

SCENIC WONDERS OF THE WORLD

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT



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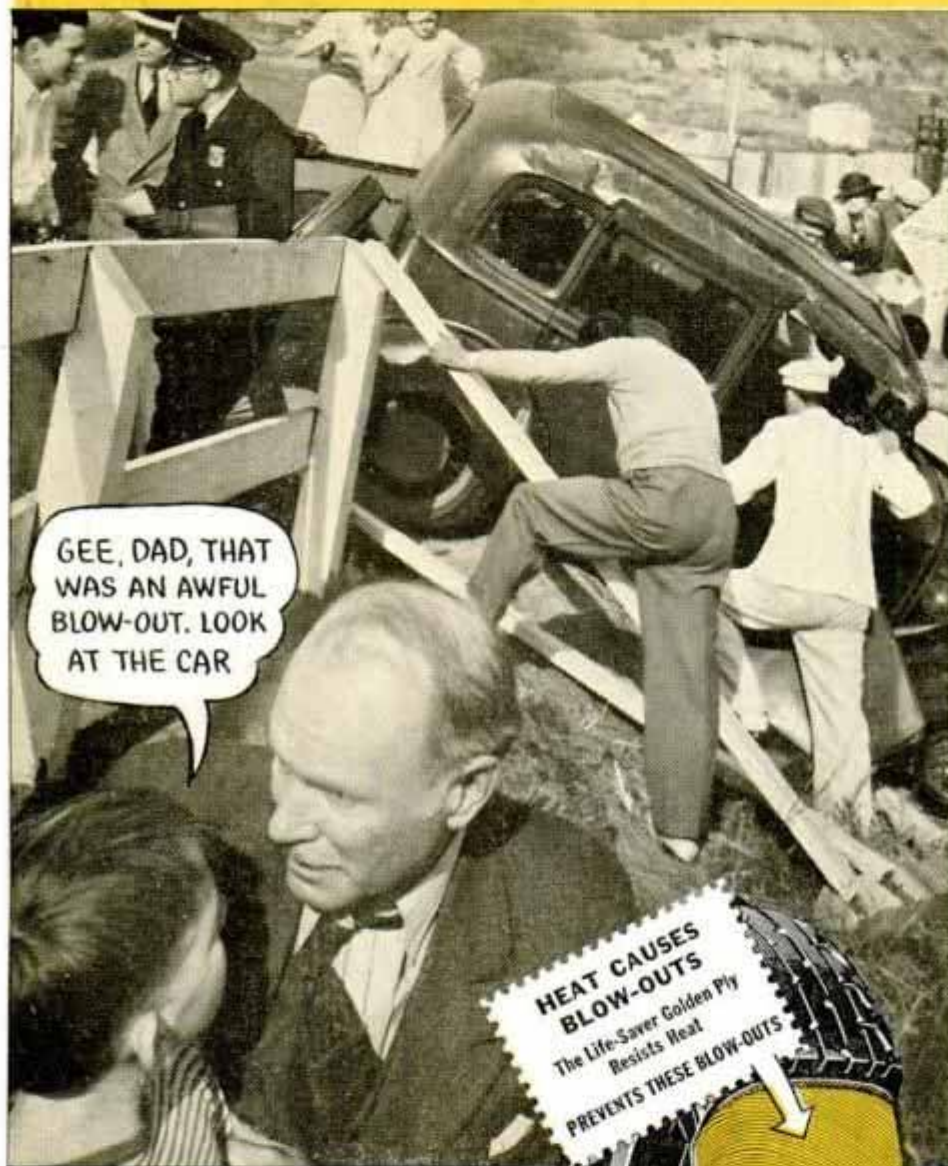
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SEE PAGE 336

WHY GAMBLE ON TIRES THAT DON'T GIVE REAL BLOW-OUT PROTECTION



Here's more than just a "PAPER" guarantee

"Paper" guarantees may put new tires on your car, but they won't save your life if your tire blows out going 40, 50 or 60 miles an hour. Play safe. Get the new Goodrich Silvertown—the only passenger car tire in the world that guarantees you Golden Ply blow-out protection, plus a full 12 months (business use, 6 months) guarantee against all road hazards except punctures, fire, theft or abuse from running flat.



Play safe—Get a set of Goodrich Silvertowns, the only tire that gives you Golden Ply protection

LUCK is usually all against you when—BANG! you have a blow-out. It's just one of those things you can't do much about *when* it happens. But you can do plenty about it *beforehand*.

How people are killed

Today, unless you are protected, the danger from blow-outs is greater than ever. Due to higher speeds and smaller wheels, the heat generated *inside* the tire is terrific. Rubber and fabric begin to separate. A tiny blister forms and grows—bigger—BIGGER until BANG! A blow-out.

To protect you from blow-outs, every new Goodrich Safety Silvertown Tire has the Life-Saver Golden Ply. This remarkable invention resists intense heat. Rubber and fabric don't separate. Thus, blisters don't form inside the tire. The great unseen cause of blow-outs is prevented before it starts. Get a set of Goodrich Silvertowns *before* it's your turn for a blow-out.



FREE! Handsome emblem with red crystal reflector to protect you if your tail light goes out. Go to your Goodrich Dealer, join Silvertown Safety League, and receive one FREE. Or send 10¢ (to cover packing and mailing) to Dept. 409, The B. F. Goodrich Rubber Co., Akron, Ohio.



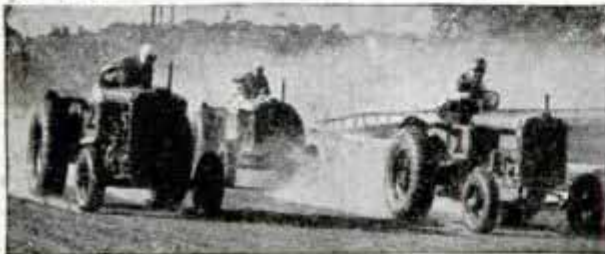
The **NEW** Goodrich Safety Silvertown
 Copyright, 1934, The B. F. Goodrich Rubber Co. WITH LIFE-SAVER GOLDEN PLY

PYROIL

HOW IT MAKES HISTORY



BARNEY OLDFIELD, established a world record, 1933, racing an Allis-Chalmers farm tractor at 64.28 miles per hour — **using Pyroil.**



LOUIS MEYER, won 1933 Indianapolis 500-mile race, shattering previous records — **using Pyroil.**



BILL CUMMINGS, shattered world record, 1934 Indianapolis 500-mile race and won Pyroil Silver Trophy—**using Pyroil.**



FLOYD TEAGUE, established a world record coast to coast, 1934, with a Ford V-8—**using Pyroil.** Time, 56 hours 52 minutes.

Pyroil is always in the limelight — associated with famous names, famous events, the creating of new world records—because it is depended on by authorities in every field where motor punishment and endurance require a lubricant that can "take it" and come through to victory.



PYROIL HAS BEEN TESTED AND PROVED IN POPULAR MECHANICS LABORATORY AND IS USED ON PRINTING AND BINDING EQUIPMENT IN POPULAR MECHANICS' HUGE CHICAGO PUBLISHING PLANT.

If you haven't used Pyroil you ought to try it. There is no substitute, no equal for it. It is a heat-, wear-, friction-reducing super-lubricant which you simply add to your regular oil, gas and grease—by the ounce. It contains an element which is recognized by science as the greatest known enemy of friction. This element is established on all vital frictional surfaces. It constantly protects against damage because it cuts down friction, wear and over-heating. It establishes a self-lubricating surface which functions and protects with safety in the event of interruption with, or complete failure of, the oil supply. It removes carbon, frees valves, aids compression, increases power. It saves so much in operating costs that its use actually costs nothing. Sold throughout the civilized world. Ask at service stations and garages, or mail coupon for interesting and important facts.



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SEE THE PYROIL EXHIBIT AT THE 1934 WORLD'S FAIR (General Exhibits Bldg.)

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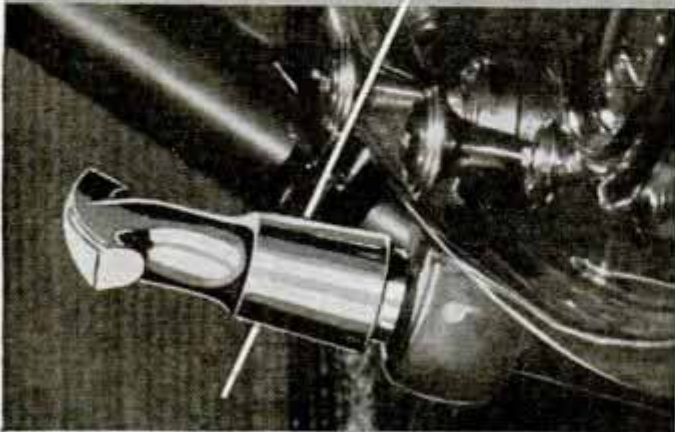
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Popular Mechanics Magazine

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

September, 1934

Vol. 62, No. 3

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Painting with Colored Lights

MILLIONS of visitors have been awed and thrilled by the day and night hues of Chicago's Century of Progress. The decorative scheme of the World's Fair represents the most gorgeous display of colors and lights ever attempted by man. Painting and lighting experts painstakingly experimented for months to achieve their results and they learned many things about the psychological effects of light and color on man. In the October issue you will find sixteen pages of World's Fair pictures in color and the story of how the exposition was colored and illuminated, including hints on how you may apply the Fair's color effects, in modified form, to your own home or garden.

Next Month

FOG is still listed as Public Enemy No. 1 on the seven seas and has accounted for 20,000 shipwrecks and collisions in the past ten years. Despite the many safeguards for shipping developed in recent years, including the radio beacon and direction finder, this blinding menace continues to challenge inventors. Read what has been accomplished in fog control and what is being attempted in the next issue.

Air Mail Thrills

HIGH adventure flies with the air mail as these planes thunder across the skyways with their cargoes of letters. For instance, there was the pilot who hunted for Chicago one stormy night and finally located it above him instead of below. Read in the October issue about the thrills experienced by these air mail flyers on their lonely journeys.

A \$1,000,000 Hobby

THE small boy swapping a knife for a coveted batch of postage stamps and the President of the United States poring over a stamp collection to which he has devoted years of effort would have a swell time together. Stamp collecting is a hobby everyone can ride and the 9,000,000 devotees in this country spend \$6,000,000 a year for the colored stickers. An article in the October issue tells you how to start.

BUILD *these* RADIOS AND RADIO DEVICES *described in* POPULAR MECHANICS MAGAZINE

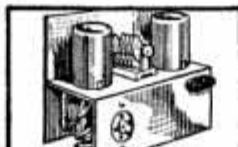
Thousands are building the successful Radio Sets and Radio Devices described each month in POPULAR MECHANICS MAGAZINE, bearing the stamp of approval of the POPULAR MECHANICS Radio Laboratory. When you build your POPULAR MECHANICS set, for assured results—use only approved parts, carefully selected in kit form exclusively for you, at prices which will save you money. Easy to understand, accurate, and completely detailed blue prints are available with each kit. The five Radio Devices which are described below are only a few of the popular kits which are available. Order your kit today from ALLIED—Radio Parts Headquarters, or send for FREE Parts Lists for building any Radio Device which has appeared or will appear in any issue of POPULAR MECHANICS MAGAZINE.



LITTLE GIANT AC-DC PORTABLE. Described in Popular Mechanics for March, 1934. A four tube midget with amazing power. Kit of selected parts with speaker, less tubes. **\$1061**

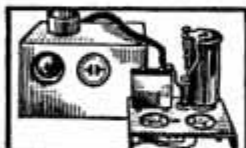
PENTAGRID MAGIC WAVE CONVERTER. Popular Mechanics for successful S. W. converter without plug-in coils. Kit of parts, less tube.

BOX SHORT Described in April, 1934. A **\$1191**



POPULAR MECHANICS 2A3 P. A. AMPLIFIER. Described in February, 1934, Popular Mechanics. An all-purpose powerful amplifier, for practical low-cost operation. Kit of parts . . . **\$3629**

BEGINNER'S 2 TUBE ALL-WAVE SET. Described in Popular Mechanics for January, 1934. Anybody can build this flexible little set, either for battery or A. C. use. Kit of parts, less accessories. **\$1357**



TUBE RELAY FOR ELECTRIC EYE. In Popular Mechanics for July, 1934. A low-cost tube operated photo-cell relay for hundreds of applications on 110 Volt, A. C. or D. C. Kit of parts with tube and photo-cell **\$2025**

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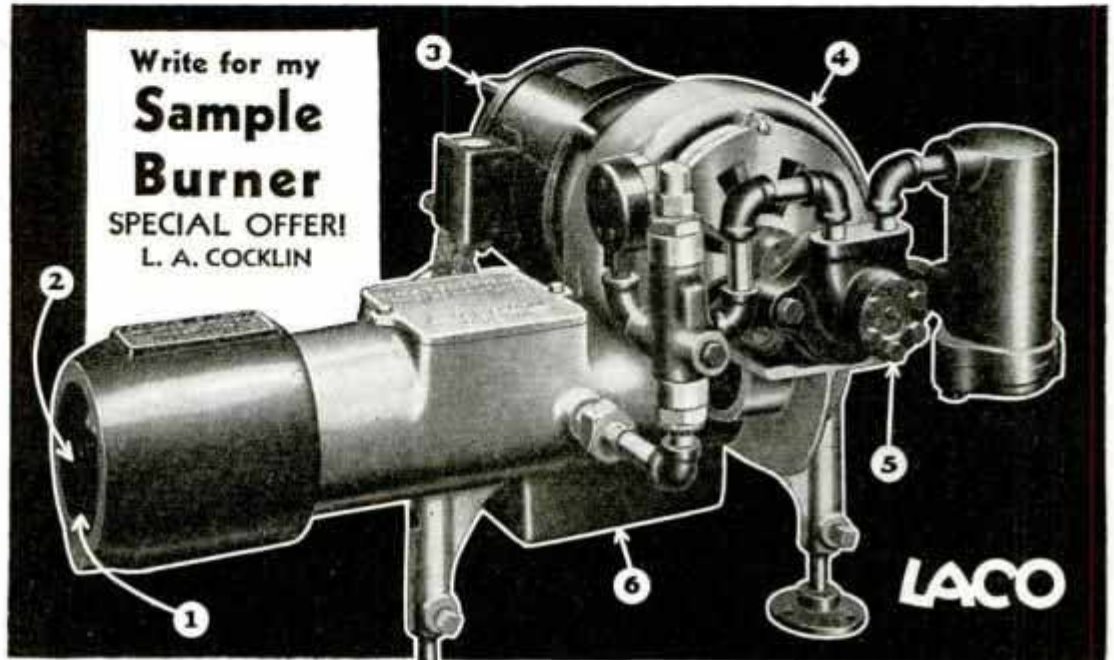
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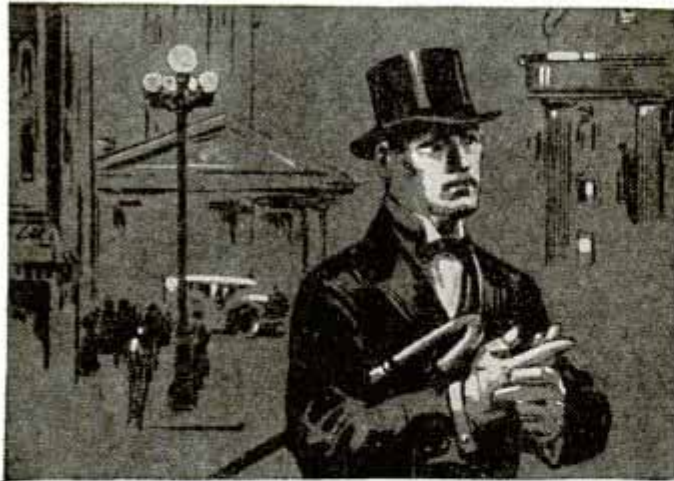


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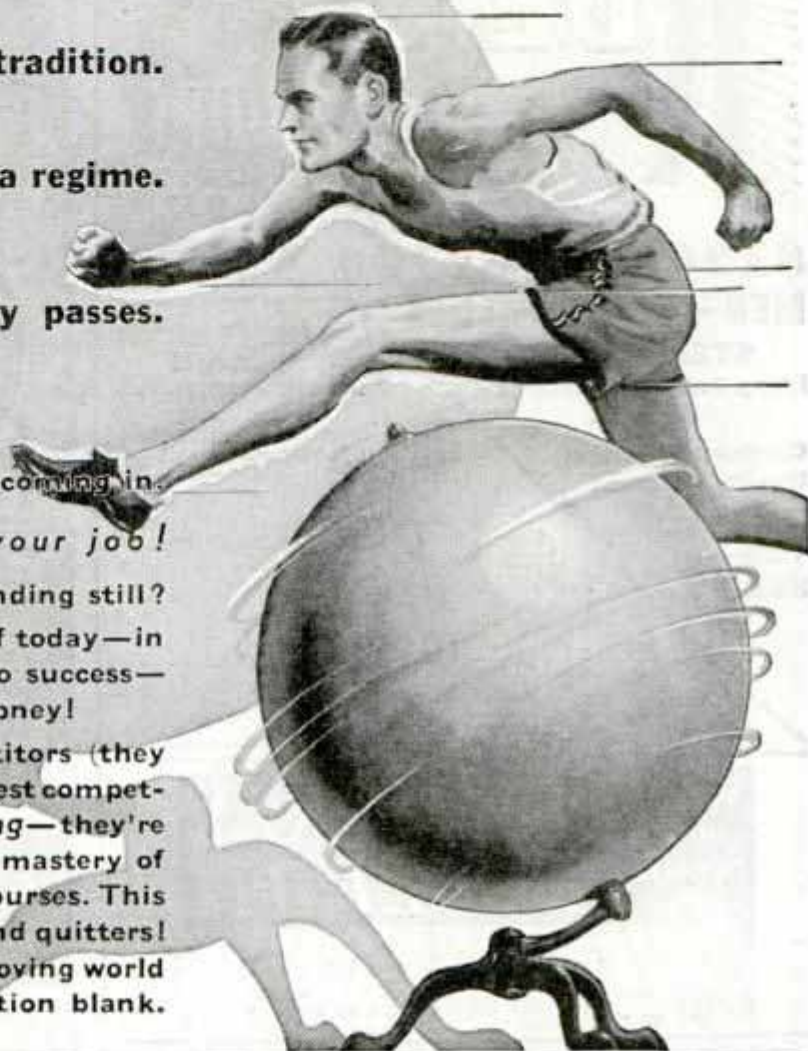
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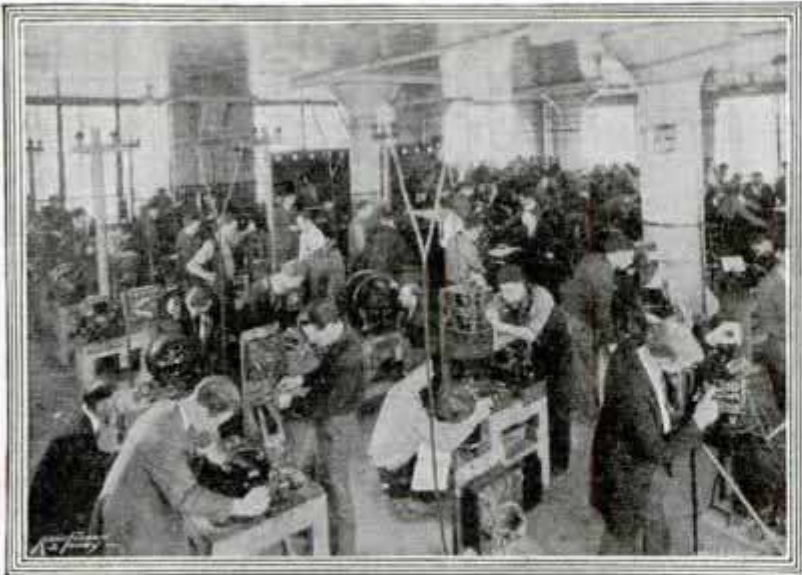
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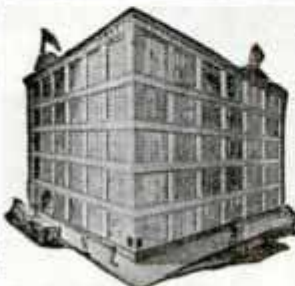
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Panel 1: A man in a suit sits at a table while a woman in a dress looks at him. She says, "BUT JIM, I DON'T SEE HOW WE CAN AFFORD TO MARRY."

Panel 2: The man is talking to two other men in suits. One says, "MARY'S RIGHT. I REALLY CAN'T SUPPORT A WIFE."

Panel 3: The man is working on a car wheel. A woman says, "GUESS I HAVEN'T A RIGHT TO ASK A GIRL LIKE MARY TO MARRY AN ORDINARY MECHANIC."

Panel 4: The man is sitting at a desk reading a book. He says, "LOOK HERE, N.R.I. HAS TRAINED HUNDREDS OF MEN LIKE ME TO MAKE GOOD MONEY I GUESS I'LL GET THAT FREE BOOK."

Panel 5: The man is working at a radio console. He says, "THIS IS SWELL FUN, AND I AM BEGINNING TO MAKE MONEY ON THE SIDE ALREADY. RADIO SURE IS FULL OF OPPORTUNITIES FOR TRAINED MEN."

Panel 6: The man is talking to a woman. He says, "YOU CERTAINLY KNOW RADIO. MINE NEVER SOUNDED BETTER." She replies, "'THANKS' YOU SEE I HAVE TAKEN N.R.I. TRAINING."

Panel 7: The man is embracing a woman. He says, "OH! JIM, IT'S WONDERFUL. NOW YOU'RE ON THE WAY TO SUCCESS." She replies, "YES MARY, AND THERE'S A REAL FUTURE FOR US IN THIS RADIO FIELD."

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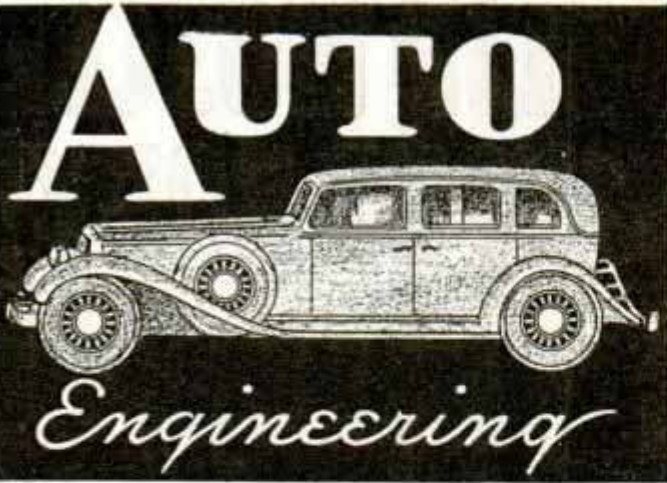
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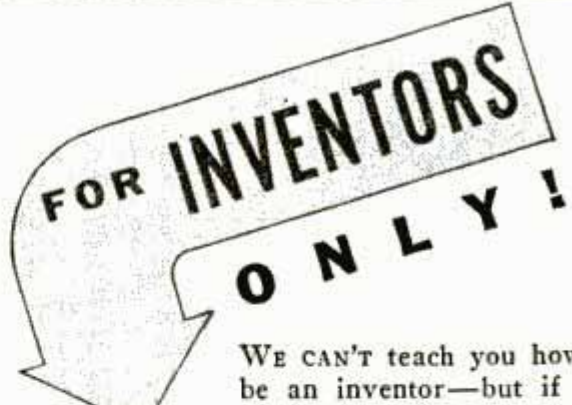
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8MM F 2.7 Stewart Warner, 3 speed camera \$33.75. Tittler \$3.69. Eastman reversible 16mm 100 ft. \$3.50 processed. Bell & Howell camera \$59.75, projector \$72.50. Sturdy wood movie tripod \$2.25. 30x40 beaded roll screen \$4.86. Mogull supersensitive negative positive best made \$5.95, processed. Catalogue, library membership free, sound, silent, exporters, cable "Bromogull." Mogull Bros., 1944-J Boston Rd., New York City.

BARGAINS. Used theatre projectors, parts soundheads, turntables, amplifiers, horns. Catalog mailed. S.O.S. Corp., 1600 Broadway, New York.

35MM ODD Reels 80c. Bargain lists 3c. World's largest dealers in 35mm films. Hoffman Film Service, 57 Broad, Albany, New York.

SUPER DeVry 35mm projector \$45. Schubel, 153 Carolina, Irvington, N. J.

WE Buy still, motion picture equipment, film. Camera shop, 1944-J Boston Road, Bronx, N. Y.

SILENT Features \$1.00 reel. Clifford Hoffman, 210 5th Ave., Suite 1102, New York City.

DEVELOP And print your own movies, instructions \$1.00. Millio, 620 Myrtle Ave., Brooklyn, N. Y.

16mm FILMS. Suitable for clubs and lodges. A. B. C. Film Service, Navy Pier, Chicago.

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FREE 16mm, 8mm Bargain lists. Films 35c up. Art sample 25c. Home Movies, Box 32, Easton, Penna.

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MARRIED Man with spare time to distribute free samples coffee, flavoring, food products and make customers. Must devote at least two hours daily and be satisfied with up to \$3 in an hour. Permanent. Blair, Dept. DFS 15, Lynchburg, Va.

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EARN Money at home. Easy dignified proposition. No canvassing. Hetzel, 802 Garden, Hartford, Conn.

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

CHRISTMAS Card salespeople—America's finest assortment. Let us prove. Rush postal. Robinson Greetings, Clinton, Mass.

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MARVELOUS New invention! A guaranteed pen that writes a year—No ink necessary yet writes in ink. No refills; not a fountain pen, yet writes like one. Small vest pocket size. Agents can sell a hundred a day at splendid profit. Send 25c for sample. Money back at once if you are not amazed. Robert Kahn Associates, Wrigley Bldg., Dept. 10, Chicago.

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1000 BEST Sellers, blades 65c hundred, moth tabs 59c dozen, needle books 25c dozen, 8 bar box soap 13½c. Free wholesale catalogue. Paty Company 5P Elston, Somerville, Mass.

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MAN Wanted by shoe manufacturer established 30 years for sales work. Ready cash daily. No experience needed. Sales outfit free. Write Mason Shoe Manufacturing Co., Dept. B8, Chippewa Falls, Wis.

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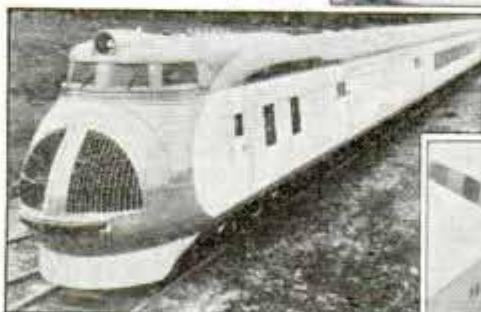
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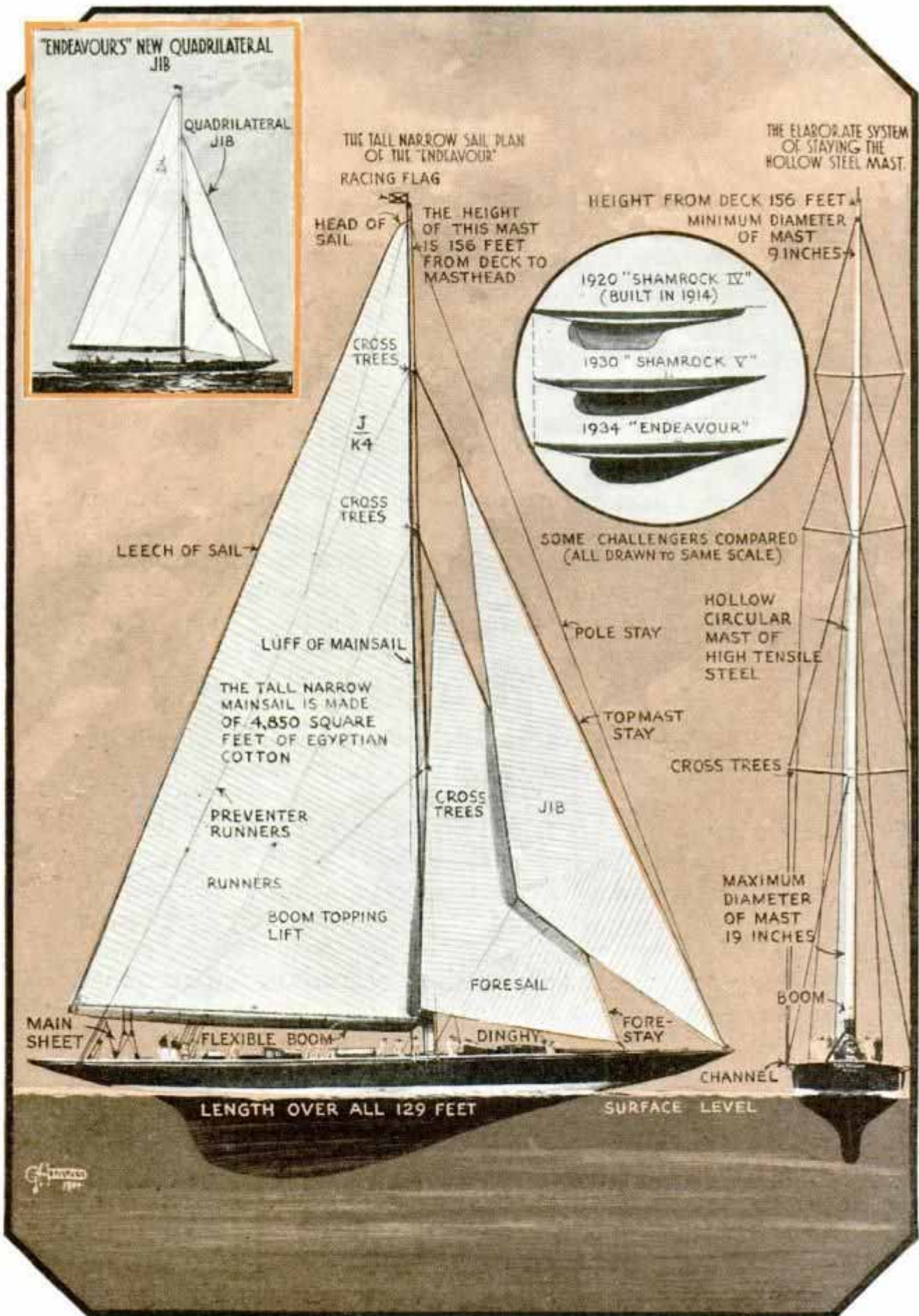
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Sketch of "Endeavour" Which Is Being Groomed to Race American Yacht for Historic Cup; Other Sketches Show Constructional Details of the English Craft; See Page 330

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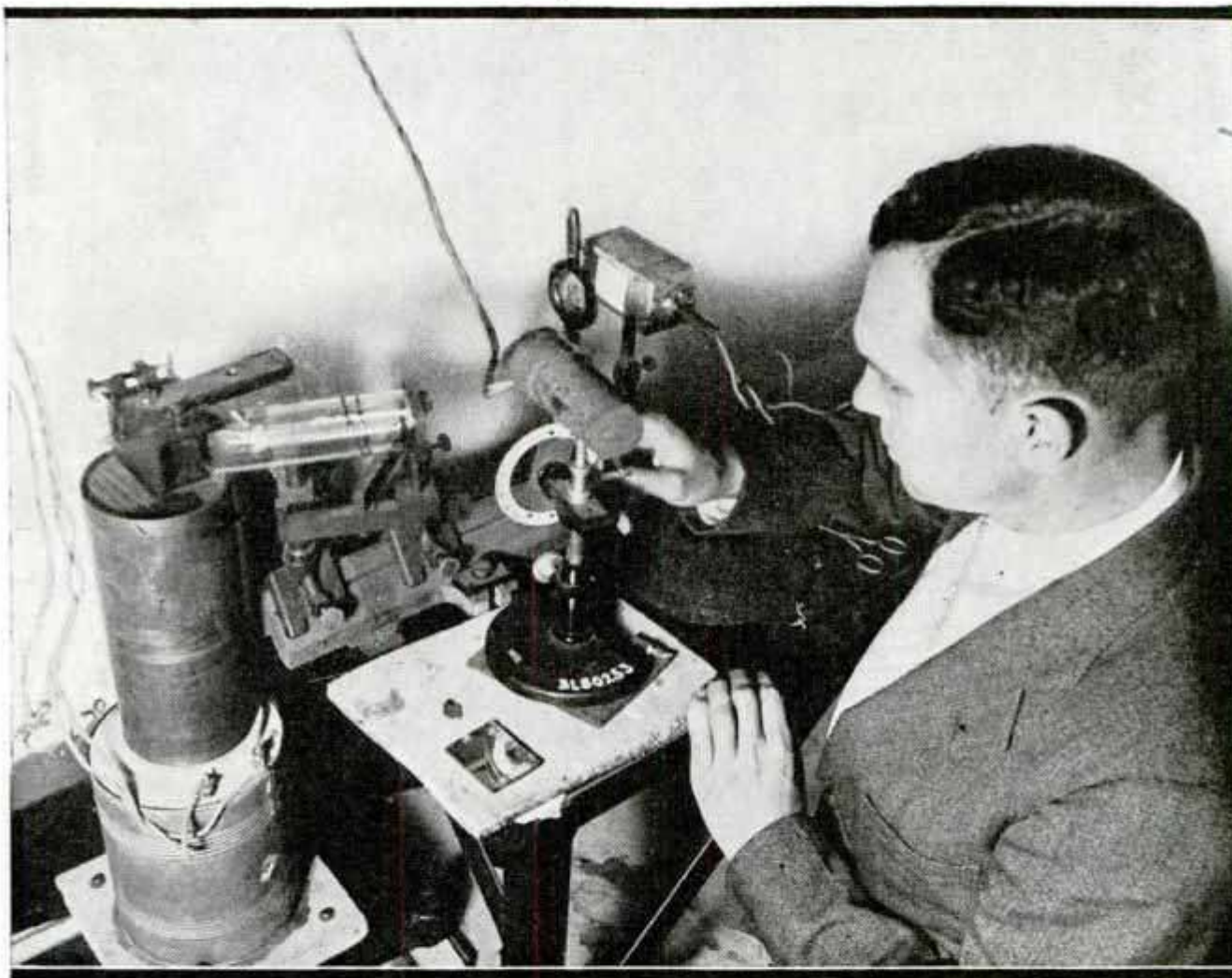
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 62

SEPTEMBER, 1934

No. 3

METALS *from* GASES



Sensitive Length-Measuring Apparatus, Such as the Scientist Is Shown Adjusting, Plays Important Part in Development of New Substances

IN his laboratory of super-cold, Dr. Alexander Goetz and his collaborators at the California Institute of Technology are coming ever nearer their strange goal of producing hydrogen in metallic form—twenty times lighter than water, yet many times stronger than steel.

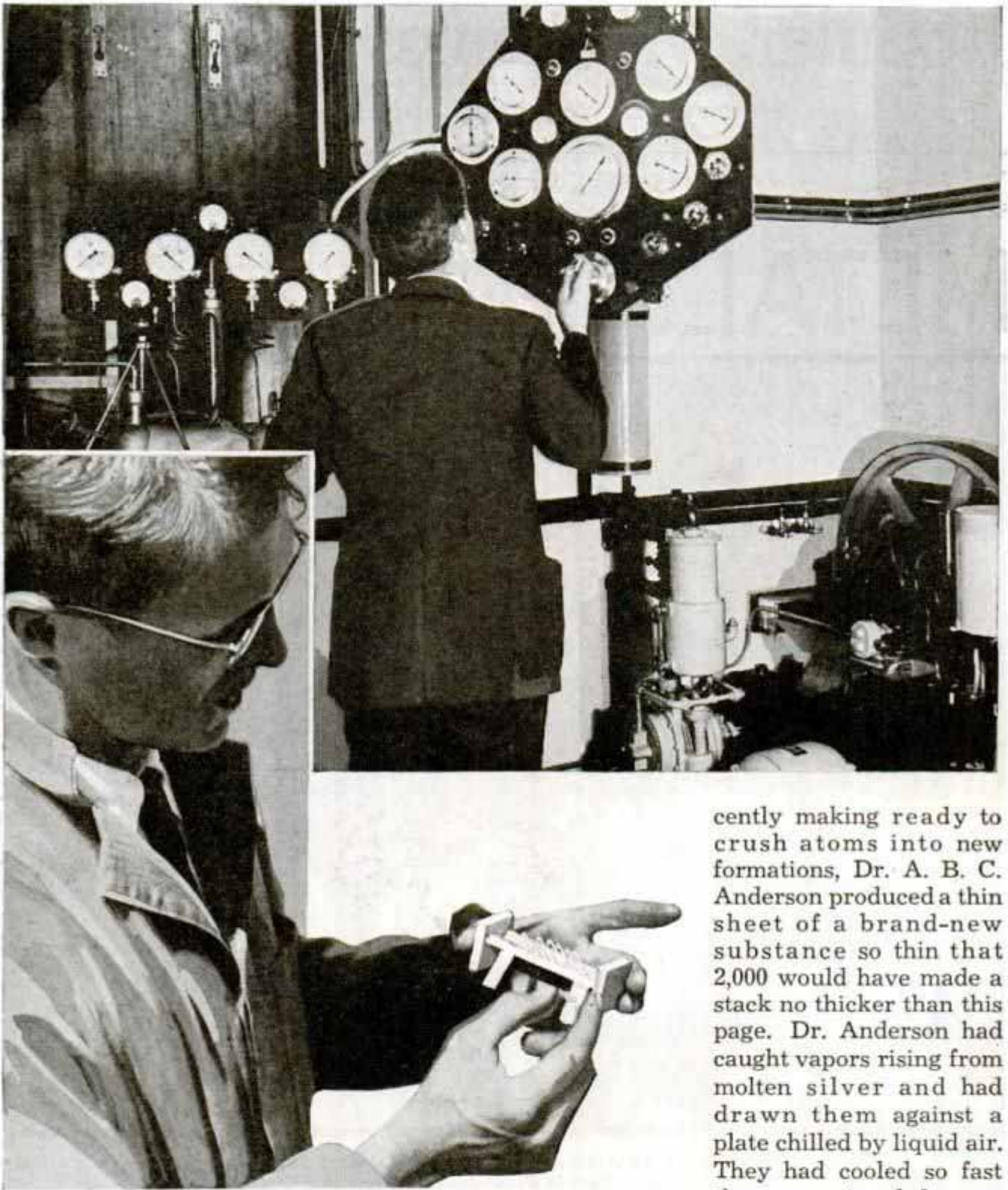
Ordinary substances like sulphur or iodine are being transformed into metals, hard, strong and mirror-like. Metals like iron and lead are turned into non-metallic

powder, or into spongy solids that will not conduct electricity.

To convert a liquid or even a gas into a metal, just squeeze it under terrific pressure, thus forcing its atoms into the closest possible formation. Reversing the process, you may convert a metal into a non-metal by beating it until the atoms assume a frothy consistency, like whipped cream.

In a giant nutcracker, Dr. P. W. Bridgman, of Harvard University, once put a

D 874
Emt. Maxwell Reid Larranck, 541 1/2 Esplanade Blvd. Los Angeles Calif.



Top, Control Panel in Super-Cold Laboratory; Bottom, Rock of Metallic Films Made by Quickly Cooling Vapors Rising from Molten Silver

little white phosphorus—a transparent, glassy substance, normally a non-conductor of electricity—and squeezed it with the tremendous force of 180,000 pounds per square inch. It came out a black and shiny cube, its bright gleam showing it to be a true metal. Its power to conduct electricity had been raised a million-fold.

While some of Dr. Goetz's staff were re-

cently making ready to crush atoms into new formations, Dr. A. B. C. Anderson produced a thin sheet of a brand-new substance so thin that 2,000 would have made a stack no thicker than this page. Dr. Anderson had caught vapors rising from molten silver and had drawn them against a plate chilled by liquid air. They had cooled so fast they remained frozen where they fell. The product was unlike silver, dull instead of shiny. Because the atoms were piled up like whipped cream, instead of being pressed together, it was actually a non-metallic metal.

This new magic unlocks the door of countless substances, each tailored to the need of industry. In the future, metallurgists may build metals they need by forcing atoms into the requisite pattern.

Riot Gun Shoots Tear Gas and Smoke Screen



Top, How New Tear-Gas Gun Shoots Combination of Gas and Smoke; Bottom, Closeup of the Weapon Designed to Repel Rioters



Tear gas or a smoke screen, or both, may be discharged to quell riots or to subdue barricaded criminals by policemen equipped with a new weapon resembling a paint spray gun. Two tanks, one containing tear gas compressed to a liquid and the other a liquid that turns into a smoke-like gas when released into the air, are carried on the policeman's back. By turning a valve on the gun, the operator may prepare to discharge either gas or a combination of the two. When the trigger is pressed, the gas is projected several feet in a volume 300 times that of the liquid in the tanks. Flexible metal tubes connect the gun to the tanks. The operator is protected by a gas mask. The smoke gas may be used to confuse criminals or rioters, as well as to shield a police squad from the eyes of gunmen, while the tear gas is held in reserve in the event of continued resistance. The gases may be directed through the

keyhole, under the door or through a hole bored by a pistol bullet through the door of a criminal's hideout. In several respects, the gas gun is superior to the gas bomb, which occasionally fails to explode and which cannot be directed with as great accuracy.

ⓁThe danger of ice forming a coating inside the carburetor of an airplane engine is being eliminated by applying exhaust heat directly to the carburetor walls.

*1922
Lexington Ave
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Synthetic Rubber Tires Wear Well in Tests



Top, One of the New Synthetic-Rubber Tires; Right, Subjecting Inner Tube of Synthetic Rubber to Severe Stretching Test

Containing coal, limestone, salt, water and other ingredients, synthetic-rubber tires have been produced and subjected to the hardest tests of the laboratory and the open road. In direct comparison with natural-rubber tires, the new product has proved equally tough and durable. Du Prene, a synthetic rubber developed by E. I. du Pont de Nemours and company from materials found in abundance in the United States, is processed into automobile tires by the same machines used to produce natural rubber tires. At present, the price of Du Prene is higher than that of natural

rubber, but its development makes the United States independent of foreign supplies and of changing prices in the world's rubber markets. The new synthetic rubber, among other things, has been found more resistant than natural rubber to the swelling action of gasoline, kerosene and other solvents, to the deteriorating effects of the air and of destructive chemicals. It can be vulcanized by the use of heat alone.



Dayton Ohio
In the processing of tires from Du Prene, the Dayton Rubber Manufacturing company of Ohio found that it mixed and milled like the highest grade of Para rubber and that it required only suitable softeners and compounding ingredients to produce stocks adaptable to rubber manufacturing operations where softness and pliability are desired.

“Creep” in Rocks May Reveal the Age of Mountains

D26
That the “creep” of rock formations may reveal the age of mountains is the belief of scientists who have been studying the stretch or creep of steel. Dr. A. Nadai, of Westinghouse Electric and Manufacturing company, points out that mountains rise out of plains as a result of the slow flow or movement of rock, a phenomenon common to all viscous or plastic materials. Of

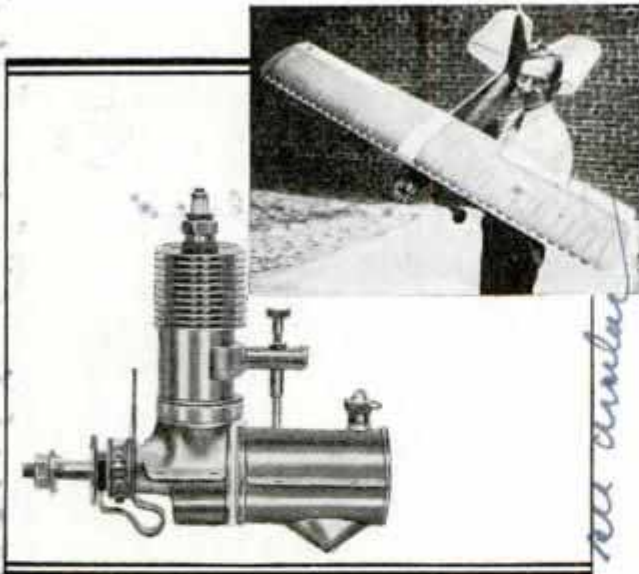
far greater immediate importance is the similar flow of steel used in present-day machinery. This creep is very similar in rock and metal. Geologists are interested in rock creep that takes place over millions of years, while physicists are interested in the creep of steel only for the usual life of machinery, ten to twenty years. Research into the physical laws

at Society of Rheology

governing metal's creep has become necessary because engineers are designing larger and more efficient machines, with the result that the metal in the machines is called upon to work at higher temperatures, higher pressures, at faster speeds and with smaller clearances between adjacent parts. Ordinary metals, when subjected to such strains and heat, stretch the creep in the direction of the pull. Extremely sensitive apparatus is being developed to measure the stretch of metals.

**TINY MOTOR FOR MODEL PLANE
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Weighing only nineteen and three-fourths ounces, including propeller, fuel tank and ignition, a tiny airplane motor now on the market is capable of driving a model plane over long distances. Installed in a plane with a wing spread of six feet, the motor kept the model in the air for more than fifty land miles, flying at forty-five to fifty miles per hour and attaining an altitude of 8,000 feet, without refueling. The motor turns over at 4,500 revolutions per minute, developing eight-tenths horsepower and driving a fourteen-inch propeller. A special ignition coil weighing three ounces is used, together with two one and one-half volt dry cells, a one-



Motor Weighs Less Than One Pound; Inset, Model Plane in Which It Is Used

fourth ounce spark plug and a three-fourths ounce condenser. That the small motor-equipped planes may be used as midget bomb carriers in time of war is the inventor's hope.

Walter Harleman



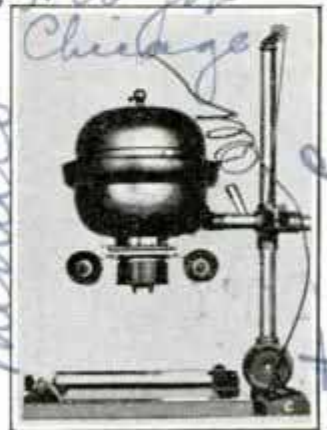
How Patient's Eyes Are Treated with Transmitter That Flashes Selected Colors

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School Girl Manipulating Her Paper-Doll Book Characters on Miniature Stage



DOLLS OF BOOK CHARACTERS ACT PARTS IN PLAY

One California school girl makes paper dolls of all the famous characters portrayed in the children's books she has read. She has also built a miniature stage and written a play in which the dolls all have speaking and singing parts. The child provides the sound effects and assists the dolls to go through their various roles during a performance.

CO-PILOT FOR SMALL BOATS

One type of outboard motor is now equipped with an automatic co-pilot which holds the motor true to its course when the human pilot takes his hand off the steering handle. This gives the fisherman a chance to light a pipe, prepare tackle or move about in the craft without fear that

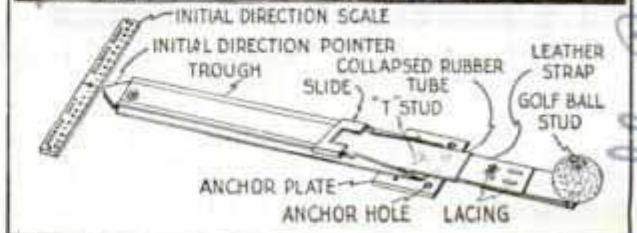
the motor will turn. A rubber-mounted steering handle also is used to take the "sting" out of steering, the cushioning construction adding to the comfort of the helmsman.

D 800

GOLF DRIVE TESTER USED IN HOME OR ON LINKS

Distance, direction, slice and hook of golf drives may be tested in the home or on the course by a device that permits the ball to travel only twelve feet. The degree of the slice or hook is registered as the golf ball is driven by what is called friction lock, the ball being locked in the position in which it is driven. The inside bottom of a trough in the machine is calibrated in multiples of fifty yards to register distance, while an aluminum trough swings around when the club head strikes the ball, pointing in the direction of flight. The golf register,

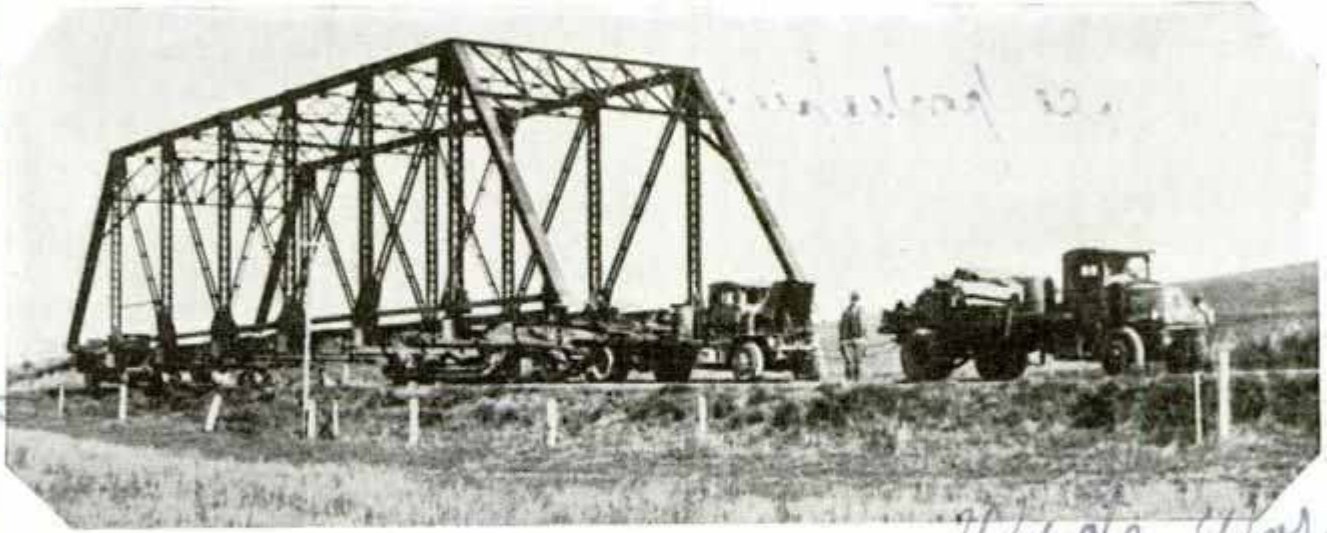
after tests by amateurs and professionals, is offered as a means of practicing at home and of warming up on the course.



Top, Goller Demonstrates Register of Shots; Bottom, Diagram of Recording Device

Chamber Commerce

Steel Bridge Is Moved Six Miles in One Day



Moving a Big Steel Bridge along a Western Highway; Tractors Hauled the Heavy Structure Six Miles to a New Location, Making the Entire Journey in a Single Day

Although it occupied the entire highway, and motorists were forced to pull off the road to allow it to pass, a large steel bridge was moved a distance of six miles in one day recently in the state of Washington. The steel span was hauled by tractors from Colfax, Wash., to Parwin Siding at an average rate of about half a mile per hour.

D 725

BLUING PADDLE FOR WASHING



Making easier the introduction of bluing for washing clothes, a bluing paddle has been placed on the market. Its use is simple, the paddle being stirred in the water until the

proper amount of bluing is obtained. One paddle is sufficient for several washings.

D 741

FROZEN FOOD DEPOSIT BOXES RENTED TO HOUSEHOLDERS

Individual compartments in a cold-storage room are being rented to householders of Yakima, Wash., for the preservation of foods. In this compartment, kept at five degrees above zero, may be placed fresh peas, beans, asparagus, strawberries and other vegetables and fruits, in sanitary paper cartons. At the low tempera-

ture, these foods freeze solid and keep indefinitely. The compartment renter uses his own key to remove all or any part of the contents at any time. The foods may be defrosted and used at once, or placed in a refrigerator and used in a few days. Fowl or meat cuts are given similar treatment. The compartments are rented at a fixed price per year, just as a bank rents a safety deposit box. The system permits the buying of perishable foods in bulk at seasons of lowest prices. In addition, the householder is enabled to serve foods, perfectly fresh, at any time during the year.



Storing Fresh Foods in Private Compartment of Cold Room; Note Locks on Boxes

Agribusiness Co 228 Washington St. Buffalo N.Y.

also James Produce also can't change

World War Portland Ore. Henry W. Young 2636 S. 28th Portland Ore.

Mobil Transfer Storage Co

D 8 10
45th New York City
made Rainbow drawing

EVERYTHING NEW

see postscript

FOR eighty-three years the news headlines in cup race years have read: "Cup Defender Beats 'Shamrock'," or "Valkyrie" or any other of the thirteen fine yachts which crossed the ocean to carry back the famous trophy won by the schooner "America" in 1851.

Coming across the ocean was the catch. For, under the historic terms of the matches the challenger must cross the sea under her own sail. That meant the defender had the edge from the start. She could be of the lightest construction that would hold together until the races were over, while the challenger had to be built to weather the gales of the Atlantic.

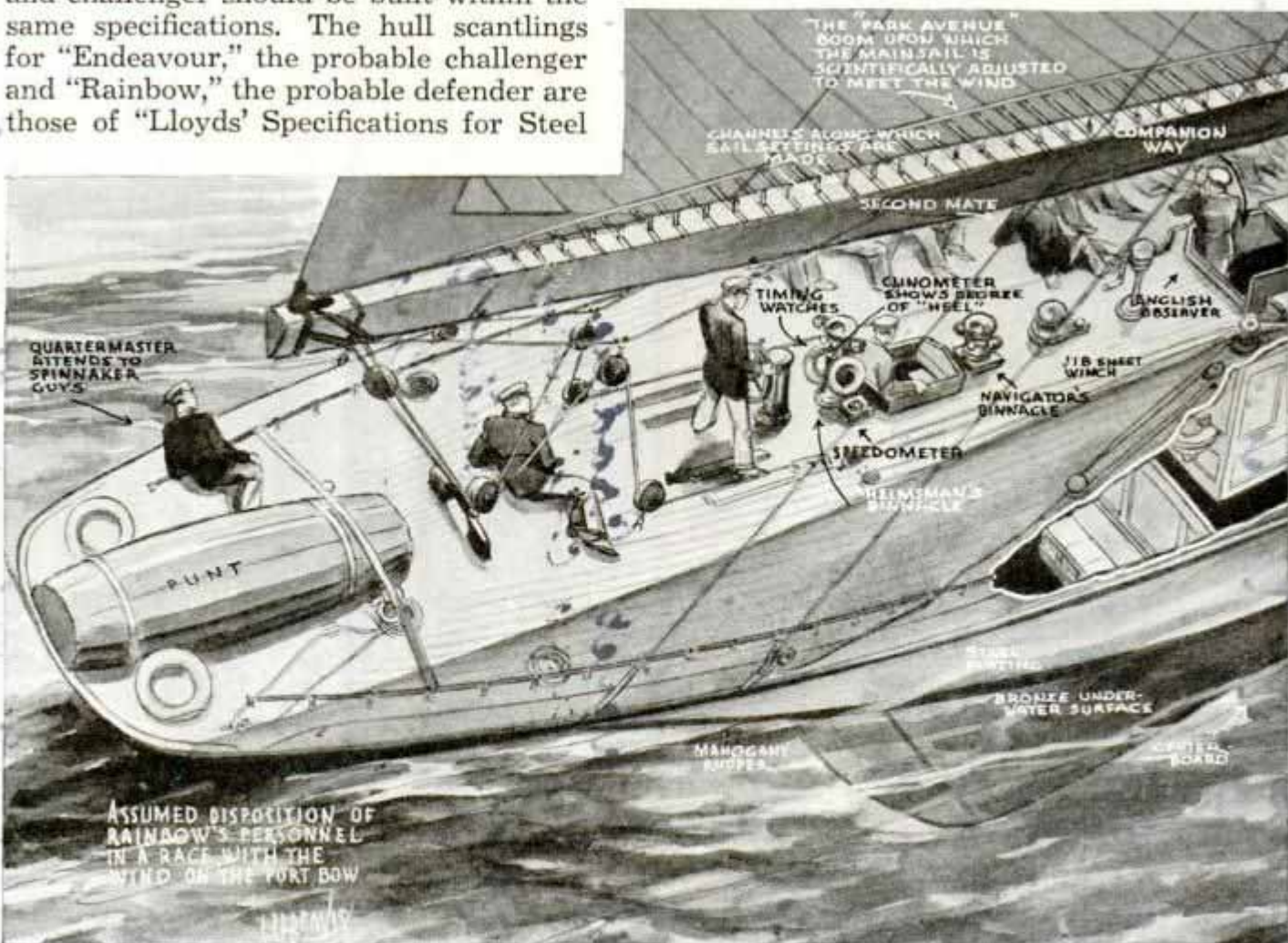
So, in the interest of good sport, the New York Yacht club, custodians of the cup and dictators of the conditions of the race for it, proposed that both defender and challenger should be built within the same specifications. The hull scantlings for "Endeavour," the probable challenger and "Rainbow," the probable defender are those of "Lloyds' Specifications for Steel

Yachts," Class J sloops. The sail area is limited to about 7,600 square feet for an eighty-two-foot waterline. The yachts must carry bulkhead, berths, galley, toilets and fittings weighing 14,000 pounds to accommodate the crew and afterguard of thirty-one men. The Marconi rig is obligatory. As a result, for the first time in forty years the defender is as able to cross the ocean as the challenger.

Strangely enough these new yachts, though built of metal with only half the sail area of the more recent old-timers, are actually faster than their flimsily built predecessors.

How is that possible? Engineering! The fine, old racers of the "Columbia" and

Drawing on This and Opposite Page Shows "Rainbow"; Inset, Opposite Page, How Yacht Design Has Changed

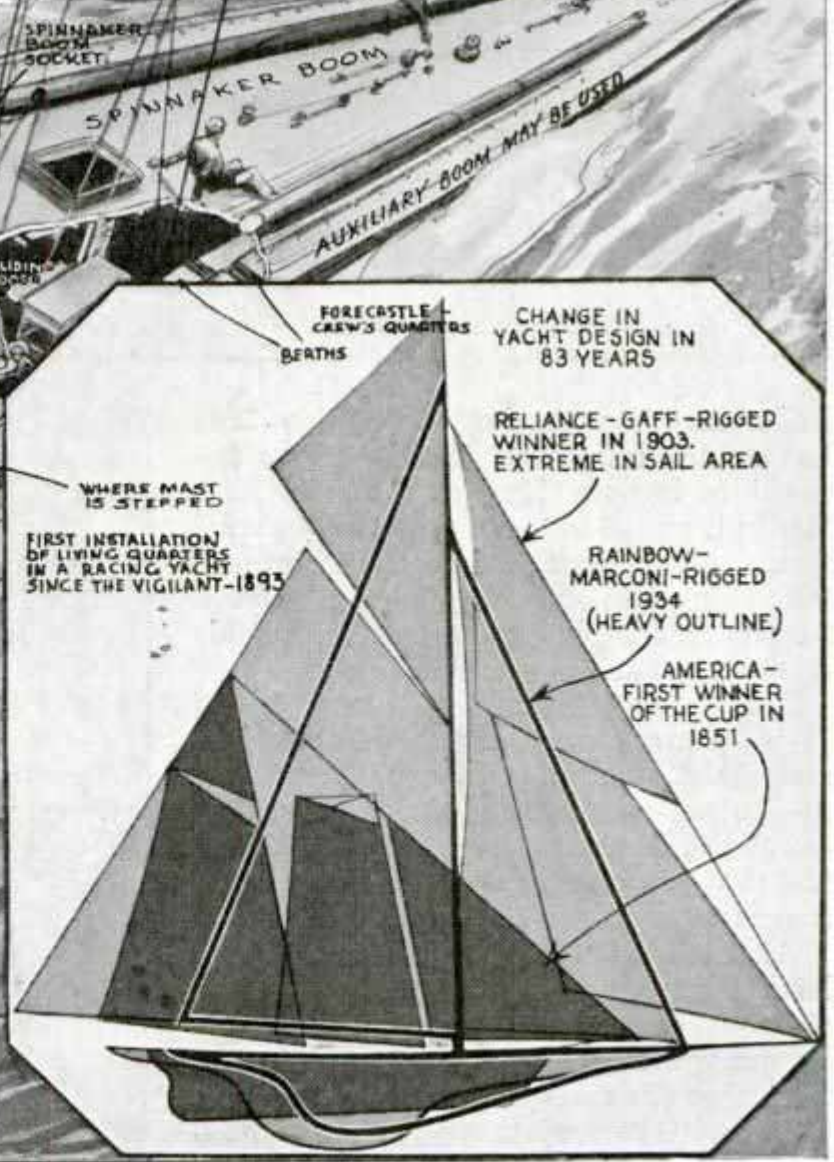
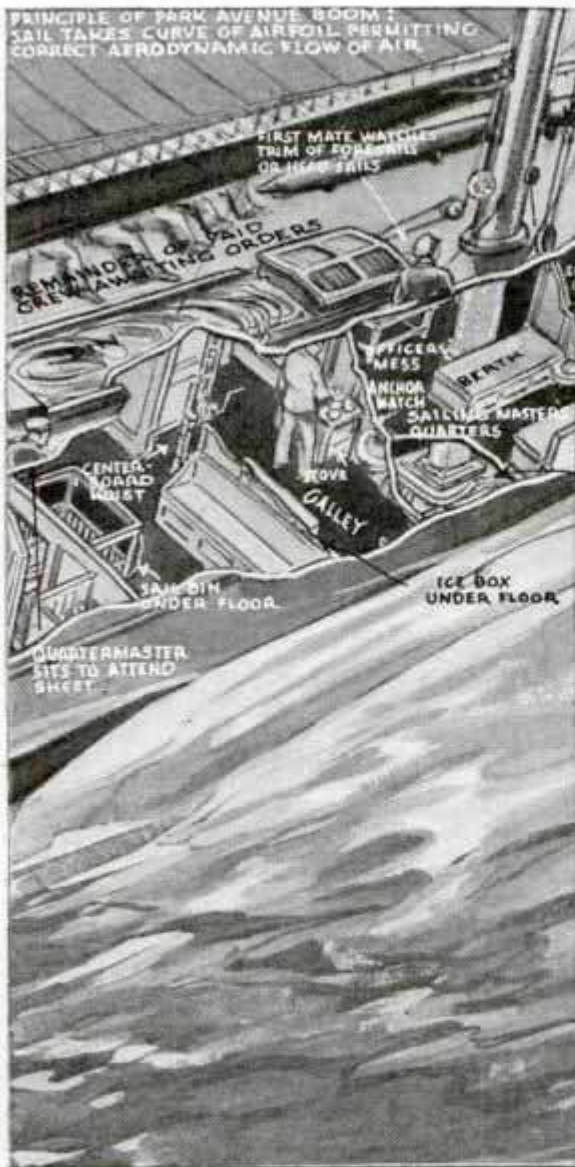
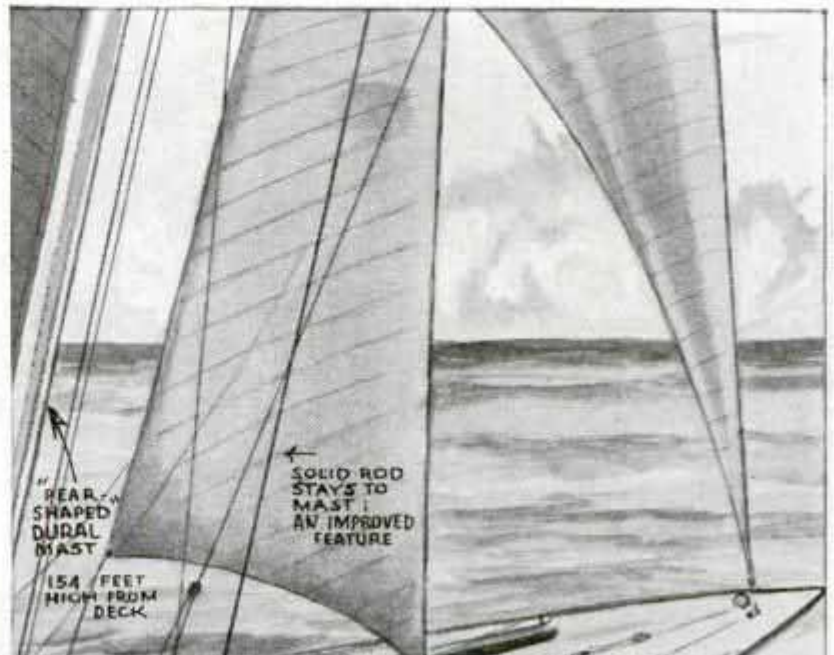


Story - Morgan Jarell D 8 70
 76 Caryl Ave.
 Yonkers, NY

but the WIND . . .

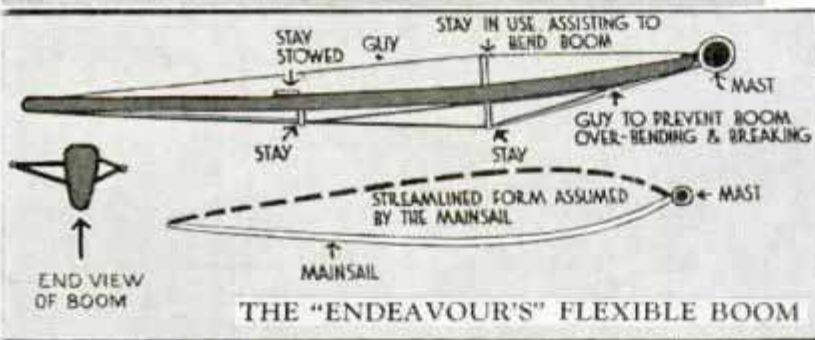
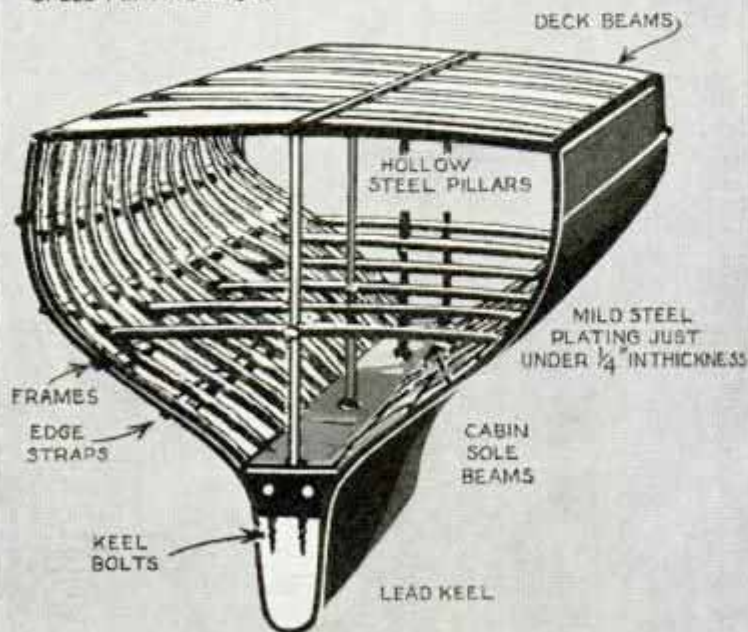
"Defender" type were products of rule-of-thumb and experiment. Nobody thought of trying tank experiments on racing-yacht models until George Watson did it when designing "Shamrock II." Apparently nobody else did it until Starling Burgess, who tried twenty different models of "Rainbow" in the tank of the University of Michigan.

In the olden days the designers could not quite make up their minds what material to use for hulls and spars. Iron

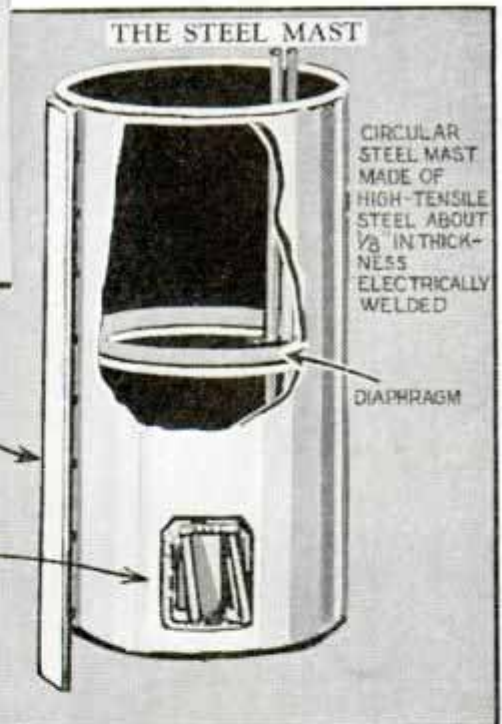


THE "ENDEAVOUR" IS THE FIRST CHALLENGER TO HAVE AN ALL-STEEL HULL.

APPROXIMATELY 30,000 RIVETS WERE USED IN FIXING THE SHELL PLATING ALONE



THE "ENDEAVOUR'S" FLEXIBLE BOOM



Top, Sketch of "Endeavour's" All-Steel Hull; Center, Flexible Boom of "Endeavour"; Bottom, Challenger's Steel Mast

hulls came in with the "Galatea" in 1886 but did not take hold. Wood was the favorite as late as "Shamrock IV" in 1920. Her hull was of laminated wood over steel frames. Iron, steel, bronze, Tobin bronze, immadium and aluminum have been used for frames and plating but wood still holds its own for decking—to this day.

Today's boat, "Rainbow," has a hull of $\frac{1}{4}$ -in. bronze plates beneath the waterline and $\frac{1}{4}$ -in. steel plates above. The plates are butted on sides and ends so that the outside of the hull is perfectly smooth. In fact the bronze plates are burnished before important races.

Although a keel boat with eighty tons of lead in her keel, "Rainbow" also carries a two-ton center-board, operated by a bronze winch to give a maximum of eight feet more draft when needed, that is when the wind is "broad on the beam." When one considers that a pressure of 200,000

pounds on the sails will list the yacht thirty degrees even with that load of lead on the keel, it is clear what enormous stresses the whole fabric must withstand.

The mast, for example, is of heat-treated duralumin thirty-two-hundredths inch thick, whose strength is 62,000 pounds per square inch. It is of streamlined section and towers 154 feet above the deck. The lifts or halliard for the jib and mainsail pass down inside it. To give the mast greater strength it is trussed with three steel spreaders running athwartship with tension rods called shrouds, of chrome-nickel steel with the incredible strength of 215,000 pounds per square inch.

These yachts have been called robot yachts because of the somewhat naive notion that the sails were hoisted and han-

dled by power and machinery. They are, but it is hand power, and the machinery is an outfit of hand-operated winches to give the final lift to a sail or tautness to a stay. For the stays are slackened off and lifted out of the way of the main spinnaker booms and of the ballooners when the boat

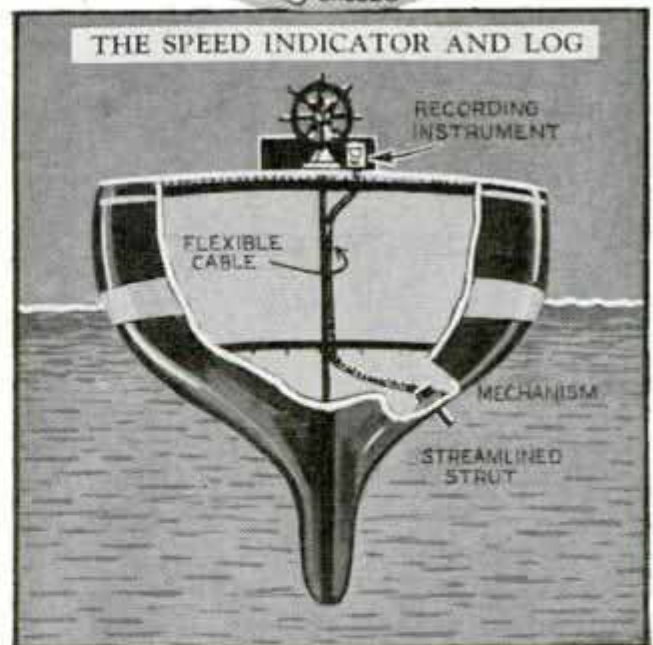
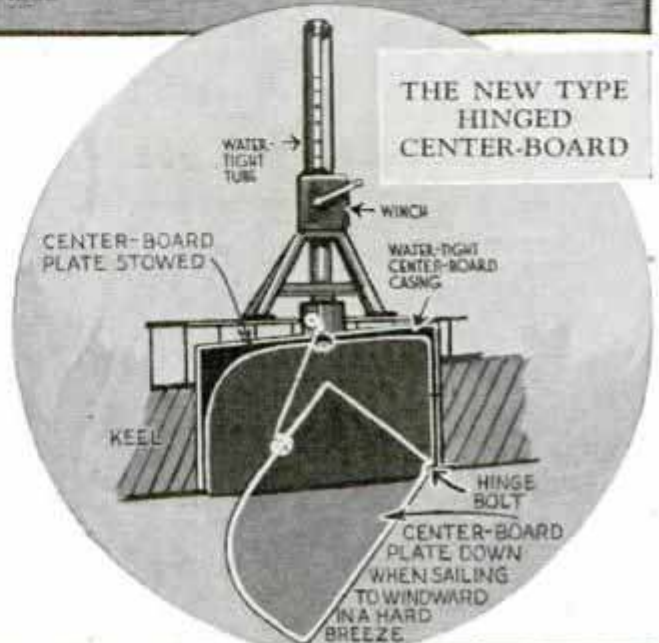


is running before the wind. Instruments are clamped to the stays to measure the tension. All the husky arms on the yacht would be unequal to the job of tightening up those stays again. The winches are very simple, being operated by cranks or handwheels. Incidentally, all handling of sail is done from the deck, there is nobody below during a race; even the cooks come up and lend a hand.

One of the most striking features of "Rainbow" is her "Park Avenue" boom, so called because of its width, four feet. It is made of spruce, built-up, and its cross-section is a triangle with the base upward. Across this base or upper face of the boom run channel guides in which blocks, bent to the lower edge of the mainsail travel. The point is to let that edge of the sail take its own natural curve instead of being forced to stay in a straight line. The result is to add one-half knot to the best speed of the yacht.

A racer like "Rainbow" may carry as many as fifty sails, as jibs, staysails, Genoa jibs, mainsails, spinnakers and ballooners, each in different sizes for varying wind intensities and in duplicate in case one is torn or blown away. These are carried in a sail locker below, together with cordage and other spares. Below, also, the yacht is fitted out like a fine cruiser with bunks, galley, mess-rooms, state-rooms and lockers. The wood is of grained butternut.

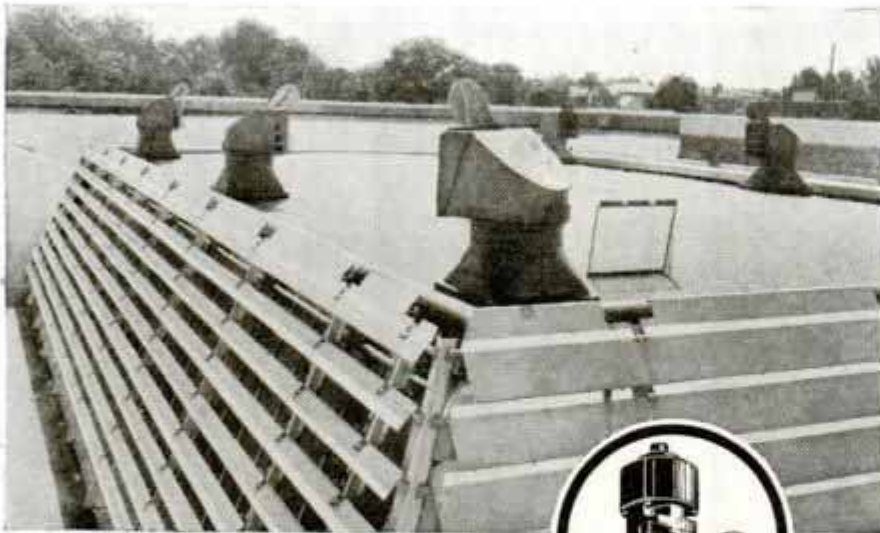
Sailing a big yacht like this in a spanking breeze, which may drive her along at fourteen knots, calls for organization, discipline and seamanship of the highest order and the crew is only half as big as that of one of the old-timers. The crew is divided into groups as mastheadmen, men for the stays, the sheets, the winches and so on. All stations are numbered and each man is assigned to one or more stations



Top, Sectional View of the Challenger; Center, Hinged Center-Board; Bottom, Showing How Speed Is Recorded

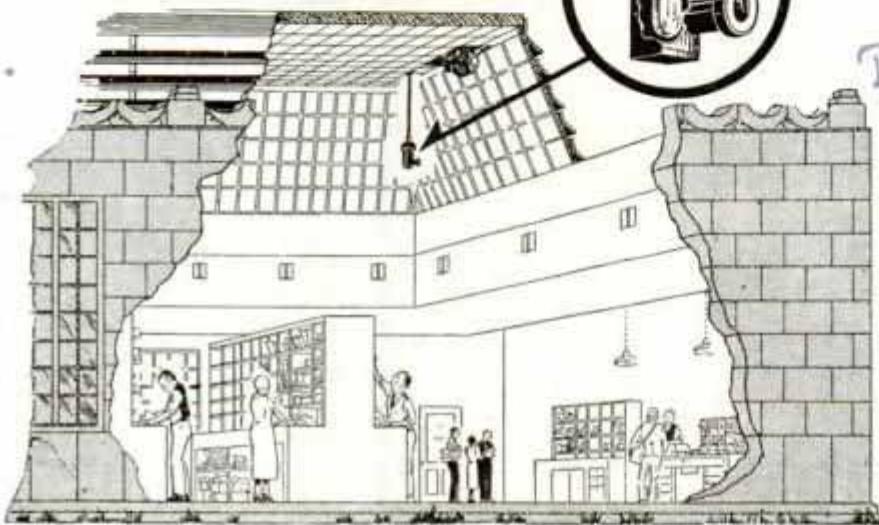
according to the maneuver to be executed. Now almost all that has been said of "Rainbow" might be said of T. O. M. Sopwith's challenging yacht "Endeavour"—all, except that—

Seamanship will decide the match.



Four electric eyes are suspended from the sorting room ceiling, one facing each skylight. As the amount of daylight falling on one of these eyes varies, it starts the motor which opens or closes its skylight shutters as much as needed. The system was installed by Westinghouse Electric and Manufacturing company.

PRAIRIE SCHOONER MODEL USED AS MAIL BOX



Top, Shutters That Admit Maximum Sunlight to Post Office; Bottom, Interior Arrangement; Circle, "Electric-Eye" Control

"ELECTRIC-EYE" SHUTTERS REGULATE DAYLIGHT

Eyesight of mail sorters in the post-office building at High Point, N. C., is protected by "electric eyes" that control louvers or shutters on the skylights. Adjusted to maintain the correct level of illumination in the sorting room, regardless of outside weather conditions, these electric eyes, or photo-electric cells, open and close the shutters, letting in the proper amount of light. This eliminates glare in the building, which is designed to admit an abundance of natural light. Nine shutters, about twelve inches wide, run the length of each of four skylights. Each shutter is hinged at the top and the nine are raised or lowered in unison by a mechanical arm powered by an electric motor. A master electric eye on the roof permits the shutters to open all the way on cloudy days, but only part way on bright, sunny days.

An ordinary metal mail box such as stands in front of most rural homes has been converted into a model of a prairie schooner by a Kansas farm boy. He carved wooden wheels, oxen and the figure of a pioneer, painted the wheels and added them and the oxen to the metal box to transform it into a covered wagon. The group is all the more attractive since it harmonizes so well with the broad prairie on which it stands.



Carved Wooden Wheels and a Team of Oxen Have Made This Mail Box into a Prairie-Schooner Model

East Pittsburgh Pa.
D 788.
Delaware County.
Contrib. Margaret Whittetmore
1015 College. An. Topeka. Kan.

D.P.O. Order by Frank Cross, 449 Wildwood Ave. Akron Ohio.

Glider for Four Passengers Has Wing Flaps



Four-Passenger Glider Which Is Equipped with Wing Flaps to Regulate the Lifting Power; It also Has an Adjustable Stabilizer; Note the Single Landing Wheel



the craft which is equipped with wing flaps like an airplane. These flaps are virtually continuations of the ailerons all the way across the trailing edge of the monoplane wing. By means of them the pilot can vary the lifting power of the wings.

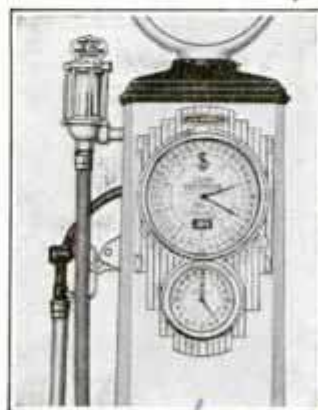
Recent successful tests have been conducted at Akron, Ohio, with a four-passenger glider, said to be the first of its kind ever built. Two men devoted eighteen months of spare time to constructing

The glider also has an adjustable stabilizer, permitting it to be trimmed for each load before flight. The wing span is forty-eight feet and the wing area is 206 square feet. A single landing wheel with low-pressure tire is used.

D817

Cash Recorder on Gasoline Pump Gives the Total Cost

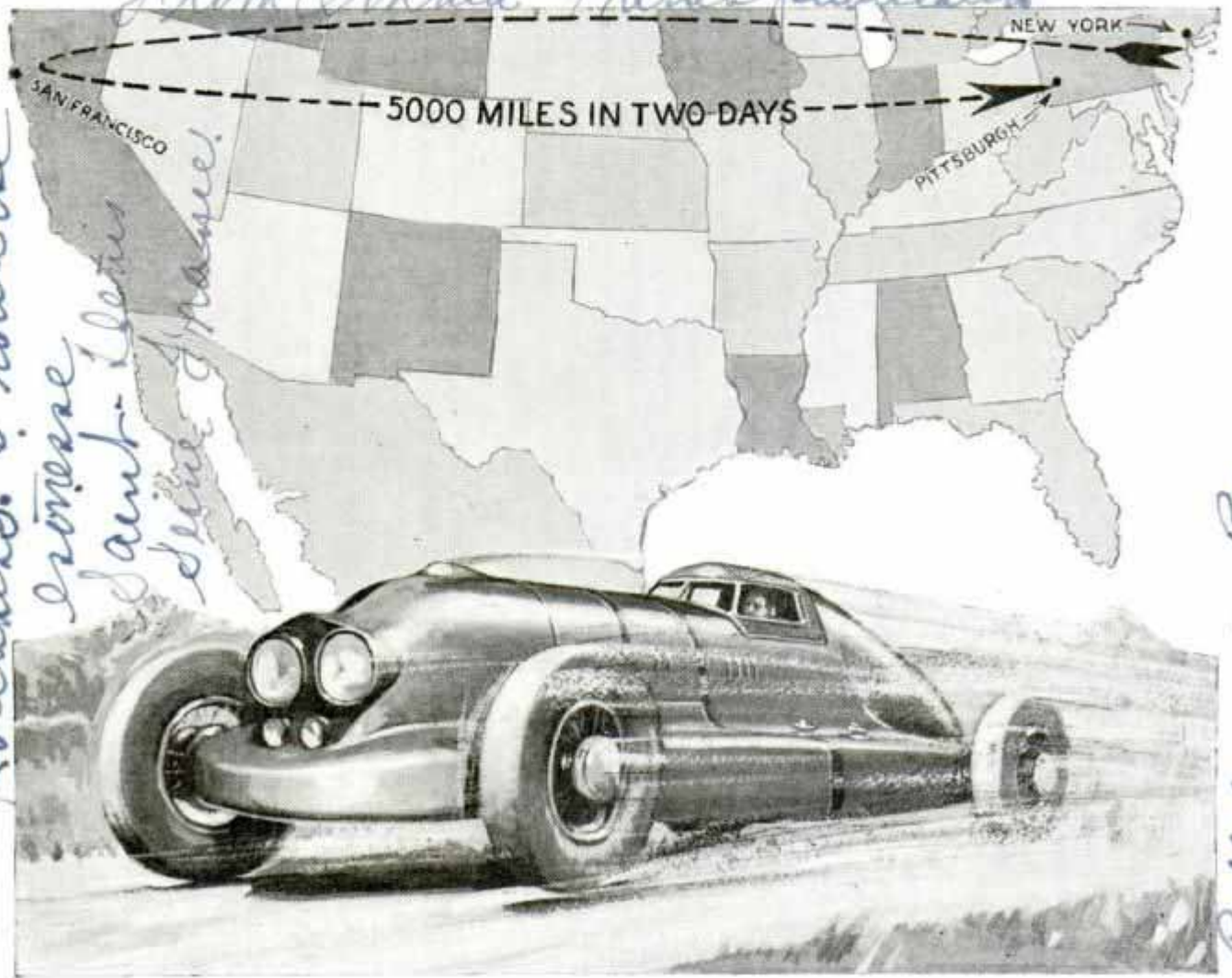
It is as easy to order a dollar's worth of gasoline as to order five gallons and be sure of receiving the exact amount purchased if the gasoline pump from which your order is filled is equipped with a cash recorder. The cash recorder measures the purchase in terms of dollars and cents as well as gallons. It is placed above the gallon register and both operate from the single driving shaft from the meter unit of the latter. The price per gallon is shown on the cash recorder and is synchronized



through the use of gears with the gallonage indicator. When the price-tab indicator is not in place, the cash recorder does not register but the gallon recorder functions in the usual manner.

Milwaukee Pump & Tank Works

Racer Designed to Carry Fuel for 5,000 Miles



Engineer's Design for Racer Equipped with a Motor Capable of Making a 5,000-Mile Non-Stop Run in Two Days; Note the Tanks Built into the Body to Carry Extra Fuel

How would you like to make a motor trip across the continent and back in less than three days? Automotive engineers in Europe are toying with ideas no less fantastic since breakdown tests with a Hotchkiss motor have shown that this engine is capable of such a performance if the car can be built to go with it. This motor on the test block ran for fifty-two hours and forty-six minutes at 4,000 revolutions per minute, a speed which would have carried a car about 5,000 miles. This remarkable proof of the engine's stamina led one engineer to plan a racer to be equipped with such an engine and intended to travel for two days or more without stopping for fuel. The most unusual feature of the streamlined body is the provision made for the extra fuel which would be carried in tanks built into the body. Actual construction of such a car, of course, would

require provision for more than a space to carry the extra fuel. The weight of this fuel alone would be a big handicap for a racing car. Even if the racer made as much as fifteen miles to a gallon it would need to carry more than 300 gallons of fuel to travel 5,000 miles without stopping to re-fuel, and the weight of this extra gasoline would be more than a ton.

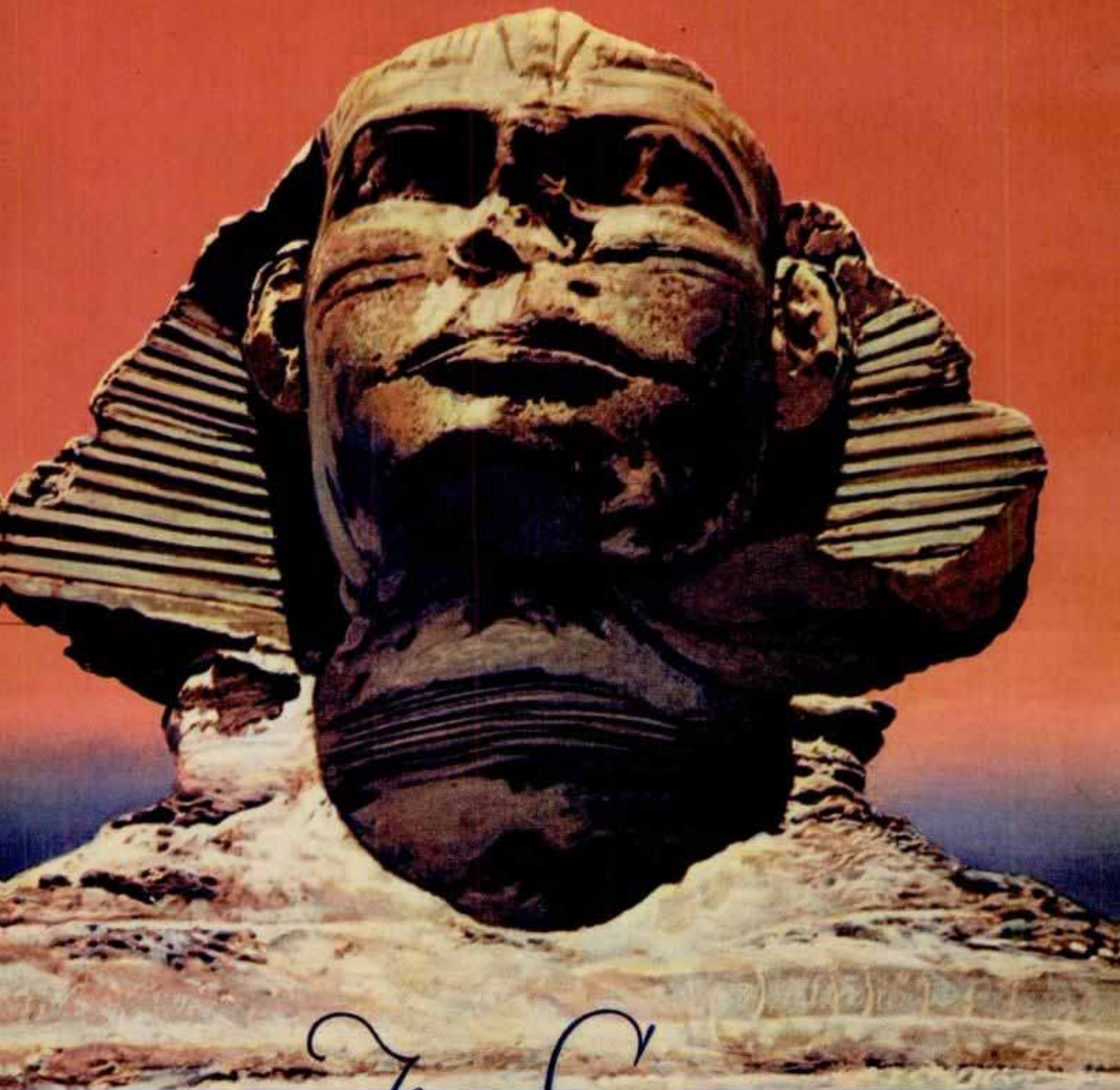
WROUGHT IRON MADE STRONGER BY ADDING NICKEL

One of the oldest iron products has been greatly improved recently by the metallurgist's inventive ability. Wrought iron containing about three per cent of nickel is now being produced. It is claimed this raises the strength about twenty-five per cent and also makes the original material even more resistant to corrosion.

*Doc: Anon. des Anciens. Etablissements
 totchuis. 6. route de
 L'omise
 Saint-Clément
 Seine & Marne.*

*Pittsburgh, Pa
 A. M. Myers Co., Clark Bldg.*

2805



The Scenic
WONDERS of the WORLD
By
BURTON HOLMES



D547.
NOBLE even in defacement, this sphinx has withstood

D541



SHIPS of the desert cruising the sea of sand which washes the base of the Great Pyramid. The pyramids, 5,000 years old and still a marvel of architecture, are man's boldest challenge to the great destroyer, time. Time passes on—the pyramids remain.

All Photos by Burton Holmes

THE nine most interesting places in the world? I should not dare to try to name them. But I can give you a list of those which to me have seemed to offer more of interest than any other nine that I have known.

First—The Grand Canyon of Arizona. Why? Because I love beauty and it is the biggest beautiful thing in the world. It is unique because the earth can show nothing to equal it in beauty, gorgeousness of color, grandeur, impressive weirdness and immensity.

Second—The Cataracts of the Iguassu in South America, on the border where Brazil and Argentina meet. Higher by sixty feet than Niagara's mighty cataracts, those of the Rio Iguassu are far more beautiful. Their beauty is unmarred by the presence of hideous buildings on the brink or scrawny bridges

spanning the rapids or chimneys lifted into a polluted sky. Remoteness from the world of man endows the Iguassu with a fascination possessed by no other great cataract save that of Kaieteur in British Guiana. Even the still greater, higher falls of the Zambesi in Africa have lost that charm that isolation lends to a great natural wonder.

The Iguassu river makes its plunge of more than 200 feet, not in one single fall, but in a series of numberless cascades and cataracts which pour over the high brink of three enormous, separate, amphitheatres that indent the highland wilderness in sweeping curves over a total width of more than two miles. Each of these amphitheatres rivals the horseshoe of Niagara and surpasses it in both depth and picturesqueness. Each separate fall—and there are scores of them,

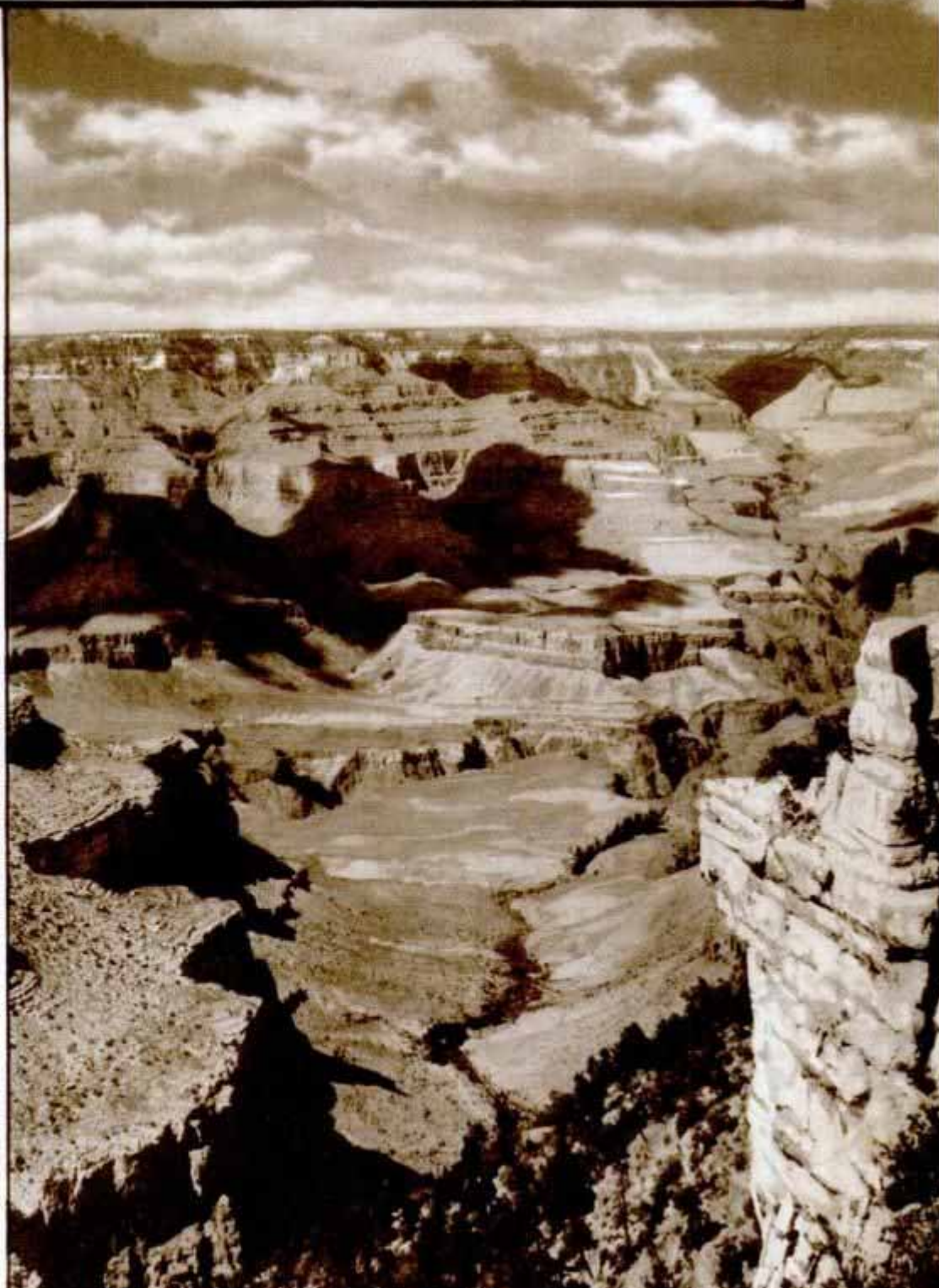


CARAVANNING toward the center of the earth down a trail of the Grand Canyon. This colorful, fantastically carved abyss, one mile deep, twelve miles wide and 210 miles long, is described by Mr. Holmes as the "biggest beautiful thing in the world!"



D 541

NATURE is making the Grand Canyon a greater wonder every day for the Colorado river is constantly carving it deeper and deeper. Above, the originals of the three monkeys who "hear no evil, speak no evil, see no evil" appear on one of the carved wooden panels adorning a building of the Nikko Shrines in Japan. You see copies of these little monkeys everywhere.





CATARACTS of the Iguassu in Brazil and Argentina, higher and more beautiful than Niagara. The Iguassu river makes its plunge of more than 200 feet in a series of cascades and cataracts which pour over the high brink of three enormous, separate amphitheaters.

save when the rainy season merges all into three mighty distinct cataracts—makes a double leap, with the exception of the grandest fall of all, called the Great Fall of the Garganta del Diablo, the “Devil’s Throat,” which plunges the full 210 feet in one majestic curtain of moving waters, veiled by clouds of spray.

Third—Venice, the queen of the Adriatic, an Italian city, yet a city that is oriental in its richly tinted beauty. Venice is unique as well as beautiful. There is no other city like it in the world. Not only beauty but the romance of history and the glory of art abide in Venice.

Fourth—the Palace of the Alhambra which dominates from its high hill the Spanish city of Granada and the fertile plain which the Moors transformed into the richest farmland of their Moslem kingdom centuries ago. There are many grander, costlier palaces in other Euro-



GRIM towers of the fortress-palace of the Moorish kings who ruled in Spain until the conquest of Granada in 1492. Below, grandest of the gates of the Nikko Shrines of Japan. So nearly perfect were the exquisitely wrought carvings, gilded and painted and lacquered in all the hues of the rainbow, that the builders feared heaven would be jealous because man had created so faultless a thing of beauty. So they purposely inverted the pattern carved on one of the great white pillars.





THE GLORY that was Greece still haunts the high Rock City—the Acropolis of Athens. Here are soldiers of modern Greece garbed in the fantastic Albanian costumes with pleated skirts which make them look like animated lamp shades on parade.

pean lands, but they are without the peculiar charm that pervades the Alhambra. It stands as the most precious memorial of the Moorish age of glory. It was a Saracenic paradise created by the masters of old Spain 600 years ago. It is today one of the most romantic beauty spots of the modern world.

Fifth—The Acropolis of Athens, crowned by the Parthenon. Of all earthly temples, the Parthenon is pre-eminently the noblest. It is still, after more than twenty-three centuries, the one unrivalled, perfect architectural creation of all time. In grandeur, dignity, simplicity and perfection of proportions, it has never been equalled. It has served as a model for the architects of all succeeding generations. Pericles and his designers achieved absolute perfection when they crowned the sacred Acropolis with the immortal Parthenon.

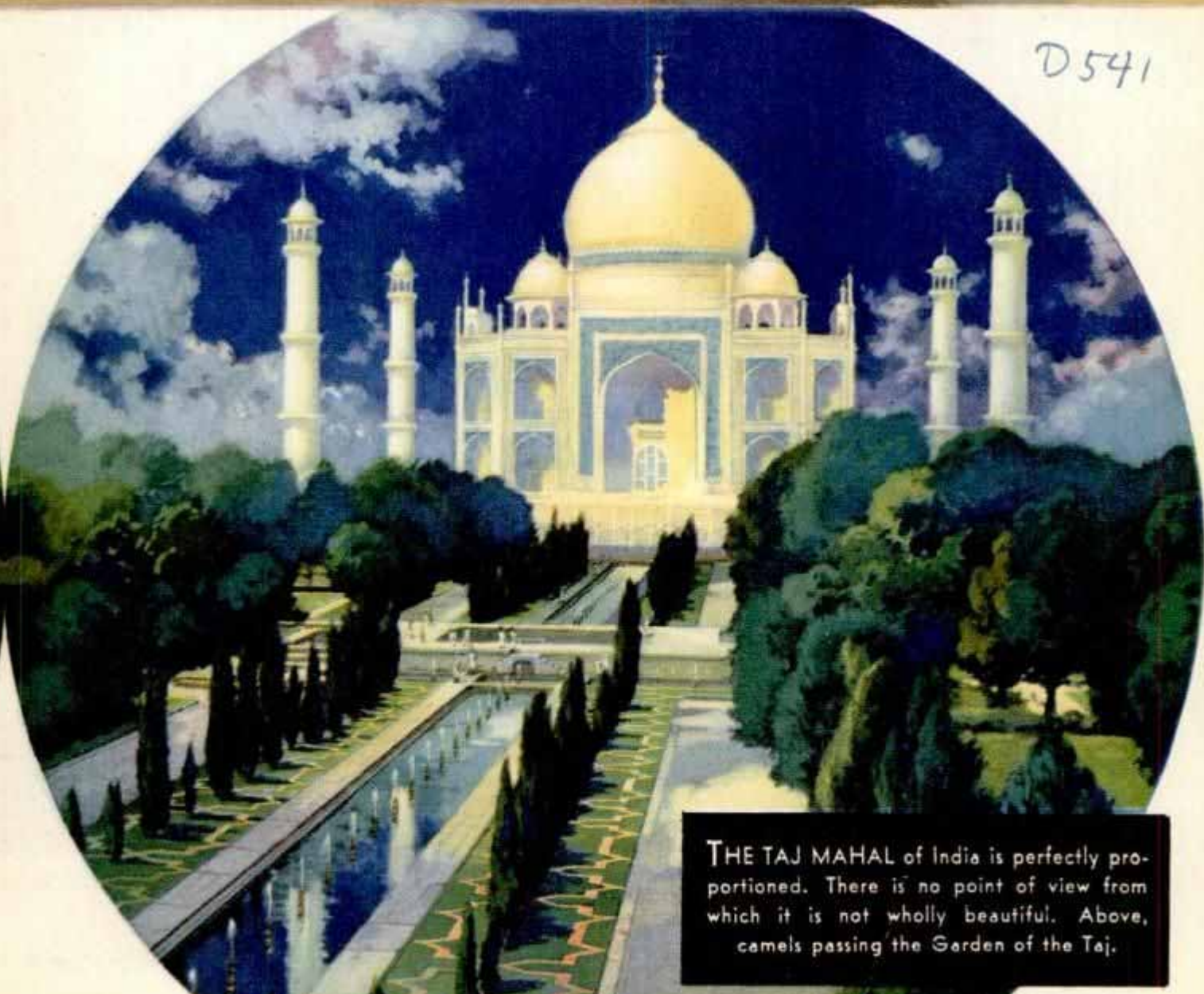
Sixth—The Pyramids of Egypt and the Sphinx. No other two names are richer in suggestions of impressiveness and mystery. Forty—nay, fifty—centuries look down from these immemorial creations and command us to include this



VENICE, with its waterways, is one of the world's most unique cities, and its gondolas are the most romantic of conveyances. The long building is the royal palace, and the tower is the Campanile of San Marco.



D 541



THE TAJ MAHAL of India is perfectly proportioned. There is no point of view from which it is not wholly beautiful. Above, camels passing the Garden of the Taj.

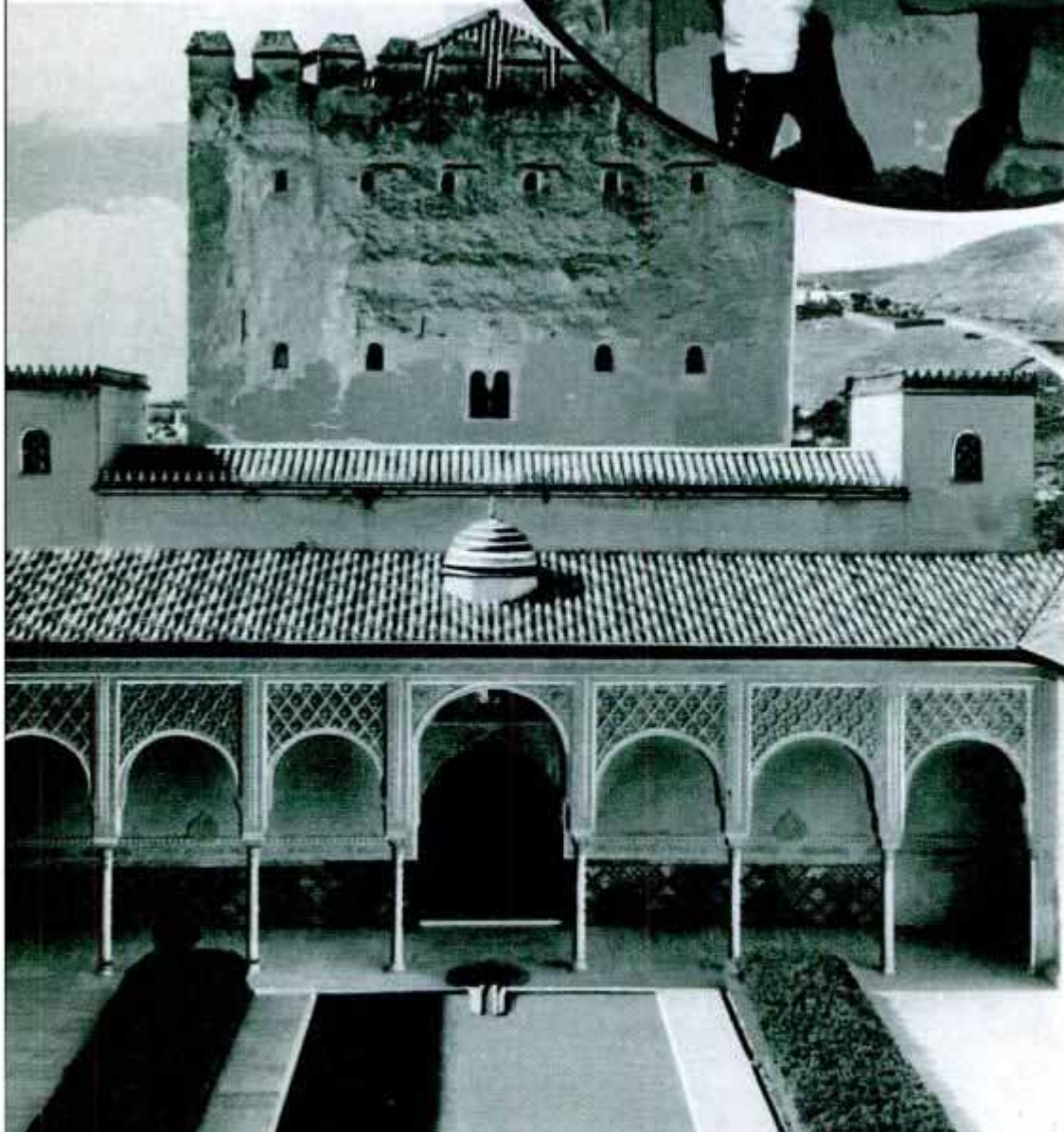
D591

ONE of four stairways giving access to the Angkor Vat, or the Great Temple of Angkor in French Indo-China. The Angkor Vat, lost for centuries in the jungle, is still clothed with mystery as impenetrable as the forest which overwhelmed it.



D 3 41

ONE of fifty-four giant statues of good demons which support a stone serpent 200 feet long on one side of the "Bridge of Victory," one of five bridges spanning the moats which guarded Angkor Thom, once inhabited by a million people.



THE BEAUTIFUL Court of the Myrtles and the tower of the Hall of the Ambassadors, a part of the Palace of the Alhambra, where Ferdinand and Isabella received Christopher Columbus on his return from the new world over 400 years ago.

D541



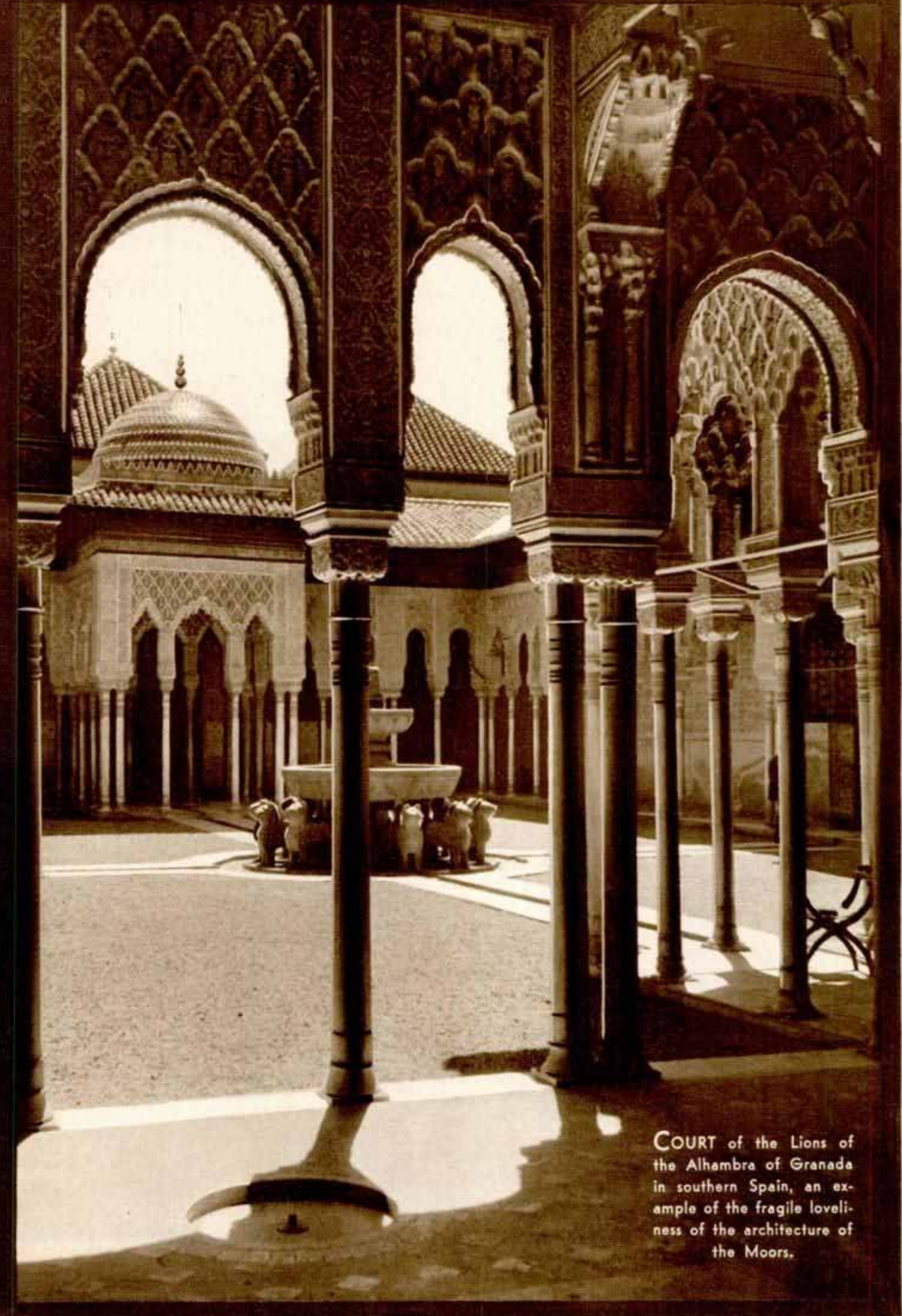
PILGRIMS ascending the steps of the Shrines of Nikko in Japan which, for more than three centuries, have attracted pious and patriotic throngs.

burial place of the Pharaohs among the supremely interesting places known to modern man.

Seventh—The Taj Mahal of Agra in old India. It stands today in all its pristine beauty and perfection as the loveliest building now existing in the orient. The nobler beauty of the Parthenon has been marred by the hand of time and the vandalism of man, but the Taj Mahal, mellowed a little by the passing of a mere 300 years, delights and satisfies the eyes of all who look upon it. To linger in the garden of the Taj by

moonlight is to experience the purest aesthetic thrill within the reach of modern man.

Eighth—The Angkor Vat, grandest creation of the ancient Khmers in the reclaimed jungle of Cambodia. The Angkor Vat, lost for centuries in a trackless wilderness of verdure, is still clothed with mystery as impenetrable as was the forest that once overwhelmed and buried it. The most interesting days I have ever known were lived in and around the Angkor Vat. Near it I found a vast abandoned city which had been, in the



COURT of the Lions of the Alhambra of Granada in southern Spain, an example of the fragile loveliness of the architecture of the Moors.



THE PARTHENON as it appears today, its many fallen columns re-erected by American enterprise and generosity. Left, during the ceremonial reception accorded Columbus by Ferdinand and Isabella, the discoverer of America undoubtedly gazed on this "rug of sunshine" spread on the stone pavement of the great hall of audience of the Palace of the Alhambra.



D 541

RICHLY garbed, and with whitened faces, these girls, dressed like the thousands of "heavenly maidens" adorning the Great Temple of Angkor, perform the holy dances of ten centuries ago.

eleventh and twelfth centuries, the abode of a metropolitan population of over a million souls. That population has completely disappeared, leaving no record of the reason for its sudden vanishing.

The jungle possessed itself, for centuries, of all the splendid monuments that tell today the story of the wealth and the artistic prowess of the Khmers, and of their great conquests in war and of their worship of the Gods of Hinduism and later their devotion to the teachings of the Buddha. There are no written records. The story is told in pictures—thousands of pictorial reliefs carved on the stones that form the walls of the long galleries of the Angkor Vat and other older temples. The romance of travel cannot die while the dead glories of Angkor wait for the traveler to thrill him with their beauty and the appealing mystery of the unanswerable questions that they raise.

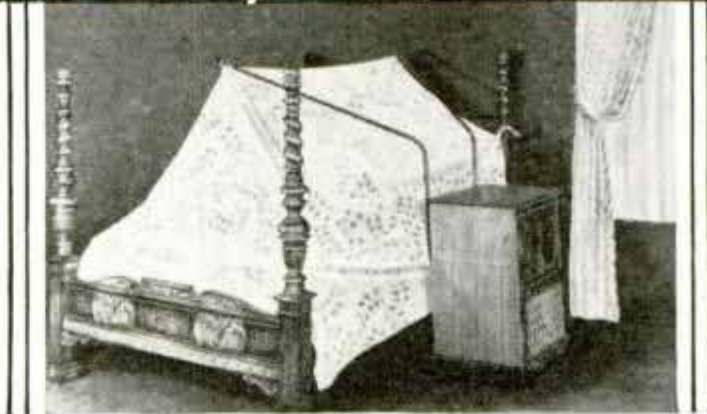
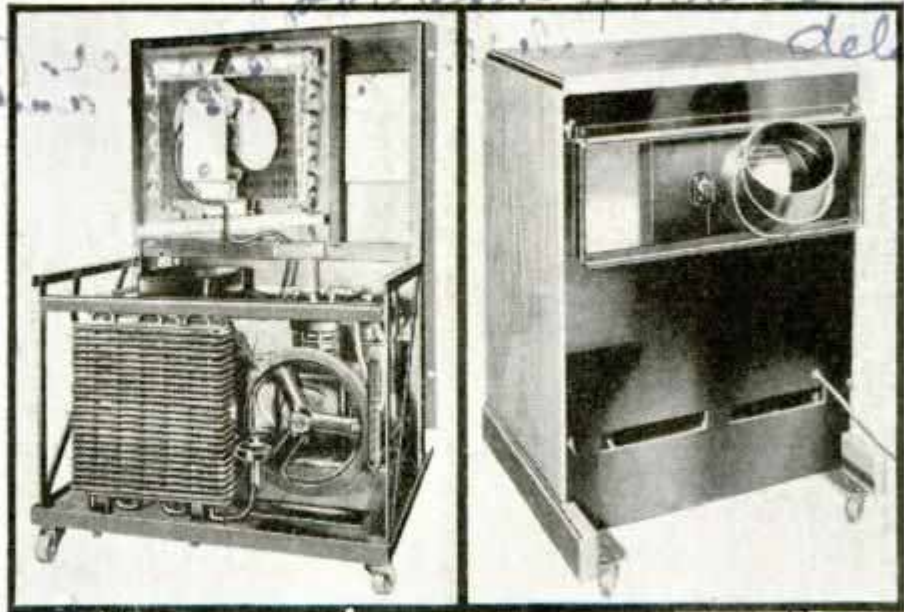
Ninth—The Shrines of Nikko in the mountain forests of Japan. There is a charm about perishable things that have endured in spite of their perishable nature. The amazing Shrines of Nikko exert *(Continued to page 116A)*



THE NIKKO Shrines of Japan where the deified spirits of the Tokugawa Shoguns dwell in golden glory, represent the most elaborately sculptured wooden structures in the world. These steps lead to the burial place of the founder of the Tokugawa dynasty of military rulers of Japan.

Conditioned Air Supplied to Canopy on Bed

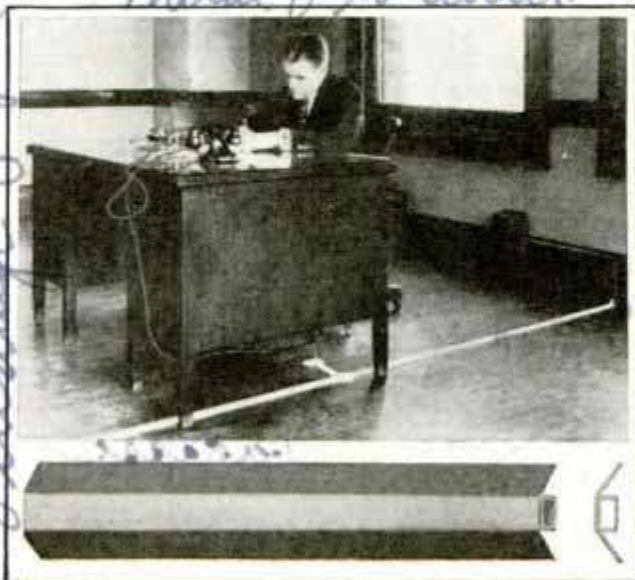
Refreshing sleep on hot nights is made possible by an air-conditioning machine equipped with a canopy which fits over the bed. Fresh air, constantly changing, is supplied to the sleeping compartment by the machine, which cools the air and removes excess moisture. The refrigerating unit and the small re-circulating fan make no more noise than an ordinary electric fan. Should the outside temperature drop during the night, the canopy may be pushed aside as easily as a blanket. The air-conditioning unit is switched on and off by means of a convenient control. The canopy is of double thickness.



Top, Left, Inside View of Refrigerating Unit; Top, Right, Outside View; Bottom, Unit as It Appears Supplying Air to Canopy

733
**LAYING OF WIRE
 ACROSS FLOOR
 MADE EASY**

Large enough to accommodate wiring for several circuits, a new metal duct or channel protects electrical and telephone wires laid on the floor. The duct is only five-



White Duct on Floor Contains Telephone and Electric Cables; Below, Section of Duct

sixteenths of an inch high, eliminating the possibility of stumbling over it, and one and one-half inches wide. With wires concealed in the duct, appearance of the room is improved. As a safety factor, the device eliminates the hazard of dangling wires.

66
HURRICANE GATES ON LAKE

Protective levees around the southern end of Lake Okeechobee, in Florida, will save surrounding country from hurricanes in the future. In the storms of 1926 and 1928, the wind velocity blew the water out of the lake and onto the rich farm lands. The hurricane "gates" at the navigation exits of the lake will form a protective wall, holding in the water and saving the surrounding country from flood.

☐ A man can walk faster than the fleetest snake.

*Snake beats Mr. Harold O. Hayes
 Walter Moser, this of Calif.
 Mr. Walter Moser, this of Calif.*

*White Duct on Floor
 National Electric*

Mr. Walter Moser, this of Calif.

D 723

Fayetteville, Ark.

New USES

Dr. W. W. Skaymer, President of
Chemistry and Soils



IF necessity is the mother of invention, old-fashioned fate or luck must be its father.

Discovery of a way to make valuable fuel from field and garden waste is an example. Dr. C. H. Harrison, a chemical engineer, was spending a very cold night at a Canadian farm home. The family was out of coal, and there wasn't a sizable log of firewood within twenty miles, so the party was keeping warm before a big tank stove designed for burning wheat straw.

The stove exploded, the house burned, and the chemist escaped with an idea. He was certain that the explosion had resulted from an accumulation of combustible gas formed when slow-burning straw is too closely confined. So he reasoned that if an ordinary tank stove could



Dr. C. H. Harrison,
Bureau of Chemistry
and Soils, U.S. Dept
of Agriculture

Above, Block of Heat Insulating Material and Printing Plate Made from Corncocks; Below, Cellulose Made from Sugar-Cane Waste

produce such powerful gas from ordinary straw, why shouldn't gas be generated commercially from ordinary crop wastes such as straws, corncocks and plant stalks of any sort?

Q. E. May, Bureau of Chemistry and Soils, U.S. Dept. of Agriculture, D. 723

for OLD CROPS

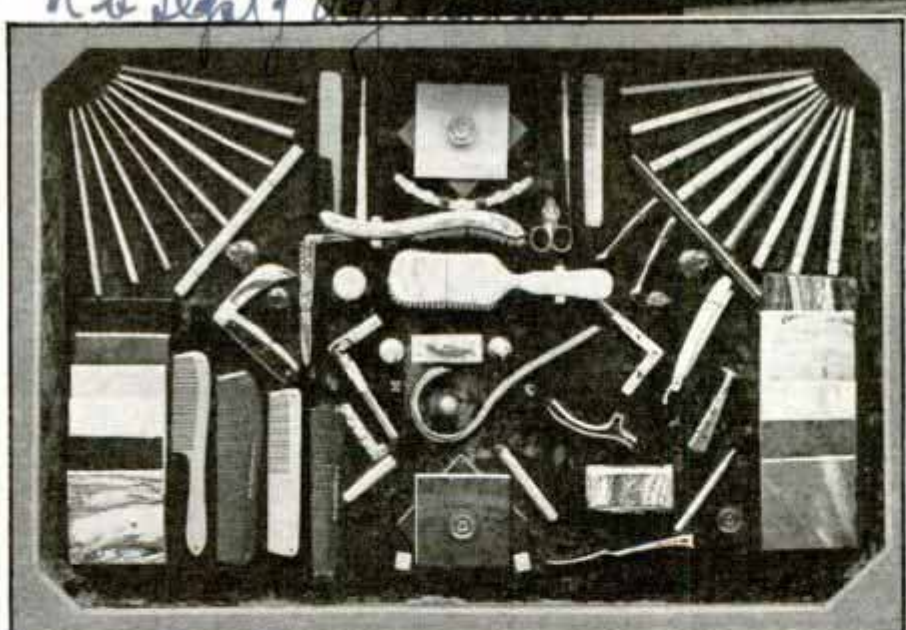
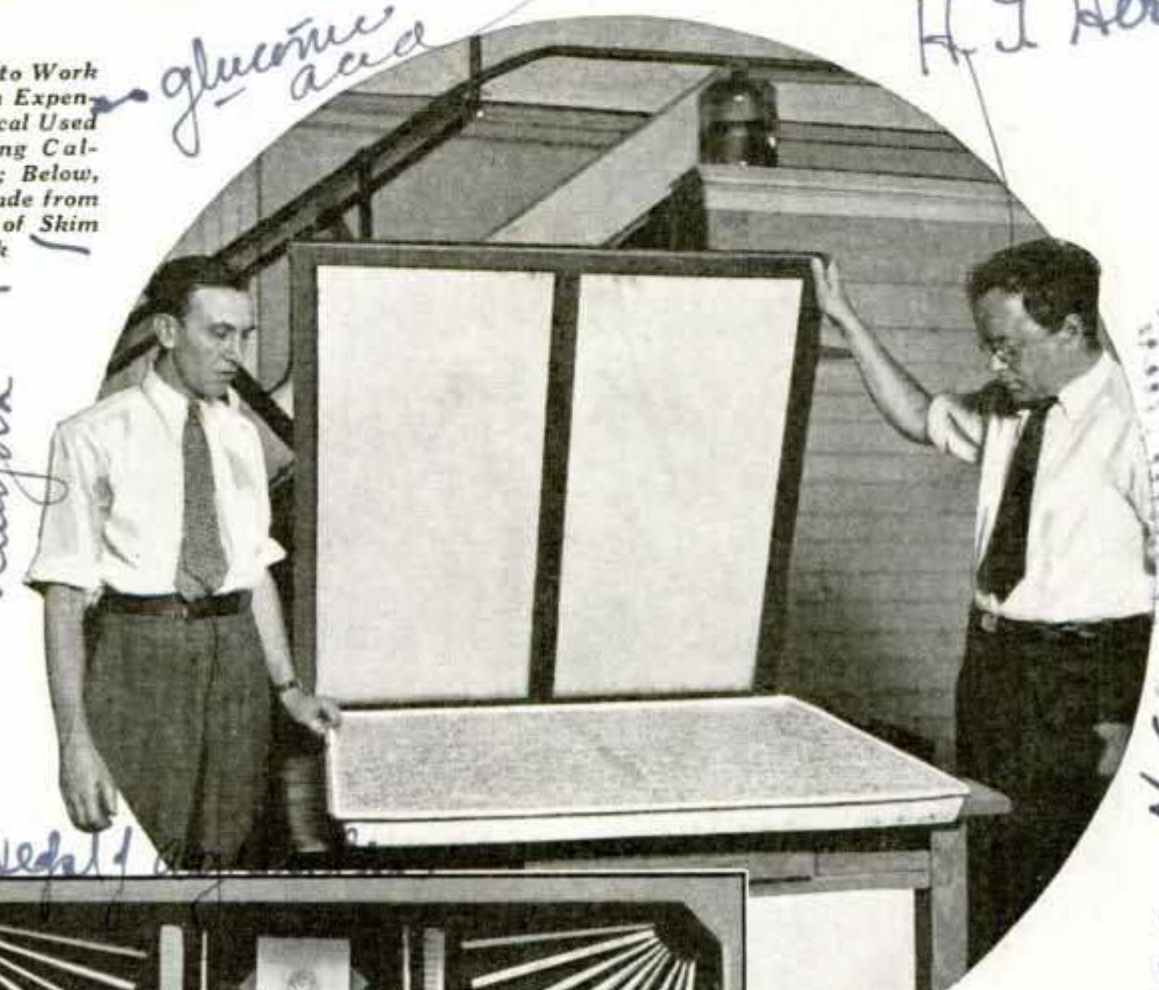
Aladumite Co., 261 Wallace Orange, N.J.

H. J. Herwick

gluconic acid

Molds Put to Work to Make an Expensive Chemical Used in Producing Calcium Salt; Below, Articles Made from a Product of Skim Milk

Catalin Co. 230 Park Ave New York



ments were then made with cornstalks and cobs, and with oat and flax straws.

All this was the seed of the idea. The final harvest is now being made by the government, through the new agricultural by-products laboratory of the bureau of chemistry and soils. P.

Accordingly the bureau of plant industries of the department of agriculture built a cylindrical steel retort equipped with a metal scrubber and condenser, and a water-seal gasometer. Then fifty pounds of loose wheat straw was dropped into the retort, heat was applied, and satisfactory gas was produced; a gas with practical light and heat values. Successful experi-

Burke Jacobs, chief of the new laboratory, located at Ames, Iowa, is in charge of the new drive to develop practical fuel, heat and light from crop wastes.

A ton of cornstalks, or similar plant growth, when correctly processed, yields about 10,000 cubic feet of gas; or, roughly speaking, a month's fuel supply for an average home. An acre of average corn

see Sept. 1922-46

Washington D.C.

D 923

out the soluble components, allowing this "breakdown material" to return to the cesspool for further decomposition. Destruction by fermentation is likely to require from five to ten days before the finished gas can be condensed and stored for distribution. The laboratory has also perfected movable compression machines, which can be transported by truck from home to home, and there press straws and stalk wastes into briquets, a compact and efficient fuel.

All this does not mean that crop wastes will become the fuel source of the nation, or that they will drive out all other gas-producing equipments. But it does suggest an alternative fuel supply for sections where fuel remains a serious problem; or where allowing stalk wastes to clutter the land over winter encourages such ruinous insect enemies as the corn borer, cotton boll weevil, and others almost as bad. It may also mean that the extravagant habit of burning valuable forest timber as fuel may find a more efficient substitute, particularly in vast areas where forests are scarce and where wood is still the standard fuel of rural and suburban homes.

The demand for cellulose is another road toward economical harvests. Cellulose and its by-products are derivable from practically any plant cell material. By volume, common straws, stalks, and field and garden refuse average about forty-eight per cent cellulose material. This is approximately the average of forest trees, which are being destroyed about four times as fast as they can grow largely to answer increasing demands for cellulose, the ingredient for hundreds of new products, wrapping materials, wall board, fuels, fabrics and chemicals.

Among the new by-products from cellulose manufactured is furfural, which may become a great motor fuel of tomorrow. It is a colorless liquid with a low boiling point, a high energy value and a flash point of about fifty-five degrees. The possible yield of furfural from corncobs and oat hulls is proved to be as high as fifteen per cent of the weight of raw materials, which may be almost any form of plant waste. It can't as yet compete with gasoline in production cost, but it has ac-

(Continued to page 116A)

Driving Wolf
Research Engineer
A. A.
Victor Co
Camden
N. J.



Small Transmitter Which Creates Its Own Heaviside Layer and Sends Out Four-Inch Waves

FOUR-INCH RADIO WAVES SENT BY TINY TRANSMITTER

Wave lengths only four inches long are sent out by a little transmitter recently developed. The micro-wave transmitter includes a tiny antenna and ionic tube modulator, the latter creating a miniature Heaviside layer which makes it possible to hold the waves to the desired length.

CUPS IN COFFEE POT

Six cups with saucers fit into a coffee pot introduced in Germany recently. The inventor solves part of the apartment dweller's problem of small storage space by constructing the pot just large enough



for the cups, nested together, and the saucers, stacked on the cups. The lid of the pot is large enough for easy removal before coffee is made.

(The belief that the greater number of eggs a hen lays, the poorer the quality of the eggs, is not upheld by tests.

under
R.A. Braden

H. Berley at 30
4250, Berley
Munich
P. Easting
D. Easting
D. Easting
D. Easting

Service Service

Fast Hydroplane Speedboat Built by Pupils



equipped with hydrofoils, or planes, suspended beneath the boat. As the speedboat gathers speed, it rises gradually on the hydrofoils, decreasing the amount of boat surface in contact with the water. The hydrofoil principle, developed by Dr. Oscar G. Tietjens, gives more speed without increasing the power.

Wide Water
Top, Speedboat in Test Run;
Bottom, Class Completes Work
on Odd-Looking Speedster

Capable of close to sixty miles per hour, a 15-foot speedboat powered with only a standard outboard motor has been completed by pupils of Rocky River high school in Ohio. The craft is



Cleveland, Experimental Version
Hoe Work on Cotton Is Reduced by Rotary Cultivator



Dallas Texas
Cultivator with Rotary Action Breaks Up Ground

Rotary motion in the latest cotton cultivator reduces hoe work. The implement consists of a wheel having sixteen teeth pointing downward at right angles to the rim or tire and mounted on the beams of an ordinary cultivator chassis, so as to revolve when the team moves forward. The attachment is made to revolve by tilting the tire to one side so that the spikes or teeth on that side sink deeper into the earth than those on the other. As the team moves ahead, the more deeply embedded teeth drag, causing those on the opposite side to move forward. The rotary motion replaces the usual motion parallel to the rows. Slight damage to the cotton results from the crosswise motion of the teeth. The implement may be used for the first two cultivations.

near Melrose
Gold fell from the sky in New Mexico for a meteorite picked up there was found to contain minute amounts of the metal.

Serena Service 6/19/34

see vol 19 33. 733

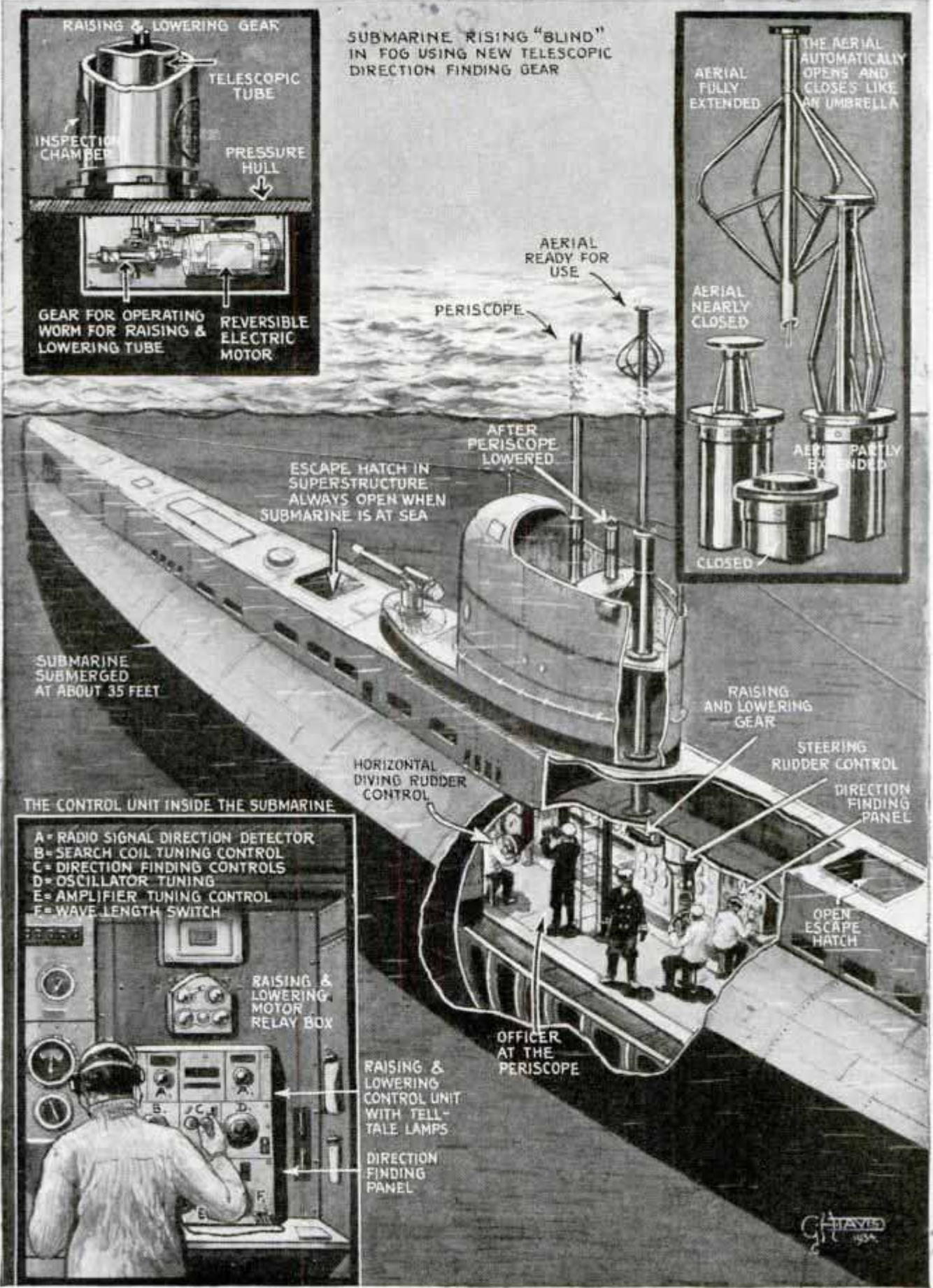
Westinghouse Electric & Mfg. Co. Pittsburgh Pa

*J.M. W. A. ...
3809 ...
Dallas Texas*

750

0706

Direction Finder Is Eye and Ear of Submarine



Direction Finder for Submarine Which Enables Navigation Officer to "See" and "Hear"; Note Telescopic Aerial Raised to Receive Signals Just as Periscope Is Raised to See

Paul

D728.



"Frosty Breath," Like That Common in Cold Weather, Is Produced by Device in Woman's Hand

ACTORS' BREATH MADE VISIBLE FOR WINTER FILM SCENES

Motion pictures of winter scenes may be made realistic by a device that makes the actors' breath visible, just as it would be at low temperatures. The device resembles false teeth. It enables the actors to keep Dry Ice in their mouths without harmful results. The warm breath causes the Dry Ice to give off vapor not unlike that produced by persons breathing in cold weather. The device does not interfere with speech.

AUTO VALVE STEM PACKING STOPS LEAKAGE OF OIL



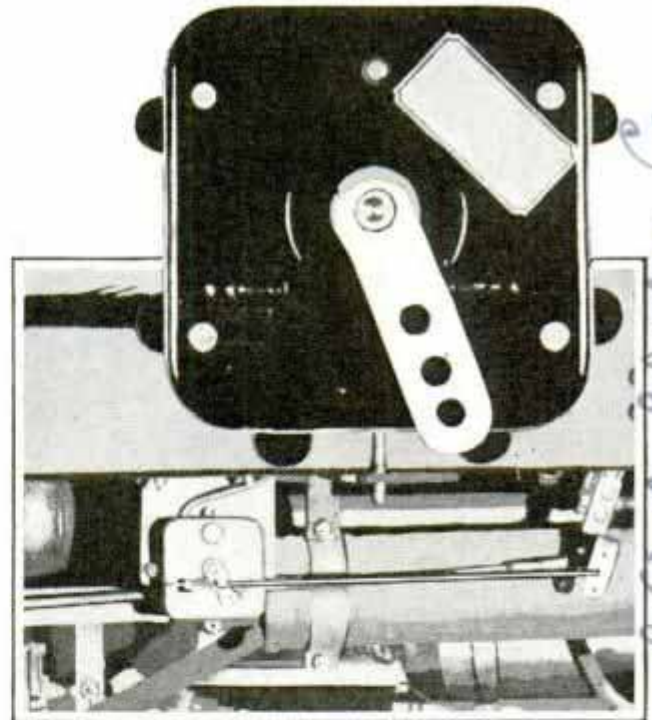
When oil is drawn into the combustion chamber of your automobile, it enters past the piston rings or the intake valve stems. If rings are good and there is no leakage past them, the excessive oil consumption can be stopped by installing a special valve packing spring on each intake valve stem. It consists of a coil retaining spring to which is attached a packing designed to seal the clearance between the intake valve stem and valve guide,

thus keeping out foreign air and oil. This in turn tends to increase compression, power acceleration and speed.

thus keeping out foreign air and oil. This in turn tends to increase compression, power acceleration and speed.

AUTOMATIC IGNITION SHUT-OFF STOPS IDLING CAR MOTOR

After three minutes of idling, the ignition of an automobile or truck is turned off by an automatic ignition stop which thus saves gasoline and wear on the motor. It can be installed in any car or truck in a short time and consists of a clocklike mechanism and a circuit breaker mounted in a waterproof metal box. A short shaft, connected with the clock, is bolted to a rod which is attached to the brake. When the driver applies the emergency brake, the rod starts the clock mechanism, and at the end of any predetermined time, usually three minutes, the ignition circuit is broken and the motor stops. The reverse



Automatic Ignition Stop Which Shuts Off Idling Auto Engine after Three Minutes

action, when the brake is released, winds up the clock and leaves it ready for the next stop.

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

Lindblom Valve Packing Rockford, Ill. Dec 5 6

Patd 10/9/23 Lis Bud Custom Eng Co

General Auto Electric Co New York 149 St. 0.30

Camera Tricks Put Rail Flyer into Talkies



Top and Bottom, Right, Two Methods of Attaching Camera to Locomotive; Center and Left, Unusual Views of the Fast Train

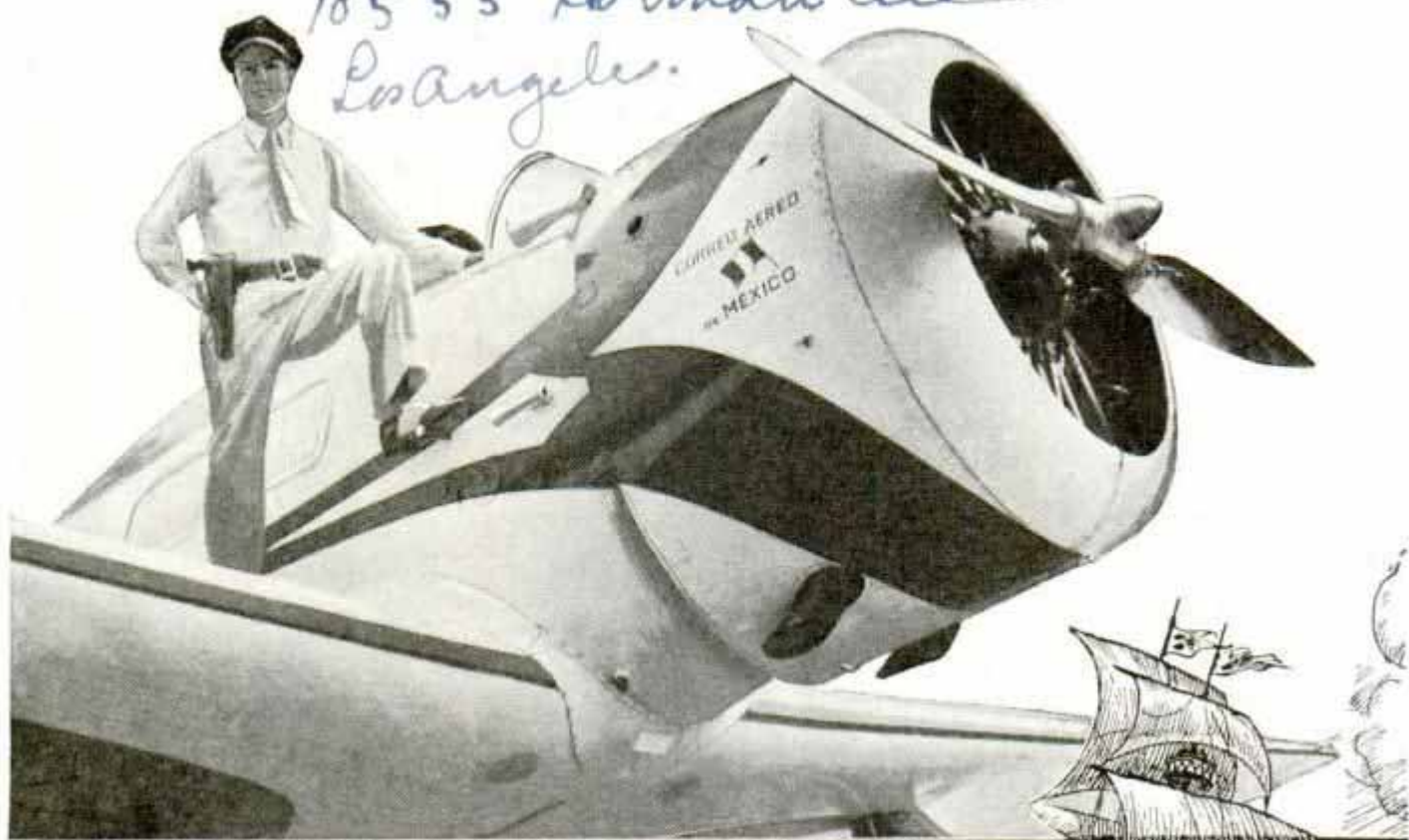
When the motion and sounds of a speeding railroad train are captured for the talkies, special equipment and photographic tricks are called into use. In filming the New York Central's "Twentieth Century" for a sound motion picture, technicians converted the great locomotive into a rolling camera mount. A steel vibration-proof shelf above the right cylinder head of the locomotive supported cameras focused on the running gear of the engine and commanding a view of the full length of the train. A vibration-proof camera boom, attached to the side of the locomotive, projected eight feet out from the point where it was mounted, supporting cameras with which unusual "shots" were made. Still another device held a camera

underneath the locomotive while movies were made of the process of taking on water while moving at fifty-five miles per hour, scooping it from open water pans. Each camera was operated by a motor controlled by photographers stationed in the cab. Head-on views were obtained by mounting cameras in a locomotive that ran ahead of the Twentieth Century for several miles.

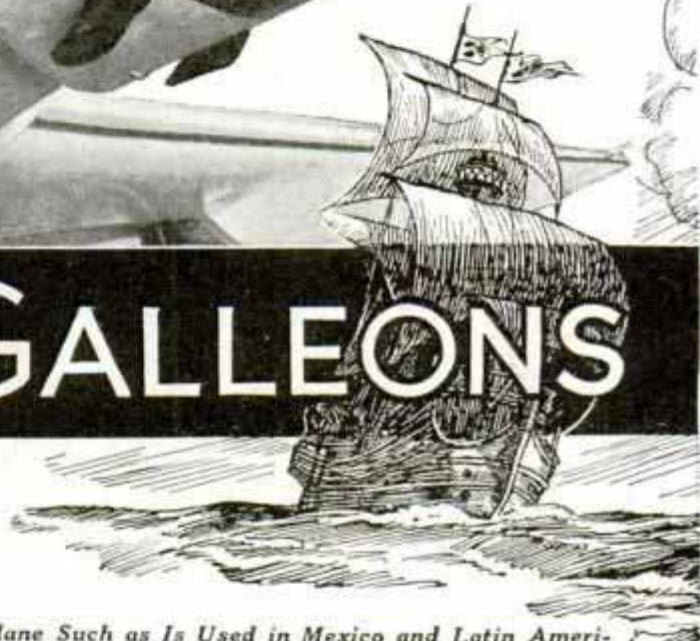
Cont. A. S. Shackwell 129 S. Bedford

D901

Crnk. Thomas E. Strinson Jr.
10555 Holman Ave
Los Angeles.



GOLDEN GALLEONS



Plane Such as Is Used in Mexico and Latin American Countries for Carrying Gold

ROARING across the jungles, dodging mountain tops, and making their way down canyons so narrow that they must bank their planes around the turns, a corps of adventurous American pilots are transporting millions of dollars worth of gold and silver through the clouds of Latin America. Sheer nerve as well as superb flying skill are part of their qualifications, for the routes they fly would turn the hair of a transport pilot gray with worry. For instance—

Mazatlan was fogged in and the three-motored plane that was circling above the clouds was nearly out of fuel. To the east, under the fog, was a precipitous mountain range, and to the west was the deep Pacific. Pilot Grant Spillman banked the plane on its side for the last time and headed inland. A few minutes later, just as he left the clouds behind, the motors sputtered and died. There was only one possible landing place and Spillman turned toward it, a tiny patch of open ground at the bottom of a narrow gorge.

This field was too small and at the last

minute Spillman skidded the plane to one side, taking his chance on landing almost broadside. The wheels plowed into the sand and the plane crashed to a stop. Then, before the pilot had time to draw a thankful breath, something whizzed past his head and crashed through the side of the plane. A 100-pound bar of gold, part of the cargo torn loose as he descended had fallen on the plane and nearly killed him after he had landed unhurt.

Flying straight across country, the pilots rarely catch sight of a trail or settlement on their way from the isolated mines and at the best a forced landing means days of struggle through the undergrowth. Added to the other hazards is the fickleness of the weather, aside from the certainty of the daily afternoon thunderstorms.

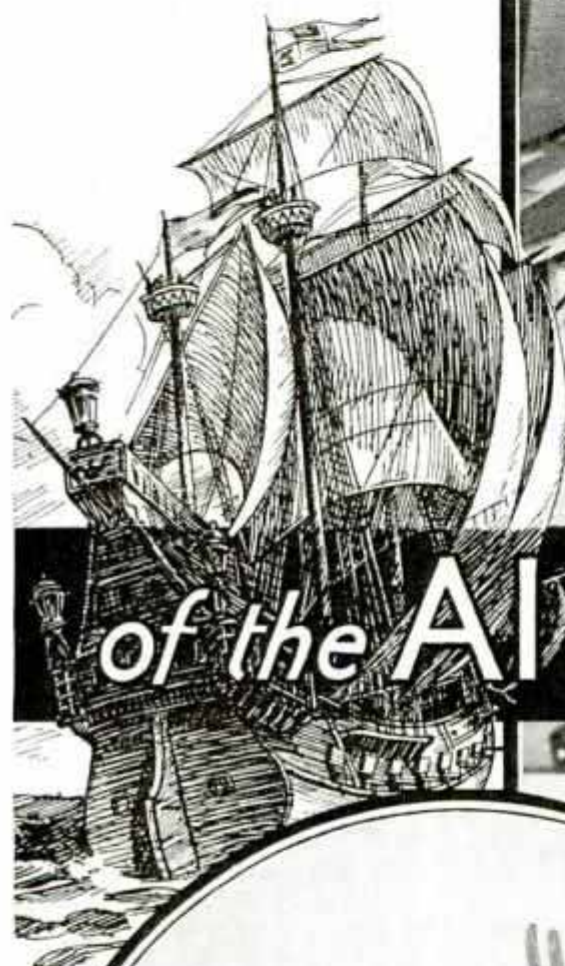
Before the advent of the airplane, bring-

Lineas Aereas Nacionales

D 70-1

*United Airport
Burbank Calif*

Testing the Motor of One of the Planes Used to Transport Gold, and the Leader of a Pack Train Which Formerly Brought Gold Out of the Mexican Mines



of the AIR



most of the Pack, 1/2 of the pack load. Aircraft & Burbank Calif

ing gold and silver from the rich mountain mines was slow and tedious work. Pack trains plodded for days or weeks along the tops of cliffs, through the jungles, and across arid stretches of desert. Added to the other dangers of the trail was the constant fear of bandits. Now the pilots cover as much distance in an hour as a pack train did in a week. Many of the mining companies are abandoning the trails and are carrying employes, as well as supplies and equipment, by air.



the landing fields are the final test of a pilot's nerve. Spillman, who makes daily flights to the Contra Estaca mine in the mountains of western Mexico, flies down a narrow gorge in which his plane is buffeted by twisting air currents and then lands "blind" on a short, rocky, dog-leg field that he doesn't see until after he cuts the motors. At the San Luis mine in the same district, Gordon Bary lands his plane on the top of a ridge that has a cliff at one end and a mountain at the other.

Bars of bullion, bags of minted gold, and stacks of currency are carried on almost every trip by the Lineas Aereas Occidentales that flies from one end of Mexico to the other. Sometimes a shipment consists of several bars of new metal brought down from the mountains by a mining company airplane, or, as happened recently, it may be half a million dollars



On the "in" trip the pilots stuff their aluminum-lined cabins with chemicals, acids, dynamite, and even with assorted equipment like electric motors and heavy pipe.

Some of the gold that the pilots fly comes from the mines that were worked in the days of the Aztecs, and mining companies are still working ancient properties that furnished gold and silver to Montezuma and the Spanish galleons. One old mine, reputed to have 300 miles of underground tunnels, is producing 100 bars of concentrated gold and silver every month.

Perched precariously on mountain sides a mile above the sea or hidden in narrow river bottoms,



Pilot Checking Gold Shipment, One of Mexico's Planes and Inspecting Motor of a Treasure-Carrying Ship

worth of Spanish coin that had laid for centuries in the vaults of a Tapachula bank.

Lately the airplane has been selected as a means of transportation for working the fabulously rich mines that are guarded by the unconquered Yaqui tribes of northwestern Mexico. For centuries the Yaquis have resisted every effort to invade their territory. Now two mining companies have established air bases in the interior of the Yaqui country and are flying in prospectors, engineers, and supplies.

A lost mine in Lower California which once yielded an immense fortune is also being sought by airplane. Located somewhere in the San Pedro de Martir range, the mine was abandoned when an earthquake caved in the tunnels and shafts. Since then cloudbursts have destroyed the trail that led to the mine and prospectors have no way of ascending the steep cliffs. After finding a landing place close to the summit the prospectors hope that they will be able to discover the old workings.



Castle on Small Scale Is Home to Californian; It Is Complete in Every Detail

HOME LIKE A SPANISH CASTLE HAS SMALL DUNGEON

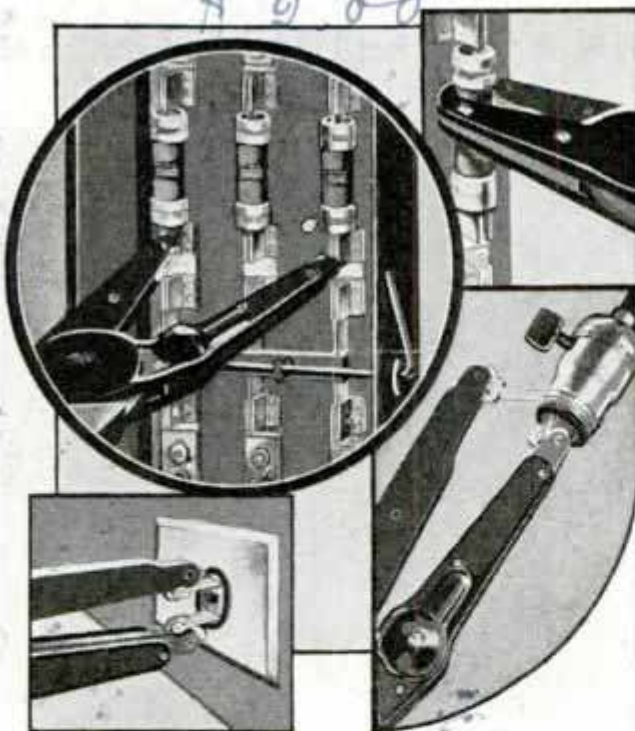
Constructed along the lines of a Spanish castle, a California home has a small dungeon, cells and a magazine room, the last without the cannon balls and powder of ancient days. The miniature castle is twenty feet long and nineteen feet wide, with five rooms on the first floor. A tiny staircase, about twelve inches wide, leads to the second floor, which contains four rooms. The ceilings are only six feet from the floor.

METAL BUNG FOR BARRELS

Useful for either wooden or metal barrels, an inexpensive metal bung is available for liquid container barrels. It can be made of any metal that does not affect the liquid, including steel, aluminum, brass, copper or any alloy. The bung is set into a bush permanently fixed in the barrel. A wrench tightens or loosens the bung with a simple quarter turn. When properly made, the wrench lifts out the bung after loosening.



TINY LAMP IN PRONG OF PLIERS TESTS ELECTRIC EQUIPMENT



Illustrating Some of the Jobs on Which Electrical Test Pliers May Be Used

Fuses, open circuits and electrical connections and equipment can be tested safely with pliers containing a tiny lamp in one prong. The lamp glows when current is on the line.

Alonzo - Mr. McLean - Alhambra, Calif.

Star-Judge Co. Inc.

I Lowy

Barbara Pasadena, Calif
New York
68 45th St.

D 912



Range Finder for Boats Which Records Distance as Well as Direction of a Radio Signal

RADIO RANGE FINDER SHOWS DISTANCE FROM STATION

In charting the relationship of a transmitting station or radio beacon from itself, a new radio range finder automatically and continuously records distance as well as direction. Previous direction finders have recorded the direction from which signals emanated, but have not shown the distance, and most of them have been operated manually instead of automatically. With this finder, the operator can tell from the readings of his indicator both the direction and distance of the finder from the station or beacon to which it is tuned, and this makes the device useful to marine navigators depending on radio beacons. The finder was tested recently by the navy.

FATIGUE OF BRAIN WORKERS IS STILL A MYSTERY

Careful study of the energy consumed by persons doing physical and mental work has failed to explain why brain workers feel so very tired after prolonged mental effort. It was found that, despite the fatigue in both mind and body following intellectual activity, brain work seems to have little effect on the general level of vital activity. Dr. Frank G. Benedict and

associates of the nutrition laboratory of the Carnegie institution, who made the tests, found that, contrary to popular belief, brain workers do not need fish or other phosphorus-rich food any more than other workers. In fact, the only extra energy needed for an hour of intense mental effort is contained in half a peanut or one-eighth of an ounce of the edible part of a banana. A housewife sweeping and dusting would expend as much caloric energy in three minutes, it was found, as a man would expend in excess of his basic needs during an hour of intensive brain work.

PAINLESS HYPODERMIC NEEDLE IS FASTER THAN NERVES

Operating faster than the nerve system, a new hypodermic needle is used for making injections painlessly. Pain sensations travel from the injured nerve to the brain in one-fifteenth of a second, while the action of the needle is only one eighty-fifth of a second. This results in complete insertion of the needle before the patient feels any sensation. The device consists of a carriage for receiving the syringe and a support with a forked footpiece, with a cam on the rear end to permit insertion of



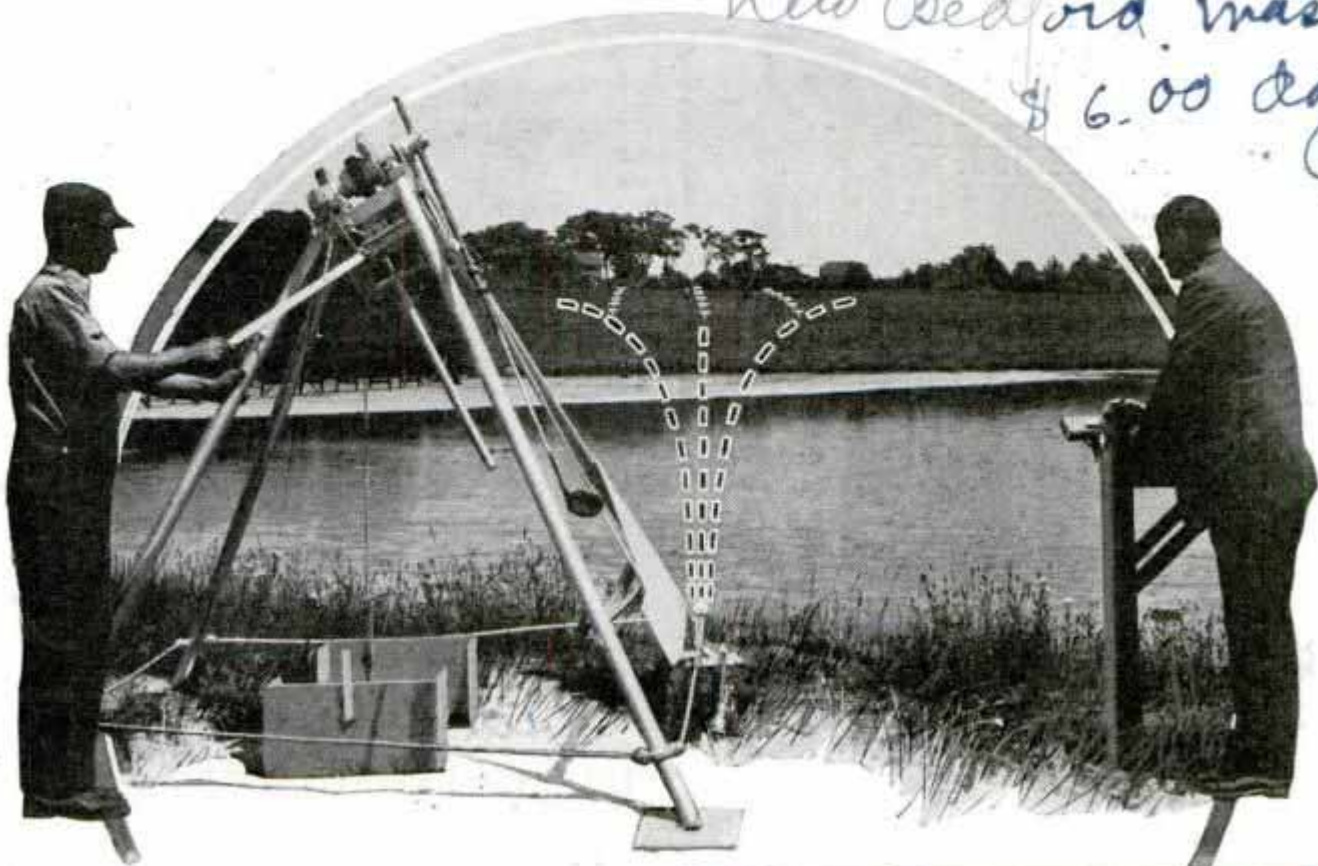
Needle Pierces the Skin So Quickly That There Is Little Sensation of Pain

the syringe without raising the cover. After the insertion, the forefinger is shifted to the top of the plunger and the contents of the syringe are injected as usual.

D 147
Jan 20, 1934
White Bear Ave. St Paul, Minn
Hypojector
or dry
jector
432
pure
White Bear Ave. St Paul, Minn
Hypojector
or dry
jector
432
pure

Hong Specialty Co
2425

Flaws at Golf Ball's Core Revealed by X-Ray



Top, Robot Drives Golf Ball Accurately to Reveal Imperfections in Flight; X-Ray for Examining Core of Golf Ball

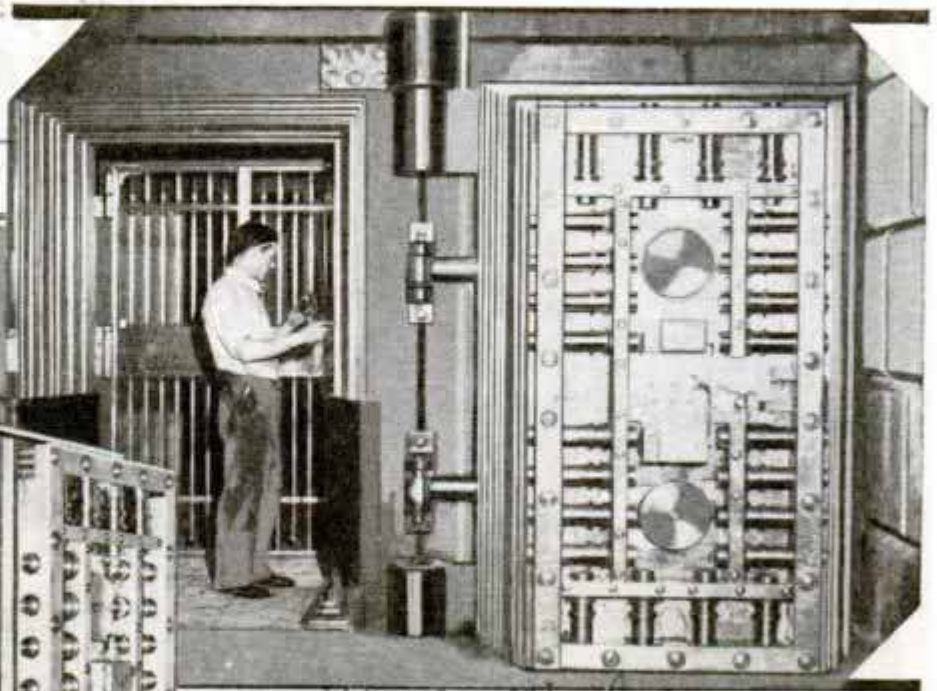
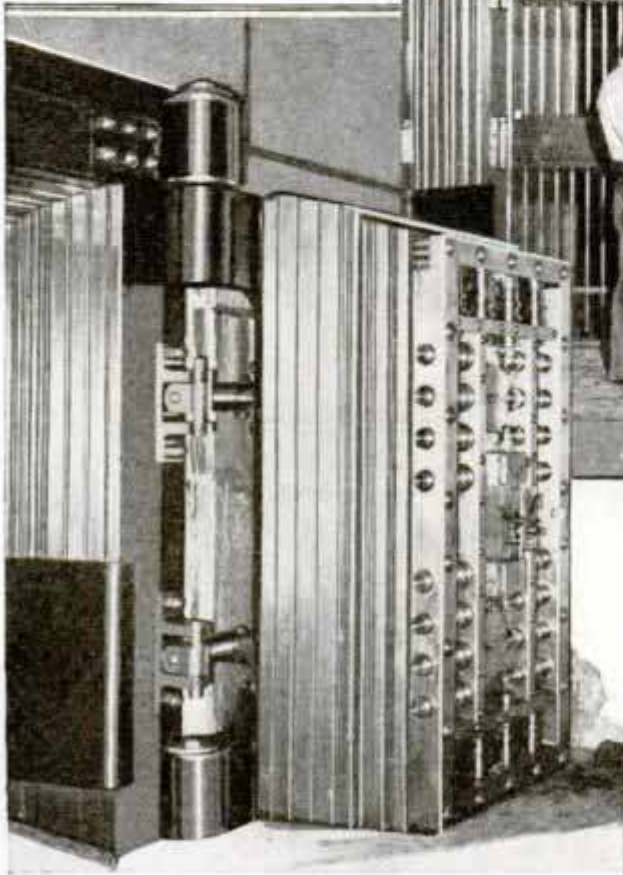
Off-center golf balls, which will not go straight when hit by driver or putter, may be detected quickly with a fleuroscope or X-ray machine used by one factory for tests. The machine is inclosed in a lead-walled room. The operator has a flat tray on which six balls are placed. The X-ray light comes on for forty seconds, during which time the operator checks on the dark center core of the balls in the tray. Then the tray is tilted and the balls roll slowly to the other end. As they roll, imperfectly centered balls are revealed by blurring at the center. Off-center balls are rejected and the others passed on. Later, these off-center balls are tested on the driving machine and on a putting table, proving that the tendency of the ball is to go to the side on which the center weight is heaviest. The driving machine consists of a driver mounted on a tripod. The ball is placed on a rubber tee, the machine wound and the trigger pulled, causing a weight to swing the driver. Away goes the ball across a pond to a marked course where pick-up men follow it, shouting the distance to check-up men.



The putting table is a long inclined table covered with billiard table cloth. When the putting trap is lifted, the ball rolls down the incline and along the level table toward a hole at the other end. If the ball is perfectly centered, as shown by the X-ray, it rolls straight and true. If it is off-center, it rolls to the side on which the weight is heaviest. If the heavy part is in the center, with the ball even on both sides, the ball rolls straight but gives a hop every time the heavy part comes down.

Thirty-Nine-Ton Door Guards U. S. Billions

Tons of steel hold Uncle Sam's billions in the new vault in the United States treasury in Washington. The door



© Harris and Ewing

Door to the New Vault in the United States Treasury; It Is Three Feet Thick

to this vault is three feet thick and weighs thirty-nine tons while the casing on the outside is made of chilled cast iron and is virtually impenetrable. In addition there are burglar alarms and other modern devices to keep out intruders.

MUSTARD GAS IS STILL MOST EFFECTIVE IN WAR

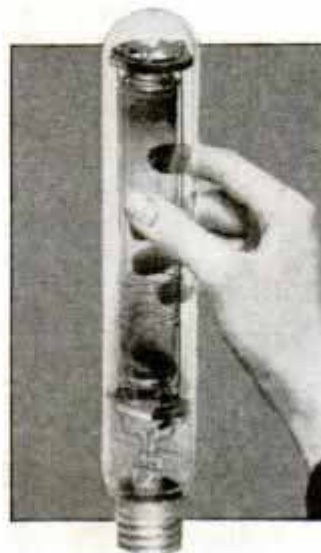
Dire tales of terrible and mysterious new war gases being developed by various nations and capable of poisoning whole cities are pure nonsense in the opinion of Dr. F. A. Freeth, of the Imperial Chemical Industries of Great Britain, who says the most effective one is still mustard gas. All others are either too heavy and immobile, or too light and too easily dissipated by the atmosphere. The most deadly of all

gases, he pointed out, is hydrogen cyanide, but this is also one of the lightest and most volatile, so its military effectiveness under all field conditions known at present is near zero. Likewise carbon-monoxide gas is deadly, but it is poured into streets every day by motor vehicles, only to be dissipated and swept away by the wind.

D927

LAMP WITH GLASS INNER TUBE GIVES BETTER LIGHT

Illumination almost the same color as daylight is produced by a new mercury lamp containing an inner tube of glass.



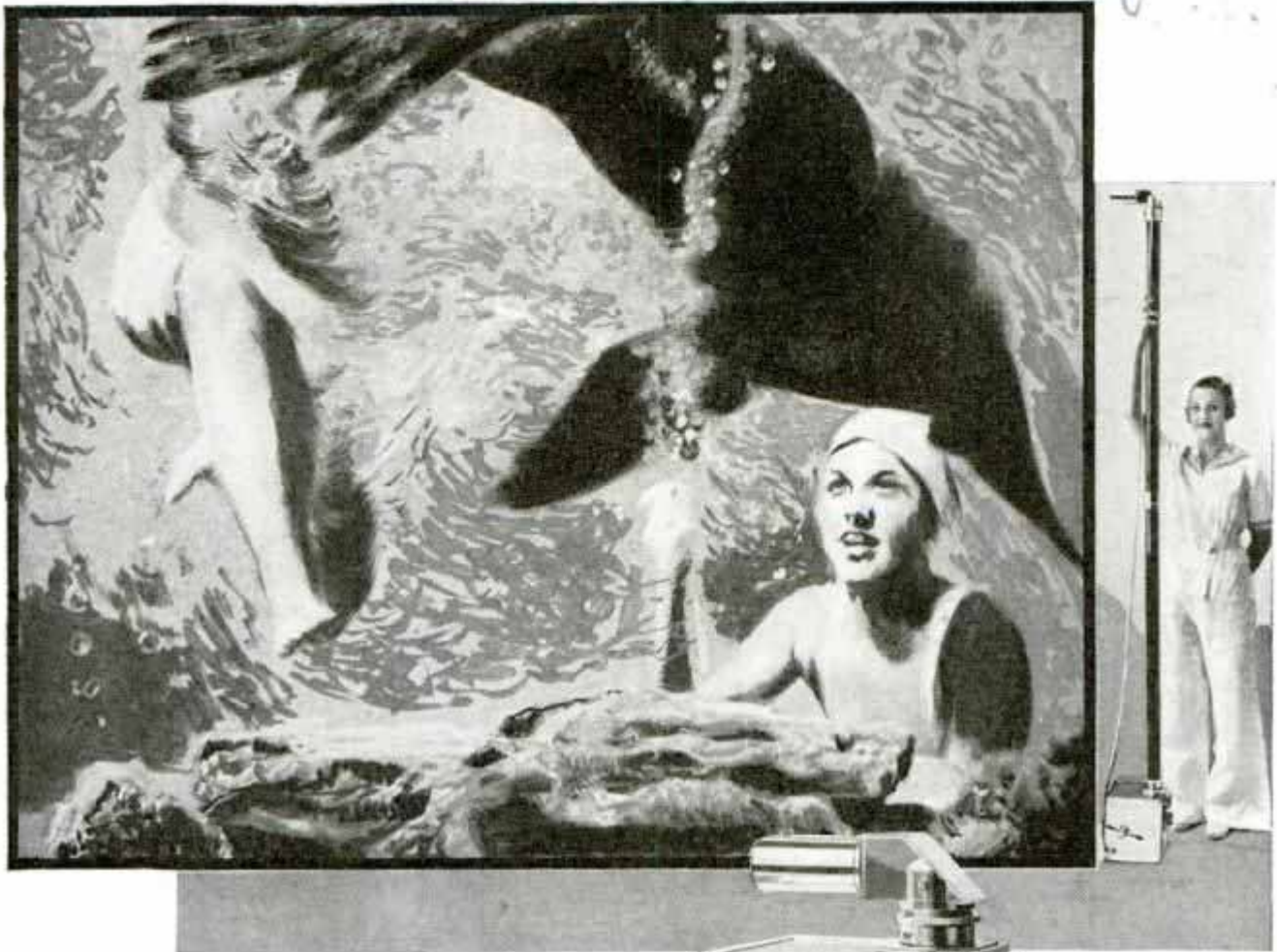
The inner tube, which is the actual source of light, contains a tiny drop of mercury no larger than the head of a match. When an electric arc is passed through the lamp, the mercury is vaporized, filling the inner tube with a brilliant bluish-white glow. A product of the Westinghouse

Electric and Manufacturing company, the lamp has high operating efficiency.

Wire Service 1/27/34

Chief Research Chemist Westinghouse Lamp Co

Periscope on Ship Works Undersea Camera



Top, Photo Taken under Water; Extreme Right, Periscope Camera; Bottom, Closeup of Camera

Undersea motion pictures may be made without getting off the deck of the ship by means of a periscope camera. The periscope, which is made with extension tubes for convenience in carrying, is attached to a watertight case designed to hold a thirty-five millimeter camera, which is wound, operated and focused from outside the case and from the safety of ship deck. The outfit can be adjusted to take scenes from any angle. The optical system permits use of as many extension tubes as desired, so that the camera may be submerged to great depths. To prevent fogging of the lenses, the equipment has a ventilating system through the tube.

D744.

GASKET JOINS PIPE ENDS WITHOUT THREADING

Threading, grooving and beveling are unnecessary in a gasket-type coupling for plain-end pipe. The coupling consists of

two drop-forged steel half-couplings which contain gripping devices, one gasket with metal protected sections and two bolts. The gasket furnishes a seal against either pressure or vacuum and the coupling will withstand a pressure of 4,000 pounds per square inch.



The joints can be broken down and made up again with the same or new pipe, the coupling being done by unskilled labor.

Champion Machine & Forging Co.

0737

Capt. Thomas E. Stinson, Jr.
705-55
Helman Ave

"MIRACLE MEN"

Los Angeles, Calif



Checkered Flag Greets the Winner of 100-Mile Race; One Wheel of Second Car Is Faintly Visible at Left of Track Official

STRANGE things happen on the track when heavy-footed drivers roar past the starting flag and settle down to a grueling race. You think you see everything that happens but most likely you don't.

If you visit the pits, you may be astonished to see a driver stop and shout to his crew: "Left rear tire's flat. Change her quick." You and the crew can tell at a glance that the tire is perfect, but the driver may insist on a change, or after getting out for a look he may shrug his shoulders and drive off again.

Someone will explain that even experienced drivers occasionally have this mental quirk. "After a driver has been racing at a constant speed for a few laps he becomes synchronized to the vibrations and noises of his car," you are told. "Then he

is super-sensitive to the slightest change. Sometimes a slight rattle builds up in his ears until he is certain that he has burned out a connecting-rod bearing and he has to slow down before he finds out that his ears have tricked him. Or a little change in vibration like running over loose dirt may convince him that a tire is soft and even when he stops and looks, he may find it hard to believe his own eyes."

One of the most spectacular race programs in track history happened after eighteen months of weekly racing, in which no serious accident occurred, at the Los Angeles Ascot speedway.

The long spell of steady racing was broken in the first heat when Mel Kenealy, driving No. 18, broke an axle housing and crashed into the fence. One wheel was

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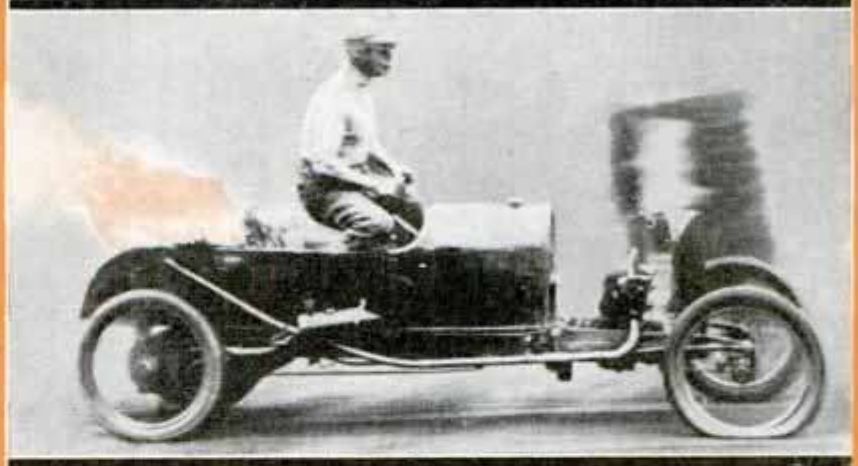
of the TRACK

thrown so high by the impact that it came down several seconds later, just in time to strike a second car. From the tail of this car the wheel bounced into a third racer, so that three cars were disabled in the one accident.

Later, Sam Palmer, known as the "miracle man" of western racing, blew a tire and hit the fence. In trying to dodge the crippled car Ernie Triplett swung into the infield and crashed into a telephone pole. At the same time, the steering mechanism of another car on the far end of the track failed and the car crumpled against the guard rail.

Palmer earned the title of miracle man by "walking away" from wrecks so complete it seemed impossible that he could live. His closest call occurred when he hit the fence, rolled over three times, and skated upside down along the track for several hundred feet. The trail of red tetraethyl gasoline on the track looked like blood, but when the car was turned over Palmer rose and walked away rubbing a skinned shoulder.

Until last year Mel Kenealy, former Pacific coast champion, was one of the few drivers who



Top, Racer Loses Wheel; Second, Another Car in Air Just Before Killing Driver; Third, English Driver Ready to Leap from Burning Car; Bottom, Spectacular Crash on American Track

o/o Howard Langley, 1344 Hansmuir 371



Top, Tire-Changing Race to Train Pit Crews; Bottom, Working on Racing Engine

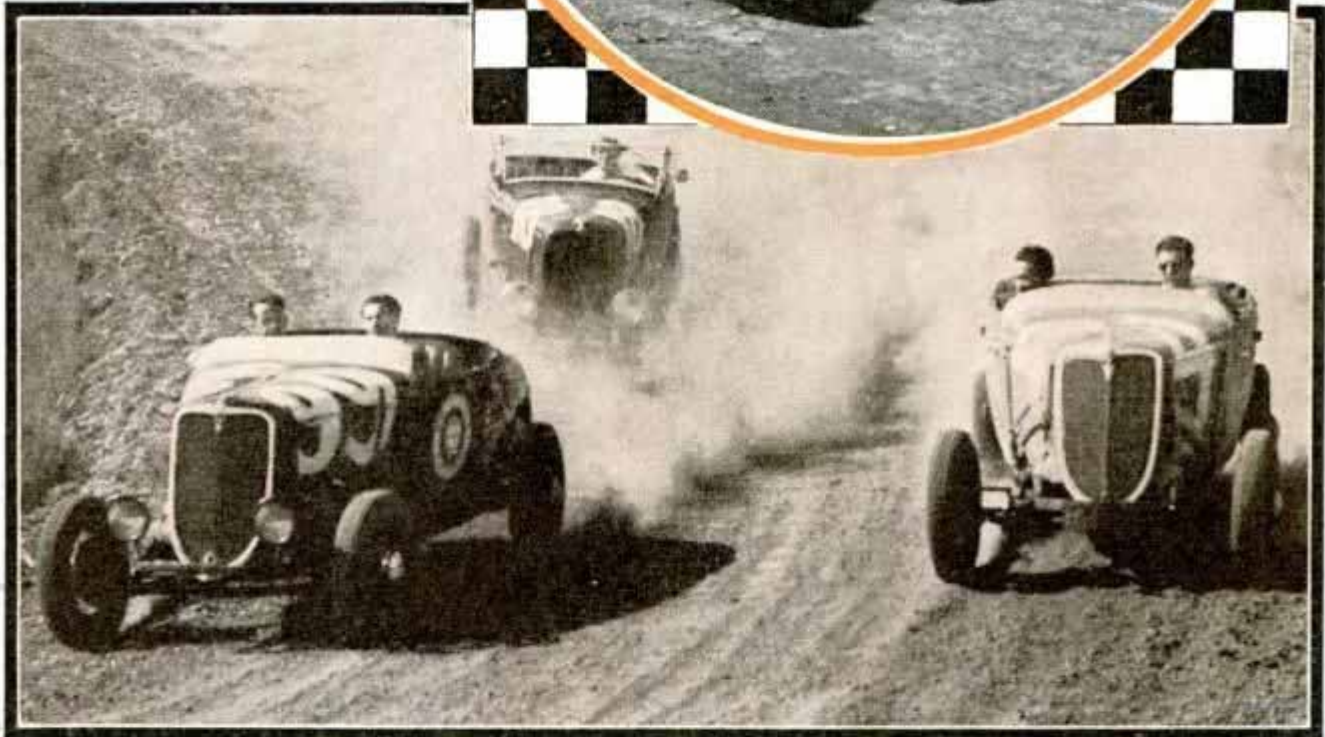
ever somersaulted a car and lived to tell about it. Roaring down the back stretch with his throttle down to the floorboards, his car struck an obstruction and turned end for end in the air. Kenealy fell free, being thrown from the seat with such force that his shoes, with the laces unbroken, remained in the car. Last year, Lloyd Vieaux, eastern dirt-track champion, somersaulted during a race, then stayed in the car and finished after it had been found

that no damage was done. A favorite trick of many drivers, especially now that at some tracks the amounts of gasoline allowed each car are being curtailed, is to take advantage of the suction behind a leading car and to coast along behind it at the end of an invisible tow rope. With a few inches of its radiator projecting beyond the side of a leading car to keep the engine cool, a slow car may be pulled along faster than it could race under its own engine alone. But if the driver decides to pull away and pass the other car, he needs all his judgment to keep his car from getting out of control when he drifts into the wind.

The fastest path is not the shortest one around a race track and after a few laps on a dirt or macadam track the "speed groove" is plainly marked on the banked turns. Three quarters of the way around a turn the drivers coolly calculate their speed and allow the rear ends to slide. If the skid is narrow a driver pounds down past the grandstand in record time, but if the skid is a wide one he has to fight the

wheel to keep from spinning. And that is the easiest way to get in trouble on the track, the drivers will tell you. One result of a spin is a wrecked car piled up against the fence, another result, not so common, is a "gilhooley," in which the spectators see the unusual sight of a car sliding backward along the straightaway at a 100-mile-an-hour clip, with the rear wheels turning one way and the front wheels turning the other.

After the first few laps, a good driver handles his car



Circle, Mechanic Checks Up on Condition of Front Tire; Below, Three Stock Car Racers Rounding a Turn on Dirt Track

almost mechanically. The wheel alinement of a race car is so perfect that the drivers rest on the stretches, conserving their nerves for the lightning-fast thinking they must do on the turns.

A question often asked around the tracks is why the foremost drivers of several years ago, men like de Palma and Cooper, seem to have slowed down in recent years. The common answer is that every driver becomes accustomed to a range of speed that is governed by the cars he drove early in his career and he hesitates to use the

top speed of a faster car. Young, unknown drivers can push racing cars down the stretches of a long track at speeds of 145 miles an hour, but such a pace doesn't seem safe to another driver who first won his laurels in the slower cars of several years ago. Dave Koetzla won his first race because his throttle stuck when he pressed it down to the floorboards. Lap after lap Koetzla fought to control the car, but not until the checkered flag had been waved as he roared past the judges stand did he remember to snap off the ignition switch.

Los Angeles Calif

Silmore Stadium

Alameda Calif

Power and Sail Cruiser Is Built in Backyard



Combination Power and Sail Cruiser Built in the Designer's Backyard; the 150-Horsepower Engine Develops Twenty Miles per Hour

Designed and constructed at home, a forty-five foot cabin cruiser recently made trial runs in San Francisco bay, testing the 150-horsepower engine and then the craft's spread of four sails. A speed of twenty miles per hour is developed by the engine, while the sails permit leisurely cruising. The owner, F. W. Delaney, worked single-handed for fourteen months on the sea-going boat. As the lumber was delivered, it went

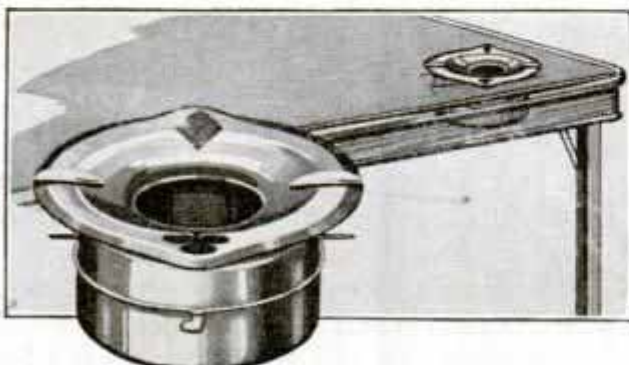
through the basement window of his home in stock sizes, emerging as carefully finished pieces ready to be fitted into the craft as it was constructed in the yard. The fifty ribs of the boat are of white oak, bolted to the keel of the same material, the hull being planked with white cedar below the waterline and mahogany above. All deck fittings are of brass, the builder having made every pattern and finished every casting. He also designed and built the auxiliary lighting plant, a three and



one-half horsepower engine direct connected to a twelve-volt generator, as well as an automatic bilge pump. The entire basement of the builder's home is equipped with power-driven tools, for both wood and metal working.

Built-In Table Trays Increase the Utility of Furniture

Receptacles that may be built into the top of tables by the manufacturers in-



Receptacles Built into the Tops of Tables Are Used for Ash Trays and Cigaret Containers

crease the value and convenience of the furniture in the home. The receptacles include ash trays, cigaret containers and match boxes for installation on bridge tables, smoking stands and end tables. Screws or tongues facilitate installation after the table top is prepared for ash tray or other receptacle.

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

Hayward, Calif

Lynchburg, Tenn

Built-In Receptacles Co.

Models of Concrete Gardens Help Make Sales

Miniatures of concrete gardens which he proposes to build are produced by a California architect to show his clients how the finished garden will appear. The architect is an artist in ornamental concrete work, constructing decorative forms and figures to beautify the garden. After the client has approved the model, the artist builds the garden, working from the concrete miniature.



Working on the Model for a Concrete Garden Used by an Architect to Show Client How the Finished Garden for a Home Will Appear

SUN HEATS WATER FOR HOME USE

It is now possible to obtain enough hot water for household purposes by employing a heater which utilizes the sun's rays. The solar heat is collected by a copper sun-coil in a glass-covered sash box four inches thick placed on the roof of the dwelling it is to serve. The bottom of the sash box is lined with copper sheets which catch all the rays that do not fall directly on the sun-coil. These sheets are in direct contact with the coil, so this heat eventu-

ally passes into the circulating fluid inside the coil. The water to be heated does not pass through this coil but is contained in a well-insulated storage tank within the house, the tank being located at a point somewhat higher than the sash-box so the heating fluid will rise to it by natural circulation. This fluid consists of a non-freezing solution of alcohol and water and as it becomes heated, it passes upward into a circulation chamber within the insulation chamber and surrounding the tank. The heat from this fluid is transmitted through the shell of the tank to the water inside, the outer strata of this water becoming very hot and rising to the top to be used. Heat loss by radiation does not exceed one degree per hour.

see March 1928 411



Solar Heater on Roof of Building; It Utilizes the Sun's Rays to Heat Water for Household Use

Francisco, Calif., Pasadena, Calif.

...and ...

Pencil 79, 100 St. D 748 Bullala 748

Co. 1337 Connecticut Ave Washington, D.C.

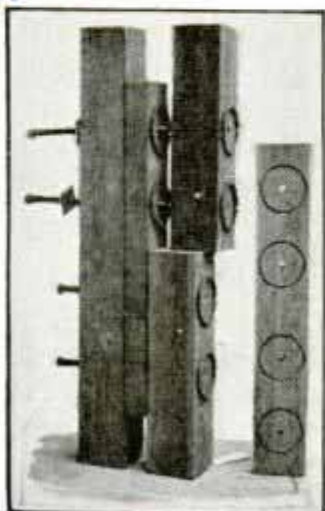


Film Slide Projector Which Throws a Sharp, Distinct Picture but Is Small Enough to Fit the Pocket

FILM PROJECTOR FITS POCKET LIKE SMALL CAMERA

Small enough to fit in the pocket of a coat like a folding camera, a little film slide projector throws a sharp, brilliantly illuminated picture across a five-foot space in the daytime and when used in a darkened room, it projects a five-foot picture at a distance of fifteen feet. It plugs into any electric-light outlet or accessories are available permitting its use with a six-volt storage battery. It is being used for home entertainment as well as for class-room lectures and in sales training.

STRENGTH IS ADDED TO WOOD BY STEEL CONNECTORS



Increase strength is imparted to wood structures by connectors, which consist in general of steel rings or dowels, inserted in or pressed into the opposing surfaces of two connecting wooden pieces. The connectors, which support and

transmit load from one structural member to another, give wooden structures a rigidity not otherwise possible and by distributing the load over their broad surfaces, add sufficient resistance to sustain larger loads and permit the use of smaller pieces. Among the connectors in commercial use are the split-ring type, which is inserted in a circular groove surrounding a bolt hole, and the "alligator" type, the jagged teeth of which are forced into the wood as the tightening of the bolt draws the two pieces together. The connectors are used in building forest observation towers, derricks, bridges, roof trusses and many other types of construction. With the aid of connectors, a single radio tower was constructed in Wisconsin by placing the station's old 230-foot steel tower upon a 120-foot base of wood, thus attaining a total height of 350 feet. The use of wood in radio towers is desirable because of its insulating properties.

STANDS FOR SMOKERS MADE OF AUTO PARTS

One California garage man utilizes the worn-out parts of automobiles he repairs by making smoking stands of them in his spare time. He uses a bevel gear for the base, a camshaft for the pedestal, a valve welded to a roller bearing for a handle and two pistons cut in half as the ash receptacles. The whole is then chromium-plated and makes an attractive piece of furniture.



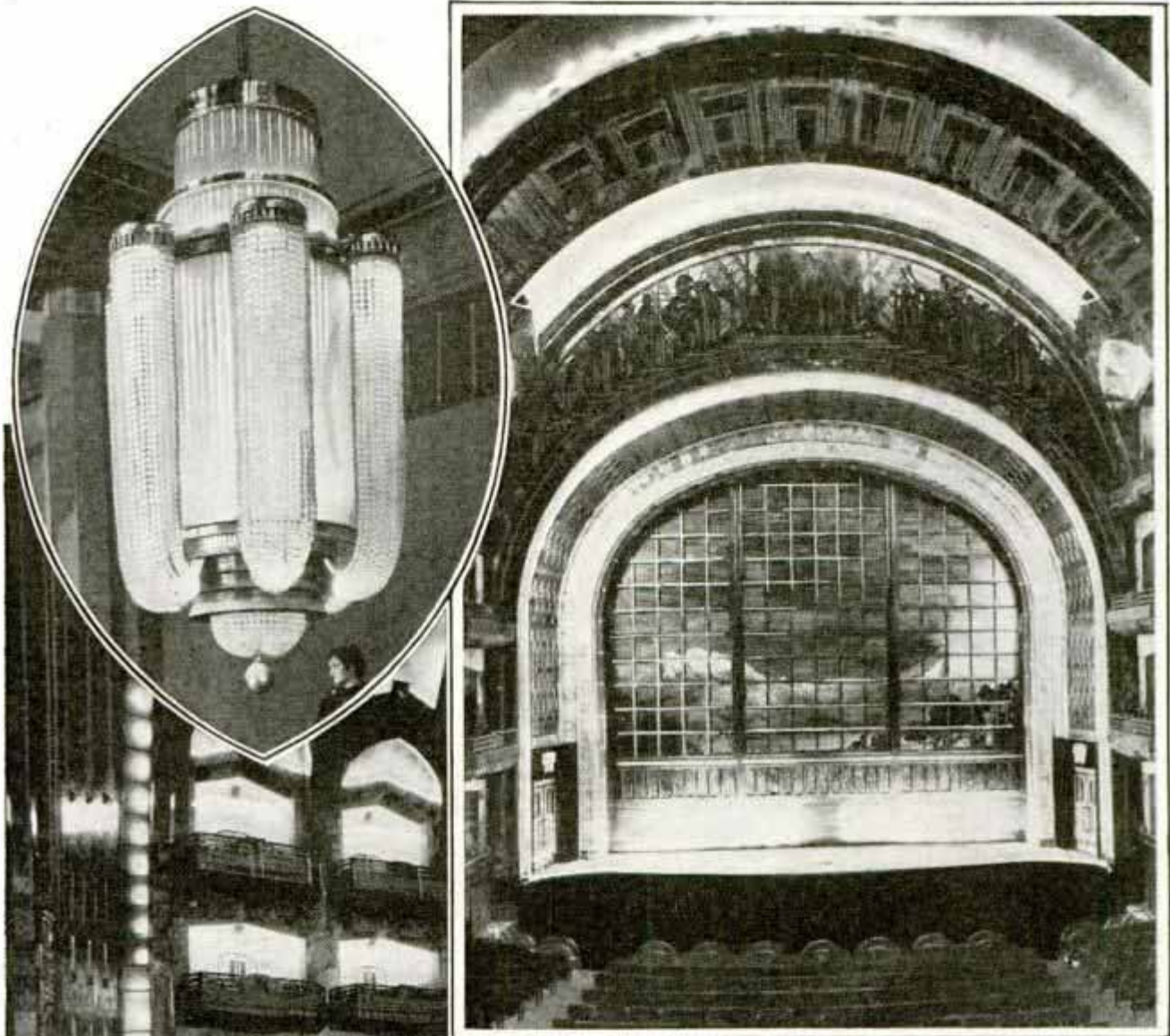
D 756

D 729

see page 356

Maximal Lumber 1337 Miller Street, Ontario, Cal

Wonder Palace of Arts Has Crystal Curtain



Started Thirty Years Ago, the Magnificent Palace of Fine Arts Has Been Just Completed in Mexico City; Top, Right, Looking Toward the Stage and Its Crystal Mosaic Curtain Made of More Than 1,000,000 Bits of Varicolored Glass; Curtain Weighs Twenty-One Tons, But Can Be Raised in Forty-Nine Seconds

Top, Left, One of the Chandeliers in Reception Room of Palace; Center, Left, the Theater Proper, Occupying One-Sixth of Third Floor But Rising through Seven Stories at Stage and Boxes; It Has Seating Capacity of 2,400; Bottom, Right, Exterior View of the Wonder Palace, with Its Artistic Lines Indicating to Some Extent the Purpose for Which It Is Used



Carl. George J. Paul.
 527 8 10 1917



Left, Present Day Hard-Rock Miner; Right, Old Railway Station Outlives the Railroad

One thing that modern "sharpshooters" like to find in the mountains of the mining country is an old abandoned cabin. Often the cabin means that a gold-bearing gravel deposit or a ledge of good ore is near by. Sometimes, too, the cabin is worth investigating, for hidden in the walls or fireplace may be a secret cache where the miners stored their gold and failed to remove it.

Treasure hunters have made a number of such finds but they never have discovered the secret of "Nigger Flat," where a

negro miner is reputed to have hidden a cookstove crammed to the lids with gold dust. The story is that the miner buried the stove and each week poured the result of his "clean-up" down the chimney, the top of which was hidden. After he had accumulated a fortune the negro died without revealing the location of the stove and it may be that the gold is still there.

Some of the ghost towns contain curious and antiques of real value. Many mining towns were abandoned almost overnight when new discoveries lured the inhabitants away. Often homes and offices were left with most of their furnishings intact when the owners stampeded to a new location and never returned. Today you can wander through the ruins of office buildings in Nevada and invade abandoned post offices and railway stations in California.

W. Parker Lyon, retired warehouse operator, has collected relics valued at a million dollars from the ghost towns. His hobby started when he made a trip to an old town in search of a Pony Express stamp. Lyon didn't find the stamp, but he did find an ancient hand-drawn fire engine complete to the leather hose that is now part of his collection. Another time Lyon visited a ghost town in Nevada and returned with a number of treasure boxes and sawed-off shotguns that were carried by the messengers on the old stagecoaches. From another camp came a pair of scales that had been used to weigh gold dust.

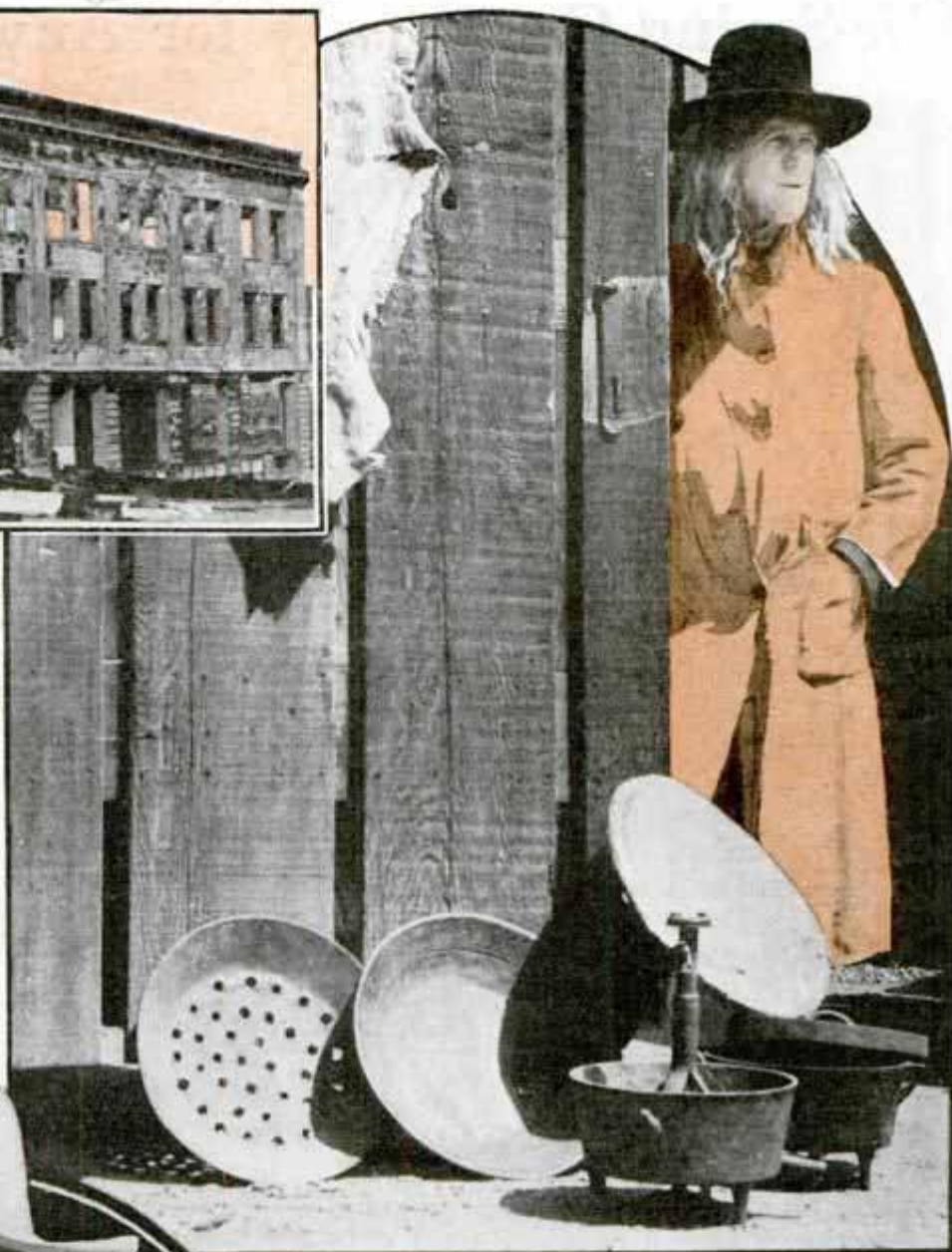
Many prospectors have a source of income from old bottles and glassware, found around the ghost towns, that have taken on a purple hue through years of exposure to the sun. Tourists buy them as mementos

Col. Armae's collection relics
in market
 1161 Virginia Road,
 San Francisco, Calif.



tos of their visit to the mining camps.

Some of the gold that is being mined today comes from properties that were worked half a century ago and then abandoned. Forty years ago the operators of the "Stray Horse" mine in Montana found that their



Top, Left, Scene in Ghost City of Bullfrog, Nev.; Right, Early Gold Seeker's Equipment



Inspecting Portable Gold Scales Discovered in an Abandoned Town in Old Mining Area

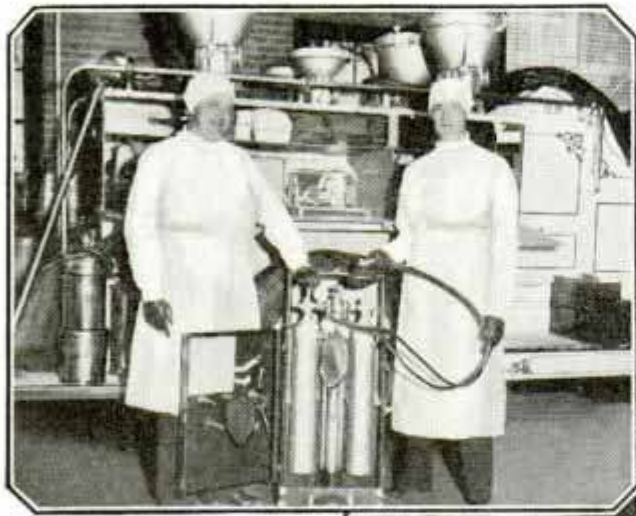
rich ledge ended at a fault. They tunneled through 140 feet of barren ground hoping to find a continuation of the ledge and then gave up. Not long ago a prospector walked to the end of the old mine and tunneled in a new direction. After digging for only four yards he found the vein and now the mine is producing gold again.

Scattered through the western hills are scores of small mines that were abandoned years ago. A few months ago a prospector stumbled upon two old wagons in a gulch. Near by he found an old tunnel and at the end of the tunnel was a thick vein of valuable ore. No one knew the history of the mine, so the prospector promptly filed his claim. Now the mine is shipping carloads of valuable ore every week.

D542

152 S. Washington St
Denver, Colo

Life-Saving Cars Ready for Any Emergency



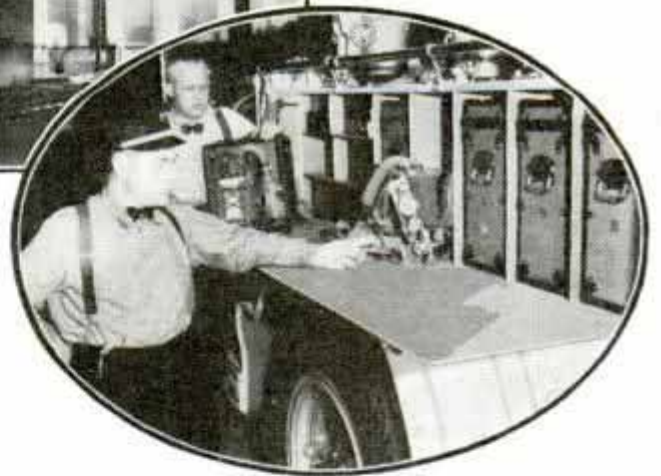
Above, Inhalator of Rescue Car; Right, Building Illuminated by Lights of Salvage Car; Below, Life-Saving Apparatus

and to remove occupants unable to escape. One case was that of a five-year-old girl who jumped into a tank wagon nearly filled with asphalt in semi-liquid condition. The child was sinking when the squad car arrived, but through the efforts of the crew was successfully extricated. A lighting unit containing four 1,000-watt

floodlights and two 450-watt lights works off of the generator attached to the transmission. This plays an inestimable part in fighting night fires. Other equipment includes inhalators, resuscitator, extension ladder and block and tackle.

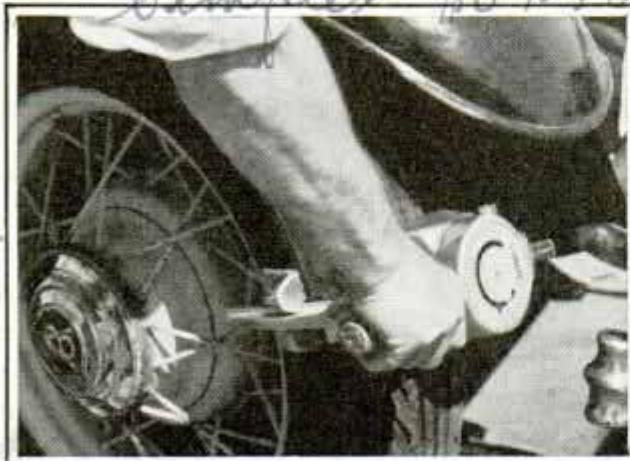


Manned by specially trained crews, two rescue and salvage cars in Denver's fire department each carries a miniature hospital with every known life-saving device, a floodlighting unit, and machinery for sawing or melting through steel. Emergency calls include hospital, asphyxiations, poisonings, drownings and many others. Squad cars equipped with breathing apparatus and smoke masks are extensively employed in penetrating smoke and gas-filled buildings to extinguish fires



Hand Tester for Auto Brakes Which Clamps on the Tire

Simplex \$34.50



Hand Tester for Auto Brake Which Clamps to Tire and Shows Brake's Holding Power on a Dial

Inexpensive and simple to operate, an accurate tester for automobile brakes is worked by hand. The device clamps on the tire, a twist of the wrist binding it securely. After setting the brakes, the operator presses down on the handle until the wheel moves. A pointer on the dial indicates the brake's holding power. The tester works as easily on rear wheels as front and may be attached without difficulty on wheels of streamlined automobiles. A pedal adjuster holds the brake at any tension that is desired, maintaining uniform tension while all four brakes are being tested.

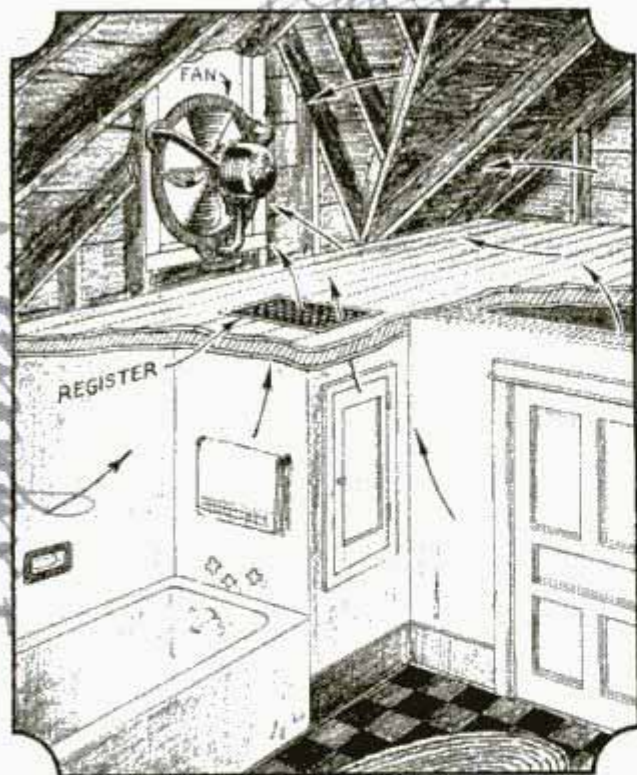
The Simplex Mfg. Co
Wichita, Kansas

**PHOTO TRANSFERRED TO GLASS
METAL OR WOOD**

Photographs can be placed permanently on glass, metal or wood objects by using a special paper sized with a soluble gelatin and agar medium which separates the paper from the film. This paper can be printed and developed in the usual manner, then the picture can be stripped from the paper with ease by applying a little heat to the back of the paper. This process does away with the usual method of negative stripping and is an easy way to decorate plates and bric-a-brac with photos.

**ATTIC VENTILATOR COOLS HOME
BY EXPELLING WARM AIR**

By pulling warm air out of the house, an attic ventilator system lowers temperatures and creates house-wide circulation of fresh air drawn in from the outside. The exhaust fan is located in the attic, to which the warm air from rooms below is drawn through registers or trapdoors. As the warm air is removed, the cooler and fresher air is drawn in through the windows. Tests show that attic temperatures



Attic Ventilating System Which Draws Warm Air out of House and Lowers Temperature Downstairs

fall as much as thirty degrees and room temperatures fifteen degrees within a short time after the exhaust fan is started.



Measuring Wheel with Automatic Counter Which Makes It Easy to Compute Area of a Field

**LAND MEASURED BY BIG WHEEL
WITH COUNTER AT HUB**

Accurate measurement of land is a difficult task for two men when undertaken with a tapeline, but when it is done with a measuring wheel, it is an easy task for one man. The wheel is constructed of ordinary building lath and is turned by a convenient handle at the hub. A small automatic counter near the hub keeps a record of the number of revolutions, thus enabling the operator to check the distance between any two points in a field.

**ELECTRIC PLUG CONTAINS FUSE
TO MAKE REPAIRS EASY**

Repairing a short is an easy matter if your electric lamps and other appliances are equipped with plugs containing built-in fuses. This eliminates the putting out of all the lights on a circuit when a short occurs in one appliance, and repair is made by disconnecting the shorted cord and inserting a new fuse in the plug after the cause of the short has been eliminated. The fuses are made of glass and hence are easy to detect when blown.



D 795
Haggina Electric Shop
1017 4th St. North, U.
Salesman & Co.

Research Laboratories
made by A. F. Turner
Specialist at
College
maintained
and

Electric Ventilating

Berlin Germany



Keyelme

Water Craft with Two "Wings" Which Move Vertically Instead of Horizontally and Are Operated by Hand with the Aid of Two Levers

SMALL BOAT WITH "WINGS" OPERATED BY LEVERS

Novelty in water transportation is offered by a "boat with wings," the invention of a German craftsman. The streamlined little craft has two "wings," one on each side, and these are operated by hand with the aid of levers. The wings move vertically instead of horizontally and develop considerable speed without tiring the rower.

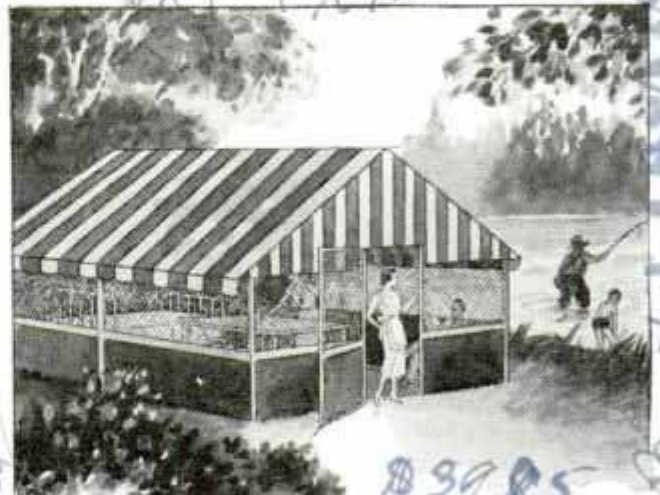
PROGRAM "CUTOUT" FOR RADIO

Any part, or the whole, of a radio program can be tuned out automatically by an attachment for the receiver. If the listener wishes to turn off his radio for one-minute intervals every fifteen minutes, it is necessary only to push a button. The

receiver "goes dead" for the desired interval, then turns itself on. The attachment can be operated by remote control. It makes possible the tuning out of announcements, talks or musical numbers to which the operator of the receiver does not care to listen.

KNOCKDOWN HOUSE CAN BE OCCUPIED YEAR ROUND

Portable and easy to make weatherproof, a "knockdown" house that may be used the year round is available. For summer, the house has a canvas roof, half-walls of panels and galvanized screens for the other half of the walls, the ends and the door. In fall, winter and spring, the house is made weatherproof by installing extended panels of waterproof fiber board. The roof also may be of the fiber board and windows with pane glass may be used. The corner posts are angle iron, with steel beams supporting the roof. The house is made in several sizes.



Portable House Which Can Be Made Weatherproof for Winter and Occupied the Year Round

See me, service 167604

D755

*Chas. Floyd S. Caskey
E. H. Lombard Place*

Curran & Mitchell, Inc.

\$39.85 for Quoted

Oldest Living Plant Is Giant Tree in Mexico



This Tree in Mexico Is Probably the World's Oldest Living Thing; It Is a Cypress about 175 Feet in Circumference and It Is Believed to Be Between 5,000 and 10,000 Years Old

After a worldwide search for the oldest living thing on earth today, most authorities have agreed that the honor probably goes to the colossal Tree of Tule in the state of Oaxaca, Mexico. This cypress stands in a churchyard of the village of Santa Maria del Tule and at a height of three feet above the ground recently measured 175 feet in circumference. It has been estimated that it is between 5,000 and 10,000 years old. In addition, it is still growing at the rate of about seven-eighths of an inch in diameter per year. The branches are very thick and extend outward for more than 100 feet. In height it is dwarfed by many trees still standing in this and other countries. Despite its age it is less than 200 feet high. A much younger tree, the sequoia known as "General Sherman," towers 280 feet above the ground. The extreme corpulence of the Mexican tree gives it a volume, however, which few trees can match. It is estimated that its

wood alone weighs 1,208,000 pounds, the equivalent of 360,000 board feet, or enough to build twenty-two American homes.

D780

ANGLE PLATE WITH T-SLOTS IS ADJUSTABLE TO WORK



Adjustable to any angle and equipped with a positive lock, a tool makers' angle plate is handy for many types of metal work. It is constructed with T-slots, three on the face side and

one at the top when set at ninety degrees, making attachment of the work easy. Its adjustable feature makes it possible to work accurately on metal whose shape might handicap drilling or grinding.

D770
55 w. 8.6 ft. height
see Oct 1933
860

make Franking machine
 Patterson Tool & Supply

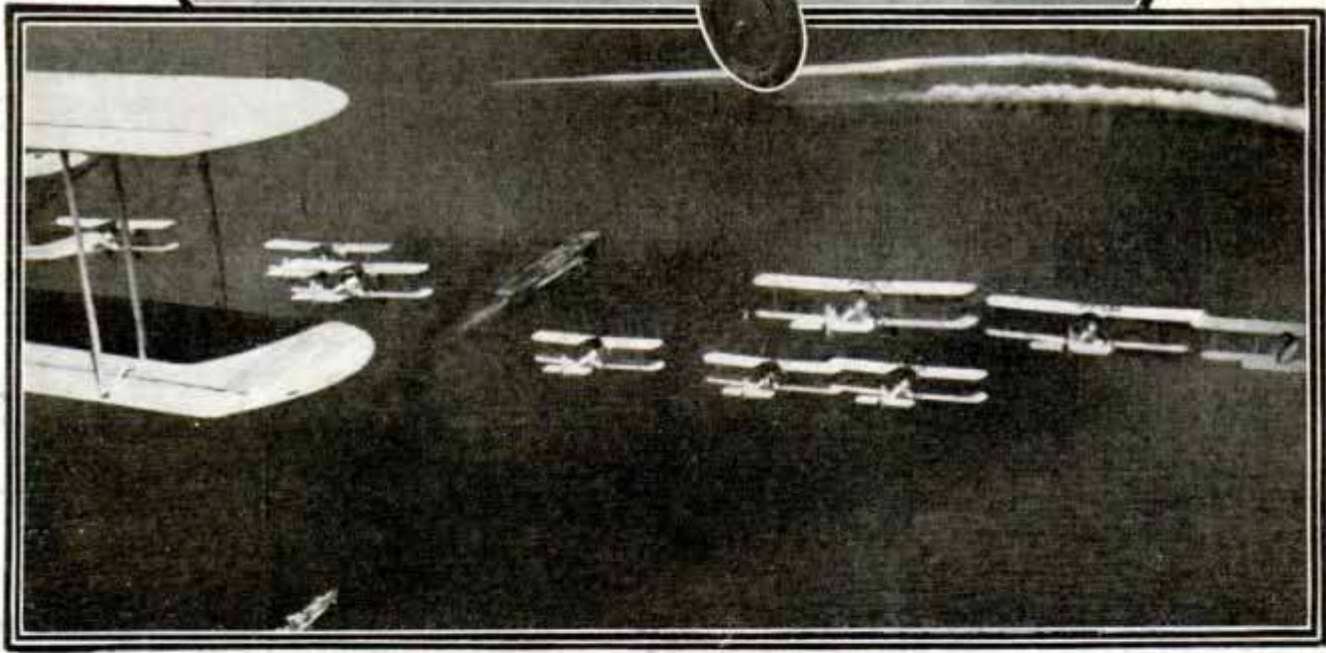
\$12.00. Pat. 2,417,321

D 57 1

Comd. Robert W. Gordon
of The Infantry Journal

WHY do THEY

1125-17th St NW Washington, D.C.



Planes in Maneuvers Off Panama and an Attack Plane Which Uses Machine-Gun Fire and Fragmentation Bombs against Troops or Other Ground Targets

By BOB GORDON

SOLDIERS on parade and military airplanes flying in formation usually produce a similar effect upon the mind of the civilian. "Snappy stuff"! he says, and goes away wondering just what relation all those precise maneuvers have to actual warfare.

What the civilian does not quite understand is that parade drill for ground troops is given to instill teamwork and the habit

of instant obedience. Formation flying not only develops the same kind of teamwork, but is actual preparation for the kind of flying to be done in the next war. The day of the lone ace is past, and mass tactics are now recognized as the most effective method of aerial fighting.

Being slower and less maneuverable than pursuit planes, bombers must stay in close formation for mutual protection. Their mission is to fly over a certain area and discharge a load of bombs, and it

FLY *that Way* ?

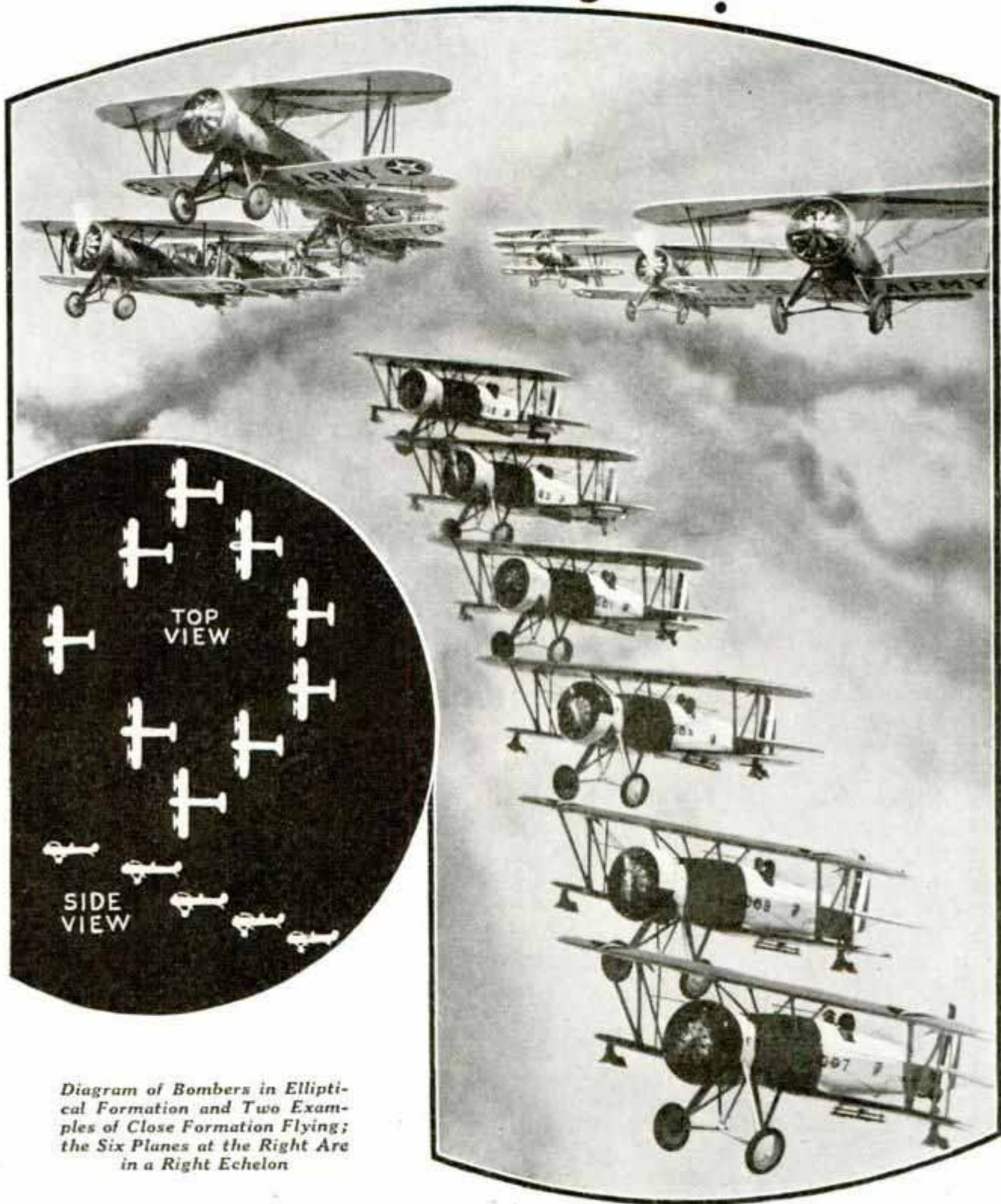
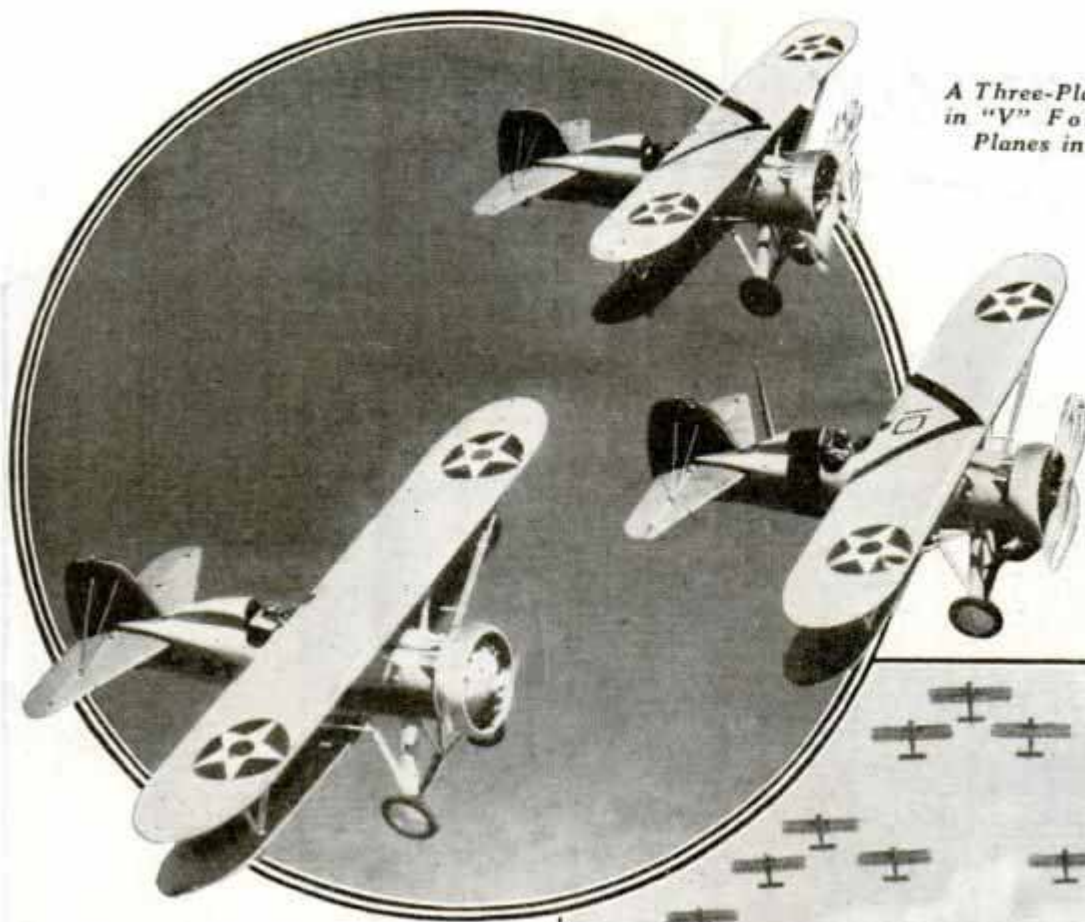


Diagram of Bombers in Elliptical Formation and Two Examples of Close Formation Flying; the Six Planes at the Right Are in a Right Echelon

would be defeated if they tried to dodge or turn and fight. Their sole protection in daytime, unless accompanied by friendly pursuit planes, lies in massing superior machine-gun fire against attackers.

Machine guns fire from 600 to 1,200

rounds a minute, and since the cartridges held in one belt are limited and the pilot cannot reload in flight, he must make his shots count. While his superior speed will theoretically permit him to attack from any angle, he must get his plane lined on

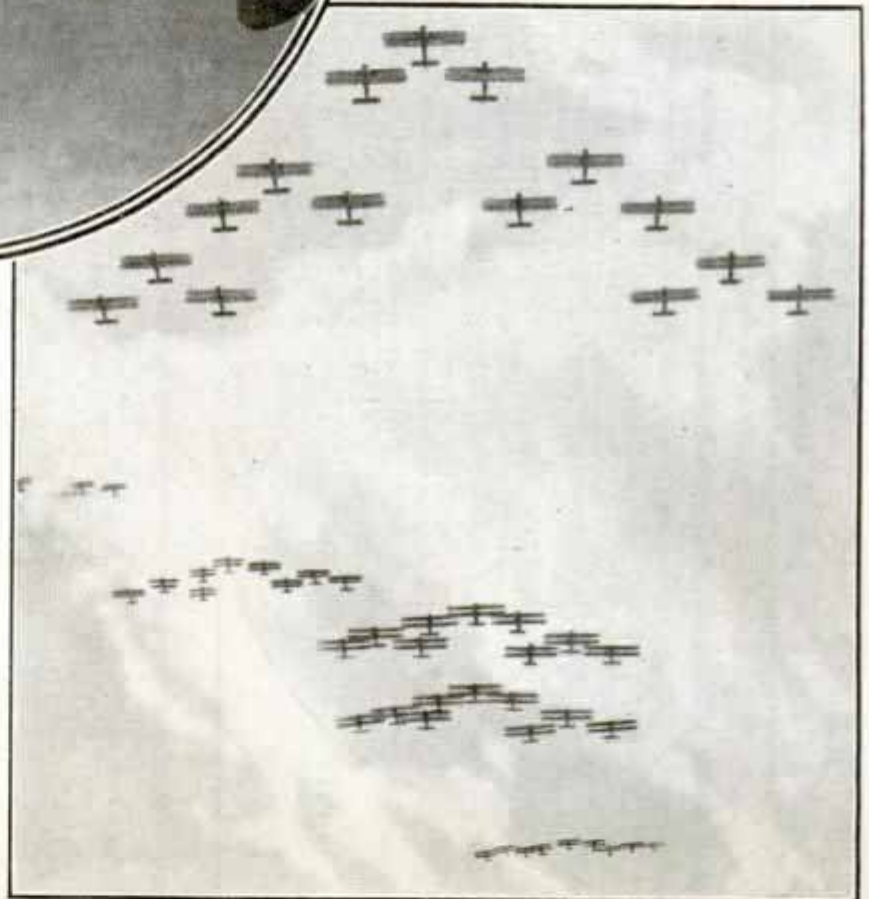


*A Three-Plane Pursuit Element
in "V" Formation and War
Planes in an Aerial Review*

the target and hold it there long enough to get in a good burst of fire if he hopes to bring it down. A haphazard attack from any angle, therefore, does not promise results.

So the pursuit plane must approach from above and behind in order to do any effective firing. For this reason the bombing formation is arranged to give the greatest possible protection to the rear. This is done by stepping the rear elements downward from the leading plane so that the rear gunners of all the bombers may concentrate their fire behind.

Bombing formations must be narrow so that the number of pursuit planes diving on them at one time will be limited. Because they must pull up suddenly after a dive, and must be free to maneuver in order to aim their planes, single seaters must fly far enough apart to obviate the danger of collision when attacking, so a bombing formation five planes wide can hardly expect more than three pursuit planes to be firing on it from any one direction at a time. No bombing formation is now prescribed by the U. S. air



corps tactical school of more than five planes width.

In passing over areas strongly defended by anti-aircraft guns, a formation of seven, eight or nine bombers would fly in elliptical formation, with the planes stepped down from front to rear. This formation may be flown quite loosely when under anti-aircraft fire, so that no more than one plane would be disabled by a single shot. The javelin formation, flown with seven or ten bombers, also presents a very narrow



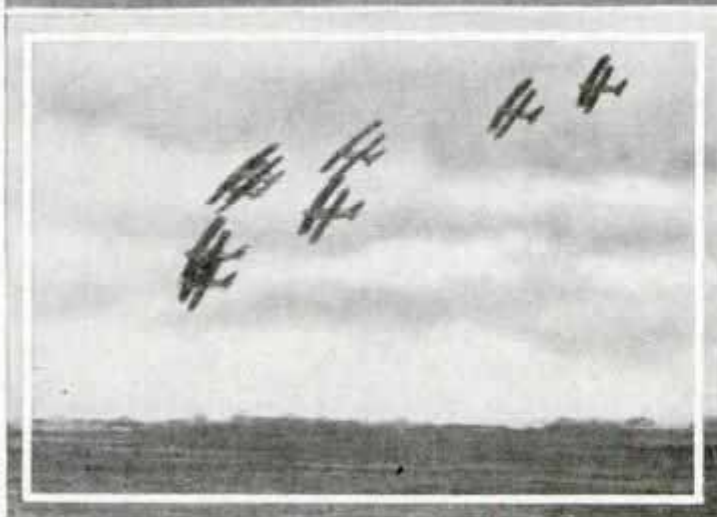
Above, Army Pursuit Plane over Detroit; Left, the New Bombers Have Few Vulnerable "Blind Spots"

target for pursuit planes. Sometimes bombers are attacked by two-seater fighters flying parallel to the formation, their rear gunners firing, or such planes will fly above the formation and attempt to break it up by dropping time-fuse bombs on it. In such cases the bombers increase their distances in the formation while keeping their respective positions, closing up again when danger has passed.

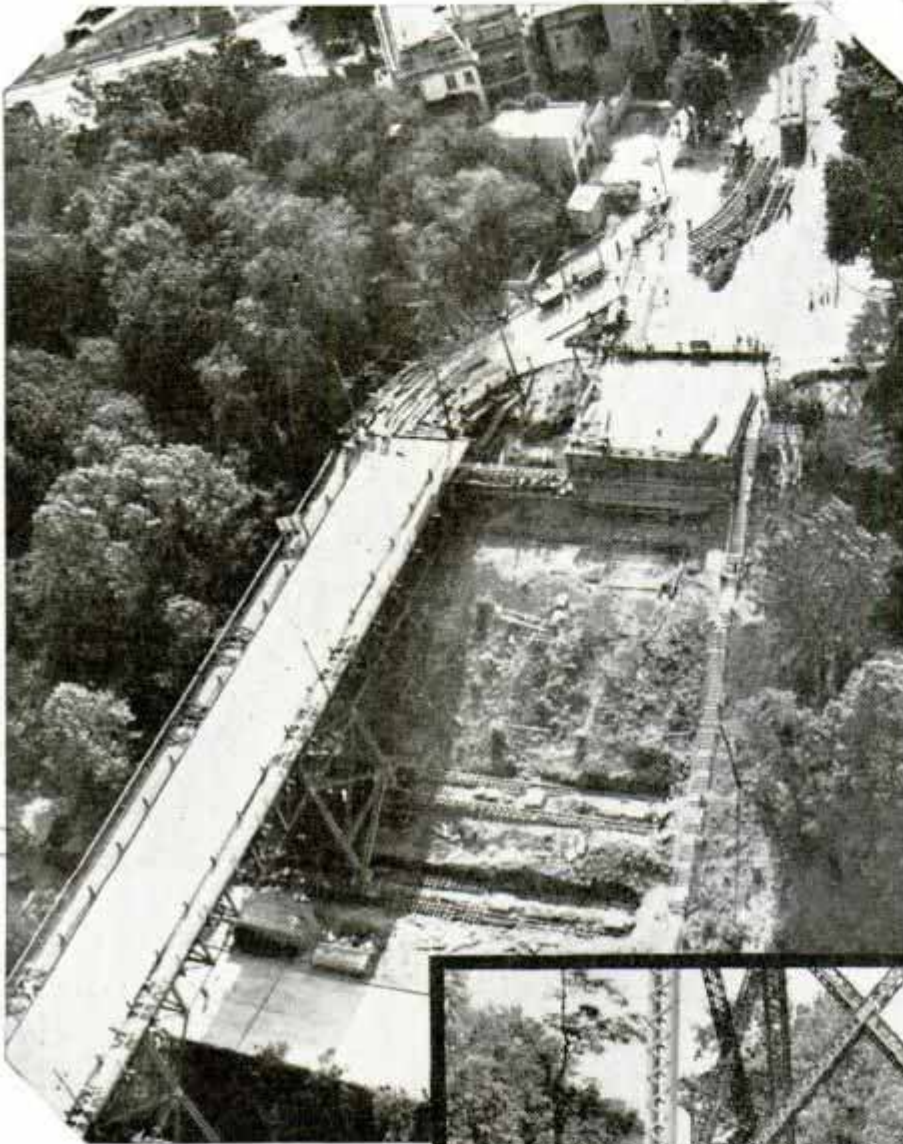
Contrary to the general belief, the bombing officer of each plane does not ordinarily sight and release his bombs independently. The leader of the squadron, flying at the apex of the formation, sights and drops his bombs, the other planes releasing their loads as they see the bombs of the leading plane begin to fall. Bombing, especially from a great height, is not

(Continued to page 122A)

A Flight of Attack Planes Which Usually Fly Close to the Ground so They Can Approach Their Target without Being Seen



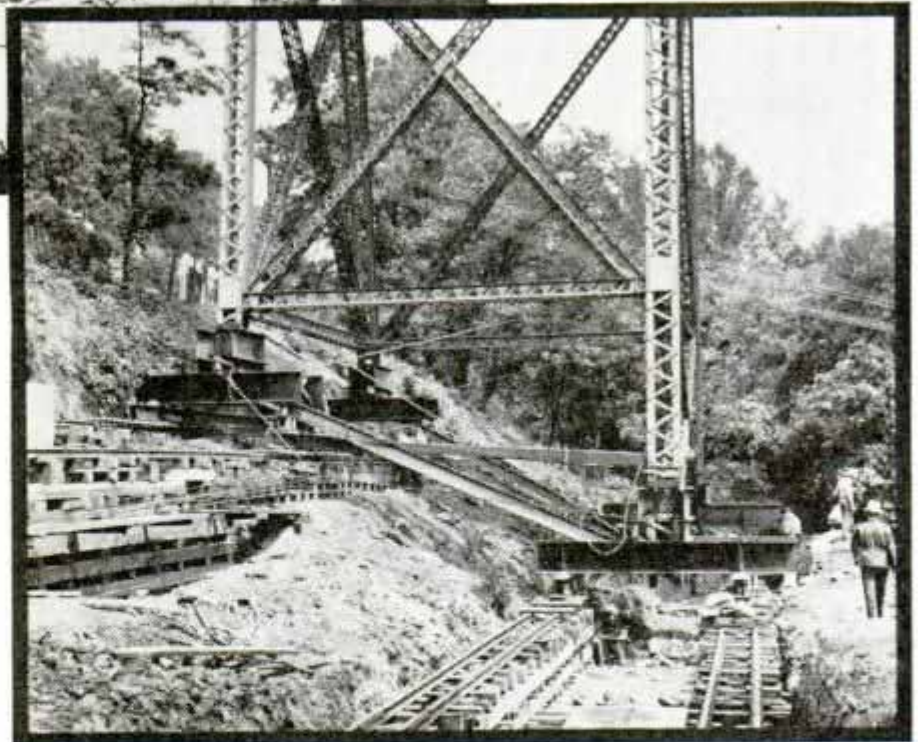
Ten Men Move Twelve-Hundred-Ton Bridge



Above, Moving a 1,200-Ton Bridge on Rollers; Right, the Tracks over Which the Bridge Was Rolled

Moving a 1,200-ton bridge for eighty feet downstream was accomplished in one day by a contractor in Washington, D. C., who decided to move the old structure to a new location to serve as a temporary bridge while a new one was built, instead of erecting a detour trestle for the purpose. The old steel bridge, 750 feet long and standing 130 feet above the stream it spanned, was moved after five weeks of preparation. Excavations were made along the route each of five

supporting towers were to take and in the ditches were set timbers on which rails were laid. Three of the steel supports were loosened and set on temporary bases, and foundations were laid in the new location. On moving day welders cut the street-car rails at each end of the structure with acetylene torches and the two supporting towers which had been left intact were loosened. The bridge then was jacked up enough to permit the placing of hundreds of three-inch steel rollers on the tracks beneath special sledges supporting each tower. Then the engineer blew a traffic whistle, ten men pulled against the handles of



Washington Daily News Photo

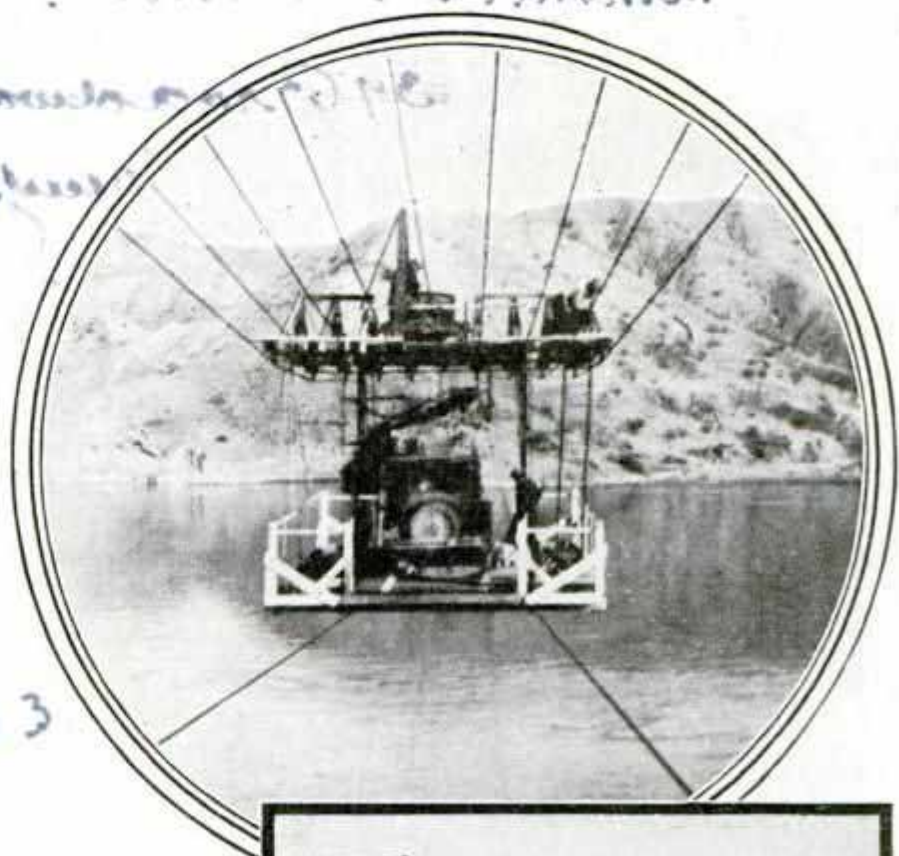
horizontal jacks and the bridge was on its way. Later the men were replaced with five horses which supplied the power. Several times during the moving it was found that

Calvert St. Bridge

D 759

Mrs. Margery ... Washington, D.C.
212 7 California St. Washington

one end of the structure was being moved faster than the other, and it was necessary to accelerate the turning of the windlasses at the lagging end, but at no time did the structure bend more than one-half inch out of line. Traveling with the bridge were telephone cables containing more than 8,400 wires which had been spliced previously to give slack for the eighty-foot move. When the rollers and jacks were removed, the structure settled into position on the temporary abutments.



GAS WASTED BY CAR MOTOR MEASURED BY TESTER

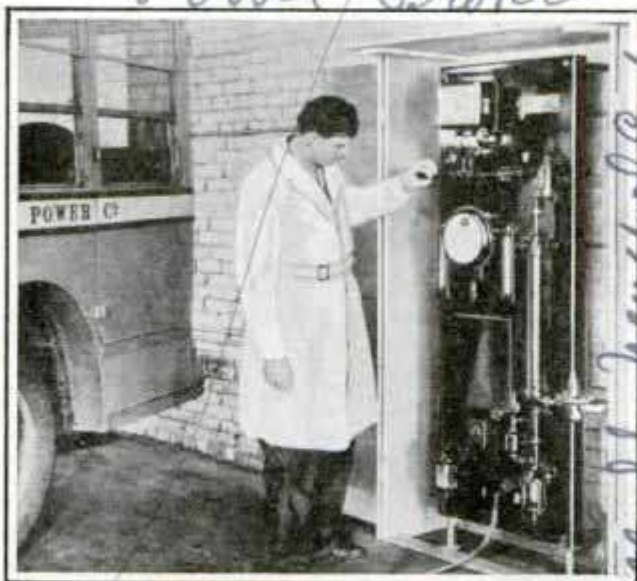
Gasoline wasted through the exhaust of the automobile is accurately measured for the motorist by a testing device which analyzes the exhaust gases by burning the raw, unused gasoline blown out through the exhaust pipe. In a few seconds the result of this analysis is recorded on a dial in terms of combustion efficiency of the en-



Two Views of Automobile Ferry Making Trip on Suspended Cables across the Colorado River

AERIAL FERRY TRANSPORTS AUTOS ACROSS RIVER

Across the Colorado river near Searchlight, Nev., is an aerial ferry that carries automobiles from one side to the other. It is suspended on cables, eight above and two below the carriage, and is driven by a gasoline engine that winds the cable drum. The cables run over pulleys on towers thirty-two feet high, one on each side of the river. On the Arizona side, the cables are anchored to a 200-ton mass of concrete, while on the Nevada side, only the tower is anchored, the cables being fastened to individual weights. The ferry travels 640 feet in two and one-half minutes carrying one large automobile or two small ones. The ferry saves seventy miles on the road between Kingman and Boulder City, in addition to providing easy access to the Painted Canyon of the Colorado.



Using a Tester Which Analyzes Exhaust Gases and Determines Efficiency of Auto Engine

gine. Once this is determined, it is possible to put the motor through a scientific tuning routine to increase this efficiency.

Went to beautiful city

Developed by engineers

Vertical handwritten note on the right margin.

D 763

Power Prover

Handwritten notes at the top of the page, including 'D. J. D.', 'Designed by J. J. D.', and 'Brown'.

Hamburg - American line,

Trip to Europe Made by Air, Rail and Water

39 Broadway

New York

see opposite page



The "Graf Zeppelin," One of the Links in the Three Weeks' Trip to Europe and Back by Air, Rail and Water, Waiting at Its Mooring Mast at Pernambuco to Start for Germany

Crossing the Atlantic ocean by air has been removed from the category of high adventure to a regular form of transpor-

tation running on schedule. For the traveler who is in a hurry, one steamship line has established, as a part of its regular

service, a trip by air, rail and water which permits the tourist to cover three continents, or about 16,500 miles, in from nineteen to twenty-one days, depending on the speed of the steamer he uses. The three weeks' trip spanning three continents covers North America, South America and Europe. From Miami the traveler goes by plane to Rio de Janeiro or Pernambuco, then he boards the "Graf Zeppelin" which makes regular trips from Rio de Janeiro to Friedrichshafen, Germany. From Germany the tourist travels by rail to Cherbourg, France, where he boards a liner for the trip to New York.



Route from New York to Europe and Return, Showing the Parts Traveled by Plane, Dirigible, Train and Boat



Newsboy Wearing a Sign Which Reflects the Light from the Headlamps of Passing Autos

NEWSBOYS WEAR REFLECTORS WHEN SERVING MOTORISTS

Los Angeles newsboys selling papers to motorists wear signs which reflect the light from automobile headlamps, the reflectors serving both for safety and for advertising purposes. The signs, bearing the name of the paper being sold, are of white material over a red background and are worn on the back as well as in front. They are suspended over the shoulders and tied about the waist, a bib in front containing a handy pocket for change. The newsboys claim that they increase sales.

SUN GOGGLES WITH SLOTS SHUT OUT THE GLARE

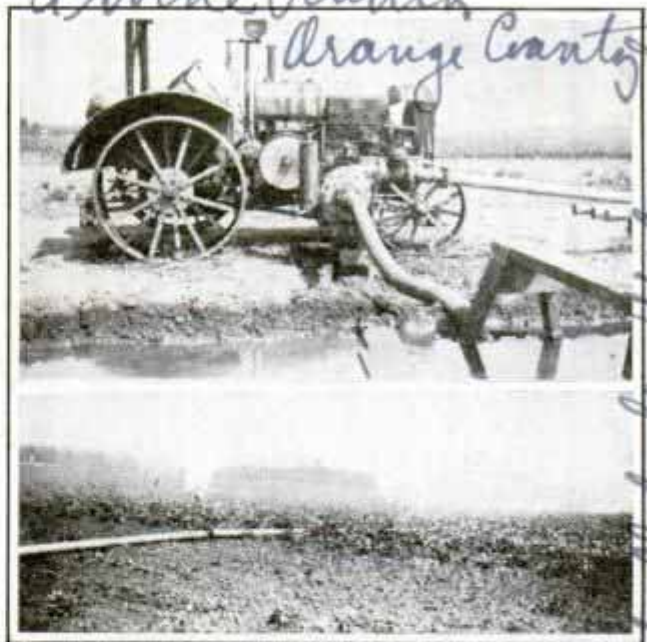
Full normal vision without any colored-glass distortion is possible with a pair of sun goggles containing slots through which the wearer peers. Glare is thus eliminated while at the same time the user sees objects in their true natural colors. They are safe for sports wear since they contain no glass to break, and are also used for driving against the sun or headlamps.



Pat. 1,954,184

OVERHEAD IRRIGATION SYSTEM IS RUN BY TRACTOR

Bean and beet fields in southern California are being watered by an overhead irrigation system of sprinklers operated by tractors. Each tractor drives a centrifugal pump, the power take-off from the tractor being connected to the pump by a belt drive through a reduction pulley. The pump suction is taken from a pit into which a well discharges an eighty-inch head of water continuously. The discharge leads through a four-inch galvanized pipe line to a row of from thirty-five to fifty sprinklers located on a right angle of the same line and extending several hundred feet across the field. The sprinklers are of the revolving type, and are located twenty feet apart, each having a covering radius of twenty feet or more. Eighty inches of water discharged through about forty sprinklers gives a moisture penetration equivalent to two inches of rainfall after one and one-quarter hours of continuous operation. The whole outfit is portable, and when moved to a new location, another water pit is dug. A spotlight on the tractor assists the operator at night as the artificial rain-maker operates night and day in the very dry season.



Tractor Pumping Water through Pipe Which Leads to Overhead Sprinklers in Beet Field

☐ A liquid has been developed for refinishing autos which is applied without polishing and which it is claimed will last from eight to twelve months.

Centa Trading Corp
253 E. H. St.

Can not locate

Chicago
D789 7378 5th St Long Beach Calif
West
no information
supplied traffic department
admission
no information
McComick
Orange County
Orange County
Water Seal
Western
Barkeley
California
618
Installed by
Comp-Lunds
are for

Byrd's Antarctic 'Igloo' Is Scientific Wonder



Sectional Drawing of Admiral Byrd's Antarctic Hut; Inset (Top), Victor H. Czegka, Designer of Hut; Bottom, Method of Insulation

Built to withstand temperatures ranging from sixty-five to nearly 100 degrees below zero, the small house in which Rear Admiral Richard E. Byrd is spending the winter, 125 miles south of Little America in the Antarctic, is a scientific wonder. Only four-inch walls separate Admiral Byrd from the most intense cold in which man ever has attempted to live. These walls are made up of two thin foils of

aluminum, two thin layers of wood like those used in peach baskets, three to five layers of waterproof building paper and two half-inch blankets of kapok. The "igloo" looks like a huge packing box, being bound together with bands of steel

Everett W. Wilson, 19 Blachwood Road Asheville, N.C.

tape. It has a door leading to a small porch, two glass windows in the roof, a stovepipe for the stove and heater, a six-inch hole in the floor connecting to a vent pipe that extends above snow level and two four-inch vents in the ceiling. A trap door in the roof permits the admiral to reach the surface of the snow when his tunnels become choked with ice and snow. The secret of how the cold is kept out by such thin walls lies in the use of aluminum-foil coated paper, made by the Reynolds Metal company. Embedded in the wall, the foil paper throws the heat, which is generated by the stove, the heater, the lights and the admiral's body, back into the room, much in the manner of mirrors. As a result, only four quarts of oil per day are used for cooking, heating and lighting.

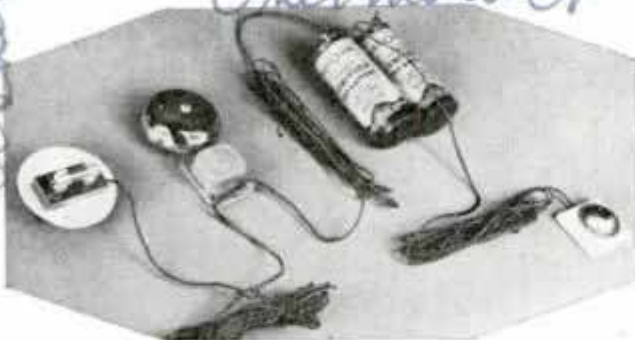


Disks on Cylinder Ready to Reproduce Tones of Pipe Organ When Proper Keys Are Touched

FIRE ALARM RINGS DOOR BELL WHEN BLAZE STARTS

D 781

Transforming the ordinary electric door bell into a reliable fire alarm is made possible by attaching a small fuse which melts and forms an electrical contact to start the bell ringing at 130 degrees, the happy medium between harmless and possibly



Equipment for Transforming Your Door Bell into a Fire Alarm; Note the Fuse at Left

Thermotach

dangerous temperatures. The fuse is mounted in a cartridge like an ordinary fifteen-ampere electric fuse and is attached to a fuse block. Wire, screws and staples for installation are included. The device is virtually self-testing since it operates as long as the door bell is in order.

PIPE ORGAN WITHOUT PIPES USES DISKS INSTEAD

D 995

Pipes are replaced by disks in a pipe organ invented by a Kansas college student which, it is claimed, can be produced

for about one-fifth the cost of a conventional organ and occupies only a fraction of the space of the usual instrument. The inventor "constructs" each tone of the organ in his laboratory and records it on a thin steel disk. Then, having each tone recorded and the disks in their proper place on a cylinder, he touches the keys of an organ console which establish electrical contacts and send the impulses from the disks through an amplifier to produce music like that of a regular organ. Any other sound can be produced in a like manner, but the idea is particularly adapted to the reproduction of pipe-organ tones. It is even possible for one musician, with the proper disks, to produce all the effects of a small orchestra. It is claimed the instrument would require no microphone for radio broadcasting and the person practicing can use headphones and hear his own music without disturbing anyone.

WRIST-PIN BUSHING CUTTER EASILY RESHARPENED

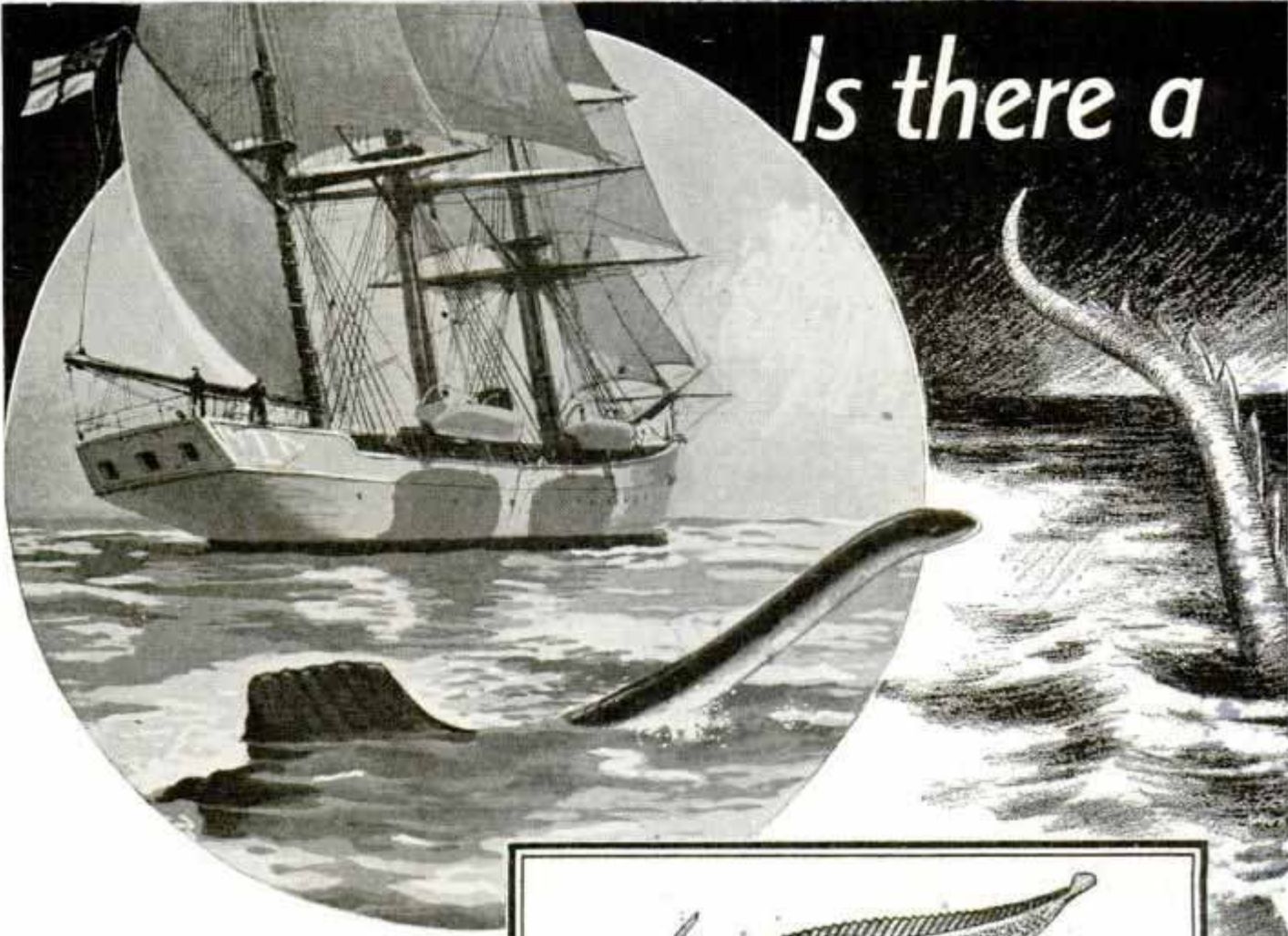
D 474

Fitted with a single cutter, a new broach for wrist-pin bushings may be resharpened hundreds of times without losing its size. The tool fits all pins alike, since it can be operated in only one way.



Earl P. Kest *Hollingsworth*

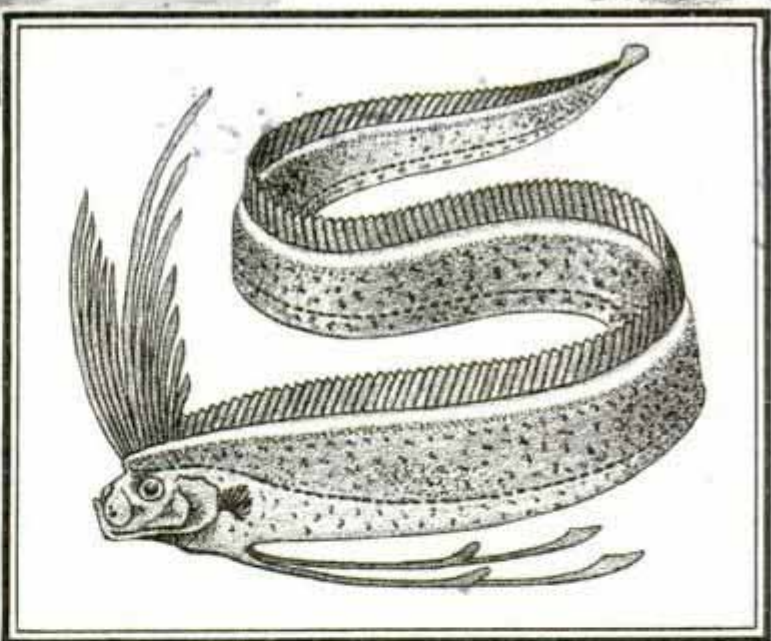
D 7 32 (Mr.) Chapman W. Johnson,
22774 W. 118th
Newport Ok



Is there a

RECENT startling events have revived the ocean's greatest unsolved mystery—Is there a sea serpent? Startling apparitions have evoked an amazed reply of "Yes!", which downright fakes have turned to a wisecracking "No!" But best scientific opinion refuses to deny flatly, that somewhere, in the deepest depths of the ocean, there may be such a thing, a species unknown to modern science.

This possibility appears amazingly real in the light of the sensational tales of the last nine months that have made the sea serpent come alive again, after years of quiescence. For almost all these tales are told not by one person, but by hundreds. All vow they have seen marine monsters like nothing known, and in several different places. Nearly two hundred canny Scots have seen something that undoubtedly inhabits Loch Ness, inland lake in northern Scotland. In the Pacific ocean,



Above, the "Valhalla" and Drawing of a Creature as Observed from This Craft Off Brazil in 1905; Below, Dorfish, a Deep-Sea Dweller Which Some Believe May Have Been Mistaken for a Sea Serpent

near Vancouver, three score testify to having seen a sea monster. High officers of the liner, "Mauretania," wrote in the log book recently that they saw one in the Atlantic.

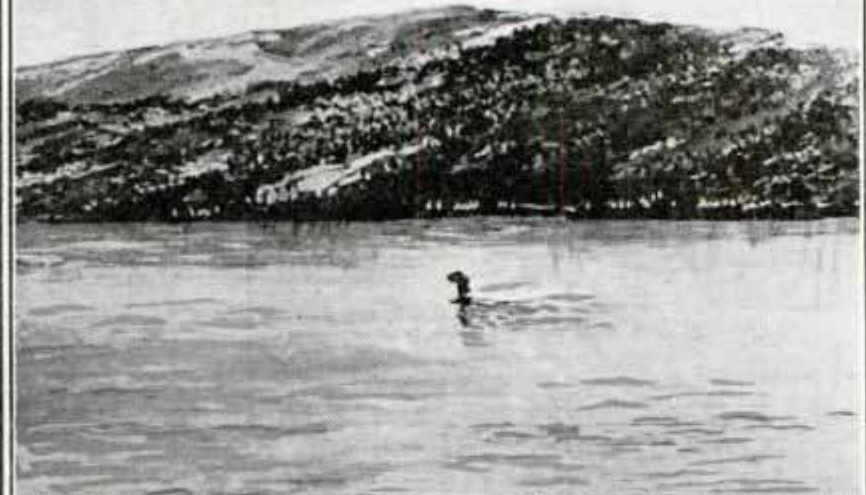
All descriptions of the sea serpent agree pretty well—a snake-like creature usually with coils protruding from the water

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SEA SERPENT ?



SEEN BY MISS JANET FRASER & TEN OTHER WITNESSES FROM "HALF-WAY" TEA HOUSE, AULTSAYE, SEPTEMBER 22ND, 1933, 11AM. (FROM A DRAWING MADE UNDER HER SUPERVISION)



SIDE VIEW OF HEAD. SHINING SPOT.



HEAD TURNED TOWARD WITNESSES

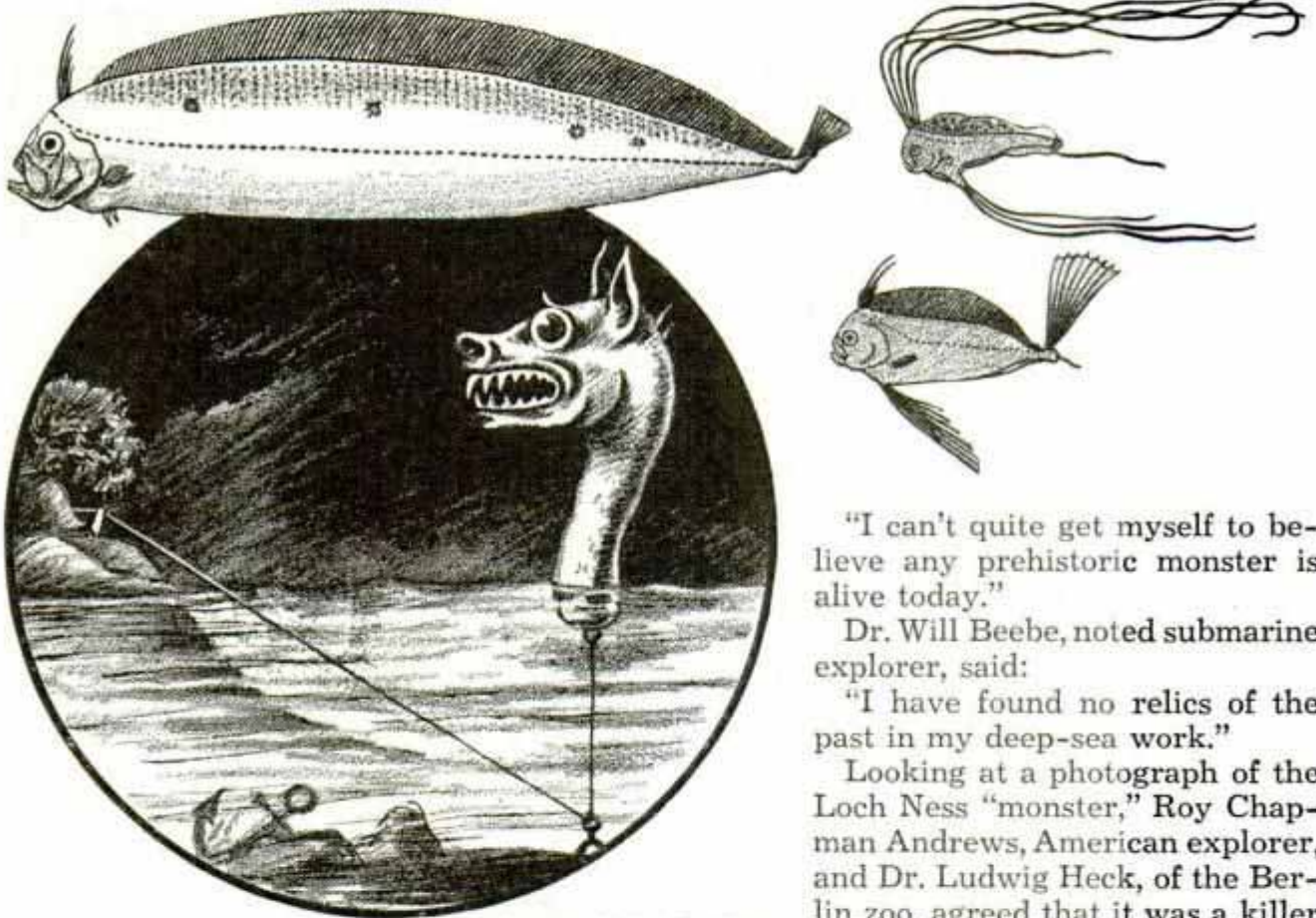
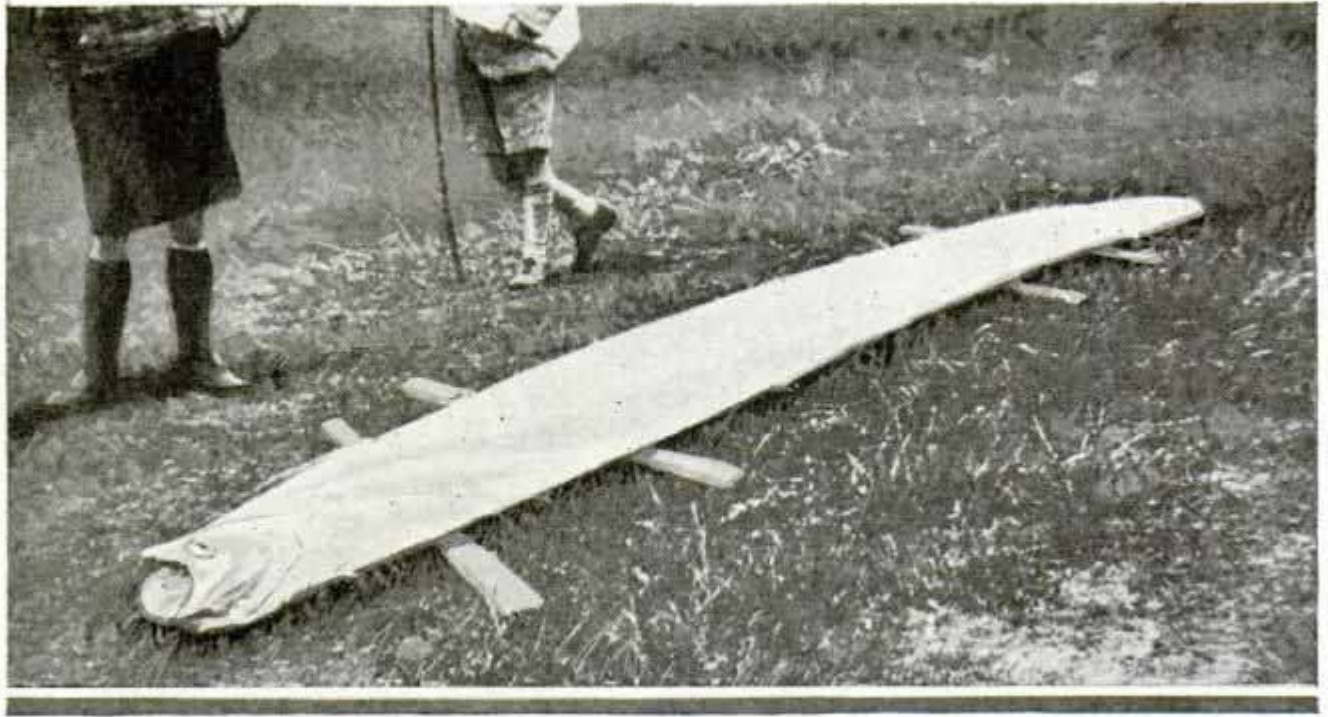


HEAD TURNED AWAY



something like a caterpillar's humps, dorsal fins or flippers, perhaps webbed, and a small, snake-like head. Often the "serpent" has been proved to be porpoises swimming in a line, a big seal, a giant squid, a ribbon or oar fish or some other weird, snake-like creature of the deep that is, nevertheless, known to science. But many scientists, noting the similarity in the descriptions, admit there may be a rare, separate species. Or, more astounding, that some great reptiles of early days, dwelling in slimy submarine fastnesses,

Drawing of Loch Ness "Monster" Made from a Description of Several Witnesses Who Observed the Shining Spot on the Head and Other Details



Lower Drawing © New York Sun
Top, a Creature Landed Near Loch Ness, Believed to Be a Conger Eel; Center, Mature and Small Ribbon Fish, Related to the Oarfish; Bottom, Drawing Showing How the Fake "Sea Serpent" Which Frightened Summer Visitors at Lake George Was Operated

"I can't quite get myself to believe any prehistoric monster is alive today."

Dr. Will Beebe, noted submarine explorer, said:

"I have found no relics of the past in my deep-sea work."

Looking at a photograph of the Loch Ness "monster," Roy Chapman Andrews, American explorer, and Dr. Ludwig Heck, of the Berlin zoo, agreed that it was a killer whale and what resembled a neck and head, was its dorsal fin. Someone else said it might be a species of newt, grown enormous by some freak of nature. Still, the mystery stands: "Is there a sea serpent?"

may have been brought by earthquake or other upheaval to the surface.

Raymond L. Ditmars, curator of reptiles at the New York zoo, says:

People around Vancouver, B. C., retort, "I'll say there is!"

At the end of January, two youths named

Andrews and Georgeson were at Pender island, duck shooting. A bird fell. Suddenly, up from the water thrust a horrid head, shaped somewhat like a horse's head. The jaws seized the duck. The water thrashed. A "streamlined" body swam away. It was two feet thick, and twelve feet of it showed grayish brown.

A week later, three other men said they had seen almost the same thing, a sea serpent attacked by gulls. Twelve workmen said they had seen the monster, and so did the captain and mate of a ship. Canadian government officials reported seeing a snakey thing, bluish green, in the water. Is there a sea serpent in the northern Pacific?

There was one in the Caribbean, says S. W. Moughtin, senior first officer of the great "Mauretania," on January 30. On the blue water curved a shiny jet-black, snake-like body, six feet thick and sixty-five feet long. The head was only two feet across. The third officer also saw it. Together the officers vouched for an entry in the ship's log: "Sighted sea monster headed S.W.; 1:20 P.M." Obviously there arises the question: Is there a sea serpent?

If not, who can cast light upon this occurrence of the dark night of February 15, 1934. The freighter, "Pecos," was riding the swells of the Gulf of Mexico. Suddenly, came a jolt. The ship trembled. "Something hanging on our bows, sir," the lookout told Captain L. Baker. In a flashlight's spot, Captain Baker saw "something" athwart the bows. It was grayish brown, spotted, thirty to forty feet long, and five to six broad. It did not move. The ship reversed, and it dropped off, sank quickly and silently. Dr. E. W. Gudger of the American Museum of Natural History says it may have been the rare whale-shark, but he is not sure. Nor is Captain Baker.

"But science has neither bones nor hide of such a creature to work on," says Dr. Charles Haskins Townsend, director of the New York aquarium. "People who report them at sea are usually victims of faulty observation. Once, when I was aboard the U.S.S. 'Albatross,' off Mexico, I was excitedly called to behold a sea serpent. There was a large creature on the water's surface, making a great splashing. Naval officers hailed it as a sea serpent. Actually, it was a humpback whale, finning. These

(Continued to page 118A)



Several Sets of "Daylight" Tube Lamps under Test Before Being Installed in Cabinets

CARBON DIOXIDE TUBE LAMP GIVES "DAYLIGHT" GLOW

Illumination approaching daylight is produced by a new tube lamp in which carbon dioxide is the conductor. The tubes are arranged in batteries and enclosed in cabinets for use in stores, factories, offices and other places where a large amount of artificial light is required. The lamp gives a white glow as an electric current passes through the carbon dioxide.

NOSE AND THROAT ATOMIZER FITS POCKET OR PURSE



Hay fever sufferers and others having frequent need of a nose or throat sprayer can now obtain an instrument which can be carried in the pocket or purse. It consists of a flexible rubber base instead of a glass jar, and pressing this base forces the liquid through a specially designed head in the form of a mist or spray.

David Rodwick
Asgood Packard and
O.C. [unclear]
See Aug 1935 - 239
Several Sets of "Daylight" Tube Lamps under Test Before Being Installed in Cabinets
Carbon Dioxide Tube Lamp Gives "Daylight" Glow
Illumination approaching daylight is produced by a new tube lamp in which carbon dioxide is the conductor. The tubes are arranged in batteries and enclosed in cabinets for use in stores, factories, offices and other places where a large amount of artificial light is required. The lamp gives a white glow as an electric current passes through the carbon dioxide.
NOSE AND THROAT ATOMIZER FITS POCKET OR PURSE
medi spray
Hay fever sufferers and others having frequent need of a nose or throat sprayer can now obtain an instrument which can be carried in the pocket or purse. It consists of a flexible rubber base instead of a glass jar, and pressing this base forces the liquid through a specially designed head in the form of a mist or spray.
Pines Wenter [unclear]



The WAR HORSE

D724

HAS the day of the horse in war gone never to return? In these days of machine guns, armored tanks, bombing planes, poison gas and chemical warfare, there is a large school of military strategists who say that the horse has no place in the modern armies, and will very soon be relegated to museums beside bows and arrows, rusty armor, spears, lances and battle-axes.

"Oh no!" retorts another influential school of military scientists. "Even in the last war, with thousands of internal combustion engines and motor vehicles available, the horse had his place. There are, all over the world, plenty of wooded and hilly countries where mechanical transport is practically impossible—even with caterpillar tracks—and here the horse may be very effectively used to cooperate with armored fighting vehicles and infantry."

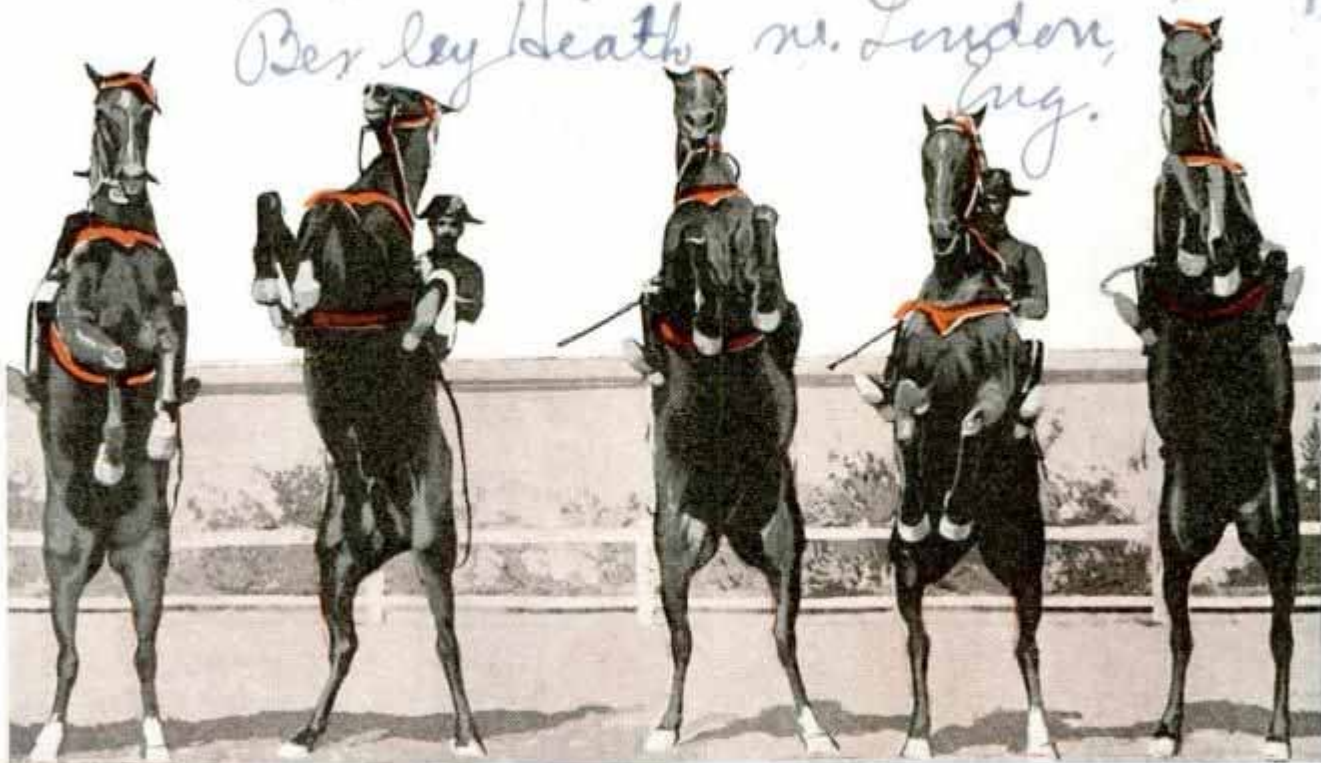
France, which not long ago erected a



Top Photo © Keystone View Co.
Top, Italian Cavalry "Sliding" Down Hill; Below, French War Horse Performing the "Croupade"

striking war memorial to the 1,140,000 French horses which fell on the field in the great war, does not believe the war horse has had his day. Today, at leafy Saumur, on the river Loire, in western France, the French government maintains a remarkable cavalry training school which

Cont. Harold S. Williams, Capt.
Colomberie 29 O'Beary Road D724
Berley Heath nr. London, Eng.



at SCHOOL

was founded in the days of Napoleon Bonaparte. Here, under the control of the French war department, 400 cavalry students, carefully chosen from all French mounted regiments, and also coming from the military academy for cadets, at Saint Cyr, are trained in riding and equestrian display. The Saumur school has its own corps of signalers, telegraphers and wireless operators, and a special establishment for training veterinary assistants.

A French soldier, in the mounted army, who wants to qualify for the higher pay and more responsible position of cavalry corporal must have first served four months in the field. But, if he wishes to qualify for a commission, he must obtain entrance to the



Top Photo © Zenpictures

Above, Horses Performing at French Military Training School; Below, This Stunt Is Not Dangerous with a Well-Trained War Horse



The horses are made to dance to band music or the strains of lively military marches. And these equine dances are done singly, or in companies of seven or a dozen young and graceful chargers. Another evolution, called the "coubette," shows the horse rearing almost upright on his hind legs, while the rider, without stirrups, maintains exactly the same position, in relation to the animal, as he would were the horse standing still in the nor-

cavalry school at Saumur. The young horses are early accustomed to the sight of the glittering sword, or cuirass, the bridle, headdress and sky-blue uniform. No matter whether he is standing, walking, or on the march, the horse must be taught not to fear gunfire. He has to be present at all rifle practices and, step by step, is made used to the sound of the firing of field guns and large ordnance.

The aspirant has to get into the mind of the horse, by studying him at all times. The horse has a memory, and the man must be careful not to teach the horse wrong lessons. If he does, it will be probably next to impossible to unlearn the horse. Some horses are dull, some quick in apprehension. The latter quality is usually the mark of the thoroughbred. But whether the horse be slow or smart in his reactions, blows will not bring him to reason, or make him quicker. They will make him either vicious and irritable, or destroy his spirit and make him timid and, obviously, unfit for military purposes.

Remarkable displays of trick riding are part of the course. The riders, generally, use no stirrups, but rely solely on pressure of knees and light touch of the supple hands on the reins. A kind of buck-jumping called the "croupade," in which the horse leaps as he tucks his hind feet under him, starts off the annual displays, called the "carrousel." These are the direct descendants of the knightly jousts and tournaments held in medieval France.



Above, War Horses in Maneuvers; Below, Riding Display by French War Horses and Cavalrymen

mal position. Then the horses perform in companies. Two horses with riders, stand upright in the coubette, while between them a third horse, with rider on his back, performs the croupade, leaping by rearing with his hind legs tucked under, and head toward the ground. Another performance shows half a dozen horses standing upright on their hind legs, while, with riders mounted, their front legs and hoofs

are curved like the paws of dogs standing up begging. The same horses and riders reverse and perform a similar trick, but with their sterns to the spectators, and standing on their hind legs.

But the most interesting and striking performance of the carrousel takes place in the barrack square, when about twenty soldiers, in uniform, and sitting or standing at a table covered with a white cloth, and set with glasses and



Cavalry Student in the Quaint Uniform of the French Military Riding School

Top Photo © Saumur School of Military Riding
Above, French War Horse Leaping over Auto

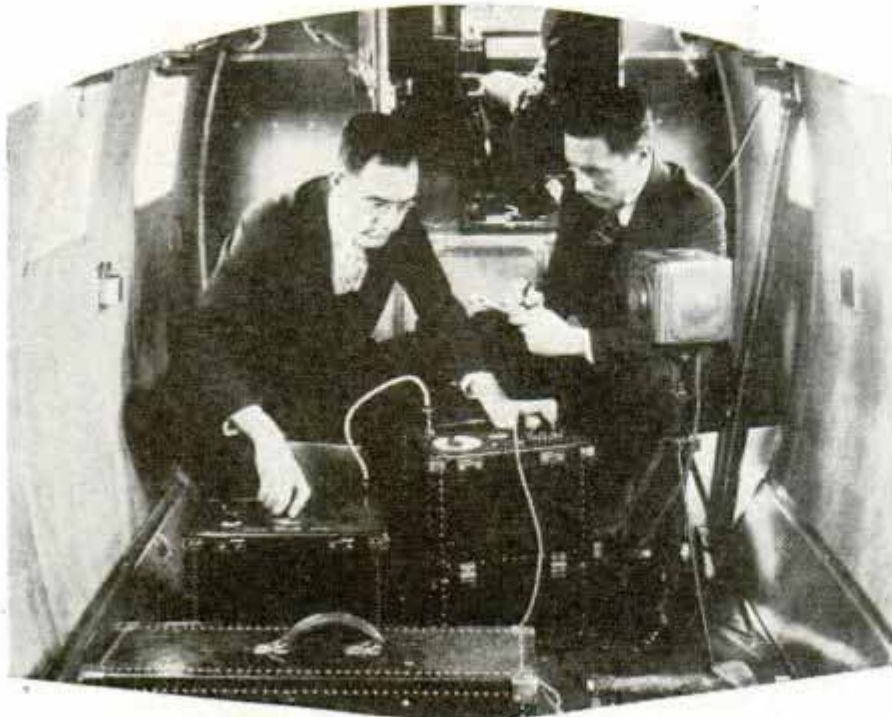
bottles of wine or vermouth, toast horse and rider as the skilful animal jumps over them, without so much as flicking cloth, glasses or men. Similarly, a motor car is halted, and the horse, with rider in the saddle, bounds clear over the car.

Ⓜ A plastic rubber substance is being used to fill tree cavities, since it does not crack as the tree grows.

and a brown Parkseph.

Leardysse Tree & Rubber

Portable Sound Analyzer Runs Down Noise



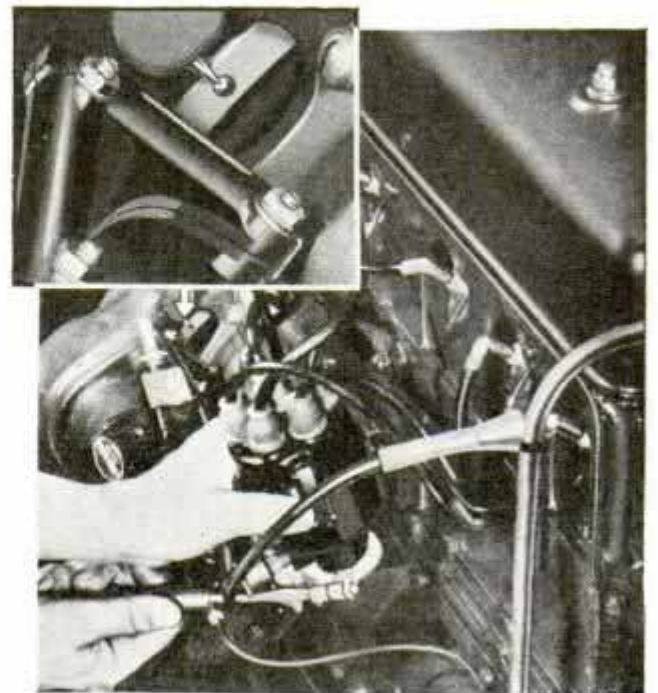
Portable Sound Analyzer Which Breaks Up a Noise into Its Component Parts and Traces Each Sound to Its Source

Equal in sensitivity to the best laboratory equipment, a portable sound analyzer has been developed by the Westinghouse Electric and Manufacturing company for making noise analysis of airplanes in flight, of speeding trains, street cars and buses. The analyzer is not to be confused with a noise meter which measures only the loud-

ness of a noise. The portable equipment diagnoses a noise, separating it into the different elements which compose it and measures the pitch and intensity of each component. It is transported in three cases, one containing a noise meter, the second a noise analyzer and the third a microphone and batteries. Noises have not previously been analyzed to find out what percentage is in the low-frequency field, how much is in the high-frequency band, at what frequencies peaks of noise occur and other information enabling engineers to eliminate the causes of unpleasant noises at their source. When an electric motor is exposed to the ear of the analyzer, for instance, engineers can tell how much of the total noise of the motor is caused by unbalance of the rotor, how much by the commutator bars, what part by slots in the rotor and what part by gear noises.

Neon Flasher Times Ignition While Auto Engine Idles

Flashing each time the spark plug of No. 1 cylinder fires, a small neon lamp illuminates a polished steel ball in the rim of the 1934 Chevrolet engine's flywheel, speeding up the task of timing the ignition. The lamp, which is placed to illuminate the opening in the flywheel housing, flashes so fast that the steel ball in the flywheel appears to stand still. By rotating the distributor until the ball appears directly in line with the fixed timing pointer, the timing can be set to an accuracy of one-half of one degree. The method is so simple that anyone can do the job in less than five minutes. The special lamp, fitted with clamp and connector, is produced at low cost in order to enable owners to keep their engines at maximum performance capacity by frequent timing adjustments.



W. O. Cleburn, Research Engineer

& Pittsburgh Pa

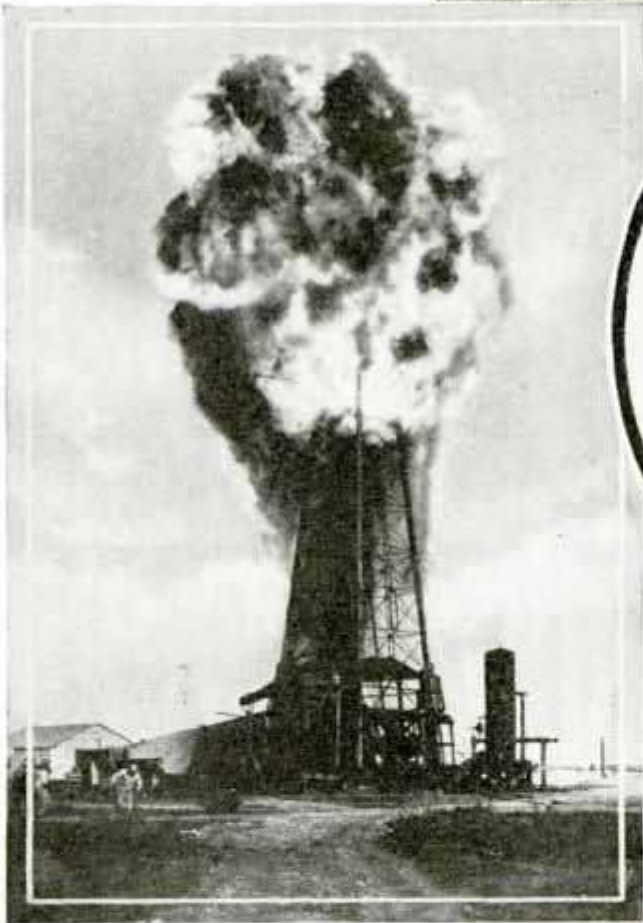
D686

Chevrolet Motor Co

The Petroleum Exposition, Tulsa, Okla.

Oil-Well Fire Staged as Latest Crowd Thriller

Setting an "oil well" on fire and then extinguishing the flames is the latest crowd thriller. An underground pipe line carrying twenty-five million feet of gas per hour is run from the gas main to an eighty-four-foot derrick. Most oil-well fires burn more gas than oil, so this set-up approximates a real oil well. A valve one-quarter of a mile from the derrick turns on the gas. The spectacle is staged at



Left, "Oil Well" Bursts into Flames as Stunt Men Flee; Right, Top, Fire Hose Protect Stunt Men; Bottom, Attaching Cables to Drag Away Lower Part of Derrick

night, with only the faint outlines of the rig visible to the crowd some distance away. First a faint runner of flame is seen chasing around the top of the derrick, then there is a roar of gas, followed by a blinding flash as the oil well bursts into flame. After an hour of burning the top of the rig tumbles in. Then stunt men, two of them dressed in asbestos, advance under

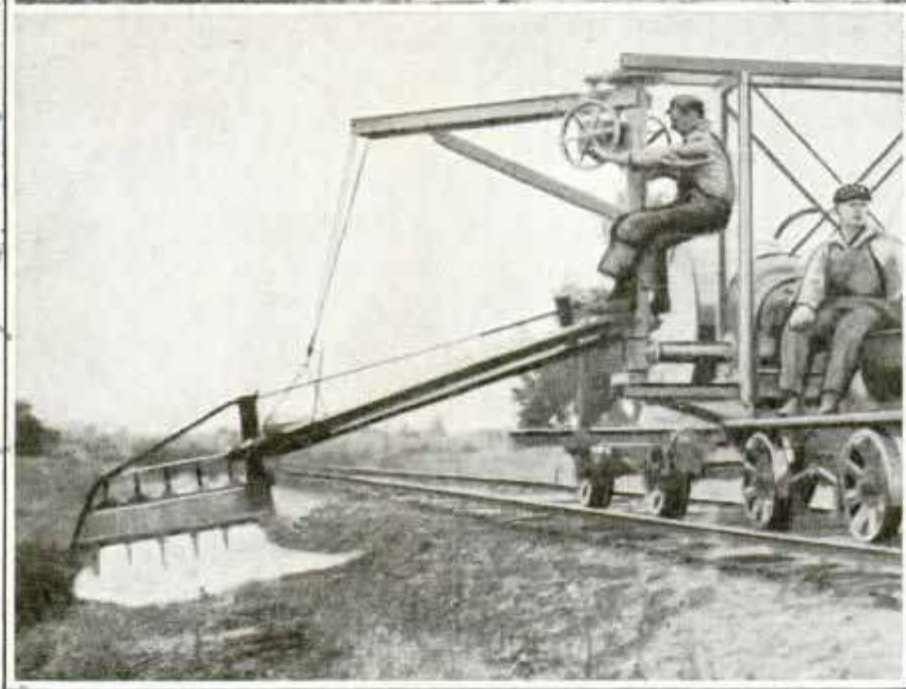
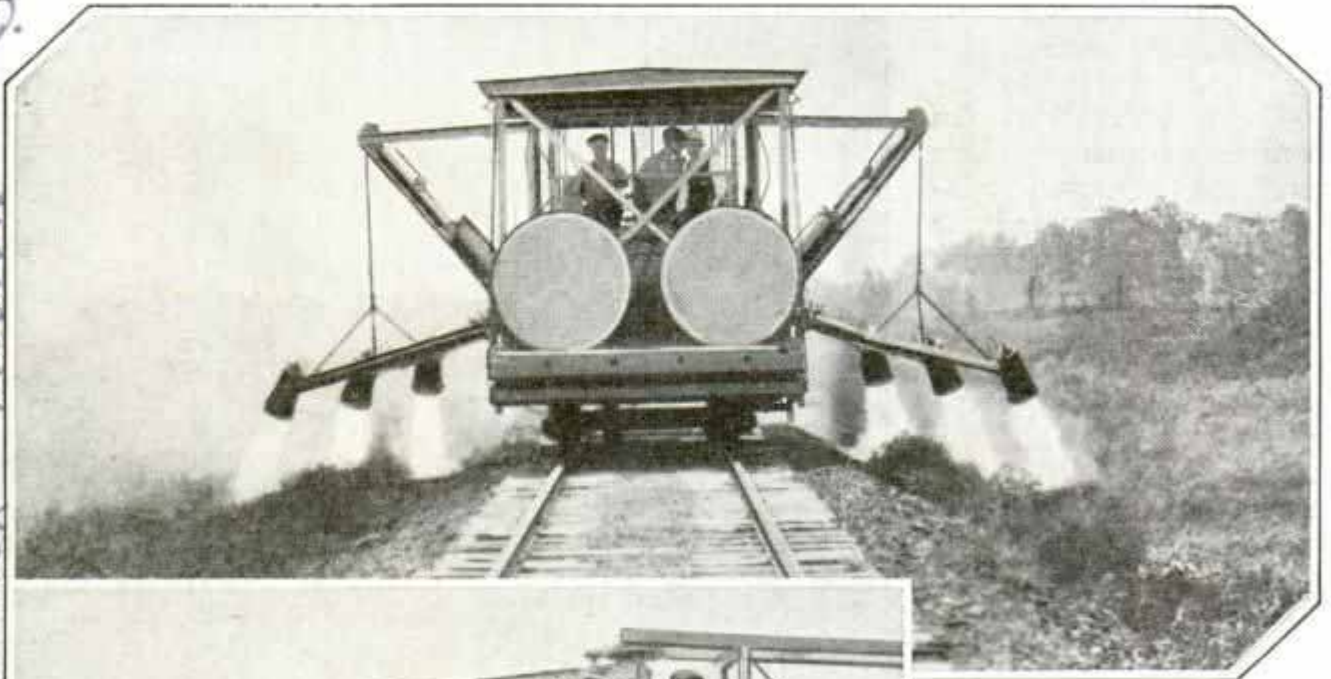
the rain of fire hose to attach cables to the lower part of the derrick. As they back away, the rig is pulled from the well, leaving nothing except the giant gas jet. Another man, protected by hose lines, advances to the well carrying a charge of nitroglycerine which is placed in position. As he reaches a safe spot, the field is plunged suddenly into darkness, an ear-splitting blast following a moment later. The explosive has snuffed out the fire and the gas is turned off at the valve.

*Capt. Veed Clement
Box 2505, Tulsa, Okla.*

Weed Burner Prevents Fires along Railroads

D562

For Fairmont Railway Motor
 review of Fairmont
 Comp. Price



Using a Weed Burner to Destroy All Vegetation and Rubbish along a Railroad Right of Way; It Kills Roots as Well as Stalks

with a crew of three men, of less than \$3.50 per mile. The weed burner aids adjacent farmers and has been found more effective than chemicals for the purpose. It can also be used for highways, being mounted on a truck and burning a swath on one side only. For this

Weeds, trash and brush along a railroad right of way are destroyed quickly and economically by a weed burner on wheels, which thus prevents such material from serving as the kindling to start forest and field fires. The burner is equipped with "ovens" which hold the flames at a temperature of 2,500 degrees within a foot of the ground so that the fire not only burns the weeds but destroys the roots as well. Air-circulating devices prevent the burners from overheating. The trash destroyer burns a swath from eighteen to twenty-five feet on each side of the track center, and the largest type operates at a speed of four miles per hour, burning forty gallons of distillate per mile at an average cost,

purpose it can be operated by one man. Both railway and highway burners can be followed by extinguisher cars manned by a driver and two hose men. With the aid of nozzles operated by triggers, shots of water at high pressure are directed at smoking embers and incipient blazes.

D196

STARCHLESS POTATO

Starch, the very essence of potatoes, is almost entirely lacking in a variety raised under experimental conditions by two Canadian scientists, who injected into the stems cultures of bacteria having the power to change starch into sugarlike compounds. The main stems of young potato

*Dr. R. F. Smith
 Macdonald College*

*McGill University
Montreal, Canada*

plants were cut off and quantities of the bacteria were injected into them at intervals until the plants were mature. When slices of tubers were tested for starch by the iodine method, a purple ring was shown for about an eighth of an inch around the outside, but no purple color indicating starch was visible in the center. This led to the conclusion that the food stored in the center was probably sugar or related compounds.

**HOSE BRUSH CONTAINING SOAP
USED IN WASHING DOG**

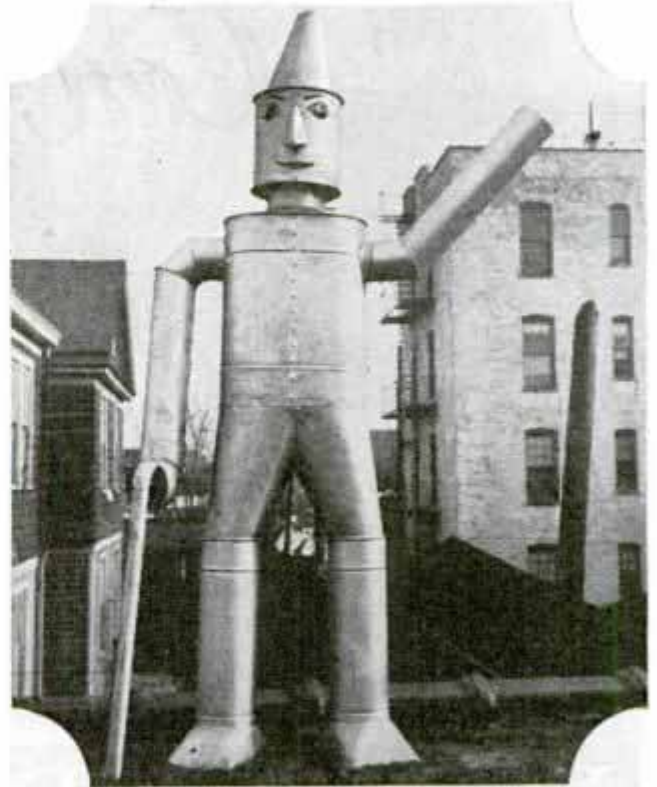
Designed to make easier the task of washing a dog, a hose brush contains antiseptic soap. The brush is attached to a short length of hose, which connects to a convenient faucet. A lever diverts the water from passing over the soap when rinsing is desired, enabling the operator to cleanse the dog's coat and skin of all soap particles. The washer is supplied complete with soap, and refills are available.



Washing the Dog Is Easy for This Youngster as He Pries a New Hose Brush

**LOUDSPEAKERS IN METAL "MAN"
MAKE ROBOT MUSICAL**

By connecting loudspeakers in a sheet-metal "man" to a radio receiver, a musical robot has been produced as an advertising stunt for a New York store. The metal figure, made of stovepipes, galvanized-



This Odd Iron "Man" Atop a Store Contains a Loudspeaker to Attract Customers

iron cans and funnels, is installed on the roof. Wires from the loudspeakers located in the hollow arms of the robot are connected to the radio set in the store beneath, enabling the operator of the radio to make the man on the roof sing, deliver a lecture or perhaps tell a bedtime story to passersby on the street.

**NON-ELECTRIC HEAT CONTROL
FOR HOT-AIR FURNACE**

Direct automatic control of warm-air furnaces is made possible by a non-electric thermostatic regulator that requires minimum servicing. The safety device consists of a long rod of non-expanding metal, inclosing a small metal I-beam that expands or contracts as heat increases or decreases in the bonnet of the furnace. This expansion or contraction actuates controls that regulate the draft and check dampers. One adjustment dial, located in the house, permits regulation for more or less heat.



*Super Metal Tuff Co. 141 W. 00ster
New York*

9.2.50 comp.

D717

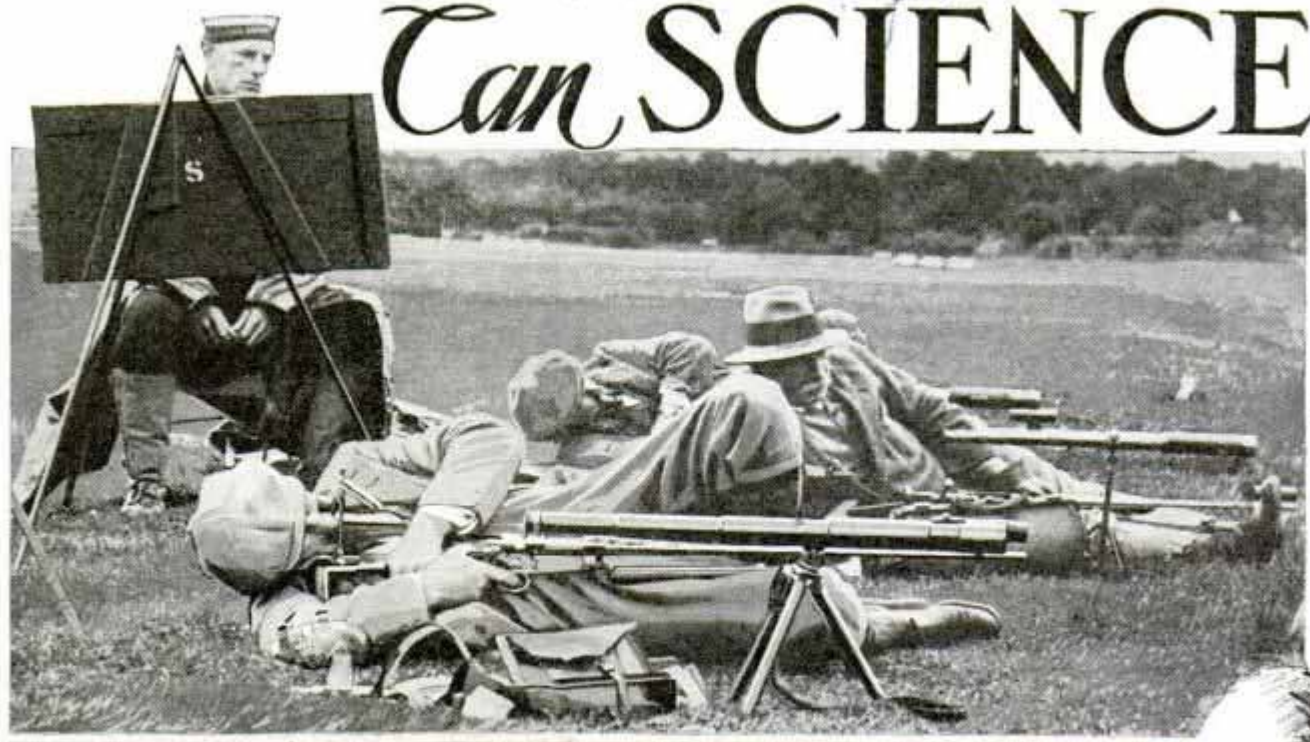
Thomas Long Control Co. chue.

(Cub) Andrew

D 768

22 E. 69 Hill
Newspaper

Can SCIENCE



YOUR SPORT?



By E. C. SCHNURMACHER

WITH the aid of the skilled machinist, the ballistics expert, the research chemist and other scientific workers interested in the development of modern firearms, it is possible for many average sportsmen who shoot for recreation today to equal the almost legendary marksmanship of Daniel Boone, Davy Crockett and other famous pioneers.

States Edwin Pugsley, vice president of the Winchester Repeating Arms company and a rifle and ballistics expert of note:

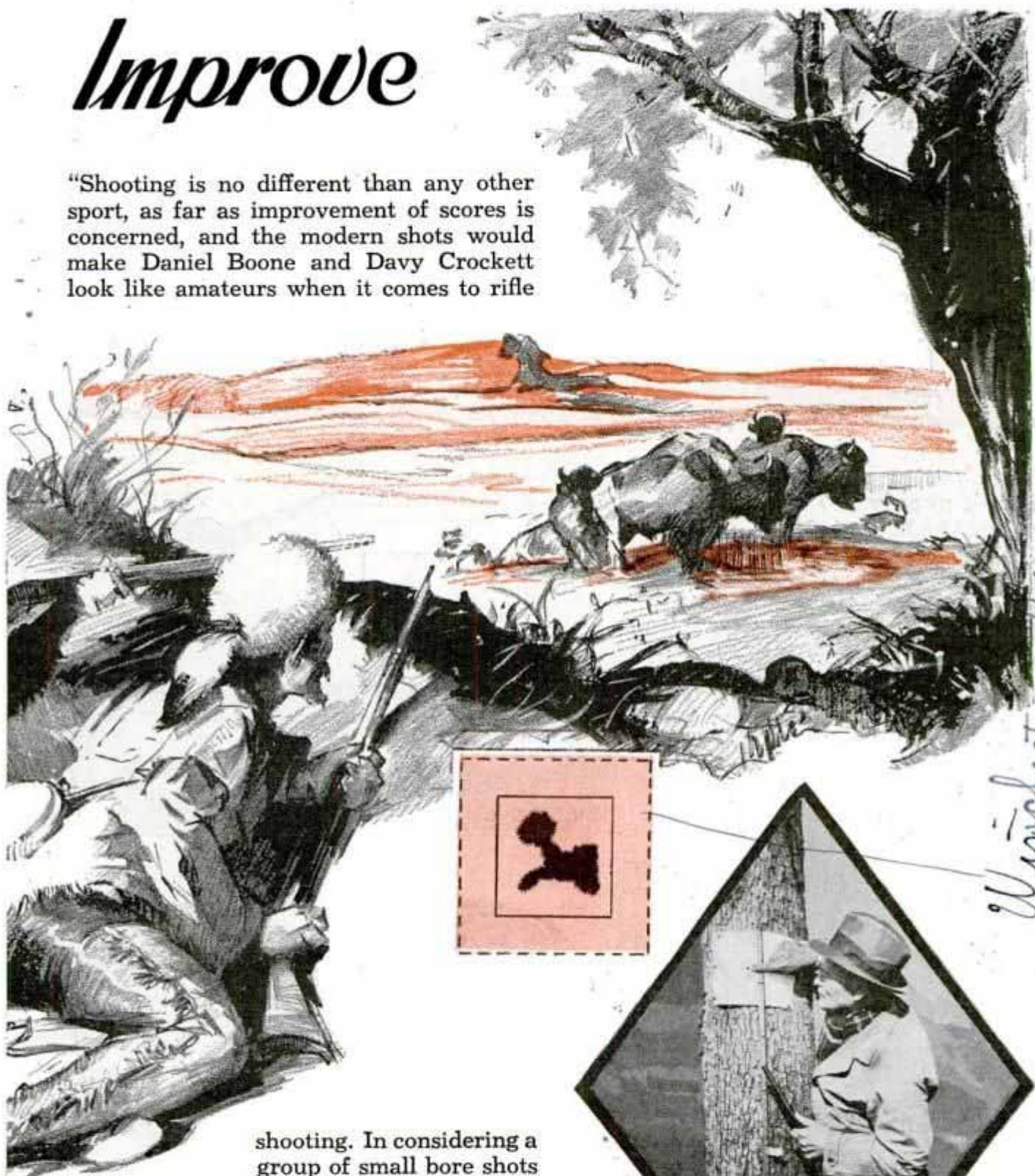
Above, Using Telescopic Sights in 1,000-Yard Shooting Match; Below, a Modern "Dead Shot"

Handwritten notes in the left margin, including the word "sport" and other illegible text.

Handwritten notes at the bottom of the page, including the name "E.C. Schnurmacher" and other illegible text.

Improve

"Shooting is no different than any other sport, as far as improvement of scores is concerned, and the modern shots would make Daniel Boone and Davy Crockett look like amateurs when it comes to rifle



Winchester Laboratories
... Progress is our business

shooting. In considering a group of small bore shots at fifty yards and 100 yards, representing the accuracy of today, it may be seen that our legendary shooters, Daniel Boone and Davy Crockett, could not do as well.

"In the matter of shotgun shooting the same condition exists. Scores in trap-shooting are continually mounting. Twenty years ago a score of ninety-five out of 100 at a sixteen-yard rise would win almost any tournament whereas today if the

Drawing Courtesy Remington Arms

Daniel Boone Could Not Place a Cluster of Shots at Fifty Yards as Accurately as the Modern Marksman

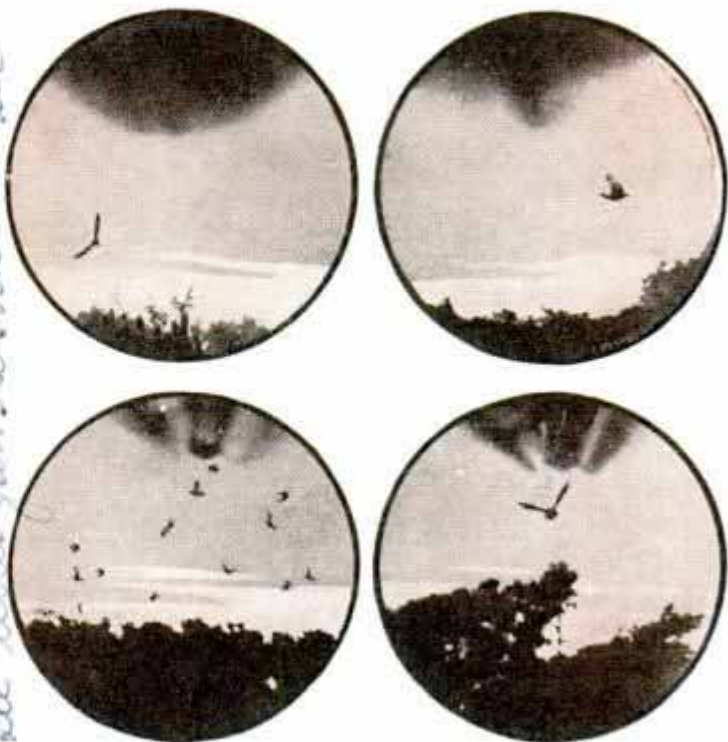
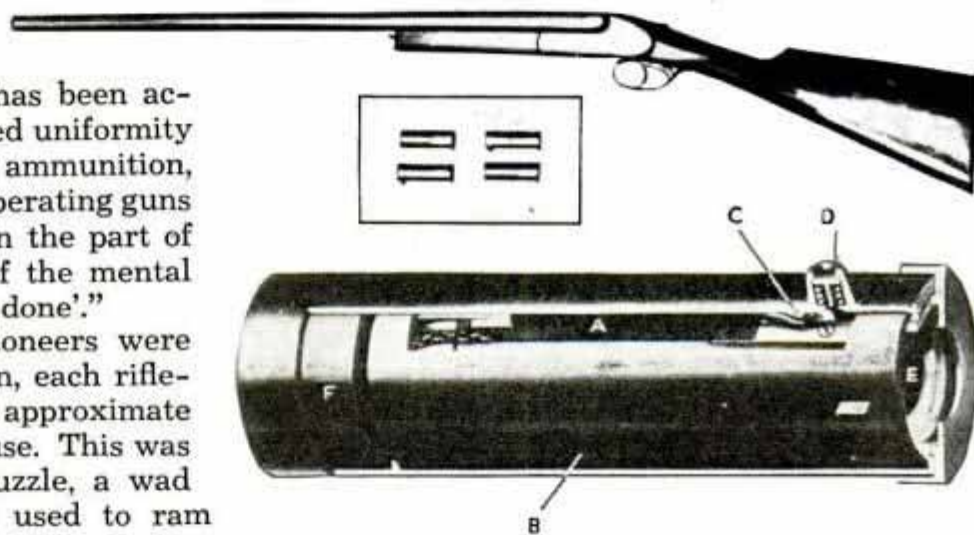
D768



trapshooter can't break nearly 200 straight he had better stay home. This has been accomplished by increased uniformity of performance of the ammunition, better firing, quicker operating guns and the overcoming on the part of the average shooter of the mental hazard that 'it can be done'."

The guns of the pioneers were loaded by powder horn, each rifleman guessing at the approximate amount of powder to use. This was placed in the rifle muzzle, a wad added and a ramrod used to ram down the charge. The ball was then inserted in the muzzle and another wad added, the entire combination then being rammed down. As a result, it took from twenty to thirty and more seconds to load a rifle. The charge of powder was uncertain and, with the leading of the barrel, the shot was liable to be inaccurate. The American rifle shot a bullet that was smaller than the bore. Some practical pioneer, tired of cleaning his rifle so frequently, thought of placing a patch of leather around the lead ball when ramming it into the muzzle, thus preventing contact with the inside of the barrel and consequent leading, but it was discovered that unless the rifle ball was placed exactly in the center of the patch, greater inaccuracy would result.

The pioneer rifleman overcame this by placing the patch of leather



Top, the Accurate Modern Rifle; Below, Camera Cartridge Used to Study Errors in Aiming and Some of the Images

The average shooter of the mental hazard that 'it can be done'."

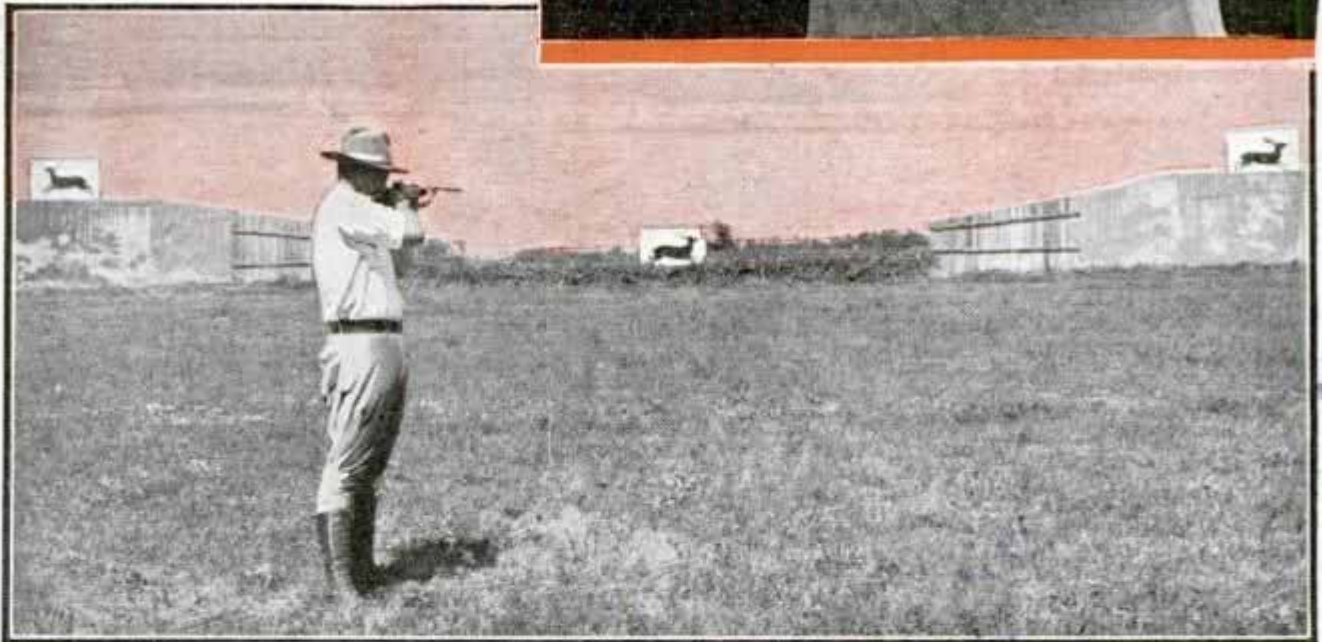
see letter from Schramm

not on market - experiment

carefully over the muzzle of the gun with the rifle ball in its exact center. The ramrod pressed the ball into the muzzle and the ends of the patch were cut off. From leather and other crude innovations the patch was gradually changed to linen and the leading of the barrel began to occur at less frequent intervals.

To overcome the funneling of the muzzle, the "false muzzle" was devised. This was a piece of rifle barrel added to the regular muzzle by means of pegs or dowel pins. It was attached in position, both false and true muzzle being reamed together. When the rifle was loaded or cleaned, the false muzzle was added but it was removed previous to firing.

While gunsmiths made rifles by hand in pioneer days, gun barrels were imported from England or Europe. In 1816 two men, a smith and his son, both named Eliphalet Remington, were busy at their



Top Photo © Kadel & Herbert, New York

Above, a Device Intended to Absorb about Seventy Per Cent of Recoil When a Shell Is Fired; Below, Firing at a Mechanical Deer Which Takes Six Seconds to Cross the Open Space

forge at Illion Gorge when the younger Remington asked his father for money to buy a rifle. When the latter refused, the son collected scrap iron which he skillfully welded into a gun barrel and then walked fifteen miles to Utica to have it rifled by a gunsmith.

This resulted in such a good gun that neighbors ordered others like it and before long the Remington forge found itself hard at work to meet the increasing demand. Remington finally devised machinery to do the rifling himself.

(Continued to page 128A)

D 731. National Bldg of Commerce Bldg. St. Louis Mo.

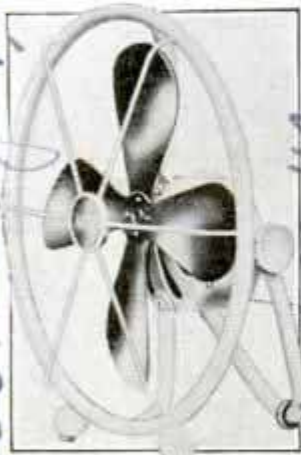
CAMPERS' STOOL IS "FIREPLACE" WHEN TURNED UPSIDE DOWN



Camp Stool of Steel Which Can Be Converted into a Stove When Turned Upside Down

Weighing only three and one-half pounds, a campers' stool of collapsible steel supports a weight of 350 pounds and can be converted into a fireplace for use with "canned heat" as fuel by turning it upside down. Only two pieces make up the chair, a round, pressed steel top and a supporting three-legged frame which folds into one jointed piece.

DESK FAN HAS PIVOTED ARM FOR HANGING ON WALL



Equipped with an adjustable, pivoted arm, the latest German made desk fan may be hung on the wall. Used as a desk fan, it may be inclined forward or backward. When the arm is swung back, the fan can be attached to a wall fixture or a hook. Another fan has a strong wire guard by which it may be suspended on an adjustable bracket from the wall or the

ceiling. The fans have induction motors that operate on single-phase alternating current. Both models are inexpensive.

C 2034

TEMPERATURE EIGHT MILES UP IS NINETY-NINE BELOW

Free balloons released by Canadian meteorologists during the 1933 polar year have given added information about upper-air levels and their influence on our weather. Twenty out of twenty-four such balloons sent up from Calgary with recording instruments were recovered, fifteen reaching the tropopause, the next highest level to the stratosphere. One of them went up 80,710 feet, more than fifteen miles, where its thermometer registered seventy-one degrees below zero. The coldest temperature of all, however, was recorded by a balloon which reached only 42,060 feet, or about eight miles, and showed 99.4 degrees below zero.

Dr. J. Patterson, director, Meteorological Service, Toronto

D 736

FENCE BUILT OF AUTO WHEELS HAS DECORATIVE EFFECT

Forty-five old automobile wheels, without their tires, are part of an unusual fence decorating the yard of an Oregon home. It



Discarded Auto Wheels, Held in Line by Rails at Top and Bottom, Make Unusual Fence

is ninety-five feet long. The wheels rest on a two-by-six, with a two-by-four rail on top. X-shaped blocks hold the wheels apart and in line.

D 621

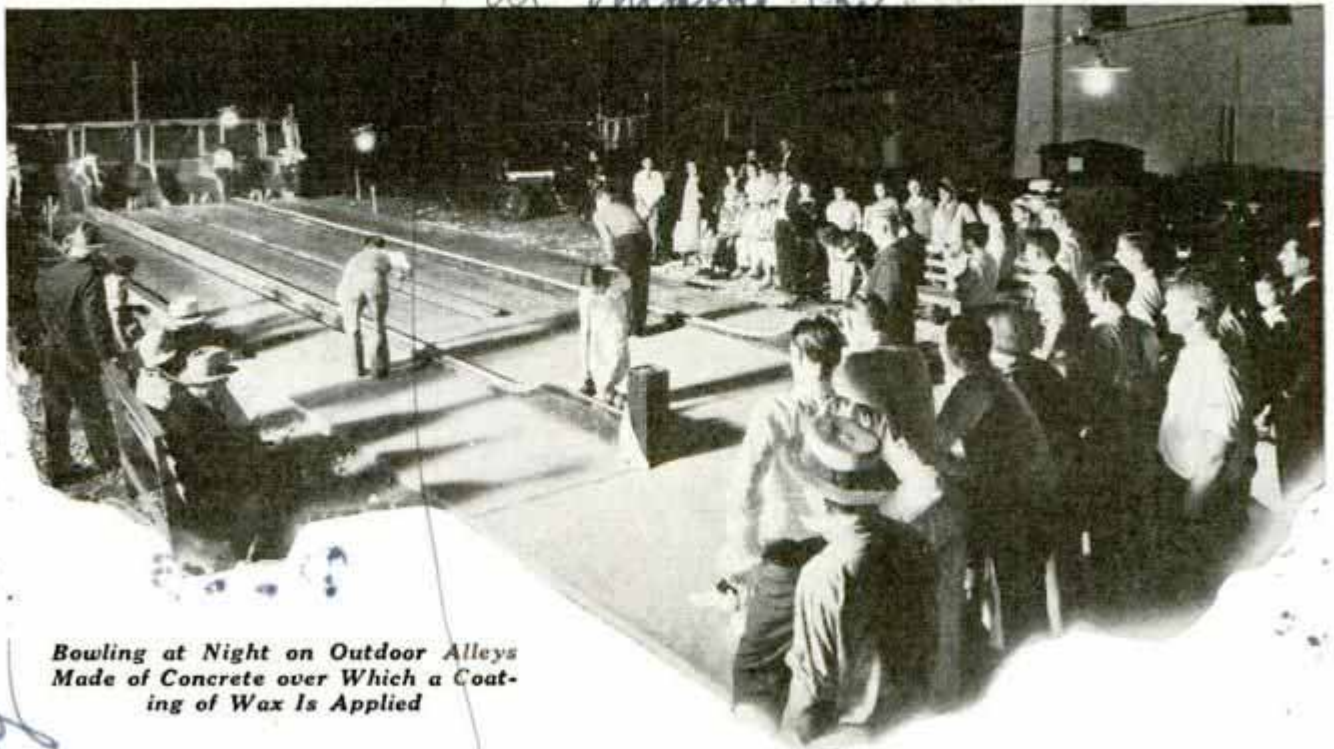
*A. E. Es. Works
Zweidrich Karl Wery*

Berlin No. 40

not Spigent

*Owner - P. A. Petrum
Point, Wash. Comm*

Concrete Alleys Used for Outdoor Bowling



Bowling at Night on Outdoor Alleys Made of Concrete over Which a Coating of Wax Is Applied

Bowling has been made an outdoor sport in Florida where concrete alleys are being constructed in the open for the ball and pin enthusiasts. It was found that concrete makes a smooth, fast alley when

the surface is waxed and also stands exposure to the weather without deterioration. The outdoor alleys are floodlighted at night and the concrete reflects the light and gives good visibility.

Speedboat Balloon Spearing Is the Latest Water Sport

Spearing rubber balloons from a racing speedboat is a new water sport which has proved as popular with spectators as with the participants. Two-men racing runabouts compete in this sport, going five times around a one-mile course. Across the starting line a wire is stretched and to it cords with sinkers tied to the ends are fastened. The inflated balloons are suspended from the lead-tipped cords just over the heads of the racing crews. The boats start in the manner of a regular race. Each time around the course each boat crew must spear one balloon. If the spearman misses, the boat must come about and he tries again, the craft not

being allowed to proceed until the balloon is punctured. The first boat to complete the five laps, breaking a balloon on each lap, wins the race, the balloons serving to make the contest an obstacle race.



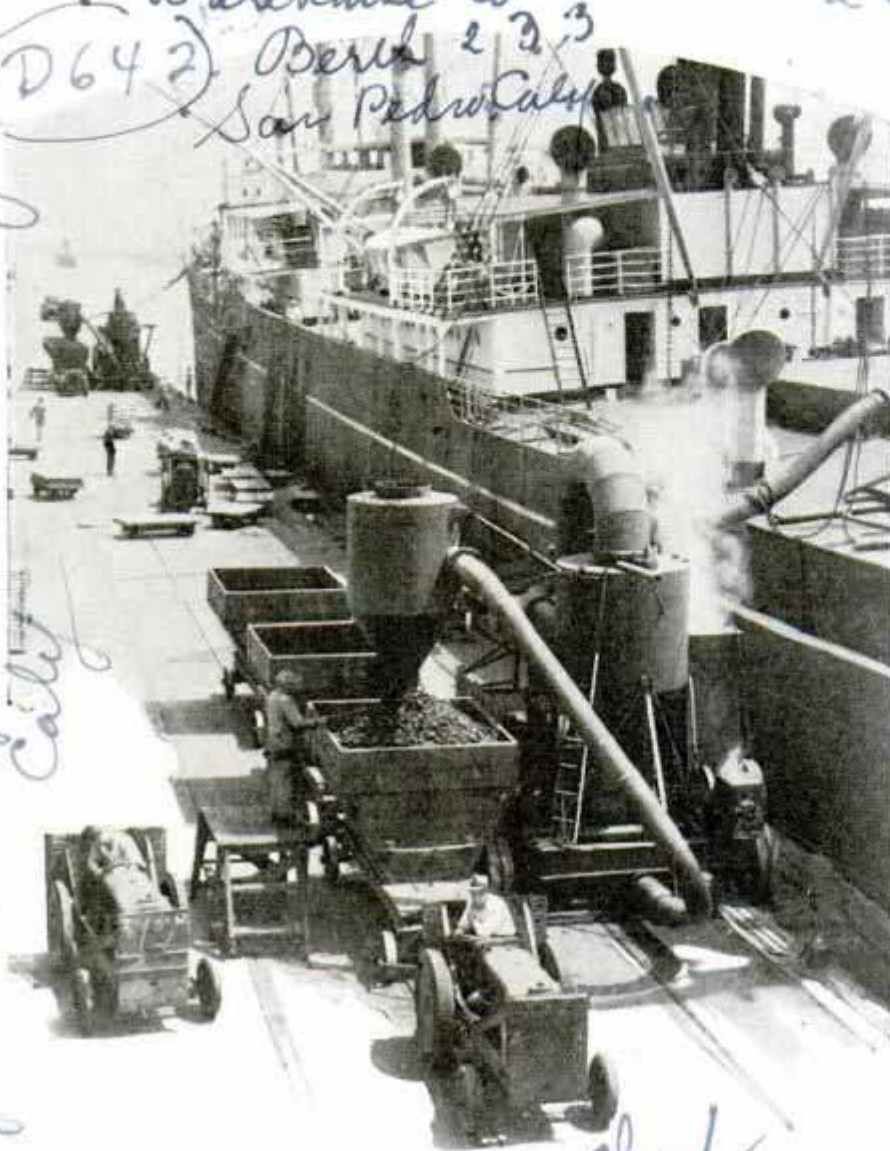
Trying to Spear a Bobbing Balloon from a Bouncing Speedboat Requires a Steady Eye and Hand Plus Considerable Luck

Southern California Outboard

cont. Ray Chapin. 797 8544. Long Beach Calif.

at measure (2)

Gene Mills
Crescent wharf
Warehouse Co
Berth 2, 3, 3
San Pedro Calif
Standard Oil Co
New Jersey
26 Broadway New York
at Foreign Trade Exposition Los Angeles
Calif
Club



"Vacuum Cleaner" Machine as It Sucks Fifty-Eight Tons of Cargo per Hour from Ship's Hold, Speeding Up the Process of Unloading

SHIPS UNLOADED BY SUCTION OF BIG "VACUUM CLEANER"

Giant "vacuum cleaners," designed to unload copra from ships at the rate of fifty-eight tons per hour, have been demonstrated on the Pacific coast. The machines, which are built on the same principle as the familiar household vacuum cleaner, speed up the job of unloading ships as they draw certain types of cargo from the holds by suction.

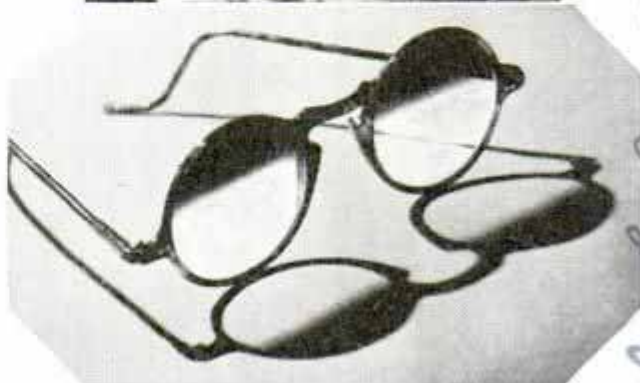
MORE MILES PER GALLON

Extra mileage is claimed for a new fuel developed by blending a safety gasoline with a casing-head gasoline that is so volatile and gaseous that a glass of it, if thrown into the air, will evaporate before a single drop touches the ground. The safety gasoline, also known as "heavy" gasoline, is

non-explosive and non-inflammable at ordinary temperatures. The casing-head gasoline gives the mixture the properties of rapid acceleration and quick warm-up, without losing the weight and power of the safety fuel. Increased mileage of about fifteen per cent better than that obtained with conventional racing gasoline is claimed. The new fuel is expected to be in demand in racing fields where frequent refueling is undesirable.

VISOR LENS GLASSES PROTECT THE EYES

Protection from sun glare by day and from the light of approaching cars at night is afforded the eyes of the motorist by visor lens glasses. The upper half of each lens is shaded to keep out the glare of the sun or lights while the lower half is clear glass. The lenses are made of shatter-proof glass and the eye protectors also are found helpful on the beach or golf course and for other outdoor sports.

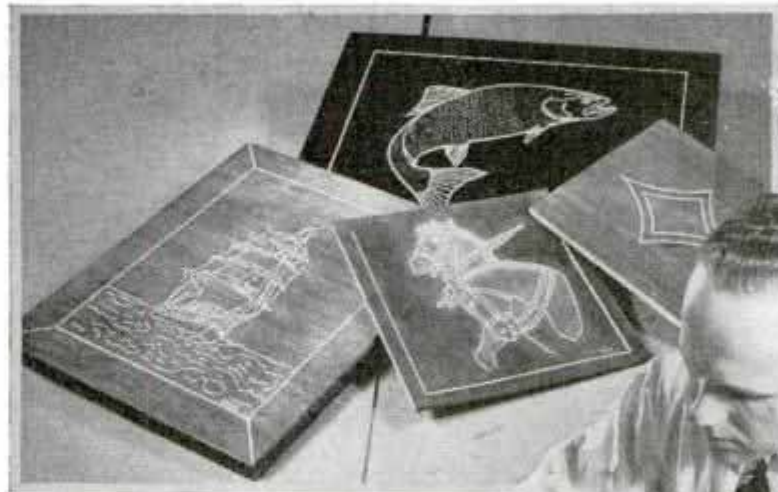


Driving Glasses with Half of Lenses Shaded

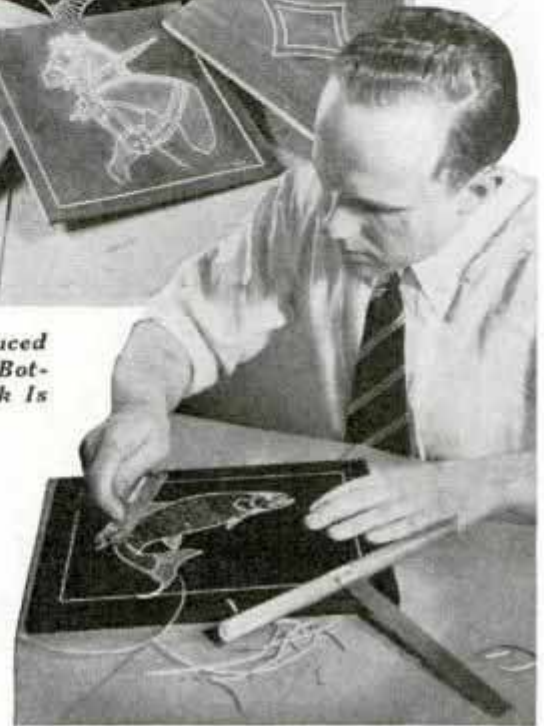
D663
La E. Mc Cants, 4555 Malden St Chicago
Calif

Hand Router for Inlays Is Easy to Operate

Amateur craftsmen may decorate their work in professional manner by using a simple hand router that works equally well in wood, leather and linoleum. It is especially suitable for simple inlay work, since strips removed by the cutter can be dyed and glued back in place. Three steel blades varying in width are provided. The depth of the cut is regulated by changing the position of the blade in its holder. The arm of the cross-cut guide, when screwed to the router frame, serves as a compass for making circular cuts.



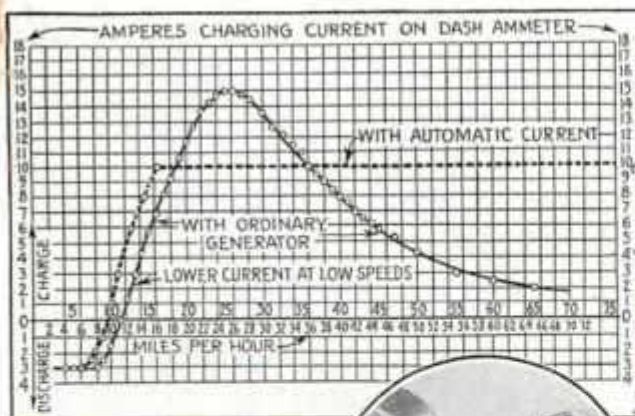
Top, Samples of Work Produced with Aid of Hand Router; Bottom, How Simple Inlay Work Is Done with the Router



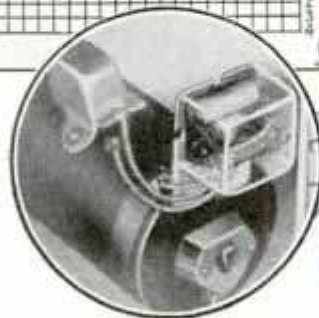
BATTERY CHARGE HELD STEADY BY AUTOMATIC CONTROL

Much of the trouble resulting from undercharging of the battery or overloading of the generator may be eliminated for the automobile owner by a small automatic control that is easy to install. The device

the battery receives ample current for operation of such accessories as radio, electric clock and extra lights.



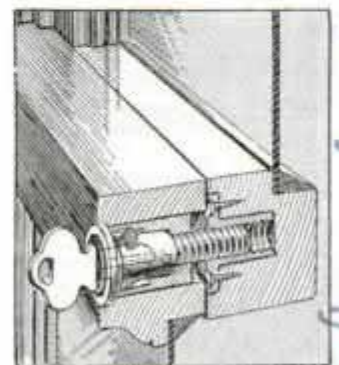
Right, Battery-Charge Control; Top, Charge Comparison; Note Level with Control at Ten Amperes



holds the battery-charging rate at an efficient level, reaching that point earlier and holding it longer than is possible through adjustment of the generator. In this way,

INVISIBLE WINDOW SASH LOCK PROTECTS THE HOME

More protection against burglars is provided by a new window sash lock that is virtually invisible. The lock is installed in the sashes, its housing in the upper sash and the bolt in the lower sash. When the bolt is locked into the housing, the sashes are drawn together tightly, eliminating the need for weatherstrips on the parting rails. The face of the lock is flush with the surface of the lower sash so that it cannot be detected easily from the outside. It is barely noticeable from the inside of the house. A key operates the lock.



Electric Mfg Co

Mr. Cr... Invisible Sash Lock

D695

D649

Mr. Cr... Be

Making HOME



Left, Food Mixer Mounted on Porcelain Enamel Cabinet Containing Washing Machine Is Operated by Same Motor That Runs the Washer; the Motor Also Drives the Wringer and Ironer; Other Electrical Devices May Be Operated on Top of Cabinet



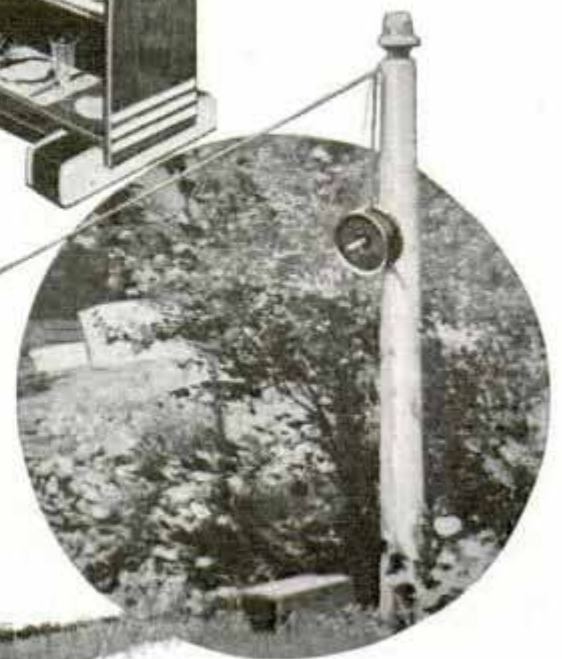
Above, Combination Cupboard and Table as Unfolded; Left, Folded, with Glassware and China Stored Away; If Desired, the Cupboard May Be Arranged with Service Ware so That When a Catch Is Released, the Table Appears, Ready for the Meal



Left, Pocket Salt Shaker for the Camper Keeps Salt Dry and Uncaked in Wet Climate; Molded Screwcap Keeps Out Moisture; on the Bottom Is a Round Knife-Sharpening Stone



Right, Unreeling the Clothesline for Use on Washday; after the Clothes Are Removed, the Line Is Reeled In, Keeping It Clean and Protected from the Weather, as Well as Protecting It from Theft; Operation of the Handy Reel Is Extremely Simple



The combination cupboard and table set is a very practical and convenient piece of furniture. It is made of a heavy material and is very durable. The table is very sturdy and can hold a large amount of glassware and china. The cupboard is very spacious and can hold a large amount of service ware. The combination cupboard and table set is a very practical and convenient piece of furniture.

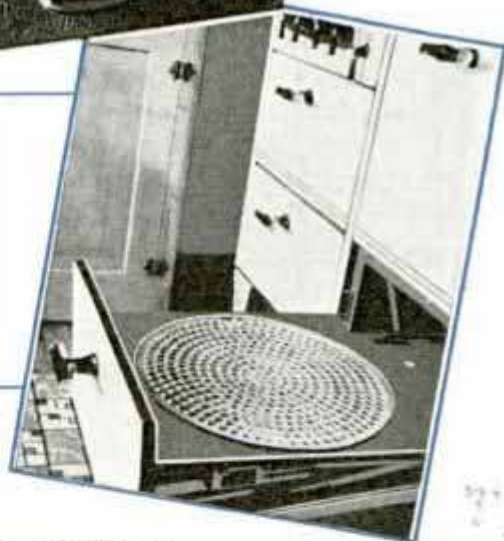
TASKS a Pleasure

Left, Below, Handy Jack Releases Ice Tray from Freezing Compartment Quickly, Solving Problem of Sticking; It Is a Feature of Latest Westinghouse Line; Right, Below, Luggage with Rack on Which Six Dresses Can Be Carried without Wrinkling

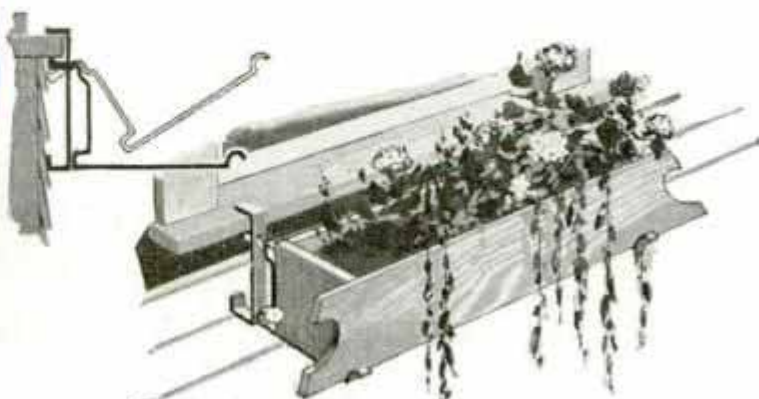


Below, Wire-Formed Doughnut Lifter Has a Curved Flattened Wire Pickup End so That One or More Doughnuts Can Be Lifted Out of the Hot Vessel at a Time without Breaking the Soft Crust

Right, Broiler for Gas Ranges Is Perforated to Allow Grease to Run Off the Meat, Eliminating the Possibility of the Grease Catching Fire; Made of Aluminum, the Broiler Heats Quickly



Below, Iron Hangers for Flower Boxes Require Little Effort and No Tools to Install



ACCELERATOR WORKS STARTER WHEN PEDAL IS PRESSED



Starter for the Ford Which Turns the Motor When the Accelerator Pedal Is Pressed

Driving the Ford V-8 is further simplified by equipping the car with an accelerator starter, a compact little accessory which starts the car when the accelerator pedal is pressed. When the engine is started, the circuit is broken automatically and the pedal becomes the regular accelerator. Should the engine stall in traffic, it is restarted merely by pressing the pedal without removing the foot from it. The starter cannot be engaged while the engine is running, no difference how far it is depressed. It is claimed this device protects starter gears and battery, reduces overchoking and saves fuel. It is easy to install and does not change the "feel" of the accelerator pedal.

AUTO POLISHER HAS RESERVOIR FOR WAX IN THE HANDLE



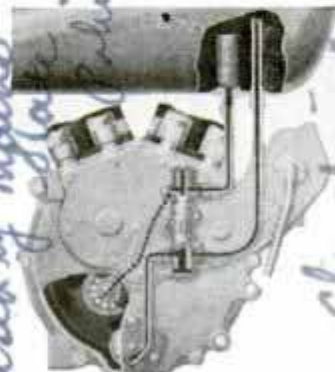
Waxing the automobile is made an easier task by using a polishing pad like an eraser with a reservoir for the wax in the handle. The pad consists of a felt base to which a

wooden handle is cemented. This handle is shaped to provide a comfortable grip

for the hand and is hollow so the wax can be poured inside. A cork prevents the wax from spilling when the pad is laid on its side and the reservoir contains enough wax to go over the car with one filling.

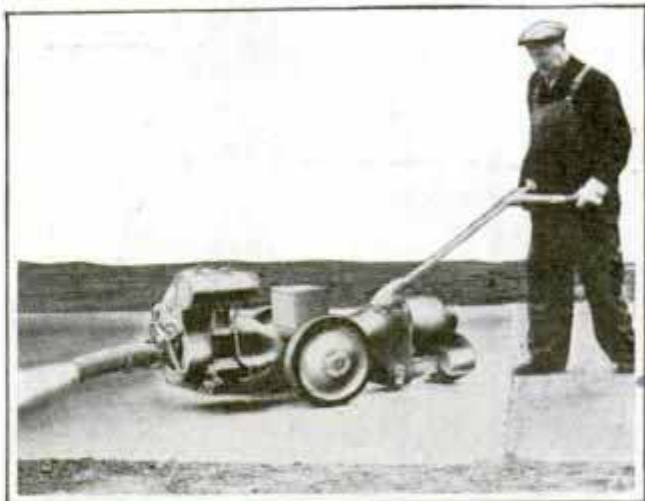
DRY SUMP OILING SYSTEM USED ON MOTORCYCLE

Dry sump oiling like that used in some airplane motors is being applied to the motorcycle to improve engine performance. Instead of the oil being stored in the engine base, it is placed in the oil tank. A powerful pump driven from one of the camshafts circulates fresh oil through the motor. One pipe takes cool oil from the tank to the engine while another returns warm oil to the tank for cooling.



ONE-MAN CONCRETE LEVELER SMOOTHS OUT ROADS

Operated by one man, a small concrete leveling machine has been developed for smoothing out roadways, sidewalks and other concrete surfaces. It is driven by a gasoline engine. Cutters running at high speed grind down high spots in the con-



Concrete Leveling Machine Grinds Down the High Spots to Make Roadway Smooth

crete surface, the dust being removed by a special collecting system so that the cutting head always works on a clean surface.

105.
162 N. Franklin Chicago
Salap 85 00
Road
only
Howard Howell
356 S. Main
Los Angeles
D678
Littlefield
mg.
Essoite Co
5735 Esrenshaw Blvd

D 440
Used by engine
Chrysler Motorcycle
50 S. J. M. Clary Toledo, Ohio
American Floor Surface Machine



TUNING *for* Short WAVES

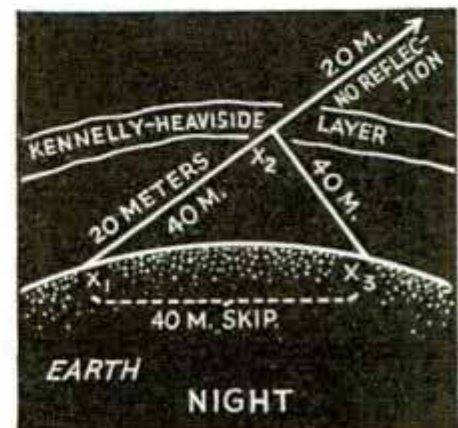
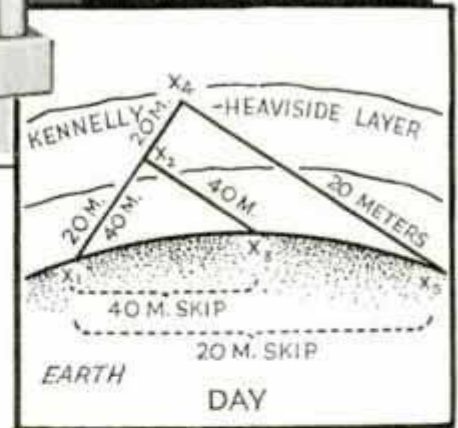


By **FRANK L. BRITTIN**

SKILL in tuning for short-wave stations really means nothing more than knowing when and where to tune. Many of the foreign stations change their wavelengths and schedules without notice, therefore it is necessary to have an up-to-date and accurate list to determine the time of day that these distant transmitters are on the air. With a steady hand, and a little patience, anyone can tune in foreign programs even with a small short-wave receiver. A good antenna is important and it should be of either the shielded or doublet type in noisy locations.

It is quite necessary to know just where the various frequencies, or wavelengths, fall on the dial. These points are found by locating as many stations as possible and marking the exact spot on the tuning dial. The short-wave lists now available will give you the wave-

(Continued to page 120A)



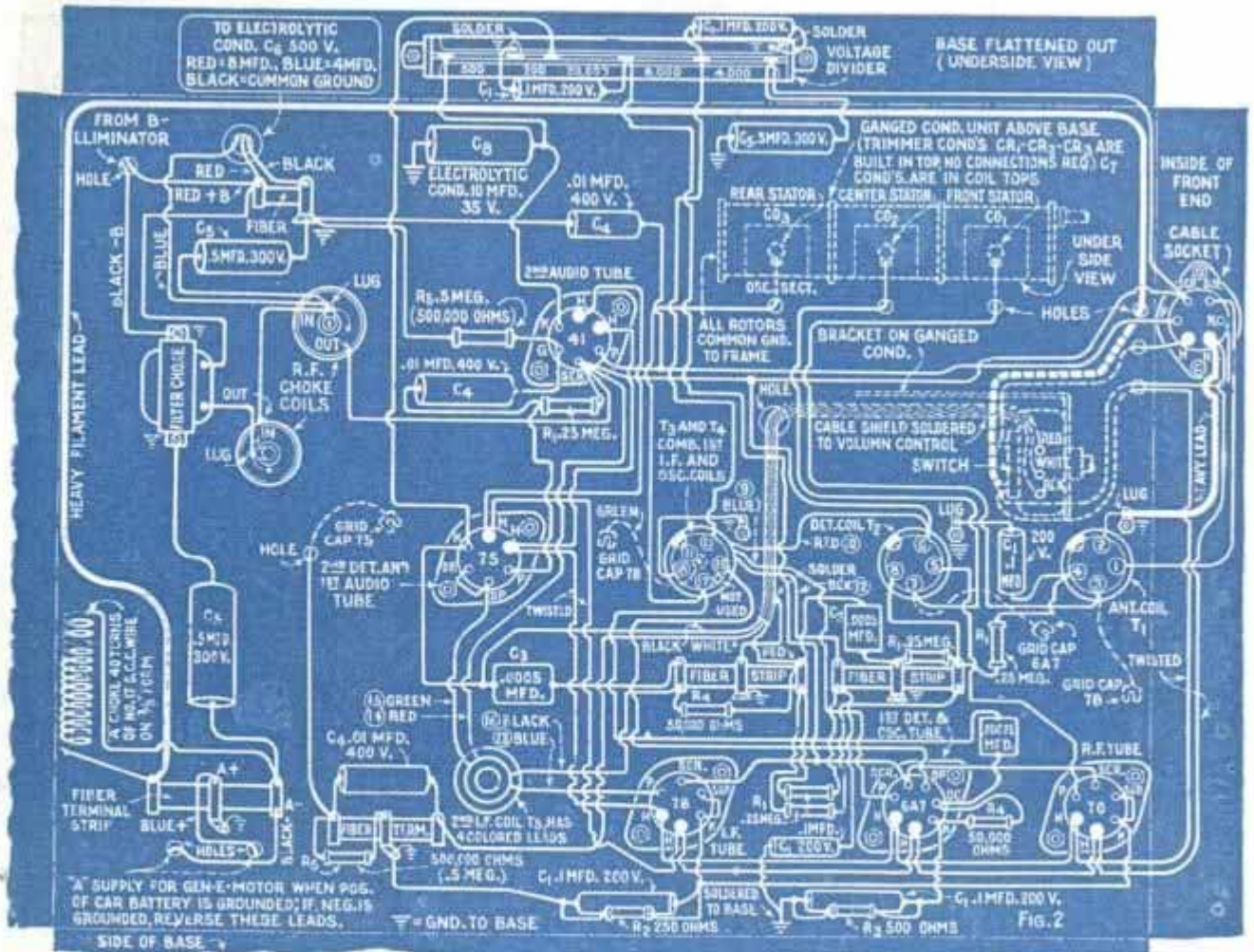


Installing the AUTO RECEIVER

PART II

WITH all parts mounted on the base, as shown in the photo on the opposite page, the various coil and socket terminals should be in the positions indicated in the simplified wiring diagram, Fig. 2, as viewed

from the under side. The tube-socket positions are easily located by means of the large heater-prong openings indicated by the black dots. Coils T_1 , T_2 and the combination coil, T_3 and T_4 , are mounted so that the small wooden dowels, which support the coils in the shield cans, are in the positions shown. The various soldering-lug terminals for these special litz-wound coils are numbered. The combination coil also has four colored leads which are numbered in this diagram to correspond with diagram, Fig. 1, that appeared in the Au-

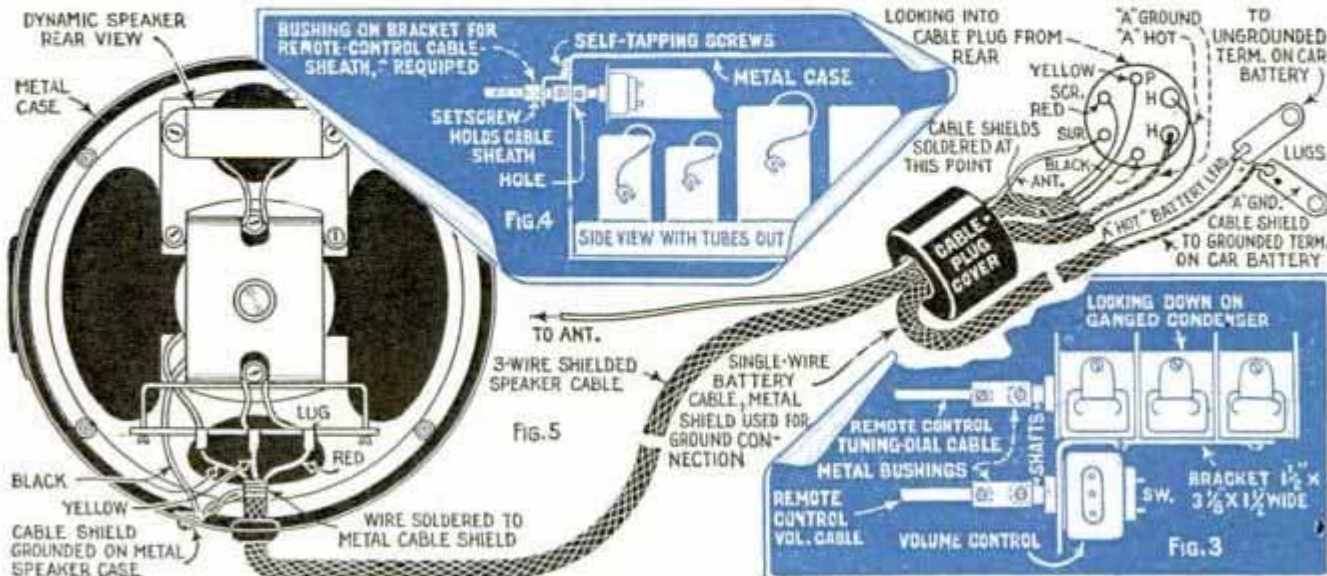
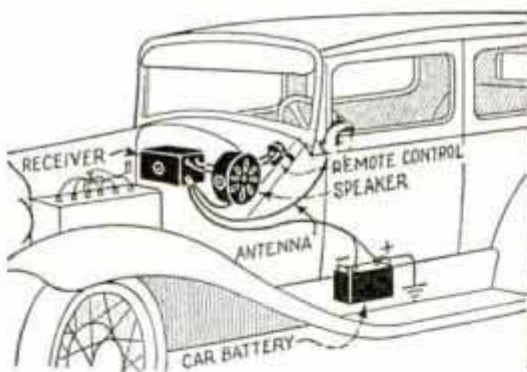
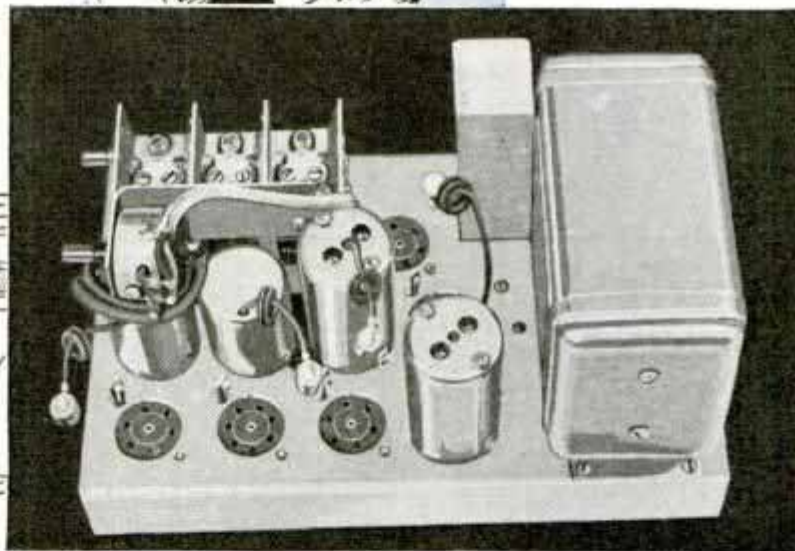


ALL-ELECTRIC



gust issue. All leads should be as short and direct as possible; the resistors and fixed condensers are provided with pig-tailed leads that should be soldered firmly with a good grade of rosin-core solder. Heavy insulated flexible wire of a gauge not less than No. 14 should be used where the heavy leads are indicated in the diagram. The

(Continued to page 114A)

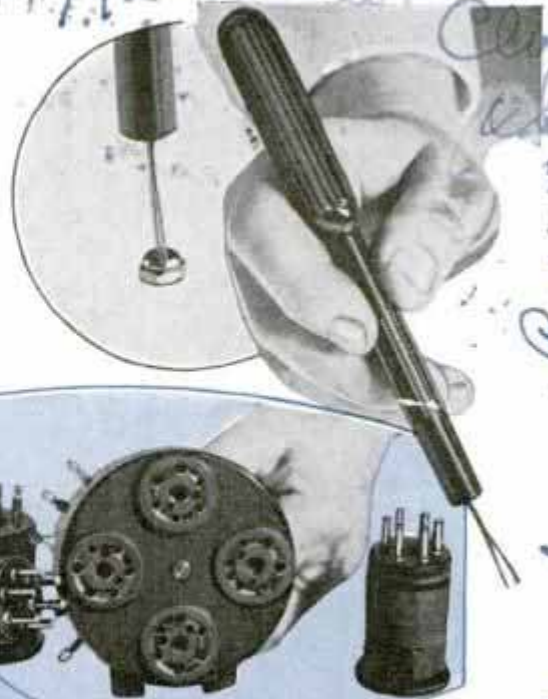


HINTS for RADIO EXPERIMENTERS

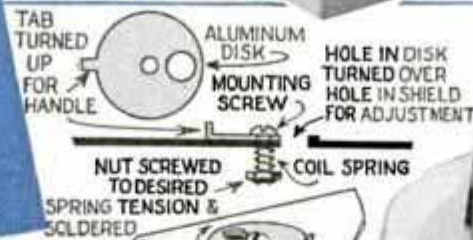
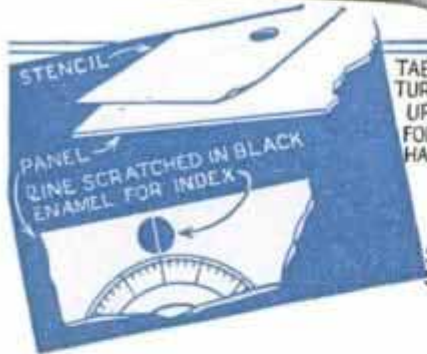


Left, Brass Strip Makes Reducing Bushing for Standard Dial; Right, Screwdriver with Spring Screw Grippers for Awkward Places

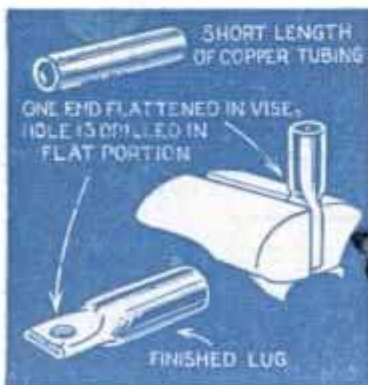
3/16" CONDENSER SHAFT



Variable Coil-Selector Unit for Building Short-Wave or All-Wave Receivers, Can Be Used Singly for Small Sets and Double, or Triple, for Multi-Tube Receivers; Left, Method of Mounting for Front-Panel Operation; Below, Dustproof Adjustment-Hole Cover



Above, Easily Made Index Mark for Tuning Dials; Below, Handy Soldering Lugs Quickly Formed from Copper Tubing



Above, Small 1 1/2-Volt Dry-Cell Now Available for Portable Receivers, and Test Sets, Is Less Than Half the Size of the Usual No. 6 Cells Commonly Employed as A-Batteries for Tube Filament Supply; Left, Extremely Lightweight Low-Loss Transposition Blocks for Doublet Receiving-Antenna Feeder Lines

national
61 Sherman
malden
mass
Bright Co
11,340 W. Justice
Chicago



Conn
General Electric Co. Bridgeport
Conn
Coupling Transformer for Portable 5-Meter Antenna; Above, Installation Showing Feeders Connected

Antenna-Coupling Unit for Five Meters

Designed as a part of the usual 5-meter antenna, this well insulated unit houses the spiral-wound coils for coupling the output of the transmitter to the antenna proper. The method employed was described in the article on the two-way five-meter phone that appeared in the May issue. Two 43-in. brass rods are inserted in each end of the coupling transformer where they are firmly held by the knurled thumbscrews. This efficient antenna is easily portable and works equally well for transmitting or receiving.

D 4566
Permanent-Magnet Dynamic Speaker

Adapted for use in hotels, schools and other public places where a number of speakers are required, this permanent-magnet speaker is claimed to have excellent tone and volume. The magnetic air-gap is shielded against the entrance of metallic particles and dust, a common source of trouble in speakers of this variety.



2530 Superior Ave.
The Rola Co. Inc.
Cleveland Ohio
It will greatly improve the performance of battery-operated sets where it is impractical to apply energy for the usual dynamic speaker.

D 4572
Test Oscillator Operates on A.C. or D.C.

This handy signal generator enables the service man to accurately line up and check the sensitivity of receivers. A.C. or D.C. line operation eliminates batteries and decreases the weight. All coils are separately shielded and the electron-coupled circuit is very efficient. Calibration charts are done away with by means of a snap-position frequency-selector switch on the front panel. When this control is set, the exact desired frequency is obtained and the usual errors from inaccurate tuning are not possible.



D 4550
Auto Receiver Is Portable

Placed on the seat of the car, this auto set may be operated by the driver or passenger with equal ease. The sloped case can be used as an arm rest if desired. It may be picked up and carried into the house where it performs as efficiently using a.c. for power as when operating in the auto with the 6-volt car battery.



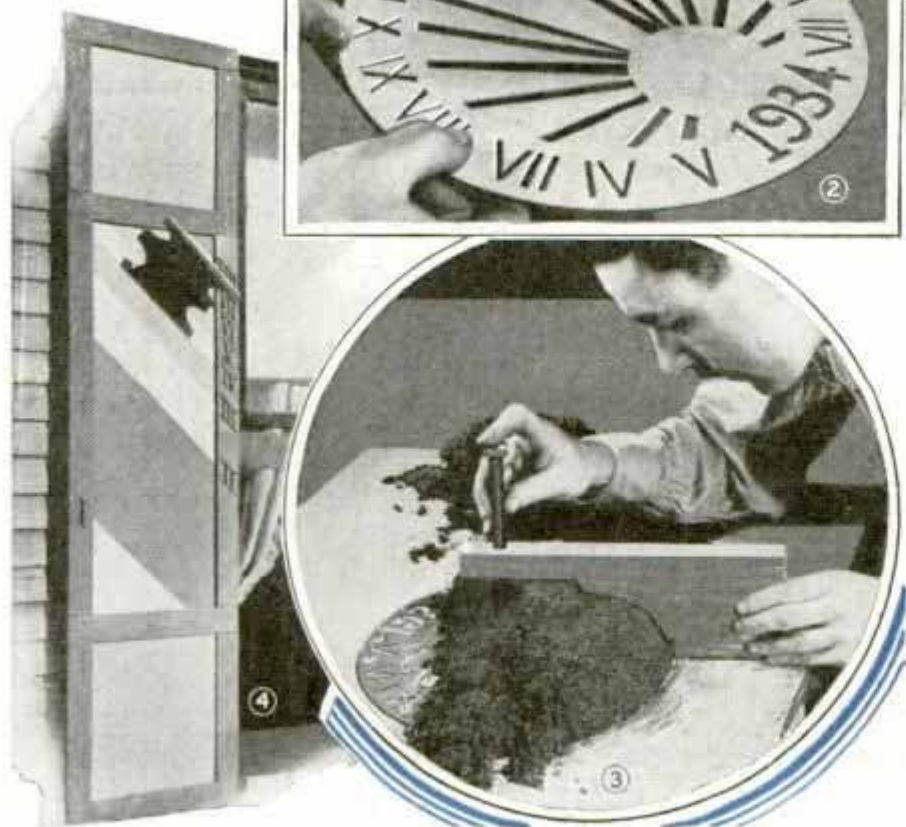
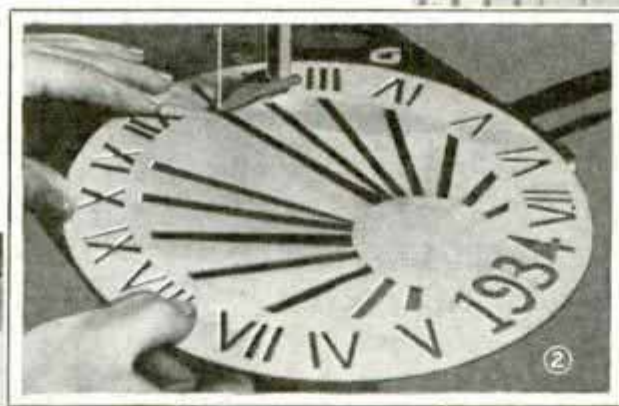
Portable Auto Set with Built-In Speaker at Front; Handle Snaps Down in a Recess

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

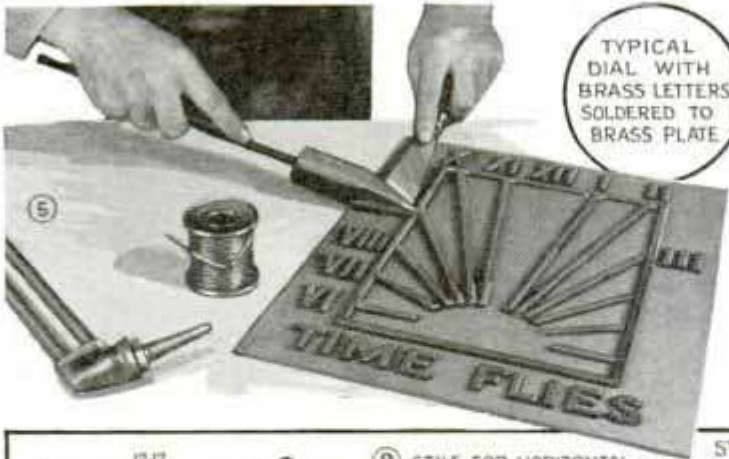


Novel Styles in SUNDIALS

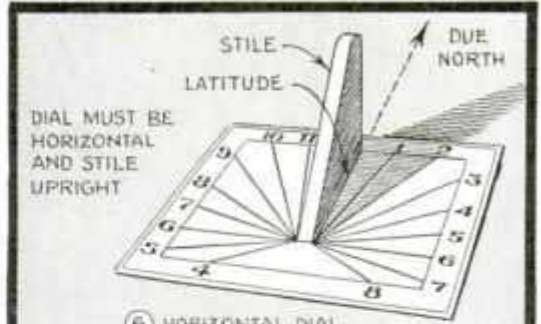
THE day is long since past when sundials were necessary as timekeepers, but they still serve in decorating the home grounds while retaining the ever-satisfying capacity to actually tell time. They may add a decorative touch to the garden gate, Fig. 1, window shutters, Fig. 4, and flower boxes, Fig. 14. The older pedestal dial is not, of course, out of the picture. Cut from thin brass on a modern scroll



saw as in Fig. 2, this type of dial can be combined with colored concrete to form an attractive unit. Fig. 5 pictures another form of easily made dial—a brass plate on which is soldered the necessary hour lines and numbers. The letters can be cut with a metal cutting saw or simply made up from straight lengths of $\frac{1}{8}$ by $\frac{1}{4}$ -in. brass stock. The hour lines are not fixed like a clock, but vary considerably according to the locality in which

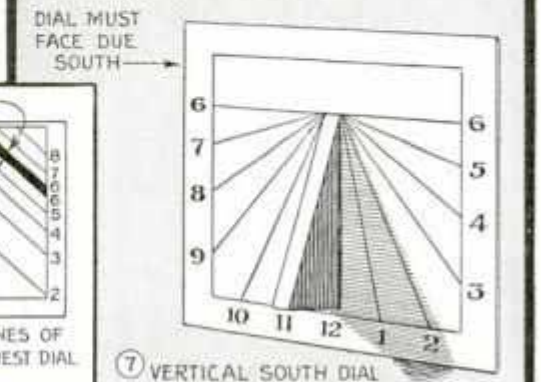


TYPICAL DIAL WITH BRASS LETTERS SOLDERED TO BRASS PLATE



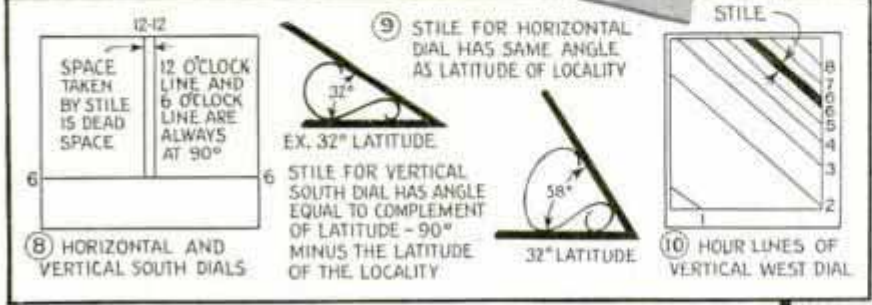
DIAL MUST BE HORIZONTAL AND STILE UPRIGHT

⑥ HORIZONTAL DIAL



DIAL MUST FACE DUE SOUTH

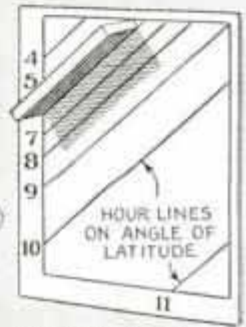
⑦ VERTICAL SOUTH DIAL



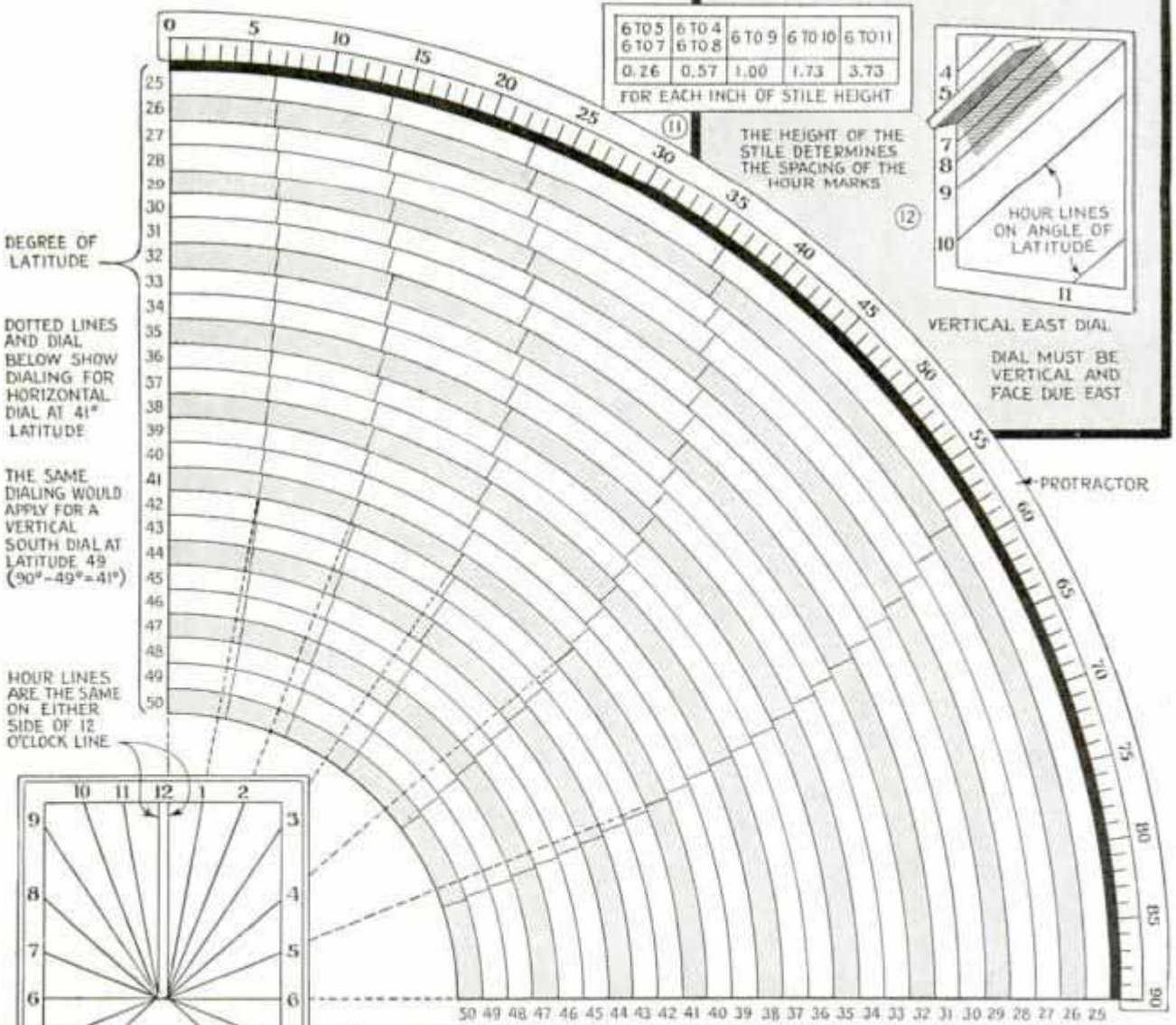
⑧ HORIZONTAL AND VERTICAL SOUTH DIALS

6 TO 5	6 TO 4	6 TO 3	6 TO 2	6 TO 1
6 TO 7	6 TO 8	6 TO 9	6 TO 10	6 TO 11
0.26	0.57	1.00	1.73	3.73

FOR EACH INCH OF STILE HEIGHT



VERTICAL EAST DIAL
 DIAL MUST BE VERTICAL AND FACE DUE EAST

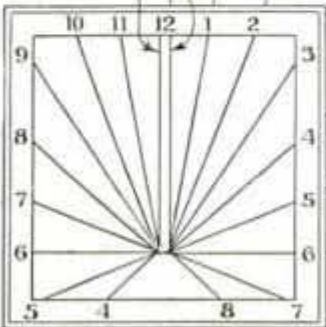


DEGREE OF LATITUDE

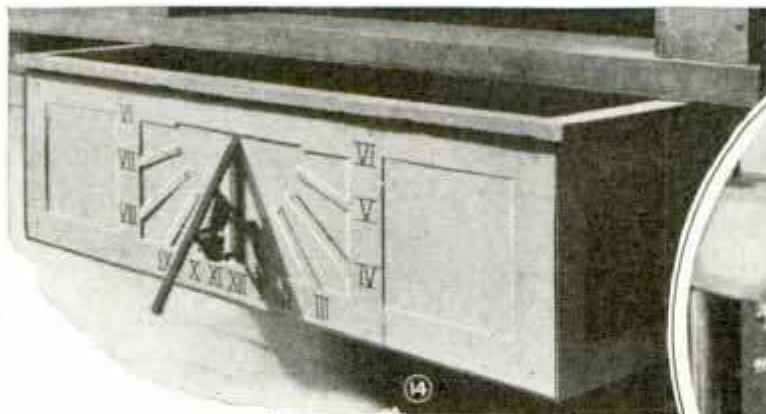
DOTTED LINES AND DIAL BELOW SHOW DIALING FOR HORIZONTAL DIAL AT 41° LATITUDE

THE SAME DIALING WOULD APPLY FOR A VERTICAL SOUTH DIAL AT LATITUDE 49° (90° - 49° = 41°)

HOUR LINES ARE THE SAME ON EITHER SIDE OF 12 O'CLOCK LINE

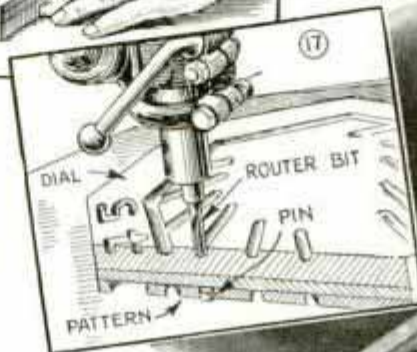
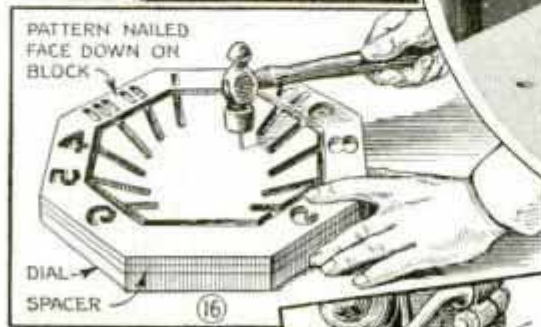


⑬ DIAGRAM SHOWING DIALING FOR HORIZONTAL AND VERTICAL SOUTH SUNDIALS BETWEEN LATITUDE 25° AND LATITUDE 50°



the dial is used. The basic factor is latitude, indicated on maps by lines running across them, parallel to the equator. All of the United States and part of Canada and Mexico lie between latitude 25° to latitude 50° . Find the latitude of your own locality and you have the one necessary fact which you need in making any sundial.

Proper dialing is made very simple by the diagram shown in Fig. 13. The hour marks, 1, 2, 3, 4 and 5 o'clock, can be readily varied to suit your own latitude by simply projecting these marks from the proper degree circle in the drawing. The 12-o'clock line and the 6-o'clock line are always at right angles on horizontal and vertical south dials, as in Fig. 8. The hour marks, 11, 10, 9, 8 and 7 o'clock, are set off at the same angles as the 1 to 5-o'clock marks. Four and 5 o'clock in the morning and 7 and 8 o'clock in the evening are simply continuations across the face of the dial. On horizontal dials the stile must have an angle equal to the latitude of the locality, and the point must come exactly on the 6-o'clock line, as shown in Fig. 6. The 12-o'clock line must point due north. The stile for a vertical south dial, Fig. 7, must have an angle equal to the complement of the latitude, that is, 90° minus the latitude of the place, as shown in Fig. 9. Vertical south dials must face due south, with the stile at right angles to the dial face. Fig. 12 shows a vertical east dial. The hour lines here are the same for all localities, but they must make an angle



with the horizon equal to the latitude of the place. Spacing is determined by the height of the stile, allowing the dimensions shown in Fig. 11 for each inch of stile height. The vertical west sundial is made on the same order, with the exception that the hour lines are exactly opposite, as shown in Fig. 10.

Dials are best made from metal, but wood is also used. In routing a wood design, the pattern is first cut on the scroll saw and then nailed face down to the dial block, as shown in Fig. 16. A guide pin is then set in an auxiliary drill-press table and the dial is routed as in Figs. 15 and 17. The router bit will duplicate the cut-out pattern exactly. The same method can be used with metal tools in marking a metal dial. Forming a concrete dial block directly on the dial is shown in Fig. 3. Stiles can be made from solid metal, wrought iron, or they can be cast. Simple silhouettes can be cut from plate stock and riveted in place between the two arms to give added interest, as shown in Fig. 18.



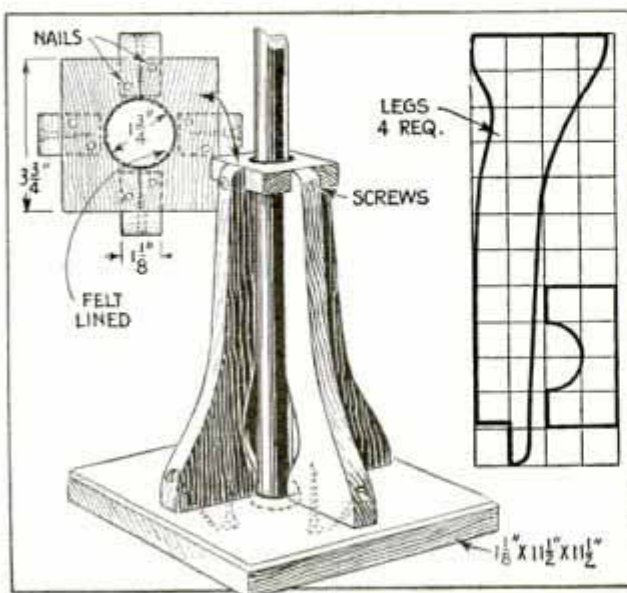
Washboard Held in Tub with Clamps Reduces Back Strain When Rubbing Clothes

Clamps Hold Washboard on Side of Tub

You can make washday easier for your wife by fixing her washboard so that she will not have to stand in a cramped position to hold it in a tub. Make two steel clamps and screw them to the bottom of the board so that they can be slipped over the edge of the tub as shown.

Portable Flag-Pole Stand

Although portable and light in weight, this flag-pole stand is sturdy enough to support a large flag, depending upon the size of the base. Four legs are sawed to the shape shown and are then screwed at

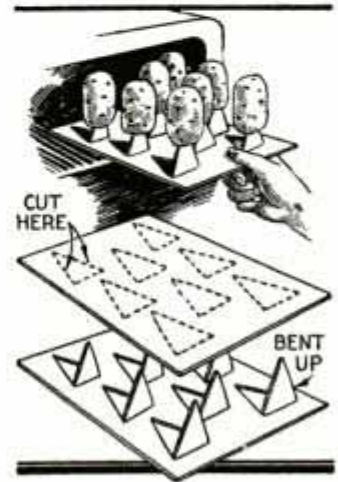


This Portable Flag-Pole Stand Is Lightweight and Will Support a Large Flag

the top to a square block which has been drilled through the center to take the flag pole, and to the base at the bottom. The base is drilled also in the center, about half-way through, to support the end of the pole.—A. C. Ullrich, Park Ridge, Ill.

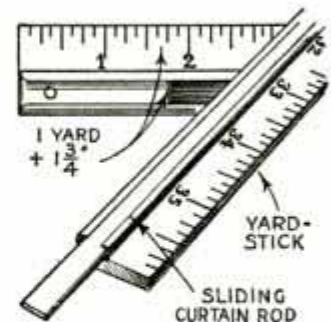
Holder for Baking Vegetables

Here is a simple holder made of sheet metal for baking vegetables in an oven. With a cold chisel, a number of triangular-shaped pieces are cut in the metal and bent upward as shown in the detail. In use, the vegetables are slipped over the pointed projections and the holder is put into the oven where the vegetables bake evenly without danger of burning, and without the bother of turning them.



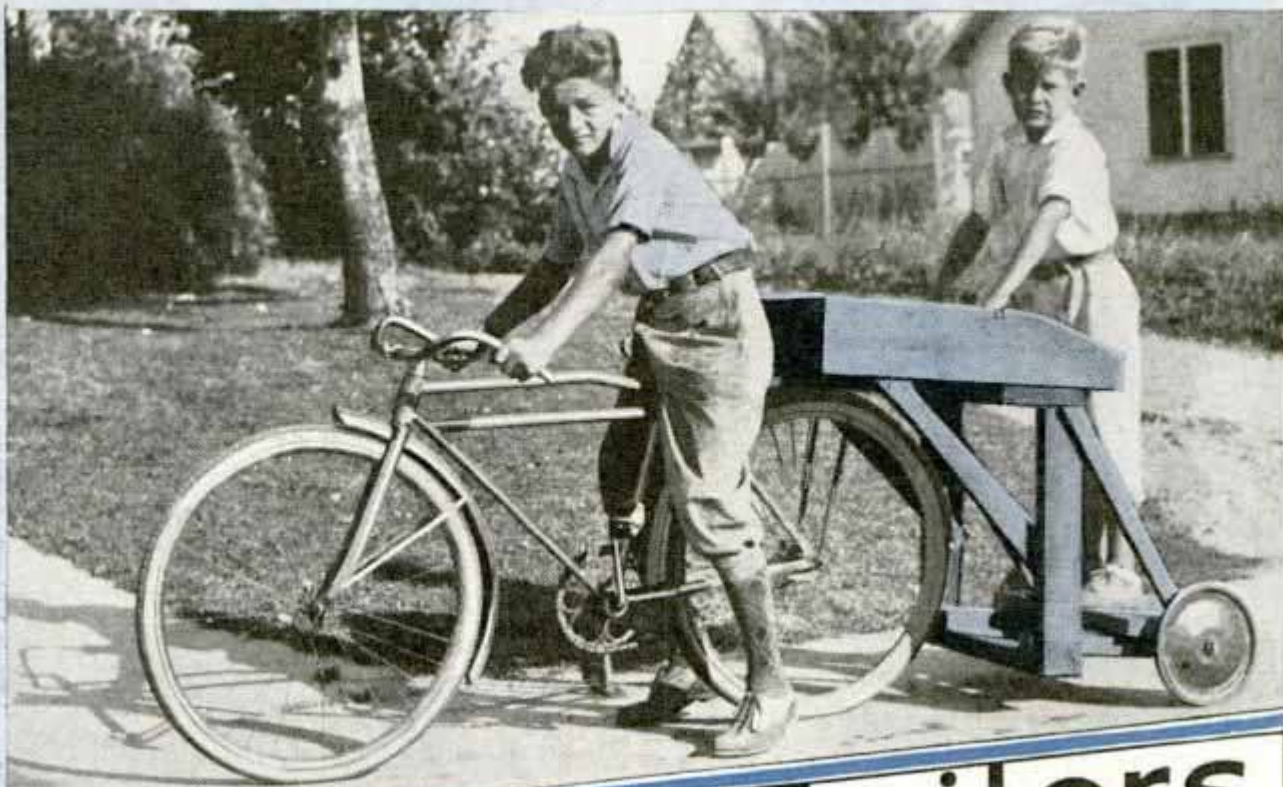
Making a Yardstick Adjustable

For measuring windows, doorways and other large openings, an adjustable device can be had by tacking the channeled half of a sliding curtain rod to a yardstick. A metal slide exactly the same length as the yardstick is then fitted into the channeled part. The slide need not be graduated if it is moved to the right, as the reading on the yardstick at the left end of the slide indicates the length of the portion pulled out.—Lester P. Young, Culver, Ind.



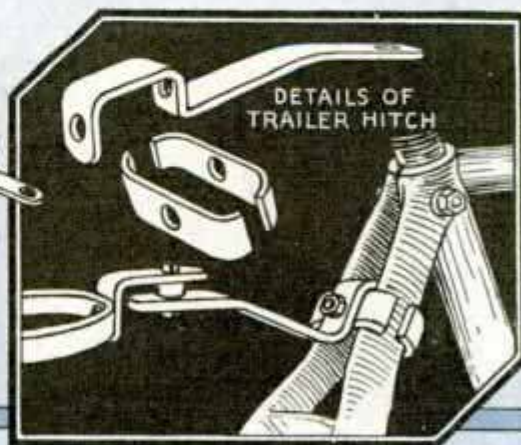
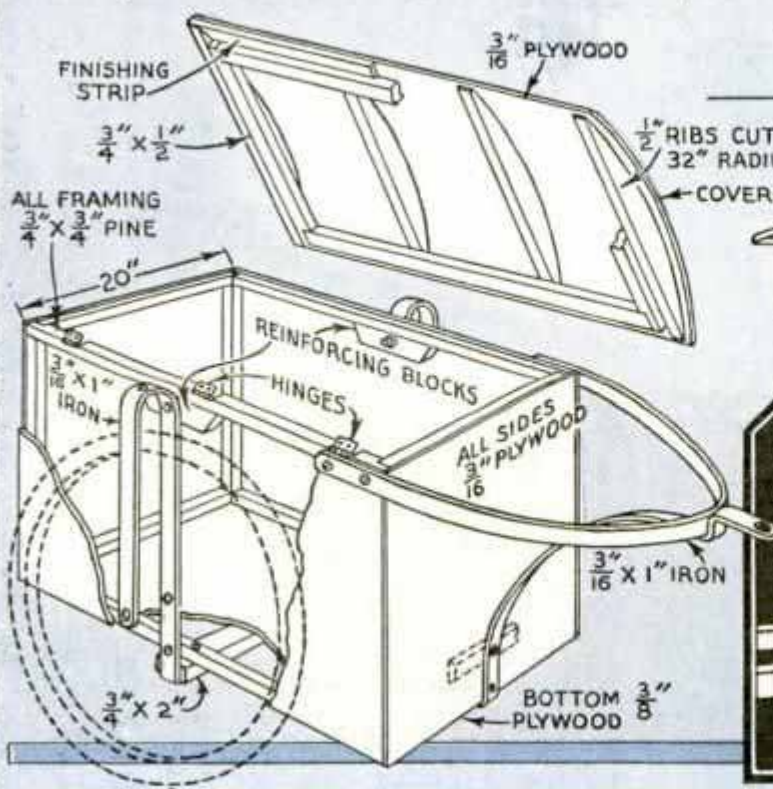
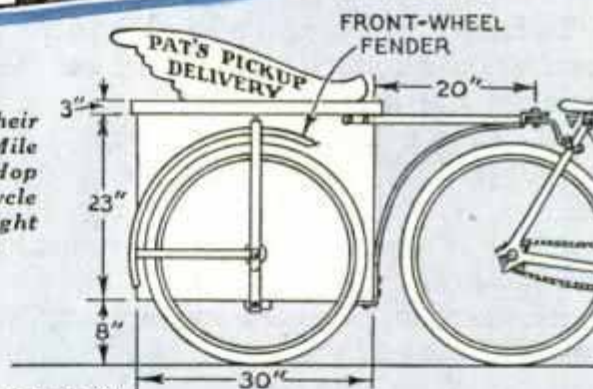
Paraffin Seals Ink Bottle

If it is necessary to carry a bottle of ink in your purse or suitcase, dip the stoppered end in melted paraffin and let it harden. Repeat the dipping as many times as necessary to get a heavy coating of the wax over the stopper to seal it.



Bicycle Trailers

Above, Carl and Dick Gemin, of Dayton, Ohio, with Their Newspaper Delivery Trailer, Used to Cover a 5-Mile Route. Notice the Low Platform Enabling One to Hop On and Off. The Front Slips over a Pin on the Bicycle so That the Trailer Is Quickly Removed. Below, Light Plywood Trailer, with Hinged or Removable Top





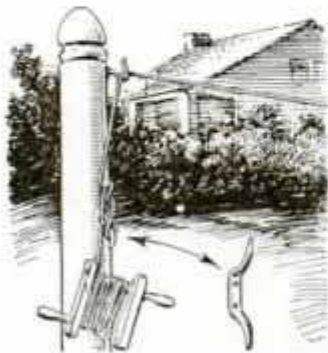
Inner Tube Cut to Shape and Fitted with Hooks Holds Pad on Ironing Board

Handy Method of Holding Pad on Ironing Board

To keep a pad stretched tightly over an ironing board, yet permit it to be removed quickly, the arrangement shown can be used. Take a length of inner tube, cut it as indicated by the shaded parts in the drawing, and fit the remaining short sections with wire hooks. After stretching the pad over the board, the hooks are fastened into buttonholes made along the edges of the pad.

Claw for Fastening Clothesline to Support Post

Screwed to a support post within easy reach, a wood or metal claw provides an effective means of fastening the end of a clothesline without stretching to reach the hook at the top of the post. This is better than the usual method of tying the rope end to the post as it eliminates knots,



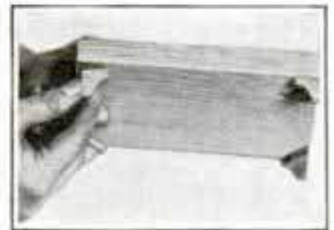
which usually slip and permit the line to sag.—George E. Kilpatrick, Jr., Drexel Hill, Pa.

Cleaning Typewriters and Printing Plates Safely

Gasoline and naphtha, which are highly inflammable and accordingly somewhat hazardous when used for cleaning typewriter type, printing plates and printing presses, may be replaced with carbon tetrachloride for these operations. Carbon tetrachloride is noninflammable and its fumes are no more toxic than those of gasoline. If the room where it is used is well ventilated, the fumes are carried away.

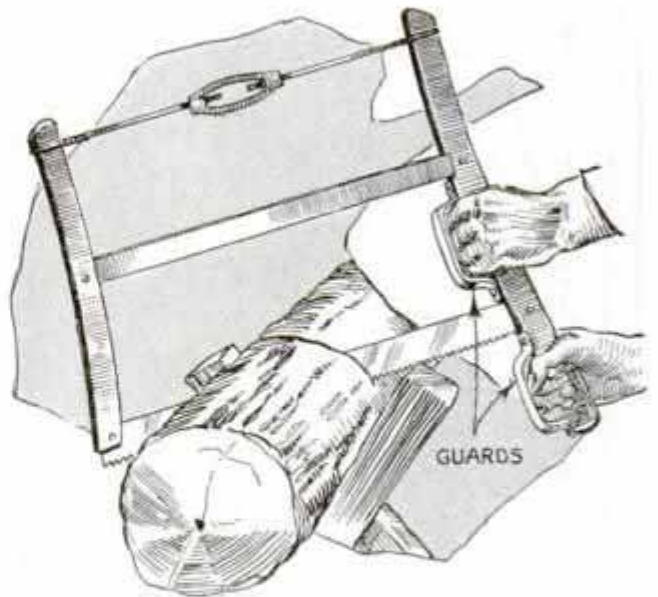
Sections of Molding Used as Feet for Small Boxes

Small V-shaped sections cut from a strip of molding make serviceable feet for small boxes and instrument bases. The feet should be sanded and finished to match the box or base before they are glued in place.—R. B. Wailes, Bethesda, Maryland.



Guards on Bucksaw Protect Hands

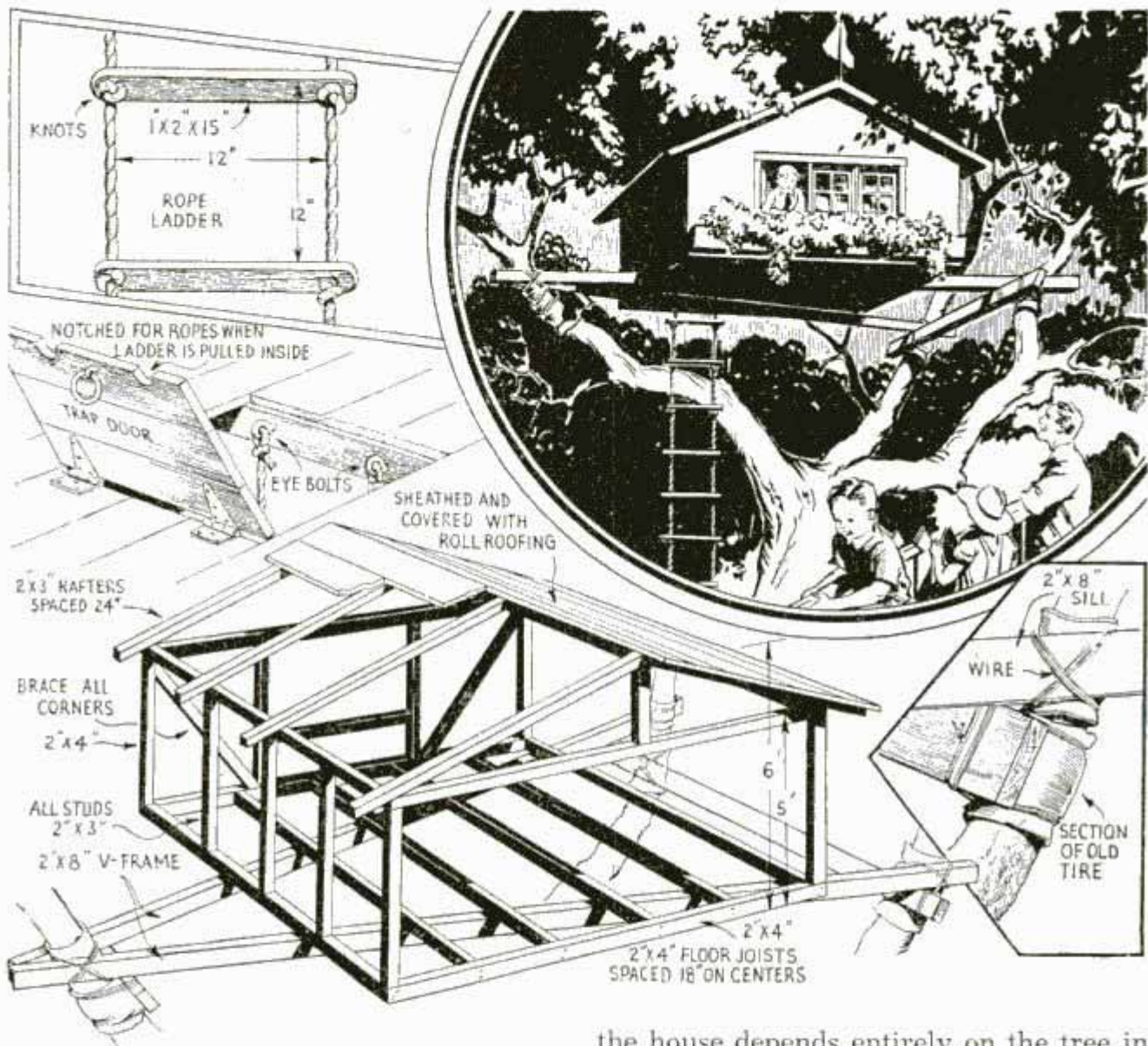
Screwed to the handle of a bucksaw as shown, a couple of door pulls will serve as hand guards if too long a stroke is made



Metal Guards on Bucksaw Handle Protect Knuckles If too Long Stroke Is Taken with the Saw

with the saw. If door pulls are not available, the guards can be made from strips of flat iron.

Aerial House Has Three-Point Suspension



By erecting this little clubhouse in a tree on a V-frame, supported at three points, the structural strains due to rocking in high winds are almost entirely eliminated. If there are only two branches of substantial diameter in the tree, a third one, much smaller, can be utilized by locating most of the weight near the heavier ones. The first thing to do is to lash a short 2 by 6-in. plank to two branches about six feet above the floor level of the proposed structure. The V-frame should be fairly heavy material, and should be lashed to the branches in the manner shown. Sections of old auto tires wrapped around the branches will prevent the wire from cutting into the bark and damaging the tree. Upon the V-frame, lay the floor joist. No plan dimensions are given, as the size of

the house depends entirely on the tree in which it is built. The height at the eaves should be about 5 ft., with a clearance of 6 ft. under the ridge pole, or peak of the roof. Allow for the windows in your framing, and brace all corners with diagonals, which is important in a tree house. Lay the floor and cut a hatchway between two of the floor joist. The trap door is made as shown, and is hinged at one side. Sheath the sides and roof of the house with $\frac{3}{4}$ -in. material and cover the latter with roll roofing. Unless shingles or tar paper are used on the sides, the boards should be ship-lapped to prevent rain from seeping in. End windows should be hinged at the top with a bracket arranged to hold them open when ventilation is required.

❏ Instead of ironing tea towels, fold them neatly and run them through a wringer.

Refer me to Paul Sutton, 612 Leary & Luce, Chicago

The Secrets of



A. & P. Photos



"Babe" Ruth at the Marionette Carnival of the 1933 Century of Progress, Autographing the Bat of the Marionette Babe Ruth



By RUFUS ROSE

PART II

ARTISTS' oil paints, obtainable in tubes, offer the best medium for painting marionettes. Flat white paint is used as a ground color to cover all exposed parts. When dry, white enamel is used to get a gloss on the teeth and eyeballs, using a small camel's-hair brush as in Fig. 30. To get flesh color, mix burnt sienna with flat white paint, sometimes adding small quantities of red, yellow or blue to bring out various skin shades. Apply a spot of vermilion in the center of each cheek and blend it into the flesh color of the face. The lips are painted with a suitable mixture of vermilion and burnt sienna. Shades of blue or brown, or a mixture of both, are used to make eye shadows and lines to imitate wrinkles in the face and hands.

There are several methods of wiggling, depending on the kind of marionette. In

Making



some cases, it may be advisable to cast the hair in plastic wood. This simple method is often used for male characters having short hair. Other wigs may be made from a ten-cent switch, a sheepskin dusting mit, or even from embroidery silk or wool yarn. In making a wig from a switch, the hair is sewed to a cloth skull cap as in Fig. 28. After fastening it to the head, it is trimmed to suit with a pair of small scissors, Fig. 29. After gluing the wig to the head, it is often advisable to sew the hair down loosely with colored thread, to hold it in order.

The materials used in costuming a marionette must, in general, be soft and pliable. You can dye fabrics to suit your needs. It is a good idea to make paper patterns for all parts, as in Fig. 33. Be sure to cut the material large enough so that the clothes will not fit tightly over the joints. Careful sewing with a sewing machine, Fig. 32, is necessary as the clothes must stand lots of wear and abuse. When selecting colors for costumes, the stage effect is the important thing to consider. It is advisable to try the colors and textures under the lights to be used. A colored light makes its complementary color look gray, as a red light on a green costume. A light of the same color will



greatly intensify it. As the costumes are usually seen from some distance, it is well to use exaggerated intensities of the colors desired. Certain parts of a costume, such as leggings, may be tacked to the marionette's body, as in Fig. 34.

Ordinarily, when a character appears in completely different costumes during the course of a play, it is advisable to make two separate marionettes of the character. However, it is possible to arrange one costume to be worn over the other, so it may be removed or added for the change. Because of the control strings, a remov-



able costume must have provision made by slits to allow the costume to come off. When the removable costume is worn, the slits are concealed by snap fasteners. In this way the sleeves may be slit up to the shoulders and the coat slit up the center to the single rear control string. It then becomes an easy matter to remove the coat as in Fig. 31. If the ankle joint is well made, the stockings and the modeled shoe are painted in black enamel. If for any reason you wish to make stockings, they can be sewed up the back of the legs. The stocking material should be brought under the bottom of the foot and the shoe and fitted over it to form a neat joint. Shoes are made of thin leather, which is soaked so that it will take the shape of the foot. Its edges are carried under the foot all around and anchored there by the thick leather sole and heel tacked to the bottom of the foot with brads. Marionette jewelry can be made over from ten-cent store jewelry, but it is important that it be held in place close to the marionette so that it will not tangle the control strings.



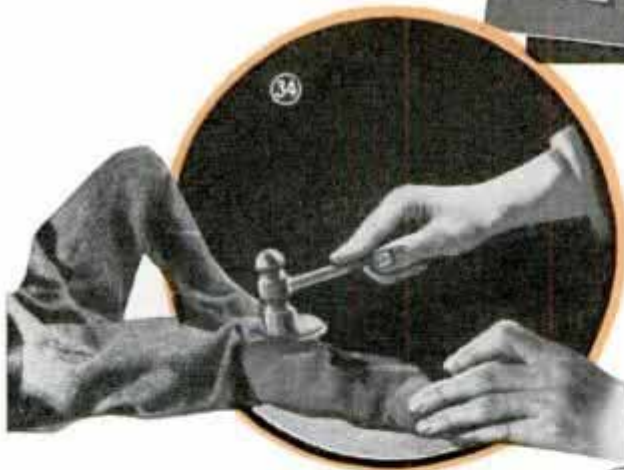
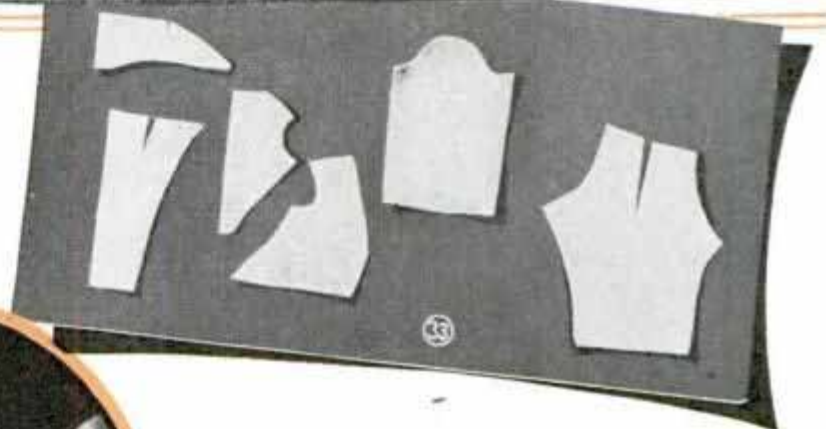
Paper fasteners make good brass buttons.

The conventional type of controller shown in Figs. 35 and 36 is the simplest type used on upright figures. This controller is the base type from which variations are made for more complicated controllers. It provides for the operation of the minimum of nine essential control strings used on all upright figures. The main control bar is 10 to 12 in. long, the foot control bar 11 in. long, and the head control bar 7 in. long. The spring clip, which holds the foot bar when not in use, is fastened by a bolt and wing nut which also



fastens the head bar to the main control bar. The strap, used for hanging the strung marionette on an S-hook, on the puppet rails, is riveted to the head cross bar. A screw eye, through which the shoulder strings pass, is screwed into the underside of the main control bar, halfway between its ends. With a fine-gauge saw, make slits $\frac{1}{2}$ in. deep for the leg strings in the middle of each end of the leg control bar. Do likewise in

the head cross bar for the head strings. Make one slit in the middle of the back end of the main control bar for the back string, and two slits, $\frac{1}{2}$ in. apart, for hand strings, in the front end of the main control bar. Make small notches on either side of all control bars $\frac{3}{4}$ in. from each end. These notches, together with the slits, hold the control strings anchored in correct adjustment. The proper length for the strings is determined by the stage equipment which you use. For the stage, which will be described in the next article, the operator works over what is called a leaning rail. When the marionette stands on the floor of the stage, the top of the controller strap should be 6 in. above the

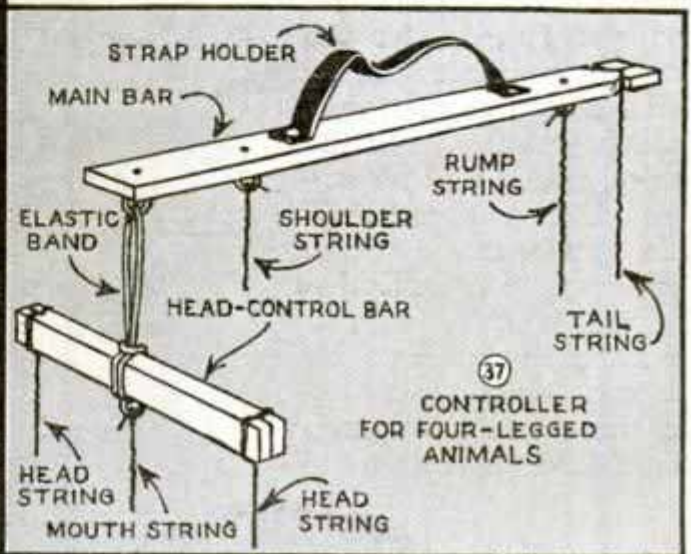
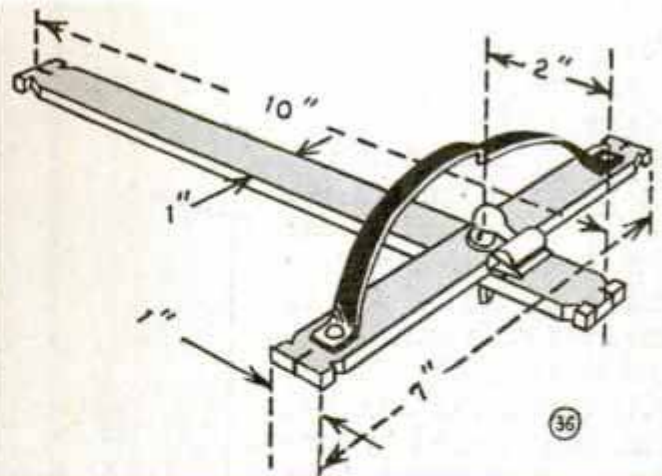


top edge of the leaning rail. If you are making a marionette for use without a stage, the controller is held at elbow height. Hang the controller by the strap to the correct height and cut fishline (black fishline with silk core, 18-lb. test) to correct lengths with the controller parallel to the floor. Allow 10 in. over actual length on all but the shoulder strings, for anchorage to the controller. All strings are attached to the marionette before any of them are anchored to the controller. Tie



the head strings to wire loops on either side of the head. With a large needle, carry the shoulder strings through the costume and tie them to the wire shoulder loops in the chest piece. Do likewise with the back string, tying it to the wire loop at the base of the back of the chest piece.

On a figure with trousers, carry the leg string through each leg of the trousers at a point $\frac{1}{2}$ in. above the knee loops. When the figure wears a dress, carry the leg strings through the costume, 1 in. above the knee loops, and wide enough apart to allow ample leg movement. Drill small holes through each hand at the base of the thumb and fasten the hand strings through the holes by knots on the inside of the hands. Attach the shoulder strings to the controller by tying one shoulder string to a piece of doubled fishline 6 in. long, carrying the doubled line through the screw



eye and tying the other shoulder string to it on the other side of the screw eye. The weight of the marionette is held by shoulder strings, allowing the head to work freely as it is held in position by the head control bar. Attach the back string to the back end of the main control bar and the hand strings to the front end of the main control bar. The leg strings go to the leg control bar so that when the bar is held in the clip, the leg strings are of equal length and slightly slack. When the figure stands erect, the back string is adjusted so that it is taut when the main control bar is parallel to the floor. The hand strings should be taut when each hand hangs at the lowest points. The method of holding the control bars is shown in Fig. 27.

A four-legged animal control bar is shown in Fig. 37. No provision is made for the leg control, as the legs can be made to respond more effectively by having them loosely swung from their joints without strings. Their motion is obtained through rhythmic rocking of the main control bar.

(To be continued)

Potted Plants Nourished with Chemical Pills

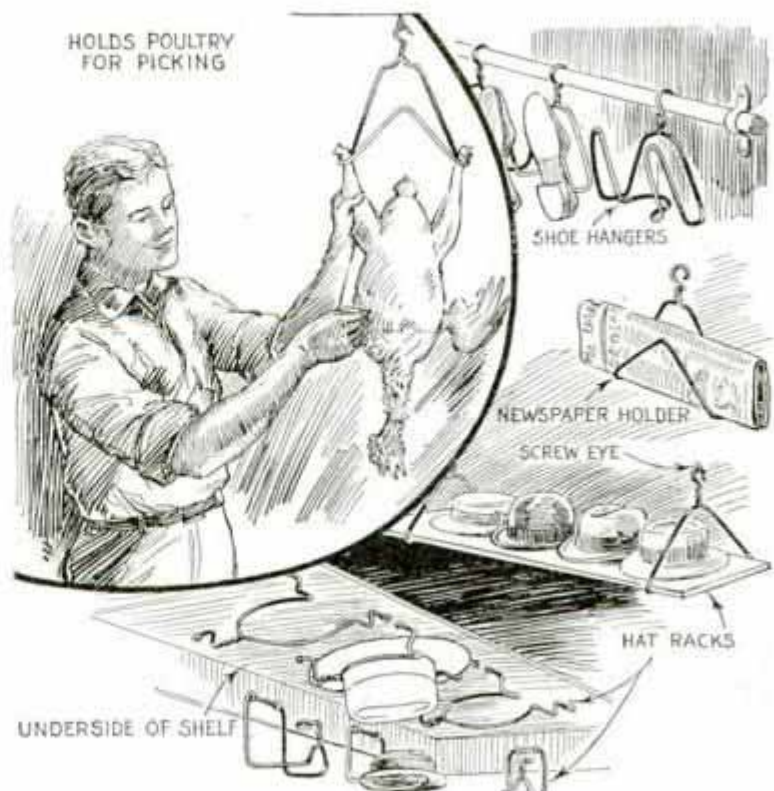


If plants thrive in pots or hotbeds, the soil must contain plenty of nutritious foods, which are chemicals that can be concentrated in small pills and put in the soil. One pill is sufficient to keep the earth in a flower pot replenished for an entire season. To make the pills, soak ordinary sheet gelatine in cold water, and, while it is swelling, mix and grind the following chemicals in a mortar: Sodium phosphate, 1 oz., sodium nitrate, $\frac{1}{2}$ oz., ammonium chloride, 100 grains, magnesia, 25 grains. To this mixture, add an equal amount of powdered slaked lime and mix it well.

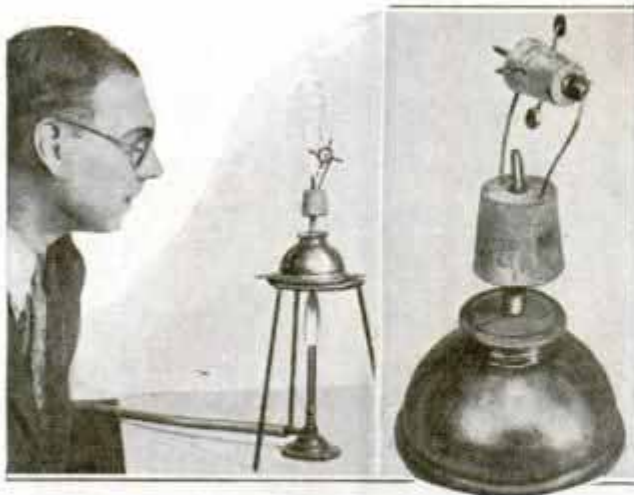
Then remove the gelatine from the water and heat it in a dish until it melts. The gelatine is then added to the compound to make a thick paste, which can be rolled into pills about the size of peas in the palm of the hand. In using the pills, it is best to drop one in a hole made in the earth of each pot with a pencil. Two or three of the pills should be used in hotbeds containing larger quantities of dirt. The pills do not disintegrate when water is added to the soil, but swell and release the chemicals in minute quantities as required.

What You Can Do with Surplus Wire Clothes Hangers

In almost every home there is an excess amount of wire coat hangers that can be put to many uses, some of which are shown. A hanger bent to the proper shape will hold poultry by the legs while picking it, or by bending up the ends of several hangers, they can be used to hold shoes. Hooked into a couple of screw eyes in a closet ceiling or shelf, they make serviceable hat racks. They can also be used as hat racks under a shelf by cutting them in two in the center and screwing them to the shelf as shown in the lower detail. Neat flower trellises can be made by weaving the hangers together, and they can be used to support swinging shelves in basements, closets and similar places. —L. E. Litton, Lincoln, Nebr.



Model Steam Turbine from Oil Can

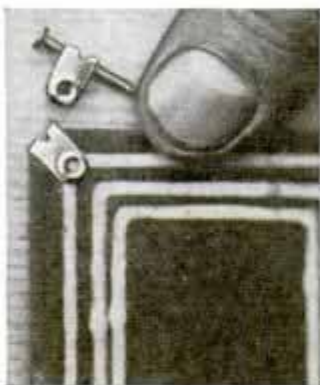


A Bunsen Burner Fires This Model Steam Turbine, Which Uses an Oil-Can Boiler

This model steam turbine utilizes an oil can for a boiler and is fired with a bunsen burner or an alcohol lamp. The rotor is a cork having brass-head tacks pushed into position for blades with the heads bent so that escaping steam strikes the cupped part. A nail serves as an axle for the rotor and turns in bearings formed by bending eyes on the ends of two stiff wires. These are supported by a cork, which is drilled in the center to fit over the spout of the oil can.

Paper Clips Protect Corners of Floor Mats

Clamped over the edges, paper clips, of the type shown, will protect the corners of



linoleum floor mats and keep them from being broken off. Before putting the clips on the mats, bend them over a small nail so that they will fit the corners of the mats snugly.

Killing Ants in Their Burrows

Ants can be destroyed by pouring carbon disulphide into the entrance holes of their burrows. Two tablespoonfuls of the liquid are sufficient for a small burrow, but more will be needed for a larger one. After pouring the chemical into the hole,

immediately press dirt over it to prevent the fumes from escaping. They are heavier than air and will penetrate all chambers of the ant hole. This chemical is highly inflammable and should be handled accordingly.—L. E. Litton, Lincoln, Nebr.

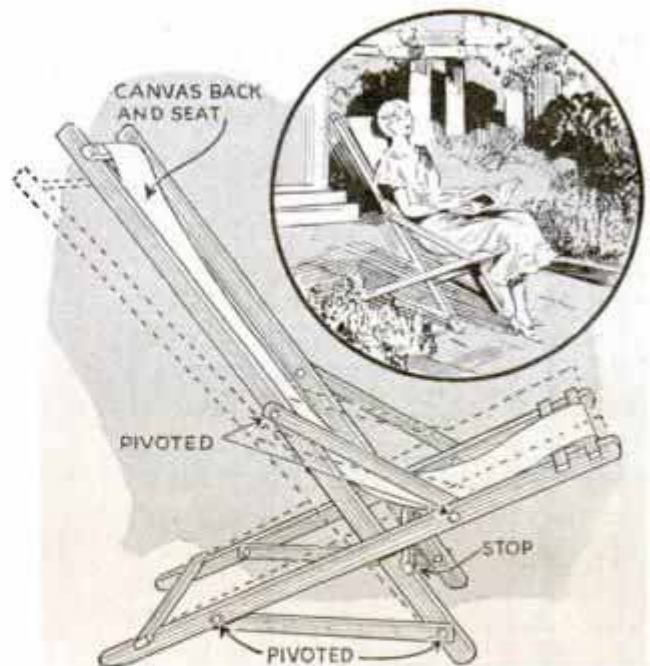
Golf Tees Used as Tiny Pulleys

Small pulleys for operating working models with belts can be had by cutting off the large end of wooden golf tees. The ends of the tees are drilled transversely through the center so that they can be slipped over the shafts of the models. These tees are grooved already around the top so that they will accommodate either a narrow or a wide belt.—Frank W. Bentley, Jr., Missouri Valley, Ia.



Garden Chair Converted into Rocker

Here is a simple method of converting an ordinary garden chair into a comfortable rocker. The rocking motion is made possible by swinging the weight on four

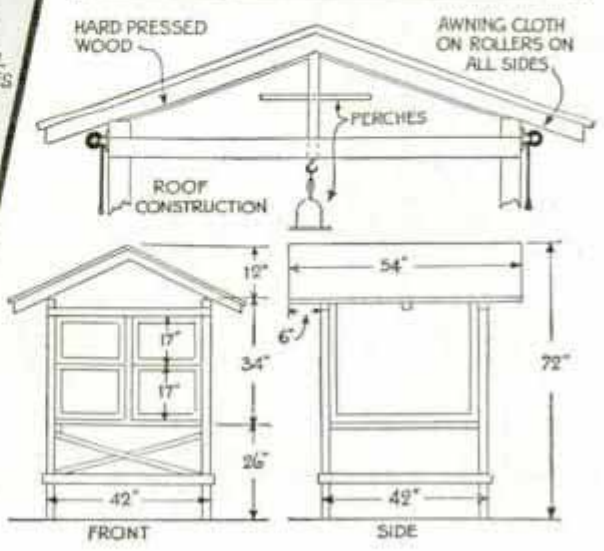
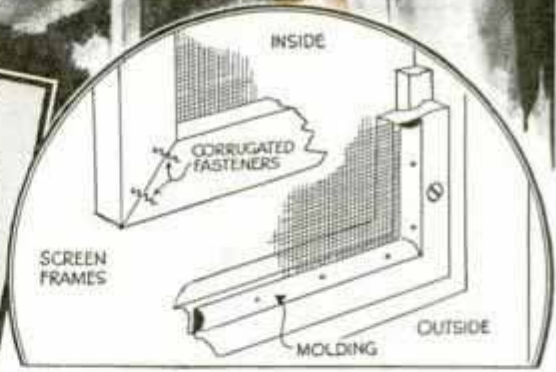
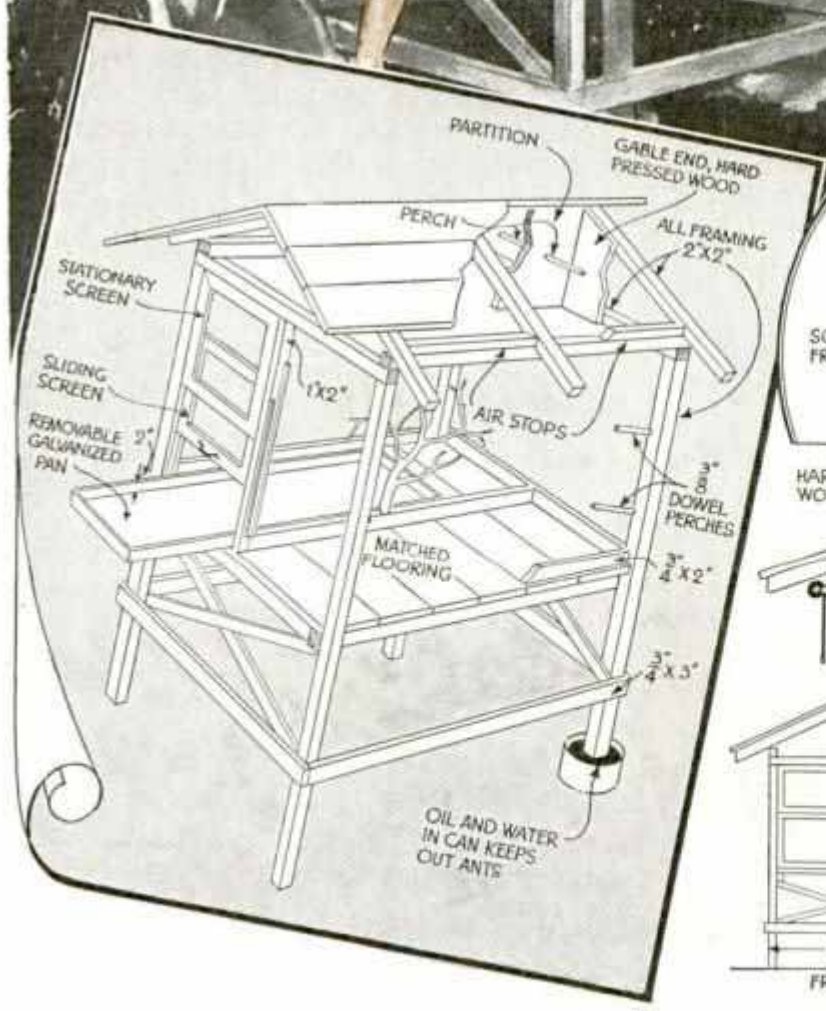
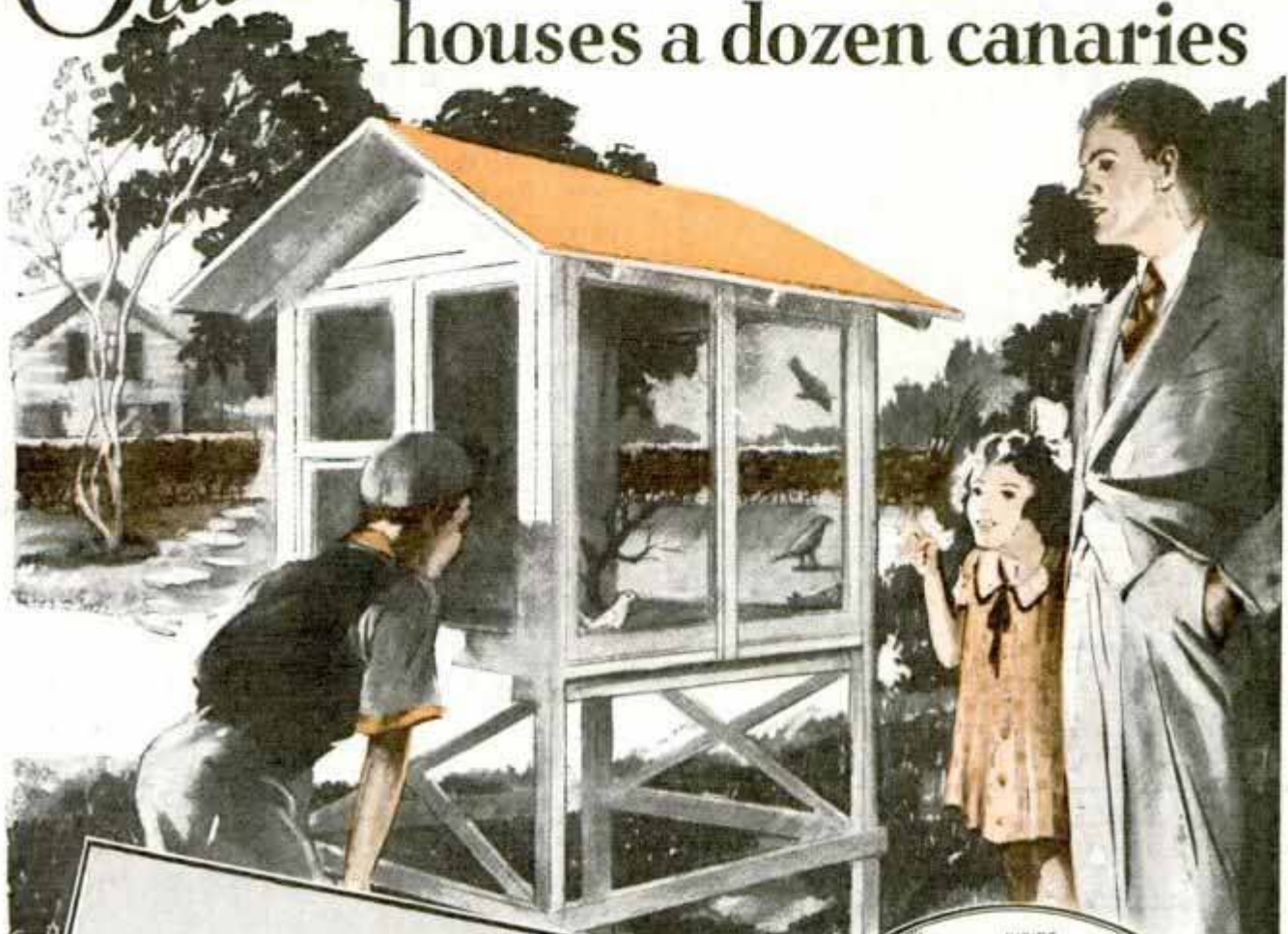


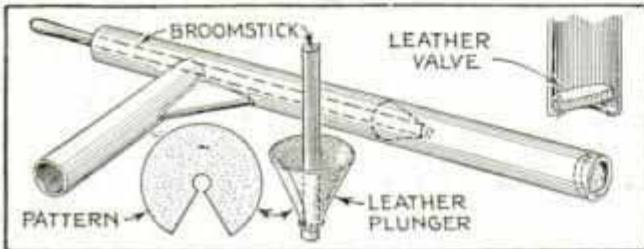
Ordinary Garden Chair Converted into Rocker by Fitting It with Pivoted Braces

pivoted braces as shown. The chair feet do not move on the ground, except for an almost imperceptible motion.

Outdoor AVIARY

houses a dozen canaries





Pump Made from Eave Conductor Pipe Quickly Empties Boat Filled with Water

Homemade Pump for Your Boat

Made from two pieces of galvanized sheet-metal pipe such as eave conductor pipe, this pump can be used to drain a water-filled boat in a short time. The pieces of pipe are cut and soldered together as shown in the detail, the bottom end of the longer piece being crimped and fitted with a leather valve. A plunger is made by attaching a conical piece of leather to one end of a broomstick.—Bert Ruthenberg, Wauconda, Ill.

Slip-On Bail Converts Can into Bucket



Many times, around the home or shop, an old tin can is used as a container in which to heat liquids, but is rather difficult to carry because there is no bail. If a piece of thin spring steel is bent as shown, the

ends can be slipped under the lip around the top of the can and used as a bail to lift it without being burned.

Fuller Balls Keep Rake Teeth from Damaging Lawn

When you use an ordinary garden rake to remove dead grass and leaves from the lawn, slip two fuller balls over the end teeth. This will keep the rake from digging into the sod. If fuller balls are not at hand, a couple of wood spools will serve the purpose provided they are cut off flush with the ends of the teeth.—



F. W. Bentley, Jr., Missouri Valley, Ia.

Keeping Basement Clothesline Out of the Way

By fastening your basement clothesline between two wood arms pivoted to the floor joist, you can swing it up against the floor when not in use. Two iron washers should be slipped over each pivot bolt between the joist and the arms to prevent wear on the wood and to provide friction so that the clothesline can be held at the desired height from the basement floor. In tying the line to the arms, it is a good



Clothesline in Basement Pivoted to Floor Joist Swings Out of Way When Not in Use

idea to allow a few inches of one end to hang free for pulling the line down.—W. T. Diebold, Louisville, Ky.

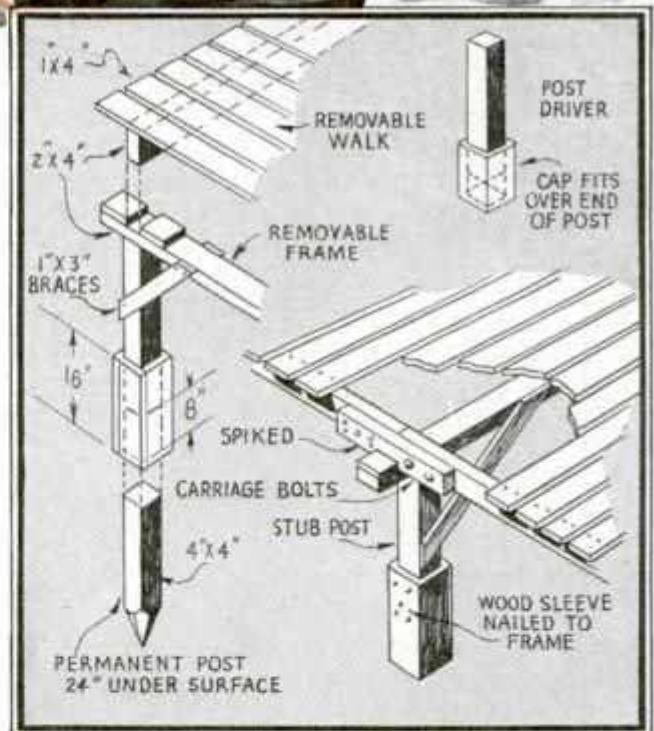
Light Sectional Pier Is Stored during Winter



Small, light piers are generally impractical as they are likely to be damaged by winter ice, but this one is built up in sections that permit quick dismantling and storage. Permanent underwater posts support trestles on which the sections of the walk are laid. The stub posts of the trestles have wooden sleeves to fit on the permanent posts, and small blocks on the ends of the trestle cross members hold the walk rails in place. To hold the walk sections together, blocks are nailed to the rails of one section and bolted to the rails of the adjacent section, which makes dismantling or assembling a quick job.

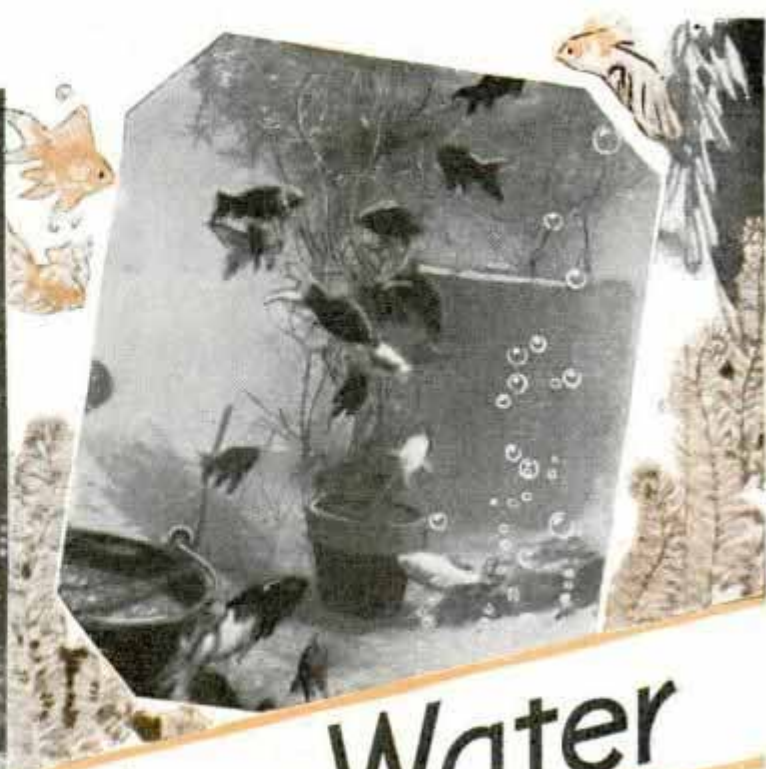
Firm Angle Worms Assure a Big String of Fish

When using angle worms for fish bait, anglers will find that trout and bass are more apt to strike them if they are kept fresh and firm. This is best done by lining the bottom of your bait box with swamp moss, which can be found in marshy woodlands. If the moss is not available in the woods, it can be obtained at your nearest florist. After covering the bottom of the bait box with moss, dampen it, place the day's supply of worms inside and cover

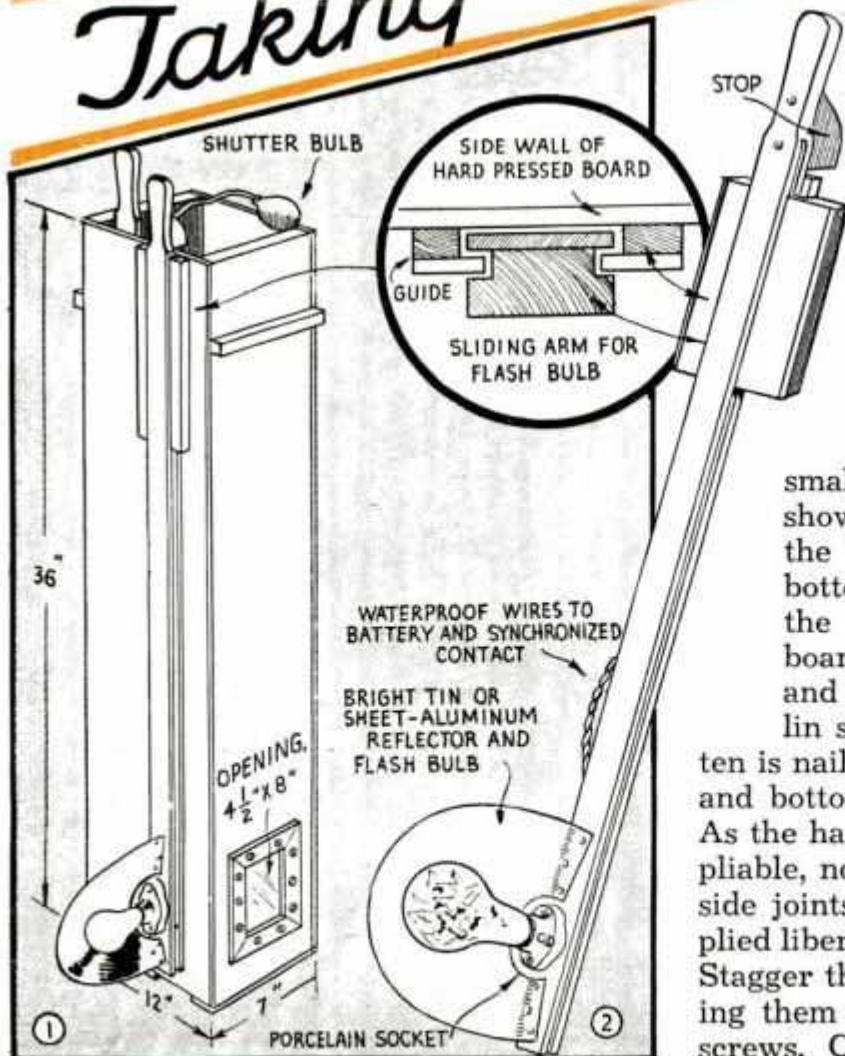


them with more moss. The worms will be firm and fresh when the stream or lake is reached and they will remain in good condition for a full day's fishing.—Ben C. Robinson, Newcomerstown, Ohio.

☐ If the edges of buttonholes in a sweater are sewed together before washing it, they will not stretch out of shape.



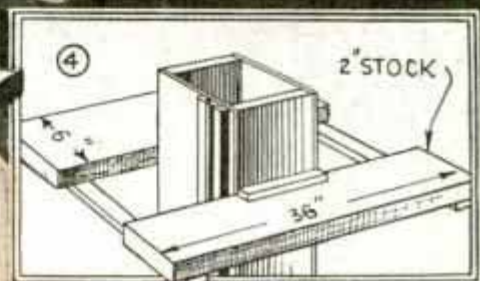
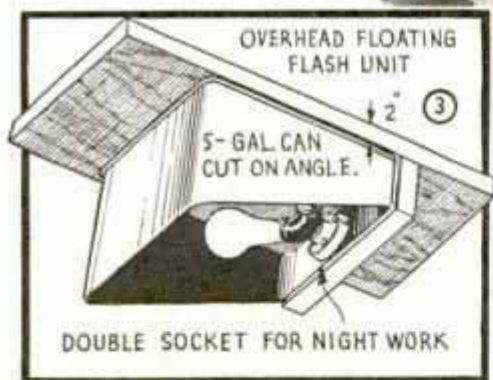
Taking Under-Water



SUBMARINE photography offers a wonderful new field to the amateur, and with the use of a water-tight camera and submerged photo-flash lamp, fish and plant life can be snapped right on their native heath so to speak, not to mention human divers in action under the water.

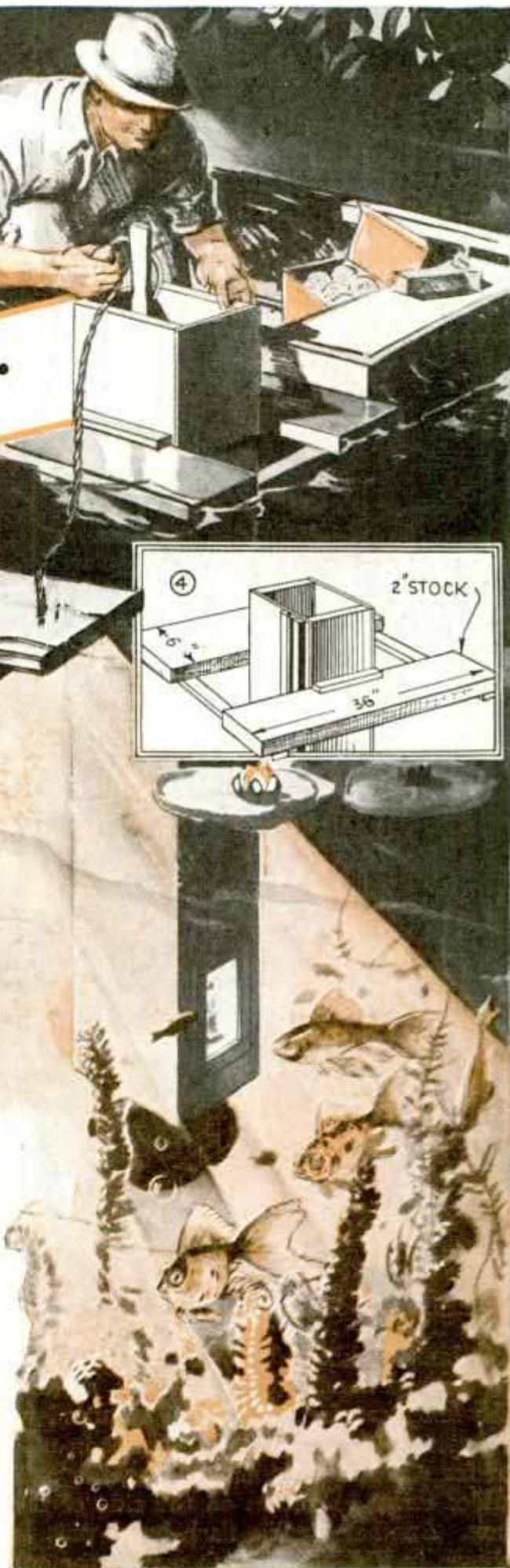
In Fig. 1 are given general dimensions of a box to hold a camera of postcard size, or smaller. The cut-away view, Fig. 5, shows how to go about constructing the box. Front and back walls and bottom are of $\frac{3}{4}$ -in. white pine and the side walls are of hard pressed board. The joint between front wall and bottom contains a strip of muslin soaked in white lead, and a batten is nailed over the joint. The rear wall and bottom joint is made the same way. As the hard pressed board is more or less pliable, no muslin strip is required in the side joints, but white lead should be applied liberally along the edges of the wood. Stagger the nails about $\frac{3}{4}$ in. apart, driving them in well with a nail set, or use screws. Cut the opening for the window,

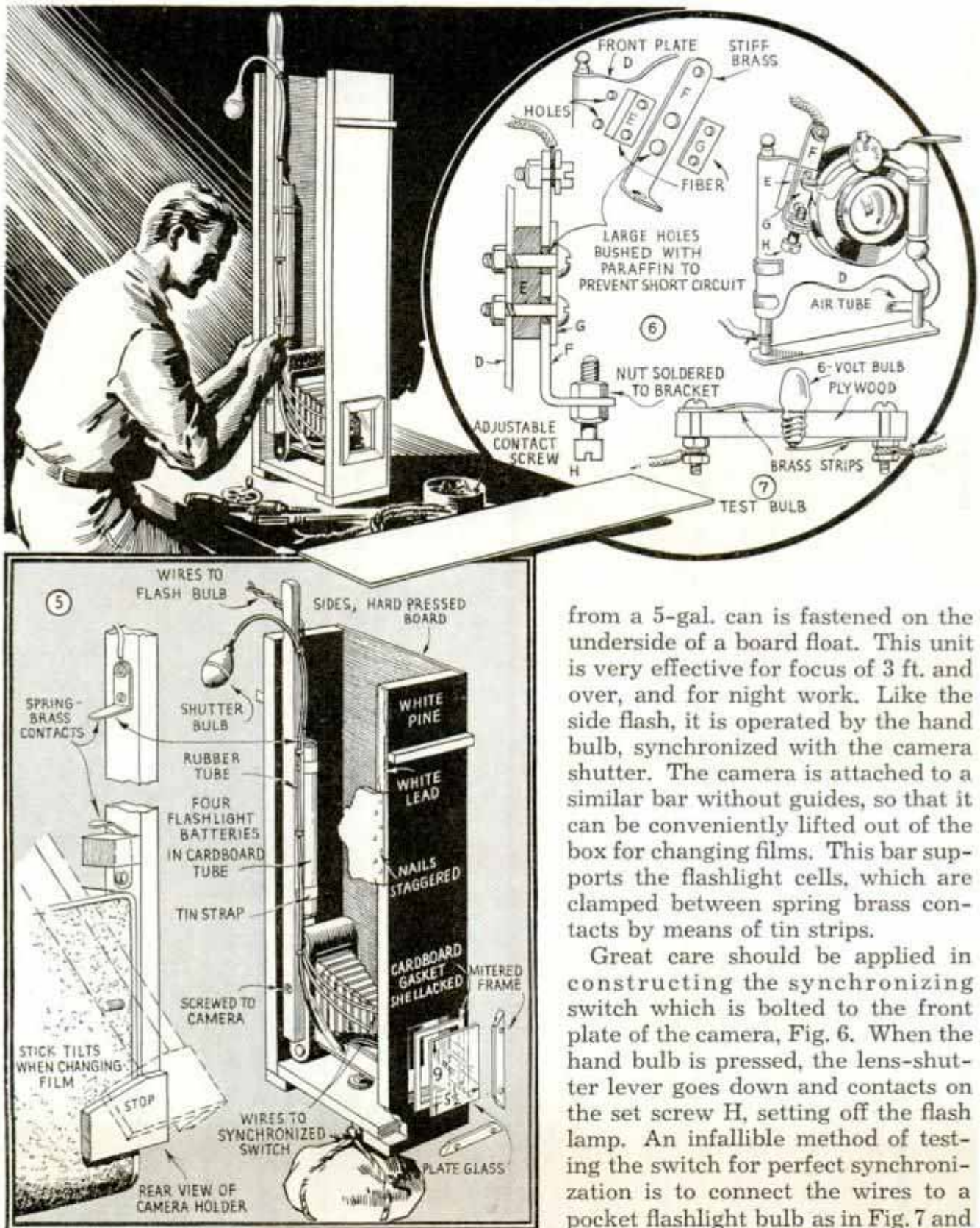
PHOTOS ...



4½ by 8 in., after the box is assembled, and paint the inside of the camera chamber a flat black. The pane of plate glass should be 5½ by 9 in. to lap the window opening at least ½ in. all around. Cut a cardboard gasket the size required, apply shellac on both sides of it and lay it over the window opening, pressing the pane down firmly upon it. The rabbeted-and-mitered wood frame, screwed down, holds the joint water-tight. Do not install the glass until all hammering is finished on the box; otherwise it might be loosened and develop a leak.

For convenience in handling, the porce-





lain lamp socket and reflector are attached to a wood handle, Figs. 1 and 2, so that the lamp can be held where required in relation to the subject. When not in use, or for pictures on a short focus, the unit slides down in guides on the side of the box. Another handy flash-lamp unit is shown in Fig. 3, in which a reflector cut

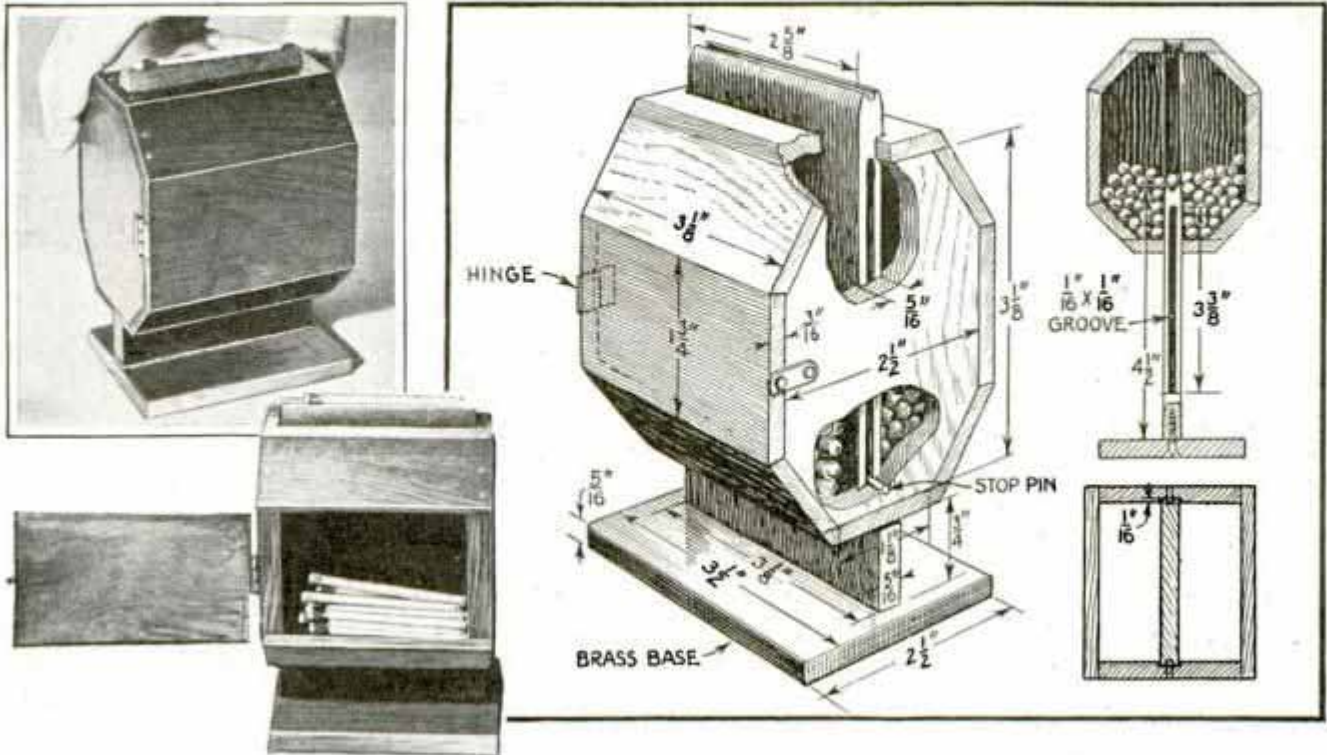
from a 5-gal. can is fastened on the underside of a board float. This unit is very effective for focus of 3 ft. and over, and for night work. Like the side flash, it is operated by the hand bulb, synchronized with the camera shutter. The camera is attached to a similar bar without guides, so that it can be conveniently lifted out of the box for changing films. This bar supports the flashlight cells, which are clamped between spring brass contacts by means of tin strips.

Great care should be applied in constructing the synchronizing switch which is bolted to the front plate of the camera, Fig. 6. When the hand bulb is pressed, the lens-shutter lever goes down and contacts on the set screw H, setting off the flash lamp. An infallible method of testing the switch for perfect synchronization is to connect the wires to a pocket flashlight bulb as in Fig. 7 and place it inside the camera, opposite

the lens. Set the shutter at $\frac{1}{25}$ second and experiment with it in a dark room, looking directly into the lens. If the light flashes at the instant the shutter is fully opened, both are properly synchronized.

In use, the camera box is supported by a float as in Fig. 4 and the lower end is weighted with a rock as in Fig. 5.

Match Dispenser for Your Smoking Cabinet



When properly finished, this match dispenser will provide a neat addition to your smoking cabinet. It is made of $\frac{3}{16}$ -in. hardwood, and is operated by lifting up the box or body, which leaves a match in a groove in top of the standard. The latter

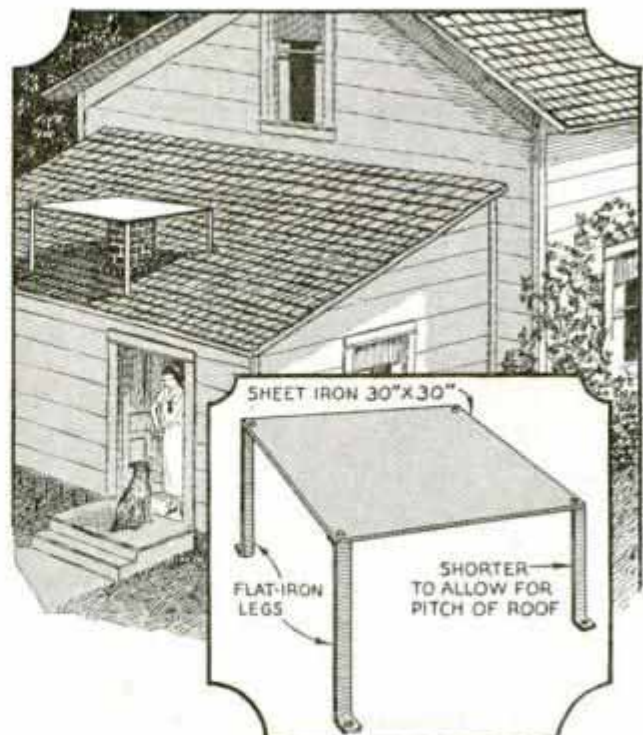
is screwed to a brass base and is slotted at one edge for a stop pin, which is driven into one end of the box to keep it from being lifted off the standard. A small door hinged to one side provides a means of replenishing the match supply.

Sheet-Metal Shield over Chimney Prevents Down Drafts

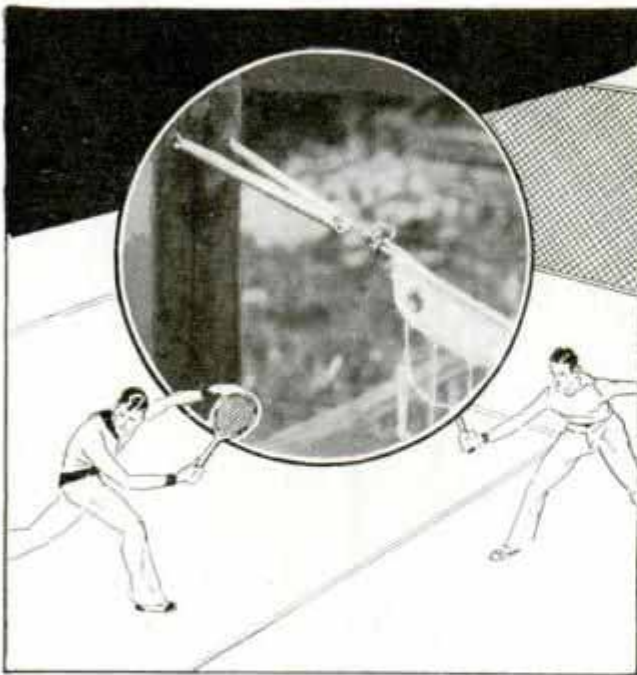
Instead of putting a long extension pipe on his kitchen chimney to prevent down drafts, one home owner used a sheet-iron shield. Flat-iron legs support it and hold it about 2 in. above the top of the chimney. Two of the legs, of course, must be shorter than the others to allow for the slope of the roof. The shield has been found just as effective in preventing down drafts as a long extension pipe and is not likely to be blown over by high winds.—A. H. Waychoff, Riverside, Calif.

Photoflood Lamp Aids in Making Prints from Dense Negatives

When you have a negative so dense that it requires 2 or 3 min. to get a good print, substitute photoflood lamps for the regular ones in your printer. These lamps produce a strong light that will expose the print in a few seconds.—K. S. Anderson, College Station, Tex.



Small Sheet-Iron Shield over Short Chimney Prevents Down Drafts on Windy Days



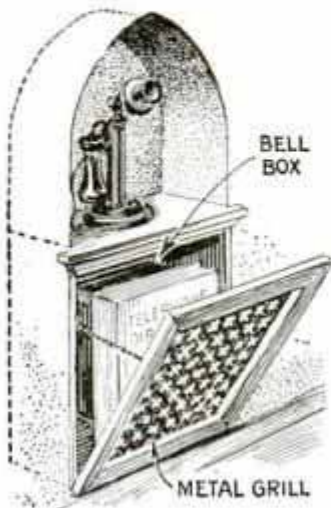
Coil Springs to Hold Tennis Net Taut Eliminate Frequent Readjustment

Springs Hold Tennis Net Taut

When a mechanical device is not at hand for holding tennis nets taut, two coil springs, such as are used on a tire-chain adjuster, may be nailed to each net post and fastened to an S-shaped hook made of wire, which is hooked into the grommet of the net. This arrangement holds the net securely, yet allows it to be taken down without any trouble.—Frank W. Bentley, Jr., Missouri Valley, Ia.

Grille on Door Hides Telephone Bell Box in Wall Niche

In order to conceal his telephone bell box and to provide storage space for the directory, one home owner put a shelf in the telephone niche and covered the lower part with a metal grille. The latter is set in a rabbeted frame, which is hinged at the bottom as shown. If you cannot obtain a metal grille, a scroll-sawed plywood grille, backed with cloth, may be substituted. It is also a good idea

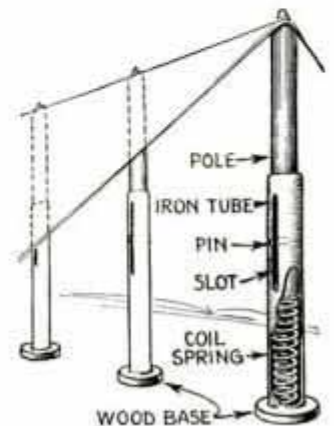


to provide a chain to hold the grille from opening too far.—L. H. Georger, Buffalo, New York.

Spring Tent Pole Automatically Keeps Canvas Tight

With these telescoping spring poles, it is not necessary to loosen guy ropes when a tent gets wet as they automatically allow for stretching or shrinking of the canvas.

Each pole consists of a 2½-in. galvanized iron tube and a hardwood pole, the end of which rests on a compression spring inside of the tube. The latter is slotted for a pin, which is driven into the pole to hold the assembly together when moving it.—Arthur W. Rice, Trent, Ore.



Metal Clip Helps Prevent Breakage of Coaster-Wagon Tongue

Breaking a coaster-wagon tongue by stepping on it or by turning the wheels abruptly when in motion can be prevented by slipping the tongue in a spring-steel clip, which is bolted to the front end of

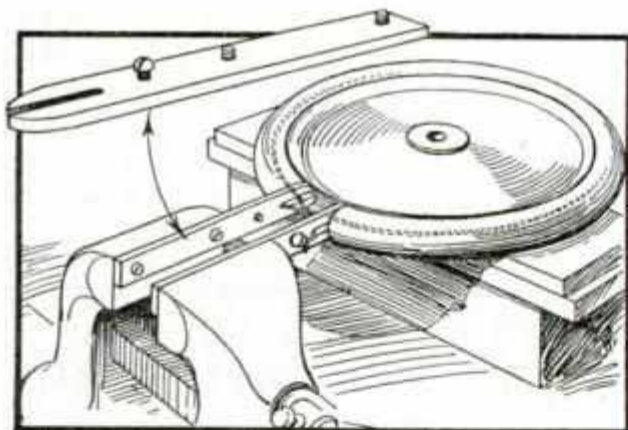


Clip Holds Wagon Tongue Erect When Standing Still or Coasting

the wagon bed. Besides holding the tongue, the clip serves as a bearing to avoid twisting the tongue when making a sharp turn.

Putting New Tires on Tricycles and Coaster Wagons

Anyone who has a vise can put new tires on tricycles, coaster wagons and baby carriages. Tire rubber up to 5/8-in. in diameter can be purchased at most bicycle shops. If the vise you have available is faced with removable steel bars, substitute the ones shown for them. If not, the faces of the jaws can be drilled and tapped to attach the bars. These are rounded at one end to fit inside of the wheel rim and are slotted to take the ends of the wire inside of the tires. Each bar should be drilled and tapped for a machine screw near the end of the slot. After cutting the tire rubber to the correct length, place it around the wheel, pull the wire tightly through the slots in the vise bars and wrap the ends around the screws. Next slowly open the vise to spread the rubber at the joint. After this has been done, twist the wires together where they cross with a large nail and then cut off the ends. Removing the wheel and working the tire ends together completes the job.—A. L. Long, Springfield, Ill.



With the Aid of a Vise, It Is a Simple Matter to Re-Tire Coaster Wagons and Tricycles

Gluepot Improved from Tin Cans and an Electric Bulb

Glue can be heated to the boiling point in a few minutes in this pot, which is improvised from a couple of tin cans and an electric bulb. One can, which is larger than the other, is mounted on a wood base directly over a porcelain lamp socket by means of flat-iron legs. A hole in the bottom of the large can takes the neck of the bulb, which is inserted from the top, and a larger hole in the lid takes the small can. The latter contains the glue to be heated,



This Gluepot Is Operated by an Electric Bulb and Boils Glue Quickly

and, when in use, rests on top of the bulb. A little experimenting with bulbs of different sizes will determine the one to use. Usually a 40-watt bulb produces about the right amount of heat to keep the glue hot while one of 60 watts will make it boil in a short time.

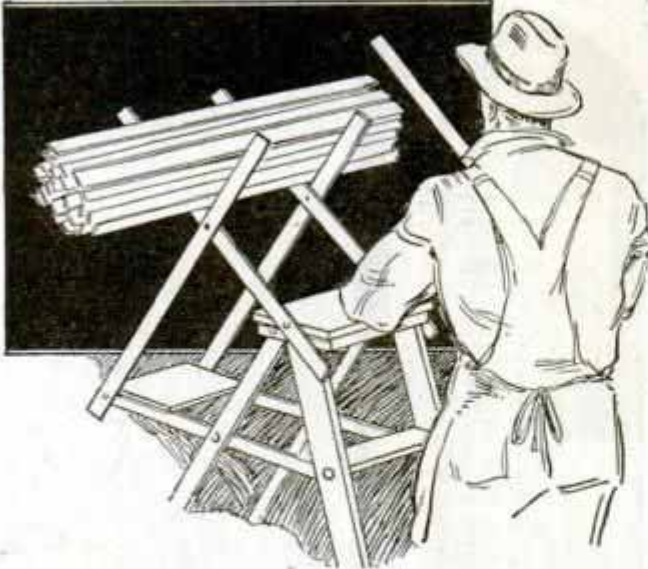
Small Rod Aids in Changing Jig-Saw Blades

Difficulty in holding down the spring-controlled rod on a jig saw while changing a blade can be overcome by using a small iron rod as shown. A hook is bent on one end of the rod to engage the bottom of the spring housing and the other end is bent at right angles to slip over the upper end of the rod.—Ray J. Marran, Kansas City, Mo.



Wax candles that are to be used for decorating a dinner table will not be affected by warm temperature in the room so quickly if they are thoroughly chilled in a refrigerator before using them.

30 Wagon
 New York



Simple Attachment on Ladder Holds Laths When Scaffolding Is Not Practical

Ladder Attachment Holds Laths for Ceiling Work

When nailing laths on a ceiling in closets and narrow hallways where scaffolding is not practical, the illustrated attachment on a stepladder will be found handy for holding the laths within reach. Four laths are nailed to the ladder to provide a holder as shown in the drawing.—G. E. Hendrickson, Argyle, Wis.

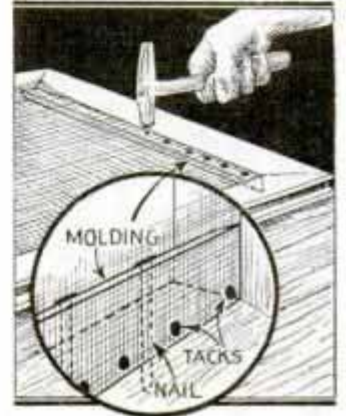
Framing a Photo to Prevent It from Buckling

In order to frame a photograph so that it will not buckle or show dust between

the glass and the picture, first soak it in tepid water for an hour. Then blot off the excess water, wet the face of the photo with a thick solution of gelatine in hot water and press it in contact with the cleaned glass. All surplus gelatine should be pressed out with a rubber roller. When the picture is dry, it may be placed in the frame and the back covered with cardboard in the usual manner.—Kenneth Murray, Sturgis, Mich.

Repairing Rusted Window Screens

Instead of going to the expense of replacing screen wire when it has rusted away from the window-screen frames, nail pieces of quarter-round molding to the inside edges of the frames and tack the wire to them as shown. The rusted edges of the wire are, of course, first cut off. If the wire is painted before tacking it to the molding, rust will be retarded and several more years of service can be had from the screens before new wire will be needed.



380 Blueprints for Home Craftsmen



Boat Building

"Roamer," 16-ft. outboard cruiser, 765 to 770 (6 prints). "Hi-Ho," 14-ft. outboard or inboard runabout, 840 to 845 (6 prints). "Pop's," Class-A outboard racer, 813 and 814 (2 prints). 15-ft. Rowboat, flat bottom, 644.

Model Making

"Sovereign of the Seas," 828 to 835 (8 prints). Boeing Transport Plane, 865 to 870 (6 prints). "Zip," 50-in. Model Yacht, 880 to 883 (4 prints).

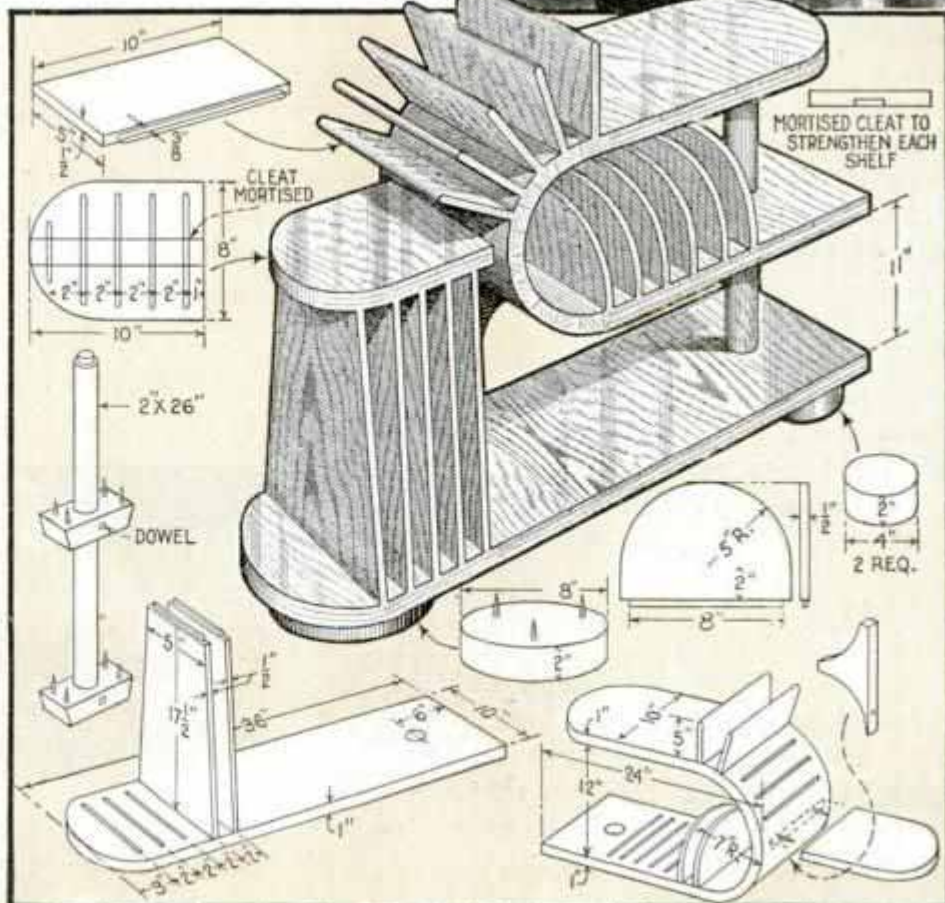
Woodworking

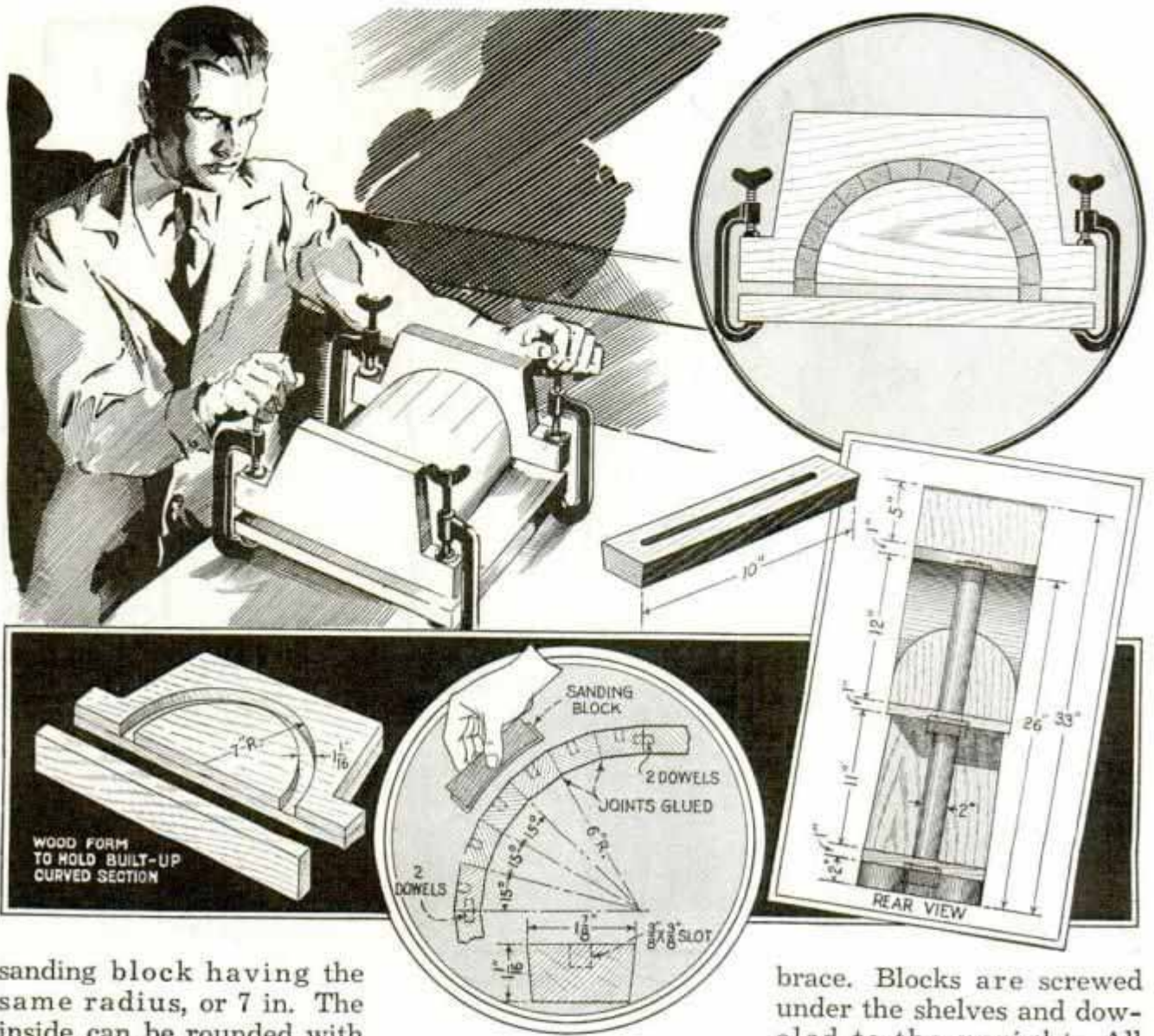
Bird Huts and Bird Hotels, 884 to 886 (3 prints). Ornamental Wood Fences, 640. Corner Cupboard, 839. Revolving Book Stand, 500.

List of blueprints for 3c postage. Prints sell for 25c each or six prints (not projects) for \$1.00. Address Blueprint Department.

English LOUNGE TABLE

HERE is an interesting job for the man who likes to take his time and produce something really fine in the way of furniture. The design of this lounge table is novel throughout, particularly the curved portion of the shelves which gives the appearance of heavy stock being bent in a graceful semicircle. By careful and accurate workmanship on this part, a built-up job can be made to appear as a continuous piece. The method of construction is as follows: First saw out $1\frac{1}{16}$ -in. stock $1\frac{7}{8}$ in. wide with the sides beveled $7\frac{1}{2}^\circ$. There should be twelve of these pieces about 11 in. long, to be trimmed down to 10 in. after assembly. Five of the pieces should be mortised, as shown, for the tenons of radial partitions for books. The beveled pieces are glued together, one at a time, and clamped in a specially made jig to hold them in semicircular position. After the assembly has set for 24 hrs. the outside is carefully planed to a smooth curve and then sanded with a concave





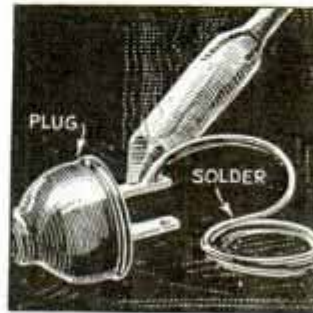
sanding block having the same radius, or 7 in. The inside can be rounded with coarse sandpaper over a curved block, and finished with a fine grade. In this work the human element enters largely, and you must depend upon your eye and hand for a satisfactory job.

The flat shelves are made of 1-in. stock with the grain crosswise, and a mortised cleat set in lengthwise on the underside of each. They are doweled and glued to the ends of the curved portion.

Partitions are set in as shown in the assembly drawing. The base is mounted on three circular feet which are built up or sawed from 2-in. stock. Compartments for large magazines are built at one end. The first four of these are alike but the last tapers more at the top. These pieces are tenoned into the base and the top. The upright post is inserted up through holes bored in the base and lower shelf and doweled into the top shelf. The curved portion is screwed to the shelf and to a

brace. Blocks are screwed under the shelves and doweled to the upright. All joints, of course, are glued and excess glue wiped away. Carefully assembled, with neat joints, this job can be finished in natural walnut, oak, mahogany, maple or any wood of your choice.

Solder on Prongs of Electric Plugs Assures Good Contact



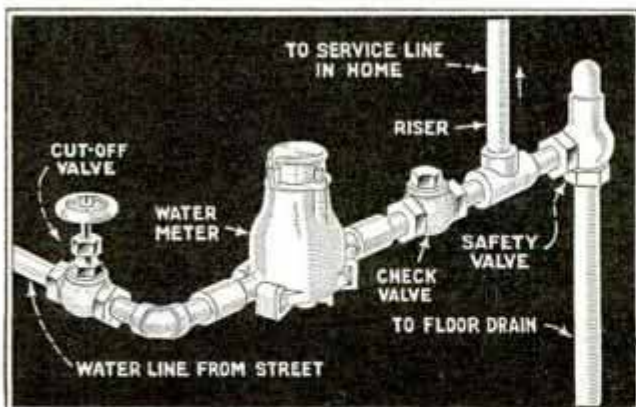
Mysterious noises in radios and inefficient operation of electrical appliances are often caused by attachment plugs that fit loosely in the wall sockets. This trouble can be remedied by flowing a thin coat of solder over the prongs of the plugs so that they fit in the sockets tightly.

Pure Gold Foil for Stamping

Gold foil for use with electric-pencil outfits for writing in gold, silver, or colors can be made as follows: First coat thin parchment paper with thin white shellac, and, after this has dried, press it into contact with a sheet of pure gold foil as used by artists. The foil will adhere to the parchment and leave its original paper backing. It should be sprayed then with shellac, and, when dry, can be used in the same manner as regular foil that is furnished with the pencil outfits. Gold foil made in this way will not tarnish, and is not expensive, as several sheets will last a long time with ordinary use.

Safety Valve Protects Home Plumbing against Pressure Surges

Owners of homes in suburban towns and other places where the water supply is pumped over long distances under high pressures, will find that a safety valve installed in the supply lines between the meter and faucets will protect the plumbing fixtures against sudden pressure surges. To install the valve, replace the elbow at the riser pipe of the service line with a tee and connect the valve to it with a close nipple as shown. From the bottom connection on the valve, run a pipe to the floor drain to carry off waste water when the valve opens. These valves can be set



Installed in a Home Water-Supply Line, a Safety Valve Prevents Surges from Damaging Plumbing

to open at any pressure desired. The valve also protects the water meter in case the hot-water supply in the home is accidentally heated to the steaming point. Some home owners install a check valve in connection with the safety valve as further protection for the meter.



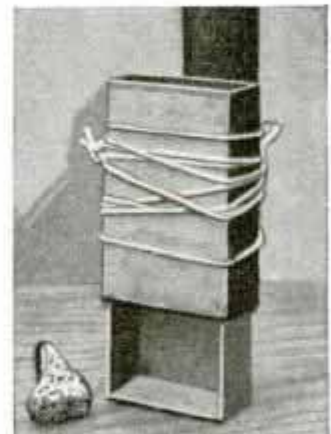
Three Table Forks Used to Support Strainer Cloth on Top of Vessel

Strainer Cloth Supported with Table Forks

Women who use a cloth to strain liquids will find that three table forks, with the tangs arranged as shown, provide a good holder which prevents the cloth from sagging too far into the vessel. With this arrangement, it is unnecessary to bind the cloth around the top of the vessel.

Match Box Retrieves Small Articles Lost in Furnace Register

Lashed to the end of a short stick with cord, a penny match box is useful for retrieving articles that have been dropped through a furnace grate or a similar grating. With the box partly opened, as in the drawing, it is inserted through the grating and the article is scooped up, after which the box is closed by pushing against the stick.



☐ Fruits and vegetables can be dried with an electric fan if placed in stacked trays that have wire-mesh bottoms so that the fan can force air through them.



WHILE we were talking on the front porch, one day, Al Jenkins, a neighbor of mine, cast an appraising eye on the porch ceiling and noting a white deposit on the varnish asked, rather irrelevantly I thought, "When were your rain gutters and spouts last cleaned?"

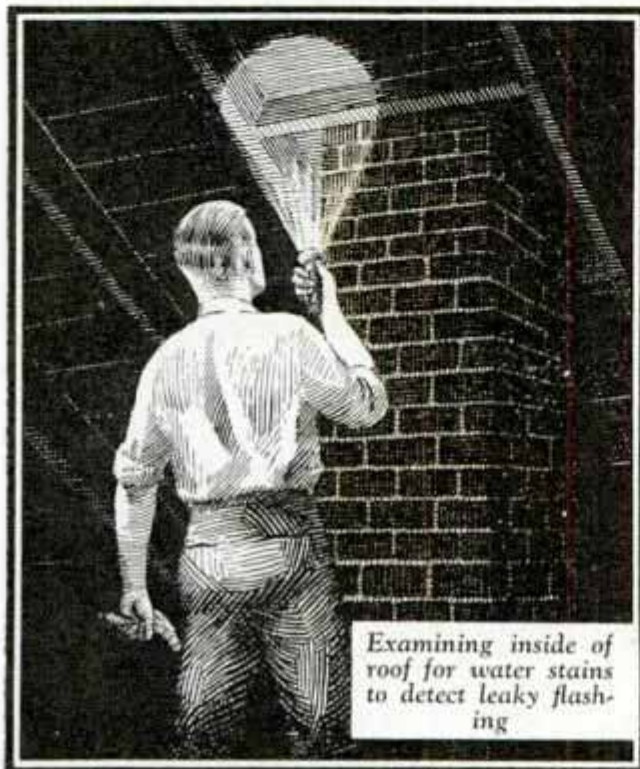
Questions on my part revealed that clogged rain carriers caused an overflow of water onto the cornice, and that some of this water frequently worked its way into walls and ceilings. In cleaning the gutter we discovered that it was badly rusted in one spot. Al cut a piece of tar paper large enough to cover the spot, coated both it and the metal with elastic roof cement and pressed it into place. Then he covered the tar paper and the adjoining metal with a final protective coat of roof cement.

While he was on the ladder, Al had a look at the metal flashing of the near-by roof valley and asked if I had ever noticed any roof leaks. I remembered that the

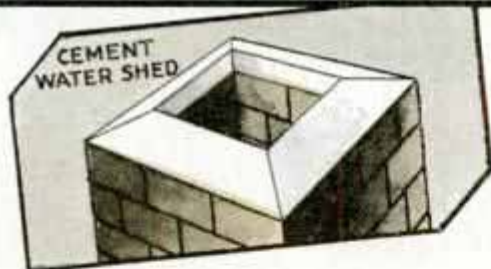
combination of heavy rain and a hard northeast blow always caused a leak in the north bedroom. After I had explained this to Al he eased up on the roof and began a close examination of the valley which faced almost northeast. In a few minutes he reported, "Some of this flashing is loose. Throw me that small hammer and the box of $\frac{3}{4}$ -in. tacks." I watched carefully as he forced a generous quantity of roof cement under the loose edge of the flashing before nailing it down. I noticed that the metal flashing was entirely covered by shingles. Thereupon I asked Al if it would be necessary to rip all these up if the metal had to be replaced. I learned that it was not necessary to remove any shingles. Al said the trick was to use squares of metal whose diagonal was equal to one and three-quarters times the exposed length of a shingle, to bend these on the diagonal, and beginning underneath the last shingle at the eaves, thrust one piece of metal under each. The diagonal

HOME REPAIRS

By WALTER E. STEWART



Examining inside of roof for water stains to detect leaky flashing

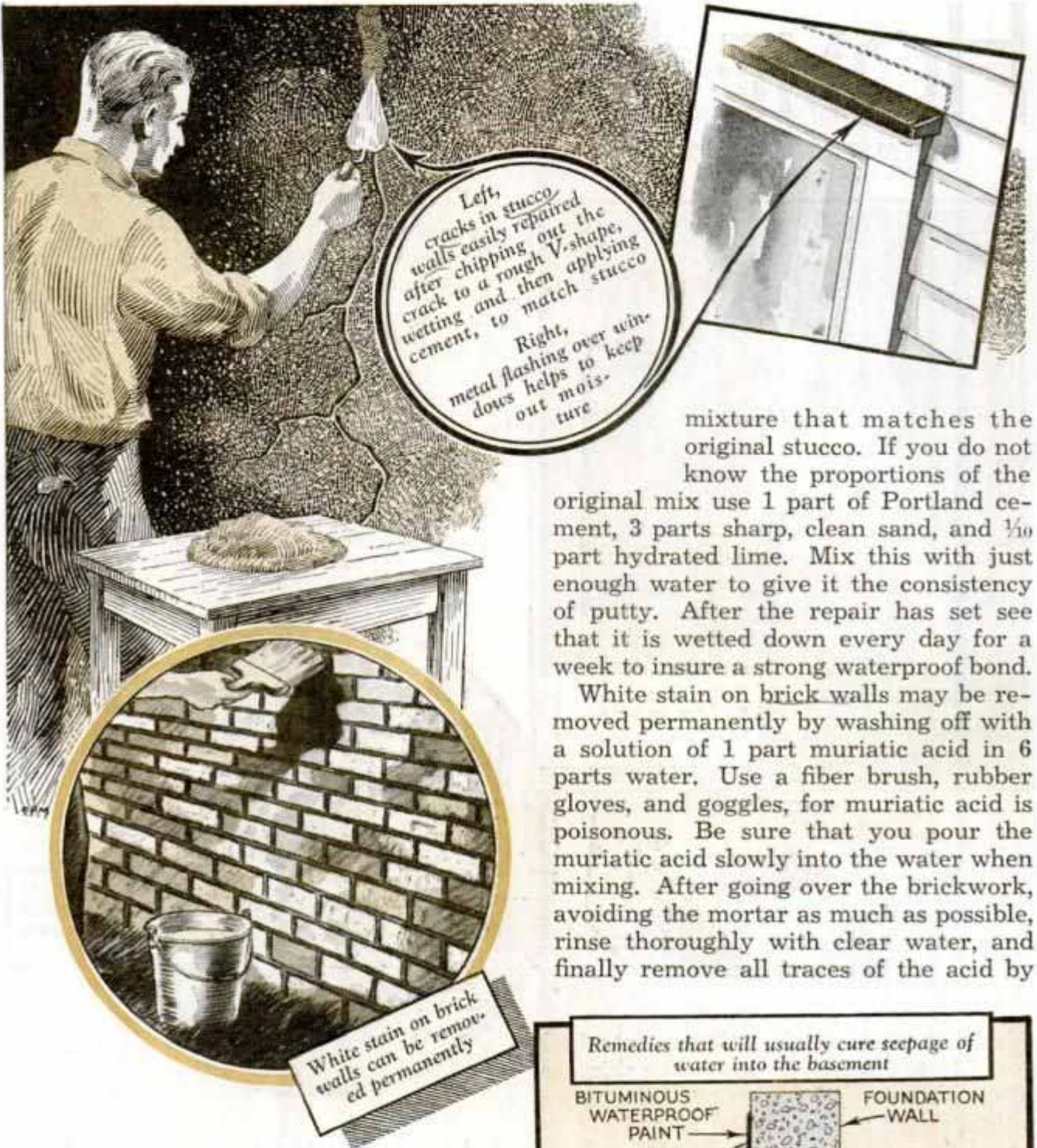


Keeping bases of porch columns well painted to protect wood from decay

bend was used to make a rigid point which could be pushed easily under the shingles. They were to be inserted until the upper point of each piece reached about halfway up of the shingle next above. When I inquired how he got the metal past the shingle nails he showed me a long thin piece of steel, sharp at one end, which could be driven under the shingles to cut those nails which were in the way.

The metal flashing over window casings is often another source of dampness inside the house. If necessary, replace or reinforce it with strips forced up under the weatherboarding above the casing and brought out over the top casing. Also examine the joints where walls meet door and window frames. You may need to caulk these joints to keep out the cold win-

ter wind. Porch columns nearly always rot from the inside, and for this reason are often beyond repair before the damage is discovered. Make a point of keeping an unbroken coat of paint on them and their footings. Exterior steps and lattice also possess the characteristic of rotting from the hidden side. Preservative paint applied underneath is worth much more than its cost in new lumber. Examine your chimney for evidences of weakness. Make sure that it does not deviate seriously from the vertical, and that the mortar is not washing out from between the bricks. Also take note of the chimney flashing, as this is fre-

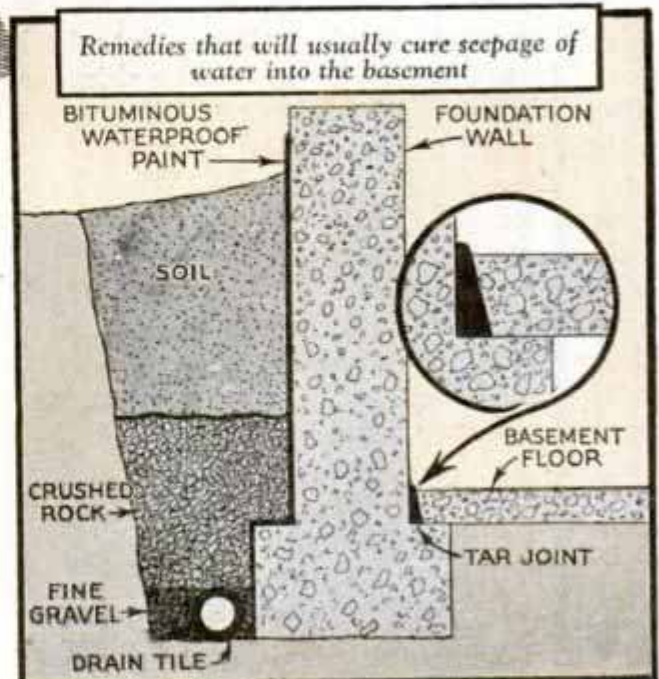


mixture that matches the original stucco. If you do not know the proportions of the original mix use 1 part of Portland cement, 3 parts sharp, clean sand, and $\frac{1}{10}$ part hydrated lime. Mix this with just enough water to give it the consistency of putty. After the repair has set see that it is wetted down every day for a week to insure a strong waterproof bond.

White stain on brick walls may be removed permanently by washing off with a solution of 1 part muriatic acid in 6 parts water. Use a fiber brush, rubber gloves, and goggles, for muriatic acid is poisonous. Be sure that you pour the muriatic acid slowly into the water when mixing. After going over the brickwork, avoiding the mortar as much as possible, rinse thoroughly with clear water, and finally remove all traces of the acid by

quently the cause of a most insidious form of leak. The sour smell of wet plaster after protracted rains is often the first evidence of leaks around the chimney entrance. Protect your chimney top by providing it with a cement watershed which is sloped down from the inner to the outer edge.

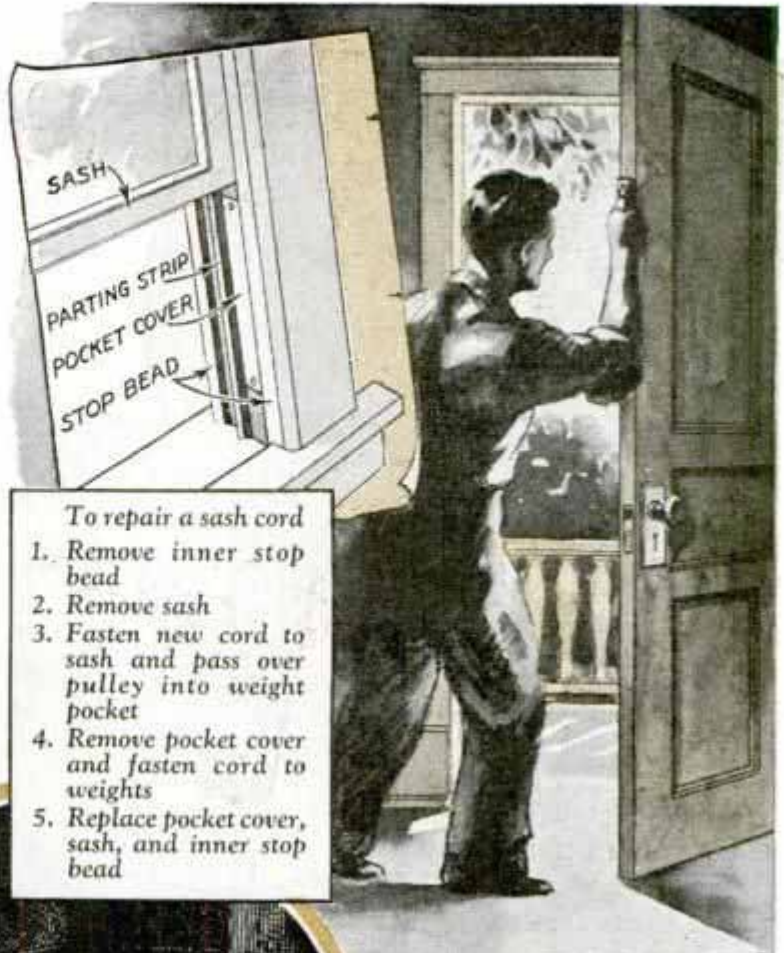
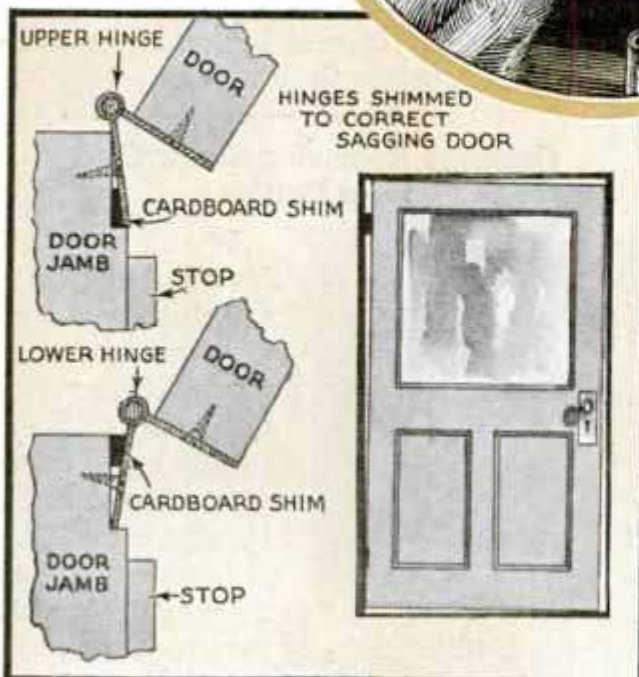
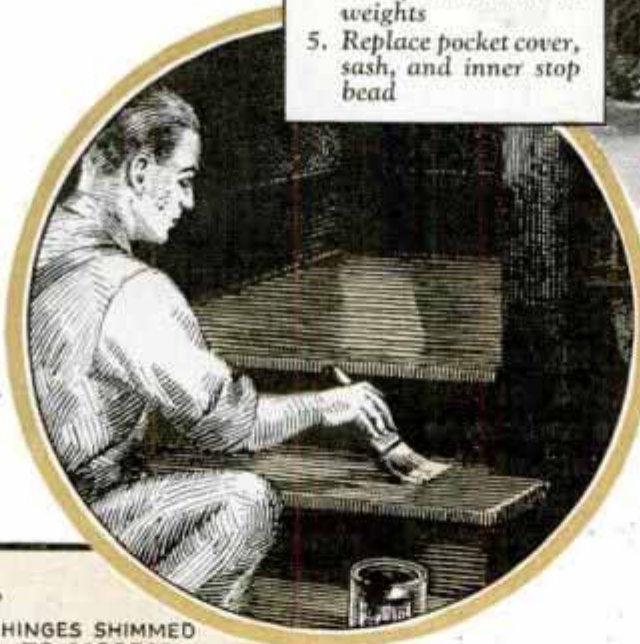
Large cracks in stucco houses often admit moisture, and should be attended to at once. They are usually the result of unequal expansion of stucco and supporting material, or of settling of the house itself. Chip out the crack to a rough V-shape, wet thoroughly, and tamp in a cement



flushing with a solution of 1 part of commercial ammonia to 16 parts water.

When Al Jenkins waterproofed our basement, I paid particular attention. Al decided that the bulk of the leakage was due to improper outside filling around the basement wall, and to a cracked joint between wall and floor. He proposed alternate remedies: The first was to chip out a narrow seam in the floor just where it joined the wall, and to refill it with tar. The seam would be made wider at bottom than at top so that water pressing inward would tend to wedge the tar in more tightly. The second, and most thorough, plan was to dig a trench against the outside of the walls and lay a drainage tile in it at the level of the bottom of the wall footing. On the pipe would be placed small crushed stone to a depth of one foot, then

Stairways are subject to much wear and should therefore be varnished frequently



To repair a sash cord

1. Remove inner stop bead
2. Remove sash
3. Fasten new cord to sash and pass over pulley into weight pocket
4. Remove pocket cover and fasten cord to weights
5. Replace pocket cover, sash, and inner stop bead

a layer of old burlap to keep soil out of the rocks, and on this the soil which had been removed. The tile would be sloped and provided with an outlet into the storm sewer at the street.

Waterproofing paints for application on the inner surface of masonry walls are often ineffective in stopping leaks as the pressure of

water from the outside will push the paint away from the wall. In very mild cases waterglass may hold, but the only inner application which can be relied upon is a thick coat of cement. The mixture should be 1 part of Portland cement, 3 parts sharp, clean sand, and as little water as practical. The mixture is applied after the leak has stopped, but with the wall thoroughly dampened from the inside. After the cement has set, it must be kept damp for about a week.

Upstairs, Al first turned his attention to the squeaky floors. I observed that inva-



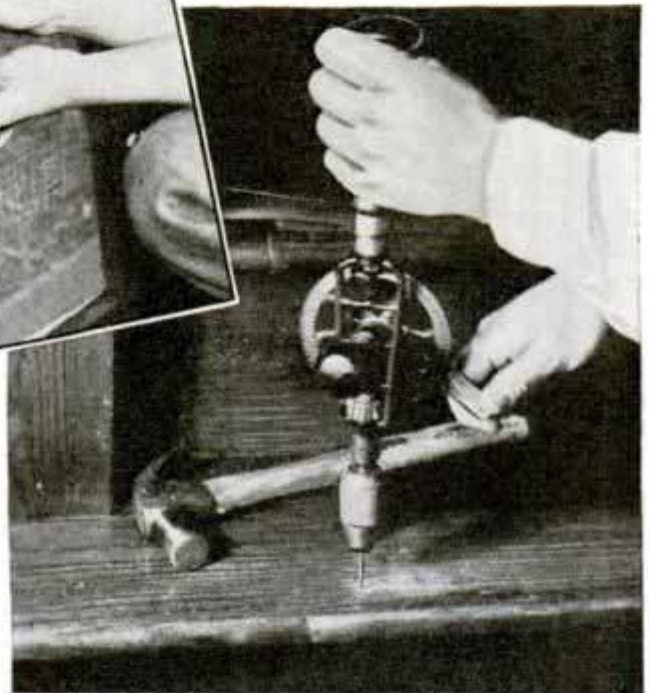
riably the squeak was caused by a piece of flooring which was not held firmly in place. Al's remedy was to locate the end of the offending plank, drill two very small holes about $\frac{1}{4}$ in. from the end and one inch apart, and then pull the plank down into place with two galvanized finishing nails struck alternately with the hammer. He drove these below the surface with a nail set, and filled the holes with plastic wood. Squeaky steps on the main stairway were remedied in the same manner, except that the nails were set near the forward edge and at the ends of the step. As the repairs progressed I watched and learned. Cracks between baseboard and floor are usually caused by shrinkage of the former. They are best eliminated by removing the quarter-round molding which is fastened to the lower edge of the baseboard, and renailing it to the floor only. The baseboard can then expand and contract by sliding along the inner surface of the molding without creating a visible crack.

Cracks in plaster walls are easily repaired. First, the crack must be scraped out in a V-shape until it is about $\frac{1}{4}$ in. across at the surface. Then all loose sand and plaster are brushed away, and the crack thoroughly wetted. Commercial patching plaster is the best filler to use. The mixing pan must be clean and the water pure. The dry plaster is stirred into the water until the consistency is

about that of soft putty. The mixture is packed firmly into the crack and smoothed off at the surface. To prevent the old plaster from absorbing moisture from the new, and so making it chalky, the patch must be kept damp for at least twenty-four hours.

To replace a broken window sash cord requires a little special knowledge and

Above, Solidly Fastened Flooring Does Not Squeak; Left, Small Piece of Screen Carefully Woven over Hole Makes Neat Patch; to Avoid Splitting Finished Woodwork, Drill a Small Hole Before Nailing



considerable care. One of the drawings shows every step in doing this. A sagging door may be re-leveled by inserting cardboard shims under the hinges.

Grips for Removing Screw Caps from Bottles



of pliers, which usually damage threads in the cap or break the bottle neck.

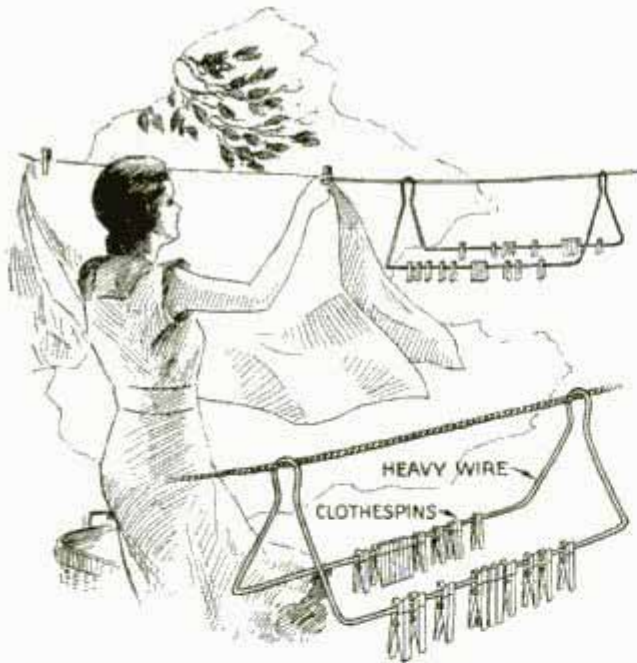
Washers cut from the end of a garden hose and stretched over tight-fitting screw caps on bottles, provide good finger grips for removing them. This is a better method than using a pair

Patching a Canoe in the Woods

While on a trip in the north woods with an Indian guide, the canvas on our canoe was damaged. As no material was available for patching it, the guide quickly repaired it with a piece of birch bark and spruce gum. The bark was rolled into a conical shape and was filled with the gum, after which it was held over the tear in the canvas and a blazing birch stick was applied to the small end. This melted the gum, which ran onto the tear. After pressing the torn edges of the canvas firmly into the melted gum, more gum was applied on the outside.—Ben C. Robinson, Newcomerstown, Ohio.

Holder for Spring-Type Clothespins

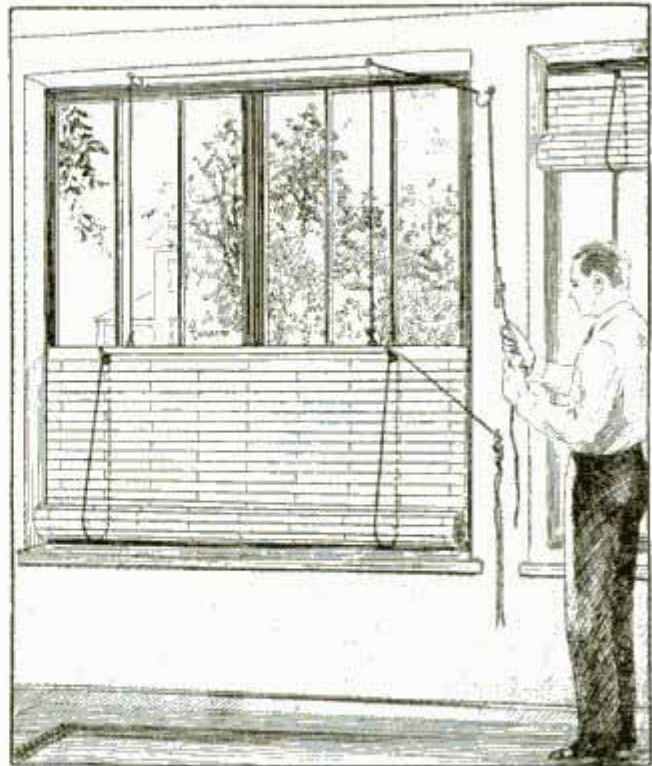
To avoid the necessity of carrying a basket of clothespins when hanging a washing on the line, one housewife employs a holder, which fits over the line as shown. It is made of heavy wire and can be pushed along the line as the clothes are hung up.



Hung on a Line, This Holder Keeps Clothespins Handy at All Times

The holder is always ready for use, and no time is lost in stooping or searching for mislaid clothespins.—G. E. Hendrickson, Argyle, Wis.

☐ A small fern transplanted in a decayed block of wood will grow rapidly as the rotted wood makes good food for the roots of the plant.



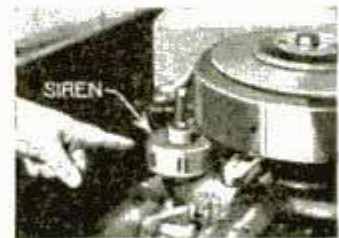
Slat Curtains Can Be Manipulated to Any Position Desired on a Window with This Arrangement

Improved Installation of Slat Curtains

Here is a simple method of installing slat curtains that permits any part of the window to be covered. Two swivel pulleys are mounted at the top of the window and a third at one side. Ropes are run through these pulleys and are fastened to the top of the curtain with screw eyes.

Bicycle Siren Used on Outboard Motor Boat

Installed so that it will make contact with the motor flywheel, a bicycle siren can be used on an outboard motor to sound navigation signals. The siren should be mounted below the flywheel so that it is out of the way of the starting rope and should be attached so that the siren part stands clear of the manifold while the roller rides close to the flywheel. While



the regular clamp bracket that comes with the siren can be used, it is better to change it a little. Take the bracket apart and drill a hole through it so that it can be slipped under a convenient nut.



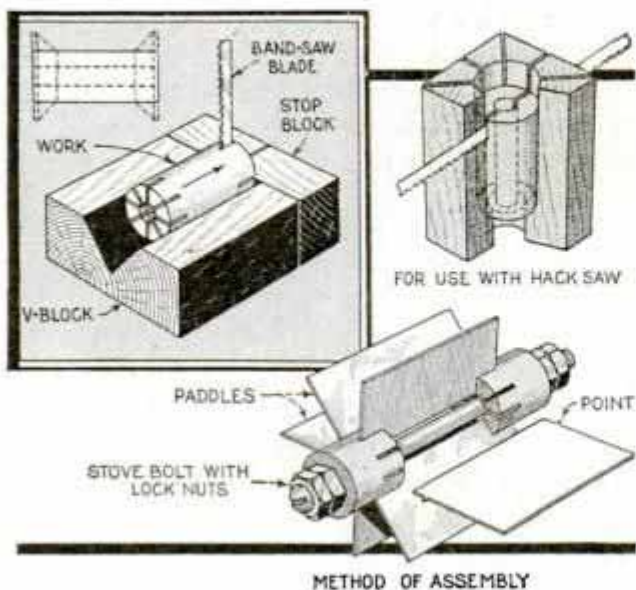
When Not in Use This Towel Holder on Kitchen Stove Slips Out of the Way

Towels Dried Quickly on Rod Attached to Kitchen Stove

A hanger for holding towels in front of a kitchen stove to dry them can be made by bending each end of an iron rod at right angles, the tips of the rod being offset to hold the hanger in holes, which are drilled in the railing of the stove top. When not in use, the hanger is slipped back into the holes so that it will be out of the way.

Making Paddle Wheels for Model Boats

Rigid, well-balanced paddle wheels for working models of paddle-wheel boats can be made by cutting the flanges from a



Spool and Sheet-Metal Blades Used in Making Well-Balanced Paddle Wheels for Model Boats

spool and kerfing it to take sheet-metal blades. The altered spool is placed in one of the jigs shown, and the kerfs are cut into the spool, radial lines first being laid off on the spool to assure evenly spaced slots. The spool is then cut in half and the metal blades inserted in the slots, a stove bolt being used to hold the assembly together. The blades can be filed until the wheel is in perfect balance.—John E. Hyler, Peoria, Ill.

Shade to Prevent Sunburning Your Nose

Guests at a popular desert resort in California found it advisable to wear sun shields on their noses to protect them from excessive sunburn. The shields were made from brown paper, cut to the shape shown and folded over the bridges of their sun glasses. The paper should be fairly stiff so that it will hold its shape when folded.



Locating Position of Screw Eye for Screen-Door Hook

To correctly locate the position for a screw eye in a door casing for a screen-door hook, put the hook in the screw eye and hold it snugly against the casing as shown. Then, with a lead pencil, mark the casing at the center of the screw eye while the threaded portion is held parallel to the surface of the casing. Then drive the screw eye into the wood at the mark.



☞ Fat rendered from a groundhog and sealed in a small bottle will serve as a barometer for forecasting the weather 12 hours in advance. The fat will get cloudy before a storm and remain clear if the weather is to be fair.



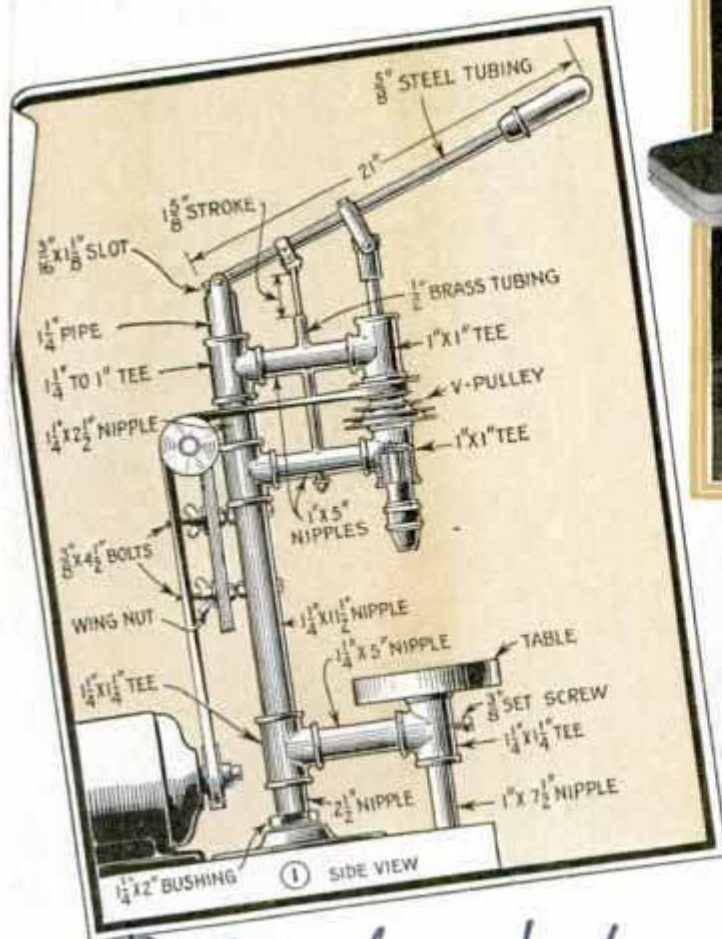
SHOP NOTES

Homemade Ball-Bearing DRILL PRESS

By A. L. MILLS

CONSTRUCTED almost entirely from pipe fittings, this drill press will be found exceptionally rigid, neat in appearance and quiet in operation.

First get a cone pulley having a thick hub to allow a slot for the key. Refer to Figs. 1 and 6, and construct the frame. Drill through for the spring-assembly tube before screwing on the table support. Bush



the 1-in. tees with 1-in. pipe as shown, cut off and carefully drive in model-T Ford spindle bushings after having reamed to fit 1/2-in. drill rod. Insert the shaft and align the bearings by tapping the shaft. With the shaft in place, pour molten babbitt around the spindle bushings. Now fasten a pulley on the shaft, take up the end play with a shaft collar, place it under power and turn down a

Ball thrust bearing for drill press

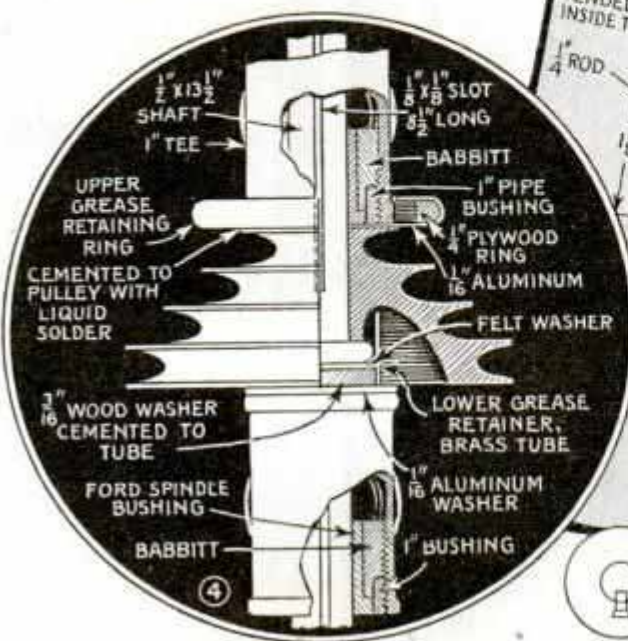
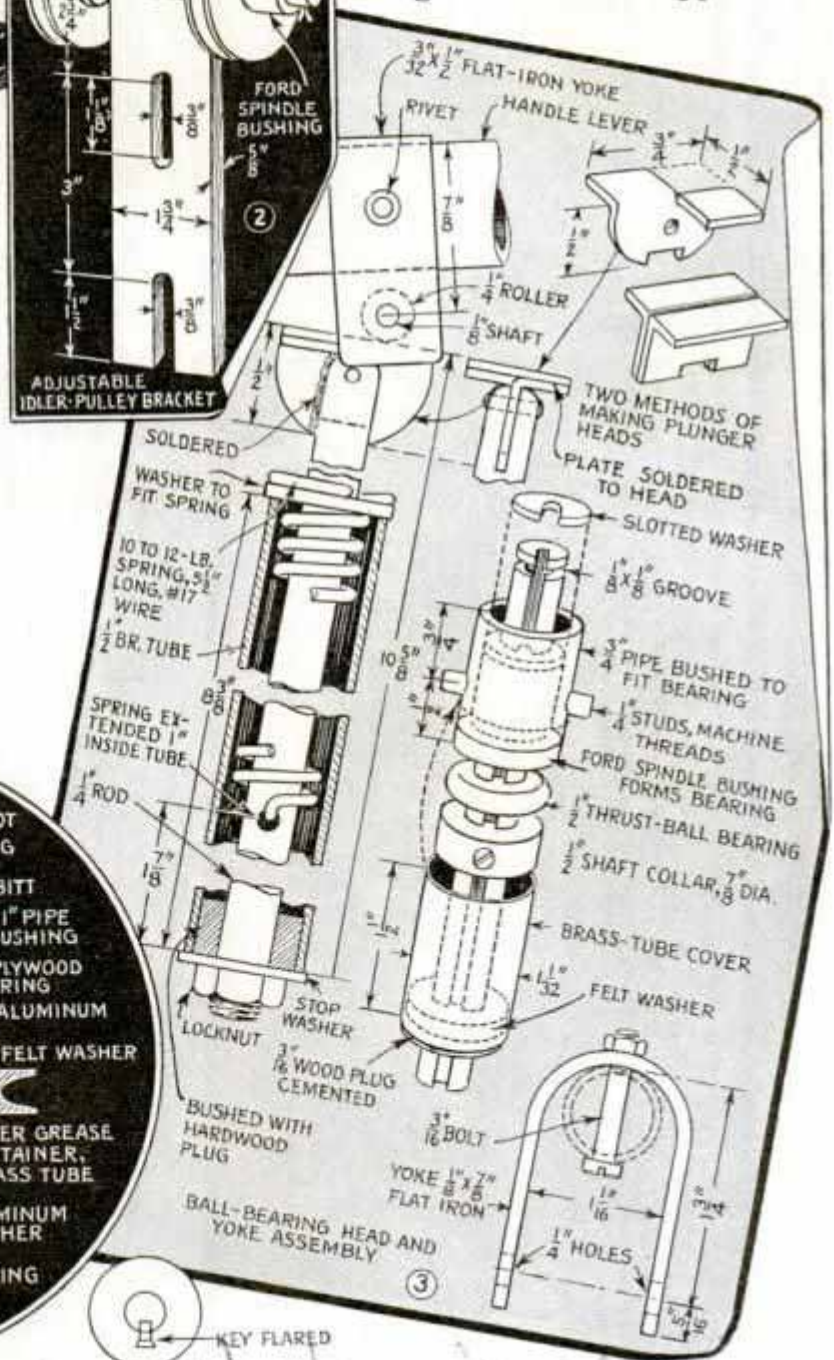
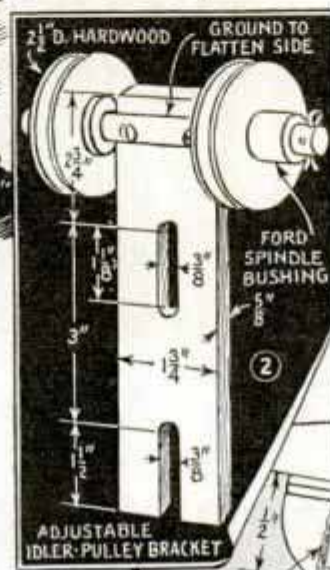
26 Hartung Park Ave. Philadelphia, Pa

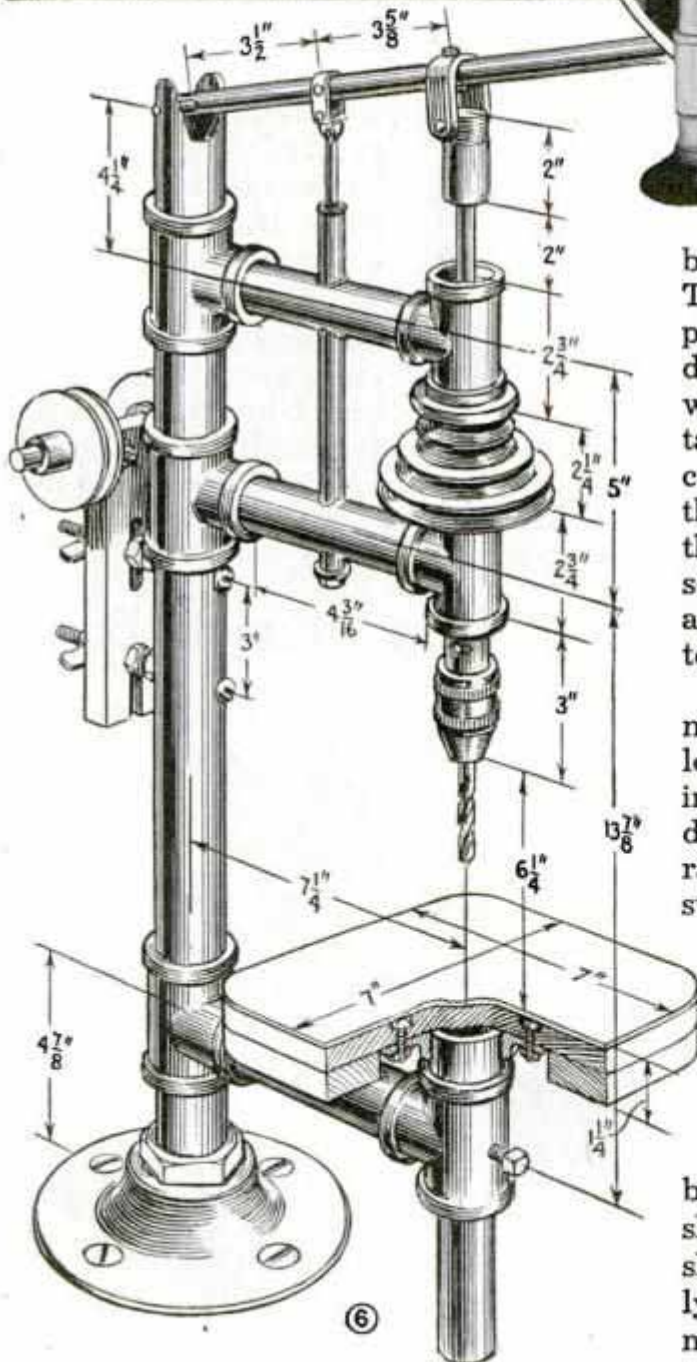
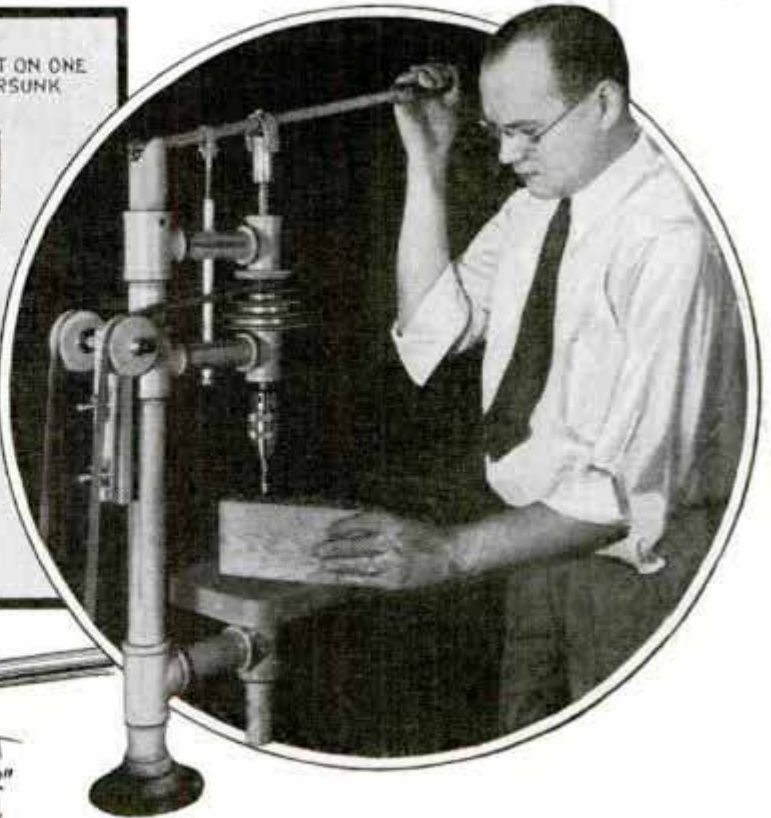
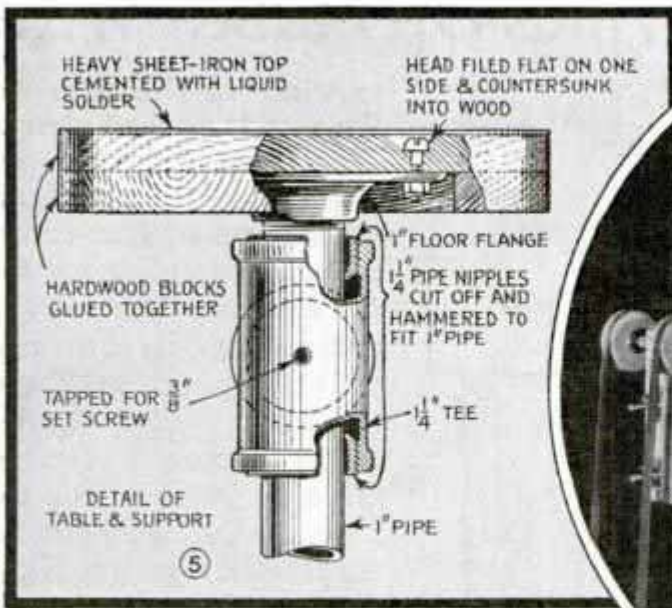


to the disk. Turn this true and cement the upper disk, which is cut out to clear the tee. Turn the whole assembly true with a file. The lower grease retainer is simply a brass cup, Fig. 2, made by wiring sheet brass around a 3/4-in. pipe and soldering the joints. Cement a wood plug in the bottom as shown. Make a large aluminum washer to support the lower ball-bearing assembly.

To assemble the shaft, drop the lower ball-bearing cup down into the tee and slide the pulley in place. Raise the grease retainer cup into place and slide the washer beneath. Then insert the shaft upward through the pulley. Refer to Fig. 3 to make the upper ball-

groove as shown in Fig. 3. The long slot is cut easily with a plane made of two hack-saw blades clamped between two thin boards and a third board extending below to guide against the shaft. Make a key to fit this slot as in Fig. 4, and drive it into a slot cut in the top of the pulley. The upper pulley grease retainer is made by cementing a 1/16-in. aluminum disk to the pulley. Allow 24 hours for drying and then cement a 1/4-in. plywood ring

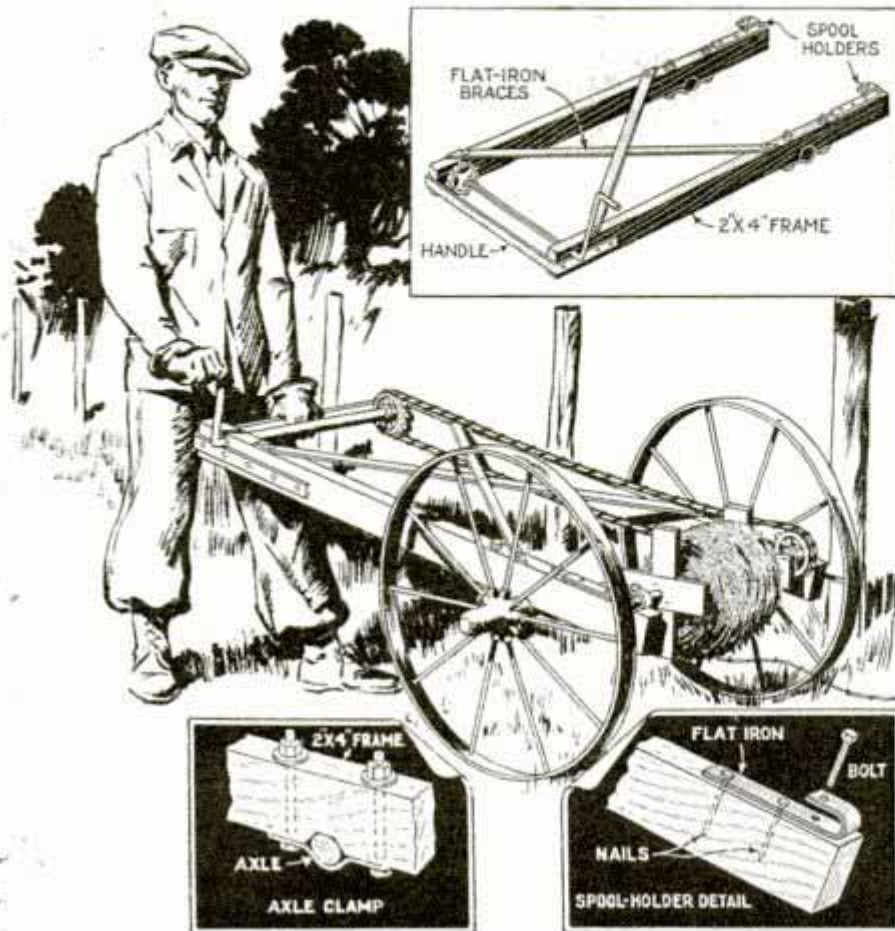




bearing grease retainer assembly as shown. The cover slides to a tight fit on the $\frac{3}{4}$ -in. pipe. Cut off a Ford spindle bushing and drive it into the $\frac{3}{4}$ -in. pipe after bushing with split tubing or tin. Drill through and tap for $\frac{1}{4}$ -in. studs. The studs must have cut threads to avoid turning through into the shaft. See that all pivoting points in the handle lever are in alignment by inserting long rods in the holes and sighting along these. If not lined up properly the top bearing will heat up rapidly.

Construct the spring plunger assembly next as in Fig. 3. Use a spring having at least a 12 to 15-lb. pull when extended 1 in. The tube inclosing the spring is soldered to the frame as in Fig. 1. This arrangement relieves the upper bearing of strain, allowing high speeds. Refer to Fig. 2 and construct the bracket as shown using two $\frac{3}{8}$ -in. bolts to support it. Drive a spindle bushing through a hole in a hardwood block and turn it to the dimensions shown. Wing nuts and lock nuts hold the bracket firmly in the desired position, providing for belt adjustment. The table is made as shown in Fig. 5. Level it square with the shaft by bending the malleable tee slightly, with blows of the hammer. Use a well-made chuck having a short overhang. A standard 58-in. V-belt is used.

Hand Crank on Cart Winds Up Barbed Wire



to wind up the wire as the cart is pushed along. The frame of the cart is of wood and is made rigid by means of flat-iron cross braces, after which one end is mounted on an axle and wheels of an old walking cultivator. Two shafts are needed; one to hold the spool of fence wire and the other to serve as the hand crank. A sprocket wheel from an old grain binder is keyed to each shaft to carry a sprocket chain. Turning the crank will rotate the spool of wire, which must be keyed to the other shaft. In order to make it easy to remove or replace the spool on the shaft, bearings of the kind illustrated in the lower right-hand detail are

Made from junk parts, this cart saves time and labor when handling barbed-wire fencing. It is especially convenient on account of the hand crank which is used

used. Each one is merely a piece of flat iron bent to a U-shape at one end to take the shaft, and having two holes drilled in line to receive a bolt.

Wet Mash Quickly Mixed with Old Auto Fan in Barrel

Farmers who feed wet mash to their live stock will find this arrangement better for mixing the mash in a barrel than a hoe or large paddle. An old auto fan is keyed to a small shaft or pipe, which is suspended from a wood block placed across the top of the barrel as shown, the ends of the block being grooved to fit over the edges to hold it in place. A collar welded or keyed to the shaft a few inches from the top end prevents it from slipping through the block. Attaching a crank to the upper end completes the job. If you desire to have the fan turn faster than is possible with this arrangement, an old hand grinder head can be mounted on the block and the fan shaft attached to it by means of a sleeve and set screws. If this is done, use a two-blade fan instead of one having four blades.

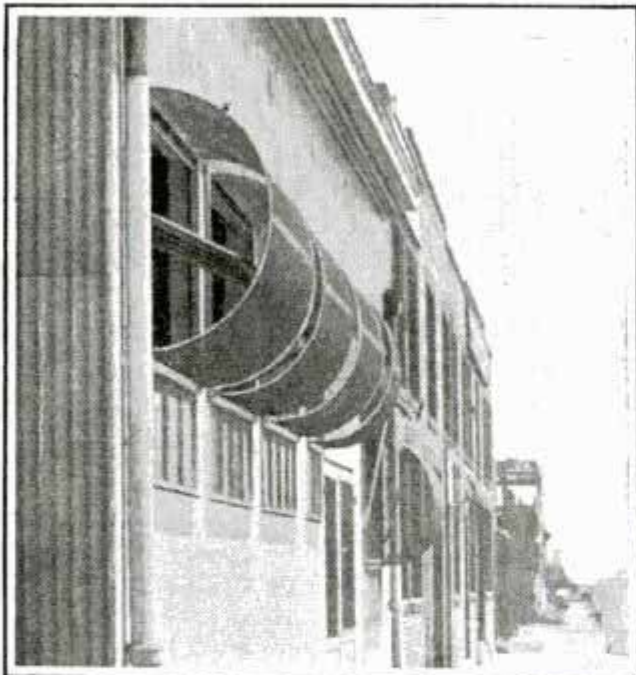


**Light Trucks for Use in Orchards
Improved from Model-T Fords**

Many orchard owners find the use of large trucks or horse-drawn vehicles rather inconvenient for gathering and hauling the picked fruit to the sorting sheds. A Massachusetts fruit grower solved this problem by purchasing old model-T Ford roadsters and touring cars. He removed the tops and windshields and stripped everything back of the front seats down to the chassis. Two sills and a board platform were then put on the back of each car in which to haul the fruit. These improvised trucks were low enough to go anywhere in the orchard, leaving the large trucks free to deliver the packed fruit to the market. Being used entirely on the owner's land, they required no registration or driver's license.

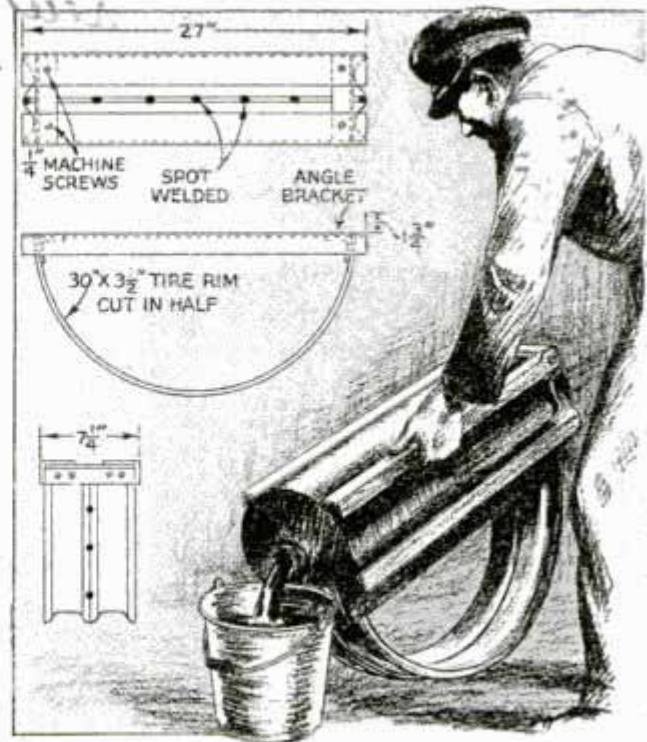
**Curved Window Screens Made
of Flat Iron**

Semi-circular screens for window sash that are pivoted horizontally in the center can be had by soldering the screen wire to curved frames of flat iron. These are screwed to the casings at each side of the



Screen Wire Soldered to Curved Iron Frames Provides Screens for Pivoted Window Sash

windows and are braced horizontally in the centers to stiffen them. The screen wire, of course, is soldered over the sides as well as the fronts of the screen.



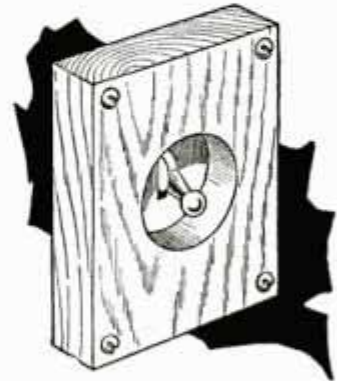
This Rocker Is Handy for Up-Ending Heavy Boxes or for Emptying Large Barrels

**Rocker Made from Tire Rim for Draining
Large Containers**

Although intended for draining oil from large circuit-breaker tanks, this rocker readily lends itself to other uses, such as tilting heavy barrels and drums or large boxes. It is made from a tire rim cut in half and spot-welded together, as shown, to provide the rocker. Short pieces of angle iron riveted to each end on the inside with pieces of flat iron on the outside to anchor the rivets provide lugs for attaching an angle-iron top with machine screws.

Wood Block Protects Toggle Switch

After a toggle switch in a narrow hallway of a warehouse had been damaged several times by wheel trucks, the superintendent of the building used a wood block to protect the switch.



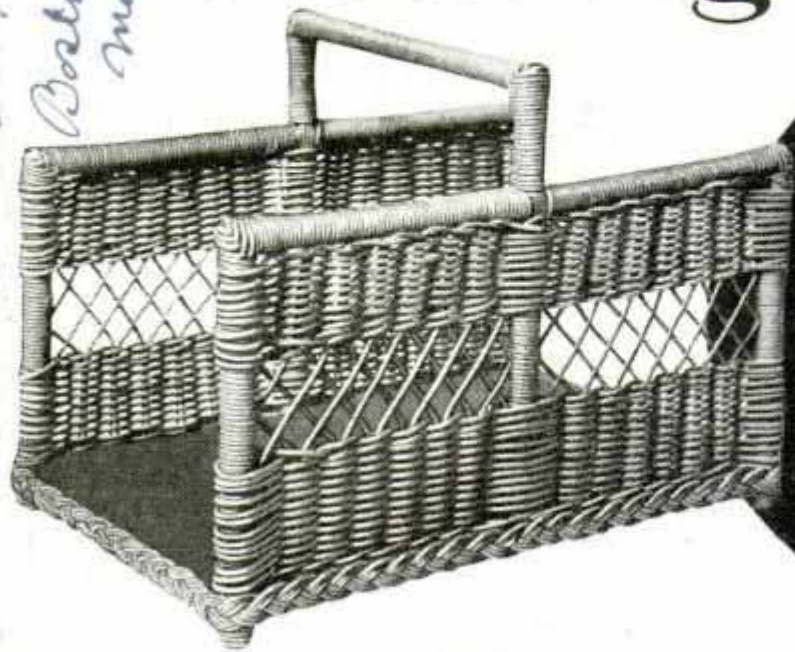
A hole, large enough to permit easy operation of the switch, was bored in the block, which was then screwed to the wall over the switch plate as indicated.

Handwritten notes on the right margin:
This rocker is handy for up-ending heavy boxes or for emptying large barrels
Horse & Co

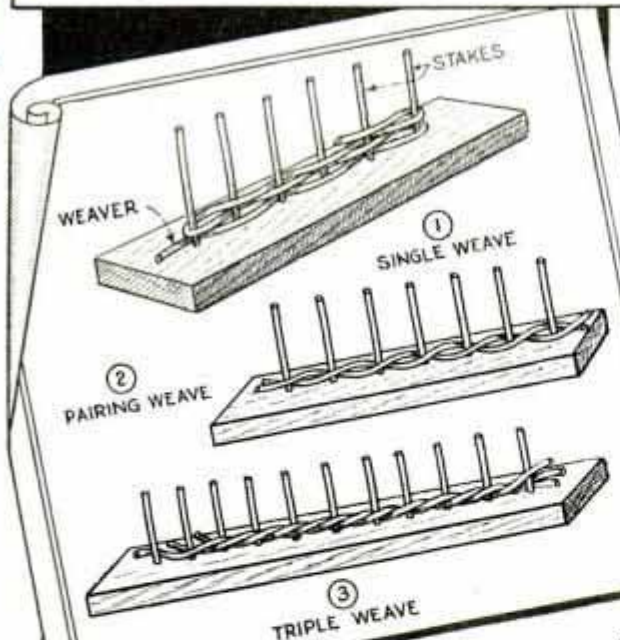
American Handicraft Co.
Dept. P. 130 Beekman St.
New York City

Weaving Reeds

Louis Sloughon Brakes,
Allston Station, 34,
Boston
Mass



Weaving baskets and many other useful and ornamental articles is a fascinating hobby that can be carried on with few tools and at small cost. The variety of pleasing designs in different colors and materials is practically unlimited, and with little practice you will soon become adept at this art



Three types of weaves in common use. The pairing weave has two weavers, crossing each other between adjacent stakes. In the triple weave, the first weaver passes over the other two in front of two stakes and behind the next, and the second goes the same way

BASKETRY has always held an important place in handicraft, largely because of its simplicity and the low cost of the materials and equipment required for the work. Your home workshop will supply all the tools needed. These are a pair of lightweight snips for cutting heavy reed, cutting pliers for trimming, an awl for splitting, a rule, a knife and a hand drill with assorted drill sizes. Reed is the material used chiefly in weaving basketry. Though this material is supplied in practically any quantity it is economical to buy the reed by the hank. Quality reeds may be recognized by their whiteness, smoothness and pliability. Keep the material in a basement where the temperature and humidity remain fairly uniform.

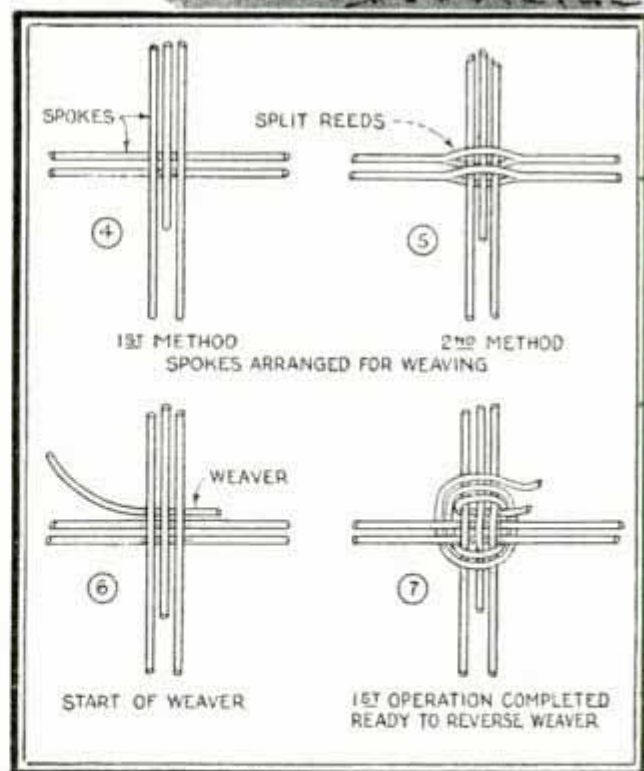
The most commonly used sizes of reed are Nos. 2, 3, 4 and 5. Since reed cannot be worked in a dry state it is necessary to soak it for a short time in warm water before using, an average of from 8 to 10 min. being sufficient as the material will discolor if left in the water for longer periods. Figs. 1, 2 and 3 show the three types of weaves in common use. The strand of reed which is woven in front of and behind the uprights is referred to as the "weaver" while the uprights are

into BASKETS



known as the "stakes." The simplest weave, known as the basket weave, is that shown in Fig. 1. In this the weaver passes in front of and behind each alternate stake. With this weave it is necessary to provide an odd number of spokes so that the weaver may continue to pass over and under. The pairing weave is shown in Fig. 2 wherein two weavers are used with any number of stakes. The left-hand weaver crosses the right-hand weaver, the process being one of uniform repetition. The triple weave is illustrated in Fig. 3. Three weavers and any number of stakes may be used. The procedure differs in that the left-hand weaver is always brought over the other two, in front of two stakes, in back of the next stake and out. The latter two methods permit the use of colored reed in working out various geometric designs on the sides of baskets and other articles similar in design.

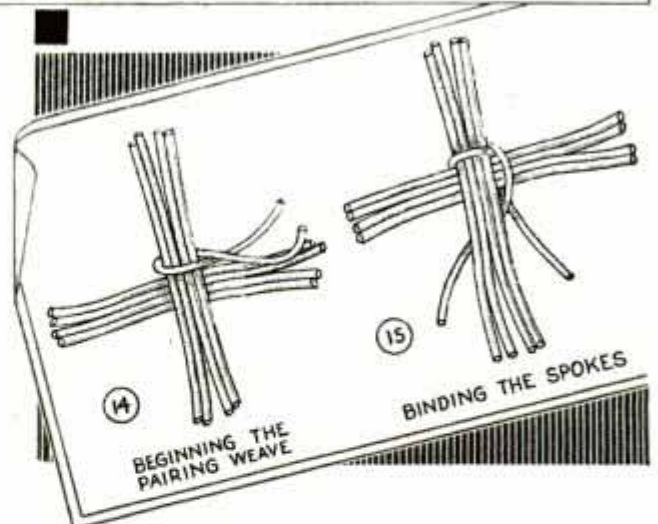
Figs. 4, 5 and 6 show how the weaver is started when weaving the circular bottom of a round basket as an example. The beginning of a full-woven basket of this type is shown in Fig. 4. The reeds necessary for the bottom or mat are four pieces of No. 4, cut 15 in. long, one piece 9 in. long, and several strands of No. 2 reed. Place two of the long spokes together and two



with the short spoke between them in the position shown in Fig. 4. The long spokes cross at the exact center, while the short



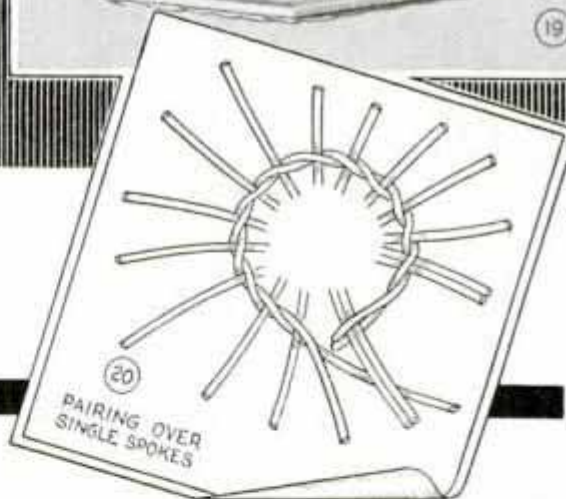
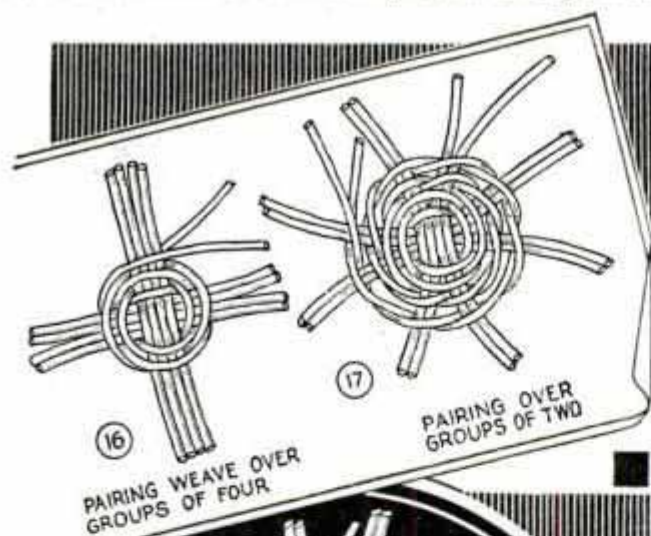
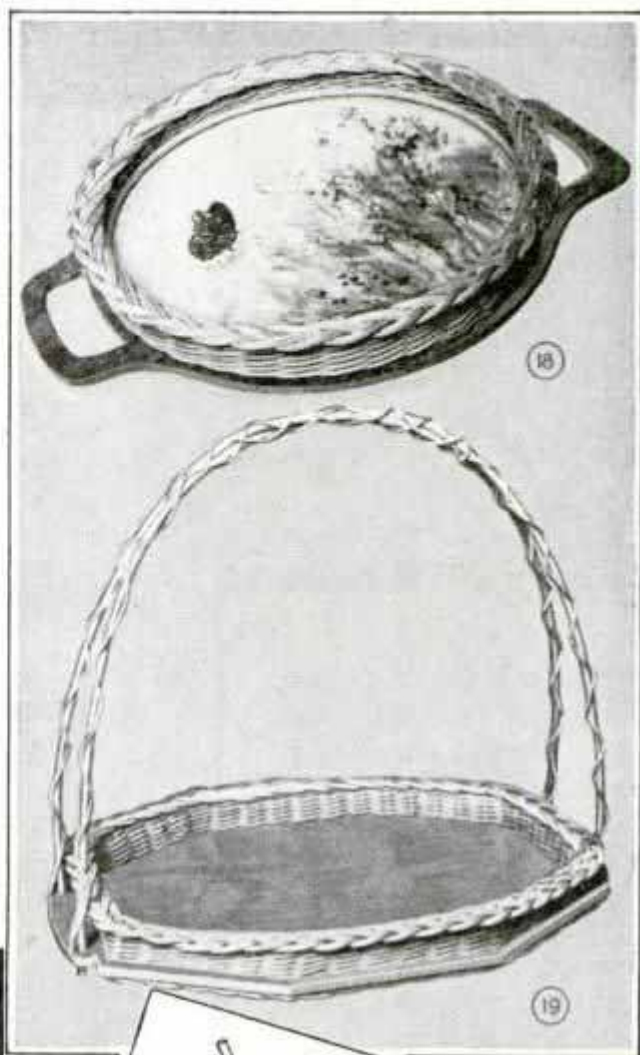
spoke extends beyond the center as shown. A second method of starting a center is shown in Fig. 5 where two of the spokes are split to receive the three intersecting ones. The weaver is started as in Fig. 6 and the first operation finished as in Fig. 7, after which the direction of the weaver is reversed as shown in Fig. 8. The spokes are then separated and the weaving continues under and over alternate single spokes, as in Figs. 9 and 11. Adding a new weaver is done as in Fig. 10, and after the weaving has been completed the projecting ends are cut off with cutting pliers or a sharp knife. When the mat is the size desired and is not to be used as the bottom of a basket, the edge is overcast as in Fig. 12, where two stitches of overcasting are indicated. The process is continued over and under each spoke until the circuit of the spokes has been made, after which the weaver is cut off underneath. A border may be added as in Fig. 13, which shows two simple designs.



To make a mat by the pairing weave method, you begin with four vertical spokes and two weavers as in Fig. 14. The front weaver passes in front of the vertical spokes and behind the horizontal spokes, while the rear weaver passes back of the vertical spokes and in front of the horizontal, the procedure being clearly shown in Fig. 15. The weavers continue around the four groups of spokes in this manner

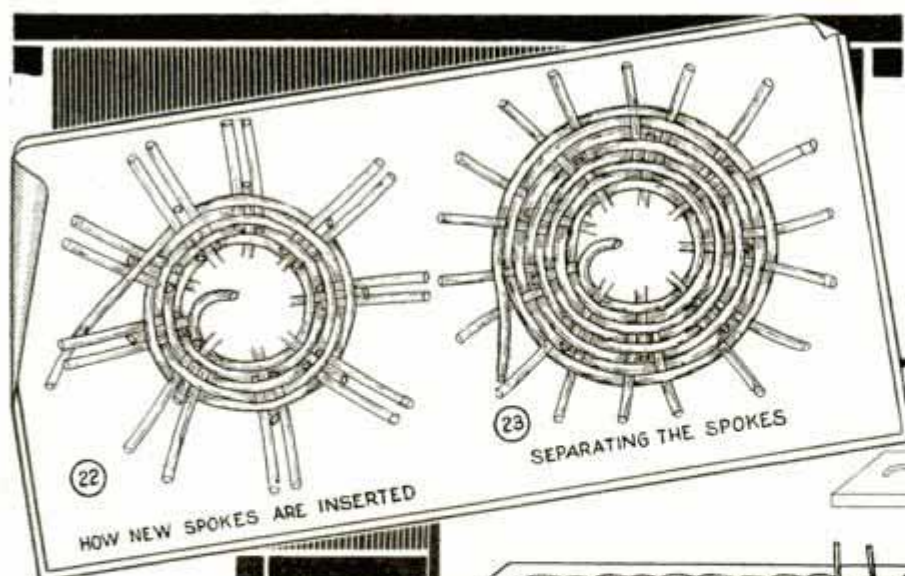
until the latter are held firmly as in Fig. 16, after which the spokes are separated into groups of two each and the same procedure continues, as in Fig. 17. Continue several times around the twos until the spokes are equally separated, then weave with the same weave over and under single spokes after these have been separated as in Fig. 20. The pairing weave is then continued over and under single spokes until the mat is the required diameter.

The beginning of a small full-woven basket is shown in Fig. 21. Here the spokes are sufficient in number to complete the basket without adding others. Two rows are woven around the four groups, then the spokes are separated into twos. Two more rows are woven and the spokes separated into singles. The procedure then continues as has been described. Larger baskets make the addition of spokes necessary after the center of the mat is completed. This is done as in Figs. 22 and 23, and the weaving continues as before. When the bottom has been completed the spokes



are turned up to form the sides. They are then designated as stakes. The shape of the basket is determined by the curve of the stakes and it is necessary to maintain sufficient tension on the weaver to hold the stakes in the proper position.

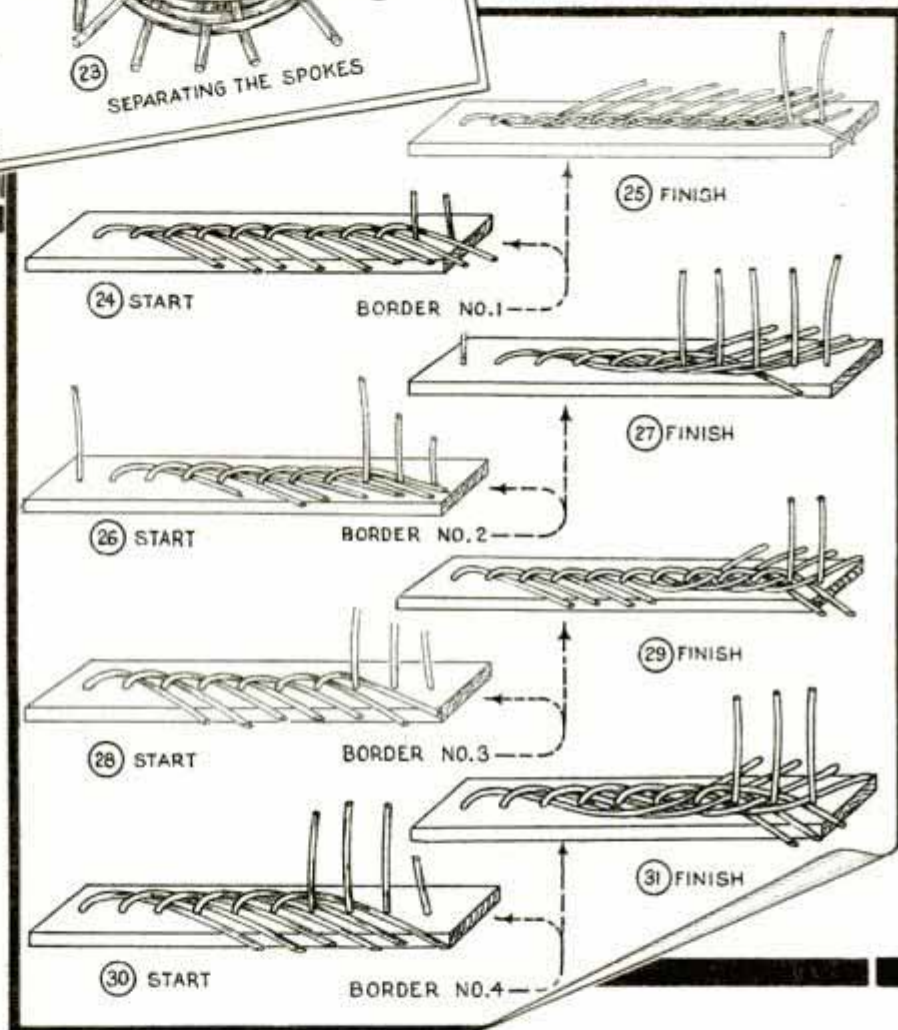
A closed border is a weave used to tie or lock the stakes or spokes after the other weaving has been completed. It binds each stake to the succeeding stake and is itself bound. Methods of starting and finishing closed borders are shown in Figs. 24 to 31 inclusive, the process being largely self-explanatory and clearly shown in



weaver reed is inserted beside the foundation reed as indicated and is wrapped around the larger reed three times. Fig. 38 indicates the way in which the weaver is returned to the starting point. The weaver is car-

the drawings. A more complex type of closed border is shown in Figs. 33 and 34 and also Fig. 35. Variety may be given to this border by the open spacings and by passing over a greater or less number of stakes. Allow from 8 to 10 in. of the stake to project above the finish of the weaving. The material must be kept moist during this operation to insure pliability as each strand must be turned sharply to produce neat work. The method of making the braided border is shown in Figs. 35 and 36, with the stakes numbered in Fig. 35 for convenience. To start, bend down stake No. 1 and pass it over stake 2 between stakes 3 and 4 to the inside. Pass 2 over 3 between 4 and 5 to the inside. Pass 3 over 4 between 5 and 6 to the inside. These operations leave stakes 1, 2 and 3 inside and stake 4 outside. Pass 1 out over 2 and 3 between 5 and 6. Press 5 down outside of and parallel to 1. Stakes 1 and 5 are now to be used as a single stake. This is the start of the procedure which is continued as shown in Figs. 35 and 36.

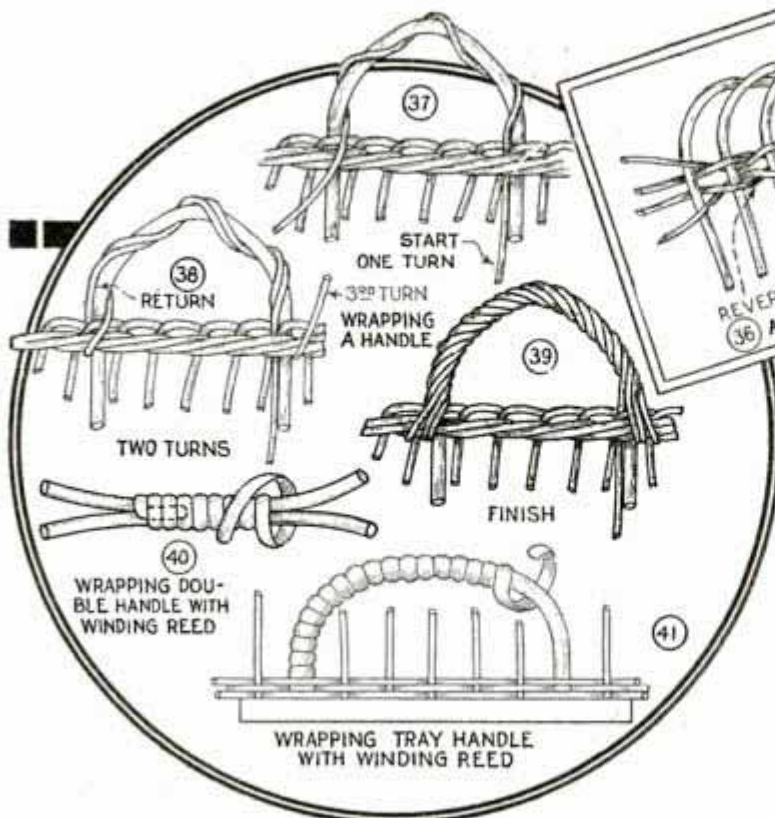
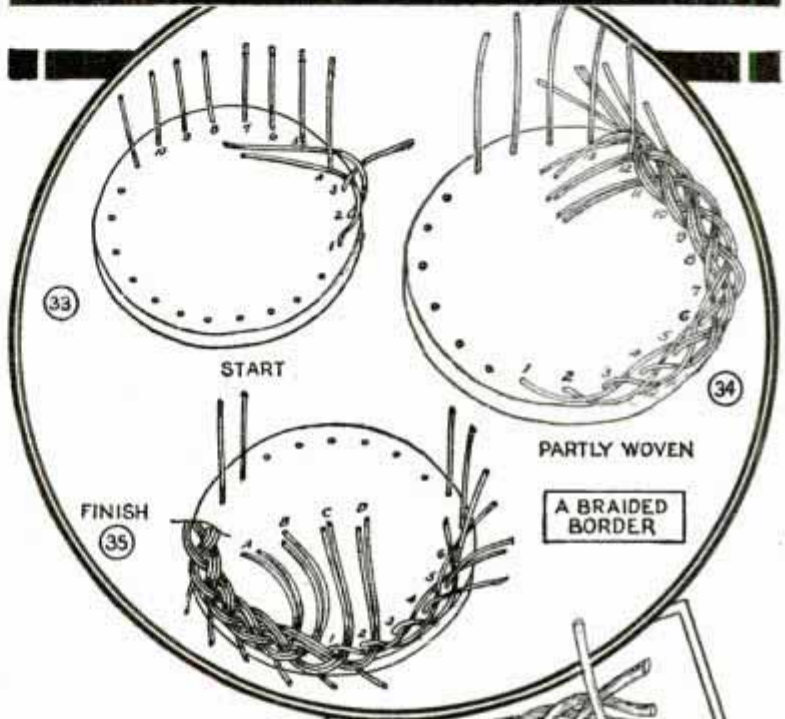
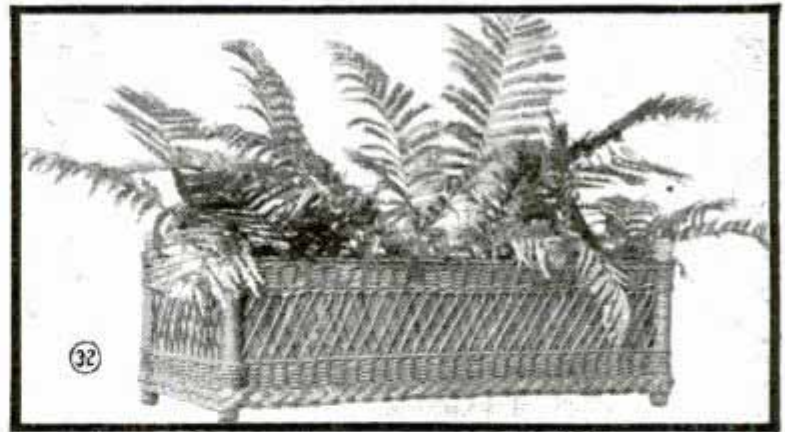
Figs. 37, 38 and 39 show in detail the method of making a handle for a basket or tray. Fig. 37 shows the first turns of the weaver reed over the foundation reed. The



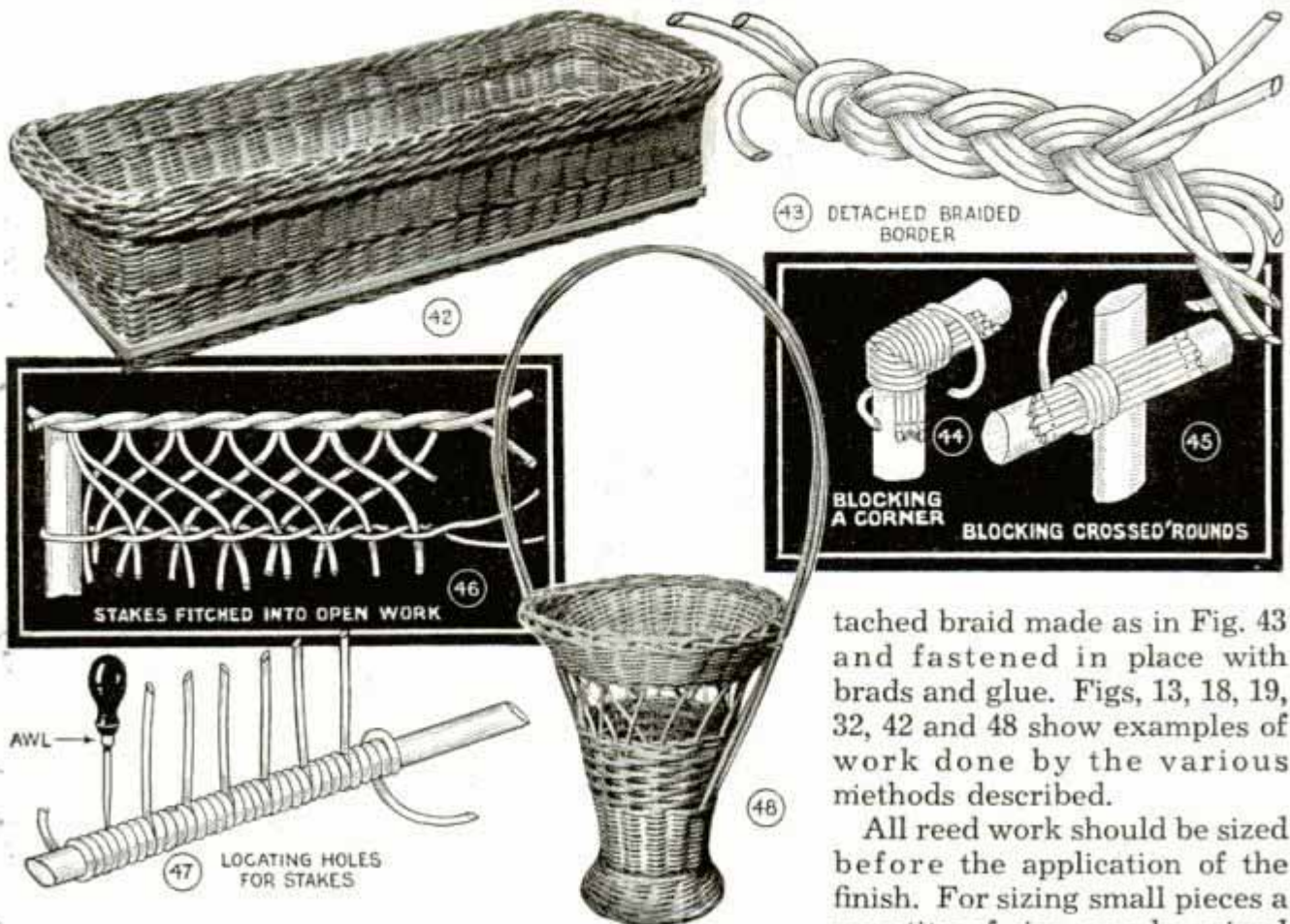
ried under a section of the woven part of the basket a number of strands below the border and follows the course of the initial strand back to the point where it was first inserted. The wrapping is continued until all the space on the foundation reed is filled, which finishes the handle as in Fig. 39. The end of the weaver is pushed in between the front and back weavers and cut off short. A second type of wrapped handle is shown in Fig. 40. Here the foundation reed is wrapped continuously with what is known as flat winding reed. This reed is flat on one side, there being but a slight curve on the upper surface. In wrapping a double handle, Fig. 40, one

end of the winder is turned under at the start of the winding. The succeeding turns of the winder must be kept tight and uniformly close together. When the winding is finished the loose end is forced in between the reeds and under the wrappings. The wrapped handle in Fig. 41 is used on trays, the two ends of the foundation reed being glued into holes bored in the base. The flat reed is used for the winding and the procedure is the same as described before.

Owing to the difficulty of working the natural reed in covering frames, most so-called reed or woven furniture at the present time is woven from fiber cord which is paper, machine-twisted into a tight uniform strand which is very strong and pliable and well suited to weaving. Furniture frames suitable for weaving may be obtained ready made. The joints and corners on these frames are strapped and blocked before proceeding with the winding or wrapping of the framework. Fig. 44, for example, shows a corner which cannot be wound. Any right-angle joint of this kind must



be blocked with fiber strips in the manner shown. The ends of the fiber strips are tacked to the dowels with very fine tacks made especially for this work. Fig. 45 illustrates another type of blocking necessary where two dowels of a framework are joined to a third, forming a cross. Pieces of fiber are laid across to the opposite side as the drawing indicates, and the ends are tacked securely in place to be covered later with

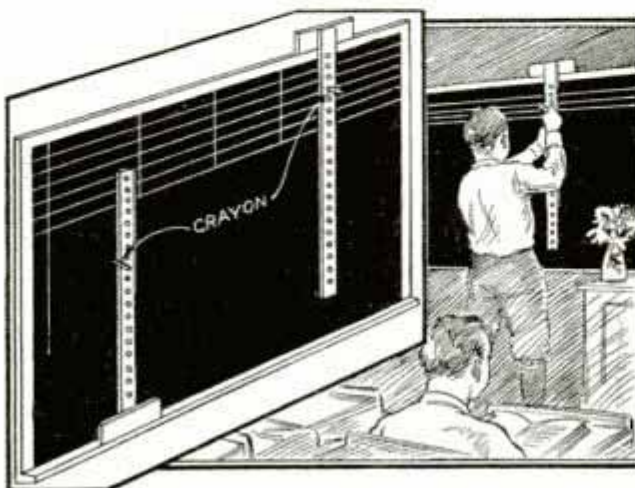


the fiber wrapping. Figs. 46 and 47 show two methods of fitting stakes into open work. In the first, shown in Fig. 47, holes are drilled in the frame to take the ends of the stakes. The frame is then wrapped in the regular way, after which the strands of the wrapping are pried apart for insertion of the stakes. The second method is known as fitting and is illustrated in Fig. 46. The pairing weave is used to separate the stakes into open work. Edges which cannot be woven are trimmed with a de-

tached braid made as in Fig. 43 and fastened in place with brads and glue. Figs. 13, 18, 19, 32, 42 and 48 show examples of work done by the various methods described.

All reed work should be sized before the application of the finish. For sizing small pieces a quantity of size may be mixed in a large receptacle and the piece dipped into the solution and allowed to drip dry. All parts must be covered with the sizing solution. On larger pieces the sizing must be done with a brush in the regular way. After sizing, the basket or other article may be varnished in the natural color. Or it may be finished in bright colored enamels applied with a brush or better, a spray gun which is most effective in working the finish into the surface. Stains, followed with a coat of shellac are also effective.

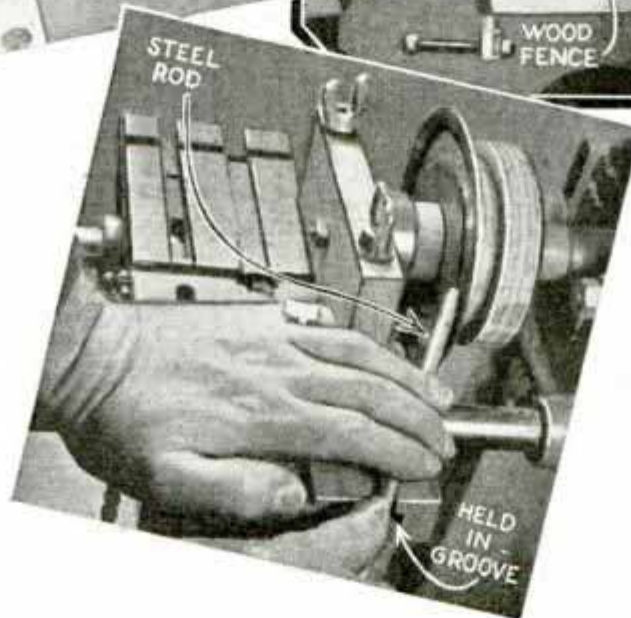
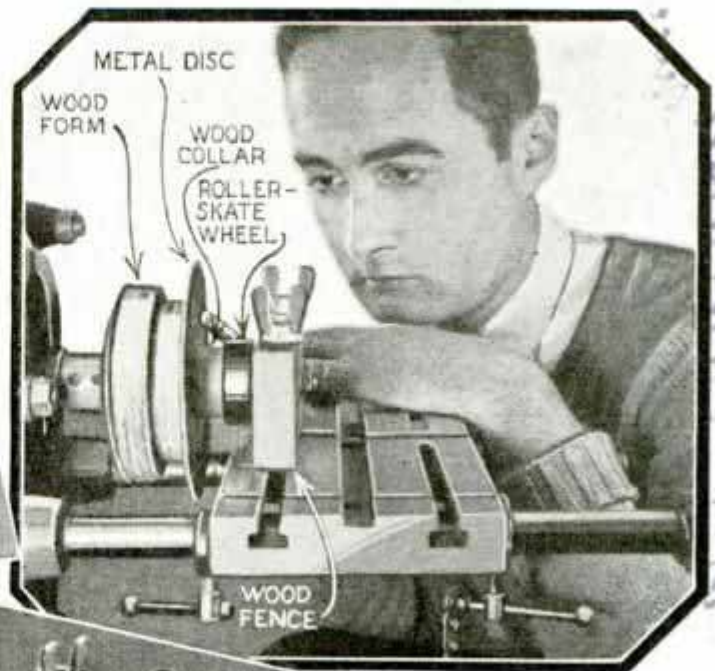
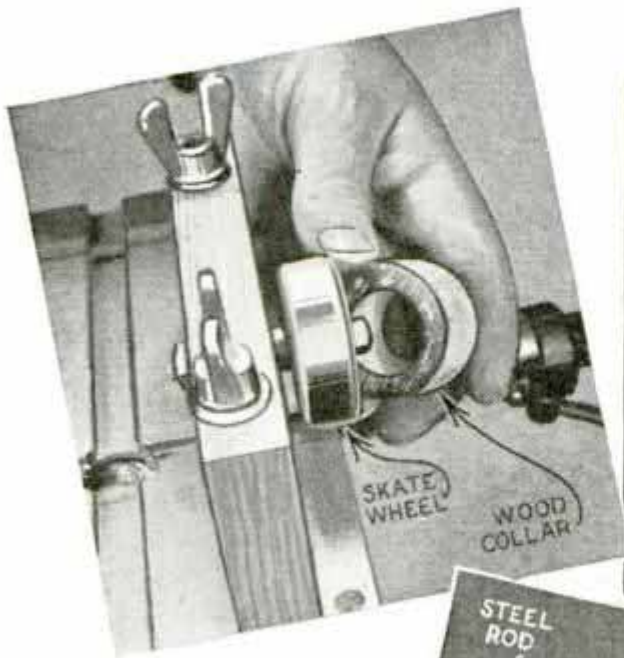
Large Blackboard Quickly Ruled with Aid of T-Square



In schools or offices where blackboards are ruled vertically and horizontally for various diagrams, a sliding T-square will be found convenient. Evenly spaced holes in the square allow the insertion of a crayon to rule horizontal lines which is done by sliding the head of the square along the base molding or over the board.

When finishing shafts do as much of the work as possible in the lathe and use a file very little, as filing has a tendency to flatten the shafts due to unequal hardness of the metal.

Mortiser Used for Small Metal-Spinning Jobs



Small jobs of metal spinning can be done on a mortiser and by varying the setup, even on a drill press. The wood, over which the metal is spun, can often be cut from plywood and is attached to the faceplate with screws. A roller-skate wheel is bolted to the fence on the mortiser table to form the thrust bearing. A wooden collar with a slightly rounded face fits over the thrust bearing and provides

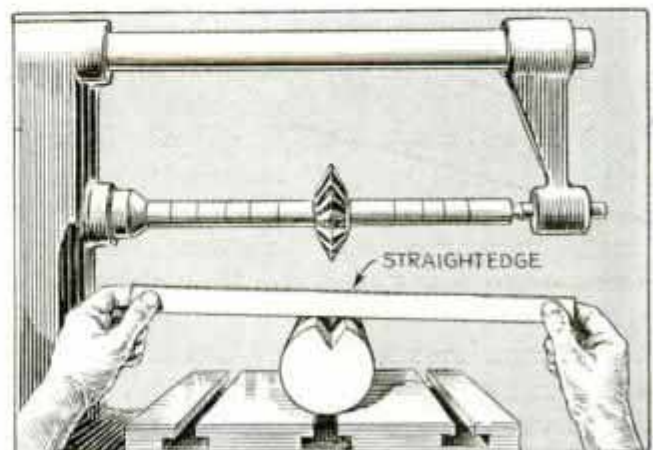
support for a metal disk to be spun, which is centered on the form and held securely by pressure applied through the thrust bearing. With a rounded piece of steel rod, the metal disk may be made to flow over the form until it takes the shape of the pattern desired. Thin sheet

copper and aluminum are the best metals to use for light spinning.

Milling Cutter Centered on Round Work with Straightedge

When centering a shaper, planer or milling-machine tool for use on round work, set the tool as close to the center of the work as possible by sighting with the eye and then take a light cut. Lay a straightedge across the edges of the cut as shown. If this is not parallel with the machine table, the cutter is not set centrally, and either the tool or the work should be shifted.—Charles Kugler, Philadelphia, Pa.

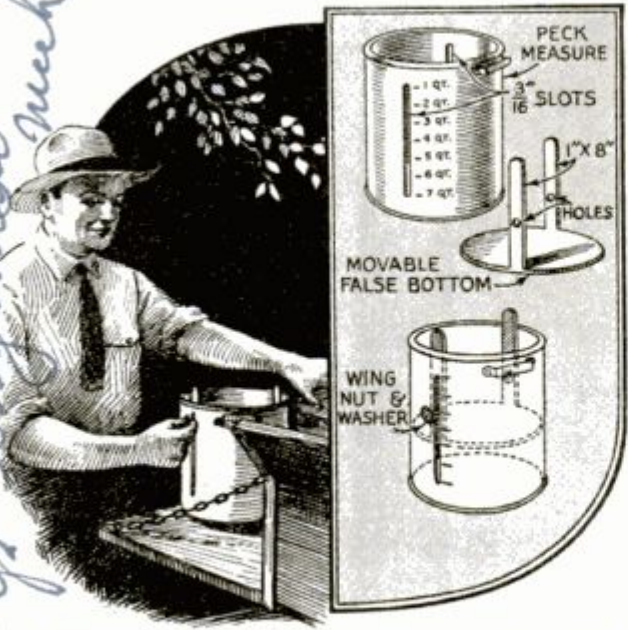
Adhesive tape placed on the underside of oilcloth where it passes over table corners will prevent it from wearing through at these points.



Centering Shaper, Planer or Milling-Machine Tool on Round Work with Straightedge

Adjustable Peck Measure Saves Time

my copy 1436 W. Randolph Chicago
 mayer
 Peck Measure Corp.



Peck Measure Fitted with Adjustable False Bottom Measures Quantities from One Quart to One Peck

A farmer who sold fruits and vegetables in small amounts took a peck measure and fitted it so that he could measure quickly any quantity from one quart to one peck. To do this, he cut a couple of narrow slots on opposite sides of the measure and fitted it with a false bottom. When cutting out the bottom, two narrow projections were left and were bent up at right angles. These projections were drilled for small bolts. In this way, the false bottom could be raised and clamped in any position to measure the desired amount.

Sign Holder Held on Window with Suction Cup



For holding signs on windows and other smooth surfaces securely, store owners will find the use of small suction cups highly effective. Some of these cups are provided with a screw imbedded in the rubber, and it is an easy mat-

ter to punch a small hole through the sign to permit its attachment to the cup. Where signs or placards of the same size are changed daily, a grooved wooden frame, permitting quick insertion or removal of

the signs, can be made as shown in the drawing. The frame is mitered at the corners, the sides and bottom are grooved, while the top has a slot cut through its entire width. The sign need not be covered if used indoors, but when used outside it may be protected by a piece of glass or celluloid of the same size, also slipped in the frame, or the sign may be covered with Cellophane. Two suction cups, one on each side, will hold the frame firmly on the window where gusts of wind will not dislodge it.

Wrench for Removing Bungs from Oil Drums

An emergency wrench for removing the bung from an oil drum is quickly made by screwing a couple of nuts onto a bolt and spacing them to fit snugly inside the recess in the top of the bung. This type of wrench can also be used on hexagon bungs by spacing the nuts to fit them.—G. E. Hendrickson, Argyle, Wis.



Weights for Focusing Cloth

To weight a focusing cloth so that wind will not blow it off a camera when taking outdoor pictures, fuller balls can be slit and slipped over the corners of the cloth



Fuller Balls Attached to Corners of Focusing Cloth Hold It Down in Wind

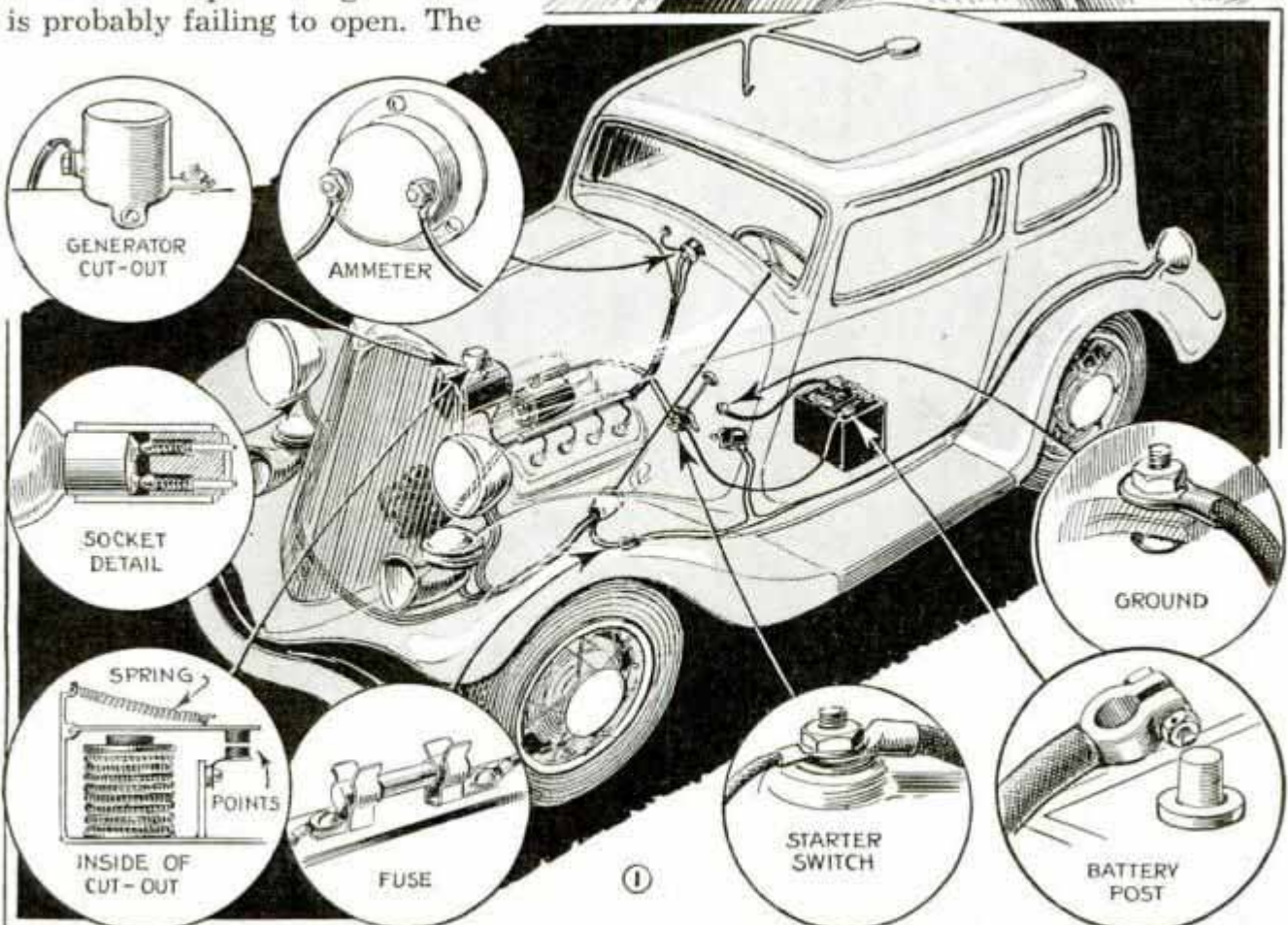
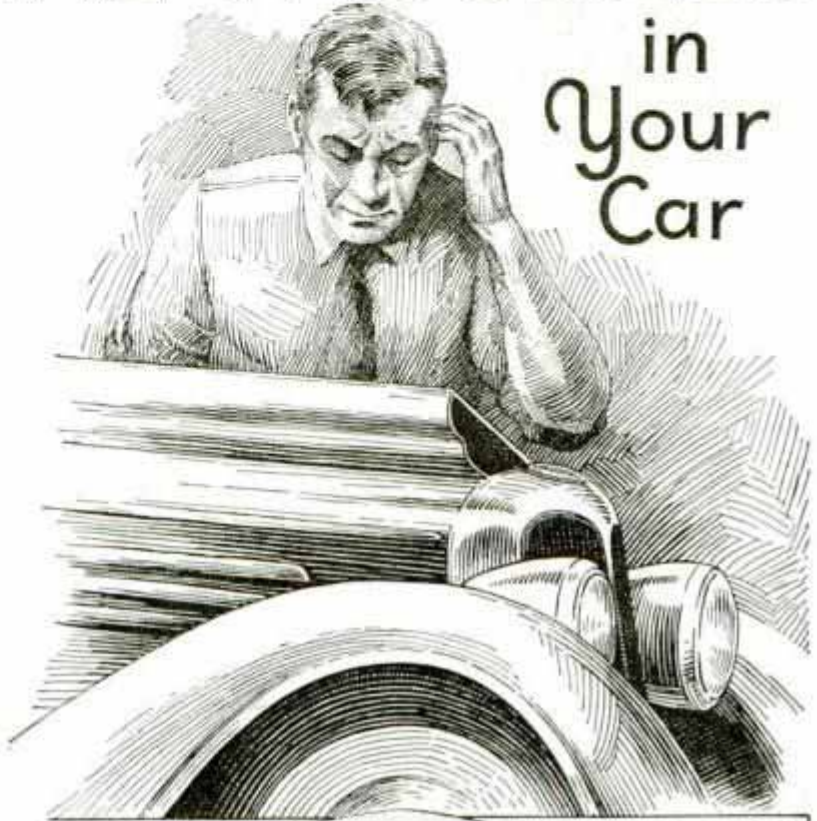
as shown. The balls are heavy enough to hold the cloth down, yet will not cause any damage to the photographic equipment if they accidentally strike it. The balls are easily removed when not needed.

Simple Tests Locate ELECTRICAL TROUBLES

in
Your
Car

WITH the aid of a test light, consisting of a 6-volt bulb, socket, two lengths of insulated wire and a couple of battery clips assembled as shown in Fig. 5, you can "run down" short or open circuits in your car. Most electrical troubles are intermittent, and, for this reason, are hard to locate unless traced systematically.

Suppose your battery runs down while the car is standing idle. The first thing to do is to be sure that the ignition switch or lights have not been left turned on. Also watch to see that the ammeter goes back to zero when the motor stops. If it shows a discharge of 10 to 18 amps., the cut-out on top of the generator is probably failing to open. The





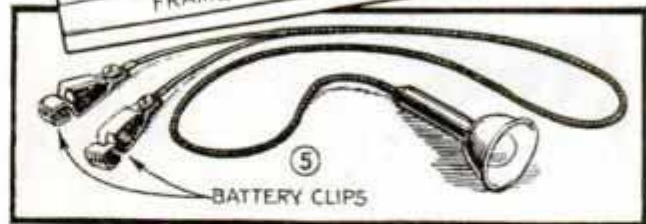
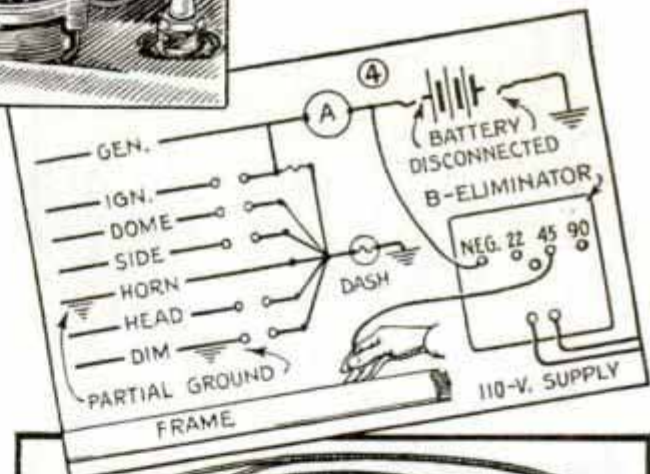
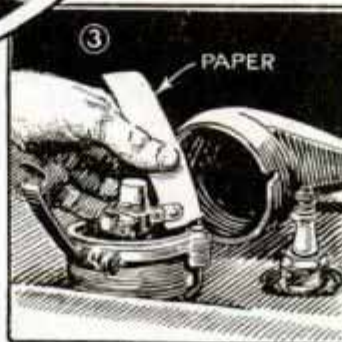
cure is to remove the cover, smooth the points with a fine file, if rough, and increase the spring tension a little until the cut-out just opens. Next, check all the connections indicated in Fig. 1 to see that none of them are loose.

If the cut-out and battery are both in good condition and the latter still runs down, the trouble is probably in the wiring. The first step is to have the battery fully charged and put back in the car, leaving one terminal disconnected. With all switches turned off, strike this terminal on the battery post. If a spark occurs, you have a bad short. But, although you can't see a spark, there still may be a short. Take the test lamp and snap one clip to the terminal of the cable and the other on the battery post. If the lamp lights, there is a short or ground, and by leaving the lamp on and moving the cable and wires connected to it until the light goes out, you can often find the trouble. The final check for leaking current is made by removing the bulb from the test light and touching your tongue to the contacts, Fig. 6. This is known as the "salty-taste" method. Current leakage so slight that it will not light the bulb is indicated by a strong salty taste at the contacts.

High-resistance grounds that discharge a battery slowly are sometimes found where a wire touches the metal covering

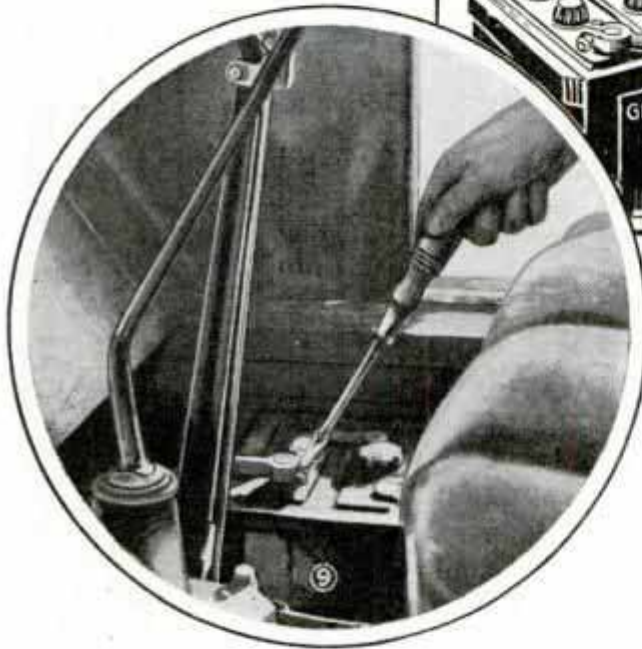
of a cable at one point and the cable touches the frame at some other point. Another high-resistance type of ground is where a wire has rubbed against the speedometer housing or some other metal part of the car. If the short is not located in this way, it may be in the light or ignition wiring and may be making contact at intervals as the car is driven. To find this trouble, remove all the bulbs from the lamps, place paper between the ignition points as in Fig. 3, and turn on all switches. Connect the test light in series with the battery. Then

go over each wire thoroughly, moving it back and forth and up and down, especially where it passes over any metal, to see if the test light flashes. If it does, you have lo-



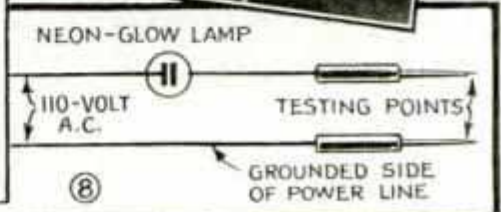
cated the ground. If these tests fail to locate the trouble, the next step is to insert fuses in the various circuits. Then, by noting which fuse blows out, it is just a job of tracing that line to find the ground. Intermittent shorts are common in the tail-light wire where it passes out from the frame of the car. They are also common where wires pass through the dash and radiator shell. If the lights burn brightly before going out, either the generator is overcharging the battery or there

is a loose connection between the generator and the battery. The charging rate of any third-brush controlled generator is reduced by moving the third brush, the thinnest one of the three, against the direction of armature rotation. One way to find points of high resistance in the charging line is to run the motor with the generator set at the maximum. Then connect the test light from the generator terminal to the frame. With the light burning, trace the circuit from the generator to the battery, making it a point to poke and pull each connection with the fingers. If the light flares, you have located a contact that should be



cleaned and tightened. Pay special attention to the battery terminals, Figs. 7 and 9.

Sometimes a short circuit cannot be located by the tests described because the insulation is not entirely worn through and the current leakage is very light, yet it is enough to run down a battery over a period of time. In this case, an old radio B-eliminator can be connected to a 110-volt line and substituted for the car battery as shown in Fig. 4. Be sure that the negative connection of the eliminator is connected to the negative circuit of the car. Also disconnect the generator from the car circuit to avoid damaging it. Attach a wire to the 45-volt terminal of the eliminator, and, holding the bared end in the hand, touch the same hand to the frame of the car and have someone go over the wiring in the same way as with the



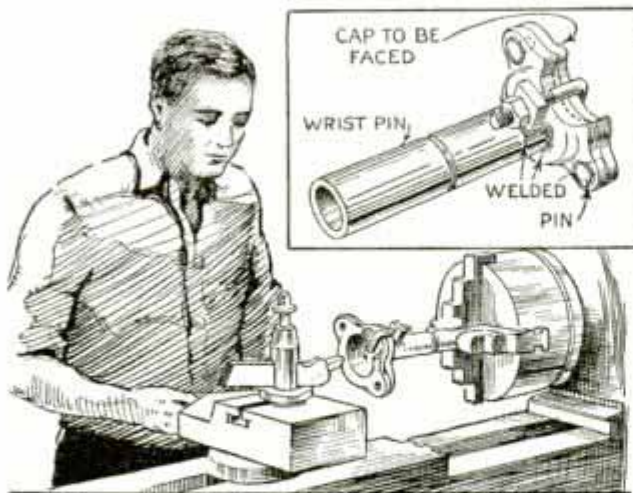
test lamp. The eliminator runs 45 volts through the wiring and when a short is found, a slight shock will be felt in the fingers. The stronger current will show up a weak current leakage very quickly. Still another method is to connect a neon-glow lamp into a 110-volt a.c. line as shown in Fig. 8. This method is especially convenient for locating breaks in a wire when the insulation shows no sign of a break, as the pointed testing points can be pushed readily through the insulation to contact the wire. Fig. 2. shows a method used in testing for short-circuited spark plugs.

Auto Door Hinges Lubricated with Tallow Candle



Auto door hinges and locks may be cleanly lubricated by using an ordinary tallow candle which has been pointed at one end. If more convenient, the candle may be melted and the tallow swabbed on the moving parts. This lubricant has the advantage that it will not soil clothing or upholstery.

Holder for Facing Ball-Joint Caps in a Lathe



With This Holder, Caps That Hold Ball Joints on Fords Are Faced in a Lathe

I often have to face off a cap that holds the ball joint on the front radius rod of a Ford car. To save time on these jobs, the holder shown was made so that the work could be done in a lathe. To make the holder, an old cap was welded to one end of a wrist pin and a small steel block with a hole through it was welded just behind the cap as shown. This takes a J-bolt, which holds the cap to be faced. Short steel pins welded in the holes at the ends of the cap fit in the holes of the work and prevent it from turning.—A. E. Wittman, Humboldt, Ia.

Rubber Bulb Tests Fuel Line for Leaks

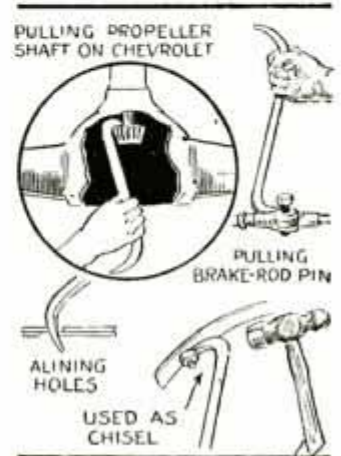


By means of a rubber bulb, such as is used for filling storage batteries, and a length of rubber tubing, you can often locate leaks in a fuel line of a car. To make the test, disconnect the line from the fuel pump or vacuum tank and slip the tubing over the end of the line. Squeeze the bulb and then let go. If it fills quickly, there is a leak that admits air to the line, but if it fills slowly and pulls in gasoline, then the line is air tight. If a short glass tube is inserted in the rub-

ber tubing, the gas can be seen flowing into the bulb when there are no leaks in the line.

"Tommy Bar" Has Many Uses in a Garage

Auto mechanics will find many uses for a tool known as a "tommy bar." It is made from a 12 or 14-in. length of tool steel, and has one end hammered to a chisel shape and bent at right angles while the other is drawn to a dull point and bent in the opposite direction to a radius of about 2 in. The tool can be used as a gear puller, brake-pin extractor, or an angle screwdriver. It may also be used as a cold chisel by striking a hammer on the side opposite the chisel edge. The rounded end is useful in securing proper alignment of holes in parts to be bolted or riveted together.

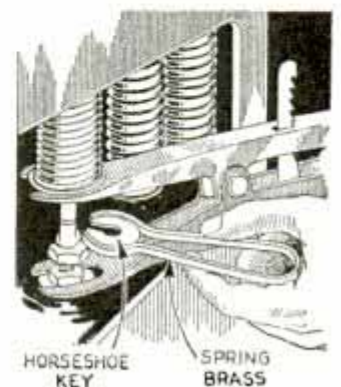


Heat Aids When Removing Old Weatherstrip on Windshield

Rubber weatherstrips around car windshields are usually enclosed in T-slots, which makes it difficult to remove the old rubber to put in new strips. If a small flame from a gas or alcohol soldering torch is played over the rubber, it will be softened so that it can be easily dug out with the blade of a screwdriver.—W. F. Lowder, Humboldt, Ia.

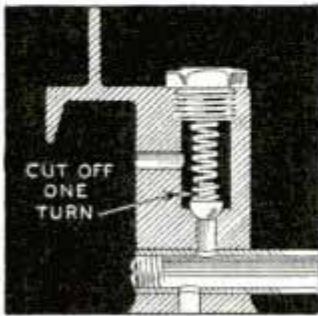
Holder for Inserting Horseshoe Keys

Made from a strip of spring brass or steel, this tool will be found handy for inserting horseshoe keys. It is useful for handling the keys used on some cars to retain the valve springs.



Methods of Reducing Oil Consumption in Ford Motors

When a Ford V-8 motor is in good condition mechanically, yet uses too much cylinder oil, a mechanic usually does one of two things to remedy the trouble. He either installs a new oil pan and valve baffles or lowers the oil pressure. The latter is done by removing the oil-pressure



regulator spring and cutting off a turn from one end. This allows a free by-passing of the oil and drops the pressure. After making this change, it is a good idea to check the oil pressure. When

the crankcase is filled with new oil having a viscosity of S.A.E. 30 and thoroughly warmed, the pressure should be 12 lbs. at idling speed.

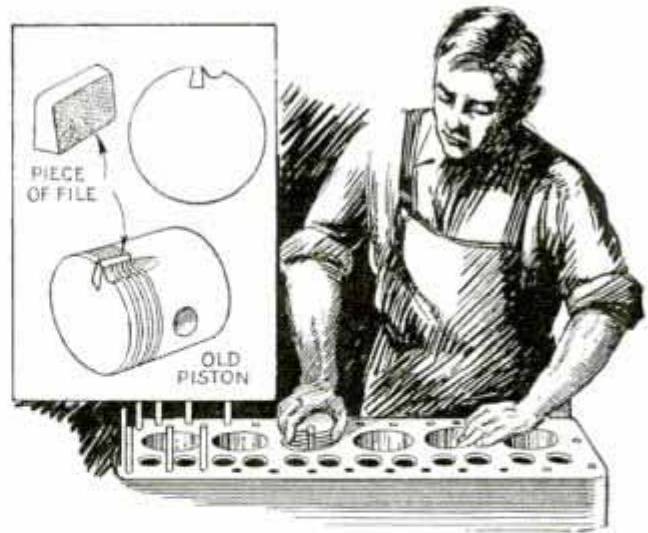
Beveled Curbs Aid Steering in Narrow Driveways

If entrance to your garage is through a narrow passageway between two buildings, it will be a good idea to bevel the curbs with concrete as shown. This will greatly reduce the chances of accidentally



Curbs on Narrow Driveways Beveled with Concrete Prevent Fenders from Scraping Sides of Buildings

scraping the sides of one of the buildings when driving in or out, as the beveled curbs tend to keep the wheels straight.



Tool Improvised from Old Piston Removes Ridge at Top of Worn Auto Cylinder

Removing Ridge at Top of Worn Auto Cylinder

When fitting oversize rings or pistons in a worn cylinder of an auto motor, it is necessary that the ridge at the top of the cylinder be removed so that the larger piston and rings can be inserted. Without the proper tools, this is a difficult job, but the owner who likes to do his own repairing can improvise a tool with which the ridge can be removed. Take one of the discarded pistons and slot it on one side at the top, as shown, to take a cutter made from a short section of a file, which has been ground to a sharp edge so that it will scrape down the ridge when the piston is inserted into the cylinder and rotated with the hand. The piston skirt serves as a pilot for the tool.—Wm. Blackhurst, New Bedford, Mass.

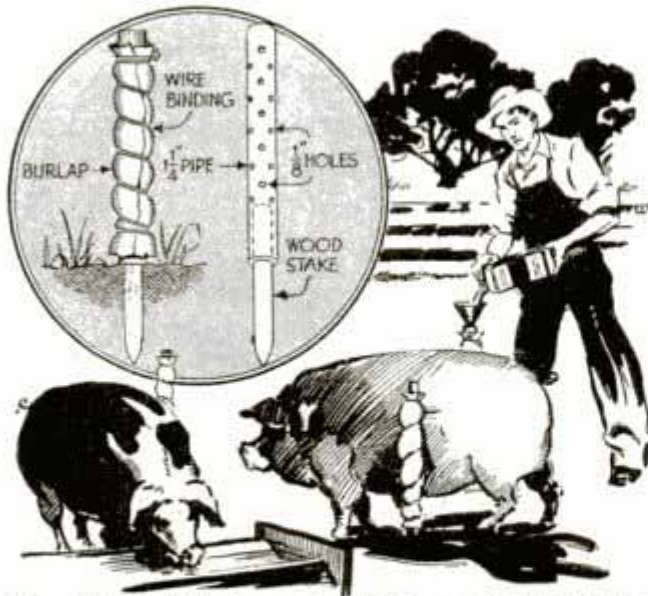
Cleaning Spark Plugs with Chemical

Spark plugs can be cleaned easily by spraying them inside with carbon tetrachloride. After spraying the plugs, let them set for a few minutes to allow the chemical to loosen the carbon deposit, and then blow



them out with compressed air. A small fire extinguisher is handy for spraying the liquid on the plugs. If an extinguisher is not available, a spray gun will do.

Hog Oilers Improvised from Pipe



Pipe Driven into Ground and Wrapped with Burlap Provides Oilers for Hogs

To keep his hogs free of lice without going to the expense of purchasing special

oilers, one farmer used substitutes made of pipe. Suitable lengths were fitted with pointed wooden stakes at one end and a number of $\frac{1}{8}$ -in. holes were drilled through each one as shown, after which the pipe was wrapped with burlap.

Paint Used to Make Solid Black on Tracing Cloth

In making tracings where a considerable area is solid black, difficulty is sometimes had in getting India ink to spread properly. This trouble can be eliminated by outlining the area to be covered with a wide, heavy line of ink and filling in between with black lacquer. One coat is usually sufficient, but a second one can be applied after the first one dries, if necessary. If the lacquer runs across the inked line, it is easily scraped back with a razor blade after it has partly dried.

The Next Issue

INEXPENSIVE IMPROVEMENTS FOR THE HOME

Homemade exhaust fan started automatically when transom or ventilating window is opened; how to install louvers to circulate air through attics; service boxes for milk and grocery delivery; concrete garbage container; novel ironing boards that fold or slide out of the way.

PROTECTING YOUR BOAT AGAINST WINTER

If you have a boat, you should know about these methods that are used to prevent damage to boats when they are dry-docked for the winter.

SOLDERING WITH AN ELECTRIC ARC

This electric soldering outfit is operated on a transformer connected to a 110-volt alternating-current circuit. The arc is drawn from a carbon electrode.

SERVICING KNEE-ACTION WHEELS

What every owner of the newer model cars having knee-action should know about this mechanism; when and how to service the knee-action units.

ARTCRAFT WITH WAX CRAYONS

Artistic effects with wax crayons, such as dissolving them to tint photos, pressing the colors into cloth and using them to decorate wooden objects.

USING YOUR HACK SAW

Tricks of technique in handling a hack saw explained to avoid habits of unknowingly misusing this tool and overcoming many frequent difficulties.



There are thrills in motorcycling that no other sport can match: The thrill of flashing getaway that leaves all other traffic behind . . . The thrill of eager power that flattens hills and laughs at heavy going . . . The thrill of road mastery as you breeze away, free as a bird, your mount under easy, effortless control, responding to your every whim.

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a bottle lasts
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It is very easy to give your hair that rich, glossy and orderly appearance so essential to well-groomed boys. Just rub a little Glostora through your hair once or twice a week—or after shampooing, and your hair will then stay, each day, just as you comb it.

Glostora softens the hair and makes it pliable. Then, even stubborn hair will stay in place of its own accord.

It gives your hair that natural, rich, well-groomed effect, instead of leaving it stiff and artificial looking as waxy pastes and creams do.

Glostora also keeps the scalp soft, and the hair healthy by restoring the natural oils from which the hair derives its health, life, gloss and lustre.

Try it!—See how easy it is to keep your hair combed—any style you like—whether parted on the side, in the center, or brushed straight back.

A bottle of Glostora can be bought for a trifle at any drug store and will last for months.



Glostora

FOR THE HAIR

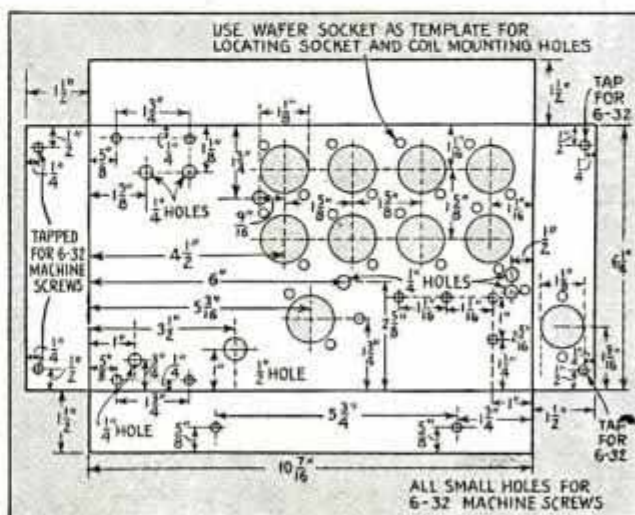


INSTALLING THE ALL-ELECTRIC AUTO RECEIVER

(Continued from page 423)

small fiber terminal strips are provided with mounting brackets and insulated terminal lugs for connecting the various leads.

Before soldering the A-supply leads for the gen-e-motor, be sure to check your



Base Drilling Template; Hole Is Cut in Metal Case Opposite Socket at Lower Right

car battery to determine which side is grounded to the frame of the car; this is important. The ungrounded terminal is the "hot" side, which may be either negative or positive. The A-connections shown should be reversed if the negative side of your battery is grounded. Use a shielded metal cable for the volume-control leads; the dotted lines indicate the leads and instruments above the base. A complete material list can be obtained upon application, without charge.

Figs. 3 and 4 show the method used for connecting the remote-control cables to the tuning condenser and volume-control shafts. The bushings are placed on the shafts and the rear setscrews are tightened by inserting a long screwdriver before fastening the side of the case in position.

The dynamic speaker and combined cable connections are all clearly shown in Fig. 5 and require little further comment. An enlarged blueprint of all wiring and layout diagrams is available, those who wish it should specify blueprint No. 200. To test the receiver, place it outside the case on a table or workbench and connect the remote control temporarily. Insert the tubes in their respective sockets and plug in the combined battery and speaker cable.

(Continued to page 118A)

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with the *f.4.5* lens

Kodak Six-16 with *f.4.5* lens will instantly appeal to those who know fine photographic equipment.

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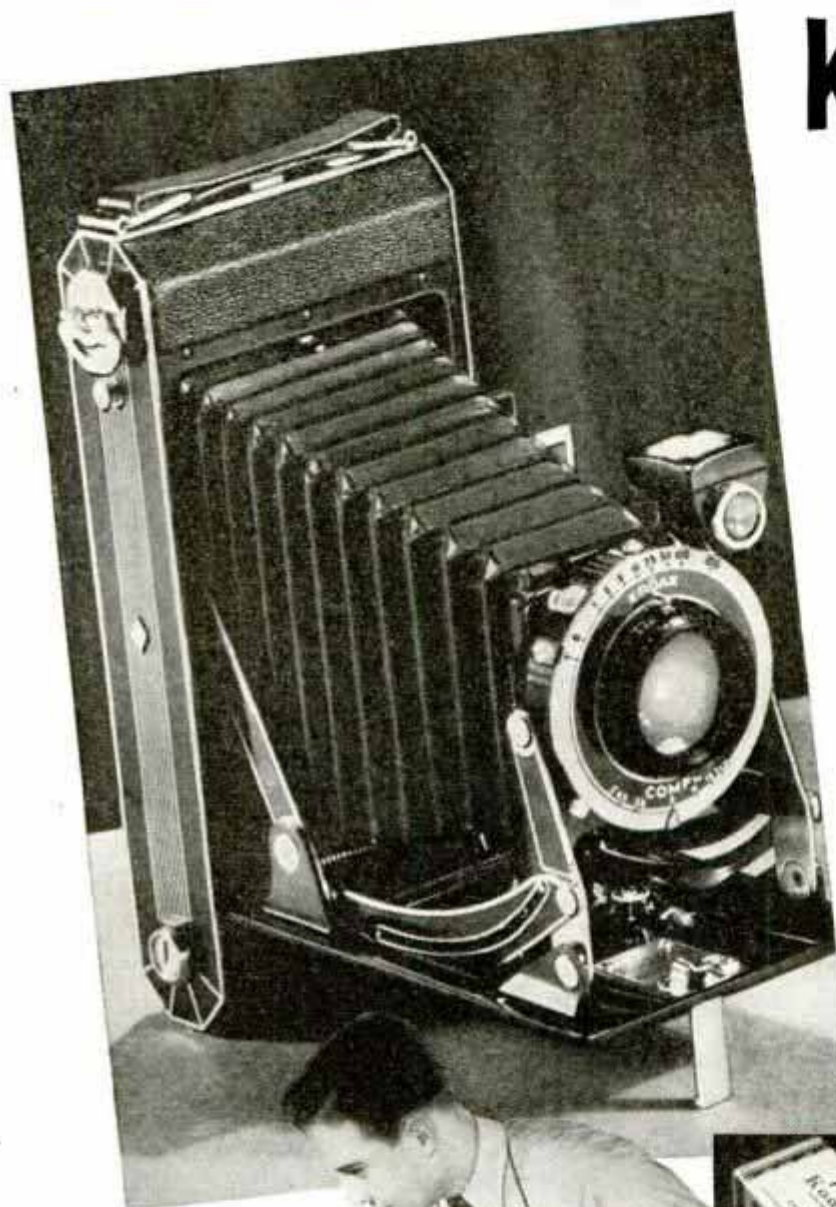


light and "action." Both conventional and eye-level finders. With the built-in self timer, you can get in the picture yourself. Focuses down to 4 feet—near enough for close-ups.



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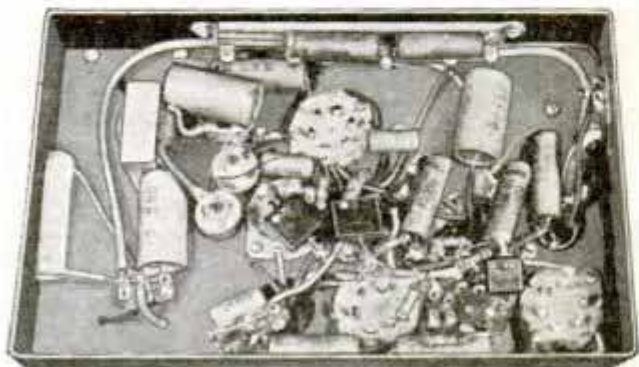
HOBART BROS.
Box M-941 Troy, Ohio



INSTALLING THE ALL-ELECTRIC AUTO RECEIVER

(Continued from page 114A)

Connect the battery cable to a car battery and ground the side that corresponds with your car ground. Use 10 ft. of wire for the testing antenna. Adjust the remote control to zero reading with the ganged condenser plates all out, and tighten the setscrews. Tune the set to some known station near 1,400 k.c., about 13 to 15 on the dial. If the signal comes in outside



Underside View of Base; Fig. 2 Shows These Parts in Their Relative Positions

these limits, adjust the oscillator trimmer condenser CR₃, on top of the ganged condenser section at rear, until the station comes in between 13 and 15 on the dial. Now adjust the other two ganged-condenser trimmers for maximum volume. The next step is to tune the set just off this station and adjust the I.F. trimmer condensers C₇, with a small screwdriver inserted in the holes in the coil-can tops. Assuming that the set is tuned off a station, adjust these C₇ trimmers for maximum noise. When this is done, leave the dial at the same point with no station heard, and readjust the front and center ganged-condenser trimmers CR₁ and CR₂ to maximum noise. Do not readjust the oscillator trimmer. Follow these steps in rotation and the set will track over the entire dial with maximum sensitivity.

The receiver is now ready for the metal case. The method of installation in the car is shown above Fig. 4. If ignition noises are troublesome, use a suppressor on each spark plug and the distributor cap, also a .5-mfd. encased condenser from the relay of the car generator to the frame of the car. If your car is not equipped with antenna, the rod type is easily installed and will give excellent results with this highly efficient superheterodyne auto receiver.

IS THERE A SEA SERPENT?

(Continued from page 401)

whales like to roll on the surface of the water, their eleven-foot fins striking the surface. That's all."

But no such explanation seems to cover certain remarkable occurrences of the world war, told by numerous capable naval officers and men, German and British. Baron Von Forstner, of the submarine, "U 28," tells how on July 30, 1915, in the North sea, he torpedoed a British freighter. The ship was sucked into the depths, and beneath the surface exploded. A geyser of water spurted up. In its midst, fifty feet into the air, shot something that looked like a giant crocodile. It had legs, with webbed feet. It wriggled and twisted as if in pain. With a great splash, it fell back again into the water, and disappeared. From the submarine's deck, six men saw this, and agreed upon a drawing and entry in the log book.

A little less than forty years ago, occurred the greatest of modern American sea-serpent scares. This one was said to inhabit Lake George, in the Adirondack region of New York. One summer it almost frightened away everyone. Out on the lake these people said they saw, bobbing up from the water, the neck and head of a horrid creature. It had a gaping mouth, two sharp, protruding ears, great teeth, and large and baleful eyes.

It reappeared just recently in the New York Sun. The veteran reporter, Martin Green, disclosed that the Lake George monster had been a gigantic hoax. The horrid head and neck had been a large cedar log, carved and painted, and pulled through the water by invisible ropes.

Yet, despite all the fakes and the mysteries, there are sea serpents. Also, they are deadly. There are the Hydrophiinae, poisonous snakes that swim the ocean, usually the Pacific off Lower California and Mexico. They are six to eight feet long and swim in large schools. Frightful tales are told of swimmers finding themselves surrounded by one of these schools. There is also a serpent that is sometimes swept from the Orinoco river of South America, down to the sea, eventually reaching the swamps of Trinidad. Some are twenty feet long. So, whether or not there are unknown species of sea serpent, the known ones are formidable enough.



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TUNING FOR SHORT WAVES

(Continued from page 421)

lengths for your log. Unlike tuning for long-wave stations, distant short-wave reception is best in the daytime, the early morning and late afternoon hours, especially for the foreign programs. Day and night skip-distance effects, that influence short-wave reception, are illustrated by the charts. In each case the 20 and 40-meter signals start at X I. The 20-meter signal is reflected back to earth during the day at X 4 by the Kennelly-Heaviside layer, a stratum of ionized gases high above the earth's atmosphere, and has twice the skip distance of the 40-meter signal that is reflected at X 2. At night the longer wavelength is reflected at a higher point and its skip-distance is greatly increased. The 20-meter signal, at night, goes right on through the gaseous layer without reflection.

The short-wave energy starts out in all directions, but is not necessarily equally distributed in every direction. It gradually thins out some of it being absorbed or deflected by uneven earth-surface conditions. Thus the part of the energy that is directed upward at an angle is reflected back to earth thousands of miles away while the lower, or ground waves, may be so weakened that a receiver located at a distance of but a few hundred miles would lose the signals entirely. The lower short waves travel best over level ground or water and very poorly across mountainous country.

NEW USES FOR OLD CROPS

(Continued from page 116A)

stayed in the catalogue of wastes. Then investigations proved that the oil content of the bean ranges frequently from twenty to thirty per cent of volume, which meant a tremendous new source of vegetable oils. Then paint industries experimented with the fad crop, and found that soy oil builds an untarnishing luster into paint colors; makes the whitest of all whites and is an excellent oil base for heavy and slow-drying paints. Then the Ford Motor company became interested, established a great soy bean laboratory and in co-ordination with government agencies and other manufacturers began to develop models

(Continued to page 126A)



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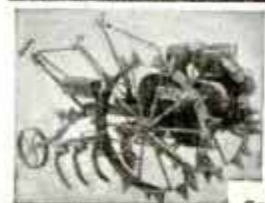
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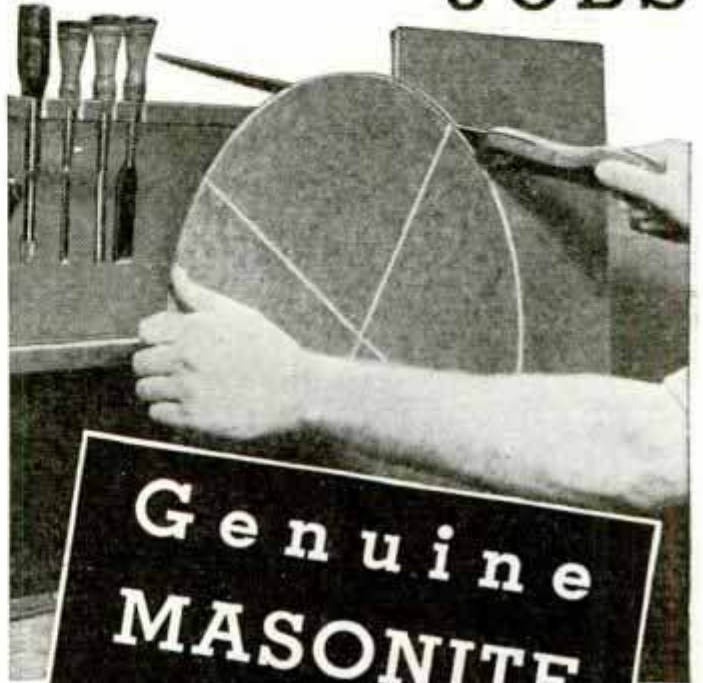
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10 TRICKS TO TEACH YOUR DOG
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—a copy of "10 Tricks to Teach Your Dog" with every can of Pulvex Flea Powder

WHY DO THEY FLY THAT WAY?

(Continued from page 389)

257 | nearly so accurate as some amateur strategists would have us believe; but when a formation drops its bombs simultaneously around the target, some of the bombs are almost sure to hit it. To make this sort of bombing at all accurate, the planes must all be flying straight ahead as they approach the target. Therefore the time for dropping their bombs is the most vulnerable for the formation.

Night bombers do not fly in formation except on bright nights. Formation flying on dark nights is impossible over enemy territory, for no lights can be carried, and losses by collision would outweigh any damage the bombers could do. Night bombers operate singly or in widely separated groups of three, each plane approaching the target from a different direction in order to confuse the defense. Such planes leave the home airdrome at intervals and fly in specified zones, returning by a different route or at a different altitude, thus lessening the danger of collision. Attack by pursuit aviation is impossible at night until the bomber has been picked up by searchlights, so a continuous arrival of separate bombers has a better chance of escaping detection than a single formation.

The missions of pursuit planes are so varied that no inflexible standard of formation has been set. However, the basis of practically all pursuit formations is a "V" of three airplanes, called an element. A flight is composed of two or three such elements, while two or three flights constitute a squadron. Aside from the three-plane "V," pursuit pilots are instructed to avoid a definite regularity of formation when they expect to meet the enemy. All formations must be so arranged that both elements and individual airplanes can be maneuvered freely, that accurate fire can be delivered, that elements may be mutually supporting, and that the leader may control the force.

For cruising, the usual formation for a flight or squadron is a large "V," the sides of which may be composed of elements in "V's" or echeloned above and to the side. Another cruising formation, when quick turns are expected, is the echelon off one wing, in which the planes form a single diagonal line, each plane to one side, above

(Continued to page 124A)

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WHY DO THEY FLY THAT WAY?

(Continued from page 122A)

and behind the preceding plane. This is the easiest close formation to fly.

In launching an attack from formation against one single seater, only three planes dive to the attack, and since only one plane can fire effectively, the two ships on the flanks withhold their fire until the quarry turns. When a single flight attacks an enemy pursuit formation, each pilot selects the opponent corresponding to his own place in the formation and attempts to stick to that plane until it is shot down.

Pursuit pilots are taught not to drive home an attack on bombing, observation or attack formations unless they outnumber them at least two to one. Instead they harass the formation with long-range fire, closing instantly on individual planes which fall out of position. When the pursuit outnumbers the defensive formation by the required margin, coordinated attacks are launched from different angles, being timed so that each succeeding flight arrives just as the preceding planes have finished firing and pulled up.

Since pursuit planes can fire only to the front, a formation attacked by hostile pursuit planes can escape only by rapid maneuvering. When the enemy is seen in time, a very effective maneuver is to reverse direction and face the attack head on; then as the attack passes overhead, make another reverse. When a flight is attacked by a slightly inferior force, an effective maneuver is for each element, and the planes within the element, to spread out rapidly, thus giving the planes not being fired on time to maneuver and counterattack.

The Lufbury circle is a purely defensive maneuver evolved during the war but still being taught. If, for instance, a two-element flight flying in echelon should be attacked, the planes would immediately turn and fly in a circle. With each plane thus protecting the tail of the ship in front, an attack becomes extremely hazardous to the attacker.

While single flights and squadrons will no doubt operate independently in a future war, large concentrations have been proved to be most effective. A four-squadron group of seventy-two planes is now laid down by the air corps as being the ideal defensive force.

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● One step from your train at Cleveland's Union Passenger Terminal (or your car in the Terminal Garage) and you are in Hotel Cleveland's friendly, club-like lobby. And here you are at the very heart of the city—only two steps from anywhere you will want to go.



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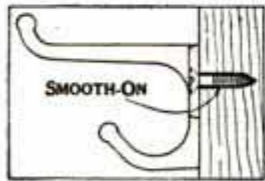


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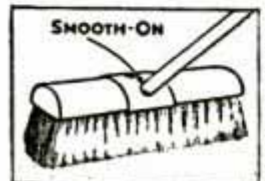
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9-34.....

NEW USES FOR OLD CROPS

(Continued from page 120A)

of individual farm extraction plants for soy oils which make it possible for a farmer to raise and refine his own oil at low cost and high efficiency. Therefore the soy bean crop increased by millions of acres and is beginning to direct millions of good dollars back into the farmers', scientists' and manufacturers' pockets.

This typifies the new challenge for vegetable oils in industries, since ours is still a machine age, and machinery must be oiled. True, mineral oils still take first place in the vast field of lubrication, but experts have learned that heavy machinery and high-speed rolling stocks are requiring higher viscosity in lubricants and that mineral oils and greases which contain a certain amount of vegetable fats and oils, probably three to five per cent of volume, are capable of increased viscosity. Several prominent manufacturers of lubricants are increasing contents of vegetable oils, as varied types of machines continue to turn faster.

Savers of crop wastes also see possibilities of new motor fuels. We see Germany, almost lacking in native petroleum, using vast amounts of alcohol made from home-grown grains as fuel for especially designed auto motors. Although American petroleum supplies seem to be plentiful, the home experimenter who studies better methods for refining motor fuels from common grains or grain wastes may be at the start of a way to fame and riches that may lead away from such tragic realities as good corn and wheat being sold or dumped at such ruinously low prices as ten or fifteen cents a bushel.

Perhaps the day is dawning when mankind can use plant crops as efficiently as he has learned to use animal crops. Just as Swift and company now list over 200 pork products, Dr. O. R. Sweeney, of Iowa State College and one of the great leaders in the war against crop wastes lists over 200 marketable products that can today be manufactured from the humble corn stalk—ranging from sausage wrappers to cigarette holders, from book paper to freight-car wheels and battleship equipment. Unquestionably hundreds of new plant products are eagerly awaiting the coming of new Aladdins who can continue to rub the magic lamp of progress.

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Have your own PRIVATE telephone set with UTILIFONES. Save steps and time. A practical telephone (¾ regular size) at toy price. Talks and rings electrically like real phones. Rugged, durable, construction with transmitter and receiver combined in French type hand piece. Talks perfectly at distances up to 4500 feet. Operates on 2 dry-cell batteries. Easy to install. Guaranteed. Set consists of two phones and 35 feet of wire.

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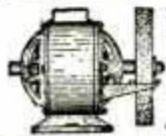


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Send 15c (5-3c stamps) for sample and terms with copy of exclusive sales contract . . . specify territory.

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Please send me complete information on the 5-amp. Mercury Tungar Battery Charger.

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NEW YORK BIOLOGICAL SUPPLY CO. - DEPT. 15-34 UNION SQ. N.Y.

CAN SCIENCE IMPROVE YOUR SPORT?

(Continued from page 413)

The forge became a complete gun factory, receiving material as scrap iron and turning out finished rifles. Shotguns were also made. Gradually tilt hammers, trip-hammers, bellows, grindstones and boring and rifling machines were added and more accurate guns began to be available.

The accuracy of the bullet when leaving the gun, while greatly dependent upon the gun itself, was equally dependent upon the powder and the shape of the bullet. So attention began to be focused upon the bullet, and the ballistics expert and chemist began to play an important part.

When the crude lead spheres of pioneer days were replaced with the tapered "sugar loaf," accuracy increased from 200 to 500 yards. Then came the breech-loading rifle with the necessity for shorter bullets, and science increased the accuracy of the rifle bullet from 500 to 1,000 yards. Then chemists replaced the charge with more efficient powder.

Science then started to pay even closer attention to the various phases of the sport. Special .22 short spatterless bullets which do not ricochet were developed for shooting galleries, special shotgun shells were made for long-range loads, bullets of the same caliber but with different degrees and kinds of hitting power were invented for various types of hunting.

An interesting incident in the improvement of the modern gun is the increasing speed of the hammer blow or, more technically, the decrease in lock time. This is the few thousandths of a second from the time the hammer is released by the trigger until it strikes the cartridge.

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Modern science has developed the gun and its ammunition to a point where it is more accurate at a much greater distance than was the rifle of Daniel Boone. Science has also made it possible for that gun to fire ten and more shots as quickly as one may pull the trigger. But it has left it to the sportsman's own skill and practice to develop to a point of far surpassing Boone or Crockett in results.

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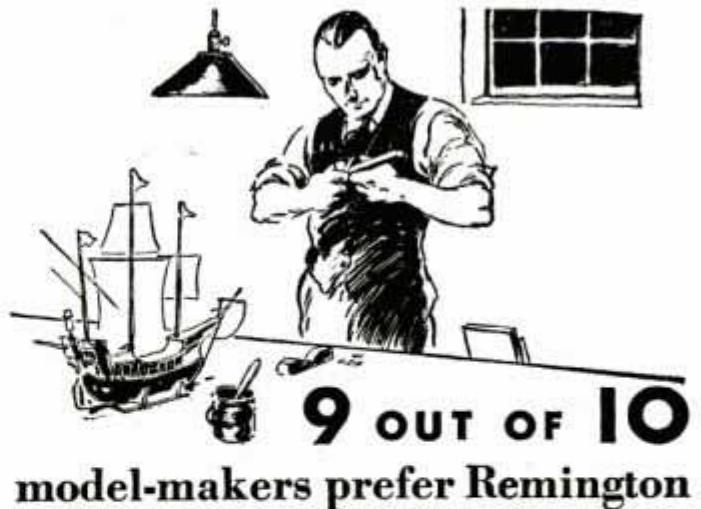
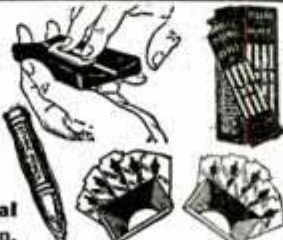
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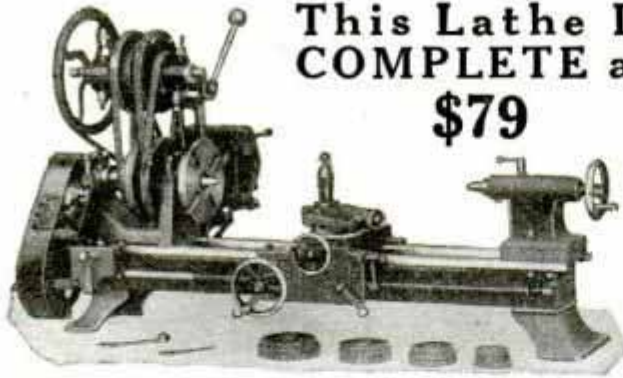
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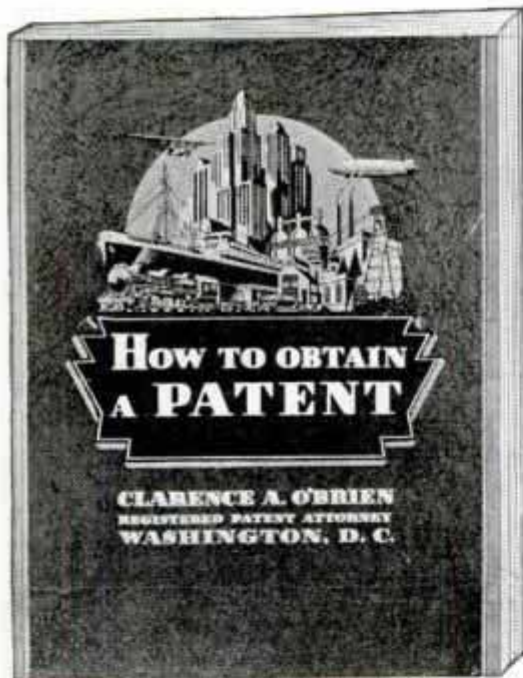
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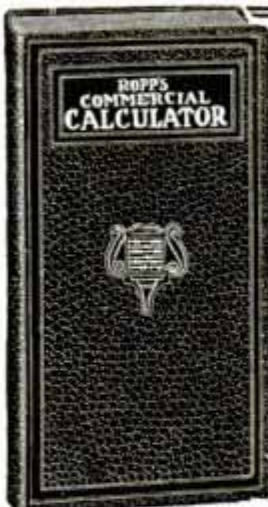
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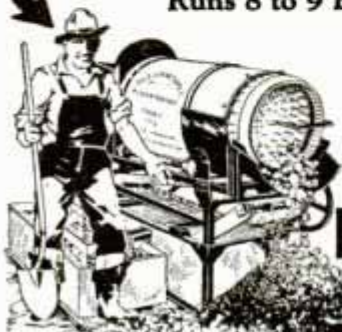
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Popular Mechanics Press, 200 E. Ontario Street, Chicago

FOR PLINKING, hunting pests and small game, or for a bit of target shooting, there's no finer or stronger rifle than this Remington bolt-action .22.

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Among the many features of this Model 33 are double-locking lugs that insure safety and accuracy not found in other rifles priced so low. Bolt handle and lugs are one solid piece, permanently locked into bolt, and chromium plated to prevent rust. Bolt head is shrouded for added safety. Shoots without adjustment .22 short, long, or long rifle cartridges, regular or Hi-Speed. Stock and fore-end are one-piece selected American walnut with pistol grip and finger grooves. Rear sight is adjustable. And the easiest take-down and assembly imaginable!

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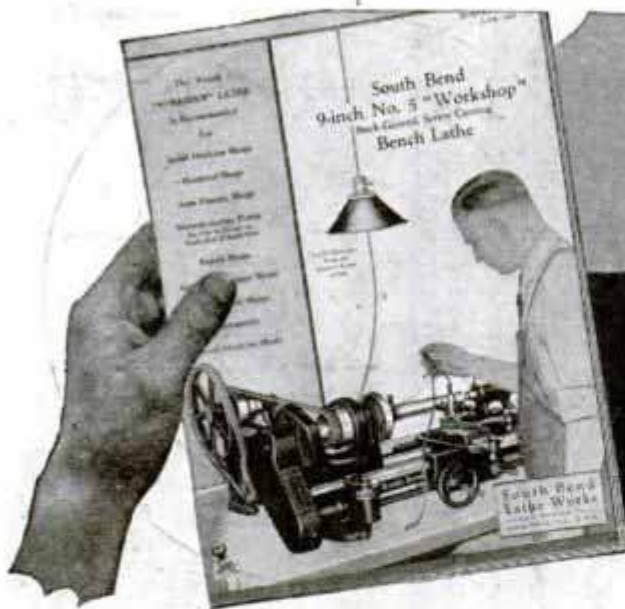
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**MODEL 33 BOLT-ACTION
SINGLE SHOT**



When writing please mention Popular Mechanics



Bulletin No. 5-W shown above has 20-pages, 8½" x 11", with over 100 illustrations describing the new 9-inch "Workshop" Lathe and its uses in the manufacturing plant, machine shop, laboratory, automotive service shop, electrical shop, repair shop, school shop, home workshop, etc. A valuable booklet for any mechanic. Sent free, postpaid, on request.

Over 35 Modern Features

The 9-inch "Workshop" Lathe at right is a Back-Geared, Screw Cutting Metal Working Lathe taking 18" between centers. Can also be used for working wood, compositions, etc. Cuts screw threads 4 to 40 per inch, including 1½ pipe thread.

Features of the lathe include: Back-geared headstock with six spindle speeds; automatic longitudinal power feed to carriage; wide range of turning feeds; reverse gear for left-hand threads and feeds; graduated compound rest swivels to any angle; hollow steel headstock spindle with ¼-inch hole for handling chuck and bar work.

This 9-inch swing "Workshop" Lathe has the power to reduce the diameter of a steel shaft ¼" in one cut. Lathe is available in Countershaft Drive and Motor Drive types, in bed lengths of 3', 3½' and 4'. Other specifications are shown in detail in Bulletin No. 5-W, described above. Terms as low as \$21.00 down, \$7.00 a month.

96 Other Sizes and Types of Lathes

South Bend Back-Geared, Screw Cutting Precision Lathes are built in 96 other sizes and types from 9" to 36" swing, with countershaft drive and with individual motor drive, price range \$75 to \$1500.

South Bend Precision Lathes are used by U. S. Government, General Motors, Kelvinator, R.C.A., Victor, Curtis-Wright, Eastman Kodak Co., N. Y. Central R. R. Co., U. S. Steel and by hundreds of other leading industries in the U. S. and 97 countries throughout the world. A few popular sizes are listed at right.

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Please send the free booklets checked below.

- "Workshop" Bulletin No. 5-W
 General Catalog No. 94

Size of Lathe interested in.....

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Back-Geared, Screw Cutting
"WORKSHOP" Bench Lathe **75** less motor drive



Operates from
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Wt. 300 lbs.

9" swing x 3' bed "Workshop" Lathe complete with Horizontal Motor Drive Equipment, ¾ H.P. reversing motor and reversing switch, as shown..... **\$94.00**

Size	Weight Countershaft Motor		
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9"x3' Junior Bench Lathe.....	416 lbs.	170.00	188.00
9"x3' Standard Change Bench Lathe.....	461 lbs.	225.00	244.00
9"x3' Quick Change Bench Lathe.....	471 lbs.	265.00	284.00
11"x4' Quick Change Lathe.....	920 lbs.	340.00	433.00
13"x5' Quick Change Lathe.....	1460 lbs.	402.00	535.00
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General Catalog No. 94

If interested in larger and heavier lathes than the 9" "Workshop", send for a copy of the new General Catalog No. 94 describing the full line of South Bend Back-Geared, Screw Cutting Precision Lathes and attachments, including Tool Room Lathes, special Large Swing Lathes, Gap Bed Lathes and Brake Drum Lathes. 72 pages. Sent free, postpaid, on request.

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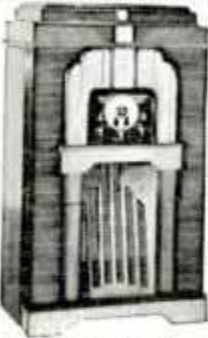
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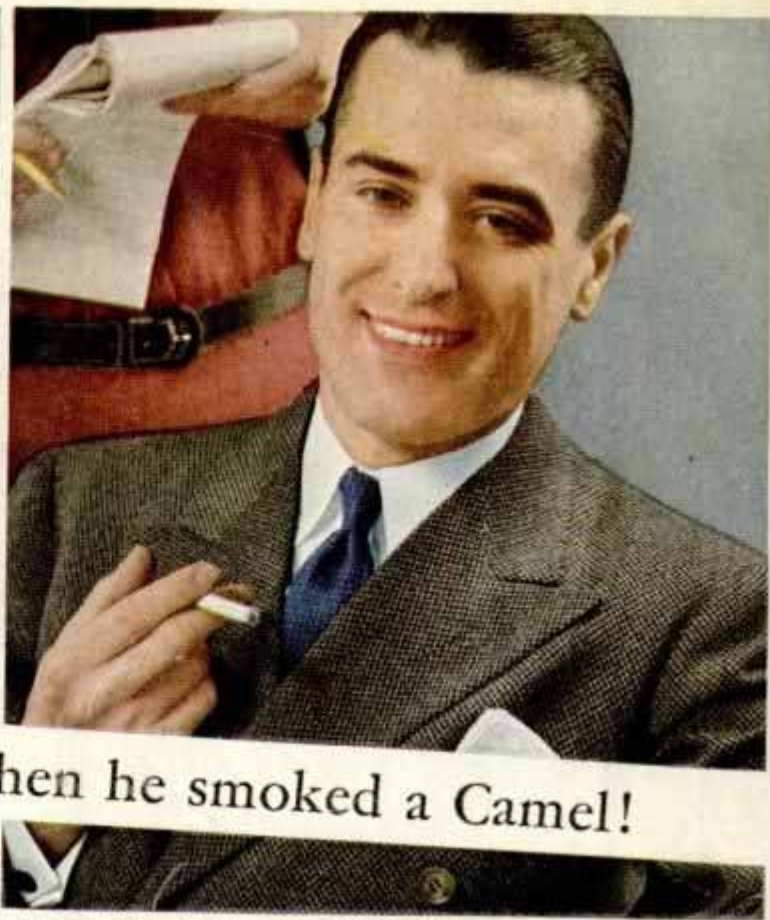
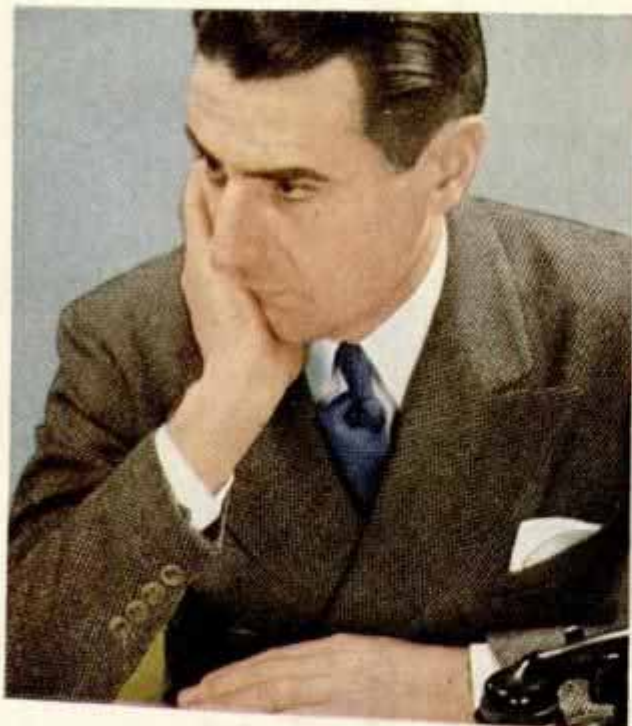
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