Car Front and Rear with TEMCO Shock Absorbers

Double Spiral Steel Vanadium Springs

EQUIP your Ford with Temco Shock Absorbers—only \$15 for set of four. Save your tires—your engine—your fuel—save your repair and upkeep expense.

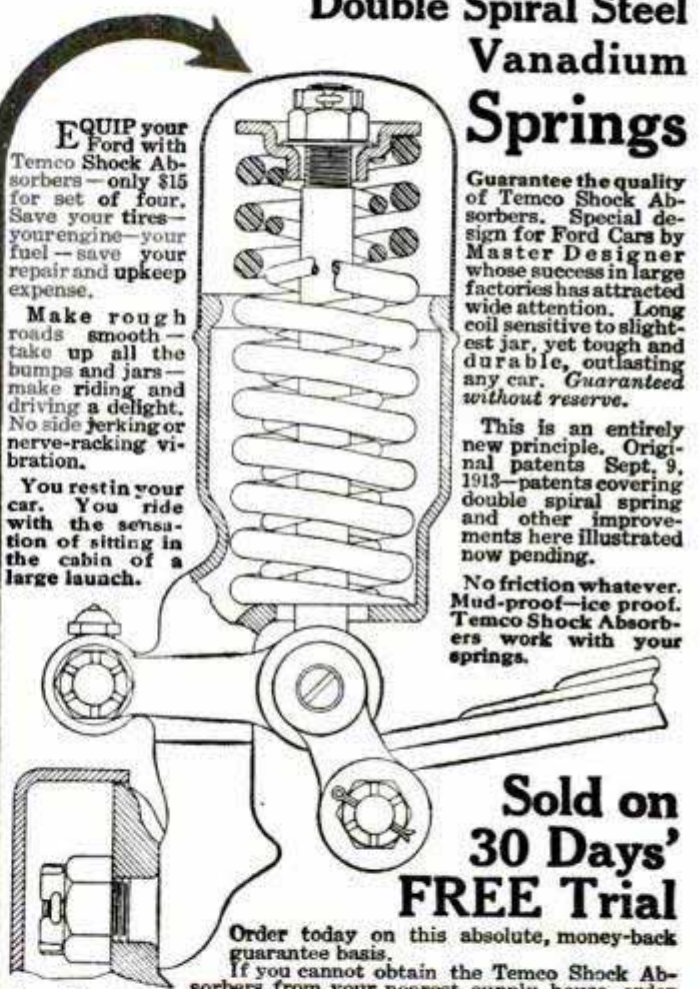
Make rough roads smooth—take up all the bumps and jars—make riding and driving a delight. No side jerking or nerve-racking vibration.

You rest in your car. You ride with the sensation of sitting in the cabin of a large launch.

Guarantee the quality of Temco Shock Absorbers. Special design for Ford Cars by Master Designer whose success in large factories has attracted wide attention. Long coil sensitive to slightest jar, yet tough and durable, outlasting any car. *Guaranteed without reserve.*

This is an entirely new principle. Original patents Sept. 9, 1913—patents covering double spiral spring and other improvements here illustrated now pending.

No friction whatever. Mud-proof—ice proof. Temco Shock Absorbers work with your springs.



Sold on 30 Days' FREE Trial

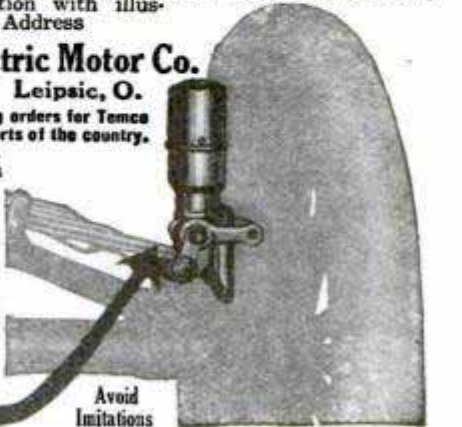
Order today on this absolute, money-back guarantee basis.

If you cannot obtain the Temco Shock Absorbers from your nearest supply house, order them direct from us. You can apply them yourself as easily as you put on tires. No changes—no readjustments—no holes to drill. Price \$15 prepaid to any address in the U.S. Order now—or write for complete information with illustrated circular—free. Address

The Temco Electric Motor Co.
1012 Sugar St. Leipsic, O.

DEALERS: We are receiving orders for Temco Shock Absorbers from 27 parts of the country. We want you to fill them. Write us today for terms and prices.

The Temco Electric Motor Co. are the original manufacturers of Shock Absorbers designed especially for Ford Cars. Thousands of sets in daily use.



Avoid Imitations

Please Mention Popular Mechanics

DAY TIRE VALVE

For Automobile
Motorcycle or Bicycle

does away forever with tire valve troubles. It has no springs or other delicate parts to become deranged. The Day Valve has but three parts—only one working part—as against seven complicated parts in old style valves.

It outlasts other valves because of its simple and heavy construction—is absolutely leak-proof—is interchangeable without danger of affecting the working part—can be removed for deflation in 1-10 time required by old style valve.

With the Day Valve you can pump the biggest tire with a foot pump in 1-3 the time and with 1-3 the number of strokes. Its air passage is 3 times as large and you don't have to overcome the 30-pound back pressure of the spring resistance in old style valves. All your effort goes to sending air into the tire.

Get a set today at your dealers or direct. Price, 50 cents for a set of 5 valves. Satisfaction guaranteed or money back.

Illustration at left is sectional view of valve showing position of plunger and air passage when valve is open.

Illustration at right is sectional view of valve with cap on showing position of plunger when valve is closed.

Atlas Auto Supply Co.

3258 West Lake Street
CHICAGO ILLINOIS

Make \$5.00 to \$25.00 PER DAY

with our "DANDY" POST CARD and TIN TYPE Machines which make pictures direct on post cards or tin types without the use of negatives, films, or dark room. Price of Machines, \$10.00 up to \$40.00. NO EXPERIENCE NECESSARY! Start business for yourself with a very small investment and be your own boss. Write TODAY to the MAIN office and factory of Ferrottype and Post Card Machines and Supplies.

BENSON DRY PLATE & CAMERA CO.

Dept. 24, 21-23-25 Delancey St., New York City, U. S. A.

Get Your Canadian Home From The Canadian Pacific

One-twentieth down—the balance in 19 equal annual payments. Good land in Western Canada—every kind of farming—\$11 to \$30 an acre.

\$2,000 Improvement Loan

20 years to pay—only 6% interest. Best livestock supplied, actual cost. Expert demonstration work at your service. FREE BOOKLETS on Manitoba, Alberta-Saskatchewan, Irrigation Farming. Write today.

G. E. THORNTON, Colonization Agent, 112 W. Adams St. CHICAGO

\$3.50 The "SPRAY" Shower \$3.50

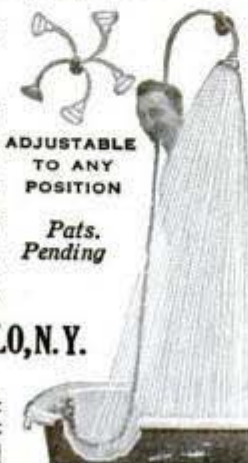
Delivered Anywhere in the U. S.
Guaranteed to Please.

Needs no curtain — fits any bath faucet. Anyone can put up or take down in a jiffy. All brass, heavily nickel-plated. Healthful, invigorating — Get it NOW.

SMITH & CO., 12 Broadway, BUFFALO, N. Y.

Folder on Request

AGENTS: Light Weight Sells On Sight



BURNS BARRELS OF AIR

WONDERFUL COMBINATION PORTABLE COOKING, BAKING AND HEATING STOVE

Bolls, bakes, fries, roasts—cooks anything. Ideal for family use, picnics, cottages, camping. Quick meals, washing, ironing, hot water, canning fruits. **Summer and Winter Stove.** Intense heat under control. **Not Dangerous Like Gasoline.** Valveless, Wickless, Automatic, Blue flame. **Air Gas Burner.** Consumes **Barrels of Air** to one gallon of **Kerosene (Coal Oil).** **Won't Explode. Thousands Now In Families.** Ed. N. Helwig—"Used half gallon oil last week for cooking, baking, ironing." F. C. Boylston, S. C.

—"Easy to run—nice and clean." Wm. O. Poe, Mo.—
—"Can get a meal in 20 minutes." Mrs. M. E. King, Ky.

—"Can do anything my range does. Cool, comfortable kitchen." No coal, wood, dirt or ashes. Nothing to get out of order. Gives economy, service, genuine comfort. Saves time, trouble, expense, drudgery, fuel bills. Always ready for use. Simple, durable, lasts for years. **Price Low**—\$3.25 and up. Any number of burners. Not sold in stores. **Send No Money.** Write today for description, **30-Day Trial Offer.**

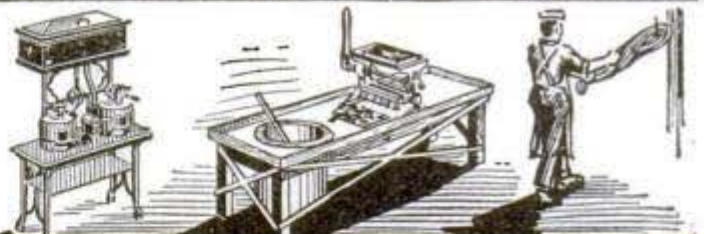
AGENTS MAKE MONEY Quick, easy, sure. All year seller. Show 12 sell 10. Nothing ever like it before. Guaranteed. Write today for **Money-Making Plans** and full particulars. Territory going fast—get in early. **WORLD MFG. CO. 6000 World Bldg. CINCINNATI, O**



GRAY MOTORS FOR BOATS

Engines of both 2-cycle and 4-cycle type for boats of all sizes. Material and workmanship absolutely guaranteed. We are largest builders of 2-cycle marine engines in the world and there are over 1000 dealers who sell Gray Engines and give Gray service. Write today for our three valuable books about Gray Motors and complete Motor Boats. **GRAY MOTOR CO., 798 Gray Motor Bldg., Detroit, Mich.**

3 H.P. \$55
WITH COMPLETE OUTFIT



There's Big Money in Crispettes

We Teach You the Business FREE! Our kettle popped Popcorn is seasoned while popping. **GREAT-BIG-LIGHT-FLUFFY KERNELS** that melt in your mouth. 20 per cent more bulk corn per pound than from any other machine. Makes **CRISPETTES** far superior to others. Enormous profits with our **WORLD BEATER** Machines. Write for catalog.

E. C. DELLENBARGER, 625 Jackson Street, CHICAGO, ILL.

The Boy Mechanic

GREATEST BOYS' BOOK PUBLISHED

Describes 700 Things for Boys to Make and has 1,000 Illustrations. **Price \$1.50 Prepaid**
POPULAR MECHANICS BOOK DEPT.
6 N. Michigan Ave., CHICAGO

AMATEUR MECHANICS

Nos. 1, 2, 3, 4 and 5, and

Mechanics for Young America

Are books for boys who like to make things. The price of each is **25 cents postpaid** and if you send for one you will want the others.
Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago

DIAMONDS-WATCHES ON CREDIT



640 \$25
641 \$50
642 \$75
643 \$100

The Best Gift of All

MEN'S 12 SIZE THIN MODEL WATCH, 17 JEWELS, ADJUSTED,

ILLINOIS, ELGIN, HAMPDEN, or WALTHAM movement.

Warranted accurate. Finest gold strata case, guaranteed 25 years; engraved, engine turned, plain polished or your monogram engraved FREE. Eighty per cent of all men's watches sold today are these neat open face Thin Models. At our Special Sale price of \$18.95, with monogram engraved free, this watch has no "running mate" in the world. Sent all charges prepaid on

30 DAYS FREE TRIAL

THEN \$2.00 A MONTH If not satisfactory, return at our expense.

These Diamond Rings are the famous Loftis "Perfection" 6-prong 14k solid gold mountings. Finest pure white diamonds. CREDIT TERMS: One-fifth down, balance divided into eight equal amounts, payable monthly. Sent prepaid on approval. Write for free Catalog, containing over 2,000 illustrations of Diamonds, Watches, Jewelry, etc. It tells all about our easy credit plan. Local Representatives wanted.

LOFTIS BROS. & CO., Diamond Merchants,

Dept. B894 100 to 108 N. State St., CHICAGO, ILL.

Stores also in: Pittsburgh, St. Louis, Omaha.



No. N75

Guaranteed 25 Years

"VIM" ENGINE



\$25 COMPLETE

Save money by using a **VIM** 1 1/4 HP. Farm Motor for churning, washing, pumping, separating, spraying, etc. Women operate easily. No valves, cams, gears or complicated parts. Water Cooled, automatic positive lubrication, sensitive governor. Weighs only 75 lbs. Comes ready to run. Fully guaranteed. Get catalog and special agency offer.

THE VIM MOTOR CO., 807 Water St., SANDUSKY, OHIO

PEG TOPS EXPRESS PREPAID FREE



NO EXTRA CHARGE FOR EXTREME PEG TOPS

Cut in the latest style. Made-to-your-individual measure. \$2.75 and up.

Fit, Workmanship and Wear GUARANTEED

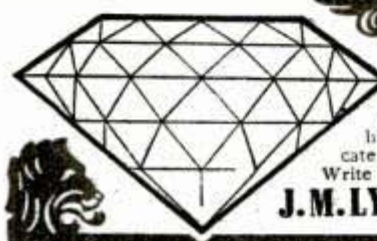
AGENTS WANTED

A good live hustler in every town to take orders for our celebrated made-to-measure clothes. Samples of all the latest materials **FREE**.

WE PAY BIG MONEY

to our agents everywhere. Turn your spare time into cash by taking orders for our stylish clothes. Write today for beautiful **FREE** outfit.

THE PROGRESS TAILORING CO., Dept. 607, CHICAGO



Diamonds on Credit

20% Down; 10% a Month

Every customer is protected by our written guarantee to refund his money if his dealer can duplicate our diamond at our price.

Write for Illustrated Catalog No. 3.

J.M. LYON & CO., 71-73 Nassau St., New York City

The Pictorial Review of Current Events

Cartoons

Magazine

15 Cents a Copy

\$1.50 per Year

[By H. H. WINDSOR, Editor Popular Mechanics Magazine]

Get the JULY Number

And keep up with the events of this busy world without wasting hours of your time.

In Its New Garb the Cartoons Magazine Becomes the Magazine for Everybody

Its pages are crowded with the best work of the cartoonists of the world and these clever drawings are accompanied by comment gleaned from the columns of editorials penned by newspaper writers trained to follow the questions of the day.

Cartoons Magazine has become the ready reference book of the up to date man. It is not a mere collection of clever pictures but is a magazine that improves and educates.

Ask your newsdealer to show you the July number, or

Send your order to **CARTOONS, 6 N. Michigan Ave., Chicago, Ill.**

Bound Volumes One, Two and Three NOW READY

These bound volumes contain more than 3,000 reproductions of the very best cartoons that have been printed during 1912 and 1913. A collection of more than 120,000 cartoons was made in order to secure them. Bound in the three volumes they make an "instant history" of the past months, for they are a pictorial record of the events of the world.

These three books, artistically and durably bound, are now ready for distribution and will be sent all express charges prepaid to any address in the United States or its possessions upon receipt of **One Dollar Each**

THIS PICTURE IN COLORS

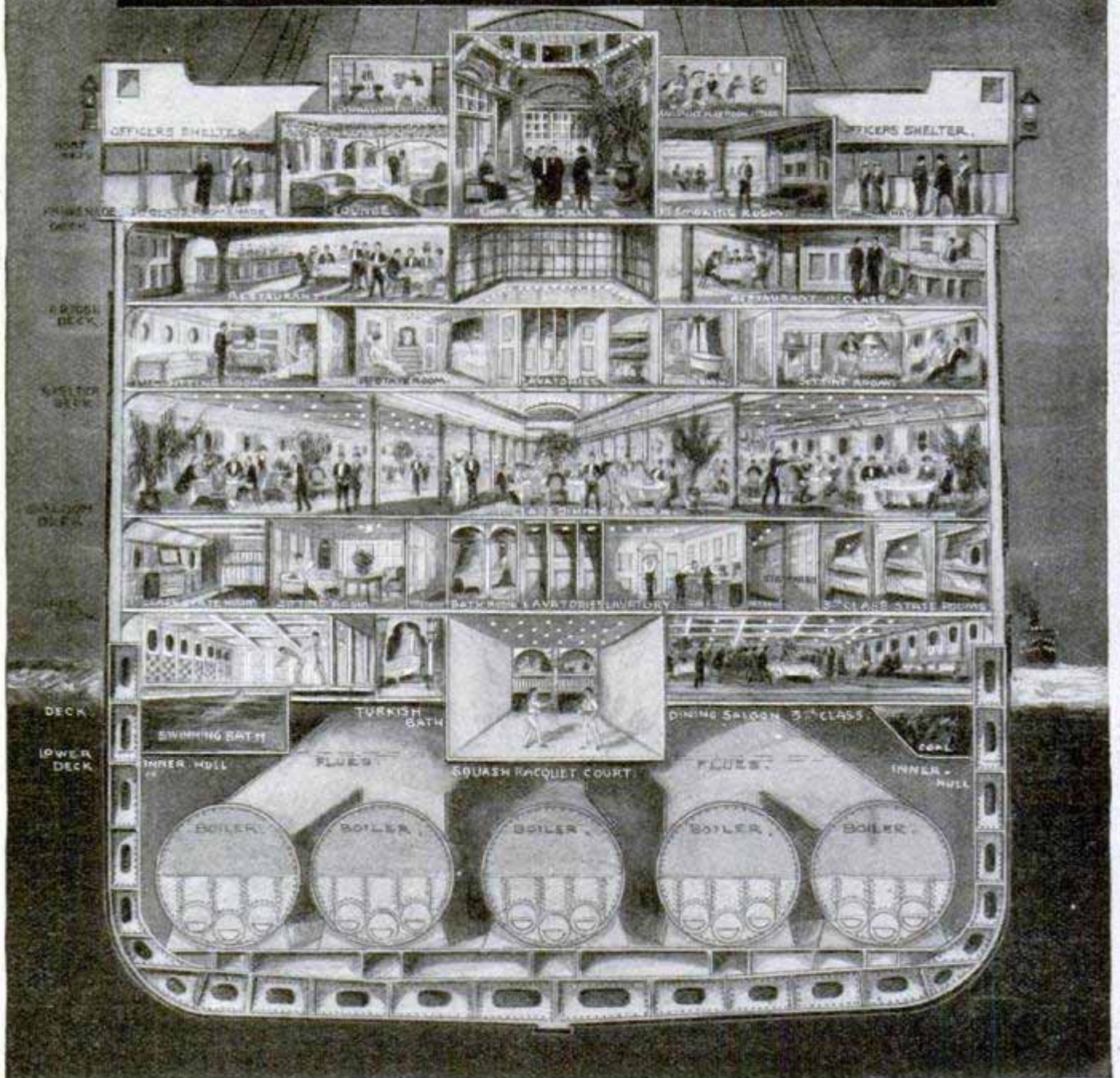
on heavy plate paper for framing or hanging.

14 x 20 INCHES

Sent postpaid to any address in the world on receipt of 4 cents in stamps to cover packing and mailing.

ADDRESS

POPULAR MECHANICS MAGAZINE, 6 N. Michigan Ave., Chicago





THE LIFE GUARDS

Vacation Accidents

YOU NEED accident insurance the year 'round. Accidents are most numerous in the vacation period because you are most actively

**Traveling by Land and Water,
Automobiling, Living in Hotels,
Driving, Boating, Fishing, Hunt-
ing, Golfing, etc.**

In 1913, The Travelers Insurance Company paid for Travel and Vacation accidents **\$810,668.00.**

When Less than Seven Cents a Day will secure an accident policy paying from \$5,000 to \$15,000 for death and dismemberment and \$25 to \$50 a week for total disability, you cannot afford to be without an accident policy protecting you and your family every day in the year from every kind of accident.

Ten per cent. of all deaths are due to accident, and one in every eight policyholders is injured each year.

It may be your turn soon.

MORAL: Insure in The TRAVELERS

The TRAVELERS INSURANCE CO., Hartford, Conn.

Pop. Mech. H

TEAR OFF

Please send particulars regarding Accident Insurance. My name, address, occupation and date of birth are below:

Making Useful Men

THE NAVY is a vast training school, where many thousands of young men are instructed each year, and receive their start in life.

☐ A man need not be experienced in order to join the Navy. All that is required of him is that he be an American, of good health, sound in body and mind, with a clean record, a fair education, and willing to work. He is offered a chance to advance himself in the line for which he is best fitted. He will find the life in the Navy interesting and instructive. There will be frequent cruises to foreign shores, with unusual facilities for sight-seeing. There will be opportunities to serve his country, and show the results of his previous training; and when he has completed his enlistment creditably, the Honorable Discharge he receives will prove the best kind of recommendation in seeking employment.

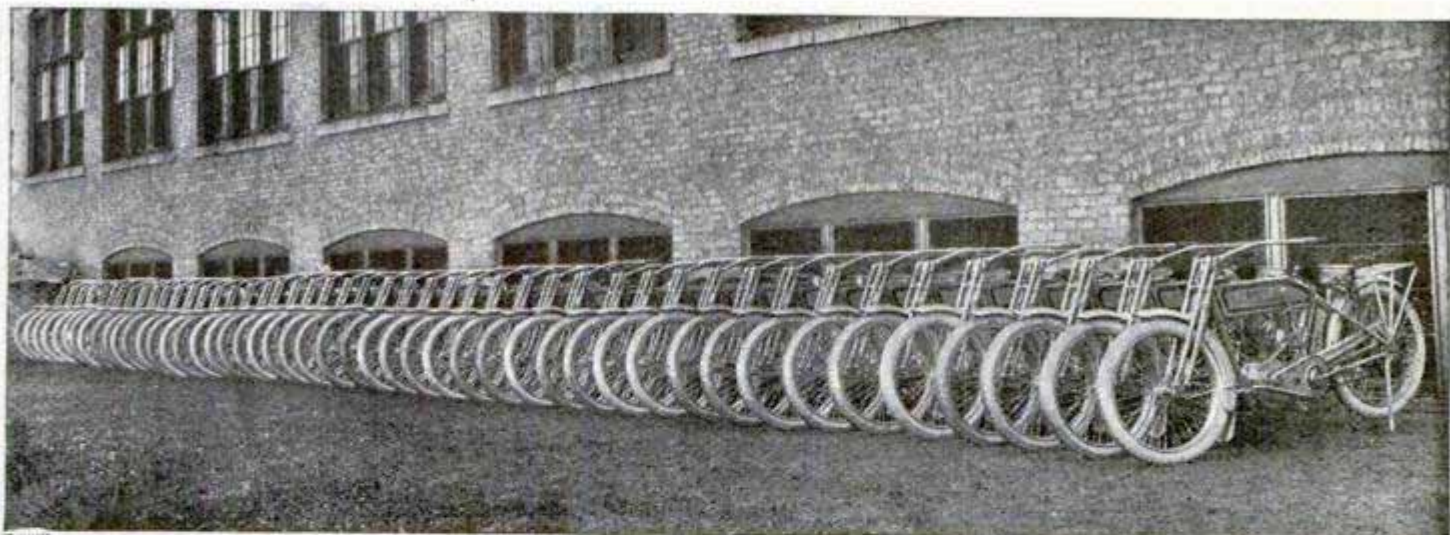
☐ The Navy offers many advantages to men who decide to remain in the service after discharge. All these advantages, as well as the rates of pay, hours of duty, privileges, and requirements of the naval service, are fully described in pamphlets which will be sent *free* upon request. Apply at nearest Navy Recruiting Station, or

ADDRESS BOX 67

BUREAU OF NAVIGATION

NAVY DEPARTMENT

WASHINGTON, D. C.



People's Gas Company Purchase 47 More Harley-Davidsons

May 5th, the People's Gas Light & Coke Company of Chicago placed an order for 47 more Harley-Davidsons. Previous to this order they had 62 Harley-Davidsons in daily service. This order was the direct result of over four years thorough try out of all makes.

The People's Gas Light & Coke Company purchased Harley-Davidsons because they had found them the most reliable, durable and economical machines. Price did not enter into the consideration.

They purchased Harley-Davidsons because, among other reasons, they were the only machines built with a Step-Starter, a simple yet positive starter that never fails to work.

DOUBLE CLUTCH CONTROL

The People's Gas Light & Coke Co. purchased Harley-Davidsons because the clutch could be operated either by foot or hand, a great convenience when traveling over bad roads or in congested traffic. This does away with the necessity of taking either hand off the handle bars to operate the clutch.

DOUBLE BRAKE CONTROL

Double control also, of the extra large Harley-Davidson brake, makes the Harley-Davidson absolutely safe to handle in traffic.

A motorcycle which can work 24 hours a day if need be for a public service corporation and yet give perfect satisfaction is the machine you should buy.

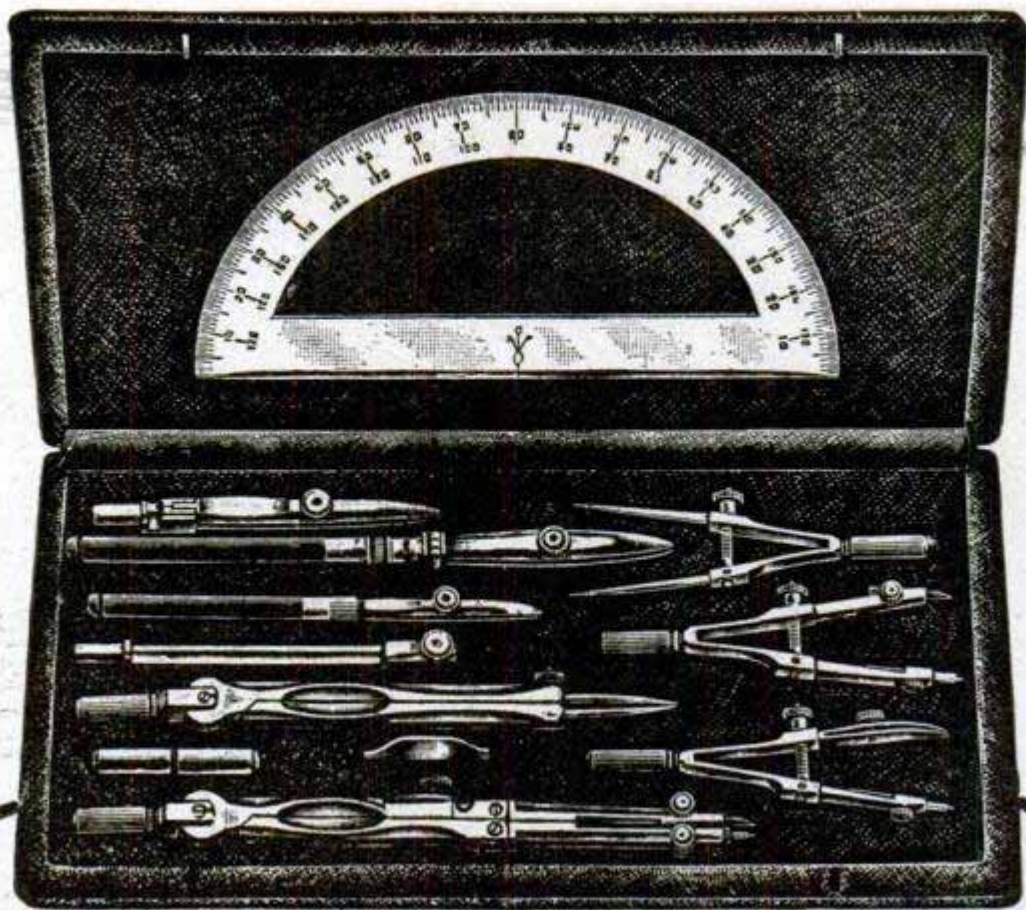
Call on our nearest dealer or write for catalog

HARLEY-DAVIDSON MOTOR COMPANY

Producers of High-Grade Motorcycles for More Than Twelve Years

392 B Street

Milwaukee, Wis.



FREE

\$15.00 Draftsman's Complete Working Outfit

Yes sir. I will give you a complete draftsman's outfit absolutely free. Besides these German Silver Draftsman's Instruments shown here I also give you absolutely free a 20x25 inch drawing board, a 24 inch T square, 12 inch rule,

supply of drawing paper, 2 triangles and French curve, pencil and eraser, drawing ink and thumb tacks, etc., etc. These are genuine working instruments. Just the kind of an outfit I use myself. You couldn't get this outfit anywhere for less than \$15.00. I give it to you **free** when you enroll. Send the free coupon now — today.

Be a Draftsman

Earn \$125 to \$175 a Month at Once

Thousands of positions paying big money are open right along. All over, concerns are constantly wanting trained men. They pay big money. Hundreds of positions open paying from \$75.00 to \$100.00 weekly. A prominent chief draftsman will give you personal instruction, practical training, the kind demanded by firms that pay the biggest salaries. You can learn to become a draftsman in your own home—during your spare time—by mail.

Chance to Earn Money

I have perfected a plan by which a few men who could not otherwise take up this practical, personal training can earn money to pay their way as they go along. Write for this plan today. Put your name on the coupon at the bottom and get it in to me right away. If you have been one of those who have dreamed of the future of greatness and power, send the coupon.

I Guarantee

To instruct you until competent and in a position at a regular salary paying from \$125.00 to \$175.00 per month and furnish you free \$15.00 Working Outfit at once.

Chief Draftsman Will Instruct You Personally

For 20 years I have been doing the highest paid expert drafting work. I will train you personally and give you practical training. I will give you this kind of training as long as required during your spare time, in your own home.

Free Outfit Coupon

Chief Draftsman

Div. 119Y, Engineer's Equipment Co., Chicago

Please send me your book, "Successful Draftsmanship" and also full particulars of your liberal "Personal Instruction" offer to a few students. It is understood that I am obligated in no way whatever.

Pay As You Wish

Don't bother about the money. If you are ambitious and want to become an expert draftsman, don't worry about the money. Write to me now—at once for full particulars.

Send the Free Coupon NOW

For Big New Free Book Just fill out the free coupon and absolutely free and prepaid a new book, "Successful Draftsmanship." Tells you all about the profession and about the wonderful opportunities that are now open. I'll tell you how you can start earning big money as soon as you enroll. Here is your chance to get into the big money class. The first step is to send the free coupon. Send it **now**.

Name

Address

CHIEF DRAFTSMAN

Div. 119Y, Engineer's Equipment Co., Chicago, Ill.

DIAMONDS \$ 97.50 DIAMONDS

Per Carat



No. 24705
Mounting \$3.75
3/8 carat dia. 8.25
Complete \$12.00



No. 24706
Mounting \$3.75
1/4 carat dia. 17.50
Complete \$21.25



No. 24707
Mounting \$3.75
1/2 carat dia. 45.00
Complete \$48.75



No. 24708
Mounting \$3.75
3/4 carat dia. 67.50
Complete \$71.25



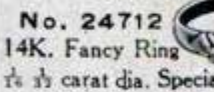
No. 24709
Mounting \$3.75
1 carat dia. 97.50
Complete \$101.25



No. 24710
Mounting \$3.75
1 1/2 carat dia. 146.25
Complete \$150.00



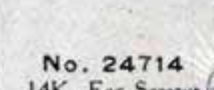
No. 24711
14K. Fancy Ring
1/2 carat perfect cut diamond Special
Complete \$5.75



No. 24712
14K. Fancy Ring
1/2 3/4 carat dia. Special
Complete \$9.75



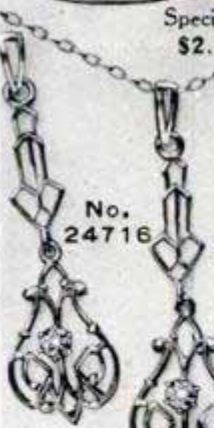
No. 24713
\$15 value, Special
Complete \$7.50



No. 24714
14K. Ear Screws
Mounting \$3.00
Two 3/4 carat dia. \$35.00
Complete \$38.00



No. 24715
14K. Stylish
Seamless
Special
\$2.75



No. 24716
Solid gold
July, Ruby; Sept. Sapphire
Aug., Sardonyx;
Birthstone LaValliere with chain
\$6 value. SPECIAL PRICE \$3.00
(State which wanted)

Genuine Perfect Cut DIAMONDS

\$97.50 per carat—world's lowest diamond price!
\$50.00 per carat less than jewelers ask! 1/8 carat only \$8.25. 1/4 carat \$17.50. 1/2 carat \$45. 3/4 carat \$67.50. 1 to 2 carat sizes \$97.50 per carat! We save you 1/3 on any diamond, because we import direct from the cutters of Europe—eliminate all middlemen: because many sales permit small profits!

Send No Money—See First!

Let us send you any diamond—set in your choice of mountings—at our expense—without obligating you to buy. Don't buy a diamond till you see ours; Basch prices and quality set a new standard by which all diamond values must be judged!

BASCH MONEY BACK GUARANTEE

enables you to turn your Diamond into CASH at a moment's notice!—It's a written contract, issued with every diamond, to REFUND FULL PRICE IN CASH LESS 10% within 2 years; permits you to EXCHANGE AT FULL PRICE, any time! Nothing like our Guarantee in the whole diamond business!

Here's a Valuable "Tip:"

Always buy diamonds BY THE CARAT! You can't compare prices or values—you can't be sure of getting your money's worth, if you buy by the piece! Don't trust any dealer who fails to tell you carat weight and price per carat. Basch has sold by the carat for 35 years.

128 Page DE LUXE Basch DIAMOND BOOK FREE!

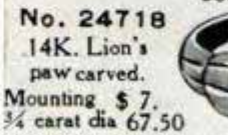
Costly, complete, authoritative, full of facts by recognized experts; thousands of illustrations. You can't buy a diamond intelligently without the information it contains. Shows not only more diamond jewelry than any book published; but in addition, complete line of Watches and Jewelry at factory prices which by comparison are startling.

Write, or Mail Coupon

L. Basch & Co. Dept. S247 State & Quincy Sts. Chicago



No. 24717
14K. 6 prong tooth.
Mounting \$5.50
1/2 carat dia 45.00
Complete \$50.50



No. 24718
14K. Lion's
paw carved.
Mounting \$7.
3/4 carat dia 67.50
Complete \$74.50



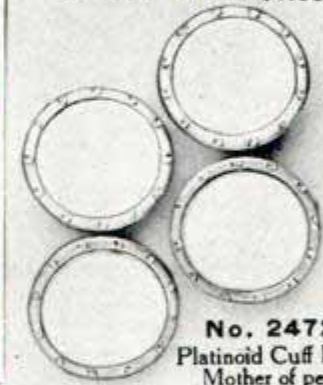
No. 24719
14K. Solitaire
Stud.
Mounting \$2.25
carat dia. 97.50
Complete \$99.75

No. 24721
14K. Solitaire Scarf
Pin. Mounting \$3.00
1/2 carat dia. 45.00
Complete \$48.00



No. 24723
Solid gold Cuff Links.
2 diamonds. Wonderful
value
PRICE, \$1.75

No. 24720
Solid gold Tie Clasp.
1 diamond. \$4 value.
SPECIAL PRICE, \$1.00



No. 24722
Platinoid Cuff Links.
Mother of pearl.
Wonderful value
\$1.25 pair

\$97.50 Per Carat DIAMONDS
Basch
CHICAGO MONEY BACK GUARANTEE



No. 24724
Thin model Pocket Knife. German silver handle. 2 blades; nail file. Your name engraved Free. Special value \$1.00

Please mail me absolutely Free a copy of your 128 page De Luxe Basch Diamond Book.

Name

Address

Mail to L. BASCH & CO.
Dept. S247, State & Quincy Sts., Chicago



That's The Ticket!!

Coca-Cola
TRADE MARK REGISTERED

Ask the athlete—ask the man with the player's thirst and the "in-training" beverage limitations. He'll tell you; Coca-Cola quenches *big* thirsts—refreshes—delights.

Snappy—Delicious—Wholesome

Demand the genuine by full name—
Nicknames encourage substitution.

THE COCA-COLA COMPANY
ATLANTA, GA.

Whenever
you see an
Arrow think
of Coca-Cola.