



POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND

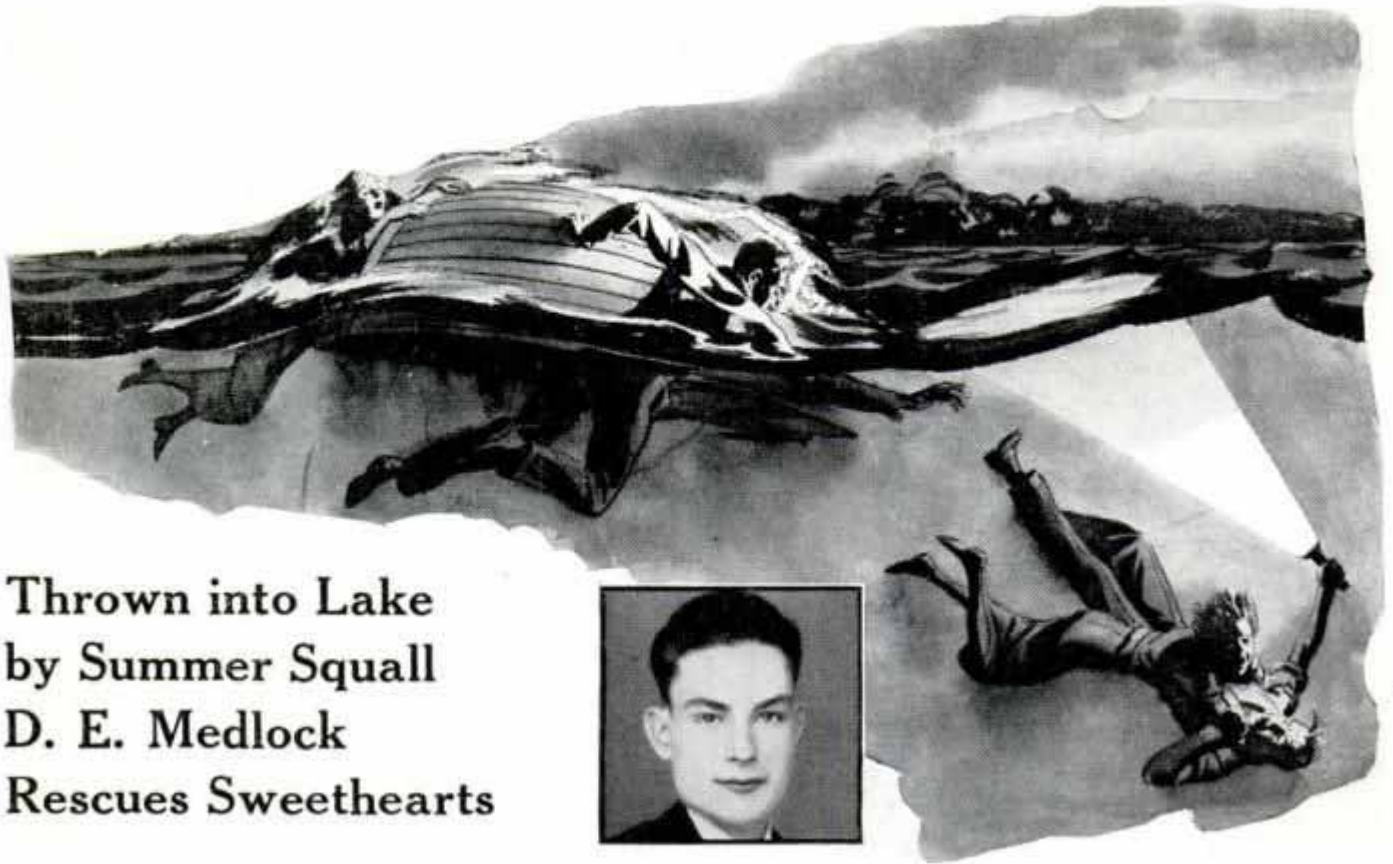
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25 CENTS



SEE PAGE 166

"DOWN THEY WENT... IN EACH OTHER'S ARMS"



Thrown into Lake by Summer Squall D. E. Medlock Rescues Sweethearts

"Sailing peacefully in the summer moonlight one minute... in the teeth of a squall the next! Almost without warning, the whole crowd of us found ourselves suddenly in the water and far from shore. With

the first gust of the storm the mast had shattered and the boat capsized," writes D. E. Medlock.

"One couple couldn't swim. They went down together, locked in each other's arms... But the boy had my Eveready flashlight in his hand. The light continued to burn and he hung onto it as the two of them slowly spiraled down toward the bottom in a well of light.

"Thus, I was able to dive for them and to get them back to the surface. Then, the same water-logged light made it possible for me to signal the shore for the rescuers who finally came to our aid.

"I had been using those batteries for months before, yet, because they were really fresh when I got them, they met this supreme test. In fact, when I picked up the flashlight six weeks after the rescue, the light would still burn."



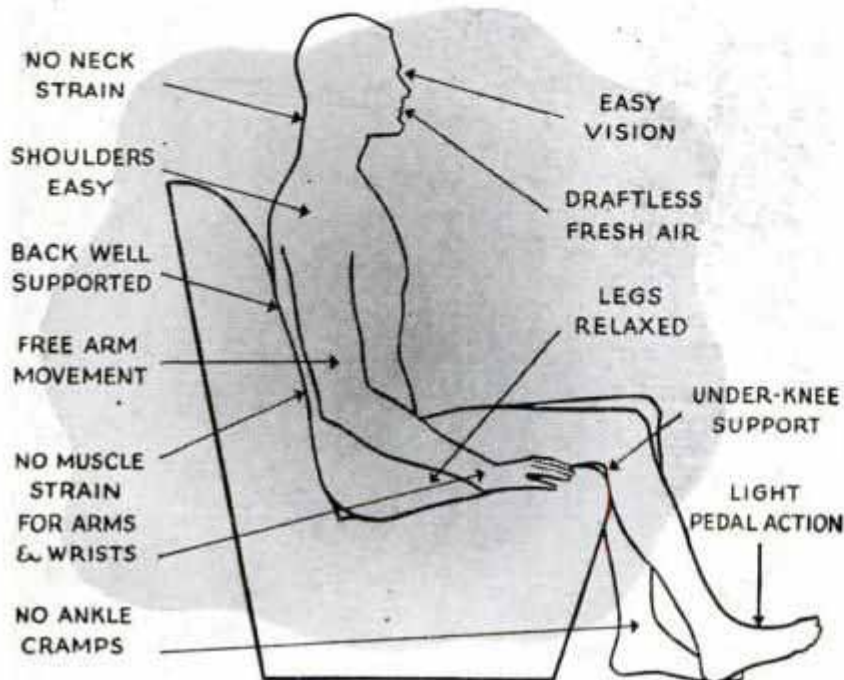
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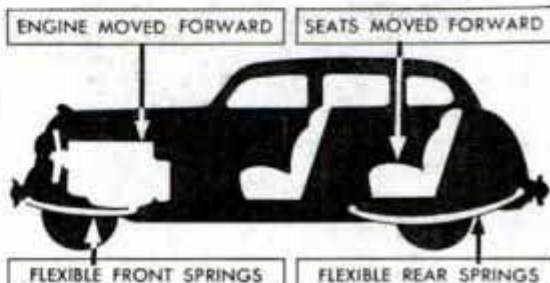
Cars now *Tailored* TO SUIT THE HUMAN BODY



DRAWING SHOWS how carefully engineers have designed Plymouth so as to permit full comfort for the driver, as well as passengers... chair-height seats allow an easy, natural position.



(Above) COMPLETE RELAXATION in Plymouth's deep-cushioned, luxurious interior. Flexible ventilation gives added comfort.



BALANCED WEIGHT and spring action give Plymouth its famed Floating Ride.



(Above) NOISE INSULATION—Like a blanket of rubber, special insulation separates steel body from the frame... keeping out noises and road roar. You glide along comfortably... quietly.

(Right) EASIEST CLUTCH AND BRAKE ACTION—Double-action Hydraulic brakes are easiest to apply... as well as safest. Plymouth's air-cooled clutch is 33½% easier.



Engineering Genius Today Provides a Low-Priced Car with New Factors Scientifically Designed for Comfort

IT'S HARD to realize that a motor car can be actually "tailored" to fit bodily comfort. People who take their first ride in a 1936 Plymouth car, find this a delightful surprise.

Plymouth engineers eliminated vibration by Floating Power engine mountings, balanced car weight, equalized front and rear springs for smooth riding and gave easier clutch, gear-shift and steering.

Plymouth's still the only one of "All Three" low-priced cars with both Safety-Steel body and Hydraulic brakes.

Plymouth's priced with the lowest, \$510 and up, list at factory, Detroit (special equipment extra); terms as low as \$25 a month at any Chrysler, Dodge or De Soto dealer.

Plymouth Division of Chrysler Corp.

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connected with the Bell telephone in your home or office. This country also leads in the number of telephones in relation to population, with 13 for every hundred people. The average for Europe is less than three.

Universal service in this country did not just happen. It has been made possible by the development of the Bell System over the past half-century.



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Popular Mechanics Magazine

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August, 1936

Vol. 66, No. 2

Special Features

The Challenge of Dust	161
New Tasks for Glass	Coloroto
Bulldogs of the Deep	180
Rare Metals Conquer New Worlds .	188
Speed—Six Dollars a Pound . . .	194
Canine Mind Readers	204
Easy Tricks of Juggling	212
Fighting Fires from the Inside . .	218
Latest Movie Miracles in Sound .	226
The Brainstorm Boys	232
Adventures of the Plant Hunters .	242
Camping in Comfort	248

(Continued on next page)

Building the "Big Eye"

IMAGINE a telescope so powerful you might peer through it from New York and watch ships moving in the Pacific, beyond San Francisco. Or by turning it eastward, see planes flying above the streets of Paris. That's the power of the world's biggest eye—the super-telescope now being built for the California Institute of Technology. This giant instrument, about 640,000 times as far sighted as your own two eyes, will enable scientists to study eight times as much space as has been explored so far, it is expected. Eight years of steady work have gone into the "big eye." Its completion is still four or five years distant, and will mark a great scientific achievement. Read next month how astronomers and engineers are meeting the many problems encountered in building it.

Next Month

IT IS quite likely you may some day live in a glass house and work in a glass office building. Glass buildings already have been constructed and some architects vision future cities of shining glass, cities of metal-framed buildings with glass walls, floors and ceilings. Read in the September issue of the architectural possibilities of glass. Eight pages of Coloroto pictures illustrate this second article on modern glass.

Wings for Cowboys

NO LONGER does the cowboy of the modern ranch leap on his faithful pony to round up stray calves. He hops into a fast plane. Owners of large ranches are finding planes indispensable and running a big ranch from the air is twice as exciting as running it from a horse's back—as you'll find out by reading next month's story, "Wings over the West."

'Murdercycle' Thrills

AN ACCIDENT a week is about the average for the "murdercycle" boys—the chaps who shove their two-wheeled mounts around the short tracks. Riding in a cloud of dust, these drivers rub elbows and handlebars at sixty miles an hour and cheat death at every turn. It's an exciting business of thrills and spills. Watch for "Cheating Death on a Motorcycle" in September.

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MOTORISTS WISE SIMONIZ

(Contents—Continued)

AGRICULTURE AND FARMING	
Garden label has magnifying glass top	186
Tin cans on bean poles destroy beetles	186
Adjustable clamp on post holds garden hose.....	222
Gas treatment saves oranges	251
AUTOMOTIVE	
Automatic starter prevents car from stalling.....	178
Stunt riders seesaw atop a motorcycle	178
"Auto desk" holds map or memo before driver....	183
Coal chute spans lawn from elevated truck body...	203
Electric vulcanizer for tubes	203
Circuit breaker for auto prevents road delays....	216
Air hose trigger inflates or deflates tire	224
Foot warmer for the autoist is heated by battery..	229
Moving picture of road tests motorist's skill	236
Electric tool cuts tread on smooth tires	237
Oil carburetor converts car to use cheaper fuel....	247
Auto axle puller saves time	252
Midget auto built for three dollars	256
AVIATION	
Two-deck flying boat	166
All-metal training planes at "West Point of air"...	177
Wingless giro proves safety in capitol landing....	183
Plane controls on odd vehicle help teach flying...	185
Auto engine in flivver plane cruises at ninety....	193
"Queen Mary" compared with air giants	200
Automatic pilot lands plane	202
Latest helicopter passes wind-tunnel tests	209
Man-made lightning "sews" plane parts	211
Fast "Clipper, Jr." carries fifteen passengers	223
Pilot strapped into glider uses feet for landing....	224
Four-place plane is faster on less horsepower....	236
"Flying Pancake" passes tests for safety	239
Giant zeppelin launches U. S.-Germany line.....	246
BOATS	
Paddle-wheel boat made from old bicycle	192
Four-masted sailing ship on rocks	197
High-speed crash boat for seaplane rescue work...	225
CONSTRUCTION	
Electric straightedge marks high spot on pavement.	186
Tent over house excavations speeds winter building.	191
Spillway jets curb turbulent water under dam....	208
Invisible door check and closer	229
Diesel truck hauls forty-three ton concrete pipe...	231
Cables three feet thick support bridge	251
Stop-and-go escalator	252
Truck rides "clock hand" testing road surfaces....	253
HOUSEHOLD	
Batteries charged by washing-machine motor	251
"Electric chair" for flies	252
Air-conditioning heater independent of electricity..	253
Latest home accessories	254, 255
MOVIES AND PHOTOGRAPHY	
Big books copied on tiny film to save storage space.	193
"Shotgun" telephoto camera eliminates tripod....	202
Movie camera watches plant trap a fly	210
Three-way camera takes movies or snapshots.....	247
RADIO AND ELECTRICITY	
Electric scanner helps blind read printed page....	179
Giant tubes in Berlin station aid overseas broadcast.	191
Two-way police radio run without generator.....	211
Telephone for the deaf has amplifier	222
Midget radio "shoots" beam by directional antenna.	223
Electric timer flashes seconds at prize fight	225
Eight-tube all-wave kit receiver	257
B-eliminator operates from 6-volt storage battery..	258
Two-tube capacity-operated burglar alarm	260
Practical radio suggestions	261
Piezo-electric crystal oscillator for service men....	262
Portable battery set is self-contained	262
Seven-tube radiophone unit in carrying case.....	262
SCIENCE AND INDUSTRY	
Cheap manganese extraction process found	192
Intense sound lights "liquids" by "exciting" atoms.	210
Germ-killing silver medicine harmless to man	222

(Continued to page 6A)

5 HOURS and 44 MINUTES

TO MAKE ONE FORD SPINDLE BOLT!

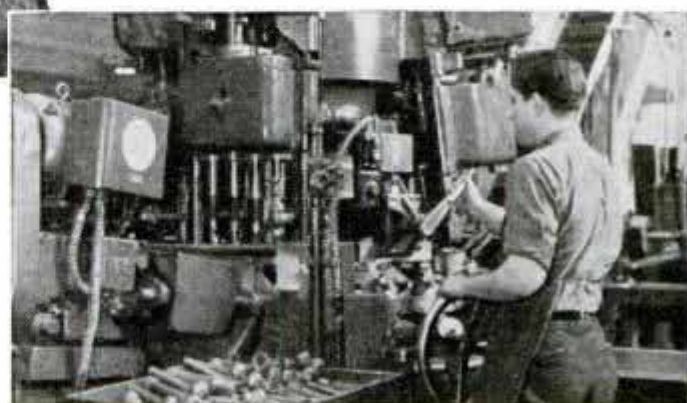


Forging spindle bolt heads.

FOLLOW a Ford spindle bolt through the various operations of its manufacture and you will spend the better part of a full working day. From the time a piece of rough stock is sheared from a bar until the finished spindle bolt is produced, you will see 33 different operations that will take 5 hours and 44 minutes to complete. You will be impressed by the care and precision used in the various forging, machining, grinding and inspection operations.

And when that spindle bolt is finished it will be the best spindle bolt that men, money, machines and experience can make.

The care taken and the precision used in the manufacture of Ford spindle bolts are typical of that used in the making of all Genuine Ford Parts. Quality materials, expert workmanship, precision machines, careful inspections are important in the making of a vital part such as the spindle upon which your safety depends.



This huge, semi-automatic machine with rotating table performs six machining operations simultaneously.

It pays always to demand Genuine Ford Parts!

When replacement parts are needed, you can maintain with Genuine Ford Parts the same high standards of quality and performance that were built into your Ford car or your Ford truck at the factory.



Inspecting spindle bolt diameter on visual indicator which has 1000 to 1 magnification—1/1000 inch looks like 1 inch on scale.



Ford Spindle Bolt and Bushing Kits contain all necessary parts for completely rebushing the spindles. Included are spindle bolts, bushings, thrust bearings, locking pins, nuts, felt washers and retainers. Complete kit costs less than when parts are purchased separately.



Heat-treated spindle bolt forgings from continuous type electric furnace.

FORD MOTOR COMPANY, DEARBORN, MICH.



CORROSION

That Destroys Auto Bearings

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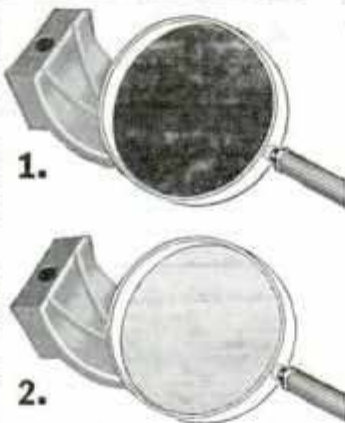


1. Unretouched Photograph of bearing run in high grade lubricating oil. The dark matter is corrosion—chemical attack.

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(Contents—Continued)

Bacteria revived by paraffin bath after sleep.....	225
Discoloration of liquid warns of poison gas.....	230
Birds vary number of feathers with season.....	236
"Teacup cannon" used in drilling for oil.....	240
Robot weather observer scouts upper air.....	245
Electric energy of brain is measured.....	252

TOOLS

Power-driven eraser removes lines with accuracy....	185
Motor-driven dust collector for grinders.....	198
Self-locking interchangeable stencils.....	199
Small drawing board requires only a triangle.....	203
Air-driven sanding pad simulates hand work.....	210
Power unit converts sander to many other jobs....	216
Wrench for pipes near wall has angle-set handle....	253

MISCELLANEOUS

"Thundering" elephant herd in museum group.....	177
Mile-a-minute tank tested at army training school..	179
Rubber bulb dispenses glue in clean manner.....	179
Four-finger "ballet" on table top.....	184
Small rotary printer for menus and programs.....	184
Barn built in 3,000-year old redwood stump.....	185
Electric "bullets" aid science seeking atom's secret.	186
A.C. clocks made possible by "master" regulator..	187
Goat propels odd vehicle.....	187
Roadside restaurant built in a shoe.....	192
Giant turbine locomotive pulls fast express.....	198
Fifteen-foot rose sign advertises florist.....	199
Giant welded pipes to carry city's water supply....	199
Player spins odd instrument fitted with strings....	208
Gas tube for rural phones eliminates code ringing..	209
Drillers hang on cliff face to carve place for dam...217	217
Tricycle with big rear wheel is propelled by hand..217	217
Faces carved on coconut cigar boxes.....	222
Ship models built of burned matches and balsa....	224
Bottle-fed pet goldfish performs stunts.....	230
Transparent lure holds live bait for fishing.....	231
Nautical skis give thrilling ride.....	237
"Very" light shot from pistol protects home.....	237
Boat speeding seventy-five sets outboard record...238	238
Electric map helps geography students.....	239
Artistry in wrought iron revives ancient craft....240	240
Huge steel tube turns fish into stock and hen food.240	240
Boatman wears gas mask on trip through sewer....241	241
Trees changed to fit the season.....	241
Waterproof flashlight has flexible rubber case....245	245
Cigar bands latest for the collector.....	256
Watch and solar compass in single instrument....256	256

Craftsman and Shop Notes

AUTOMOTIVE

Removing spindle bushings.....	306
Bed fits inside of coach.....	315
Apron on creeper keeps nuts from rolling under it..318	318
Door handle shielded to protect clothing.....	318
Piston ring expander.....	318
Screen protects grease-pit worker.....	318
Guide on jack helps get it under axle.....	319
Locking license-plate screws.....	319
Removable rumble-seat top.....	319
Tire gauge notched for easy reading.....	319
Water can with hose spout protects car.....	319

BOATS

Model boats raced in lane-marked pool.....	269
Aluminum canoe you can build.....	274
Detachable seats for fishing boat.....	285
Jibboom rig adapted to small craft.....	286
Freeing snagged anchor.....	300

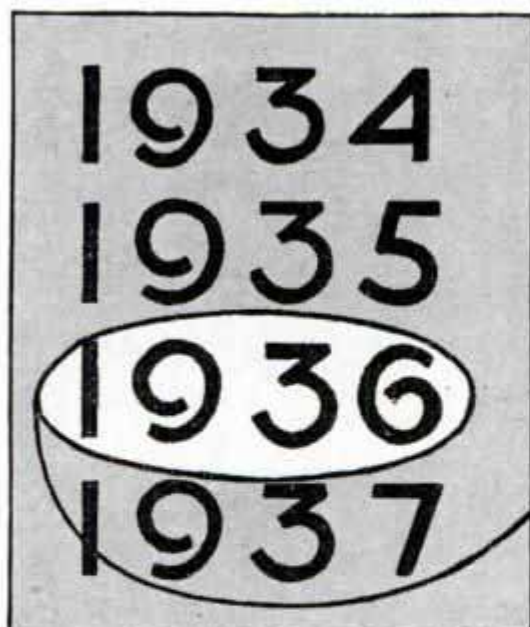
FARM

Corn knife carried in holder.....	304
Self-dumping basket to pick fruit.....	315
Growing seedless watermelons.....	320

FURNITURE

Turned plant stand in colonial design.....	266
Plywood desk for schoolboy.....	280
Bent-tube tables and chairs.....	294

(Continued to page 8A)



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RIGHT now, in many lines, there is a search for really *good* men—managers, leaders—men who can take charge of departments, businesses, branch offices, and get things humming.

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Ordinarily, there would be plenty of men to fill these jobs—men in junior positions who had been studying in spare time. But most men have been letting their training slide during these dark years of depression . . . "What's the use?"—You have heard them say. Perhaps there has been some excuse for sticking to any old kind of a job one could get the past few years—but the door is wide open for the man with ambition and ability *NOW!*

And don't let anyone tell you that "Opportunity Only Knocks Once"—that's one of the most untruthful sayings ever circulated. Op-

portunities flourish for *every* American every day of his life.

Far more to the point is to be ready—to be *prepared*—to make yourself *interesting* to the big-time employer—and LaSalle offers you a short-cut method of qualifying for opportunity jobs in accounting, law, traffic, executive management, and kindred occupations.

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All Great Champions Have It...

it's the one thing a "Would-be" lacks

by **Grantland Rice**

Dean of American Sports Writers

PEOPLE often ask me just what makes a champion. Well, basically there are three things. First, the right material to start with—then meticulous care in training, and finally and most important, that finishing touch, correct timing.

The other day in Boston I saw this same idea at work in an entirely different field of endeavor. It had been my belief that in making a safety razor blade some one picked out a piece of steel, blocked out the blade and then sharpened it. But when I visited the Gillette Safety Razor factory, I discovered that even with razor blades, champions could not be made this way. For three hours I pursued a tiny piece of blade steel from the raw metal to the finished product.

I tried to keep a record of the number of machines that were used, but I soon became much too interested in watching all the various developments used, to keep on making notes.

There were machines that checked human workers and human workers that checked machines—assuring no possible error. Throughout, the timing was as perfect as the actions of any champion . . . the result—the perfect blade.

Gillette has the one perfect system for turning out champions. I can't imagine any man being satisfied with any shave but a championship shave—and that, of course, means Gillette Blades.

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(Contents—Continued)

HAND TOOLS

Soldering holder controls heat	307
Removing bevel on flat side of hand ax	314
Star drill marked to show size	316

HOME IMPROVEMENTS

How to patch cracked plaster	268
Hedge-trimming guide is wire	270
Drawers repaired with blocks	284

HOUSEHOLD

Cottage kitchen folds into cabinet	263
Soap cake held with handle	268
Extension shelves on kitchen table	273
Flowerpot covers from can and clothespins	273
Casters silenced with tape	278
Shield for glue-brush handle	278
Steel wool held in rubber ball	280
Bottle cork has safety stop	289
Hands protected against ash-can handles	289
Table corners padded to protect children	290
Corn removed from cob with shoehorn	292
Key has name plate for easy selection	299

LAWN AND GARDEN

Wiggling sprinkler covers wide area	265
Stake table is portable	278
Dress up your back yard	279
Glass houses for year-round gardens	281

PHOTOGRAPHY

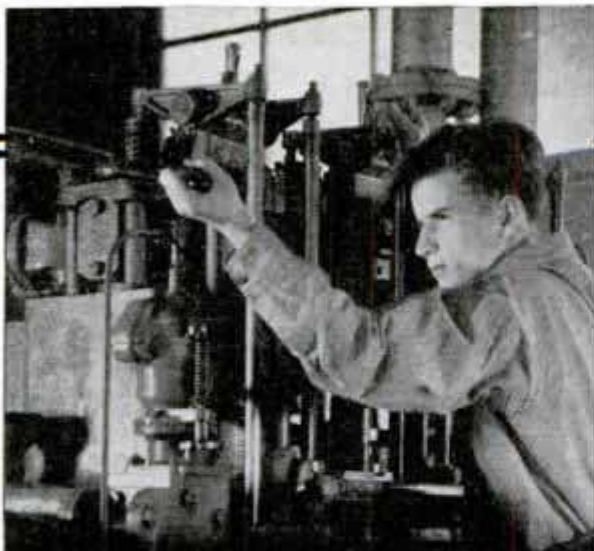
Roll film developed in glass beaker	270
Paper keeps tripod from slipping	284
Aerial photos "shot" from model planes	299
Thermometer float for instant reading	316

STORE AND SHOP

Drill points protected by safety net	290
Blowtorch pumped up with auto pump	292
Adjustable sorting bins	304
Heavy door opened with the foot	304
Soldering-iron holder is adjustable	306
Steam-heated filter for hot solutions	307
Scrap separator for power shears	314
Workbench has swinging drawers	315
Gasket-cutting tool makes rings and disks	316
Wrapping paper has string attached	320

MISCELLANEOUS

Cabin seat from rumble seat cushions	265
Fishhooks carried in match book	268
Mortar box from old oil drum	268
Lawnmower sharpened in lathe	269
Cuts for the amateur printer	270
Drawer in dog house for easy cleaning	270
Micro-camera cheaply made	271
Diving platform from oil drum	273
Scrap lumber stacked in tires	278
Preserving fish and lizards	280
Driving tubing into wood	284
Lawnmower housed in box	284
Wheelbarrow has wide, slotted tread	285
Alarm system for roadside stands	289
Kite string has shock absorber	290
Soles of white shoes shielded when cleaning uppers	290
Beach house carried on running board	291
Calcimine kept off walls with drop cloth	292
Foot scraper on step lets dirt fall on ground	292
Rotary fly chaser operated by door	293
Scroll saw has double-action blower	293
Accurate miter cuts sawed without gauge or box	298
Diagonal cuts made on circular saw	298
Golf ball lined to aid stroke	298
Repairing cracked lawnmower roller	298
Window sign flashes messages	301
Cork pad helps repairman	304
Cutting bottles cleanly	305
Tennis-court marker	305
Fingertip eraser saves time for artist	306
Traffic guide lines inlaid in street	306
Concrete pottery made without molds	308
Adjustable mercury switch	314
Pocket on sleeve for cramped places	316



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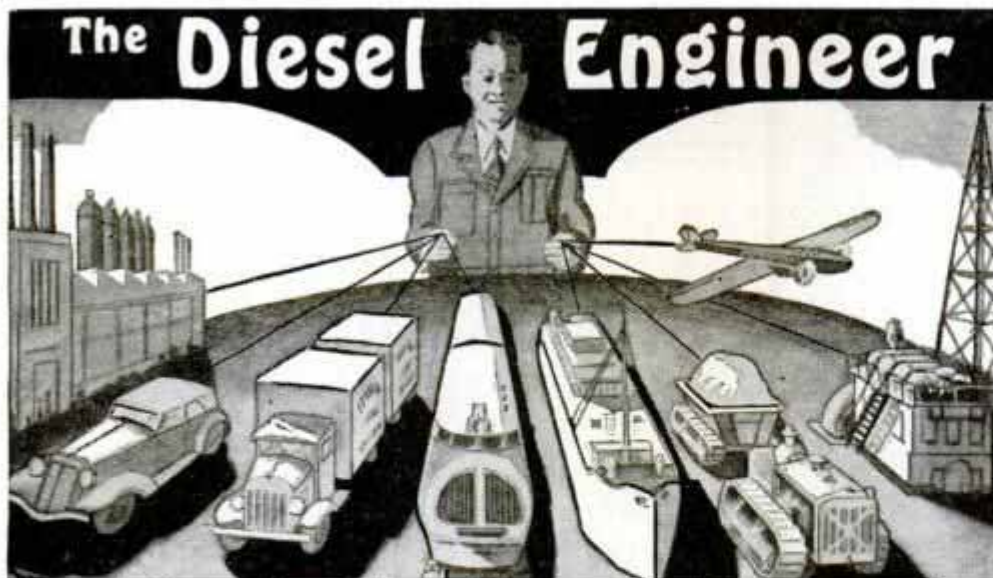
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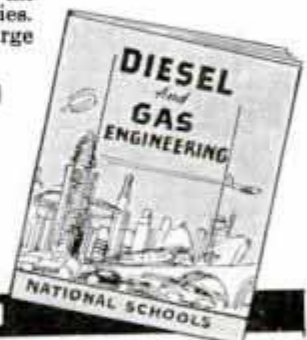
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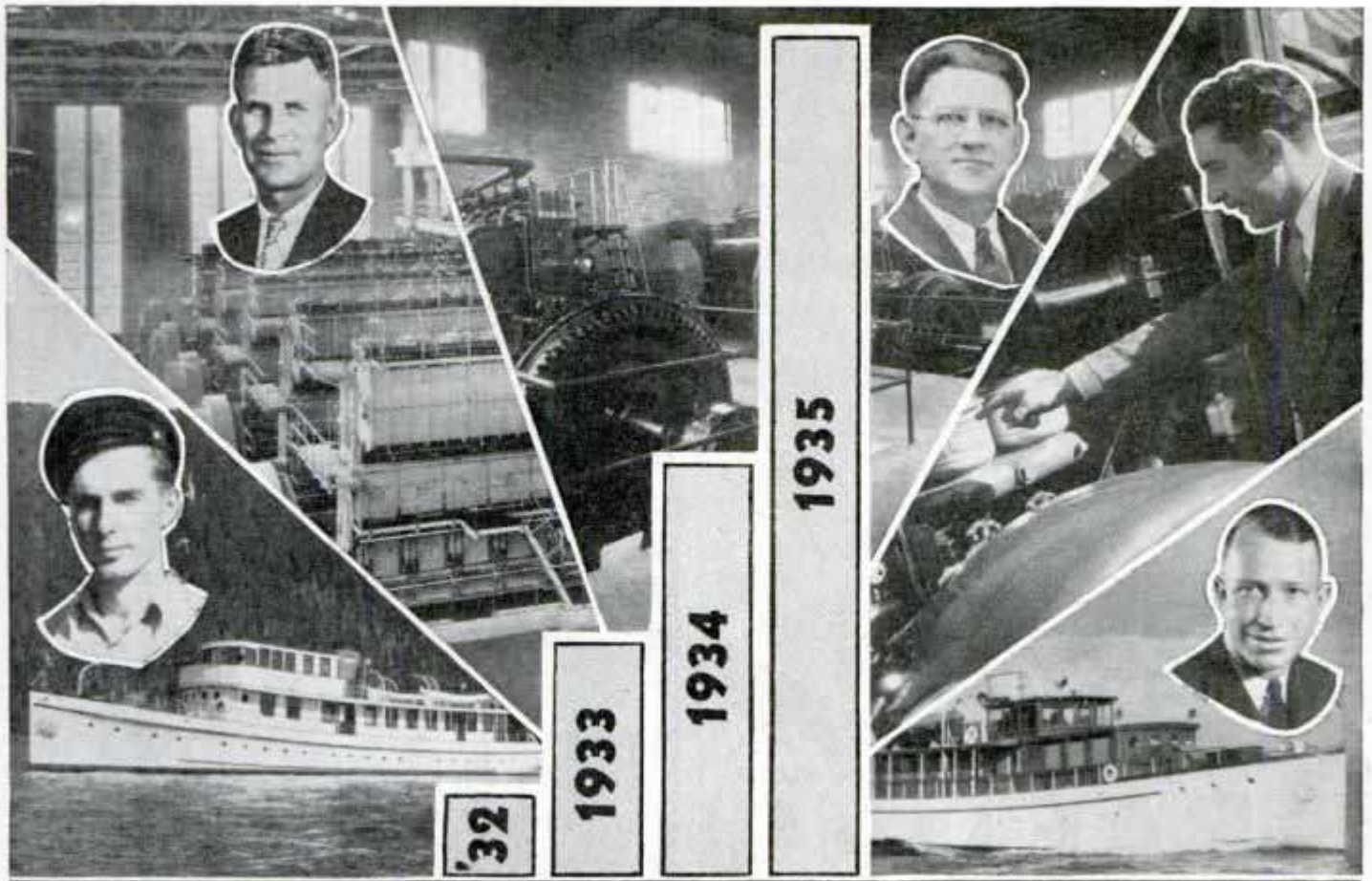
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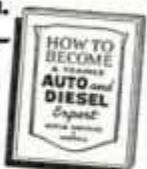
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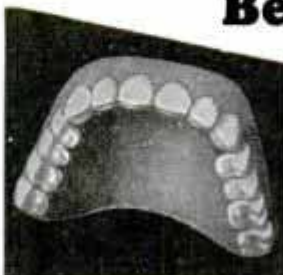
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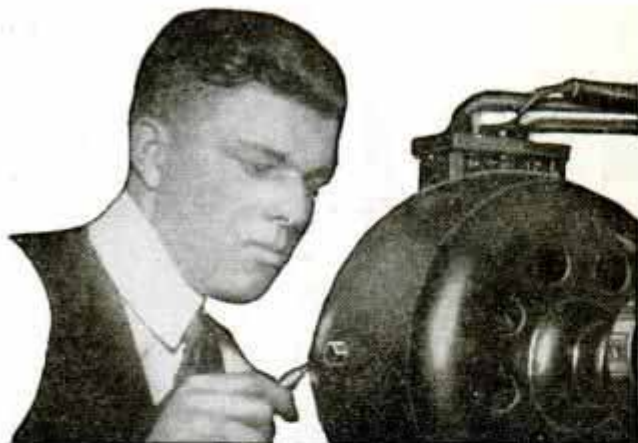
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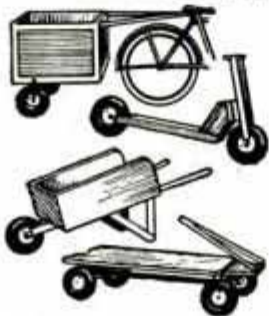
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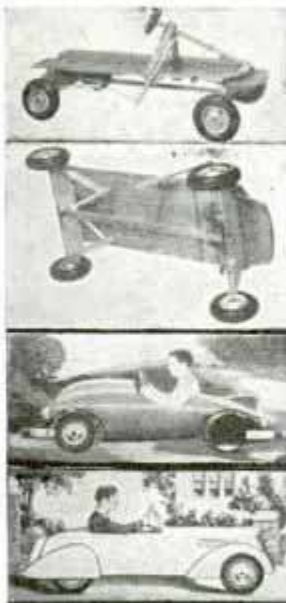
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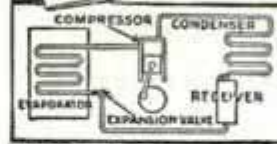
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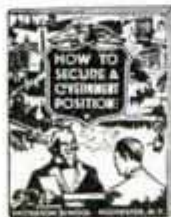
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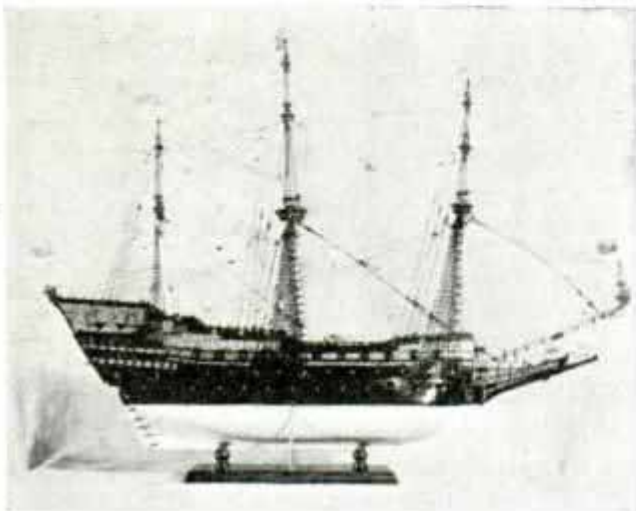
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The Editor's MAIL BAG

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"Enclosed is a photo of a model I built from your blueprints of the 'Sovereign of the Seas.' I spent 860 hours of my spare time and am happy over the result. I made all the parts by hand, mostly from scrap materials."—Leroy C. Besbeck, Chicago, Ill.

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'V' front and using materials more easily obtained here. The weight is 1,200 pounds and the pull on the car is hardly noticeable."—Russell Jones, Ashland, Ill.

Mr. Lierle's Problem

"Is there an electrical method or any other way by which carbon may be reduced to a colorless substance? I have some papers on which there are stamp pad marks (carbon ink) which must be removed without defacing the paper. Is there anything that attracts carbon like a magnet attracts steel? Any suggestions will be appreciated."—Geo. Lierle, Jacksonville, Ill.

(Continued to page 34A)

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"On my Plymouth, I obtained an average of 22 miles per gallon, an increase of 7 miles. This means a saving of \$15 a month or \$180 a year."—F. S. Peck, Calif.

"It saves me one gallon a day. I had to buy 5 gallons each day—now only 4 gallons."—L. V. Sweet, Pa.

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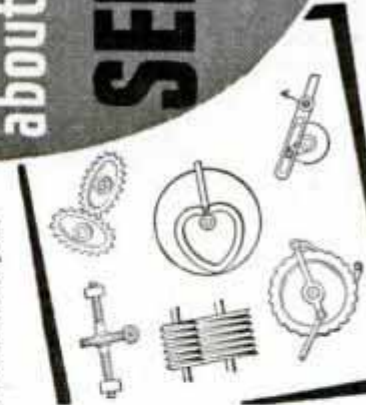
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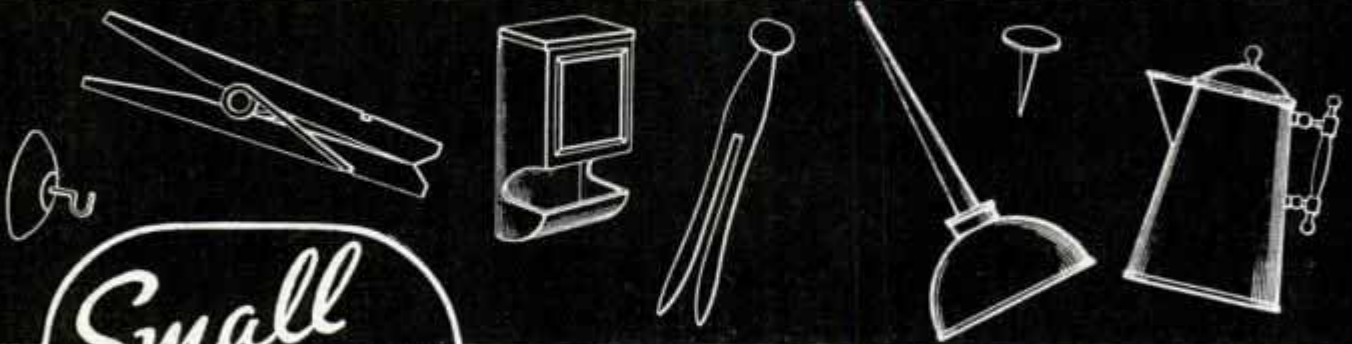
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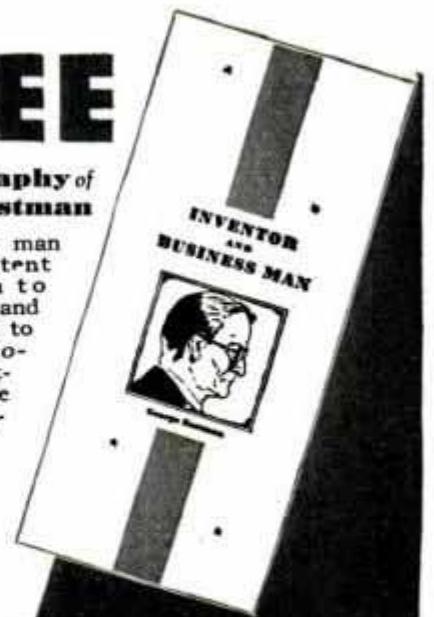
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(Continued from page 20A)

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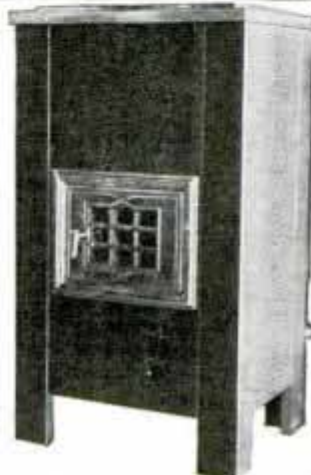


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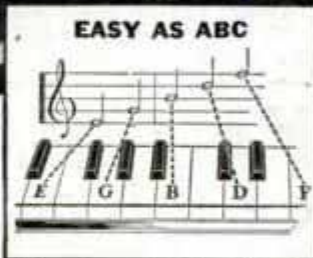
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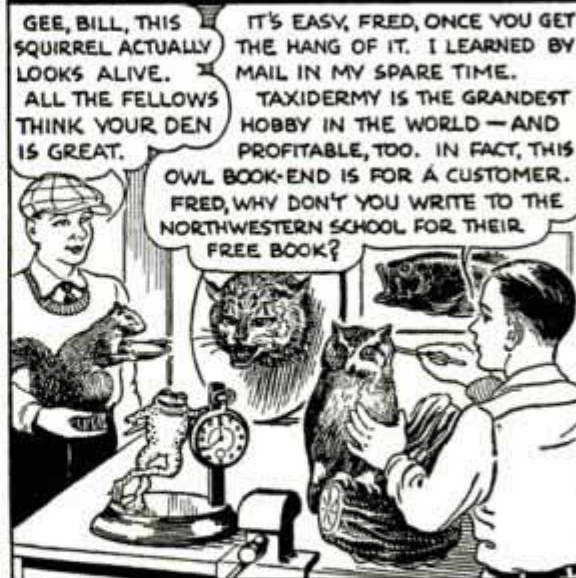
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ARTIFICIAL Marble sanitary flooring. Instructions covering wood or cement flooring 1/2 inch thick, fireproof, all colors, low cost, ornamental casting, concrete, plaster, papier-mache, garden furniture, statuary, flexible molds, particulars free. Chris. Mahler, Elmont, N. Y.

PLASTEX Industries offers industrious men an opportunity to start a business of their own, manufacturing art goods, novelties, souvenirs, etc., in Plastex and marble imitation. 5c material makes \$1 articles. Rubber moulds furnished for speed production. Small investment brings big returns. You are just in time for the big 1936 business. Write for interesting booklet mailed free. Plastex Industries, Dept. A, 1085 Washington Ave., New York.

FREE Booklet describes 107 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

GET Lots of mail. Money making offers, etc. Your name in 10,000 directories, 25c. Roscoe, 4627 Glenshade, Cincinnati.

START Little business anywhere. Everything furnished. No canvassing. Maywood, PM-923 Broadway, New York.

I WANT To send you proof of the wonderful pulling power of Popular Mechanics Magazine's classified pages. What's your proposition? Write me today. F. W. Johnson, Manager, Classified Advertising, 200 E. Ontario St., Chicago, Ill.

SELL By mail. Books, novelties. Bargains! Big profits. Particulars free. B. Eifco, 525 S. Dearborn, Chicago.

"1,000 WAYS To Make \$1,000.00." You can do it—others have. This new amazing book will startle you. 475 pages only \$2.50. Popular Mechanics Press, Room (C36), 200 E. Ontario St., Chicago.

MONEYMAKING OPPORTUNITIES

150 OUTSTANDING Money-making ideas. Only 35c complete. Enterprise Bureau, Syracuse, N. Y.

10c BRINGS Copy National Mail Order News, Box 1773-PM7, Roanoke, Virginia.

CASH From old rubber, 26 other money makers. 25c. Irvine's, (Est. 1873), Box 292, Macon, Georgia.

"HOME Factory." Start in business for yourself. Details. Elyte Supply, Linden, N. J.

HIRE Yourself! We show you how to make money in the mail order business on sensible system with limited capital. No hot air. \$50 a week income easily possible. Now is the time to start before winter sets in. Send dime for "Key to Self-Earned Wealth." Midas, 10 W. 26th St., Minneapolis, Minnesota.

SUCCEED With your products. Make-sell them. Learn how. Formulas. Processes. Analyses. Catalogs, circulars free. B. Thaxly Co., Washington, D. C.

LEARN Sign painting at home. Be independent. Earn \$50 to \$100 weekly. Particulars free. Pomeroy Service, 1121 7th St., Des Moines, Iowa.

BIG Money at home plating auto parts, reflectors, mirrors, chandeliers, by late method. Experience unnecessary. Free particulars. Gunmetal Co., Ave. N., Decatur, Ill.

FREE Booklet describes 107 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

FORMULAS, PLANS, ETC.

EXTERMINATE Bed bugs permanently. Send 30 cents for my guaranteed formula. Buy ingredients at any drug store for a few cents. No gas, dust or odor. A. Hill, Berne, N. Y.

EXCLUSIVE Nu-Beautee night creme formula, \$1.00. S. F. Sanquist, Pomeroy, Iowa.

FORMULAS: Aluminum solder, \$1.00. Balc, 1150 Leonard Ave., St. Louis, Mo.

GUARANTEED Formulas—New fast sellers. None better. Lowest prices. Catalog free. Kemco, 33, Park Ridge, Ill.

500 MONEYMAKING Formulas 25c. Descriptive literature free. Harvey Teeple, Decatur, Indiana.

GUARANTEED Original formulae. Courses in 35 home manufacturing industries. Expert research and analytical service. Particulars free. "Vikings," 1872 Marine Parkway, Brooklyn, New York.

ANY Formula 30c or money back. Catalog free. Ogg Laboratories, Tampa, Florida.

ANY Formula \$.50, three \$1.00. Cole Laboratories, Bryant Pond, Maine.

ANYTHING Analyzed. Duplication guaranteed. Practical formulas. Associated Chemists, Indianapolis, Indiana.

MECHANICS. Make your own soap. Formula 25c. The Powell Co., 305 South 37th St., San Diego, Calif.

LIQUID Light pocket lamp. No matches. No heat. Always ready. Formula 25c. Parham Service, Box 25A, Rochelle, Ga.

ICELESS Ice! Colder! Cleaner! Cheaper! Instructions, 25c. Duffy, Covington, Ky.

ANALYSIS. Research. Newest guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, BD-1142 Sunnyside, Chicago.

HAVE You seen our new book catalog? It's free. Just send 3c postage. Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

BENZINE Crystals formula \$1.00. Literature. Farrand Chemical Company, Tyrone, Pa.

CHEMICAL Analysis. Reasonable. Reliable. David Bros., 541 West 68th, Chicago.

EXTRAORDINARY—Wealth using formulas. Large catalogue free. Brown's Formula, 212 East Waters, Tampa, Florida.

SUCCEED With your products. Make-sell them. Learn how. Formulas. Processes. Analyses. Catalogs, circulars free. B. Thaxly Co., Washington, D. C.

3,000 FORMULAS, Facts, processes, trade secrets in Dr. Brown's Book of Formulas—380 pages. Price, postpaid \$1.00. Ogilvie Publishing Co., 57 Rose Street, Dept. 25, New York.

FORMULAS—Latest money makers. Literature free. Belfort, 4042 N. Keeler, Chicago.

CHEMISTRY

SEND 25c For new illustrated chemical experiment book with over 300 formulas and tests. Also receive 32 page illustrated catalog of apparatus, microscopes, telescopes and chemicals free. P. Winn, 124 West 23 St., New York.

SAMPLES Of thirty-five pure chemical elements, five dollars. J. J. Gossard, Wood River, Ill.

ANALYSIS. Research. Newest guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, CT-1142 Sunnyside, Chicago.

RUBBER Latex. Send dime for price list and literature twenty experiments. Eastern Latex Labs., Box 64, Norfolk Downs, Mass.

CHEMICAL Analysis and industrial problems. Estimates free. Essco Laboratories, 2206 Lyncaste, Detroit, Michigan.

25 CHEMICALS With experiments, 50c. Kayare Chemical, 5522P Ft. Hamilton Parkway, Brooklyn, N. Y.

FREE Chemistry catalogs. Supplies at 5c! Equip complete laboratory. Send 10c for postage and handling. Kemkit Corporation, 135P Johnson Street, Brooklyn, New York.

CHEMICALS, Laboratory glassware and apparatus. Catalog CP. Biological Supply Co., 1176 Mt. Hope Ave., Rochester, N. Y.

AGENTS WANTED

WANTED—Farmers or farmers sons over 21 years of age with good car to travel in the country. Steady work. Write for particulars. G. C. Heberling Co., Dept. PM, Bloomington, Ill.

SEND Hose size for samples and chance to earn \$20 weekly. Show sensational guaranteed hosiery. Guaranteed against holes or replaced free. Dignified, pleasant work. Wilknit Hosiery, Desk 37-H, Greenfield, Ohio.

ELECTRIC Or gasoline portable lamp kills insects automatically. Indoor or outside. \$1.75 up. Literature free. Sauer Bros., East Oakland, California.

BIG Money supplying demand for Mexican art goods, leather, onyx, etc. 15c brings beautiful "feathered" card and illustrated wholesale list. Importers, Box 3125, Orlando, Florida.

MAKE Money selling fly electrocuters. Free particulars. Lyon Electric Co., San Diego, Calif.

BIG Commissions selling personal Christmas cards and stationery. New 21 folder \$1 assortment. 100% profit. Bonuses. Free samples. Wallace Brown, Inc., 225 Fifth Ave., Dept. 119, New York.

MANUFACTURER Offers big daily commissions, steady employment, liberal cash bonuses. Complete new summer line tailored shirts, neckwear, dress and work pants, uniforms. Experience unnecessary. Part or full time. Outfit free Write today. Packard Shirt Corp., Dept. 322, Terre Haute, Ind.

AGENTS—To call on drug, cigar, candy stores and restaurants, with product yielding handsome all-year-round living. Write information. Safebreath, 863 Pacific Street, Brooklyn, N. Y.

500% PROFIT Selling new "20-in-1" kitchen utensil. Retail 25c. Costs you \$1.00 a dozen. \$7.20 a gross. Sample 10c. New Method Co., PMM-44, Bradford, Pa.

STRANGE Ironing cord. Saves electricity. Abolishes scorching and kinking. For telephones also. 150% profit. Sales guaranteed. Big free offer. Neverknot, Dept. 8A, 4525 Ravenswood, Chicago.

SUMMER'S Easiest 25c seller. Liquid White, cleans all white shoes, easy demonstration gets business. Large profit. Williams Corp., 368 Pine, Montclair, N. J.

WHOLESALE Catalog free. 500 best sellers. Paty Co., 1167 Broadway, Somerville, Massachusetts.

EXCELLENT Trouserpresser, stretcher, creaser, hanger, \$1.00, \$7.00 doz. Perfect pants hanger, stretcher 10c; 60c doz. Widness, 208 Van Buren St., Brooklyn, N. Y.

INITIALING Automobiles biggest money maker today. New type requiring no varnish to apply. Write for samples. International Monogram & Transfer Co., Box 6365, Philadelphia, Pa.

EXTRA Cash selling 21 folder \$1 Christmas assortment. 100% profit. Bonus, 10 other boxes. Experience unnecessary. Samples on approval. Schwer, Dept. 48M, Westfield, Mass.

\$6.85 HOURLY! Amazing No-Flatz fixes punctures without patching; makes tires puncture proof! Instantly—permanently seals holes made by nails, etc. Big seller. Free sample offer. No-Flatz, Dept. D-172, Cincinnati, Ohio.

300% PROFIT—Fast year around seller. Everyone buys. Home; stores; offices; motorists; business and industrial concerns. Nu-Finish, 1305-C East 63rd Street, Chicago.

SELL Made to measure raincoats. Outfit free. Goodyear Rainwear, 126 West 22nd, New York.

EVERY Woman wants a no knot clothes line reel. Quick 25c seller. 200% profit. Carl Clouser, 29 Edison Park, Quincy, Mass.

\$6.00 HOURLY! Amazing Karnu refinishes auto like new without rubbing, polishing, waxing or painting. Wipes on with cloth. Lasts 8 to 12 months. Free sample. Karnu, Dept. D-8, Cincinnati, Ohio.

MAN And wife—to run local coffee agency. Earnings up to \$300 in a month. I send everything needed. No money risk. Ford sedan given if you qualify. Write Albert Mills, 2772 Monmouth, Cincinnati, Ohio.

300% PROFIT In new self-starting no-flint cigar lighter. Retail 50c. Sample 25c. Get details quick on wonder seller. New Method Co., Box PM-44, Bradford, Pa.

SELL Changeable signs. Profitable. Write Koehler, 334 Goetz, St. Louis, Missouri.

AGENTS: Smash go prices! Santos coffee 12c lb. 100 sticks chewing gum 12c. Christmas cards, 21 in box, 14c. 150 other bargains. Premiums. Carnation Co., P.O. St. Louis, Mo.

MEXICAN Feather pictures. Unusual novelty. 25c (stamps) brings \$1.00 worth sample, details. Mexican Art, Apartado 1593, Mexico City.

SNAPPY Demonstration, big profits, quick sales. Sample 25c. Selfseel, 4603 Marshfield, Chicago.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 16A.

COSTS 1c—Sells 25c. Make non-explosive cleaner from benzene crystals. 1c gallon. Sample 10c. Literature free. Western Reserve Laboratories, 6615 Denison Ave., Cleveland, Ohio.

NO Boss! Sure cash! Silvering mirrors, autoparts, reflectors. Combination outfit. Write, Sprinkle, Plater, 128, Marion, Ind.

15,000 PROFIT Making formulas. Following and many others: Accidents and emergencies, agriculture, alloys and amalgams, artist's materials, beverages, cements, glues, pastes, muclages, bleaching, renovating, coloring metals, dyeing glass, heat treatment of metals, household formulas, ice cream, confectionery, chewing gum, lapidary work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. \$5.50 postpaid. Popular Mechanics Press, Room (C36), 200 E. Ontario St., Chicago.

CLEAN Up 260% profit with Whisk. Chemically treated cleaning and polishing tissue. Send for free sample. Gilcor Mfg. Co., 34 University Place, New York.

SALESBOARD Men—New put and take jars. Details, samples free. Tom Thumb, Dent. PM, Nauvoo, Ill.

GOLD Reflecting letters for store windows. Large sizes penny each. Free samples. Modernistic Sign, B-3004 Lincoln Ave., Chicago.

SELL Necessities; amazing profits. Hundreds of fast selling items in our line. New sales plans and free gifts clinch sales. Catalog free. National Products, 116, Berwyn, Ill.

PROFIT With new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, BD-1142 Sunnyside, Chicago.

GENUINE (Not imitation) gold leaf sign letters and script signs. Largest and finest assortment styles and sizes. Consolidated, 416-V So. Dearborn, Chicago.

SELL Graf-Seal super-lubricant. Added to oil and gasoline for automobiles, trucks, busses, factories, etc. Saves users many times its cost. Big profits, repeats regularly. Send 50c for dollar size sample, post paid. Fully guaranteed. Graf-Seal Co., Mansfield, Ohio.

ARTISTIC Window sign letters. Lowest prices. Enormous profits. Stalbright Co., 44 West 30th, New York. Established 1905.

NEW Sanitary device for toilet seats. Sample 25 cents coin. Dozen \$1.80 post paid. Cash with order. Money refunded. Fair Oaks Co., 724 Burlington, LaGrange, Ill.

ENGRAVED Name plates, numbers, signs, easily sold, profits large. Brett Bros., Winthrop, Mass.

CHRISTMAS Cards take on sensation of 1937. Our artistic Sunshine line sweeping country. \$5.00 value for 50c. Big profit. Sunshine Greeting Card Co., 3945 Percy St., Dept. C, Los Angeles, Calif.

MANUFACTURE Finest ink with dehydrated crystals; deflag eradicators. Sample free, tremendous profits; exclusive franchise. Acid-Proof Ink Co., 911 Holland Building, St. Louis, Mo.

500% PROFIT! Gold and colored sign letters for windows, offices, trucks, signs. Monograms. Easily applied. Neonite, Akron, Ohio.

SENSATIONAL Gasoline station and store stimulator. \$5.00 advance commission. Outfit free. H. Karr, Commercial Trust Building, Philadelphia.

NEW Ice tray for refrigerators. New features. Remove piece of ice without disturbing any other. Quick sales. Exclusive territory. Utility Specialty Co., Dayton, Ohio.

"COFFEE" Chewing gum, new 5c fast seller. Stores want it. Send \$1.00 for pre-paid agency packages to sell. Credit slip, samples, advertising. Big profits repeat. Coffee Gum Industries, Hollywood, California.

STARTLING Discovery gives amazing results. Saves gas, oil, repair bills in autos, trucks, airplanes, stationary engines. Millions of prospects. Make up to \$75 per week. Product sells itself. Builds steady big monthly repeat sales. Have exclusive territory with salesmen, dealers working for you. Territories going fast. Test this product free of risk. Write today. K-W Corporation, 3250 Holmes St., Kansas City, Mo.

NEW Amazing foot powder. Has relieved thousands. Guaranteed. Fast, easy seller. Good profit. Positive proof free. Shoemaco, Bellevue, Ohio.

TRANSPARENT Day and night signs. 8"x14"; 4c, retails 25c; over 1000 designs; sample free! Lowy, Department 648, 8 West Broadway, New York.

SUCCEED With your products. Make-sell them. Learn how. Formulas. Processes. Analyses. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

AGENTS Wanted: 5000 ladies and gents wrist and pocket watches. Hamilton, Illinois, Waltham, Elgin. Good opportunity to become independent. Ask for free catalogue, and new plan. The New York Jobbers, 74 Bowery, New York, N. Y.

MAN In each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers, by late method; experience unnecessary. Simple plan of manufacturing at home starts you in big money making business. Free particulars and proofs. Gunmetal Co., Ave. H, Decatur, Ill.

MAKE And sell your own products. Employ agents yourself. We supply formulas and full instructions for making toilet preparations, perfume, flavoring extracts, soap, household specialties. Valuable booklet free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

WANTED—Direct purchasing agents. No experience or money required. Write Purchasing Manager, 174 N. Halsted, Chicago.

AGENTS Mosco corn and caljous remover will build you a steady repeat business. Send today for pocket-size trial outfits. The Moss Company, 64 Searle Bldg., Rochester, N. Y.

GOLD Reflecting letters for store windows. Easily applied. Large sizes, penny each, free samples! Atlas Sign Works, 7941 Halsted, Chicago.

100 PROFITABLE Mail order and local business plans. A. Pruitt, Elburn, Ill.

AGENTS—Opportunity to make money; book containing 107 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

PROFITABLE Home business. Legitimate. No canvassing. Maywood Publishers, P-923 Broadway, New York.

GENUINE Gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 40, East Orange, N. J.

NEW Cleaner! Washes clothes quickly. Cleans everything. Premium deals. Free sample. Bestco, 5007 Irving Park, Chicago.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples. "Ralco," 1084 Washington, Boston, Mass.

HIGH-GRADE SALESMEN

\$1200 SIDELINE. Representative must understand surgical bandages and athletic tape. Trade experience with doctors, schools and industrials essential. Man with other established line preferred. Reply Nu-Hesive Corp. of America, Fitchburg, Massachusetts.

IMMEDIATE Openings for ambitious men! Wear, introduce "Fairbanks" tailored-to-measure clothes, make up to \$10 in a day. Experience unnecessary. Free suit offer. Low prices. Quick sales. Free outfit. Permanent! Fairbanks Company, 2359-A Wabansia, Chicago.

SELL Candidates! Most profitable 1936 field. No competition. Largest, finest line. Union label. Free samples mailed experienced salesmen. Ad-Nov-Co., Newton, Iowa.

SELL Only (4) all wool suits to get yours without cost. No limit to number of suits you may earn. Prices \$14.95 to \$26.95. Zipper leather carrying case. Sample line free. No experience needed to make big money. All suits individually cut and tailored to measure. Satisfaction or money back guarantee. Three Star Clothes, Dept. 36B, 330 So. Franklin, Chicago.

DON'T Be a job hunter. Start your own business on our capital. No hard times; no lay-offs; always your own boss. Hundreds average \$3,000 to \$5,000 annual sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary. Wonderful opportunity to own pleasant, dignified, profitable business backed by world wide industry. Write Rawleigh, Dept. H-U-PPM, Freeport, Ill.

BIG Pay advanced daily. Complete line printed business necessities. New low prices. Snappy campaign items, summer specialties, novelties, labels, advertising book matches, pricing sets, business stimulators; also complete line process engraved-like combinations for professional trade. New plan. Experience unnecessary. Large outfit free. Federal, HH-301 South Desplains, Chicago.

NEW Punchboard line. Free 32 page full color catalog. Nothing to carry. Larger cash commissions daily. Season now! Lea-Moore Co., 180 Adams, Chicago.

SELL "Protect-O-Check" pencils. Big profits. Quick sales. Sample 15c. Centaur Service, Box 1228, Albany, N. Y.

SALESMEN For sales promotion nationally advertised product. Anthracite Boiler Compound Company, Scranton, Pa.

EARN Up to \$15.00 daily presenting our brand new copyrighted "Bank Day" business stimulator deal. Individual plan for every retail merchant. Sells on sight. No premiums. Very popular. Experience unnecessary. Complete sales outfit free. Federal Trade Builders, GG-176 Adams, Chicago.

DISTRIBUTORS, Home and foreign for Soderite and Rat Annihilator. Small investment. Profitable business. Miller Products, Grover Hill, Ohio.

SALESMEN: High grade ribbon and carbon line. American Ribbon and Carbon Company, Rochester, New York.

SALESMAN—Sell Havana cigars. Commission. Sullivan Cigar Co., Tampa, Fla.

GIVE Away free 1936 short wave and home radios, also full electric automobile radios with our unique "Punch Sales Card Plan." 2 sales daily pays \$203.88 weekly profits. Write for our free starting offers. DeLuxe Mfg. Co., Dept. 267, 173 W. Madison, Chicago.

SALESMEN. Complete printing line. Free delivery 4th parcel post zone. Write for free catalog. Standform, 131-J Prince, New York City.

BOOKS—All subjects, practical, profitable. Big catalog free. Send 3c for postage. Popular Mechanics Press, 200 E. Ontario St., Chicago.

LARGEST Commissions, quickest sales are made on our brushes. Write for proposition. Wire Grip Sanitary Brush Corp., 220 Southern Boulevard, New York.

SALESMEN: Sell complete line book matches, labels, carbonized salesbooks, pricing sets, business stationery. Wonderful sideline. Free deals. Comm. daily. Free sales portfolio. Lionel Press, Dept. LH312, So. Hamilton, Chicago.

EARN Many free suits and up to \$7.00 extra daily. Show friends how to save up to \$10 on fine, made-to-measure clothes. Priced \$15.95 up—to you. Money back guarantee. Easy plan gets you free suit right away. Extra large samples in fine traveling case free. O. K. Tailoring Co., 317 S. Market, Dept. PM-8, Chicago.

MAN—Handle regular store route. Place nationally advertised 5c-10c counter card mds. New aspirin deal—6 tablets 5c. 85 other fast sellers. 100% profit. No investment. Samples free. World's Products Co., Dept. 8810, Spencer, Ind.

PROFIT With new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, DT-1142 Sunnyside, Chicago.

\$50.00 WEEKLY Opportunity introducing Texas mineral water crystals. Imperial Company, Waco, Texas.

THIS Match book opportunity sweeping country! Exclusive! Get facts today direct from mgr. Match Corp. of America, Dept. E-8, 6041 West Grand, Chicago.

PRINTING Salesmen. Finest deal in country on cards, blotters, labels. Send for kit. Hitt, 426 South Spring, Los Angeles, Calif.

EXPERIENCED Clean cut salesmen. Stamp. Universal, Box 93P, Morristown, N. J.

SELLING Tires and tubes, highest quality. Complete line to dealers, fleet operators. Exclusive territory. Box 397, Leavittsburg, Ohio.

NEW Specialty—Sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Ferrell cleared over \$1,000.00 monthly. Write, F. E. Armstrong, President, Dept. PM, Mobile, Ala.

BE Independent. Own your business; experience unnecessary, selling \$10,000 accidental death, \$50 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady renewal income. \$726,415.63 securities deposited. Universal Policy, 716-A Lefcourt Bldg., Newark, New Jersey.

SOMETHING New in fire extinguishers—Red Comet Automatics. Proved in west five years. Exclusive territory. Low price opens pocketbooks. Write, Red Comet, 404 Comet Building, Littleton, Colorado.

SALESMEN: Sell advertising novelties, calendars, fans, thermometers, etc., for nationally known firm. Liberal commissions. Stanwood Hillson Corp., 21 Station St., Brookline, Mass.

SALESMEN—New deal guarantees stores \$10 for one. Two \$15 sales net you \$20 daily. Sayers, 2801-123 Sheffield, Chicago.

FREE Booklet describes 107 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

BRAND New grab-bag deal. Going big everywhere—big profits—swift sales—fast repeats. No restrictions. All dealers buy. Act! K&S, 4373 Ravenswood, Chicago.

START A business of your own! Become a subscription representative for "Popular Mechanics." No capital required. Liberal commissions. Monthly bonus. Write for details. V. D. Angerman, Circulation Manager, 200 East Ontario Street, Room 235, Chicago.

HELP WANTED

LOCAL Agents wanted to wear and demonstrate free suits to friends. No canvassing. Up to \$12 in a day easy. Experience unnecessary. Valuable demonstrating equipment, actual samples free. H. J. Graves, Pres., 1300 Harrison, Dept. H-817, Chicago.

GO Into wholesale business without investment. Call on stores with biggest line self-selling counter displays: Aspirin, razor blades, handkerchiefs, breathlets, household cement, 79 different items. Up to 125% profit for you. Experience unnecessary. Write for catalog and plans. Procopax, Dept. 36-B, 1956 S. Troy, Chicago.

IF You want to get groceries and household supplies at wholesale, and a wonderful chance to make \$15 a day besides, send me your name immediately. No experience necessary. New Ford sedans given to producers. Albert Mills, 2766 Monmouth, Cincinnati, Ohio.

MRS. M. earned \$267, three weeks, raising mushrooms in cellar! Exceptional, but your cellar, shed perhaps suitable. We buy crops. Book free. United, 3848-A64 Lincoln Ave., Chicago.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 16A.

TEACHERS: Register now; many grade and highschool vacancies being reported. Treweeke Assn., 599, Wichita, Kansas.

MAN Wanted—Manufacturer established 46 years will finance responsible man with complete stock of guaranteed food, farm and household necessities—you pay when sold. Mighty attractive proposition. Good living right from start with steady increase for industrious man. Big value combination deals, premiums and fast-selling specials now in effect. For the week ending June 6th, Jacob Van Dyke of Michigan sold over \$441.21 and Maurice Vander Haar of Michigan sold over \$376.15. Pleasant outdoor work. Experience not necessary. No slack seasons or layoffs. Write today for "No Investment" offer. McConnon and Company, Room 66HS, Winona, Minn.

SPARE Time workers wanted. 3c stamp brings proposition, instructions. No selling. Howard Taft Smith, Tarrytown, N. Y.

\$3 WATER Softener. Thousands already sold. Patented. Alkalitrap, Sausalito, California.

RELIABLE Man to take care store route. Distribute and collect. New products. No selling. Earn excellent weekly income. Berland Nut Company, Dept. D, Saint Paul, Minn.

OPERATE New kind of local contracting business, without capital or experience. Free approval offer. Albert Service, 6 North Dearborn, Chicago.

LEARN Air conditioning—America's next big industry. Thousands of opportunities for far seeing men. Get your start with complete new book by E. W. Riesbeck. \$3.50 postpaid. Popular Mechanics Press, Room (C36), 200 E. Ontario St., Chicago.

EDUCATIONAL AND INSTRUCTION

WORK For "Uncle Sam." Start \$105-\$175 month. Men-women, age 18-50. We can help you qualify. Write, Ozmint Instruction Service, Dept. 101, St. Louis, Mo.

BECOME An investigator or secret service agent. Practical low price course. Taught by ex-gov't secret service agent. Write Joseph Kavanagh, PM-86, Hoboken, N. J.

SECRET Service. Particulars free. Write immediately. George Wagner, M-2640 Broadway, New York.

GOVERNMENT Jobs. Start \$105-\$175 month. Men-women. Prepare now for next announced examinations. Common education. List positions, free. Write immediately. Franklin Institute, Dept. M3, Rochester, N. Y.

DO You like to draw? Artists, cartoonists, illustrators earn big incomes. We teach you how. Write for free art book, Federal Schools, Inc., Dept. P86, Minneapolis, Minn.

"SHORTHAND Simplified" (self-instructor) \$1.00. Free lesson. Erskine Simmons, Cromwell, Conn.

REMEMBER People you meet. Simple, effective, memory system mailed 25c. Jemco, 103 E. 9th, Ashland, Ohio.

LEARN Spanish in one day. Everyday phrases easy with pronunciation English Spanish. Copyrighted authoritative wonderbook, mail 25 cts. Prischmann, Box 1792, El Paso, Texas.

LEARN Salesmanship quickly at home. Complete \$5. Easy payments. Wilmack Institute, Olyphant, Penna.

LEARN Auto mechanics, body, repairing, welding, electricity, refrigeration. Diesel. Stevinson's, 2008A Main, Kansas City, Mo.

LEARN Latest methods solving arithmetical problems quickly. Frederick A. Smith, 2410 Smalley Court, Chicago.

LEARN Machinist trade, tool, die making. Automatic and hand screw machines. Modern shop methods. Actual work. Jobs open for trained men. Employment help. Illustrated booklet free. Allied Screw Machine Company, 601 Lake Street, Chicago.

STAMMERING. Stuttering corrected. Write Lewis Institute, 12052 Woodward, Detroit, Michigan.

BIG Bargain catalogue educational matter 10c. Handling, Y-799 Broadway, New York.

MEN Wanted willing to learn landscape designing and fill big paying positions as landscape architects. Free test of your natural ability and chance to win in \$750 contest. No experience needed to start. Earn while you learn. Write today for free test blank. American Landscape School, 400 Plymouth Bldg., Des Moines, Iowa.

HAVE You chosen your profession? Be an exterminating engineer. There are 22,000 good towns in U. S. without an exterminating engineer. Be our representative in one of these towns. Study at home. Our scientific course of instruction leading to diploma \$50. On easy terms. A graduate should earn \$60 weekly in any good locality. Write for free literature. Exterminating Engineers of America, 1809 Radford Avenue, El Paso, Texas.

CHIROPODY Taught by correspondence. Evans School of Chiropody, Montgomery, Alabama.

U. S. GOVERNMENT Positions. \$1700-\$1900 and up a year. Let our expert (former government examiner) prepare you for a position in the railway mail service, rural carrier, post office, customs and other branches. Write today for free booklet. Dept. 8, Patterson School, Rochester, N. Y.

MODERN Refrigeration. New industry needs trained men for installing, servicing, repairing. If you seek a new field with larger opportunities get latest book by Alt-house and Turnquist. \$4.00 postpaid. Popular Mechanics Press, Room (C36), 200 E. Ontario St., Chicago.

CARTOONING—COMMERCIAL ART

CARTOONING Course:—30 lessons, 500 illustrations, drawing pens and pencils, \$1.00 complete. Scovell Studios, Box 748-P, Hollywood, Calif.

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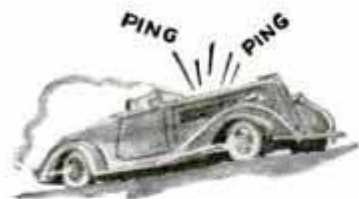
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HERE'S THE LOWDOWN

in 43 seconds



BEWARE a "pinging" sound this summer when you "step on the gas" for pick-up, or hills. It is your engine's way of saying: "I feel hot weather, too. I'm *losing* power, *wasting* gas and *overheating*. Give me better gasoline."



KNOCK is the name of that warning "ping." It occurs when a gaso-

line breaks down (burns too quickly) under the heat of a modern high compression engine.

Cars built in recent years have high compression engines. And in summer the knocking evil is at its worst because hot weather increases engine heat.



THE CURE—and preventive—of knock is better gasoline. That is why most oil companies now improve gasoline by adding anti-knock fluids (containing tetraethyl lead) made by the Ethyl Gasoline Corporation.

They recommend, as their *best* fuel for summer driving, special gasoline sold at pumps marked "Ethyl" on the base or globe.



YOU GET at the "Ethyl" pump:

- ! Enough anti-knock fluid to stand up under the highest engine compression on the hottest day.
- ✓ All-round quality that is double-checked—by the oil companies and the Ethyl Gasoline Corporation—at the refinery and at the pump.



GIVE YOUR CAR the *coolest* fuel this summer. Avoid knock—power loss, gasoline waste and overheating. Get more power from each gallon of gasoline you buy!...

NEXT TIME GET ETHYL

IT PAYS TO HAVE THE LOW DOWN ON HIGH COMPRESSION



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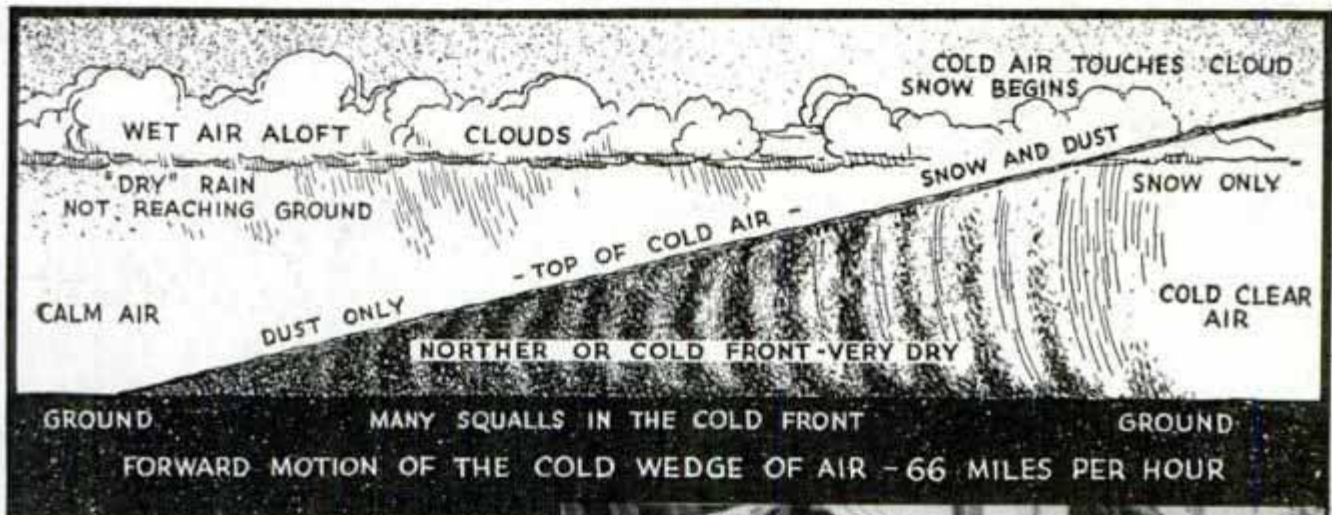
Vol. 66

AUGUST, 1936

\$751

No. 2

DUST HURLS A CHALLENGE



THE eternal struggle between man and the elements has broken out again in the "dust bowl" of our southwest. For three years dust storms have raged. The water table is falling and the dry, parched soil is easy prey to every wind that blows. Not only have the hardy homesteaders suffered, but also those who must cross this howling wilderness to get from east to west.

"Necessity is the mother of invention." And when one invention is produced, a dozen others must also be made to enable the first to endure. Today, one of the greatest products of man's ingenuity, the internal combustion engine, has encountered a force of nature which taxes it to the utmost. The gasoline engine is an air breather. To obtain proper



Diagram illustrating the birth of a dust storm, and Kansas merchants cleaning up after a duster

Cont. Alexander Maxwell



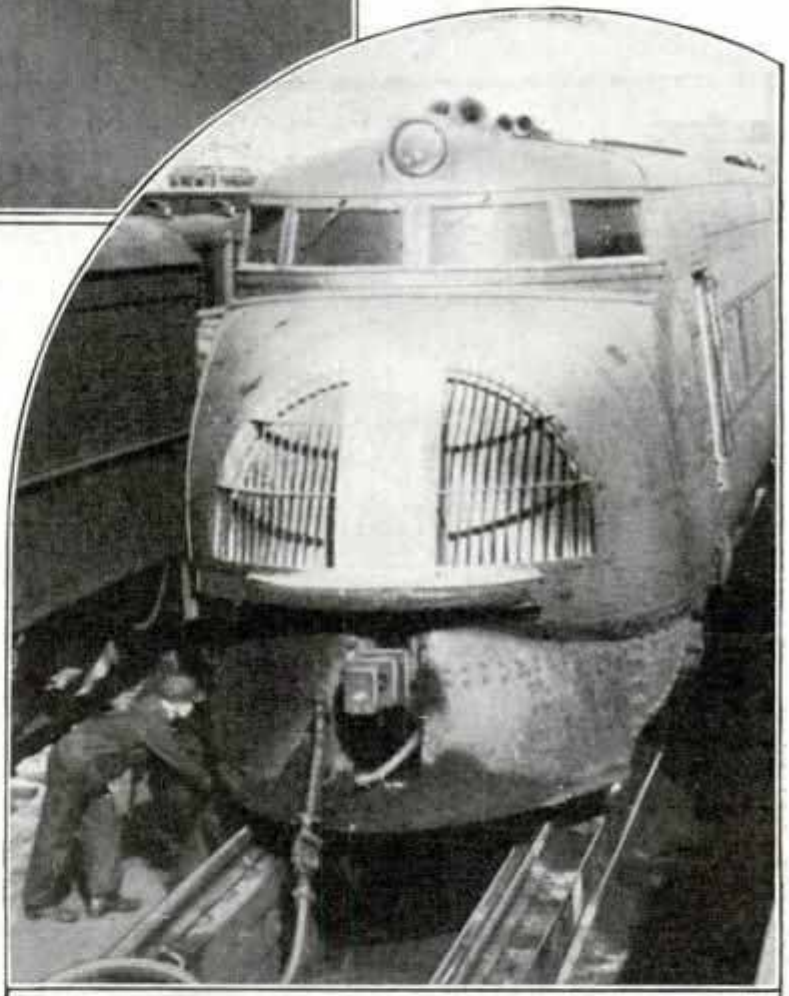
cannot be sealed. So grit and dust find their way in, and trouble follows.

Several railroads now are running Diesel-electric trains. The Diesel is an air breather and it consumes almost one hundred times as much air as the largest motor truck. On several occasions in the recent past, crack streamliners have had their schedules bro-

combustion one part of fuel must be mixed with many times its volume of air. When the engine inhales air it also sucks in everything that goes with it.

In northern Texas, a twelve-cylinder car bearing eastern license plates came to a dead stop on the open highway and refused to start. The air filter was packed solid with red adobe dust, fine as flour, almost a peck of it. When this was removed the car still refused to go at more than a crawl. Inspection showed that enough dust had been sucked in through the breather hole in the gasoline tank cap to fill the sediment bulb and clog the gasoline line. The car had traveled many miles at high speed. Contact with the dust-laden air had scoured patches on the body and fenders down to the glistening steel.

Railroads have suffered heavily. Little has been said officially, but statements from trainmen and repair shops indicate that hot boxes and bearing trouble are much more abundant than they should be. Roller bearings are sealed, and have stood up well, but the older sleeve bearings, with which the majority of rolling stock still is equipped, have required more than ordinary attention. Due to their nature they



Photograph of dust storm taken through windshield of auto at noon. Below, cleaning streamliner after it has passed through a dust storm

ken due to encountering dust storms with the accompanying inconveniences.

The mention of dust does not convey a very clear picture to a person who is not familiar with desert conditions. Imagine a hot and sultry day. The sun is shining brightly. Far overhead float lazy thunder caps. They billow high and are flat on the bottom. From them descend long wisp-like streamers. It is raining, but none of

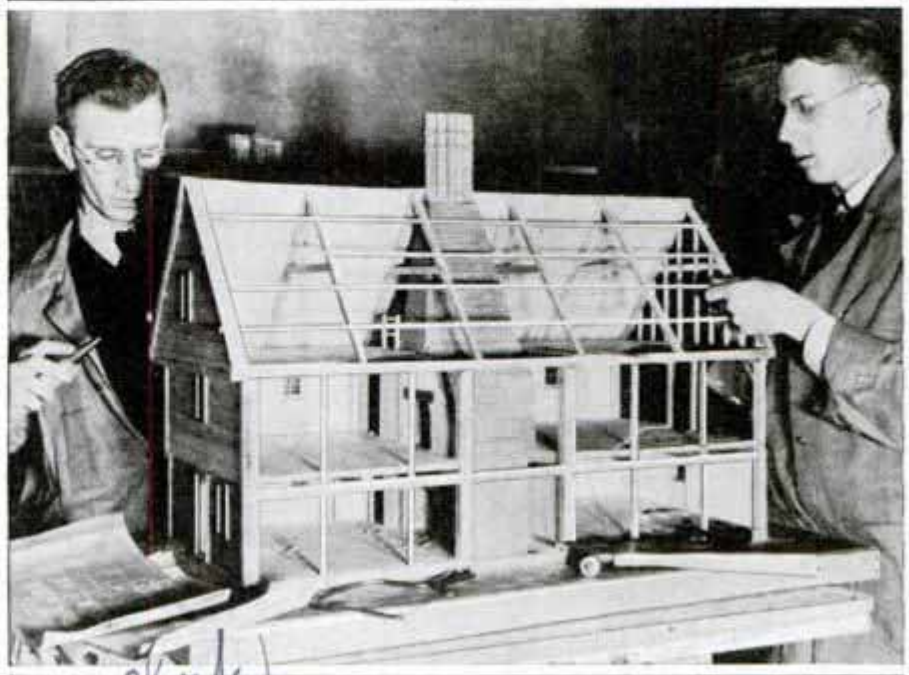
Cont. Diesel engines

Broken University Providence R. I.
Early Homes in Model Form

F718 Used to Show Architecture

the moisture reaches the parched earth of the desert. In the north a pocket of cold air is forming. It is expanding but is not yet powerful enough to dislodge the southern hot air. As the pressure builds up, a long tongue of cold air suddenly licks out under the hot and starts southward with a rush. It hugs the ground and advances with a turbulent swirl like water released by a burst dam. The proportions of the storm are gigantic. It may be 500 miles across. As the wedge of cold air sweeps onward it picks up huge quantities of dust, gravel and even small stones.

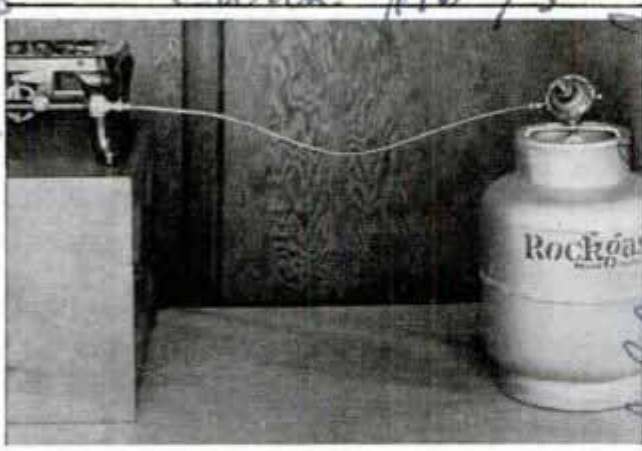
(Continued to page 144A)



clark
 Constructing an early New England home in model form as a demonstration of architecture followed in eighteenth century

Bottled Gas for Tourist Trailer Supplies Fuel for Cooking

Bottled gas is now available for the kitchen stove in your touring trailer. The small cylinder designed for use in the bungalow-on-wheels carries a twenty-pound supply of gas, enough to burn 100



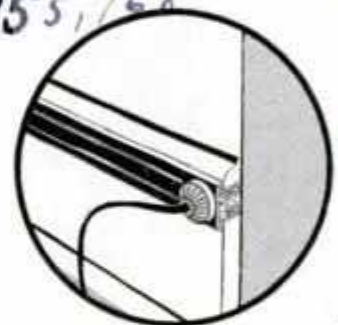
Small gas tank is shown connected to stove for cooking in touring trailer

hours and last the average touring family thirty to forty-five days for cooking. A regulator is furnished to reduce the gas to low pressure at the burner. Several refueling depots are being established.

Models of some of New England's earliest homes have been constructed for exhibition in Rhode Island to show the architecture of that day. One of the models is a miniature of the Parson Capen house, built in Topsfield, Mass., in 1721. Its architecture is the type which influenced early Rhode Island home builders.

Wall Strip Has Electric Plug Every Six Inches

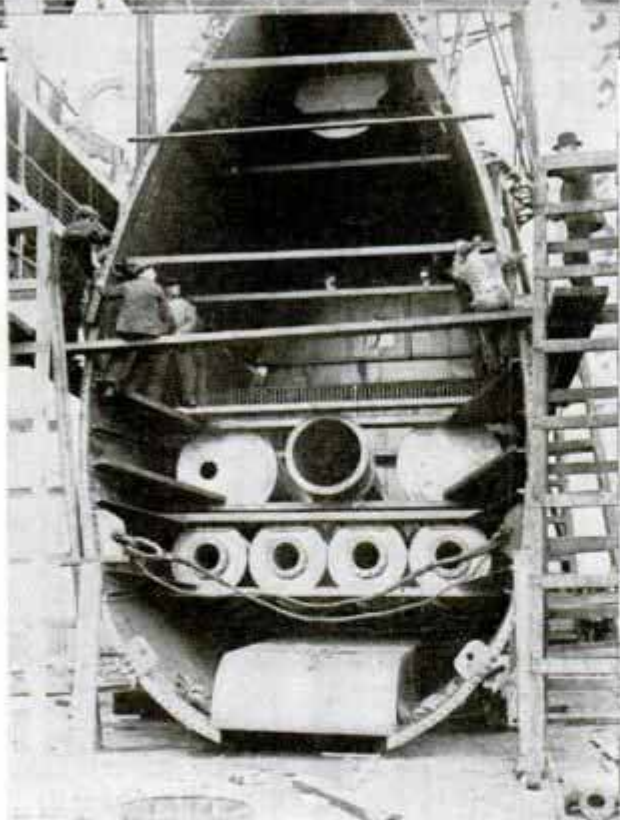
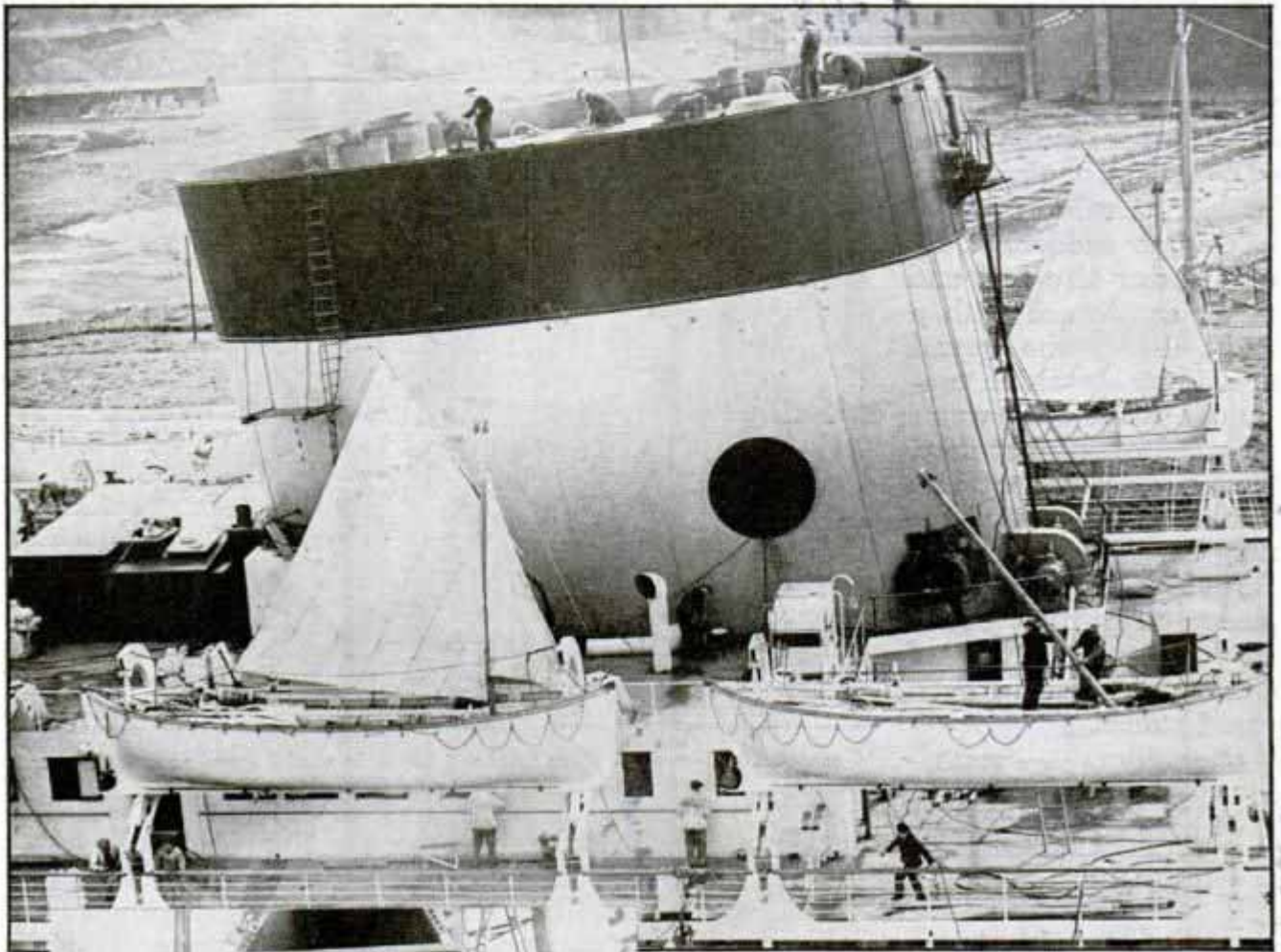
Safe, neat and easily installed, a new continuous outlet wiring system has an electric plug-in socket every six inches. It is intended for installation as a wall strip, almost unnoticeable in any scheme of decoration because it is placed on the baseboard. The strip replaces unsightly exposed wiring and its attendant danger of short circuits where the wiring wears. In addition, the strip offers many more outlets than the average installation.



1955/1958
F702
national Electric

Pittsburgh, Pa.

Vast Teardrop Funnel Is Diesel Ship's Exhaust



No billowing clouds of black smoke belch from the big funnels of a Diesel ocean liner. In fact, so vast a funnel as the steamer requires is unnecessary to exhaust the spent gases of a Diesel engine, yet many Diesel-powered vessels are still built with great stacks in the traditional manner. Looking down into the broad, streamline funnel of the "Dunnottar Castle," building in the Belfast shipyards, one can see tanks and expansion chambers, the latter acting as silencers for the four Diesel motors. The teardrop funnel of the "Athlone Castle," another new ship at Belfast, dwarfs the big lifeboats swinging above the deck. Its lifeboats are equipped with sails.

Locusts Used as Fertilizer
After Pests Are Trapped

At last a use has been found for locusts. In Argentina large quantities of the pests are converted into fertilizer. When

come
© Planet News, Ltd.
Top, the broad exhaust stack of the "Athlone Castle." Notice the lifeboats equipped with sails. Bottom, looking into teardrop funnel of the "Dunnottar Castle," showing the expansion chambers which are silencers for the Diesel engines

*Dep. of Commerce
Belfast
5/28/36*

*Under direction of
Ministry of Agriculture*

*from American Commercial
Attaché at Buenos Aires.*

in the hopper stage, locusts are caught by building long barriers of sheet-iron plates too high for the pests to hop over. They fall into trenches from which they are gathered, dried, sent to grinding plants and made into fertilizer meal. In South Africa where locusts last year virtually stopped trains, cars carrying tanks of poisonous liquid are being run over the roads and the poison is pumped over the entire right of way. Experiments also have been tried with flame-throwing apparatus.

F699

Cabin Built on Roof from Pilot House of Side Wheeler

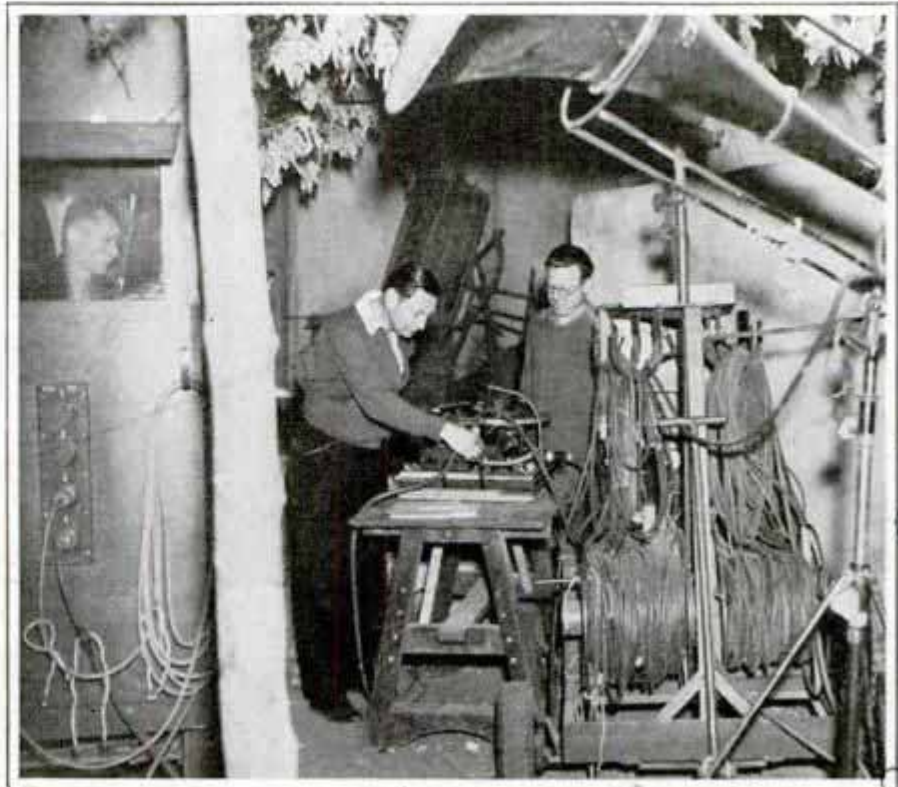
High above the river narrows the steamer "Cygnus" threaded for sixty-three years, the pilot house of the famed side wheeler has found a final haven. Rescued from a junkyard after the old ship was condemned, the neat white cabin is now perched on the roof top of a Brooklyn apartment house for the recreation of its residents. The surrounding roof is trimmed like a ship's deck, with ventilators and life preservers.



clw
Veteran of sixty-three years on a side-wheeler, this pilot house now surveys river traffic from a Brooklyn apartment roof

Secret of Better Movies Lies in Synchronization

F689



Starting the musical records made previously to accompany movie cast in dance scene. Note loud speaker horn at upper right

How producers obtain better singing and dancing numbers in motion pictures than the same performers usually could do "in person" has puzzled the public. The secret appears to lie in perfect synchronization. First the sound records are made, with the actors doing nothing except singing. When the best possible record is ready, the dancing scene is filmed, with the actors doing no singing, merely moving their lips. Thus they concentrate on dancing and actual acting, going through the routine to the music of their own recording as it is played on the set over a loud-speaker system. The result is synchronization of the dancing with the singing previously recorded.

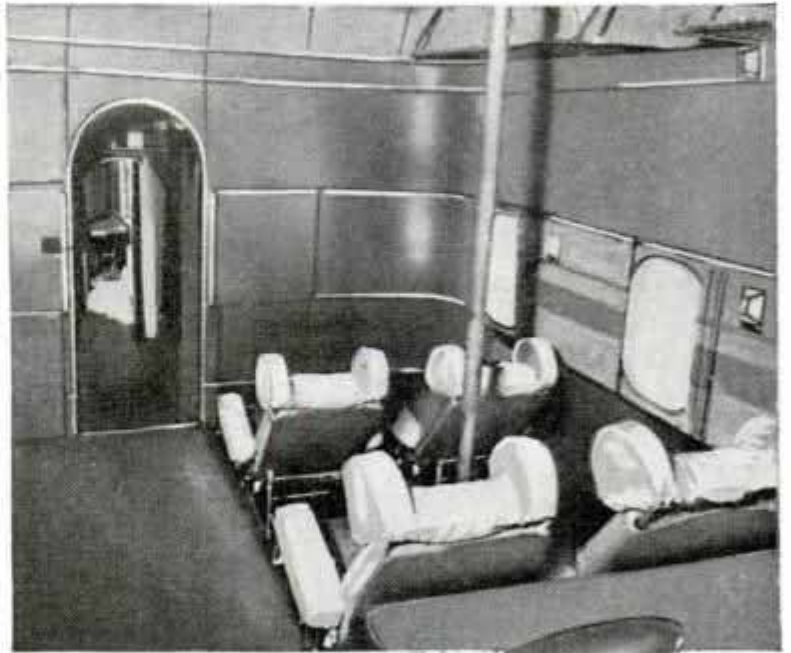
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56 Mr. A and 7th Ave. New York
Mr. W. J. Walsh

Cladis Pictures, 41 Park Row, New York

Two-Deck Flying Boat Has Sleeper Berths

Twenty-nine big flying boats, each accommodating twenty-four daytime passengers and having berths for sixteen at night, are being built for service between England and Australia and on other routes of Britain's Imperial Airways. A "mock-up," or full-size model of the design constructed to guide the builders, shows each boat will be equipped



British flying boat as it will appear when completed, and views of berths and compartment



with a smoking compartment and promenade saloon in addition to the seats and berths, and each will have two decks, the upper one being occupied by the crew and by compartments which will accommodate three tons of mail. Baggage is carried in the tail and fuel in the wings. The boats are all-metal monoplanes of the high wing type with wing-tip floats. Each is equipped with four air-cooled supercharged engines, each engine being rated at 740 horsepower. Each engine will drive a variable-pitch propeller and the top speed of the boats is expected to be about 200 miles per hour. The boats, each manned by a crew of two pilots and a radio operator are being equipped for night flying, an innovation for Imperial Airways which heretofore has not flown at night.

Illustrated London News 5/28/34 p. 560
ADHL
Imperial Airways Ltd
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England
Australia
London
England
Australia

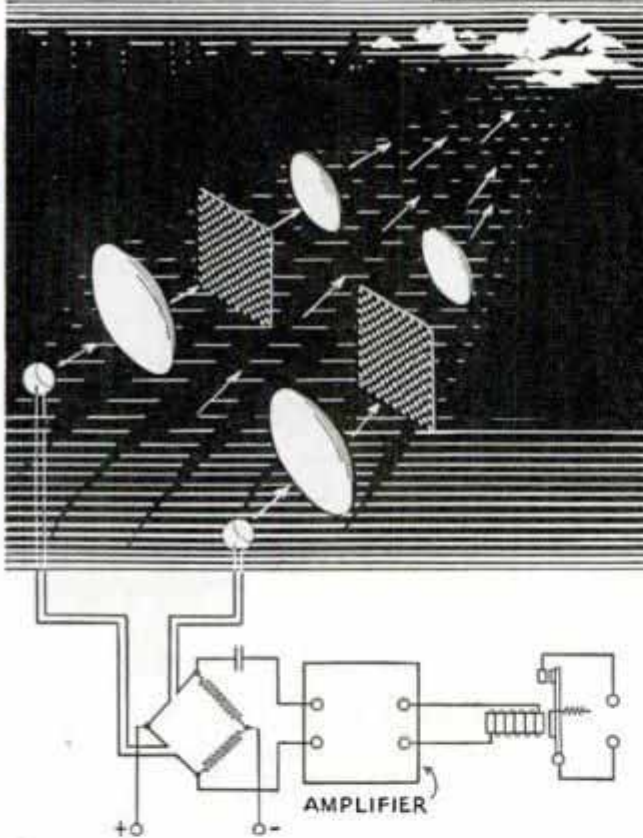
TWIN 'EYES' SCAN SKY FOR PLANES

Alarm Is Sounded When Ship Flies in 'Sight' of Photocells

Thousands of feet away, an airplane streaks across the sky unnoticed by human eyes. But it crosses the range of vision of the twin-eyed "Petoscope," upsets its delicate balance and sets an alarm ringing. The two electric "eyes" of this instrument can see any moving object within its focal field. It represents a fresh application of the photo-



Top, Petoscope's twin eyes watch sky above airport. Left, light reaches photocells through lenses and screens of opposite pattern



electric cell, distinct from the familiar method of operating a mechanism by cutting a light beam focused upon a photocell. The human eye notices moving objects more readily than still things. Similarly the Petoscope sees things that move—passing automobiles, trains, an airplane in the sky. The light from the field toward which it is pointed falls upon two objective lenses, is directed in parallel beams through two screens, then through condensing lenses to twin photoelectric cells. The two screens are divided

into checkerboards of alternately opaque and transparent squares or other shapes; the patterns are unimportant, but the two screens must be identical in pattern except that one is opaque where the other is transparent. Thus a beam of light falling through the two lenses passes through one screen but not the other. As long as any object in the visual field is stationary the same amount of light falls on both photoelectric cells, which are connected through resistances to form a balance. But when a moving object crosses the field, more light passes through one screen than the other, the balance is upset and, through an amplifier, a bell or other signal is actuated.

7778 Diesel Engine Used as Brake

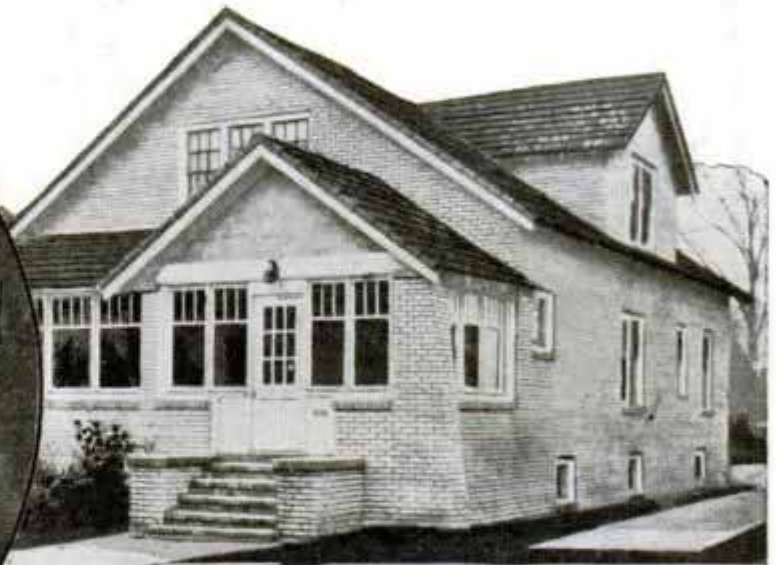
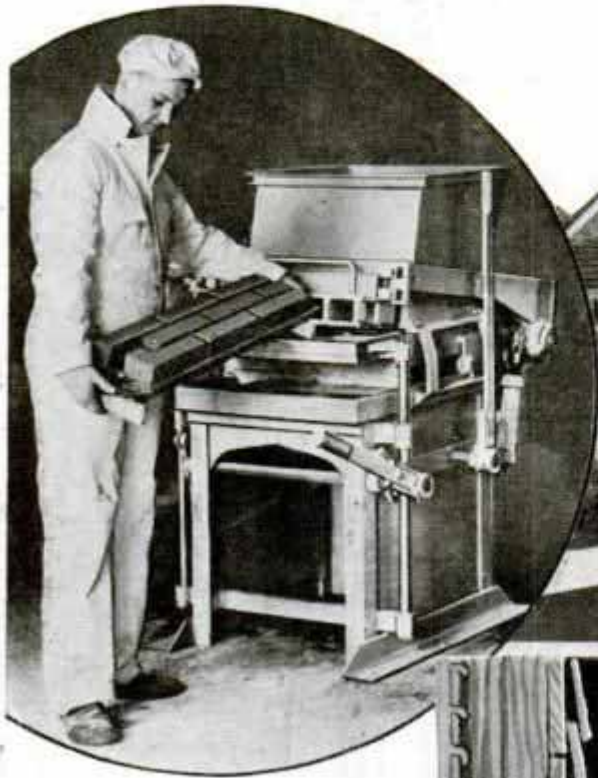
Automobiles and trucks equipped with gasoline engines utilize motor compression as a braking element when the throttle is closed. Vehicles with Diesel engines cannot do this because usually there is no throttle in the air passage. To remedy this, the French Westinghouse company has produced an engine brake enabling an engine under braking conditions to function as an air compressor instead of as an idling air pump. It consists of a valve inserted in the exhaust line.

Auto Industries

Research Associate in Elec. Eng.

Cub. No. 12, Eckhardt, 2097 N. Park Ave. Phila. Pa.

Six-in-One Bricks Cut Labor Cost in Building



OLD SIDING
DEAD-AIR SPACE
BRIKCRETE

Top, making six-in-one brick unit, and the resurfaced house. Below, wall section showing insulation space, and laying the brick veneer wall

Searching for ways to slash building and modernization costs, two Holland, Mich., contractors conceived the idea of six-in-one bricks. Instead of laying brick upon brick, lining up each row, spreading mortar for every brick, they developed a unit of six cement bricks fabricated together—easy to manufacture and economical to lay. The unit covers about a square foot of wall. Being three bricks high and two bricks wide, overlapping, the lining-up is simplified and only one-sixth the mortar is required for the entire wall. Machine-made, the multiple unit is always neat and accurate, and special corner units and single and half sizes are supplied to obviate the labor of cutting to fit around windows and doors. Originated to meet the demand for low-cost modernization of homes and office buildings, the method proved quite economical. A special machine was developed to cast the six-brick, corner and fractional units in one operation. The veneer brick walls

were built around outworn frame and stucco walls, leaving a small air space between old and new exteriors. A variety of color is available. A plastic, specially prepared color material is applied to the cement and fuses itself into the brick units. This coloring method has been successfully applied in varied climatic conditions for twelve years. The multiple brick units are sufficiently light in weight that heavy, expensive foundations are unnecessary. Local labor and materials are used, fabrication of the brick units near the job saving transportation costs.

Columbian Industries, Inc., Holland, Mich.

Sells to... 5000...

... 5000...

New **TASKS** *for* **GLASS**



BLOWING a light globe. Glass blowing is one of the oldest of the industrial arts and many of these skilled craftsmen have spent half a century at the task. Contrary to popular belief, it doesn't take much breath to blow glass. It's the way you blow, and not how hard, that counts. The real trick is to keep the molten glass from running off the pipe.



WEDDING gown, veil, head-dress and bridal bouquet all are made of glass. Even the thread with which the gown was sewed is of glass. Below, fibrous glass products made of strands of glass much smaller than a human hair.



Designed by Elizabeth Hawley
 modified by H. W. MAGEE

21 E 67th Street New York

T O most of us, glass is just glass—a hard, brittle and usually transparent substance composed mostly of sand and used to make windows and milk bottles and drinking tumblers.

If that's your conception of glass—then glass isn't glass any more.

For modern science has taken one of the oldest man-made products, given it brand new characteristics and changed it into other forms which look and behave like almost everything under the sun except glass.

Let's consider a few of the products of the glass industry shown at a recent exhibit in the Brooklyn Museum and see



Charles Clinton Glass Co.

CHECKING the temperature of a window glass melting tank with a pyrometer in the plant of the Pittsburgh Plate Glass Company. Maintenance of just the right temperature is highly important. Below, American pressed glass of about 1875 exhibited by the Brooklyn Museum.

Westward Ho



Pyres - Corning Glass Works Corning NY



how they conform to the usual definition of glass. Take fibrous glass, or glass wool, as it is called, for example. It isn't hard. It isn't brittle. It isn't transparent or even translucent. It looks like cotton. Its fibers are from one-seventh to one-fiftieth the size of a human hair. Yet it's glass and is used for insulating everything from the walls of your home to the sides of a battleship. It has even been woven into garments and draperies, made into a filter to strain the dust out of the air you breathe and it can be employed as a covering for electric wires.

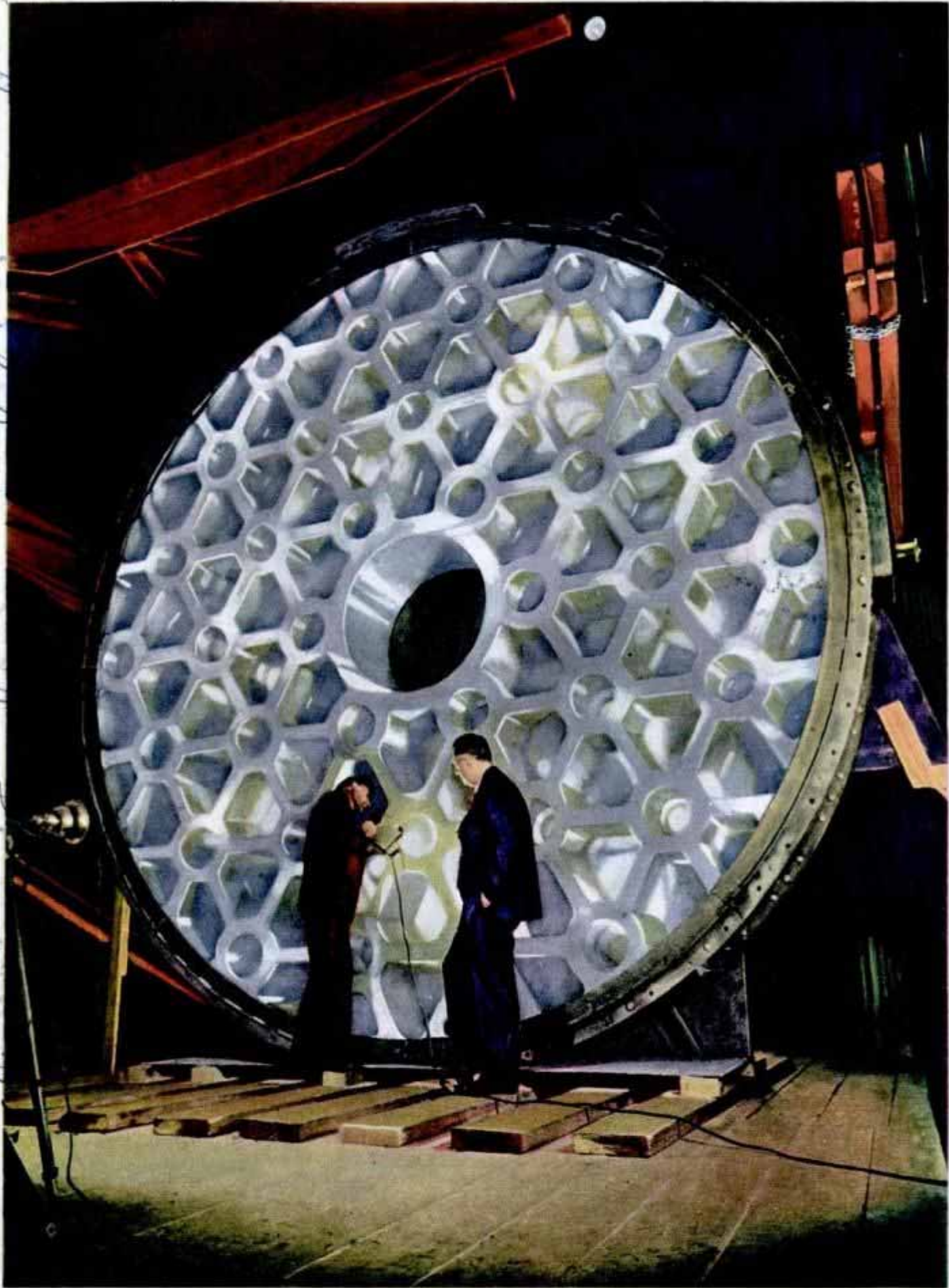
Here is another material that looks like glass—

but stretches like rubber. Smash into it and it bulges, then springs back into place. Shatter the surfaces and it can be rolled up like a carpet. But it's glass—two sheets of a special kind of glass cemented together with a plastic, a refinement of the familiar shatterproof variety.

And here's a transparent saucepan which looks like glass ovenware. But it's on top of the stove, in direct contact with the flame. Through its sides the housewife can watch the food as it cooks, then pop it directly from the top of the range into the oven. It's glass too—a kind that is twice as resistant to heat as ordinary glass ovenware.

And here are translucent bricks and tiles—also of glass. Architects are building filling stations and store fronts and even houses with them. And if

Left: Mr. George V. McCauley, Physicist in charge of disc making



EXAMINING inner structure of one of ribs of the 200-inch glass disk produced by the Corning Glass Works. It will serve as the reflector for the telescope of the California Institute of Technology.



193

F452

you live in a glass house, you now can throw stones. The glass bricks can take it. Here's a slab of glass that admits light but absorbs the heat from the sun and keeps a room cool on a hot day. Here's another piece that lets through the ultraviolet health rays—you can get a sunburn through it. And here's "one-way" glass which cuts down the glare from automobile headlamps and a curved "invisible glass" in a show window that does not reflect the light.

Each material is glass, but each is a different kind of glass made to do a particular job. Glass manufacturers have been quick to adapt their products to changing times and there are more kinds of glass today and glass is used for more purposes than ever before—and the varieties of glass and the applications for glass are constantly increasing.

MOLDING and blowing glass in the plant of the Inland Glass Works in Chicago.

6101 W. 65th St.

The origin of glass is lost in antiquity but rich men treasured it many centuries before the birth of Christ. Pliny records that Nero paid the equivalent of \$3,500,000 for a rare glass goblet and Job compares the value of wisdom with that of gold—and glass. The average buyer today can obtain art glass that would have dazzled even the Emperor Nero.

The most common form of glass is flat glass. We look through it a hundred times a day without seeing it. Now let's look at it. There are three divisions of flat glass; plate glass, window or sheet glass, and rough-rolled and wire glass. Also included in this group are struc-

I 462 194



ILLUMINATING glassware and scores of other hand-blown articles, all products of the glass blower's art.

tural glasses, colored store-front materials, table tops and bathroom furnishings, cathedral glasses and specialty glasses, the latter type including the heat-absorbing kind, the ultraviolet transmitting type and the various anti-glare glasses.

All glasses are composed principally of sand-silica, limestone and sodium carbonate, but many other components are added to impart special properties. Salt-cake speeds up melting, feldspar prevents staining and discoloration, certain oxides impart color and certain other materials are added in making colorless glass to remove the trace of iron that formerly imparted the greenish hue to plate and window glass.

By chemical analysis it is easy to determine the materials in glass, but the molecular make-up of even the simplest form of glass is still a baffling mystery. The materials are weighed, mixed with ground-up glass of the same type and

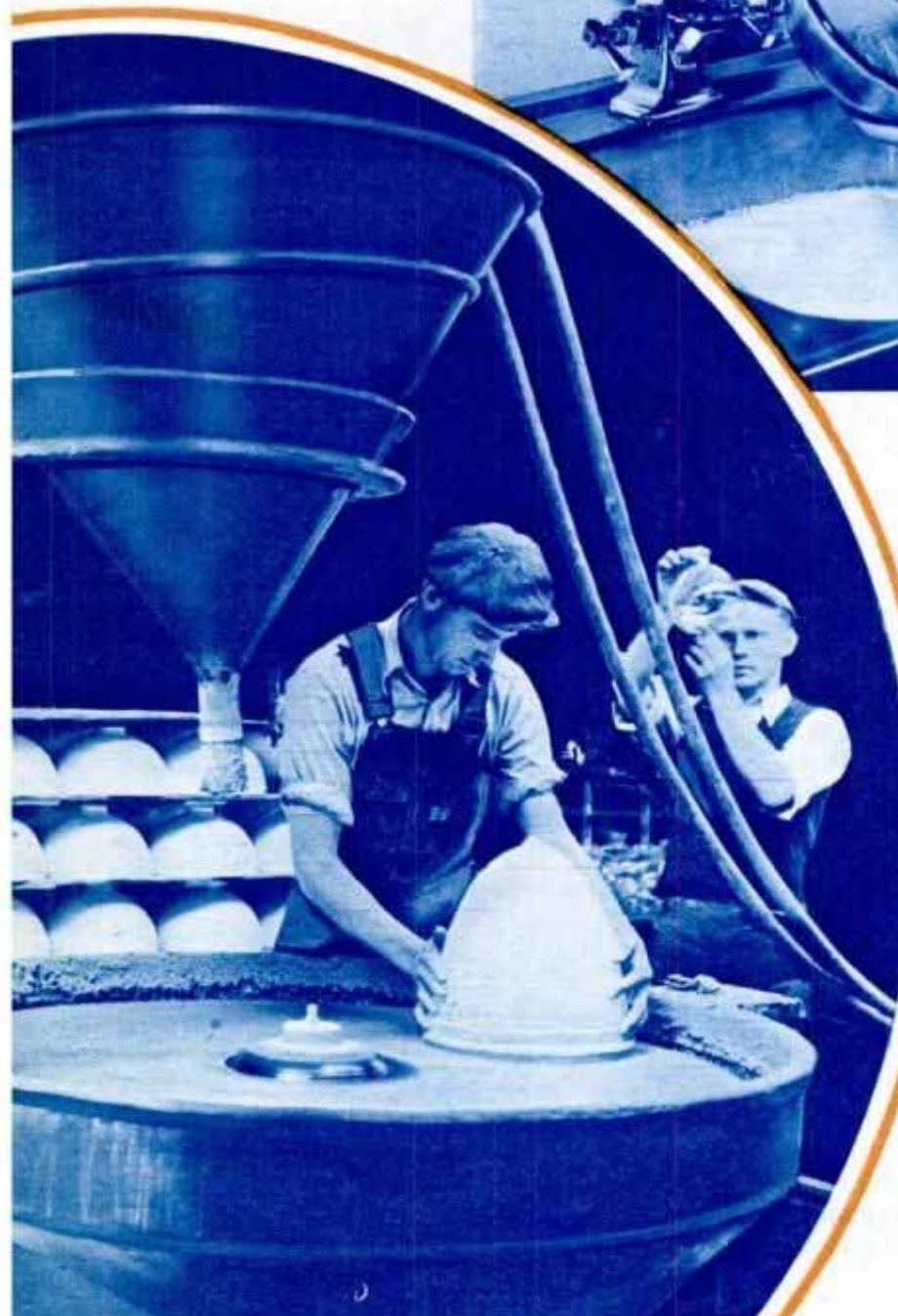
fed into continuous tank furnaces, small day tanks or pots of refractory clay. If pots, each holding a ton or more, are used, they go into pot furnaces where the batch is melted at a temperature of about 2,600 degrees. The liquid glass "cooks" until it is free of bubbles.

In making plate glass, the most expensive type of flat glass, the finished pot is carried by a crane to the casting hall where the glass is poured out and rolled into long sheets of varying thickness, then passes to the annealing furnace where it is cooled gradually to relieve internal stresses. In the continuous tank furnace, holding 1,000 tons or more, the glass flows from one end directly to rolls which form one continuous sheet.

As the glass comes from the annealing furnace it is cut into large sheets which are dull and dirty looking. Surfaces are ground down and polished by passing the glass, bedded to cars with stucco, under a series of revolving disks, suc-

GLASS dish for top-of-stove cooking, the container coming in direct contact with the flame. Note the detachable handle. Below, grinding the rough edges off light globes. A machine like this finishes 300 globes an hour.

F452



cessive disks grinding with finer and finer grades of sand mixed with water until, finally, fine emery and garnet are used. Rouge and felt disks do the polishing.

Much of the plate glass made today is used in the manufacture of laminated safety glass. In this process, two thin sheets of glass are treated with a binding medium and sandwiched against a sheet of cellulose material, the bond being effected under heat and pressure. Bulletproof glass is made in similar fashion, except that the sheets are thicker and there are sometimes five layers of glass.

Window glass has what is known as a fire polish. It does

13452
Lobby - Owens Illinois Co
Toledo, Ohio (2)



THE TOP of this desk is frosted glass, the base is mirror glass with the center portion sandblasted, and the sides are two slabs of black Vitrolite glass. Note louver type window at rear.

not require grinding and polishing, and it is not rolled, but drawn—pulled up in a continuous sheet from the surface of the molten glass. Drawing is started with a “bait” which catches the glass and starts to pull it up. The glass is viscous, like molasses, and adheres to the bait. A common method of starting the draw is to sink a slotted block into the

surface of the glass in the furnace and make the draw through the slot. The speed with which the glass is pulled upward determines its thickness. The annealing process is similar to that used for plate glass.

The modern method of making rough rolled glass is similar to the process for
(Continued on page 132-A)

Thundering Elephant Herd in Museum Group

Startling in realistic poses, a herd of eight African elephants has just been placed in Akeley Hall of the American Museum of Natural History. The herd, stuffed and mounted in native surroundings, appears to be thundering along through the jungle. The huge leader stands with up-lifted tusks and outstretched trunk scenting trouble. A baby elephant huddles close to its mother, while a young bull has wheeled around to act as a rear guard. This group is said to be outstanding in museum presentations. Four of the elephants in the group were collected by Col. Theodore Roosevelt, his son Kermit, and Carl Akeley about twenty-five years ago.

neeyak
Hall of African mammals



me
Snapped at this angle, the museum's elephant herd appears to be thundering along right out of the picture

All-Metal Training Planes at "West Point of Air"

Built from the ground up as an advanced training ship, a new type of all-metal airplane is being placed in service at Randolph field, the army's "West Point of the air." In this radio-equipped ship, air corps cadets will take "university" training to fit themselves for flying the fast tactical planes now being used by the air corps. The training plane has a top speed of 176 miles per hour.

Seversky Aircraft Corp. Farmingdale, L.I. neeyak

FL 99

ant.



Here is the first of a number of training planes which air corps students will use

Seversky Aircraft

Glass Used Instead of Bones for Growth of Marrow

With glass apparatus doubling for bones, human bone marrow has been grown in the laboratory to permit studies of the blood and metabolism by scientists of the University of Oregon medical school. Glass apparatus also has been used for growing living glands outside the body. The bone-marrow apparatus may solve important problems concerning changes in the blood and body tissues. The red marrow of bones produces the red blood cells, so it is possible the apparatus may aid in the study of anemia. A semi-permeable membrane permits nourishment to reach the culture.

F 954

Portland Ore

Gene Berry 2/26

Dr. Edwin E. Osgood
Blood in marrow

Seesaw on Speeding Motorcycle Gives Riders Plenty of Thrills



Trick riders convert a one-seater motorcycle into a three-passenger traveling seesaw

Try teetering on a seesaw atop a speeding motorcycle for a new kind of thrill. That was one of the stunts introduced by soldiers of the British Royal Signal Corps at a tournament this year. Two men stood facing each other on the seesaw mounted above the cyclist's head, tilting back and forth as the motorcycle roared along. Toe straps help them stay aboard.

Electric Pump "Kicks" Oil from Bottom of Well

Regarded as one of the most important discoveries in the oil industry, an electric pump which stands on its head at the bottom of a well and kicks oil to the surface

with its "feet" was demonstrated recently. The pump will reach oil at any depth and will send to the surface oil not recoverable otherwise. Its motor is slim, so that it will go down an oil-well casing, and it can be lengthened indefinitely until it resembles a snake in structure. The motor is a series of slim motors, each only a couple of feet long and generating seven and one-half horsepower, one standing on top of the other. The motors are connected rigidly. In action, the pump is lowered head down until it is buried deep in the oil pool. A centrifugal pump on top of the motors is the "foot" which kicks the oil to the surface. At the bottom of a 6,500-foot well, the pump carries in the pipe above it the weight of more than six tons of oil that it is forcing to the top.

Automatic Starter for Cars Prevents Motor Stalling

Automobiles can now be equipped with an automatic starter unit which requires only the turn of a key to crank the motor and keep it firing. It can be installed on nearly all current models. Because of the special breaker point control system, the engine cannot stall. As soon as it drops below its lowest possible pulling speed and the flywheel slows to a predetermined number of revolutions per minute the control system closes the starting switch, and keeps the flywheel

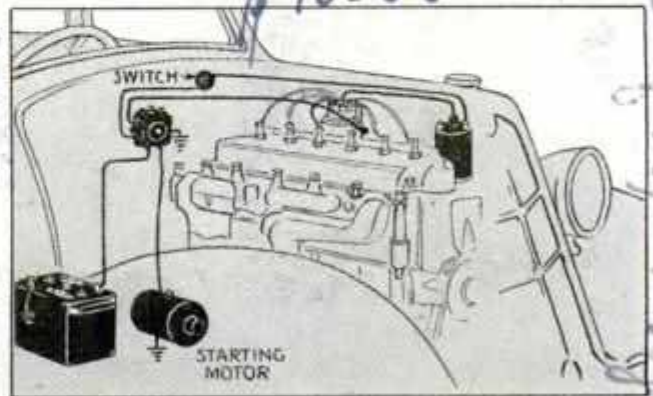


Diagram of automatic starter system which engages at turn of key and cranks engine whenever it stalls

at. Calterick Camp. near Darlington
Change Tube
5/2 3/3 6

Bartheville
Chla.
and A. Centraff
I 684.
10.00
Expensive

turning. There is no backfire. This type of starter is said by its manufacturers to reduce strain on starting parts, and save fuel, battery and generator. If starting is impossible, due to hill or load, the starter automatically locks the flywheel to keep the car from traveling backwards.

Rubber Bulb Dispenses Glue

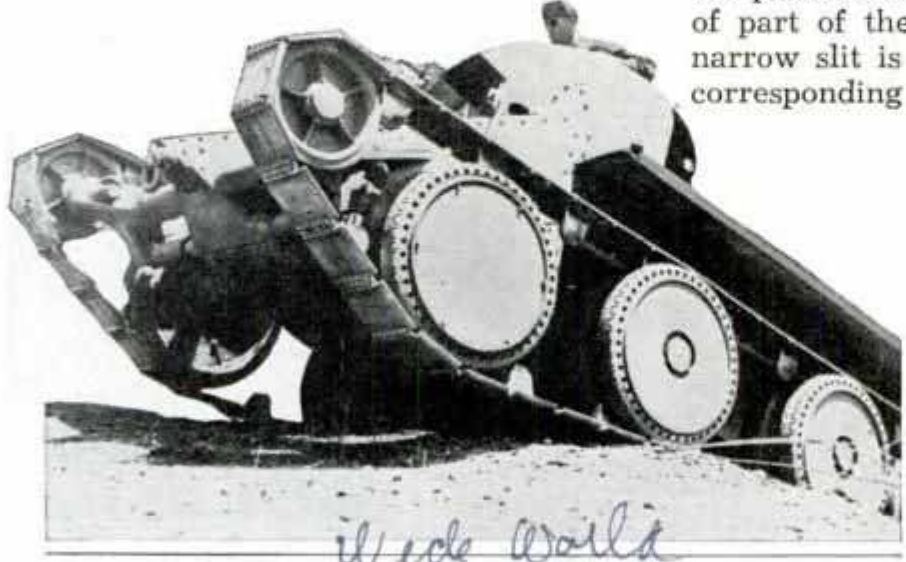


Designed for use by photographers and draftsmen, a rubber bulb with a self-closing slit in one end dispenses mucilage or glue in a clean manner. The glue may be spread in a line or squeezed out drop by drop.

Use of the bulb in applying the glue results in cleaner work.

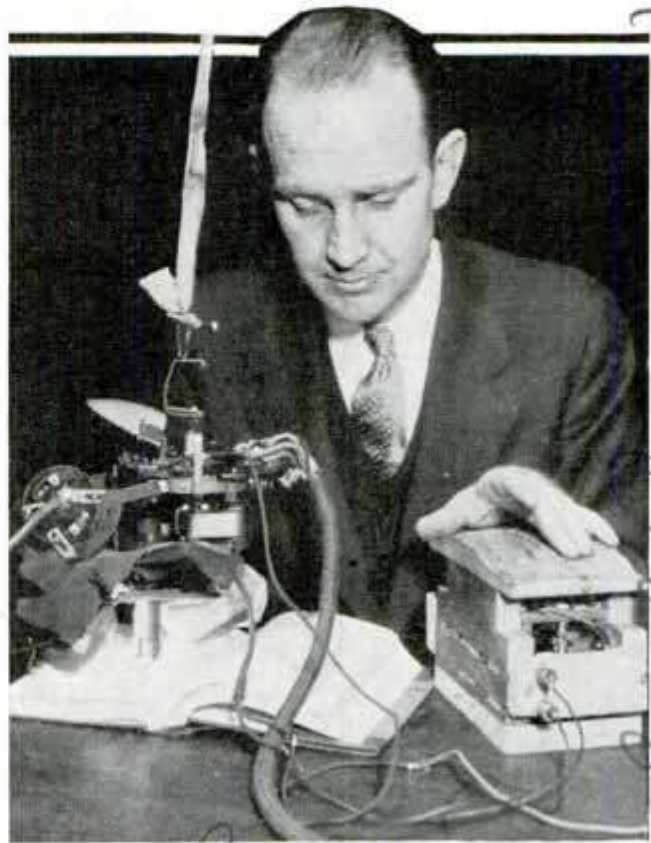
Mile-a-Minute Tank Tested at Army Training School

In tests at Fort Benning, Ga., where is located the largest infantry training school in this country, one of the fast Christie war tanks has been undergoing intensive tests over rough country. Speeds up to a mile a minute have been attained by the mobile fort, which is equipped with rubber tires, as well as the endless-track type of tread.



High-speed army tank tops the hill in test run. Note the rubber tires riding inside the endless track on which the tank travels

Blind Helped to Read Print by Photoelectric Scanner



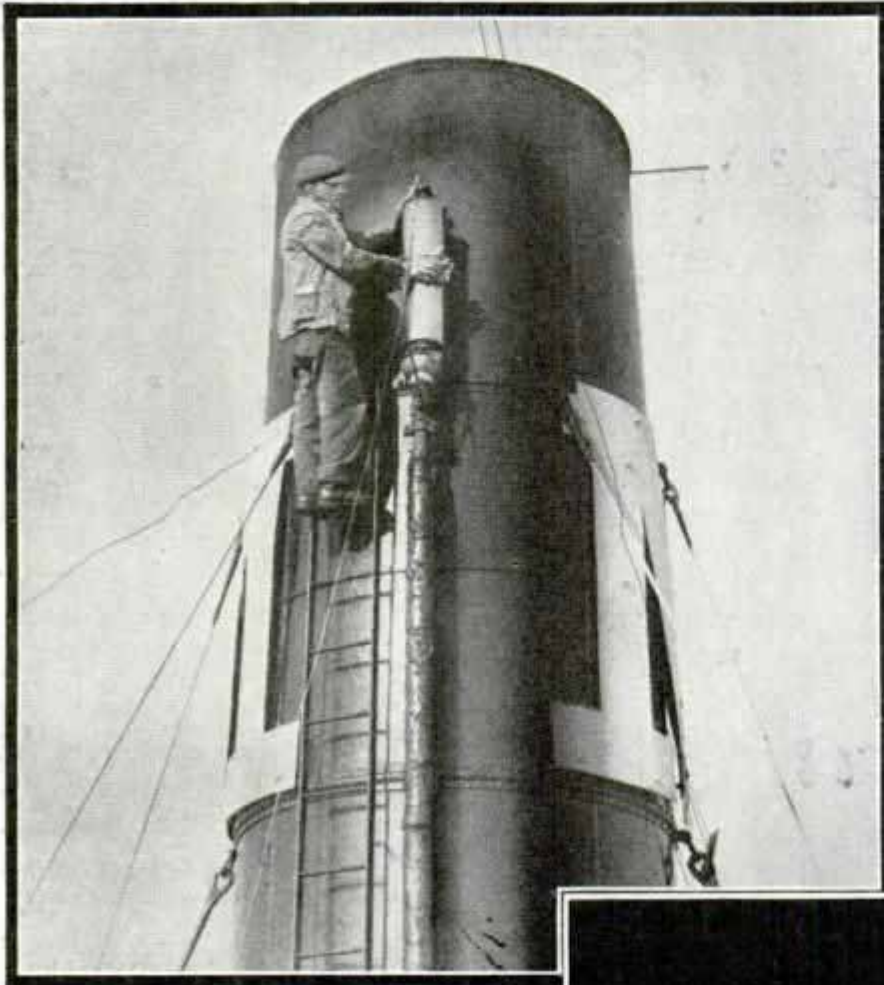
As photoelectric scanner focuses on letters of printed page, blind man feels buttons rise and recede

Ordinary printed pages of books and magazines may one day be read by the blind by means of an electric scanner being developed by a Northwestern University graduate student. It consists of the scanner itself—a light, lens and photoelectric cells—and a box on which a single row of buttons is mounted. As the scanner passes over a printed letter, the image of part of the letter received through a narrow slit is magnified and the buttons corresponding to that part of the letter are raised. When the scanner moves over the letter "E," for example, all the buttons rise for the vertical part, but only the top, center and bottom buttons remain raised for the three horizontal lines. The inventor considers this method more difficult to learn than Braille, but it would bring all printed matter within reach of the blind.

Letter ret... 11/9/39
Franklin D. Rowland, graduate student

7 329.

BULLDOGS



signed only for use in protected waters. The high superstructure of a dredge is boarded up to keep storm-driven waves off low decks, construction barges for use in the far north must be fitted with metal sheathing to protect them from ice as they are towed through the floes, and floating drydocks are closed at the ends and thus made into square-ended ships so they may be taken to sea.

All these clumsy and high-sided vessels, easily battered by the seas and offering large surfaces to the fury of the wind, afford tugboat men their

84. By Walter E. Stewart
Second Ave. Newark, N.J.

R E A D Y at a moment's notice to steam for any port of the seven seas, to tow a great floating drydock, a gold dredge, or a mud scow, seagoing tugboats are the powerful, unlovely bulldogs of the world's ocean commerce.

Voyages of several hundred miles with an average of three 250-foot ship barges in tow is one of their most valuable services to trade. Each barge will carry as much cargo as a medium-sized steamship, and at rates far below that which the most economical steamship could manage. Oil barges built on the lines of a ship are towed with equal economy.

The most spectacular activities of deep-sea tugs are met with in voyages, often of several thousand miles, with floating structures de-



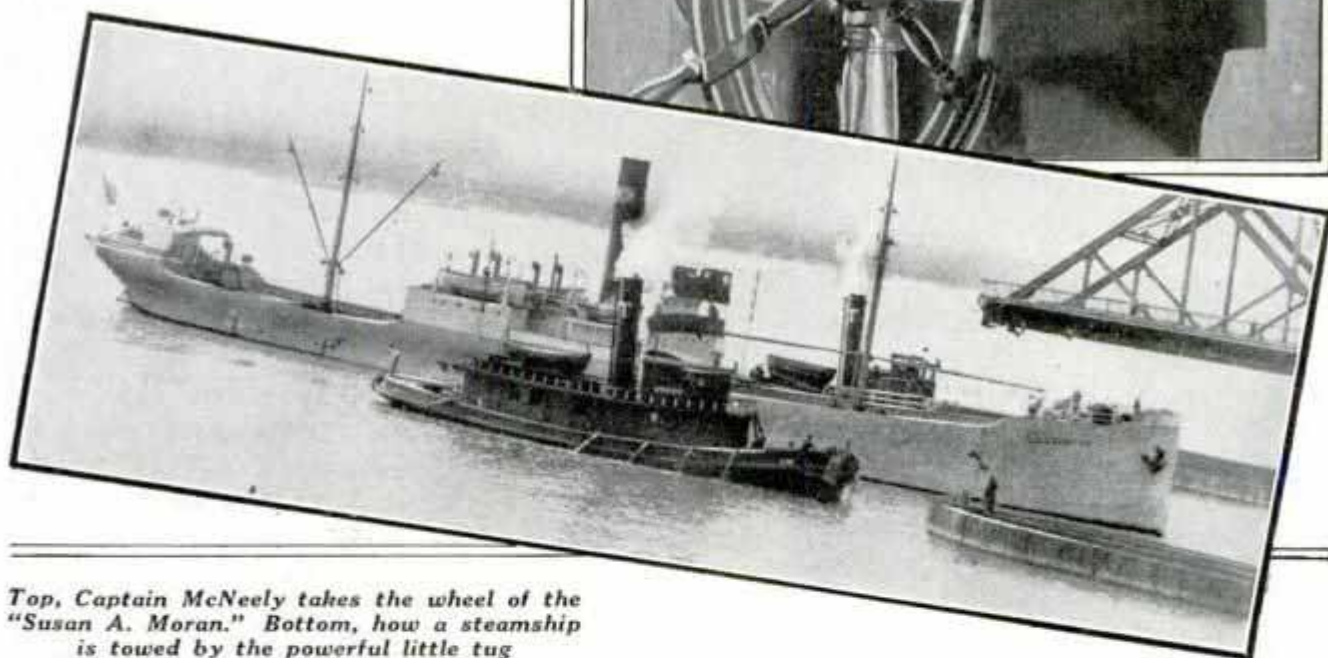
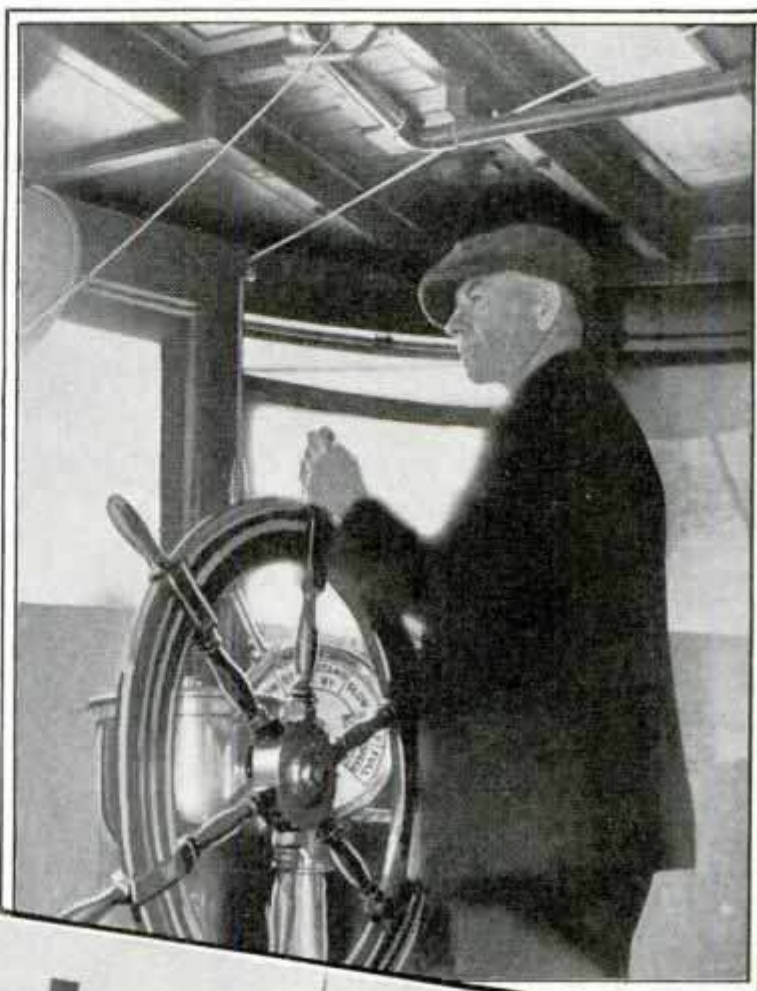
Tugboats aren't so small, after all. Top, compare size of the funnel with that of the deckhand polishing the whistle. Bottom, one voyage of the "Susan A. Moran"

F324

of the DEEP

greatest adventures and highest rewards.

The deep-sea tugs of America's Atlantic coast are among the largest, fastest and most powerful in the world. Fast coastwise voyages, ranging from Newfoundland to stormy Cape Horn at the southernmost tip of South America, are the specialty of these sturdy craft. Built of steel from the keel seventeen feet beneath the surface to the pilothouse twenty-five feet above it, these boats go to sea and stay in any kind of weather. They average a length of 150 feet, a width of thirty feet, and are built around a great two-cylinder steam engine which develops 1,200

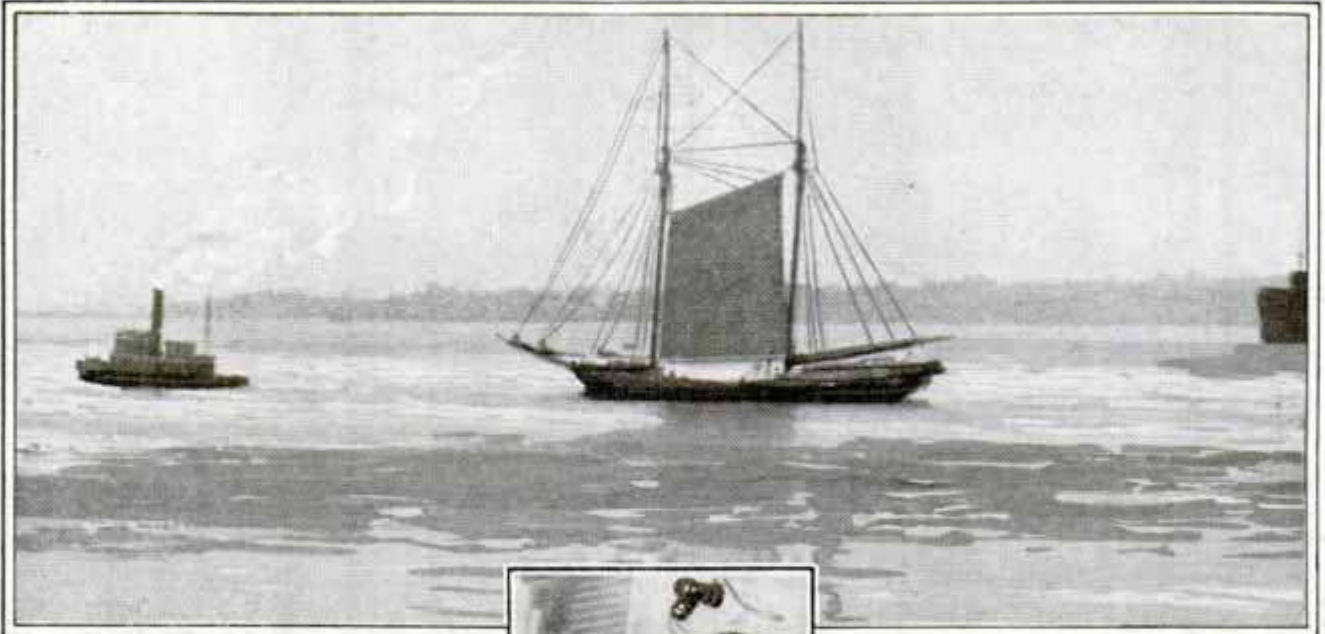


Top, Captain McNeely takes the wheel of the "Susan A. Moran." Bottom, how a steamship is towed by the powerful little tug

horsepower. The hull is just large enough to properly house the engine, boiler, and fuel and water tanks. The crew of eighteen officers and men lives in deck-house cabins and forecabin. Regularly running as long as twenty-two days at full speed, these tugs carry 700 tons of fuel oil and 100 tons of fresh water.

On one voyage recently the "Susan A. Moran" of New York covered 5,544 miles.

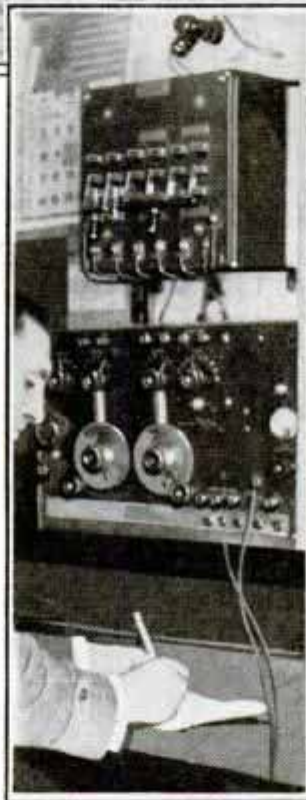
From New York she sailed for San Juan, Puerto Rico. Five hundred miles off the Carolina coast she rode out a gale that kept her decks almost continuously flooded for six hours. From San Juan she towed the U. S. army dredge "Captain Huston" 400 miles farther south to Fort-de-France on the island of Martinique. A few days later she returned the dredge to San Juan. During both trips tropical



storms were encountered which nearly succeeded in hurling the dredge to destruction on treacherous reefs.

Pausing only long enough to refuel and take on provisions, the "Susan" steamed westward 1,376 miles to Colon in the Panama Canal Zone, picked up a disabled steamer and towed it 1,972 miles to New York. The "Susan" docked late one afternoon, refueled during the night and next morning started with three \$50,000 scows in tow for the ice-choked waters of Passamaquoddy bay in Maine, 550 miles away.

The crews of ocean-going tugs are always on call, often not knowing until actually under way what their next port will be. Powerful radio transmitter and receiver keep them constantly in touch with the central dispatcher ashore. Often a tug returning from a distant port will receive at sea



Top, coastwise towing of old ocean-going sailing ship. This is getting to be a rare sight. Center, operator aboard a tug jots down weather report. Bottom, 300-ton tug towing two 10,000-ton ships side by side, demonstrating the power of the tug

radio orders to turn about and pick up a new tow for another port. Leaving for a routine tow of 250 miles from New York to Norfolk, tugs are frequently ordered farther and farther afield until they are gone, not the four days originally scheduled, but several months.

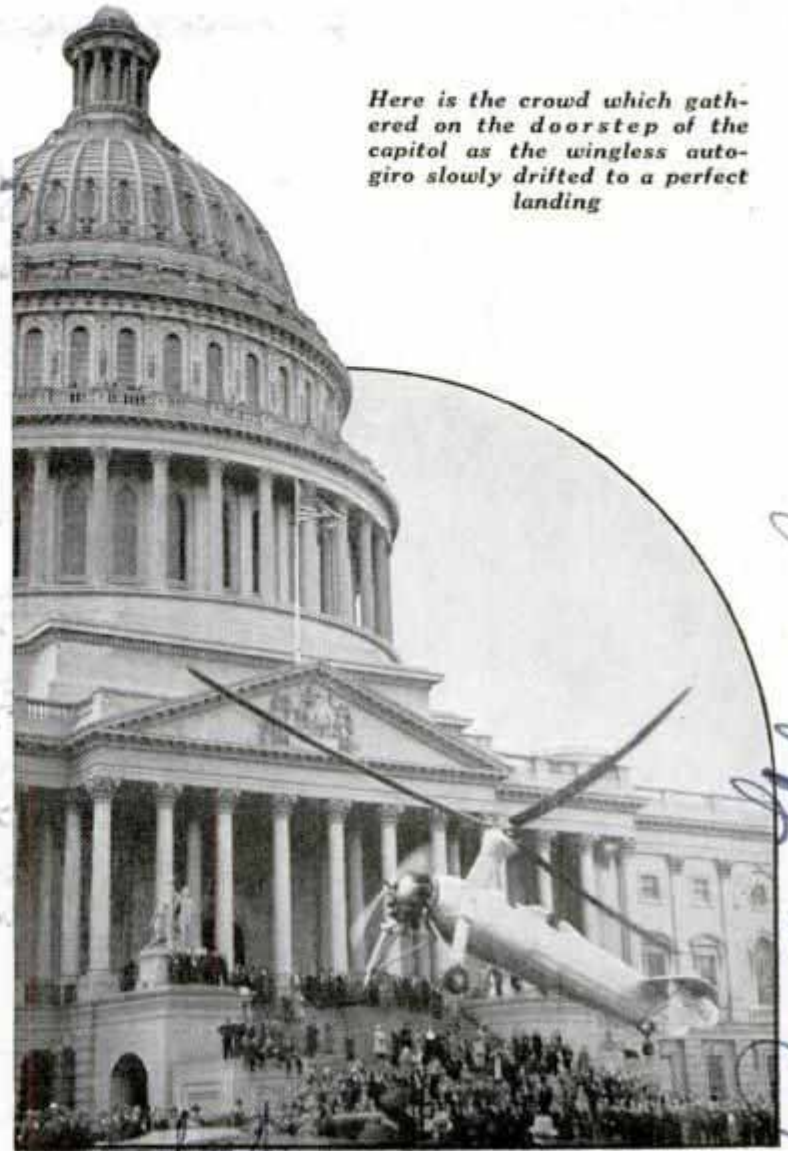
Most of the distance records of seagoing tugs are held by Dutch craft, which are relatively small, low powered, but exceedingly seaworthy boats whose low fuel consumption enables them to remain at sea for long periods. When the tugs "Zwarte Zee" and "Witte Zee" towed a 584-foot, 17,000-ton floating drydock from England 14,000 miles to New Zealand they established the present record for continuous tow. The drydock was so big and difficult to handle that the tugs had to keep it far offshore so that in case of storms they would

(Continued to page 130A)



Wingless Autogiro Proves Safety at Capitol

In a demonstration of its safety in landing, a wingless autogiro was brought gently down almost on the doorstep of the U. S. capitol recently. In the crowd watching the safe flying test were members of the senate commerce committee which has been studying various phases of aviation, particularly safety. While the giro requires a short run on taking off, it can descend vertically, stopping after only a short roll. From a safety standpoint, this is regarded as a desirable feature because the ship literally may land in a space no larger than a back yard.



Here is the crowd which gathered on the doorstep of the capitol as the wingless autogiro slowly drifted to a perfect landing

F651.
"Auto Desk" Holds Map or Memo before Driver

Fastened to the steering post, an "auto desk" is handy for keeping road maps, shopping notes, sales routes and other memoranda before the motorist's eyes. It will hold memo pads up to an inch thick, and its strong clamp can be used to hold a package of cigarettes or a lighted cigar in easy reach. At the bottom of the "desk" is a pencil holder. When touring, a map open for the immediate region can be mounted on the "desk" and turned as the trip progresses.



Handy "desk" with clamp mounted on steering post carries reminder pad or highway map

F 757
Faster Liquid-Cooled Engines Predicted for Aviation

By 1940, aircraft engines will develop at least 1,600 horsepower in a single engine according to H. Wood, British aeronautical engineer. One thing which might make this possible, the engineer said, is liquid cooling, now used in the best English airplanes. In sharp contrast is the American practice of using air-cooled engines. The air-cooled engine has a tendency to overheat if operated on the ground for any length of time and only at high cruising speed is sufficient air drawn over the engine to give proper cooling. The engine of high horsepower in the future, the British expert intimated, probably will consist of many small cylinders to take advantage of the relative increased cooling surface which would be thus attained.

Leving Auto Supply Co. 28 Oak St. Can't be reached

Royce, Ltd. London U. I. England
 14 and 15 Conduit St. W. 1. England
 150 Broadway New York

Before Society of Automotive Engineers 29th 39th

Gay Table-Top Dancers Pirouette in "Finger Ballet"



Nimble fingers of Andre Martin, French entertainer, are the legs of two dancing dolls that clog and toe dance on the table

Four fingers dressed as dancing dolls can perform an amusing ballet on a table top. Andre Martin, a Frenchman, entertains his audiences with a gay pair of dolls whose legs are his four fingers sticking through a pair of black gloves that form part of the costume of the dancers. With slippers or clogs on his fingertips to carry out the effect, he puts his nimble fingers through the fast paces of a tap dance, the pirouetting of a ballet, and other intricate steps. Spotlights add to the lifelike effect.

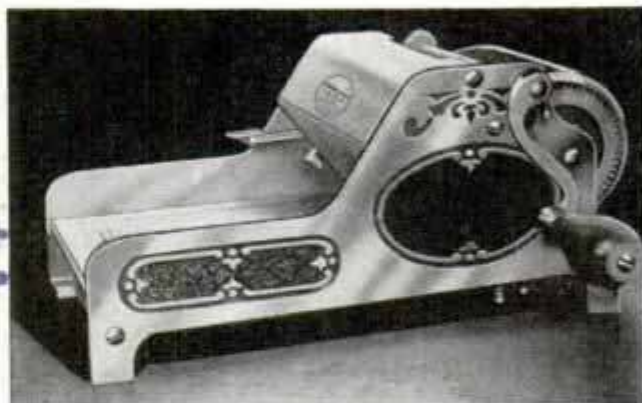
Sideways Annoys Auto Rider More Than Other Shocks

Sideways causes automobile passengers more annoyance than any other type of vibration. Prof. H. M. Jacklin of Purdue University, using an instrument for measuring accelerations, has turned human guesses about riding comfort into facts and figures. In tests with a shaking table,

with subjects seated on hard rattan street-car seats, the professor found that the human body will tolerate nearly twice as much longitudinal vibration as transverse (sidesway), and nearly fifteen times as much vertical vibration as transverse. Particular attention was given to "disturbing" vibrations which Prof Jacklin explains in this manner: "You note that certain organs or parts of your body have greater vibrations than you yourself, and you try to prevent this by tightening certain muscles." Practical applications of the studies have been made, using special sponge rubber seats to determine how they absorb the annoying vibrations. Using small vents in the sides of these seats, so that they act as bellows, it has been found that holes only one-fourth inch in diameter give best results.

Tiny Rotary Printing Press Prints Menus at Low Cost

Restaurant menus and theatrical programs can be printed at little expense with a small, compact rotary printer recently developed for the purpose. It is only twelve inches long, six inches high and six inches wide but prints a type space four by eleven inches,



It costs little to run off menus, price lists and similar work with this tiny rotary printing press

can be operated by amateurs and fifty to 100 sheets can be run off with one inking of the composition roller. Type lines are made on a standard Linotype machine

Handwritten notes:
T 659
F 740
Salem dance 5/26/36
Lafayette, Ind.
at meeting Society of Automobile Eng.
H. H. Parton
3/17/32 & second

and fixed into grooves of the type cylinder, easily changed from day to day. Although there are no grippers, register is fine enough for color work.

Barn Built in Redwood Stump Three Thousand Years Old



Bull and horse have this hollow stump of a giant redwood tree for their "old home." The tree rings indicate it is 3,000 years old.

Wind-Tunnel Tests Show Streamline Bus Saves Fuel

Operators of intercity buses could save \$161 in fuel for every 1,000 hours of travel by using streamline types, it was demonstrated in wind-tunnel tests at the New York University aeronautical laboratories. Similar experiments indicated a streamline truck would save \$95 in fuel every 1,000 hours. Interurban motor trucks and buses average about 71,000 miles a year at thirty miles an hour on long-distance runs. At this rate, cross-country buses would operate about 2,300 hours a year and save, it is estimated, \$370 a year in fuel by streamlining.

Plane Controls on Odd Vehicle Help Teach Flying

Constructed along the lines of a motorcycle, an odd vehicle invented by a Frenchman has all the controls of an airplane. Learning to operate the cycle helps the student of flying, since it teaches him use of plane controls.



"Banking" on curve. Note outrigger wheels which make the maneuver possible.

Wrote World at Crescent City, Calif.

Among the giant redwood trees of California a farmer found a ready-made barn just 3,000 years old. It was the hollowed stump of a redwood, twenty-four feet in diameter, and large enough inside to house a horse and a bull comfortably.

Power Eraser Removes Lines with Great Accuracy

Lines may be removed from delicate drawings with great accuracy by a motor-driven eraser which weighs less than seven ounces. The device clears large areas effortlessly, leaving the drawing unscarred and ready for correction. Since speed, not pressure, makes the erasures, there is little danger of wearing a hole in the paper. A switch at the finger tips gives instant control.



Service Series 6/26/36

F 742

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F677

Electric 'Bullets' Aid Science in Search for Atom's Secret

stuck in the ground, and can be read without stooping. It is made of galvanized iron and will last for years.



Interior of giant generator which manufactures the electrical charges to be fired into the heart or core of the atom

Experiments consisting of firing electric "bullets" at atoms to help science in its search for the secret of the atom are made possible at the University of Wisconsin by an electrostatic generator. This equipment generates the bullets discharged at the atoms. Release of vast energy by exploding the atom is one goal of science, but the immediate objective is the development of extremely powerful X-rays which may be effective in treating, and even curing, cancer and other diseases.

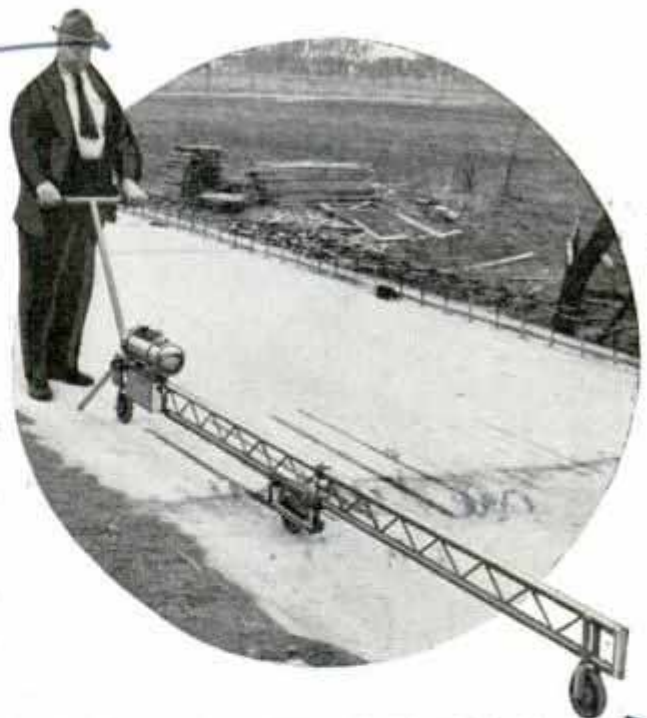
F734

Cans on Bean Poles Destroy Beetles

Tin cans and the sun are utilized by Maryland farmers to eradicate bean beetles. Shiny tin cans are mounted atop the bean poles. It is claimed the female beetles climb to the tops of the poles to lay their eggs and if the poles are equipped with the cans, deposit the eggs in them. Then the sun, shining on the cans, heats them sufficiently to destroy the larvae.

F693

High Spots on Paving Detected by Electric Straightedge



Dark lines are painted on pavement with dye fed to middle wheel when high spot is encountered on road

High areas in pavement can be found by a portable straightedge which signals electrically when it moves over a spot higher than the construction engineers

F672

Garden Label Has Magnifier Making Tag Easy to Read



Flower labels with glass magnifying lenses are offered to gardeners this year. The package top from which the seeds were taken, or any typewritten label, can be slipped under the glass, which is then screwed on and

Wp. R. As Bery
Physics Dept

Acme

Madison Wis

Chicago
5/26/38

machines

The Pavometer Co
The Pavometer Co

R. H. Macy Co
1000 Broadway

permit. The high spot automatically closes a battery circuit, sounding a warning buzzer and opening a liquid switch to feed dye from a tank to the tire of the middle wheel, making a dark line on the pavement.

F 646

Odd "Goatmobile" Uses Animal for Motor

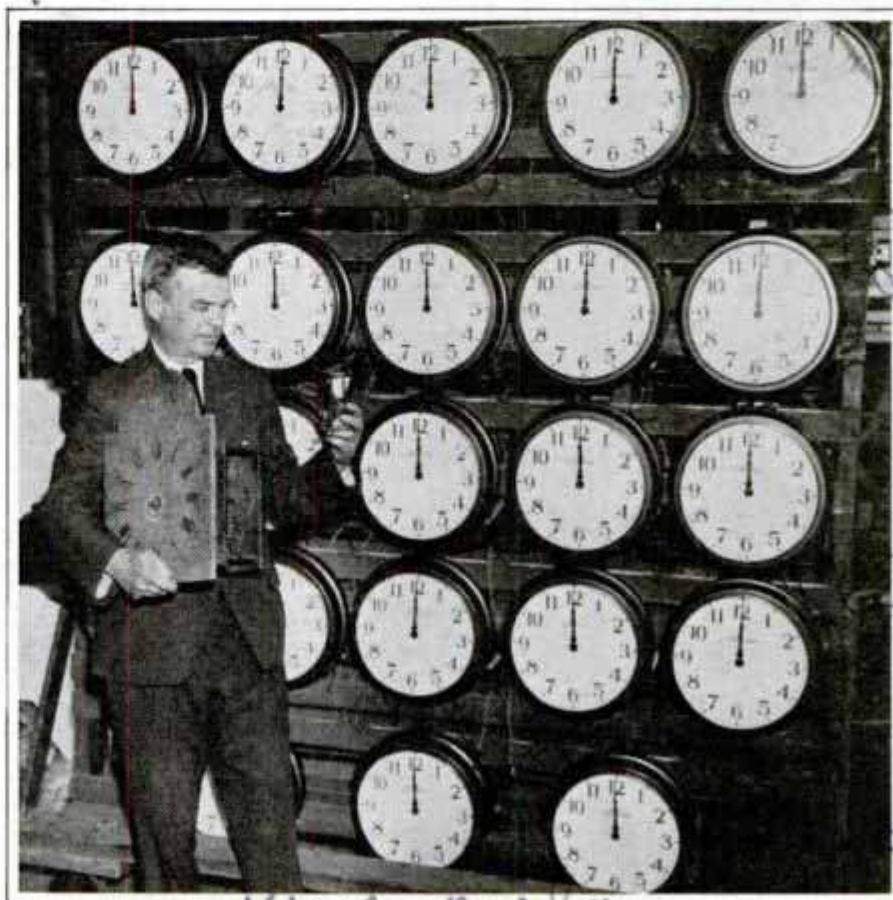
Powered by a goat walking in a treadwheel, an odd vehicle has made its appearance on Texas roads. The "goatmobile" moves, somewhat slowly, as the animal walks, the treadwheel imparting propulsion to the wheels by means of a gear arrangement. On inclines, a small motor powered by battery helps the goat. An extra animal usually is carried along to supply power when the other goat becomes tired. This extra "motor" rides on top. The vehicle has a steering wheel and a hand-operated brake.



Complete to steering wheel and brake, this animal-power vehicle moves slowly but surely. Note the extra "motor" riding on top

Owned by J. B. Wrigg

A.C. Clocks Made Possible by "Master" Regulators



View of the inventor's laboratory, showing modern electric clocks and the hourglass and hand-carved wood-wheel clock

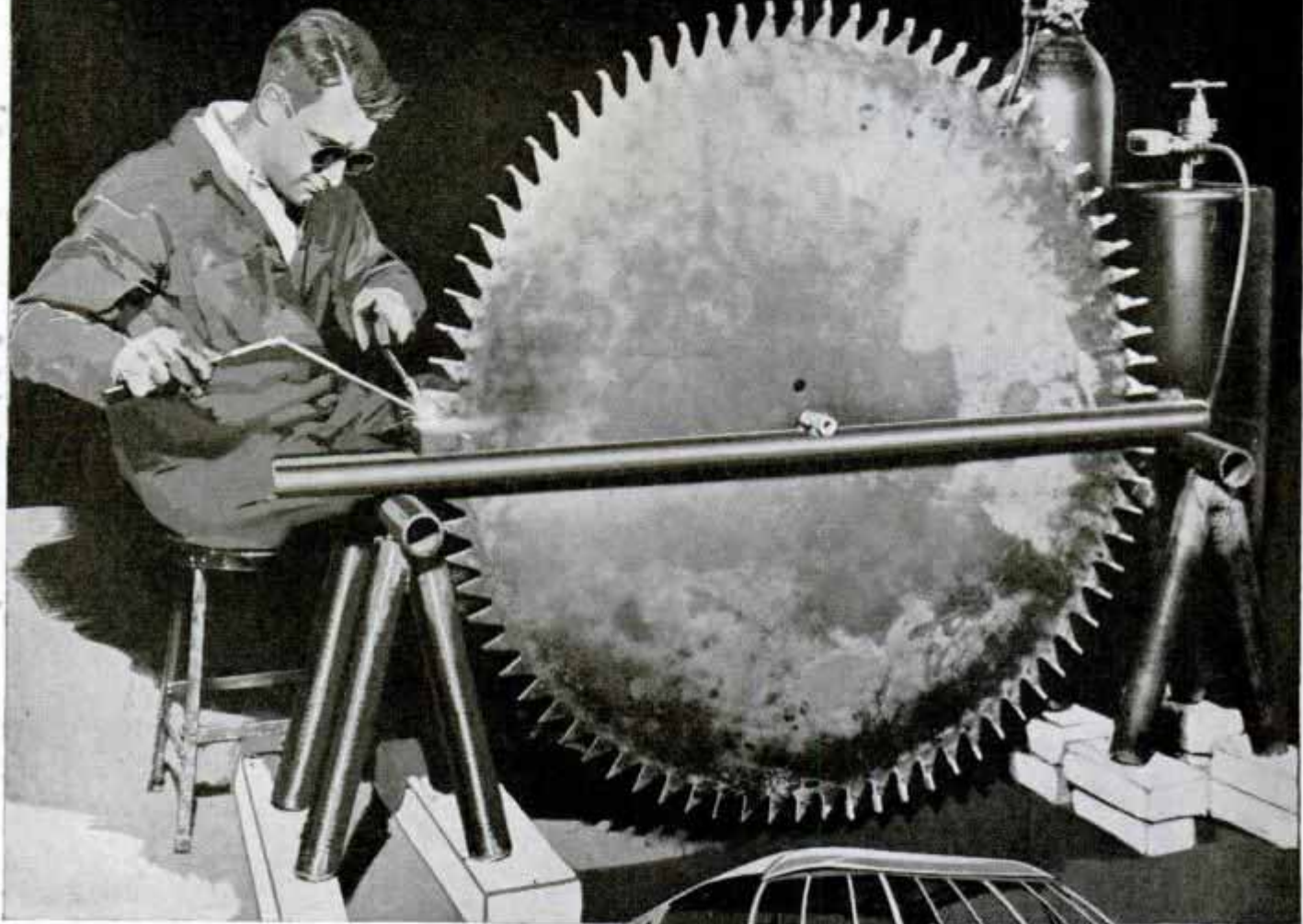
Perfect time for some fifteen million clocks operating on alternating current is made possible by the telechron frequency regulator clock invented by Henry E. Warren. The clock is used in power houses. In his laboratory in Massachusetts, the inventor has a number of giant electrical clocks, as well as a thirteenth century hourglass and one of the first hand-carved wood-wheel clocks dating from 1783.

Names and addresses of manufacturers and dealers in articles described in this magazine are kept on file and will be furnished by our Bureau of Information upon request accompanied by stamped, self-addressed envelope.

*Ans. Henry E. Warren
Archdand man*

Wide World

RARE METALS

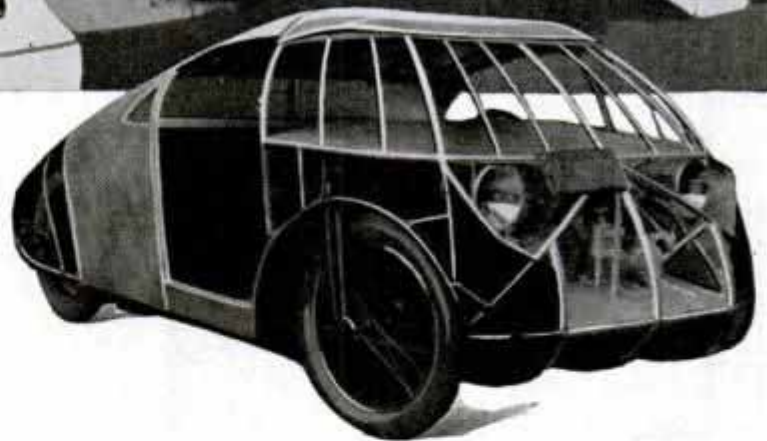


THE romantic drama of the rare metals is being enacted on a vast scale behind the scenes of industry and in research laboratories all over the world.

Rare metals are invading the manufacture of articles intended for everyday use. Why? Because they do a job that none of the common metals can do as well.

Thirty years ago America's industrial needs were satisfied by about a dozen metals. Today there are about thirty metals competing with the common ones, despite large price differentials.

Of the eleven metals which appear among the twenty most common elements in the earth's crust, only iron and aluminum are widely used. This means that we have scarcely tapped the great possibili-



Top, applying alloy of cobalt, chromium and tungsten to saw teeth to increase hardness. Bottom, experimental car's frame made of high-strength chrome-molybdenum steel tubing

ties of the other nine metals. Still comparatively rare in industry are calcium, sodium, potassium, magnesium, titanium, barium and strontium.

On the other hand, such metals as beryllium, molybdenum, cesium, vanadium, tungsten, columbium and tantalum are becoming invaluable to industry. Radio, moving pictures, aviation, telephony, ship-

see March 1936-321

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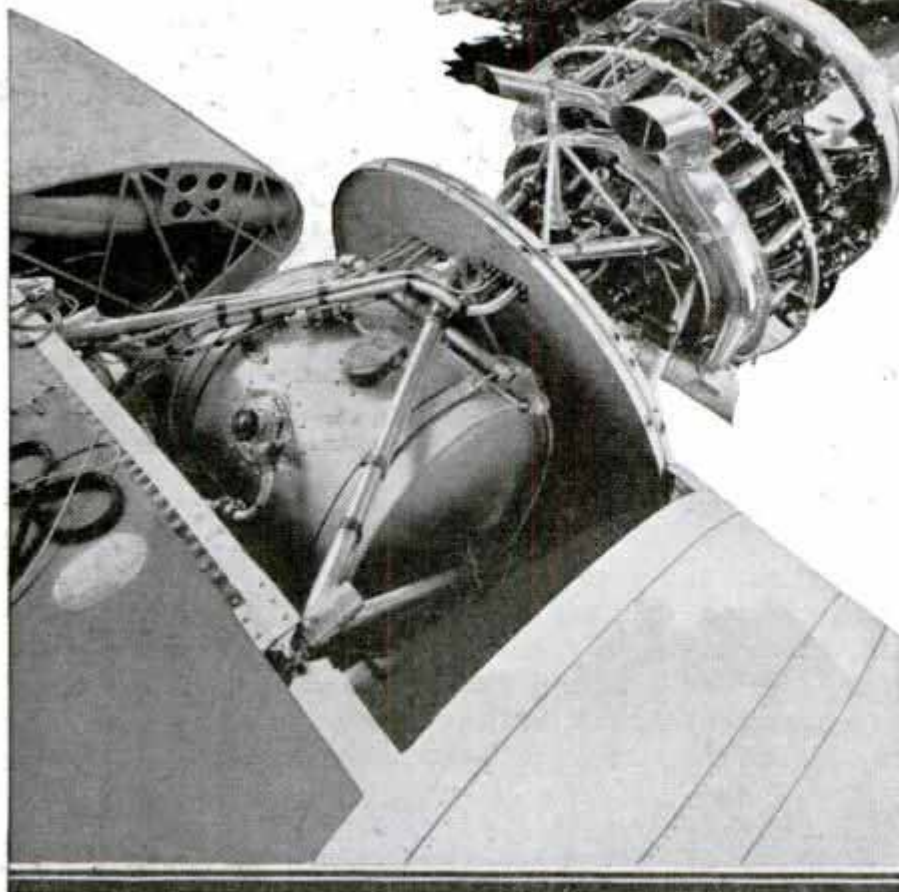
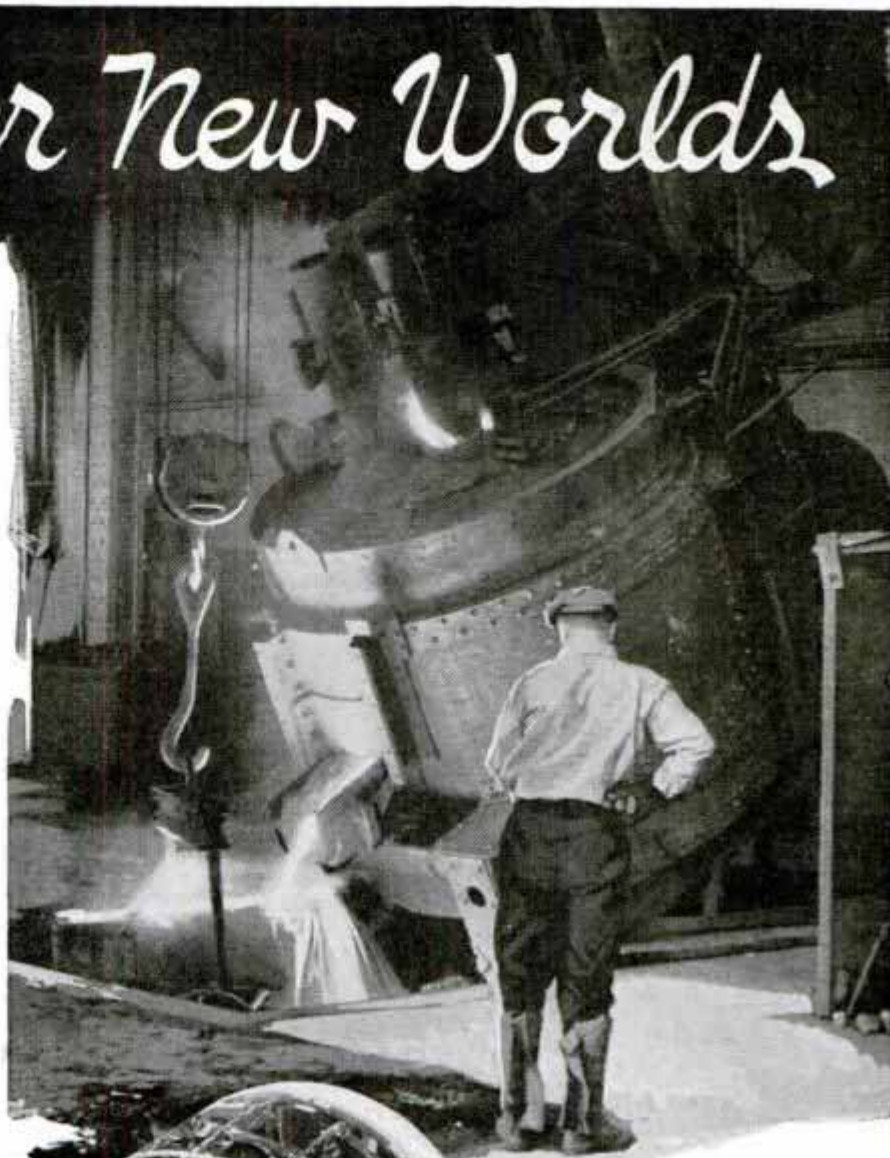
Conquer New Worlds

building and toolmaking are among the prime consumers of rare metals.

Dr. Colin Fink, one of the country's foremost electrochemists and inventor of the chromium-plating process, says:

"Great developments lie immediately ahead of the rare metals. We are finding new and simpler methods of extracting the metals from their ores. This tends to reduce the cost. Even aluminum is bound to come down. Improved methods of extraction will greatly multiply its uses.

"The problem before chemists and metallur-



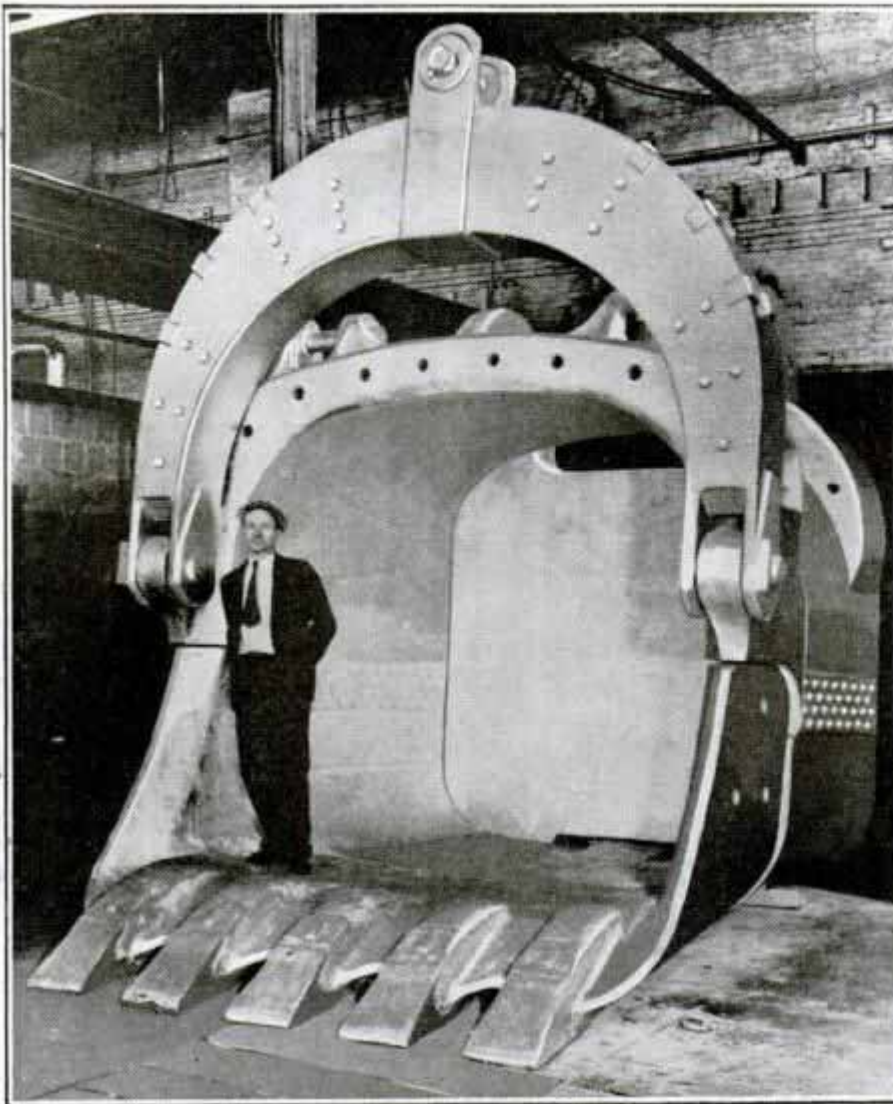
Top, vanadium steel being poured from electric furnace. Bottom, clipper plane at point where seventy-four pounds of chrome-molybdenum steel supports 2,380-pound engine

gists is to find the right solvent for extracting every one of the rare metals from ores, just as Hall found the right solvent for aluminum. Finding the proper solvent is not so difficult as it sounds because a great deal of ground work already has been done by the early chemists who investigated the properties of the rare metals.

"The future of rare metals is bound up with electrochemistry.

Electro Metallurgical Co.
37 242 nd N.Y.C.

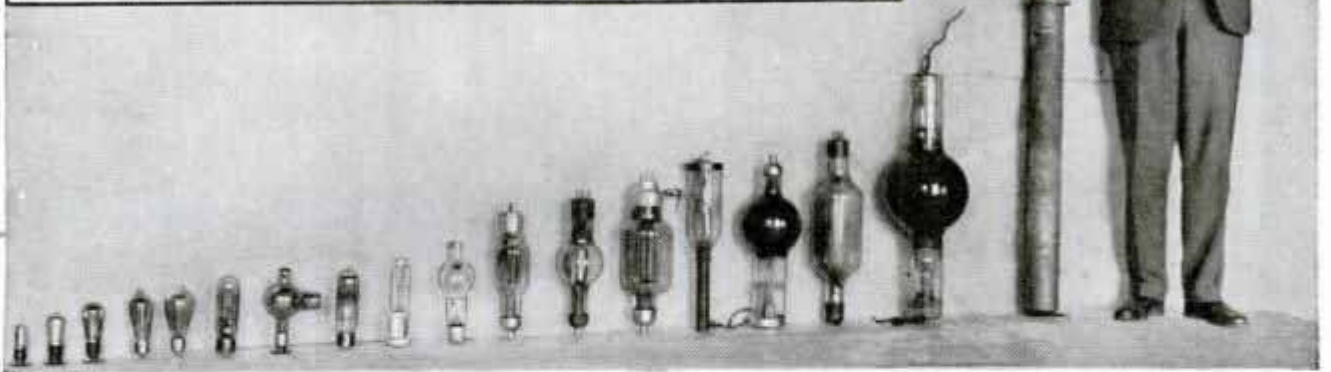
Photo from



be compared to the position of aluminum fifty years ago.

The difference between the story of aluminum and the story of rare metals now on the ascendancy is that today's industries will pay for superior metal, whereas in Hall's day they were very skeptical.

Even nature uses rare metals as a sort of an alloy. Tobacco won't thrive without a trace of lithium; tomatoes need small but definite amounts of manganese; our gastric juices contain approxi-



Top, giant teeth of shovel are tipped with wear-resisting alloy of cobalt, chromium and tungsten. Bottom, vacuum tubes which require rare metals in their construction

Smelting and blast furnaces will become obsolete. They are expensive and require the burning of coke, with its resultant fumes, heat and other annoyances. Electrochemical separation is more or less automatic and is highly effective."

So quietly have the rare metals crept upon us, that few people are even aware of their presence in everyday articles. Professor William Murray of Utica University reports that indium is on the road to success, and that its position today may

approximately .0003 per cent of arsenic. At present we are dependent upon mining for our rare metals, but there is a likelihood that chemistry and physics may produce large supplies in the future.

"The alchemist's dream, scoffed at by nineteenth century chemists, may yet be brought to actuality," says Paul My. Tyler, chief engineer of the metals division, U. S. Bureau of Mines. "No longer do we consider the atom as indestructible. The cus-

(Continued to page 128A)

Washington, D.C.

Darnold locate

Tent over Excavation Speeds Winter Building

In spite of severe winter weather, the contractor on a concrete-house project at Purdue University, Lafayette, Ind., started excavating in a test of cold-weather construction methods. Weeks of sub-zero temperatures had frozen the earth to a depth of one and one-half to three feet, so the contractor used dynamite to crack the frozen layer, sufficient to offer a hold for tools. Then he erected a large, wind-tight tent over the site and began digging the basement. A heater kept workmen from suffering at their jobs under the tent. The rock-hard pieces of frozen earth were mined out with ax, sledge and crowbar. A cable attached to a drum on the gasoline-operated concrete mixer solved the prob-



Removing dirt from house excavation. Note tent at left which protected workers from cold on this winter building job

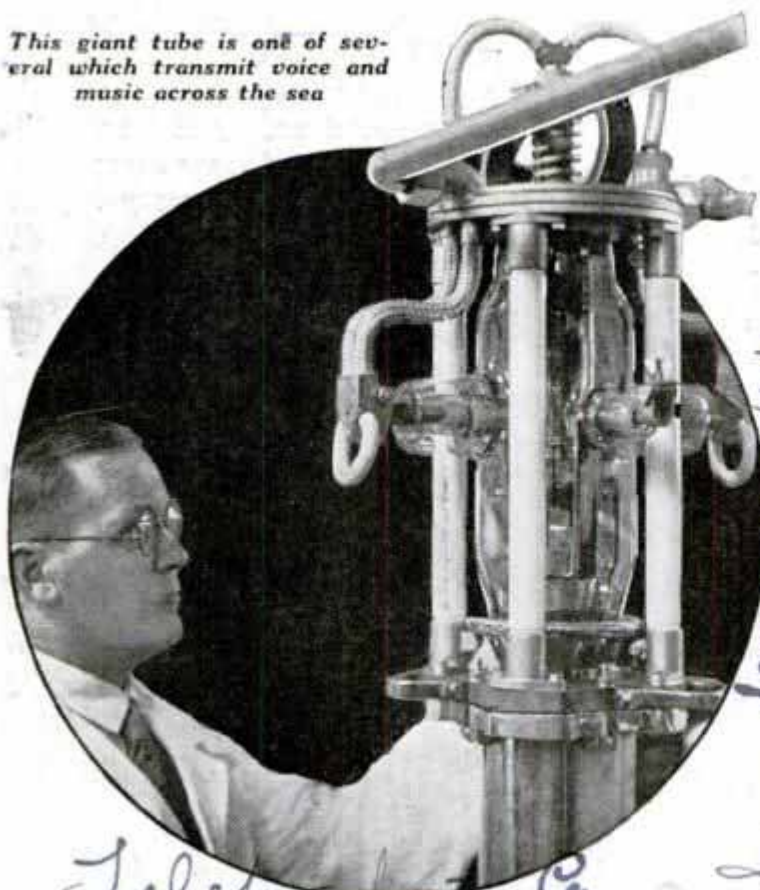
lem of removing the earth, which was snaked out a scraperful at a time. Then the mixer was returned to its second job of preparing the concrete for the foundation.

Cmk. Amalgal Par. Tom. B. 1 740
Cherry
7 39.2

Melashy Wes

^{F609} Giant Tubes in Berlin Station Aid Oversea Broadcasts

This giant tube is one of several which transmit voice and music across the sea



Helping to transmit voice and music across the Atlantic are the giant tubes in the Berlin radio station. Four of the tubes, each developing 300 kilowatts, are used with a special antenna to flash broadcast programs across the ocean, as well as to all Europe.

^{F756} Vibration of 'Phone Wires May Disturb Listener

Standing near a telephone line in the open and hearing its singing vibrations, you may have wondered whether they could be heard in the telephone receiver. The "singing" is mechanical, caused by wind; telephone transmission is electrical. Yet laboratory tests now show that wind actually can disturb telephone users by varying the circular magnetism in the wires and setting up electrical vibrations.

Telefunken Co

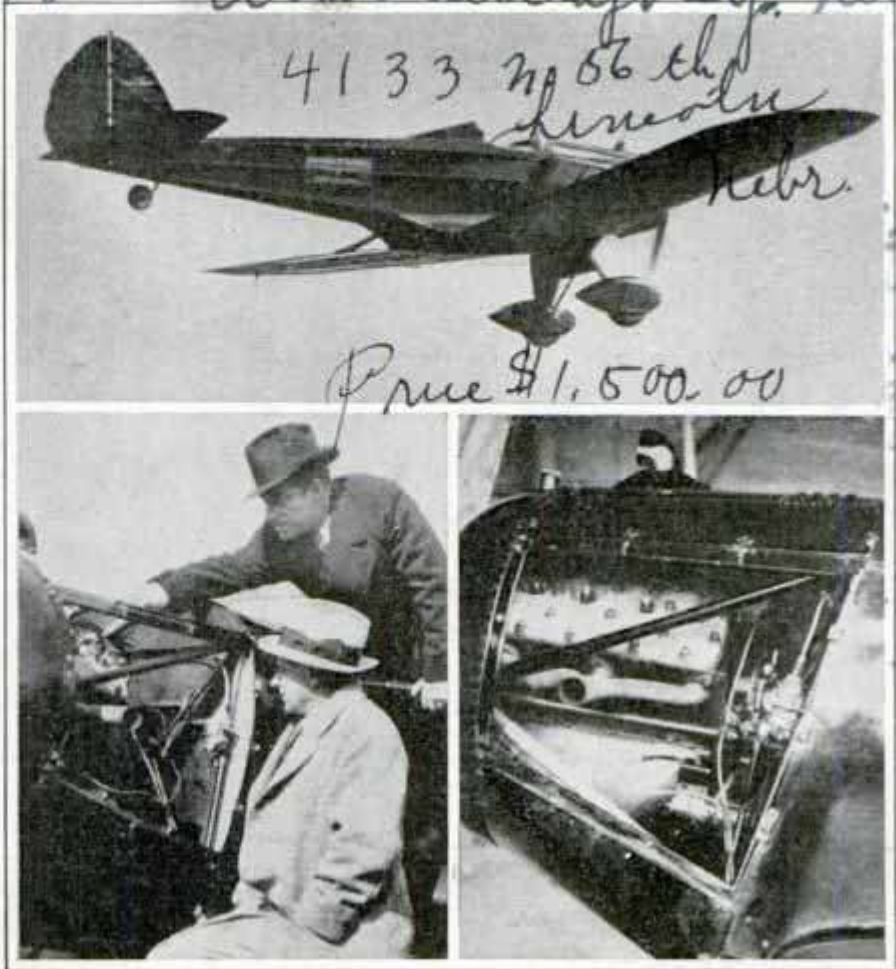
Des arch. repast. W. D. Pennell and H. P. Laubert, Bell Telephone Lab. 463 Wood Ave

9c/675 emp em

Des arch. repast. W. D. Pennell and H. P. Laubert, Bell Telephone Lab. 463 Wood Ave

Auto Engine Gives Plane Ninety-Mile Speed

Powered by a **Ford** automobile engine, a "flivver" plane with a top speed of 100 and a cruising speed of ninety miles per hour has been approved by the department of commerce. The engine is interchangeable in every way with that used in the automobile. It has an aluminum head, uses regular automobile gasoline, cruises 350 miles on twenty gallons of fuel and propels the craft on climbing at the rate of 500 feet per minute. The flivver plane has a ceiling of 14,000 feet. Its landing speed is forty-five miles an hour. In tests at Detroit, the plane was found to have an unusually high safety factor, righting itself from any position and proving remarkably stable. The plane is designed to sell for little more than a small automobile.



Top, flivver plane in flight. Bottom, two views of the automobile engine which propels the craft at a cruising speed of ninety

F642.

Big Books Copied on Tiny Film to Save Storage Space

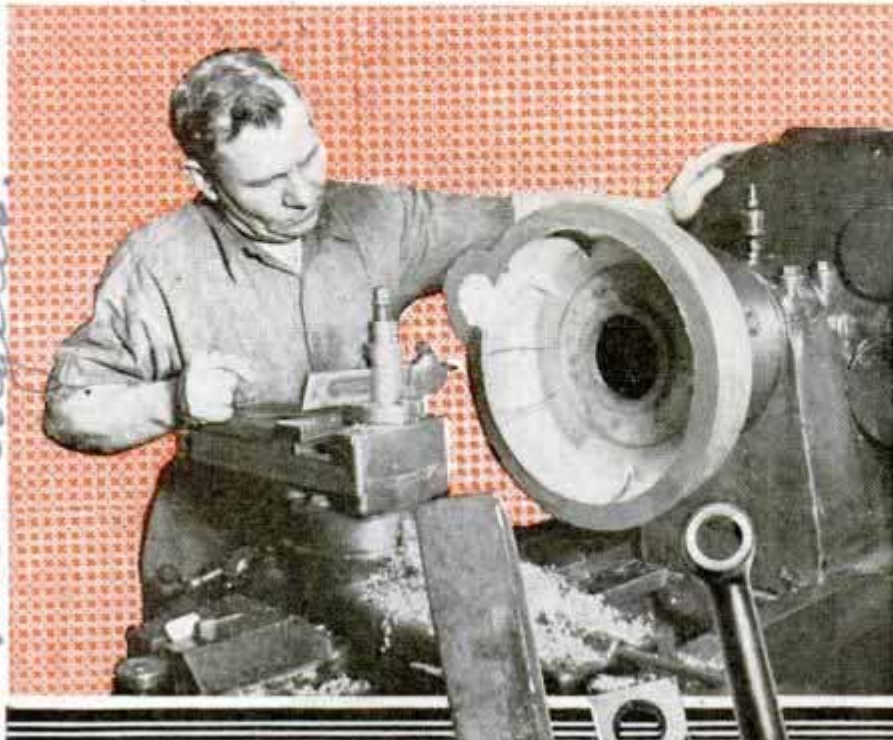


Operating the reading machine which magnifies the small film to book page size. Note that the machine is small, designed for individual use

Large books can be reproduced on a few feet of tiny film by a process which reduces each page in area three to four hundred times. This micro-copying process, says **V. E. Pratt**, president of the company, would permit loading the millions of books in the New York public library into one five-ton truck, if the books were converted into film. The small filmbooks are non-inflammable and almost indestructible, according to the makers. A special reading machine not much larger than a telephone has been developed for the filmbooks so that they may be read full size in ordinary daylight. The film is contained in a removable cartridge into which another "book" may be placed when the reader has completed the first. The machine is designed to make operation easy. Economy in production and saving in space are two advantages of the filmbook.

International Filmbook

→ SPEED ← SIX



By
William J. Tandy

FOR SALE: Speed—
\$6.09 per pound.

This is the sign that Fred Offenhauser might well hang outside his machine shop in Los Angeles, Calif.

For Offenhauser is recognized as a master designer and builder of fast racing motors. Building for speed is his business—just as other men sell neckties, speculate in stocks or peddle safety razors.

If you've got the money to pay for one of these blue bloods of motordom, Offenhauser will make one for \$2,100. Thus your 345-pound motor will run at about \$6.09 a pound. If you want extra parts, such as special housings, special flywheels or high-tension magnetos, the price may run on up to \$2,500. A complete racing car costs in the neighborhood of \$10,000.

In this unique business that keeps a crew of fifteen men working night and day the entire year, Offenhauser's best customers are the automobile racing pilots who risk their necks for cash and cheers on oval tracks from Maine to California.



Top, lathing bell housing. Center, from forging to finished connecting rod. Bottom, polishing ports in engine head, shown upside down

Offenhauser Engineering

1935 W. 6 Santa Anita 636 E 91st St
 Los Angeles, Calif. Los Angeles

1573

DOLLARS *a* POUND

Dry Lake in California, and with proper gears and other equipment they might do 175.

A four-cylinder motor is preferable to a six or an eight, Offenhauser contends, because they are cheaper to build, they are more economical and there are fewer engineering difficulties.

Offenhauser has been a ma-

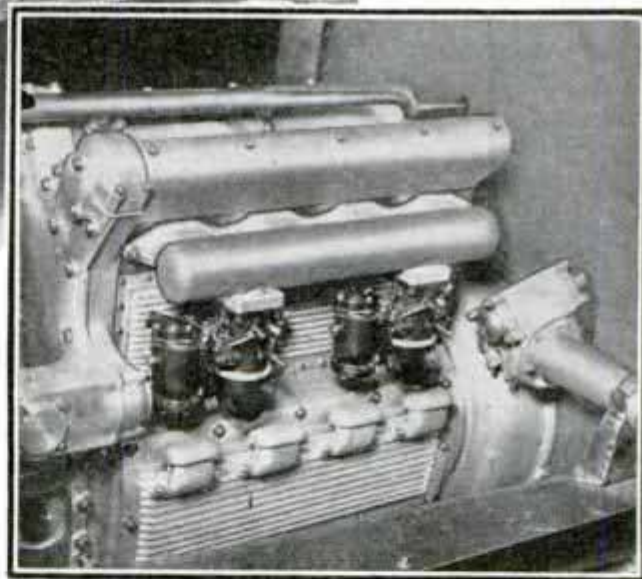


chinist for thirty-four years. During twenty-two of those years he was superintendent for Harry Miller—known to every race-track enthusiast for his carburetors and later for his racing motors.

Not a single part of the Offenhauser racing motor is "stock." Every piece—from the block down to the smallest bolt—is made of special alloy to specification. Each motor requires more than 1,500 hours of labor.

The motor has a 255-cubic-inch displacement, safely under the limit of 360-cubic-inch displacement allowable on the Indianapolis track. The cylinder bore is four and one-fourth inches and the stroke is four and one-half inches. The motor has two overhead cam shafts and the crankshaft, two and three-eighths inches in diameter, rests on five main bearings.

To withstand the terrific strain of high speeds and the 500-mile grind, the motors

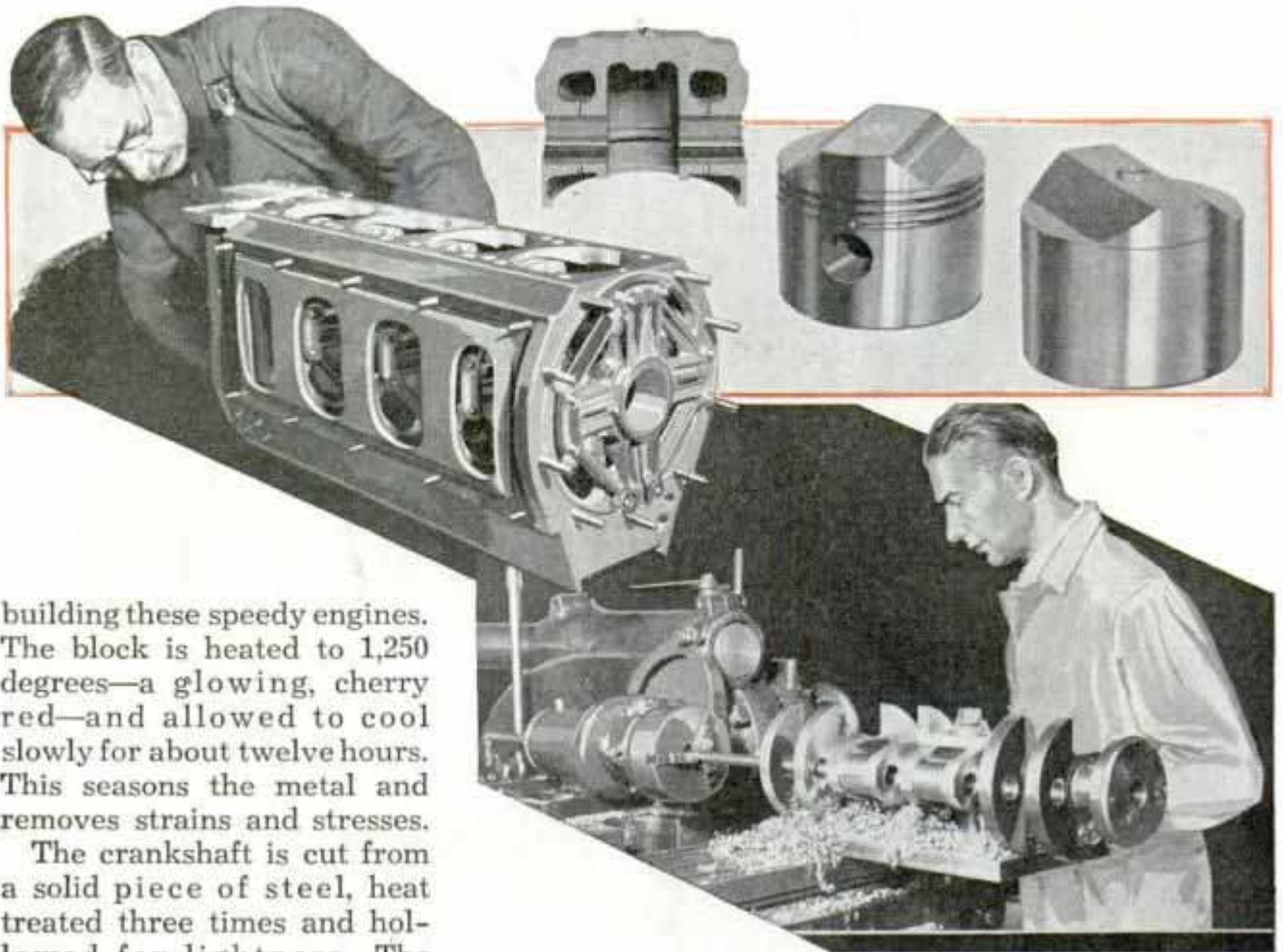


Top, Wilbur Shaw supervising construction of his Indianapolis racing car. Bottom, Offenhauser motor ready for the speed classic

must be designed exactly right by experienced men, built on a degree of accuracy exceeding all modern motor standards and balanced to a hair. It is a job for the best brains, the finest machinery and the most skilled craftsmen.

The block is built of a special nickel-steel alloy from the finest iron in the world. The cylinder head and cylinder block are cast in one solid piece, eliminating the necessity of head gaskets.

Heat treating is an important phase of



building these speedy engines. The block is heated to 1,250 degrees—a glowing, cherry red—and allowed to cool slowly for about twelve hours. This seasons the metal and removes strains and stresses.

The crankshaft is cut from a solid piece of steel, heat treated three times and hollowed for lightness. The crankcase is a special aluminum alloy—sixty-five per cent stronger than steel and one-third as heavy.

The pistons are of a special aluminum alloy. Instead of the conventional split-type piston in your automobile, the racing-motor piston is solid. And instead of the flat top, it has a roof-type top that fits into a roof-type cylinder head. A flat piston allows a compression ratio of about seven to one while the roof-type piston gives a thirteen to one ratio.

Each cylinder has four streamlined valves—two exhaust and two intake. The valves are special tulip-shaped to give extra freedom to the flow of gasoline vapor into the cylinder. Two valve springs prevent “fluttering.”

“Drive her slow for the first 1,000 miles to break her in,” your motor-car dealer will tell you when you purchase a new sedan.

Not so with the racing-car engine. It is all ready to wind up to 150 miles an hour the minute it rolls out of the factory. This is because pistons, bearings, valves and other moving parts are given more clear-

Top, left, crankcase of racing motor. Note five main bearings on removable supports. The case is made of aluminum alloy. Top, right, steps in piston construction. Roughly tooled casting is shown at left, cutaway to show trusses at center and finished piston at right. Bottom, final step in making a crankshaft, boring it for light weight. The shaft is cut from block of solid steel

ance than the average stock car. For example, the piston clearance on a racing engine is .012 while on a stock job it is only .004. The connecting-rod clearance on a high-speed engine is .025 while on an ordinary engine it is .001. A racing car may clatter and clank a bit before it gets warmed up—but she's built, not for quiet performance, but for speed!

When a racing-car engine is turning up 5,200 revolutions per minute at an average speed of 105 miles an hour it gets plenty hot. At that speed the water in the motor is between 190 and 195 degrees. Just a few degrees below boiling.

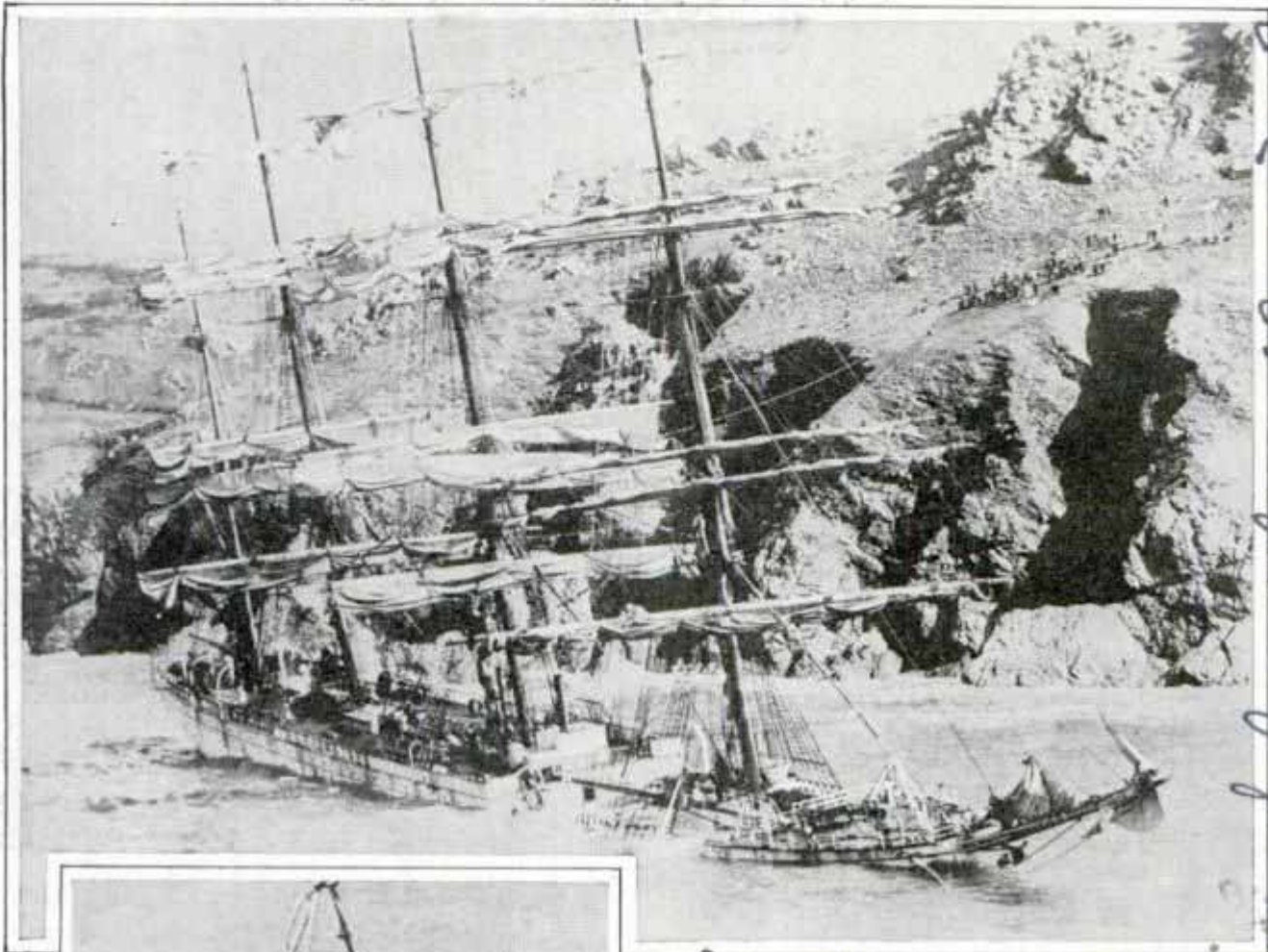
But even so the racing car carries no fan. It's just another moving part to get out of order, Offenhauser claims. Instead a water pump keeps four gallons of water circulating around the valves, spark plugs and cylinders.

The Offenhauser motor carries a high-

(Continued to page 126A)

4631.

Fight to Save Famed Windjammer on Rocks



A. Salcombe, Devon, England



"Herzogin Cecilie" fast on rocks with decks awash, and captain's wife going aboard in breeches buoy

acme

Although she was hard aground on a rugged bit of the English coast, the captain and crew of the famed four-masted "Herzogin Cecilie" refused to abandon the vessel and persisted in efforts to refloat her. Largest sailing ship in the world, the vessel had won the annual race from Australia with a cargo of grain before she struck on the rocks at Salcombe, in Devon, during fog and darkness. Two holds flooded and the foredeck was awash in the surf. Rescuers on shore sent lines aboard the ship, but the crew refused to leave while Capt. Sven Erikson directed salvage attempts. It had been a honeymoon voyage for the captain and his wife, and Mrs. Erikson, after being taken ashore, returned to the wrecked ship by breeches buoy.

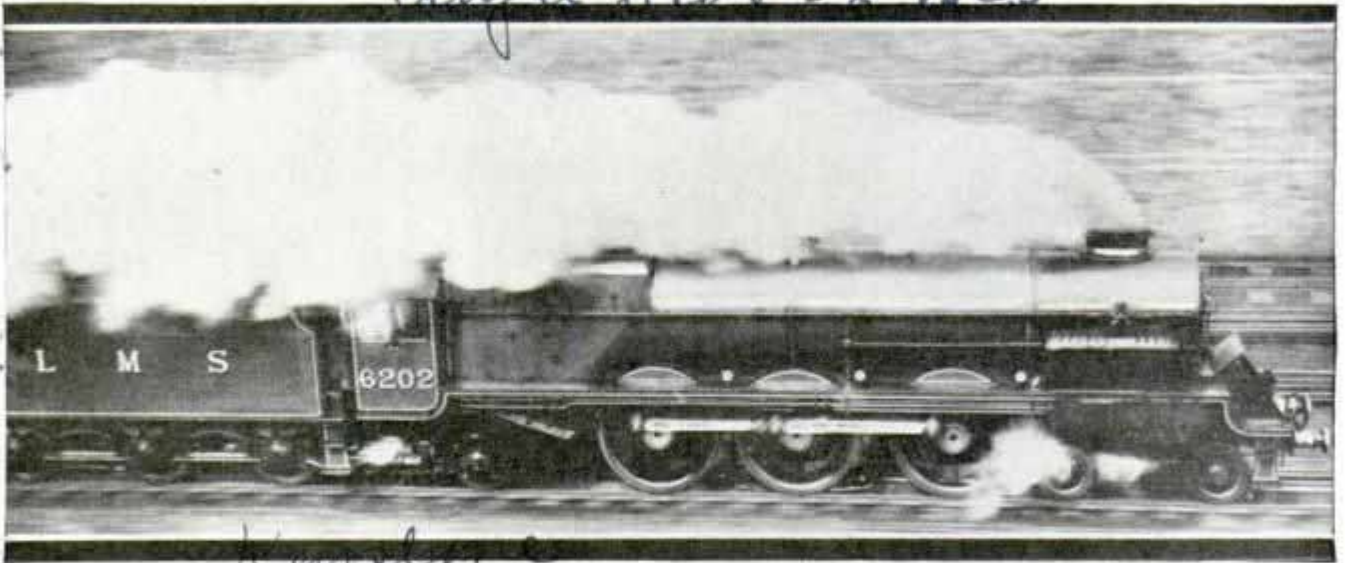
Names and addresses of manufacturers and dealers in articles described in this magazine will be furnished by our Bureau of Information upon request accompanied by stamped, self-addressed envelope.

Wm. H. ...

63 ...

Turbine Locomotive Pulls Fast British Train

Royal Scot - LMS

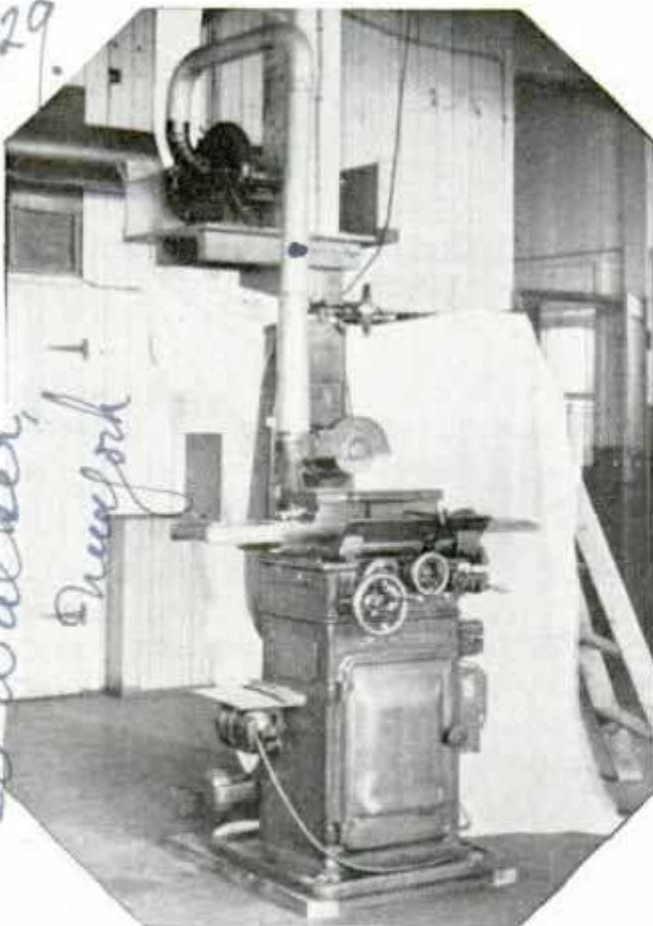


Unusual photograph of the new "turbomotive" as it appeared on one of its early runs with fast express. While not apparent here, the engine lacks much of the mechanism of a locomotive

Marked by the absence of the complicated "works" of the conventional locomotive, a turbine-driven engine weighing 163 tons is now pulling one of England's

famous fast express trains. The turbomotive develops 2,000 horsepower. It has a striking appearance, its design incorporating the latest ideas in railway construction.

Dust Collector for Surface Grinder Is Driven by Motor



Dust collector, shown installed to carry away grinder dust, keeps machine clean

Designed to collect dust and fine powder which would damage closely fitted parts of surface grinders or similar machines, a motor-driven dust collector is available. It may be attached easily to grinders. The collector, with powerful suction, draws in flying particles of dust and powder and deposits them in a bag which may be hung on the wall or suspended by a cord from the ceiling. The machine can be placed on a pedestal or at any convenient location.

F694 Auto "Arithmetic of Safety" Finds Stopping Distance

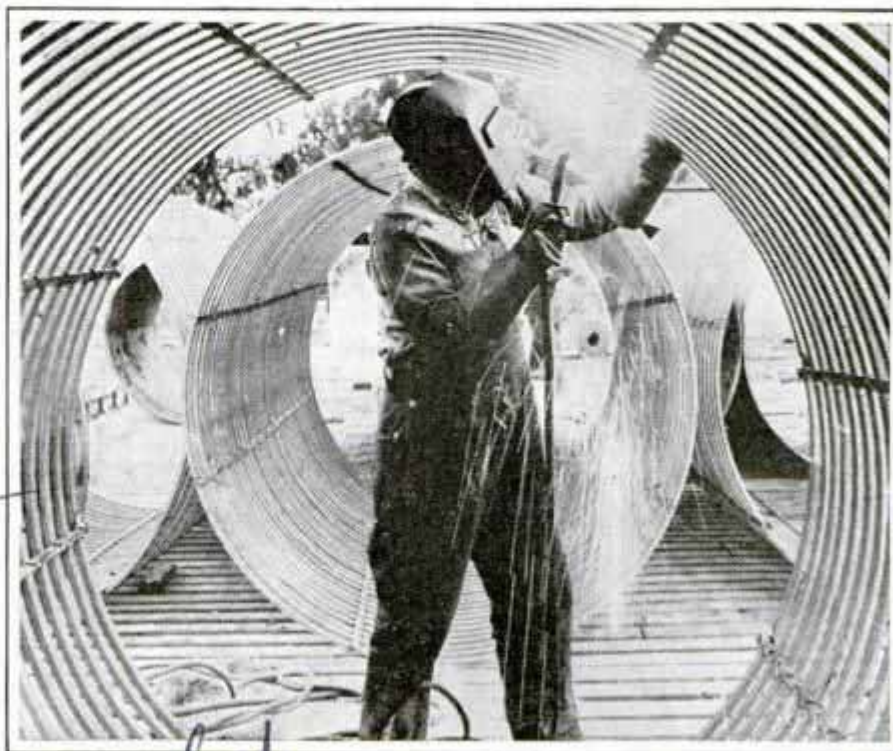
Knowing just how much road space would be required to stop an automobile can be determined easily and quickly by a simple method which Barney Oldfield, former race driver, calls the "arithmetic of safety." It works out like this: when the speedometer points to fifty, the driver thinks of fifty-five feet, which is what experts call "reaction distance," the time it takes the driver to get his foot on the brake pedal. At forty miles per hour, it is forty-four feet, at thirty miles, thirty-

Chrysler motors
Plymouth Dies' 1

7529
Heiman Prod.
E. J. Walker,
New York

three feet, and so on. The figures on the speedometer call the reaction numbers to mind. To find how much room you need to stop safely, simply take the reaction number and multiply it by three. For instance, at fifty miles per hour, the reaction distance is fifty-five feet. Multiplying by three gives 165 feet, or about ten car-lengths, sufficient distance for stopping the car safely. This method operates up to speeds of fifty miles per hour.

Huge Welded Pipes to Carry Water Supply for Big City



Welder is shown at work on the large pipe which will be a part of system carrying water from Hetch Hetchy dam to San Francisco

7635

Giant Wooden Rose Lures Customers to Florist

Visible for three blocks, a rose fifteen feet high attracts attention to a florist's greenhouse and nursery in Logan, Utah. It is no prodigious flower, but a giant wooden sign of one-inch lumber, given added realism by



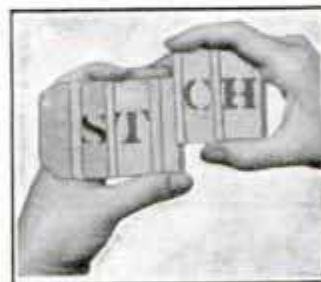
Fifteen-foot rose plant of painted wood advertises florist's headquarters in Utah city

Huge metal pipes, welded by expert workmen, are being prepared for installation in San Francisco's new water system. Water from the Hetch Hetchy dam will be carried through these pipes in quantities sufficient to supply San Francisco for sixty to seventy-five years, if the city continues to grow at its normal rate.

7638

Stencils with Interlocking Ends Are Easily Interchanged

Brass letters for stenciling on signs and boxes are now being made with grooved ends that slide on each other interchangeably, permitting the formation of a group of initials or words that can be kept together indefinitely. A slight pressure will separate the letters when other combinations are desired. The stencils are of thin, flexible but strong spring brass.



cutout leaves and petals. A tag advertising the florist is attached to the big rose like the card on a bouquet.

Curt R. O. Edson

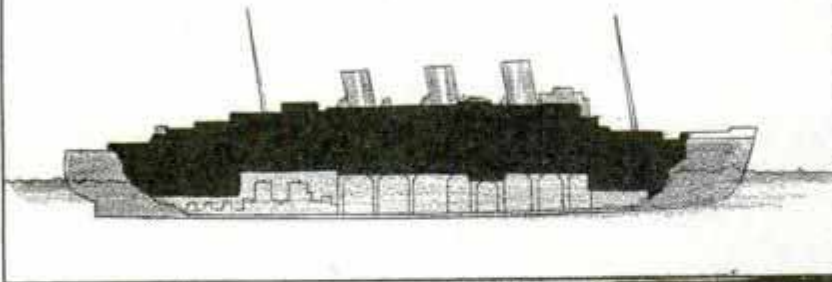
Fletcher, Jerry Co

Shaw, 630 Washington

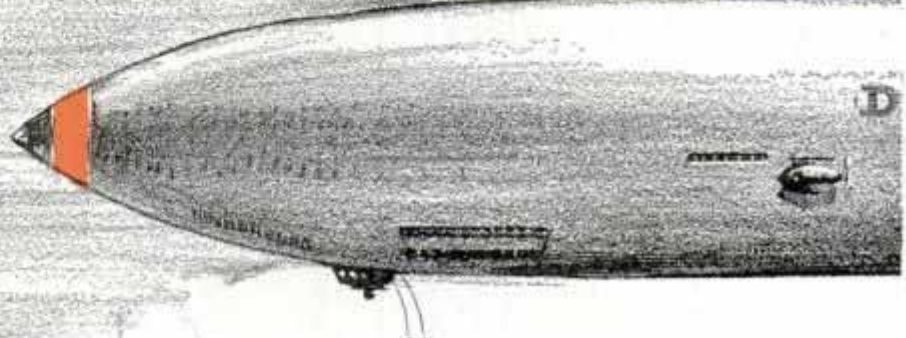
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"Queen Mary" Dwarfs Giants of the Air

SECTIONAL VIEW OF R.M.S. "QUEEN MARY" SHOWING THE VAST AMOUNT OF PASSENGER SPACE (IN BLACK)



NEW GERMAN AIRSHIP
"HINDENBURG" (LZ 129)
LENGTH 813 FT., WEIGHT
(LOADED) 120 TONS, H.P.
4,400, SPEED 84 M.P.H.
PASSENGERS 50, CREW 40

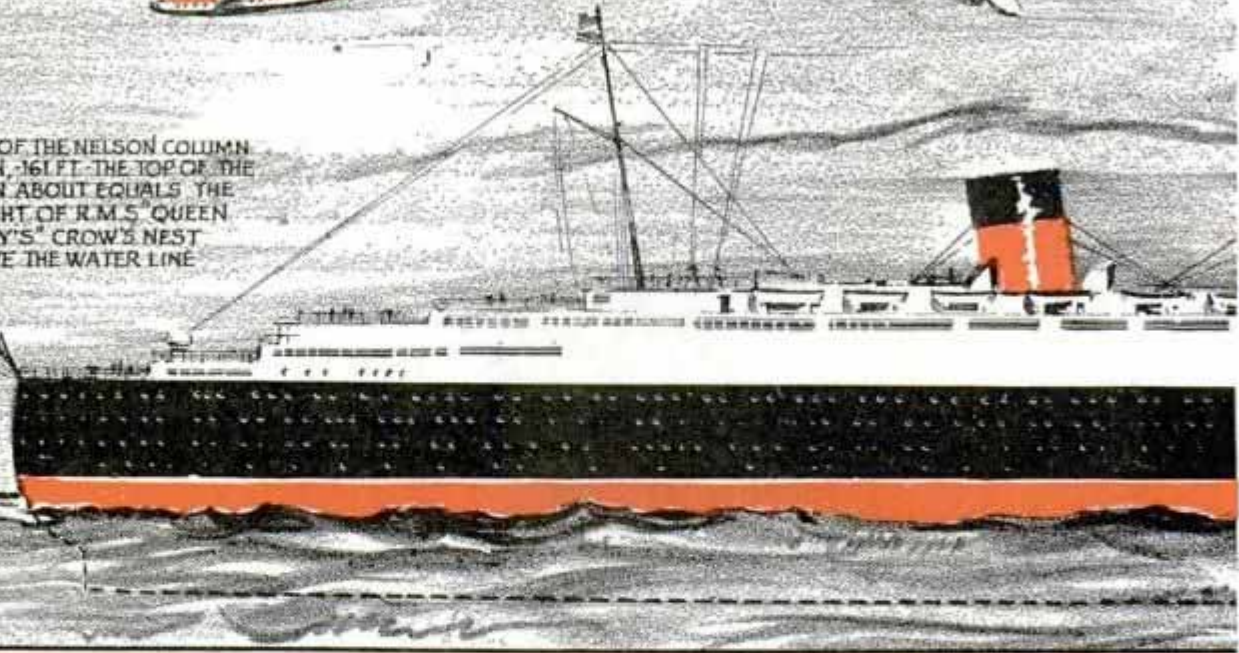


NEW AIR LINERS NOW UNDER CONSTRUCTION
FOR IMPERIAL AIRWAYS - LENGTH 94 FT., WEIGHT
(LOADED) 30 TONS, H.P. 3000, SPEED 200
M.P.H., PASSENGERS 27, CREW 4

MARTIN "CLIPPER" NOW USED ON TRANS-
PACIFIC AIR ROUTE - LENGTH 91 FT.,
WEIGHT (LOADED) 23 TONS, H.P. 3200,
SPEED 150 M.P.H., PASSENGERS 48, CREW 4



HEIGHT OF THE NELSON COLUMN
LONDON, 161 FT. - THE TOP OF THE
COLUMN ABOUT EQUALS THE
HEIGHT OF R.M.S. "QUEEN
MARY'S" CROW'S NEST
ABOVE THE WATER LINE

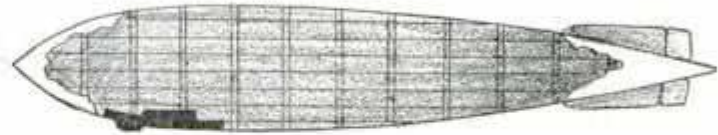


How the "Queen Mary," huge British liner, compares with the largest aircraft of today is illustrated on this and the page opposite. Note that the great German zeppelin, "Hindenburg," is only 205 feet shorter, yet her passenger space is very limited. Too, the clipper planes being used on the Pacific line are pygmies in size and passenger capacity. At top of this page note cutaway sketch of the liner, showing the vast area devoted to passengers

614
100
100

Superliner Is a Luxurious Floating Hotel

SECTIONAL VIEW OF THE AIRSHIP 'HINDENBURG' SHOWING THE VERY SMALL SPACE OCCUPIED BY THE PASSENGERS COMPARED WITH THE SIZE OF THE AIRSHIP (SHOWN IN BLACK)



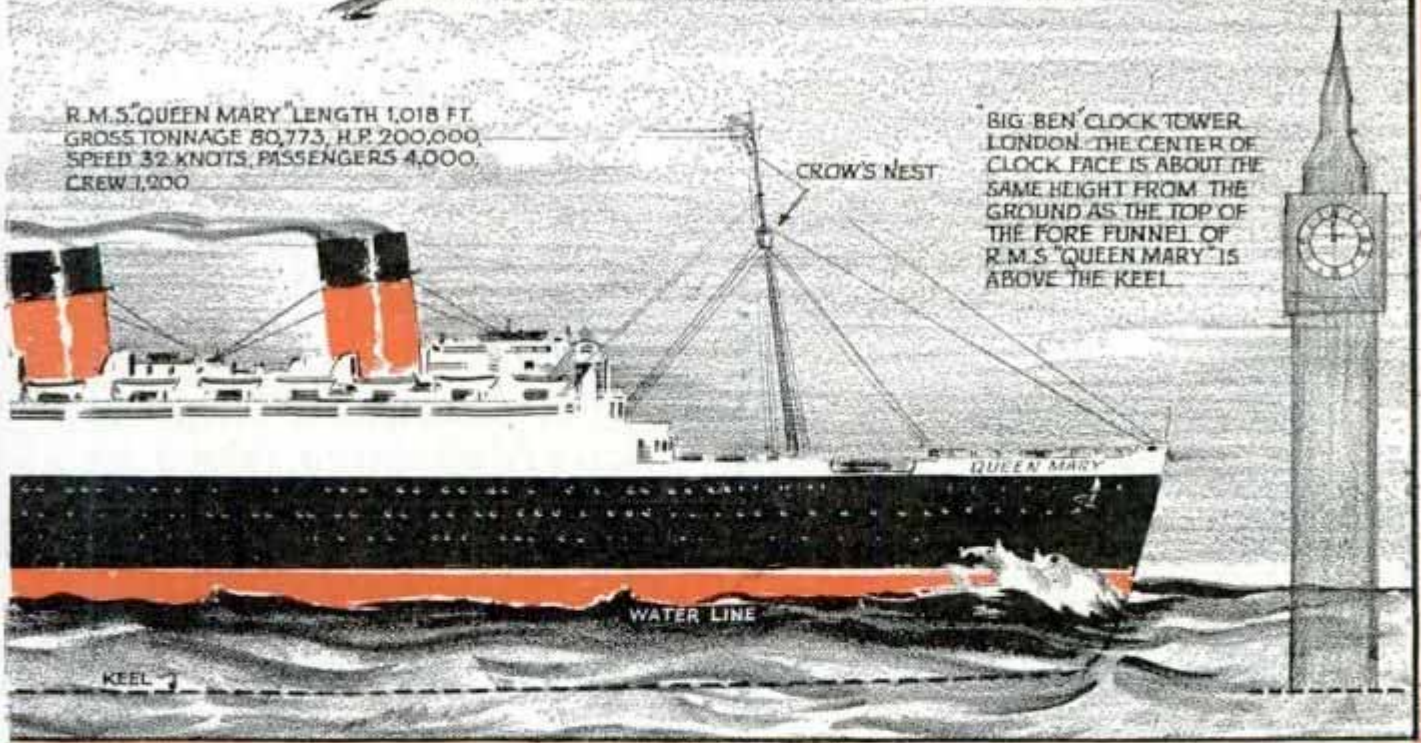
LZ-129

NEW FLYING BOATS. BUILDING FOR IMPERIAL AIRWAYS—LENGTH 88 FT. 6 IN., WEIGHT (LOADED) 17½ TONS, H.P. 2960, SPEED 200 M.P.H., PASSENGERS 24, CREW 4.

'HERACLES' TYPE AIRLINER, AS USED BY IMPERIAL AIRWAYS—LENGTH 89 FT. 9 IN., WEIGHT (LOADED) 15 TONS, H.P. 2,200, SPEED 130 M.P.H., PASSENGERS 38, CREW 4.

R.M.S. 'QUEEN MARY'—LENGTH 1,018 FT., GROSS TONNAGE 80,773, H.P. 200,000, SPEED 32 KNOTS, PASSENGERS 4,000, CREW 1,200.

'BIG BEN' CLOCK TOWER, LONDON. THE CENTER OF CLOCK FACE IS ABOUT THE SAME HEIGHT FROM THE GROUND AS THE TOP OF THE FORE FUNNEL OF R.M.S. 'QUEEN MARY' IS ABOVE THE KEEL.



Four thousand persons can be accommodated in luxury aboard the "Queen Mary," making the liner a fine, floating hotel. At top of page note small area of the "Hindenburg" used by passengers in comparison with the vast size of the dirigible. Right, illustration of the height of "Queen Mary," the top of her fore funnel being some four feet above the center of the clock face of "Big Ben," famous London clock, which is 180 feet above the ground.

Automatic Pilot Lands Plane by Following Radio 'Track'

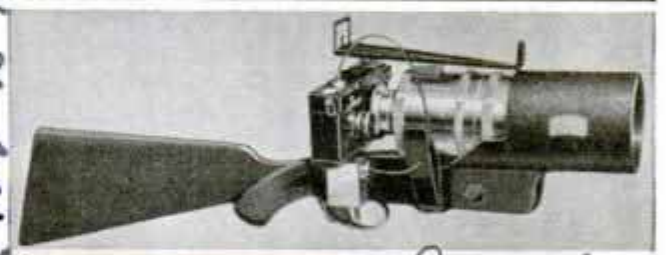


New antenna on nose of plane picks up signals which make possible blind landings with an automatic pilot at the controls

Secret experiments with a blind landing system for transport planes have been brought to a successful conclusion by United Air Lines engineers and pilots. Guided down a "track" of radio signals by the automatic pilot, planes have been landed smoothly time after time without the touch of the human pilot. The system consists of special radio beams. One is a directional beam sent out by a transmitter operating on 232 kilocycles. This is the runway marker which is narrow, only five feet wide at the landing circle and ten feet wide at the boundary of the field. The second signal is the landing beam sent out from a transmitter operating on 93,000 kilocycles. This is a curved beam following the normal gliding path of a transport plane. The beam is transmitted along the runway, gradually curving upward until it is sixty feet above the ground at the border of the field. A special antenna on the nose of the transport plane is used for receiving these signals. On the instrument

the needles indicate that the plane is deviating from the landing path. So perfectly is the plane landed that the human pilot may apply the brakes full on as soon as the wheels touch the ground, without risk of the plane nosing over.

"Shotgun" Camera for Telephoto Saves Aiming with Tripod



Miniature camera with heavy telephoto lens attached is mounted on gunstock for easier sighting

When you go hunting with a telephoto camera, a "shotgun" mounting helps to take quick aim. It was developed to elim-

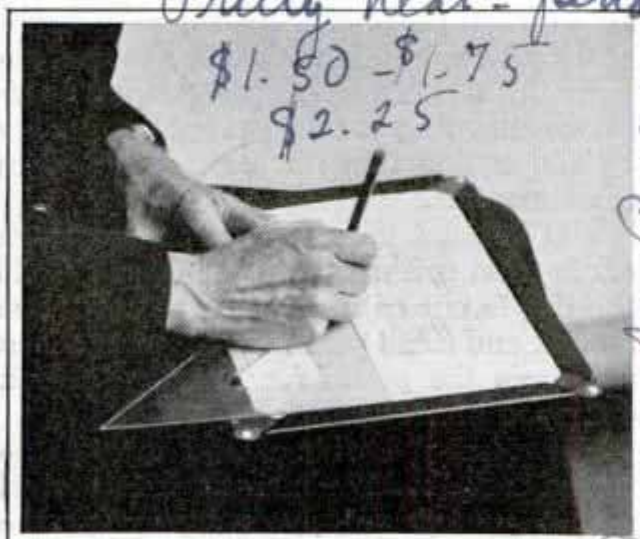
City. Bob Johnson. New Decatur, Georgia. Municipal Airport, Oakland, Calif.

Carl Zeiss. 485

inate the necessity of a tripod for telephoto shots, and makes possible greater speed and accuracy. The telephoto lens may weigh eight to ten times as much as the miniature camera with which it is used, but it is not unwieldy when mounted on a gunstock. The trigger is connected with a plunger to release the shutter. Although firmly mounted in the barrel, the lens is allowed sufficient play to be turned for focusing.

Drawing Board Is Small Enough to Fit Brief Case

Small enough to fit in an ordinary brief case, a drawing board suitable for professional work requires neither thumbtacks nor T-square. Springs with finger-tip release hold the paper firmly in place, while guide strips along the edges make it easy to fix the triangle in any desired position. The guide strips and corner clamps are so formed that they raise the corner of the triangle above the border, allowing freedom of movement beyond the limits of the board. Although built of sturdy material for hard use, the board weighs less than a pound.



Corner clamps of small drawing board raise triangle slightly so that it can extend beyond edge guides

Coal Chute Bridges Lawn from Elevated Truck Body



It is more than fifty feet from street to basement window, but this coal truck arches its back and chutes coal clear across the yard

Delivering coal can be made a clean and restful job. In Philadelphia, for example, a coal dealer chutes your winter's supply into the basement window from his truck parked at the curb perhaps fifty feet from the house. No carrying of coal sacks, no backing into the yard. The truck backs to the curb, hoists its load high and sends the coal sliding down a chute that spans a wide lawn. Its rear elevation is eleven feet two inches. The three-ton truck has a 115-inch wheelbase.

Electric Vulcanizer for Tubes Needs No Inside Patch

Neither cement nor inside patch is necessary in vulcanizing a tire tube with an electric outfit now available. It has a heating element set in a lava mold.

Plugged into a wall outlet, it heats to 302 degrees Fahrenheit and holds that temperature whether in use or not, and can be left connected indefinitely without harm.



H. E. Twombly

Jewel Vulcanizer

Philadelphia are 1623 and 53rd. Phila
The Studer... 52
Body and... Rodenhausen
As a... Wagon Works
9th... Sellers
110, 200, 250 volt
Are Chicago

\$500

20 W. Hartmouth Road
Pensacola, Mo

CANINE MIND READERS



Top, teaching dog to bark once for each finger held up. Trainer "barks" to help dog pick up the trick. Below, steps in stolen watch trick, with dog picking out "thief" by scent on his fingerprints

A STOUNDING mind-reading feats can be taught the average house dog that will, in effect, transform him into a psychic wonder.

These are mental stunts in name only. The amateur trainer with a reasonable amount of patience and common sense will find the routines suitable to the capabilities of his dog. In fact, the majority are so easy they can be picked up quickly by the canine that has been schooled in fundamentals.

The initial trick calls for six or seven cards from a freshly opened deck. While the dog is out of the room, the cards are fanned and some person is asked to select one from the group for the dog to pick out upon his return.

The selected card is placed on the bottom of the pile, face downward, on a towel placed there previously. All the cards are turned upward again, and the other person is given an opportunity of arranging



the cards any way he chooses. If he wishes, he may even scatter them about the room.

When the dog is brought in and told to name the selected card, he will do so without the benefit of a single cue or motion from his trainer.

This trick, as well as many others, is effected through the medium of scent, the best results being achieved with limburger cheese, anchovy paste, or raw hamburger. A spot on the towel is treated before the demonstration is begun. By placing the selected card on the bottom of the pile, it comes in contact with the scent and is easily picked up by the dog because he has been trained to do this.

In all probability, the dog will add to the mystery by studying each card just as if he actually knew what he were about.

Although the trainer should remain in the room at the start of the stunt to see that the selected card is placed on the correct spot on the towel, he need not be present while the dog is studying the outspread cards. This eliminates any possibility of signals between dog and trainer.

Left, dog picks out shoe on which scent has been planted. Right, top, teaching dog to "add." Inset, planting scent for stolen watch trick

Minute portions of cheese or hamburger are sufficient to supply the scent. In other turns where the odor is applied to various objects during an impromptu performance, the substance may be concealed in a fingernail or on the tip of a finger.

The best method of teaching a dog to recognize this odor is to apply it to some object he has been taught to retrieve. Gradually, it can be planted on a toy ball,



Left, psychic dog picks out a card mentally selected by one of the guests. The secret lies in applying scent to the card. Right, first step in the trick

discarded handkerchief or a rolled newspaper. When he has learned to bring these to the feet of his master, several objects that have not been treated should be put in with the others. After a time, he will get the idea that you want him to retrieve only the objects bearing the scent.

A card trick familiar to every amateur entertainer can be turned into a neat mental stunt for your dog. It is best explained with nine cards.

The trainer fans the cards and then asks some person to select one in his mind. The cards are then divided into three stacks and after holding up each one separately, the person indicates in which pile may be found the card he has selected. This is repeated and when the trainer is again shown in which pile the card rests, he puts these three on top before redividing them. In this way, the trainer discovers that the bottom card of the indicated pile is the card the person has selected. By picking up this stack last he will have the card on the bottom so that he can touch it with the scent carried on one of the fingers as shown in the diagram.

When the cards are scattered face upward, the psychic dog is brought in to pick out the card. Cards that have been con-

taminated with the odor cannot be used a second time in performing the trick.

A most mystifying trick is the stolen watch routine. Several people are assembled in a room, the lights are turned out and

one guest steals another's watch. No one knows who the culprit is. The canine detective is brought to solve the mystery.

Several sheets of plain white paper that have not been handled are numbered and carefully placed on the floor. Each person present, except the trainer and the owner of the watch, is given a number and asked to place his full handprints on the sheet bearing the corresponding number.

After the handprints have been made, the dog detective will study each sheet carefully and then pick out the fingerprints of the watch thief.

What is the secret? A few simple rules. First, the trainer makes inquiry about the time to his guests some time before any tricks are even attempted.

When a guest takes out his watch, the trainer should comment on it and on the pretense of examining it in detail, the trainer takes it in his hand long enough to apply the scent on the back and sides of the case without knowledge of the owner.

With the stage thus set, the demonstration can proceed as was explained above. The scent is carried from the watch to the culprit's hands and upon sniffing at each paper, the dog will recognize the odor and pick up the handprints.

Player Spins Odd Instrument Fitted with Strings Like Harp

Clarence F. Henderson
Miss Sarah
Clarence F. Henderson
all Seattle Wash



Playing this stringed instrument consists of rotating it rapidly by means of pedal, and stroking the strings

Consisting of a five-foot spindle fitted with strings like a harp, an odd musical instrument introduced recently is played by spinning it while the musician fingers the strings. A pedal arrangement enables the player to rotate the instrument. The strings contain four chromatic octaves. A sounding board adds to the volume and tonal quality of the instrument, which has been named the rondolin.

Skin Detects Presence of Person in Dark

Scientific support for that so-called "sixth sense" whereby the presence of another person in a dark room frequently is detected has been offered by the American Physical Society. The human skin, reports Drs. J. D. Hardy and R. W. Oppel of Russell Sage Institute of



Glass model demonstrates how rush of water at foot of spillway cuts deep into bed of stream

Pathology, is more sensitive than the best mercury-in-glass thermometers which scientists can make. Five ten-thousandths of a degree centigrade of temperature difference can be detected as a minimum by the skin. This sensitivity may be the explanation for the sixth sense.

Turbulent Flow from Dam Quelled by Spillway Jets

Surging, boiling waters that cut away the bed of a stream beneath the spillway of a dam may be curbed effectively by a simple method recently worked out. Usually hydraulic engineers have laid down thick bases to withstand the tremendous erosive force. Instead, Roy Jenson, graduate student at California Institute of Technology, proposed to quell the turbulent flow by piping eight small jets of water through the dam at the bottom of the spillway, just enough to maintain a "hydraulic jump"—a smooth flow of water away from the dam. This method is being used on a soil conservation dam near Phoenix, Ariz. Jets eight inches in diameter suffice to smooth out the stream below a 200-foot spillway.

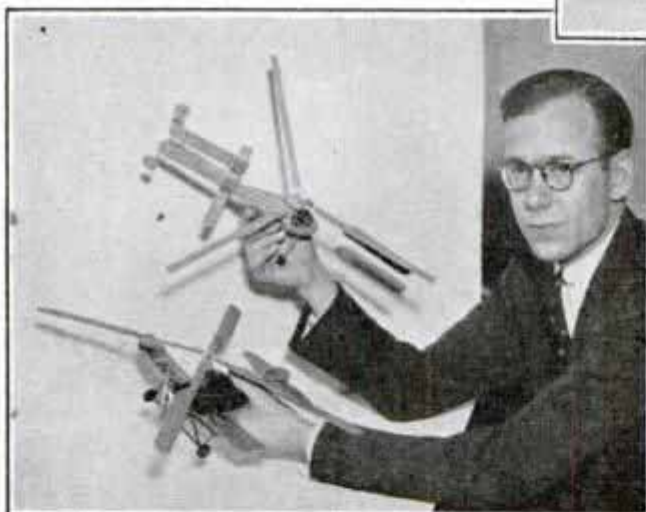
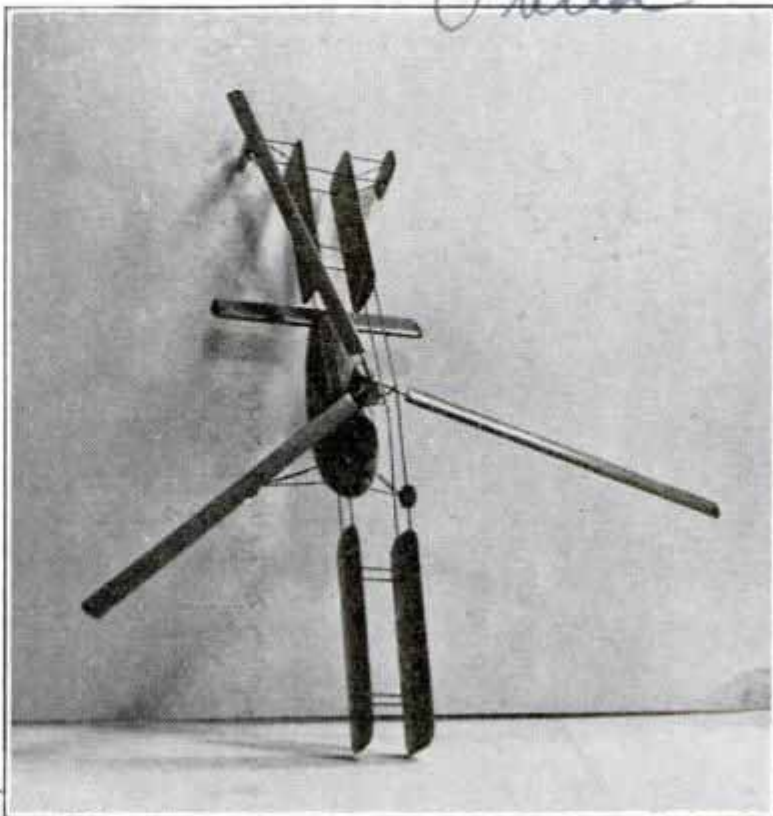
525 868th

Carl William Jandy

Aline Sarmé
4/30/36

Latest Helicopter Passes Wind-Tunnel Test

W. Laurence LePage and Havilland Platt have designed a revolutionary type of helicopter which has passed wind-tunnel tests in its model form. As a result, plans have been formed for construction of a 3,000-pound machine with a 300-horsepower engine to turn the rotor or "wind-mill" 170 revolutions per minute. This rotor speed compares with the 2,000 revolutions per minute of the airplane propeller. The helicopter is planned to rise at a speed of 2,000 feet per minute. At the altitude desired, it then would have a forward speed of 145 miles per hour. The machine differs from the autogiro in that its wings are set parallel to the fuselage or body of the ship instead of at

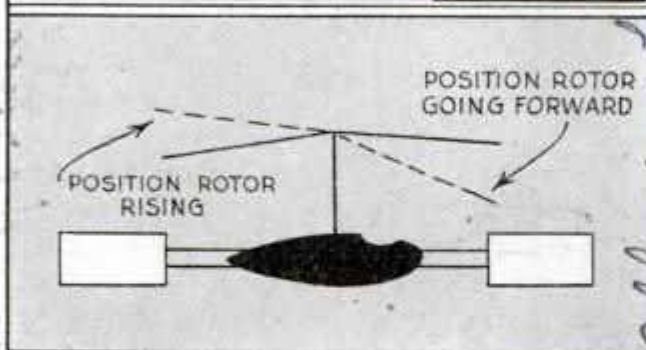


Above, model of new helicopter. Left, comparing model with that of early type. Bottom, how position of rotor is changed to get forward speed

obtained by mounting the rotor on a jointed shaft, making it possible to tilt it forward to get a pulling force. The machine has no propeller. Instead, its engine drives the rotor. In the autogiro, no power is applied to the rotor.

Gas Tube for Rural Telephones Eliminates Code Ringing

Selective ringing of rural line telephones has been made possible by a gas tube developed by William J. Vincent. The tube will eliminate the old code-ringing system under which every phone on the line jangled, the suburban exchange call and the hand crank. It consists of two electrodes in a vacuum filled with special gases. Telephone engineers call it a neon relay tube. Fitted into the bell box, the tube acts as an electric valve which allows high-pressure ringing currents to pass but catches and sidetracks stray currents which cause disturbances on the line. Selective ringing has not been practical, heretofore, especially where telephone lines paralleled power lines.



right angles to it and are placed at the front and rear of the ship. This is said to overcome the autogiro's tendency to turn from a straight-ahead course. Thus, this construction should result in a flying machine which can fly directly upward and then straight ahead. Forward motion is

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 Abbey 42
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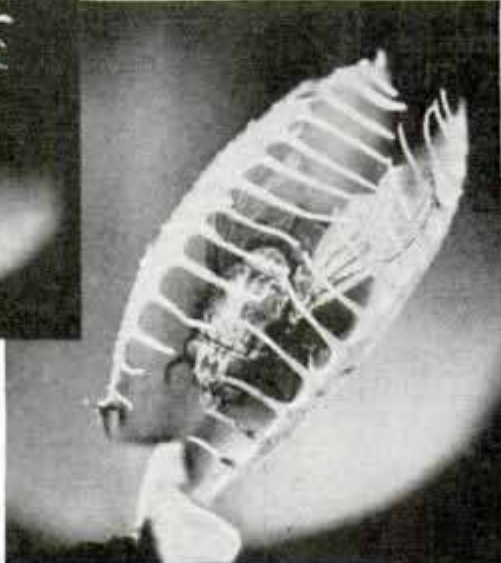
030x 105, Frankford
POPULAR MECHANICS
club

'Death Cell' Plant Traps Fly behind Its Bars



When an insect alights on the *Dionaea muscipula*, it is like stepping into the death cell of a prison. So quickly that only a motion-picture camera can record the action, the plant shoots out its hairlike fingers and enfolds the invader, those cilia closing around the insect like prison bars from which there is no escape. The plant holds its victim for a week or more until it has absorbed all the nourishment it can, then opens to await fresh prey. This sensi-

tive plant, called "Venus's-flytrap," is at home in the south-western part of the United States.



Speed camera sees fly alight on sensitive plant to be trapped in its death grip. Hairlike fingers close over insect, and at right plant has shut tight to digest fly at leisure

no source for seeds.
red letters.

Sanding Pad Driven by Air Simulates Hand Work

Dry or wet sanding so fine that it produces a polish comparable to hand work is achieved with an oscillating sand pad activated by air pressure. The abrasive pad moves back and forth at the rate of 3,000 strokes per minute, the strokes being



five-eighths inch long. To impart the oscillating motion, three flexible rubber tubular rollers are attached between air motor and pad. The pad is of wool felt, cushioning the sandpaper.

The rollers and pad permit maximum contact on uneven or curved surfaces. A water connection provides for wet sanding.

Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.

Intense Sound "Lights" Liquids by "Exciting" the Atoms

Visible light may be produced in liquids by intense audible sounds, according to Dr. L. A. Chambers of the University of Pennsylvania. The fluids glow at the point of cavitation, which occurs at many places, for example, at the blades of swift-moving ships' propellers. Holes or empty spaces are created in tiny spots within the fluid. These evacuated spaces collapse suddenly and the liquid comes together with an impact which causes high, momentary increase in pressure. The result in the case of propellers is a pitting of the metal surfaces. Steam turbine blades face the same difficulty. Dr. Chambers creates the cavitation holes by sounds with frequency ranging from 1,000 to 9,000 cycles per

Sterling Products Bldg.
4-Curtis Bldg.

Chicago

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Science

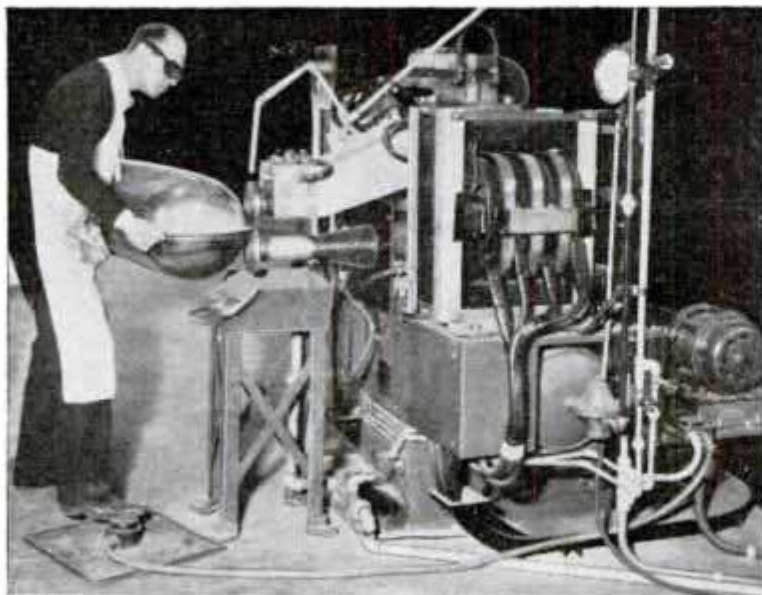
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second. In the regions where the cavitation is occurring, visible light is emitted by the liquid. An adequate explanation is lacking but it has been suggested that the atoms of the fluid are sufficiently excited to emit light.

7564
**Airplane Parts
 "Sewed" with
 Welder**

Man-made lightning is used at Wright Field by air corps engineers in a new "sewing machine" for fabricating airplanes and parts. The machine was developed to weld aluminum alloy parts which had defied commercial welding methods. Parts to be sewn are passed between the edges of two copper-tungsten disks which revolve slowly, exerting constant pressure. Electric current of only ten volts but as high as 40,000 amperes passes from one disk to the other, fusing the parts. High-duty vacuum tubes, resembling large radio tubes, assure accurate timing of the current.



"Sewing" parts of plane together in electric welder which was designed for handling aluminum alloys

Carl Charles J. Bauer
at the ...

Two-Way Police Radio Is Powered by Battery



Dual sending and receiving sets are mounted in trunk at rear. Operator throws switch on dashboard to send power to receiver or transmitter

Two-way radio equipment for police squad cars which operates independently of the generator is now being manufactured. When the radio draws its power from the car generator, the automobile engine must be kept running. This is impractical when the squad car is parked, and particularly when a house is being watched. The latest type draws power for both transmitter and receiver from a small dual dynamotor operated by the car battery. Sending and receiving units are placed in the rear of the car, and by throwing a switch on the instrument board the operator can send or receive. The switch starts one of the small dynamos furnishing power to the radio unit to be used. The antenna is mounted on a springlike mast which bends when it strikes an obstruction such as a low tree branch or viaduct.

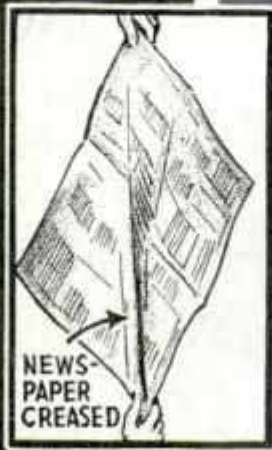
The ... is made of ...

I428

Mr. James M. ...
20 W. Hartman Ave.

Kansas City Mo

0164 B.O.H. St. Antonio L. I. ...



EASY TRICKS

Left, after mastering the one-hand balance of newspaper sheet, the amateur can learn to balance it on his nose. Right, balancing bottle on edge of plate

By Charles Carrer
Famous Juggler

THERE are many compensations in amateur juggling. Apart from the fascination and pleasure the amateur derives from doing simple feats of balance and manipulation, he finds himself a welcome addition to any party or social gathering.

As in most forms of conjuring, some of the easiest stunts enjoy the greatest popularity. Finesse and showmanship are the important things. If your movements are clumsy and uncertain in the performance of a stunt, do not attempt to work it for your friends until you have rehearsed it carefully several times.

For impromptu entertainment at a party,

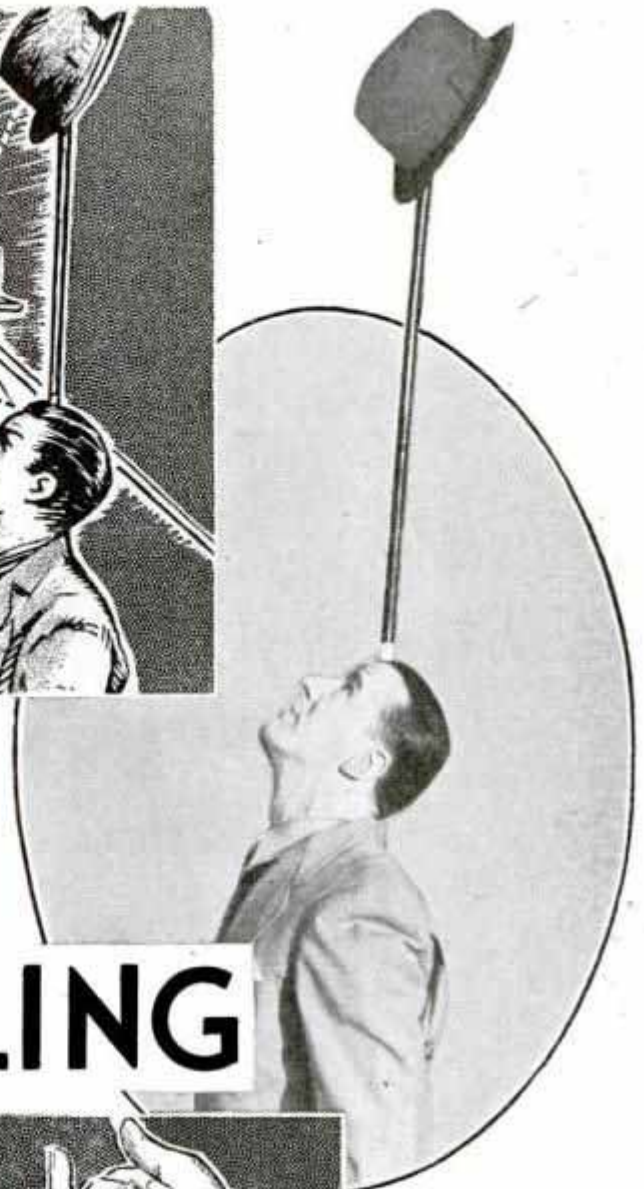
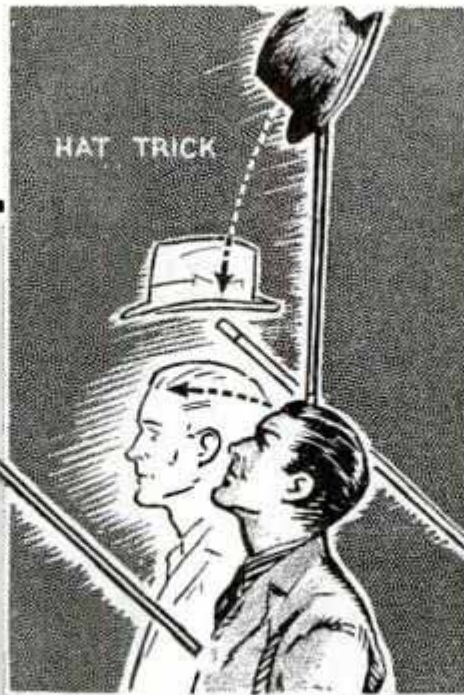
the giant cone offers a wealth of possibilities. The cone may be fashioned from a double-page newspaper. The manner of folding and rolling it is shown in an accompanying illustration. It is held together by a pin or bracket.

The cone first may be placed on the toe of the raised foot and from there sent spinning upward where it can be balanced on the chin or forehead. A hilarious variation of the turn is to balance the cone in one ear and then the other without touching it. This group of cone stunts can be mastered in a short time.

To facilitate your performance, however, it is a good plan to soak the lower portion of the cone in a bowl of salt water for a short time and then hang it up to dry with the vertex of the cone pointed downward. In this way the salt will add weight to the point and minimize the guesswork in your routine.

Another effective stunt that will make a hit at any party is balancing a newspaper

Below, circle, balancing cane and hat far back on forehead. Center and left, movements and completion of stunt as performer ducks into hat and locks cane in position



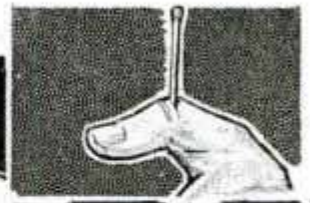
of JUGGLING

sheet in several positions. To do this, take a single-page newspaper by the fingers of both hands, flutter it a few times and then pull gently at the corners to stiffen it. Without disturbing the sheet in any way, the fingers should be released from the top portion of the paper.

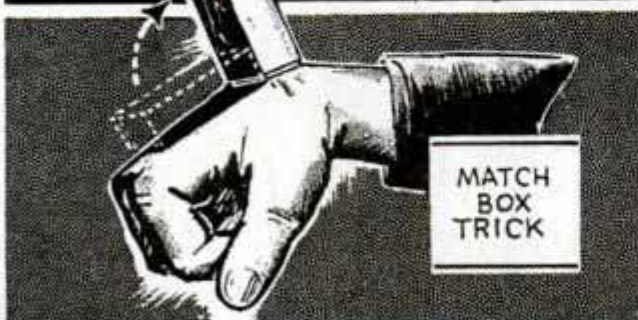
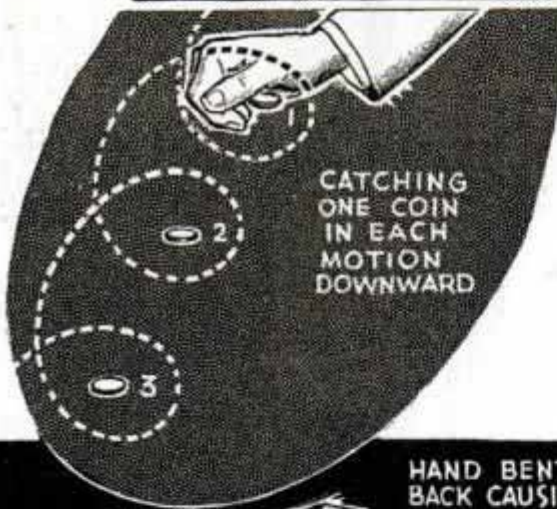
When the one-hand balance of the sheet has been mastered, the performer may then concentrate on learning to transfer it from the hand to the chin, or the bridge of the nose.

Balancing a cigarette paper on the bridge of the nose appears to be much more difficult than it actually is. Air pressure on the paper aids in keeping it in position. In working this stunt, do not stand near an open window or in a draft or your efforts will not be crowned with success.

The cane and hat trick should be in the repertoire of every amateur entertainer. The cane should be balanced as far back on the head as possible. When this is done, the performer gives a quick backward flip



Left, flipping coin by working wrist and striking match on box in mid-air. Right, a simple match trick that will startle your friends



Top, balancing cigarette paper on nose. Center and below, simple coin and match tricks

of his head, the cane falling into position. In all probability the hat will fall straight down, so by moving his head forward a trifle, the juggler ducks into the hat and the cane becomes locked.

There are a number of balancing feats that can be done with wine bottles, plates and glasses. A bottle is balanced on the edge of a plate. This is done by putting the cork in the bottle and cutting it off even with the lip, thus keeping it from slipping. For the more experienced performer, the "room service" trick has an appeal. Here a bottle is balanced on the forehead. Then someone hands you a plate which is set on top of the bottle. Another bottle and several glasses are then balanced on the plate. The bottles should be fitted with corks, as described above, and also adhesive tape should be put on the top and bottom center of the plate to keep it steady.

Simple feats with coins and matches are enjoyed by the young and old. One of the most popular of these is the placing of three quarters on the back of the hand and wrist and then trying to catch each one separately before they touch the ground. It looks easy until you try it. If you succeed in doing it with your right hand, try your left and then both!

The flipping coin is intriguing. With the hand relaxed and the thumb free, a coin is placed on the pulse. The index and second finger are then bent forward, the other two being held out straight as possible. By slowly turning the hand inward toward the body, the coin can be flipped over by action of the cords in the wrist.

With a reasonable amount of practice, you can learn to strike a match on the box in mid-air. The success of this stunt lies in timing, tossing the box up to the height that will give you just time enough to draw the match head across the sanded side of the box. Probably you will have a tendency to toss the box too high on your first attempts, thus bringing the striking action too soon to connect with the box.

Another entertaining stunt is the novel way in which a lighted match can be handed to a person. At the outset, the thumb is bent downward and the match set in the flesh line. The thumb is then straightened out and the lighted match will remain in an upright position.

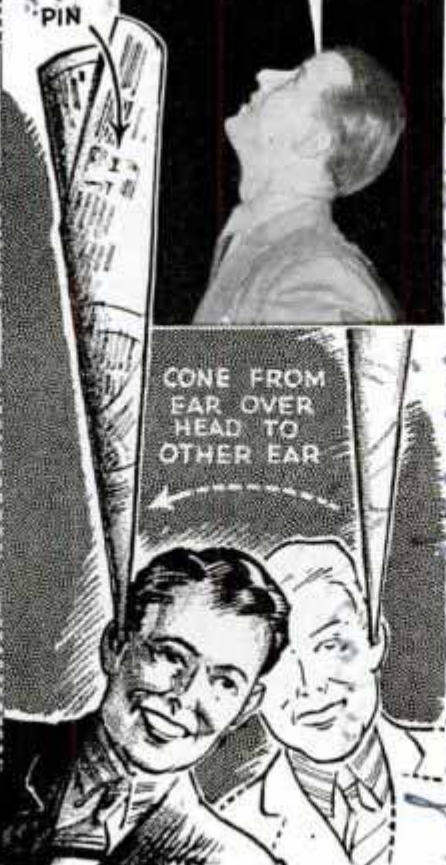
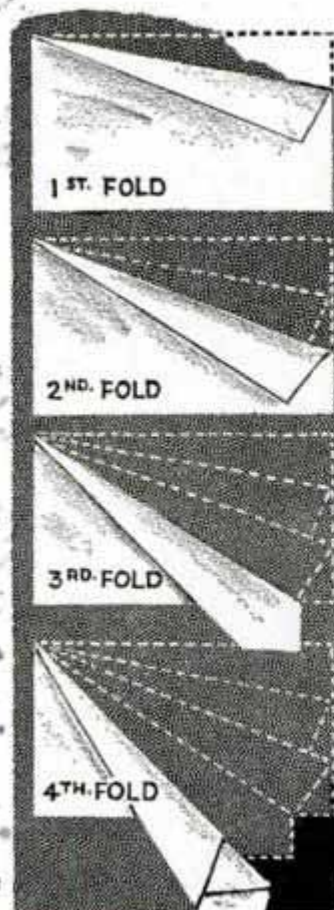
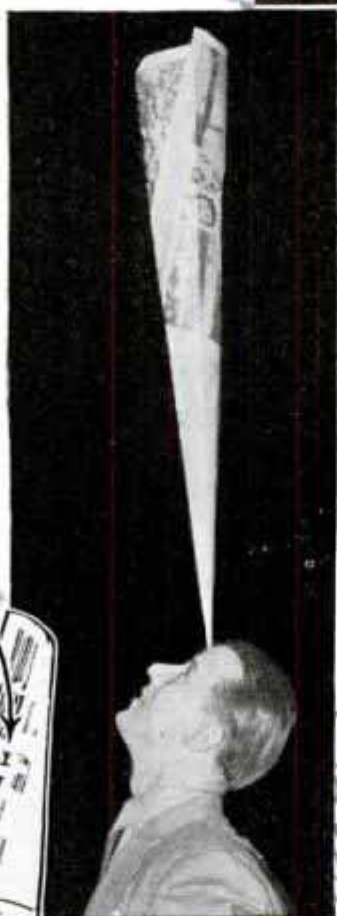
The illusion of balancing a match box on the wrist is still another simple trick. The hand is held upward and the flesh ridge is pinched by the opening in the box without the audience seeing it. As the hand is dropped slowly forward, the box will rise to a balanced position.

A laugh hit is the monocle coin stunt. To do this, the entertainer first balances a coin on the toe of his shoe. Then with a timed kick, he sends it to his forehead and after placing it there momentarily, he slides it into his eye in the fashion of a monocle. As a protective measure, the hand may be held up against the forehead to catch the coin on the first few attempts.

That daily practice is necessary to master even the simple trick or stunt is obvious. The beginner must go slowly in the routine, then gradually increase the speed of performance until each movement may be carried out smoothly and quickly. A tendency to hesitate at any point in



Left, how to roll the newspaper sheet into cone. Center and top, cone can be sent spinning from foot to chin or forehead with a little practice. The cone offers a wealth of possibilities



the performance ruins the whole effect. The amateur might take a tip from the professional who masters the stunt in private before attempting to present it in public.

Man to War on Insects with Bombs and Guns

Fighting insects with shotguns and bombs is proposed by an inventor. Shells loaded with powerful insecticides would be exploded over fields and orchards, spreading deadly dust. Slugs of insect powder would be loaded in shotgun shells. Sticks of insecticide could be exploded like dynamite. Firing range could be calculated to cover an area without risk to the exterminator.

Science Service 7/26/36
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Alto D.

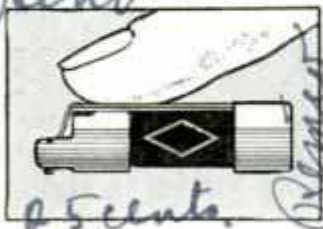
Big Jonker Diamond Split After Months of Study



Pieces of Jonker diamond surrounded by stones which will be made into necklace

Cutting the Jonker diamond, which weighed 726 carats and was the largest known, into three perfect pieces was the problem set before a New York expert recently. Because of the danger of ruining the great stone, the cutter spent several months studying the grain of the gem. Then a cutting tool was applied carefully and a sharp tap with another tool split the diamond into three pieces, each perfectly cut.

Circuit Breaker for the Auto Prevents Road Delays



Trouble with a blown fuse on the road is eliminated by a new circuit breaker for the automobile. The device, which fits into the fuse clips, cuts off the electric current without blowing out and destroying itself. After cutting off the current, it may be reset, thus

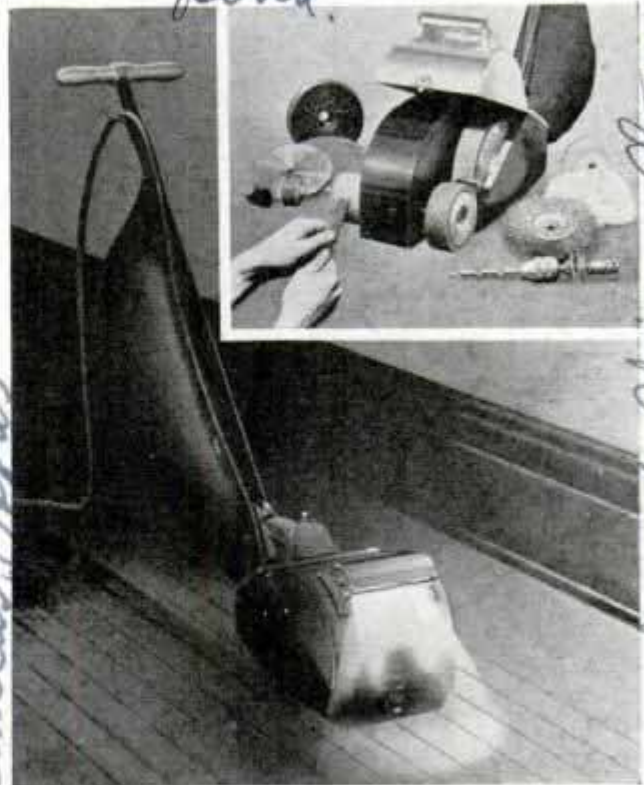
preventing road delays. If the trouble is serious the motorist may reset the device any number of times until he can reach a repair shop. The circuit breaker comes in the correct amperage for all makes of cars.

Radio Waves Escape Static When Carried in Pipes

Experimental radio waves which travel inside long tubes have been found free from outside static and from the interference of receivers near by. The waves race through the guide tubes at close to the speed of light, nearly 186,000 miles per second. Only six inches long, the waves are of the frequency which might be used for television as well as for static-free radio communication. One remarkable feature is that the waves are carried on insulating rods in the center of the metal tubes. Insulators will not carry electric current in the ordinary sense.

Power Unit Converts Sander to Many Other Jobs

Equipped with a light and closely resembling a vacuum cleaner, the latest sander is convertible for grinding, buffing



Sander with headlight. Inset, attachments which convert sander to other uses

Lagere Kaplan 800 Riverside

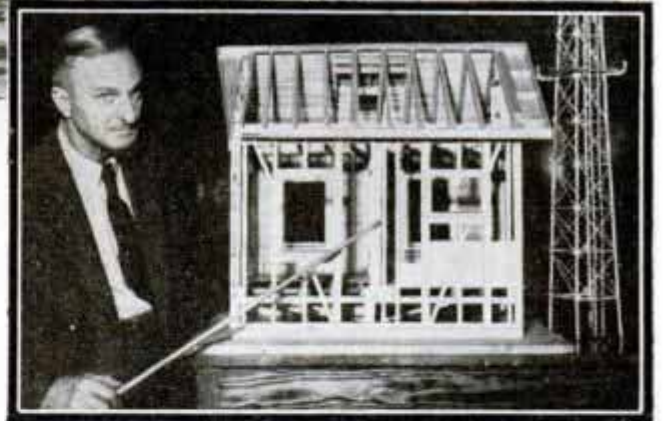
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Wash. Telephone Laboratories
463 West St. New York
Nash
Boston
Austin
Chicago
Dallas

Reynolds Mfg Co
labeling

Trimmer Mfg Co
5712 E. 1st Ave

FIGHTING FIRES



Top, working in close at lumber-yard fire. Bottom, explaining unprotected construction

THE latest technique in fighting fires is to fight them at close range with small streams of water, attacking the flames from the inside instead of the outside of buildings.

From heavy, artillery-like streams that have a range of half a block firemen are turning to lines of almost garden-hose size for sharpshooting at the flames. They walk in close, hit the fire for a few seconds, then move to a new position and turn on the stream again.

Fighting at close quarters in the smoke and heat is dangerous work, but it's one of the reasons why in Los Angeles the annual per capita fire loss is sixty-five cents as compared to the national average loss of about \$3.50. Once a fire fighter tumbled into a blazing inferno when some stairs collapsed. His mates were right behind and they pointed a stream of water

down the stairs until he could be rescued. The water kept him cool but nearly drowned him.

"Of course, not all fires can be fought at close quarters," says Deputy Chief B. M. Blake, of the Los Angeles fire department. "Old, unsafe buildings may be ready to fall in as soon as a fire starts and then we have to work from the street. But in fifteen years we have used the water tower

Los Angeles
 Calif
 Cmd. Thomas E. Stinson, Jr.
 10555 Holmair Ave

Grand and Hill

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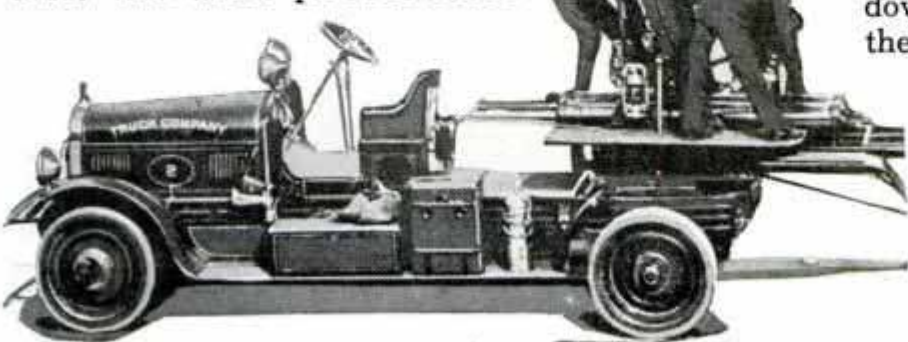
from the INSIDE

Left, demonstrating the extension ladder used for reaching upper floors. Right, fireman wearing smoke and gas mask and the steel helmet rescues fellow fire fighter who has been overcome

that hurls water from a distance only once."

In the fire college of the department Battalion Chief J. L. Gowell instructs his men to be stingy with water. Wasted water often does more damage to property than the flames themselves.

"In the old days," says Chief Gowell, "firemen responding to a kitchen fire in a bungalow would dash up, break down the front door, race through the house dragging a line that knocked down everything with its stream, and then put out the fire by washing it out the back door. The whole performance



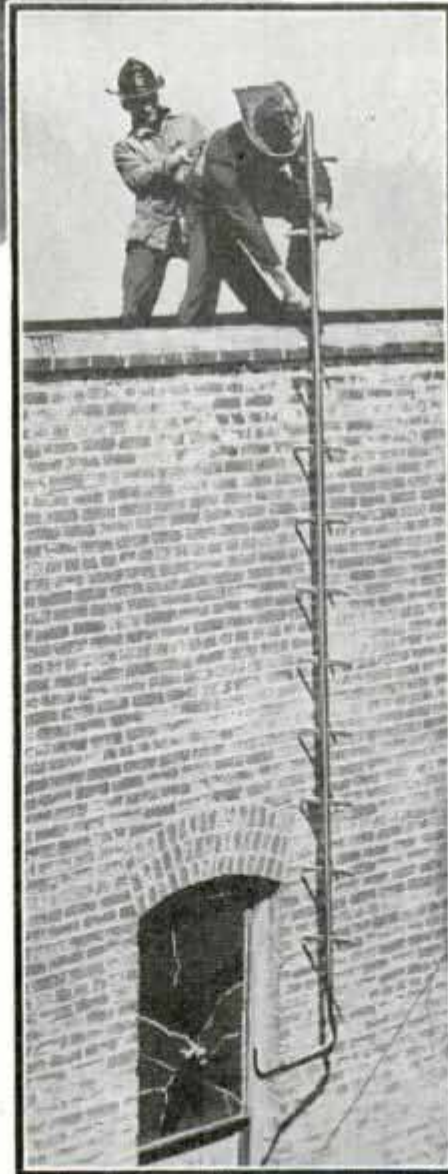
might cause \$200 worth of damage. Today we calmly go in the back door and put out the same size

blaze with a water can or a small hose. If the fire is in some overstuffed furniture such as a sofa we carry it outside and wet it down on the lawn. Often twenty-five cents worth of sawdust will save \$25 worth of damage to a home, as in the case of a roof fire. The water we use is apt to loosen the plaster of a ceiling and bring it down. Nowadays members of the salvage squad sop up the water with sawdust and drain it away before it does much harm.

"Firemen have four jobs. First is rescue work. If there is someone inside the building it's up to the firemen to bring him out.



Rescue men work in pairs and trail a signal rope behind them. The next duty is to keep the fire from spreading, especially toward another building. Then they must get to the seat of the fire and put it out. Often these two tasks can be combined by fighting a fire from the direction toward which it is spreading, driving the flames back toward the burned area with the streams. Then comes the salvage work. Mops and brooms may not seem to be the proper equipment for 'smoke eaters' but the salvage squad begins its work while the flames are still roaring and remains after the fire is out to mop up."



Every big fire takes its toll. Firemen rushing along a smoke-filled corridor depend on their mates to get up on the roof and open the skylights. Otherwise the mushrooming of the hot air knocks them out. Getting in close to the flames dries and cracks the skin. Biting smoke swells eyes shut and blisters noses. In spite of these discomforts firemen like to do their work without masks and breathing apparatus. The bulky equipment weighs thirty-five pounds. It is hard to peer through the glass windows. In a pinch they turn their helmets backward and protect their faces with the long rim at the back.

One great hazard is the thick smoke which interferes with vision, so fire-



Top, hose controlled by rotary crank. Bottom, left, smashing window to ventilate burning building. Right, using portable tank

men study every building in their district. Then, if a fire should break out they can find their way around inside in the dark.

There is a right way to do everything at a fire. Opening a door the wrong way may be disastrous. Untrained men on a roof have been killed when the explosive "backdraft" from a door opened above the fire blew them off the roof into the street. The right way is to stand out of the way and reach across to open the door so that the quick blast of hot air can rush by harmlessly. When the



Top, rescue squad in cellar of burning building. Center, life net catches man after a demonstration leap from "burning" building

roof begins to quake like jelly under their feet firemen know that they have only a few seconds to escape to their ladders.

One breath of superheated air will cause death and when firemen inside a building encounter a door almost too hot to touch they back far out of the way and try to break it open with a heavy stream of water. If you should be caught in a building that is on fire, remember that it is certain death to open a door that feels hot to the touch. It is best to wait where you are and be rescued through a window.

Ordinary electric wires are a constant peril to fire fighters. Wet feet and wet metal helmets are perfect conductors and firemen who brush their heads against ex-

Attaching a "siamese" to large hose to get two smaller streams of water

(Continued to page 138A)

*John H. Mulley
Chemist Dept*

Odd Cigar 'Boxes' Carved from Husks of Coconuts



Here are some of the odd cigar "boxes" which artist carves from coconuts. The boxes are in great demand by the tourist trade

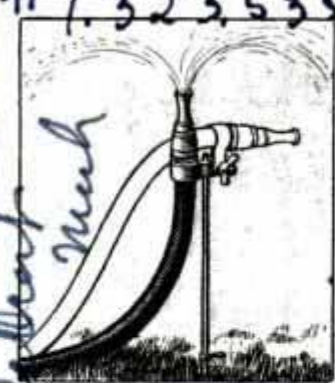
Unusual cigar containers are carved from the husks of coconuts by a Honolulu artist who decorates them with comic or grotesque faces. The cigar "boxes" are in demand by tourists as souvenirs.

oped by chemists. This silver oxide can be administered medically as a liquid or as a salve which, applied to the skin, penetrates deeply with antiseptic effect and without the irritating results of previously known silver compounds. Virtually all the silver passes from the body without damaging the organs. It is prepared from silver nitrate and sodium hydroxide.

Telephone for Deaf Amplifies Voice in Receiver

Deaf persons can hear an ordinary voice over a telephone recently designed especially for the hard of hearing. By turning a small knob, the deaf listener can amplify the voice in his receiver to any degree desired, making telephone conversations possible for all except the extremely deaf. The ampli-

Sprinkling Lawn Is Made Easy by Clamping Hose on Post



With a "hitching post" for your garden hose, watering the lawn and flowers is an easy task. A spiked pole made for this purpose has an adjustable clamp at the top to hold the hose in any position. It is readily moved to any part of the lawn and anchored securely by thrusting the spiked end into the ground.

readily moved to any part of the lawn and anchored securely by thrusting the spiked end into the ground.

Germ-Killing Silver Medicine Found Harmless to Humans

Powerful as a germ-killer yet quite harmless to healthy human tissue, a new compound of silver has just been devel-



Turning knob on telephone, deaf listener can amplify voice in receiver to suit his ear

oping apparatus is in a separate case, the knob control being conveniently located on the telephone set.

Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.

*M. Warden
Mentor Patton works
3474 Harper Ave
Elmhurst*

Always the same

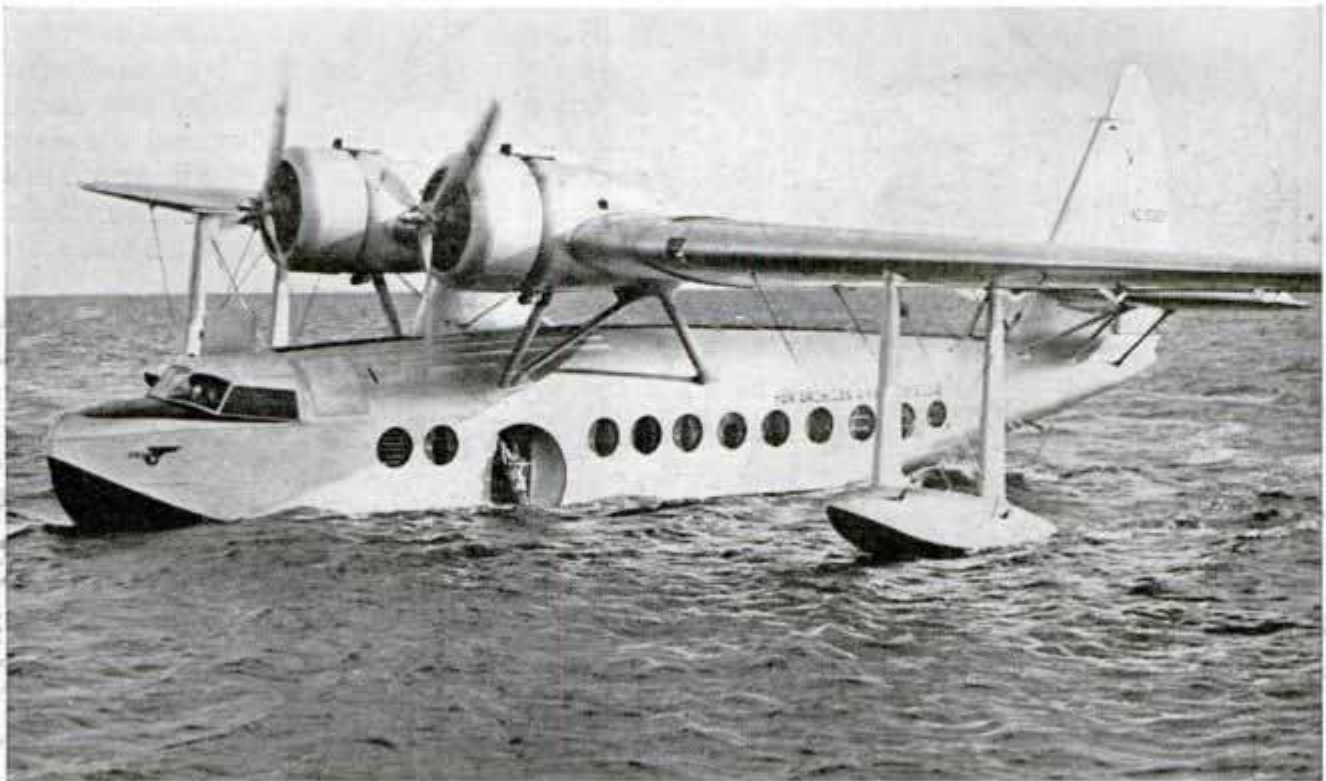
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New York Times

Invent. by Engineers

London

Fast "Clipper Jr." Carries Fifteen Passengers



This "half-size" clipper plane is ready to enter the South American trade of Pan-American. Powered by the two motors, it has a capacity of fifteen passengers. The ship weighs nine and one-half tons

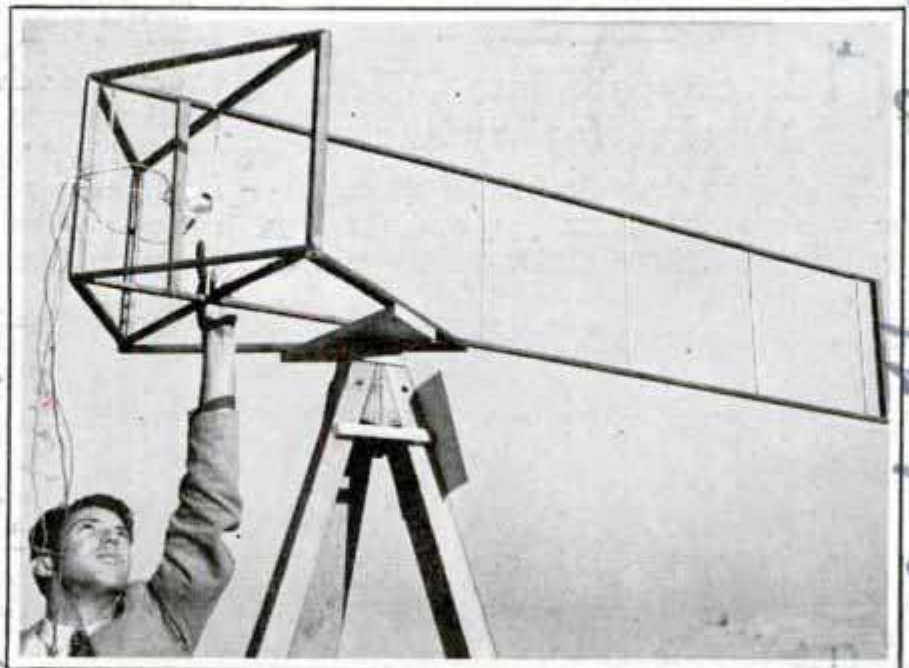
Resembling the mammoth twenty-six ton flying clipper ship which has become a familiar sight on the South American and U. S.-Manila routes of Pan-American, a junior clipper has been tested success-

fully. It weighs nine and one-half tons and carries fifteen passengers and a crew of three. Capable of landing on either land or water, the half-size clipper has a high speed of 194 miles per hour.

7563

Midget Radio "Shoots" Beam by Directional Antenna

So small that it may be held in the hand, a midget radio transmitting set "shoots" its beam-wave in any direction in which its odd antenna is directed. It has a range of twenty miles. Operating on a wave length of seventy-five centimeters, one of the shortest ever used, the set transmits a beam which has many of the properties of light. The directional antenna pivots to send the beam in the direction desired. The apparatus was developed by graduate students of the California Institute of Technology.



This odd antenna makes possible the transmission of "beam" midget radio waves sent out by a seventy-five centimeter set

Under Thomas E. Stinson Jr. Los Angeles, Calif.
 10555 Holman Ave.

Pasadena

Donald J. Holland

Crash Boat Speeds to Aid Sinking Seaplane

"Seaplane in distress three miles off shore!" Within five minutes after the call comes in, rescuers could be at the side of the sinking plane in the high-speed crash boat built for the navy. Designed specifically to aid wrecked planes at sea, it combines rescue ship, salvage and hospital boat. In official tests this forty-eight foot V-bottomed power boat reached a speed of forty-five miles an hour, or thirty-nine knots. A derrick mounted at the bow will hold sinking aircraft afloat while crew and passengers are being rescued, and below decks is a well-equipped hospital for first



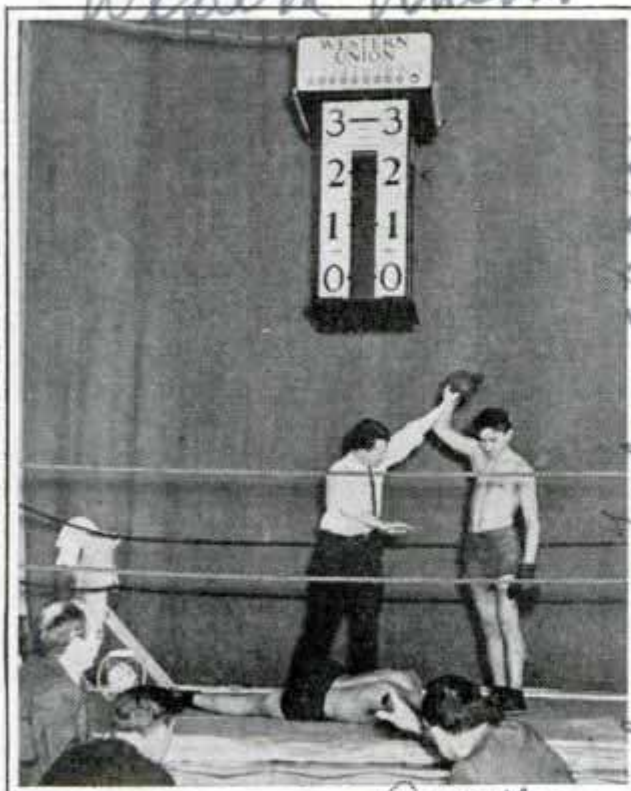
Crash boat equipped with derrick for salvage work and first-aid hospital travels at thirty-nine knots to aid seaplane in trouble

aid to the injured. The ship is thirteen feet wide and weighs more than twenty-one tons. It is powered by four 300-horsepower six-cylinder engines.

Electric Timer at Ringside Flashes Round and Knockout

Latest improvement on the human referee and timer at prize fights is an electric timer that counts out the fallen fighter with flashing lights and a verbal "One—

two—three" as soon as he hits the floor. It is a visible time-board for the audience as well as an alarm for the boxers. At the base of the big 250-pound clock the three-minute rounds are timed. A black curtain moves upward during the round until it hits the three-minute mark, then drops to the bottom for the one-minute interval and sounds a warning bell ten seconds before the next round starts. When a fighter is knocked down, the timekeeper presses a button and the upper row of lights and a mechanical speaker count off the ten seconds for the knockout.



Vertical numbers show time elapsed in round and horizontal lights count ten over fallen fighter

Bacteria Sleeping Since 1767 Revived by Paraffin Bath

Colonies of bacteria that had been "asleep" for 169 years in the adobe brick of an old mission were awakened by a hot paraffin bath. Dr. Charles B. Lipman of the University of California took a brick from the center of a wall of the San Luis Obispo mission, built 169 years ago. In it he found seeds which germinated and were grown successfully, and large colonies of soil bacteria which, after a hot paraffin dip, revived and became active.

F622

Luders Marine Construction Co., Stamford Conn.

F668

Western Union

F719

Berkeley Calif.

Used at Isolder

Reported by Dr. Ira

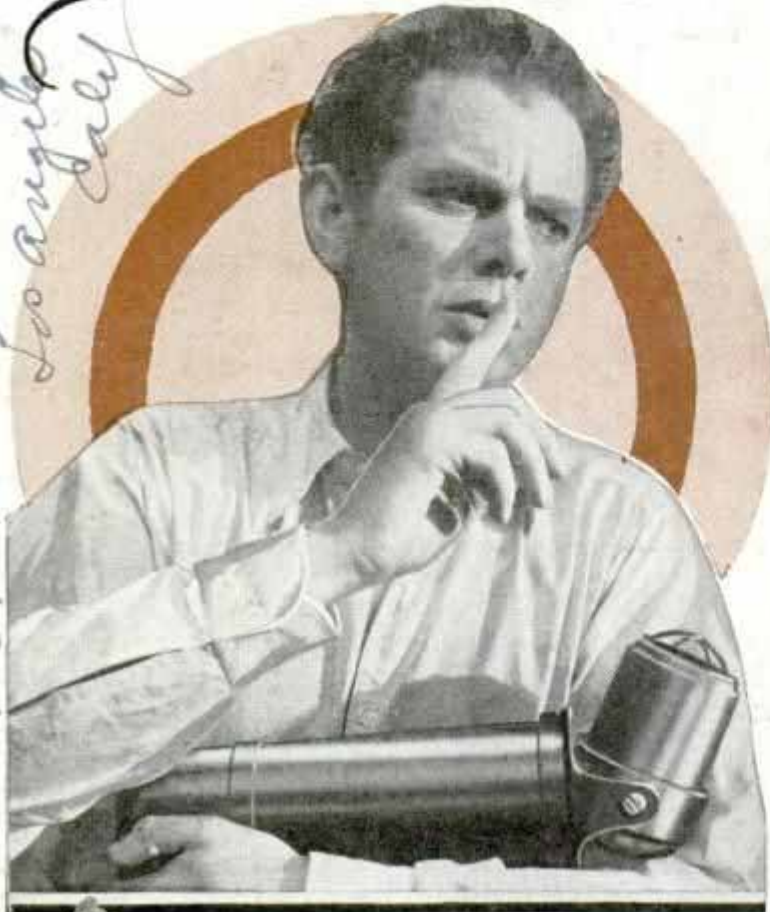
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1151 S. Broadway

Los Angeles, Calif

Latest

MOVIE



UNTIL recently much of the sound heard with pictures was faked. When a lion opened its mouth, you heard the roar of an open-end drum as it vibrated to the pull of a rosin-covered string. Now the microphone is held directly in front of the lion and his throaty voice is recorded directly.

The "baby dynamic mike" permits recording through a range of frequencies both lower and higher than has been attempted before. Through its one-inch-wide diaphragm you can hear notes ten times lower and four times higher than is possible over a telephone.

Movie sound engineers failed to record many natural sounds in the past either because their great force kicked the delicate microphone diaphragm out of shape or caused clicking noises in the

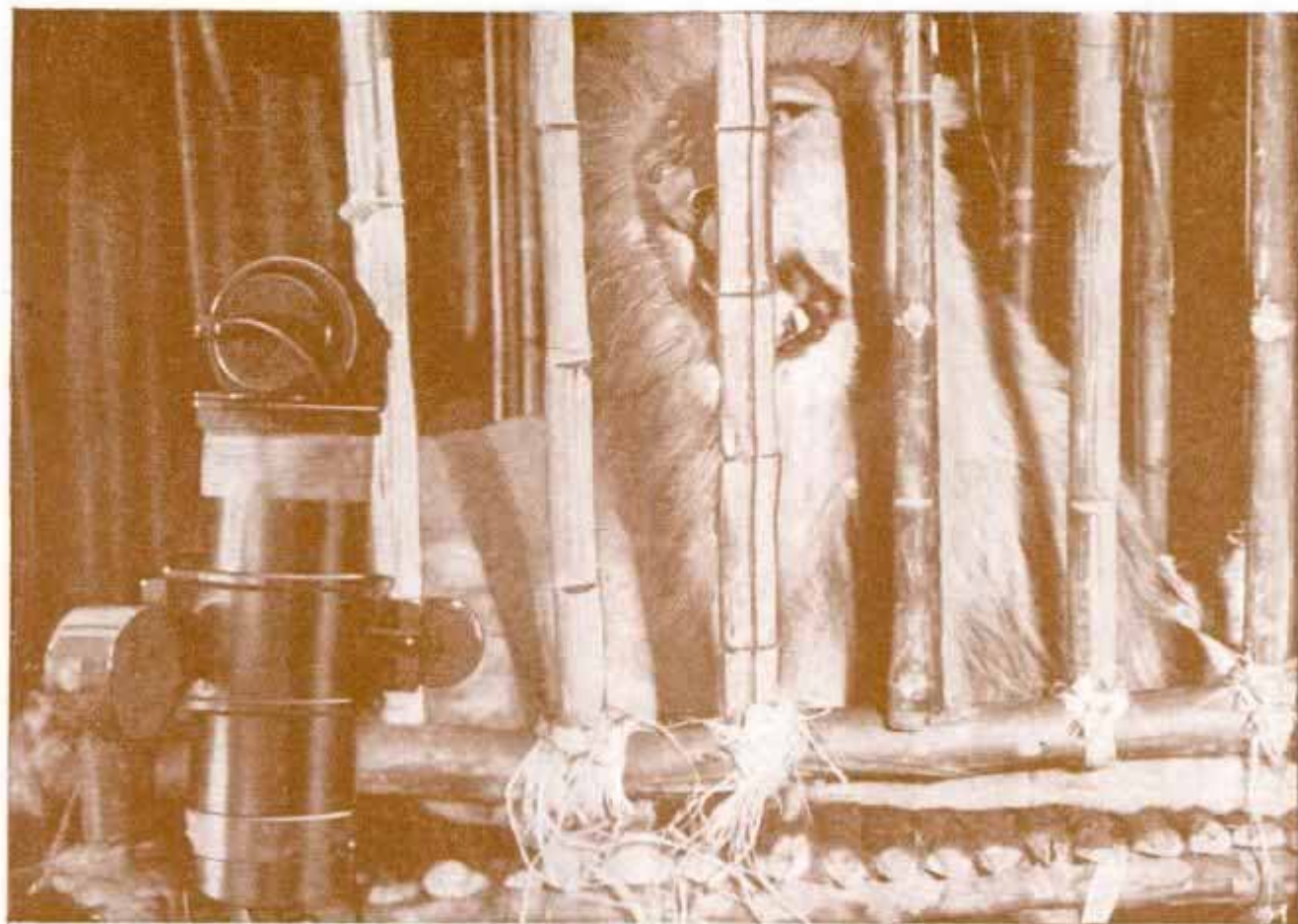


"Schnozzle" microphone, top, which may be turned in any direction to pick up sound. Below, microphone covered with cheesecloth to keep it from picking up whistling wind

Cmd. Andrew D. Dorn
1151 S. Broadway
Los Angeles
Calif

Overseer

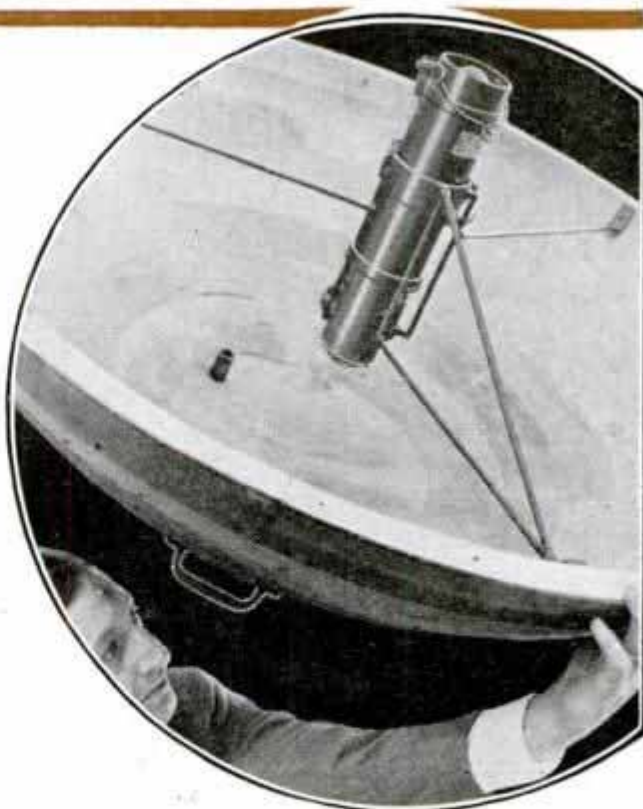
MIRACLES *in* SOUND



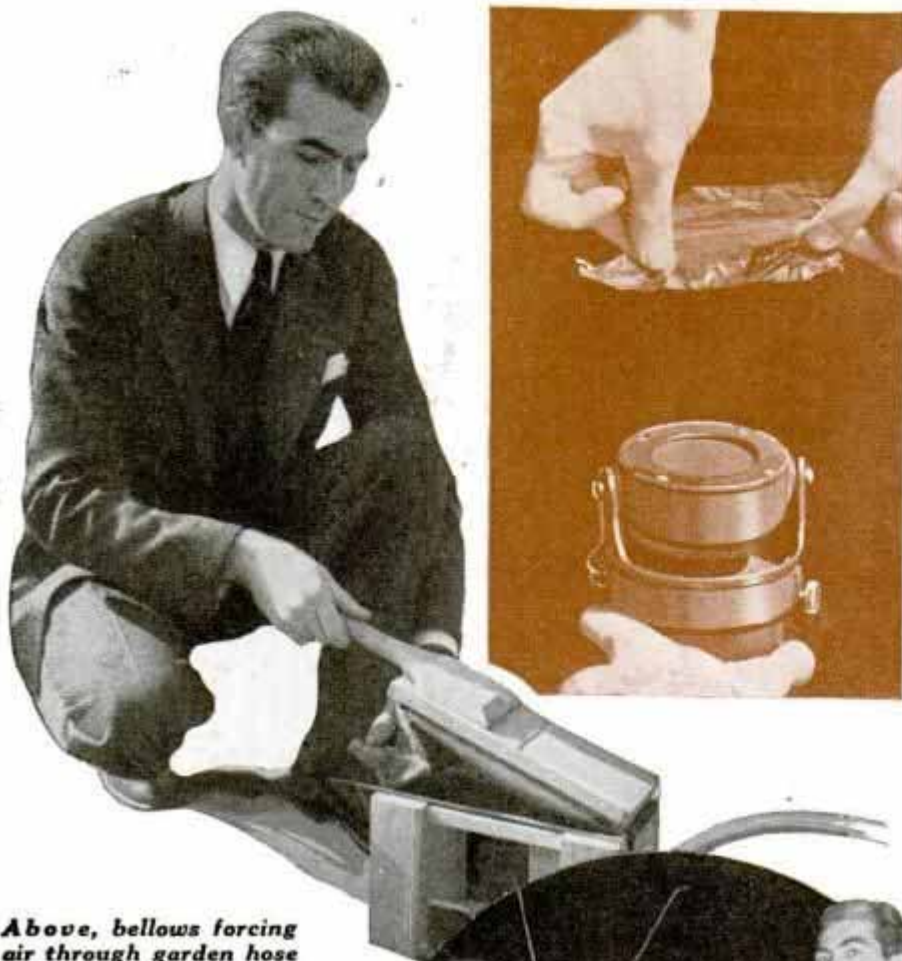
valves which turn the sound waves into light for registering on the movie negative. Instead, they created the sounds artificially by means of a variety of mechanical appliances whose noises they could control. Now they get the natural sounds. Recently, for instance, a director sent to E. H. Hansen, head of the sound department at the Twentieth Century-Fox studio, the following order:

"I want twenty feet of people stepping out of an airplane, six feet of a bugle bird bugling and one good shot of the latest sixteen-inch heavy artillery rifle firing—and make 'em natural."

Hansen dispatched three sound crews to fill the order. One visited a southern California airport and caught the passengers descending from an air liner. A second, in New York City, journeyed to the army's ordnance proving grounds at Aberdeen, Md., where they set up two mikes, one a quarter mile from a new gun undergoing



"Mike" picking up lion's roar and, below, "beam mike" fitted into parabolic reflector to concentrate sound from any direction desired



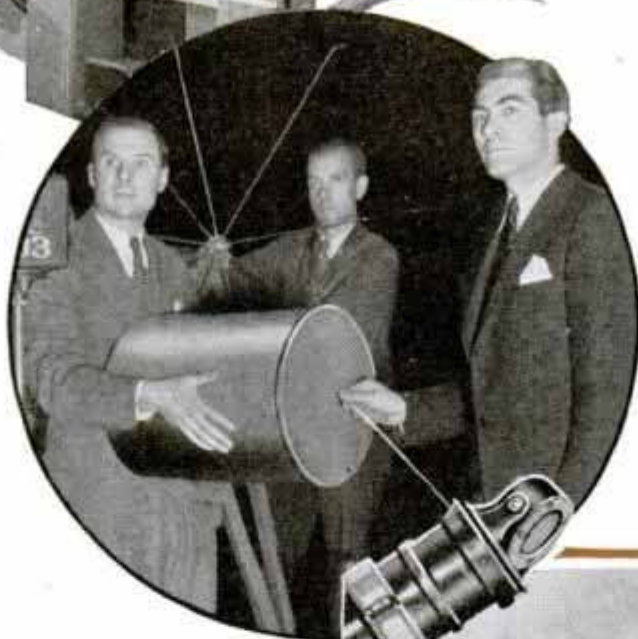
Above, bellows forcing air through garden hose imitates whale blowing, while crinkling of paper sounds like crackling fire. Right, imitating roar of lion with rosin-covered string attached to open-end drum

first tests, the second a mile in front of the gun. One recorded the initial explosions, the second the whistle of the shells. The third set up their apparatus inside a cage with a rare bugle bird and waited for three weeks until it shrilled a series of calls. The three units exposed 50,000 feet of sound track, of which not more than 100 appeared in the picture.

The booming rifle, bugling bird and descending passengers now have joined 10,000 other "natural sounds" in cans lining the walls of fireproof vaults in the world's largest library of sound. From these rooms, the librarian can supply from 3,000,000 feet of sound film many unusual records, from the swish of torpedoes racing through the ocean to eggs frying, a

porcupine rattling its quills, cards dropping on a wooden table, panning of gold, a wild boar fighting a leopard, or an electric torch singing its song of super-heat.

While resorting to natural sounds to replace thousands of mechanically produced noises, sound recorders still use many tricks in their quest for realism. Scoring of music, for instance. In most pictures, both the voice of the singer and the orchestra are "scored" on a large stage and "dubbed" in with the picture later. A few years ago scoring was done on so-called "dead" stages, or large rooms completely insulated by sound-deadening material. Later, and until recently, stages having "live" and "dead" ends were used. Here the microphone was swung from its boom in the dead



Dropping tacks in a barrel sounds like rocks falling on a roof after the noise has been passed through the movie microphone and recorded on reproduction equipment

end and the music produced in the live end. The sound literally reverberated from uncovered walls into the insulated end, where it was absorbed as it sped into the microphones.

Now the scoring room looks like a giant four-walled checkerboard, its walls a series of large, interleaved squares. Half of them are blank walls, which reflect sound, the others are covered by an absorptive material. In this type of room, the artist or orchestra may work in close proximity to or at a distance of a hundred feet or more from the mike without danger of distorted or reflected sound. When recording a large band, two mikes are operated, one near by for matching with close-up scenes, the other at a distance, for use with medium-long shots. In both cases, the sound possesses the correct quality of reverberation.

"Sound-recording is not as simple as merely placing a microphone near the source and registering it on film," Hansen explains. "Sound is first converted by means of two parallel duralumin ribbons into light. In fact, it undergoes seven changes from electrical energy into light and finally back to sound before it emerges from the horns in theaters. These changes involve a total of twenty-seven intricate mechanical, electrical, chemical and light steps. Sound reaches the microphone as a series of peaks and valleys, and the larger the diaphragm the more acutely sensitive it is to these waves. Until recently sound has been recorded on dynamic microphones whose diaphragms measure three and one-half inches across. Now the 'baby dynamic mike' has appeared, consisting of a two-inch ball housing a one-inch diaphragm. Oddly, though double the amount of electrical energy is required to obtain the same sound output, the baby mike responds to all frequencies alike and therefore transmits a more faithful reproduction of the sounds reaching its metal ear.

"Sound engineers consider the ideal microphone one whose diaphragm is no larger than a pin point, for such a small surface would have no relation to the sound waves. In fact, when some loud noises, such as a booming gun or dynamite explosion, strike a larger microphone the diaphragm is temporarily displaced by

(Continued to page 116A)

That's the new device
**Foot Warmer for Autoist
Heated by Car Battery**

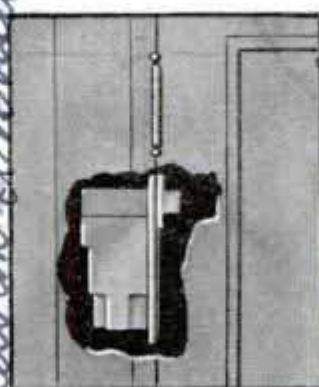


Wrote Walter

Ready to try out the foot warmers. Car battery supplies the electric current

Taking its current from the auto battery, a foot warmer for the motorist consumes only one-third of the current required for a headlight. The sole of the autoist's shoe is brought to a temperature of thirty-five to forty degrees and kept at that level, preventing the foot from becoming numb with cold. The device has been introduced in Germany.

Chicago 435 2nd
**Hidden Door Check and Closer
Is Built into Door Frame**



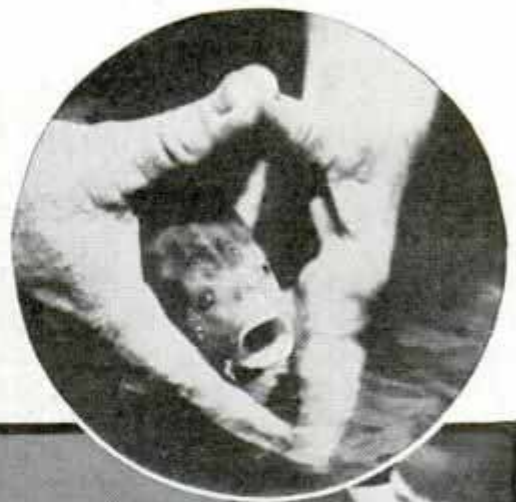
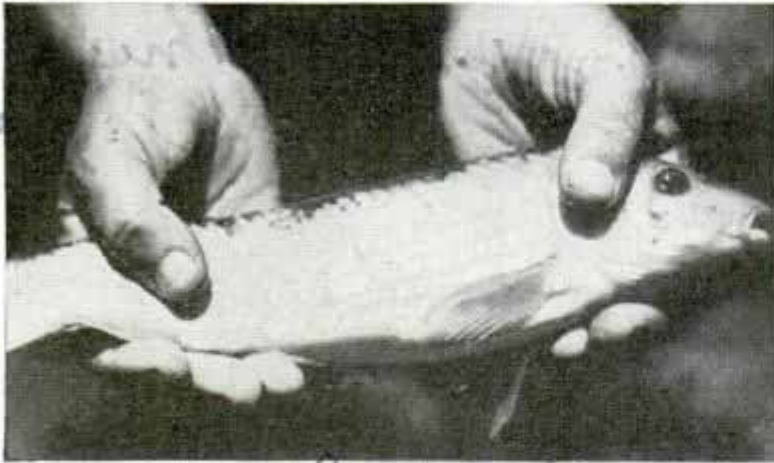
Completely invisible when installed, a door check and closer now being manufactured is mortised into the door frame like a lock. Thus it is particularly desirable where appearance is an important factor, and is also useful where there is no frame head. Various spring capacities are available, interchangeable with the same mortise. It permits a full 180-degree opening of the door.

*Russell & Erwin
New Britain*

*no agent demand
T 584.
Munich
Germany*

*Newton, Mass. 747 Atlantic
one - 33*

Bottle-Fed Goldfish Learns to Perform Stunts



acme

"Rastus" is one fish that doesn't mind an airing now and then. The pet goldfish of L. S. Swain of Gladesville, Australia, "Rastus" has been taught to drink milk from a bottle like a baby, and has learned to perform several remarkable tricks. It apparently enjoys being taken out of the water occasionally, and comes to the surface at the call of Mr. Swain's voice. When his owner makes a circle of his two hands, "Rastus" will leap through the opening like a circus performer.



Educated goldfish taking airing in owner's hands, jumping through loop formed by fingers and drinking milk from nipple

Detector Tells of Poison Gas by Change in Liquid Color

M. Kling, Director, Chemical Laboratory

Quick warning of the presence of poison gas in the air is given by the discoloration of liquids in a chemical gas detector invented in France. In the event of an air raid at Paris, in wartime, the changing color of the liquids would tell instantly if gas bombs were exploded, and residents hiding in gasproof refuges could use the apparatus to determine when it was safe to emerge. The inventor is M. Kling, director of the chemical laboratory of the Paris police.



Any change in color of liquid in this apparatus is warning of dangerous gas in atmosphere

Chimney Swift Helps Steeplejack by Carrying Line up Stack

When other steeplejacks were baffled by inability to get a line to the top of a 100-foot smokestack that was to be painted, A. B. Cospers of Anniston, Ala., enlisted a chimney swift as special assistant. Cap-

F603
Mr. Kling, Director, Chemical Laboratory, Paris Police Dept.

Paris Police Dept.

F570

Dr. Cary S. Snyder, Director, Staten Island Zoo
 Russell Pape, Asst. Reptile Curator
 American Museum of Natural History

F462



The BRAINSTORM

THE Brainstorm Boys—that's what radio announcers and engineers call the Public Events and Special Features departments of the broadcasting chains.

Because they handle the big news breaks and special programs, these departments must be made up of men who can think on their feet. Their work is the most exciting in radio. The whole world is their studio.

No distance is too far, no obstacle too large, or danger too great in securing a program that will please listeners. Eyewitness accounts of federal agents surrounding a gangster lair; word pictures of stratosphere flights, dust storms, floods and fires—these are but a few of the programs being brought to the radio audience to provide thrills.

Unexpected developments arise on special assignments. According to Paul W. White, director of Columbia's "brainstormers," his staff installed equipment in Madison Square Garden, New York, to broadcast a protest meeting of 25,000 socialists against communistic activities in Vienna.

Five minutes after the announcer had turned the air over to the microphone on the speaker's stand, 5,000 communists stormed the hall and a riot started.



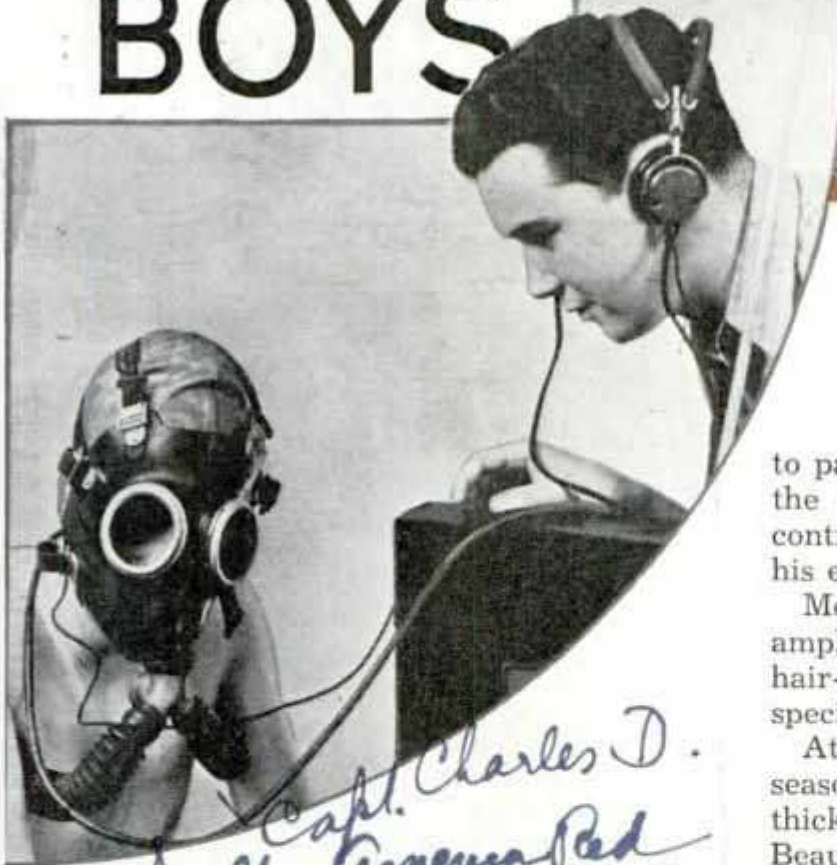
Top, extraction of deadly cobra's venom, a perilous job, goes "on the air" over NBC. Bottom, overboard with the "mike" during a special broadcast

Charles O'Connor

re: James M. Quenny, 25 W. Dartmouth Road, Kansas City, Mo.



BOYS



Top, left, sports announcer broadcasts game from lofty perch. Bottom, NBC engineer wearing experimental masks for broadcast from bottom of harbor while another announcer stands by with pack transmitter. Top, right, a big fish story goes on the air during broadcast from steam trawler "Hehla," off Georges Banks

to pause to rescue his hat and coat, while the engineer, 'cranking the gain' at the controls, was shoving rioters away from his equipment."

Modern broadcasting is filled with examples of resourcefulness, daring and hair-trigger thinking in the origination of special programs.

At the fag end of last year's baseball season, the Oklahoma City team, in the thick of a pennant fight, entrained to Beaumont, Tex., for a crucial series. Baseball interest was at a feverish pitch so WKY's special staff of announcers and engineers went along with the team to send back a play-by-play account of the games over 500 miles of telephone wires to their transmitter in Oklahoma City for a broadcast.

Unexpectedly, however, they found the baseball magnates had made an arrange-

Capt. Charles D. Scully. America Red Cross

"While chairs, planks and bricks were hurled about their heads," said Mr. White, "the engineer and announcer decided to risk injury and put the first broadcast of a riot on the air. After checking with the office in the midst of the deafening yells, the special broadcaster delivered an excellent analysis of the situation. He had



Above, Hal Totten with portable transmitter in truck as he described national corn-husking contest

ment with a rival Oklahoma City station to broadcast the series by means of telegraphic reports. Consequently, the WKY men were not permitted to set up their equipment in the park.

Without giving a second thought to this setback, the WKY crew, with the help of Beaumont newspaper officials, the police and fire departments and a fortunately placed power line pole just outside of the left field fence, made the play-by-play broadcast without so much as paying for a ticket into the game. This was a distinct scoop inasmuch as the station that had been awarded exclusive privileges was sending out telegraphic reports of the play instead of an on-the-spot account.

The setup for this "stratosphere" broadcast was as follows: a ladder was set against the power-line pole and a small perch for the announcer fastened near the top of it. With an eyeshade and a pair of strong field glasses, the air reporter was ready to give a graphic account of the series. The "control room" was set up in a motor car where portable amplifying equipment fed the broadcast to WKY's

transmitter over telephone wires.

A veteran NBC special broadcaster showed rare ingenuity in getting a visiting queen on the air. When he placed a microphone in front of her, she flatly refused to speak. He didn't argue with Her Majesty but a few hours later he wrapped the microphone in a large bouquet before her at a welcoming dinner, and thus picked up every word of her conversation for the



Center, "control room" for game broadcast set up in auto. Bottom, Larry Fisk, remote pickup engineer for Columbia, in action at special broadcast

Al Altier, Chud

radio audience. Behind these broadcasts—both those planned ahead of time and those put on at the eleventh hour—is a strange combination of courage, preparedness, enterprise and luck.

The classic experience in this pulsating work is accredited to Paul Douglas. It was in connection with his eyewitness account of the search for the debris of the "Akron" dirigible upon the storm-tossed Atlantic, and the unanticipated broadcast of the crack-up to the ill-fated blimp "J-2," which was on its way to the scene of the first disaster.

Douglas was awakened at 5:00 a.m. and told to report immediately to the Long Island airport. Henry Grossman, chief of Columbia's field engineering department, piled short-wave receiving and transmitting equipment into a taxi and rushed to meet him.

A rainy gale was blowing and upon their arrival at the airport it was discovered a single-motored land job was the only plane available. It was Grossman's intention to direct the pilot first to Atlantic City where they would drop a short-wave receiving set to a waiting engineer. However, the plane was too heavily laden to take off so they had to leave behind the auxiliary short-wave equipment.

Flying over New York with a dangerously low ceiling, the ship headed toward the Jersey coast. En route, they witnessed the second disaster of that tragic day. Beneath the plane in which the broadcasters were flying, the blimp "J-2" blew up. The crippled gondola and torn fabric crashed into the sea, and so Douglas, upon landing at Atlantic City, rushed to the Columbia transmitter there to deliver a hasty account of the crash of the "J-2."

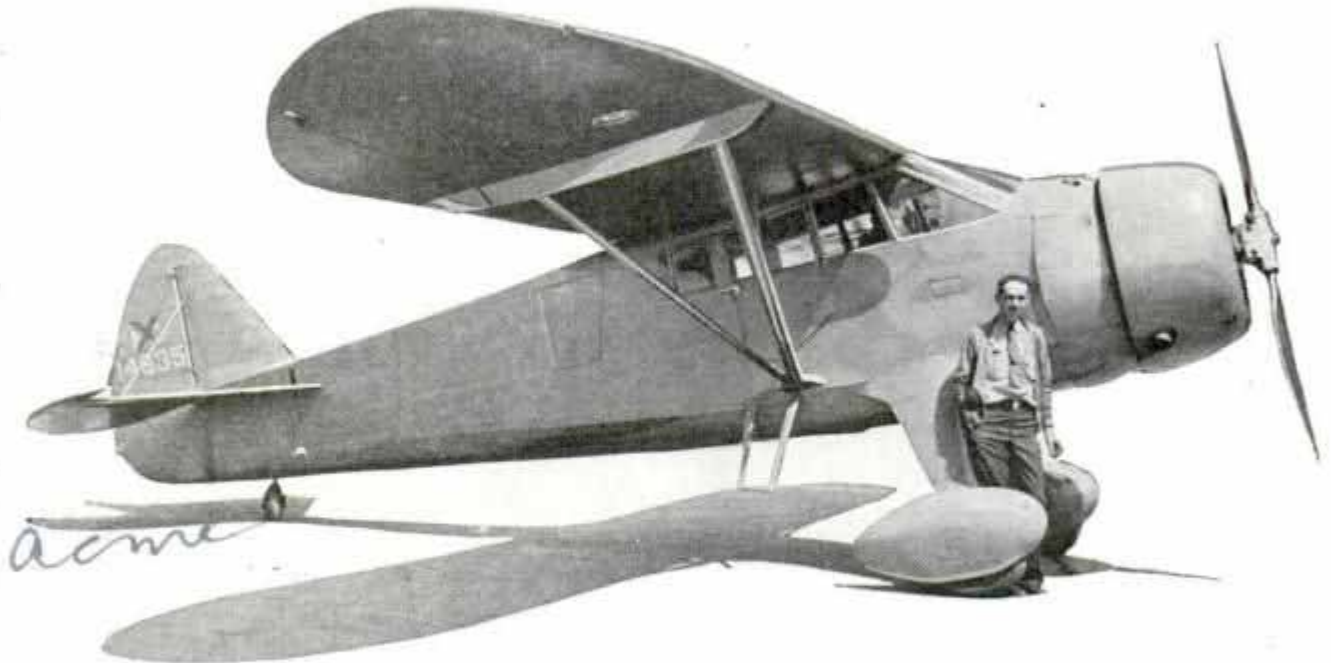
While the plane was being refueled, the short-wave receiving set was unloaded and delivered to

(Continued to page 124A)



Top, Quin Ryan of WGN interviews a lion. Center, a novelty broadcast in Chinese telephone exchange in San Francisco. Bottom, in control room during broadcast of fleet's arrival

Four-Place Plane Flies Faster on Less Power



This trim craft, designed for sports or utility, uses less horsepower to attain a speed of nearly 200 miles per hour. Its comfortable cabin has places for four passengers and baggage space is provided

Fifty to seventy miles an hour faster than similar size ships, a new four-place plane requires only 205 horsepower while cruising at 198 miles per hour at 12,500 feet. Other planes with this performance have engines with twice the horsepower. Its wing span is thirty-eight feet and the fuselage is twenty-five feet eight inches

long. The plane is powered with a new series nine-cylinder engine which develops 350 horsepower for the takeoff. In addition to the four passengers, the ship carries 120 pounds of baggage. The motor is completely cowled and a controllable pitch propeller is standard equipment. Cruising range is 1,000 miles.

Skill of Auto Driver Tested by Reaction to Road Picture

see April 1937-592



Motorist proves ability to handle car by reaction to moving picture simulating road conditions

How quickly a driver reacts to stop signs and obstacles on the highway is given a practical test by a moving picture which depicts actual road conditions. The motorist sits in a regulation automobile seat and operates the brake pedal and steering wheel as he would under ordinary circumstances. But he faces a moving picture simulating a road trip, and his reactions to the pictured hazards are recorded on instruments.

Number of Feathers on a Bird Varies According to Season

By actual count, the feathers in a bird's coat vary in number at different seasons. Dr. Alexander Wetmore, assistant secretary of the Smithsonian Institution, by laboriously counting the feathers of birds at various times of year found the number

Harvard University, Cambridge, Mass.

30 Rockefeller Plaza

Info from D.C.

in New York museum Washington, D.C. & elsewhere and

declines steadily from early spring until the end of summer. Then the bird acquires its new "suit," good for a year. Most of the new feathers come in at once, but some are added with colder weather. Birds that migrate south early, however, grow their complete new outfit before they travel.

865 N. Saigam
F611.
Handy Tool Cuts New Tread on Smooth Tire

Treads can be cut on smooth tires with an electric regroover which uses seventy-five watt, 110 to 120-volt current, alternating or direct. The blade is adjustable to any depth from one-thirty-second to one-half inch. The cutters are ground to razor-edge keenness. A pressure knob on the end of the handle makes the tool easy to operate. Regrooving a tire takes only a few minutes.



Handy tool plugs into nearest socket and regrooves tires with worn tread

7620
Water Skis Give Rider Thrill on Crest of Towboat's Wake



© Pictures, Inc.
French swimmer executes a neat turn behind a motorboat on the River Seine at Paris, his water skis riding a crest of the swell

Surf riding on water skis is the latest sport for swimmers seeking a thrill. Instead of poising on a single aquaplane, the rider is towed on two skis slightly wider than those used in winter sports. The nautical skis were introduced at Paris by a French swimmer who glided behind a powerboat on the Seine, clinging to a single towrope.

7650
Bullet of Light Shot from Pistol Frightens Intruder Away

Signal
Pistols that fire a bullet of light—the "Very" light that blazed over the lines at night during the world war—are being used to protect homes and farms against intruders. Prowlers take to their heels when the Very light, as bright as noonday, bursts overhead. One woman hearing a burglar in her home frightened him away by firing her Very pistol into the sky, and in the intense light she was able to identify the criminal. It is a protection, too, against wild animals invading ranches. The pistol shoots a light shell which bursts 250 feet in the air.

W. J. Sedgley, Inc.
P.O. Box 114, Phil...

Outboard Record Pushed Up to Seventy-Five



Top, the speedster on record-breaking run. Bottom, lowering the craft to the water. Note the big outboard motor

Barely skimming the surface in his bouncing outboard motorboat, Jean Dupuy set a new world's record of seventy-five miles per hour for that type of craft. The hull was designed by the driver and was fitted with a 105-horsepower engine. The record run was made on the Seine river near Suresnes, France. J. B. Coleman of the United States had held the record until Dupuy established the new mark for outboard drivers.

Electricity Does Work of Man for Five Cents a Day

What the average farm hand can do in a month, an electric motor will do for about \$1.30 worth of current. Tests have demonstrated that the average person cannot work at a rate of more than one-eighth horsepower through an eight-hour day, or a total of one-horsepower hour of work. That much effort will lift forty tons of hay to a loft twenty feet up; shell five bushels of corn, or churn 100 pounds of butter. A small motor would do any of those chores for five cents, at a nickel per kilowatt-hour.

(Names and addresses of manufacturers and dealers in articles described in this magazine will be furnished by our Bureau of Information upon request accompanied by stamped, self-addressed envelope.



Chemist Mows Cotton Like Hay and Digests It in Vats

Chemistry may put an end to the romantic traditions of southern cotton plantations. Instead of gangs of negro cotton pickers moving through the fields singing plantation melodies, the future may see mechanical reapers mowing densely planted acres of cotton, stalks and all. Rather than picking the bolls by hand or machine, Dr. Frank K. Cameron of the University of North Carolina proposes growing cotton like hay, harvesting the entire plant,

Chapel Hill N.C.

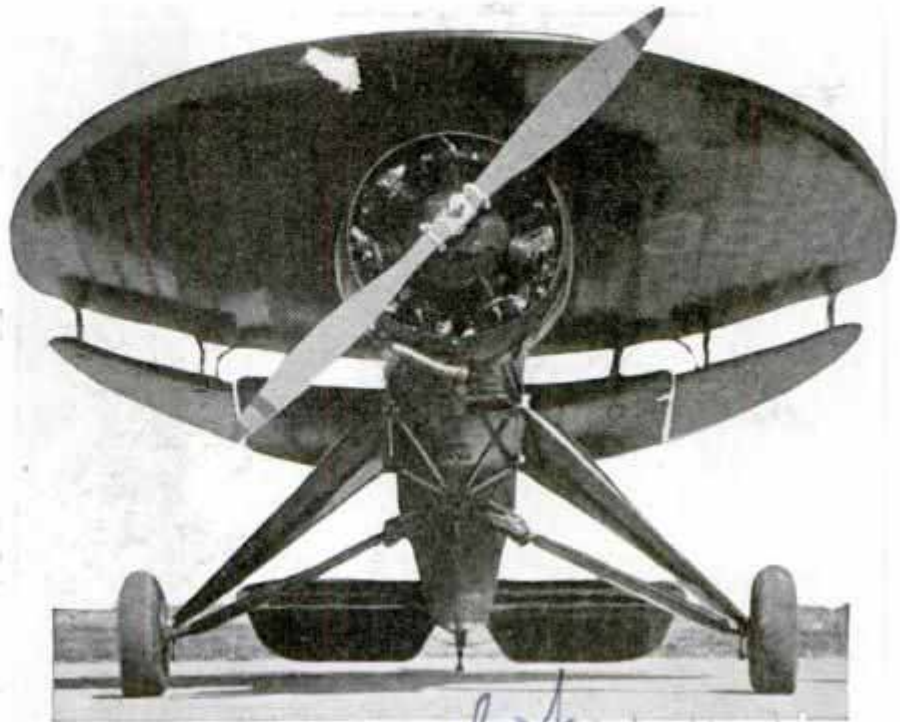
7598.
son of Madame Paul Dupuy
owner of record, Paris, France.
Bullein Co
2248
Schenectady, NY

7562

grinding it to powder, then treating it chemically. First the oil would be extracted, then both cotton and stalks would be digested into alpha cellulose, base material for making rayon and other cellulose products. After several years of experiments with this method, Dr. Cameron believes it holds the solution of problems confronting the cotton planters in the southern hill country where tractors and mechanical cotton pickers cannot be used.

no further information

'Flying Pancake' Found Safe from Sideslip and Tailspin



clark
This craft caused a laugh on first appearance, but its performance was startling, due to its high safety factor.

F521

Electrical Map Aids Pupil in Geography

Students at an English school "plug in" for their geography lessons, using an electric map instead of the conventional globe. The map is covered with electrical sockets. Plugging into the proper socket causes one of the glass frames around the map to light and show various details of the country selected. The map also shows the students the districts from which different products of the world come.

at Glenville Ill.

Somewhat resembling a giant pancake, an odd-looking plane tested recently offers unusual safety. Repeated maneuvers by the pilot failed to throw the craft into a sideslip or a tailspin and the tests showed other factors of airworthiness unusual to the small plane. A circular compound wing of radical design is the cause of the ship's odd appearance.



F605

Insulating Wall of House Saves Sixteen Degrees

Ill. Havana, Ill.

Insulation of the outside wall of a house can save sixteen degrees or more of heat as compared with the house lacking insulation. On an eight-below-zero day, with indoor air temperature at seventy-two degrees, the temperature of the wall of an average frame house would be about sixty degrees; on the windy side of the house the wall might be only fifty-two degrees. If the same wall is heat insulated, its inside temperature would drop only to sixty-eight degrees.

© Fox Photos
A light flashes when the pupil plugs in on the proper hole to answer a question in geography class

clark
W. J. Harvick
Prof. A. P. Kratz

Crotone on Hudson near York

Growing Trees Changed to Fit the Season

Visitors to Rockefeller Center in New York have been puzzled by the trees in the sunken plaza. At Christmas, the trees were evergreens, in the spring they were apple or pear trees, during midsummer they were maples and in the fall another variety. No matter what the season the trees appeared to be the kind suitable to the occasion. The secret is that these trees are changed frequently. With roots and native soil wrapped carefully in burlap, they are transported by truck from a distant nursery. Some are in full bloom or foliage. In the plaza, the trees are set up, the bases being placed on wooden framework and braced. Then the base is concealed in a wooden box. Thus, regardless of the season of the year, the visitor



Workmen at their task of changing trees to suit the season. Note how tree roots are concealed by the boxlike frames

to the sunken plaza always sees an attractive group of trees, growing as though they had been planted there years before.

Boatman Wears Gas Mask for Voyage through Sewer



Dressed as though starting on a voyage through the infernal regions, this boatman is merely prepared for any emergency during an inspection trip through a Los Angeles sewer. He wears a gas mask and helmet equipped with a lamp, and has a radio set to keep in touch with the world above. The navigator is Ruben F. Brown, assistant superintendent of sewer maintenance, and his duty requires a six-mile voyage to determine the condition of the sewer walls.

When you're touring six miles of Los Angeles sewer you must be dressed for the occasion

acme

F 394

ADVENTURES of the

Cont. Charles Morrow Wilson
(1) Charles St. Henshaw



Above, most of our vegetables and fruits are immigrants from foreign lands. Left, searching for disease-resistant sugar cane

By Charles Morrow Wilson

YOU have heard much recently of explorers hunting for dangerous beasts and death-dealing reptiles—bold men and women who go to the far corners of the earth and “bring 'em home alive.”

Equally romantic and no less brave are our plant explorers, men and women who roam wild countries in quest of valuable herbs, shrubs and crops that may add

the clothes we wear and an enormous number of other materials which help make our lives happy.

Plant introduction is one of the oldest activities of man, and one of the newest. Knowles A. Ryerson, in charge of the division of foreign plant introduction of the department of agriculture says the first organized expedition for collecting plants was that of a queen of Egypt who about 1,500 B.C. sent ships to the Land of Punt

Explorers

F 39.4

PLANT HUNTERS

to secure and bring home incense trees.

Successful countries and colonies of the world have been made so largely by botany. Java and Ceylon became rich from growing coffee introduced from Arabia, and tea introduced from Siam. Rubber from Brazil has brought wealth to islands of the East Indies. Cotton brought to the United States from North Africa has given us our great export crop. America gave the rest of the world corn and tobacco, but other countries have given us virtually all the great crops which now flourish in the United States. According to the department of agriculture, more than 87,000 new kinds of plants have been imported into America during the past thirty-two years. And American plant hunters, both private citizens and employes of the division of plant introduction, still search far and near for new plant species.

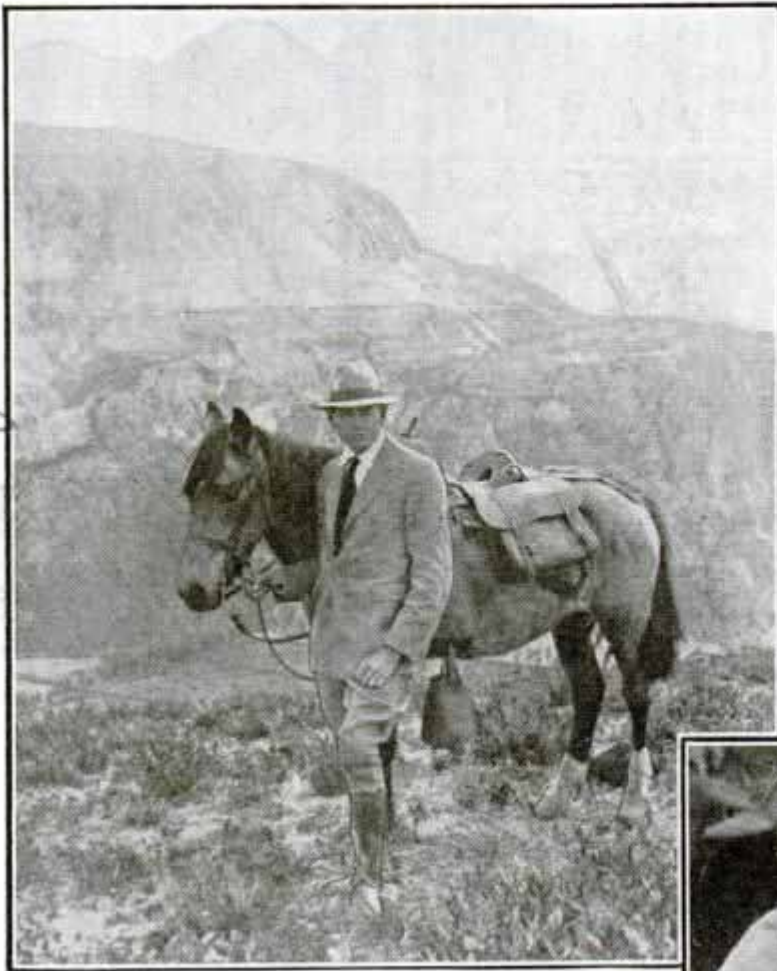
Among recent outstanding plant-hunting expeditions have been the Brandes expedition to New Guinea to gather wild canes for use in breeding a disease-resistant sugar cane; the Beattie expedition to the Orient for the collection of blight-resistant chestnuts, the commercial source of tannin, used in leather goods; the Dorsett-Morse expedition to



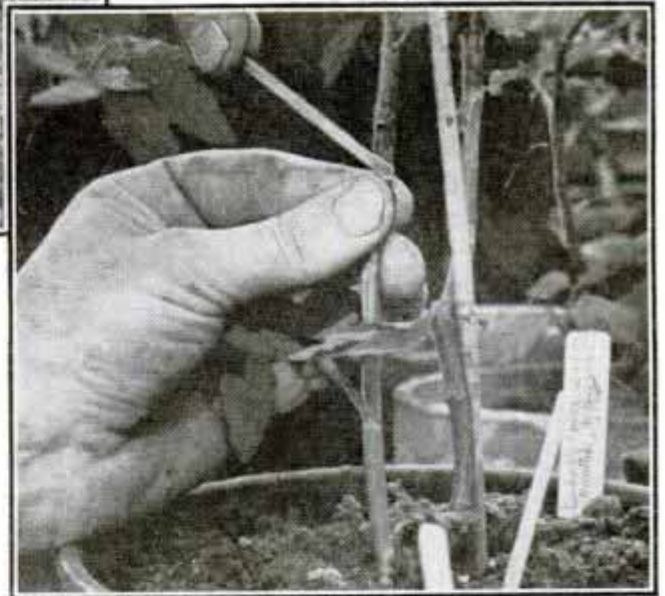
New lettuce introduced from Scandinavia, and donkey and cart used by plant hunters in China to carry supplies

see July 1936. 4th Plant

Wilson Papenoe



ability to transplant a plant to a growing condition resembling that of its native state; knowledge of basic plant species and the patience to wait, cultivate and improve. There are few proven rules in plant adaptation. The best reference literature is a standard botany text, or an authentic guide-book of American plants. You can obtain practical instruction or experience in plant budding, grafting and pollination from the agricultural extension service of your state or the federal department of agriculture. Remember also that plant introduction requires careful tillage and proper soil, water and sunlight.



American plant hunter in Ecuador, and a close-up of the budding operation

the Orient which brought back 4,000 types of soybeans and other legumes; the Ryerson-Alderman-Leslie expedition to Manitoba and Saskatchewan for hardy types of apples and plums; the Westover-Whitehouse expedition to Russia, Turkestan and Persia for wilt-resistant alfalfa; the Nixon expedition to Iraq for rain-resistant dates; the Dickson expedition to Russia for rust-resisting wheats; the Ryerson-Westover expedition to Spain and North Africa for citrus and deciduous rootstocks, and the MacMillan-Erlanson expedition to Mexico, Peru, Bolivia and Chile for tuber-bearing Solanums for use in developing disease-resistant varieties of potatoes.

Yet there is always a chance that the greatest of all plant hunters may be the person who performs exploration in his own community. He may locate a native herb or shrub which with proper care and development may become a great crop of tomorrow. Joel P. Wilson, an amateur botanist of ~~Landon, Miss.~~ Landon, Miss., developed a native oak acorn with virtually the identical flavor and nutritive value of a fine pecan.

Successful plant hunting requires no expensive equipment. It does require the

Plant hunting and adaptation to the field or garden bring a challenge to the home mechanic interested in providing the best means for germinating seed, placing or covering roots and bulbs and offering shade and moisture similar to the native conditions of the plant. Forest flowers or herbs usually require slatted or ventilated coverings. Swamp plants need suitable watering devices. Plants liking acid or nonacid soils require duplication of these native conditions.

One of the hardest chores is to protect the newcomer from insect enemies or diseases of neighboring plants and to protect

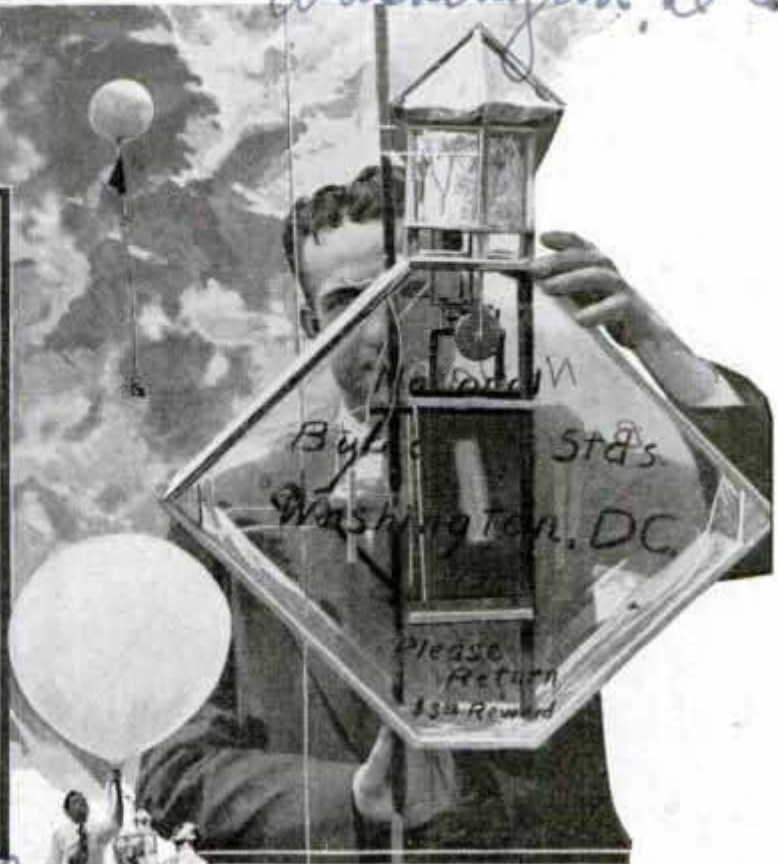
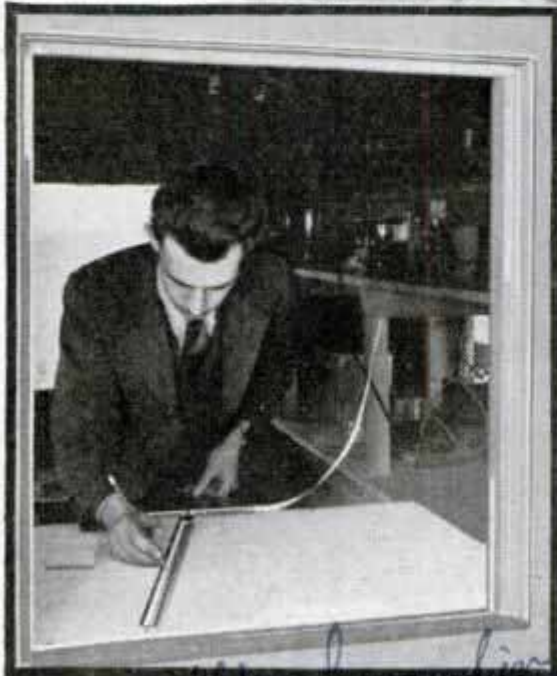
(Continued to page 118A)

P. O. I. Wilson, Miss.

Robot Weather Observer Scouts Upper Air

7 656

Smith Arlington Hall
Benjamin Franklin Station
Washington, D.C.



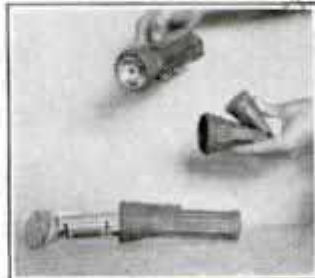
Sending up the radio-transmitting balloon. Right, closeup of the weather recording and transmitting apparatus, enclosed in Cellophane. Left, tape records signals from the robot weather observer

That the U. S. weather bureau soon may be able to send robot observers into the upper air is the outlook as the result of a recent experiment. A new device, called a radiometeorograph, was carried far into the stratosphere by a sounding balloon. Equipped with two sensitive elements which reacted to changes in temperature and pressure, the device automatically relayed weather data by radio to properly tuned receivers. The whole device was inclosed in Cellophane. On the ground the signals from the midget transmitter were picked up and tape-punching mechanism produced a record in the form of ticker tape. The spacing between perforations on the tape, which corresponded to the signals, was measured by a special device and the temperature and pressure at different levels were calculated from the measurements. By the same process was determined the elevation of the instrument. Sounding balloons of the type used in the experiment usually rise fifteen to twenty miles before they burst. A small parachute could be used to break the radiometeorograph's fall. In addition to rising to heights at present im-

possible for the airplane and the man-carrying balloon, the device would flash immediate weather reports, eliminating the delay encountered with small free balloons and recording instruments.

Waterproof Flashlight Is Made in Flexible Rubber Case

For work under water or in damp or dusty conditions, a waterproof flashlight is being manufactured. Its case is of flexible rubber with only one opening at the spotlight end. This end is of unbreakable glass fitted, airtight, into the rubber case. The buttons for turning the light on and off are molded in the rubber.



William M. Linnell

222 S. Lake Ave

Giant Zeppelin Launches U. S.-Germany Line

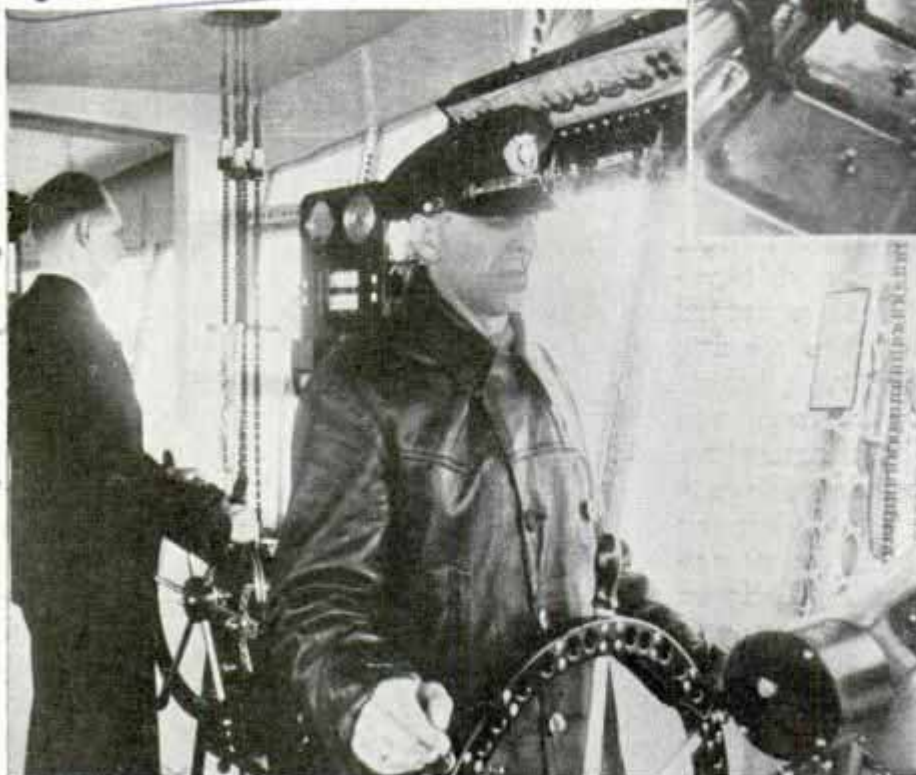


Inaugurating commercial air service between the United States and Germany, the giant German zeppelin, "Hindenburg," accomplished the maiden round trip in approximately 110 hours, crossing to Lakehurst, N. J., in a little under sixty-two hours and returning to its home airport in slightly more than forty-nine hours. Several flights have been

Top, sunrise above the clouds, as it appeared through the eye of Sir Hubert Wilkins' camera from a window of the "Hindenburg's" gondola. Note whirring propellers and the waters of the Atlantic far below. Right, unusual picture made inside the motor gondola shows mechanic watching one of the giant motors. Bottom, pilot at the wheel watches the compass as the great ship soars over the Atlantic



© International News



planned for the summer. Fifty passengers can be accommodated comfortably in the 813-foot ship. Four Diesel motors propel the great craft at a top speed of about ninety miles per hour, using some fifteen thousand gallons of oil for the transatlantic trip of about 3,000 miles. The motors develop 4,200 horsepower. Al-

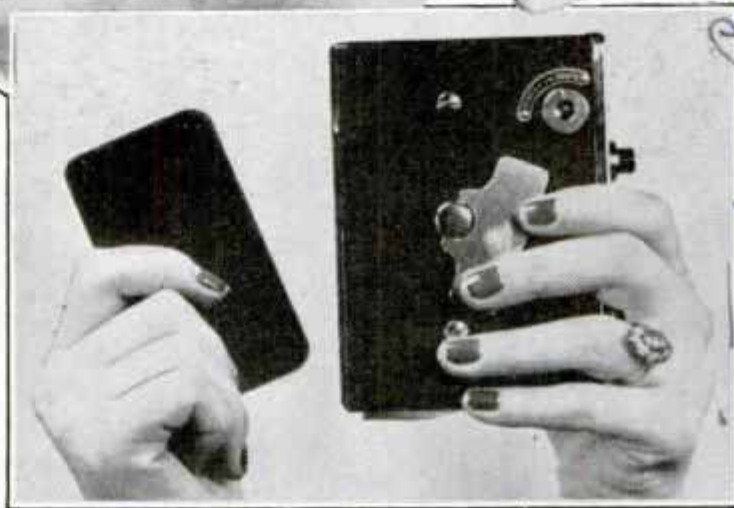
and what for 550

STANDARD...
 1000...
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though the great gas cells are filled with the highly inflammable hydrogen, passengers are permitted to smoke in certain carefully restricted parts of the passenger compartment. A radio station aboard the ship handles weather reports, news dispatches and messages for passengers. Unusual accommodations are provided for the passengers, a large observation promenade, comfortable cabins and dining saloon being among the features. Round-trip fare on the maiden voyage was \$720.

Movies or Snapshots Filmed by Triple-Action Camera

\$5.00 retail



Top, the three-way camera and "movie book" that simulates motion picture when thumbed over. Below, inserting film magazine into camera

Carburetor Adapts Auto to Run on Oil

For converting the gasoline-powered automobile into an oil burner, a centrifugal carburetor has been introduced in Germany. It permits the use of heavy oil, which is much cheaper than gasoline, without alteration of the engine. The carburetor operates like a turbine, spraying the oil in vapor form into the cylinders.

#608

Movies for your home projector, snapshots for your album, or a "movie book" of action pictures—all three are in the repertoire of an inexpensive camera for amateurs. It can make regulation sixteen-millimeter motion pictures to be shown on a screen, or movie books which give the impression of action when thumbed through rapidly. By a turn of the starting button it can be converted into a still camera taking forty vest-pocket size snapshots. It is a magazine-loading model requiring no threading of film. Three lens apertures are provided, with universal focus.



Carburetor for converting auto to oil burner is shown attached to motor

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information will be furnished by our Bureau of Information upon request, accompanied by stamped envelope.

roll sagent

Rungel & Lutz

121 W. 17th St. Manhattan, N.Y. Camera Corp. U.S. 2nd. New York.

F 435 Tent. Von Lenger, & ...
33 & Wash
Chicago

CAMPING in COMFORT



Top, right, table made of cut poles and bark. Below, right, handy tent with a "front porch"

o/s parts see p. 10
Chicago
Chicago

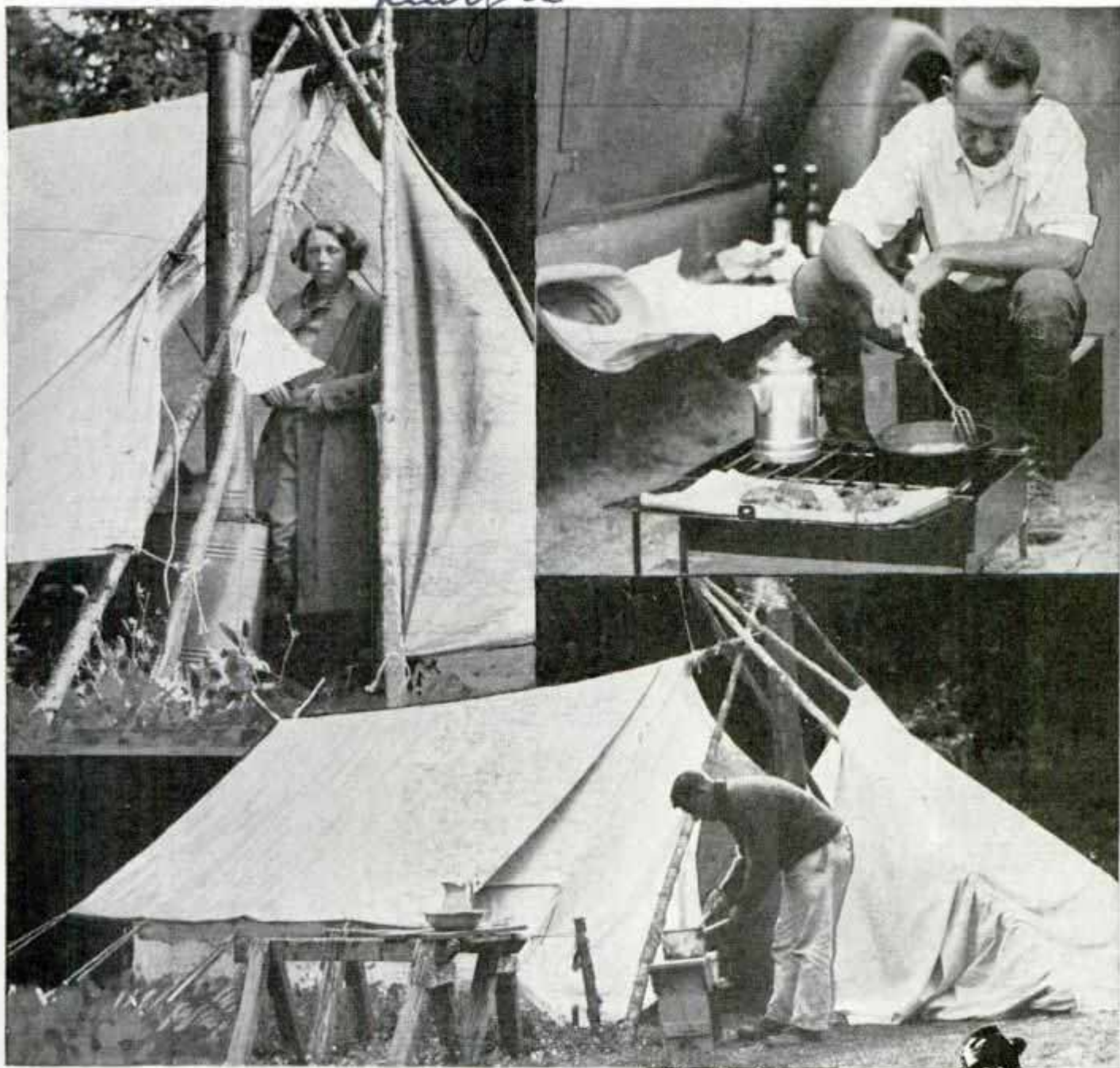
By Bob Becker

CAMPING attracts thousands of new recruits every year. Automobile trailers, inexpensive but roomy and convenient tents, collapsible beds, tricky dining tables, gasoline stoves easy to operate, and other new equipment enable the camper today to get his fun outdoors with a maximum of comfort. There are so many new tricks to the game of living outdoors that you don't need to "rough it" very much.

Here are some suggestions for the person considering a vacation involving camping and cooking outdoors. Although many campers prefer a gas stove with an oven attached, the camper who likes a

wood-burning stove will find a handy outfit available. The top of the stove will accommodate several cooking utensils. Attached to the side is a small oven so you can grill a fish or boil potatoes while the oven is baking hot biscuits. The stove can be folded up in a small space.

For one unaccustomed to cooking over a wood fire, turning out a meal is no easy task. Moreover, at some camp sites it is not always easy to get the right kind of wood. Incidentally, woods vary greatly in their adaptability for cooking. Pine makes a hot, quick fire but a pine fire is apt to burn up everything because the heat is too intense. Hard maple doesn't ignite easily but is ideal when it has



burned to a bed of long-lasting coals. Hemlock bark is excellent. Hickory, slow to ignite, produces an even, hot fire. Tamarack makes a hot, intense flame but elm and poplar are not very good for cooking.

Since the camp cook has his problems with wood, the little gas stove with an oven is a boon to the camper who wants the minimum amount of trouble. The collapsible reflector oven is the standby for the go-light camper. It's also the handy helper of the canoe camper who must save weight. This oven is for use with an open wood fire or a stone fireplace. It doesn't weigh much, folds flat when not in use and will bake biscuits, bannock, a camp pie, or a fish while the rest of the meal is



Wall tents with wood stoves outside. Top, gasoline stove. Bottom, folding oven for use with wood fire.

being prepared. When the camp cook tries for the first time to juggle a number of hot dishes he has a hard time finding anything that will save his fingers. At last the cook has a "weapon" that makes this easy. It is a holder with so many "teeth" it looks like



tent without poles which is ideal for the motor camper. Another has an awning extension in front and a wall at the back. It's inexpensive, too. You can cut some corners on expenses, but a trip can be ruined if the tent is too small or inconvenient to handle.

If there is anything that sends the novice home more tired than when he started, it's trying to sleep on a poor bed. The air mattress and light sleeping bag is best for many camping trips, especially those requiring a fellow to watch the weight of his outfit, but the average camper unused to spending much time outdoors may find it best to buy a light folding bed or cot. They can be fixed up with a mattress and thus equipped

the mouth of a shark. Open its jaws, clamp it on the pot and up it comes. The heavier the weight, the firmer the jaws clamp down.

The old days when campers sat on the ground or a stump to eat are gone for quite inexpensive dining tables now are available. One table folds into a neat box three feet long, fourteen inches wide and about three and one-half inches deep. It can be assembled in less than a minute. The box container becomes the top, it automatically braces itself and at each corner is a little seat.

There are tents for every purse and every size of party. If you are taking the family, get a tent with a "front porch," one of the square "marquee" type with an extension in front. When it rains you can cook under cover. And by taking along an extra tarpaulin to drop from one side of the extension to keep wind and rain from blowing on the cooking operations you can be snug and comfortable regardless of weather. There is a square



Top, wood stove or grill with oven attached. Below, comfortable tent for motor campers. Note the "porch" with side curtains

are quite comfortable. One with bands of metal to support the sleeper is a good bet because the metal serves as springs. It is strong, too, and can be taken down or put up in a hurry. Many veterans use a rubber pillow. Other kinds are so bulky that the rubber inflatable pillow which can be "blown up" in a hurry is a real asset.

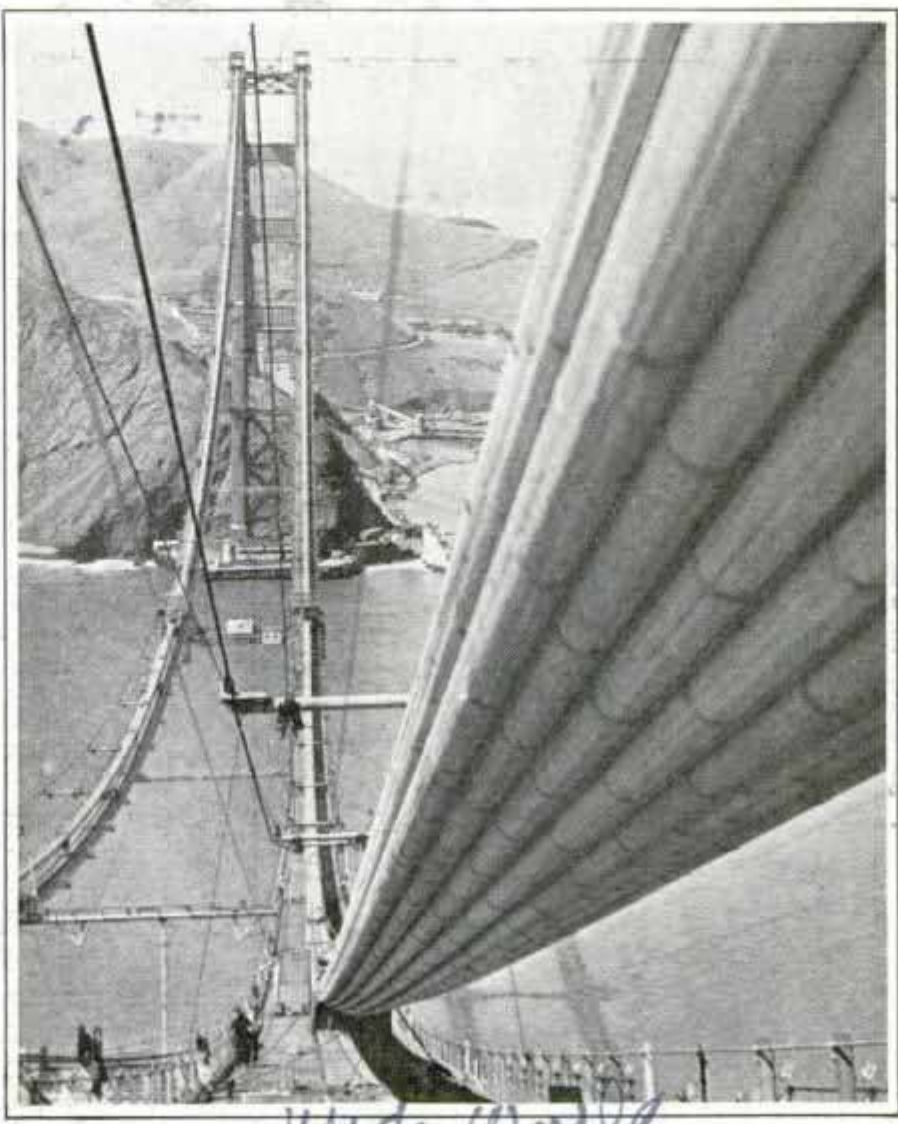
Which shall it be—blankets or sleeping bags? The answer is found in the personal preference and pocketbook of the camper. Some people are uncomfortable when they try to sleep between woolen blankets. So don't forget sheets—if you want them.

Don't forget metal cups, cooking spoons

(Continued to page 134A)

Golden Gate Bridge Hangs on Mighty Rope

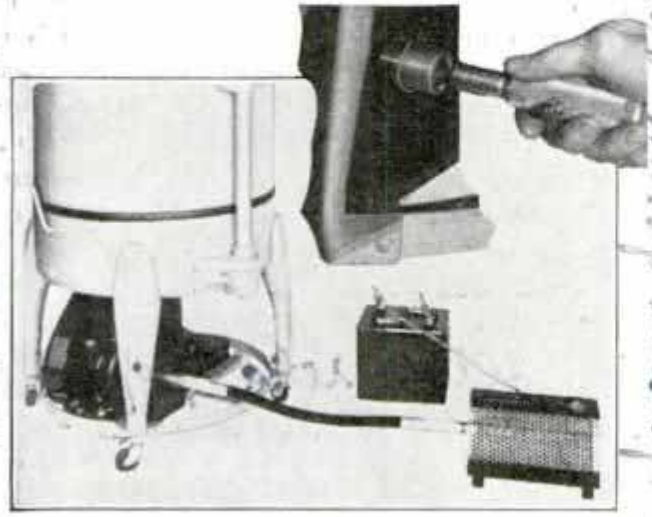
Bound together in a mighty rope as thick as the trunk of a great tree, steel cables 7,700 feet long carry the weight of the Golden Gate bridge which is to link San Francisco and Marin counties, spanning the entrance to San Francisco bay. There are about 27,500 steel wires spun together in bundles to form this mammoth cable, which is thirty-six and one-half inches in diameter.



Some conception of the might of the steel cables supporting the Golden Gate bridge is obtained from this picture

Use Washer Motor to Recharge Battery

Using the excess power of a washing-machine motor, a generator can charge the batteries of your automobile or radio while the weekly family washing goes through the machine. This method is useful and economical where electric current is not available. The generator, delivering ten amperes per hour at six volts, is connected to the gasoline motor of the washer by a flexible shaft.



Flexible shaft on generator plugs into socket on shaft of washer motor to charge battery

Gas Treatment Saves Oranges from Green and Blue Molds

Green and blue molds, destructive enemies of oranges, lemons and other citrus fruits in storage and transit, are being fought with the aid of a gas treatment developed by Dr. L. J. Klotz of the University of California citrus experiment station. The gas is nitrogen trichloride, and comparatively brief exposures to very small quantities of it have proved deadly to the mold fungi, reducing spoilage as much as fifty to seventy-five per cent. Chlorine alone is also effective but it harms the fruit. Experiments have been conducted with other chlorine compounds and some of them offer promise, but as yet are considerably more expensive than the nitrogen trichloride.

Handwritten notes and signatures: 'Midwest', 'Irvine 5/26/36', 'Revere side Calif', and other illegible scribbles.

Electrical Energy of Brain Is Recorded on Tape



Electrical impulses generated in the human brain are measured and recorded by this "meter"

Have you had your brain meter read? A measurable electric current is generated in the human brain, and can be recorded with scientific instruments. Dr. Hallowell Davis of the Harvard medical college faculty demonstrated before a convention of physicians the method of recording on a moving tape the electrical impulses emanating from the brain.

"Electric Chair" Lures Flies to Death on Wires



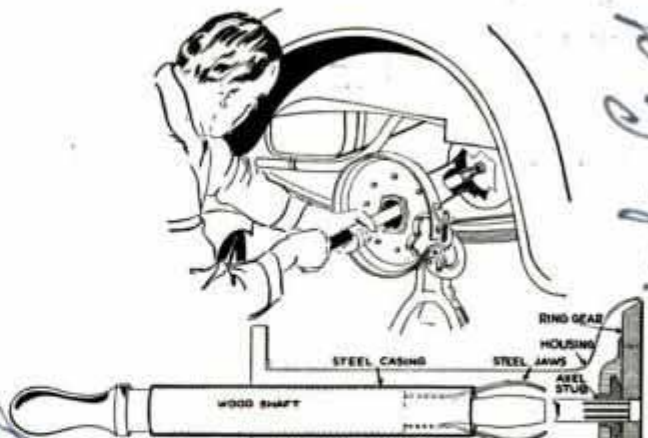
Death in the "electric chair" is the penalty for being a house fly today. What the fly paper and poison dish and fly swatter have done for years, the electric exterminator

nator does more neatly and with equal dispatch. It is a small box with electrically-charged wires stretching across the top, a quarter inch apart, and the moment an insect alights on a wire it is killed.

Stop-and-Go Escalator Moves Only if It Has Passengers

Moving stairways in department stores and elsewhere waste power by running continuously whether or not there are passengers and a method has been found to operate them only when passengers are aboard, the electric eye and a timer solving the problem. With the photoelectric cell and beam it was easy to start the escalator when a passenger stepped aboard, and it was also a simple matter to stop it with another eye when the passenger stepped off, but if several passengers were riding, the stairway would stop by this method as soon as the first stepped off. So a timing device is used instead. It was found, for instance, that a certain stairway required thirty seconds for its ascent, so the electric eye was placed at the bottom and connected to a timer which operated the stairway for thirty-five seconds. Thus it always stops thirty-five seconds after the last passenger interrupts the beam.

Auto Axle Puller Saves Time on Repairing Breaks



Letter sold 8/10/36 Showing construction of axle puller and the simple manner in which it is used

Designed to pull broken stubs without removing the differential, an inexpensive axle puller saves time and expense on re-

Cambridge Mass. at Army. G. F. 2.25 Hesper Road. Electric Screen Corp.

Alab. S. Fitzgerald Wynnewood Pa. F691 F713 F653 F669 Duo. Calif. American mfg Co of California

7674.

pairing automobile and truck axles. The tool consists of a round wooden handle, squared off at one end to permit attachment of four carbon steel spring jaws. A steel casing is then passed over the jaws and the handle. By moving the casing forward, the jaws are compressed, giving a firm grip on the axle stub.

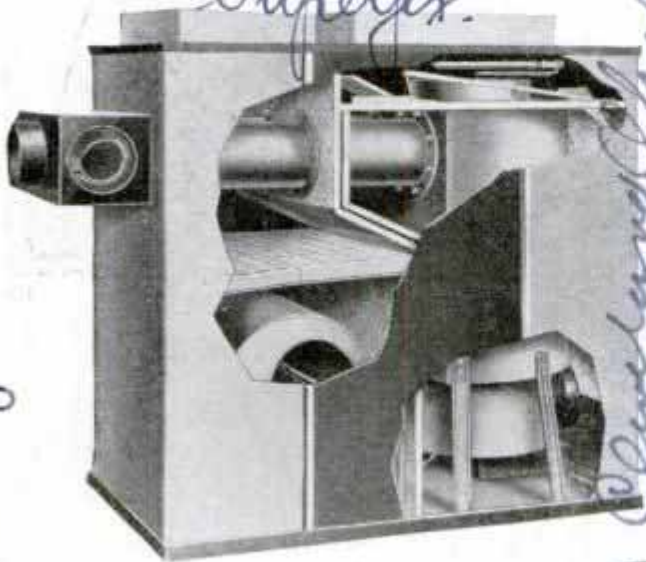
7673

Oil-Burning Heater Operates without Electric Blower

To produce an air-conditioning heating plant which will not be affected by interruption of electric power, one manufacturer has devised an oil burner which can operate with natural draft if the electric blower stops. The fuel is also atomized without electric or mechanical means. Oil is piped into the burner bowl, which contains a certain amount of carbon acting as a wick to absorb the oil and help vaporize it. Radiant heat from the pilot or the main flame changes the oil to vapor. Air reaches the burner through the side walls by natural draft and a blower, but the fire can be kept up with the natural draft alone.

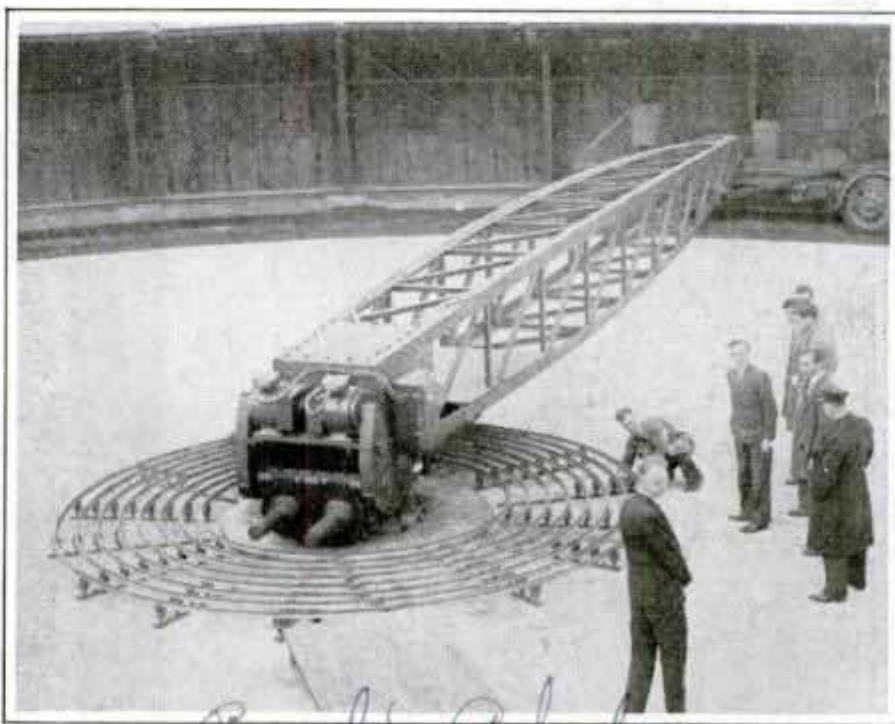
Chicago-6850 & more

Superflex



Cut-away drawing of heating plant which burns oil and can operate without electric blower

Truck Rides "Clock Hand" to Test Highway Pavement



Steel arm revolves clockwise, driving twelve-ton truck around roadway at rim of circle to test highway paving materials

Pauls Photos

Riding 'round and 'round as though on the tip of a giant clock hand, a twelve-ton truck tests paving surfaces for road builders in England. Various surfacing materials are laid on the road around the circumference of the great circle, and the lorry, attached to the long arm extending from the center, is propelled electrically.

7663

Wrench for Pipes Near Wall Has Angle-Set Handle

With its handle set an angle from the jaw, a new wrench is available for use on pipes mounted against the wall. The angle-set handle gives added leverage. An accurate built-in pipe scale on the hook jaw is handy. The wrench may be used also for ordinary work.

Ridge



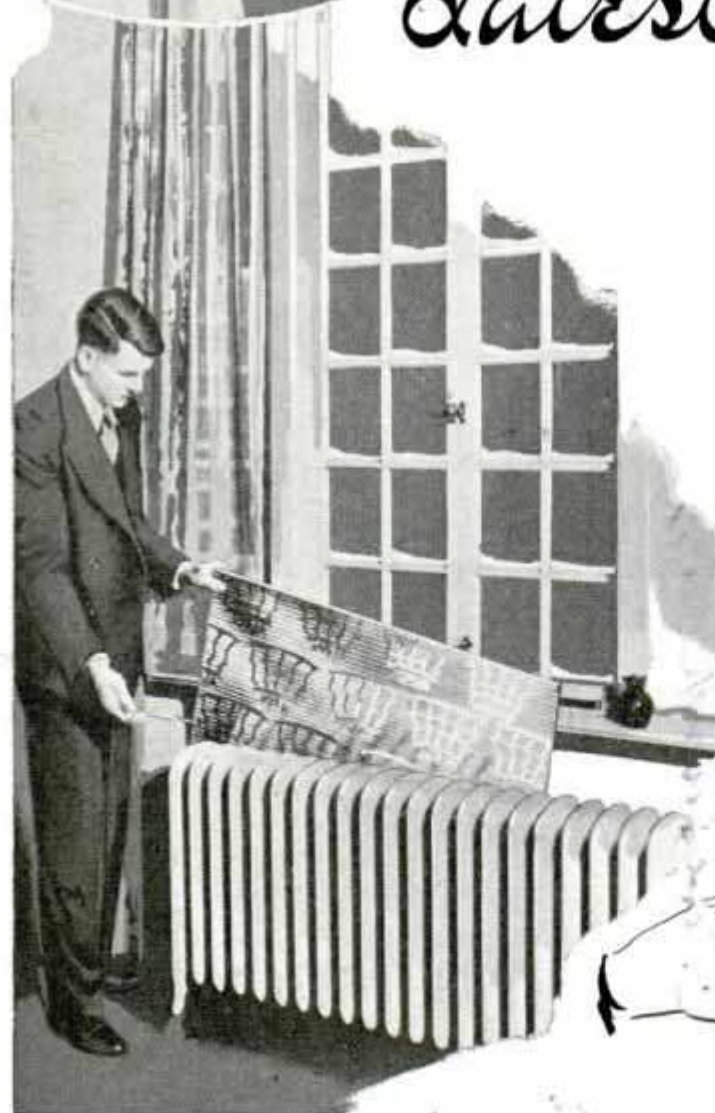
The Ridge Tool Co



Adjustable wire bracket fastened to crib, left, holds baby's bottle. Right, sponge rubber mop cleans upholstery, floors or walls, erasing and picking up dirt

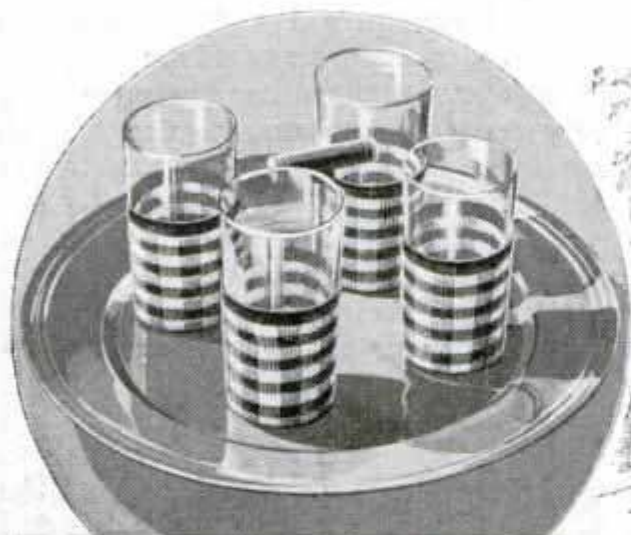


Latest HOME



One way to increase radiator efficiency, shown at left, is to place a screen of aluminum foil between radiator and wall. Intended primarily to reflect heat toward the center of the room and away from the wall, it also protects wall surfaces, drapes and curtains from dirt. The screen is fastened to the radiator, out of sight. A boon to the householder whose duty it is to carve is the roast clamp, below. Locking the tongs around a roast of beef, leg of lamb or baked ham, the host can hold the meat firmly while he carves





Knitted jersey "sweaters" for beverage glasses serve the dual purpose of keeping the fingers dry and avoiding stains on the table. Besides, they are attractive and colorful



ACCESSORIES

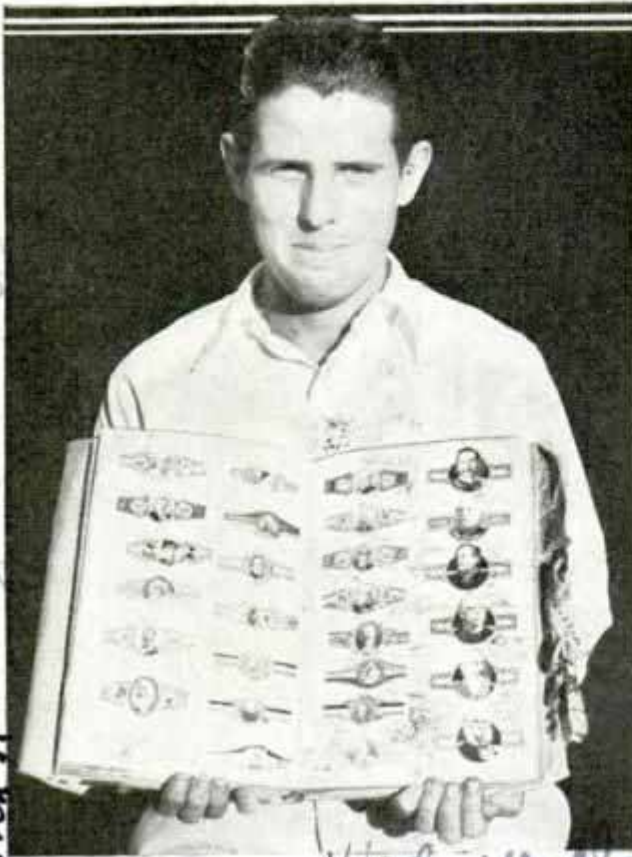
Window washing can be made safe and comfortable. At the right is a sturdy metal seat which is securely attached inside the window by clamp hooks. Its high back is an added safeguard. The chair folds flat when not in use. Below, rubber caps of various sizes form an air-tight seal for bottles in the refrigerator or the traveling case



For stormy weather afloat, there's a non-tipping holder, below, for your cocktail glass. Let the boat wallow as it may, the tumbler "floats" upright



Cigar Bands Offer Collector Latest Idea for Hobby

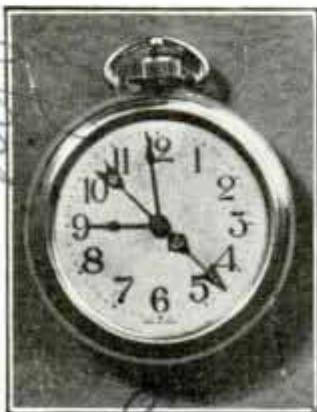


Exhibiting a variation of stamp collecting. These are bands removed from cigars

Something new to collect is exhibited by a California boy who has 3,000 cigar bands. The collection was started thirty years ago by a relative and some of the bands are from cigars no longer made.

Watch and Solar Compass in Single Instrument

Means of detecting time and direction are incorporated into the same instrument which does not depend upon magnetism in serving as a compass. The device performs the service of a watch in the usual manner. As a solar compass, its hands are set at the proper time for the particular location in which it is to be used and no further setting is necessary as long as



forms the service of a watch in the usual manner. As a solar compass, its hands are set at the proper time for the particular location in which it is to be used and no further setting is necessary as long as

the watch runs properly. There are two forms, one requiring no gears for the compass to operate, the other having a gear arrangement. Both forms require that the hour hand of the watch be pointed in the direction of the sun, whereupon the instrument indicates north and the direction in which the user is traveling. Operation is automatic. The instrument is constructed on the principle of proper correlation of the correct position of the hour hand, the position of the visible sun and the earthly longitude of the observer and the instrument. When clouds conceal the sun, the method known to woodsmen and boy scouts is employed. The observer holds the point of his knife blade upright upon a horizontal sheet of white paper or upon his thumbnail and slowly turns around in his tracks in a clearing. As he turns, the knife and paper are held still. Eventually he will find a place where the knife blade casts a more distinct shadow. Then, while standing still, he slowly rotates the knife blade until he brings the knife-blade shadow to its narrowest and sharpest point. At that position, the observer, the plane of the knife blade and the sun are in line and the observer is facing the sun.

Tiny Three-Dollar Auto Is Run by Washing-Machine Motor



One-half horsepower motor drives this baby auto eighty miles on a gallon of gasoline

At a cost of just three dollars a Rockville, Md., boy built himself a midget automobile that runs eighty miles on a gallon of gasoline at a speed of ten miles an hour. It is powered by a one-half horsepower washing-machine motor.

Ames - Carl Rogers, Leo
237 W. 45th St. - Pasadena, Calif.

F686
2082462
Plattburgh, N.Y.

F696
Photo from J. J. Orbelman, 50th Ave., New York

Ernest D. Bean

Hamprey Cisel

*Misses Radio Supply Co.
2815 W. 19th, Chicago*



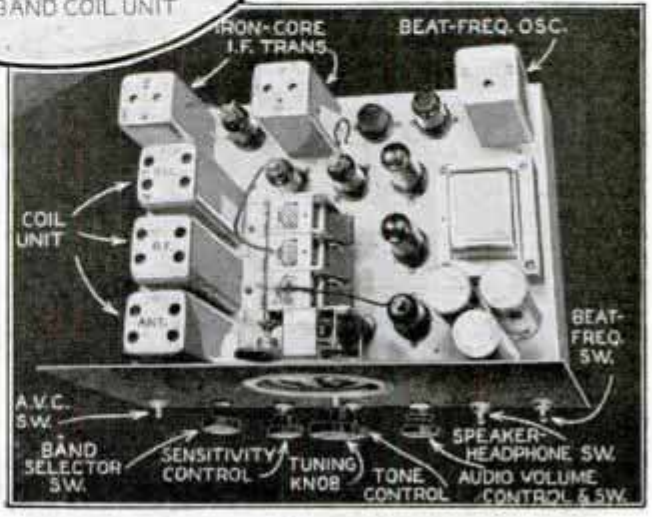
ALL-WAVE "8" WITH METAL TUBES

EIGHT metal tubes are used in this four-band kit set which is designed for home assembly. Although the circuit is of advanced type, the complicated coil-switching unit is factory wired, balanced and adjusted so that any amateur experimenter with few tools can complete the receiver.

The metal base and front panel are drilled for mounting the various parts which include a built-in power supply. This compact chassis may be installed in your old console or housed in a table cabinet if preferred.

A close-up view of the 4-band coil unit, with the shielding removed from one side to show the pre-balanced coil and switching arrangement, appears in the insert photo. The completed set is shown in the photo at lower right.

Outstanding features include iron-core i.f. transformers, for super-selectivity and gain; beat-frequency oscillator, for ease in locating foreign stations; automatic volume control and switch for speaker or phones. Complete wiring plans are included with the foundation kit of parts.



B-ELIMINATOR

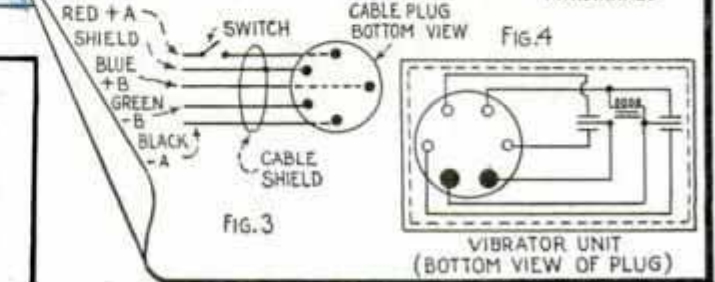
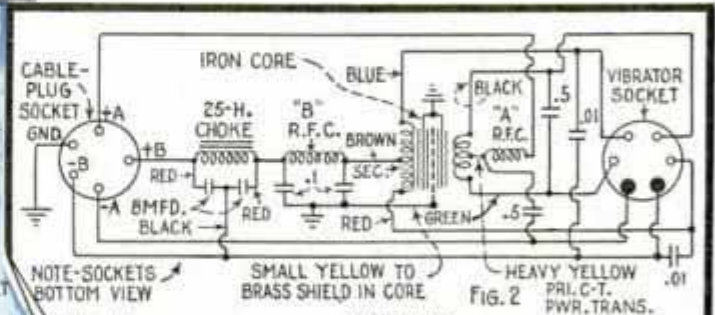
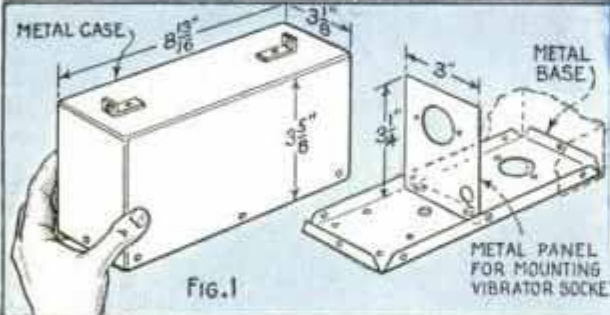
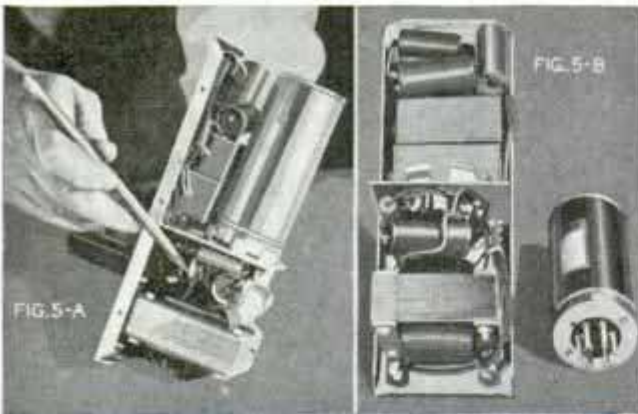
Operates from

By M. N. Beitman



ANYONE can build this inexpensive vibrator-type B-power unit and use it to replace regular B-batteries in any battery-operated receiver that employs a 6-volt storage A-battery, and does not require more than 135 volts at 42 milliamperes. This rating is ample for the proper operation of most battery-type broadcast sets now in use on farms and other locations remote from power lines.

Operating direct from the 6-volt storage battery, it provides a constant source of B-voltage with unusually trouble-free long life. With this unit, and a wind-driven battery charger, your receiver is always ready for continuous operation although you may live many miles from the nearest power line. The heart of the B-eliminator is a plug-in type, dual action, synchronous vibrator. This easily replaceable unit interrupts the 6-volt direct current from the storage battery and also rectifies the high-voltage output obtained from the built-in step-up transformer.



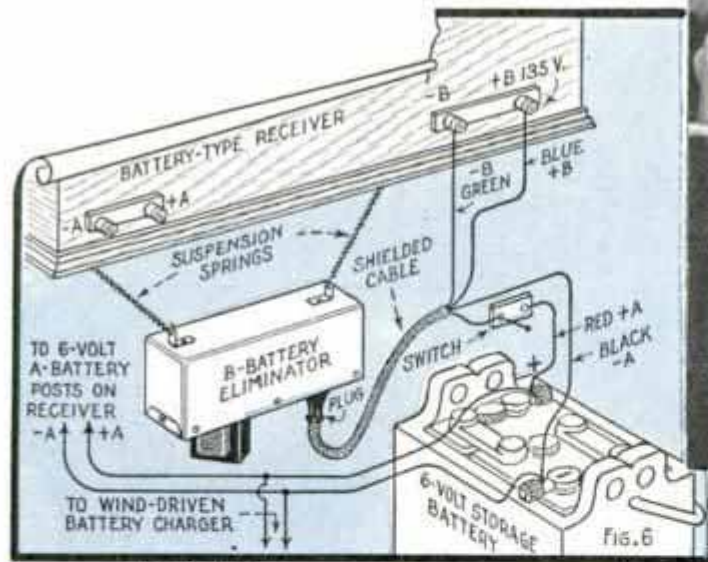
OUTSTANDING FEATURES

Long-life trouble-free operation from ordinary six-volt storage battery; replaceable plug-in type dual-action synchronous vibrator; low cost; easy to build and economical to operate; brings old-type battery sets up to date

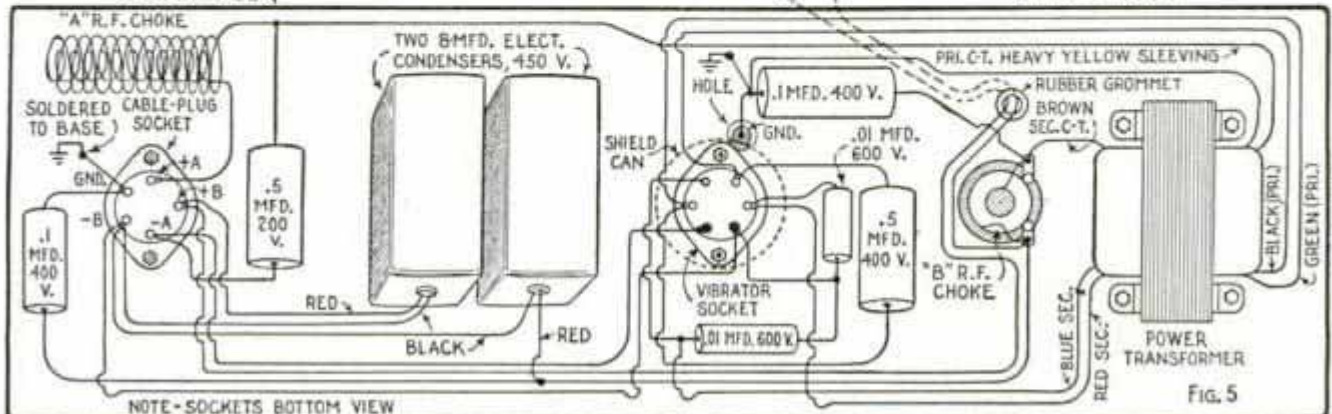
SIX-VOLT STORAGE BATTERY

The entire eliminator is based on a standard tested circuit, completely shielded to prevent noise caused by radio-frequency radiation. In order to obtain maximum efficiency, it is important that the various parts be assembled just as shown in the photos and diagrams. The metal case, base and vibrator socket-mounting panel are detailed in

(Continued to page 140A)



SIDE OF CASE



NOTE-SOCKETS BOTTOM VIEW



25-HENRY 60-MA. CHOKE (ON TOP OF BASE)

Two-Tube Capacity-Operated Burglar Alarm

By Lewis Winner



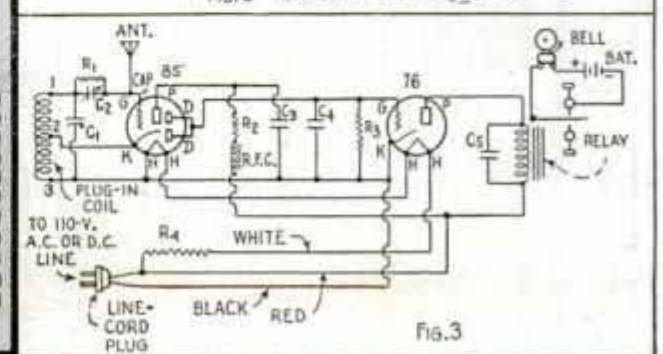
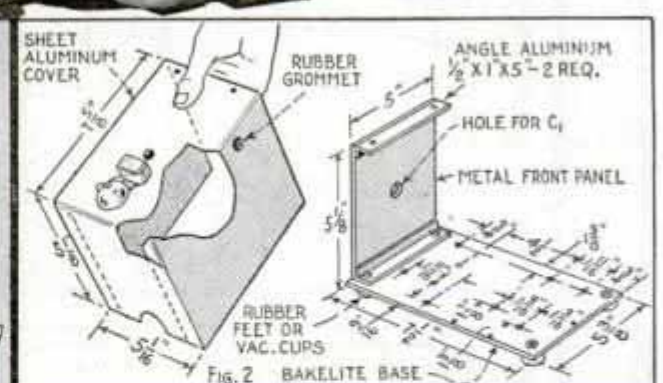
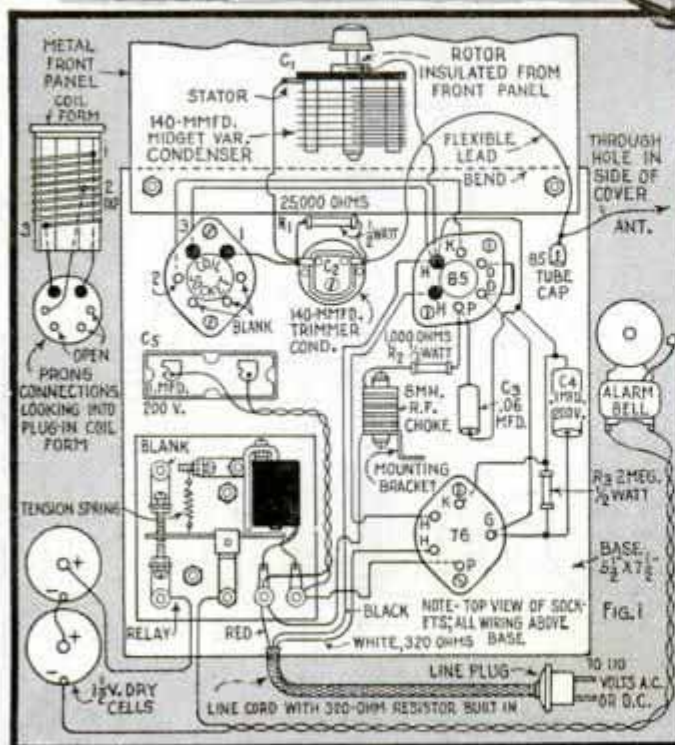
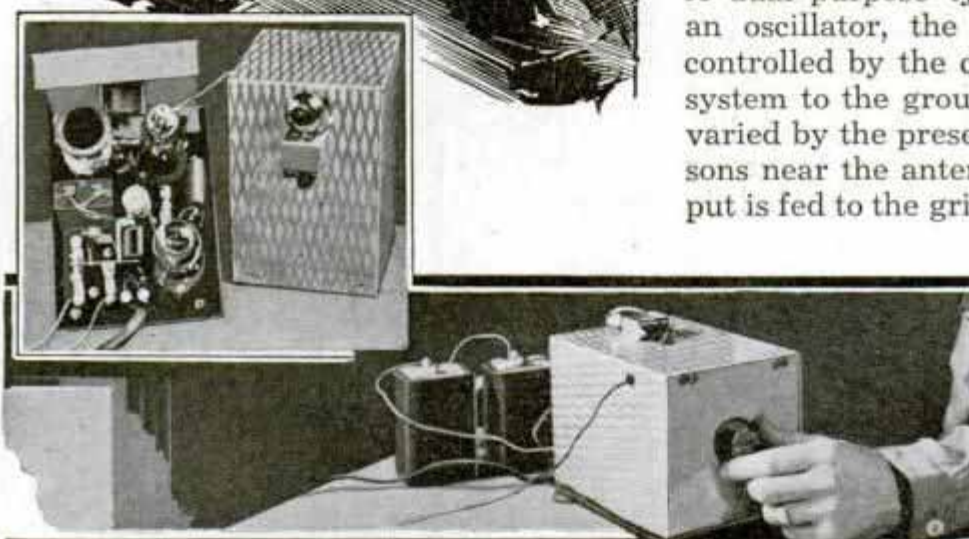
THIS capacity-operated relay is similar to the unit known as the "electric eye" but it does not require a beam of light for its operation. It can be used to ring a bell as a burglar alarm or to open or close any external circuit for automatic devices employed to open doors, work a drinking fountain, turn on advertising signs in windows or other experimental arrangements.

The circuit is a balanced spaced-control variety, sensitive to the presence of a person or any metallic body near the antenna. There is nothing difficult about the assembly or wiring, and the unit may be operated from any 110-volt a.c. or d.c. line. A dual-purpose type-85 tube is used as an oscillator, the feedback of which is controlled by the capacity of the antenna system to the ground. As this capacity is varied by the presence of a person or persons near the antenna, the increased output is fed to the grid of a type-76 amplifier

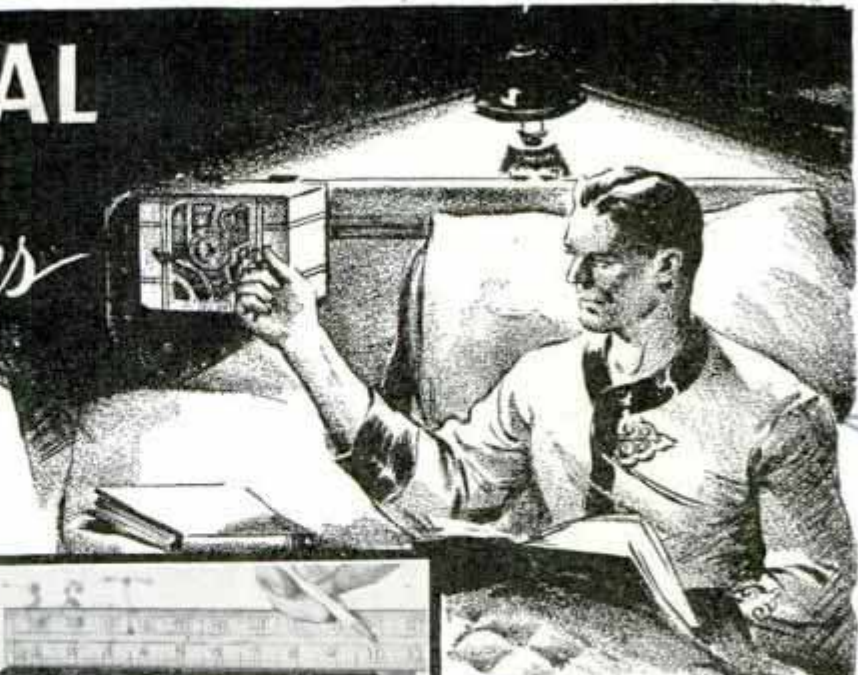
tube that operates a small relay which acts as an automatic switch to control any external circuit.

Although the parts are not ex-

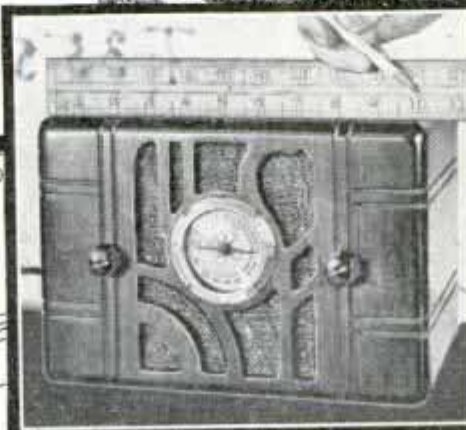
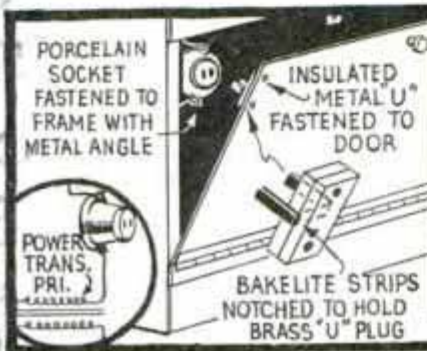
(Continued to page 142A)



PRACTICAL RADIO Suggestions

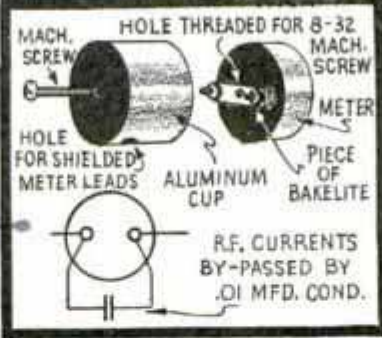
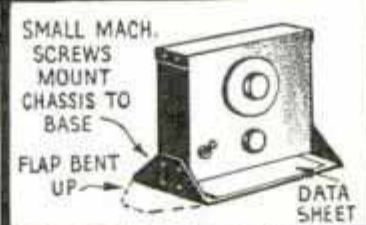


Below, easily made safety device for preventing shocks from radio, public-address system or similar apparatus where high voltage is employed. The a.c. line supply to the primary of the power transformer is cut off when door of cabinet is opened

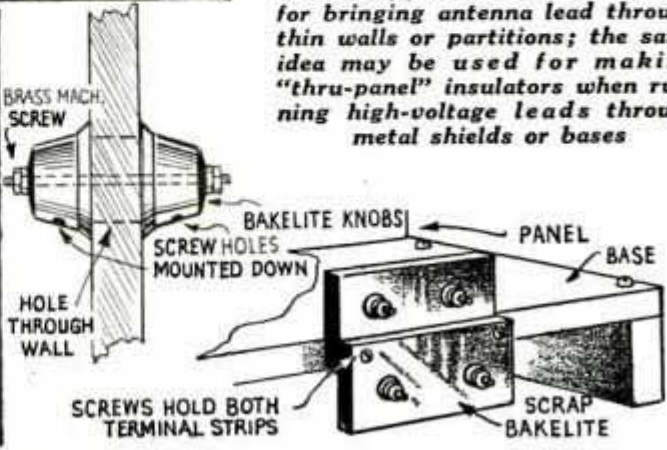
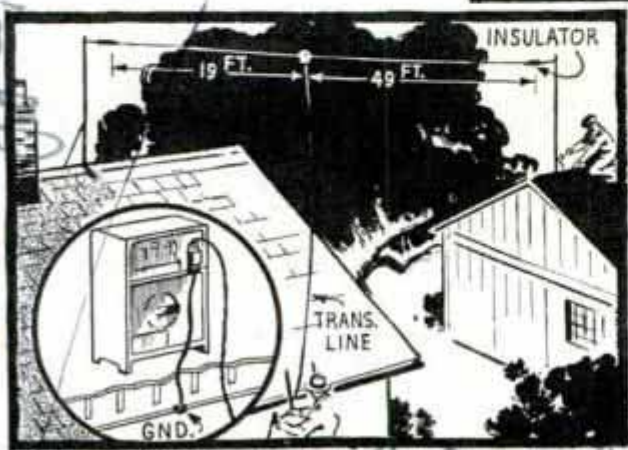


Homemade head-of-bed mounting brackets for Little Giant 4-tube midget receiver described in the March, 1936, issue, or similar small set

Upper right, a sturdy chassis for your short-wave receiver, or test set, easily formed from sheet metal. This arrangement provides ample space for mounting controls, doing away with the usual separate front panel. Lower right, protecting meters in experimental apparatus from damage by stray currents. Aluminum cup is held over the meter by means of an 8-32 machine screw threaded into bakelite strip. The fixed condenser is connected directly across the meter terminals. Below, all-wave antenna system for receivers of all types, complete ready to install; no assembling or parts required



Above, low-loss acorn tube socket for ultra-short wave receivers. Below, additional terminal strips easily added to homemade sets without special mounting angles. Left, old bakelite knobs drilled for machine screw or long-threaded brass rod, provide lead-in bushings for bringing antenna lead through thin walls or partitions; the same idea may be used for making "thru-panel" insulators when running high-voltage leads through metal shields or bases

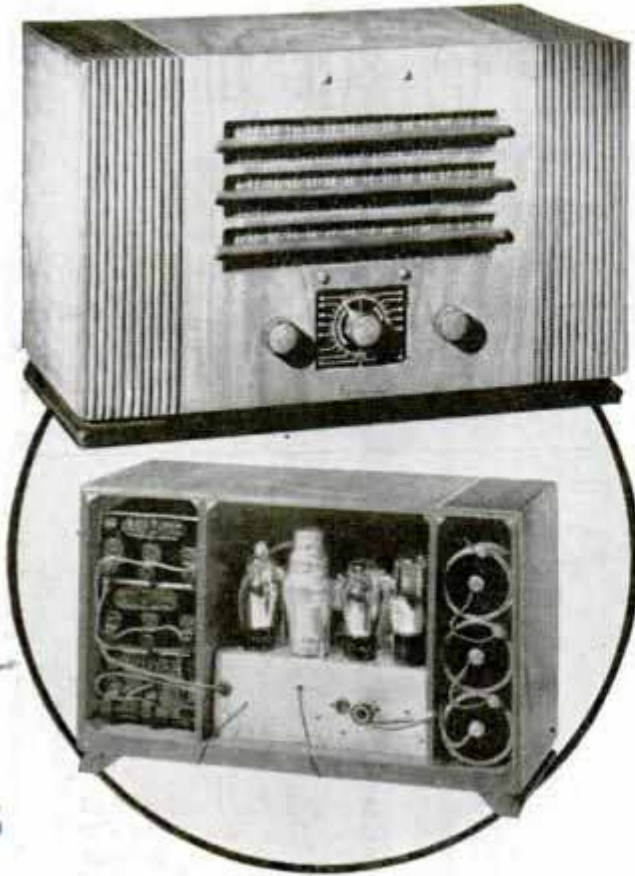


F3453
A.C. info
National Co. etc

National Company etc
Malden, Mass
61

F3545

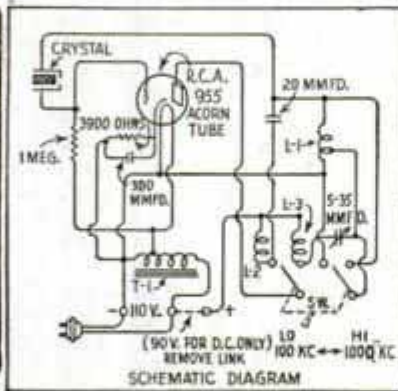
Art Arbor
F3547
Midget Battery Set Is Portable



Three dry cells and three small B-batteries are self-contained in this unusually small battery receiver which is claimed to operate about 300 hours before A-battery replacement is necessary.

E. 3663
Piezo-Electric Crystal Calibrator

Service men and experimenters can accurately calibrate receivers, test oscil-



lators and laboratory apparatus with this compact oscillator unit which employs a piezo-electric crystal and one of the new acorn-type tubes. It may be used to check frequencies from 100 kc. to 20,000 kc. in 100 kc. steps; also 1,000 kc. to 50,000 kc. in 1,000 kc. steps. A crystal oscillator of this description maintains a more constant frequency than other devices commonly used by service men and radio workers. Each instrument is individually calibrated and said to be accurate to within .05 per cent. The unit is housed in a bakelite case and operates on any 110-volt, 60-cycle a.c. line. Parts values and internal connections are shown in the schematic diagram.

F3554
Phono-Radio in Carrying Case

Travelers, and residents of summer hotels, can now supplement radio entertainment with selected phonograph records by means of this 7-tube portable combination radio receiver and phonograph. It is completely self-contained and may be operated on either alternating or direct current. The case is specially designed to house the radio chassis, loud-speaker, phono turntable, motor and pick-up arm. It will be noted also that a partition is provided for holding records. The loud-speaker, protected by a drop door, is located in the front end of the case. All controls are conveniently placed. The case measures 27½ by 13½ by 10¾ in., and the unit weighs 40 pounds complete.



Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; material lists are available without charge on receipt of postage.

NEXT MONTH—How to Build a Pre-Amplifier for Your All-Wave Receiver. This inexpensive unit will enable you to log foreign stations that are beyond the reach of your present set. Also—**Beginners' One-Tuber.** Works on six flashlight batteries, low cost, space-charge detector, crystal-set simplicity with tube performance.

R.C.A. Mfg. Co. Calhoun

Phonograph Radio are necessary



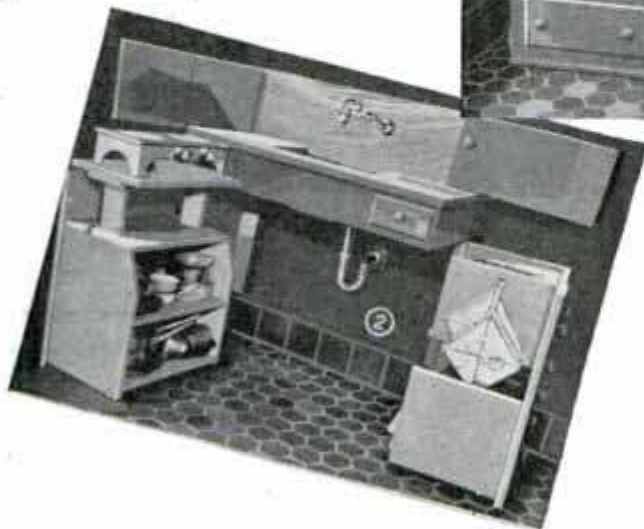
Complete COTTAGE KITCHEN *folds into Cabinet*

by E. G. Sherman

IN THE small cottage where kitchen facilities are met "by compromise," much can be added in the way of convenience by building this compact storage unit. In fact, when it is built in one corner of the lounging room of the average two-room cottage or cabin, a separate kitchen is unnecessary. At first impression, when the unit is closed as in Fig. 1, you will perhaps mistake it for a chest—a permissible deception made possible by the six dummy drawers. But what a revelation when the unit is opened! A sink,

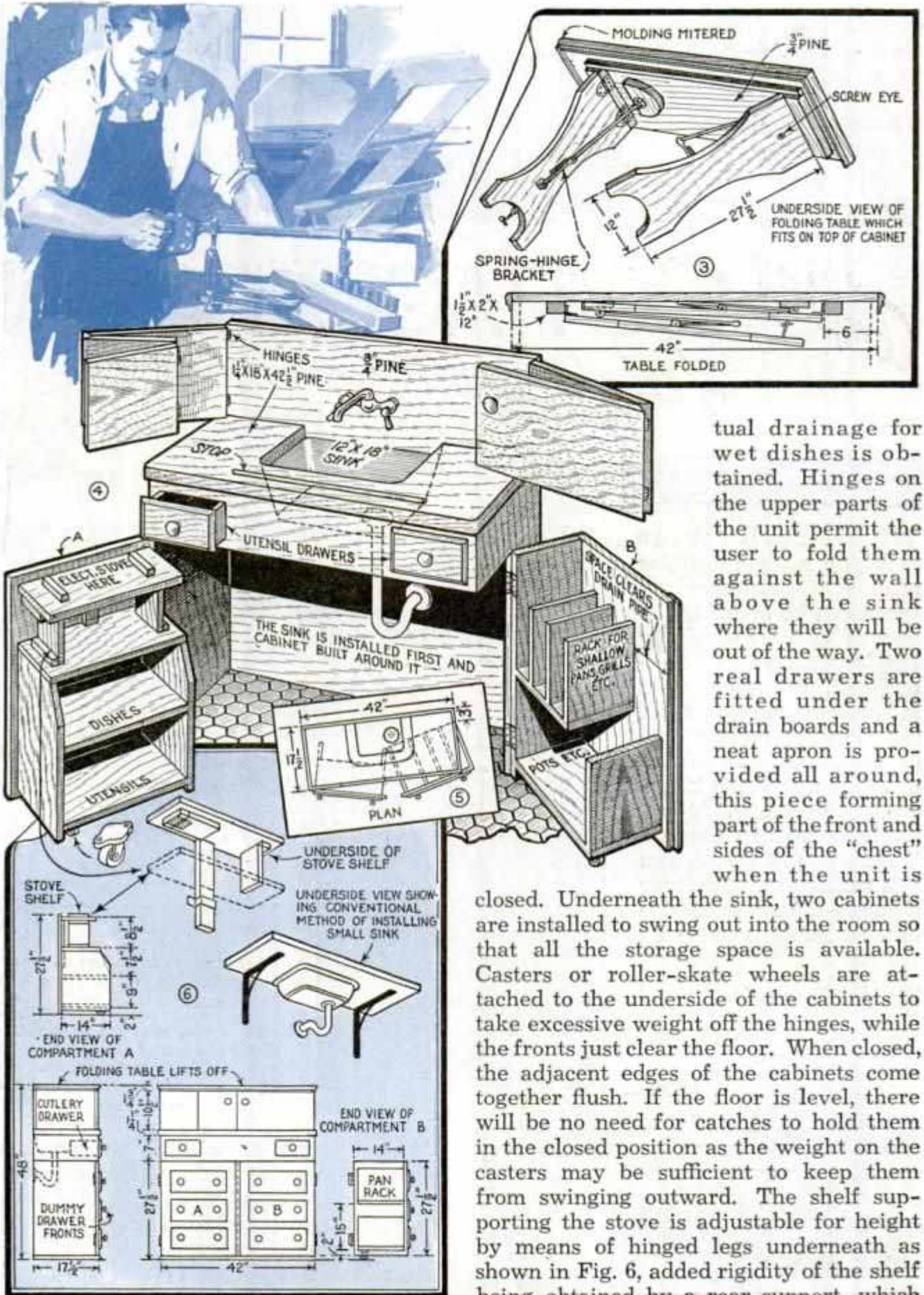


When you enter this cottage, and the kitchen is closed, you will no doubt mistake it for a chest. But what a surprise to see so many things "unfold" when the unit is opened, exposing a sink, stove, storage space and even a collapsible table, which ordinarily forms the top of the "chest." Of course, the dummy drawers are indispensable in carrying out the deception



running water, an electric or gasoline stove, drawers for cutlery and compartments for dishes, utensils, groceries, etc., are instantly exposed to view as in Fig. 2, and are at hand for quick service. A "full-grown" table even comes out of the chest!

Figs. 3 to 6 give all details. The sink is installed first after which the cabinet is built around it. While the drain boards are not shown sloping, it is an easy matter to plane the surface down so that ac-



tual drainage for wet dishes is obtained. Hinges on the upper parts of the unit permit the user to fold them against the wall above the sink where they will be out of the way. Two real drawers are fitted under the drain boards and a neat apron is provided all around, this piece forming part of the front and sides of the "chest" when the unit is

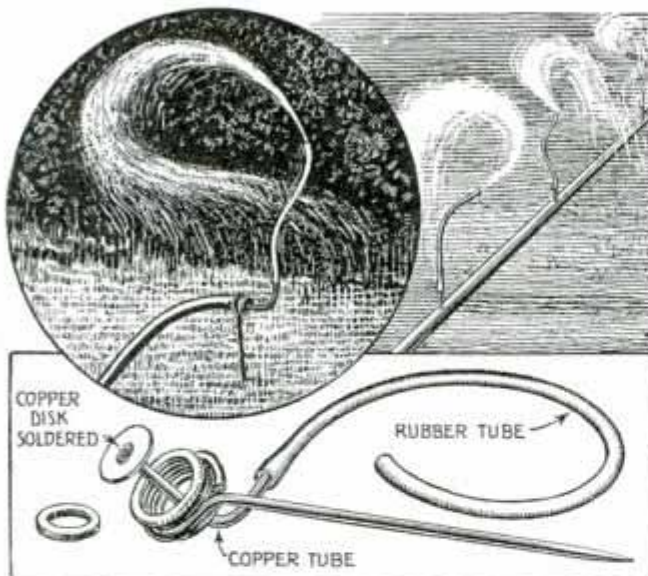
closed. Underneath the sink, two cabinets are installed to swing out into the room so that all the storage space is available. Casters or roller-skate wheels are attached to the underside of the cabinets to take excessive weight off the hinges, while the fronts just clear the floor. When closed, the adjacent edges of the cabinets come together flush. If the floor is level, there will be no need for catches to hold them in the closed position as the weight on the casters may be sufficient to keep them from swinging outward. The shelf supporting the stove is adjustable for height by means of hinged legs underneath as shown in Fig. 6, added rigidity of the shelf being obtained by a rear support, which slides down when the shelf is lowered so that the stove will clear the sink apron. The folding table, shown in Fig. 3, is a separate unit also tucked out of sight when

The outside is finished to correspond to other furniture and woodwork in the room, while the inside may be enameled white as especially appropriate to kitchen cleanliness. The weight of the cabinets is partly carried on casters

not in use. After it is collapsed and the legs swung snugly against the underside, the table is slipped into place to form the top of the unit when it is closed. The table top has a neat molding around the edge, extending over the edge of the chest to hold the top in place.

Wiggling Sprinkler Covers Wide Area

If you run water under pressure through a small rubber tube, and grasp it a foot or so from the discharge end, the unsupported section will whip about in a lively manner, distributing water over a wide area. Utilizing this principle in making a lawn sprinkler, you not only have one that is inexpensive, but one that will last a long time. To make such a sprinkler, cut a brass or copper disk to fit snugly inside a hose coupling. Drill a $\frac{3}{16}$ -in. hole in the center of the disk and solder a short length of copper tubing into it, the tube being bent to a 90° curve. Then attach the assembly to your garden hose. A length of



As the moving part of this sprinkler is a rubber tube, it will last until the rubber rots

heavy wire bent around the coupling makes a good stake for holding it. If you want to cover a large area in a short time, attach a length of pipe to the end of the hose and install several rubber-tube nozzles of varying lengths, as shown.

—Walter E. Burton, Akron, Ohio.

Comfortable Seat for Your Cabin Utilizes Rumble-Seat Cushions



When you lock up the cabin, put the cushions back in the car and leave the framework

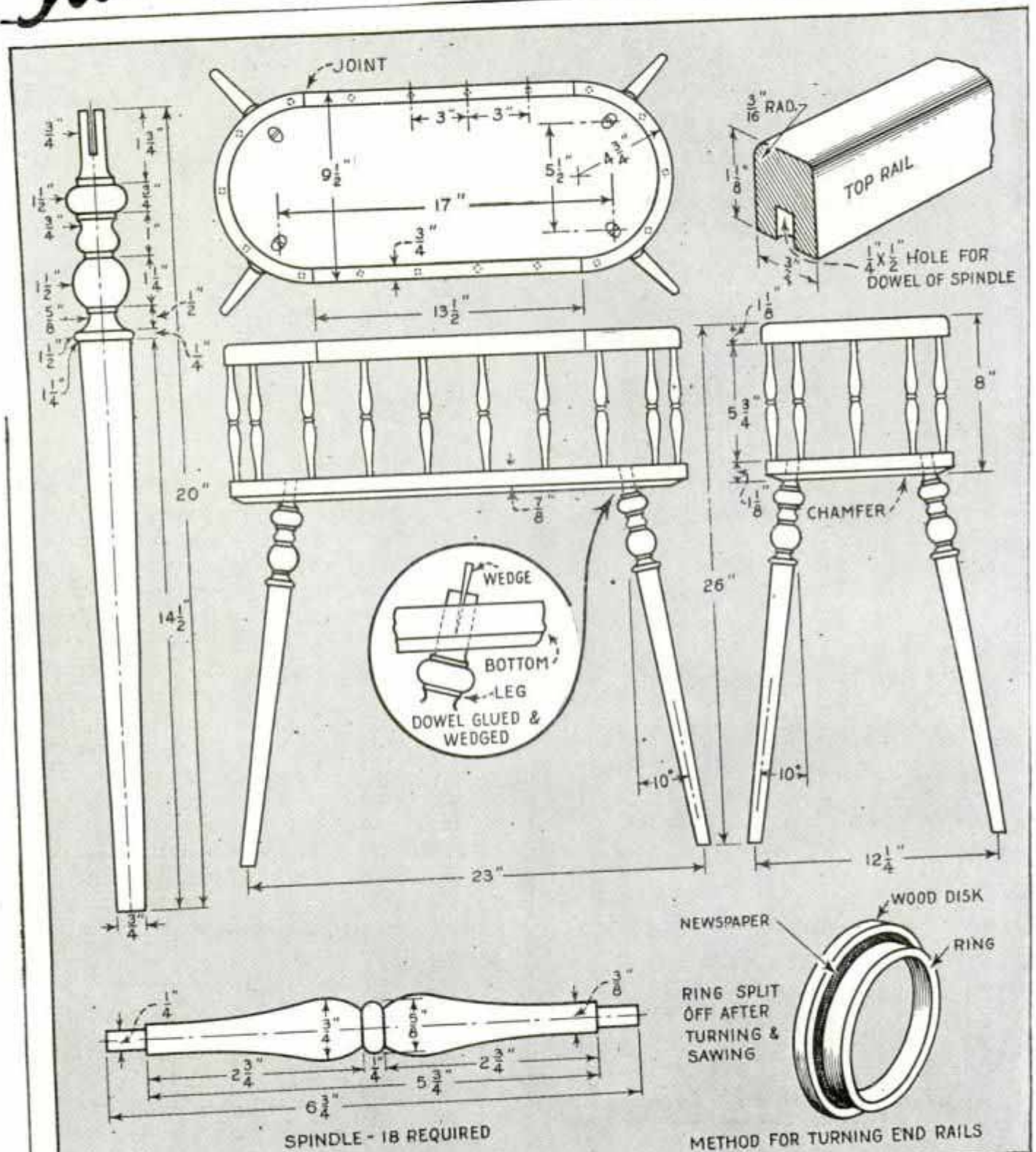
By building up a framework of pine to take the cushions from the rumble seat of your car, you not only have a comfortable settee for your cabin or summer camp, but, as the cushions are taken along when you leave, one that is not likely to be stolen should someone enter the building during your absence. To make the settee, remove the cushions and take the over-all dimensions. Then lay out the framework accordingly, giving the back a comfortable slope, and designing it so that the upper edge comes a little below the top of the back cushion. The bottom of the seat frame is constructed in the form of a box so that the cushion will fit snugly with the back of the box built amply low to avoid striking when the cushion springs are fully depressed. Finishing can be in keeping with the rest of the furniture and, if desired, seat covers can be made to match furniture already on hand.

Cleaning Willow Furniture

To clean your willow and sea-grass furniture, wash it with white soap and water, scrubbing it well with a stiff brush. I usually set the furniture out on the lawn and, after scrubbing it, wash off the soapy water with the garden hose. This method is not injurious to the furniture and is a quick way to clean it.

—A. W. Scheib, Arlington, Mass.

Turned PLANT STAND



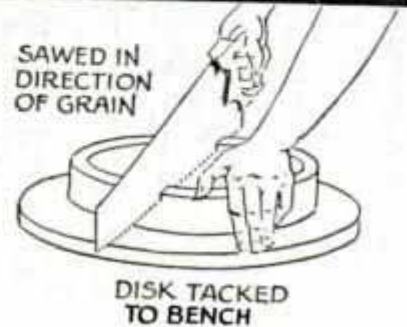
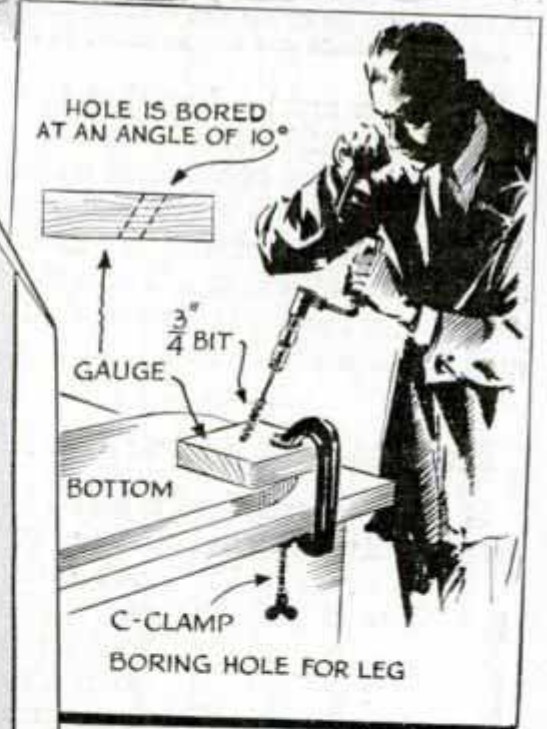
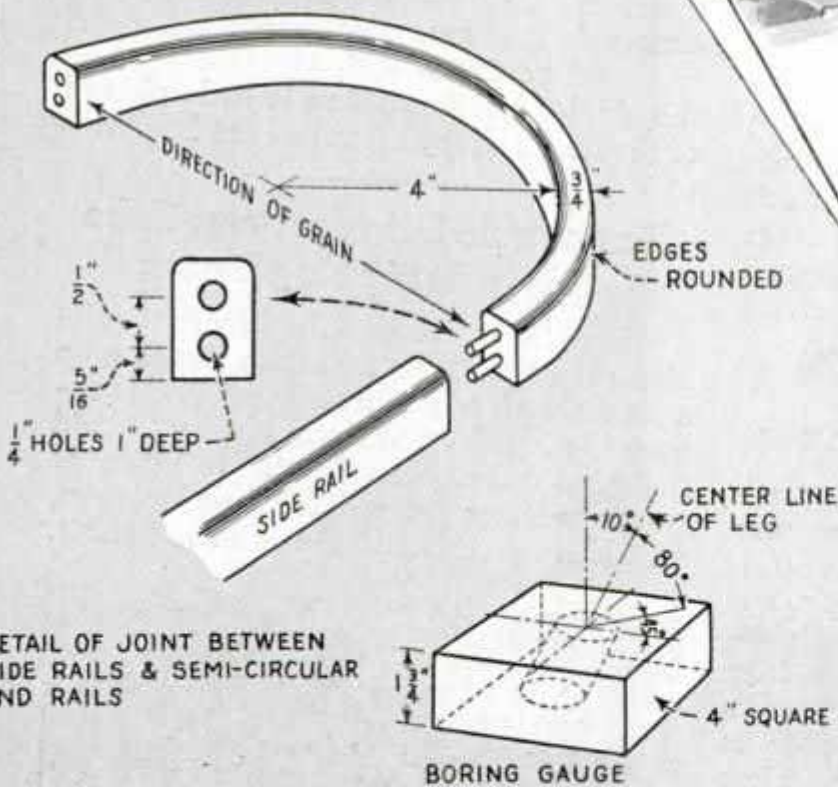
WINDSOR PLANT STAND
 SCALE OF ASSEMBLY 1/4 IN. = 1 IN. SCALE OF DETAILS
 DESIGNED BY R.O.B. TRACED BY H.W.M.
 DRAWN BY H.W.M. CHECKED BY R.O.B.

POPULAR MECHANICS
 MAGAZINE

in Colonial Design



MAPLE OR WALNUT



SHEET NO. 1

ISSUE

POPULAR MECHANICS MAGAZINE
200 E. ONTARIO ST. CHICAGO

BLUEPRINT No. SN 943

Mortar Box from Old Oil Drum Is Lasting

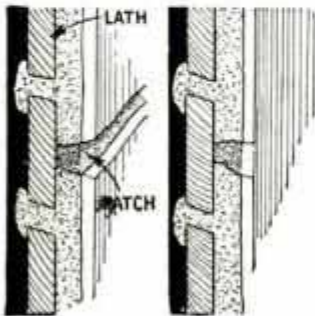


The sloping sides of the box make it easy to scrape the mortar from one compartment to the other

Here is a mortar box that is not only more substantial than the usual type, but one that is more convenient as it has two compartments, the sloping sides of which make it easy to scrape the mortar from one into the other. It will also stand much abuse, and accumulations of dried mortar may be pounded from its sides easily.

How to Patch Cracked Plaster

If you have patched a crack in a plastered wall and found that the repair was not only rough and unsightly, but that the crack appeared again in a few months, here's the way to do it next time. First cut away the plaster down to the lath so that you can get the point of a trowel into the crack. Then thoroughly wet the sides of the crack and the lath with a brush and water so that a good bond will be formed between the old plas-

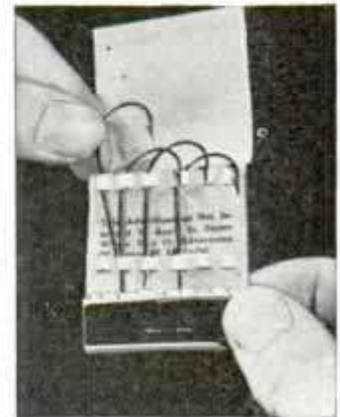


ter and the new. Apply the patching plaster, working it well into the lath, but fill the crack only to about half its depth. Roughen the new plaster with a pointed tool and let it dry. Now, mix another batch of plaster to a much thinner consistency than the first, and fill the crack, smoothing the job with a trowel. When the plaster starts to set, brush water over it until a good, smooth finish results.

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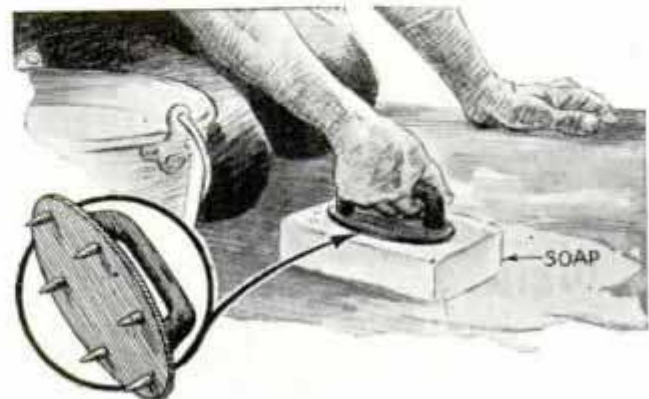
Match Book Holds Fishhooks

An empty match book may be converted readily to serve as a holder for carrying extra fishhooks safely and, as it is flat, it takes less space in your pocket than a cork. The hooks are inserted in slits cut in the book as shown, so that they are completely covered when the book is closed. As the eyes are pushed into the stapled portion, there is little chance of the hooks dropping out of the holder.



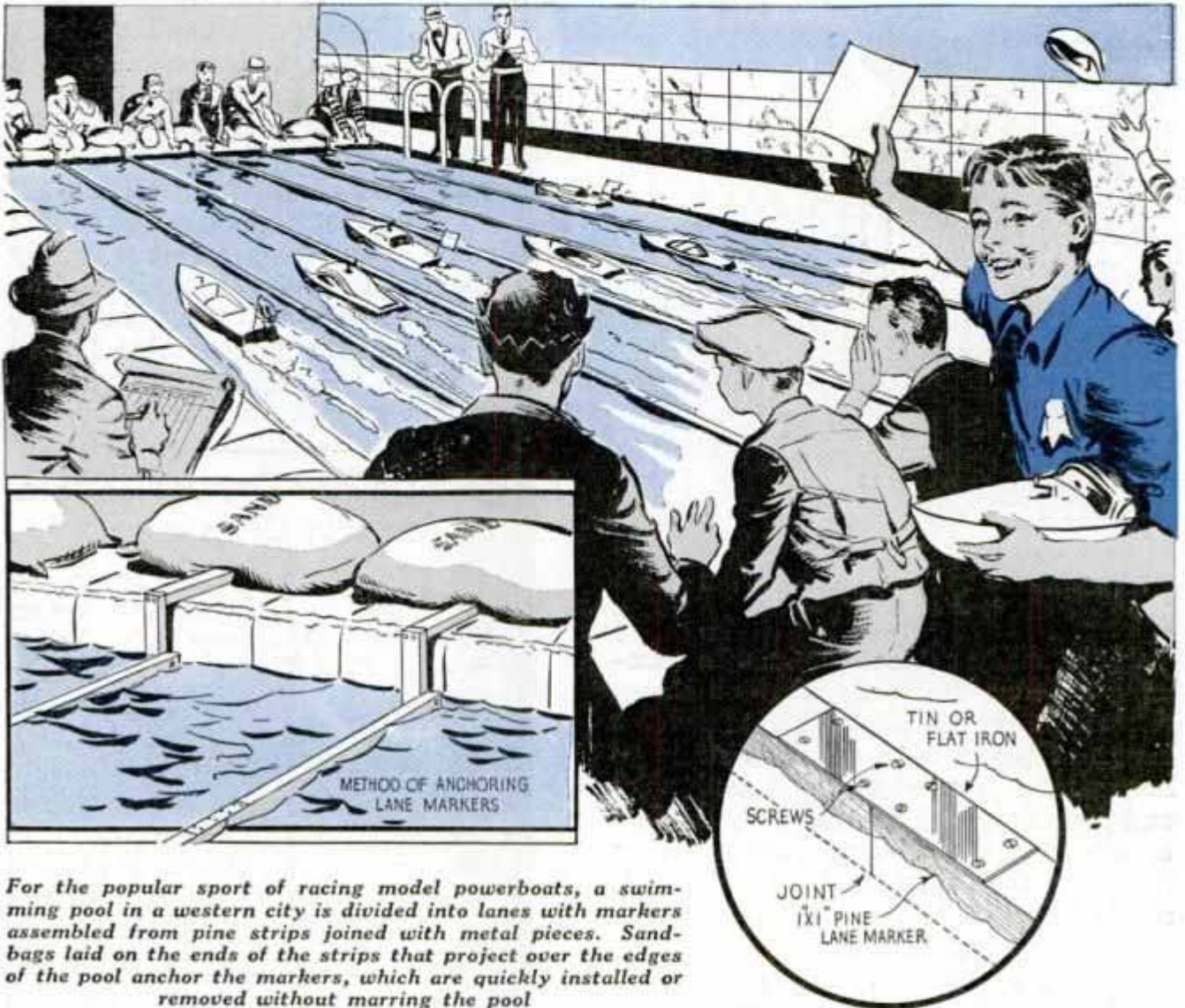
Removable Grip for Soap Cake Aids in Scrubbing Floors

Where floors are scrubbed by first rubbing soap over them and then working up a lather with a broom and water, this removable handle will make it easy to hold the soap cake. The handle is made of wood and has six pointed wooden pegs, which are forced into the cake to hold it.



With this handle you can get a good grip on a soap cake and apply plenty of pressure

Pool Divided into Lanes to Race Model Boats

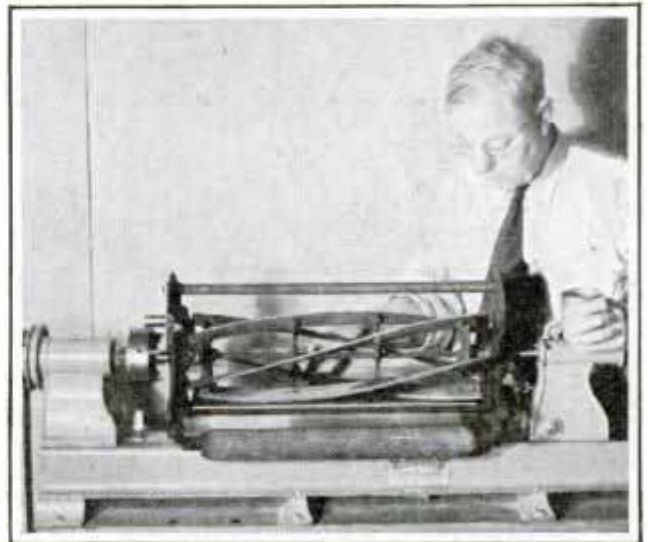


For the popular sport of racing model powerboats, a swimming pool in a western city is divided into lanes with markers assembled from pine strips joined with metal pieces. Sandbags laid on the ends of the strips that project over the edges of the pool anchor the markers, which are quickly installed or removed without marring the pool.

Lawnmower Is Sharpened in Lathe with Paste Abrasive

You can sharpen a lawnmower accurately with valve-grinding paste by rotating it in a lathe. To do this, remove the wheels, gears and pawls and mount it between the lathe centers so that the blades will rotate backward. Set the bedplate to just touch the blades and then cover it with coarse valve-grinding paste and start the lathe. Renew the paste and adjust the bedplate closer to the blades at intervals until all surfaces are ground evenly. Test by running strips of newspaper through the mower.

☞ Cheap powder puffs make excellent pads for oil-and-shellac polishing of wood turnings on the lathe, and may also be used for applying furniture wax.



Be sure both ends of the lawnmower bedplate are adjusted so that the blades touch it uniformly over its entire length

Hedge-Trimming Guide of Wire Stretched Between Posts



It's no trick to trim hedge uniformly when this simple guide is used

Of the many devices to assist in trimming a hedge uniformly, the one shown is perhaps the simplest. It consists of a length of heavy wire, which is stretched horizontally from steel posts, both wire and posts being left permanently in place as the foliage will conceal them. When trimming, the workman simply allows his shears to rest lightly on the wire.

Cuts for the Home Printer from Newspaper Mats



Glue mixed to a stiff dough and pressed into mats makes cheap cuts for the home printing press

Cuts that will print in black and white for reproducing pictures, drawings and printed matter can be made cheaply by using a glue compound and old newspaper mats. These can be had for the asking

from almost any newspaper office. After selecting the mats, cut out the part wanted, coat the surface thoroughly with oil and apply a thin coat of vaseline. Then mix waterproof casein glue with water to the usual consistency and knead it to a stiff putty with a filler such as fine wood flour. After spreading the putty over the mat evenly and working it well into all the lines, place the mat between two wood blocks and draw these together lightly with C-clamps to dry overnight. The block that contacts the putty should be coated with casein glue so that it will adhere, which will provide you with a mounted cut when the mat is removed.

Dog House Has Drawer Bottom for Easy Cleaning



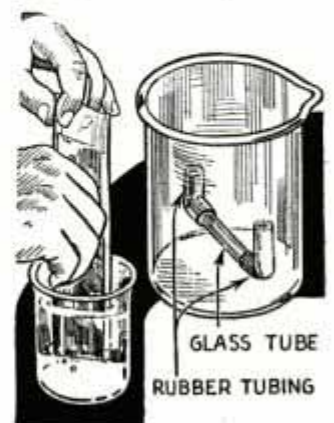
Cleaning a dog house becomes an easy task when a drawer is fitted in the bottom as shown to hold the bedding. When the house needs cleaning, the drawer is pulled out, washed and filled with new bedding in a few minutes. Also, it's

easy to leave the drawer outside for an airing at regular intervals.

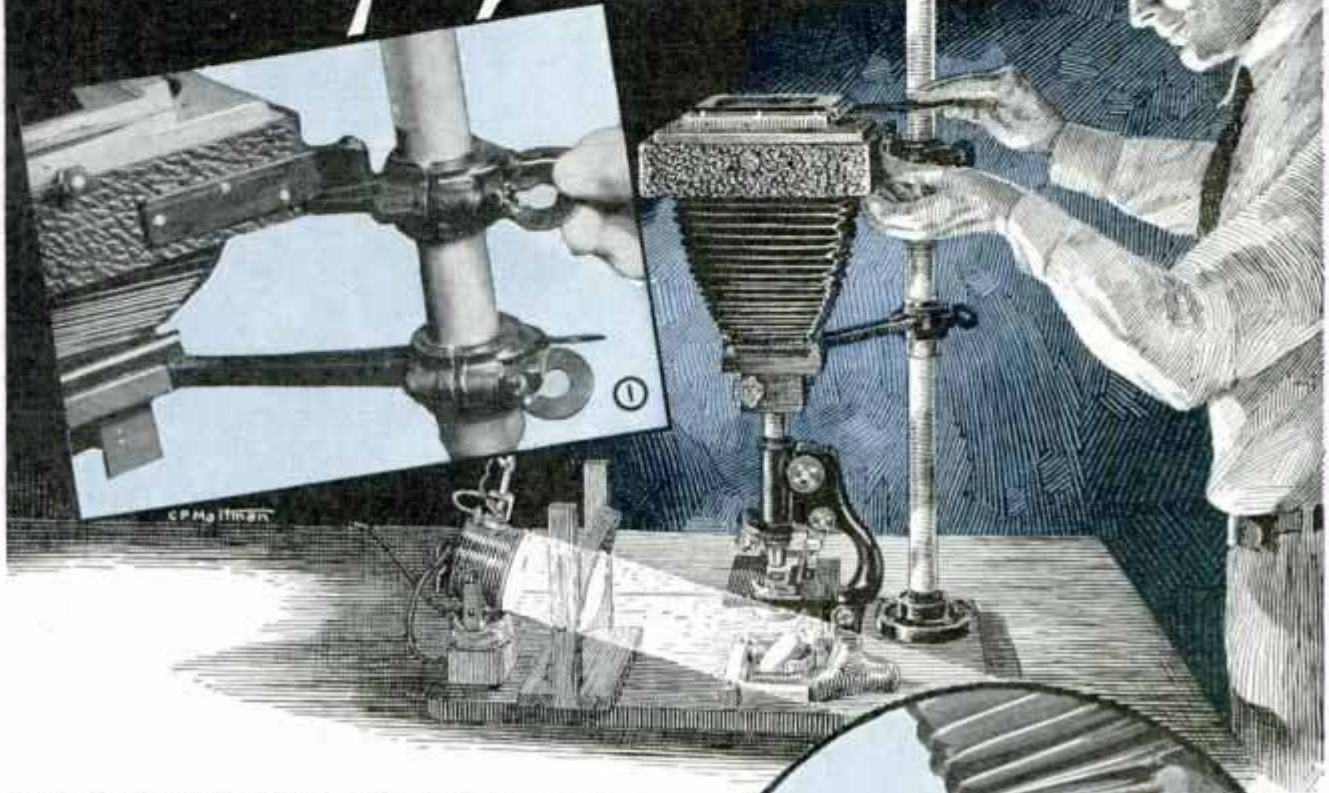
—E. J. Hartel, Jamaica Plain, Mass.

Roll Film Developed in Beaker

Roll film is easily handled in a beaker or jelly glass with little developer if the device shown is used. A glass rod or tube with short pieces of rubber tubing slipped over the ends, is wedged horizontally inside the glass about 1 in. from the bottom. Then the film is passed around the rod and slowly pulled through the developer.

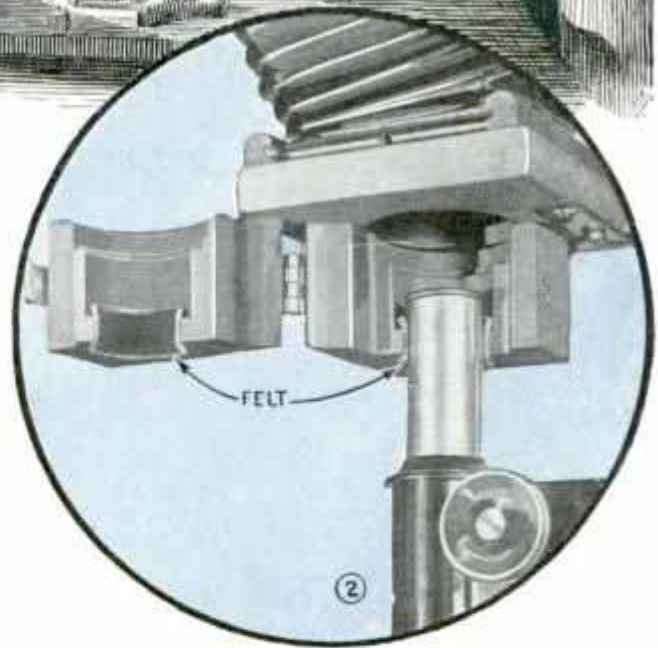


"MICRO-CAMERA" *Cheaply Made*

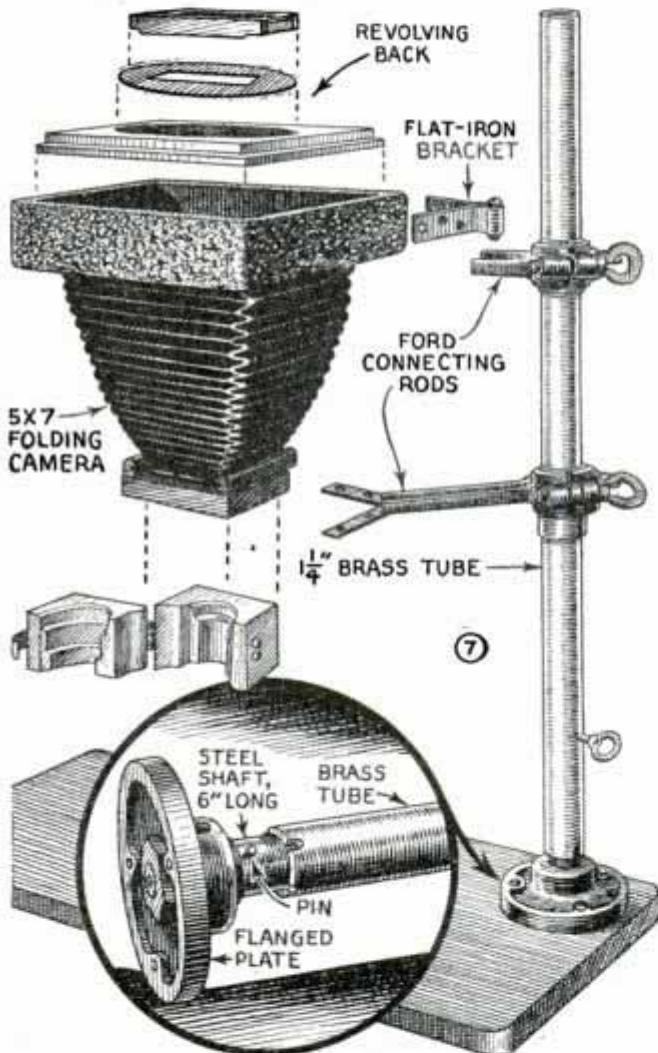
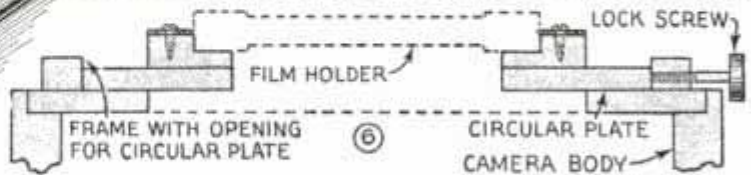
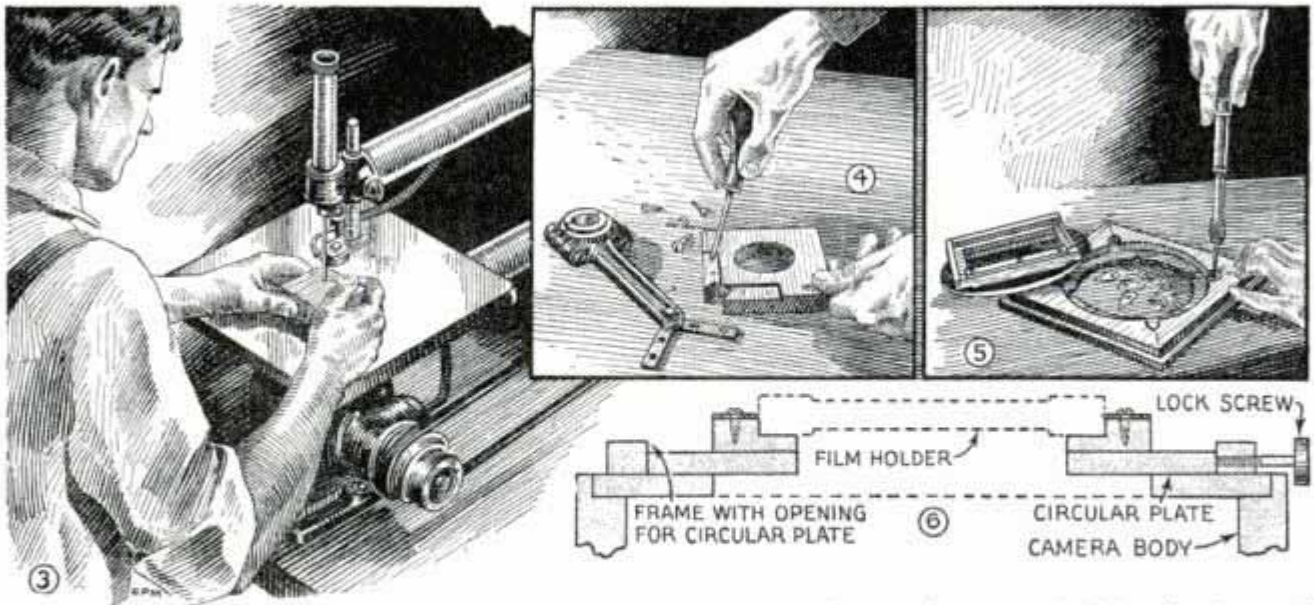


THIS photomicrographic camera can be adapted for use with any kind of microscope, but will, of course, perform best with an instrument that has well-corrected lenses. An old 5 by 7 folding camera is the starting point. The only parts used are the bellows, box, part of the removable back and the rectangular piece of wood attached to the front end of the bellows. Sections of two Ford connecting rods support the camera. It's necessary to remove some of the bearing babbitt to make the rods fit snugly around the 1¼-in. brass pipe on which the assembly slides as in Fig. 7. The two nuts on each connecting rod are fitted with handles consisting of large washers brazed to the nuts as shown in Fig. 1.

The connecting rod supporting the camera box is sawed off near the crankshaft end, and a piece of flat iron is bent and drilled so that it can be screwed to a corner of the box. The wrist-pin clamp at the small end of the other connecting rod is cut off, and a flat, wrought-steel corner plate riveted in its place as in Fig. 4. This



corner plate fits in a shallow recess in a piece of hardwood measuring 5/8 by 4 by 4 in., and having a 2-in. hole in its center. Attached to the 4-in. square of wood is another block measuring about 1¾ by 2¾ by 2¾ in. This block is counterbored in the lathe, the hole, in its lower surface, being slightly larger than the diameter of the microscope tube just below the eyepiece. From this it tapers by steps to a



diameter of 2 in. at the top as in Fig. 2. The block is cut into two parts as in Fig. 3, the cut being irregular to keep out light, and in such direction that the center hole is bisected. One part of the block is fastened to the 4-in. square piece with wood screws, and the other part hinged as shown. The inside is painted a dull black.

A spring-brass fastener holds the hinged section tightly closed.

The base for the camera mounting consists of a board to which is fastened a flanged plate. A 6-in. steel shaft, turned to fit snugly inside the brass pipe and threaded on one end, is screwed into the flange. Just above the point where the shaft joins the plate, is a steel pin, the ends of which project about $\frac{1}{8}$ in. on each side as in Fig. 7. This pin engages notches filed in the end of the pipe. A collar fastened to the pipe with setscrews prevents the assembly dropping low enough to damage the microscope.

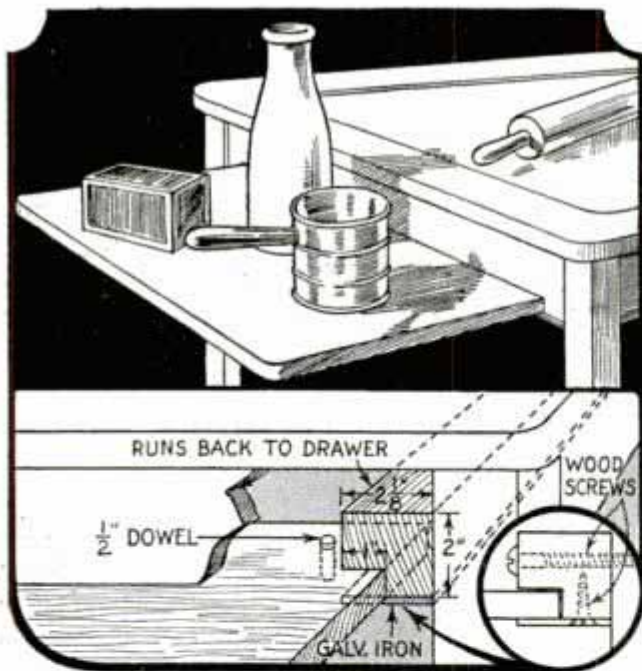
The focusing back of the camera is replaced with a revolving arrangement consisting of a disk of hard-pressed board, plywood or Bakelite. This rotates in a circular opening cut in a square of $\frac{3}{8}$ -in. plywood as in Figs. 5 and 6. Four brass lugs hold the disk in place and a knurled-head screw locks it in position. Also, it has a rectangular opening about which is built a frame of the size and shape to accommodate a $3\frac{1}{4}$ by $4\frac{1}{4}$ film or plate holder. Other standard holders can be used by varying the design and dimensions. Of course, the exact method of attaching the rotating-disk arrangement to the camera will depend on the original construction of the box.

The purpose of the rotating arrangement is to permit the microscopic image to be arranged in any position on the focusing screen and film or plate. This permits ordinary microscopes to be used with as much flexibility as one having a revolving stage. It is, of course, necessary

to use a focusing screen. The user should make certain that the ground surface of the glass lies in the same plane as the sensitive emulsion on the film or plate. Cross lines are drawn in the center of the focusing screen, on the ground side, and a thin microscope cover glass is cemented over them with Canada balsam, to make a transparent spot. A magnifying lens helps in focusing on the cross lines. No shutter is provided on the camera shown, the exposure being controlled by a switch on the lamp used as a light source.

Kitchen Worktable Has Shelves to Increase Size of Top

Two sliding shelves at the ends of a porcelain-top kitchen table will almost double its surface without taking any more room when the table is not in use. Shallow recesses in the aprons at the ends of the table take the shelves, which are supported by slides screwed to the sides of the table. The slides are rabbeted pieces



The extra space on your worktable makes this simple carpentry job worth while

of hardwood, having strips of No. 16-ga. galvanized iron screwed to the lower sides to form grooves for the shelves. Slides of this type are simple to make, and the iron provides a smooth surface that will not swell and bind the shelves during damp weather. A short dowel near the rear edge of each shelf serves as a stop.

Diving Platform from Barrel Makes Waves in Pool



Comical contortions often result from divers attempting to dive from this plunging barrel

By springing up and down on this novel diving platform you not only get in motion for your dive, but create large waves in the pool which give other bathers a thrill in riding them. The platform consists of an empty, sealed oil drum mounted between two lengths of 2 by 4-in. stock, the latter being hinged or pivoted to stakes near the side of the pool.

Flowerpot Covers from Cans and Clothespins

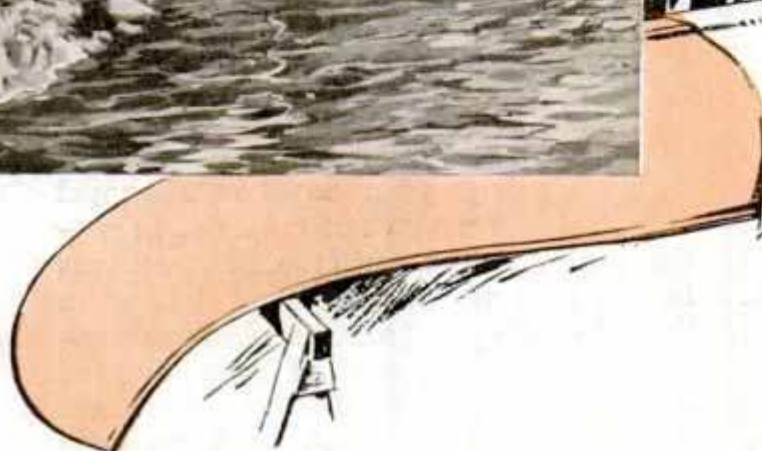
You will be surprised at the neat appearance of flowerpot covers that can be made by slipping clothespins over the edges of shallow cans as shown in the drawing. Painting adds to the appearance. Unusual striped effects can be worked out by painting alternate pins in complementary colors. Covers of this type are limited to pots having a depth no greater than the length of the clothespins.



☛ A ten-cent celluloid soapbox makes a first class leader and fly box for fishermen.

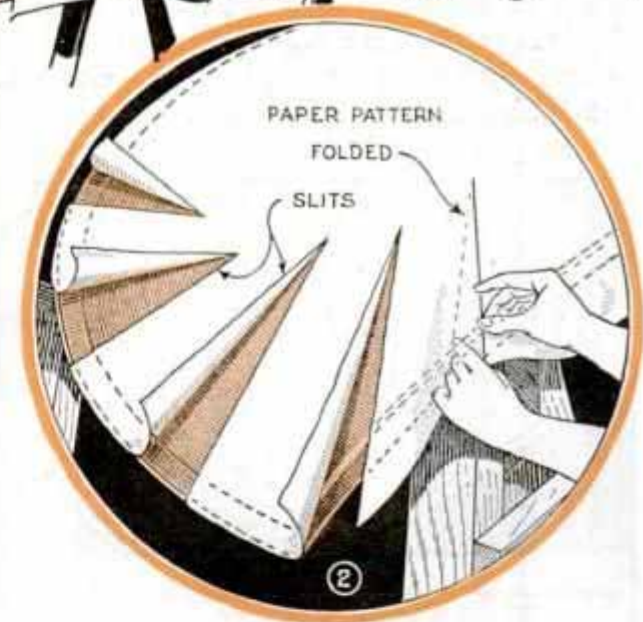
X 141A

You Can Build this



IT'S an all-aluminum job—no wood is used. This eliminates paint and canvas and the ordinary seasonal repairs. As soon as you finish joining the various parts, your canoe is ready to launch. Aluminum rivets are used throughout in the construction, although you can have the job welded, if facilities for this work are available.

A wooden canoe of the desired shape and size is used as a pattern over which the aluminum sheets are fashioned. First, the keel of the wooden canoe is removed temporarily, and a large sheet of wrapping paper is stretched over the hull as in Fig. 1. As the aluminum hull is to be made in two pieces, a pattern of only half of the canoe is cut out at one time. The paper is fastened along the keel and pulled tightly over the hull toward the stem. Due to a double curvature at this point, there will be a large wrinkle near the center of the paper. By making equally spaced slits in the paper pattern, from the gunwale to points halfway around the bulge and along the stem, the wrinkles can be



eliminated almost entirely, as shown in Fig. 2. The distance that these slits overlap represents the amount of waste material that must be cut away in order to fit the metal to the shape of the canoe. Now, the paper pattern is laid over a piece of sheet aluminum (two-thirds hard), of the proper size and gauge as in Fig. 3, after which the slits and outline are cut as indicated by the pattern. Wrinkling at the bottom of a slit can be avoided by drilling a small hole at this point, as in Fig. 4. Then the sheet is placed over the hull of the canoe, Fig. 5, and drawn tightly around it by means of wire or rope so that it can

ALUMINUM CANOE..

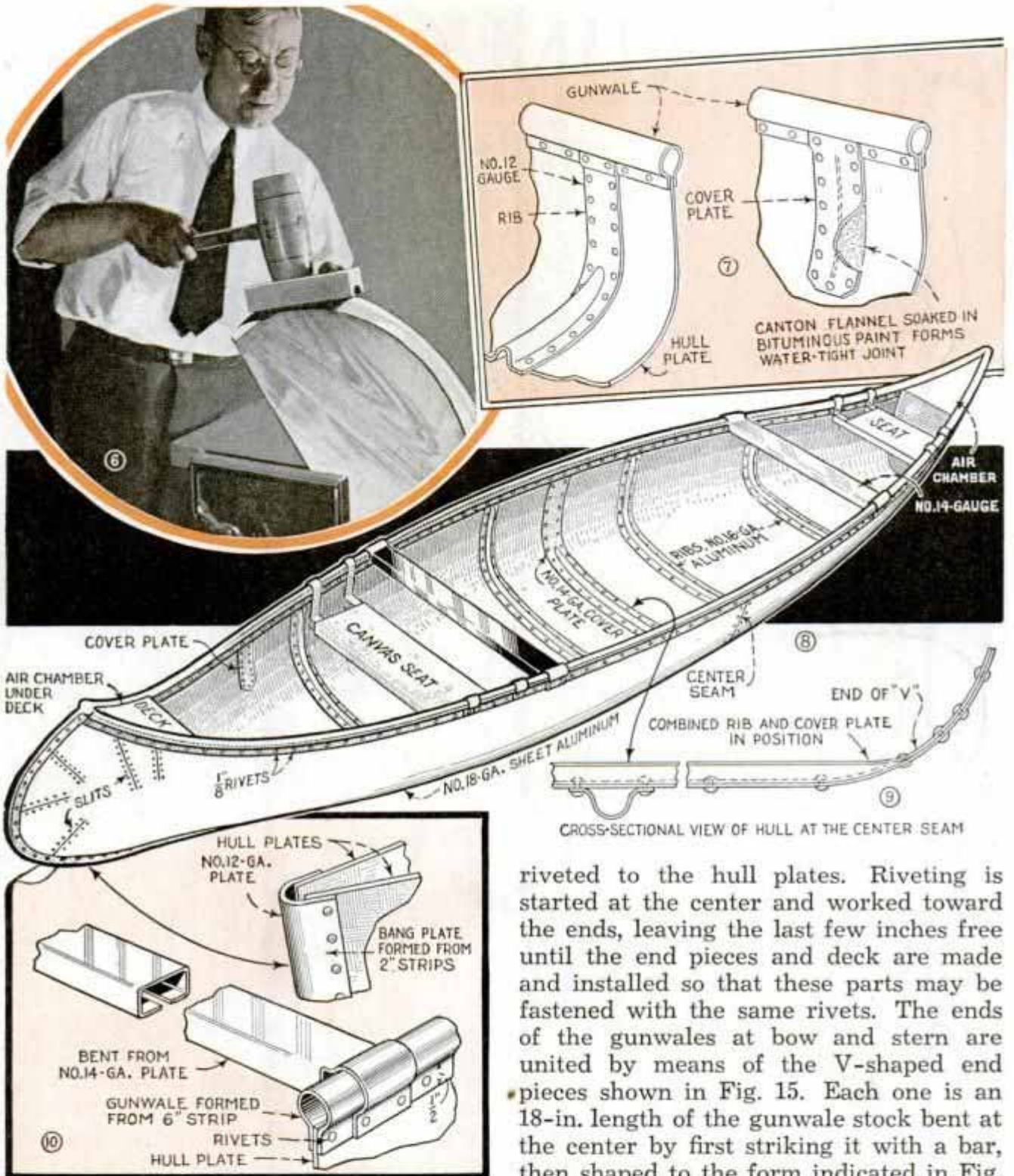


A CANOE IS USED AS A PATTERN IN FORMING THE ALUMINUM SHEET

be worked into shape. With the material overlapping at the slits, to form vees, the excess material can be marked and cut away. The slits are closed by means of cover plates riveted on the inside of the hull as in Fig. 7. To make the joints watertight, a piece of canton flannel, soaked in bituminous paint, is used to form a gasket between the hull and the plate. The cover plates should be riveted on one side of the vee before any rivets are put in the other side, as this simplifies pulling the material together. Cover-plate holes are drilled in advance, but holes in the hull are drilled as the riveting progresses.

After the two sections of the hull have been shaped, they can be removed from the canoe as they will retain their approximate shape. The sections are joined together at the center by a transverse seam running from gunwale to gunwale. A long cover plate and gasket is riveted over the seam as in Figs. 7, 8, and 9.

Bang plates, which form the stems of the canoe, and connect the hull plates at bow and stern, as in Fig. 10, are made of "dead soft" material and bent around a wood form as in Fig. 6. A wood forming block, shown in Fig. 15, having a half-round groove of the required size, is used to drive the material to shape. Any buckling at the sides can be hammered out after the piece has been formed. Rivets, to fasten the bang plate to the hull, must

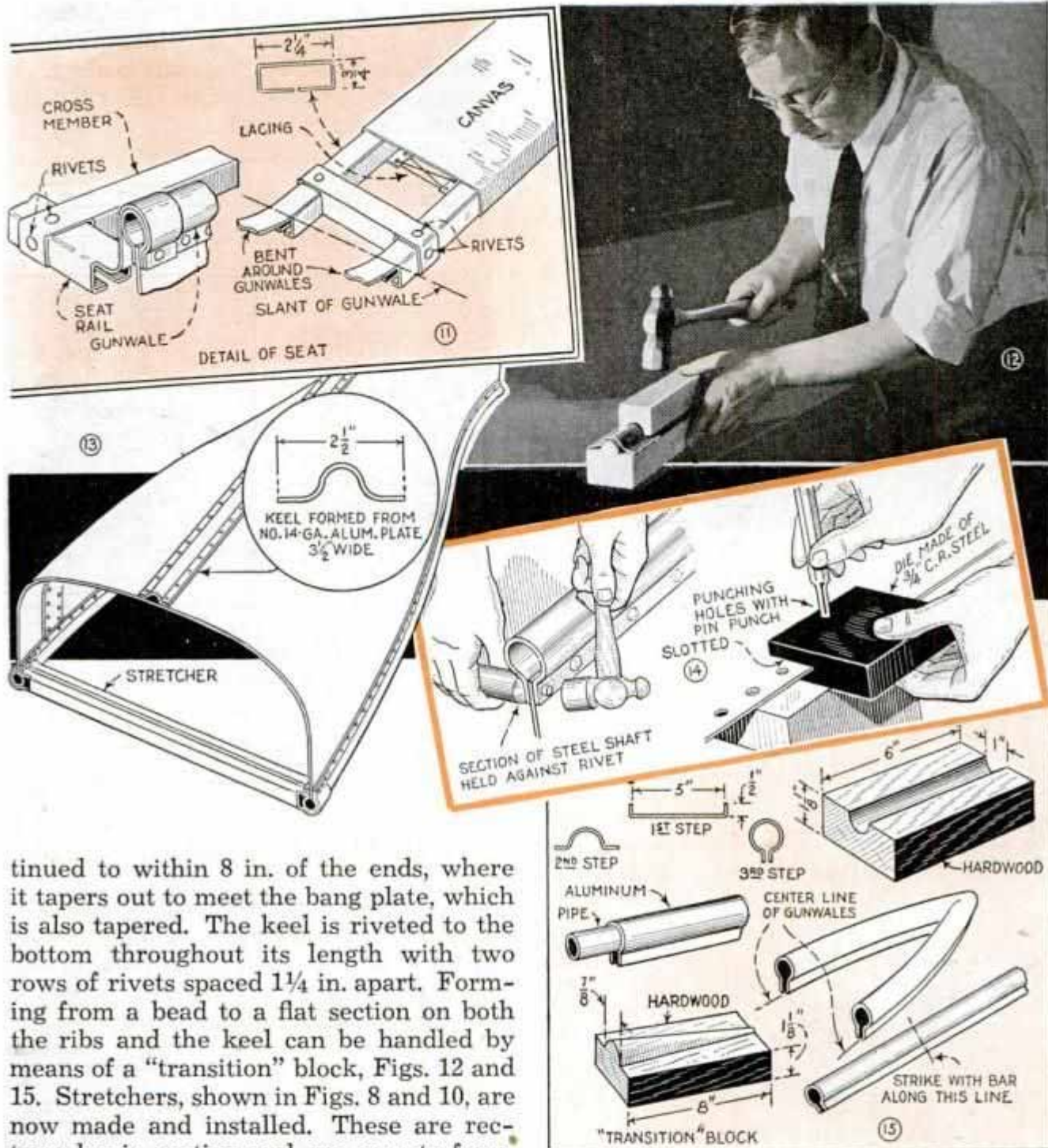


be inserted from the inside and headed on the outer side, because of limited space.

The next step is to form the gunwales. These should be made from long strips of half-hard aluminum, bent into a tubular section about $1\frac{1}{8}$ in. in diameter. Fig. 15 shows the three steps in forming these pieces. The first bend is made in a vise or between pieces of hardwood; the second with the concave block, and the third with a piece of pipe. After bending the gunwales to the shape of the canoe, they are

riveted to the hull plates. Riveting is started at the center and worked toward the ends, leaving the last few inches free until the end pieces and deck are made and installed so that these parts may be fastened with the same rivets. The ends of the gunwales at bow and stern are united by means of the V-shaped end pieces shown in Fig. 15. Each one is an 18-in. length of the gunwale stock bent at the center by first striking it with a bar, then shaped to the form indicated in Fig. 15. These pieces should be made just small enough to fit inside the gunwales. When fitted in place, the gunwales, decks, bang plates, and hull are all riveted to them.

Six ribs are installed to give additional strength and rigidity to the hull. They run entirely across the bottom and up the sides to the gunwales, and are beaded across the bottom but taper out into a flat section along the side walls. See Figs. 7 and 8. The shape of the keel is shown in Fig. 13. This "beadlike" section is con-

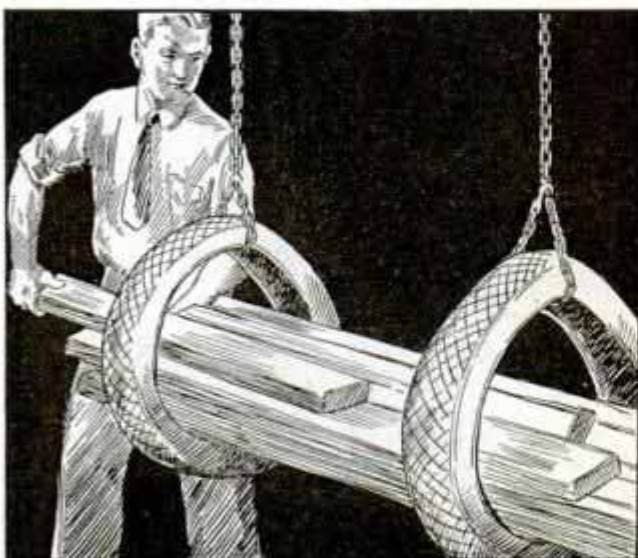


tinued to within 8 in. of the ends, where it tapers out to meet the bang plate, which is also tapered. The keel is riveted to the bottom throughout its length with two rows of rivets spaced $1\frac{1}{4}$ in. apart. Forming from a bead to a flat section on both the ribs and the keel can be handled by means of a "transition" block, Figs. 12 and 15. Stretchers, shown in Figs. 8 and 10, are now made and installed. These are rectangular in section and are easy to form, the ends being cut back as indicated in Fig. 10 so that they can be riveted securely to the gunwales.

The seat frames are also rectangular in section but somewhat smaller than the stretchers. The method of framing and covering with laced canvas is shown in Fig. 11. The ends of the main members are cut back at the top only and wrapped around the gunwales and riveted as shown. The deck pieces are simply flat and rather heavy stock, shaped to fit into the bows, with flanges for riveting on each side. As a metal canoe is heavier than water, it is necessary to provide air chambers so that

it will not sink when capsized. These can be provided by making air-tight cans which fit either under the seats or decks. If they are to be riveted an outseam must be used. Welding, of course, would be preferable. The cans are tested by submerging them in water. If no bubbles appear after several minutes, they can be riveted in place. A method of riveting and a simple die for punching lines of rivet holes in the soft aluminum sheet, are shown in Fig. 14. The die is made from a piece of flat cold-rolled steel slotted and drilled as shown for a pin punch of a size corresponding to the rivet holes required.

Scrap Lumber Stacked in Tires Always Out of the Way



Two old auto tires suspended from the ceiling make good holder for scrap lumber

When scrap lumber accumulates in the basement, garage or other home building, why not stack it in a couple of auto tires as shown, instead of piling it on the floor or standing it in a corner? The tires are suspended from the ceiling with chains, wire or ropes, to any height desired.

Noisy Furniture Casters Silenced by Adhesive Tape



If you live on an upper floor and the noise of moving furniture annoys the people underneath, wrap the caster wheels with two or three layers of adhesive tape to cushion

them. Besides this, the tape will help prevent the casters from marring your floors. Before applying the tape, however, clean the caster wheels thoroughly with gasoline so that the tape will stick tightly.

Tightening Fishing-Rod Ferrules

If you have an old casting rod on which the ferrules are loose, and are not particular about its appearance, they can be tightened in a jiffy as follows: Take the rod apart, lay the section with the outer

ferrule on a solid object and strike the shell sharply at several points with the back of a table knife. This will make little dents, scarcely noticeable, which will cause the ferrules to fit snugly.

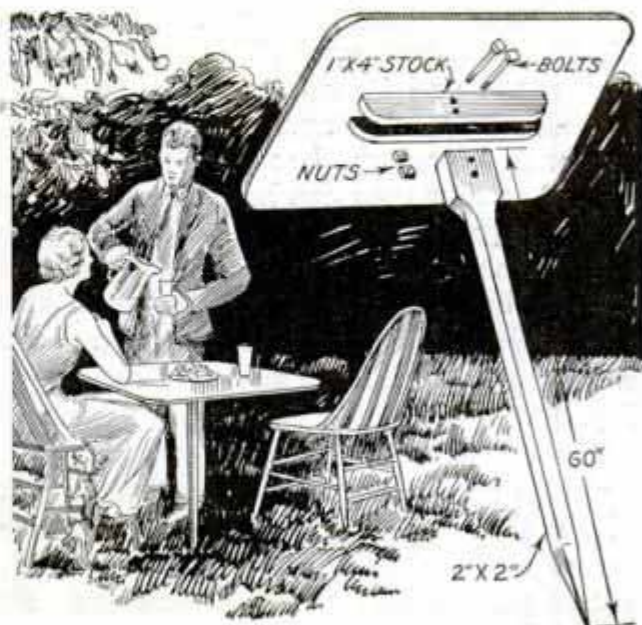
Shielding Glue Brush Handle to Protect Hands

Here is a simple arrangement that will prevent getting your fingers sticky when using a glue brush. Take one half of a small, hollow rubber ball and slip it over the handle of the brush as shown. This not only shields the upper part of the brush handle against glue, but also serves as a cover for the gluepot or bottle.



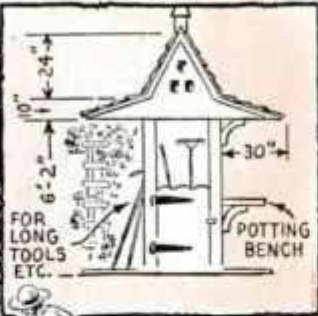
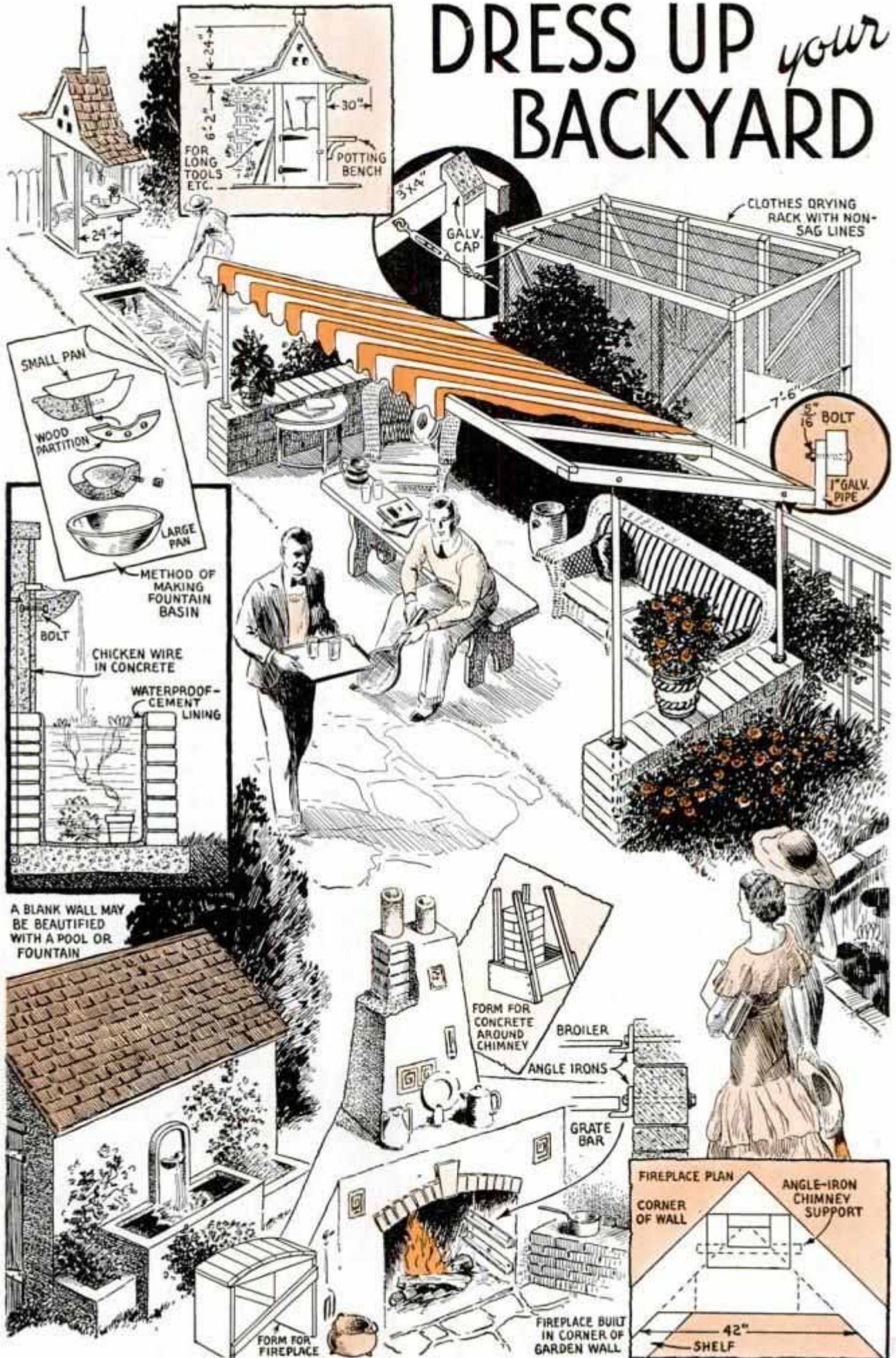
Portable Table Staked on Lawn

For card games and informal luncheons in the garden, this portable table is readily moved to any shady spot. When staked into the ground, it will be held in place firmly. As the size can be varied, only general dimensions are given. Hardwood should be used for the table, although the top may be plywood if it is kept out of the rain.—T. L. Moore, Detroit, Mich.

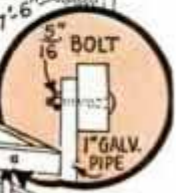


This table, which is quickly moved to any shady spot, has a detachable stake leg

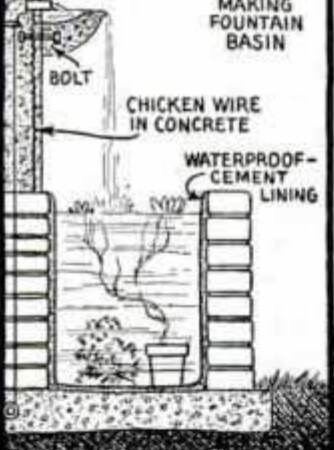
DRESS UP *your* BACKYARD



CLOTHES DRYING RACK WITH NON-SAG LINES



METHOD OF MAKING FOUNTAIN BASIN



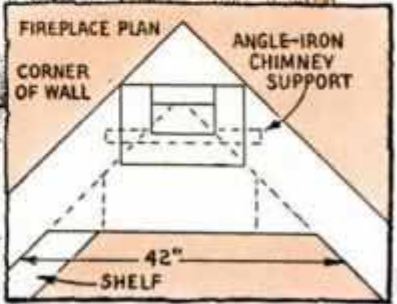
A BLANK WALL MAY BE BEAUTIFIED WITH A POOL OR FOUNTAIN



BROILER

ANGLE IRONS

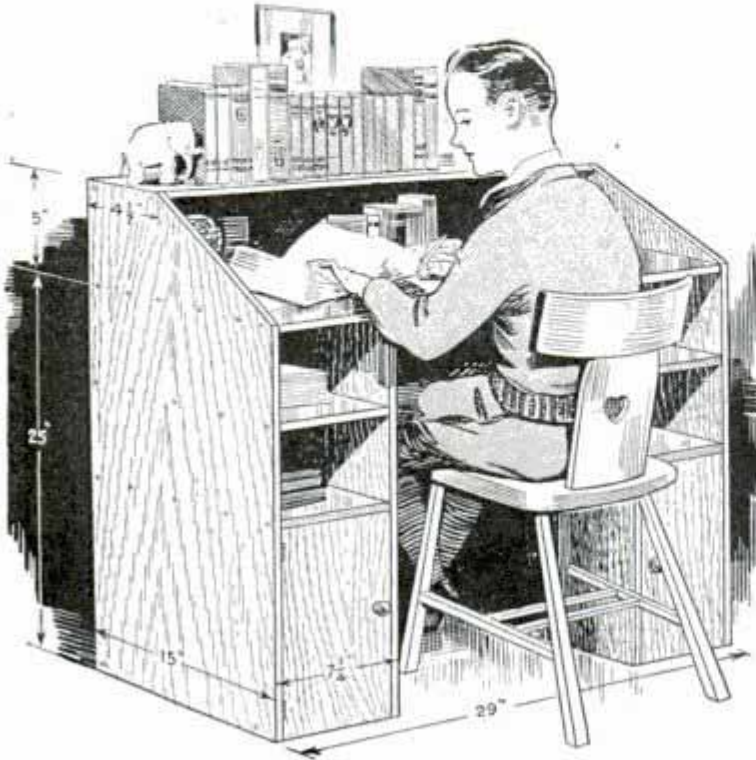
GRATE BAR



FIREPLACE BUILT IN CORNER OF GARDEN WALL

FORM FOR FIREPLACE

Inexpensive Desk of Plywood for Schoolboy's Study Room



Any boy who can use a hammer and saw can make this neat desk for his own private use

Just the thing for the schoolboy's or girl's study room, this desk can be assembled by anyone with a hammer, saw and screws. Made of $\frac{1}{4}$ -in. plywood, it is inexpensive and is really neat looking when painted or stained and varnished. Besides plenty of room for books, there is ample writing space, four open shelves for papers, ink and other school accessories, and the two closed compartments at the bottom are real treasure chests if the doors are fitted with locks. After assembling the desk, give it a thorough sanding, especially the exposed open grain at the edges and then apply your finish.

—Joseph Richter, Bayonne, N. J.

Preserving Fish and Lizards



While the preservation of large animals is a rather difficult job for the average amateur, anyone can preserve small fishes, lizards, snakes, etc., that have not been

dead more than 2 or 3 hours. Carefully wash the body in clear water and then make a clean cut along the underside and remove the intestines with a pair of tweezers. This must be done carefully as any remains may cause putrefaction. Then give the body a 10-min. bath in high-grade alcohol, dry it with a cloth and fill the cavity with sterilized cotton. As this replaces the intestines, it should not be packed tightly. The next thing is to harden the body, which is done in a 4-per-cent solution of Formalin. The hardening is best done by mounting the body of the animal on wires in a glass vessel in the same position that it is to take finally, and pouring the Formalin solution into the vessel. The hardening process takes from 2 to 6 weeks, depending on the size of the animal. Then the solution is poured out, and, after the Formalin remaining on the body has dried, a thin coat of clear

shellac is applied, the thinner the better. This must be repeated the next day, and possibly the third time. After this coat has dried, the animal is ready for mounting on wood or stones to which it is glued with iron cement.—Willy Ley, New York City.

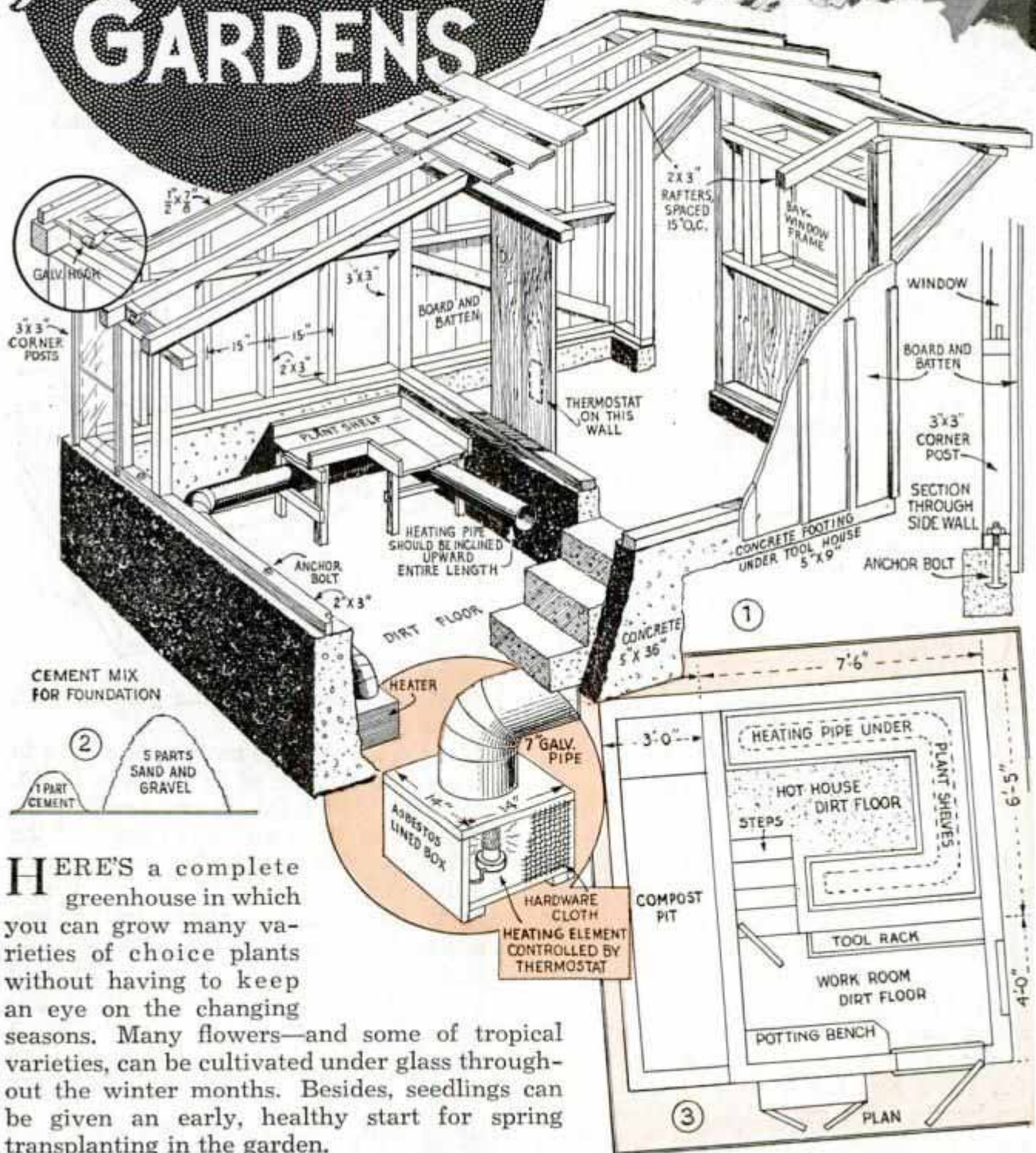
Steel Wool Held in Rubber Ball to Protect Hands

If you use steel wool for cleaning pots and pans in your kitchen, a holder made from a rubber ball will keep the wool confined so that you can apply plenty of pressure without getting fine slivers of steel in your hands. An opening, about one-third of the ball diameter, is cut and the ball is then stuffed tightly with the wool, which should project out of the opening about an inch.

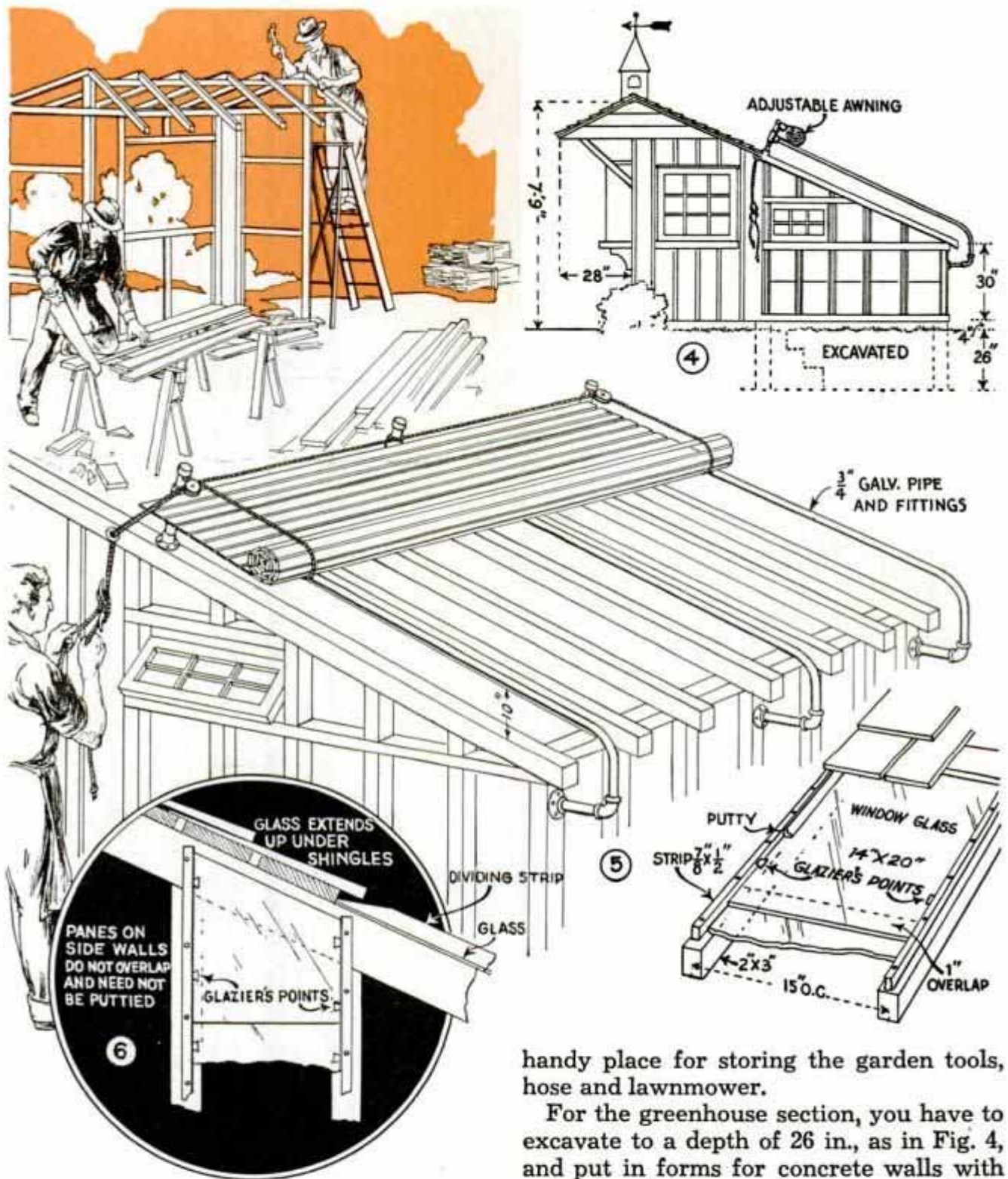
—E. T. Gunderson, Jr., Humboldt, Ia.



GLASS HOUSES *for Year-Round* GARDENS



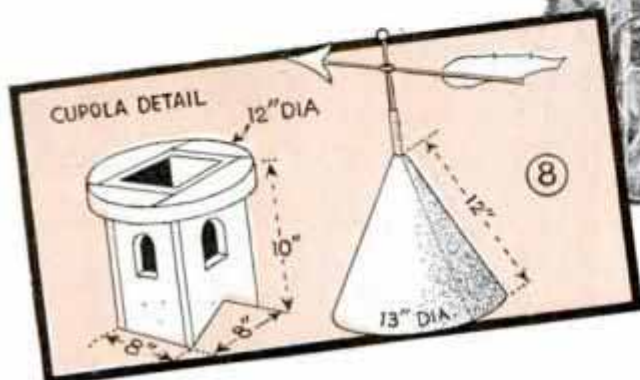
HERE'S a complete greenhouse in which you can grow many varieties of choice plants without having to keep an eye on the changing seasons. Many flowers—and some of tropical varieties, can be cultivated under glass throughout the winter months. Besides, seedlings can be given an early, healthy start for spring transplanting in the garden.



The continuous, sloping roof will save you a lot of trouble in building as a single set of rafters supports both the shingled and the glazed sections. From Figs. 1 and 3 you'll gather the general details and sizes of materials. The floor plan is merely a suggestion for the minimum size. You can increase this considerably and still use the same size materials for framing. A workroom with ground-level floor gives room for a potting bench, Fig. 9, while a rack built along the inside wall makes a

handy place for storing the garden tools, hose and lawnmower.

For the greenhouse section, you have to excavate to a depth of 26 in., as in Fig. 4, and put in forms for concrete walls with extension footings under the walls of the workroom as in Fig. 1. The cement mix for both walls and footings is shown in Fig. 2. The sills are fastened to the concrete with anchor bolts spaced about 16 in. apart. If there's room along the lot line it's a good idea to include the compost pit, in Fig. 3. If you do this, the foundation wall of the greenhouse is continued to the front, the excavation for the pit being the same depth as that for the greenhouse and walled with concrete on the remaining three sides. The rear end of the pit should



slope for easy removal of the contents. Grass and plant clippings mixed with moderate quantities of wood ashes and soil, will decompose in the pit and form an excellent fertilizing humus for your growing plants.

When you get the studding up and the rafters in place as in Fig. 1, you first board up the side walls of the workroom, put on the roof boards and lay the shingles. Then the glazed portion of the roof goes on. First, a $\frac{1}{2}$ by $\frac{7}{8}$ -in. strip is nailed along the center line of each rafter, after which the panes of double-strength window glass are set between the strips, with the ends overlapping 1 in., and are fastened with glaziers' points and putty as in Fig. 5. Note that the upper ends of the roof panes extend up under the shingles as in Fig. 6. On the side walls the ends of the panes butt together, glaziers' points and narrow strips being tacked in the corners to hold the glass in place. A small tilting window frame can be installed in each end of the greenhouse as in Fig. 5. A door to the workroom, front casement windows and a cupola, made as in Figs. 7 and 8, complete the exterior details of the building. An awning over the glazed roof, as in Fig. 5, helps to protect delicate plants from the direct rays of the summer sun and aids in maintaining a uniform temperature. Such



an awning can be made from a porch shade, galvanized pipe and pulleys at a moderate cost. Inside, you install plant shelves to suit your requirements, and an electric heater controlled by a thermostat as in Fig. 1. The exterior of the building is primed and then given two coats of outside white paint. Or, if you prefer, the surface of the wood may be stained with a gray or green shingle stain.

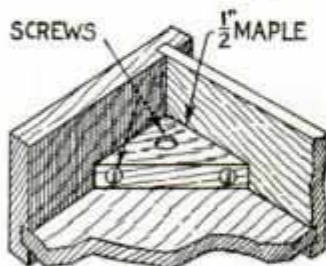
Tripod Held on Smooth Surface by Newspapers



Several layers of newspapers will keep the feet of a tripod from slipping on a hard surface

When a camera or surveying tripod is to be used on smooth, hard surfaces, where it is likely to slip, place several sheets of newspaper on the surface and force the points of the tripod legs into them. Six or eight sheets will hold considerable weight without tearing.

Drawers Repaired with Blocks

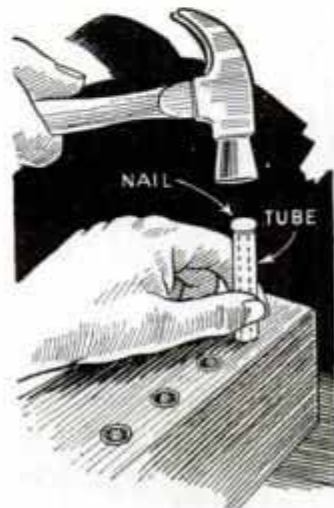


Both large and small drawers often "stick" because the glue used to assemble the rear section has loosened, allowing the parts to spread. Regluing and other similar methods do little good in most homes where the heated air is dry.

A better repair is to screw small, triangular blocks in the rear corners. In this way, the rear end of the drawer is held securely for all time and the bottom of the drawer is kept from slipping backward.

Tubing Driven into Wood with Aid of Nail

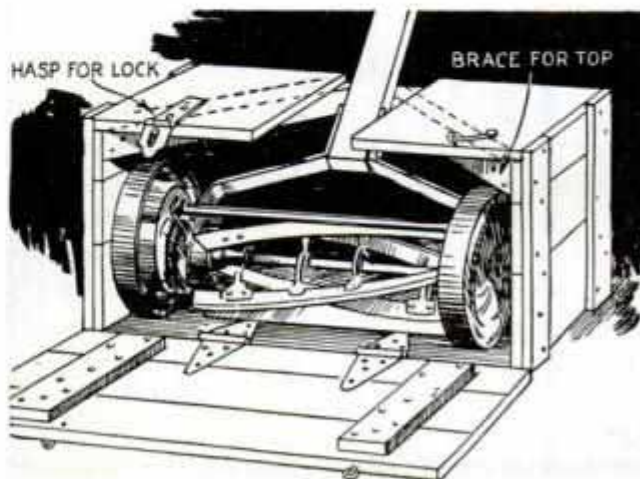
If you are making wood toys or models and want to use pieces of small tubing as bearings, here is a good method of driving them tightly into the wood. Grind one end of each piece to a sharp edge and insert a nail that fits snugly inside. You can



now drive the assembly into the wood easily, after which the nail can be pulled out, leaving the tube in place.

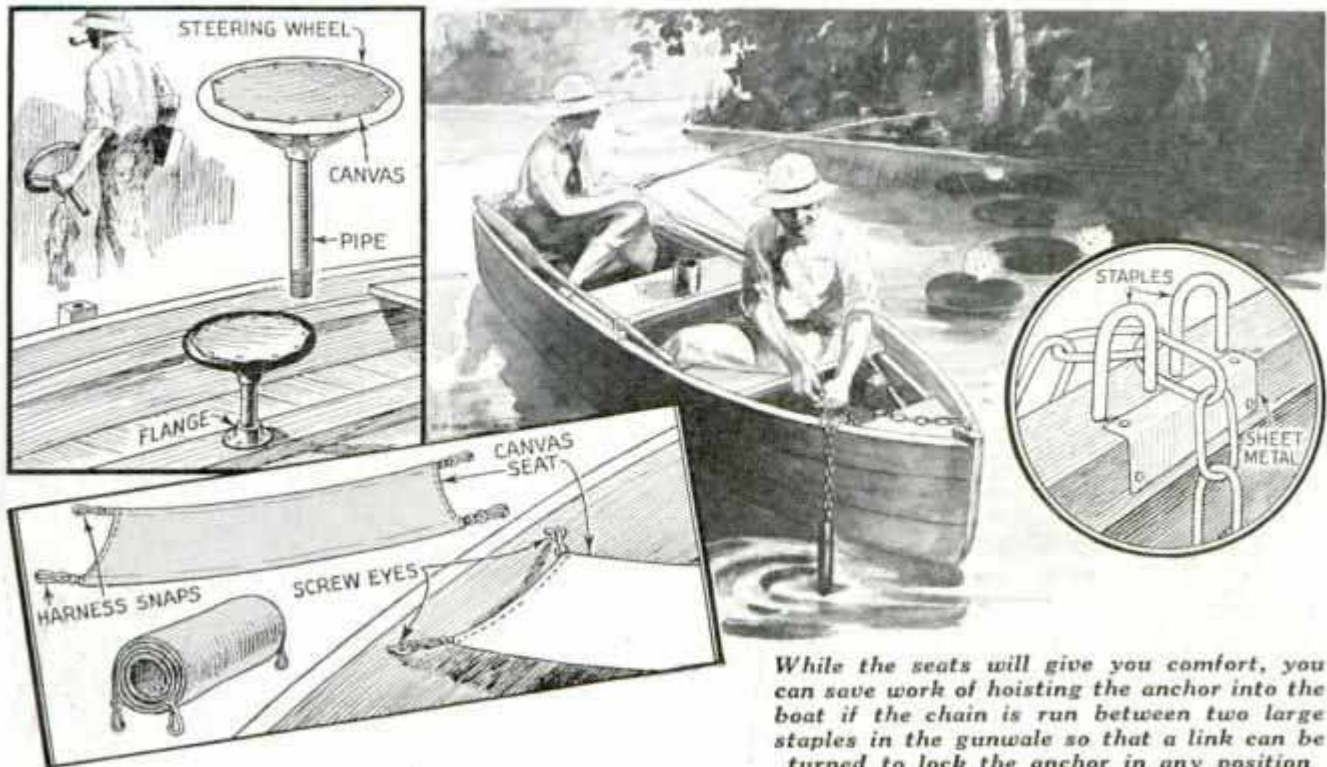
Lawnmower Housed in Box Is Out of Child's Reach

This box or housing in which a lawnmower can be stored when not in use solves the problem of keeping small children from playing with it. The divided top of the box leaves an opening for the lawnmower handle, while the hinged front, which is provided with a hasp and lock, drops down to remove the mower.



This box is made in a short time and may save your small child an injured finger

Detachable Seats Give More Room in Boat



While the seats will give you comfort, you can save work of hoisting the anchor into the boat if the chain is run between two large staples in the gunwale so that a link can be turned to lock the anchor in any position.

Have you ever gone out for an early morning fishing trip and found the boat seats wet and uncomfortable? These detachable ones, which you can take home when you leave the boat, are always dry, besides giving more leg room and being

more comfortable than the usual type. Or, if desired, the regular seats can be retained and two or three mountings for each of the detachable ones installed at different locations in the boat for use when carrying extra passengers.

"Wooden Shoe" on Wheelbarrow Rides over Soft Ground

When fitted with this detachable "wooden shoe," a heavily loaded wheelbarrow will ride over sand and soft ground and will avoid deep cuts in a lawn. Just slot 1 by 2-in. hardwood blocks to fit snugly over the rim of the wheel, and fasten them together with lengths of soft wire. You can use two lengths and loop them around each block, or you can take four lengths, two on each side, and twist them tightly together between the blocks. It's a good idea to cut small notches in the edges of the blocks to receive the wires. Hooks and turnbuckles at the ends of the tread permit it to be tightened snugly around the wheel.

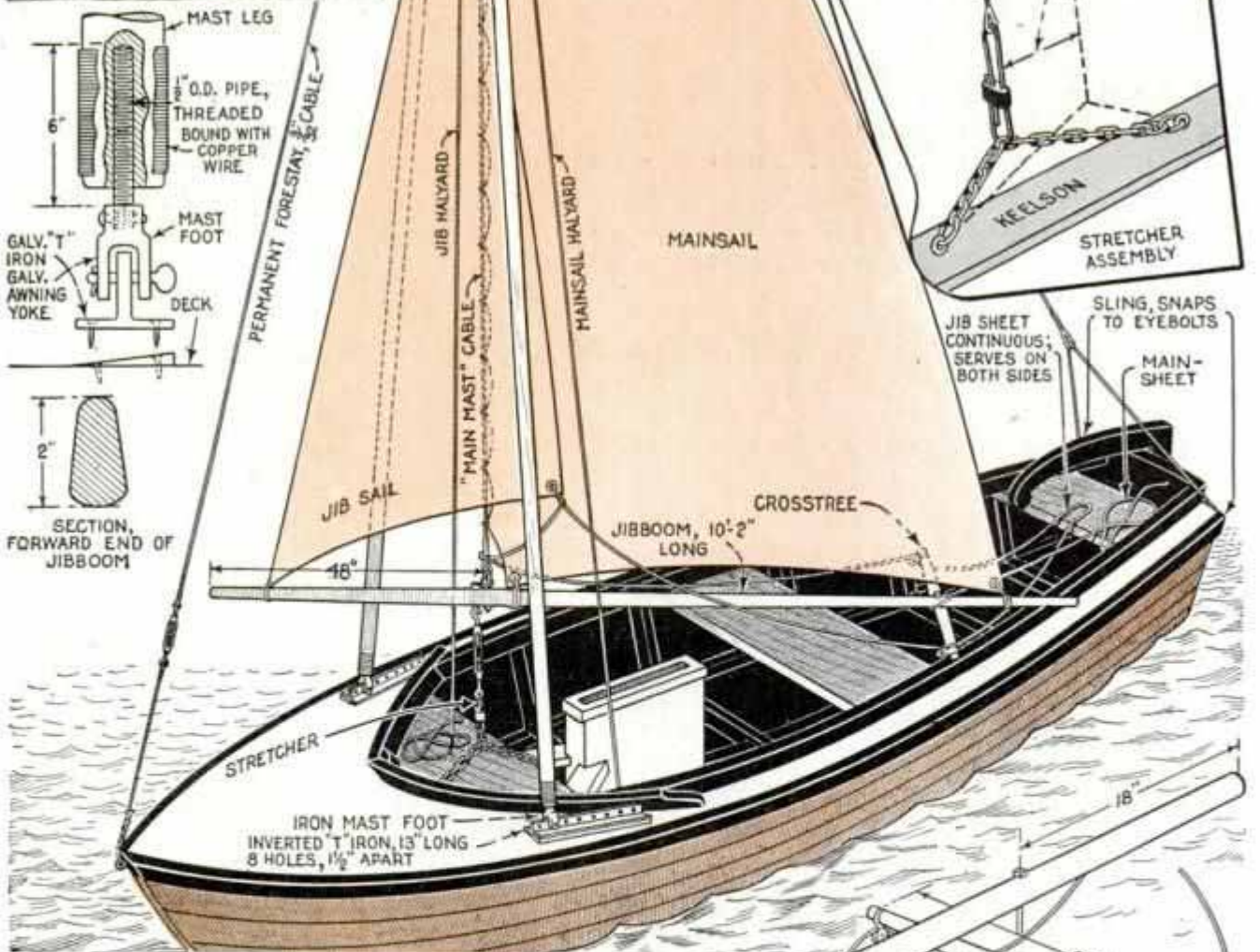
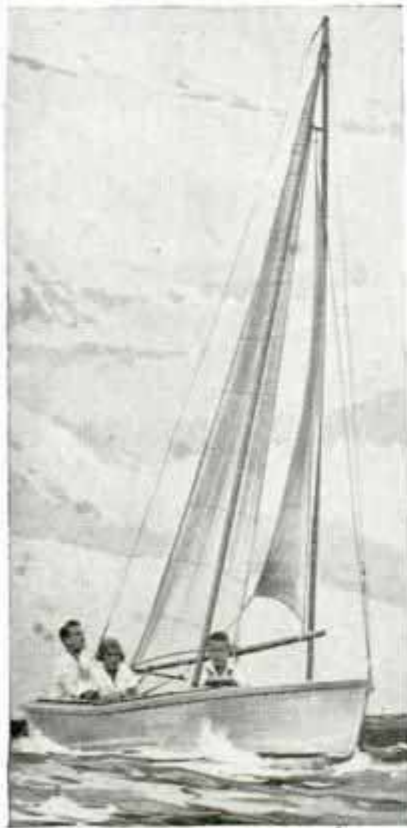
☐ Freshly enameled articles can be given an attractive finish by blowing fine bronze powder over them from a distance so that the particles are widely separated.



This wide, flexible tread for your wheelbarrow can be attached or removed in a few minutes' time.

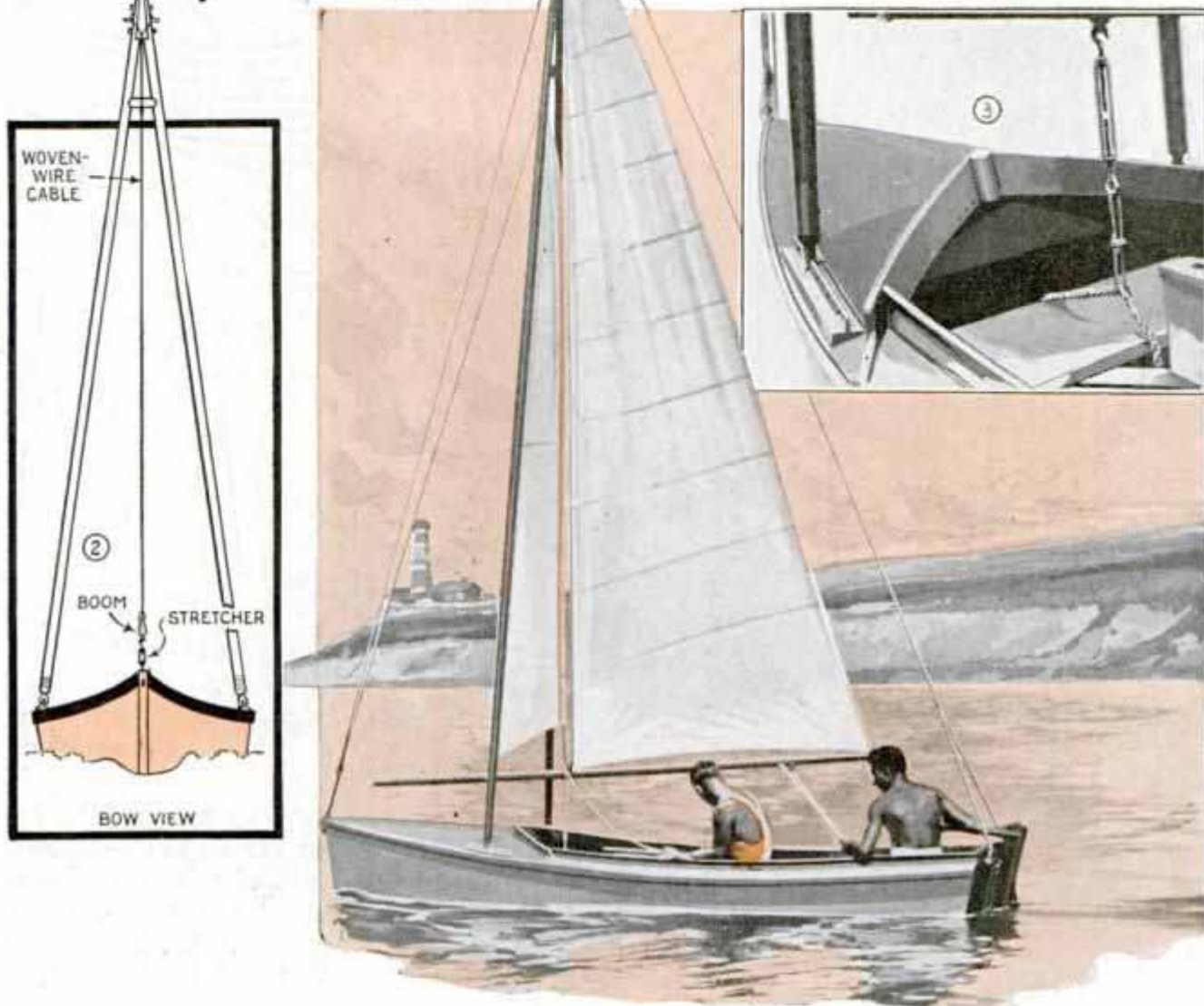
"JIBBOOM RIG"

By JAMES E. ROGERS



With this rig the wind acts directly on the luff of the mainsail, increasing its efficiency. The overlapping jib develops a funnel effect on the air stream passing between it and the mainsail

Adapted to Small Craft

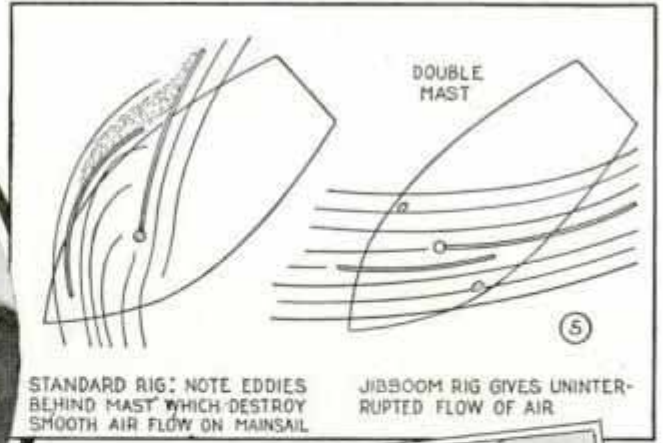
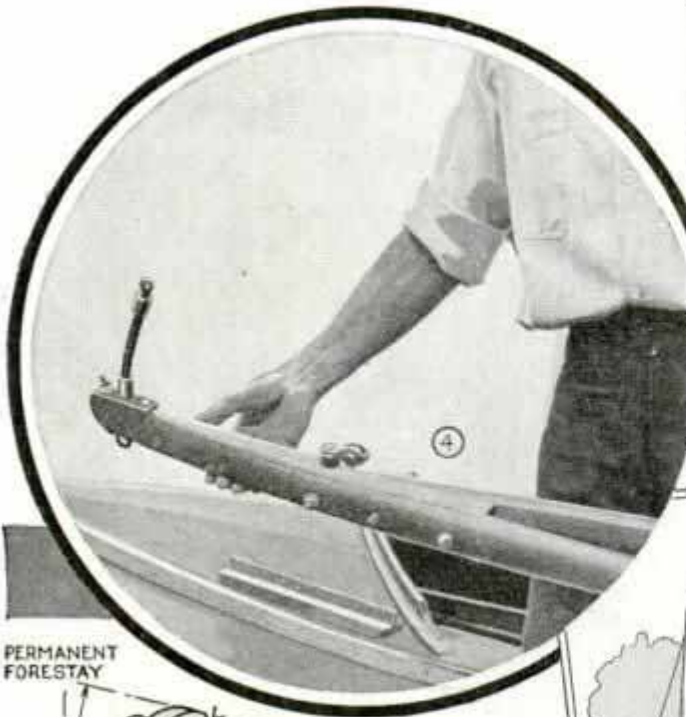


THIS novel jibboom rig has been adapted to a 14-ft. hull and has proved to be highly successful. It requires a double, or A-type mast, which provides many advantages over the standard single-mast rig. Recently two identical hulls, one with standard, the other with this jibboom rig, but with 30 per cent less sail area, were run in competition, the result proving that the jibboom-rigged sloop was just as fast as the boat equipped with the standard rig. The main reason for this greater efficiency is the narrowing of the space between the mainsail and jib. Thus, the overlapping jib develops a funnel effect on the air stream passing between it and the mainsail as is shown in somewhat exaggerated form in Fig. 5. The faster the air passes through this gap, the greater will be the drive of both sails. By narrow-

ing the gap to certain efficient limits according to the speed of the wind and the point of sailing, the air speed in the gap is increased to a maximum, without developing disturbing eddies.

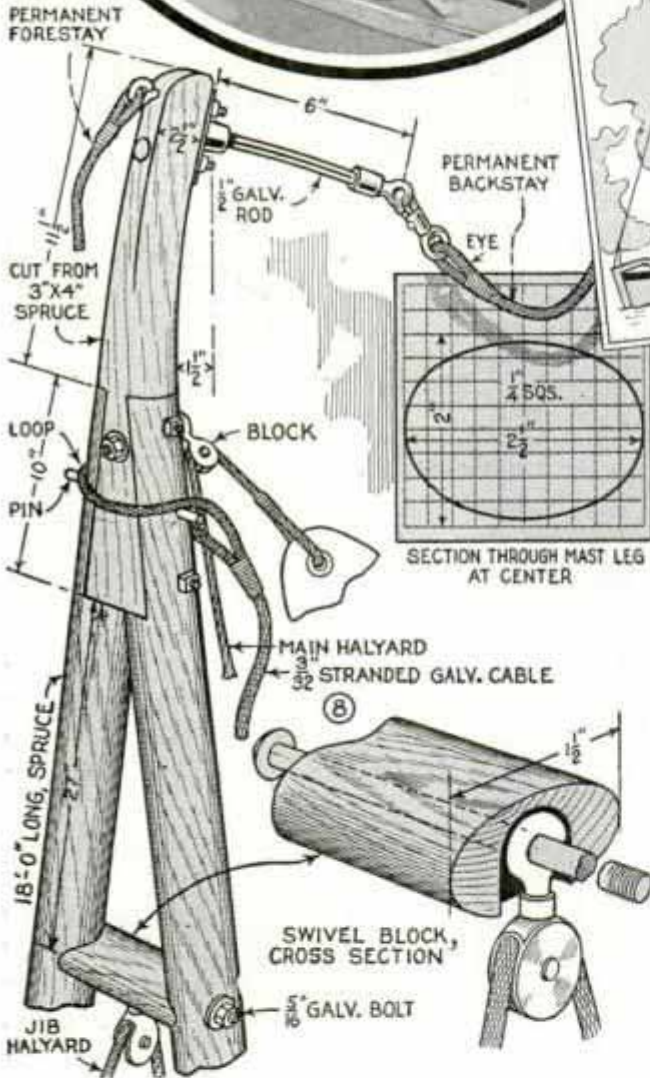
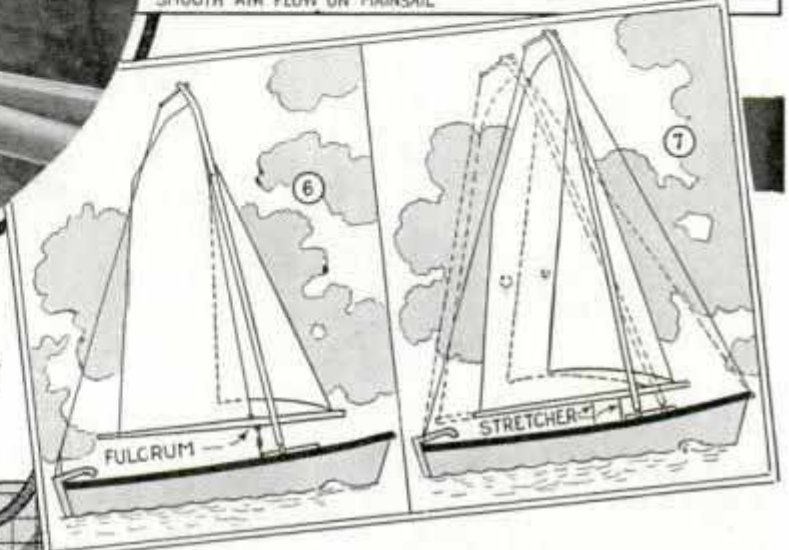
The mainsail and jib, being on the boom, exert horizontal forces on both sides of the fulcrum point, Fig. 6. The smaller jib force thus balances a portion of the larger mainsail force, making it easy for the skipper to shift the boom to any desired position. Unlike the standard rig, the mainsail is hoisted on a thin woven cable as in Figs. 1 and 2. This permits the wind to act immediately on the forward edge or luff of the sail.

The stretcher, Figs. 1 and 3, which secures the boom to the hull, acts as a fulcrum when the jib fills and tends to pull up the forward end of the boom, thus



STANDARD RIG: NOTE EDDIES BEHIND MAST WHICH DESTROY SMOOTH AIR FLOW ON MAINSAIL

JIBBOOM RIG GIVES UNINTERRUPTED FLOW OF AIR



the rake of the masts, by moving the feet of the masts fore or aft on the T-rails, or by adjusting the foot of the stretcher on the chain fastened to the keelson. The rake of the mast is controlled by the fore and aft stays, Fig. 7. Incidentally, the mast can be lowered without unshackling the feet, simply by loosening the forestay and dropping the rig aft.

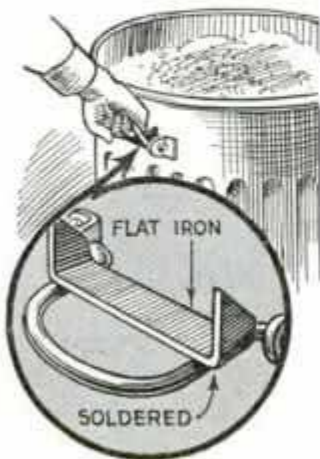
In construction, you begin with the double mast, each leg of which is an 18-ft. length of spruce oval in section as in Fig. 8. This length is suitable for a 14-ft. hull. The spread of the mast feet is determined by the location of the T-rails on the deck as in Fig. 1. At the head of the mast the legs are joined to a spruce gooseneck. To this is bolted a galvanized extension and eye for the backstay, Figs. 4 and 8, an eye-bolt for the forestay, and a block or pulley for the mainsail halyard. Projecting ends of a pin support the rawhide-seized, spliced eye in the 3/32-in. stranded-cable mainmast, which slips over the head of the double mast as in Fig. 8. Below the head of the double mast is a spruce cross member or spreader. A bolt passes through this and the mast legs, and through the eye of

helping to keep the mainsail taut, and at the same time practically eliminating the twist at the peak. The turnbuckle keeps tension on the cable "mainmast" and holds the boom to the center of the boat at the pivot point. The center of effort of the sails can be shifted at will by changing

a swivel block, as shown in the cross section, Fig. 8.

In the foot of each mast leg is fitted a connection consisting of an ordinary awning yoke, threaded and riveted to a section of $\frac{1}{2}$ -in. bronze or brass pipe as in Fig. 1. The $\frac{1}{2}$ -in. pipe is screwed into a hole bored in the mast leg after which the assembly is bound or seized with copper wire. Each of the T-rails along the deck has eight holes spaced $1\frac{1}{2}$ in. apart to permit fore and aft adjustment of the mast legs. For a 14-ft. hull, the spruce boom should be 10 ft. 2 in. long with the eyebolts for wire mast and stretcher located 48 in. from the forward end. The boom tapers fore and aft from this point. Along the after end of the boom is clamped a crosstree, the exact location of which is determined by the shape and size of the jib and by experimentation. Blocks on the ends of the crosstree carry the continuous jib sheet. Due to the partly balanced forces on the boom, it is easy for the skipper to handle both jib and main sheet in one hand and steer with the other. No traveler or tackle is required.

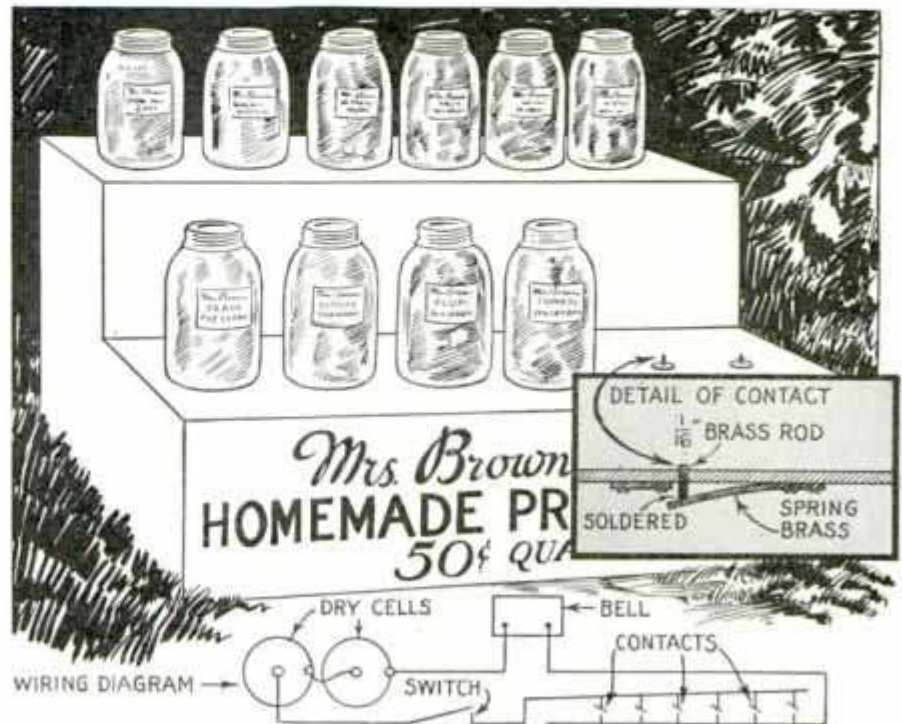
"Bumpers" for Ash-Can Handles



the ends of the "bumpers" bear against the container and provide hand space.

If the handles on your ash can, wash tub, or similar container pinch your knuckles when you pick it up, U-shaped pieces of thin, flat iron, soldered or welded to them as shown in the detail, will stop the trouble. When the handles are raised,

Lifting Jars from Counter Display Closes Contact to Ring Hidden Bell



Alarm system for roadside stands operated by dry cells or transformer is always on the job to announce the arrival of customers

One roadside-stand owner works in a near-by garden during his spare time and depends on a display built along the lines of the one shown in the sketch to inform him of the presence of prospective customers. Persons interested in the products almost invariably lift them from the shelves for closer examination. This allows the spring-brass contact to close which rings the bell, calling the owner's attention to the fact that his services are desired at the stand.—F. Mix, Chicago.

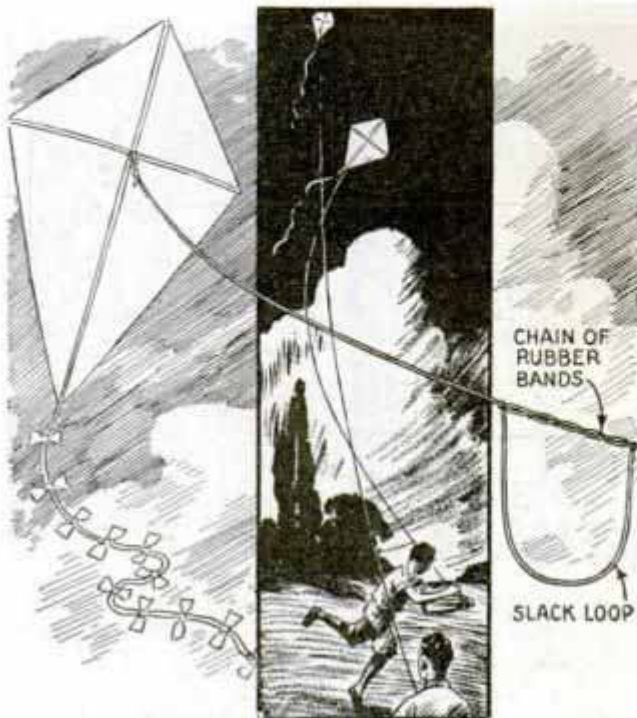
Bottle Cork Has Safety Stop

When a bottle is used frequently, you can prevent the cork from being pushed down inside if a safety pin is pushed through it near the upper end as shown in the photo. Be sure to insert the pin across the grain so that the cork won't split easily.



—A. H. Waychoff, Tempe, Ariz.

Kite String with Shock Absorber Withstands Sudden Jerks



Sudden strains that would ordinarily break a kite string are absorbed by this rubber chain

If you've lost a kite by having a sudden gust of wind break the string, a chain of rubber bands tied into it as shown will take care of this trouble in the future. Be careful when tying the rubber chain to the string to see that the slack in the latter is taken up just before the stretching limit of the rubber is reached.

—Lester P. Young, Culver, Ind.

Drill Bits Fall into Safety Net



Have you ever had a bit drop through the drill-press table and damage the point on the floor? If so, a cloth net hung underneath the table as shown will avoid this trouble. The net is fitted with straps, which are attached to the table with snap fasteners,

half of each fastener being riveted into small holes drilled through the sides of the table. If snap fasteners are not at hand,

the ends of the straps can be slit to slip over the heads of stove bolts, which have been locked in the holes with a nut on each side. In this way, one side of the net can be unfastened to hang down when fences are to be clamped to the table.

Soles of White Shoes Shielded When Cleaning Uppers

It's easy to clean white shoes without getting polish on the soles, if you use this shield which is cut from a piece of heavy cardboard, such as an old shoe box. Place your shoe on the cardboard, mark around the edge of the sole and cut inside the line about $\frac{3}{8}$ in., so that the shield will fit snugly between the welt and the upper part of the shoe.



Table-Corner Pads Protect Heads of Small Children

To keep small children from injuring their heads on a sharp corner of a table, you can use padded shields. They are



If a child bumps its head on a table corner, these pads will cushion the shock

merely triangular pieces of inner tube sewed or cemented together along two sides and padded with cotton.

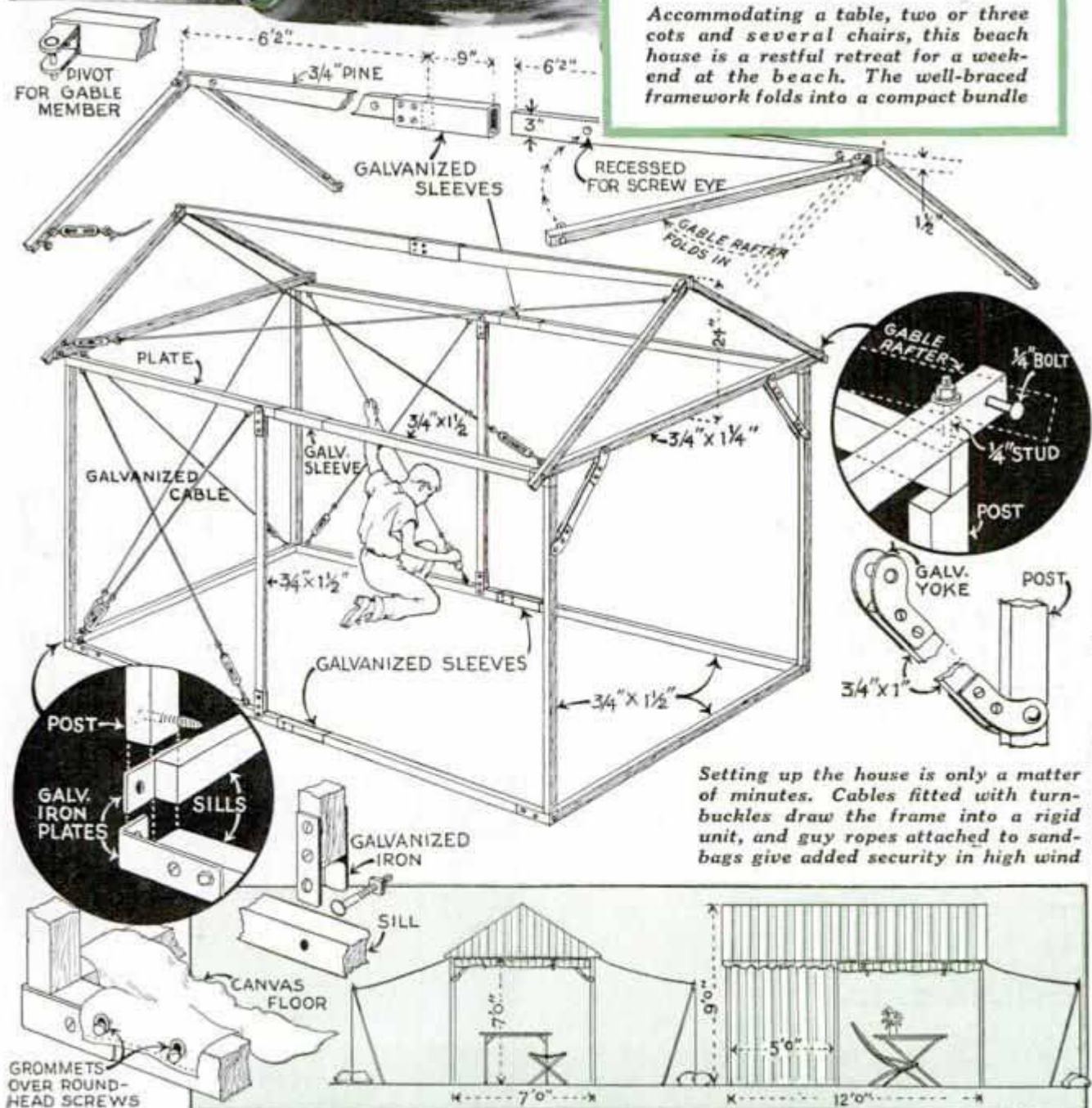
☞ Your pencil clip will hold better if a short piece of rubber tubing is slipped over the ball knob.

BEACH HOUSE

Carried on Running Board

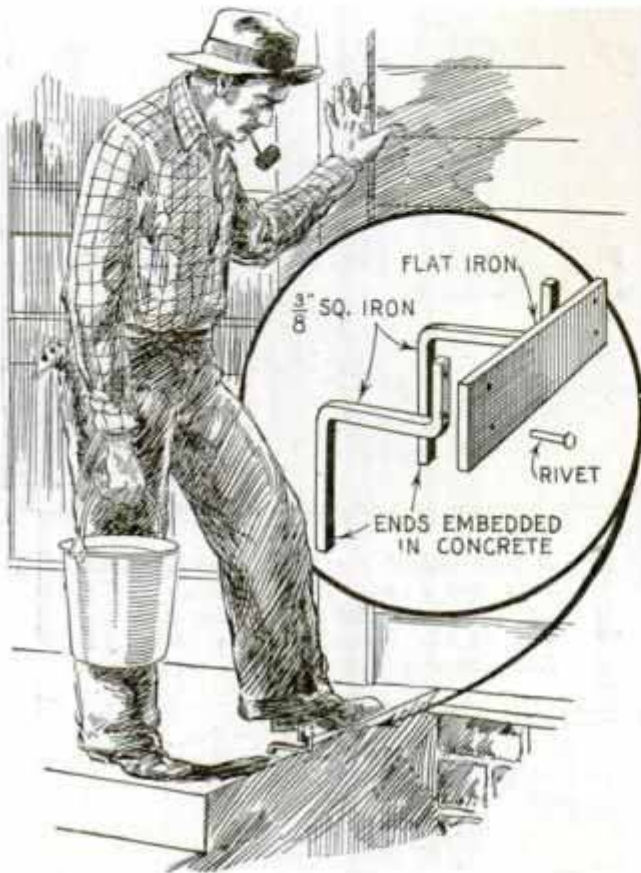


Accommodating a table, two or three cots and several chairs, this beach house is a restful retreat for a weekend at the beach. The well-braced framework folds into a compact bundle



Setting up the house is only a matter of minutes. Cables fitted with turnbuckles draw the frame into a rigid unit, and guy ropes attached to sandbags give added security in high wind

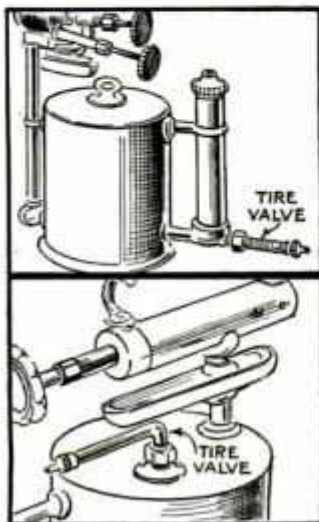
Offset Foot Scraper on Step Lets Dirt Fall on Ground



Projecting over the edge of concrete, this scraper is especially suited to porch steps where space is limited

Dirt removed from boots and shoes with this scraper falls on the ground or in a box provided for the purpose, instead of accumulating on the doorstep. The scraper may be set in newly laid concrete steps, or it can be set in a separate block buried in the ground near by.

Pump on Blowtorch Replaced with Tire Valve



When the pump on my blowtorch wore out, I repaired it as shown in the upper detail so that an auto pump could be used. The hand valve at the bottom of the pump was removed and an auto-tire valve soldered in its place, after which the upper part of

the pump barrel was plugged with solder to make it airtight at this point. The lower detail shows how a tire valve is installed when the pump is inside the blowtorch.

—Wm. A. Henry, Los Angeles, Calif.

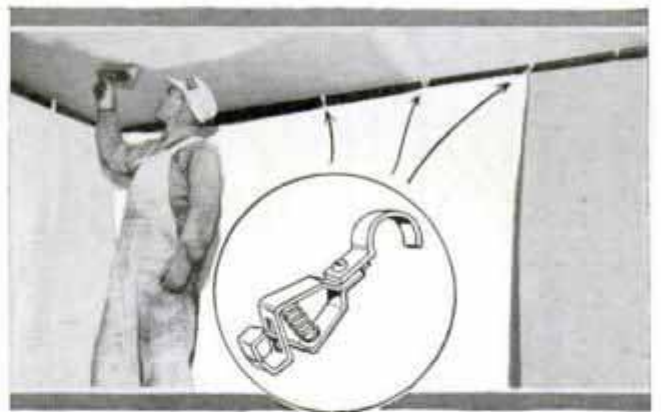
Shoehorn Cuts Corn from Cob

Cutting sweet corn off the cob for canning is made much easier by using a shoehorn instead of a knife. The wide end of the horn, which is sharpened, conforms to the curvature of the average ear of corn, making it easy to shear off the kernels. If the shoehorn is hard on the hand, a few layers of tape around the small end will pad it.



Calcimine Is Kept Off Walls by Using Drop Cloth

Temporary protection for walls when applying calcimine to the ceiling can be



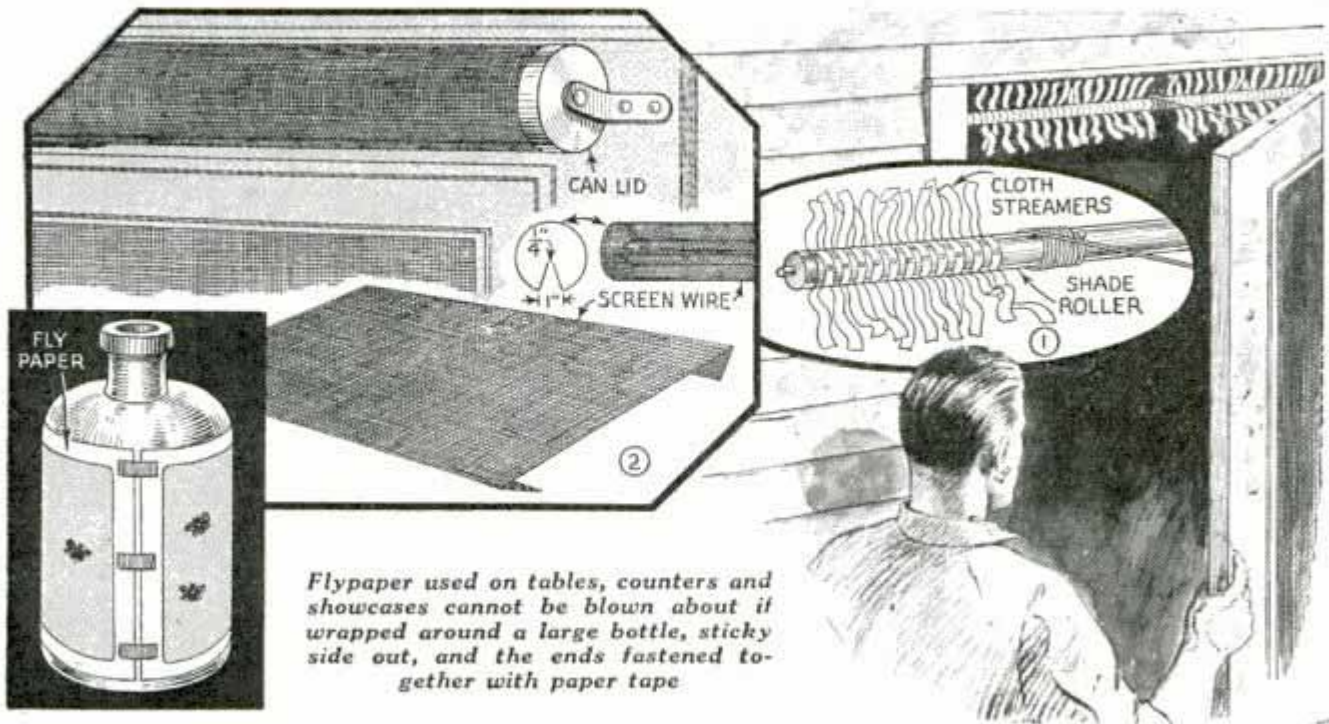
Here's the way one home decorator eliminates the job of cleaning side walls after calcimining ceilings

obtained by suspending a large sheet of muslin or canvas from the picture molding. Detachable hooks, which grasp only the edge of the cloth, are made by straightening one end of picture hooks and fastening them to battery clips.

Ⓜ Roughing the bottoms of a baby's shoe soles with sandpaper will help prevent slipping on polished floors.

see art. Dec. 1936 599

Rotary Fly Chaser Works as Door Is Opened



Flypaper used on tables, counters and showcases cannot be blown about if wrapped around a large bottle, sticky side out, and the ends fastened together with paper tape

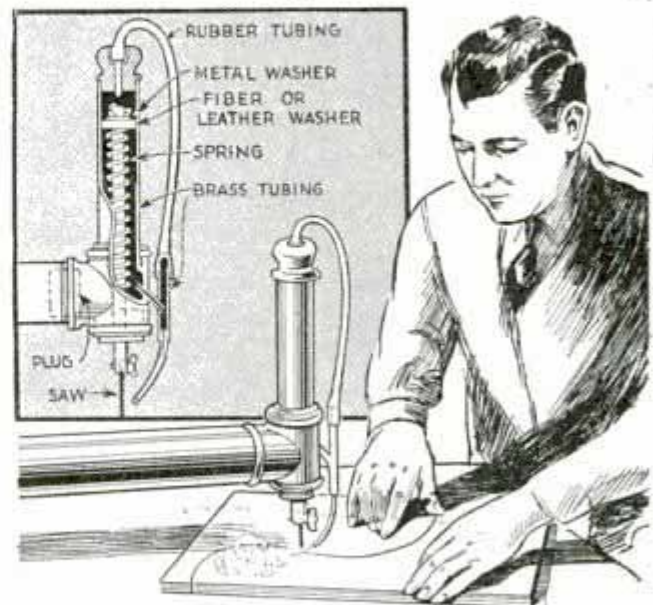
Rotating rapidly when the door is opened, the fly chaser shown in Fig. 1 will help keep flies from getting into the house when you enter. It consists of a window-shade roller carrying a number of cloth streamers and having the small pawls at the end removed so that the spring in the roller works freely. The fly chaser is rotated by means of a string wrapped around the center of the roller and tied to the door. Fig. 2 shows an effective trap to

catch many of the flies that gather on a screen door. Made to any desired size, the trap is a cylinder of screen wire with a V-shaped opening at the lower side, two can lids being slipped over the ends to hold it. Flat-iron brackets, pivoted to the lids slightly off center, support the trap just above the screen door. Or, wide legs cut from heavy sheet metal can be substituted for the brackets to support the trap on a table, shelf or counter.

Double-Action Blower on Scroll Saw Keeps Work Clean

After constructing a scroll saw of pipe and fittings, I used the saw head as a double-action blower by converting the spring plunger and its housing into a pump. This was done by putting a leather washer on the upper end of the plunger, and driving hardwood plugs into both the housing and the pipe-tee head where the latter is screwed into the horizontal member of the saw throat. Brass tubes, leading from the plug in the housing and from a small hole in the pipe tee, were joined and soldered together to form a single tube, which directed the air on the work.

—Fred Strickland, Portland, Ore.



Spring plunger in head of scroll saw converted into pump to direct jet of air on work

When correcting typewritten matter, rub only one way with the eraser and the paper is not so likely to be mutilated.

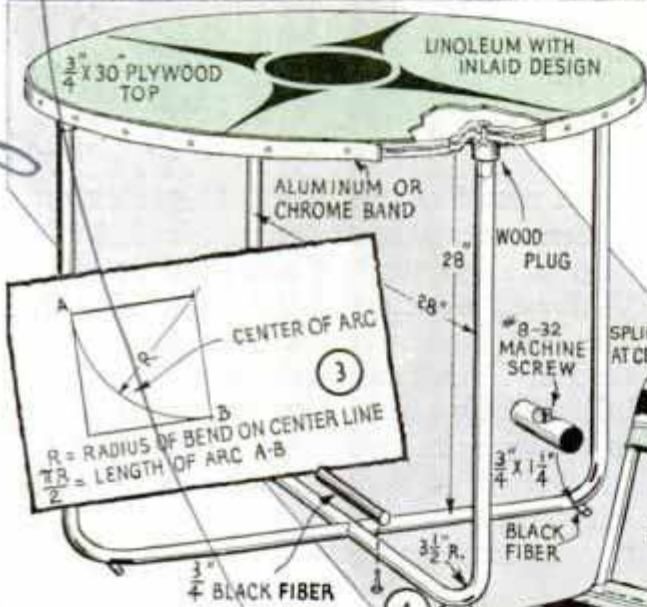
American Brass Co., Waterbury, Conn.
 Steel Tubes, dw. 200 E 131 st
 Cleveland, O.

Bent-Tube

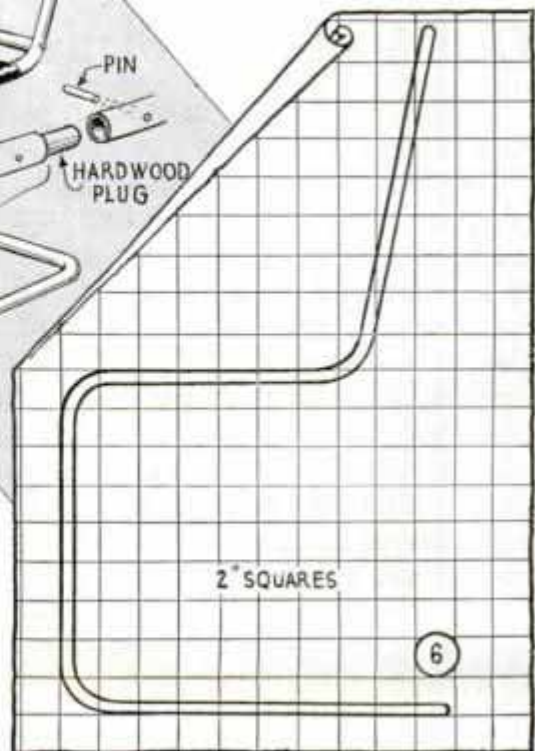


sary strength at the bends. Now, looking over the various pieces detailed you will see that by selecting designs, several sets of chairs and tables can be made.

Going into the construction, Figs. 2 and 11 show the bending jig used to shape the tubing. Fig. 3 gives a formula for getting the proper radius of the various bends, and Fig. 4 details a simple project to start with. Two of the legs are formed from a single piece of tubing as in Fig. 1. The two remaining legs are



THOUGH it's especially designed for outdoor living rooms you can use this bent-tube furniture indoors to modernize a recreation room, sun room, or even the parlor. Electrical conduit, 1/2-in. size, is particularly suited to this type of construction because it is soft enough to bend cold to a comparatively short radius and yet is sufficiently rigid to withstand severe use. The japanned finish in which this material comes makes a good foundation for quick-drying lacquers or enamels. Aluminum tubing, although it's more expensive, can also be used in making all the pieces shown except the type of chairs detailed in Figs. 5, 6, 15 and 16. Due to the design, these two pieces should be built of conduit, as thin-walled aluminum tubing lacks the neces-



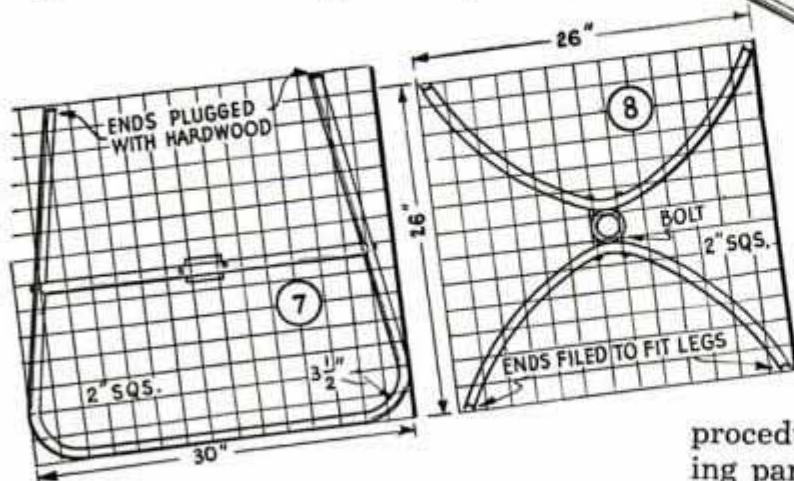
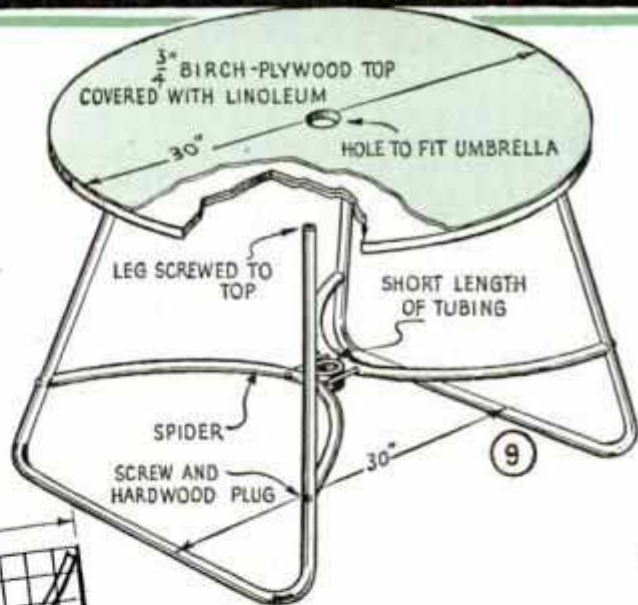
Chicago
 Steel Sales Corp.
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FURNITURE



for Modern Gardens

bent separately and the lower ends are filed concave to fit the first member and form a neat right-angled joint. A short length of $\frac{3}{4}$ -in. round black fiber is fastened over the joint with screws driven through the tubing. This holds the joint and further carries out the modern design. The four feet are of the same material. Hardwood plugs, turned to a tight fit, are driven into the top end of each leg, and screws, which hold the circular plywood top, are driven through the top into these



plugs. Linoleum, of whatever design you choose, is cemented to the top. A chrome or aluminum band around the edge finishes the job.

Now, to build the other two tables, shown in Figs. 7, 8, 9 and 19, you follow the same general procedure in bending the tubing and joining parts together. When you bend thin-walled aluminum tubing, it's best to fill the tube with sand, ramming it hard, and plug the ends as in Figs. 17 and 18. Also, it's a good idea to turn a concave groove in the edge of the bending disk on the jig,

A table just suited to use in the outdoor living room for refreshments, card parties, etc. It's arranged to hold a lawn umbrella which can be anchored with a pin driven into the ground. The inlay design shown in Fig. 4 can be used on this table top, if desired

Lussby, White & Cambridge
 69 W. Lake, Cherry
 Lussby, White & Cambridge
 69 W. Lake, Cherry

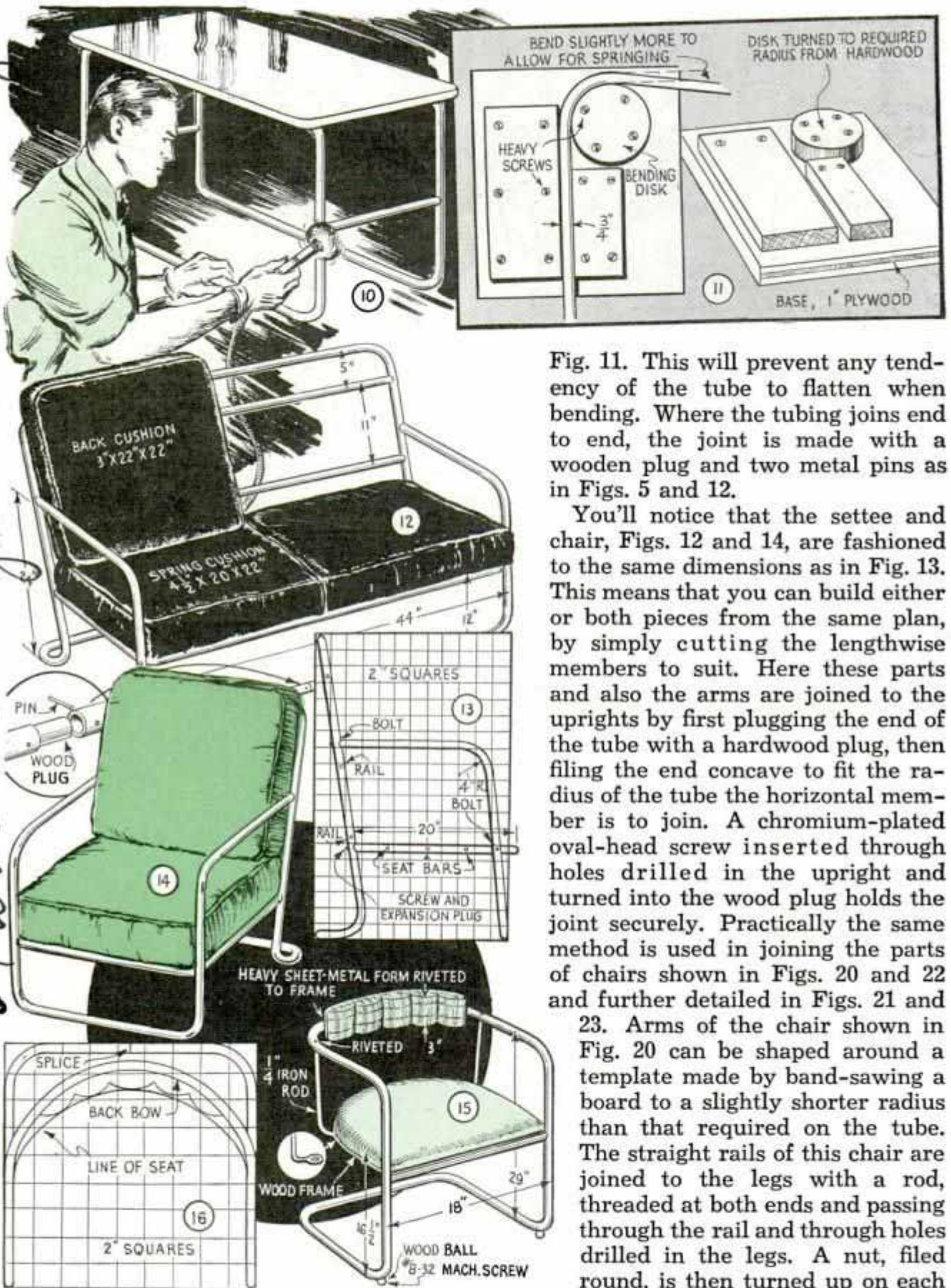
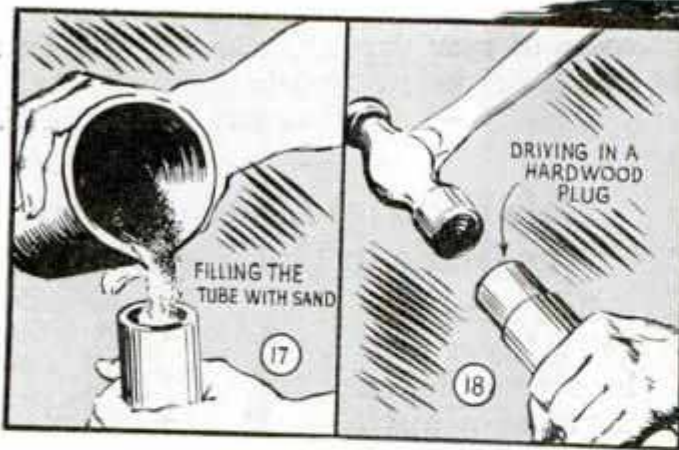


Fig. 11. This will prevent any tendency of the tube to flatten when bending. Where the tubing joins end to end, the joint is made with a wooden plug and two metal pins as in Figs. 5 and 12.

You'll notice that the settee and chair, Figs. 12 and 14, are fashioned to the same dimensions as in Fig. 13. This means that you can build either or both pieces from the same plan, by simply cutting the lengthwise members to suit. Here these parts and also the arms are joined to the uprights by first plugging the end of the tube with a hardwood plug, then filing the end concave to fit the radius of the tube the horizontal member is to join. A chromium-plated oval-head screw inserted through holes drilled in the upright and turned into the wood plug holds the joint securely. Practically the same method is used in joining the parts of chairs shown in Figs. 20 and 22 and further detailed in Figs. 21 and 23. Arms of the chair shown in Fig. 20 can be shaped around a template made by band-sawing a board to a slightly shorter radius than that required on the tube. The straight rails of this chair are joined to the legs with a rod, threaded at both ends and passing through the rail and through holes drilled in the legs. A nut, filed round, is then turned up on each end of the rod. Another way is to simply use the rod as a long rivet, peening over the projecting ends. If you countersink the hole before inserting the rod, the ends can be peened over and the excess filed

By halving the width, the settee in Fig. 12 becomes the chair shown in Fig. 14, as the end dimensions are the same. Spring-cushioned backs and seats can be made by purchasing the spring assembly ready-made, padding it lightly with cotton and sewing on a covering of cloth or artificial leather. The metal frames can be made of conduit, enameled in color, or polished aluminum tubing

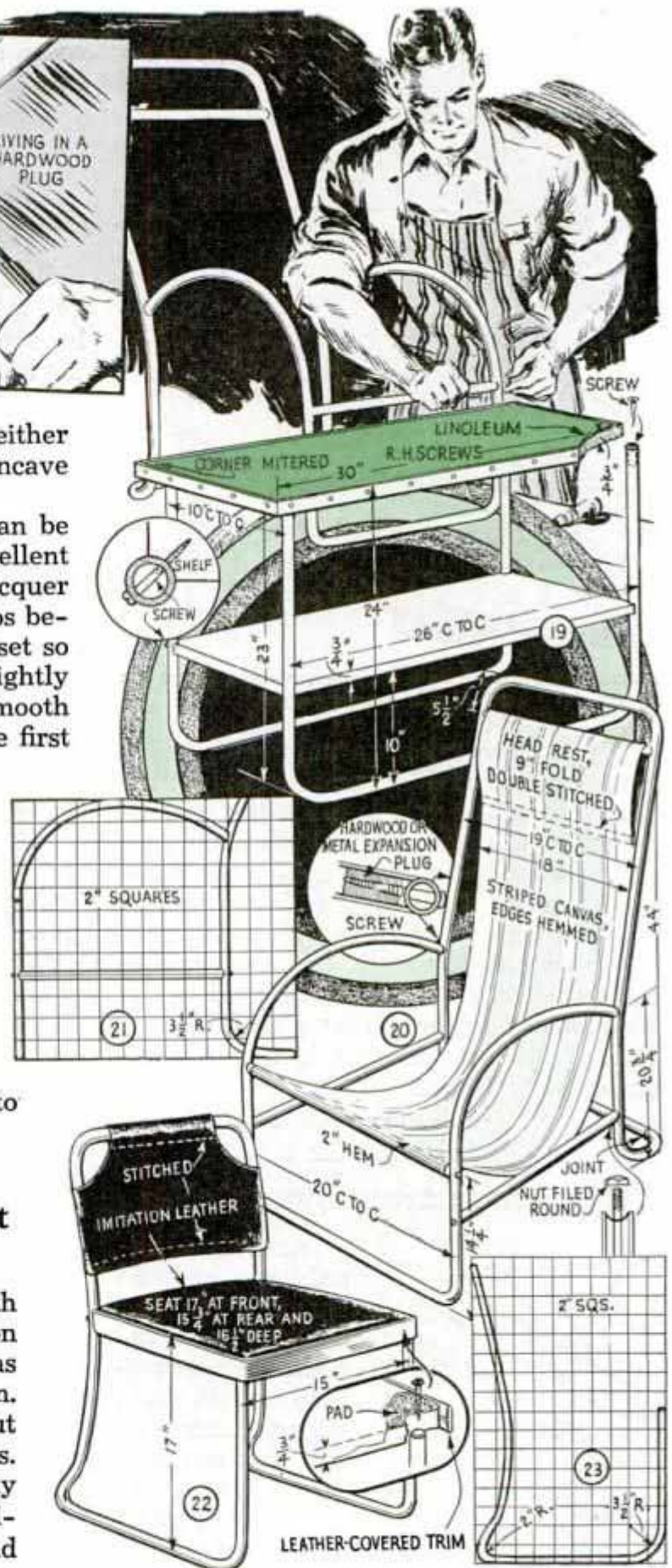


away to produce a neat job. In either case, the ends of the rail are filed concave to fit the tubular legs.

Now about finishing. Conduit can be lacquered or enameled with excellent results. Any quick-drying brush lacquer or enamel will do, the latter perhaps being preferable because it does not set so quickly. First, sand the conduit lightly to remove any loose particles and smooth up rough spots. Then brush on the first coat of enamel or lacquer and allow to dry thoroughly. Before applying a second coat, go over the first lightly with fine sandpaper. Then follow with the finish coat, carefully brushed out to avoid sagging on the rounded surfaces. Where aluminum tubing is used it may be polished highly with a buffing wheel driven by a flexible shaft as in Fig. 10. A coat of clear metal lacquer will help to preserve the high polish.

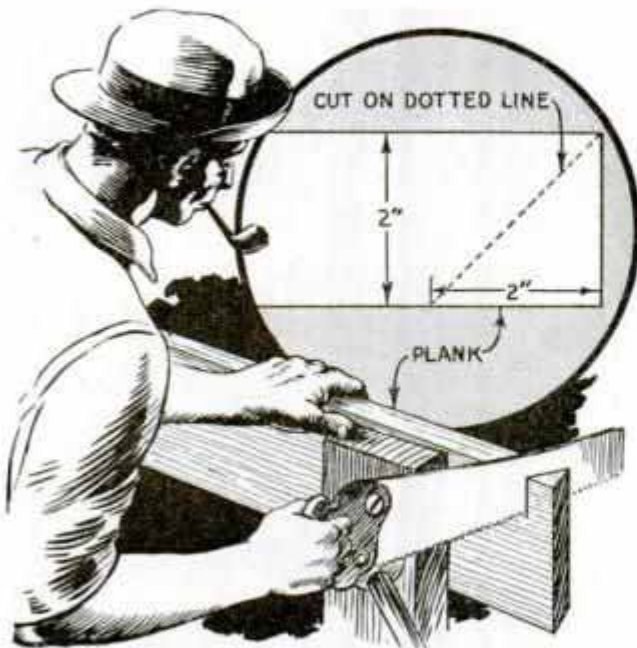
Keeping Dogs and Cats Out of Your Garden

By spraying flowers or shrubs with a dilute nicotine-sulphate solution you can keep small animals, such as dogs and cats, out of your garden. The spray is harmless to plants but it is very offensive to the animals. Commercial preparations usually contain 40 per cent of nicotine sulphate, and such preparations should be used in the proportion of $1\frac{1}{2}$ teaspoonfuls to a gallon of water. Spraying should be renewed about every two weeks during ordinary weather and after a rain.



Metal frames for any of these three pieces can be made of either polished aluminum tubing or electrical conduit finished in quick-drying colored lacquer or enamel. By combining these and other designs shown, several sets of attractive porch and garden furniture can be made

Accurate Miter Cuts Sawed Without Gauge or Box

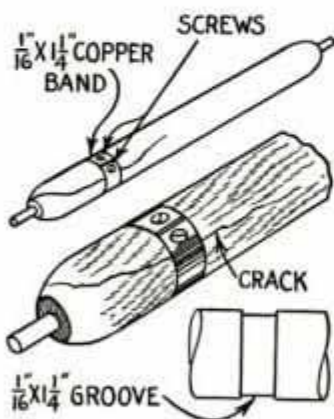


Measuring up work to make a miter cut without the aid of a box or a gauge

If you have to saw a miter cut, and a gauge or box is not at hand, here is a trick that will enable you to make the cut accurately. Simply mark off from the end of the work a distance equal to its horizontal width. Then draw a line at an angle from the end of the mark to the opposite corner of the work as shown in the circular detail. In the example given, the dimensions are for mitering the end of a 2-in. plank, but the same idea holds true on any work by using its horizontal width.

—C. F. O'Kelley, Griffin, Ga.

Repairing Lawnmower Roller



Instead of repairing a cracked lawnmower roller by bolting it together or wrapping it with wire, why not make the neat, permanent repair shown? Remove the roller and cut a groove around it to take a copper band.

Force hot glue into the crack as deeply as possible, after which the band is screwed in place with flat-head wood screws. Then

sand the roller thoroughly and give it two coats of spar varnish, allowing the first coat to dry before applying the next one.

—L. H. Georger, Buffalo, N. Y.

Golf Ball Has Line in Center as Guide in Holding Club

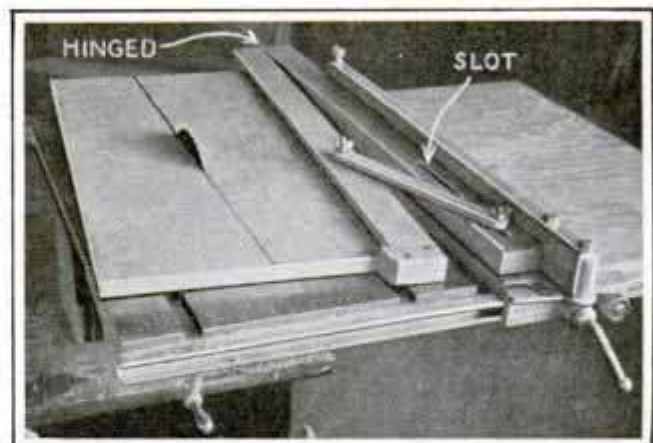
One amateur golf player who has trouble in making a putt, claims that a narrow black line painted around the center of the ball aids him in holding the club at the correct angle.



Before making the shot, the ball is turned with the line pointing toward the hole, after which the player holds the side of the club at right angles to the line.

Circular-Saw Cuts Made at Angle with Aid of Jig

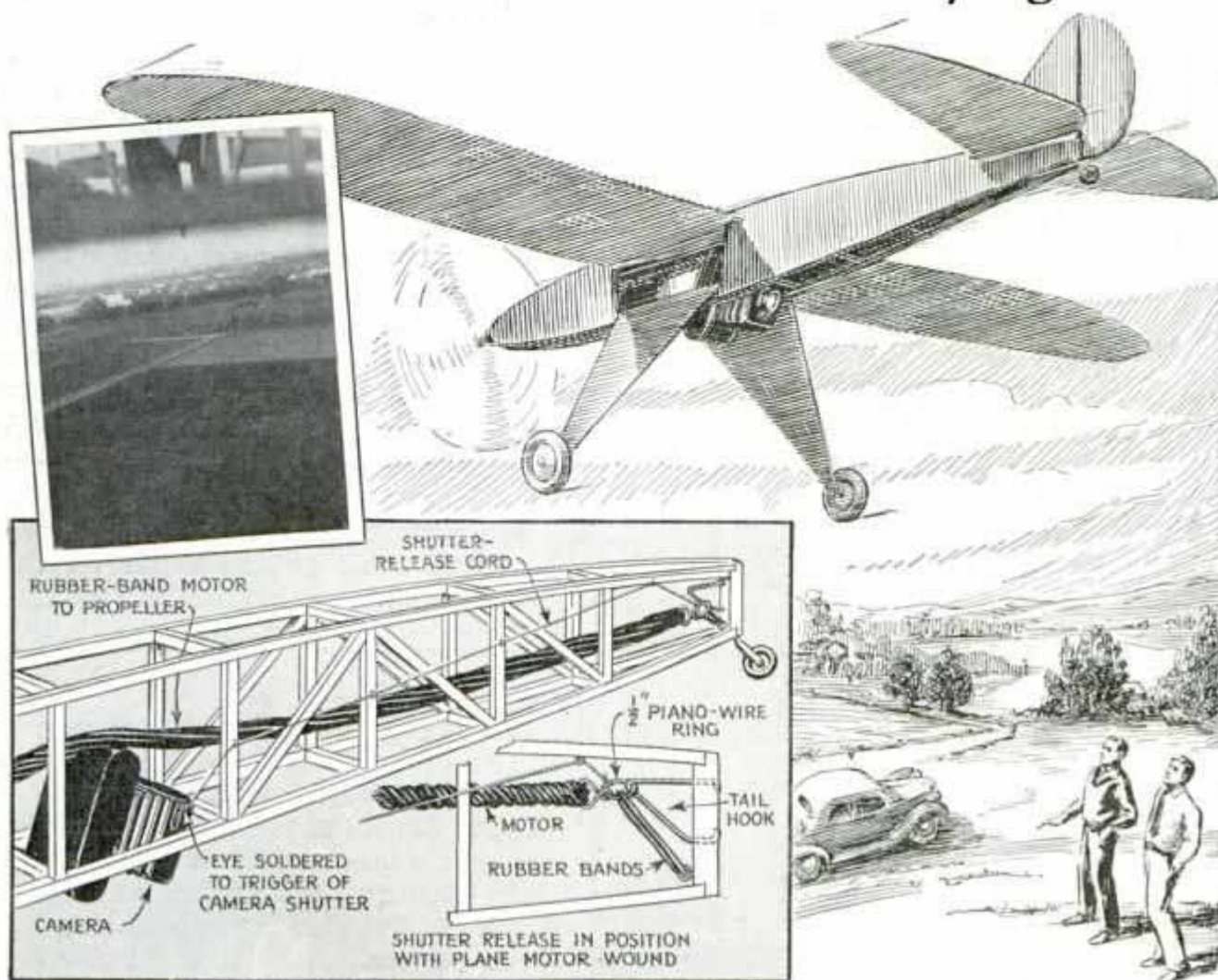
For making straight cuts that are not parallel to the edge of the work on a circular saw, this jig assures accuracy. It consists of two wood arms hinged together at one end, and fitted with a tie bar at the



Jig rests against ripping fence and holds work at correct angle as it passes over saw

other end to lock the adjustment. In use, the jig is placed next to the ripping fence with the edge of the work resting against one arm, which carries a cleat across the end to fit over the edge of the work as shown.—Brooks Hill, Neosho, Mo.

Aerial Photos 'Shot' from Model Flying Plane



Any fast-climbing monoplane with a wing span of 40 in. or over can carry aloft a midget camera of the universal-focus type weighing about 3 oz. All you have to do is to cut and frame an opening in the bottom of the fuselage for mounting the camera. The latter should be so placed that its center of gravity is slightly ahead of the center of gravity of the plane. Ordinary model cement will do to fasten the camera in place at an angle of about 30° with the centerline of the fuselage. Of course, you can vary this angle if you wish. The shutter release is a simple affair, rigged as shown in the details. The release cord should be run through wire eyes on the outside of the fuselage to prevent it from fouling the rubber-band motor. As you will see from the details, the mechanism is so arranged that it releases the camera shutter at the instant the plane reaches its ceiling and levels off in a stalling position. The plane should reach an altitude of from 150 to 200 ft. You may

find it necessary to increase the power of the motor with one or more additional strands of rubber.

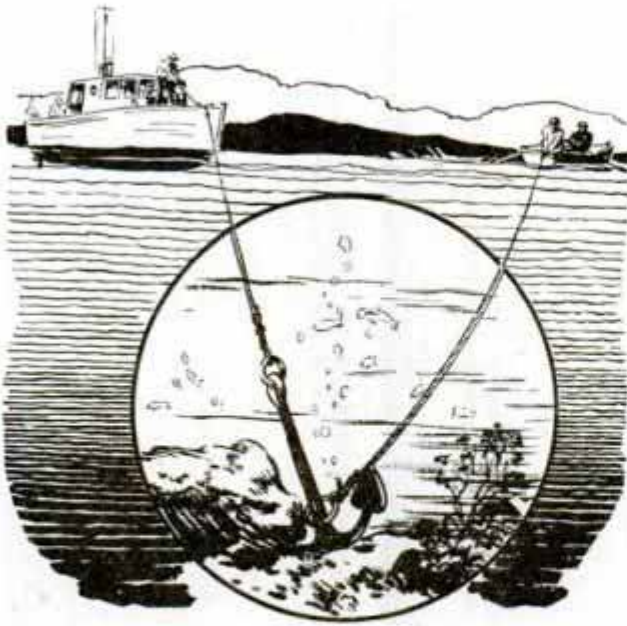
Key Fitted with Name Plate Is Easy to Select



ALUMINUM NAME PLATE.

For those who carry a number of keys on a ring, there will be no guesswork about selecting the right one if each key carries a name plate on which is scribed a code number corresponding to one on the lock that the

key fits. A piece of thin sheet brass or aluminum cut and bent over the key as indicated makes a good name plate.



Snagged anchor freed by pulling on it with extra rope tied to steel ring, which is slipped down over anchor chain

Anchor Snagged under Rock Freed from Rowboat

When the anchor on my large motorboat became snagged under a rock so tightly that it couldn't be freed by the usual methods, we loosened it as follows: A large steel ring with a long, stout rope tied to it was slipped over the anchor chain and allowed to drop down on the anchor as shown. Then I got in a rowboat and pulled on the line from several directions until the anchor was free. Some boatmen keep a light rope tied to one prong of the anchor for such emergencies.

—F. J. Harbaugh, Camden, N. J.

☞ Clean your mirrors with a dampened chamois to avoid getting water on the back, which might ruin the silver coating.

Lawn Table, Barrow Chairs, Trellises . . .



Bent-Iron Tables—568

arched gateways, ornamental wood fences, Dutch windmills and many other easy-to-make items which will help beautify your garden, are included in Popular Mechanics' blueprint service. You can order from this list, or send 12c for our 80-page "What to Make" booklet describing hundreds of other projects.

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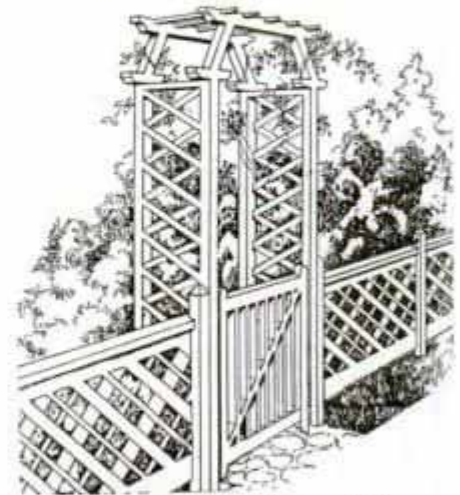
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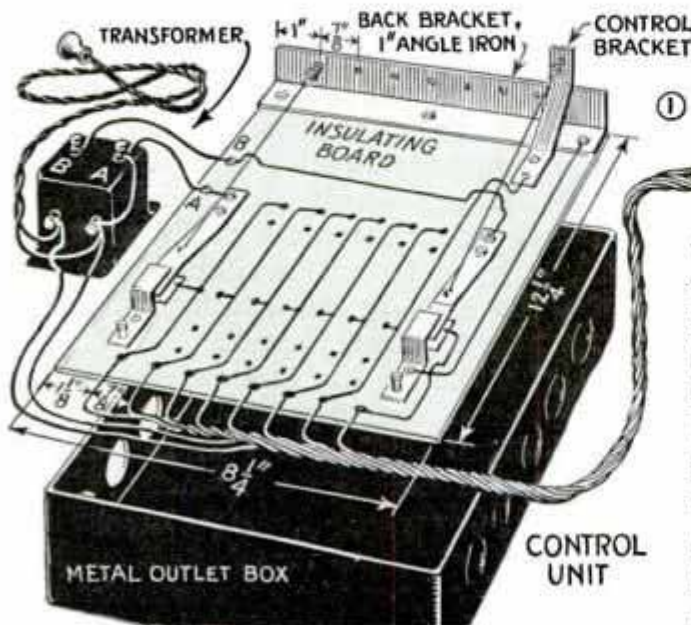
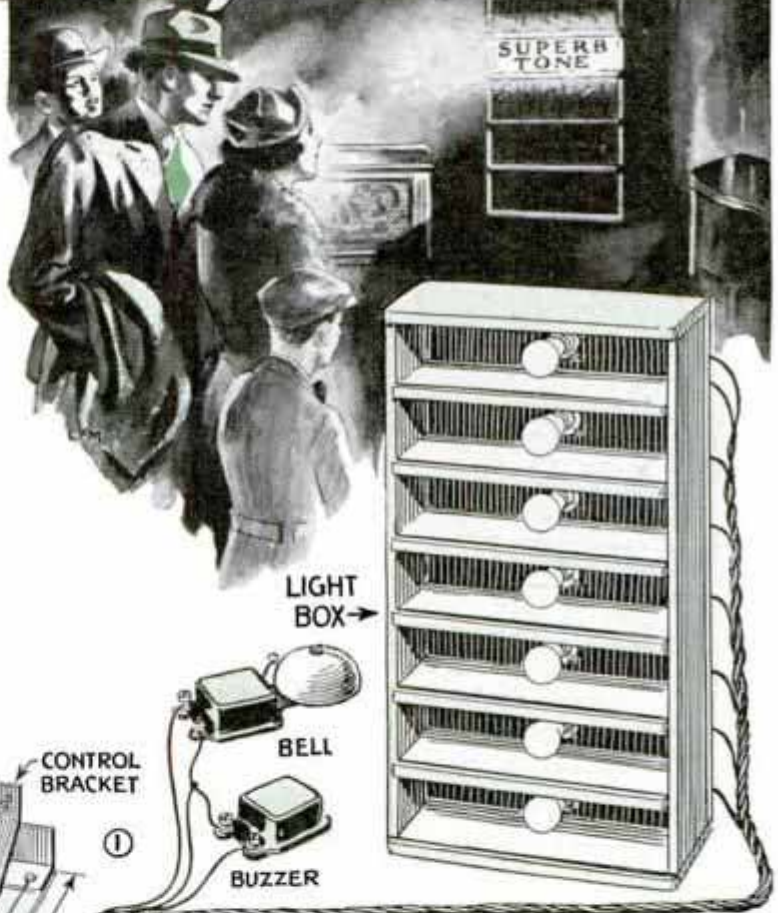


SHOP NOTES

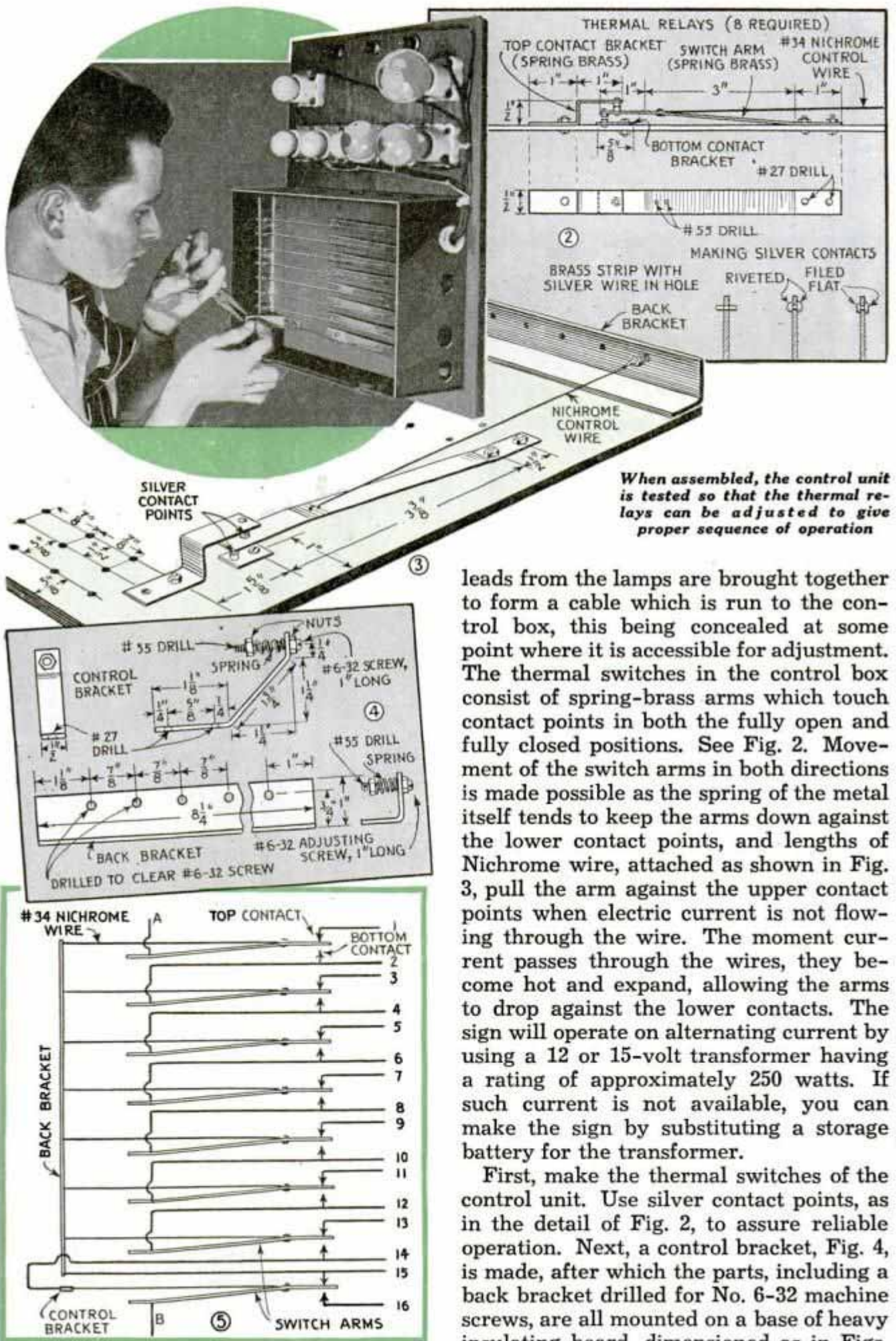
WINDOW SIGN *Flashes Messages*

By C. A. Crowley

THE ringing of a bell comes from a semi-darkened store window! When the bell stops a buzzer sounds and an instant later a brilliant sign flashes the merchant's message. Then, one by one, each line of the sign goes out while the buzzer still sounds, and when the last one is extinguished, the bell again rings momentarily, the buzzer follows, and the complete cycle is repeated. That's the way this automatic sign works. As pictured in Fig. 1, there are two parts; one is a light or sign box, which is divided into several

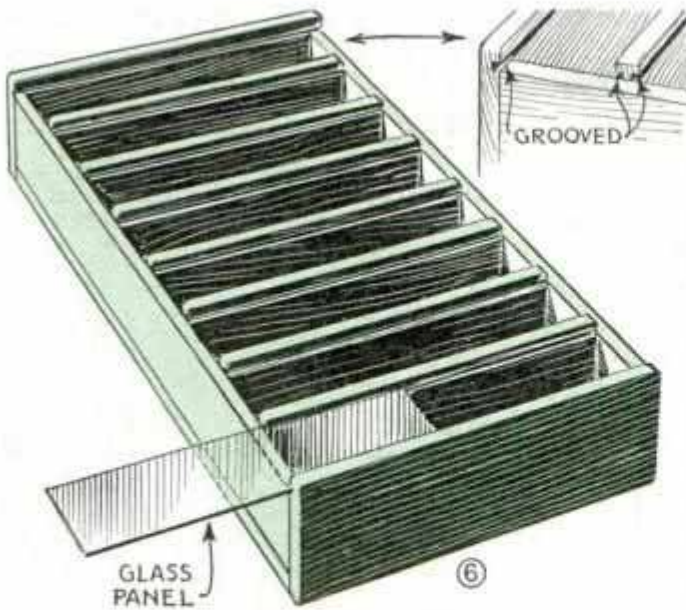


compartments, each containing a lamp, and the other is a control unit consisting essentially of thermally operated switches or relays arranged and connected to work in sequence. Each compartment of the light box is fitted with a ground-glass panel carrying part of the message, the wood partitions being grooved so that the panels can be inserted or removed readily as in Fig. 6. Each compartment is provided with a 10 or 15-watt lamp and the



leads from the lamps are brought together to form a cable which is run to the control box, this being concealed at some point where it is accessible for adjustment. The thermal switches in the control box consist of spring-brass arms which touch contact points in both the fully open and fully closed positions. See Fig. 2. Movement of the switch arms in both directions is made possible as the spring of the metal itself tends to keep the arms down against the lower contact points, and lengths of Nichrome wire, attached as shown in Fig. 3, pull the arm against the upper contact points when electric current is not flowing through the wire. The moment current passes through the wires, they become hot and expand, allowing the arms to drop against the lower contacts. The sign will operate on alternating current by using a 12 or 15-volt transformer having a rating of approximately 250 watts. If such current is not available, you can make the sign by substituting a storage battery for the transformer.

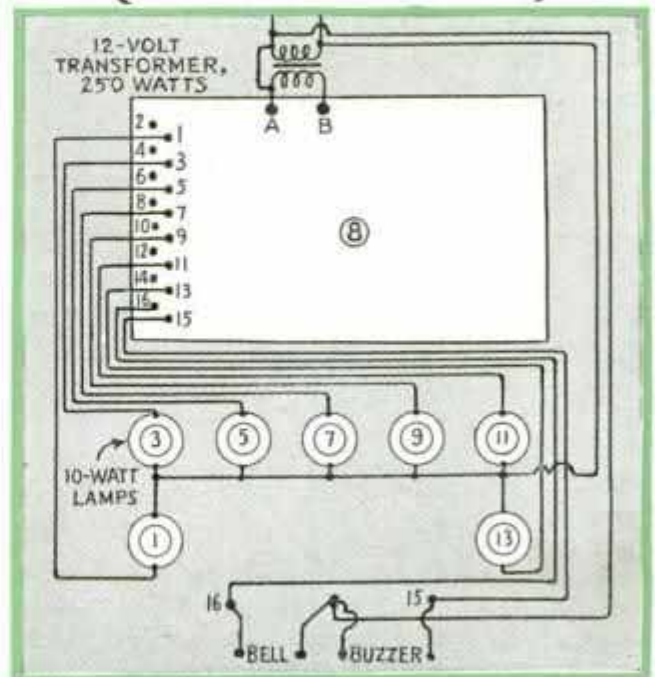
First, make the thermal switches of the control unit. Use silver contact points, as in the detail of Fig. 2, to assure reliable operation. Next, a control bracket, Fig. 4, is made, after which the parts, including a back bracket drilled for No. 6-32 machine screws, are all mounted on a base of heavy insulating board, dimensioned as in Figs.



1 and 3. Small machine screws are used to fasten the parts to the base, after which lengths of No. 34 Nichrome wire are run from the switch arms to screws on the back bracket, the screws being drilled transversely with a No. 55 drill to facilitate attachment of the wires.

The wiring as in Figs. 5, 7 and 8 must be followed carefully, after which the control unit is connected to the transformer. The unit is housed in a metal outlet box of suitable size, keeping all metal parts and screws on the insulating base from touching the box. With the current turned on, the device is made to operate as already explained. Of course, adjustment will be necessary and for this purpose, the screws on the back bracket are arranged as in Fig. 4 so that the tension on the Nichrome wires can be varied.

In operation, current enters the first switch at point A and from there feeds to light No. 1. From this point it feeds back through the wire to the bracket, the wire being heated and expanded, which allows the switch arm to drop against the bottom contact. Thus light No. 1 is extinguished and current from A then feeds to the second switch, heating the attached wire, and this sequence is continued until the last switch arm drops to the position which turns off lamp No. 13. Current then feeds into the control bracket, heating the length of wire attached, which allows this switch arm to open and remove the current supply from all the relays. The control arm also is connected to the bell and to the buzzer.



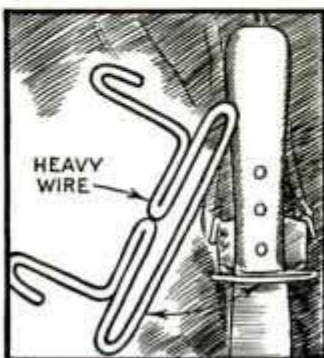
Door on Spring Hinges Opened by Stepping on Treadle



Workman approaching with both hands full steps on treadle to swing heavy door open

In a warehouse where workmen carrying heavy or bulky loads with both hands, must pass through a door, a treadle is used to give the latter a swing with the foot as shown. The treadle is a piece of wood hinged to the floor so that a caster or skate roller at the upper end bears against a metal plate screwed to the lower corner of the door.

Corn Knife Carried in Holder



Those who have occasion to use a corn or brush knife often cut themselves while trying to carry the knife and a bundle of corn or brush at the same time. To avoid such an accident, I slip the knife in a wire holder. The holder is bent from a piece of fairly stiff wire and is

hooked over the hammer loop in my overalls. In this way, the knife is carried safely, yet is readily available when needed.

—F. W. Bentley, Jr., Missouri Valley, Ia.

Cork Pad Holds Small Parts to Drill Them

Mechanics who do light repair jobs away from their shops will find a thick, cork pad helpful in holding small parts while drilling them. When the work is placed on such a pad, the pressure from the drill tends to depress it into the cork so that it will not turn, and friction between the cork and any surface it is laid on, even a smooth one, is usually sufficient to keep the pad from turning.



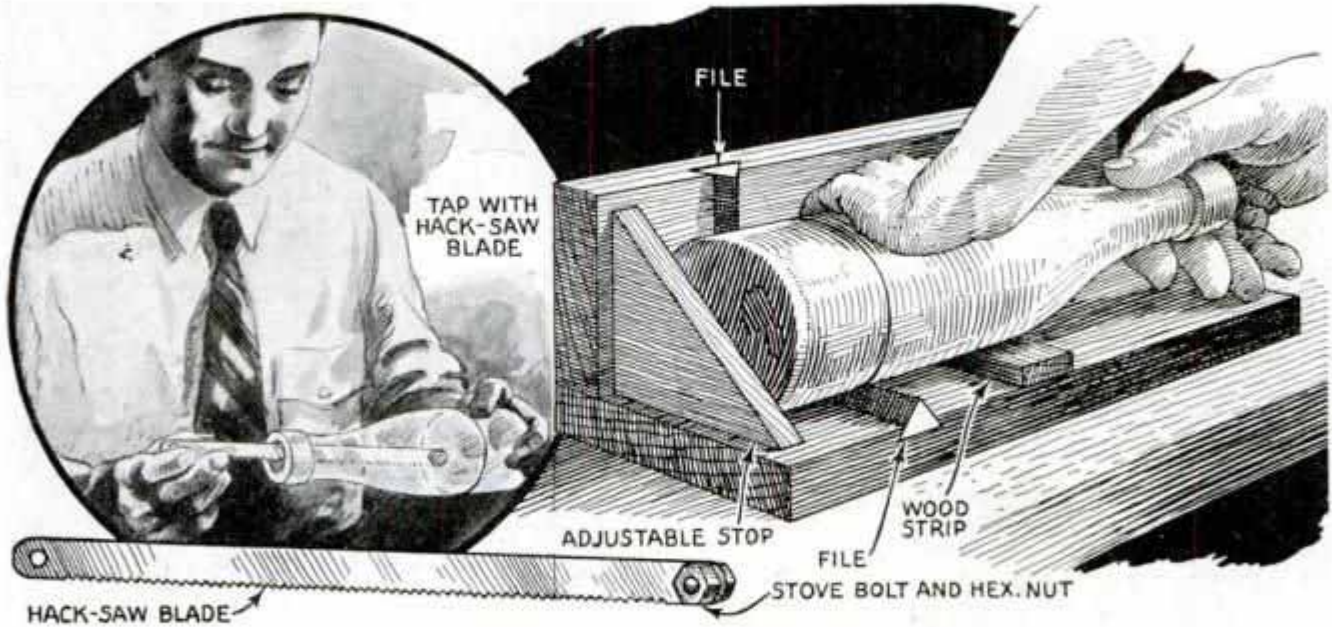
Sorting Bin Improvised on Bench Has Adjustable Dividers

In shops or factories where small parts are to be sorted for assembly or shipment, each packing bench may be provided with adjustable sorting bins by attaching a length of coil spring to the wall above the bench, and inserting dividers of hard-pressed board or sheet metal between the spring coils as shown. When not in use, the dividers can be removed.



Compartments are quickly made to any size and the dividers can be stored when not in use

How to Cut Glass Bottles Without Breakage

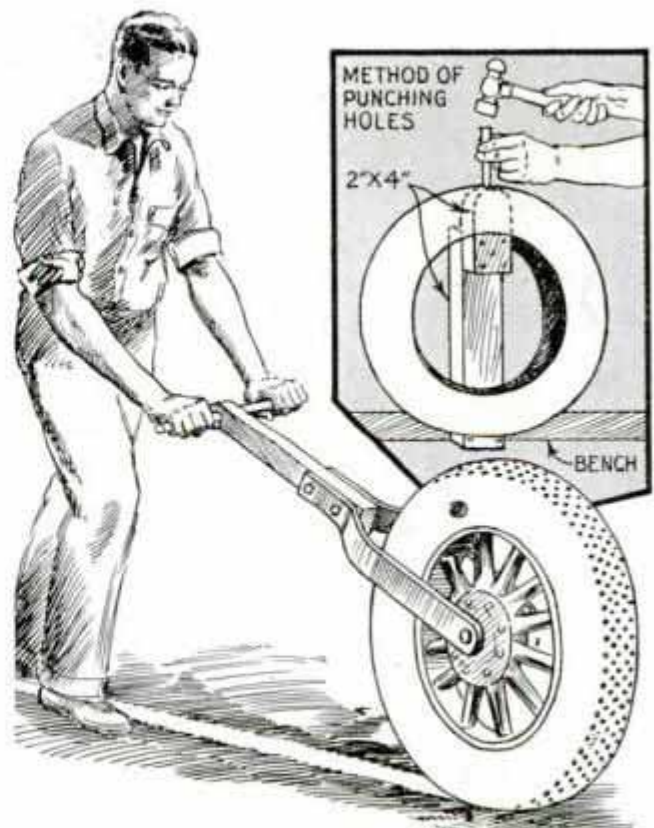


Small glass containers and funnels, often needed around the home or experimental laboratory, can be made cheaply from bottles by using this cutter, which utilizes two pieces of a three-cornered file. Rest the free end of the bottle on a wood strip having a thickness equal to the distance that the horizontal file projects

above the base. This assures getting a straight score all around the bottle, provided it is kept against the end stop while rotating. After the glass has been scored, tap it over the score from inside the bottle with a flexible tool which is made from an old hack-saw blade and stove bolt as shown in the illustration.

Tennis Courts Lined Quickly with 'Wheelbarrow' Marker

Pushed along like a wheelbarrow, this unusual marker spreads a ribbon of lime accurately to lay out tennis courts, baseball diamonds, etc. An old auto tire, having its tread perforated with a hollow belt punch, serves as a lime container and spreader when mounted on a wheel and fitted with a bolt for an axle, and a suitable handle. The upper detail shows how two 2 by 4-in. blocks are nailed together to hold the tire while perforating it.



The tire is filled through a hole cut in one side and plugged with a cork

Discolored Lens Affects Camera

Camera or microscope lenses of the type that are cemented in place, often tend to discolor with age, which is due to the yellowing of the Canada balsam used as a binder. In a camera, the discolored lens slows the action appreciably, and in a microscope the discoloration causes a loss of light from the object. The only remedy for this trouble is to clean and re-cement the lens, which is best done by the manufacturer.

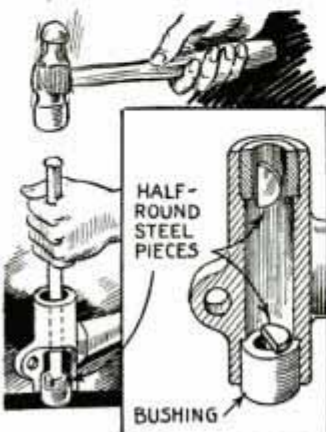
Traffic Guide Lines Are Inlaid Permanently in Street



Inlaid lines of white cement contrast sharply with darker street paving so that they are easily seen

Instead of the crosswalk and traffic guide lines being painted on the pavement of a street intersection in University City, Mo., they are permanently inlaid in the concrete with white cement, thus eliminating the expense of frequently renewing them. First, concrete bases were poured, after which a mix consisting of white cement, 1 part, white sand, 2 parts and $\frac{1}{2}$ -in. white limestone, 3 parts, was troweled to a depth of $1\frac{1}{2}$ in. on top of them to come flush with the paving material when it was poured. After the forms were removed, spikes were driven into the bases to serve as dowels for binding the lines firmly with the paving concrete.

Removing Spindle Bushings



The usually difficult job of removing spindle bushings is simplified by one mechanic who uses a split metal disk of approximately the same diameter as the bushing. In use, the halves of the disk are dropped through

the upper bushing and moved into position with a piece of wire to form a cover over the lower one, after which a steel rod is used to drive it out.

—M. L. Golden, Crenshaw, Miss.

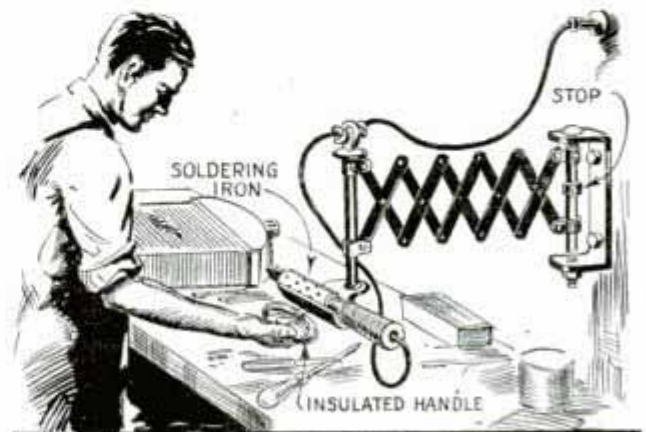
Fingertip Eraser Saves Time for Artists

When sketching a model in a pose that is difficult to hold, where the artist must work as rapidly as possible, this fingertip eraser will be found a timesaver in helping to reduce unnecessary hand movements. Cemented to a rubber finger pad worn on the index finger, the eraser is quickly brought into use when needed.



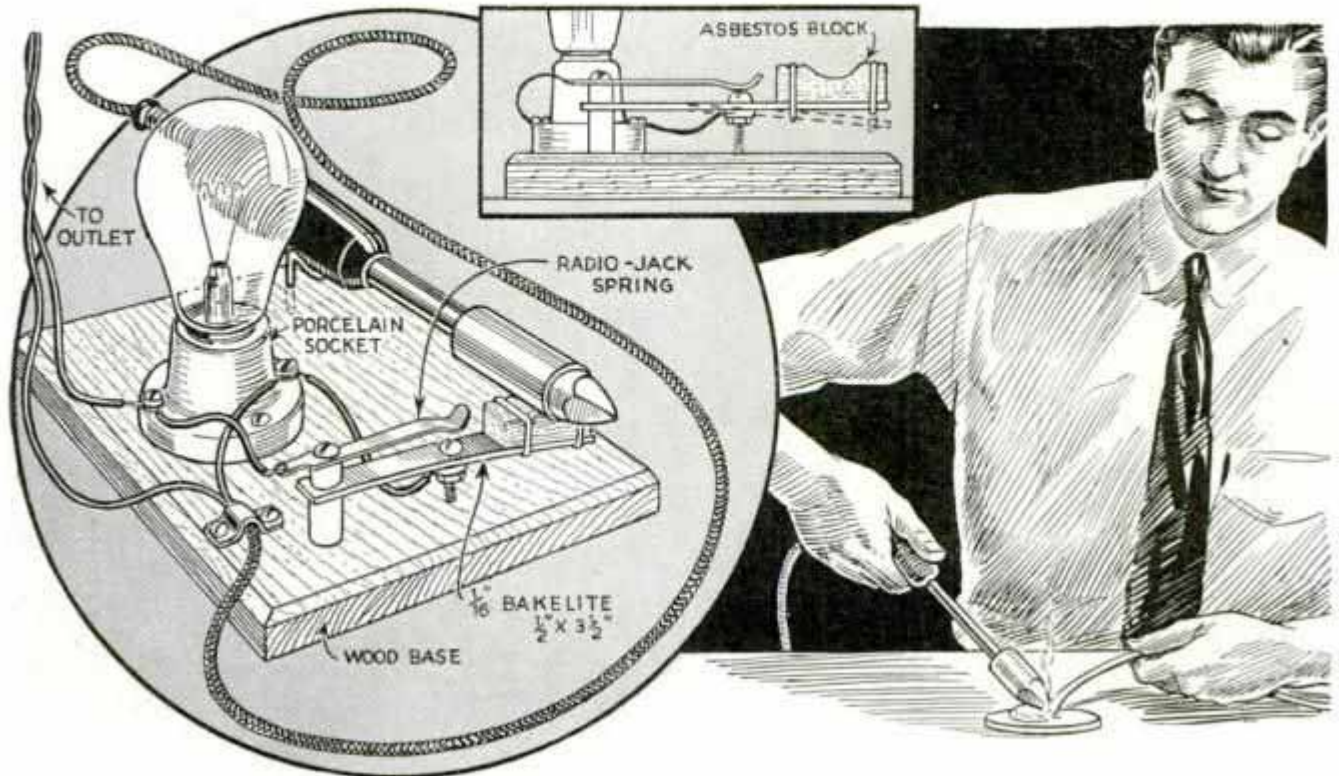
Soldering Iron Always at Hand on "Lazy-Tong" Holder

Mounted on a wall above a workbench with a U-shaped bracket, a "lazy tong" makes a good soldering-iron holder that is quickly extended or swung to one side to bring the iron within easy reach. A sheet-metal cradle at the free end of the holder carries the soldering iron, and is fitted with a handle insulated to avoid burning the hand. To prevent extending the holder too far, a sheet-metal stop is clamped around the pivot bolt at the wall.



A soldering iron on this holder is out of the way on a crowded workbench when not in use

Heat of Soldering Iron Controlled by Holder



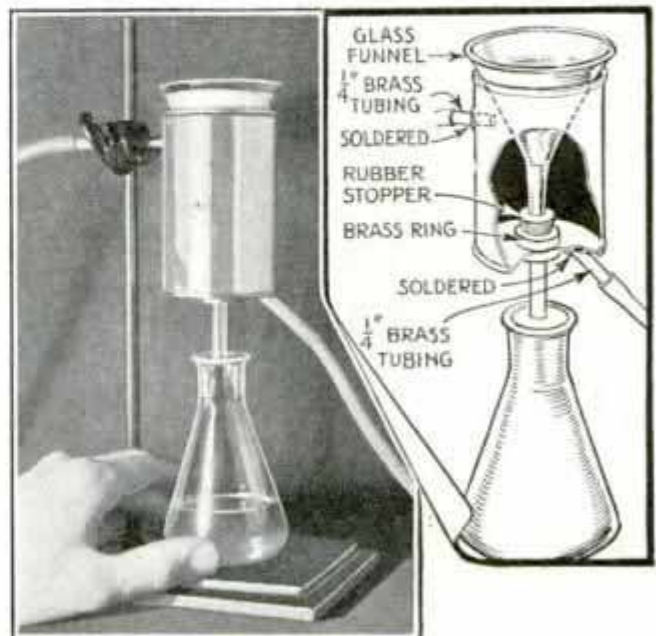
Here is a simple soldering-iron rest that not only holds the iron safely, but automatically cuts in the resistance of a lamp when the iron is laid on it. Thus the iron is kept hot enough for instant use, yet overheating is avoided and current is saved. The size of the lamp to use is determined by the wattage consumption of your particular iron. Construction and wiring of the holder are shown clearly.

The upper contact is a spring leaf taken from an old radio jack, and the lower one may be a copper screw although a silver contact point is preferable. Stiffness of the Bakelite strip holds the contacts closed until the iron is placed on the rest. The heat block, which supports the hot end of the iron, may be lava, chalk or other heat-resistant material filed to shape.

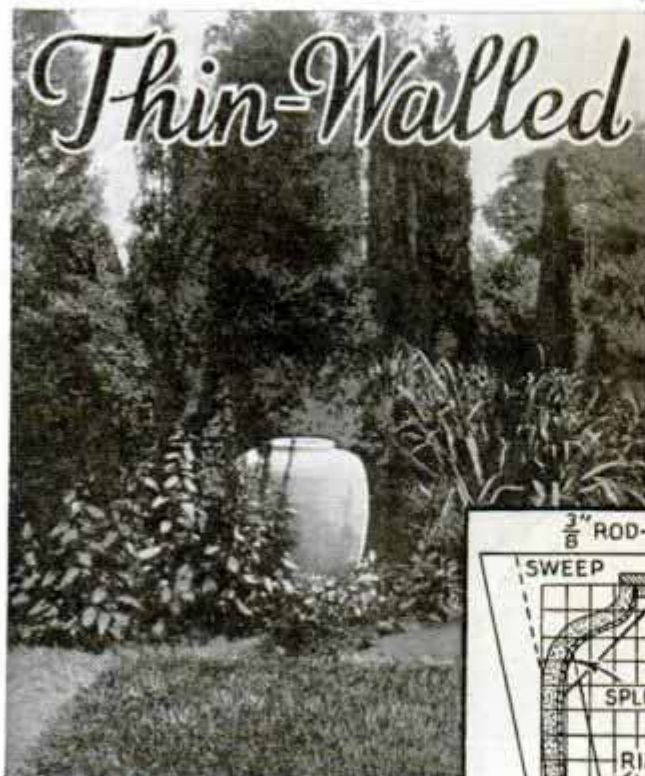
—G. F. Lampkin, Bradenton, Fla.

Hot Filtering of Inflammable Liquids in a Steam Heater

When filtering a hot solution, using an inflammable solvent, this steam-heated funnel prevents the dissolved material from crystallizing. A glass funnel is set inside of a tin can with the neck projecting through the bottom. A steam-tight joint at this point is had by soldering a wide, brass ring into the hole to take a rubber stopper, drilled lengthwise to fit the funnel neck snugly. The cone of the funnel should overlap the can to deflect steam. Lengths of brass tubing soldered in holes through the bottom and one side of the can serve as steam inlets and outlets.

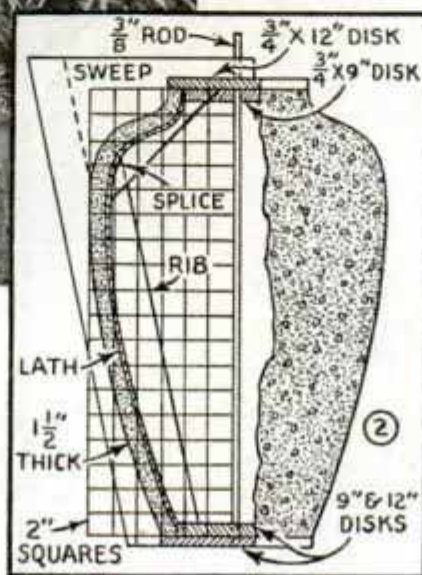
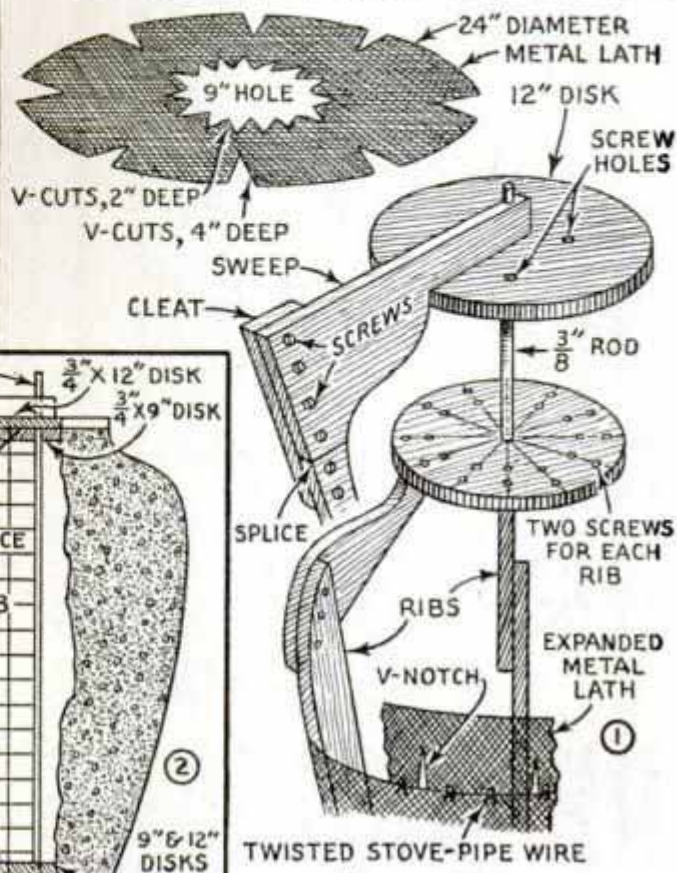


☐ Work a paste of rottenstone and glycerin into a rubber sponge and you will have an excellent metal-polishing pad.



Thin-Walled

CONCRETE



PART II

GARDEN VASES, URNS AND WINDOW BOXES

HAVE you ever had a "yen" to decorate your garden with large colored vases so reminiscent of the oil jars in which the forty thieves of Arabian Nights fame concealed themselves? Here is a brand new idea for making as many of these vases as you wish, at comparatively little expense. Instead of a large mold, the vase is cast or formed over a riblike framework covered with expanded metal lath as in Figs. 1 and 5. The cement is simply plastered on in three layers.

Fig. 2 shows a squared layout of the ribs and the method of construction. Twelve ribs are bandsawed to the shape shown and are assembled between the disks, as in Figs. 1 and 4. The form is then ready for the expanded metal lath. One sheet, 4 by 8 ft., is sufficient, if care is taken in cutting. Starting at the top, a circular piece as in Fig. 1 should be cut out with snips and formed over the top of the frame. Great accuracy is not required beyond getting the material into the approximate contour of the frame. The V-cuts are made wherever required and are drawn together with short lengths of soft iron wire, as are all other connections between pieces of the lath. After the neck

and shoulder have been covered, the balance of the surface is wrapped with strips of the material as shown in Fig. 5. The lath is not fastened to the wood at any point as this would prevent removal of the frame after the concrete has set. The outside contour of the vase is formed with a sweep, as shown in Fig. 6. The sweep is pivoted at the top by means of a rod which runs through the top and bottom disks. The larger outside disks are screwed on at both the top and bottom to provide a guide for the sweep and also to assure uniform thickness.

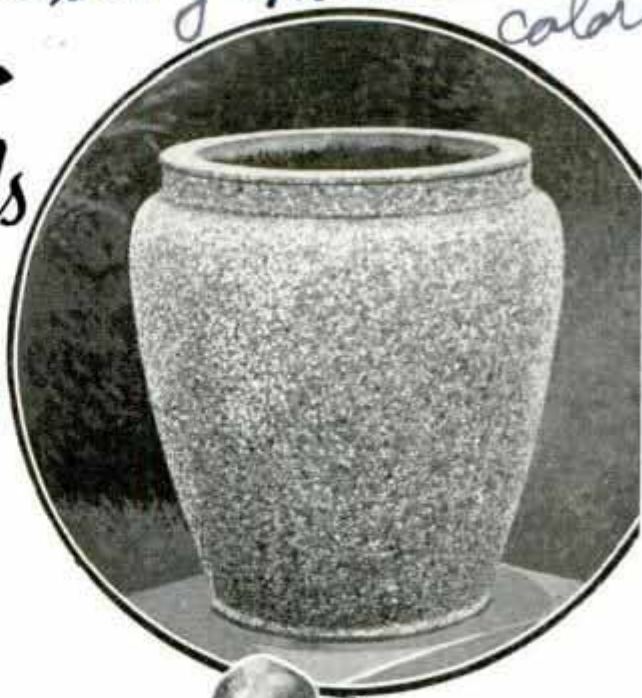
There are a few simple precautions to be observed in preparing the cement. It must be fresh and dry. Cement which contains lumps has partly set from absorbing moisture and lacks the adhesive properties required for this type of work.

rec. 1941. July -
makers of mineral colors

POTTERY...

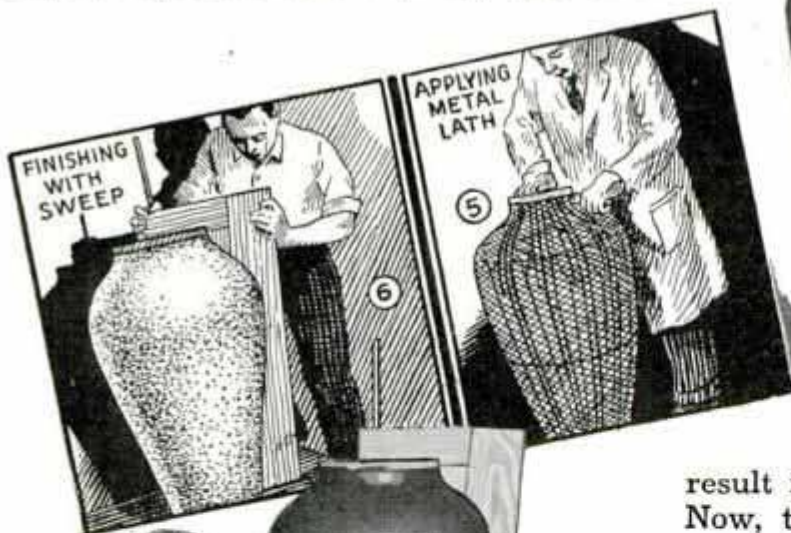
made without Molds

The sand must be sharp—torpedo—and free from the presence of loam. The mix, Fig. 3, consists of cement, 1 part, sand, 3 parts, and hydrated lime, $\frac{1}{10}$ part. After these have been well mixed, enough water should be added to make a "fatty" consistency. The mixture should stand an hour before applying, to "jell." The purpose of the lime is to make the mix more plastic and adhesive. It also whitens and waterproofs the mixture. The cement is applied with a trowel in three layers, each approximately $\frac{1}{2}$ in. thick. Smoothing the first two coats is unnecessary, as a rough surface helps to bond the succeeding layer. Apply the coats a day apart. Fig. 7 shows how the last coat is trued up. Burlap or old carpeting is wrapped around the finished work as in Fig. 8 and kept wet several days to allow the concrete to "cure." This is important as a crumbly vase will



BUILDING THE FORM

④



FINISHING WITH SWEEP

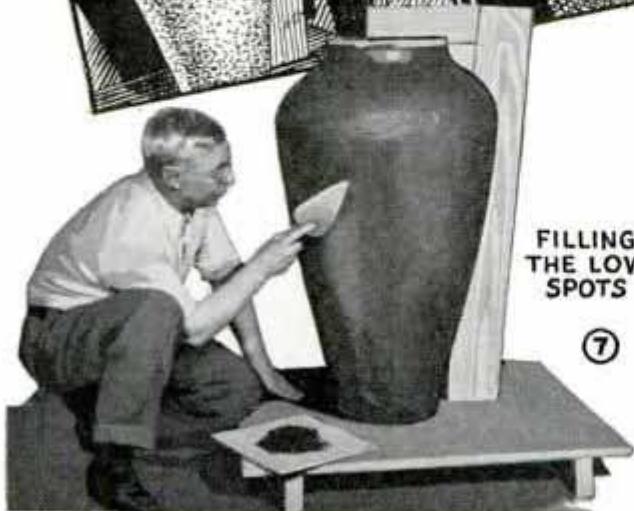
APPLYING METAL LATH

⑥

⑤

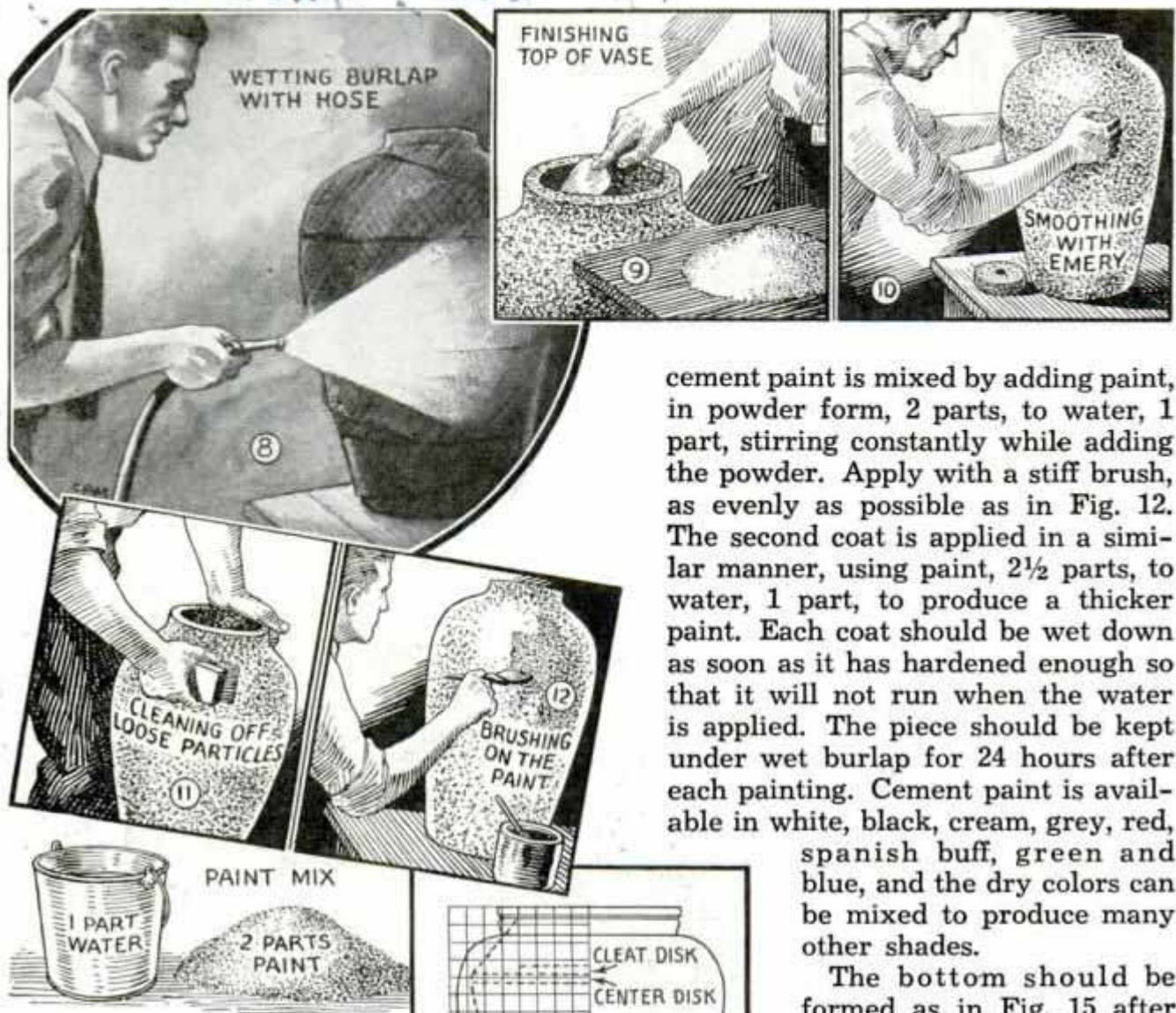
FILLING THE LOW SPOTS

⑦



result if the drying takes place too fast. Now, the top and bottom disk are unscrewed, and by a bit of manipulating each of the twelve ribs is removed through either the top or bottom openings.

Fig. 9 shows how the rim and inner surface of the neck are finished off with a rich cement mixture, the surface being thoroughly wet before this patching is attempted. As the rest of the interior will be covered by soil it need not be smoothed. If the surface of the vase shows trowel marks or other irregularities, it can be smoothed down by scrubbing it, while

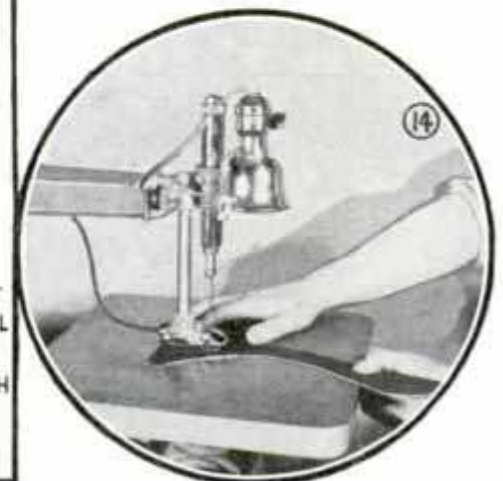
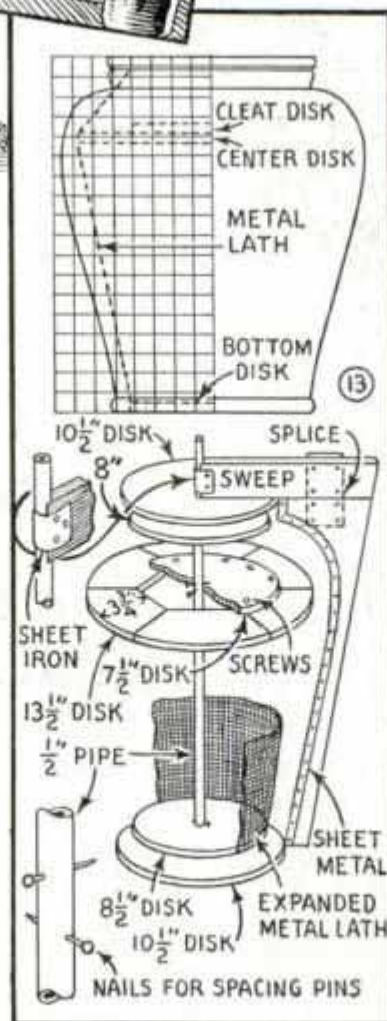


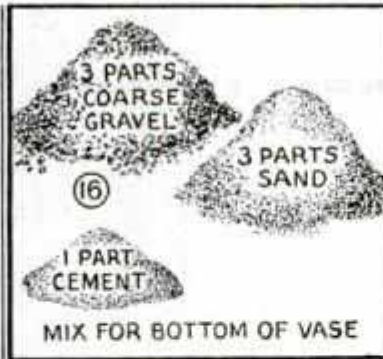
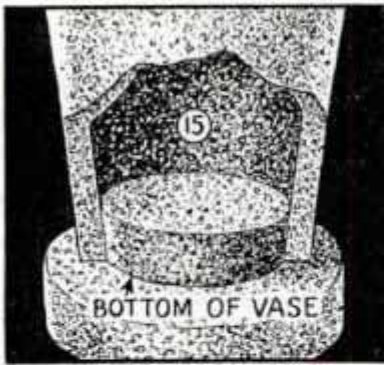
wet, with an old emery wheel dipped in water as in Fig. 10. Small depressions are readily filled with a mortar of cement and water. Be sure the surface is wet so that the mortar will adhere, and keep it moist for several hours after patching.

Now for the color. Clean off all dust and loose particles with an old scrubbing brush as in Fig. 11, and wet the vase down thoroughly again to prevent the porous surface from absorbing the water out of the paint before the latter has had a chance to set. The moisture also gives an easy flow to the paint. The first coat of the

cement paint is mixed by adding paint, in powder form, 2 parts, to water, 1 part, stirring constantly while adding the powder. Apply with a stiff brush, as evenly as possible as in Fig. 12. The second coat is applied in a similar manner, using paint, $2\frac{1}{2}$ parts, to water, 1 part, to produce a thicker paint. Each coat should be wet down as soon as it has hardened enough so that it will not run when the water is applied. The piece should be kept under wet burlap for 24 hours after each painting. Cement paint is available in white, black, cream, grey, red, spanish buff, green and blue, and the dry colors can be mixed to produce many other shades.

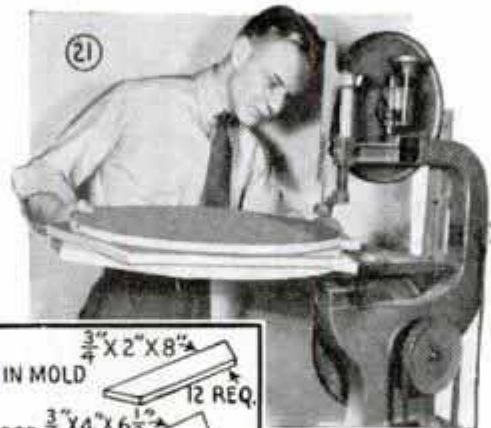
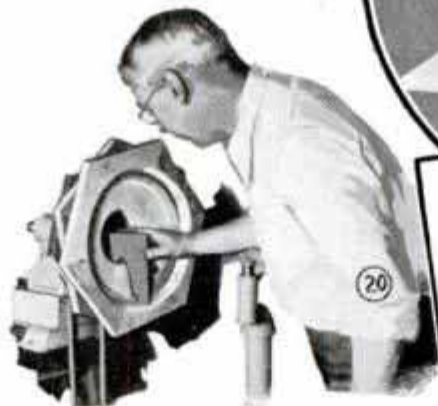
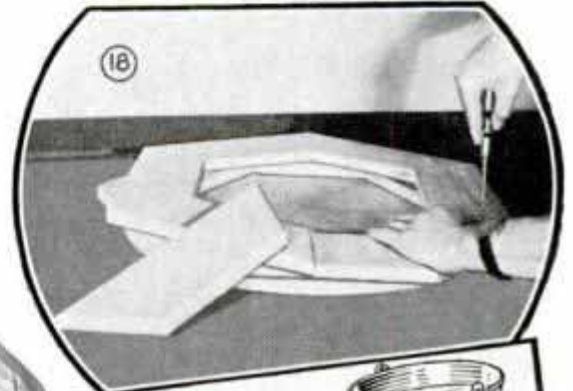
The bottom should be formed as in Fig. 15 after the piece has been set in place so that it will not be so heavy to handle. It is necessary to pour in only about 3 in. of a mix containing coarse gravel, 3 parts, sand, 3 parts, and cement, 1 part, as in Fig. 16. This will produce a porous bottom





that will provide drainage. The vase is then half filled with coarse gravel and the remaining space with black soil.

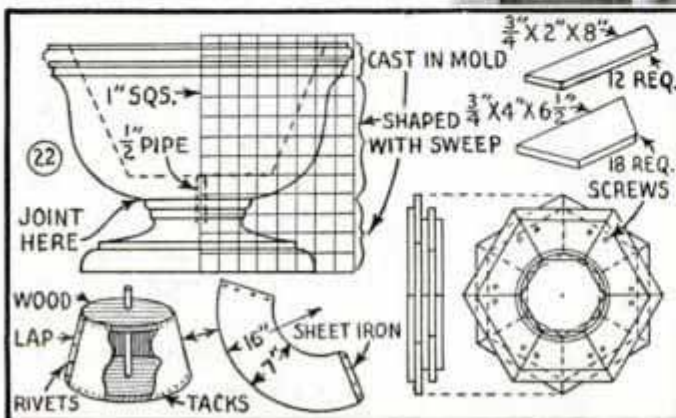
A proper setting adds much to the beauty of your vase. Fig. 24 suggests an arrangement consisting of a circular pad for the vase, surrounded by cast flagstones. Molds are made for casting the flagstones and the circular pad, the latter being built up with segments which are cut to shape on a band saw. A wagon tire would serve this purpose, if available. A pleasing effect is obtained by partly surrounding the vase with shrubs or flowers. Floodlighting is effective at night. The vases are usually used simply as garden ornaments, though they are equally attractive for use in pairs before an entrance. Vines or small evergreens may be planted in them but the usual practice is to leave them empty, except for the soil. In climates where freezing would be likely to crack the vase, it is advisable to provide

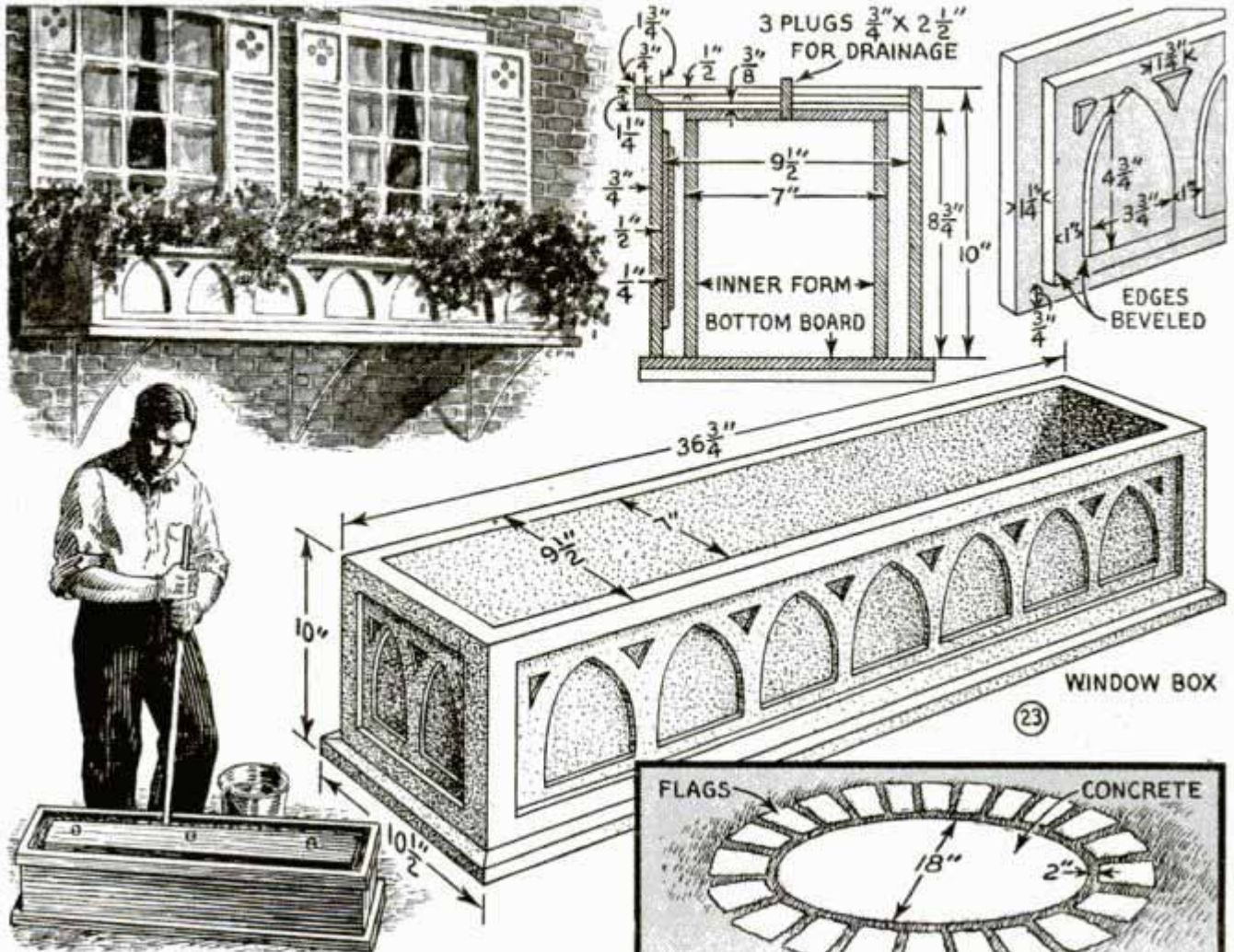


a wood or metal cover to prevent the entrance of snow and rain, in winter.

The wide-mouthed jar in the photo above Fig. 4 shows another attractive finish for concrete work of this kind. The outer surface of this piece looks like marble, the effect being obtained by using aggregates of white sand and marble chips. The mix is prepared in the

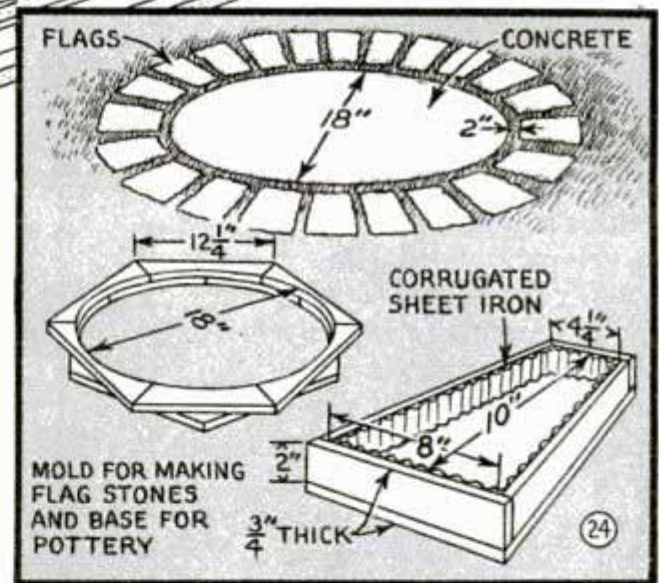
usual way and the surface finish is produced by scrubbing off the film of cement with a stiff brush and water, or with an emery stone, as previously described. Granite screenings, crushed felspar, slag or other colored rock materials are obtainable and may be used



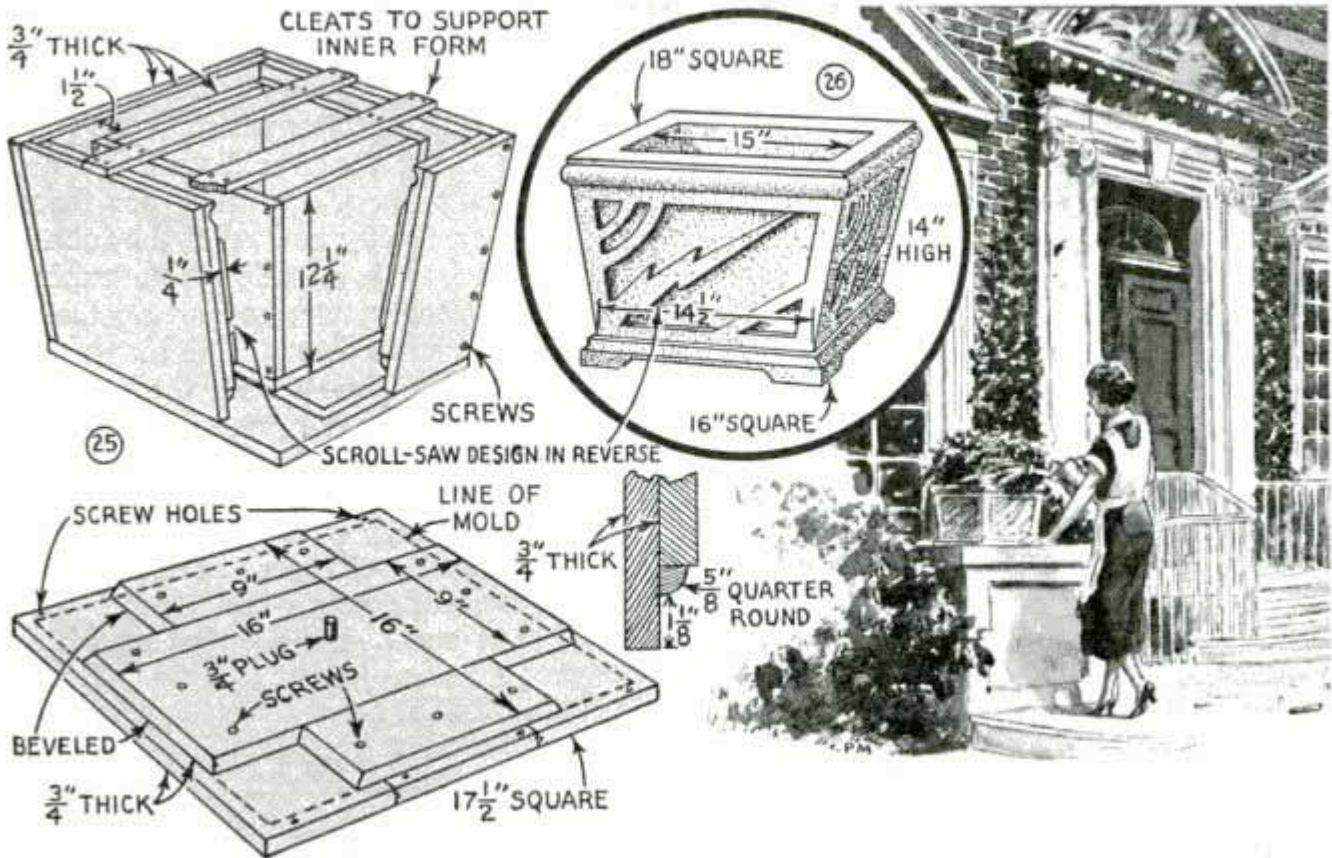


in a similar manner. A method of casting these large-mouthed jars is shown in Fig. 13. The form for the jar consists of a series of disks, the center one of which is made up of segments, held together by a smaller disk and screws. The outside is covered with metal lath, as before, and the concrete plastered on in layers. Nails pushed through holes drilled in the length of pipe, space the disks. After the job has set, remove the top and bottom disks, unscrew the small center disk and the six segments can be removed readily for use on a repeat job. The contour of the base is given in the squared detail, Fig. 13, and the curve of the sweep may be taken from this. The sweep is faced with thin sheet metal cut to shape on the jig saw as in Fig. 14.

Flower urns, of the type detailed in Fig. 22, are easily made if you have a lathe equipped so that you can turn on the outside of the headstock. The method, as shown in Fig. 17, is a combination of sweeping and molding. Five sets of segments are required for the base, as shown in Figs. 18 and 22. The base is turned in



two sections, the first two layers of segments being mounted on the faceplate and turned to approximately the curve required. Then the second section of three layers is screwed on and the curve turned to a template as in Fig. 20. The slowest speed on the lathe should be used when turning large diameters. When the mold is complete it is given two coats of shellac and one of machine oil to prevent the cement sticking. The mix for the urn, Fig. 19, should be cement, 1 part, and water, 3 parts, mixed fairly thick and thoroughly tamped into the mold. As the segments are held together with screws, it is an easy matter to remove but one segment at a



time and thus avoid damaging the cast. The pattern for the upper rim of the urn is made in a similar manner but requires only two rows of segments. Because of the large diameter, it is necessary to bandsaw the segments and mounting disk as nearly round as possible, as shown in Fig. 21, to prevent excessive throw or vibration. The inner form is made of sheet metal and assembled on wood disks, as shown in Fig. 22. The setup for casting the bowl is shown in Fig. 17. A sweep, lined with a piece of sheet iron, is used to produce the outside contour. The surface treatment is a matter of choice.

Cement flower boxes, if not too massive, are always attractive, and by the use of colors pleasing effects can be obtained. The rectangular window box, shown in Fig. 23, is ornamented on the face and ends with a series of depressed panels which may be painted in contrasting colors. Details of the mold construction and a section through the center are also shown in Fig. 23. The box is cast upside down. The flower box shown in Fig. 26 is ornamented with a modern design requiring bright coloring for a pleasing effect. A combination of red, yellow and aluminum is suggested. The latter cannot be applied until the piece has thoroughly dried out,

however. A detail of the base, showing how the opening between the feet is produced, and the method of constructing the mold are shown in Fig. 25. Shellac and oil must be used, as previously described, and it is advisable to screw all parts together for safety in removal. The cement mix for the flower boxes is the same as for the urn and thorough tamping is equally essential for a good casting.

Potato Eyes Lifted with Shoehorn

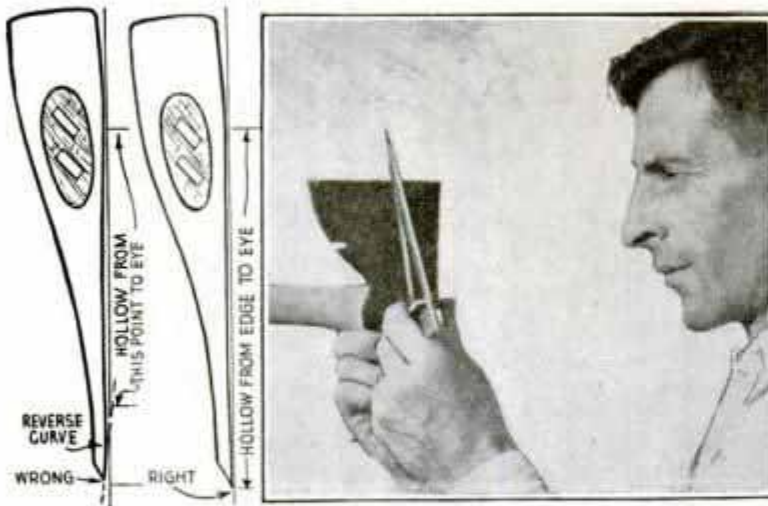
If potatoes are planted in rich soil, it is unnecessary to use more than the eyes of



the tubers to obtain strong, vigorous plants. In fact, many seed dealers often ship only the eyes of potatoes in order to avoid excessive freight expense. To remove the eyes easily, saving the balance of the vegetable for table use, sharpen the small end of a shoehorn and use it as shown.

—G. E. Hendrickson, Argyle, Wis.

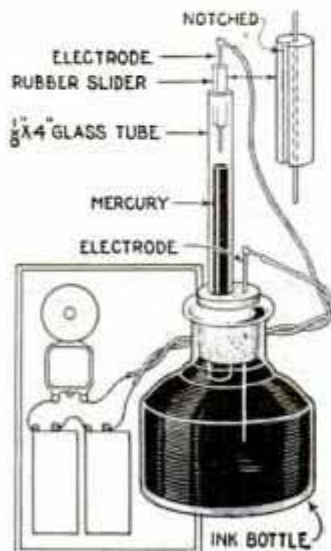
Bending the Blade of a Hand Ax to Make It "Hug" Work



If your hand ax is beveled slightly on the flat side, it will do better work if the bevel is removed

Cutting edges of new hand axes, even those of the best quality, are often beveled slightly on the flat side, which makes it necessary to remove this slight bevel if the ax is to "hug" the work for good chopping. This is usually done by grinding back the main bevel enough to remove the slight one on the opposite side, which is quite a chore with an ordinary hand grinder. I find that a better and quicker way to remove the bevel is to bend the blade by laying the ax on an anvil, flat side up, and striking it on the high spot. Bend the blade just enough so that light will show between the ax and the edge of a T-square held snugly against the flat side. —Edwin M. Love, San Gabriel, Calif.

Adjustable Mercury Switch Serves as Thermostat



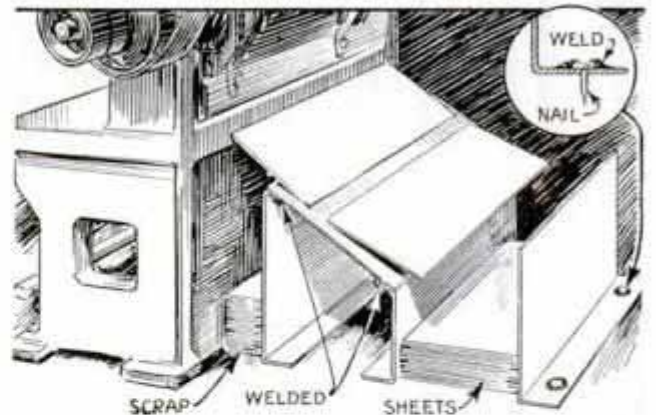
This thermostatic switch is handy where a low-voltage circuit must be opened or closed within certain temperature limits to operate a warning bell or other electrical device. To make the switch, a small bottle is filled with mercury and then tightly corked

with a stopper carrying a small glass tube and an electrode of iron wire. It may be necessary to add a little mercury through the tube to bring the liquid well up into the glass. After this has been done, the upper end of the tube is fitted with an adjustable rubber slider carrying a second electrode. The slider is notched along one side to allow air in the tube to escape as the mercury column rises. In use, the slider is adjusted so that the mercury, which expands and contracts under temperature changes, contacts the electrode when the temperature has reached the point at which you want the bell to ring. Loca-

tions of the slider for various temperatures can be marked on the tube.

Scrap Separator for Power Shears

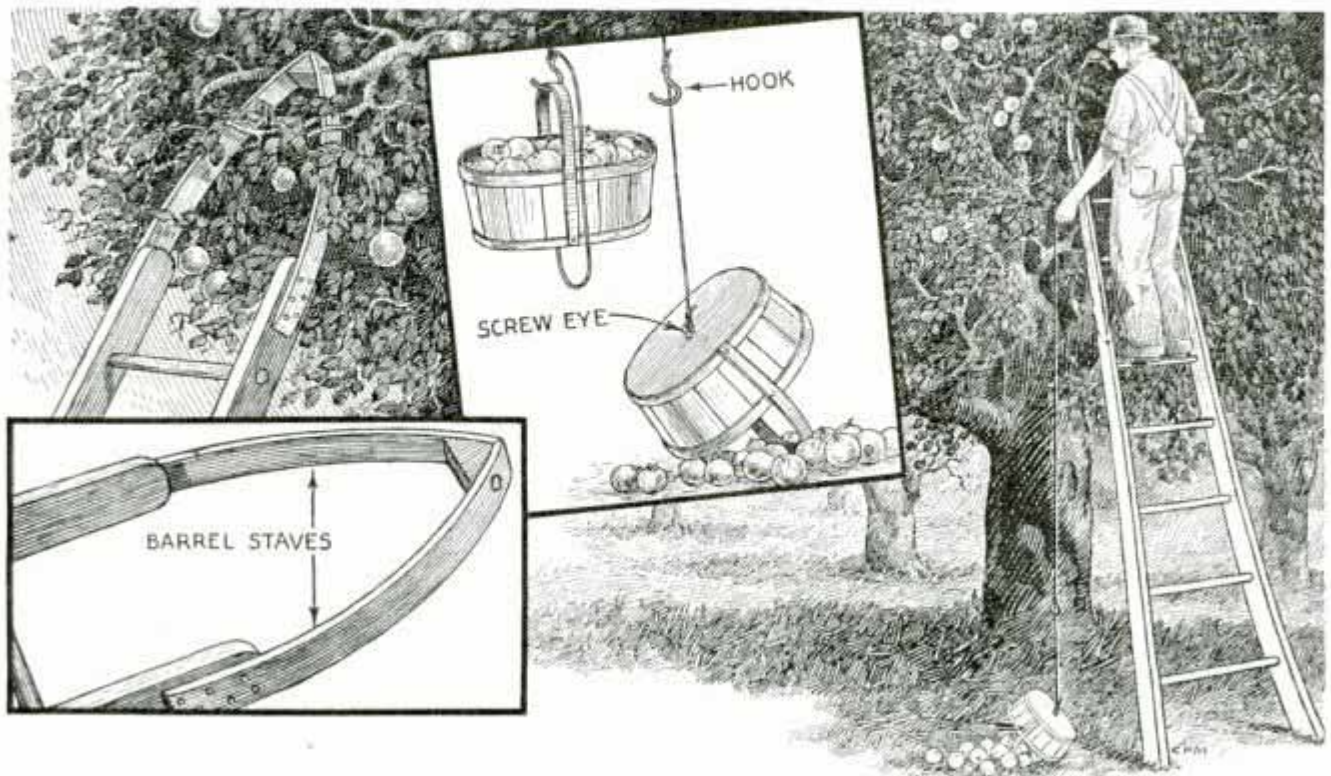
Here is a simple method used in one shop to automatically separate scrap and sheets cut on power shears. As shown, the work slides over the sloping face of a small sheet-metal table in front of the shears, while the scrap, which is narrower than the work, falls into a well between the table and shears. A stop nailed to the



Scrap and work leaving metal-cutting shears automatically fall in separate receptacles

floor or bench in front of the table forms a second well to receive the sheets. The width of each well is adjusted by moving the table and stop, short nails being welded to the latter so that it is only necessary to pry it loose with a screwdriver to make the change. The table is not anchored as it is held in place by the scrap and sheets. —Charles Kugler, Philadelphia, Pa.

Fruit-Picker's Ladder and Basket Improved



Difficulty of safely supporting a common ladder on a large, bushy tree is overcome by nailing two hardwood barrel staves to the upper end as shown, thus giving the ladder a pointed end which can be pushed into the thick branches and rested in a fork or against a limb. When using such a ladder, you can save many trips up and down it by using the self-dumping basket shown in the center detail. A length of clothesline rope is ideal for lowering the basket to the ground

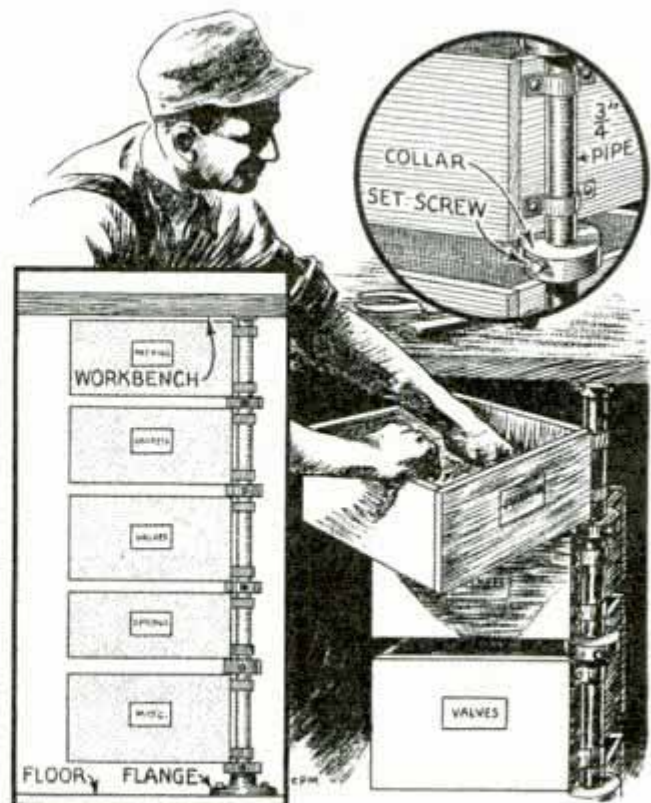
Drawers Pivoted under Workbench Utilize Waste Space

Space underneath most workbenches can be used to good advantage by installing a number of drawers, which can be swung forward by a slight pull at one front corner. Rigidly constructed of sheet metal or hardwood, the drawers are pivoted at one corner to a standard by means of heavy pipe straps, the drawers being spaced by 2-in. collars, which are fastened to the pipe by means of set screws. Pipe flanges screwed or bolted to the floor and to the underside of the bench hold the standard rigidly in place.

—Herman R. Wallin, Brooklyn, N. Y.

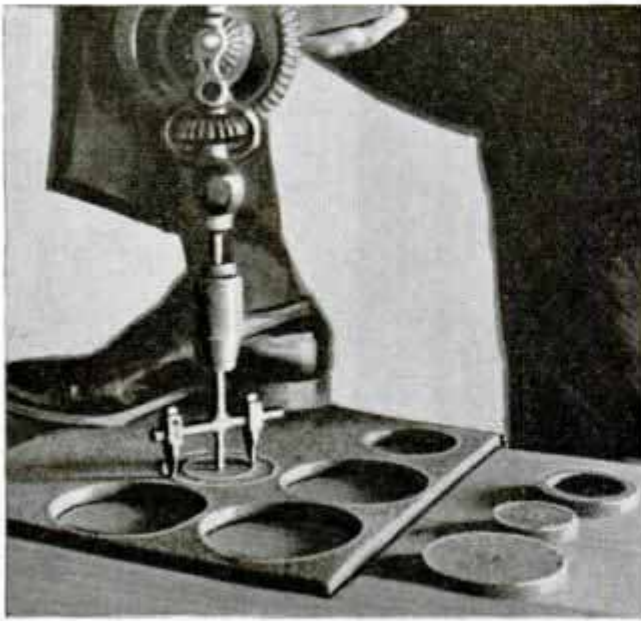
Hauling Water in Open Barrels

When water is hauled in open barrels for short distances, wood-disk floats placed in them will help check the movement of the water and avoid excessive splashing. On long hauls, it is a good idea to use pieces of cloth tied tightly over the tops of the barrels in addition to the floats.



A slight pull at one corner swings these drawers outward to expose the entire contents

Gasket Cutter Made of Tool Steel Is Adjustable

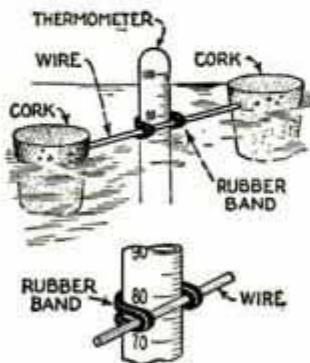


With this tool, ring or disk gaskets are cut to any size needed right on the job

Instead of taking the time to hunt for gaskets, or to go to a store for them, one shopman uses this adjustable cutter and makes them right on the job. Cutting either rings or disks, the tool consists of two lengths of drill rod welded together to form a cross, and two cutters. The lower end of the vertical cross piece is pointed to serve as a pilot for the tool. The adjustable cutters, which are drilled to slip over the horizontal arms, are held in place with set screws and are ground to shape from square stock.

—Jos. C. Coyle, Winterhaven, Calif.

Thermometer Floats in Liquid on Two Corks



Temperature readings are easily taken at a glance when this float is used to hold a thermometer in liquids. The float is made from a piece of wire, a rubber band and two corks. In addition to supporting the thermometer the float offers some protection against breakage. This is especially useful for checking photo developer when it must be chilled

to keep it at a uniform temperature. A good way to chill developer is to suspend an ice-filled rubber tube into it. Such a tube can be made by cementing one end of a section of inner tube together.

—Birt Obelies, Jr., Hastings, Nebr.

Nail Pocket on Worker's Sleeve Handy in Cramped Places

Carpenters, electricians and others who often have to work in cramped places where it is difficult to reach into a trouser or coat pocket for small parts, will find a pocket sewed on the sleeve convenient. Heavy canvas is ideal for the pocket, which should have a flap and snap fastener. If a number of different articles must be carried, two or three pockets can be sewed on one sleeve without interfering with arm movement.



Star-Drill Handle Is Notched to Show Size at a Glance



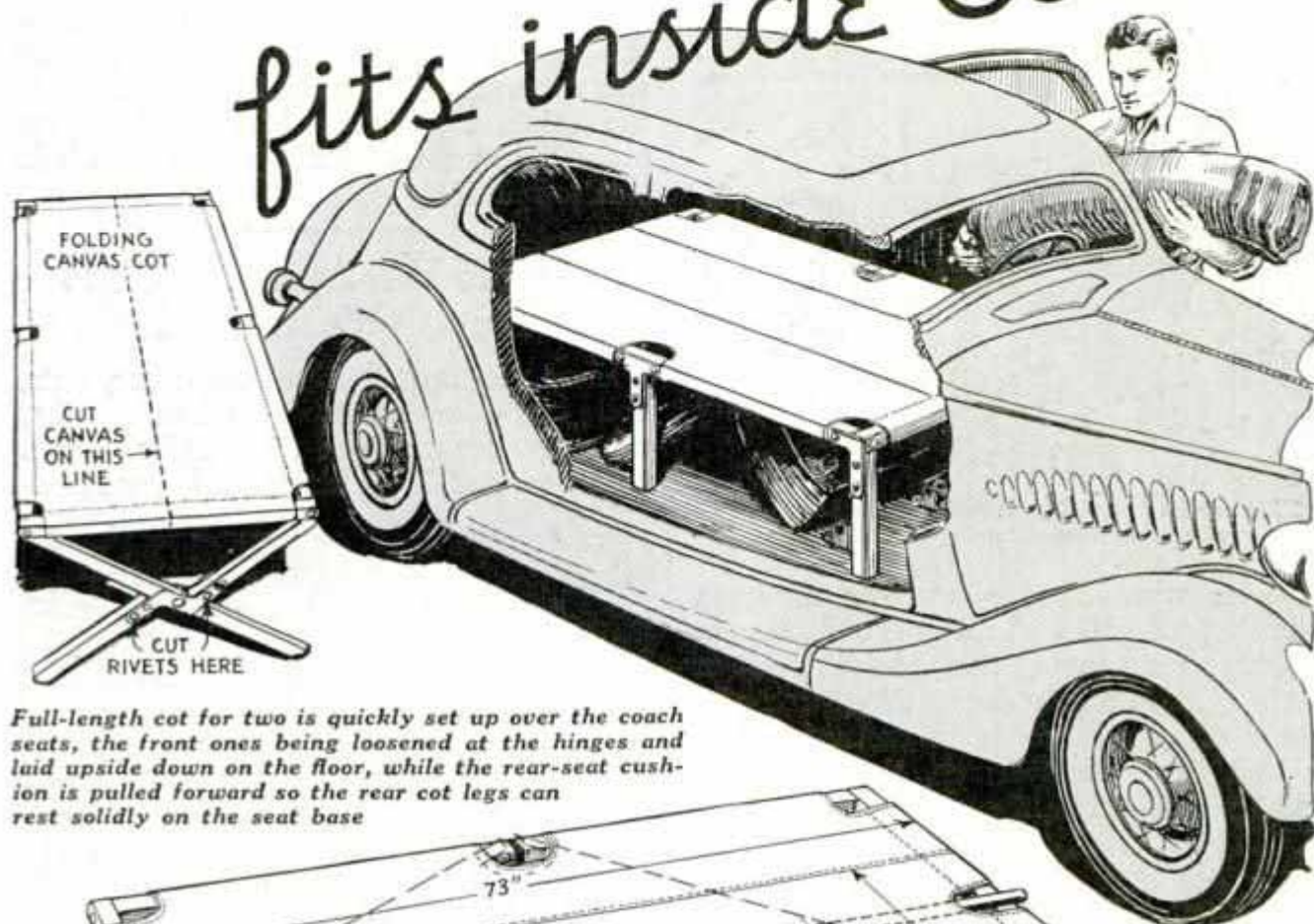
Of the various methods of marking star drills used in masonry work to indicate their size, the one shown here is probably the simplest and easiest to read. It consists of grinding or filing one notch in the handle for each $\frac{1}{8}$ in. of the diameter of

the drill. That is, one notch for a $\frac{1}{8}$ -in. drill, two notches for a $\frac{1}{4}$ -in. drill, etc.

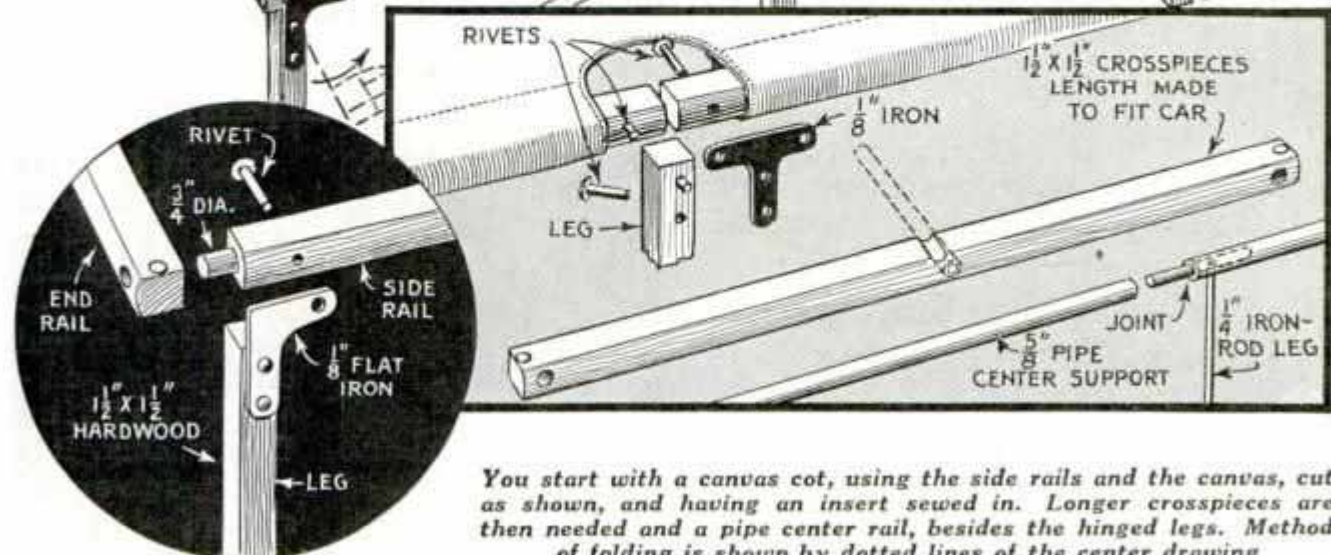
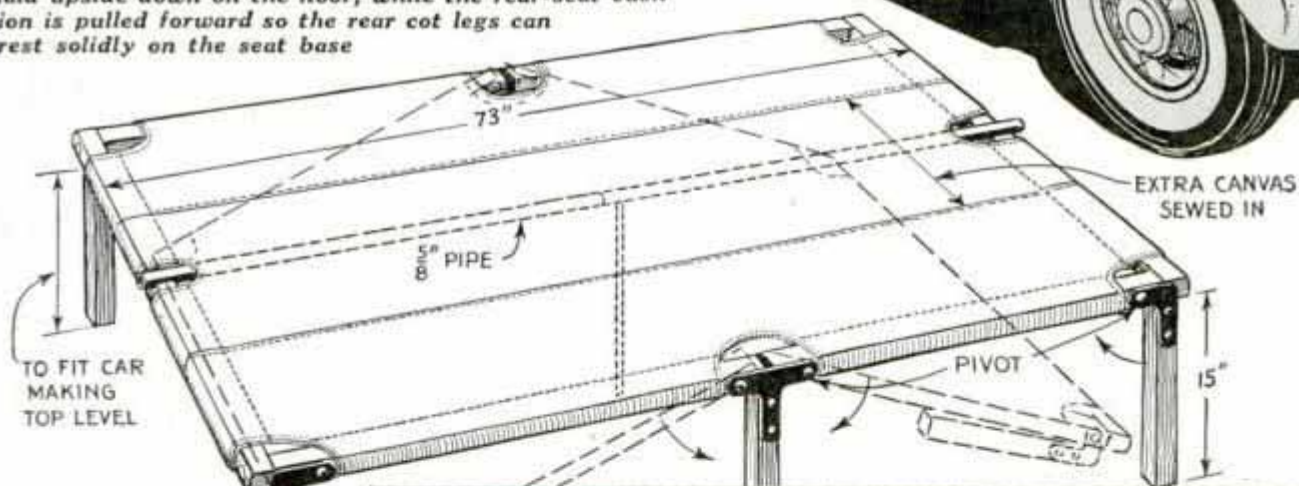
¶To prevent glass from "sweating," due to uneven temperatures, coat it with the following transparent solution: Gelatin, $\frac{1}{4}$ oz., acetic acid, $\frac{1}{4}$ oz., warm water, 20 oz.

FOLDING BED Coach

fits inside

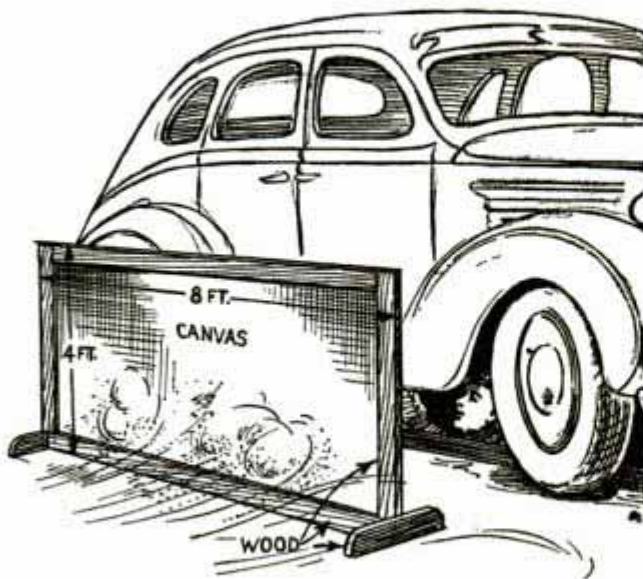


Full-length cot for two is quickly set up over the coach seats, the front ones being loosened at the hinges and laid upside down on the floor, while the rear-seat cushion is pulled forward so the rear cot legs can rest solidly on the seat base



You start with a canvas cot, using the side rails and the canvas, cut as shown, and having an insert sewed in. Longer crosspieces are then needed and a pipe center rail, besides the hinged legs. Method of folding is shown by dotted lines of the center drawing

Grease-Pit Worker Is Shielded from Dirt by Screen

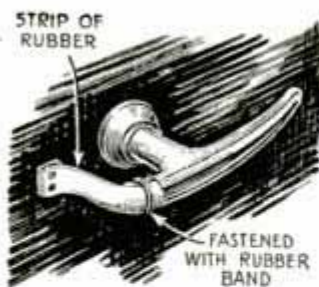


This screen is quickly moved to any position to stop dust from blowing into the pit

Those who have to work in an open greasing pit will find this portable screen effective for keeping dust and dirt out of their eyes on windy days. Consisting of a piece of canvas or hard-pressed board tacked to a wood frame, the screen is readily moved to either side of the pit.

Inside Door Handle Covered to Protect Clothing

When one end of an inside door handle projects so that you often catch some part of your clothing on it, a strip of rubber used as shown will stop the trouble. The strip is tacked to the door and is fastened to the heel of the handle with a rubber band. Make the strip long enough so it will not pull off when the handle is turned.



Removing Broken Starter Bolt from Clutch Housing

A car owner who broke a bolt on the starter shaft of his car, and had the misfortune to have it drop down inside the clutch housing, removed it in a few minutes without taking the housing apart.

The starter was removed and a quantity of hard grease was plastered on the flywheel starting gear through the opening thus provided. Then, by jacking up a rear wheel and putting the car in high gear, the flywheel was given a half turn with the rear wheel, after which the motion was reversed to turn the flywheel back to the original position. When the grease appeared at the opening, the broken bolt was found in it.

Creeper Has Apron on Sides So Nuts Can't Roll under It

Have you ever dropped wrenches, nuts, bolts and other small parts when working on a creeper and had them roll under it out of reach? If so, strips of heavy leath-



"Fishing" for small parts that have rolled under a creeper is stopped with this apron

er tacked around the edges of the creeper to come flush with the floor will stop the trouble. It's a good idea to cut handholds in the leather on each side of the creeper so that you can carry it.

Piston Rings Quickly Installed with This Expander



If you do your own car repair work, this expander will enable you to slip the piston rings on and off a piston without expanding them unduly. It is two pieces of spring steel or clock spring about

1 ft. long with a rivet through the center where they cross to hold the assembly together.—Jerome Ford, Lancaster, Ohio.

Locking License-Plate Screws

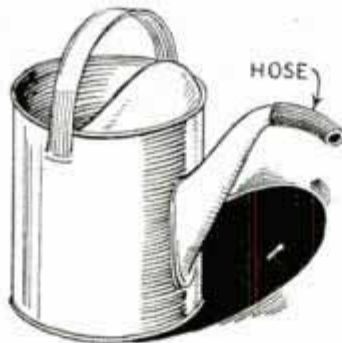


I have found that strips of heavy sheet metal installed on license-plate screws as shown are very effective in keeping them tight. If the strips are plated, they add to the appearance of the car. Or, if they are painted to match the license plates, they will not be noticeable.

—M. G. Winterton, Fort Lewis, Wash.

Water Can Has Hose Spout to Avoid Marring Car

When filling radiators of new cars, on which the hoods have to be raised to get at the filler holes, it is a good idea to slip a short piece of hose over the spout of the water can to avoid marring the car finish. Also, as the hose is flexible, it can be guided into the filler hole with one hand, making it unnecessary to bump the can against the car.



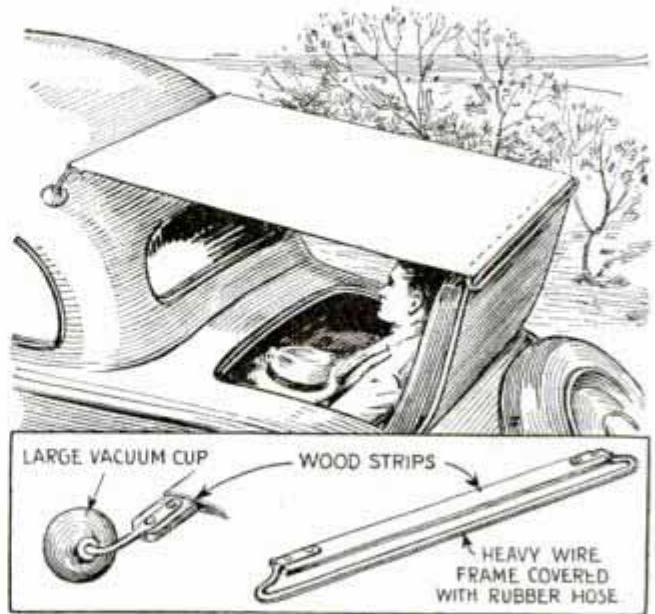
Tire Gauge Read in Dark with Fingers

If you carry a tire-pressure gauge, file a small notch at the number indicating the pressure carried in your tires and you can check them easily in the dark or at a poorly lighted station by running a finger over the scale.



The notch will not interfere in any way with the accuracy of the gauge.

Removable Rumble-Seat Top Folds for Storage

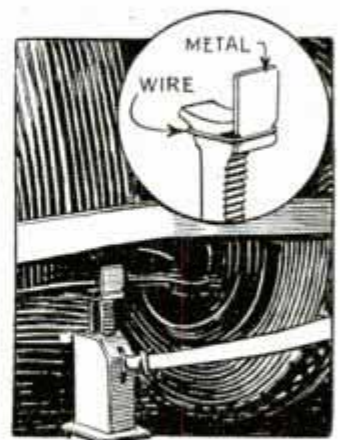


This sun or rain shield is instantly attached to protect riders in a rumble seat

This rumble-seat top is not easily dislodged by wind. It protects riders from sun or rain and may be rolled up and tucked away when not in use. To make it, use canvas or any waterproof cloth, and hem the ends to take wood slats. Large vacuum cups on the front slat attach it to the car top, while a length of heavy wire, bent to the shape shown and screwed to the rear slat, slips over the upper edge of the seat back.

Guide Helps Get Jack under Axle

Wired to the top of a jack as shown, a piece of flat metal will serve as a guide in getting the jack under the axle, especially at night, as it keeps the jack from being pushed beyond the axle. The metal piece should be fastened so it can be removed quickly when the jack is used to raise some other part of the car.



☞ Screwed to the wall above the workbench, a metal toothbrush holder makes a handy place to keep screwdrivers.

String Attached to Wrappers Saves Clerk's Time



Time saved by these specially prepared wrappers helps this storekeeper retain good will of customers

In delicatessens and other stores where there is a pre-dinner rush for small items, considerable time in tying up the packages can be saved by having string temporarily fastened onto the back of the wrapping paper. A length of string sufficient to tie up the average-size package is attached to each sheet of paper with strips of gummed tape. Stacked in a convenient place on the counter, the wrappers are ready for immediate use.

—Opie, Read, Jr., Chicago.

Growing Seedless Melons

A retired army major, whose hobby is gardening, claims that he has raised many watermelons which were practically seedless. As soon as the plant has blossomed he buries a joint of the vine near the rootstalk. Then, within a week or ten days, this portion of the vine has also taken root, and he cuts it from the parent stalk, leaving the newly rooted joint to care for the growth and development of the plant.

The Next Issue

LIGHTS, BELLS AND MOTORS OBEY YOUR VOICE

The sound of a voice, the ringing of a telephone or just someone's approach to a door or window can be made to ring a bell, turn on lights, open doors, start motors or other electrical apparatus. The experimenter can build his own "house of magic," the heart of which is an inexpensive grid-glow tube.

ELECTRIC DOOR CHIMES ANNOUNCE GUESTS

A touch of the doorbell button floods your home with soft, pleasing music. Chimes play several notes, then stop, ready to repeat the cycle.

BIRD BATHS AND SUNDIAL PEDESTALS

Modern designs made attractive with color. How to make forms for casting round, square and reeded columns; shape bath bowls and cure the concrete.

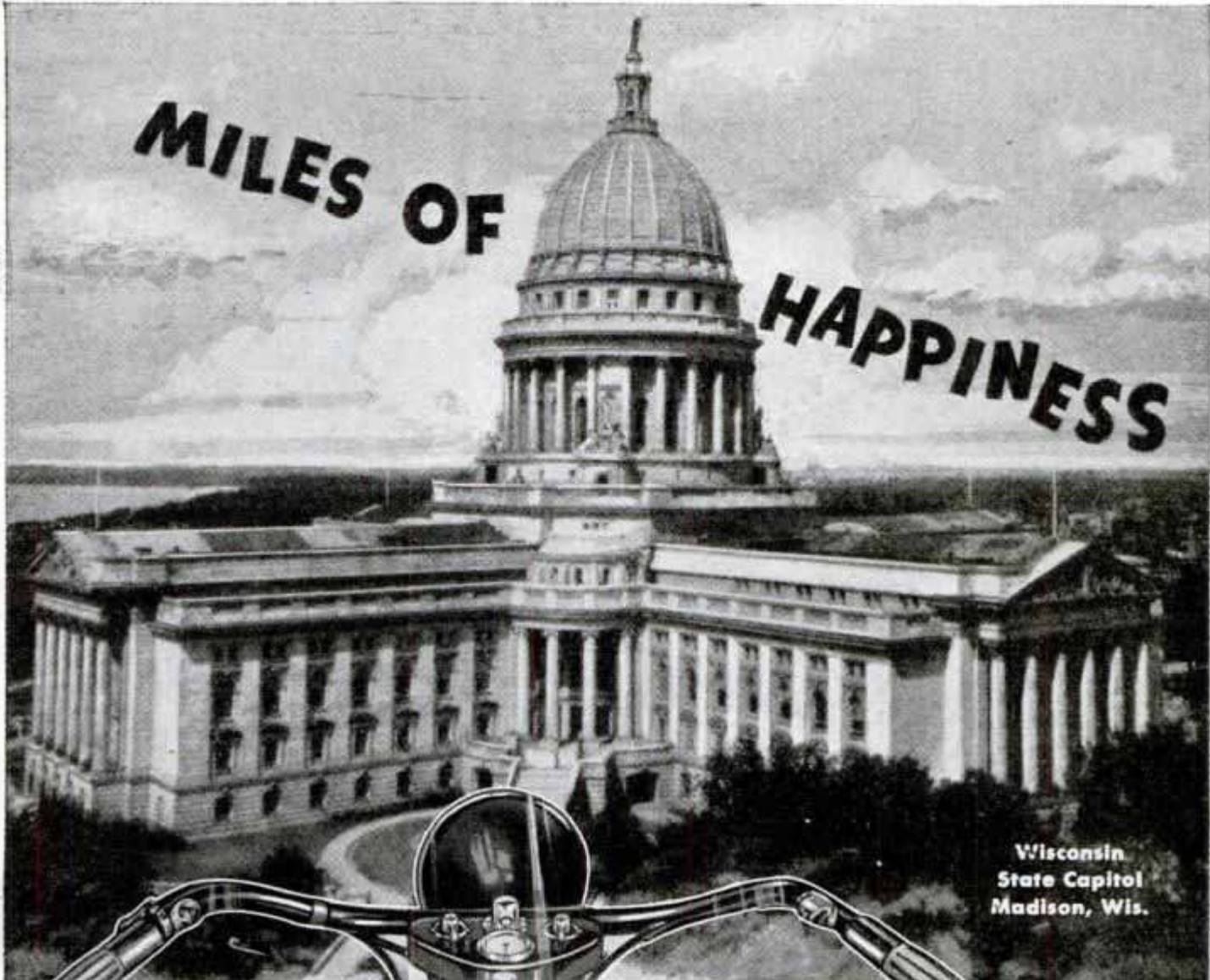
YOUNG SAILOR'S TRAINING SHIP

Stanch, 6-ft. sailing skiff; mast is stepped well forward and carries a single "Leg-o'-Mutton" sail. Can also be used as a rowboat by unstepping the mast.

SOLDERING ALUMINUM

Aluminum sheets, castings, utensils, etc., soldered to last. Proper cleaning, heating, applying of flux and solder explained step by step.

MILES OF HAPPINESS



Wisconsin
State Capitol
Madison, Wis.



**IN THE SADDLE OF
A HARLEY-DAVIDSON**

Happiness, you bet! To see the scenic wonders of your own state—visit the capitol city—stroll through the great capitol building. You can even make a “Capitol Tour” of several states on your vacation. No time tables to follow—and so economical, the Harley-Davidson way.

Get the thrill of fast getaway—zooming speed—high-stepping power—eye-filling style—and gliding ride that’s yours when you own a 1936 Harley-Davidson.

See the new streamline design and up-to-the-minute motor improvements at your Harley-Davidson dealer’s. Ask him for **FREE Ride**. He’ll gladly explain his **Easy Pay Plans**. And send in the coupon—**NOW!**

HARLEY-DAVIDSON MOTOR COMPANY
Department P, Milwaukee, Wisconsin

Ride a



**HARLEY-
DAVIDSON**

HARLEY-DAVIDSON MOTOR CO., Dept. P,
Milwaukee, Wis.

Interested in motorcycling. Send illustrated literature. Postage stamp is enclosed to cover mailing cost.

Name.....

Address.....

My age is () 16-19 years, () 20-30 years,
() 31 years and up, () under 16 years.
Check your age group.



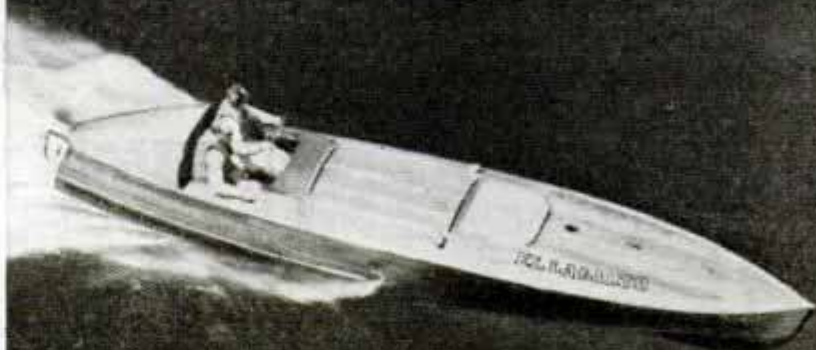
VICTOR HUGO'S IN LOS ANGELES. The world of fashion calls Victor Hugo's charming Garden Room "Paris in Los Angeles"! And, as the diners pause to enjoy their Camels, Hugo says: "Our guests know fine tobacco. Camels are the outstanding favorite here."

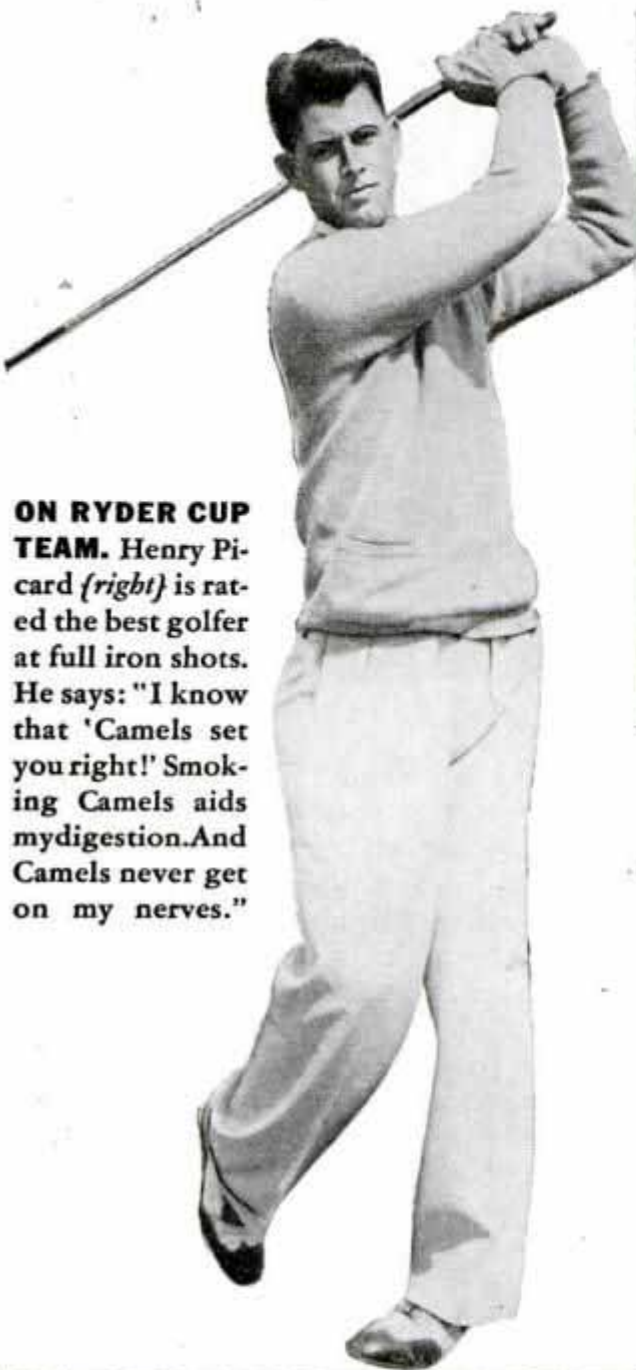
**During and after meals, Camels
bring a sense of well-being and
good feeling. That's why people say:**

"-for Digestion's sake... smoke Camels"

GOLD-CUP WINNER!

George Reis won the trophy *three times!* "I'm a Camel smoker," says this outstanding speed-boat driver. "I eat heartily, smoke Camels, and enjoy that feeling of well-being that goes with good digestion. Camels set me right!"





ON RYDER CUP TEAM. Henry Picard (*right*) is rated the best golfer at full iron shots. He says: "I know that 'Camels set you right!' Smoking Camels aids my digestion. And Camels never get on my nerves."



"**YOU KNOW WHAT** nervousness and eating fast can do to digestion," says Claire Huntington, public stenographer. "I find that smoking Camels helps digestion."

**Camels stimulate digestion...
increase alkalinity**

Digestion responds unfavorably to nervousness and strain. It is encouraged by smoking Camels. Scientific studies show how Camels aid digestion. Using sensitive apparatus, it is possible to measure the increase in digestive fluids—alkaline digestive fluids—that follows the enjoyment of Camels.

For a cheery "lift" and for digestion's sake, enjoy Camels. They never get on your nerves. They are gentle on your throat.

Copyright, 1936, R. J. Reynolds Tobacco Company, Winston-Salem, N. C.

COSTLIER TOBACCOS!

Camels are made from finer, **MORE EXPENSIVE TOBACCOS** — Turkish and Domestic — than any other popular brand.



When writing to advertisers please mention Popular Mechanics

Latest Movie Miracles in Sound

(Continued from page 229)

the pressure and thus does not register at all. While a pin-point mike would suffer a loss in efficiency in that more power would be required to operate it, it would yield better fidelity in its output to the recording channel."

Only occasionally need studio experts resort to trickery in sound. A mine cave-in, for instance, with timbers grinding and cracking, is accomplished by crushing small match boxes in the hands in front of a mike. Crackling tin foil a few inches from the diaphragm supplies the higher notes to a flaming building. Nails dropped into a keg furnish the reverberation of rocks falling on a roof. Obviously, no sound recorder can be lucky enough to be around when a whale blows; so a bellows forcing air through a short section of garden hose turns that trick; shorten the hose, and you have an alligator breathing.

Soon you will hear many sounds which recording engineers have made no effort to bring to the screen because they cannot get them out through the horns in theaters. Today Hollywood's recorders cover a frequency range of sixty to 7,500 cycles, whereas the ordinary telephone system transmits intelligibly frequencies of 400 to 2,800. When a new horn system and amplifiers recently developed by the Bell Telephone company reaches the theaters, frequencies as low as forty and as high as 10,000 will be heard.

This will open an entirely new range of sound recording and bring to the screen a realism hitherto impossible. Today, for instance, when you see and hear an orchestra, you do not hear all the music, because recording a maximum of 7,500 cycles shuts out the upper particles of the flute and violin and the harmonics of the piano.

The lisping and hissing effects which have marred the screen voices of many talking-picture stars have been completely eliminated, and the quality of musical reproduction improved, by means of a radically new sound-recording and printing method which utilizes ultraviolet light, in a narrow range above visibility, instead of ordinary white light.

Recording with the ultraviolet system is like improving the details of a photograph. In this case the photograph is the picture

of the sound on the film. Engineers in the research laboratories of the Radio Corporation of America discovered that by restricting the light focused on the film negative, during recording, to a narrow band in the ultraviolet range, sharper focusing of the lenses in the optical system and controlled penetration of the light on the negative emulsion made it possible to photograph the sound patterns with a sharpness and delineation which corresponds more closely to the characteristics of the original sound.

The tendency for the high-pitched voices of some screen celebrities to sound sharp-edged, especially in the sibilants, has long presented a difficult problem to motion-picture sound engineers. The reason for these harsh-sounding effects is that by ordinary recording and printing methods the finely graded variations in amplitude of which the upper frequency tones are composed become blurred or distorted on the sound track, so that instead of an exact pattern of the speech characteristics there is merely an approximation. The upper frequencies are the tones which make possible realistic reproduction.

Ordinary white light is composed of a great many different wave lengths. Since it is impracticable to focus all of these wave lengths exactly at one time, those of them that are even slightly out of focus blur the edges of the sound pattern on the negative and introduce distortion in the reproduction. Additional distortion results when the light penetrates too deeply into the film emulsion and scatters.

The new ultraviolet method involves only a few simple adjustments in existing high fidelity sound-recording systems, consisting in the main of an adjustment of the lenses in the optical system for sharper focusing, and in the use of a light filter over an ordinary incandescent lamp, which limits the radiant light energy focused on the film to a narrow band, invisible to the unaided eye. The same method permits a wider latitude in the process of making accurate positive prints for the theaters.

Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.

FAST ACTION**INDOORS AT NIGHT****EVEN IN THE RAIN**

Much less than actual size

For the Pictures You Want —when you want them

THE big fun of picture making is in having a camera that doesn't need time off. Kodak Six-16 (f.4.5) lets you master every snapshot opportunity.

Every hour of the day or night is picture-making time with this modern Kodak. No matter when or where snapshot opportunities arise, you're set with Kodak Six-16.

Action shots . . . scenes . . . close-ups . . . even indoor snapshots at night, with Kodak "SS" Film and Mazda Photo-flood bulbs, are easily within range of this Kodak. Take the restrictions off your snapshot making . . . ask your dealer to show you this all-round, fine Kodak.

FEATURES: 1/250-second Compur shutter with delayed-action timer, Kodak Anastigmat f.4.5 lens, eye-level finder. Makes 2½ x 4¼-inch pictures, costs \$40.



KODAK AUTO-FOCUS ENLARGER, MODEL B. The ideal enlarger for home darkrooms—takes negatives up to 4x6 inches, is adaptable to film or plate negatives, enlarges from 1½ to 3½ diameters. Complete with lens, Photo-flood lamp, paper holder, table clamp and set of seven flexible metal masks. Price, \$40.

**Kodak
Six-16
(f.4.5)**



The 4-section lens is a photographic jewel . . . a high-quality, high-speed anastigmat that "makes good" under difficult conditions.



The Compur shutter has eight speeds, from 1 to 1/250 second. Delayed-action timer lets you get in the picture yourself.

The eye-level finder frames the picture accurately in following fast action. When not in use folds flat against camera.



Metal spools make Kodak Six-16 the smallest roll-film camera for its picture size. No bulky wooden spools take valuable room.



NEW KODAK CATALOG

Just off the press—1936 edition of the small Kodak catalog. Write today for your copy, or get it at your dealer's . . . Eastman Kodak Co., Rochester, N. Y.

Name _____

Address _____

City _____ State _____

P. M. 8-36

Adventures of the Plant Hunters

(Continued from page 244)

near-by plants from blights or insects which may be carried by the variety being introduced. In the case of native plants disease hazards usually are not great. But introduction of foreign plants is almost always a hazard so the bureau of foreign plant introduction enforces rigid inspection and quarantine when a plant shipment is received from a foreign country. First, the package is opened by expert entomologists and pathologists who make a thorough inspection for diseases or pests.

Then the plants are placed in the experimental gardens at Bell, Md., near Washington. New species of bamboo are sent to a garden near Savannah, Ga.; subtropical or tropical plants go to an experimental garden in Florida and new imports of cotton, figs, grapes and citrus fruits are sent to a government garden in the Sacramento valley. Garden plant immigrants usually are planted in quarantine houses. These houses are protected by two screen doors at each entry, all ventilators are screened against insects, and oil moats around the buildings prevent the entry of crawling insects. Only those directly concerned with the care and handling of the quarantined plants are permitted to enter the houses, so insects, spores, or bacteria cannot be carried in by visitors. The plants are grown and harvested but are not distributed until the end of the second year.

There is reason to believe that new foods, fabrics, and materials of tomorrow will result from the search at home and abroad for new growths. To date at least 103,500 plant species have been introduced to American fields. Many of the introductions failed to stay but dozens are among the greatest American crops of today, and others may be among the great crops of tomorrow. Oranges brought from Spain by way of Brazil now cover 100,000 acres and the crop is worth more than \$40,000,000 a year. Hard winter wheats introduced from Russia and Sweden cover millions of acres of dry lands not usable for earlier types of American wheat, and represent an annual return around \$300,000,000. Through recent introduction of semi-desert cottons from Egypt into dry land areas of California, Arizona, New Mexico and Texas, millions of dollars are being

added to the purses of farmers, dealers and manufacturers.

The Virginia savoy spinach, developed by crossing the local variety with a disease-resistant wild type found in Manchuria, saved the spinach canning industry of Virginia and other states. Crossbreeding with an unsavory native melon found in India, has helped make the American melon disease-resistant. A wild onion recently discovered by American plant explorers in Persia, now promises a way to end damaging blights and wilts. Through introduction of the soybean from the Orient in 1907 we have developed a major crop worth more than \$40,000,000 a year for hay, seed, cover crop and oil. The soy crop has caused the rise of an entirely new American industry. Present uses of the oil include the manufacture of paint, linoleum and insulating materials. Henry Ford's famous laboratory has already devised steering wheels, knobs, distributor shells, insulators and other auto parts from soybeans.

Korean Lespedeza, sometimes called Japanese clover, first introduced in 1919, is now becoming a valuable pasture grass on poor soils of the Mississippi valley states and the south. A more recent species, introduced from Manchuria in 1929, is proving of value to poor soils in New England and other colder areas. Of the many ornamental trees and shrubs brought from foreign lands, the Chinese elm, introduced from Manchuria by Frank Meyer, one of the most famous of Uncle Sam's plant hunters, now grows on the Great Plains from Canada to Texas. Mr. Meyer also introduced from China the *Rosa adorata*, now a standard rootstock for hot-house roses.

With the exception of corn, America had few important field crops when white men reached our shores. Of the original fruits, only strawberries and crab apples have survived. Early Indians raised different varieties of squashes and beans but squashes and beans now raised upon a commercial scale are either imported varieties or developments from the aboriginal species. And, strangely enough, almost all our original native grasses have

(Continued to page 120A)



DO WE HAVE TO ASK PAUL— HE LOOKS SO TERRIBLE

THE GIRLS WERE GIVING PAUL THE "GO-BY" UNTIL —



Don't let Adolescent Pimples put a stop to YOUR good times

Young people are often plagued by pimples after the start of adolescence— from about 13 to 25. Important glands develop at this time, final growth takes place. Disturbances occur in the body. The skin gets oversensitive. Waste

poisons in the blood irritate this sensitive skin— pimples break out!

Fleischmann's Yeast clears these skin irritants out of the blood. Then— pimples go. Eat 3 cakes daily—plain, or in a little water—until skin clears.



clears the skin
by clearing skin irritants out of the blood

Copyright, 1936, Standard Brands Incorporated.

(Continued from page 118A)

vanished, or waned to a point of insignificance. In a very basic sense, American progress has been a progress of plants and livestock.

Nowadays the purpose of crop introduction is not so much to increase the number as to better the quality and yield of those we already have. Budding, grafting and cross-pollination offer ways of using new plant species to breed desirable qualities into standard species.

During the past fifty years the number of important American crops has risen from fifty-five to more than 500. China, with more than 4,000 different crops under cultivation, leads the world in varieties. The American total, however, is about twice that of any other country. Many of China's vegetable and root crops would not be regarded as edible here but we have taken more plant species from China than from any other country.

In addition to improving the breed of our great crops, much of today's plant hunting is being directed toward improving and restoring healthy grasses, including lawn grasses; increasing the variety of ornamental trees and shrubs, and developing a vegetable source for plant sprays and insecticides, and developing more and better rootstocks for the common and valuable fruits.

Restoration of native grasses and finding new varieties suited to the soil and rainfall conditions of the United States is most important. Not only do we need to restore native grasses of high feed value, hardiness and beauty, but we need new grasses in many sections of the country which have never produced a satisfactory grass. More than fifty per cent of the land area of the United States is classified as grass land. Hundreds of thousands of square miles of this once-great land is now either bare or grown to inferior varieties. The amateur botanist or plant lover who succeeds in locating or developing a successful range grass, or a hardy and attractive new lawn grass will make a valuable contribution to his country.

Mr. Ryerson says the field of ornamental shrubs and plants has hardly been touched in the United States and no government projects have been undertaken for importing foreign shrubs or making better use of native shrubs. Therefore,

adapting attractive native shrubs and trees to the home garden or lawn offers an outstanding challenge to the home gardener or amateur botanist. The same is true of current possibilities for developing hardier rootstocks. Virtually all our fruits, including apples, peaches, pears, cherries, plums, oranges, lemons and grapefruit are propagated and developed by grafting or budding superior breeds upon a common and hardy rootstock. The same process is followed in the propagation of roses. There is now a demand for stronger and more easily adaptable rootstock materials.

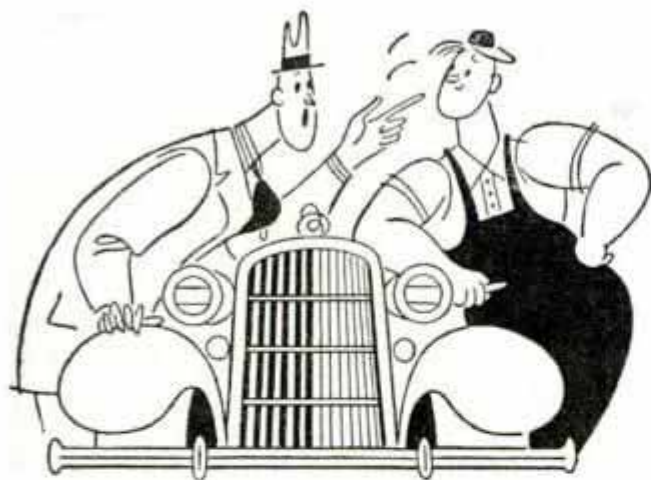
Insecticide plants which can be made into sprays for use upon other plants and trees are also sought. There is reason to believe that vegetable sprays are less injurious to plants than mineral sprays. We are now seeing the introduction of poisonous plants into the United States. We formerly relied upon Japan and other foreign countries for all our insecticide plants. Plant hunters today are searching through northern South America for native vegetable insecticides. They have already sent back species of the "fish-kill" weed—named by South American Indians who throw the plants into streams to kill the fish. This use is a strong recommendation, for people eat the poisoned fish without injury.

So the new procession of new crops, flowers, trees and shrubs pushes on. New seed and roots still come to us from the four corners of the earth—and from lanes, woods, and gardens within a stone's throw of our homes.

7645 —————
**Diesel Ship Built for Sea Base
 of Transatlantic Planes**

Designed especially as a mid-ocean base for transatlantic air-mail planes flying between Germany and South America, the catapult ship "Ostmark" has been launched at Kiel. At the stern is a large crane to hoist planes aboard, while on the forward upper deck is a new type catapult for launching aircraft. Powered with two 900-horsepower Diesel engines, the 2,000-ton vessel is capable of fifteen knots. It was built for the German Luft Hansa to replace the 5,000-ton "Schwabenland," retired from service.

Reported by Council
 & W. Madison



DON'T GET EXCITED, MISTER

"We'll give you the best oil we can buy... but we can't keep it from getting sludgy and tarry looking right after you begin to use it. That's up to you!"

"Sure it's up to you! You've got a *genuine* Purolator Oil Filter under that hood. For about 8000 miles it's kept your oil clean... so clean that for around half that distance it has even kept its bright natural color. But *after* about 8000 miles of driving, the Purolator is so full of the sludge, grit, dirt, hard carbon and small metal particles that find their way into an engine, it can no longer take this deadly stuff out of the oilstream. That's when they begin to grind away at cylinder walls, bearings and valves... and good engines start on their way to the junk heap."

So remember this:

**RE-SERVICE YOUR PUROLATOR
AFTER ABOUT 8000 MILES**

and for further information write Motor Improvements, Inc., Newark, N. J., Makers of

PUROLATOR

The Oil Filter on Your Motor Car
LICENSED UNDER SWEETLAND PATENTS

Important Notice

TO OWNERS OF FORD V-8
Passenger Cars or Trucks

You can now secure a GENUINE Purolator Oil Filter with all attachments, at a price of \$3.25 plus a small charge for installation. Ask your service station.



GLEAMING TILE WALLS AT LOW COST WITH MASONITE TEMPRTILE

(WOOD-FIBRE BOARD)

• Building a new home? See these beautiful bathroom walls even the most modest budget will buy — with MASONITE TEMPRTILE, a wood-fibre board. Does away with hours of cleaning. Makes the entire room cheerful, spotless, sanitary.

And does it save money? It comes in boards, already scored, and costs so little that it ordinarily doesn't amount to more than regular wall surfacing. A carpenter just cuts it to fit and nails it right into place. Then a painter comes in and finishes it. And that's all there is to it.

But that's just the start of the saving. MASONITE TEMPRTILE is grainless and moisture-resisting. It won't warp out of shape. The finish won't chip off and have to be touched up. And these walls will outlive lots of other materials.

No house is too large or too small to be equipped with MASONITE TEMPRTILE in bathroom and kitchen. Mail the coupon for free sample and complete information.



MASONITE CORPORATION, Dept. PM-8
111 W. Washington St., Chicago, Ill.

Please send me a free sample and more details about MASONITE TEMPRTILE, the modern tile material.

Name _____

Address _____

City _____ State _____

'DARE WE TELL HIM
ABOUT
SANI-FLUSH?"



A CLOGGED radiator means a hot motor. Engine efficiency is ruined. Costly trouble often results.

It's so easy to keep the radiator clean and free of rust and sediment. Sani-Flush removes sludge and lime deposits . . . keeps the water running freely and the motor running cool. Use some Sani-Flush yourself, for ten cents. Pour some in the radiator (directions on the can). Run the motor. Drain. Flush. Refill with clean water. Sani-Flush is safe. Cannot harm aluminum head, block or motor fittings.

Clean radiators regularly, twice a year. You'll find Sani-Flush in most bathrooms for cleaning toilet bowls. Sold by grocery, drug, hardware, and five-and-ten-cent stores—25c and 10c sizes. The Hygienic Products Company, Canton, Ohio.

Sani-Flush *Safe* NOT CAUSTIC
KEEPS RADIATORS CLEAN



GIVEN!
\$6 Double-Blade Paddle
now given with
your Ki-Yak—
if you hurry!

BIG MONEY Assembling NEW BOAT!

Make big money on each 20-lb. Mead KI-YAK, you easily assemble at home from complete "cut-to-fit" Kit at amazing LOW COST! Seaworthy. Fast! Snappiest thing afloat. (Complete Sailing Rig, a few dollars extra.) Rush 10c for illustrated folder and \$6 Paddle Gift Offer! MEAD GLIDERS, 15 S. Market, Dept. B-8 CHICAGO, ILL.

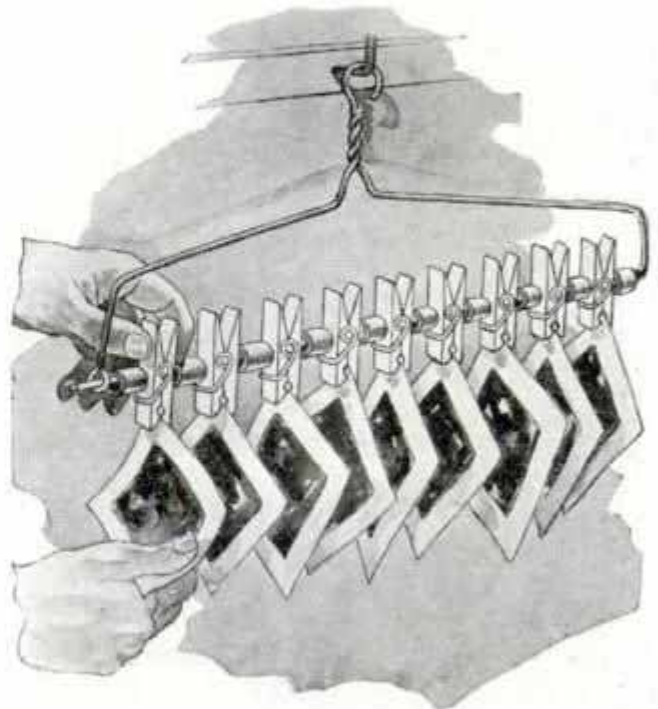


AUTO ENGINE SPEED CONTROL GOVERNORS

FOR FLAT BELT
FOR V BELT
TO CARBURETOR LEVER

To control speed of any make of auto or truck engine, regardless of load changes, when used as a stationary or portable power plant. Fully guaranteed. No cash down. Governor speed range from 400 to 3000 R.P.M. Fine opportunity for established agencies. Circulars. Mrs. Candee-Smith Gov., 215 No. L. A. St., Los Angeles

Print Drier from Coat Hanger Handles Several Photos



If longer spacers are placed between the clothespins, the drier can be used for negatives

This photo-print drier is not only inexpensive, but it can be hung up any place, and can be carried about as a unit, making it unnecessary to handle the prints individually. To make the drier, a wire coat hanger is cut in two as shown, and an eye is formed on one of the severed ends to take the end of the horizontal wire which carries several spring clothespins. The pins are spaced on the wire with short pieces of rubber tubing.—K. F. Keith, St. Petersburg, Fla.

Kitchen Utensils Hung on Wall with Fishhooks



Fishhooks with the barbed ends cut off as shown, make good hooks for hanging pots, pans, cleaning brushes, etc. The hooks are strong, can be obtained in a variety of sizes, and are quickly attached to a wall or edge

of a shelf by driving nails or screws through the eyes.

SKINNY? THOUSANDS GAIN 10^{TO} 25 POUNDS THIS NEW EASY WAY



Posed by
professional
model



NEW IRONIZED YEAST TABLETS OFTEN ADD HUSKY POUNDS —in a few weeks!

EVEN if you never could gain, remember thousands have put on solid, naturally attractive flesh with these new little Ironized Yeast tablets—in just a few weeks!

Not only has this new discovery brought normally good-looking pounds, but also naturally clear skin, freedom from indigestion and constipation, glorious new pep.

Scientists recently discovered that thousands of people are thin and rundown for the single reason that they do not get enough Vitamin B and iron in their daily food. Now the richest known source of this marvelous body-building Vitamin B is cultured ale yeast. By a new process the finest imported cultured ale yeast is now concentrated 7 times, making it 7 times more powerful. Then it is combined with 3 kinds of blood-building iron in pleasant little tablets known as Ironized Yeast tablets.

If you, too, need these vital elements to build you up, get these new "7-power" Ironized Yeast tablets from your druggist today. Then day after day watch flat chest develop and skinny limbs round out to natural, husky attractiveness. Constipation and indigestion from the same cause vanish, skin clears to normal beauty—you're a new person.

Money-back guarantee

No matter how skinny and rundown you may be, try these new Ironized Yeast tablets just a short time, and note the marvelous change. See if they don't build you up in just a few weeks, as they have thousands of other men and women. If you are not delighted with the results of the very first package, your money will be instantly refunded.

Special FREE offer!

To start you building up your health right away, we make this absolutely FREE offer. Purchase a package of Ironized Yeast tablets at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body." Remember, results with the very first package—or money refunded. At all druggists, Ironized Yeast Co., Inc., Dept. 538, Atlanta, Ga.

SEAL CRACKS AROUND TUBS WITH PLASTIC WOOD



Now you can quickly and easily seal unsightly cracks around bathtubs and sinks, reset loose bathroom fixtures in plaster, loose tiles, seal baseboard and floor cracks—for only a few cents with this waterproof and wearproof Plastic Wood. Handles like putty—dries to hard, permanent wood.

USE THE GENUINE

Genuine Plastic Wood is actual wood in putty form, when dry it is hard wood that can be sanded, sawed or carved—will adhere to any clean, dry surface—wood, metal, porcelain or plaster—can be painted, varnished or lacquered—is waterproof and weatherproof.

Ask for the Genuine Plastic Wood—sold at all leading paint, hardware and variety stores.



Plastic Wood also comes in white which is ideal for bathroom repairs.

PLASTIC WOOD

BUILD YOUR OWN FANS. 20 inch aluminum propellers for aeroplane fans \$3.50. Shipped collect. Michael Electric Co. Fort Worth, Texas



TRAILER ★ BUILDERS
★ BUYERS
★ OWNERS

SEND 25c TODAY

for this big 64 page book that tells how to build Tops, Beds, Cabinets, etc. All about Electric Light and Water Systems, Floor Plans, etc. Pages full of valuable information, ideas, suggestions that save time and money for trailer builders, buyers and users. Catalog of parts and equipment includes everything you want—Axles, Hitches, Pumps, Stoves, Lights, Windows, Sinks, Toilets, Mattresses—over 200 items exclusively for building and equipping a trailer. Rush 25c (coin) today—satisfaction positively guaranteed.

TRAILER SUPPLY CO., Box 438-A, Wausau, Wis.

The Brainstorm Boys

(Continued from page 235)

the engineer who would pick up the short-wave impulses from the plane flying over the Atlantic at the scene of the "Akron" disaster.

They took off again, heading forty miles over the ocean. Circling over the spot where ships were scouting through the debris, the engineer tested his short-wave equipment, and from the network's New York office, the announcer was given his cue to begin a fifteen-minute description.

The American networks have been responsible for many unusual broadcasts emanating from focal points of interest in Europe. In fact, the Americans have made a habit of scooping their continental competitors on events taking place in their own back yards. This is due to the fact that American radio men try, and in most cases do what the foreign experts consider impossible, or not worth the trouble.

Such unusual features as the broadcasts from Addis Ababa, the crater of Mount Vesuvius, and the St. Bernard hospice in the Swiss Alps are but a few of the feathers in the NBC cap. None of these broadcasts were even attempted until the American engineers decided they could be done.

When a broadcast from Addis Ababa was first suggested, Max Jordan, European representative of the American network, proceeded to find out if there was a radio transmitter in Ethiopia. No one in Europe seemed to know.

"The first thing I did," explained Jordan, "was to cable Addis Ababa, but my message went unanswered, and so did the next half dozen I sent. We asked questions everywhere but could learn nothing. At length, however, we heard the Italians had built a station in Ethiopia several years before, and it was generally understood it had been turned over to the native government.

"When we proceeded to run down this clew we were beset with more difficulties. We were unable to make contact with the station until we discovered a Swedish engineer was in charge. A cable to Sweden eventually brought his name, and upon cabling him at Addis Ababa, he informed us the transmitter was only five kilowatts, and too small for our needs. We decided to make the attempt, anyway."

Because of unrest in Europe, the network wanted to set up communication directly from the Ethiopian capital to New York. Tests were made, and when a clear strong signal was obtained, the program details were arranged.

One of the most thrilling broadcasts of this type was from Mount Vesuvius at Naples, Italy. Broadcasting the rumble and hiss of the boiling lava appealed to American engineers, but Europeans believed such a stunt too dangerous to attempt.

After three days of preliminary work, two RCA-Victor fifteen-watt aviation transmitters were lowered into the depths of the seething crater and Vesuvius roared and grumbled, at times nearly drowning out the voice of the announcer who spoke from another microphone at the edge of the crater.

Before a special broadcast is made—if time permits—engineers go over the ground and make a preliminary survey. This is out of the question on spot news broadcasts, but on such events as the stratosphere flights, months of intensive preparations are made. This was particularly true of the first flights when special transmitting and receiving equipment had to be built for the gondola.

Variety, of course, is essential in modern broadcasting. Officials grow gray thinking up novel programs. When the Sky Ride at A Century of Progress was being toppled last year, a radio-minded steeple-jack carried an NBC microphone to the top of the 628-foot spire to pick up sounds of the crash to the ground. Recently, two old Broadway theaters were razed and the reports of the dynamite blastings were sent out over the air lanes.

Squeaking of Floor Is Stopped by Treating with Chemical

That squeaking floor has a specific cure. A chemical compounded especially for the purpose is applied from a tube and rubbed into the squeaky boards, a method less expensive than relaying the floor. It contains no oil, water or acid and does not injure the floor, varnish or floor coverings.

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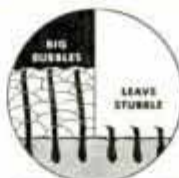
NON-STOP FLIGHT FROM NEW YORK TO LOS ANGELES

GIVE HER ALL SHE'S GOT, AL... WE'VE GOT TO SHAVE BEFORE THAT RECEPTION TONIGHT

NOT ME!

SAY YOUR FACE IS SMOOTH... WHAT'S THE SECRET?

I USED COLGATE RAPID-SHAVE CREAM THIS MORNING—BOY! THOSE SMALL BUBBLES GIVE SKIN-LINE SHAVES THAT LAST! COMFORTABLE, TOO!



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NEW YORK—AFTER THE TRIP BACK

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PULVEX FLEA POWDER

Speed—Six Dollars a Pound

(Continued from page 196)

pressure oiling system, 125 pounds when cold and eighty-five to ninety pounds when the oil is hot. No oil is carried in the engine but is stored in a special tank under the cowl. It is pumped to the engine and collected again in a dry sump base. Circulated through four or five feet of tubing it is cooled by the air. Six gallons of oil are allowed for the Indianapolis race. The Offenhauser motors use only two or three gallons in the grueling 500-mile grind.

Only thirty-seven and one-half gallons of gasoline were allowed for the Indianapolis speed classic this year as compared with forty-two and one-half gallons in 1935. This meant that the drivers had to nurse their cars along on fourteen miles to the gallon.

To make his motors more efficient on gasoline consumption, Offenhauser made the following changes this year:

The intake manifold was altered to insure constant velocities.

Timing on the valves was shortened to eliminate excessive overlap. This was done by making the valves open later and close sooner, with a high lift.

Idling jets could be shut off from the dashboard so no extra gasoline would be wasted. Some were closed nearly shut, except for emergency starting.

A special spider-gear was installed in the rear end to save power on the turns. Up until this year most of the drivers have used locked rear ends because the cars handled better on the curves.

The secret of fine engine building, says Offenhauser, is the proper use of the proper alloys in the proper places.

The custom-built parts of the Offenhauser motor that carry icy-nerved young daredevils around the brick oval at Indianapolis will some day be parts of your pleasure car. For almost every major improvement in the automobile industry has been tried and tested on the race track.

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information is kept on file and will be furnished by our Bureau of Information upon request, accompanied by stamped, self-addressed envelope.

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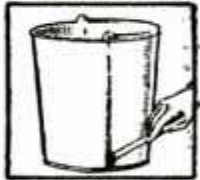
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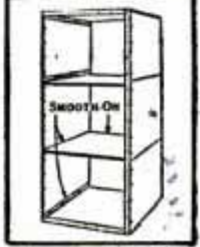
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Rare Metals Conquer New Worlds

(Continued from page 190)

tomary procedure for transmutation today is bombardment with high-velocity particles, which is wasteful of electrical energy. But if or when such transmutations become anything more than laboratory phenomena, we may be able to fabricate the elements we want from raw material blasted out of commoner elements."

A single mountain at Climax, Colo., is now producing more than seventy per cent of the world's supply of molybdenum. Before the winter of 1936 production will be 10,000 tons of ore per day.

The molybdenum mountain contains, according to engineering estimates, about 140,000,000 tons of the ore-bearing minerals. In 1936, this single mine produced 10,000,000 pounds of the pure metal and it was sold for about seventy cents per pound.

Another rare metal that is conquering new fields is barium. The vacuum-tube industry consumes ever-increasing quantities. Recently barium was alloyed with nickel and adapted to the manufacture of spark plugs. It gives a better and steadier spark.

It was recently discovered that beryllium nickel alloy can be tempered to have a tensile strength of 259,000 pounds per square inch. Beryllium copper has shown no signs of fatigue after two billion vibrations at the rate of 230 cycles per second. The price of beryllium is approximately \$50 per pound.

Vanadium steel castings and forgings with or without other alloys in combination are now extensively used in locomotive construction in the new streamline trains. The streamliners have chromium-vanadium steel springs. In the construction of large ships like the "Normandie," in protection armament, guns and mounts, in automobile gears and springs, vanadium is finding considerable application and many tool and die steels contain vanadium.

Cadmium production is leaping, and its uses are growing proportionately. The automotive industry needs the metal for crankshafts and one popular-priced car has silver-cadmium alloy bearings. Dr. Van de Graff, of Massachusetts Institute of Technology, reports that he has successfully transmuted silver into cadmium,

but the process is expensive. Selenium-cadmium is used in Europe for auto headlights. Cadmium sells for about fifty-five cents a pound.

A few years ago the metal selenium was something of a curiosity, interesting because of its unusual property of changing electrical conductivity when exposed to light. Today it is the basis for photocell construction, is useful in decolorizing glass, and certain insecticides contain selenium. British investigators have found that a thin film of elemental selenium resisted sea water better than any paint investigated.

Tantalum is gaining wide application. Thin sheets worth about \$50 a pound are now used to line chemical tanks which contain corrosive substances. Tantalum tubes are used for hypodermic needles and electronic tubes employ tantalum.

Zirconium, its ore worth about \$55 a ton in the New York market, is useful in flashlight mixtures and in ammunition primers. It is alloyed with rare metals other than iron. Zirconium dioxide has a high melting point and resistance to attack by acids; as a result it is used for furnace bricks, which are superior heat-savers.

Tuning Fork Regulates Clock on Direct Current

Designed to operate an electric clock accurately from direct current, a tuning fork with a pitch of sixty vibrations per second has been devised. It is placed in an insulated box with thermostat heat control to prevent temperature changes from changing the pitch of the fork. When the fork is set moving between two coils, it acts as part of a generator setting up alternating current of sixty cycles, since it vibrates sixty times per second. Part of this current is returned to another set of magnetic coils which keep the fork buzzing at its sixty-vibration speed. Thus the fork is never at rest. The rest of the current is amplified and transmitted to a synchronous electric clock. So accurate is the fork that the clock keeps almost perfect time, a variation of only twelve seconds fast or slow being registered.

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24
HOUR
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ERY

F 324 Bulldogs of the Deep

(Continued from page 182)

have ample sea room. The tugs alternated in casting off and steaming to the nearest port to refuel. Of almost equal distance was the tow of the fire-gutted liner "City of Singapore" from Adelaide, Australia, to Rotterdam, Holland. Two Dutch tugs, "Willem Barendy" and "Vlaanderen," barely escaped destruction on this job. Caught by a typhoon in the South Seas, tugs and ship were being driven ashore on a volcanic island. The leeward tug hung on until soundings showed less than a fathom of water under her keel, then cut loose and slowly fought her way to deep water. Meanwhile the remaining tug, having the advantage of deeper water, was still straining at the steel hawser which linked her with the "City of Singapore." At almost the moment when it seemed the ship would strike, the tide changed and, with the aid of a favorable current, the "Vlaanderen" managed to claw her way off with the liner still safe.

In the salvage of wrecked ships the work of deep-sea tugs is as important as that of the salvage men themselves. Ashore in Saroka bay, Russia, the steamer "Ulidia" seemed a total loss when a Russian ice breaker pulled out the entire stern in an attempt to float her. Improvising patches of poured concrete, the crew of an English tug filled in the holes, rigged pumps, and managed to work the "Ulidia" off the rocks. With the pumps barely holding their own against intruding water, the tugboat men tied down their safety valves and forced their engine to the limit for fifty-four hours until they could reach a safe beaching place, 300 miles westward. After refastening the patches, they again refloated the steamer on a rising tide and towed it, with the pumps working day and night to prevent the leaks from gaining, for 2,200 miles through the Barents, Norwegian and North seas to a drydock in England.

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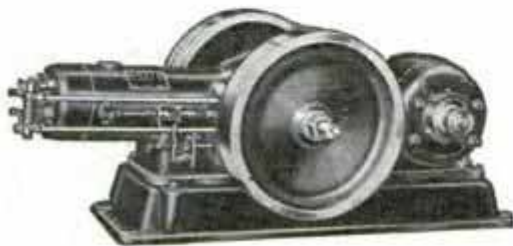
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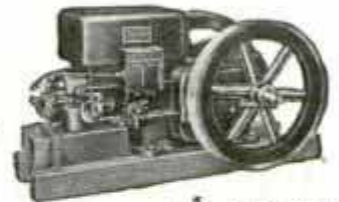
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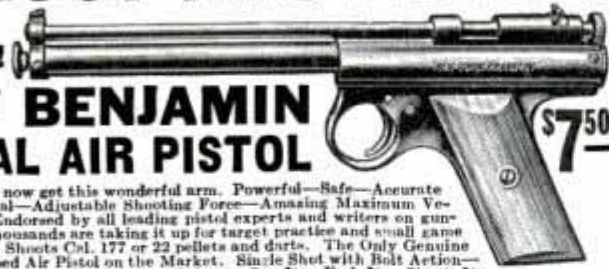
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TRANSPARENT · WATERPROOF



New Tasks for Glass

(Continued from Coloroto section)

continuously rolling plate glass. From the tank furnace the glass flows to a pair of rolls, the bottom one being engraved with the pattern to appear on the glass. Wire glass is made by feeding the netting under the spout from which the glass flows onto the bottom roll, or above the spout, back of the top roll. Wire glass you see through is ground and polished on both sides, but figured or obscure glass used in partitions and doors is ground and polished on one side. Structural glass, in colors, is rolled and polished on one side. Tinted mirror glass is made by using colored glass and silvering the back or painting with aluminum.

"Stained glass" or cathedral glass, is made by melting small batches of various colors in pots, while heat-absorbing glass, colored yellow, green and blue, contains enough iron to absorb the heat-bearing rays of the sun. Skylight glass is rough rolled wire glass with special patterns of prisms to give daylight illumination to interiors by means of diffused light. Diffusion also is effected by means of snowy opal glass. Glass for transmission of ultraviolet light must be entirely free from iron and can be obtained as plate, window or rough rolled glass.

Fibrous glass, or glass wool, is made by a patented process but the methods and materials are quite similar to standard glass practice. Glass wool is a flexible mass resembling cotton batting but possessing the chemical stability characteristic of glass. Fibers can be made in different lengths and diameters. For insulating purposes, it is made in felted bats or in granulated form, the latter being used for blowing into old buildings. It weighs two pounds or less per cubic foot and has been used in insulating battleships, refrigerators and buildings. The same material has also been used successfully in insulating electrical conductors. Textiles woven from fibrous glass are resistant to acids, heat and moisture, and hence are likely to find a variety of applications in the future.

(Concluded next month)

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F435
Camping in Comfort

(Continued from page 250)

and other dishware. The compact cooking outfits have many advantages, especially in weight, but when hot food is placed in some it's almost impossible to handle them. One metal now used is a sort of stainless steel or alloy. It doesn't burn your fingers every time you touch it.

Don't think of starting without a tin of prepared fly and mosquito dope and a little spray gun to "shoot" it around. Any of the prepared "dopes" are worth their weight in gold. No matter how clean you keep your camp site, flies will come around. The "whiff" gun with fly dope is a big help. At night after the netting has been closed in the tent this outfit also comes in handy to exterminate the mosquitoes, flies or spiders. Incidentally these dopes sprayed on your clothing will keep mosquitoes from you while fishing.

The average camper has so many chances to shop for foods that he doesn't need to know all the cooking tricks of the backwoods tenter unable to pick up a fresh loaf of bread or a small steak when he pleases. However, every camper ought to know how to turn out a few tasty dishes in the woods, including hot bread. Following are a few recipes.

You can produce appetizing hot bread—a "man's dish"—without much work. For two people you need one and one-half pints of flour, one and one-half heaping teaspoonfuls of baking powder, one-half teaspoonful of salt, one heaping tablespoonful of lard, and one-half pint of cold water. You may need more water. It will depend on the flour. Put the baking powder and flour in a deep pan, then add the salt. Mix with a big spoon. Then mix the grease thoroughly. You must have no lumps in the mixture when you're through. Now add the water and slowly keep stirring it. The objective is a stiff dough. The amount of water must be governed by the way the dough works up. When you have a pretty stiff dough turn it out into a greased pan and bake it in your oven. Run a long sliver into the loaf. When the sliver comes out clean the bannock is ready. Serve it hot. Break it, don't cut it, and butter at once.

Nearly everybody fries fish in camp.

(Continued to page 136A)

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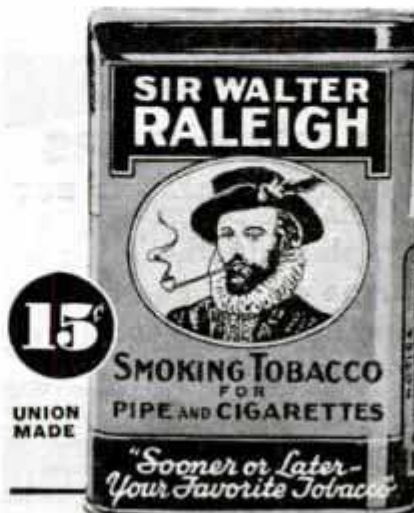
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(Continued from page 134A)

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Clean and split the fish down the back. Make cuts on each side of the backbone and take boneless filets from the sides, if the pike or bass is large enough. If not, broil the whole fish. Put strips of bacon over the fish as you broil it over coals—not a burning flame. When the fish is done baste with a little bacon fat or butter and give it another turn until the butter or bacon fat melts.

Here is a dish every camper ought to know. It's tasty, nourishing, and economical because it utilizes left-over potatoes and fish. Cut the pieces of fish very fine. Now mash the potatoes left over from the previous meal. Mix two-thirds potatoes and one-third minced fish. Now season with salt and pepper. Beat two eggs and add them. Now get a pan ready with plenty of hot fat in it. Make small cakes of the fish and potatoes, roll them in flour and brown them in the hot fat.

Nearly all who do considerable camping take rice because it is an old standby. But you soon tire of boiled rice. Rice cakes and Spanish rice are not difficult to prepare. For Spanish rice, take two or more cups of boiled rice, one good-sized onion cut in small pieces, and a can of thick tomato soup. Add plenty of pepper, if you like a hot dish, salt and put in your camp oven for at least an hour. For breakfast, take cold boiled rice, make small cakes, roll in flour and fry in butter.

If you tire of tinned meat or wish to keep down expenses by getting an inexpensive cut of meat, consider this recipe—so simple you can make it even though you never tried your hand at camp cooking. Cut the meat into small squares. Put these into a frying pan. Brown them well. Add a tablespoonful of sugar and a cupful of sliced onions. Cook until the latter are browned and tender. Now turn the contents into a deeper dish, cover with water and let it simmer for two or three hours over a slow fire. Flavor with salt, pepper, or whatever you want. Don't boil this concoction. It must simmer and it's great for a rainy day when you will be around camp to keep an eye on it.

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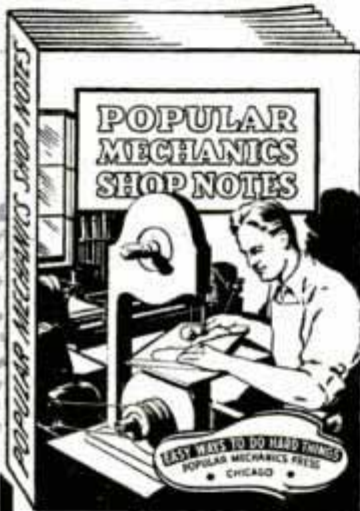
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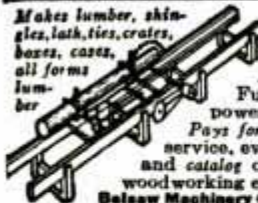
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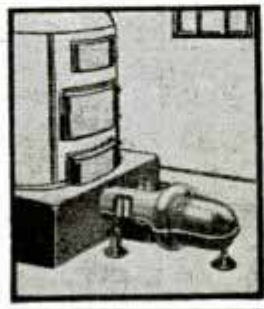
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(Continued from page 221)

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Water is the last thing to use for putting out a fire which involves aluminum shavings in a machine shop. It makes the shavings seem to explode. Sulphur and lime are also dangerous to fight with water and the best thing to do is to smother the fire with some of the material or with some other inert substance.

Hundreds of ideas and suggestions are submitted to the nation's fire departments every year for more efficient ways to put out fires but water still remains the chief weapon of the firemen. Soda-acid mixtures are injurious to some materials and can't be used universally. Even foam blankets that contain carbon-dioxide gas are not always practical because they don't cool the extinguished materials and the fire is apt to flash back.


Most improvements to apparatus are invented by firemen themselves. Chief Blake, for instance, has developed nearly a dozen devices, from improved types of nozzles to stronger hydrants. Practically all nozzles these days have shut-off gear that enables firemen to walk up close to the flames before turning on the water. One type of rotary crank shut-off permits him to control the volume of the stream and shuts off gently so that no back pressure is built up that might burst a hose.

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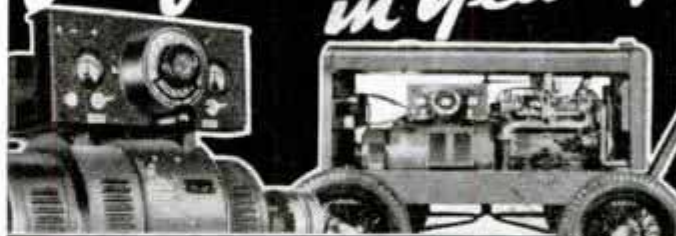
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B-Eliminator Works on Six Volts

(Continued from page 259)

Fig. 1; these may be obtained completely formed and drilled for easy assembly. The only tools that are required for building the unit, are a pair of pliers, screwdriver and soldering iron. A schematic circuit diagram is given in Fig. 2. All shielded battery leads, including ground soldered to cable shield, and cable-plug prong connections, are clearly indicated in Fig. 3. Fig. 4 merely shows the internal construction of the plug-in dual vibrator unit and a bottom view of its base prongs. A simplified wiring diagram appears in Fig. 5.

All parts are inexpensive but must be of good quality, and have been carefully selected to insure best results. A complete list of the original materials can be obtained upon application to Popular Mechanics radio department, without charge. The blueprint number is R-226. Both r.f. chokes, "A" and "B," are available; type "A" consists of 70 turns of No. 16 d.c.c. wire wound in several 1½-in. layers. Those who wish to make their own may use a lead pencil as a winding form. The "B" r.f. choke is a standard 2.5 mh. lattice-wound variety; its location in the assembly is indicated in Fig. 5-A, and type "A" appears at the upper right in Fig. 5-B.

A power transformer of special design is required for battery-operated B-eliminators of the vibrator type. The primary of the one used in this model is center-tapped for 6 volts input on each half, and the secondary is approximately 170 volts each half of center tap. Fig. 5-C shows the vibrator socket and can-shield grounding plate. The completed unit, with the 25-henry filter choke in position, appears in Fig. 5-D. The final hook-up to the receiver and storage battery is clearly shown in Fig. 6. Place the B-eliminator close to the receiver and battery; note that the unit is suspended by means of small springs to eliminate vibration. A small knife switch is connected in series with the 6-volt A-positive battery lead so that the B-eliminator may be disconnected from the battery when the receiver is not in use. If other values of B-voltage less than 135 volts are required, connect a 50,000-ohm, 25-watt voltage divider, with adjustable sliding clips, across the output terminals of the B-eliminator.

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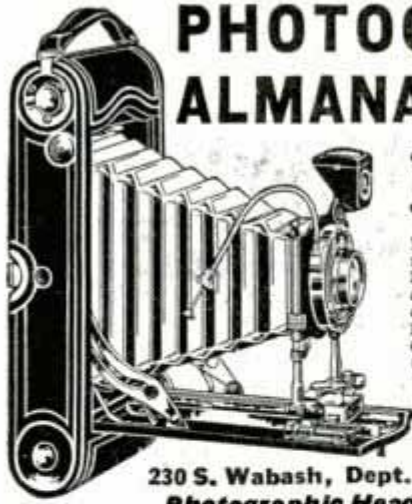
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Two-Tube Burglar Alarm

(Continued from page 260)

pensive, they have been carefully selected to insure good results and should be just as specified. A complete list of the original materials used can be obtained from Popular Mechanics radio department upon application, without charge. A simplified wiring diagram is given in Fig. 1; the base, panel and cover dimensions are clearly shown in Fig. 2. All sockets are mounted on $\frac{7}{8}$ -in. metal bushings. When drilling the metal front panel for mounting the midjet variable condenser C_1 , make the hole large enough to clear the condenser shaft by about $\frac{1}{8}$ of an inch. Fiber washers are used to insulate the condenser from the metal panel.

As this layout is used as a burglar alarm, a small 3-volt bell is mounted on top of the cover and two $1\frac{1}{2}$ -volt dry cells are connected in series to operate it. The plug-in coil is a Hammarlund, 17 to 41-meter type SWK-6 with the primary and tickler windings removed, leaving only the heavy secondary winding which is center-tapped as shown. Those who wish to wind their own can use a similar coil form $1\frac{1}{2}$ in. in diameter. The winding consists of $8\frac{3}{4}$ turns of No. 16 silver-plated wire, space wound. A line cord, with a built-in 320-ohm resistor, is used to drop the line voltage for the tubes. The schematic circuit diagram appears in Fig. 3.

To place the device in operation, plug the line cord in a wall socket; if the line is d.c. it may be necessary to reverse the plug in the socket for correct polarity. To balance the unit, use a short length of antenna wire, about 2 feet long, turn condenser C_1 halfway in and place your hand on the antenna wire to start the bell ringing. If it does not ring, adjust trimmer condenser C_2 until it does. Now when the hand is removed the bell should stop ringing; if it continues to ring, reduce the bell-battery voltage. When properly adjusted, connect 20 or 30 ft. of flexible insulated antenna wire to the short antenna lead and run it near the door or windows to be guarded. When this is done it may be necessary to restore the full battery voltage for the alarm bell. No ground wire is used; the knob on the front panel controls the effectiveness of the alarm at all times after the unit is properly balanced.

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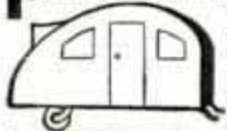
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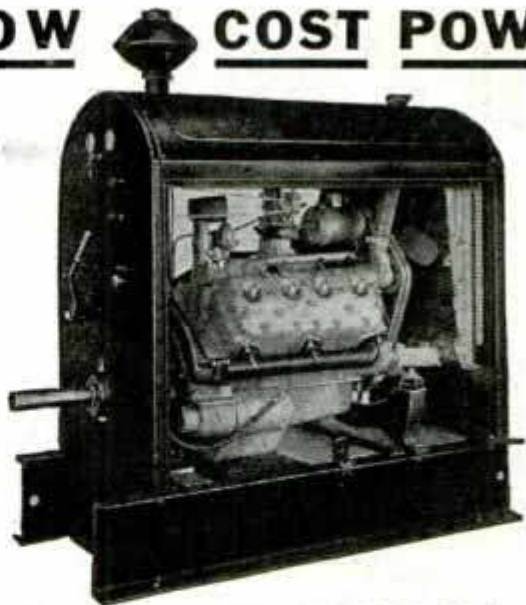
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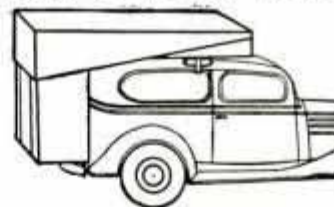


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Dust Hurls a Challenge

(Continued from page 163)

The sky turns to a copper red and the sun is a gleaming violet disk. The sight is unearthly and terrifying. Near-by objects are blotted out. The air is filled with sharp fragments of flint which strike exposed flesh like a charge of birdshot, frequently drawing blood. The abrasive action of the sand is sufficient to reduce a green field of wheat to barren desolation in an hour. Leaves are torn from trees, houses and paint part company.

The air is stifling hot and choked with dust. Static sparks jump from skin to metal. The wind blows and sighs in an undulating, monotonous blast. As the hours pass the air becomes perceptibly cooler. Soon it reaches freezing. The advancing cold wedge has intercepted the lofty thunder clouds and now snow mingles with the dust. It is muddy snow and smears what it touches. Soon there is more snow than dust and the air clears. On the following day the sun rises in a blue sky. It is crisp, clear and cold. The swirling dust in the streets has solidified into cementlike adobe. People are breaking it off the walks with pick and shovel.

Storms of this nature are now so frequent they seldom attract attention. We have already had three years of such weather and there are indications that we may have many more. There is little man can do to remedy the situation, but the challenge has been hurled to inventors to devise a means of protecting man's property from dust, particularly his transportation facilities. At certain times of the year motoring across the dust bowl is not only uncomfortable but actually dangerous.

Nearly all the railroads operating in the northwest have installed air-conditioned or pre-cooled cars as standard equipment. It is thus possible for passengers to ride in comfort and cleanliness at all times. The same method applied to bus and passenger automobiles would be a boon, not only to desert travel but to all touring. An air cleaner which could be installed by any garage, assuring a circulation of dust-free air at all times, would solve the problem.

A more difficult job, but one of supreme importance, is an air filter for the engine. There are today many on the market, all of which perform their functions up to a certain point. But a filter to be universal-

ly acceptable must not only extract all the grit and dust from the intake, but must expel it. In a severe storm it does not take many minutes for the screens of the average filter to become clogged and useless.

Dust working into the bearings through the crankcase breather pipe produces damage which is not noticed for some time. This damage usually is due to the forming of a sludge which retards the circulation of oil. A method of flushing, other than by injecting a cutting oil, or better yet, a dust-free system of crankcase ventilation would be a major improvement.

Sand will cut paint and even steel, but it has virtually no effect on rubber. Rubber aprons to tie over those parts which receive the full force of the scouring blast would preserve the appearance of the car.

Static sparks jumping from plug to cylinder head frequently interfere with the operation of the engine. Also, sparks leaping from the frame of the car to knees, elbows and ears of occupants are very annoying. Dragging a chain is one way of grounding the car. A better method would be welcomed.

Spectacle lenses are made of soft optical glass. They scratch and pit easily. Transparent shields to slip over the lenses, affording adequate protection and still not interfering with vision would be warmly received. An inexpensive paint for wood and metal, tough enough to withstand both heat and sand, also is greatly needed.

The outstanding requirement of the railroads in the battle with dust is a means of making the journal boxes of cars more dust-tight and still not making them harder to inspect and service.

Every calamity of national importance has left in its wake a series of inventions, so that the next disaster would be less destructive. Thus have been developed serums, cyclone-proof fences, fire-resistant building material, safety lights and radio beacons. Our modern civilization is built on our ability to profit by mistakes and outwit the forces of destruction. This time the enemy is dust, and it is up to our inventors to withdraw its fangs.

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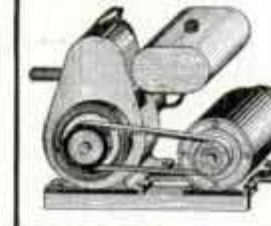
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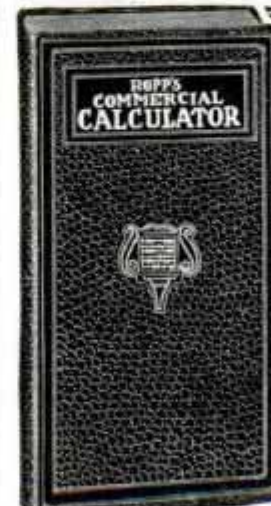
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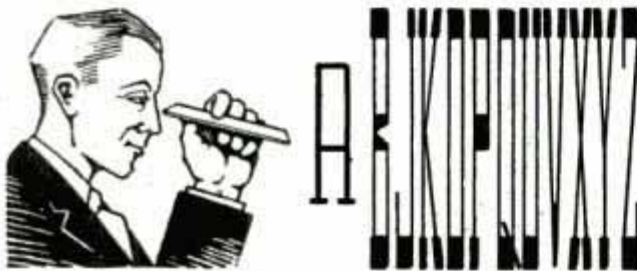
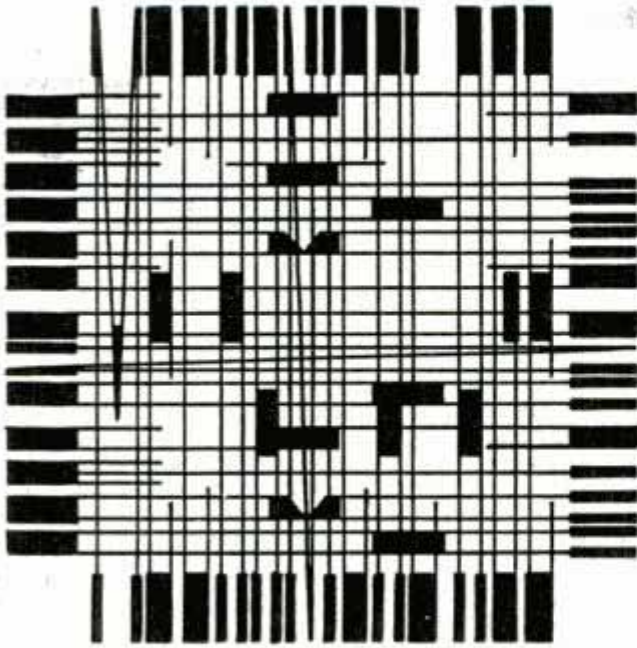
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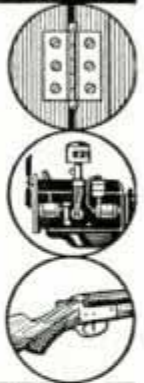
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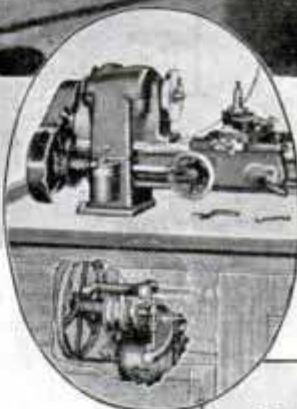
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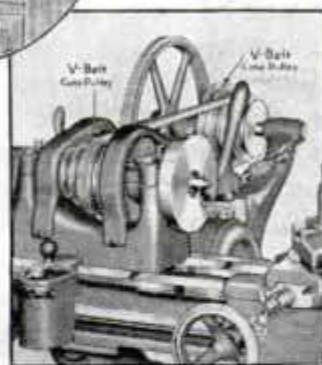
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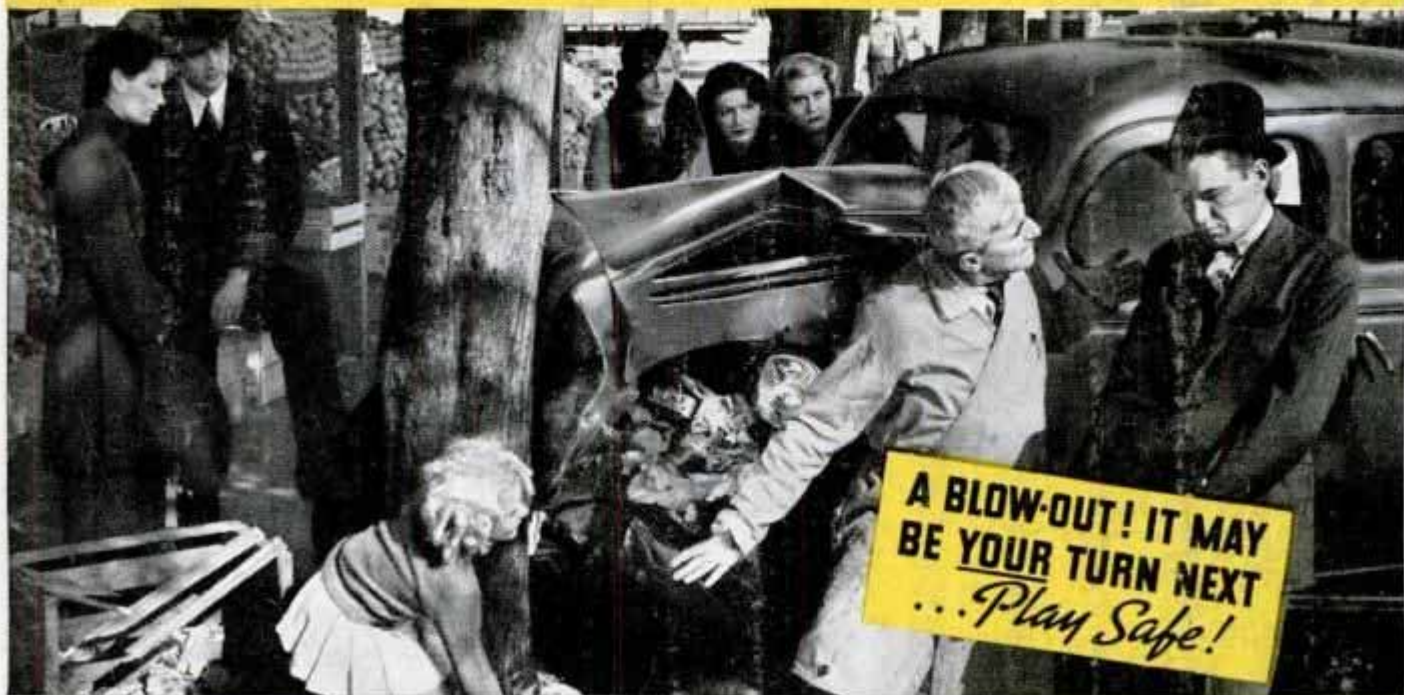


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