

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG'D. TRADE MARK, GREAT BRITAIN, NO. 40428

SEE PAGE 170



MALROSE

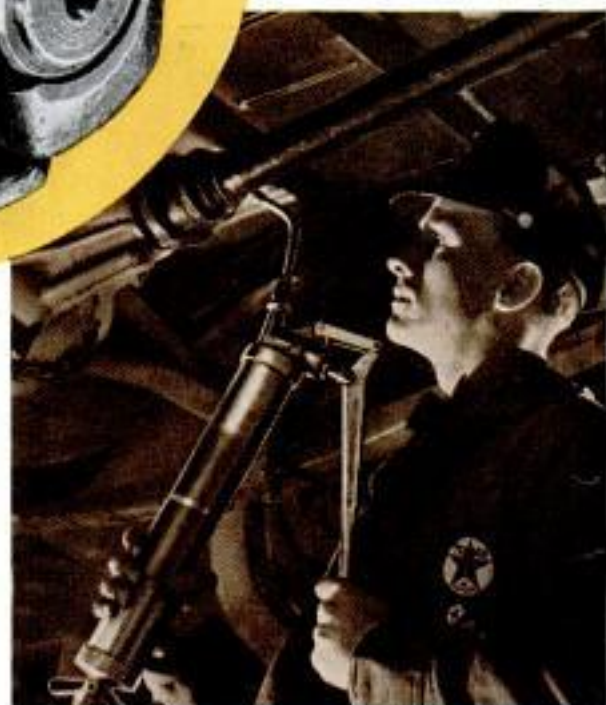


One of the types of universal joint used on modern cars. Some require a viscous grease, while others must be lubricated with heavy oil. All types need regular attention.

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There are two in the car you drive—the same in principle as those used 300 years ago. These universals may have to take the load at speeds upward of 4000 r.p.m. and more. It's a strain on any mechanism. Yet the universal joint, one of the most critical lubrication points on the car, is one often neglected. Texaco Certified Lubrication never neglects or overlooks a single point.

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## NOW WHO ELSE WANTS BLOW-OUT PROTECTION FREE?

**Amazing new invention eliminates cause of blow-outs**

**I**f you were offered a tire that is saving thousands of lives... and preventing thousands of those blow-out accidents that maim and cripple people... wouldn't you be interested? And if that tire didn't cost you a penny more than standard tires... wouldn't you want it on your car right now?

### What causes blow-outs

Today's high speeds generate terrific heat inside your tires. Rubber and fabric begin to separate. A blister forms... and GROWS... until BANG! A blow-out. And a terrible drag starts pulling your car off the highway.

But now Goodrich has perfected the amazing Life-Saver Golden Ply. This invention resists the most intense heat. Rubber and fabric don't

separate. Thus blisters don't form inside the tire. Blow-outs are prevented *before they even start!*

At gruelling speeds on the world's fastest track the new Goodrich Safety Silvertown, with the Life-Saver Golden Ply, lasted 3 times as long as first quality tires that did not have this feature. These Silvertowns never blew. They wore right down to the fabric. But the Life-Saver Golden Ply refused to give.

Scientific tests with leading makes of tires prove that the Goodrich Silvertown has the most skid-resisting tread. Its squeegee drying action gives your car *extra* road-grip.

Why take chances? Look up your Goodrich dealer in the Classified Telephone Directory. Have him put a set of Silvertowns on your car. **BE SAFE!**



**Goodrich Safety Silvertown**  
WITH LIFE-SAVER GOLDEN PLY

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A NEIGHBOR, passing by, glances through your window and sees you in the living-room. But you are around the corner on Main Street, ordering from the druggist. You are in a nearby town, chatting with a friend. You are in a distant city, delivering a message of cheer and reassurance. You are across a continent, or an ocean, talking clearly and easily, as if distance had ceased to be. . . . Your neighbor, returning, glances in again. You are still in your living-room.

Your telephone is you. In a moment it multiplies and projects your personality to many different places and many different people, near or far. Part of your very self is in every telephone message—your thoughts, your voice, your smile, your words of welcome, the manner that is you. You use the telephone as you use

the power of speech itself, to play your full part in a world of people. With it in your grasp, you are master of space and time. You are equal to emergency, ready for opportunity, receptive to ideas, equipped for action. The extraordinary fact is that the more you use your telephone, the more it extends your power and personality.

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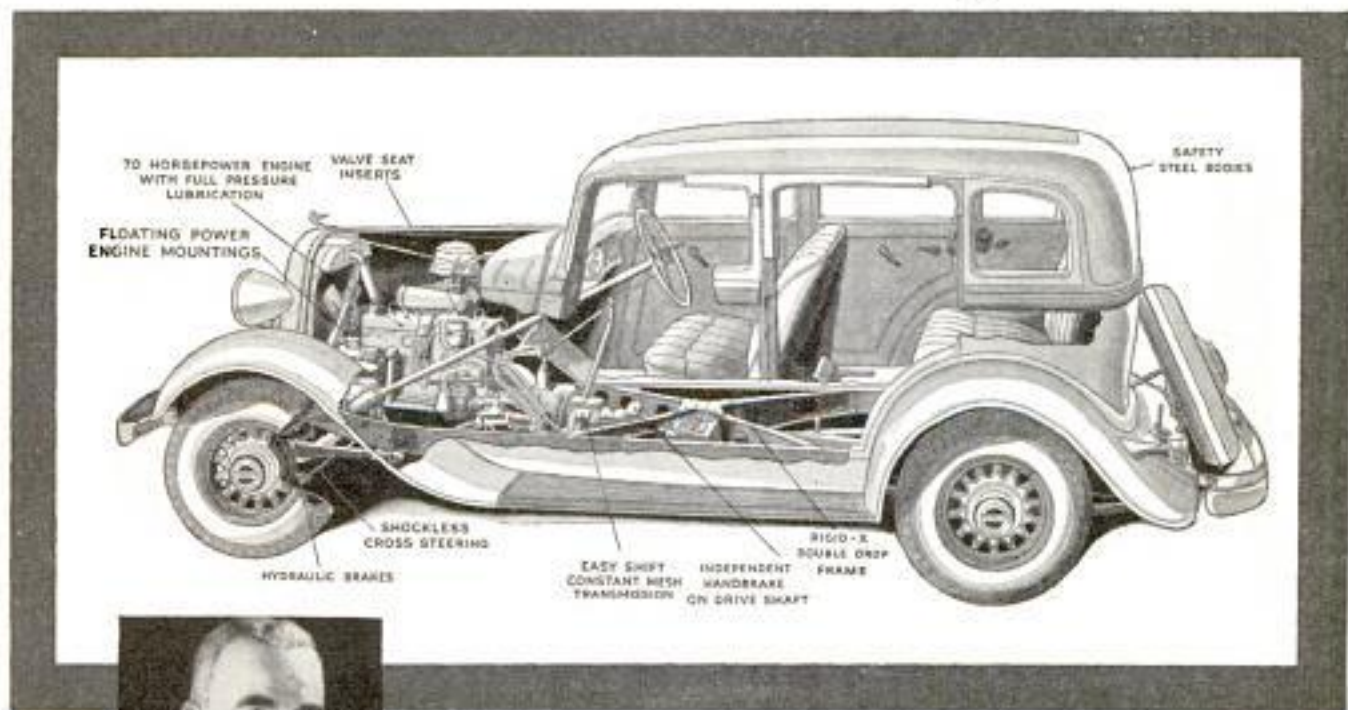
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## SHOP NOTES

# Famous Engineer Explains Vital Features of 2 New Plymouths



**FRED M. ZEDER** *points out 9 Important Features that make Plymouth a bigger value.*

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"Heat-resisting valve inserts cut valve grinding to once in 30,000 miles. I have deliberately not shown in the drawing at least a dozen other features, such as air cleaners, oil filters, and silent U-shackles!

"And when you get behind the

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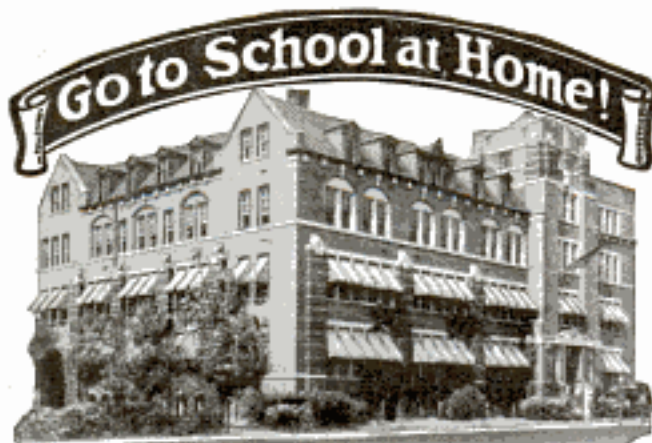
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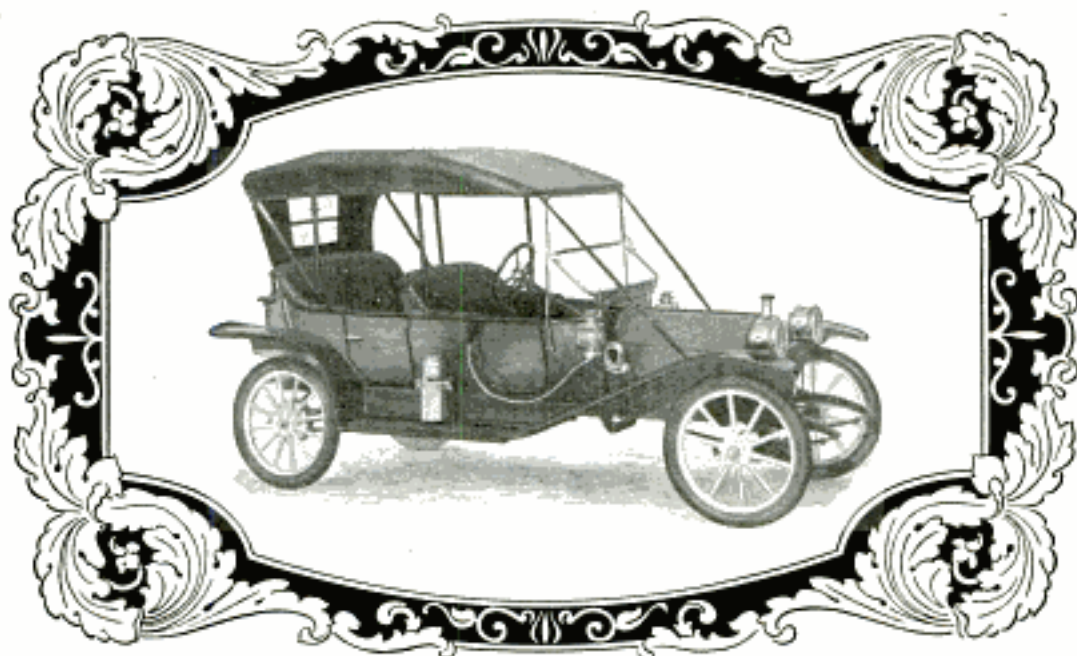
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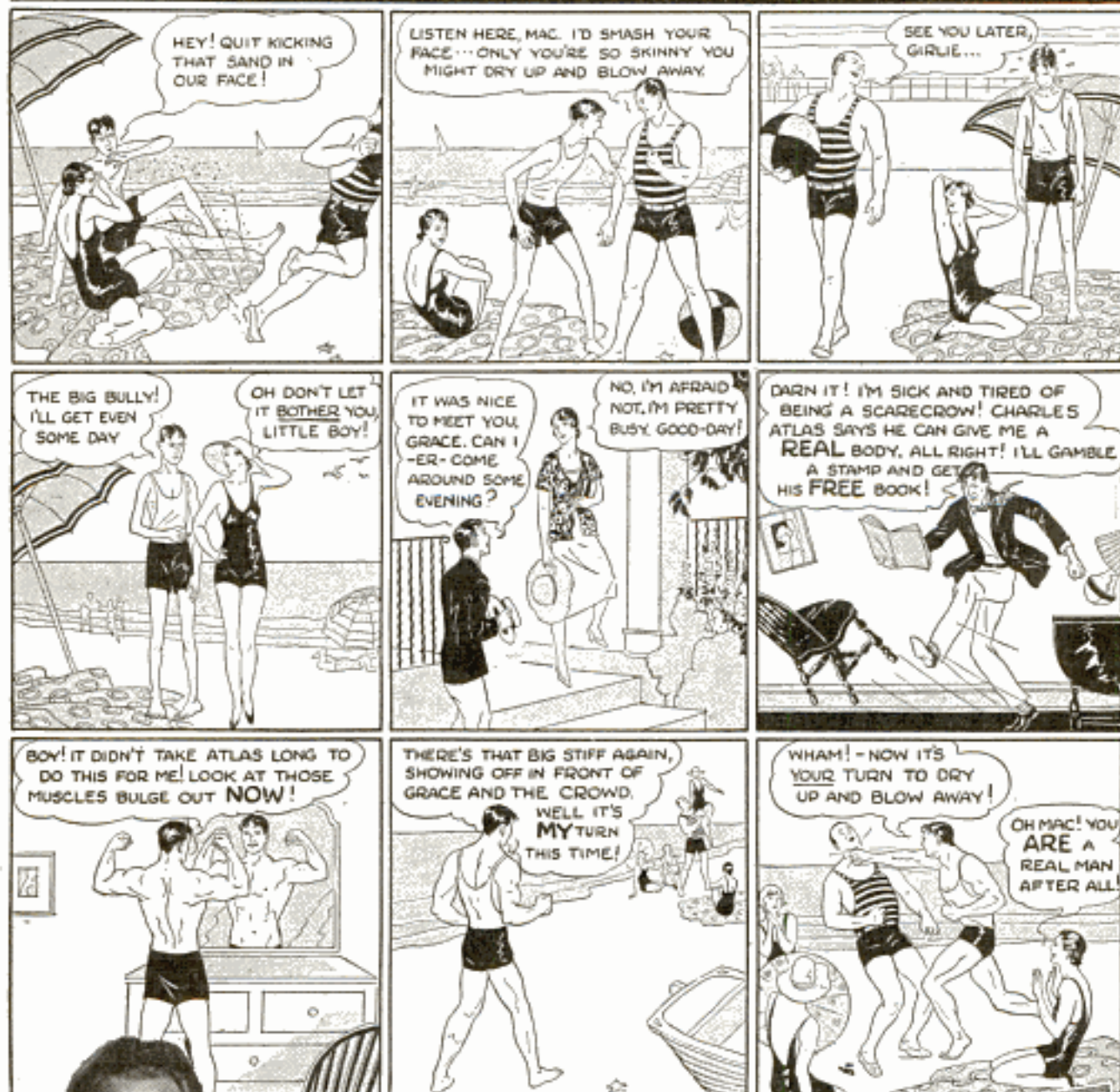


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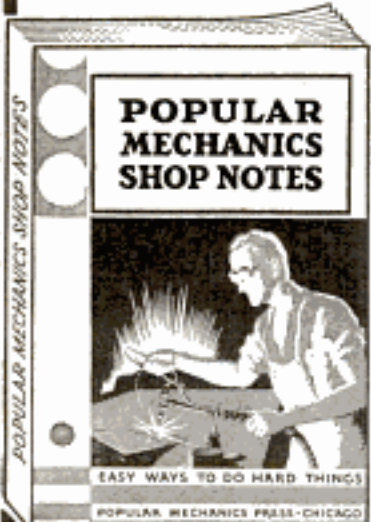
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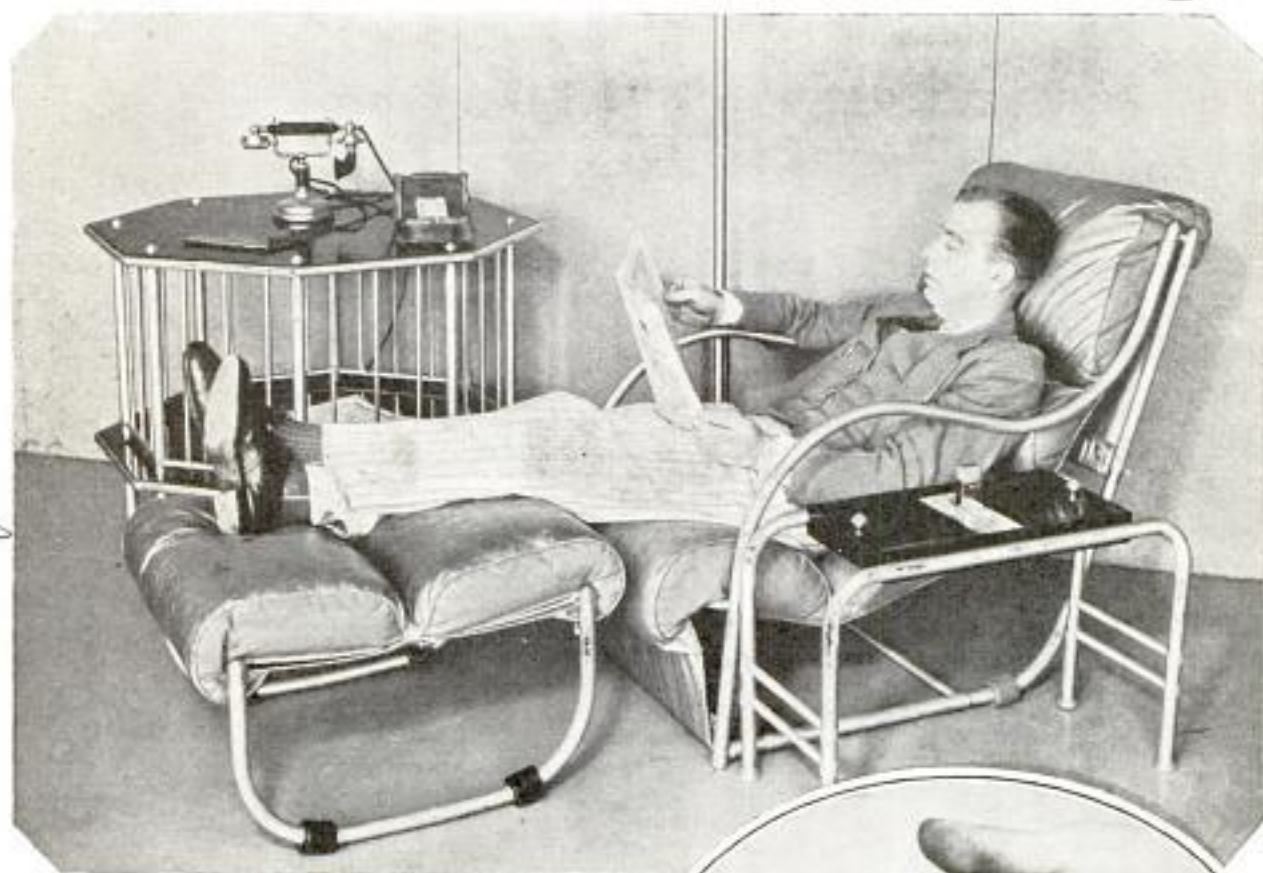
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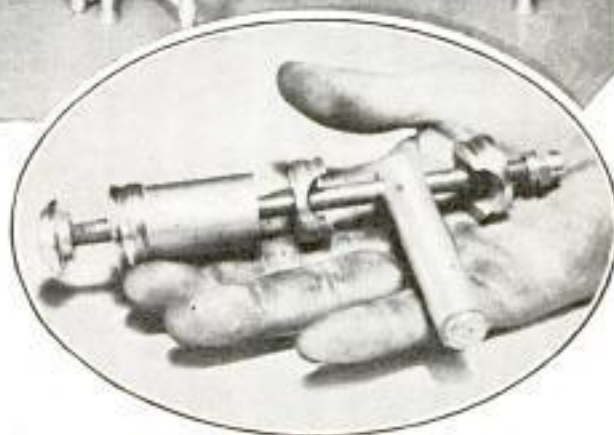
0893

## • Metal Furniture • Built without Heating



NEITHER heat nor welding is necessary in making a new type of metal furniture which is assembled much like a child's construction set, and with little more labor involved than in building a mechanical toy.

This furniture is made of copper, brass and aluminum tubing with steel rods of small diameter extending down the inside of each section. In assembling the tubes to form a chair, for instance, only a few



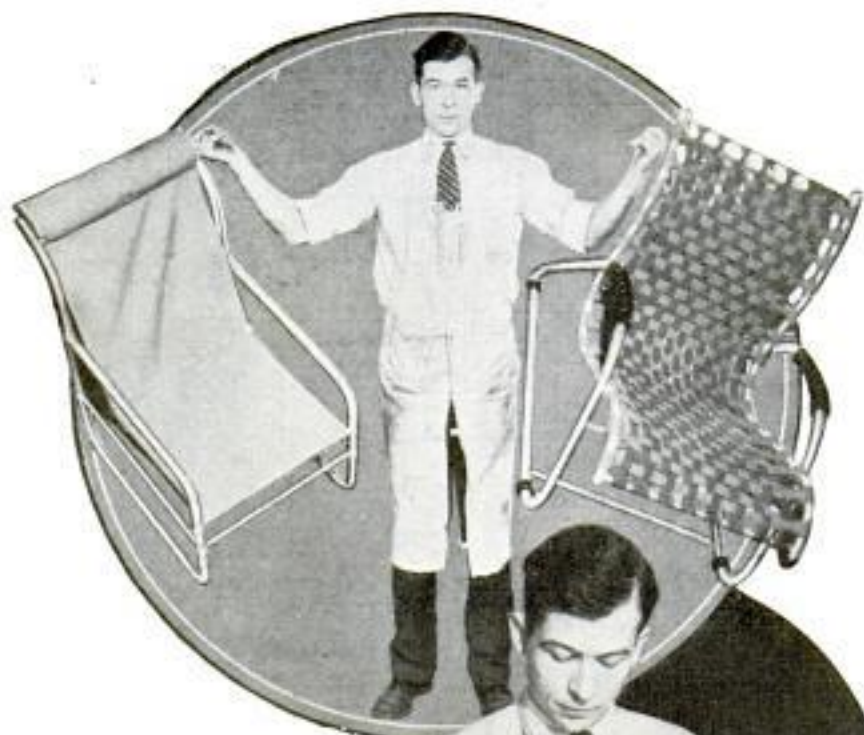
Top, Examples of Metal Furniture Made without Heating; Below, Simple Parts Used in Assembling the Sections of Tubing for Construction

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all furniture only - no parts nor tools

2893



Top, Lightweight Metal Porch Chairs; Right, Assembling a Stool; Below, Living Room Equipped with Metal Furniture



simple parts are needed, such as threaded steel rods, nuts, ferrules or washers, and gliders and caps. By the skillful use of these parts all the fastenings are concealed and the finished unit appears to be constructed of tube sections much longer than are used.

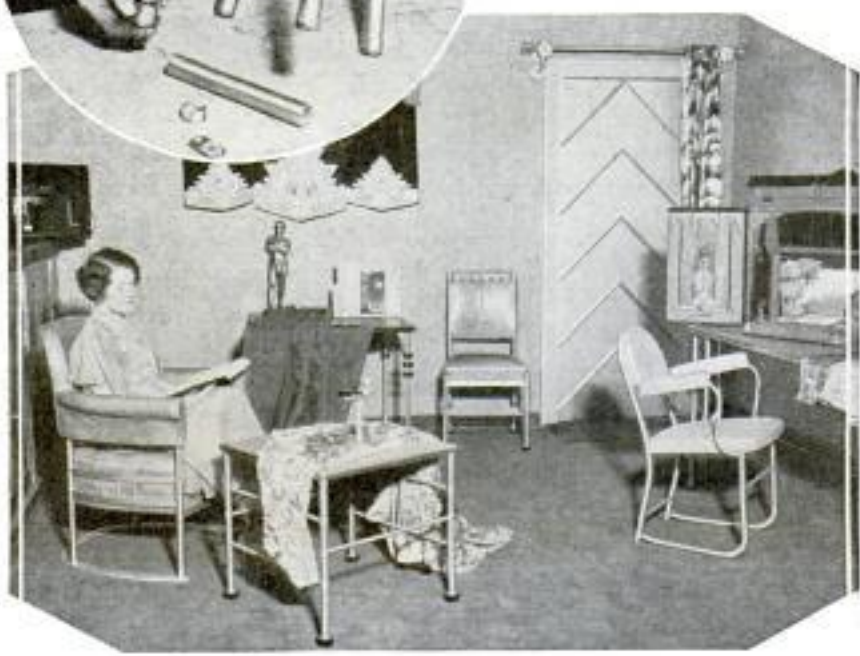
Even the most complicated piece of furniture can be put together with amazing speed because the metal tubes can be bent virtually without distortion, and thus can be formed into circles or other shapes. To preserve the contour, the tubing is always bent with the steel rod inside.

The inventor claims that this method has advantages over heating or welding the parts of metal furniture, which, he says, tends to destroy

the strength, temper and beauty of the metal. A complete bar stool, such as is used for soda fountains, can be assembled in twenty minutes by a person skilled in handling the tubes and rods.

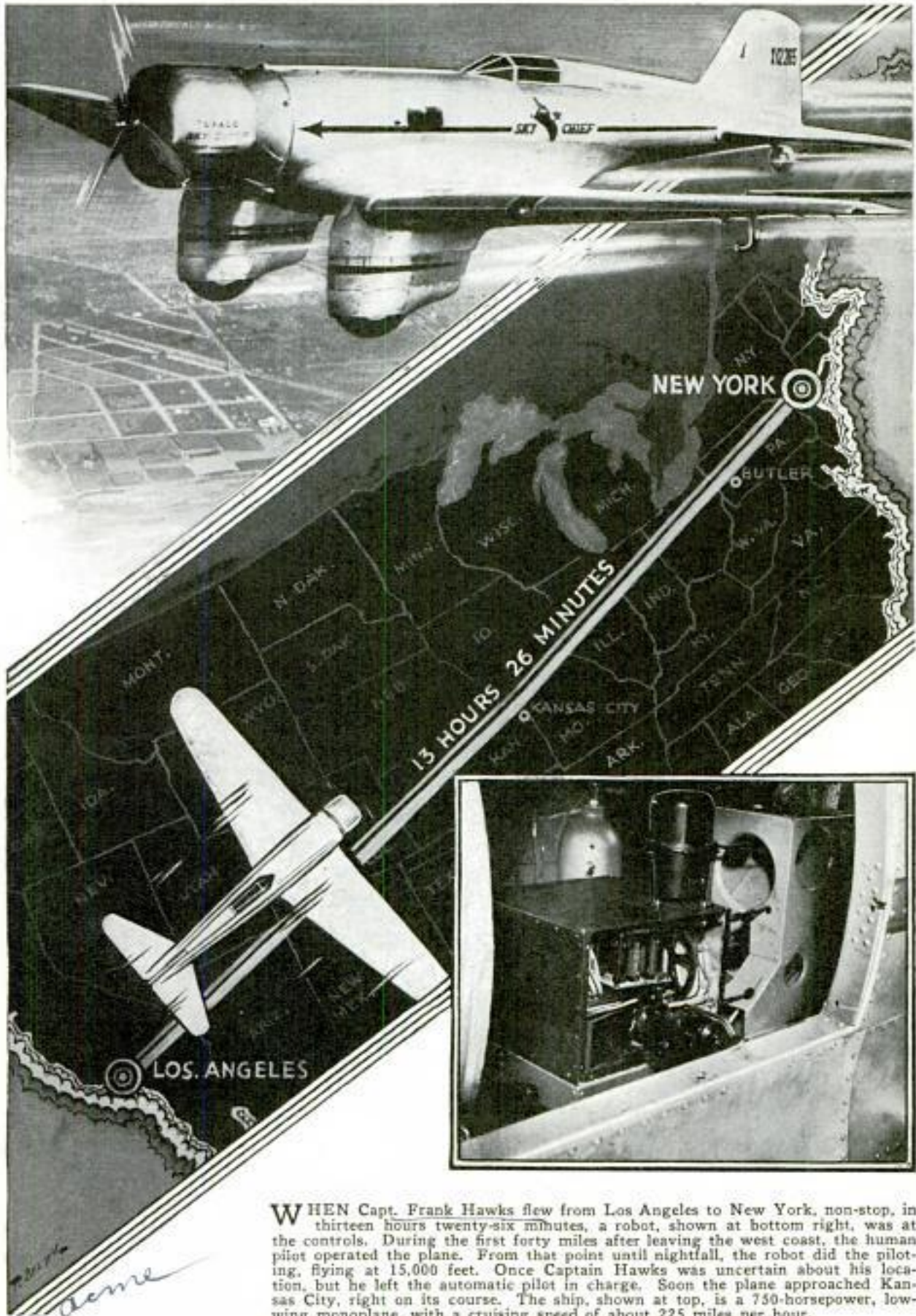
Furniture for the parlor, porch, beach, kitchen, dining room, library, hall, bedroom, and for such places as restaurants, hotels, clubs and offices is being turned out by this process. Upholstery is frequently used with the metal pieces which are exceptionally light in weight. Easy chairs made of aluminum, for instance, are readily held off the floor on one finger.

Heretofore copper and brass furniture have not been made on a large scale because of the need for using heat in the fabrication, but under the new method, these two metals lend themselves readily to the art of the furniture maker.





# Robot at Controls on Coast-to-Coast Flight



**W**HEN Capt. Frank Hawks flew from Los Angeles to New York, non-stop, in thirteen hours twenty-six minutes, a robot, shown at bottom right, was at the controls. During the first forty miles after leaving the west coast, the human pilot operated the plane. From that point until nightfall, the robot did the piloting, flying at 15,000 feet. Once Captain Hawks was uncertain about his location, but he left the automatic pilot in charge. Soon the plane approached Kansas City, right on its course. The ship, shown at top, is a 750-horsepower, low-wing monoplane, with a cruising speed of about 225 miles per hour.

## Butterfly-Wing Art Rivals Man's Best Work

Rivaling prize art created by man, unusual butterfly-wing paintings are being produced by a California studio. Thousands of beautiful butterflies, gathered from all parts of the world, provide the material for this new form of art. With them, the artist reproduces in exact color famous paintings, colors photographs in natural tones, inlays tables and dresser tops in beautiful designs and adorns jewel boxes, cigaret

*Owner. Mrs. W. W. Whitson, 27 W. Washington St., Los Angeles, Calif.*



Top and Bottom, Reproductions of Paintings by Use of Beautifully Colored Butterfly Wings; Center, Some Imported Butterflies

boxes and costume jewelry. The method of reproducing is to obtain a photograph of the original, enlarge it from miniature to almost life-size on special papers and then to overlay figures and background with butterfly wings in identical colors of

the original. The fragile wings are affixed to the paper with a special glue, being handled only with delicate instruments designed particularly for the work. The finished product is shielded from the direct rays of the sun, which would disfigure the painting, by drawing an oil from the wings. Every color and delicate shading of the spectrum can be reproduced with the butterfly wings. Mrs. W. W. Whitson, who operates the studio, im-

ports butterflies from the Amazon jungles, the veldts and tundras of Central Africa, the forests of Borneo and Sumatra and even from the French Guinea penal colony of Devil's island. Because of the insects' fragility, they are netted with greatest care, then killed with a cyanide gas to prevent handling, are then dried, assorted, carefully inserted in individual envelopes and started on their journey to the studio at costs ranging from one to twenty-five dollars.

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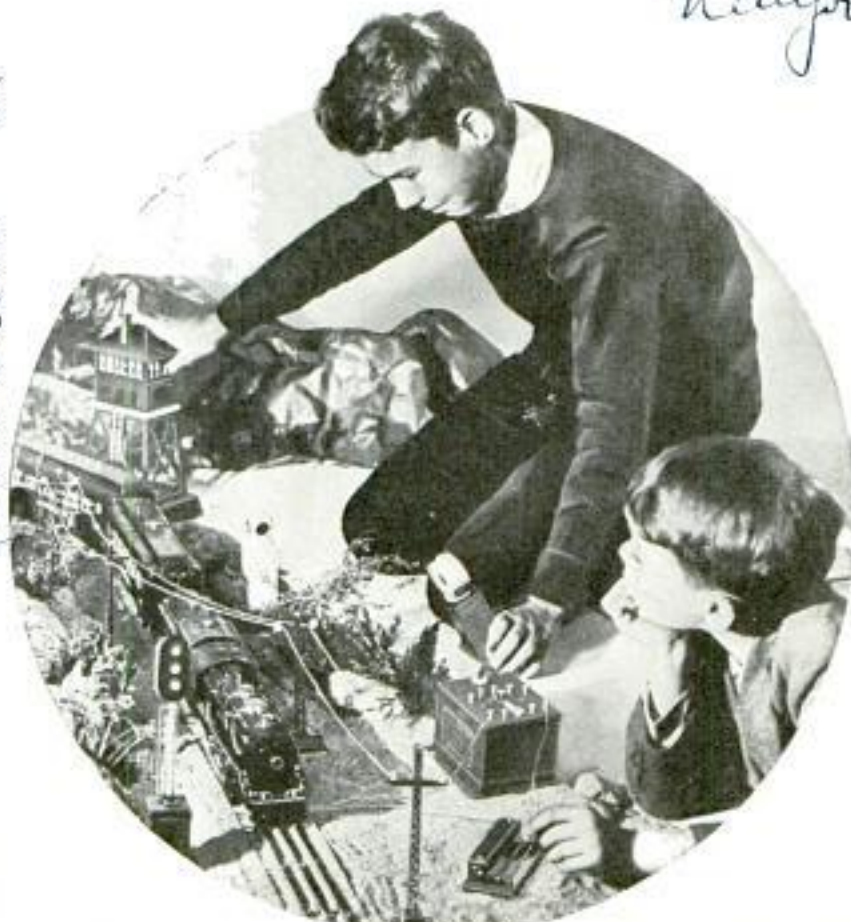
NON-METAL TOOTH FILLING SOUGHT IN TESTS

0865

Too wasteful and expensive, gold, silver and platinum are going out of fashion for dental repairs. Another reason for the decline in popularity is that these metals frequently react as do the plates in an electric battery, starting injurious chemical changes. Extensive experiments are being conducted at the University of Michigan to produce materials for non-metallic fillings. Only twenty per cent of the American people, whose teeth are the best cared for in the world, can afford adequate dental service, due largely to the necessity in the past of using precious metals in repairs. Perfection of cheap substitutes is the aim of dentistry. If gold should be used for the next two years at the rate called for by American dental faults alone, as much of the metal would go into patients' mouths as has been lost in shipwrecks.

U. of M. News Service. 6/12/33

Ann Arbor



Latest Toy Train Has Chugger Device to Produce Noise Resembling Steam of Real Locomotive; Note Remote-Control Equipment

TOY TRAIN MAKES STEAM NOISE LIKE REAL LOCOMOTIVE

Giving the effect of a steam exhaust, a sound device for toy locomotives is the latest contribution to realism in miniature railroading. The same toy train is equipped with "remote control" for starting, stopping, switching and other operations.

FRUITS OF TEMPERATE CLIME TO BE GROWN IN TROPICS

For the next decade botanists from the New York Botanical Gardens will conduct research work on Dominica, one of the Leeward islands, in an attempt to adapt temperate-zone fruits and other plants to cultivation in the tropics. The research workers will conduct their experiments each year, from autumn until spring, with different kinds of temperate-zone plants under a variety of conditions.

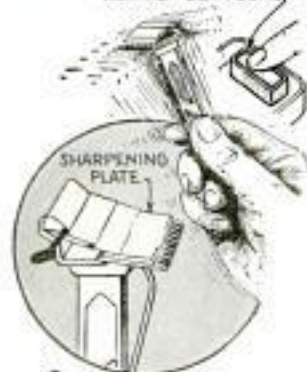
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Blades 50c  
rattlelike snaps so that the sliding sharpening plate clicks in and out under the blade, thus stropping one side of the edge. Honing is done in much the same way after using a compound on the plate.

The Haven Razor Co.  
Swanton, Ohio.

By simply shaking a new kind of safety razor, the user may strop and hone the blade quickly. To strop, the razor is held so that the fingers do not interfere with a bar in the center of the handle. Then, it is shaken by quick, rattlelike snaps...

Thiokol Corp. Yardville, N.J.  
Superior  
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Co. Washington

1354 Woodlark Ave  
after read by W. L. White, Chief of Cranberry, Marlborough, Mass.

# Sea-Floor Explorers to Hunt 'Lost Continent'



Equipped with Latest Devices for Exploring the Sea Floor, British Scientists Are Ready to Start a Long Voyage in Search of the "Lost Continent" of Lemuria, Believed to Lie between Madagascar and Sumatra in the Indian Ocean; Ticker for Recording Ridges, Peaks and Valleys in Sea Is Illustrated at Left, While Bottles for Capturing Specimens of Ocean Life, and Lead Lines to Take Samples of Bottom Are Shown at Right

RAY OF GROWING TISSUE AFFECTS ADULT CELL

Science News Letter 6/10/37

Full-grown cells are susceptible to the influence of rays given off by actively growing tissues, says Dr. H. Kowarzyk, of Poland, after studying the effect of this strange radiation on one class of white blood corpuscles that destroy bacteria and other foreign bodies. Doctor Kowarzyk, in his tests, isolated a quantity of these corpuscles from human, horse and rabbit blood and exposed them to the mitogenetic or M-rays of actively growing turnip tissues. Different samples of the corpuscles were given various species of bacteria to attack, including those of typhoid fever, blood poisoning, boils and the common colon bacillus. The corpuscles of human and rabbit suffered a depression in their ability to destroy the bacteria; those of the horse were stimulated. Doctor Kowarzyk therefore regards the M-rays as effective upon mature, non-dividing cells.

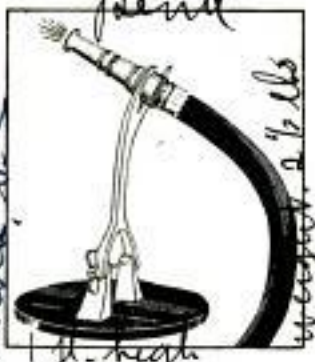


Firemen Are Shown Wearing Masks to Which Washed Air Is Supplied by Two-in-One Nozzle on the Hose

the nozzle chamber into a fine spray. Gas-mask lines pick up the washed air at this point and carry it to the hose men wearing the masks. When the water stream for extinguishing a fire shoots through the inner nozzle, it clears the outer nozzle by one-eighth of an inch. Through this small area, a current of fresh air, given off by the water under pressure, also circulates back into the nozzle chamber and through the gas-mask lines.

HOLDER FOR THE GARDEN HOSE MAKES SPRINKLING EASY

Automatic Rubber Co. Columbus, O.



Sprinkling is made easy with a simple support for the garden hose which makes it possible to direct a stream of water in any direction desired. The support consists of a base to which is attached a prong support for the nozzle. This support is adjusted by a thumbscrew. The holder is of metal, one foot high.

FIRE HOSE SUPPLIES FRESH AIR TO THE FIREMAN

Supplying fresh air to the fireman amid heavy smoke, a fire-hose nozzle fits on the standard coupling. Force of the water passing through the device, which is actually a nozzle within a nozzle, turns a ball-bearing spiral inside at a speed of 800 to 2,800 revolutions per minute. A tiny fan attached to the spiral whips the water in

SELF-BREATHING SEAT CUSHION IS COMFORTABLE AND COOL

Seat cushions which actually draw in and expel air and thus dissipate body heat are now offered as a more comfortable and cooler chair covering than the ordinary rubber cushion. They are of sponge rubber covered with mohair, velour or felt. The "breathing" action is made possible by lateral and vertical vents in the cushion. As the vertical openings are compressed by the weight of the body, air currents are created which are distributed through the lateral tubes, expelling air when the cups are compressed and drawing it in when they expand as the position on the cushion is changed.



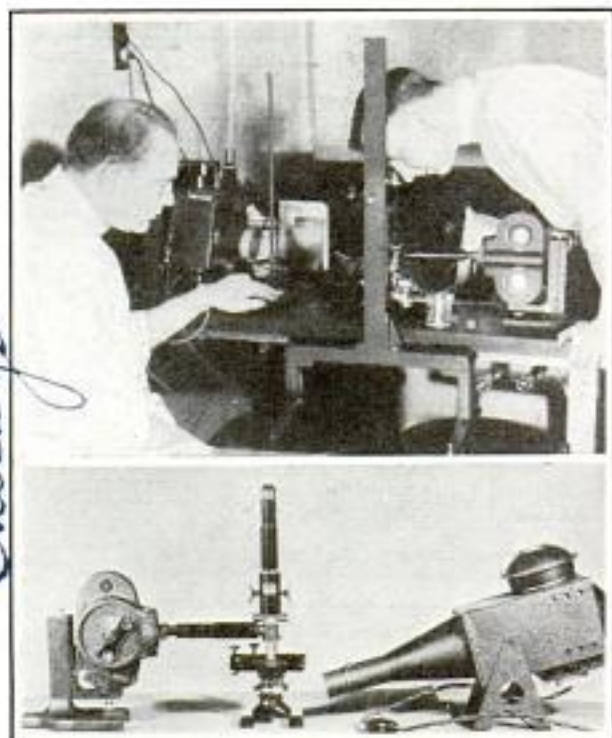
Dr. W. Benjamin Balthazor  
1173 Reilly Court  
Racine, Wis.

L. M. Bickett Co.  
Waterstown, Wis.

A.B.  
Stark, Alambek Co.  
410 N. Washington Ave Chicago

c871

Paul Emerson,  
-c/o The Lysace Co  
c862 Amer. & Iowa



Top, Taking Microscopic Movies with Ordinary Camera and Attachment; Bottom, Equipment in Place

### MICRO-MOVIES EASY TO MAKE WITH CAMERA ATTACHMENT

Making microscopic motion pictures has been greatly simplified by an attachment developed for use with a Bell and Howell sixteen-millimeter movie camera and an ordinary microscope. It consists of a horizontal tube mounting a split-beam prism which reflects about ninety per cent of the available photographic light in a parallel ray into the standard lens. The remainder of the light passes up the microscope tube, over which fits a finder sleeve fitted with a mask to show the user the limits of the field being photographed. This reduced amount of light reaching the eye makes it easy to observe the object being photographed and to keep it in sharp focus by means of the fine adjustment of the microscope. The third part of the accessory setup is an adjustable camera stand that raises or lowers the camera to the exact height necessary.

Winter months in the United States average four degrees warmer than sixty years ago.

### PAINT DEODORIZED BY MIXTURE PRODUCED AT LOW COST

Commercial floor and wall paints can be deodorized by a mixture compounded by Paul Emerson, soil chemist. The mixture, which is added directly to the paint before thinning fluids are introduced, prevents the usual nauseating effects that accompany interior decorating. Only a small amount of the compound is required, and the cost per room should not be more than ten cents. None of the ingredients used in the mixture has any noticeable effect in reducing paint odor. But when mixed together, it is a different story. Apparently the reactions taking place in the mixture have some activating effect that speeds up drying of the paint.

### RAIL CART WITHOUT WHEELS DRAWN BY HORSES

In remote mountain districts where there are no roads or railways, the Canadian government is building highways as a means of unemployment relief. Ingenious methods of transportation for hauling purposes have to be devised. At one place, rounded poles served as a track for a horse-drawn cart without wheels. This cart was used to carry away rocks blasted along the Big Bend Columbia highway.

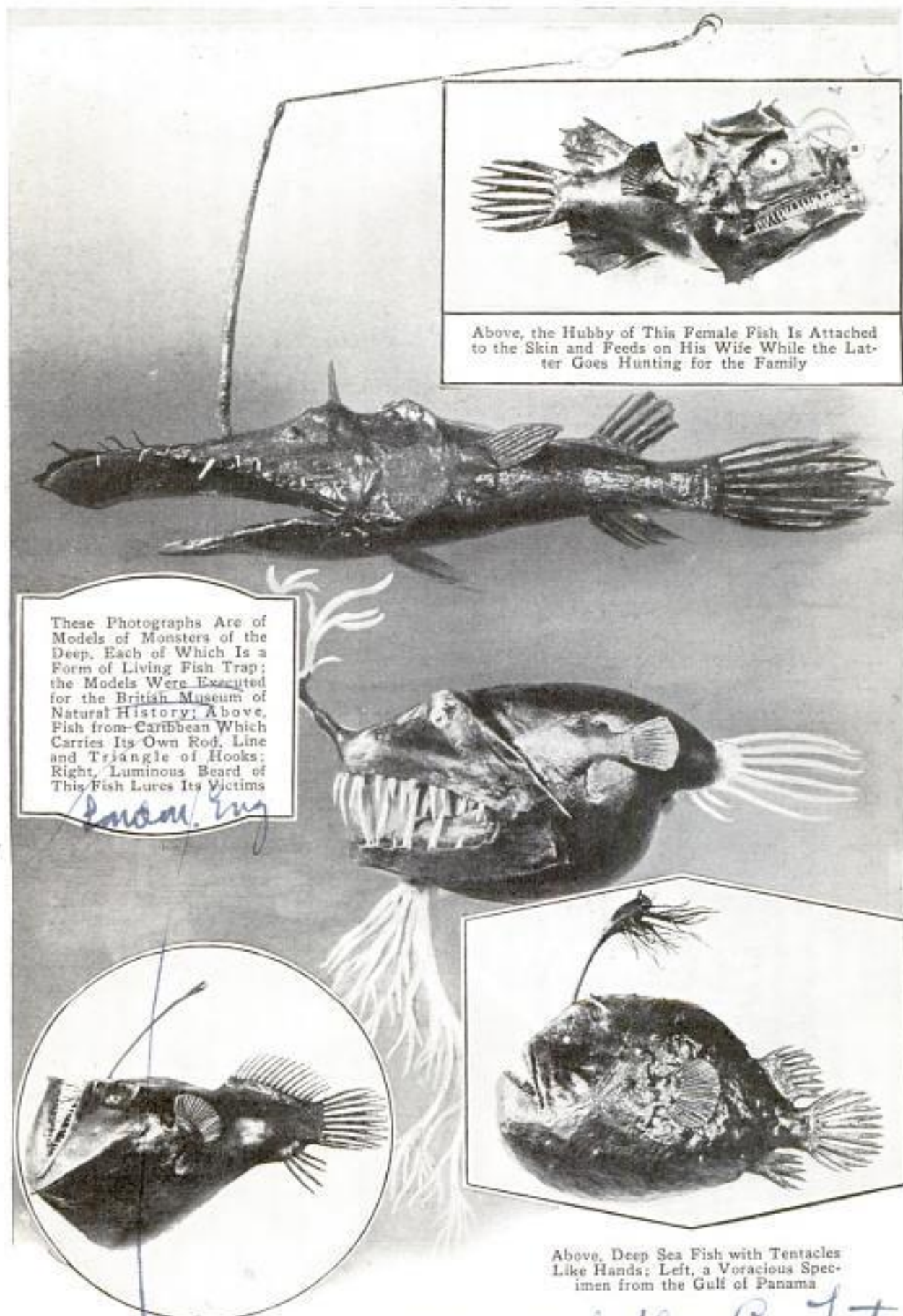


This Unusual Drag Sled on Poles Is Used for Hauling Away Rock Blasted from Highway Excavations in Canada

Copyrighted material  
 Cont. James Montague  
 608 Harbor Commission  
 Photo: Farming & Gardening

Bell & Howell Co. 1801 Larchmont Ave Chicago

# Living Fish Traps Wear Bait to Lure Victims



Above, the Hubby of This Female Fish Is Attached to the Skin and Feeds on His Wife While the Latter Goes Hunting for the Family

These Photographs Are of Models of Monsters of the Deep. Each of Which Is a Form of Living Fish Trap; the Models Were Executed for the British Museum of Natural History; Above, Fish from Caribbean Which Carries Its Own Rod, Line and Triangle of Hooks; Right, Luminous Beard of This Fish Lures Its Victims

*London, Eng*

Above, Deep Sea Fish with Tentacles Like Hands; Left, a Voracious Specimen from the Gulf of Panama

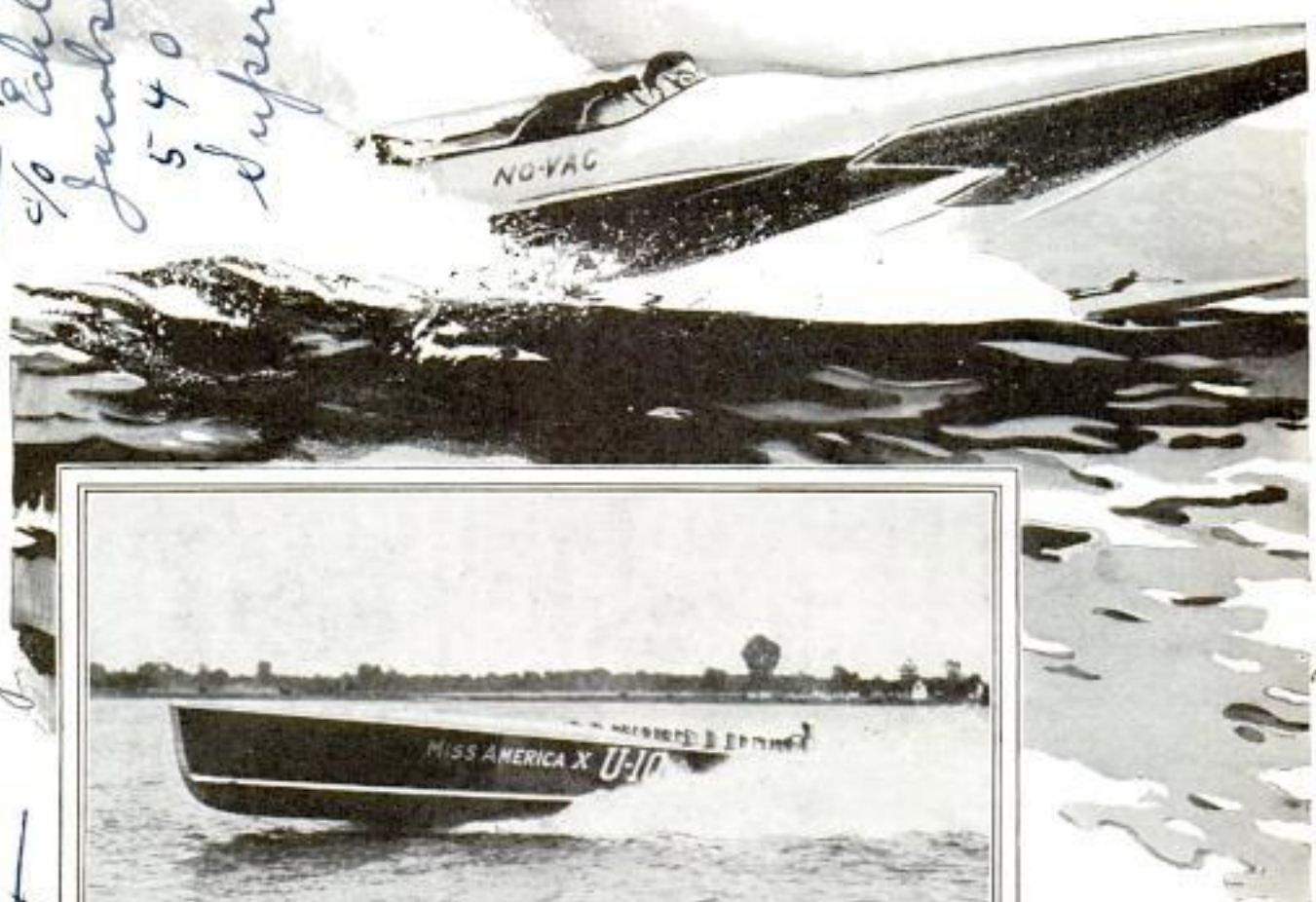
*under direction of Mr. C. Tate  
Reg. Br. Mus.*

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# Hulls or

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78  
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540 N. Michigan  
Superior 75 477.



Here is Gar Wood's "Miss America X" in Action: Her Thirty-Eight-Foot Hull Carries Four Huge Motors Delivering More Than 6,000 Combined Horsepower to Drive Her Forward

By LE ROY MALROSE

ARE the super-powered speed boats of today marked for defeat by newer craft of radical hull design? Will 100-mile-per-hour flyers, like "Miss America X" and "Miss England III," bow before smaller boats carrying only a fraction of their tremendous horsepower? Naval architects and speed-boat builders concede that this is possible. They point out, that in the last twenty-five years, larger and larger motors have been responsible for winning races, rather than any decided changes in

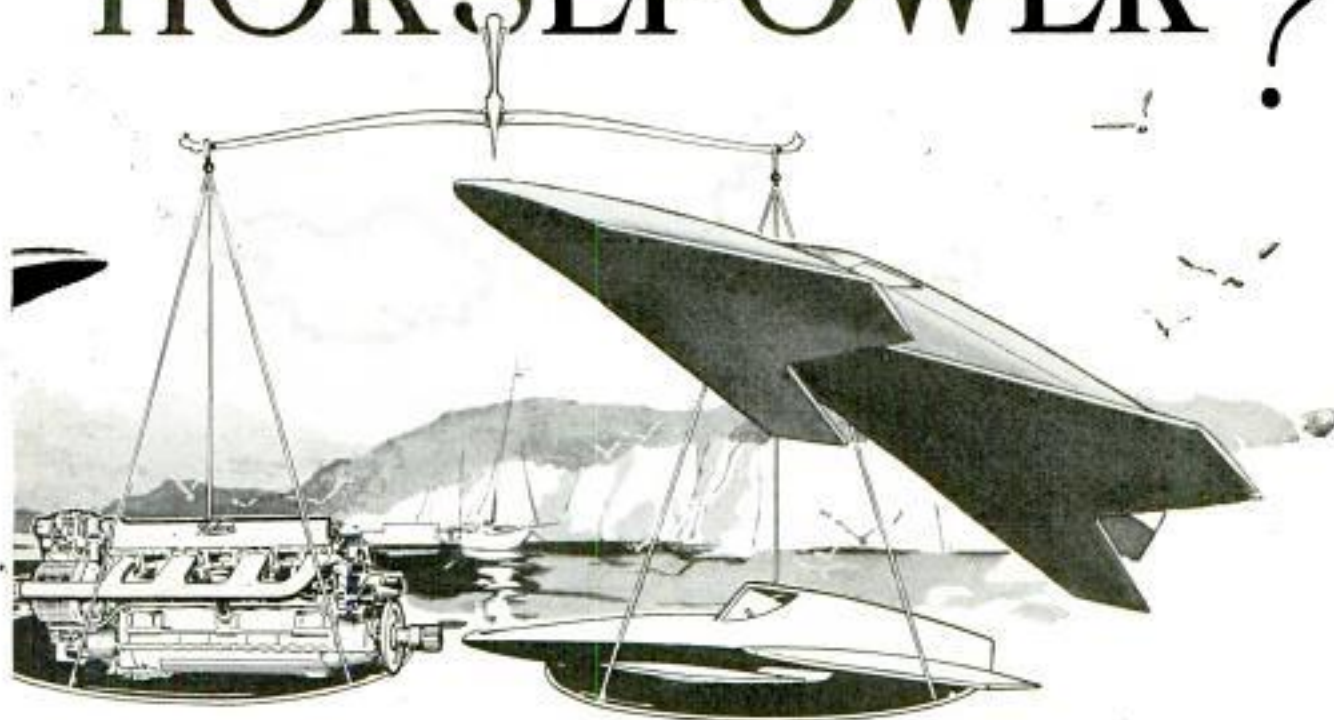
the boats that have carried them. Better hulls may again beat big motors.

History reveals just such an upset. In the early part of this century, when any boat that could top twenty miles per hour was considered a "racer," a new type of boat was brought from France to America. To appreciate her performance, a comparison must be made between "Ricochet" and her American rivals. The latter were displacement boats. Their hulls were thrust through the water like a submerged pointed board. Their motors were large for the time, but much of the power was



c 789

# HORSEPOWER?



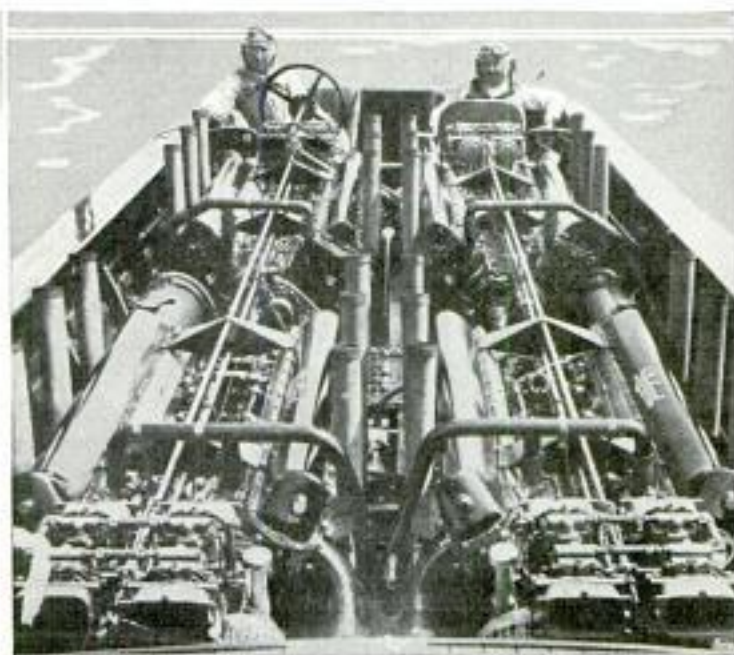
consumed by the thrust of their hulls against the resistance of the water. Hence, speed suffered. But under speed, "Ricochet" planed the surface just as a flat stone skips when thrown across a mill pond. Driven by only a six-horsepower motorcycle engine, the newcomer could do as high as

eighteen miles per hour! The secret lay in her new hull form. This was scow-shaped with a step about halfway aft, like modern outboard racers. The step provided a division between the two planes forming the bottom, which were elevated at the forward ends so that the water resistance would tend to lift the boat's bow out of

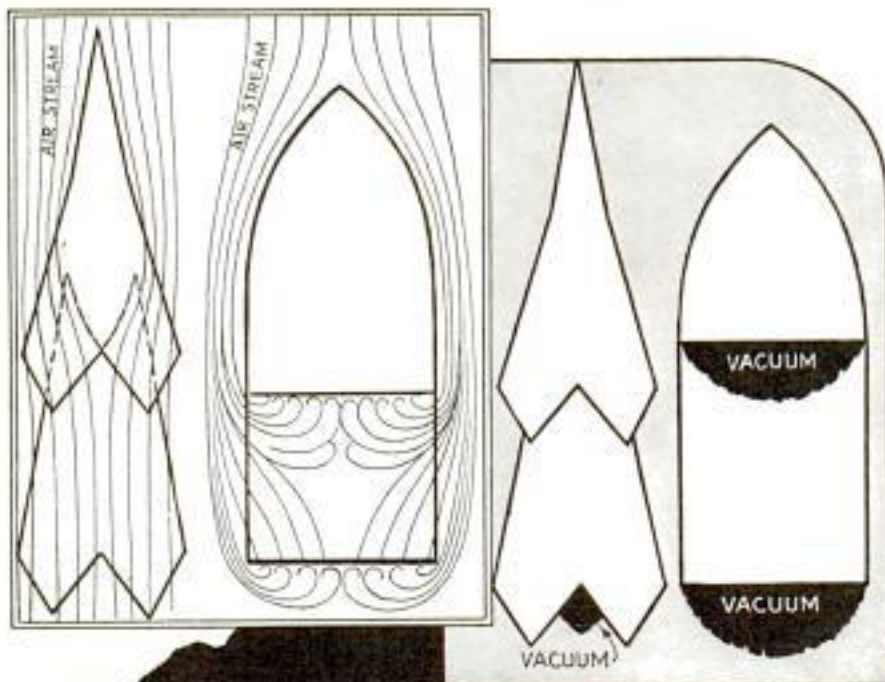
the water as she gained speed. The faster the speed, the less hull area contacted the water, with a constant lowering of water resistance. "Ricochet" was called a hydroplane—the first of her kind in this country.

Yet not all American designers accepted this advanced-speed principle. Wealthy backers continued to finance faster displacement boats with larger motors. But later, when the English-built hydroplane, "Pioneer," challenged and raced "Dixie," the champion American displacement speed boat, the superiority of the hydroplane hull was apparent to all. During the early stages of the race, "Pioneer" completely outran "Dixie" and was soon far in the lead. But a bit of seaweed choked her cool-

The Four Powerful Engines Which Give "Miss America X" Her Great Speed

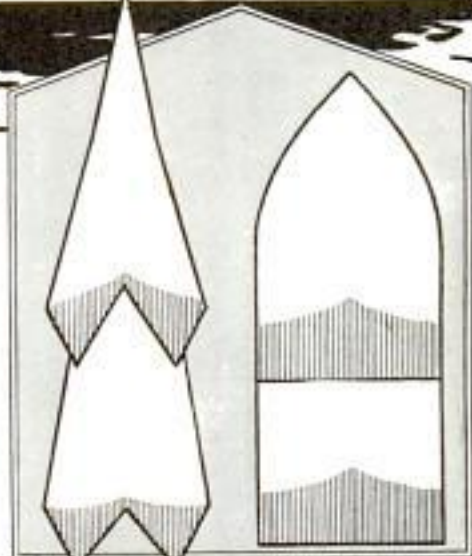
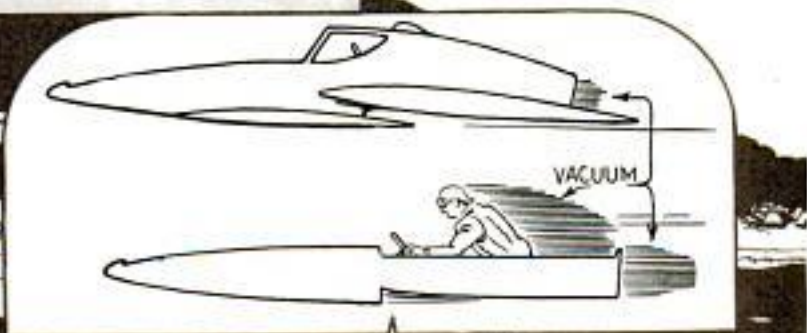
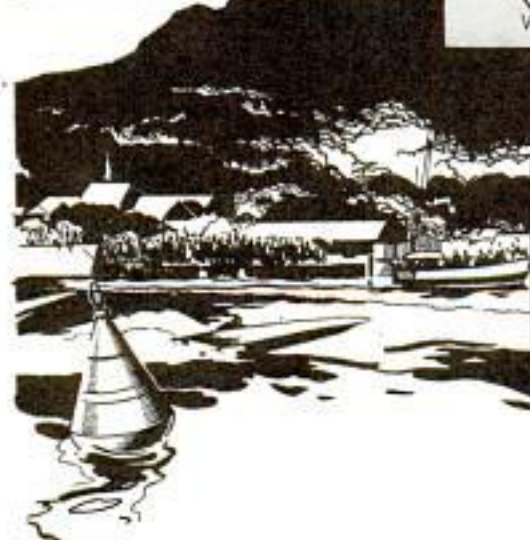


C 1789



to improved hull designs for more speed. In line with their studies, these men look for a parallel in airplane developments. Air resistance is a big factor in airplane calculations. A typical hydroplane exposes nearly all its hull to the air at top speed. Therefore, they ask, "If streamlining produces faster airplanes, can't we apply this fact to speed boats as well?"

And wind-tunnel tests of motorboat



Diagrams Illustrating How Water and Air Resistance Are Reduced in the "No-Vac." Designed by the Author, LeRoy Malrose, as Compared with Standard-Hull Design; Note Comparison of Air-Stream Action, Vacuum Area and Wetted Surfaces

ing system and her motor burned up just short of the finish line. "Dixie" kept the Harmsworth Trophy. But this boat and others of her type lost favor rapidly as the use of hydroplane principles became universally standard for racing hulls. "Miss America X" and "Miss England III" are hydroplanes—refined modern versions of old "Pioneer." So are most champion outboard boats.

But now—if hydroplane speeds have depended mainly upon increased horsepower—how soon will that limit of power be reached? The thirty-eight-foot hull of "Miss America X" already carries four huge motors delivering more than six thousand combined horsepower. Can more power be packed into a speed boat that is still of a size to handle surely and safely? Some builders believe not and are turning

1558  
Superior Chicago

hulls are encouraging. In one instance, two speed-boat scale models were tested. Each model had been reduced from an actual boat whose performance was known. One was a conventional hydroplane, the other was similar under water, but roughly streamlined above. The streamlined boat was much faster on the water than her sister, yet both carried the same mo-

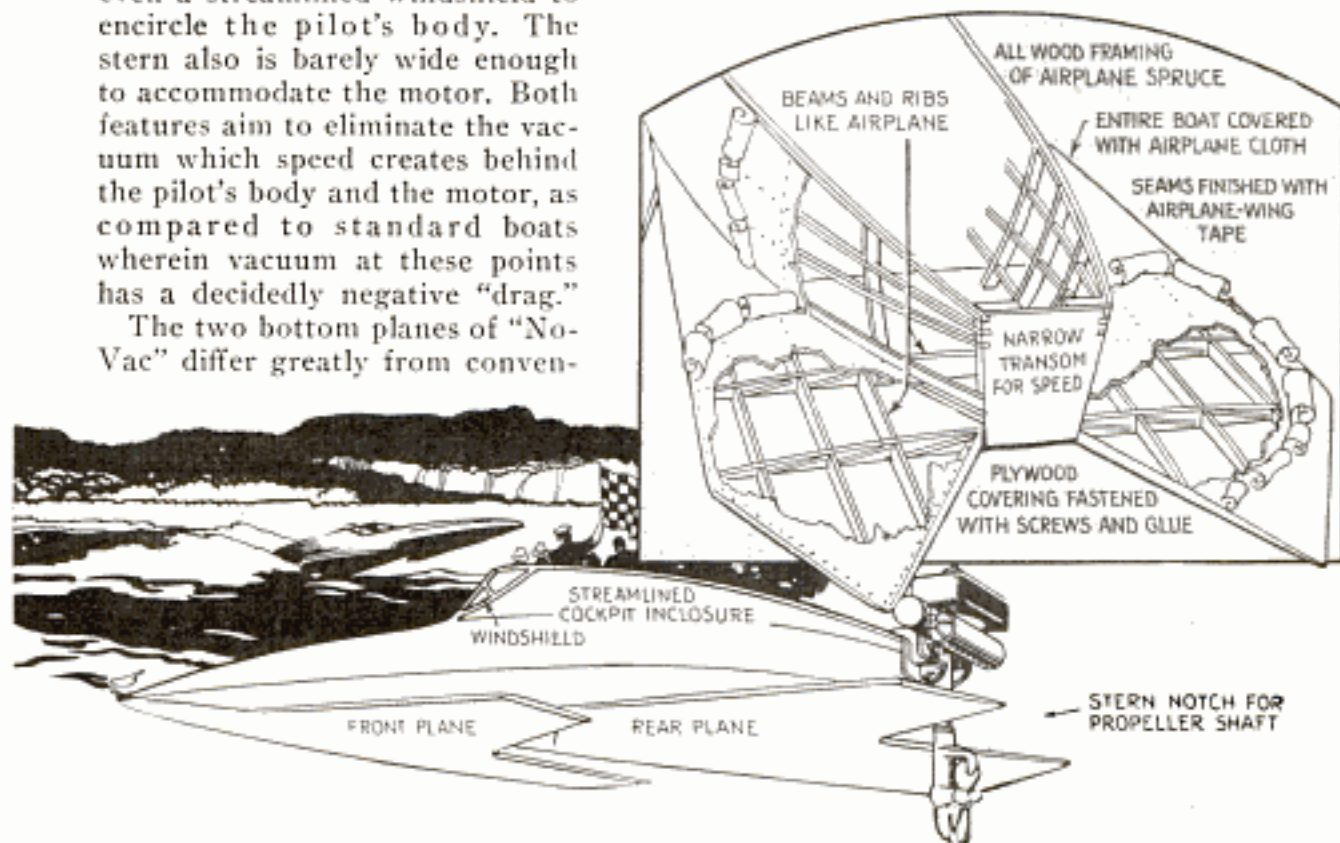
tor power. In the wind tunnel, the former boat was shown to have a third less air resistance than the conventional hydro!

A practical example of ultra-streamlined speed-boat design is represented by "No-Vac," an outboard racer which was recently built and tested in Chicago. The upper part of her hull resembles an airplane fuselage, narrow, with even a streamlined windshield to encircle the pilot's body. The stern also is barely wide enough to accommodate the motor. Both features aim to eliminate the vacuum which speed creates behind the pilot's body and the motor, as compared to standard boats wherein vacuum at these points has a decidedly negative "drag."

The two bottom planes of "No-Vac" differ greatly from conven-



Above, Modern Outboard Racer; Below, Cutaway View of Stern of Malrose Boat and Rear Quarter View of Bottom



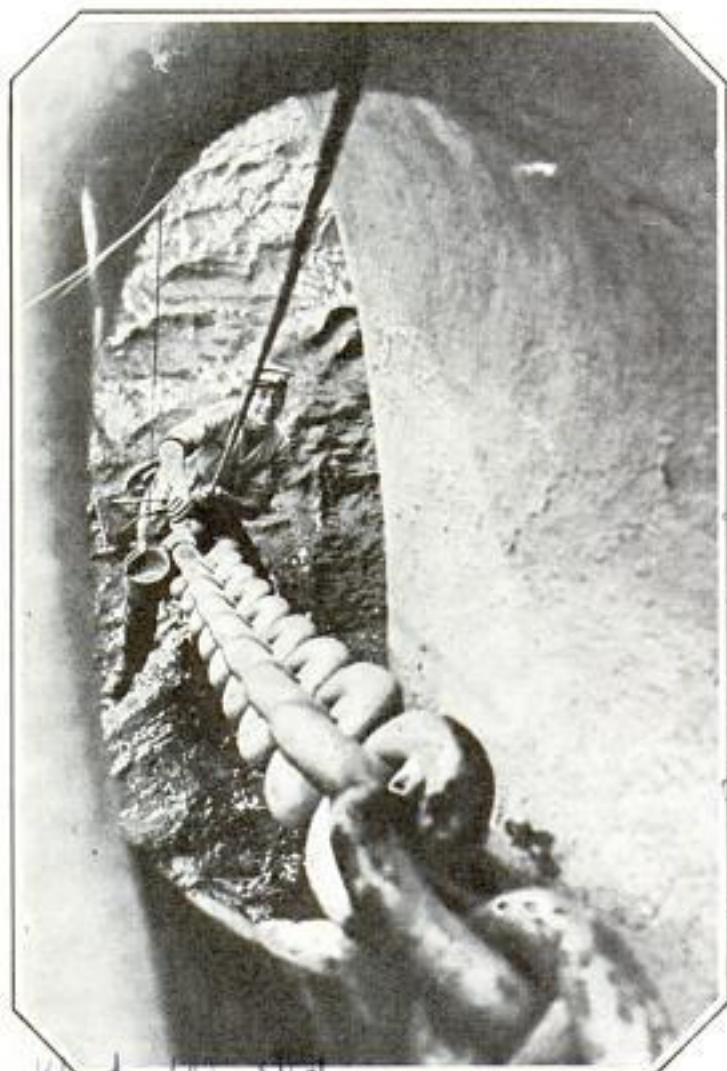
tional hydroplane practice. Triangular in shape, they have no solid side-to-side step, another point at which vacuum checks the speed of standard boats. Instead of a solid step, this new boat provides open passages through which the air stream may flow down under the trailing plane, offsetting such vacuum as might otherwise exist. The diverted air stream forms a bubbling cushion that increases the boat's speed and improves its handling when crossing the wake of another craft. With the same motor and under the same water conditions, "No-Vac" exceeded the speed of a standard racer by seven and one-half miles per hour!

In an effort to improve racing hulls, an Eastern designer has modeled another type of boat which reduces water and air

resistance. This model has a cigar-shaped streamlined hull which, at rest, floats on the water. Just forward of amidships, a framework below the keel supports a horizontal, upward-tilted plane, of fixed angle. Aft, another framework carries a smaller plane that is adjustable for angle by controls in the pilot's cockpit. The basic idea is that the slight upward angle of the central plane will cause the hull to clear the water when speeding.

In designing rooms and workshops all over the world other types are being developed and built. Is there among them a marine David of strange new form that can defeat the Goliaths of horsepower who reign today? One thing is certain. Man, with his machines, will continually strive for more speed.

C822



Unusual Picture, Taken through Hawser Pipe, Showing Sailor Painting Huge Anchor Chain of British Warship

### HUGE CHAIN HOLDS BATTLESHIP WHEN ANCHOR IS LOWERED

One of the largest chains in the world, and the biggest in the British navy, is the anchor cable used on the English warship, H.M.S. "Hood." This cable contains 1,627 links and is 625 yards long. The accompanying photograph was made by aiming the camera through the hawser pipe as a sailor was engaged in painting the cable.

### MOTOR COACHES USE FLARES WHEN STALLED ON ROAD

Under a new state law in Pennsylvania, busses, motor coaches and commercial vehicles with a capacity of two tons or more, must be equipped with at least two red or yellow-burning danger or caution signals, similar to the railroad fuseses. These are to be placed in the highway and lighted in

the event the vehicle is stalled and becomes a menace to other traffic. The law is expected to reduce the number of collisions between cars and trucks stalled in the road.

### RADIO TUBES OF METAL ALMOST UNBREAKABLE

After two years of research, a radio tube made of metal has been produced in England by Marconi scientists. It is claimed the metal tube is virtually unbreakable and its metal shield gives better screening than metallizing on a glass bulb. Its small size is expected to result in more compact sets. The tube uses its anode as the envelope for containing the vacuum. Its over-all length is less than five inches and it is about an inch in diameter.

### PAD FOR PHONE DESK AIDS IN WRITING

Designed to eliminate the hunt for pencil and paper when it is necessary to write down a telephone message, a handy pad has been produced for the phone desk or table. Neatly arranged on the pad is a sheaf of note paper, a pencil, receptacle for a package of cigarettes and a removable ash tray. The pad

Handy Pad for the Telephone Stand Has Writing Materials to Aid in Taking Messages



is made of a new material which is cleaned by wiping with a damp cloth.

Sandell Mfg. Co  
537 S. Dearborn  
Chicago

20 Jan. 1934  
63. News

C892

See Jan 1934  
P. 63.

Phil. Inquirer 6/4/33

C871  
C 79  
Ballmore, Jan. 6/4/33

Wid. World

Handyphone

stained material  
Cheap

C814.

Con. Esq. H. Watson Southern  
News Service, Box 2489,  
Birmingham, Ala.

POPULAR MECHANICS

175



"Little Jerusalem," a Miniature City Depicting Various Scenes in the Life of Christ, and the Builder Who Has Worked Intermittently for Thirty Years at the Task

### CITY OF "LITTLE JERUSALEM" CONSTRUCTED BY MONK

Over a period of several years, a miniature city, called "Little Jerusalem," has been built by a monk at a monastery at St. Bernard College, Cullman, Ala. The work had its inception about thirty years ago when the monk began building a grotto on the recreational grounds. From time to time he has added to it miniatures of various scenes in the life of Christ in the Holy Land. The builder is now engaged in constructing a much larger grotto in a place open to sightseers without restrictions since thousands of visitors have come to the monastery asking permission to view the little city.

### PLASTER CAST OPENED EASILY WITH WIRES AND KEYS

Removing a plaster cast from a fractured limb is accomplished like opening a sardine can by a method developed recently. Heretofore such casts have been cut away with big shears, softened with vinegar or sawed through, each a tedious process. By the latest method, three

lengths of braided, rustproof wire are placed between the inner bandages and the layers of cloth impregnated with plaster. One wire extends the full length of the back of the cast, the two others being placed along the front. To remove the cast, the free end of each wire is attached to a small winder, the wire cutting through the cast as the winder is turned.

### HOSE REPLACES BRUSH HANDLE TO CLEAN OFF CALCIMINE



After painting with a new calcimine brush, the handle may be unscrewed and an ordinary hose attached for running water through the bristles. This feature provides easy cleaning. While the water is running, the brush is worked up and down in a bucket to loosen all particles of calcimine. The brush may be attached to a threaded faucet if the hose is not available.

ing, the brush is worked up and down in a bucket to loosen all particles of calcimine. The brush may be attached to a threaded faucet if the hose is not available.

Rex P. Jensen & Co  
Box 2340, Dallas  
Texas

introduced in Eastern New York  
at the Radio Hosiery Co.

demonstrated by  
Dr. W. R. Kearsley.

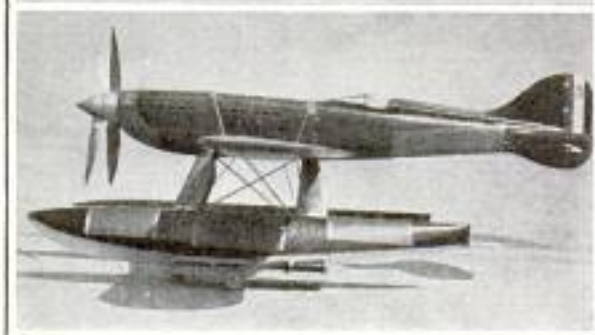
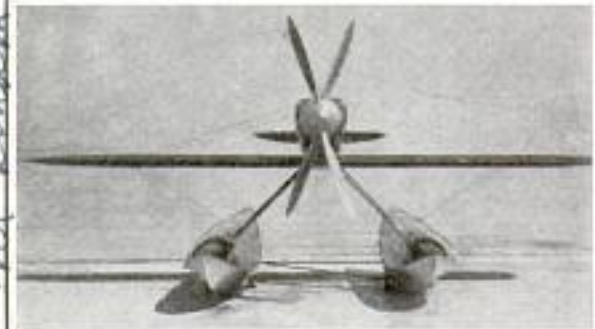
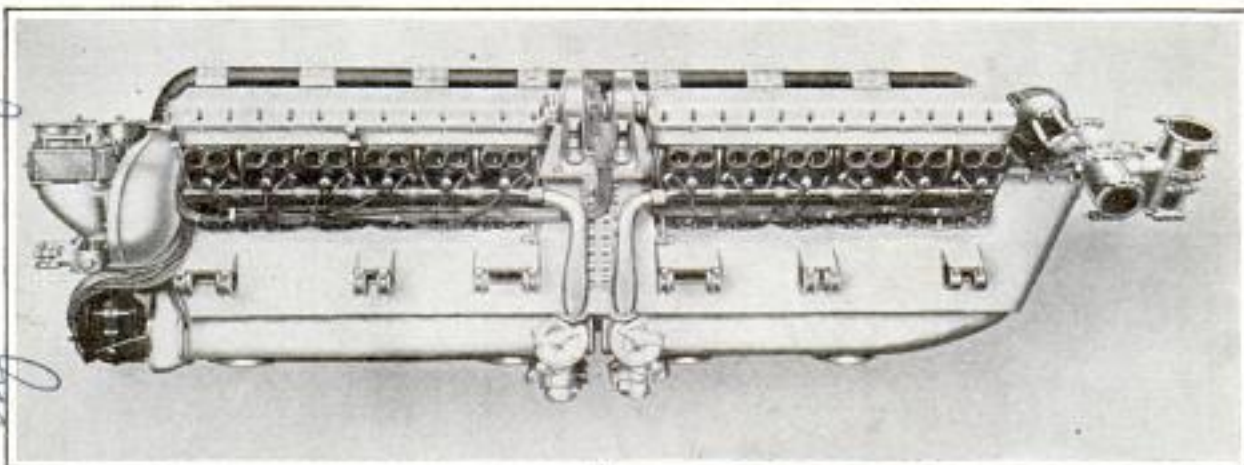
My order 5/14/33

826

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# Twin Propellers Drive World's Fastest Plane

Cont. Harold J. Wilkins Esq. Colombari  
29 Beaugrand Road, Beaulieu Heath  
M. London, Eng.



Top, Two Engines Joined Together in Record Plane; Left, Two Views of the Craft

Twin propellers, whirling in opposite directions, drive the world's fastest airplane, which attained a speed of 424 miles per hour with F. Agello, Italian flying officer, at the controls. The propeller shafts revolve one within the other, the rear tubular shaft being passed through the front shaft. Two engines, joined end to end, make up the power plant that develops 2,900 horsepower at 3,200 revolutions per minute. By causing the propellers to rotate in opposite directions, builders eliminated the tendency of one side of the plane to sink when the throttle was opened, thus swinging the ship before rudder control became effective. The craft is of the seaplane type.

## WATER MOTOR RUNS WASHER FOR DELICATE CLOTHES

Operated by an efficient water motor, a clothes washer employing only water for power is ready for use when connected to the bathtub or sink faucet. It has a capacity of three and one-half gallons of water, but can be operated with only one-half gallon and is particularly suited for washing delicate clothes which might be damaged by ordinary means of cleaning. It is



Level Electric Mfg. Co  
4505 Parkerswood Ave  
Chicago

equipped with an oscillating agitator, weighs only seven pounds and is one foot in height and less than a foot in diameter.

## TWO-WAY POLICE RADIO AIDS IN MOTOR PATROL OF CITY

Two-way radio communication between patrol cars and police headquarters is now being used at Eastchester, N. Y., to facilitate the work of the police cars. The officers in the cars not only receive messages from headquarters or from another car, but can also send messages, since each car has a sending set as well as a receiving unit. Broadcasting from the patrols is done by means of a hand microphone, and the sending sets are run by dynamos operated on storage batteries.

Cont. Jacob Sleschin Room  
2240, 500-5th Ave  
New York City

Telephone  
Long Beach, 5166

Colombari 84-27

2881

material

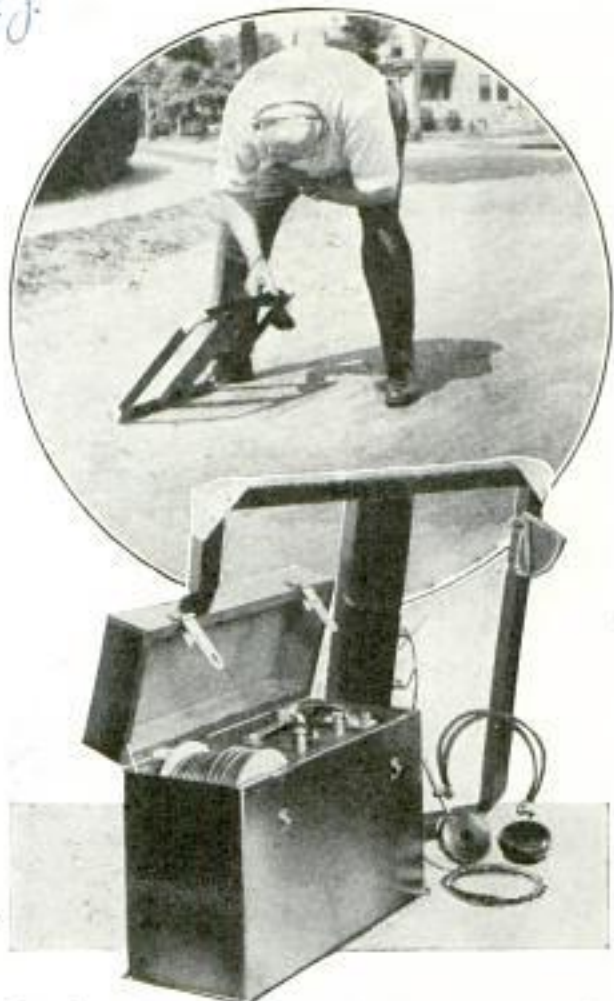
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 and C. W. Bray, Princeton  
 POPULAR MECHANICS  
 Univ. Princeton N.J.

c 78 0

**SCIENCE TAPS KATYDID'S EARS  
 TO HEAR INSECT NOISES**

Science News Letter 4/15/33

By tapping the hearing circuit of the katydid and cricket, ~~scientists~~ have been able to listen in on the insects' world of sound. This was done by placing electrodes against the insects' knees, which are their own peculiar "ears," amplifying the responses picked up and listening in on these in an ordinary telephone receiver. The resulting sound was always a sort of "shushing" noise, regardless of the source. Human speech lost all characteristic qualities, except the rhythm, which was preserved. The katydid apparently is deaf to ordinary sounds of our world and hears principally those that are beyond the reach of human ears. Sounds of frequencies below 800 cycles produced no response, even when very loud. But the higher frequencies, even up to 45,000 cycles per second, were picked up. The limit of man's hearing is usually 20,000 cycles.



Top, Searching for Water Main; Bottom, Close-Up Photograph Shows Simplicity of the Detector

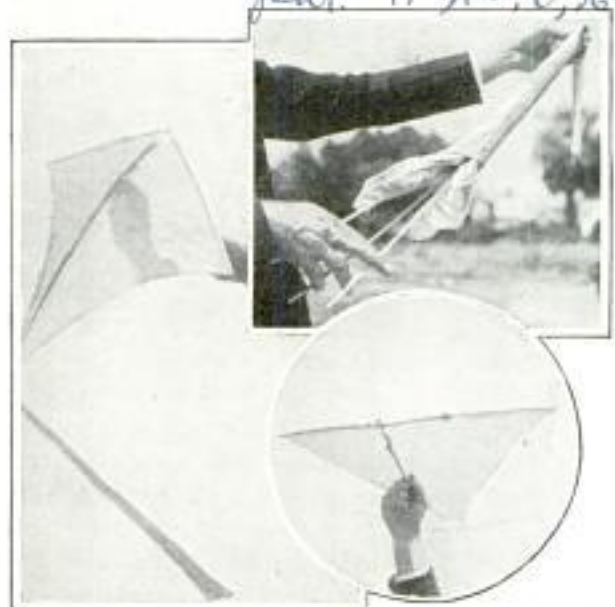
**PIPE DETECTOR "HEARS" WATER  
 AND FINDS BURIED MAIN**

Detection of the depth and position of a water pipe buried underground may be accomplished by using a device called the "pipe-finder." The instrument converts into electrical energy the vibrations of water flowing in the main, so that it literally "hears" the water, enabling the operator to determine the depth and position by taking readings on a dial. Attached to one portion of the device is a dial which indicates the depth of the pipe. One edge is placed on the ground and the other, which is held in the hand, is raised or lowered until a buzzing in the detector's ear-phones reaches its peak. At this position, the dial is read. Locating the direction that a pipe runs is as simple, the instrument being moved over the ground until the buzz is heard in the phones.

**KITE MADE OF CLOTH IS FOLDED  
 LIKE AN UMBRELLA**

Made of cloth, a kite which folds like an umbrella when not in use is more durable than the ordinary paper kind. The tail forms the case in which the parts are carried. By removing the tail, the assembled kite can be used as a glider. It is easy to put together and, while light in weight, is exceptionally sturdy.

pat. 1,680,036



Cloth Kite Which Folds into the Tail Like an Umbrella for Carrying; It Is Also a Glider

Chemists can produce synthetic woods harder than teak and softer than cork.

Multicolored Folding  
 Kite Co., Ocean Park  
 Calif

no information

George A. Caldwell Co., Mattapan Square, Boston 26, Mass.

c 709 Capt. Thos. E. Stinson  
145 S. Spring St.  
Los Angeles, Calif.



Above, Taper Streamlining of Racing Plane; Below, Fast "Gee Bee" Bumblebee

**A**VIATORS used to have a saying that with enough power they could make a barn door fly. This year they are doing that and more, for they are practically flying the motor alone. The knifelike wing of a record-breaking plane is smaller than a barn door. The fuselage is merely a streamline fairing behind the radial engine.

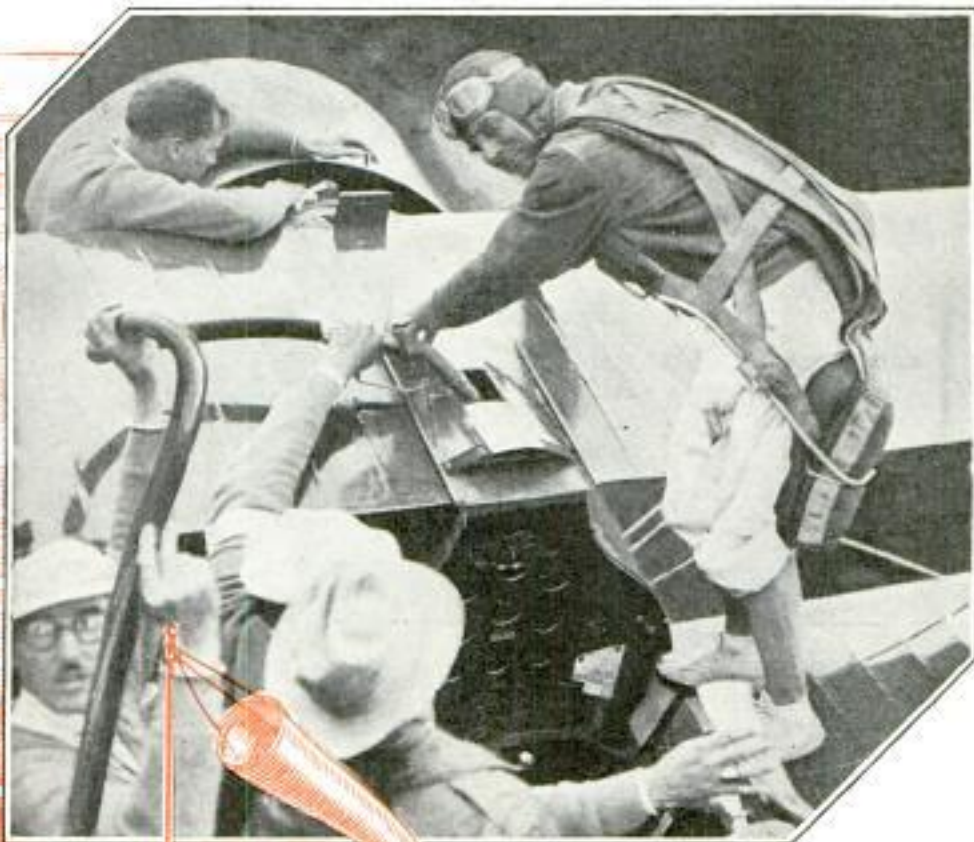
By reducing the size of the planes and increasing the size of the motors, engineers

are producing man-made meteors that hurtle through the air at 300 miles per hour. Several of the planes racing this summer can do five miles a minute.

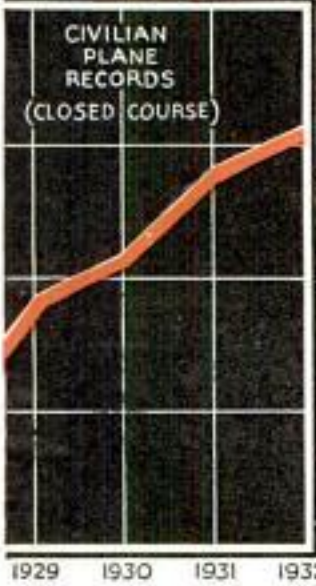
Tucked away in the tail of his midget plane, the pilot sits almost motionless during a race. Controls are hypersensitive at high speed and the slightest pressure on the stick brings an immediate response. So exacting are the requirements of rac-

1926 1927 1928





Above, Fueling a Racing Plane; Left, Racing Plane Starting a Vertical Bank Preparatory to Rounding a Pylon

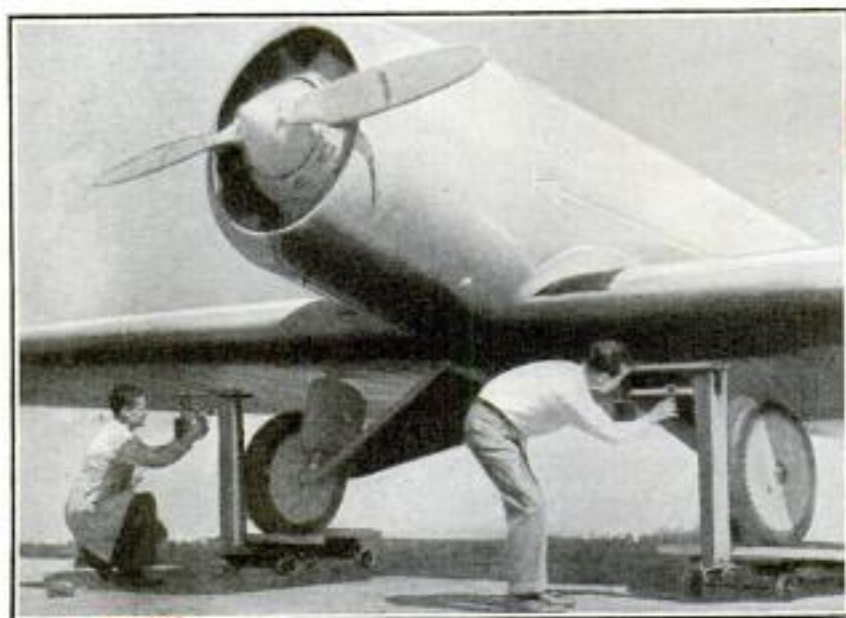


ing that nearly all the speed-flying in this country is done by a small group of professional racing pilots. Among them are Col. Roscoe Turner, who has been awarded the Harmon trophy as America's premier flyer, Maj. James Doolittle, who holds the world landplane speed record, Frank Hawks, James H. Haizlip, and J. R. Wedell. Theirs is the most thrilling and dan-

gerous work in the world. When Jimmie Wedell was putting a new race job through its paces before delivering it to Colonel Turner, he finished the test by racing the plane at wide-open throttle. As he streaked toward the field the horrified spectators saw a wing flutter and then collapse. But instead of plunging straight to the ground the rest of the plane zoomed up into the air. Working frantically at the controls, Wedell literally "rode the motor" to a safe altitude. Then, as the plane fell over on its side, he rolled out of the cockpit and pulled the safety ring of his "chute."

"Jimmie took the only chance a pilot has if anything goes wrong," commented Colonel Turner in recalling the near-tragedy. "Speed races are flown at too low an altitude for a parachute to open. The only way out is to use the terrific speed to pull the plane to a safer altitude and then roll the ship over on her back. For you can't jump from a racing plane. Sitting on the floor, with the cockpit shielded over, you haven't time to stand up. You roll the plane over and fall out."

What does a pilot think about when flying a racing plane? Colonel Turner sup-



Left, Lockheed Low-Wing Monoplane; Bottom, Riggers Covering Racing Plane

plied the answer. "Mostly, he prays that the plane will stay together. Every new racing plane is an experiment and the tremendous speed may tear it apart in the air. Even a minor failure is disastrous. A slower plane can sit down almost anywhere for emergency repairs but racing planes can make a safe landing only on runways that are absolutely smooth.

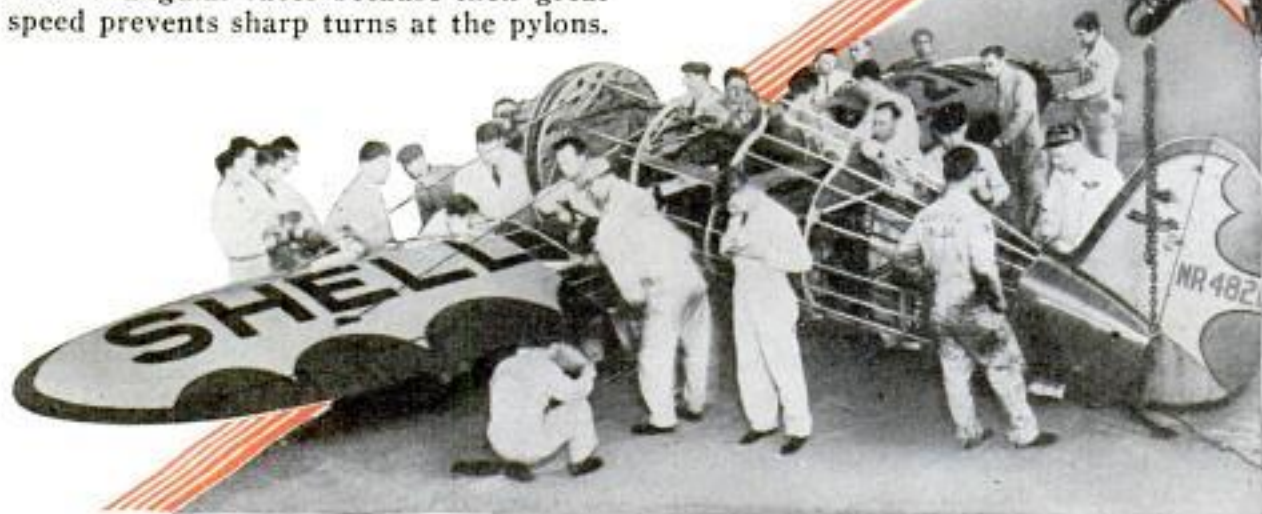
"Also, you hope that no one gets in your way. Visibility from the cowled cockpit is limited and even if you should see a plane coming across your course you are moving so fast that you would be on top of it before you had even a chance to move the controls."

Racing a plane around a closed course in company with other planes calls for delicate judgment and iron nerve. Planes that can fly 300 miles per hour seem slower in triangular races because their great speed prevents sharp turns at the pylons.

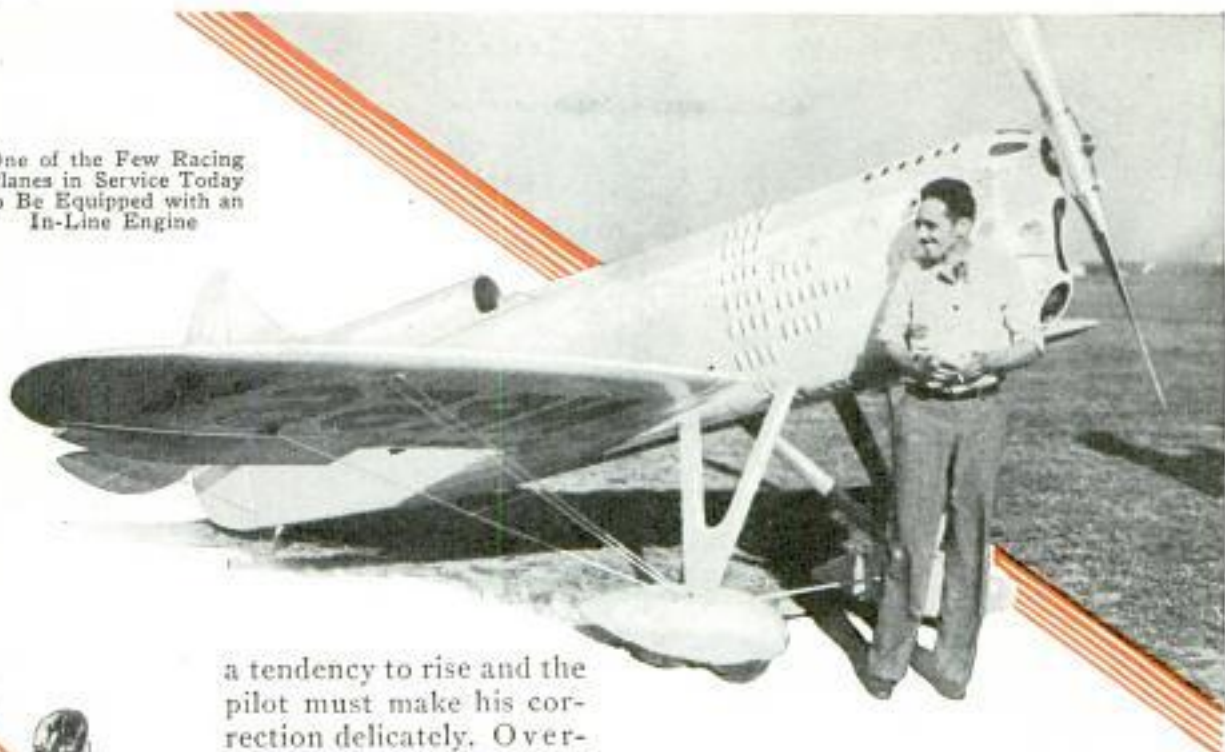
course, the pilot puts his plane in a vertical bank to get around the corner with a minimum of skidding. In this position the controls are reversed and if the pilot should use the rudder instead of the elevator to turn the plane he would fly into the ground. But when he comes out of the bank he must shift back to normal operation. As the plane comes out of the turn it has

The path of a speed plane is more nearly a circle than a triangle. At that, the pilot does his best to cut the corners, for the closer he can stay to the true course the better are his chances of winning.

"The most dangerous parts of a race are at the turns," said Colonel Turner. "Flying with his left wing dropped toward the



One of the Few Racing  
Planes in Service Today  
to Be Equipped with an  
In-Line Engine



a tendency to rise and the pilot must make his correction delicately. Overcontrolling would dive the ship to the earth.

"Traffic congestion at 300 miles an hour sounds like a nightmare but that's what happens in a race. The jams occur mostly at the turning pylons, where a plane going into a turn is apt to overtake a slower plane that has

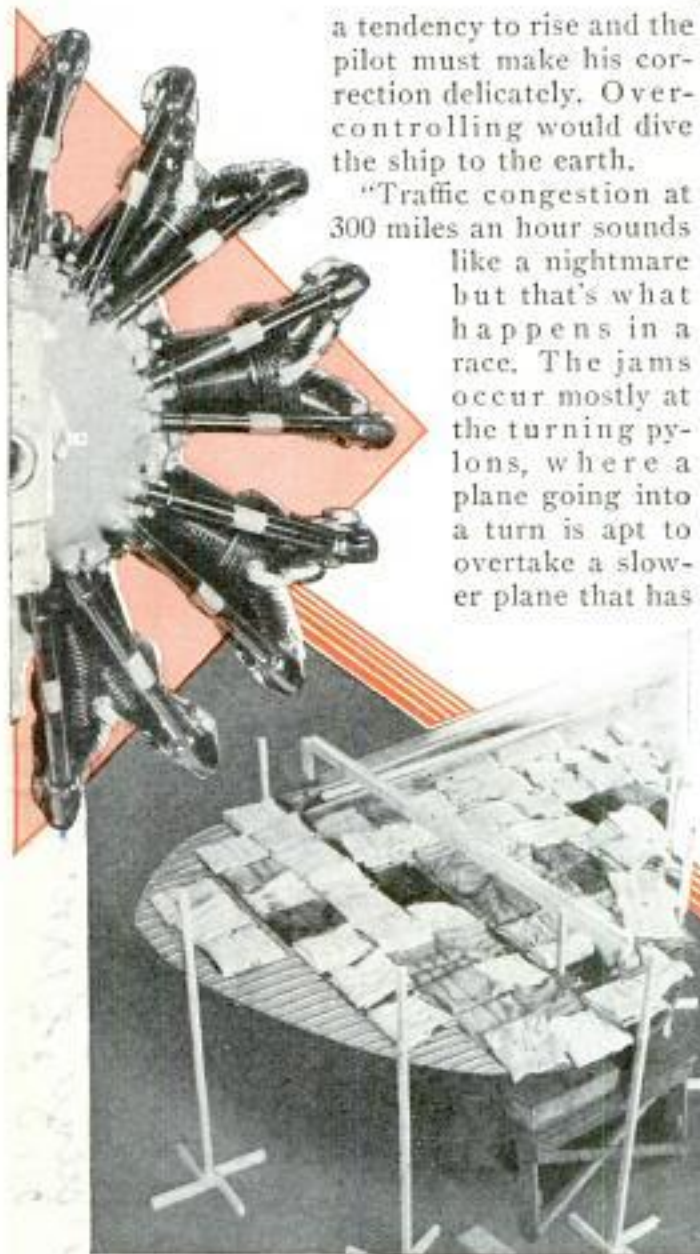
banked over on its side. At such a time a split second is all a pilot has in which to pull clear. In last year's Thompson trophy race I happened to look back just as I was making a turn. A few feet behind me and overtaking my plane was Major Doolittle's bumblebee! He pulled up over me just in time to miss a collision.

"The great speed of a racing plane gives a pilot pretty good control but it increases his discomfort. A passenger in a transport plane feels a slight bump now and then as the plane hits a change of air. A racing plane hits the same current so hard that the pilot gets a bad jolt. It's exactly like traveling across rough water in a fast speed boat. That's one of the reasons why we try to avoid bad weather in making a coast-to-coast dash. A speed flyer is slammed all over the sky in a storm."

Until recently, creating a new record-

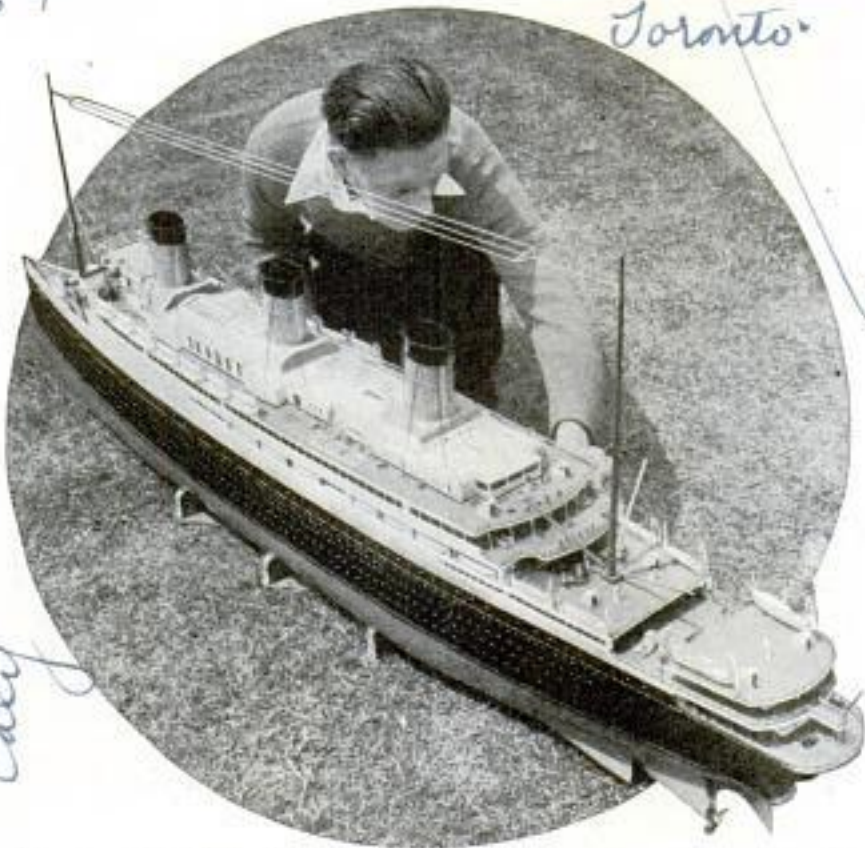
(Continued to page 123A)

Center, 300-Horsepower Pratt  
and Whitney Wasp Engine;  
Below, Weight Test to De-  
termine Strength of Control  
Surfaces



Dept. of Commerce Memo 5/26/33  
Report from Asst. Trade  
Commissioner A. J. Peterson  
Toronto

by Harry Windsor, Chingwood  
C 66 4  
Caly



Constructed to Scale, This Miniature Ocean Liner Even Has a Complete Wireless Aerial; It Is a Model of the Steamship "Majestic"

### SHIP MODEL MADE OF SCRAPS HAS WORKING PARTS

Constructed of cans, shoe eyelets, parts of alarm clocks, piano wire, pins and other odds and ends, a scale model of the S. S. "Majestic" has machinery that operates anchors, booms, windows and lifeboat launching devices. The model, declared by experts to be one of the finest of its kind, is seven feet long with a twelve-inch beam.

transportation facilities, but much of the prospecting work in recent years has been in areas accessible only by air. A number of claims, far from roads, have proved promising in preliminary tests.

tion attachment plug and receptacle. This is inserted in the receptacle feeding the refrigerator and the refrigerator is plugged into the other portion of the combination attachment.

### GOLD MILLS GO BY AIRPLANE

Portable gold milling units are being carried by airplanes into remote mining areas in Canada to work unproved and undeveloped claims. The units are designed primarily for free milling ores as recovery from complex sulphide ores, also found in Canada, would require more complicated equipment. Most of the Canadian gold output is from established mines well served with

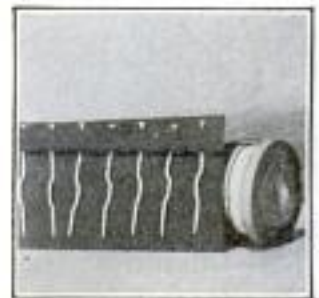
### ELECTRIC CLOCK FOR KITCHEN DEFROSTS REFRIGERATOR



Doing double duty for the busy housewife, an electric clock for the kitchen not only keeps the correct time but defrosts the electric refrigerator automatically as well. The clock operates a switch which turns off the refrigerator for a few hours each night, then switches it on again. It is equipped with a combina-

### PIN WITH CROOK HOLDS BETTER THAN A STRAIGHT ONE

Crooked pins have been found to hold more securely in cloth than the ordinary straight kind. The crook is similar to the hump in a camel's back, and keeps the pin from falling out but does not prevent removal with the fingers. It is also claimed the pin does not cause a sewing-machine needle to jam, since the needle slips around the crook and does not get caught in it.



The smell of paint, disagreeable to some, has been replaced by a pleasant odor in a new quick-drying enamel.

The quick Products Corporation

Ue. Frost Clock  
C 771  
84.95

Bryant Electric Co.  
Bridgeport, Conn.  
844 W. Adams, Chicago

7524 Terrace Drive  
Monte Carlo, Berkeley, Calif.  
French Wolf  
Paint Products Corp  
Bristol, Pa.

George Jones  
5/13/33

Lake,  
near Akron, Ohio

**STANDING STRAIGHT AIDS BODY AS POSTURE EXERCISE** *833*

Straightening up into correct posture many times a day is the best exercise for good posture, the Missouri State Medical association has concluded. According to the modern theory, poor posture is not the result of weak muscles, but the result of acquired improper muscle habits. It follows that trying to correct poor posture by daily and hourly gymnastics to strengthen the muscles is wrong. The way to do it is to correct the faulty muscle habits by assuming the proper posture many times during the day.

Employed at Boise Payette Co. Plant B. Barber, Idaho

**FURNITURE MADE FROM WASTE AT PLANING MILL** *C763*

One planing mill makes a practice of selling all waste pieces and defective boards to employes who in turn work up the good sections of board into ironing boards, smoking stands, tables, bird houses, and even linen and drawer chests. Most such articles are turned out at a cost of only twenty-five or fifty cents for the lumber plus the price of hardware necessary. These cabinetmakers have a wide demand for their products, since the pieces are considered novelties as no attempt is made to conceal the fact that scraps were employed in making them.



Pieces of Furniture and Bric-a-Brac Made from Waste Boards Discarded by Planing Mill

Charles Lee, #21  
Theid St. Barber  
Idaho



Small Broadcasting and Receiving Set on Wheels Used for Communicating with Airship in Flight

**TWO-WAY RADIO ON WHEELS TALKS WITH AIRSHIPS**

Army radio engineers have developed a tiny broadcasting and receiving station on wheels for use in talking with airships in flight. The equipment, mounted on a rubber-tired push cart so it can be moved about the flying field, consists of a five-meter transmitter for voice, and a receiver. The operating range is about fifteen miles. The aerial is a vertical rod extending above the set, and power is provided by a storage battery which operates a motor-generator unit supplying B voltage. The "station" is used mostly for talking with airships approaching or leaving.

Capt. Walter E. Burton, 1032  
Florida Ave. Akron, O

**LEAD MADE SUPER-CONDUCTOR BY LIQUID HELIUM BATH** *C836*

By immersing lead in liquid helium, Prof. A. Goetz and Dr. Alfred B. Focke, of the California Institute of Technology, created a super-conductor. They found that a thirty-foot coil of fine lead wire lost all trace of electrical resistance in the helium bath. The work was conducted at the new laboratory equipped for low-temperature experiments.

Pasadena Calif

Science News  
Letter. 5/6/33

C 814  
184

*Dr. Horner J. Hanna,  
Engineering Dept. State  
College of Washington, Pullman, Wash.*

POPULAR MECHANICS



As Auto Moves Along, Moving Pencils Write the Road's Condition on Paper Shown in Recorder

ROAD ROUGHNESS IS RECORDED ON MOVING PAPER

Rough spots in the road can be recorded by a device attached to the instrument board of an automobile. It is operated by the car's movement and marks a record in pencil on a roll of paper that passes slowly under the instrument. Accumulated mileage and accumulated "roughness" of the road are stamped on the paper every half mile. Up and down movements of the right front wheel cause the pencil to register the roughness, while the speedometer operates the mileage stamp. Landmarks, speed of auto, character of paving, and other data, can be noted by hand on the paper. A high-speed gear on the device makes it possible to record extreme detail, such as individual bumps and holes.

NEWBORN BABY IS SENSITIVE TO WORLD AROUND HIM

That the baby just arrived in this world is sensitive to what is going on around him has been established in experiments conducted by Dorothy R. Disher, of Ohio State University. In tests on sleeping babies, Miss Disher let the subjects smell an odor of definite quality and strength and then measured the activity which fol-

lowed. Moving pictures recorded all the kicks and jerks, puckers of the face and movements of the head. Even very young babies, from one to ten days old, notice the difference between dim and moderately bright illumination and demonstrate that fact by a reduction of activity in the stronger light. LaBerta Weiss, of the Iowa Child Welfare Research station, also reports that the newborn is aware of his surroundings, her findings being based on the results obtained by using a machine called the stabilimeter, which records each little wriggle, squirm and jerk of the tiny body. Exposure to noises ranging from that of the vacuum cleaner to that of a motor truck showed that the babies can differentiate between comparative silence and moderately loud sound.

C 761

TELEPHONE SHUTS OFF RADIO WHEN LIFTED FROM BASE

There is no need to hurry to shut off the radio when the telephone rings if the receiver is equipped with an automatic control operated from the telephone. The control is in the form of an attractive base on which the telephone rests. When the phone is lifted from the base the radio is shut off automatically. It has a twenty-foot wire attachment and can be installed in a few minutes.



Base for Telephone Which Automatically Shuts Off the Radio When Instrument Is Lifted Off

C 812

*alter  
5/12/33  
same*

*Reported to Midwestern  
Psychological Assn.  
at Ames*

*Latham Mfg Co  
333 N. Michigan  
Chicago*

*wa 600 and my*

*made*

*wholesale radio*

*As a Prochtem*

*Allden*

*imp...*

*Columbus  
Ohio*

*Expedition under leadership of Dr Paul Bartsch*

*8-7-78. Birmingham Tank Co. Birmingham Ala*

**POPULAR MECHANICS**

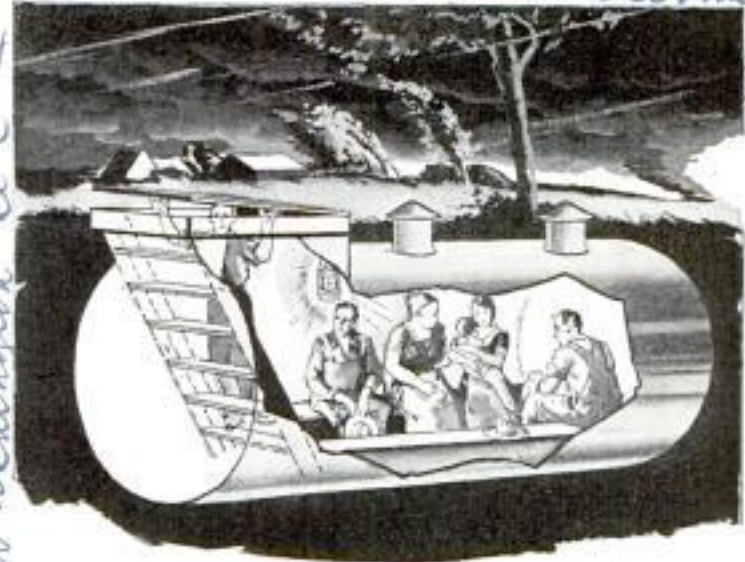
*Curator of Mollusks*

**STRANGE OCEAN ANIMALS ONCE RULED EARTH**

*4/18/33*

*Science News Letter*

Strange animals, called sea lilies, that were once among the dominators of life on the earth, have been taken from the darkness of ocean depths by an expedition of the Smithsonian Institution. Relatives of the starfishes, these creatures have a number of radiating arms that are branched. The animal is attached, bottom side up, to long stalks that anchor them permanently to the bottom. Although the sea lilies are still numerous on the sea floor, their leadership has been taken from them by more advanced and active animals. There are no plants in the great depths at which the sea lily grows, just north of Puerto Rico. No light ever penetrates that region. The whole world of life there consists of animals preying upon other animals, with supplies of carrion plant and animal material drifting down from the sunnier water above. Among the beasts that prey upon living things down there is a species of shrimp with folding razors for claws, very thin eels with daggerlike beaks, and mollusks with shells like corkscrews.



Cross-Section Drawing Shows How Shelter from High Winds Is Provided by Tanklike Storm Cellar Installed Below Ground Level

**STORM CELLAR MADE OF STEEL SHELTERS TWELVE PERSONS**

Twelve persons can find protection from cyclones and other windstorms in a tank-like cellar made of steel. Resembling a hot-water tank but much larger, the cellar is installed in the ground. A waterproof cover closes the entrance.

**ONE-AT-A-TIME SEED PLANTER PROVIDES EVEN SPACING**

*752*

For planting small seeds singly and evenly, a tiny planter like a bottle with the bottom extended to form a hollow glass tube is now being used. The opening in the tube is just large enough to allow the seed to pass through. The package of seeds is emptied into the device and the top is closed with a cork which holds most of the seeds in the upper section of the planter by suction. A slight shake causes a seed to drop into the lower part and pass out into a hole previously made in the soil, only one seed at a time passing through the tube. There are three planters to a set, each having a different size of opening.



*Walter E. Hull, Cox*  
**AUTO COMPASS ON WINDSHIELD HELD BY SUCTION CUP**

*ad 81-25-246 Warren*



Motorists are kept headed in the right direction on strange roads by using an automobile compass which attaches to the windshield by a suction cup. The

instrument is similar to an airplane compass, being of the liquid type with a rotating dial and jeweled pivot. The letter indicating direction of travel appears behind a glass face with a magnifying effect. The compass is sturdily constructed to withstand bumps and road shock.

CA new brickmaking machine pumps air out of the clay and so produces bricks of greater strength and density.

*The Bonnat Co. Canton, Ohio*

*R.P. Cargille, 26 Cortlandt St. New York City*

*Science 2/6 7/37*

C 7 31

Com. Thomas M. Johnson,  
417 W. 118th St. New York

Sent Bernard C. Staff (Brooklyn  
114 Wilson St.) analysis of his  
men

# SEAFARING



Opium-Smoking and Gambling Paraphernalia Seized by Marine Police on Chinese Excursion Boat

**A** CRUSHED, battered boat, drifting helpless. In it, two crumpled, bloody figures. Tragedy of a peaceful Sunday on Jamaica bay.

"Out fishing, and went to sleep," said those who found them. "Speed boat ran into 'em."

But when a hurrying launch brought police, they examined the wrecked boat more carefully.

"Fresh green-paint marks," they said. "There's no fresh-painted green speed boat around here."

They found a green-painted craft—not a speed boat, but an amphibian plane! They towed the plane to their floating repair shop and laboratory on Randall's island in the Harlem river. They tested, chemically, paint scrapings from the amphibian and the smashed boat. They were the same. So they charged the pilot with being New York's first hit-and-fly driver. One of his victims was dead, the other maimed for life.

Down he had swooped upon them, struck the water near by, then taxied straight into their craft—so frail the pilot thought he had only bumped a log. But the green-paint marks told the story to the seafaring cops who police New York's harbors.

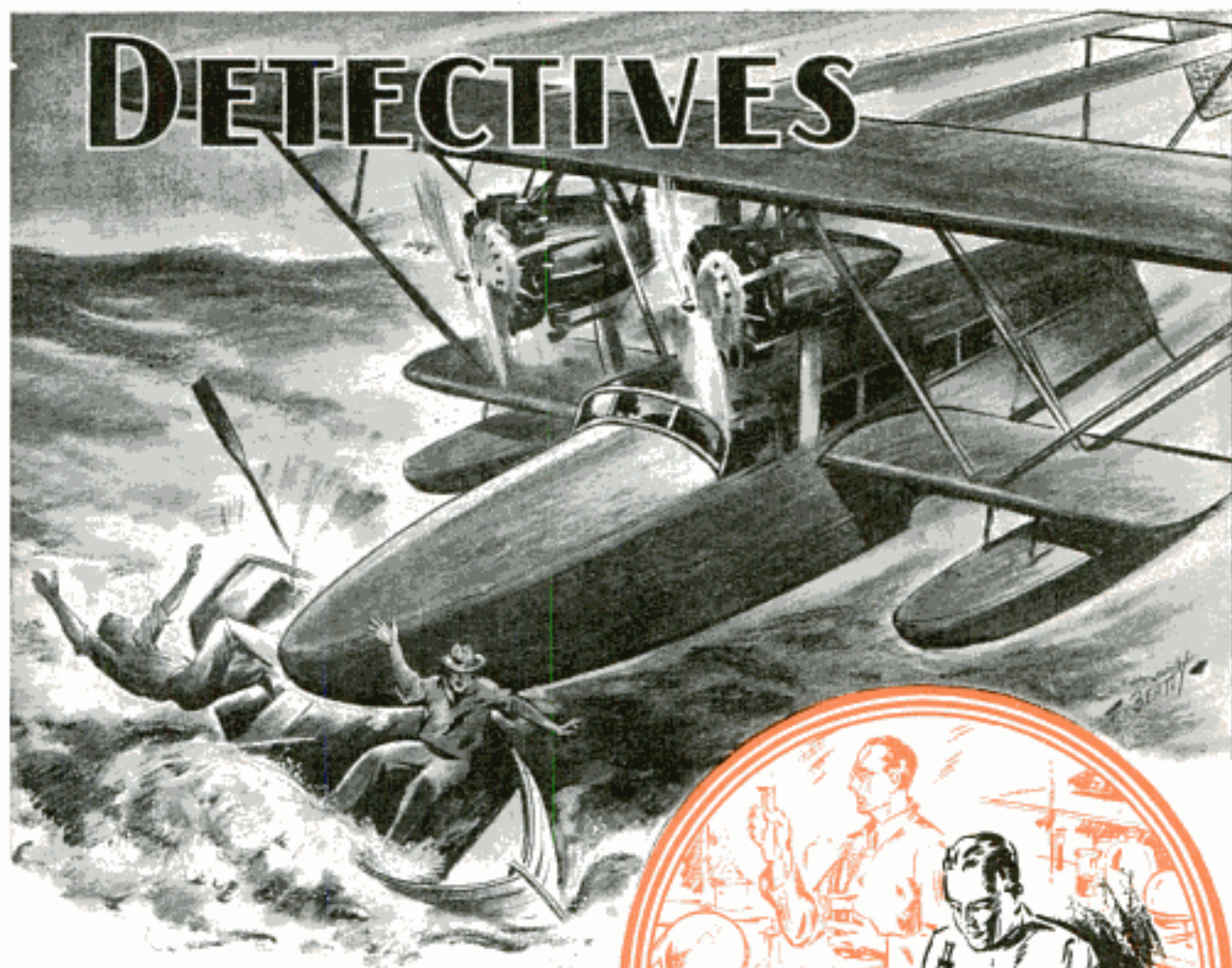
Their task demands not only skill, but courage. Not so long ago, rumrunning speed boats sneaked through the Narrows and delivered goods at Manhattan piers.



Latest Type of Police Launch: It Has a One-Man Control, Is Exceptionally Strong and Cost \$23,000



# DETECTIVES



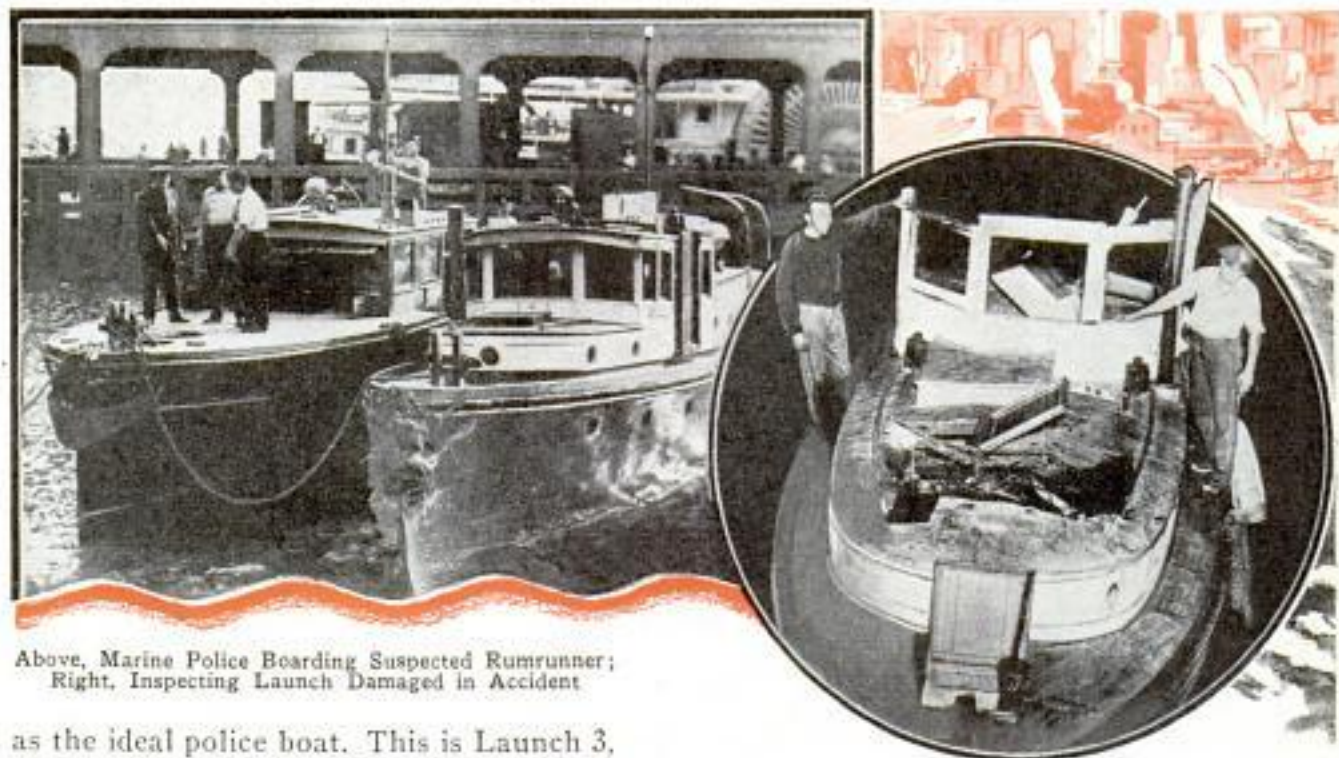
Laboratory Paint Tests Told the Police a Boat Accident Had Been Caused by an Amphibian Plane

One caught the eyes of two patrolmen aboard the swift "Gypsy," and a stern chase began. The rumrunner scooted up the Hudson, thronged with ferryboats, barges and an occasional liner. The police boat zipped hard after, firing a fusillade of shots to which the bootleggers replied. Finally the two boats raced neck and neck and the policemen sprang across the slit of foaming water between. They landed on the rumrunner's deck—and slid its full length. The deck was greased, to foil boarding parties. But the policemen, pistols ready, pushed into the suffocating engine room. Two men in gas masks threw up their hands, but a third looked ugly. An officer fired one shot, just close enough to send his hands up, too. Lucky, for it was his last shot—and his partner's, too.

The only bootleggers in New York harbor now are the pikers who row beneath piers, passing a few bottles up through hatchways to taxicab drivers, but the sea-

faring cops lead a busy life on the waters touching the 500-mile shore line of the world's busiest harbor, with its 800 piers and terminals. Some of these waters are the Atlantic ocean, so Capt. Henry Malley's 158 officers and men are indeed "seafaring cops"—including many former sailors and licensed pilots.

They scour the waters from Spuyten Duyvil to Raritan bay or Coney island in ten launches, flying a flag of police green. The newest boat was especially designed



Above, Marine Police Boarding Suspected Rumrunner; Right, Inspecting Launch Damaged in Accident

as the ideal police boat. This is Launch 3, forty-eight feet six inches long, eleven feet six inches beam, with two 150-horsepower engines capable of nineteen miles an hour, a one-man control, two fire-extinguishing systems, one controlled from the pilot house, an armament of sub-machine guns, forty-four rifles, gas and smoke grenades and grappling irons. Experiments are afoot to install radio on police boats, as on squad cars.

Police boats get rough usage, and some are always laid up at the unique repair shop at Randall's island, part of which is afloat and can be towed to water-front strikes or riots. Here mechanics work on police launches, and on all boats confiscated within city waters, which are auctioned annually. Ingeniously, they have rigged a sand blast to clean spark plugs, found ways to put in intermediate shafts to save as much as possible of the old, and are now installing, in every boat, a flexible brass hose for filling gasoline tanks without risking explosions. Besides overhaul work, they must make emergency repairs.

Harbor waters may be more perilous than ocean, what with shoals, hidden cables and submerged pipes. A pipe wrecked a launch recently, injuring all three men aboard. Luckily a sergeant had strength and wit to use his outspread coat as sail and get inshore. There two other police launches found her, helpless. The only way to bring her in was by "cradling" her upon

lines passed beneath her hull, from one rescuing launch to the other. This was working well, when suddenly smoke came from the craft. She had caught fire, a mile from shore, with 150 gallons of gasoline aboard—and hundreds more aboard the two rescuers! The cops averted a sea tragedy by leaping aboard and putting out the fire.

The horror of fire at sea is intensified by incendiarism. A lighter fire looked suspicious, then a bomb explosion in Fulton market. There were thefts of explosives from barges. The marine division arrested two suspects who had tossed a bomb overboard. They had checked a large supply of explosives in a storage slot machine in the subway and they planned to blow up a whole fleet of lighters for a "boatmen's union."

The police are trained to see trouble upon the waters. For instance, a fishing boat slipping past Rockaway point at dusk, with nobody aboard. Why? A police launch went to see. Nobody on deck, but below, lying down, packed like sardines, thirty-three Italians, fresh from Italy, all without passports. One police launch went to shore and its men gobbled chauffeurs of a fleet of taxicabs waiting to drive the newcomers to a prearranged refuge. They also arrested the ringleader, who spent two years in Atlanta. As a result a large



Top, Drawing Showing Harbor Police Boarding a Fleeing Craft;  
Below, Liquor Cargo Seized by Marine Police

alien-smuggling syndicate was broken up.

Collisions seem to the landlubber visiting New York harbor a constant threat, with the constant to-and-fro movement of all manner of craft. The most dangerous collision of recent years was between the "Fort Victoria" and the "Algonquin," each bearing several hundred passengers. Luckily, all were saved by near-by pilot boats and police launches. In fact, New York harbor has only about one collision every two months, and of these only one a year is serious. That is because the noisy tooting of whistles and sirens is not so aimless as it sounds. Mostly, it is pilots talking to

one another. The marine division worries less over collisions than over "junkies." Dingy, coughing, they thread the harbor waters, buying and selling at piers and boats the same sort of thing as ashore. The junkie is often a "fence" afloat, constantly watched by police launches.

When a big transatlantic liner comes in, it is boarded at quarantine by marine division detectives. Sometimes they are looking for celebrated international crooks, or diamond smugglers, who are usually expected. Or perhaps a gambler has been making a clean-up and the captain has radioed ahead.

It will be deduced that a policeman's "life on the ocean wave" is varied. There is about one dead body a day, and when it is in a trunk or a bag, there is a new murder mystery.

Many rescues also are made by the police. "Remember this one thing," says Captain Malley, "when in distress, never mind trying to get back where you came from. Make shore at the nearest safe place. That would prevent many drownings."

C 747

Dr. Duncan Mac Donald

~~Anthony Wayne Hotel~~

POPULAR MECHANICS

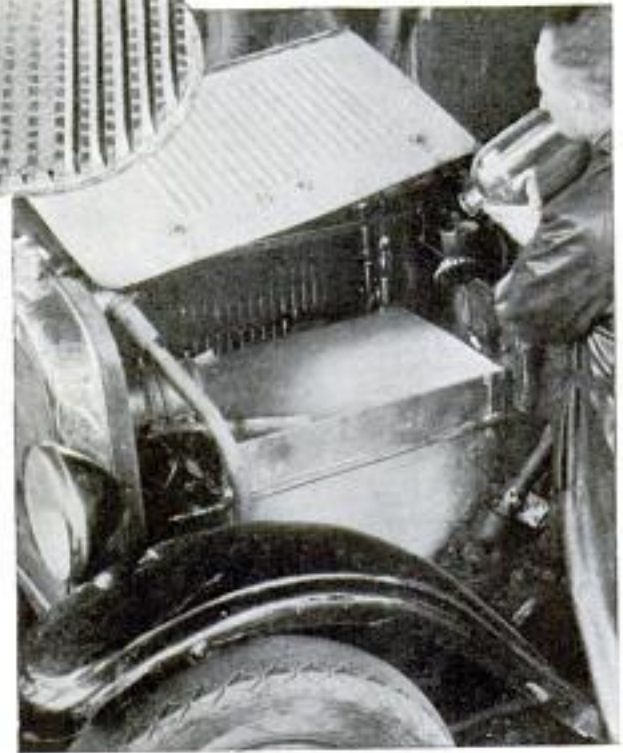
Dearfield, Akron, Ohio

# Steam Engine for Auto Burns Furnace Oil



Steam-Driven Power Unit for Auto; Pictured Are the Blower, and Burner Which Uses Oil Fuel

burner is started by turning on the blower unit and pressing a button operating a spark coil used for igniting the vaporized oil. Feeding of oil to the burner is controlled by a thermostat, and the flow of liquid to the generator is regulated by an automatic pressure device. The liquid used for generating steam has several advan-



Furnace oil is used for fuel in a gearless, steam-driven power unit recently developed for installation on standard motor cars equipped with ordinary gasoline engines. The unit consists of the steam generator and a four-cylinder steam engine connected directly to the rear wheels. In place of the usual gasoline engine under the hood is the generator of about the same size. It consists of an inclosed box having, at the top, an oil burner forcing a hot flame down against the generator coils of stainless-steel tubing. Generation of steam is almost instantaneous, the pressure being near 1,000 pounds per square inch, but since only a small amount of vapor is present at any one time in the tubes, it is claimed a disastrous explosion is impossible. The furnace oil is vaporized by a carburetor and then mixed with air by a blower unit before being fed into the burner, which looks like a honeycomb with hundreds of narrow openings. Steam is fed to the engine located under the rear of the car, completely inclosed and running in a bath of oil. Two of its cylinders operate a two-throw crankshaft connected to the driving axle of one rear wheel. The other two cylinders are connected to the other rear wheel. Because each wheel operates independently, no complicated differential equipment is required. The engine, rated at twenty horsepower for tax purposes, develops more than 100 for the small car unit. The car is controlled by a throttle operated by hand or foot. In place of a clutch pedal, there is a reverse. The

tages over water. Its boiling point is 160 degrees instead of 212 for water, oxygen and boiler scale are eliminated by its use, and it will not freeze and burst the tubes. The steam power units are designed to replace existing engines, clutch and gear assemblies, rear axles and other parts of several makes of cars without drilling holes or cutting metal. The standard radiator of the coil is used for condensing steam returning from the engine.

## SEA GARBAGE AS SOURCE OF OIL REVEALED BY STUDY

That petroleum, now one of the principal wealths, was originally garbage is revealed by Dr. Parker D. Trask, of the United States geological survey after an extensive study. Modern and ancient sea-

Washington, U. S.

Copyrighted material

Letter 7/17/30 respect & about operations in very short time

Letter 5/27/33  
D. C. Mac

at meeting of American  
Petroleum Institute

POPULAR MECHANICS

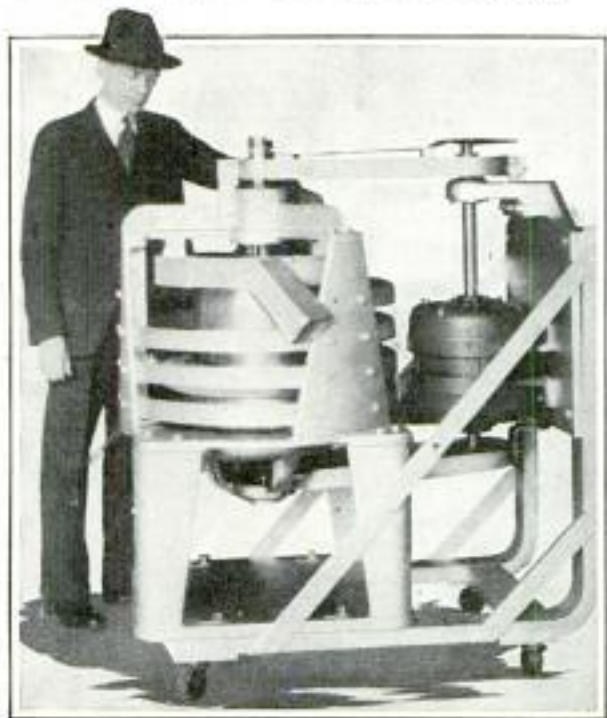
C 755  
Cmt. Jack Ceynar  
5732 Carrollton Ave  
Indianapolis  
Inda

bottom deposits were examined during the research intended to gather more information about how petroleum was formed, so that oil seekers might have a better idea of what kinds of geological formations are likely to yield paying results. Doctor Trask found that oil comes from offal from the endless complex banquet of the sea that not even bacteria in the bottom slime would eat. Fine-grained beds were found to contain more organic matter than coarse-grained, clay more than silt and silt more than sand.

C 741

**WATER FROZEN OUT OF FRUITS TO CONCENTRATE JUICES**

Concentration of fruit juices, beverages, liquid coffee, medicines and milk is simplified by a centrifugal device that removes water in the form of ice, leaving the solids, flavors and even the aroma. The device consists of an electric motor and a separator, something like a cream separator. The dilute juice or liquid enters the machine and is thrown into a thin sheet in the centrifuge. A gas at freezing temperature is forced against this sheet of liquid, causing the water to freeze. The rapidly revolving blades of the centrifuge throw the ice from the machine through a spout in the form of snow, while the concentrated liquid flows out the bottom.



Water Removed from Fruit Juices Is Ejected in Form of Snow from Chute Near Top

Low Temperature  
Processing Co. Cleveland  
4108 Clark Ave. Ohio



Top, Racing Driver Wears Headphones; Bottom, Two-Way Radio in Car for Talking to Pits

**TWO-WAY RADIO FOR RACE CAR SAVES TIME AT PITS**

Two-way short-wave radio communication was used this year at the Indianapolis races between one of the racing autos and the pits. By use of the radio the driver and his mechanic kept in constant touch with the pits, receiving orders instead of signals or signs and transmitting information on driving conditions. The driver wore a helmet containing earphones such as is used by the aviator. The radio installation took up little space and added little to the weight, and the saving in time at the pits more than compensated for such disadvantages.

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

used by Chester Boardman  
Chas. Alden Sampson car

c 400  
192

Appleton Electric Co  
1701 Wellington Ave  
POPULAR MECHANICS  
Chicago



This Convenient Stand Provides Illumination for Auto-  
Repair Work; It Can Be Adjusted Easily

### PORTABLE LIGHT FOR GARAGES AIDS REPAIR MEN

Repair work in garages can be speeded up by using a portable lamp stand that provides efficient illumination for the workman and mechanic. A reel in the lamp base holds fifteen feet of rubber-sheathed flexible cord. Slack in the cord is pulled back onto the reel automatically, so there will be no coils on the floor to trip over. In addition, the stand has a separate outlet on the upper part for plugging in portable electrical tools. The lamp reflector is at the end of a flexible arm that can throw the light where needed. This arm is attached to a rod which can be raised or lowered in the stand.

### LOW AUTO SPEEDS SAVE FUEL IN ECONOMY TESTS

It's cheaper to drive slow, between twenty and forty miles per hour, experts have found in carburetor tests. According to their findings, a gallon of gasoline that produces twenty miles at a speed of twenty miles per hour may deliver only seven miles at seventy miles per hour. At speeds

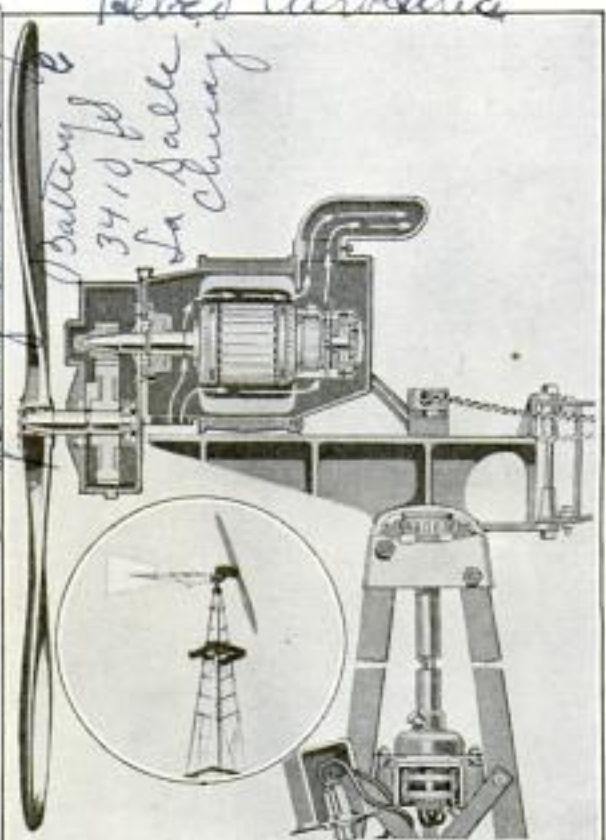
from twenty to forty, the decrease in mileage is only two miles to the gallon, but grows rapidly at higher speeds. At fifty miles per hour, tests showed fifteen miles per gallon and at sixty, only twelve and six-tenths miles.

C 428

### WIND SUPPLIES FARM POWER BY CHARGING BATTERY

Sufficient electricity for operating farm machines is generated by a wind-driven power plant that requires little attention. The plant is automatic. A battery connected to the power line acts as a reservoir for surplus current, assuring a level operating voltage in high or low winds. The generator is of the type that produces maximum electricity at low speeds. It is protected from the weather. A wooden propeller, shaped in accordance with approved air-foil principles, is guarded from damage by severe storms by tension control. This device controls the plant, automatically, in any wind. Towers of steel, forty to 100 feet high, can be obtained for mounting the propeller and generator in a position where wind conditions are most favorable.

Complete taken over by Universal



Cross-Section View of Wind-Driven Power Plant; In-  
set, Propeller in Place on Top of Tower

Com. Leon Black of  
United Air Lines, United  
Airport, Burbank, Calif.

Herbert & Buckler Corp  
Elkhart, Ind.

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Mrs Peyton Ross  
and J. W. Beard

(Owner. Samuel B. Jones Jr.)  
Marblehead

**MAGNET PULLS LIVING CELLS FROM VEINS FOR STUDY**

Pulling blood cells out of the veins with a magnet is the method devised by scientists of the Rockefeller Institute who wanted to study a particular group. The cells are very active scavengers that quickly and thoroughly purge the blood of foreign matter by consuming it. To lift these cells out for study, the scientists injected iron into the blood, in the form of highly magnetic iron oxide. The cells at once ate the iron, becoming highly attractive to a magnet. The group was loosened from their location in the liver by massage and a stream of fluid, then were separated from other elements and pulled out by the electromagnet, like so many iron filings. Washed and released into a culture medium, the cells are studied directly.

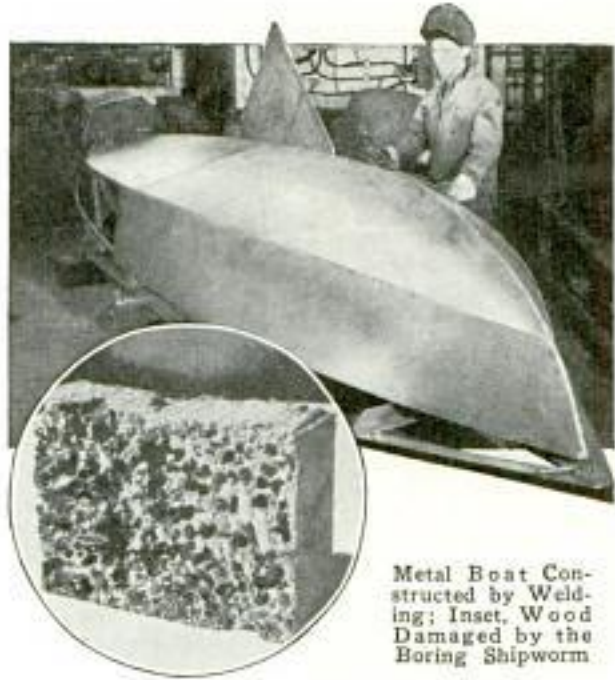
**GOLF CUP HAS SAND CONTAINER FOR EASY CLEANING**

Designed especially for sand greens, a new golf cup has an inner container to receive sand that gets into the cup. A holder for the flag also is provided. A deep groove around the cup forms a resting place for the lip of the container, forcing all sand to enter the container. When full, the container can be removed by a small ring and chain, simplifying cleaning the cup.



**SAILBOAT OF WELDED METAL RESISTS SHIPWORM**

Constructed of iron plates welded together, a metal sailboat is safe from attack by the destructive shipworm, or teredo navalis. Up and down the seaboard, this pest has its hunting grounds, boring through wood for shelter from which its soft, tenuous siphons extend into the water, one forming an inlet for food and the other an outlet for excretions and wood particles from the holes it digs. Even the hardest woods are successfully attacked by the teredo. Its tunnels range from five

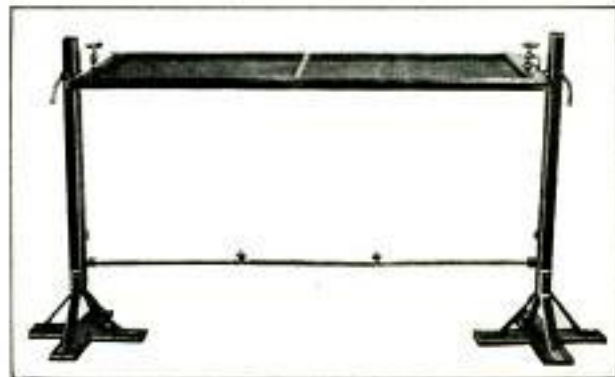


Metal Boat Constructed by Welding; Inset, Wood Damaged by the Boring Shipworm

inches to five feet in length with a diameter of slightly more than one inch. Soon the wood is perforated until it is in honeycomb condition and useless. All craft with wooden bottoms are exposed to this menace. The metal sailboat, invented by Robert W. Rose, is built of sixteen-gauge plates, with a quarter-inch plate rudder and centerboard. Iron pontoons help to lift the sixteen-foot craft in rough seas.

**FRAME FOR PAINTING SCREENS SPEEDS UP WORK**

Storm windows, screens and screen doors can be painted more rapidly and efficiently by using a revolving rack. When one side has been painted, handles on the supporting frame are loosened, permitting the screen to turn into position for painting the other side. Clamps hold the door or window in the frame.



One Position of Door in Rack; Painting or Other Work Is Facilitated by This Frame

Chas. Charles Allen  
2618 - 14th Ave  
Moline, Ill.

Science News Letter  
4/29/33  
Ray Meesehon, Route 5, Box 45,  
Mushogeeville

Marblehead Boat Co  
Marblehead, Mass



# Secret Voice for WAR or

**T**RANSMISSION of secret messages in time of war, between divisions of the army or the navy, is within the grasp of scientists who have been experimenting with the ultra-short waves of radio. This development also may be used for privacy in commercial conversations.

Any wave less than seven meters long is considered ultra-short. Next is the short wave, seven to 200 meters, used by police and amateurs, then the broadcast band and finally waves as long as 20,000 meters.

After transmission, short waves are re-

flected back and forth between the earth and the "Heaviside layer" which hangs like a giant reflector, miles high in the sky. Ultra-short waves do not follow the curvature of the earth, nor do they bounce back after striking the Heaviside reflector. Instead, they "jump the track" like a runaway locomotive at the first curve, leaving the earth entirely and shooting off into space, no one knows where.

For that reason, the ultra-short waves must be aimed at a receiver in a direct line with the transmitting station. This can be done because the waves are projected in narrow beams like a searchlight. Costly directive antenna is unnecessary, only insignificant power is required and atmospheric noises are not disturbing to these waves.

"Beam-casting," the name given this development, is the sending of conversation or music through space on a tiny, invisible





# PEACE

beam. Practical equipment for demonstration purposes has been constructed by the Westinghouse Electric and Manufacturing company, under the direction of I. E. Mourmontseff, research engineer. Transmission is done on a wavelength of nine centimeters, nine hundredths of a meter, only a fraction of lowest wavelength used by amateur operators.

In beam-casting, the sender focuses the invisible waves upon a parabolic mirror which concentrates the rays into a long, narrow beam diverging only a few degrees and having almost parallel rays. In the receiver, a similar parabolic mirror gathers in the "beam" and focuses its rays on a tiny aerial less than two inches long.

Since the rays travel only in a straight line, the range is limited by the horizon, but the reach may be increased if the

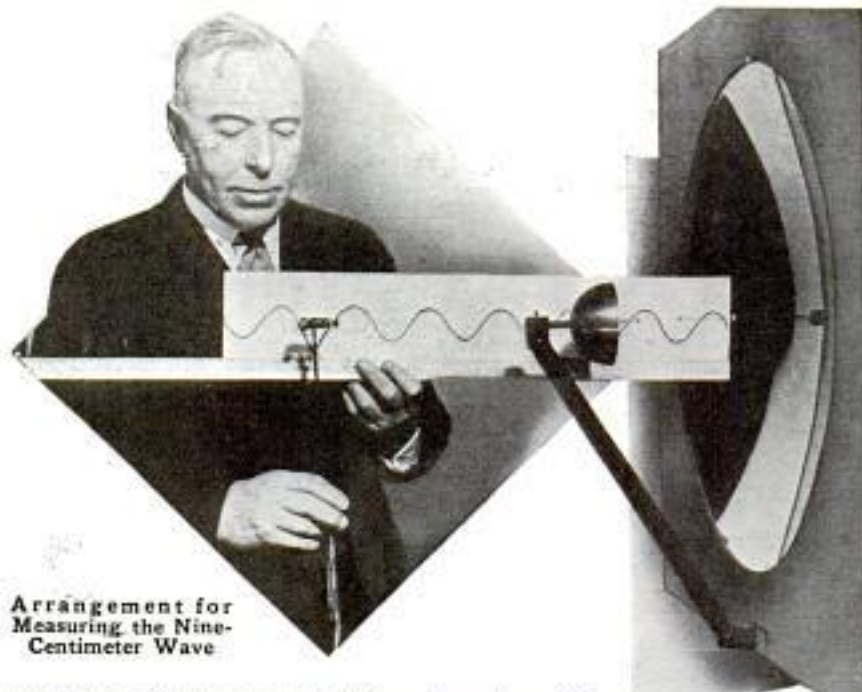


Top, Drawing of Possible War-Time Scene Showing "Beam-Casting" Station; Inset, How Ultra-Short Waves Fly into Space, Never Returning to Earth

transmitter or the receiver, or both, be raised above the ground, the higher the better. Therefore, the tops of high buildings, towers, hill tops or an elevated sea-shore are most suitable locations for beam-casting stations. Houses, trees and other intervening objects between a transmitting and receiving station can absorb and dissipate energy of the waves and, therefore, must be avoided.

The Westinghouse equipment has been successfully tested between points more than a mile apart, and the company's research engineers say there is every indication that it can be used effectively be-

*East Pittsburgh, Pa*



Arrangement for Measuring the Nine-Centimeter Wave

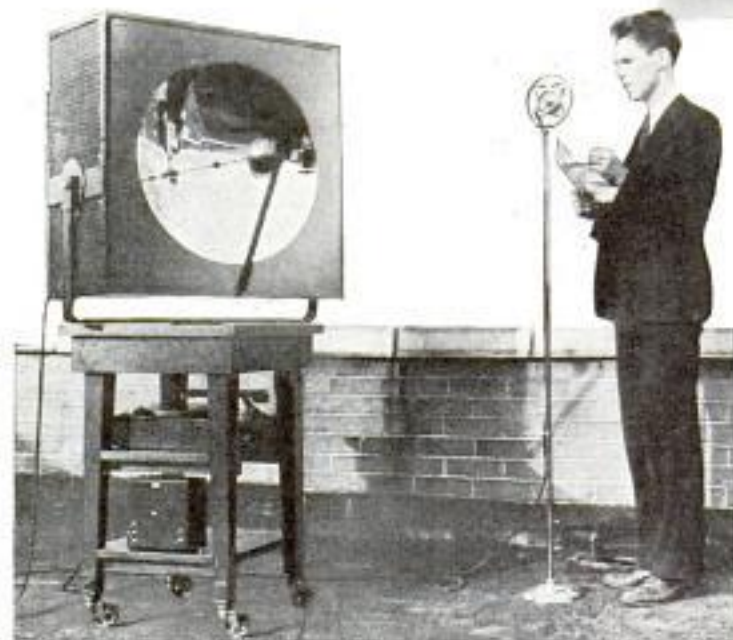
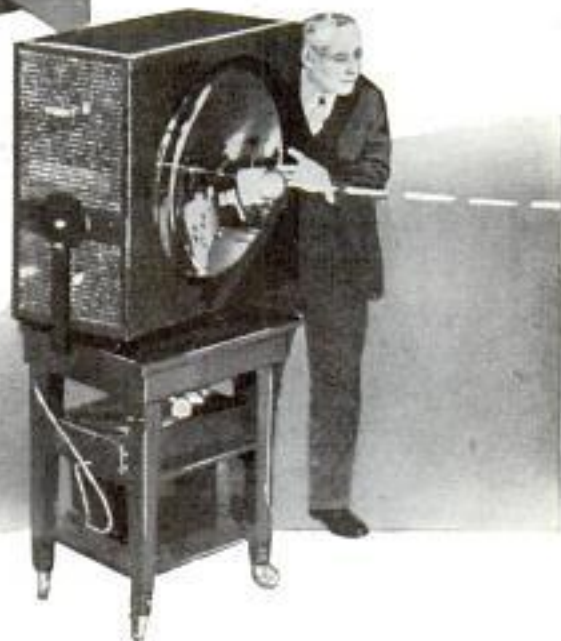
into receivers hidden from the enemy.

The beam-caster has many advantages over light signals, allowing voice and sound communication, use day or night, and penetration of fog, mist, rain and similar atmospheric obstacles. Over regular radio waves, the ultra-short has the advantage of requiring only simple, portable transmitting and receiving equipment, which could be easily adapted to use on the battlefield and in numerous cases of

tween points separated by twenty miles or more.

Thus, an army equipped with portable towers might set up a beam transmitter on top of one with the receiver atop another tower perhaps ten miles away. Orders could be flashed to the front lines with all secrecy by shooting them along the ultra-short beam.

Like light waves, the nine-centimeter waves can be reflected by any flat material placed directly in their path, so metallic reflectors could be used to catch the army's secret messages and deflect them



Here Is Transmitting Apparatus; Song or Speech Enters Microphone and Is Converted into Invisible Waves for "Beam-Casting"

sea and air navigation. One feature of the Westinghouse equipment is direct measurement of the wavelength. A metal sheet, placed in front of the transmitter, combines the direct and reflected waves into standing waves so that the measurement can be made with a metric rule.

In the short-wave field, Karl G. Jansky, of the Bell Telephone laboratories, has been seeking to solve the mystery of static. From his research on a 14.6-meter wavelength has been developed a system for recording the direction of arrival and intensity of static. It

963 West St  
New York



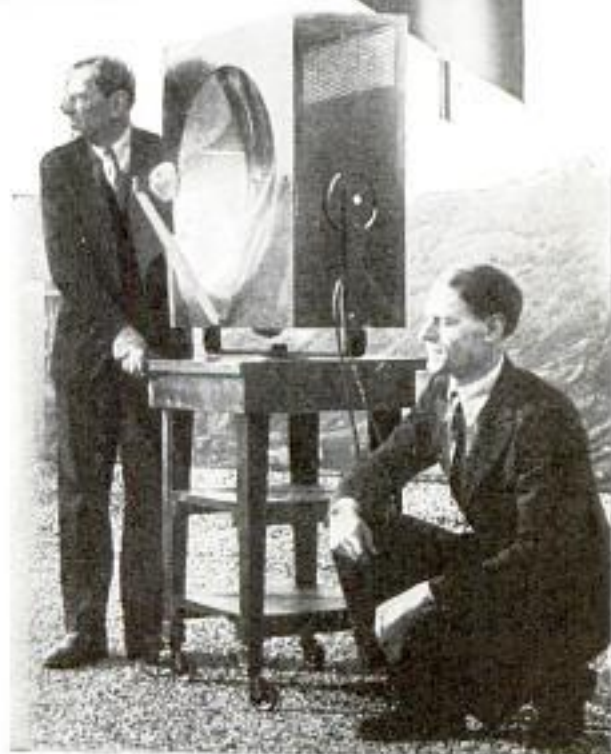
Top, Rotating Directional Antenna Used by Karl Jansky in Seeking Causes of Static Interfering with Short-Wave Communication; Right, Mr. Jansky Listening in as Static Recorder Operates on 14.6-Meter Wavelength



consists of a rotating directional-antenna layout, a double-detection receiver and an energy-operated automatic recorder. The presence of three separate groups of static is revealed by the system; static from local thunderstorms, static from distant thunderstorms and a steady hiss-type static that seems to come from the direction of the sun.

In addition to communication, ultra-short wave investigators also seek to signal the approach of icebergs and to project radio paths for aviators. Ultra-short waves also are being used in high-frequency machines to combat disease.

Beyond the latest achievements in short and ultra-short wave fields lies another goal, transmission of power by radio. Perhaps, sometime, that will come, say the experimenters.



Center, Ultra-Short Wave Reflected by Metal Sheet; Bottom, Receiver for Nine-Centimeter "Beam"

C. Lorber, 2358 Walnut,  
 Louisville, Ky  
 POPULAR MECHANICS

198

2633

E.

various patents 10e



Top, Drawing with Aid of Grooved Chart; Bottom, Chart and Tracing Paper

**GROOVED CHARTS TEACH CHILD TO WRITE AND DRAW**

Teaching the child to write and draw is being speeded up by grooved charts that make tracing easier. The grooves guide the child's hands without cramping the fingers. Letters of alphabet and outlines of animals are supplied in the grooved chart books, along with tracing sheets.

**EXPERIMENTS REVEAL CURIOUS THINGS ABOUT GLASS**

2853

Experiments that any one may conduct will reveal many curious things about glass. Brittle and breakable, glass exceeds almost all other materials in elasticity. If two glass balls are made to strike each other at a given force, the recoil will be nearly equal to the original impetus, due to their elastic qualities. If the hole in a hol-

low sphere is tightly closed with the finger, the sphere will fly to pieces because of the expansion of the internal air from the heat of the hand. Vessels made of glass that have been suddenly cooled possess the curious property of being able to resist hard blows on the outside, but collapse when a small particle of flint is dropped inside. This property seems to depend upon the comparative thickness of the bottom, the thicker the bottom, the more certainty of breakage by this experiment. Some of these vessels resist the stroke of a mallet, yet are shattered by a flint the size of a pea falling from a height of three inches.

**VALUABLE BOOKS ARE GASSED TO DESTROY WORMS**

B1996

The destructive bookworm, nemesis of libraries and private collectors of valuable editions, now is doomed to death in a gas chamber. A method of dealing with the pests has been developed by a California library which is in no way injurious to the books themselves. Volumes to be treated are placed in a large airtight tank, from which the air is pumped and then replaced by a lethal gas, odorless and colorless. The high vacuum draws the gas through the books, completely exterminating the worms and larvæ. Apparatus based upon this principle is to be installed in the Vatican library at Rome to protect the rare old volumes there.

Huntington Library



Rolling a Case of Books into an Airtight Tank Where They Are Treated with Poisonous Gas to Destroy Bookworms

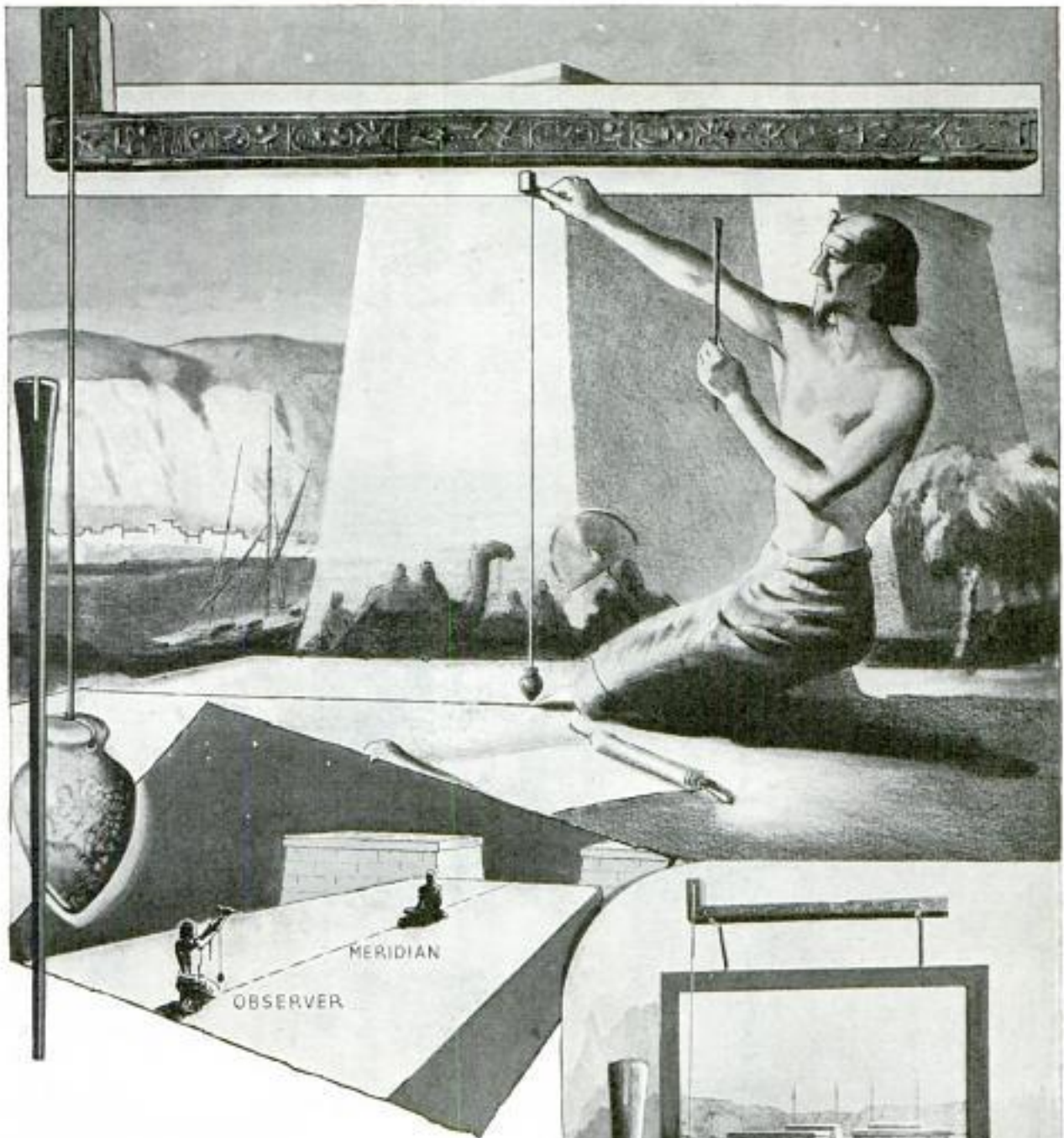
terminal and Warehouse Co.  
 444 W. Broadway  
 similar with dome by

Cml. Kenneth P. Wood.  
 110 N. 49 St.  
 Phila

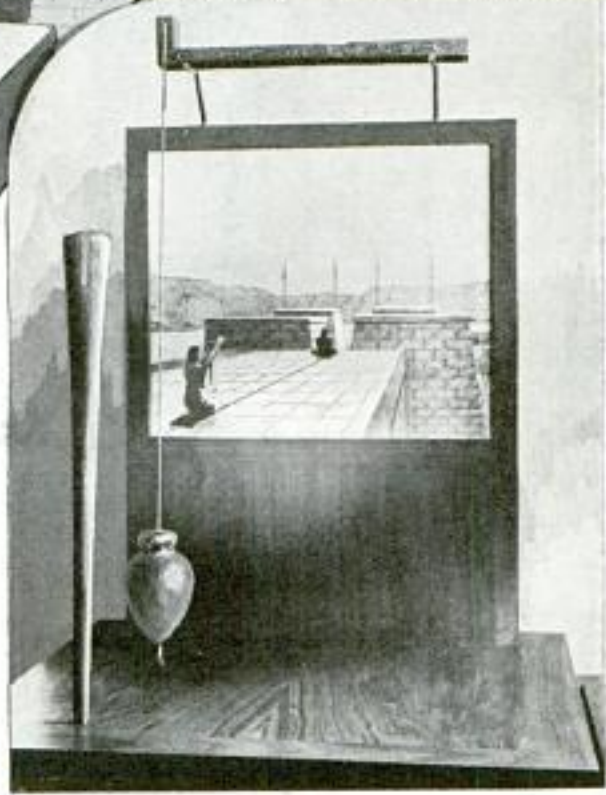
San Marcos  
 Calif.

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# Clock for Studying Stars Made by King Tut



**ENABLING** the observer to determine when a certain star crossed his meridian, illustrated at bottom, left, an astronomical instrument made by King Tutenkhamon is on display at the Oriental Institute of the University of Chicago. Of the device, made by King Tutenkhamon to replace one damaged by robbers of the tomb of his ancestor, Thutmose the Fourth, only the essential piece, the handle, to which a plummet was attached, exists. The handle, shown at top, is of ebony and bears on its two edges inscriptions stating that it was made "with his two hands," by Tutenkhamon, "restoring monuments for his ancestor Thutmose IV." Restored for exhibition, shown at bottom, right, the instrument consists of the handle, to which a plummet is attached by a plumb line, and a sighting device. The plummet was employed in setting the sighting instrument directly over the observer's meridian, presumably a north-and-south line marked on the pavement or on a flat temple roof. The tomb of Thutmose, plundered about 1350 B. C., was robbed again after the restoration by Tutenkhamon and the history of the instrument is unknown.



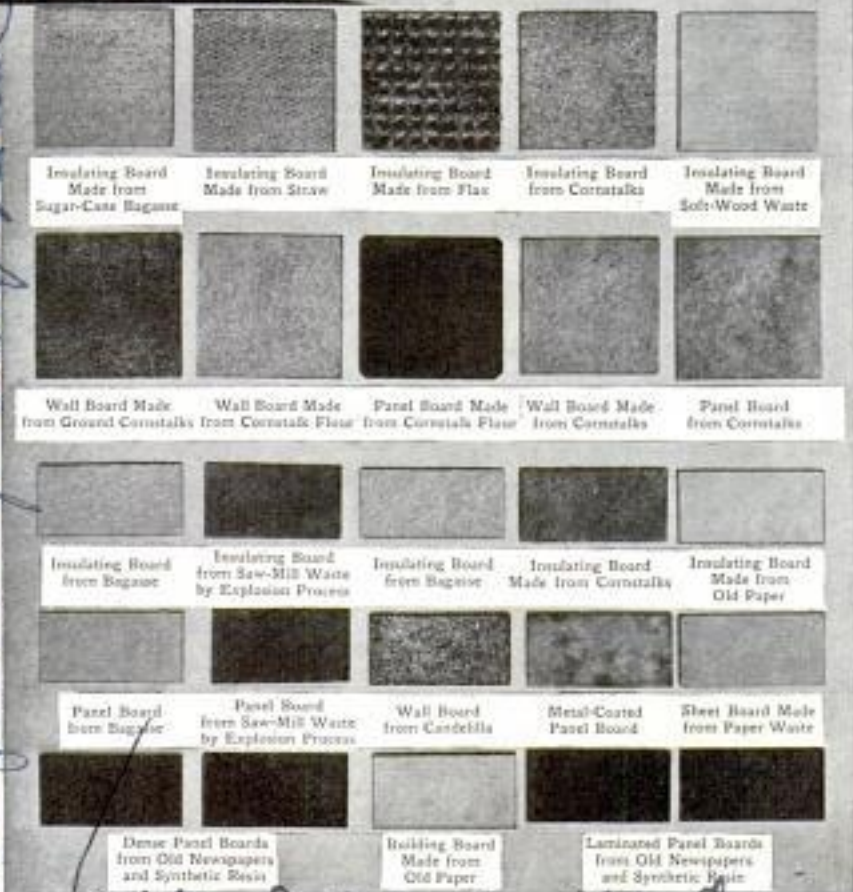


lars, half a dozen are picked at random and sent to the treasury to be tested. After weighing, each coin is rolled into a thin strip more than a foot long. This is placed beneath a row of punches which cut out numerous little silver disks. A dozen of these disks are selected and assayed to find the silver content. Being obtained from various parts of the coin, they represent fairly the average fineness of the dollar. If the weight is too little or the fineness is not up to stand-

Top, Liquids and Insulating Materials Made from Corncobs; Right, By-Products Obtained from Farm Wastes

**CORNCOB TURNED INTO MONEY**

Through the efforts of the United States department of commerce, the once useless corn-cob gives promise of becoming valuable as a source of by-products. Among these by-products are furfural, lignin ethyl, alcohol, cellulose, xylose, adhesive, acetic acid, glucose and carbon. As an example of what can be done, rayon has been dyed with colors made from the lignin. Other farm wastes furnish the materials for manufacturing insulating board, wall board, panel board, sheet board and other articles valuable to the building industry.



Insulating Board Made from Sugar-Cane Bagasse	Insulating Board Made from Straw	Insulating Board Made from Flax	Insulating Board from Cornstalks	Insulating Board Made from Soft-Wood Waste
Wall Board Made from Ground Cornstalks	Wall Board Made from Cornstalk Flour	Panel Board Made from Cornstalk Flour	Wall Board Made from Cornstalks	Panel Board from Cornstalks
Insulating Board from Bagasse	Insulating Board from Saw-Mill Waste by Explosion Process	Insulating Board from Bagasse	Insulating Board Made from Cornstalks	Insulating Board Made from Old Paper
Panel Board from Bagasse	Panel Board from Saw-Mill Waste by Explosion Process	Wall Board from Cardella	Metal-Coated Panel Board	Sheet Board Made from Paper Waste
Dense Panel Boards from Old Newspapers and Synthetic Resin	Building Board Made from Old Paper	Laminated Panel Boards from Old Newspapers and Synthetic Resin		

**TEST MADE OF SILVER DOLLAR TO INSURE ITS PURITY**

Unusual precautions are taken to insure uniformity in the silver dollars and other coins turned out by the government mint. Out of each batch of new silver dol-

ars, all the coins must be picked over, but if the samples are up to specifications, it is assumed the entire batch is of standard quality. Thus the precautions taken in testing are almost as complete in their workings as the process of minting.

Most modern glass has the same chemical composition as glass that was made in the Middle Ages.

Corn Products Co. (at U.S. Dept. of Agriculture)  
 Legumille, Ill.  
 Stewart Chemical Co. St. Joseph, Mo.  
 Maywood Cork Suburbs, Ill.  
 Stewart Chemical Co. Washington, D.C.

Cent. Kenneth P. Wood  
110 N. 49 St. St. Paul

Chas. Kenneth P. Wood 2935  
110 N. 49th St

Phila

**HOT-SPRING DEPTH ESTIMATED BY HEAT INSIDE EARTH**

Depths of hot springs can be estimated with fair accuracy by calculating from the scientific basis that the earth's heat increases one degree for every sixteen yards down. The deepest coal mine in England is at Killingworth, where the surface temperature is about forty-eight degrees. Four hundred yards down, the temperature is seventy-seven and at three hundred yards, it is seventy. Taking into consideration variations in pressure, scientists conclude that sixteen yards represents one degree of heat in penetration toward the earth's interior. The heat of waters at Bath is 116 degrees. Multiplying 116 by sixteen, the depth of Bath springs may be estimated at 1,856 yards or a little more than one mile. Thus, the probable depth of a boiling spring would be 3,392 yards, with 212 degrees Fahrenheit as the known boiling point of water.

C169

**"CONNING TOWER" ON RAIL CAR HOUSES CONTROL CABIN**

Passengers obtain a full view ahead from a Diesel railway car used in Germany, which is equipped with a conning-tower control cabin. The tower places the operator in the middle of the car and above the roof, instead of at the front, and allows gear-changing by mechanical means. It is particularly adapted for tourists, runs at a top speed of more than seventy miles an hour and has a four-speed gear.



Diesel Railway Car with Control Cabin Mounted above the Roof and in Center of the High-Speed Vehicle

No Ad agent here

Maschinen-Fabrik  
Augsburg-Munich



Refreshment Stand Equipped with Wheels for Moving; Note Containers for Iced Goods

**ROADSIDE STAND ON WHEELS OFFERS REFRESHMENTS**

Rolling refreshment stands, occupying a space of only four by three feet, have been produced for roadside or street-curb use. The stand carries four insulated refrigerated drums with a fourteen-gallon capacity for chilled foods and confections. Above the drums is a three-tier shelf for other merchandise or display purposes. The stand is topped by a gayly striped, collapsible canopy, illuminated by electric lights. Eight feet high, the device is mounted on rubber-tired roller-bearing wheels and is easily operated by one man. Some of the stands are equipped with radio.

Forty-two of every hundred radio sets in use today are over three years old.

Source Source 3/6/53

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520 N. Michigan  
Chicago  
Marshall, Mich

e963

872 Hudson Ave  
Rochester, ny

Left, Inexpensive Microscope and Kit; Right, Proboscis of Fly Magnified  
Microscope Photo Courtesy Wollensak Optical Co.



# The WORLD

7609 By DR. C. J. COLWELL, *Chicago*  
*Grandma*

LIKE the mythical drinking horn of the Norsemen, the small end of which lay in a lake, a brass tube of today dips its small lens-capped end into an infinitely minute empire. Its bountiful supply ever increases, opening new fields, effecting new cures and instructing a rising generation. The microscope recognizes no barriers and adapts itself to the hobbyist with the same versatility with which it takes its place in science.

Grains of salt and sugar appear as boulders, a moldy crust of bread as a dense jungle, stagnant water becomes an aquarium and tiny insects resemble prehistoric monsters under the influence of its lenses. Old worlds to see, new worlds to conquer, worthy of any man's mettle.

The crop is always abundant and knows no seasons. Within your own home or far afield an endless variety of subjects is to be found.

Right, Photo-Micrograph of a Particle of Potato Starch; Below, This Is Not a Beetle but a Louse



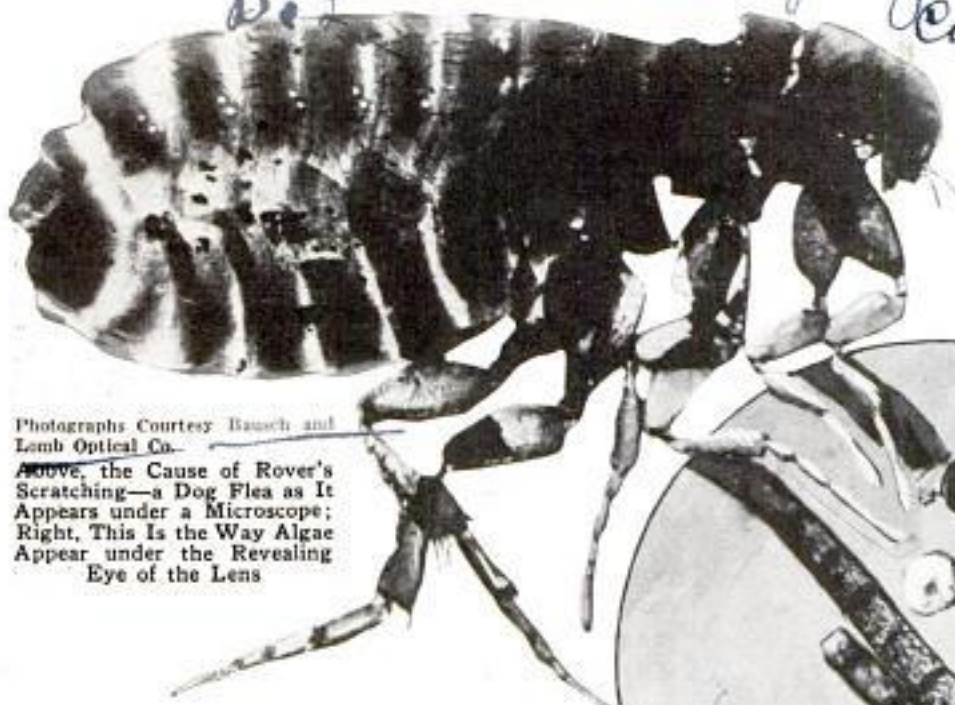
*60 2 10 St. New York*

Photo Courtesy of E. Leltz, Inc.

Left, One of Several Types of Inexpensive Microscopes Suitable for the Amateur; the Beginner Should Have Good Equipment but It Need Not Be Expensive



Taken thru Os & Lsem  
 microscope with Eastman  
 6-26 camera. Photo by Boy Scout at  
 Camp Pioneer.  
 July 1932. P863



Photographs Courtesy Bausch and Lomb Optical Co.

Above, the Cause of Rover's Scratching—a Dog Flea as It Appears under a Microscope; Right, This is the Way Algae Appear under the Revealing Eye of the Lens



# under a LENS



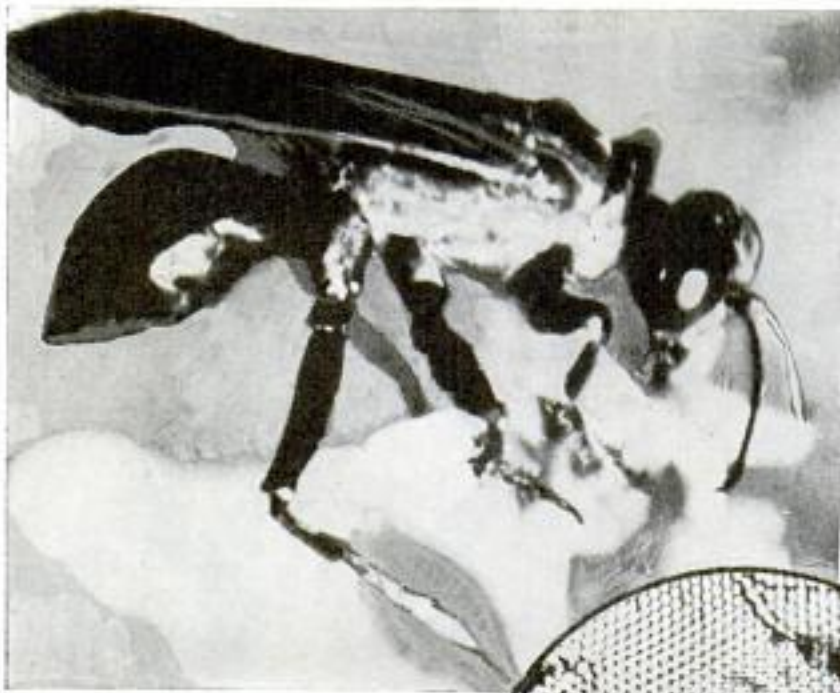
Left, This It Not a Giant Fly but the Head of Another Nuisance—the Bedbug; Next to It Is a Blood Smear Showing the Corpuscles as They Appear under a Microscope

Things you eat, your stationery, script, newsprint, metal and wood, insects, plant life, soil—everything you see is a possible specimen. Some will merit only a cursory examination, others you will want to preserve for a slide library.

Travel with a minimum kit and maximum knowledge of how to get there for little is to be found by "rule-of-thumb" methods. Select good equipment and work with a system of reasoned action, based on a knowledge of the microscope and the

scientific principles of technique.

The microscope may be small—fifty to 500 diameters magnification is ample for the amateur—and inexpensive, \$5.00 to \$35.00, depending on power and adaptability. With proper care, such an instrument will give many years of pleasant and constructive service. Its mechanical parts are the base, the joint allowing inclination of the body tube, the draw tube for adjustment of magnification, the focusing knob, and the stage and clips to hold the object in position. The optical units are the eyepiece, the objective and the mirror, usually concave. The first two form the image of the object and the latter gathers and directs light to the specimen.



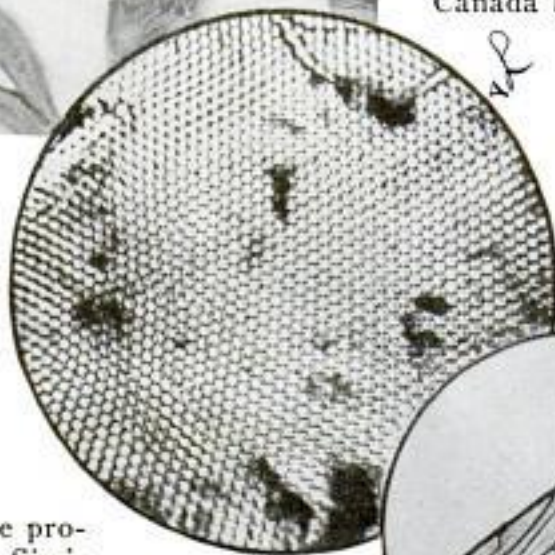
a natural source of light. Direct sunlight is to be avoided. Because of the uncertainty of daylight, an artificial source is needed also. For most purposes a twenty-five to sixty-watt frosted incandescent lamp is sufficient and may be inclosed in a square can. The work is simplified by mounting the socket on the can lid.

A few plain glass slides, one by three inches, and cover glasses, a tube of Canada balsam, a vial of

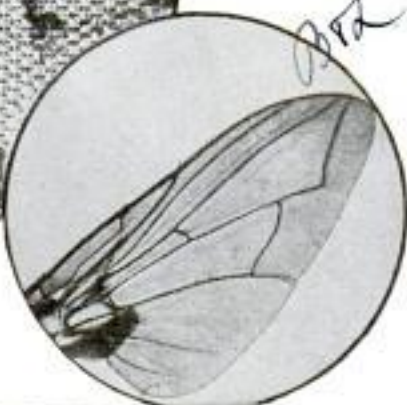
Keep your microscope clean and avoid mechanical injury. Provide a soft close-woven cloth for dust protection, or a cardboard cylinder, if you leave the instrument set up. Dust with a soft, clean paintbrush before wiping with a cloth. A trace of non-corrosive oil, lightly applied and wiped off, will leave an invisible protective film on the metal parts. Similarly, a droplet of oil may be applied to screws and joints. Do not oil such bearing surfaces as the rack and pinion, but use a non-medicated acid-free vaseline. Clean off spilled observation liquids with chloroform or benzine. Never use alcohol on your microscope.

Particular care must be taken of the optical parts. To avoid soiling the glass surfaces is easier and less injurious than to clean them. Do not remove the eyepiece or objective unless necessary. This prevents dust from reaching the back surfaces of the lenses. When cleaning is needed, first dust with a small camel's-hair brush. A clean, soft linen cloth or lens paper moistened with distilled water will remove obstinate deposits. Avoid undue rubbing and flooding the surfaces of the lenses.

Daylight, particularly of diffused white clouds, evenly distributed, is preferred as



Top, Bluebottle Wasp after Nectar from a Flower; Insects Offer Interesting Studies under the Lens; Left, Section of the Compound Eye of a Fly



Right, the Wing of a House Fly; Below, Inexpensive Kit Containing All Necessary Equipment for Amateur

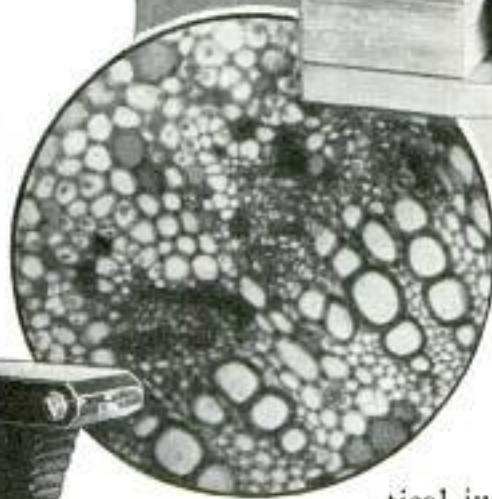
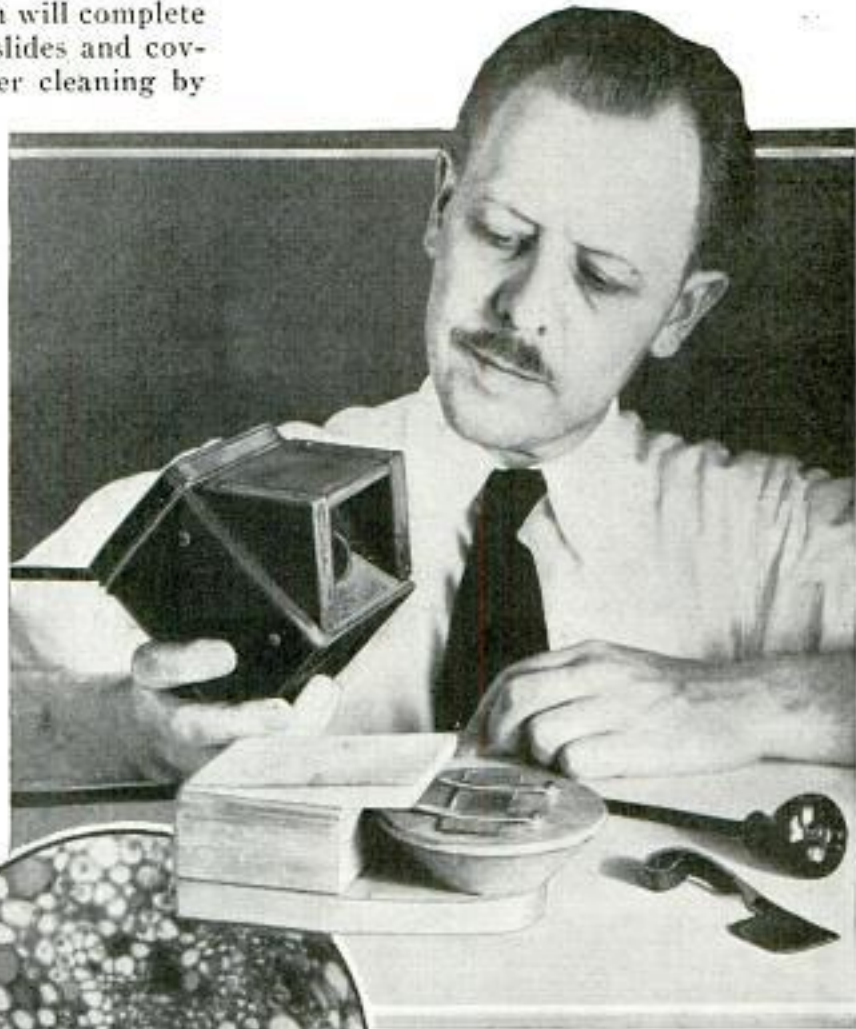


alcohol, a dissecting needle, razor blade, tweezers, a medicine dropper, a turntable,

*Bausch + Lomb*  
637 St. Paul Rochester, NY

shellac and a lettering brush will complete your elementary set. The slides and covers may be used again after cleaning by washing with alcohol. The dissecting needle may be a large darning needle inserted in a one-fourth-inch dowel rod three inches long, leaving an inch of the needle projecting.

To examine life in fluids and to make permanent mountings for a slide library, a cell is required on a slide. A ring of shellac is applied with the lettering brush by placing the slide on the turntable made by mounting a one and one-half by four by three-inch block and the end of a large spool at



Top, Homemade Light, Turntable and Eye Shade; the Light Is Made from an Old Can; Center, Micro-Photograph Such as May Be Obtained from a Set-Up Like That Shown at Left

will hold the slide. Circles about the center of the table act as guides for the cell construction.

In using, place a slide under the clips and center it; dip your small brush in shellac, (not enough to drip) and hold it vertical just outside the desired-size ring on the table and rotate the table rapidly. The result should be an even ring which is dried by warming. A cell of considerable depth may be built in this way.

Large subjects may simply be laid on a plain slide. Small thin specimens like insect wings are best seen if first dipped in distilled water or alcohol, placed on a slide and held flat with a cover glass. In handling, use your tweezers and dissecting needle. Pollen and kindred materials to which liquids are destructive may be placed dry between two slides.

Fluids are spread with another slide and covered with a cover glass, a single drop from the medicine dropper sufficing.

(Continued to page 125A)

least three and one-half inches in diameter, rotating on a nail, on a baseboard six inches long. Thin strips like stage clips

C 703

C.W. Keenan  
170 Livingston St.

Brooklyn, N.Y.

AK 2/25/40



Left and Right, Designs That May Be Drawn with Aid of Two Instruments Shown in Center; Each Instrument Has a Large Number of Uses

**DESIGN DRAWING MADE EASY BY COMBINATION TOOLS**

Drawing of designs is made easy by compact tools that do the work of many instruments. The "design-aid" is an arrangement of the protractor, rule, flexible rule, dividers, parallel, stencil set, compass, gauge plate, French curve, thirty and sixty-degree angle, forty-five and ninety-degree angle and the square, which are used by architects, engineers, draftsmen, designers and students. The "rotractor" is another tool for similar purpose, being eleven instruments in one. It is an educational device, in addition to being practical for pattern-makers, artists, architects and engineers.

**HAY FEVER CAUSED BY MOLDS FROM DUST AND RINGWORM**

Molds may cause hay fever and other nasal disturbances. This theory has been advanced by two Washington doctors who found eight cases characterized by sneezing and running noses were caused by sensitiveness to two species of molds. One of the molds is commonly found in dust, the other is a common parasite of man and animals and produces ringworm of the scalp. Contact with a person suffering from ringworm may cause hay fever

in a sensitive person, it appears, but such sensitive persons can be desensitized, thus relieving the symptoms. The hay fever due to molds may appear at any season or in any locality. It is also believed asthma may be caused by molds.

**ART-DESIGN BRICKS AID BUILDER**

Beauty can be built into the modern structure by using brick of improved designs. The building unit consists of three diamond-shaped and one standard brick, adaptable to thousands of designs, patterns and facade treatments. Economy and ease in laying the units are claimed by the makers, who say this is the first improvement in brick in several centuries. The architectural value of the diamond shape is combined with the load-carrying quality of a series of arches over the standard brick. This results in stronger construction.

*Patented Bricks # 1,355,987*



Structural Work with Brick of Improved Design; Unusual Effects Are Shown at Right

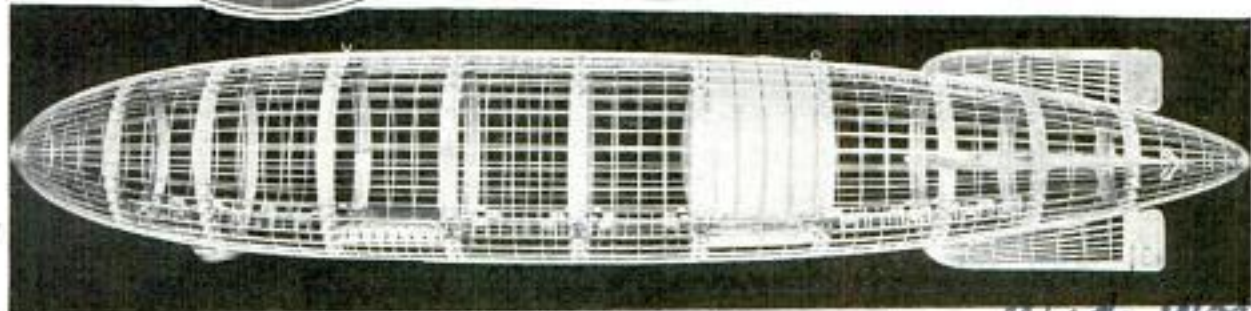
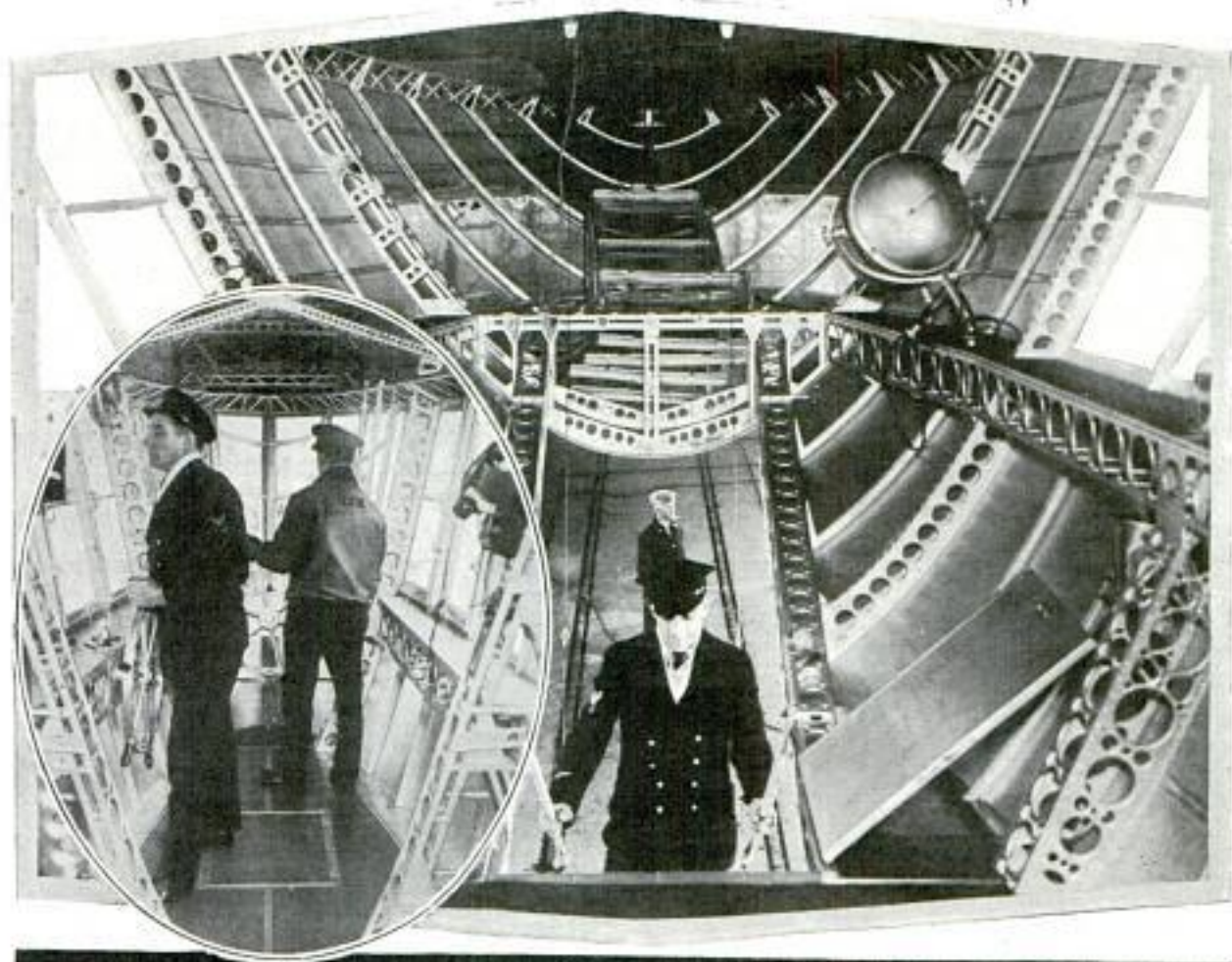
Edward F. Hammer  
42 N. Sherman Place  
Aspen, W. Va.

Harry S. Brenton and  
Charles Thom  
*Journal of Allergy*

*Designator. 50¢ postage 3¢  
Rotator. (with instructions) 75¢  
Postpaid 20¢*

*Saine New Letter  
6/3/33*

## "Brain" of Giant Dirigible Is in Control Room



Top, Hatch Leading to Interior of the "Macon"; Note the Riblike Framework; Inset, Officers in Auxiliary Control Room; Bottom, Model of the "Macon" Built to Exact Scale by Westinghouse Engineers

When the U. S. S. "Macon," giant new dirigible of the United States navy, sails up and down the nation's coasts or across country, its every movement is directed by a "brain" in the control rooms. This brain consists of delicate instruments, controls and dials, all of which have some part to play in operating the "queen of the skies." In the auxiliary control room, located in the lower vertical fin of the great craft, are the elevator wheel, the rudder wheel and numerous instruments. The after room of the control car provides entrance to the

ship, together with a hatch leading to the interior of the hull, and is also used as the officers' smoking room. From this section of the dirigible may be seen the inside construction, a network of metal that surrounds the gas cells. This part of the craft is of utmost importance, also, since these gas cells provide the tremendous lifting power that keeps the "Macon" in the air. Among the instruments that aid in the ship's operations is a hot-wire anemometer designed to figure the wind stresses to which the "Macon" is subjected.

e 748 Fischer Lany Co  
225 N. Wabash Ave

Science News Piller  
6/3/33



Walking Stick with a Handle Which Folds Outward in Two Sections to Make a Seat

**CANE WITH EXPANDING HANDLE MAKES COMFORTABLE SEAT**

If standing room only is available at the races or other outdoor event, you are still sure of a place to sit provided you carry one of the walking sticks which expands into a seat in an instant. The cane has a curved handle, the two halves of which fold outward in opposite directions until they rest on the upper part of the shaft. A rubber tip prevents slipping and the cane will support 200 pounds.

**TUBE FOR COMBATING FLAMES SHOOTS CHEMICAL STREAM**



Simplified for fighting fire in the home, office, factory, automobile or boat, a flame extinguisher is available in tube form. The device consists of only three parts, the tube, cap and a pair of compression shields. The tube, which is

leakproof, contains the fluid that is directed upon the fire by removing the cap and

Pioneer Chemical Works, Inc.  
25 N. Franklin  
Chicago

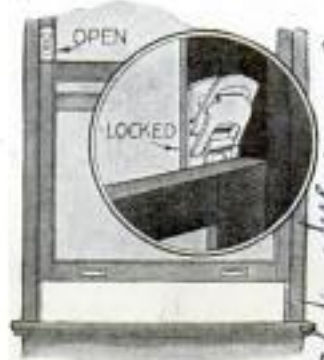
pressing the side plates. The chemical stream is projected at high velocity over a distance of twenty feet. When the fluid is exhausted, a refill tube is installed between the compression plates.

**MILE-A-SECOND RIFLE BULLET IS SQUEEZED IN FIRING**

Bullets traveling one mile per second, able to pierce armor plates of army tanks at moderate range, can be fired from a new-type rifle invented by H. Gerlich. The bullet, of .35 caliber when it goes into the breech, is only .25 caliber when it comes out of the muzzle, meaning that its diameter has been squeezed down one-tenth of an inch as it traveled through the bore. This is done by having the bore tapered through part of its length. The terrific velocity, nearly twice that of standard army rifles, naturally flattens the line of flight so that the soldier need not trouble himself so much about having the right elevation. It shortens the time of flight from rifle to target, an important matter for anti-aircraft machine gunners. Technicians of several powers are testing the rifle.

**LOCK FOR THE OPEN WINDOW SAFEGUARDS HOME**

Permitting thorough ventilation without sacrificing protection against burglars, a new lock prevents movement of window sashes except to closed position. The lock is placed six inches from the bottom of the upper window sash and screwed in firmly with screw heads flush with the lock surface. The bottom sash is opened a few inches, not enough to admit an intruder's body, and fastened in that position by pushing up the hinges of the lock. The hinges unlock from inside the window.



Aluminum wire mesh and cables are being used to construct billboards, the letters spelling the advertising message being attached to the mesh.

Aluminum Company of America  
Pittsburgh, Pa.

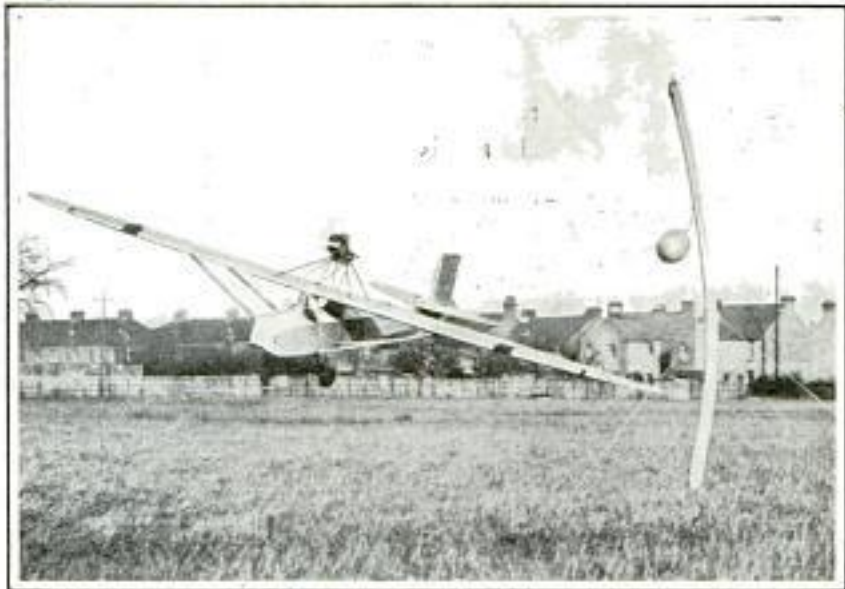
Fire Path Pak

C-770

England  
lock - Mrs. J. Light, Inc. 82 W. 111th St. New York

*Albuquerque, N.M.*  
**BATTERY METAL  
RESISTS ACID**

For manufacturing non-corrosive parts for storage batteries, a new metal withstands chemicals, including sulphuric acid. It consists, by weight, of ninety per cent pure lead and ten per cent antimony brought to a high degree of heat and then massed together by heat treatment with ten-per-cent weight of silicon. The process is said to be similar to that used for case-hardening of steel with cyanide. Immersed in 100-per-cent sulphuric acid during exhaustive tests, the metal showed no corrosive effects. The regular strength of sulphuric acid used in batteries is about twenty per cent. Terminals, bolts and other parts subject to corrosion may be constructed of the metal.



© Planet News, Ltd. *Acme*  
Small Airplane Powered by Six-Horsepower Motor Prepares to Land; Sport of Racing These Lightweight Ships Has Been Revived by English Pilots

**SIX-HORSEPOWER PLANES RACE  
IN REVIVAL OF AIR SPORT**

*Hastings Aerodrome*  
Racing of light aircraft has been revived in England. New planes, driven by six-horsepower engines, have been developed for the sport, which was popular before the World War. The ultra-light ship has a wide wing spread, the engine is mounted on top and the pilot sits in front, somewhat like the arrangement in gliders.

**HORSE MOVED WITH FURNITURE  
TO SAVE EXTRA TRIP**

When a resident of Fresno, Calif., decided to move to San Diego, he was faced with the problem of transporting a horse without making an extra trip. He solved the difficulty by "packing" the animal in the furniture van. It was blanketed and wedged in as carefully as a piano and made the trip with beds, tables, chairs and the rest of the household furnishings.



Horse "Packed" in a Truck with a Load of Furniture, the Arrangement Saving the Mover an Extra Trip

**BIG TIDAL WAVE IS PREDICTED  
WITHIN SIX MINUTES**

After a recent earthquake in Japan had registered on seismographs in Hawaii, seismologists realized a tidal wave might occur in the Pacific, and predicted its arrival in Hawaii within six minutes. They estimated the water wave, traveling 450 miles an hour, would reach Hawaii in eight and one-half hours. With this information available, Japanese sampans and fishing boats were moved from harbors into the ocean to prevent wreckage in case of a large wave. The wave actually struck within six minutes of the time estimated, and lasted for about two hours, but caused little damage, due to the fact that preparations had been made for its coming.

*George E. Johnson,  
325 E 3rd St,  
San Diego, Calif*

*News Letter 5/6/7/8  
reported by Suph  
P. Leavitt, Hawaii  
National Park.*

C744

Com. Frederick C. Russell  
115 Wallbridge Road  
Hartford, Conn

# THEY'VE GONE



Car Driving Itself Out of Garage after Motor Has Been Started and Doors Opened Automatically

**I**F you pass a neighbor's garage some morning and see his car back itself out and stand waiting with the motor all cranked and ready to go it will just be an action picture of the American motor car "going automatic."

Already it is possible to touch a button on the instrument board and have the garage doors swing open or shut. If that's too mysterious you can flip a switch on a post as you run along the driveway, the doors responding to your wishes like humble servants. At comparatively small expense you can add a few time switches and controls so that your motor will start itself any time you desire. It can be made to back itself out the garage or come down the driveway to meet you.

Tricks? Black magic? Nothing of the sort. When you buy a motor car today you are buying an automatic mechanism, not merely an automobile. From the new tires which automatically snub their own bouncing action to the choke valve that closes itself, the modern motor vehicle is

a bundle of self-acting controls. And the end of the process of going automatic is nowhere in sight!

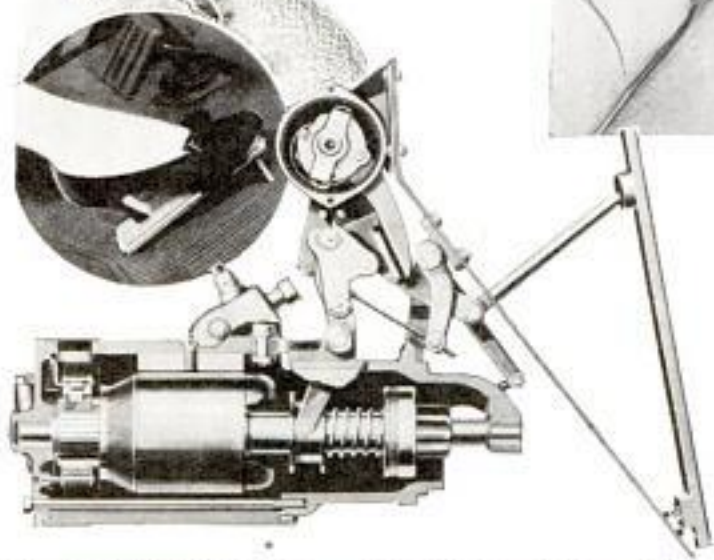
Take any one of a number of cars with automatic features. Head it into a modern private garage equipped with a motor-driven door operator. Leave it with hand brake off, the gear-shift lever in reverse, and the automatic clutch control in the "on" position. Simple enough. Now for just one or two changes to make this car act like a trained flea.

Insert into the battery circuit an inexpensive switch to delay the time of contact. Set this for 7:30 o'clock tomorrow morning, and switch on the ignition. The motor does not start because the circuit is broken by the delayed-time switch and will not be completed until the appointed hour for action. That's step one.

Next install a photo-electric cell near the tail-light and wire it into the circuit that controls the electric door opener. See that the front wheels are set in the straight-ahead position, switch out the lights in the garage and retire. Tomorrow morning you may sleep through the warning of the alarm clock but the car will be



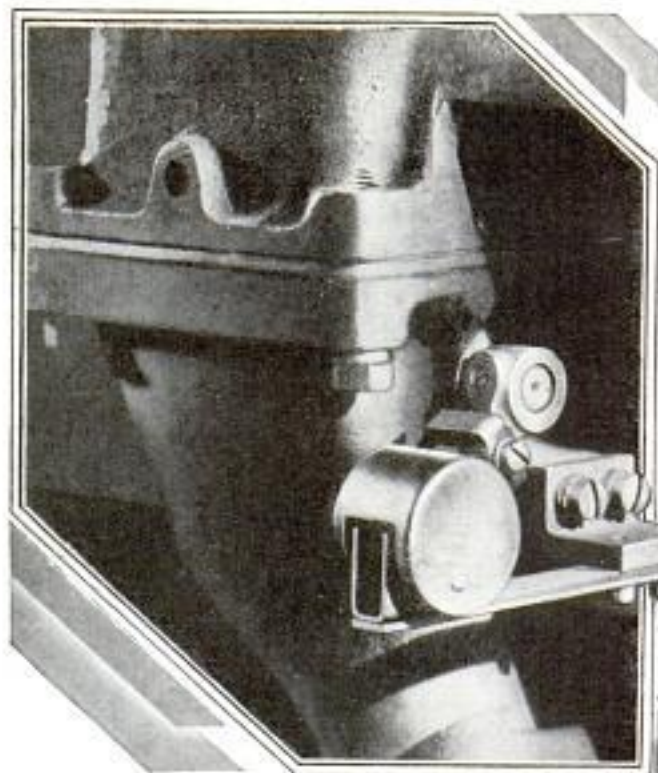
# Automatic!



Top, Control Which Actuates Automatic Gear Shifter; Below, Coincidental Starter Operated by Pressing Accelerator

out of the garage with its motor purring, waiting for you to get aboard.  
It's simple enough. At exactly 7:30 the time switch completed the circuit to the various electrical units of the car. Because the gears were in reverse and the backing light went into action, the photo-electric cell quivered a signal to the motor that operated the garage doors. By the time the doors swung open the automatic start-

er set the starter-motor into action with the result that the car began to back up. Simultaneously the motor was cranked. An automatic choke does a better job than the driver could. In a few minutes the car was out on the driveway, rolling to a stop. Just as soon as vacuum was created in the intake the automatic clutch control disconnected the power to the transmission. Even though the car still was in reverse it ceased to move until the driver took the wheel and made the necessary changes.  
Aside from the use of a time switch and a photo-electric cell this weird action of the car involves the use of merely three of the modern automatic features—clutch control, automatic starter and choke control. And the modern car has a half dozen other equally important automatic features! To these have recently been added



of the twelve or sixteen-cylinder type, but it is quite likely to become a feature of the simpler motors.

Comparatively few motorists are familiar with the automatic heat control, a special thermostat which, when inserted in the intake manifold, automatically regulates its temperature. More efficient motor operation is the result. It is being widely used in combination with the new downdraft carburetors and automatic choke control.

The driver who used to fuss with a remote control of the intake heating device now keeps his hands on the wheel and

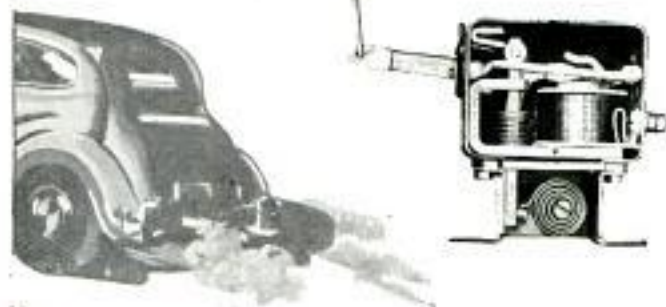
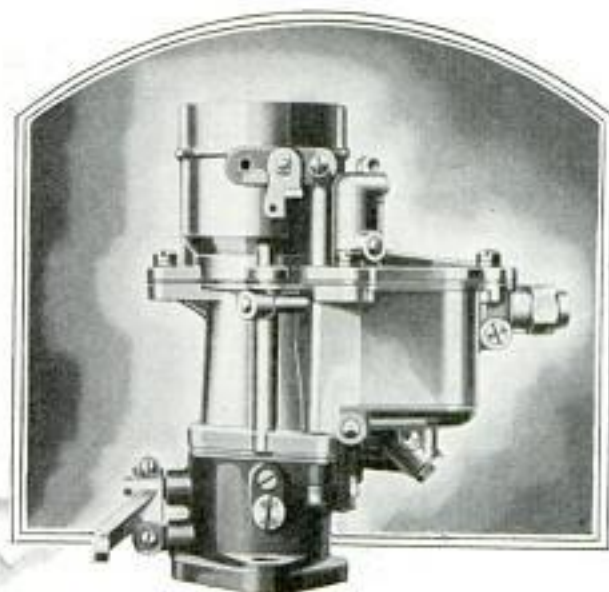
the automatic transmission, self-regulating shock absorbers, power brakes and the coincidental starter. Individually these innovations have striking advantages; in partnership they suggest results that fairly stagger the imagination. With an automatic transmission it is obvious that a car could be started headfirst out of its private garage and be made to shift itself through the various combinations into high or run the length of the street all by itself. You could prevent the automatic clutch from letting it free wheel to a stop simply by setting the throttle for higher motor speed. What to do to stop the car once it got itself into such a burst of self-expression is something we need not worry about now. We're simply on our way along the automatic route. Already cars have been demonstrated with power steering in which the driver's own personality is considerably submerged.

On two high-priced cars, it is no longer necessary to adjust valve tappets, or fret over their varieties of noise. Hydraulic tappets, which automatically adjust themselves for the proper clearance in relation to expansion of the valve stems, accomplish this trick. This step was taken primarily to avoid the difficulty of adjusting tappets in the "V" of a motor



Top Automatic Heat Control for the Manifold Operated by a Special Thermostat; Below, Button on Instrument Panel Which Operates Radio Control on Garage Doors

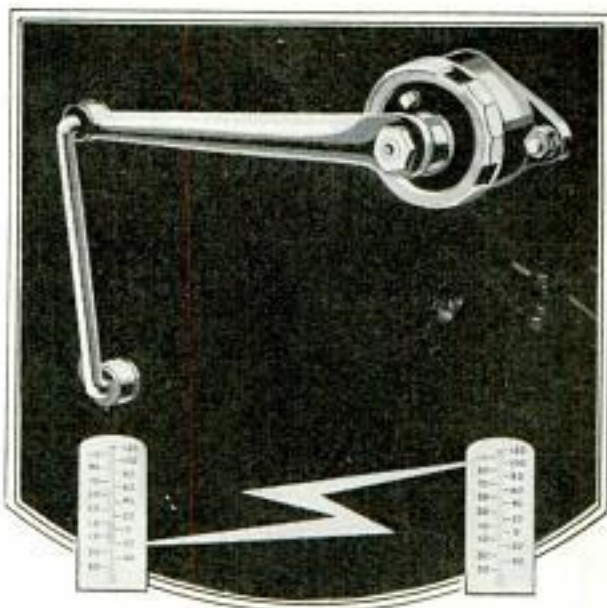
finds that the automatic control thinks for him most efficiently. It is very much the same with automatic shock absorbers which adjust themselves to road, load, temperature and speed conditions. If the road is rough they relax for a soft ride, but quickly stiffen if the driver steps on the gas. Varying swings in temperature bring suitable changes in the adjustment. Whether the car is seating seven or just



Top, Self-Adjusting Shock Absorber; Below, Choke Automatically Controlled by a Thermostat

the driver, these controls of the springs stiffen up or relax accordingly.

A conventional motor today may carry as many as five thermostats, each one doing some job automatically and doing it well. One controls the radiator shutters, another assists in heating up the cooling system for more efficient performance during the first five or ten minutes of operation, and a third takes care of the choke valve. There are also thermostats to regulate intake heat and to control the opening and closing of the doors in the sides



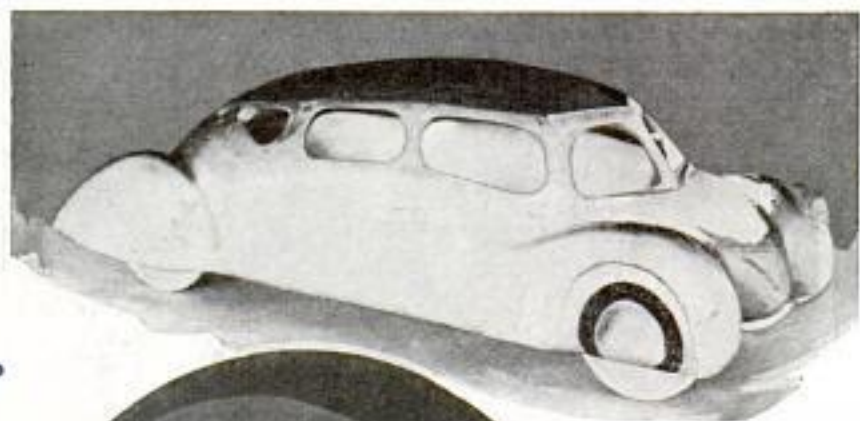
of the hood. Automatic suction valves, actuated by motor vacuum, control the spark regulation on some motors. Another new application of the suction valve is in connection with the coincidental starter.

This starting system was developed out of a human failing. Engineers noticed that when the average driver stalled the motor he seemed to expect action by pressing all the way down on the accelerator. Out of this has come the arrangement whereby you start the motor by pressing on the accelerator pedal. This starting feature is automatically disengaged while the motor runs, because of the suction from the intake manifold. Stalling of the motor causes the suction to cease, engages the electrical contacts and provides immediate re-cranking while the driver presses the pedal.

For some years the distributor has carried what is known as semiautomatic spark control. Some cars have had full automatic control. The principle is that of the governor. Small flyweights swing out as the speed of the distributor shaft increases. This automatically advances the spark timing. On one of the latest cars there is an additional spark control which does not come into action until the car is hitting fifty miles an hour.

Motorists are stopping one of the new cars by using the brake pedal as a "treadle." A power unit on the propeller shaft supplies the actual power by harnessing the car's momentum, the only physical ef-

(Continued to page 126A)



These Models Show How Streamlines Will Help Reduce Wind Resistance in Future Automobile

**ULTRA-MODERN AUTO DESIGNED TO SAVE ON FUEL**

Designed to reduce wind resistance to a minimum, an ultra-modern automobile now in the process of construction will be featured by unusual operating economy. Forty miles to a gallon of gasoline at a speed of sixty miles per hour will be regular performance, its designers say. By means of a patented manifold, engineers will be able to regulate fuel consumption, within certain limits. Tests on model autos produced improved streamline effects in the design. Each wheel of the new auto will be a separate unit, complete with its own spring, no axles being necessary. The motor will be located at the rear as an integral part of the rear-wheel system, which will be detachable, making it possible to replace a unit requiring repairs with a spare motor-and-wheels unit. Passengers in both front and rear seats will be cradled between front and rear springs. No chassis or frame will be used. Plates will be welded or riveted. Wood will not be used. The design provides more space

for passengers, discarding mud guards and sinking the wheels into the sides of the body.

**MILLION-YEAR OLD LIFE SOUGHT IN CHINA**

How mankind lived one million years ago may be revealed by following two clues, a low-browed skull and a fragment of charred wood discovered not far from Peiping, China. Dr. Ralph Chaney, of the University of California, on an expedition to northeastern Asia, is studying the relationship of the wood fragment to the remains of the so-called Peking man, found near Peiping in 1930. In the opinion of Doctor Chaney, discovery of charred wood near where the Peking man's skull was found proves that this earliest-known inhabitant of Asia knew the use of fire. Scientists place the age of the skull at one million years.

**GAS POWER REPLACES STEAM IN MIDGET LOCOMOTIVE**

When steam power failed in the miniature locomotive of an amusement-park railway, a gasoline engine was installed. Supplementary connecting rods and a pair



How Gasoline Engine Was Installed in Amusement-Park Locomotive When Steam Power Failed

of eccentrics geared to the transmission taken from an automobile deliver the power to the wheels. The engineer sits on a cushion on top of the tender.

*Capt. James Hennessy  
575 16th Ave  
San Francisco, Calif*

*Study Motor Car Co. Indianapolis, Ind*

*San Diego Union 5/19/33*

*Berkeley Calif*

*C669*

*C671*

*Calif*  
**GASOLINE ENGINE RUNS  
 PORTABLE GENERATOR  
 FOR LIGHT WORK**

*c 928*  
 Weighing only thirty-five pounds, a compact but complete generating plant is capable of supplying electrical power where electric energy from public-utility lines is not available. The generator is run by a small gasoline motor and the two are built into a single case which also contains the gas tank. It develops 350 watts of power at 350 cycles, and will operate ten forty-watt lights, various types of searchlights, arc and neon lights, radio beacons or a one-fourth-horsepower motor. As a separate unit, a rectifier can be obtained for connecting with certain appliances. The engine is started by pulling on a cord around the exposed end of the flywheel. The tool or appliance is then plugged in in the usual way. The engine is air-cooled and self-lubricating, oil mixed with the gasoline reaching all working parts through grooves in the hollow crankshaft. It will run from three to five hours on one gallon of fuel and is particularly adapted for powering camp equipment. A collapsible handle is supplied for carrying, and the unit can be taken apart and reassembled in half an hour.



Portable Generator and Gasoline Motor in One Compact Unit

*c 929*  
**LOW-SLUNG TRAILER CHASSIS  
 PREVENTS ROLLING**

Rolling and weaving are eliminated in a trailer chassis with an axle constructed of two two-inch spring-steel tubes, permitting the trailer load to be carried lower



Low-Slung Trailer Chassis with Four Springs and an Axle Made of Two Spring-Steel Tubes

than is the case with the ordinary trailer, yet leaving adequate road clearance and providing a level floor. Instead of the usual two springs there are four, spaced across the length of the axle. Two of them are outside the wheels and thus, no matter what the width of the chassis, the spring spread is only four inches narrower than the outside dimensions of the body. Widening the spring spread distributed the weight of the trailer house over a much greater surface, preventing rolling when in motion. In making tire repairs, the jack is placed under the body instead of under the axle, and a wheel can be removed by loosening one nut and taking off two others. The chassis accommodates any kind of trailer body, and six different treads are available.

☐ The first steamship voyage across the Atlantic took twenty-five days.

*Trailer book 25¢  
 606-3rd St.*

*Hammer Blow Tool Co  
 Wausau, Wis ad P. 125. a*

c 508 *Com. Bro. Louis [unclear]*

*Arthur Gagne*

216 +

POPULAR MECHANICS

*Bro. St. Arnes School*

TABLE TOP HAS INLAID GAMES ON BOTH SIDES



One Side of Inlaid Table Top, Showing Intricate Design; Twelve Different Woods Were Used

Constructed as a jigsaw puzzle might be put together, a table top, with inlaid designs for games on both sides, is made up of nearly 6,000 pieces. More than a dozen kinds of wood are used, each picked for its particular color value. Pieces of ebony bring out black wherever desired. The table top was built by Arthur Gagne in 1899.

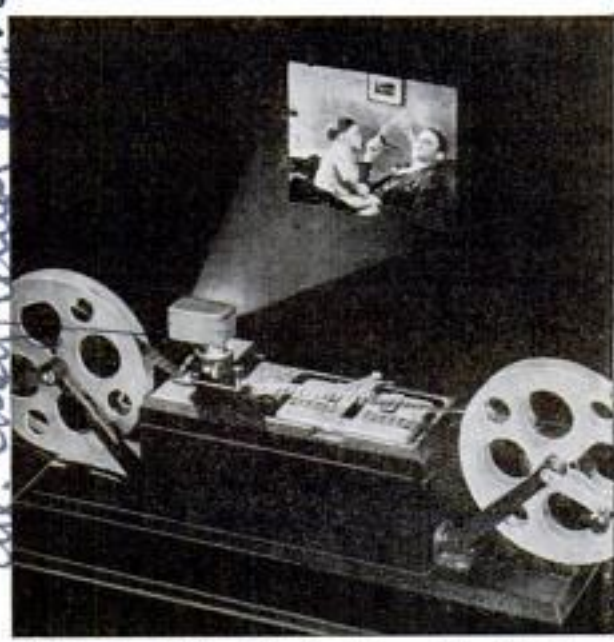
VISUAL INDICATOR FOR PLANES KEEPS PILOT ON COURSE

Pilots now can see whether they are on their course instead of listening for this information. Radio course indicators on the instrument board have been developed by the Westinghouse Electric and Manufacturing company, permitting the flyer to use his headphones for weather information exclusively. For many years airways have been marked by radio-beacon systems which transmit signals day and night in specific directions. The pilot has been accustomed to tune his receiver to this beacon system and listen for tone signals. So long as the tone signal was steady, he knew he was on the course. By the visual system, an indicator, in the form of a meter, is placed on the instrument panel. This meter, or course indicator, operates much like the ammeter in automobiles. The indicator usually rests in the center, marked zero, but when the

plane drifts to right or left of the course, it indicates the deviations. The complete receiver for operating the indicator is contained in a box about eighteen inches long. Although the equipment consists of but a single-tuned radio-frequency receiver, it has unusual sensitivity. The use of a vibrating reed filter permits the operator to listen to weather reports without interruptions to the course indications appearing on the meter. The signals picked from the beacon station by the receiver are a simultaneous mixture of weather reports and low-frequency indication signals. The apparatus associated with the receiver is so arranged that these two signals are separated, permitting the operator to see the one and hear the other. In order that the pilot will receive constant signals, a very sensitive automatic volume control is arranged for operation in connection with the receiver. In addition, a second meter is used to indicate the volume output of the pilot's receiver at times.

PROJECTOR FOR MOVIE FILMS SHOWS STILL SHOTS

For editing moving-picture film, a projector is now offered which throws on the



Projector for Editing Moving-Picture Film; It Throws a Large Still of the Frame on a Screen

screen a large still of the frame being inspected, thereby relieving eyestrain and speeding up the work of inspection. The instrument is equipped with a special

*Victor Triumatograph Corp. [unclear]*

*400 Hancock St. Lawrence Mass*

*East Pittsburgh Pa.*

*c 530*

*8*

*one copy [unclear]*

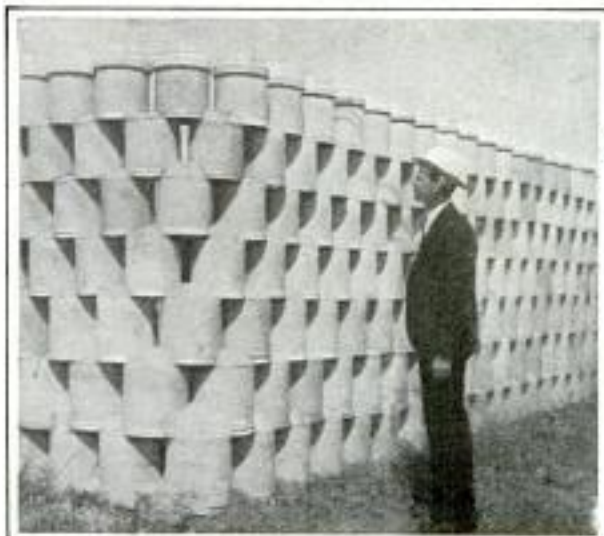
Copyrighted material

prism and projecting head which permits the picture to be projected any convenient distance and viewed right side up. A rewind can be used with or independent of the projector head, and a built-in splicer is heated to an even temperature to assure quick and positive bonding of film. As extra equipment, there is a small film-pack camera which attaches to the editing device instead of the prism. The camera is complete with film-pack adapter, ground glass and camera lens, and is of the fixed-exposure type.

e541

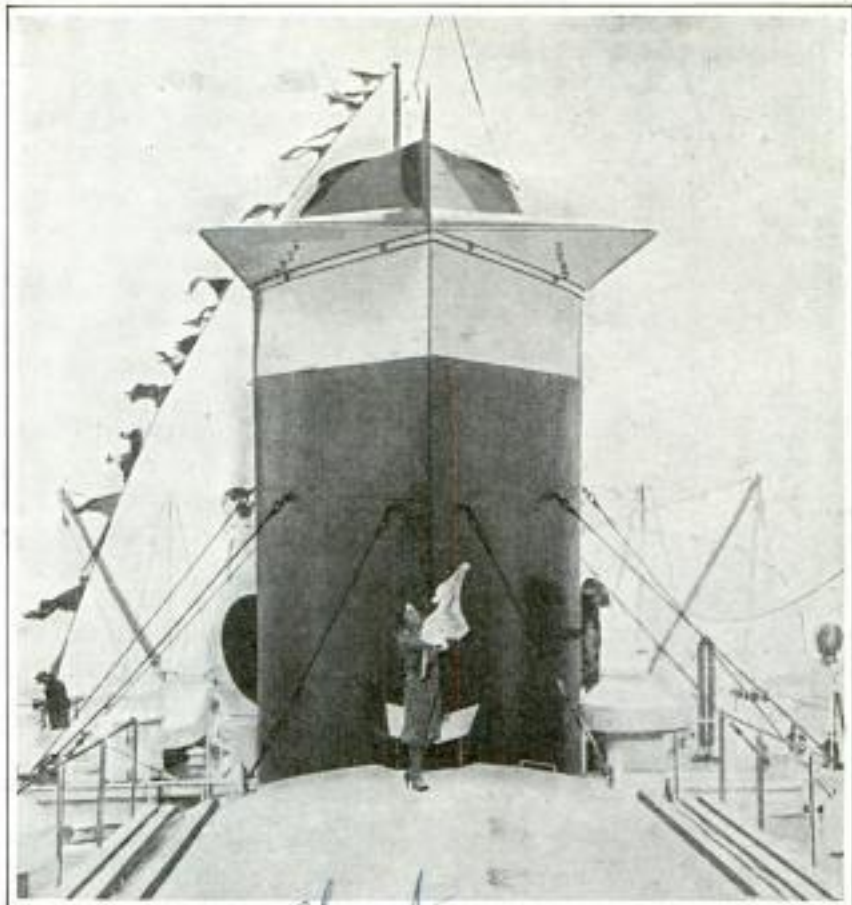
### STONE-JAR FENCE AROUND POTTERY

Stoneware jars and milk crocks compose the fence around a Pittsburg, Kans., pottery plant. The fence was made by cementing three and five-gallon jars together and capping them with smaller milk containers. Seconds or slightly defective jars with little market value were used. The fence contains more than 1,400 separate pieces with a capacity of 7,800 gallons. It is taller than a man's head and stretches a half block each way.



Stone Jars and Milk Crocks Cemented Together to Form a Fence around a Pottery Plant

*Pittsburg Pottery Co  
Kans*



*club*

Scarf in Woman Passenger's Hand Shows How Rising Air Current Is Created by New Design for Ship Funnel; Smoke Likewise Is Carried Upward

### "AIRPLANE" FUNNEL FOR SHIPS SENDS SMOKE UPWARD

Shaped like the tail of an airplane, a new-type funnel for steamships diverts smoke skyward. The funnel has been installed on new Grace liners operating between New York and California. An upward current of air is created by the stack's shape, carrying smoke away.

### CAPTAIN "SEES" ENTIRE VESSEL WITH FIRE DETECTORS

e781

To reduce the risk of fire at sea, detectors recently developed enable the captain of a ship to "see" his entire vessel as far as the fire hazard is concerned. Air ducts, or channels, are fitted to every vulnerable point of the vessel. At the end of each channel is a small detector and extinguisher resembling a telephone mouthpiece. A rise above a predetermined temperature causes the detector to set off an alarm. Once the alarm is in action, carbon dioxide automatically is pumped through the air channels and smothers the blaze.

*report from London*

*W. Herald Tribune  
5/21/33*

# METALS worth



pan would never have recognized the new metals—not even if he had them in hand. Only by the aid of spectrum analysis, the wondrous new tool of science, developed by Doctor Kennard for mineral prospecting, can most of these rare elements of nature be found. So acute is this instrument, that this scientist can detect an amount equal to less than one ten-thousandth of a milligram, a trace so slight that the most powerful microscope devised would have difficulty in finding it.

“Fortunately, a number of the rare or uncommon metals are quite often found in the same types of ores,” asserts Doctor Kennard. “Gallium, rubidium, caesium, lithium, zirconium and at times other rare metals are

**M**INE-RUSH days, like those of '49 and '98, may soon be lived again.

But instead of a rush for gold, the search will be for the rare and little-known metals of the earth, some of which are worth many times as much as the yellow metal of international exchange. Such a revival of prospecting is forecast following the discovery by Dr. Theodore G. Kennard, research geochemist of Pomona College, Claremont, Calif., of many valuable and uncommon metals in North America.

We wonder why these new metals haven't been sought and mined. The answer is because science has only recently devised a method of locating deposits of these unusual minerals; and some of the metals are so scarce that industry has as yet developed no commercial use for them.

The old-time prospector with pick and



Top, Piece of Lepidolite Containing Five Rare Metals;  
Below, Screening Method of Prospecting for Gold  
Which Cannot Be Used with the Rarer Metals



# more *than* GOLD

Old Dumps Like This  
May Contain Metals  
More Valuable than  
the Gold and Silver  
Originally Recovered

found in lepidolite. Quartz contains other groupings. In searching for these rare metals one should look first for deposits of silicates of igneous origin in which lepidolite and quartz occur. Then with the spectroscope or spectrograph tests should be made to determine where the richest ores are located. The same methods would prevail as regards formations containing any of the rare elements. After rich 'finds' are uncovered, the ore could be processed to deliver its metallic elements."

Doctor Kennard has developed a unique method of quantitative analysis whereby he is enabled to ascertain the value of the rare metals in mineral deposits, as well as merely name the elements present. He can make quantity determinations so fine that the amounts entirely escape detection by the methods of chemical analysis. The prospector seeking the rare metals, he says, should first acquaint himself with the formations and mineral types in which the elements customarily occur. From a quantity spectral analysis the prospector can easily find out if his mineral will "pay."

"Recently an Arizona mining firm sent me ore samples for analysis," said Doctor Kennard. "The concern 'suspected' certain rare metals which their chemists had been striving to analyze for three months



without success. In ten minutes with the spectroscope I had analyzed the ore and found five missing elements. The amounts present had been too small for detection by analytical chemistry!"

The methods used by this young research geo-chemist in the new prospecting are based upon the knowledge that every element in nature gives its own distinct color pattern when put in a flame, the light from which is passed through a prism and broken into its characteristic lines or spectrum. The photograph of this color band is called a spectrograph. By noting the position of the spectral lines on a photographic plate, Doctor Kennard can name what elements are present in any ore. By comparing the strength of the

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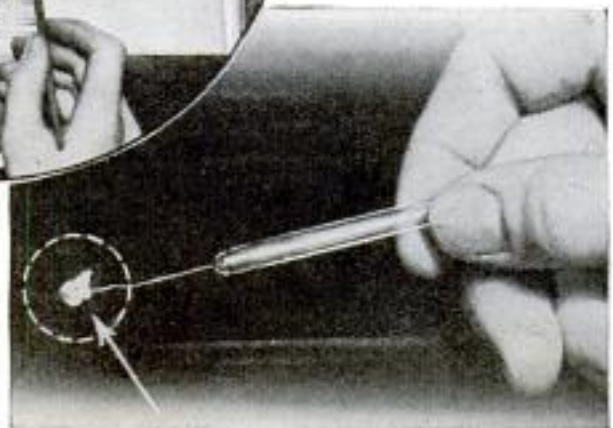
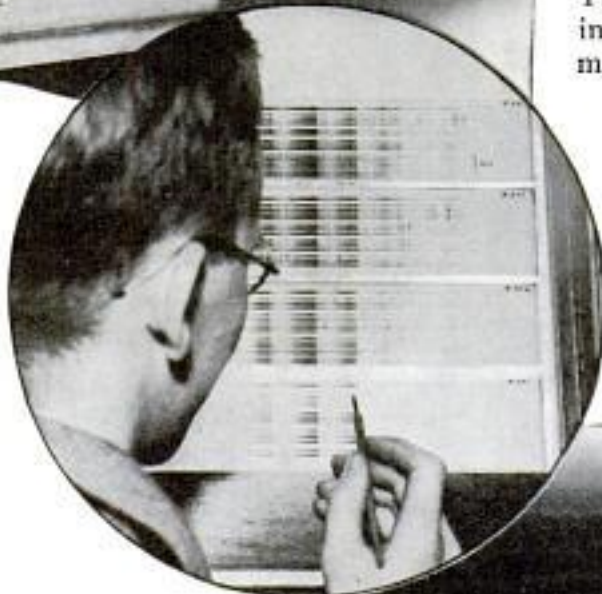
yet discovered, and is used where the impact of light is needed to instigate current flow. Caesium costs five times more than gold. If it could be found in quantities and put on the market cheaply, it is predicted caesium would have tremendous commercial importance.

"The uncommon metals are divided into two main groups," explained Doctor Kennard. "Some are rare because of actual scarcity; others because of limited commercial demand. Not so long ago aluminum was classed among the rare metals. Then it was found useful in everyday life. A demand was created, an economical way of refining and manufacturing developed, and today aluminum is one of the cheapest and most popular of all metals. Ytterbium, yttrium, erbium, lith-

spectral lines with standard plates containing the spectrum of the elements under observation, this scientist can interpret accurately how much of the element is in the ore under sample. From such "readings" it is possible to tell if a deposit containing rare metals is rich enough to make its working worth while. Some of the elements found by Doctor Kennard in North America are scandium, osmium, yttrium, ytterbium, rubidium, strontium, titanium, indium, gallium, caesium, zirconium, lithium and hafnium. Strange names to most persons, yet names that may become familiar within the next decade.

Of what use are these metals?

Iridium, one of the hardest substances known, is relatively impervious to acids. More precious than gold, it finds use in fine watch and compass bearings, pen-point tips, and the hard-wearing surfaces of delicate balances. Gallium, a bluish-white metal, melts when held in the palm of the hand, from body heat. Its terrific radiating power causes its use in light-houses, supplanting magnesia. Caesium is the most photo-electric of any element

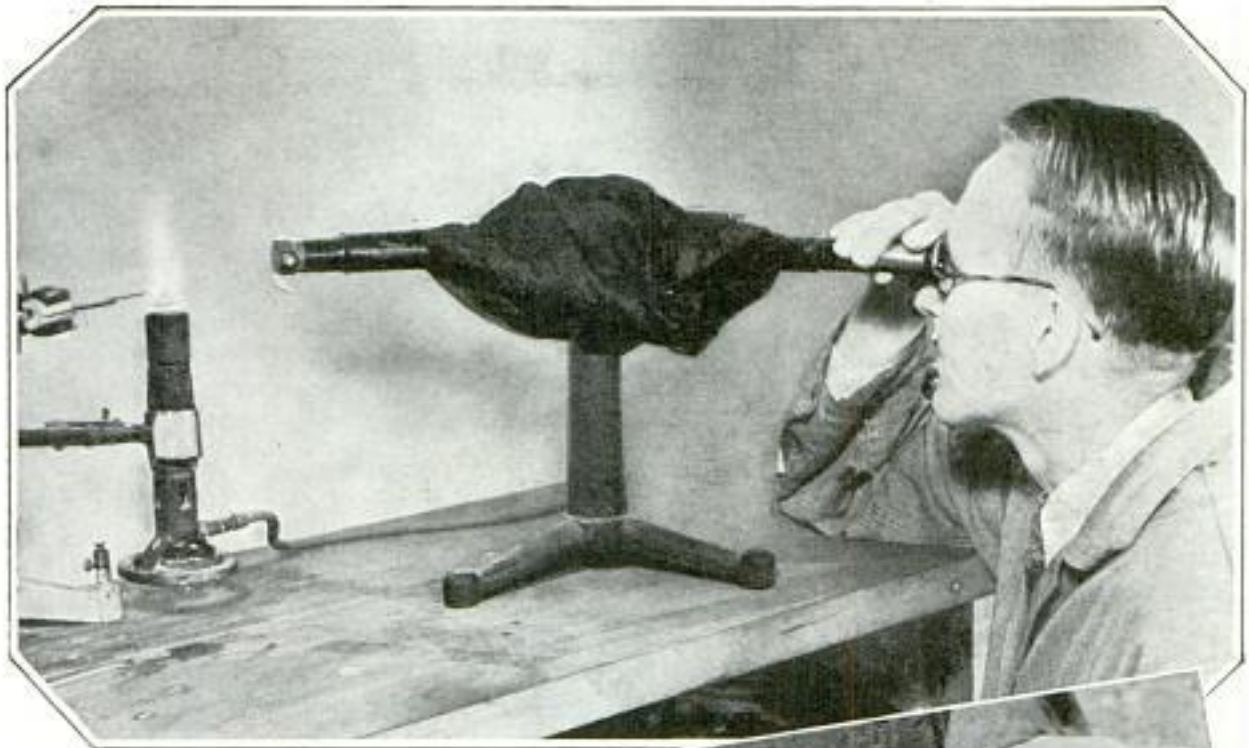


Top, Using Spectrograph to Identify Elements; Center, Analyzing Spectra of Various Elements; Below, Heating Ore for Spectroscopic Examination

ium and titanium are all metals that undoubtedly occur prominently in the earth's crust, yet no consistent demand has been created for them. Science or industry may develop at any moment a favor for one or more of these metals to spring it into prominence almost over night.

"Hafnium, priced at \$40 a gram, is worth twenty-five times as much as gold, and is found in North America. Scandium was

c759

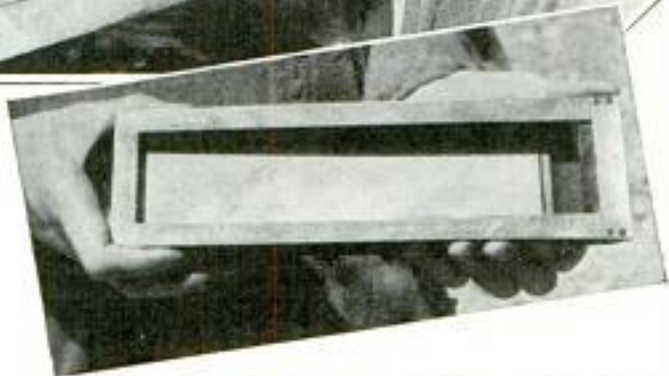


discovered by spectral analysis and is so rare that its chief use is in science laboratories. It is worth what you can get for it. Indium is softer than lead and makes a mark on paper. It is found in zinc blend and sells for around \$51.50 a gram. Osmium is perhaps the densest of all metals, valuable because of true rarity.

"Because the rare and semi-precious metals are often grouped together in quartz and lepidolite ores of igneous origin, it is probably that tailings and ore dumps of many mining operations of by-gone days contain metals more valuable than the gold and silver for which they were once worked."

There is no way to evaluate the money worth of such metals as iridium, platinum, scandium, gallium, zirconium, caesium, rubidium, osmium, indium and others which undoubtedly occur in many mineral communities but which, to date, have remained largely unworked because prospectors have lacked the means or knowledge of determining their existence, asserts Professor Kennard. It is equally certain that many miners passed through their hands precious metals of greater value than the gold and silver removed. And that immense values remain yet to be derived from the dross of these old workings.

Demand already exists for many of the



Top, Viewing Visible Spectrum of Piece of Ore; Below, Plate Holder and Plate on Which Photographic Impressions of the Spectra Are Made

little-known metals, and is growing for others. There is every indication that the next rush to mining fields will not be for gold, but for the relatively more precious metals now known chiefly to science, and that the North American continent may soon witness a revival of mining activities rivaling those of the colorful days of California, '49 and the Alaska rush of '98.

c843

MINERAL LIKE RAVEN'S WING

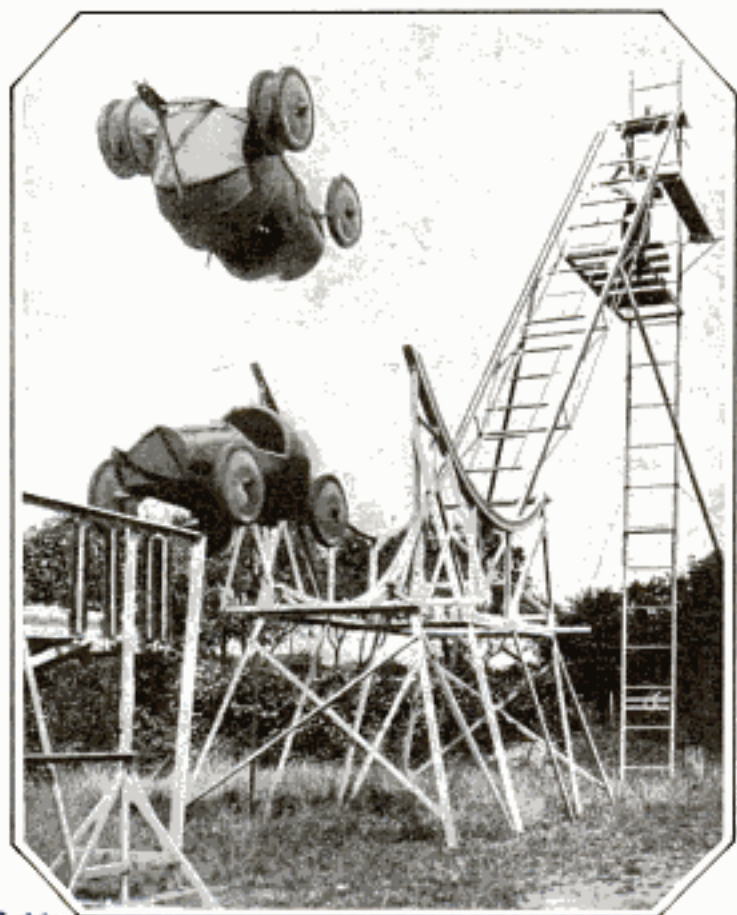
Corvusite, or ravenstone, is the name given to a mineral found recently in Utah which has the iridescent luster of a raven's wing. It contains a high percentage of the rare metal, vanadium, and was found in close proximity to the carnotite deposits which constitute the chief source of radium in the United States. Intimately associated with the corvusite deposits are the petrified remains of ancient trees.

reported by Smithsonian  
 investigation

Edw. J. Henderson  
 by Frank L. Hess.

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C 105



Somersaulting Auto in Mid-Air as a Second Car Passes Beneath; Both Come to Rest on a Platform with Springs

### AUTO SOMERSAULTS IN MID-AIR TO THRILL SPECTATORS

Unemployed engineers in Germany constructed an automobile-chute-the-chute which provides thrills and chills without spills for spectators. A racing car is started down a steep incline with a second car close behind. The first auto catapults into the air and turns a somersault, the second car passing beneath it while the leader is still upside down. Both vehicles land on a platform supported by springs.

*ad. Barber. Heintzschel*

### TESTS OF MODEL ARCH DAMS AID THE ENGINEER

Important discoveries have been made in recent tests of model arch dams, holding possibilities of economy and increased efficiency and safety in power development, irrigation, water-supply projects and flood control. Among the findings were: that concrete dams are not stationary, that concrete is slightly plastic under high pressure, that some forms of "tension cracks" in a dam do not affect its

safety, that chemically generated heat within the concrete affects its serviceability and that proposed arch dams can be tested accurately first in the form of models. These discoveries were made in tests on a sixty-foot arch dam especially constructed in a gorge of the Sierras on Stevenson creek in California. The dam, with its walls curved upstream instead of straight across from bank to bank, withstood high water successfully. Hundreds of instruments built into the model revealed strains and temperature changes within the concrete, deflections of the wall from its original position, changes of curvature of arches under pressure of water and even movement of the bedrock beneath the dam.

### SEEPING HOSE FOR LAWN KEEPS GROUND MOIST

Irrigation of lawns and gardens is simplified by using a large hose made of woven fabric which permits water to seep through the sides throughout its length, thus applying the moisture uniformly. When filled, it measures three inches in diameter, and when empty it collapses into a flat tube. It is supplied in sections which can be joined together for long reaches, and is flexible and light in weight. Water is fed



Garden Hose of Woven Fabric Which Permits Water to Seep Through and Keep Ground Moist

through an iron pipe or ordinary rubber hose coupled to the oozing hose, and by regulating the supply pressure, the seepage from the hose can be controlled to suit the capacity of the soil for absorption.

Cotton and silk are combined in a spun yarn that rivals rayon.

C 795

*San Diego  
Blum  
5/21/33*

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*Said to be made abroad*

*Coys, Inc. Howell, Mich*

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Pipe & Foundry Co  
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below American Assoc  
to Study of Isotopes  
POPULAR MECHANICS

San Diego Bureau 5/18/32

### ATOMS IN HUMAN'S BODY LIKE "SOLAR SYSTEMS"

What man eats is radiation which releases electrical currents for the body's electrical circuit, the nervous system, and this all-important radiation is imparted to food by the sun's rays. Atoms are not billiard balls but are solar systems, Dr. George W. Crile explains in a new concept of human life. Atoms are the vehicles that are filled with solar radiance as so many coiled springs. Taken into the body as food, the energy-carrying atoms are discharged in the body's protoplasm, the radiance furnishing new chemical energy, new electrical currents. Doctor Crile points out that the picture of an atom would look something like a solar system. In the center, where the sun would be, would be the nucleus. Around it, revolving about it as the planets revolve about the sun, would be the electrons. The human body, says Doctor Crile, is made up of such atoms.



Roofing Made of Cast-Iron Plates Which Looks Like Tile When Laid; a Locking Key Holds Slabs in Place

### CAST-IRON PLATES FOR ROOFING RESEMBLE TILE WHEN LAID

Cast-iron plates of special design are being used for roofing on homes and factories. They are easily applied and give the appearance of tiling when the roof is completed. Each section consists of two parts, the plate itself and a rounded cap which connects two plates and keeps rain from entering between them. Plates are spaced about an inch apart, the cap piece is placed in position over the flanges and a metal locking key is inserted on the underside of the cap. The key fits in a keyway which is part of the cap and extends between and below the plates to a position near the flange of the steel roof beams. The key engages below this flange and holds cap and plate to the beam. The placing of the keys is done from the top side of the roof, eliminating the need of scaffolding within.

C532

### REFLECTORS FOR ROAD POSTS GUIDE AUTOS AT NIGHT

Red reflectors mounted on white posts have been placed along dangerous curves on one highway in England to make night driving safer for motorists. The lights of cars shining on the reflectors not only make them serve as a warning, but also show the path of the highway for a considerable distance ahead.



© Planet News  
Red Reflectors on Roadside Posts Warn Motorists at Night and Indicate Path of Highway

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

at Hounslow  
Middlesex, England.



Two-Passenger Midget Auto Like a Toy Wagon; It Is Driven by Means of an Accumulator

### MIDGET AUTO LIKE TOY WAGON DRIVEN BY ACCUMULATOR

Resembling a toy wagon with an engine, a tiny auto attracts attention in Berlin whenever the youthful owner goes for a spin. It has room for two small passengers, was designed by a German engineer and is driven by means of an accumulator.

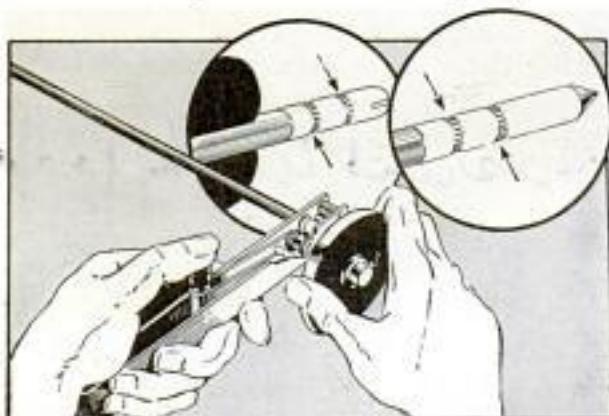
### OLDEST MANUSCRIPT OF BIBLE HAS UNUSUAL PASSAGE

Two of the oldest known Bible manuscripts, believed to have been buried in the sand of the Egyptian desert for more than 1,000 years, have been placed on exhibition at the Smithsonian Institution. The most significant is a parchment manuscript of the four gospels, which has a unique place among the source materials of Christianity. It was purchased in 1906 from an Arab dealer near Cairo and is believed to date from the fourth, or early fifth, century. Replete with textual errors of the copyist, it appears to have been prepared from two sources, probably the "Antioch recension," source of the Greek testament, and the "Latin recension," which was the gospel of the early western church. This gospel contains one significant passage which does not appear else-

where in manuscripts. Some critics hold that the portion of Mark which follows the Latin recension may be closer than any other source now extant to the original Greek gospel. The additional material is found in the sixteenth and last chapter, which describes the resurrection of Christ and follows the ninth verse. The disciples are talking with the risen Savior and the text is translated as follows: "And they answered saying, 'This age of unrighteousness and unbelief is under the (power of) Satan which does not permit things which are (made) impure by the (evil) spirits to comprehend the truth of God (and) his power. For this reason reveal thy righteousness now,' they said to Christ, and Christ replied to them, 'The limit of the years of the power of Satan has been fulfilled but other terrible things are near at hand; and I was delivered unto death on behalf of those who sinned in order that they may return to the truth and sin no more, to the end that they may inherit the spiritual and incorruptible glory of righteousness (which is) in Heaven. But go ye unto all the world and preach the gospel.'" The manuscripts have been accessible to scholars in facsimile editions for several years.

### POINTS FASTENED ON ARROWS WITH POCKET-SIZE TOOL

Points can be attached to arrows by the amateur or professional using a pocket-



Drawings Show How Simple Knurling Tool Makes Easy the Attachment of Points to Arrows

size knurling tool. This method eliminates the use of cement and punching with a nail. The tool may be used in the shop, at home or in the field. Aluminum nocks also can be attached with this instrument.

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C 769  
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5/24/32

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**BRITISH ISLES TO HEAR SUPER-POWER RADIO OVER TWO WAVES**

Powered at 100,000 kilowatts, a super-power radio broadcast station to be constructed in England is expected to serve the entire British Isles. It will have one long-wave transmitter for national programs, and a high-powered medium wave for regional programs, thus replacing two stations now in operation. Engineers anticipate better-quality broadcasting and less interference from the station, which is expected to be in operation next year.

Reported by Trade Com. Lloyd & Sullivan, London & Dept. of Commerce



Top, Gold Separator at Work as Operators Pour in Gravel; Bottom, View of Apparatus in Which Precious Grains Are Collected

es B3  
 Pat pend  
 \$342.50  
 fold item

foreign  
 \$375.00 ft Denver

**ROCKING JACK FOR AUTO HELPS IN GREASING**

As an aid in lubricating automobiles, an auxiliary jack which rocks the car back and forth is being used in some service stations. The rocking jack is air-operated through a direct line from the compressor and maintains a gentle rocking motion through a two-inch stroke. This makes it possible to properly grease frozen shackles, and allows the fine oil spray to enter between the leaves of the springs.

Rock A. Car Jack



Arrow Points to Auxiliary Jack Which Rocks Car While It Is Greased, and Locates Squeaks

**GOLD SEPARATOR IS PORTABLE FOR PLACER MINING**

Constructed so that it can be taken apart and packed on mules or in a light truck, a portable placer-mining machine is being offered as an aid in the renewed search for gold. The separator has a high-recovery rating, eighty-five to ninety-five per cent. One gallon of gasoline will operate the one-horsepower engine for six hours, while lubricating-oil consumption is small. Only a small amount of water is ordinarily required. A new-type riffle pan is used, its feature being the ease of removal without stopping the machine.

**SIX ELEMENTS IN MOTOR FUEL TRIED OUT IN ITALY**

Italy has approved the sale of a motor fuel containing six elements—absolute alcohol, aviation gasoline, benzol, acetone, ether and castor oil. The proportions of the ingredients for this fuel, known as velox, were not revealed, but it is expected it can be used in airplane engines as well as automobiles.

San Antonio Machine Supply Co  
 San Antonio, Texas

Reported by Commercial Alliance  
 Missouri M. Mitchell, Rome & Dept. of Commerce

c 694 Cont. es H. Macy  
46 39 Montgomery Ave  
Bethesda Md.

# UNCLE SAM'S

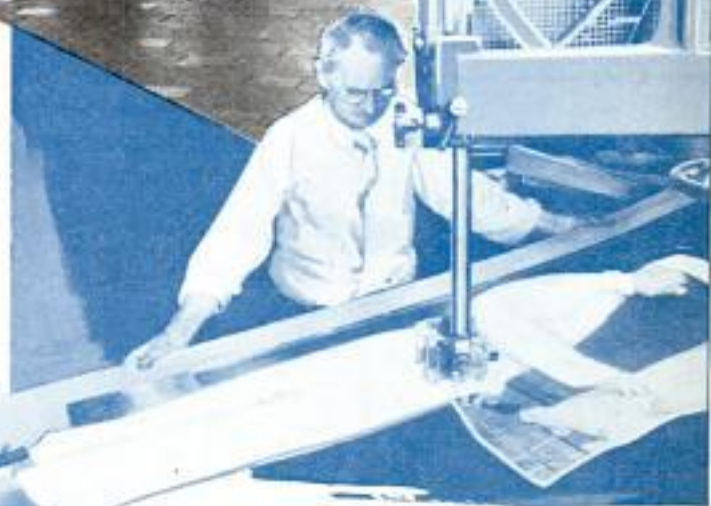


Above, Making Pictures in Statuary Hall in Washington with the Assistance of Long Ladders

**W**IZARDRY worked by the all-revealing eye of the camera has solved some of the most intricate enigmas which ever confronted the seasoned scientists of the government.

A case in point is that of the cameraman, M. L. F. Foubert, of the department of agriculture, who recently identified an unknown parasite which killed a race horse worth \$5,000 by making microscopic pictures of the contents of a flea's stomach.

Considering that the flea is so small that you can just barely see it, you can well understand its stomach is not large. Uncle Sam's scientific ferrets found some fleas bivouacked in the coat of a thoroughbred which died under mysterious circumstances. Eventually, the technicians as a last resort dissected the fleas under the microscope and delivered their stomachs mounted on glass slides to Mr. Foubert for photographing. By microphotography, he enlarged the stomachs over 1,000 times



and, aided by powerful mercury lights, took their pictures. The photographer even held his breath during that process as the slightest vibration would have ruined the vastly magnified art work. The pictures showed traces of horse's blood in the stomachs. That blood contained incredibly small parasites—the disease carriers which had killed the race horse.

Certain grasses turn white instead of green when grown in some soils. In making mystery-solving pictures of those dis-



# Photographic SLEUTHS

Right, Cutting a Mask, One of the Steps in a Rapid and Inexpensive Process of Producing Government Maps; Below, Cutting Out Large Figure Which Is a Bromide Enlargement Mounted on Plywood



eased grasses, Mr. Foubert, utilizing filters and artificial light, made exposures for thirty minutes, or longer. Amazingly delicate details are reproduced on the negatives by this practice. The lights are focused on the plant cells to illuminate them so vividly that the pictures can be made right through the very hearts of the plants and portray what is transpiring within the cellular tissue. By the process, Foubert can predict in advance when green plants are about to turn white and when the practice of scientific-control measures will be effective and cause the white plants to

resume their natural verdant coloration.

The cameraman investigator can show in pictorial form why one particular leather does not tan satisfactorily because of the uneven distribution of fat in the cellular structure of the skin. Foubert has solved some of the most baffling puzzles ever passed along to a technical cameraman. One of the epics of his marvelous collection is a color slide depicting the cannibalistic activities of a given bacteria which is parasitic on a second bacteria, which, in turn, is gnawing away tirelessly at the vitals of a living plant.

He has aided government scientists devise a pictorial-record system to identify domestic animals infallibly by the struc-



Posing a Pig Before Chart Which Makes It Possible to Keep Record of Its Development; Bottom, Bromide Enlargement of a Dairy Cow

ture of their hair. This is a stepping-stone in the method of identifying human criminals by the scales and structure of their hair.

How would you pose a living fish in a small aquarium if you wished to make "before and after" pictures showing inflamed and swollen spots caused by bacterial infection, and, subsequently, their appearance after successful treatment? The pictures were made with the camera mounted directly above the aquarium in a vertical position. The photographer, aided by profuse artificial illumination, bided his time until the pet was in the most advantageous position. Curiously enough, the artificial lights were used also to warm the glass and the contiguous water. The heat fooled the fish. That swimmer thought it was solar heat and swam as close to the light source as possible—and remained there. Just to prove that fish are gifted with some degree of memory, that same creature duplicated his performance several weeks later when the second series of pictures were made.

How would you photograph a cotton shirt to show the penetration of starch resulting from laundering? Science does the trick by microscopic enlargement and the use of filters and lights. Under normal conditions, both the fiber and the starch

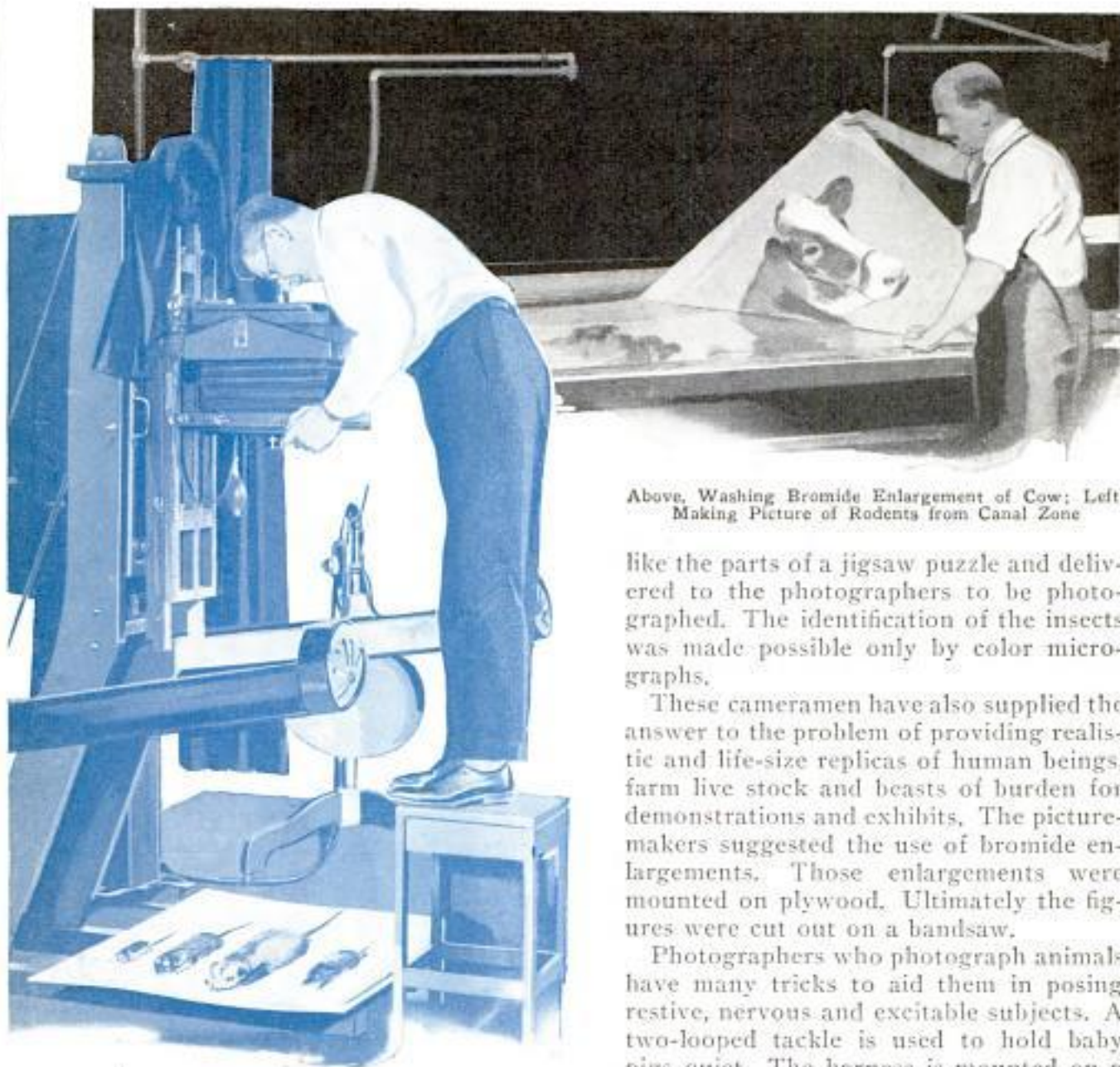
reproduce as white. But the use of a yellow filter on the camera lens makes the starch stand out as green against the translucent fiber. That simple expedient enabled investigators to trace the



starch in hotel linen which had been laundered several hundred times.

Government photographers also bring to light symptoms of diseased plants invisible to the human eye by the use of filters and artificial lights. A typical case is that of a certain potato disease which attacks the vines and leaves of the plants long before any signs of infestation are visible. The use of lights and filters gives pictures showing positive evidence of this disease several months before its presence is otherwise manifested.

C 694



Above, Washing Bromide Enlargement of Cow; Left, Making Picture of Rodents from Canal Zone

like the parts of a jigsaw puzzle and delivered to the photographers to be photographed. The identification of the insects was made possible only by color micrographs.

These cameramen have also supplied the answer to the problem of providing realistic and life-size replicas of human beings, farm live stock and beasts of burden for demonstrations and exhibits. The picture-makers suggested the use of bromide enlargements. Those enlargements were mounted on plywood. Ultimately the figures were cut out on a bandsaw.

Photographers who photograph animals have many tricks to aid them in posing restive, nervous and excitable subjects. A two-looped tackle is used to hold baby pigs quiet. The harness is mounted on a special background, being operated by a concealed attendant. The background is spaced into uniform squares, and pictures of the growing porkers are made at intervals, serving as faithful records of growth and development.

Uncle Sam has also evolved unique camera stands to facilitate making pictures of the body contour of experimental cattle and hogs from directly overhead. The platform for photographing the backs and sides of cattle is twenty-six feet high, the camera being mounted in a vertical position. The pose is fixed so that pictures taken at different ages of the same animal can be compared and measured scientifically. A similar stand sixteen feet high is used in making pictures of groups of hogs.

Another pictorial puzzler hinged around the portrayal in film of the "wear-worthiness" of different samples of carpets and rugs. The task assigned to the photographer was to show definitely the structure of the fibers in these floor coverings, and how they withstood strenuous service. That was solved by powerful magnification to enlarge the desired images so that their most minute details could be recorded.

A scientist in an airplane at different altitudes exposed sticky-glass slides directly in the air blast in attempts to collect specimens of insect life present in the upper air. The force of collision was so great when the insects struck the exposed slides that many specimens were smashed. Those remains, however, were patched together

C 170 4  
230

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However, when choosing the proper camera plates or films, recalling that the major part of the photographic effect is due to light of short wavelengths, the blue and violet colors, it may be seen that this method approaches invisible photography. Removal of prominently visible rays, especially the yellow colors to which the eye is most sensitive but the camera plate is not, will minimize the disturbance to the subject who may not even be aware of the flash nor of the fact that

**GOLD PAN OPERATED BY MOTOR COPIES HAND METHODS**

Closely copying the old hand-panning method of gold mining, a motor-driven gold-panning machine has been produced for small-scale placer operations. In order to produce the same motion of hand panning, the combination of pans is slightly tilted, while a steel yoke and saddle connected to a rotating, ball-bearing eccentric give a positive vibrating motion that settles the gold. The gravel is shoveled into the feed hopper of the new pan where it is washed and screened over a coarse punched plate and then a finer screen by the vibrating motion. The finer material falls on the first of three concentrating pans, which has a copper bottom coated with mercury for amalgamation. The second and third pans have bottoms lined with a special rubber matting to catch the fine gold.

he has been photographed. Such flash-lamps should be a boon to news photographers who must get shots in court rooms and of timid or distinguished personages. Many bulbs are studied by the Westinghouse Lamp company in producing a flashless flashlamp for commercial uses.

**PUZZLES CUT BY STEEL STAMP INSTEAD OF JIGSAW**

Fast production of jigsaw puzzles is made possible by a steel die that cuts the puzzles into the desired number of pieces by a simple stamping process. The sharp-edged steel strips, which form the die, can be crimped into many fantastic shapes



Left, Jigsaw Puzzle; Right, Steel Stamp for Cutting Out Odd-Shaped Pieces; Bottom, Press for Operation of the Stamp

**FLASHLESS FLASHLAMP AIDS PHOTOGRAPHER**

By coating the inside of photographic flash bulbs with a peculiar deep blue dye, the visible flash can be almost entirely removed without destroying the effectiveness. If the eye and camera saw alike, cutting down the visible light this much would be detrimental to securing good pictures.

by an adjustable mechanism. The rapid stamping method is said to be economical for the small puzzle-making shop.

Westinghouse Lamp Co  
150 Broadway, N.Y.C.

J. F. Helmholtz  
146 E. Custer, Chicago

Chicago, 146 E. Custer, J. F. Helmholtz

# Stable Is Transformed into Attractive Home



This Attractive Country House Was Once a Stable; in Remodeling, the Architecture of the Barn Was Retained and Emphasized by the Quaint Simplicity of a Modernized Early American Influence; Top, Picturesque Open Staircase Leading from Dining Room, and the Rustic Garden; Below, a View of the Living Room and Its Plain Furnishings, and the Quaint Entrance to the Home

*Not an actual residence Keystone  
Set for motion picture  
'When Ladies Meet.'*

C 7-43

232

American Radiator +  
Standard Sanitary Corp.  
POPULAR MECHANICS

40 W. 40th Street, New York

## Home-Made Weather Regulated by Dials

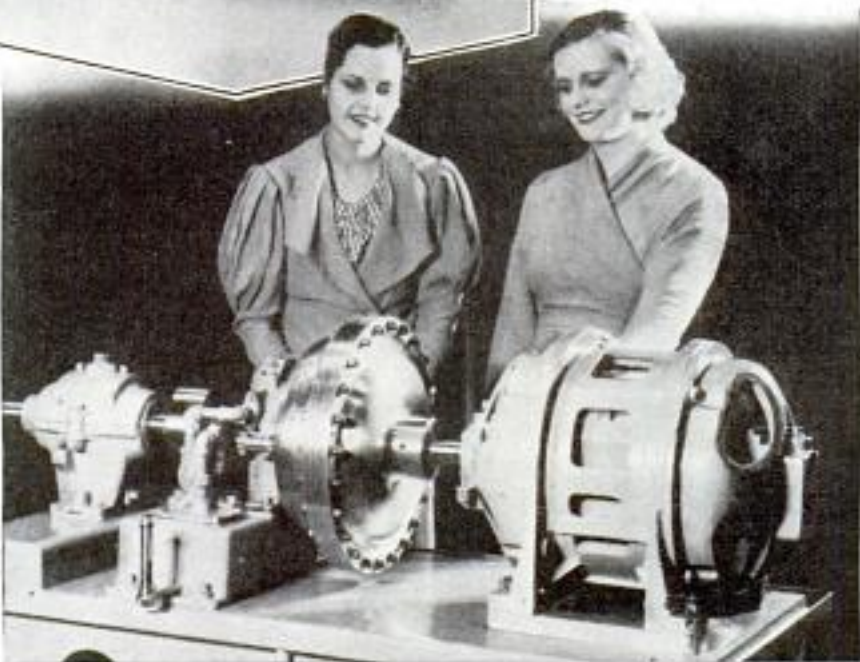
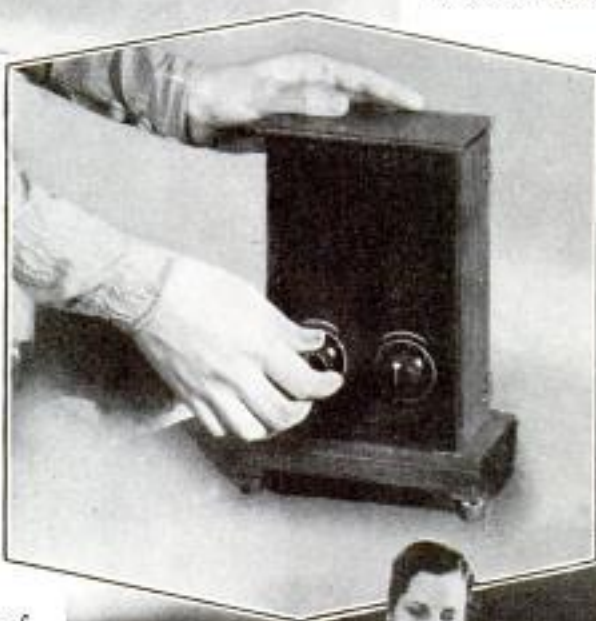


Top, Dial of Seasons, Showing Possibilities of Machine-Made Weather; Center, Radiolike Regulators; Bottom, the Hydraulic Coupling

Machine-made weather for the home has reached a stage of development where "indoor climate" can be controlled from any part of the house with regulators as easy to operate as the dials of a radio set. Visitors to the World's Fair in Chicago see a display of equipment developed in the last few years which enables mankind to control the weather of the home and be independent of outside-weather conditions in any part of the world. Automatic weather machines can now cool in summer, heat in winter, add or reduce the amount of moisture in the air, and purify and circulate the air through the home the year round. Much of this equipment is economical to operate, some is suited for installation on present heating plants, and all of it is designed to

be within reach of the average home owner. In one such unit, known as a decalorator, steam is used for summer cooling, water being the only refrigerant. The steam creates a vacuum under which city tap water is reduced to temperatures low enough for cooling. A gas boiler is employed to produce steam as well as the hot water necessary for winter heating, the same ducts which supply heated air in winter furnishing the cooled atmosphere for summer. A mechanical development used in such installations is a hydraulic coupling

which eliminates much expensive and complicated electrical-control equipment formerly used in air handling, and makes possible a considerable saving in horsepower. The coupling can be manually or automatically operated to control the speed



of fans. Another installation utilizes the principle of the gun silencer to eliminate

noise in an air-conditioning unit for offices, bedrooms or similar locations. Air conditioning is only one of the services such equipment is able to perform today. It makes people independent of outside weather on the coldest winter day or the hottest summer night, eliminates dust and dirt, does away with drafts and keeps out noise. To show what can be accomplished with these weather-making devices, a "Garden of Comfort" has been built at the Century of Progress where visitors not only see the weather machines operate, but experience the results. Adjoining the garden where weather is regulated, is a home where the manufactured weather also is controlled mechanically.

C 719

**PORTABLE MOTOR-DRIVEN SAW SPEEDS UP TREE FELLING**

Easily moved from tree to tree, a light-weight power saw is speeding up the lumberjack's job. The equipment, consisting of a chain-type saw with a self-contained gasoline motor, has remarkable cutting capacity. Hardwood trees fifteen inches in diameter can be felled in about twenty seconds and the speed in soft woods is greater. Engine speed is controlled by a



Collection of Gold Nuggets, Hooks and Ornaments; Inset, Golden Fishhook of South America

**ANCIENT FISHHOOKS OF GOLD DREDGED FROM RIVER BEDS**

Fishhooks of gold, hardened by a secret process, have been recovered from river bottoms in which they were lost hundreds of years ago by their Indian owners in South America. Dredges have brought up from the river beds of Colombia these hooks, gold earrings, finger and nose rings and several nuggets. The largest nugget weighs over ninety grams and contains gold worth nearly fifty dollars. One of the fishhooks is valued at \$4.23, based on the amount of gold which it contains.



Tree-Felling Saw in Operation; Note Small Motor at Right Controlled by Cycle-Type Handle

motorcycle-type throttle on the right handle, while a switch on the other handle stops the motor.

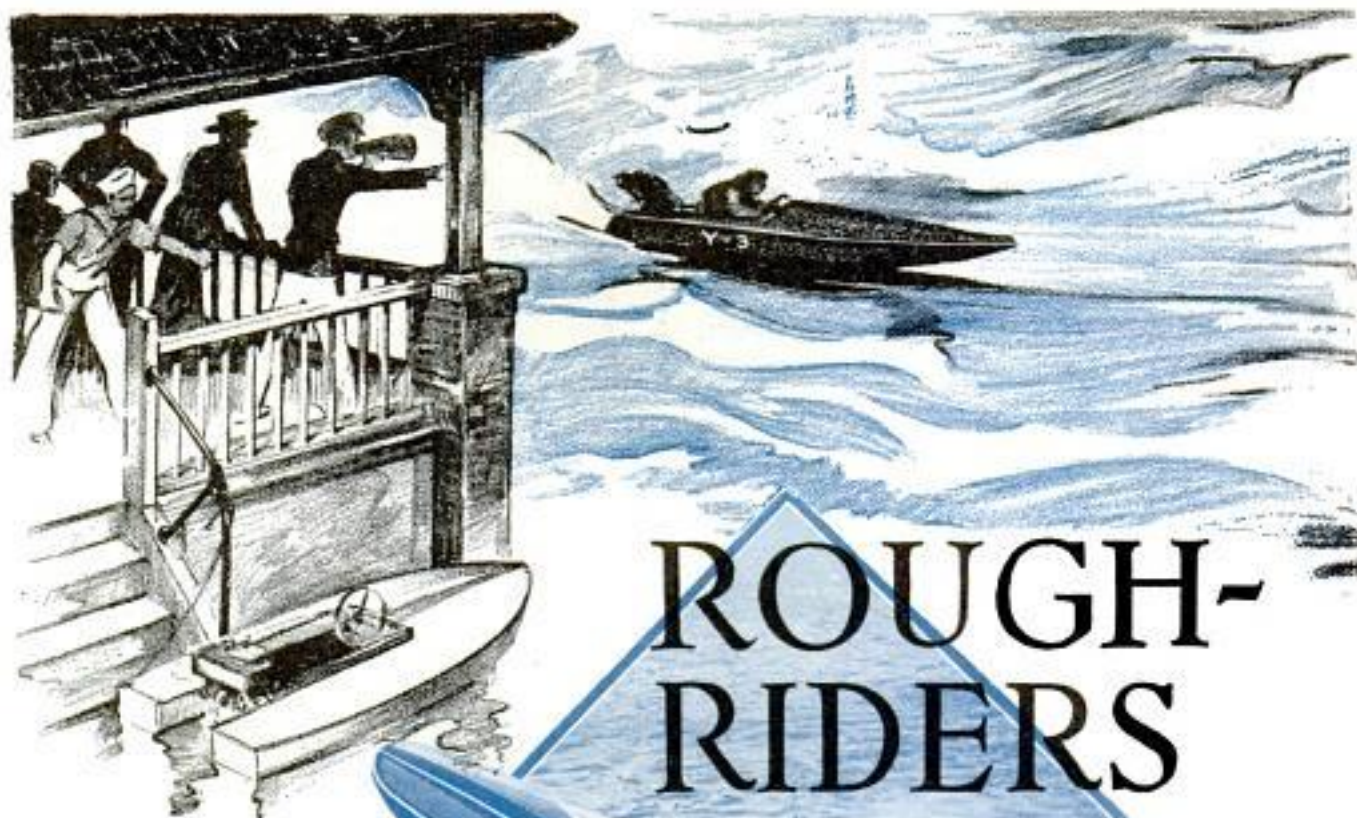
**EARTH SEEN FROM THE MOON WOULD APPEAR BLUE** C 810

If the earth were to be viewed from the moon or from some other distance out in space, it would appear as a bluish planet. This is the decision of Prof. V. M. Slipher, of Lowell observatory, who determined the color from spectrograms made photographically of the earthshine on the moon. Light from the earth was reflected back to the scientist's delicate instruments. Pluto is of a reddish hue.

*Science. News Letter 5/27/33*

*Reed. Prentice Corp. Worcester, Mass*

*Flagstaff Ariz*



Right, Loretta Turnbull, Often Called "Queen of the Outboard Racers," Warms Up Her Boat Before an Event; Note How Powerful Motor Thrusts Nose of Craft Out of Water

By JULIAN LEGGETT

**R**UNNING an outboard motor through its paces over a wave-torn racing course is just like riding a bucking broncho, except that a high-powered boat produces more jumps per second and far greater speed.

Not every one can drive an outboard racer. The wave-jumping pilot must know what to do and when to do it, he must have a superfine sense of balance and he must possess more than ordinary courage to stick to his tiny hull when the going is rough.

At the starter's gun, the outboard boat's nose is thrust high out of the water by the drive of its powerful motor, so the driver's first job is to throw his weight forward onto the deck to prevent his mount from overturning backward or veering off at a crazy angle. As the boat

# ROUGH-RIDERS

Courtesy Johnson Motor Co.

*Waukegan Ill*

gathers speed, the pilot gradually shifts his weight until he is sitting far enough back to keep the bow, or nose, well clear. This reduces friction between the bottom of the boat and the water, increasing speed so that the tiny hull is racing along at its fastest pace in a few hundred feet. The speed depends, of course, on the size of the motor and construction of the boat.

Making the turns is another test of skill since weight must be adjusted as the speeding hull is swung around the barrel





# of the WAVES

buoys to reduce the time of turning and the chance of capsizing. The experienced skipper knows that cutting down the number of turns enables him to get more speed, so he swings wide and makes two turns suffice for the half-dozen scattered around the five-mile course. In the early days, the driver often plunged his clinched left fist into the water to serve as a pivot on which the boat turned, but a broken arm probably would result from trying this trick at the higher speeds of today.

The whirling propeller on an outboard hydroplane, a type of boat that attains exceptionally high speed, revolves about three times as fast as the average airplane propeller, making the small craft very un-

stable and increasing the importance of a sense of balance to avoid spills.

Flashing across the water at express-train speed is productive of more thrills than perhaps any other form of sport. Some of these rough riders of the waves have deserted airplane piloting and automobile racing to flirt with danger behind the wheel of a tiny outboard. On one occasion, Lawrence Masters, Chicago driver, was leading by a wide margin when a rod in his engine let go, bombarding him with steel bearings. Then the rod broke loose and pierced one of the two life jackets he was wearing. The pilot was knocked onto the deck of his craft and narrowly escaped overturning four miles out in Lake Mich-

Over the Tops of the Waves  
Goes This Speedy Craft





igan. Other drivers tell of close contact with the more perilous side of the game. Some have had steering cables break and whip around their necks and into their faces, inflicting painful injuries.

When the tiny boats race around the turns with the stern of one almost touching the bow of the next, danger is riding high. If the leading hull strikes a wave at

Art Sauerberg in World's  
Record Time Trial of 58.91  
Miles per Hour



Top, Start of a Race around Manhattan Island; Note the Waves; Below, Two Views of Exciting Moments; Bottom, Taking a Fast Turn around a Buoy

the wrong angle and overturns, the one following probably will cut right through the capsized boat, sending it to the bottom and perhaps seriously injuring one or both drivers. Almost anything can happen if the outboard racer gets beyond control. Boats have been known to throw their drivers twenty-five feet or more, or to drag them down when they failed to free their legs from the small compartment under the deck.

But for all the risks, outboard racing

has a record of few serious accidents and it holds an undeniable appeal for boys and men, girls and women. The game is young, scheduled regattas having been held for only six or seven years, but each year brings new faces into the circle of competing drivers.

Precautions for safety are being taken by manufacturers and federal and state authorities, cooperating with the National Outboard association. For instance, every driver is required to wear a life jacket, which is cumbersome even when dry. If it is



Top, Right, Off to a Flying Start in Lipton Trophy Event; Left, Chuck Hall, Leader among Outboard Skippers, in His Speedy Craft

speeds to sixty miles per hour. Class "C" probably is the most popular, although the larger motors attain higher speeds. For instance, Art Sauerberg, a professional, set a world's record for outboard motors at 58.91 miles per hour with an "F" motor. Other professional drivers, and amateurs, have crossed the fifty-mile mark, but the game is so young and motors and racing hulls are being improved so rapidly that records established today probably will be broken tomorrow.

Back in the early days, each driver had his own ideas about how to pep up his racer. Some used shaving cream to lubricate their motors, while others favored vaseline and similar preparations. Fuel mixtures included the combination of wood alcohol and castor oil or that of benzine, alcohol and castor oil. Today, special graphited heavy oil for lubrication and racing fuels especially adapted to the outboard motor are in use.

Likewise, motors have been greatly improved. In addition to outboards for fishing, hunting and other everyday purposes, special racing jobs are being produced in Johnson, Caille, Evinrude, Elto and other factories. Speed ratings are available for each motor to tell the owner what he may expect if his hull is constructed properly.

Pioneers in the game had widely different ideas on how to get more speed out of

(Continued to page 125A)

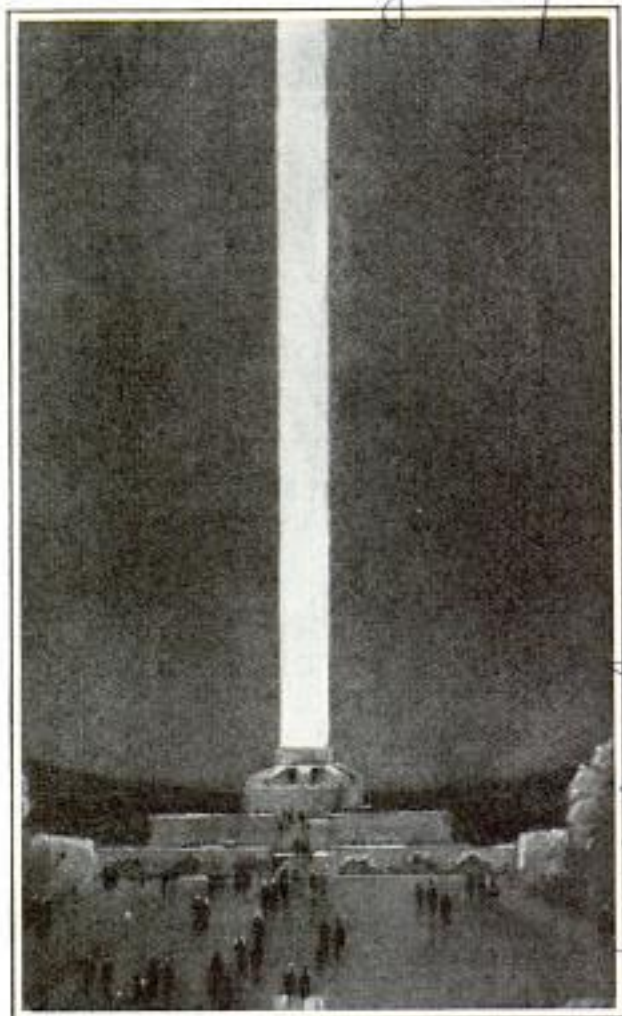
wet, and it usually is, its weight is about fifteen pounds, something of a handicap to action but giving the wearer plenty of protection.

At present, outboard motors used for racing are classified, starting with the new sub-class "A" in which the engine has a piston displacement of only seven and one-half inches and a speed between twenty and twenty-five miles per hour. This motor is designated by some manufacturers as "M" or midget. Then comes the "A" class and on up to "F," with displacements ranging to sixty cubic inches and

C 372

Com. Jacob Leschick  
1510 Jesus Ave  
New York City

Mr. Charles Thom  
Kenneth B. Raper



Drawing of Memorial Proposed for the Late Thomas A. Edison; Note Giant Shaft of Light

### GIANT LIGHT SHAFT PROPOSED AS EDISON MEMORIAL

As a memorial to the late Thomas A. Edison, a 400-foot shaft of light projecting into the sky is proposed. The light would be generated by a giant dynamo in a building in Menlo Park, N. J. Mrs. John Eyre Sloane, daughter of Mr. Edison, suggests the memorial.

### THIN FILM CLINGING TO METAL MAY PREVENT CORROSION

Better protection for metal surfaces against rust and corrosion may be one of the practical results of a recent discovery by two British physicists. Their discovery has to do with the way thin films of atoms or molecules arrange themselves when deposited on the surface of other metals by the electrical method known as "sputtering." They found that the atoms arranged themselves in the shapes of the metallic

crystals underlying them and not in their own natural shapes. Aluminum on platinum assumed the dimensions of the platinum crystals so far as length and breadth were concerned, though the aggregations of atoms kept the greater height characteristic of aluminum. Thus, the deposited film is no loose layer laid over the surface, but is gripped by every atom in it.

### FUNGI USING ARSENIC AS FOOD PRODUCE DEADLY GASES

Thriving on things that are rank poison to other plants and to animals, certain fungi have been found to have astounding appetites for compounds of arsenic. Two deaths in Great Britain, apparently due to the action of these molds on arsenic-containing walls, inspired the U. S. department of agriculture to study this problem. It was found that some forms of fungi fed on arsenic compounds gave off poisonous gases in abundance. As a result, it is recommended that compounds of arsenic should not be used as preservatives for materials kept in inclosed spaces.

### BOY'S CAR BUILT FROM RUBBISH RUNS AT LOW COST

Seventy miles on a gallon of gasoline at a top speed of thirty-five miles per hour is the record of the auto which a fourteen-year-old Los Angeles boy constructed from junk-pile materials, his mother's dishpan and a 1918 motorcycle engine. The



This Midget Car Is Just a Pile of Junk, Having Been Built from Rubbish Materials, But It Runs

little car, which has room for only the driver, has a modern radiator shell, but no hood, no top and no upholstered seats.

Science News Letter 5/27/37

Prof. W. Fincham and Mr. Quarrell, Imperial College, London, England.

Acme  
Harry Steniar  
Copyrighted material

*Kleener, Calif*  
**Gold Dust Forced to Float in Recovery Plant**

By forcing tiny particles of gold to float, placer-mining operators are conducting a successful recovery business. Machines for applying the flotation principle have been placed on the market recently after thorough tests. Comparatively coarse gold is recovered by the usual riffles, matting and mercury trap and then comes the recovery of the fine, flour gold which usually is carried away by the wash water. The flotation unit



Hand-Panning Method of Recovering Gold Compared to Machine That Forces the Fine Grains to Float



and shipped as bullion. Flotation reagents, used in small quantities, are inexpensive, costing from two to four cents per ton of flotation feed. Outside the cost of handling the gravel and tailings, the whole process of recovery costs but ten to fifteen cents per ton. The machines, some of them adapted for easy transportation by mule back or automobile truck are built to handle from five tons of gold-bearing sand and gravel a day and up. They may be used in recovering values from old low-grade mine dumps, as well as from

may consist of one, two or more cells. Reagents, usually pine oil for frothing and xanthate with a hardwood creosote for collecting, are added in minute quantities to the fine pulp and water left after coarse gold has been removed. When the mixture has been aerated, the particles of gold attach themselves to the air bubbles and float to the surface, where they are quickly removed. In this manner, concentrates containing from \$500 to \$5,000 per ton may be obtained and shipped to a smelter for refining. Or, the gold may be separated by amalgamation with mercury or dissolved in cyanide, then precipitated

placer operations, often turning an unprofitable venture into a success.

**COAL BEING MINED WITH SAW INSTEAD OF EXPLOSIVES** *c808*

Coal is now being mined with a saw instead of being broken loose with explosives. The development of the coal saw to its present practical state has improved both the quality and value of coal, mining men claim. It has likewise improved working conditions and safety in mines. Large lump coal which stands handling well results from saw mining.

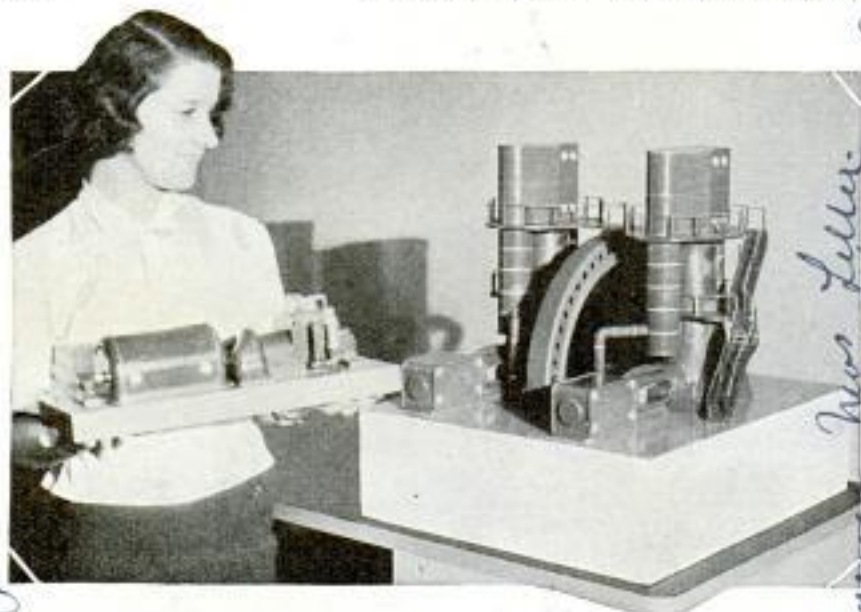
*C. H. McLaughlin, Supt  
 Pioneer Coal Co  
 315 Lathrop, Louisa, Va*

*Canada - 92 Front St. W. Toronto.  
 London, Eng. - 840 Salisbury House London Wall*

*See new letter 5/27/33*

Developed by  
Bell Telephone Laboratories  
463 West St.  
C811

WATCHES ARE SET  
IN TEN MINUTES  
BY TIMER



Left, Modern Turbine and, Right, Old-Fashioned Steam Engine; Both Produce Same Power But Engine Is Seventeen Times the Size of the Turbine

PROGRESS OF POWER PLANTS  
REVEALED BY MODELS

Advancement in the design and efficiency of power plants is demonstrated by two models recently placed on exhibition by the Westinghouse Electric and Manufacturing company. One model represents the Manhattan steam engine of thirty-two years ago, while the other is a miniature modern turbine. The steam-engine model is more than seventeen times the size of the turbine, yet both original plants produced the same amount of electric current, 7,500 kilowatts. When the Manhattan engine was replaced by the modern turbine some time ago, the output of the New York power station was quadrupled without enlarging the space required to house the old engine. The turbine enables the modern man to produce far more than his predecessors, yet at low cost. F. R. Moulton, Chicago engineer, points out that in 1931, the equivalent of the mechanical work that a man did in a day of ten hours was done by electricity at an average cost of about two cents. More work was done by electricity alone in the United States in 1931 than could have been done by all the horses and men in the country if they had worked ten hours per day, every day in the year. The nation's enormous productivity can be traced largely to efficient machinery.

Regulation of watches in ten minutes, instead of the ten days ordinarily consumed in setting the timepiece for maximum efficiency, is made possible by a new electric timer. Accurate time intervals, given by a special electrical current of 100 cycles per second, are supplied, with the special current driving a synchronous motor similar to those that have come

into such wide use in electric clocks. Within the new timer, an image of the watch balance wheel is reflected on a mirror, and a flashing lamp controlled by the precise motor flashes. This makes the watch's balance wheel seem to stand still when the watch and motor have exactly the same speed. This stroboscopic effect allows the jeweler to inspect and diagnose any trouble in a watch, as well as to regulate it.

GRANDSTAND RIDES ON ROLLERS  
TO SITE TWO MILES AWAY

When it became necessary to vacate the site of an auto-race track in California,



How Rollers Helped in Moving Race-Track Grandstand; After Being Placed on Wheeled Base, It Was Pulled to New Site

the operator placed his grandstand on large rollers and moved it overnight to a site two miles away where it now stands.

Cont. J. Ripley Edson  
Box 98, Mission Beach  
Calif.

East Pittsburgh, Pa

5/27/33  
New Letter

© 599

San Diego

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Latest Air-Transport Plane in Europe; Note How the Twin Cabins Are Constructed under the Wings, with the Cabin Roof as Part of the Wing; Each Cabin Has Two Wheels

**CABINS UNDER WINGS OF PLANE FOR PASSENGER SERVICE**

Departing from ordinary construction, builders of a new French passenger plane placed the cabins under the wings instead of on the fuselage. The ship is a four-wheeled Bleriot type, with a front motor to pull and a rear motor to push.

*Typographer Co. Inc.*  
*100*  
*New York*  
*Ind. U. Calif.*

**FOUNTAIN PEN WITH INK GAUGE SHOWS WHEN TO REFILL**



There is no guessing about whether it is time to refill a new fountain pen equipped with an ink gauge. The ink level is visible. The pen is ebony black material and is fitted with a gold pen point, iridium tipped.

**MUSSEL FARM SUPPLIES SHELL FOR PEARL BUTTONS**

Mussel farming to produce shells for the pearl-button industry has been conducted as an experiment for several months in Texas by Dr. M. M. Ellis, of the bureau of fisheries, U. S. department of commerce. The natural-shell supply is being destroyed rapidly by erosion and pollution in rivers. In average years, the

pearl-button industry purchases about \$5,000,000 worth of shells from fishermen. The experimental farm is so arranged that the various species of mussels are reared under a wide range of conditions. In this way, it is possible to determine the most desirable type of food, water temperature, mussel-bed composition and other factors. The mussels are planted in concrete troughs which are divided into sections. It has been found that mussels can exist as long as nineteen months without food. During this period, there is virtually no growth. Fed continuously they grow rapidly. It is believed that the most economical time to harvest them is when the mussels are between three and five years old.

**BUTTONS OPEN KEYLESS LOCK BY MANY COMBINATIONS**

Operated by push buttons that can be arranged to work more than 40,000 combinations, a keyless lock has been produced. It may be opened in the dark without the aid of a light. All of the buttons on which the combination has been set are pressed at the same time, instantly opening the lock. The combination may be changed at will.



*U.S. Dept. of Commerce.*  
*5/12/33*

*Inv. O. J. Blaschke*  
*409. 17th St.*  
*Merced, Calif.*

# The MAN who PILOTS



Above, Pilot Conversing with Radio Dispatcher; Right, Dispatcher Taking Barometer Reading Preparatory to Aiding in Landing a Plane

By H. W. MAGEE

**T**WO thousand feet above the cornfields of Iowa a United Air Lines passenger plane is streaking toward Chicago from Des Moines at 150 miles an hour. Up front the pilot and his mate appear bored by the vista stretching below. In the cabin a pretty stewardess passes magazines to passengers who try to appear as bored as the pilots.

Gazing idly from your window, you note the overcast sky, the thickening haze ahead and the lessened visibility. A while ago the sun was shining. You begin to wonder if it will rain, what the weather is like in Chicago, whether you will arrive on schedule. Off to the right there is a flash of lightning. You wonder if the pilot

saw that. He probably did, but the pilot isn't worrying about the weather. He's probably wondering if his wife will drive to the airport in the rain to meet him. For he knows the weather all the way to Chicago. As a matter of fact he knew about the storm you see ahead before he left Des Moines. Probably he has made an "end run" around the worst of it. Since taking off he has found out it has started to rain in Chicago but that visibility is good. He knows the condition of the lit-



# the PILOT . . .

the square you see below that is an auxiliary landing field. He knows the west side of that field is soggy and would avoid that side if he landed on it.

How does he get all this information and lots more which you, a passenger, know nothing about? Probably you have guessed it—the radiotelephone. Inside the flaps of his helmet are earphones. In front of him is a little transmitter. He is never out of touch with the ground for more than a few minutes. And when he calls, day or night, twenty-four hours of every day and sixty minutes of every hour, a man stands ready to respond with information, advice aid—whatever the pilot asks. He's the radio dispatcher, the man who pilots the pilot, and the chap this piece is about.

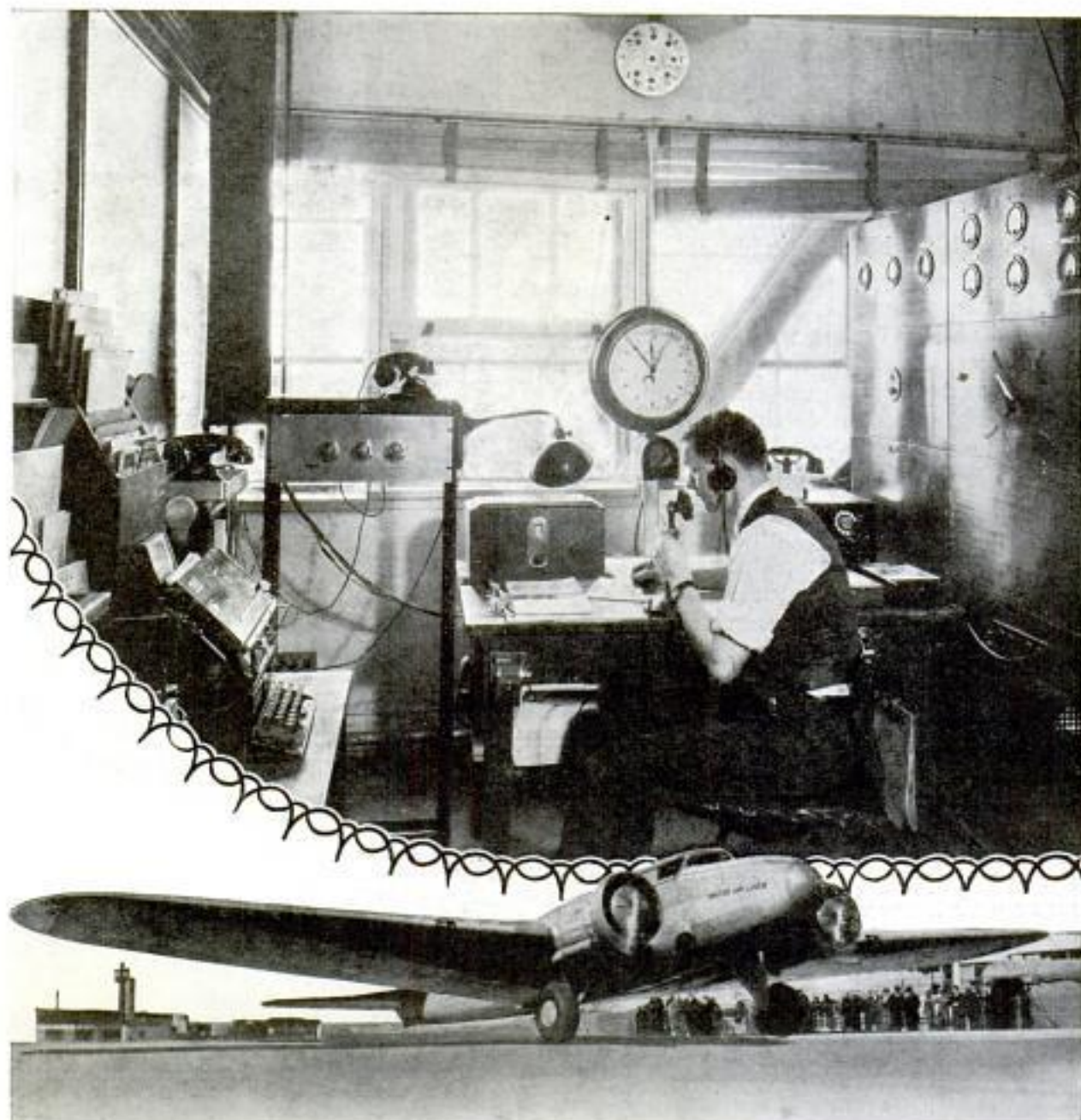
At the turn of the century, many an ambitious youth with time to spare could be found at the railroad station most any day. He struck up an acquaintance with the telegraph operator, and if the key-pounder was good-natured, he agreed to teach the youngster the key in return for sweeping out the office and carrying in coal. Eventually the boy might be found sending dots and dashes ordering the milk train to take the siding for the Bullet limited.

Today modern youths are wearing paths to the community airports, drawn by the same magnet which attracted those of another generation to the telegraph offices. These ambitious boys enviously watch trim young fellows in neat uniforms conversing with pilots speeding over the air lines and long to be on the same chummy terms with the flyers.

The radio dispatchers fill brand-new positions created by a brand-new industry—commercial aviation. Each is being trained and is



Dispatcher on Roof of Airport Conversing with Pilot of Transport Plane about to Land; from This Remote-Control Point the Dispatcher Serves as Extra Eyes for the Pilot



Above, Dispatcher in the Radio-Control Room; Note Clock Which Indicates Time for Calling Each Ship in the Air and, at Extreme Top, the Dial Which Is an Electric Wind Indicator

training himself for advancement in this industry, and dispatching is just a step in the ladder. The average dispatcher knows next to nothing about the technical details of radio. He can change a tube, change the frequency of his set by twirling a knob and may be able to change the equipment in a plane, just a matter of disconnecting a few wires and supports.

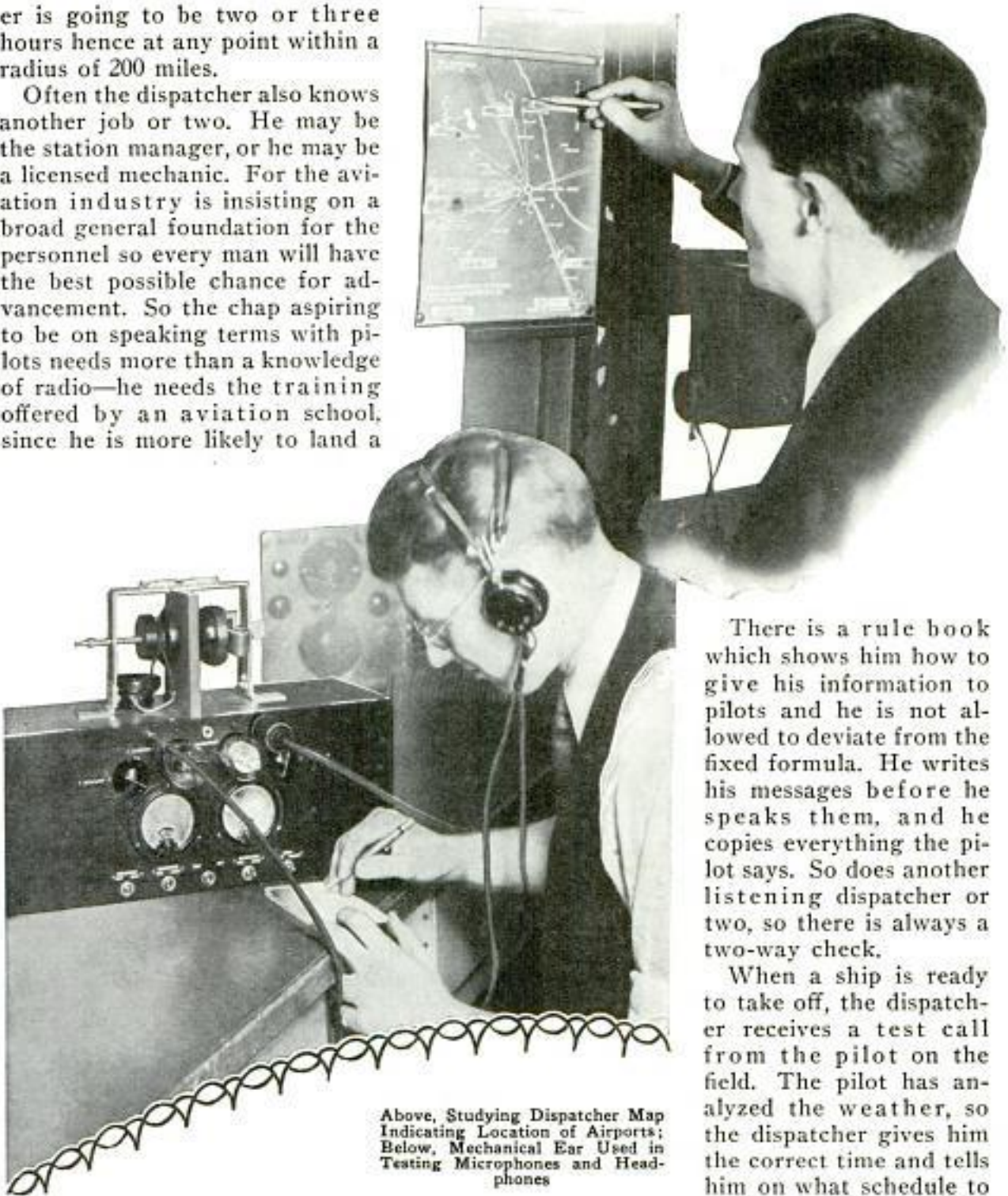
But the dispatcher does not keep his set in repair—he leaves that to the maintenance crew—and the youth who starts on the road to dispatching by building his own set may only be wasting time. While the dispatcher is not a radio expert, he

knows a lot of other things you would never suspect from his title.

He has a good working knowledge of meteorology, for instance. Also he is a pretty fair weather forecaster. In addition he knows his geography, at least in his own territory. He knows the terrain, the location of all landing fields, the condition of these fields and the exact route of his air line. Last of all, and probably most important, he knows his weather. He knows what the weather was yesterday, what that means with relation to today, what the weather conditions are 100 miles away now, and just about what the weath-

er is going to be two or three hours hence at any point within a radius of 200 miles.

Often the dispatcher also knows another job or two. He may be the station manager, or he may be a licensed mechanic. For the aviation industry is insisting on a broad general foundation for the personnel so every man will have the best possible chance for advancement. So the chap aspiring to be on speaking terms with pilots needs more than a knowledge of radio—he needs the training offered by an aviation school, since he is more likely to land a



Above, Studying Dispatcher Map Indicating Location of Airports; Below, Mechanical Ear Used in Testing Microphones and Headphones

There is a rule book which shows him how to give his information to pilots and he is not allowed to deviate from the fixed formula. He writes his messages before he speaks them, and he copies everything the pilot says. So does another listening dispatcher or two, so there is always a two-way check.

When a ship is ready to take off, the dispatcher receives a test call from the pilot on the field. The pilot has analyzed the weather, so the dispatcher gives him the correct time and tells him on what schedule to report while in flight.

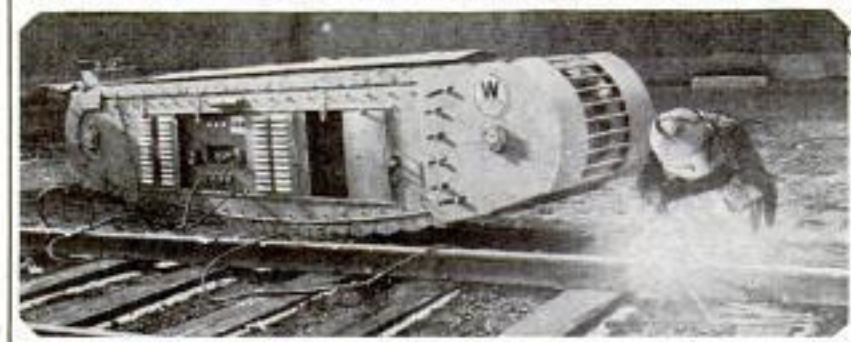
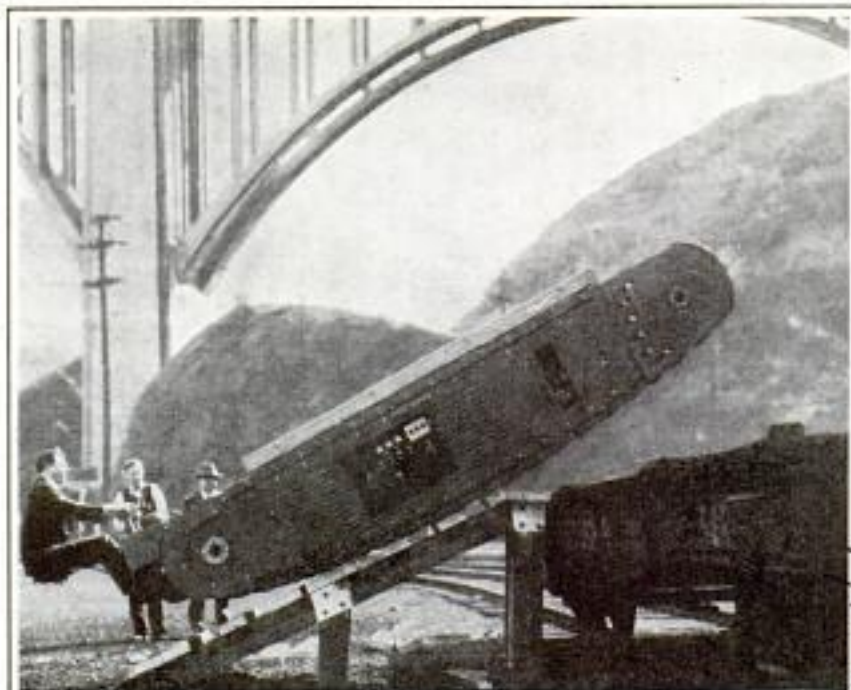
job if he knows three than if he only knows one.

The dispatcher who keeps the ships moving acts for the station manager who is the responsible man at each airport. While the dispatcher is a garrulous person, his topics of conversation are limited. He doesn't twirl a knob and decide on impulse to ask Pilot Johnson over at Omaha how last night's rummy game turned out.

Once in the air, the ship is covered by two stations, the one he has left and the one toward which he is proceeding, the latter usually being designated the control station.

Above the dispatcher's desk is a clock with a dial circled by letters, each combination of letters representing the time a pilot is to be called by radiophone. The

(Continued to page 120A)



Top, How Peace-Time Work Tank Is Loaded on, or Unloaded from, Flat Car; Bottom, Tank in Use for Welding Beside Railroad Tracks

### WELDER LIKE WAR-TIME TANK USED ON PEACE-TIME JOBS

Closely resembling the war tank, a mobile electric arc welder has been tested successfully for use in rehabilitating railroad tracks, steel bridges and other industrial property. The machine, weighing more than five tons, is a long, narrow tractor, only thirty-six inches high. A gasoline engine drives an electric generator which supplies current for the welding operations, and for driving the tractor from place to place by furnishing power to electric motor-driven tread chains. Small in width and height, the machine can be parked adjacent to railroad tracks without interfering with passing trains. In spite of its weight, the tank easily ambles over railroad rails, climbs an eight-foot ramp onto a standard railroad flat car, fights up a steep thirty-degree bank and runs along side slopes as steep as forty-five degrees

without tipping over. It turns around in a space the size of a three-foot circle and can extend nearly half its length beyond the top of a wall without toppling over. Six of the welders have been constructed by the Westinghouse Electric and Manufacturing company for the Lehigh Valley railroad.

C 767

### SKY'S "STAR DUST" MEASURED BY LIGHT COLOR

Measurement of the amount of "star dust" in the heavens has been accomplished by studying the colors of the light of the stars. Astronomers at Yerkes observatory, University of Chicago, calculate that the amount of gaseous and solid material between the earth and one of the most distant stars is not more than could be packed into a half-inch cube. The

astronomers found that observations made with a forty-inch telescope showed that the light of distant stars is dimmed in its passage through space and that its color is reddened. The same effect was noted in observations made at the Lick observatory. Distant stars appear somewhat redder than those closer to the earth, an observation which suggests effect similar to that which makes the rays of the sun look red when the sun is near the horizon and its light travels through a thick layer of air. The density in interstellar space is so slight that if the contents of the half-inch cube could be drawn out in a straight line with the same density, light traveling at a rate of 186,000 miles per second would require 10,000 years to cover the distance. While the number of larger particles between the earth and a star cannot be accurately determined, it is probable that there is not more than one dust particle per fifteen cubic inches.

*reported in Astrophysical Journal, U.S. Press*

Williams Day, Wis

U.S. News

May 13-20, 1933

C 663

**WRAPPED ICE IS NOT AS COLD AS THAT LEFT EXPOSED**

C 778

If you wrap the ice, the box is not as cold as though it were left exposed. The faster the ice melts, the lower the temperature around it, so when melting is slowed down, the temperature rises. Another reason for not wrapping ice is that undesirable odors are condensed on its moist, cold surface. Studies by the bureau of home economics have revealed that wrapped ice does not maintain milk and meat at a temperature low enough to be considered safe in the ordinary ice box.

Washington, D.C.

**DOUBLE WHEEL ADDS SAFETY IN TESTING TIRES**

C 650

As an added safety factor, a fifth wheel was used this year on some cars in testing tires on the Indianapolis motor speedway. In speeding in a counter-clockwise circuit over the brick track with its quarter turns, the right rear tire generally shows wear first and a blowout at high speed may be disastrous. In testing tires for some of the cars, the drivers run until the tire fails. To protect them, a flange, carrying a smaller but complete wheel and tire, is attached to the right rear wheel and when the regular tire goes flat or blows out, the

Studebaker



Extra Wheel on Racing Car Which Protects Driver Testing Tires in Case of a Blowout

car comes to rest on the emergency wheel and tire, making it easy to stop.

Cont. Jack Ceynae  
5132 Carrollton Ave  
Chicago, Ill.



\$2.35

International Tool Co  
Lincoln, Neb

Showing the Five Ways in Which Combination Garden-and-Field Implement May Be Used

**FIVE-IN-ONE TOOL FOR GARDEN USEFUL ON MANY JOBS**

Designed so that it replaces five ordinary tools, a seven-edged garden implement saves time for the gardener, the nurseryman and the beet or cotton-field laborer. As a spade, the tool will break almost any soil with its four six-inch steel tines. When plants are above the ground, it can be used for mulching the soil between rows and for chopping out weeds. The implement also is useful for raking up mulch straw, leaves and rubbish, for hoeing and for trimming walks and drives, or outlining flower beds. A seven-inch blade across the back serves the purposes of a push-hoe and of tools used for cultivating under overhanging branches. The implement weighs only thirty-five ounces.

C 772

**SINGING CRICKETS GUARD HOME**

In Japan, singing crickets, kept in fancy little cages, serve both as pets and watch dogs. Late in the day they begin to sing and continue through the night. Japanese houses are light and if anyone walks across the floor, the bamboo structure shakes. The vibration frightens the crickets, their song stops, and the unusual silence awakens the household.

Raymond L. Vittmar  
New York Zoological Park  
New York

C 199 Capt. Katharine  
A. Smith, Arlington  
248 Hall, POPULAR  
Benjamin Franklin Bldg  
Wash

C 758 Working with  
State Hospital  
MECHANICS Indusone  
Columbia S.C.

**SHIPPING OF MOSQUITO GLANDS  
CUTS TREATMENT COSTS**

By shipping glands of malaria-infected mosquitoes instead of the live insects, costs of treatment of paresis, a brain disease, have been reduced considerably. This is the accomplishment of Dr. Bruce Mayne, U. S. public health service research worker, who says that shipping the live insect costs the government \$200 per mosquito. Now, Doctor Mayne first uses the infected mosquito on paresis patients in the hospital where he works, then removes its salivary gland, which contains the malaria parasites, and ships it to distant institutions. The cost of shipping a package of infected glands to San Francisco from South Carolina by air mail is only \$5.50.



Night Observations Are Made by Attaching Paper Lantern Containing Candle to Weather Balloon

**LIGHT FOR WEATHER BALLOON  
AIDS NIGHT READINGS**

By attaching small paper lanterns containing candles to pilot balloons used by the U. S. weather bureau, meteorologists are able to make night readings. Wind direction and velocity are determined to provide airplane pilots with forecasts of air currents. The gleam of the illuminated balloons is followed as easily after dark as the unlighted balloon during the day.

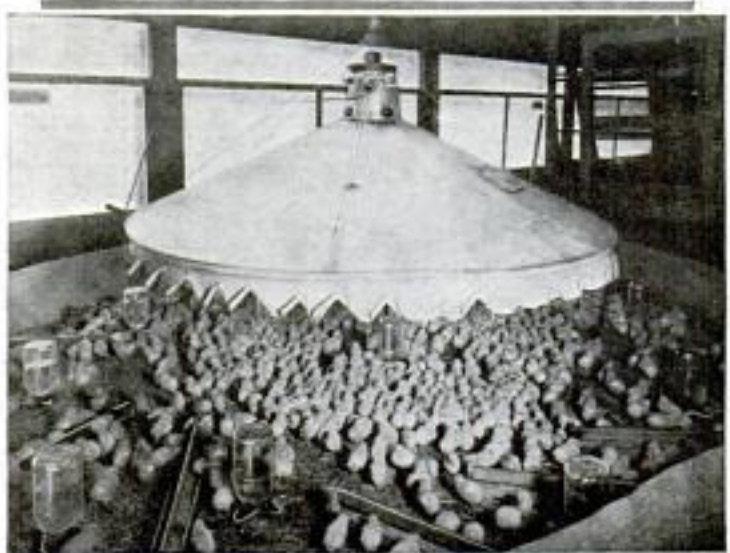
Each balloon, about thirty inches in diameter, is filled with just enough hydrogen to insure its ascension at a rate of 600 feet per minute. The ascent is carefully timed and watched through an instrument like a surveyor's transit, angular readings being taken at one-minute intervals to fix the balloon's position. By computing the balloon's direction and speed of travel for each minute's flight, the velocity and direction of air currents through which the small bag rises may be determined. Thus, airplane pilots are warned against dangerous air levels.

☛ Cooking utensils are now being made in colored aluminum.

No information as to maker

C 35  
**ELECTRIC "HEN" RADIATES HEAT  
AND ELIMINATES DRAFT**

Just as a hen keeps her chicks warm by radiating heat, so does an electric brooder send its warmth outward instead of drawing cold air from the floor. Many electric brooders of the fan type draw air from the space near the floor and discharge it through a ventilator at the top. By a chimney arrangement, this brooder draws the air from the top, warms it, and sends it out beneath a canvas curtain. Consequently, no chick, even on the outermost fringe of the brood, is subjected to cold draft, and as a result, a much higher percentage survive, it is claimed.



Electric Brooder Which Radiates Heat from the Bottom, Keeping All Chicks Warm and Eliminating Drafts

Puget Sound Power & Light Co. 55-60 Stewart Bldg  
Seattle, Wash

Process of coloring aluminum  
Mr. Arthur J. Little, 30 Charles River  
Boston, Mass

Scene from letter 6/17/33

C914 Cont. Robert Stahler, 1124 - 4M  
St. Portsmouth, Ohio

## CHEATIN' Ol' Man River



Train Nearing Outskirts of Portsmouth While the Ohio River Was at Flood Stage and Had Covered the Tracks; the City Itself Is Now Protected from Water by a Flood Wall

**A** STRANGER, entering Portsmouth, Ohio, might think that knighthood is again in flower and that the mighty wall which rises grimly from the Ohio river bank is a medieval barrier raised to repel savage attacks from opposing clans. However, there is nothing ancient about Portsmouth, a thoroughly modern city of 60,000 population. And the three-mile concrete wall, though built for defense, was not planned against armed invaders. Its purpose is to keep out old man river.

Portsmouth, with hundreds of other towns and hamlets located along the 1,000-mile Ohio water course, has experienced several disastrous floods. Its people and millions of other folks living adjacent to flooding rivers, thus pay heavy tribute for man's folly—the ruthless slaughter of timber in vast hill and mountain sections. This unrestrained pillage destroyed huge natural reservoirs of thick, tree-leaf sponges which hold in check melting snows and rains.

Over the vast watershed of the Ohio river—an area comprising 214,000 square miles—millions of acres of once timbered slopes have been left open to soil erosion

with resultant quick run-off of snow water and rain. In these regions small feeding streams to the Ohio become powerful destructive forces within a few hours following a downpour. And when heavy rains occur generally over the upper Ohio valley, the Ohio river is frequently forced above its banks by swollen tributaries.

Weary of flood damage, Portsmouth decided to build a wall to foil the Ohio, and in 1908 the first section, of a mile length, was built. Then came the worst flood in Ohio valley history, the 1913 invasion which gave the wall its baptism. The barrier was designed to hold out sixty-two feet, twelve more than flood stage. But the 1913 flood reached a height of sixty-eight feet before coming to a stand.

Though the damage at Portsmouth was estimated in the millions, loss was greatly reduced in the lower residential area and in all the business district, the only parts of the city protected by the short wall completed at that time. The wall retarded the flood for several hours while huge quantities of household goods and merchandise were moved to higher ground. So it was decided to completely wall the



loads of debris jamming streets and alleys, would have given Portsmouth a costly cleaning-up job. But because the wall nosed out the river by an eighteen-inch margin, all this nuisance and loss were avoided. Conservative calculators credit Portsmouth's flood barrier with saving the city \$1,250,-

river side of the town, linking its defense with that of the Norfolk and Western railroad, about two miles away.

Late last March, the Ohio, pepped up with its spring tonic of snow water and rain, again went into action. As the river approached flood stages, anxious eyes scanned river bulletins. A lull in the rising tide brought hopes that "ole man river was wearyin'." But a few hours later the river observer for the district reported heavy rains over much of the Ohio basin. With this added reinforcement, the Ohio continued rising until all localities, from headwaters at Pittsburgh, Pa., to the river mouth at Cairo, Ill., were menaced. At Cincinnati an eleven-foot rise in twenty-four hours was reported.

At Portsmouth where the flood stage is fifty feet, a crest of sixty and seven-tenths feet was reached. Lacking flood defense, the Ohio would have entered the city in depths varying from one to ten feet, paralyzing business. Stocks of merchandise and household equipment would have been lost. Thousands of people driven from their homes, would later return to find their possessions sodden wrecks and floors covered with river filth. Countless truck-



Above, Flood Wall Holding Back Ohio River; Below, Aerial View of Portsmouth Showing Section Which Would Have Been Flooded, Except for the Wall

000, a tidy sum these days. The wall was built in three one-mile units at a total cost of \$750,000. Its average height is seventeen feet. In thickness, the barrier is about eighteen inches, heavily reinforced with steel, and it withstands a head pressure amounting to five tons per eighteen feet of height by one foot of width. This tremendous force is exerted when flood waters near the wall top.

Because of its success in turning back the March rise, the Portsmouth flood wall has been of great interest to department of agriculture officials and to other civic leaders whose towns lie under flood menace. Recently, several delegations have visited Portsmouth to inspect the barrier that humbled the river. Any one may safely hazard a guess that work will be started on similar walls in many municipalities in the near future.

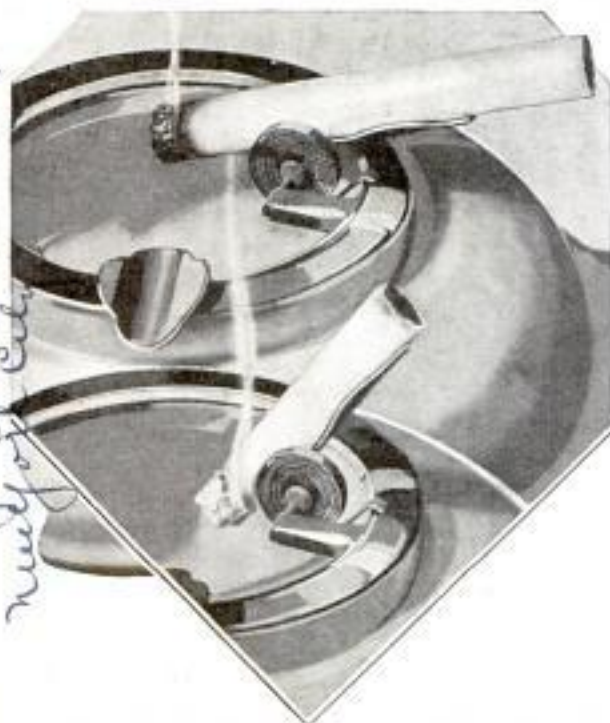


*newford*  
**SEVENTEEN-YEAR LOCUST DIES  
AFTER MONTH OF FLYING**  
*c 413*

For almost seventeen years the cicada, or seventeen-year locust, burrows and tunnels its way under ground before emerging into the sunlight of spring. Crawling up a tree, it sheds its soiled shell and spreads its wings for flight. But the process which gives it wings dooms it to a brief existence in the open. Its mouth parts are so injured that it cannot feed. In less than one month, the cicadas sing their song, mate, deposit their eggs and then die of starvation.

*c 458*  
**SELF-DUMPING ASH TRAY TIPS  
CIGARET INTO RECEIVER**

Cigaretts are kept from falling from tray to floor when burned to the ends by employing a self-dumping ash tray which automatically tips the nearly consumed smokes into a receiver. The holders on the edge of the tray are fitted with springs sensitive to heat. When a cigaret burns back to a point where the heat expands

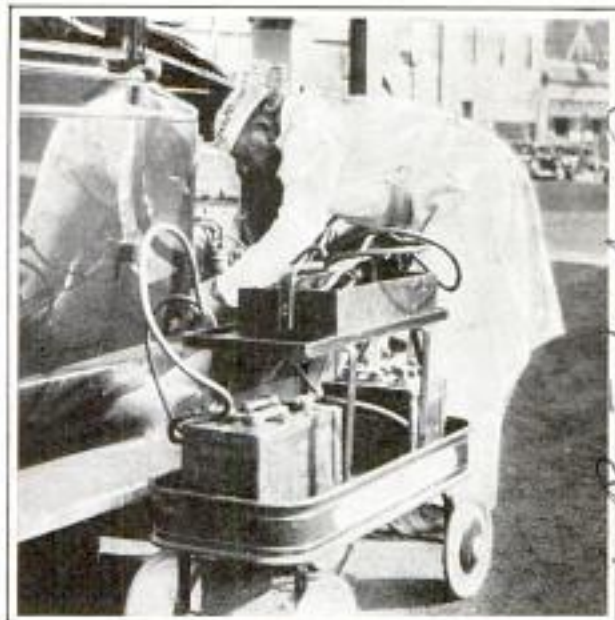


Ash Tray Which Automatically Tips Cigaret into Receiver; It Is Actuated by the Heat

the spring, the holder is raised at an angle which slides the stub into the tray.

Twenty-one million acres of American land, more than the arable acreage in Japan proper, have been ruined by erosion.

*Ans. & mgr. - J. W. Straub, 241 Front St  
New York City*



Portable Battery Mounted on a Toy Wagon Used by Service Station to Start Balky Cars

**PORTABLE BATTERY ON WAGON  
HELPS START AUTOS**

One California service station uses a portable battery, mounted on a child's wagon, to help start balky autos. By clamping terminals to the starter cable and stepping on the starter, power is obtained direct from a twenty-one-plate, 220-ampere battery in the wagon.

**ANTI-MOTH DYE FOR CLOTHING  
SOUGHT TO REDUCE LOSS** *c 760*

In an effort to reduce the ravages of moths, amounting to \$100,000,000 per year in the United States, scientists and chemists are seeking to produce an anti-moth dye for clothing. Some six hundred moth-proofing materials have been patented, not including fumigants, but at present, only one dye on the market is moth-repellent. The problem is being tackled at the University of Illinois by H. E. Ritchey, Textile Foundation fellow, under the direction of Dr. L. R. Shriner. First, the investigators seek to determine whether moth repellents will retain properties when combined with dyes. If they do, the next problem is whether the anti-moth material will interfere with the coloring of the dyes. The ideal material would be effective, have no objectionable odor, should adhere evenly to the fabric, be unrecognizable on the material, not dust off, not be toxic to man, and be reasonably priced.

*San Diego  
143, San Diego, Calif  
Cont. Arthur W. Tomford 1937*

*Same New letter  
5/20/33*

*Same Same 2/6/33*

*Urban, d l*

C 751



**BURNING CLOTHING OFTEN PRODUCES DEADLY GASES**

Burning clothes give off deadly gases which are responsible for many lives lost annually in fires. This conclusion was reached after an investigation conducted at the Polytechnic Institute of Brooklyn. Fumes from various types of fires were investigated in a small structure consisting of a single room lined with asbestos and containing three windows and a door. Openings made possible the sampling of gases at various levels. Combustible materials tested included wood and cellulose products, oils, gasoline, various textiles, and articles containing rubber. From the tests it was decided that persons attempting to escape from fires have probably been overcome by gases evolved from their own burning clothing and have lost their lives by breathing these

Workmen at Hoover Dam Crossing the Colorado River in an Aerial Car Traveling on a Cable 600 Feet above the Bed of the Stream

**AERIAL CARS CARRY WORKMEN OVER COLORADO RIVER**

Workmen at Hoover dam are carried from the Arizona side to the Nevada side of the Colorado river in aerial cars traveling about 600 feet above the river. There are nine cableways strung across the Black canyon about one-fourth of a mile apart and these "skips," as they are called, play a big part in the construction of the dam since they transport both men and materials, carrying 150 tons at a time. Watch towers strung along the Nevada side direct the movements of the cars, the operators telephoning from the towers to the main station.

Ⓜ A machine seals cellophane over milk bottle tops and fastens it in place with colored tape.

gases. When the clothing is burning, it is almost inevitable that the wearer will inhale the gases produced, and woolen carpets and draperies add to the hazard. Wrapping a burning person in a blanket, providing hand extinguishers for incipient fires and better gas masks are some recommendations resulting from the tests. Cellulose materials burning in the absence of air give off highly toxic concentrations of carbon dioxide and monoxide. The concentrations of these gases are lower in a gasoline fire, indicating that a person could breathe gases from a gasoline or oil blaze longer than those from a wood or cellulose fire. Rubber-insulation fires gave off considerable amounts of saturated and unsaturated hydrocarbons, free hydrogen and appreciable quantities of highly toxic hydrogen sulphide, along with large amounts of carbon monoxide and dioxide. Decom-

Aiguo Service 3/6/33

Package Machinery Corp Springfield, Mass

reported in Industrial and Engineering Chemistry

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C 681 Chicago Lighting  
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Chicago

position of woolen materials produced the other toxic gases mentioned as well as hydrocyanic acid, ammonia, nitrogen and hydrogen. Natural silk produced prussic acid and ammonia as well as several other gases. Three distinct layers of gas were generally encountered, one at the ceiling, one on the floor and an intermediate layer consisting of more nearly pure air than either of the other two.

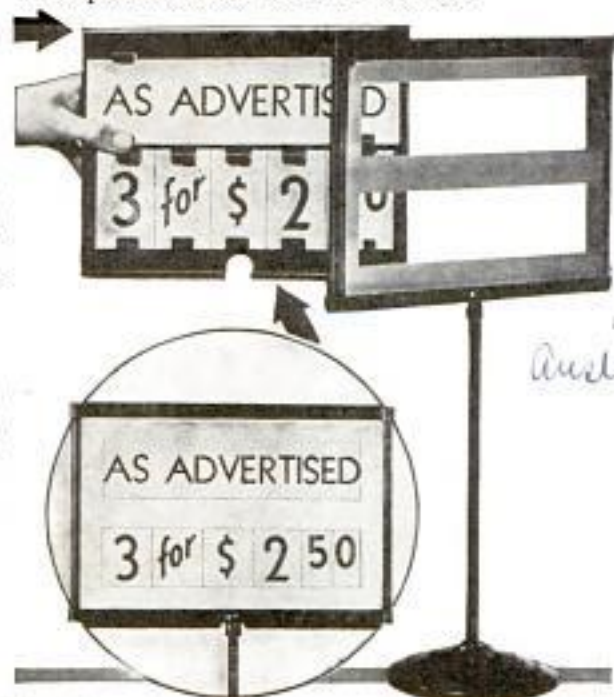
How Moving Light Changes Expression on Face of Small Statue; Four Positions of Illumination Are Shown; Note Arrangement in Center



**MOVABLE PRICE CARDS IN RACK ARE CHANGED EASILY**

C617

Ten thousand changes in price cards are available in a system that employs a metal frame to display movable cards. The frame or rack snaps onto the standard display-card frame used in stores. A flip of the finger removes it for quick changing of prices or heading. Each clerk or department head can make price-card changes the moment new displays are required, with assurance that no errors can occur in spelling or figures. The system includes the frame, assortment of headings and price cards, mask and non-inflammable transparent face for the frame.



Top, Inserting Card in Frame; Bottom, How Rack Appears After the Change Has Been Made

**LIGHTS BRING SMILE OR FROWN TO STATUE'S FACE**

By changing light direction, a small statue can be made to smile or frown. Concealed lights border the inside of the frame. By letting these lights blink on and off in rotation, shadows on the statue are changed, thus altering the expression.

**TEST REVEALS AGE OF WRITING BY INK ACTION ON PAPER**

C 759

Chemical methods of detecting the age of writing have been produced by Dr. Siegfried Turkel, research chemist for the Vienna police. All writing inks contain chlorides, but in widely variant quantities. The chloride, of which common salt is a variety, slowly spreads in paper, though invisible to the human eye. The Vienna expert, by a simple chemical reaction, replaces the chloride in a document by metallic silver, deposited as a black image like that of a kodak print. In the same operation, he bleaches out the normal ink dye. The document, photographed to yield a chloride print, takes on a new appearance, depending on its age. One hour old, the writing is clear black; one day, clear but with broadened lines; four days, margin of pen stroke hazy; ten days, quite fuzzy; sixty days, small loops in letters closed; six months, small writing illegible, and one to two years, entirely illegible.

Mulholland Co Merchandise Mark Chicago

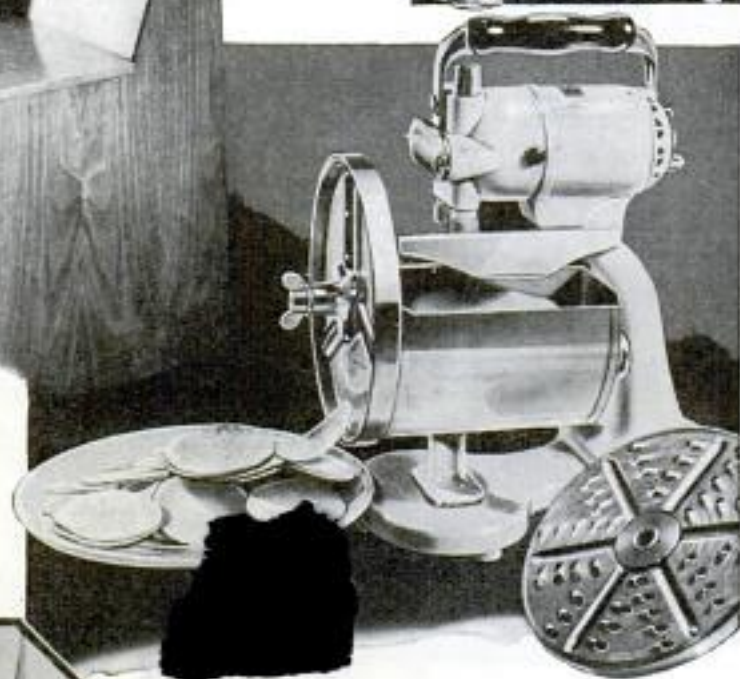
Saness Industries  
225 W. Huron  
Chicago

Science News Letter  
5/10/33  
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# EASIER WAYS



Left, Dressing Table with Lights on Each Side of Table Top; Additional Lights under Drawers Give Full-Length View; Right, Potato Peeler Run by Electric Motor



Below, Mechanical Darner Which Makes the Job so Simple That Even a Man Can Mend His Own Socks; It Lifts the Remaining Unworn Threads so the Threaded Needle Can Be Slipped through the Raised Loops Until a Firm Wearing Surface Is Formed; No Skill Is Required to Operate the Darner

Above, Electric Slicer and Shredder Which Can Be Used in Preparing Fruit and Vegetables, Grating Nutmeg, or Making Shoestring Potatoes or Cabbage Slaw; Below, Electric Mixing Bowl for Cream, Eggs, Salad Dressing, Light Batter, or Cake Icing; Hole in Top Allows Salad Oil or Other Ingredients to Be Added While Mixer Is Operating; Glass Container Is Graduated in Pints, Cups and Ounces, Eliminating Measuring Utensils



# of DOING IT

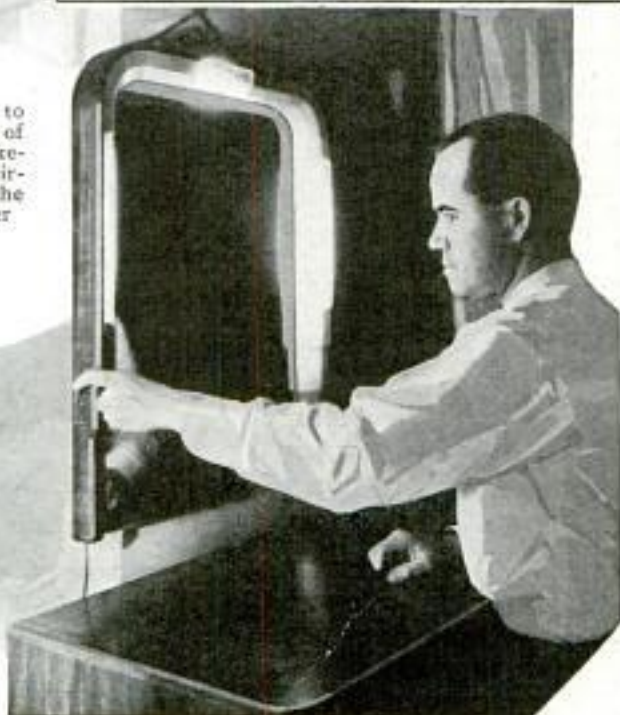
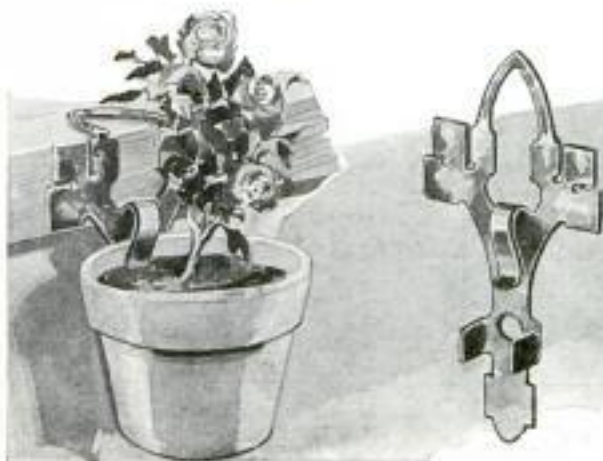


Above, Clothesline Fastener Which Takes Up Sag When Knurled Sleeve Is Turned, and Eliminates the Need for Knotting or Splicing



Above, Disappearing Hose in Sink for Spraying Dishes or Vegetables; When Not in Use, the Three-Foot Hose Drops Out of Sight, Leaving Only the Downspray Nozzle Exposed; Left, Sink Faucet with a Valve Opened by Pressing against the Rubber Wheel, Making It Possible to Fill a Glass with One Hand

Below, Flower-Pot Holder Which Can Be Fastened to a Wall or Frame and Can Be Adjusted to the Size of the Container; Right, Dresser with a Surface of Bakelite, and Lights Incased in the Frame around the Mirror; the Light Switch Is Located on the Side of the Frame within Easy Reach of Person Using Dresser



C684

Lillis. Welch no. T. Well  
North Kettleman Oil & Gas Co  
POPULAR MECHANICS

256

# Oil Well Two Miles Deep Only Produces Gas

Cont. The Lillis Co. Gorman are  
at 25 N. St. Long Beach Calif



Top, Instruments for Gauging Amount of Pressure on Drilling Equipment; Right, Framework That Incloses Drill and Other Apparatus

much weight was on the point of the drill at the bottom of the well. The total weight of the drill pipe at 10,881 feet is about 240 tons and the driller was able to keep the weight within the limits of fifty pounds of any desired pressure on the bit.

C777

## GARMENTS FROM FLOUR SACKS MADE AT LOW COST

at nearly way 13

Garments and household articles are being made in many communities, at virtually no cost, from flour sacking after the material has served its original purpose as a container. The sacking has been found to lend itself to many uses, one home-economics teacher supervising 100 pupils in making from it undergarments, dresses, bed sheeting and even curtains. Some of the sacks were dyed various col-



In the search for oil-bearing sands at lower levels, an oil well in California has been drilled to a depth of 10,881 feet, over two miles deep, without striking oil sands. Gas from the well is being piped to several cities. Drilling at such depths frequently results in loss of the drill bit, which may mean weeks of "fishing" to recover it. In reaching the two-mile depth, the utmost precautions were used. One hundred and forty tons of concrete were poured in the foundations for the 100-foot steel rig, and every known instrument to aid in the drilling of the straight holes was called into service. For instance, a weight indicator told the driller just how

ors and thus converted into inexpensive and easily laundered dresses.

reported to Extension Service Dept. of Agriculture  
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Coop. with Carnegie  
Institution of  
Washington

Carl. Hans J. Rutschbach  
Brieholzstrasse 20  
257  
Berlin-Lankwitz  
Germany

POPULAR MECHANICS

C923

Science News Letter 5/6/33

COSMIC RAYS MADE OF PARTICLES TESTS SHOW

That cosmic rays are composed principally of positively charged corpuscles or particles is indicated by tests under the supervision of Dr. Thomas H. Johnson, of the Bartol Research Foundation. With three cosmic-ray counters arranged in line so that a record was made only when all three were coincidentally discharged by cosmic radiation, Doctor Johnson obtained results that support the theory that rays are particles. In addition, he found that cosmic rays smash into the atmosphere of Mexico City with more intensity from the west than from the east.



Berlin Street Cars Transformed into Traveling Billboards by Decorating the Sides with Removable Placards Advertising Various Products

STREET CARS ARE BILLBOARDS FOR ADS ON WHEELS

Berlin is using its street cars for mobile billboards. The cars are decorated with placards and run over the surface-line system, the placards being changed at intervals to advertise various products.

DUMMY CHAIR SHOWS FABRICS TO AID SALESMAN

Fabrics used for upholstering can be displayed better on a dummy chair outlined in a picture frame. A gentle pull on a handle at the back tilts the plate containing the mold of the chair so the salesman may slip in a sample square of upholstering fabric. Then the plate is closed and the

\$26.00 for Buffalo



Fabrics Displayed by Picture of Chair; Right, Inserting the Material into Frame; Note Effect Created by Heavy Lines



Science 5/13/33

CATFISH USED IN NERVE STUDY TO AID MEDICAL SCIENCE

Because the nerve of the cold-blooded catfish degenerates slowly, scientists have taken that fish as a means of learning more about the nerves of human beings. They find that when a nerve is cut, degeneration sets in over the whole part beyond the point of severance, beginning near the cut and proceeding outward. This is contrary to what has been assumed heretofore regarding the action of injured nerves. The fish was called into service when the experimenters found that changes in the injured nerves of warm-blooded animals take place too rapidly to give a good picture.

Prof. G. H. Parker  
and W. L. Parry, Harvard  
Univ. Cambridge, Mass.

Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information, inclosing return postage.

Maker. Display Bureau Co  
Buffalo NY

Dist. H. H. Taylor Co  
99 Oak St. Buffalo, NY

*Cincinnati Ohio*

This Frameless Screen  
Can Be Fitted Easily  
into Standard-Size  
Window or Cut for  
Odd Sizes



**FLY SCREEN WITHOUT FRAME  
IS EASILY INSTALLED**

Easy to install and practical in operation, a frameless fly screen has been produced. No fitting is required, other than measuring the height and width of each window opening. It is made in all standard sizes. The screen is full length, covering top and bottom sashes. There are no rolling parts. Only a screwdriver is required for installing the screen, which is of all-metal construction. When cleaning is necessary, the whole screen can be immersed in soapy water or other solution.

**TUBES CONTROL GIANT MOTORS  
BY VARYING SPEED**

Vacuum-tube control for synchronous motors has been developed by Dr. E. F. W. Alexanderson, consulting engineer of the General Electric company. An important field for the system promises to be the electric ship. Steam turbines operate most efficiently at full speed and it is necessary to slow down the turbines to slow down the propeller motors. With the new equipment, the turbines operate at one speed all the time but the speed of the propeller motors can be varied by changing the frequency of the current fed to them through the vacuum-tube control. Instead of the captain communicating orders to the engine room for a change

in speed, the apparatus makes it possible for him to regulate the speed of the driving motors directly from the bridge. The control system for demonstration purposes consisted of a 400-horsepower motor and eighteen thyatron tubes. Power fed into the bank of tubes directly from a 4,000-volt line was converted by the tubes into different frequencies before it was delivered to the motor. This varying frequency in the current resulted in varying speeds of the motor. With commutator motors, efficiency between power line and motor shaft is about ninety per cent. Tube control is said to raise this efficiency to ninety-eight and one-half per cent.

*C623*

**COOKING KIT FOR THE CAMPER  
FOLDS INTO COMPACT UNIT**

All the necessary implements for broiling, frying or baking outdoors are contained in a cooking kit for campers which folds into a compact unit. The broiler is made with an extension handle for long-range use and the oven is a folding attachment which utilizes the same heat used for frying. All the parts pack into a small canvas carrying bag, and the weight is ten and one-half pounds.



Cooking Outfit for Campers Which Contains All Facilities for Frying, Baking or Broiling

**DUST PUTS OUT SMALL BLAZES  
BETTER THAN WATER**

Fire-fighting dust which smothers a small blaze as efficiently as water without doing the damage water may do has been developed by an engineer of the University of Washington. The dust is played

*C734*

*Schenectady NY*

*Prof. Frederick H. Kerster, Aeronautical Eng.*

*on Lengerke's Antenna 33 of Wash*

*nugget \$5.00*

*Chicago*

*Seattle*

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on a fire in an aerated mass through a hose and smothers the blaze by developing a large quantity of carbon-dioxide gas under heat. The dust does not absorb water, looks like coarse flour and flows like water under treatment. A pressure of 200 pounds can be put behind it. A specially designed fire engine using the dust has been tested successfully and it has also been used satisfactorily in a small hand extinguisher.

— 2367

**MIDGET CAMERA TAKES PICTURES FOR ENLARGING**

Tiny but extremely sharp negatives, from which enlarged prints can easily be made, are produced with a baby camera so small it fits in the palm of the hand. Thirty-six consecutive exposures can be made without reloading, the pictures being thirteen by eighteen millimeters. The films can be joined and projected on a screen for study in negative form, or can be used for exhibition purposes if a positive is made. Enlargements to postcard size are scarcely distinguishable from originals, and enlargements up to eight by ten inches are possible. Although weighing only five ounces, the camera has many of the features of large and expensive ones.



Comfort for Warm Weather Can Be Obtained by Planting Grass on a Roof; Note How It Can Be Trimmed During the Growing Season

**GRASS GROWING ON THE ROOF KEEPS HOUSE COOL**

Temperatures in the home can be controlled better if the roof is covered with growing grass. A Long Island architect has found that such a roof keeps the house warmer in winter and at least twenty degrees cooler in summer. His home is covered with a roof of grass growing on eight inches of sod laid on a waterproof foundation. Two layers of sod, held in position by wooden supports running around the base, sides and top of the roof, were laid in reverse position, the lower layer with the grass facing the roof and the upper layer facing outward. In time, the roots of the two layers grow together, the grass underneath rotting and acting as fertilizer. The grass is watered by perforated pipes running along the top ridges, the water being turned on and off in the house. The grass must be cut occasionally, but the roof seldom requires repairs.

*Roofed, East Rockaway, Long Island, N.Y.*

*Louis*

*Taken from Handbook of Chemistry and Physics, Chemical & Physical Constants, 2nd Edition, 1932.*



Small Camera, Weighing Only Five Ounces, Which Makes Pictures Suitable for Enlarging

*Bydapest 3 by 4.5 cm. Berlin, W.G.*

*Prague*

*W. H. Wagner*

*Photo Cameras, Dr. Kaptanski,*

*There are seven metallic elements lighter than aluminum, see list Science Service Feature 12/12/32.*

C656

Developed by C. P. Frederick

Developed by Dr. Colin S. Fink and

260

POPULAR MECHANICS

Seattle Wash

Chao Y. Wong

Columbia Univ. New York



Stream of Water That Coil-Spring Arrangement Lifts Twenty-Seven Feet or More from Source

### WATER LIFTED BY COIL SPRING IN DEFIANCE OF NATURE

Defying the laws of Nature by lifting water higher than had been considered possible, a pump consisting of an endless-steel coil spring mounted on two pulleys has been produced. The free-turning wheel is at the bottom of the well or other source of water, while the drive pulley, turned by a small electric motor, is at the reservoir to which the liquid is delivered. As the spring passes over the lower pulley, the curve causes the coils to spread slightly, scooping up water, which is lifted within the hollow core of the spring and thrown out at the top as the coil is spread by curving over the upper pulley. The inventor says that the pump will supply a steady stream of water to a receptacle 100 feet above the point at which the coil picks up the liquid. This is done by using a spring with an inside diameter of one inch. In a test tower twenty-seven feet high, a one and one-half inch coil spring delivered thirty-seven and one-half gallons of water per minute to a receptacle at the top, nearly double the volume lift-

Resodium draguodaxala

ed by some modern pumps of other design. A one-third-horsepower motor was used, producing an efficiency of seventy-eight per cent at 290 revolutions per minute. As many as ten pulley and spring arrangements may be installed on the same shaft.

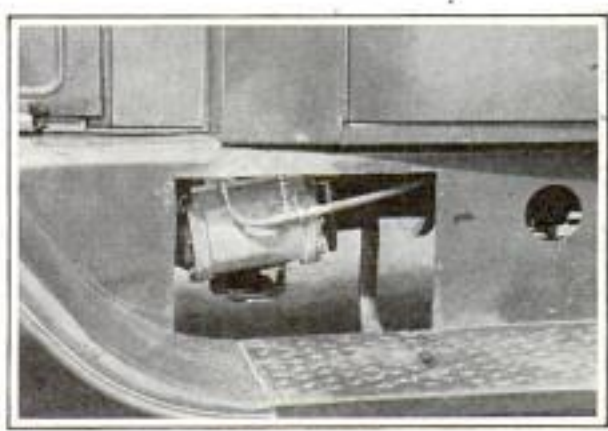
C737

### SAFE COPPERPLATING METHOD ELIMINATES CYANIDE USE

Elimination of dangerous cyanide solutions for copperplating of steel can be effected through the use of a new electroplating method. A complex copper salt is used in the bath, along with sodium sulphate and boric acid. Only one minute is required to obtain a satisfactory copper deposit with a low electrical-current density in the new bath. This method is said to produce copperplating less subject to deterioration through wear than one employing cyanide, which is very poisonous.

### STEERING CONTROLLED BY AIR C631/MAKES DRIVING EASIER

Increased ease of driving the heavy-motor transport vehicle is attained through use of an air control for the steering gear of truck or passenger bus. The device consists of a double-acting cylinder, controlled by an ingenious double-valve arrangement. In exhaustive tests under supervision of the Bendix-Westinghouse Automotive Air Brake company, by whom it was produced, the control unit functioned perfectly in all kinds of weather and on all kinds of roads. Engineers found that not only did the control make driving easier, but that its use permitted a substantial reduction of gear ratios.



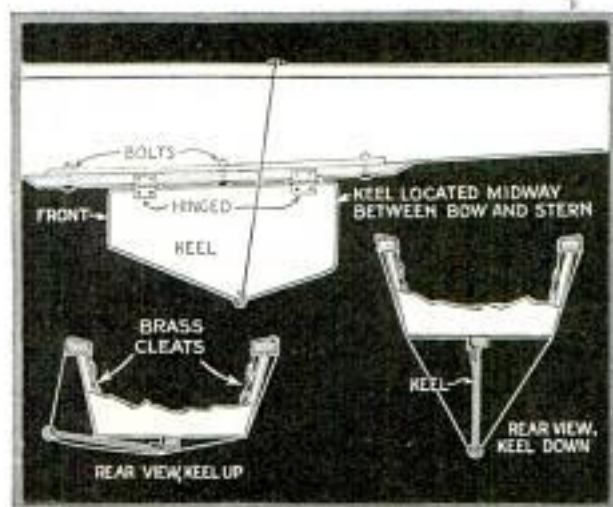
Cut-Away View of Air-Steering Column in Truck; Device Helps to Handle Large Vehicles

Bendix-Westinghouse Automotive Air Brake  
Pittsburgh Pa

14th Ave. N.W., near the Ballard bridge

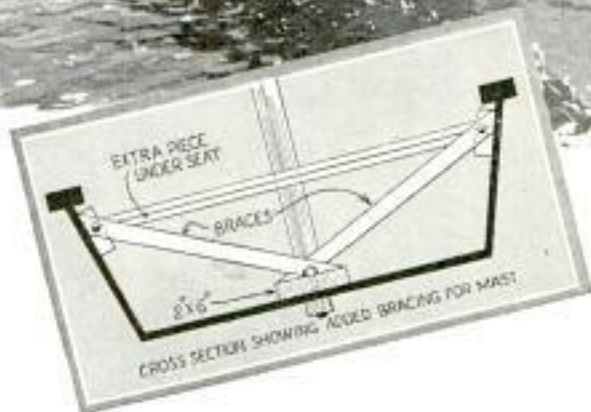


# SAILING *with a* Rowboat



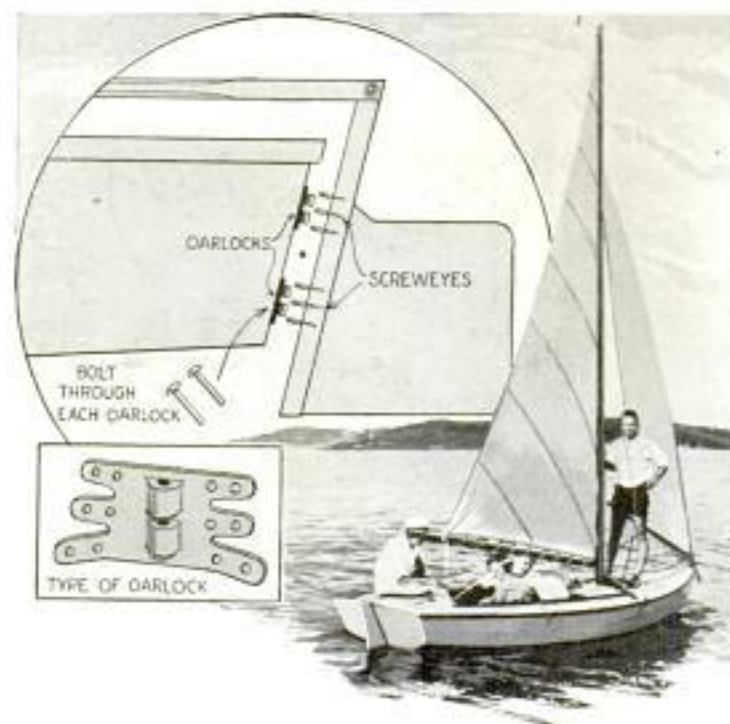
By R. M. ROLAND

EQUIPPED with a few homemade parts—a hinged keel, a rudder and, of course, a mast and sail,—an ordinary rowboat is capable of giving you some real sailing thrills. The drawings above show how a sheet-metal keel is attached. It should be made of fairly heavy stock, about  $\frac{3}{16}$  in. thick, and the size for the average rowboat should be about  $2\frac{1}{2}$  ft. wide and  $3\frac{1}{2}$  ft. long. If your boat is not already provided with a wooden keel, one should be bolted on in order to assure ample reinforcement. Two butt hinges are used to attach the metal keel, which should be located approximately midway between the bow and stern. The hinges are attached to the boat with brass screws

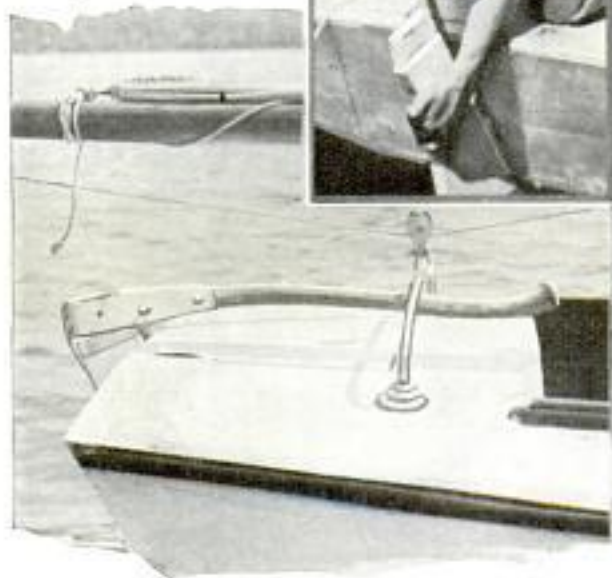


and they are fastened to the keel with bolts. The keel, hinged in this way, is pulled up to a horizontal position in shallow water so that it will not scrape on the bottom. It is lowered to a vertical position as soon as one gets into deeper water, and is held in this position securely by sash cord, which is tied to the lower edge of the keel and to two cleats screwed to the inside of the boat as shown.

The mast is removable, being set in a



hole drilled through a 2 by 6-in. block which is fastened to the floor, the bolts used for this purpose extending through the wood keel already in place. Locate the mast block directly under a seat so that the mast passes through the seat, a hole being drilled in line with the one in the block. An extra piece of 1-in. stock, preferably hardwood, is screwed to the underside of the seat, and two cross braces are provided to help distribute the strain. The cross braces are bolted to the block and to cleats screwed to the sides of the boat directly under the gunwales. The photos show



the approximate location and relative height of the mast.

Oarlocks may be used to hold the rudder, the rudder post being provided with screweyes as shown. Bolts are slipped through the screweyes and oarlocks to hold the rudder in place yet permitting it to move from side to side freely. The rudder may be made of  $\frac{3}{16}$ -in. sheet metal, bent over at right angles at one edge where it is drilled and screwed or bolted to the rudder post, which should be a piece of hardwood. The tiller may be another piece of hardwood, notched at one end and bolted to the rudder post, or it may be of the removable type. The writer has found an old ax handle highly satisfactory for this purpose. In this case a piece of

sheet metal is bent to a U-shape, and is bolted to the end of the ax handle so that the extending loop fits the rudder post.

#### Preventing Incurable Plant Diseases

When a plant becomes infected with an incurable disease, it is best to pull it up and burn it, after which the remaining plants should be treated to prevent a further spreading of the disease. Mildew is a disease that attacks roses, carnations and various other cultivated plants and spreads rapidly if unchecked. It appears as a white or gray mold on the foliage of the plants. Rust also appears to be of the same form, but in a brownish color. An application of sulphur in some form, preferably flowers of sulphur, which can be dusted on the affected plants, will usually prevent further spreading of these diseases. There are also several commercial forms of sulphur that can be used for this purpose.

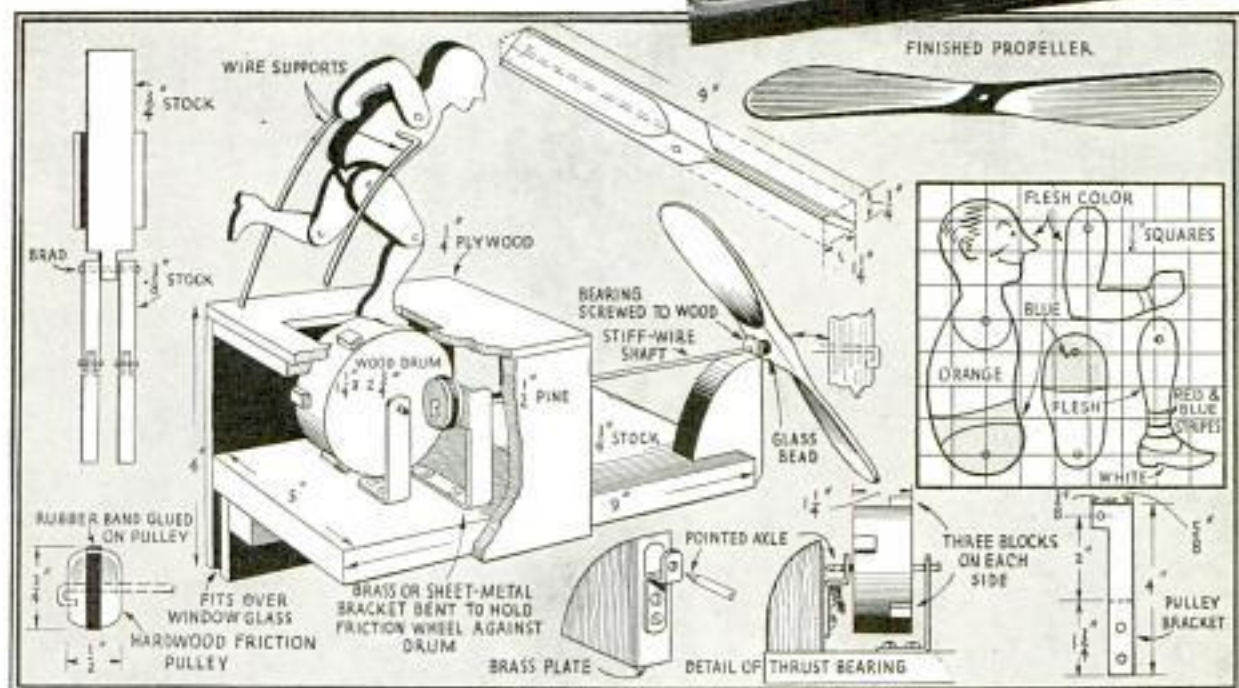
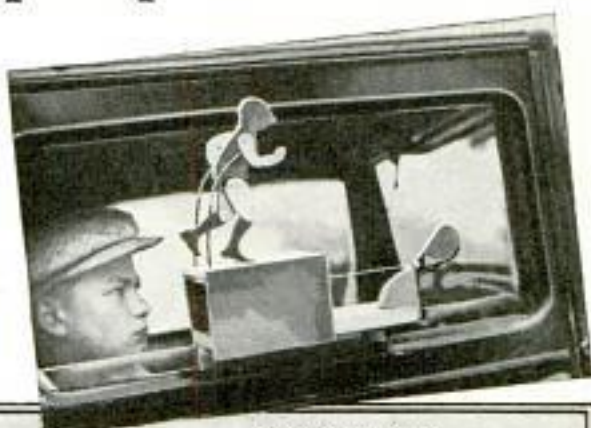
#### Kerosene-Soaked Brick Starts Camp Fire

A brick, soaked in kerosene for a day or two, will burn for a long time when lighted, and if one is taken along on hunting or hiking trips, a fire can be started, even with wet material. A piece of brick, the size of your fist, should burn over an hour.

Hot pie tins are easily removed from an oven with a trowel.

## Marathon Runner Keeps Up with Your Car

Here is a little fellow who shows amazing endurance, for no matter how fast you drive, he will be running along with the car. A propeller provides the motive power, which is transmitted to a revolving wood drum, fitted with a number of blocks that throw the runner's feet backward to simulate running. The assembly is housed in a wood box, which is made to fit over the edge of the window glass. The drum



and a friction pulley that drives it, are mounted on brackets, which also serve as bearings. It will be necessary to provide a thrust bearing for the end of the drum axle. The runner is pivoted to the frame above the drum by means of two wire supports. All joints in the body are loose-

ly pivoted to assure free action. The left-hand detail shows how the knee and hip joints are put together. By altering the adjustment of the runner, a wide range of action can be had, while a couple of coats of paint or enamel in various colors will help produce a realistic effect.

### Gasoline Camp Stove Generated with Shoe-Polish Dauber

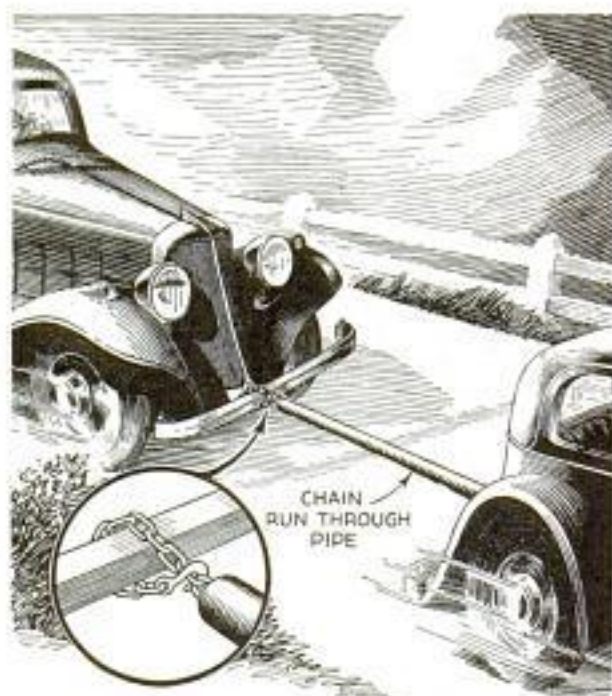
Gasoline camp stoves can be generated without danger of fire, from overflowing the generating cup, by using an alcohol-soaked dauber such as is used in a bottle of liquid shoe polish. Your supply of alcohol can be carried in the bottle. By



using alcohol in this manner, the stove is not blackened with soot as is the case when gasoline is used for generating.

### Illuminating Photos for Oil Coloring

Photographs are easy to color with oil paint by using a square box having a glass top and a 60-watt lamp inside. Rest the photo on the glass while coloring. This provides good illumination for the work, and heat from the lamp will dry the paint almost as fast as it is applied.



Length of Pipe Slipped over Tow Chain Prevents Damaging Rear End of Tow Car

#### Semi-Rigid Connection to Tow Autos

Slipped over a tow chain, a length of pipe provides a semi-rigid connection for towing cars. The advantage of this method is that it eliminates slack in the chain and thus prevents the sudden jerk when starting. The pipe also keeps the two cars from bumping together when the tow car suddenly stops.—Ovard Styles, Greer, S. C.

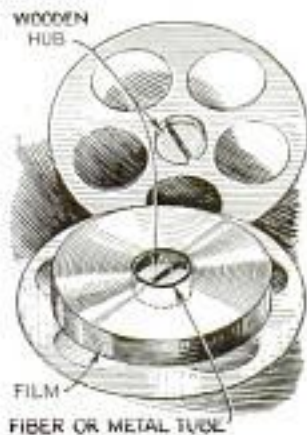
#### Eliminating "Brown Patch" in Lawn

Many beautiful green lawns are disfigured by a fungus disease known as "brown patch," which appears in late summer. Spreading rapidly from a small spot, it kills the grass, leaving unsightly brown patches. Government grass specialists advise fighting the disease with chemicals, sowing of different types of grass seed, or by careful watering. Where chemical means are employed, use bichloride of mercury (poison), 1 oz., to each 1,000 sq. ft. of lawn. To apply it, the poison may be mixed with fine soil, or dissolved in water so that it may be evenly distributed. After applying the chemical, the lawn should be well watered to prevent burning. This treatment should be repeated each time the disease appears. If a chemical treatment that is more lasting is desired, a mixture of bichloride of mercury, 1 oz., and calomel, 2 oz., can be applied in the

same manner. Where the soil and climatic conditions are favorable, seeding the lawn with Kentucky blue grass will help in reducing damage done by brown patch. A seed mixture of blue grass, 9 parts, Chewing's fescue, 9 parts, and redtop, 2 parts, is also effective for this purpose. The disease spreads most in damp or moist weather, and if the lawn is watered in the morning, which is better than watering at night, as the sun's heat will soon dry the lawn, the disease may be checked.

#### Two-Piece Reel Accommodates Extra Rolls of Movie Film

Owners of home-movie machines who have more rolls of film than reels to accommodate them, can use two-piece reels from which the films can be removed and stored, permitting the same reel to be used over again. Reels for this purpose are altered so that the sides are removable, two short, wooden plugs being substituted for the regular hub and a short piece of fiber or metal tubing being fitted over the plug to hold the film. Friction between the plugs and tube is sufficient to hold the sides of the reel together. It is necessary, of course, to have a piece of tubing for each roll of film.



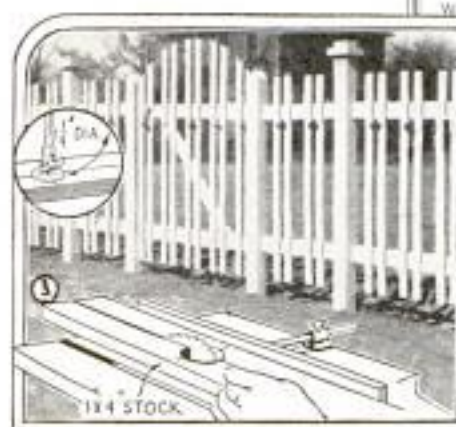
#### Thin Lacquer Sprayed with Atomizer

An atomizer provides an effective gun for spraying lacquer on small parts. The lacquer should be thinned to about half of its normal consistency so that it will pass through the small hole in the nozzle. Be sure to clean out the atomizer thoroughly with thinner immediately after using it or the lacquer will dry and clog the passage, ruining the atomizer for future use.

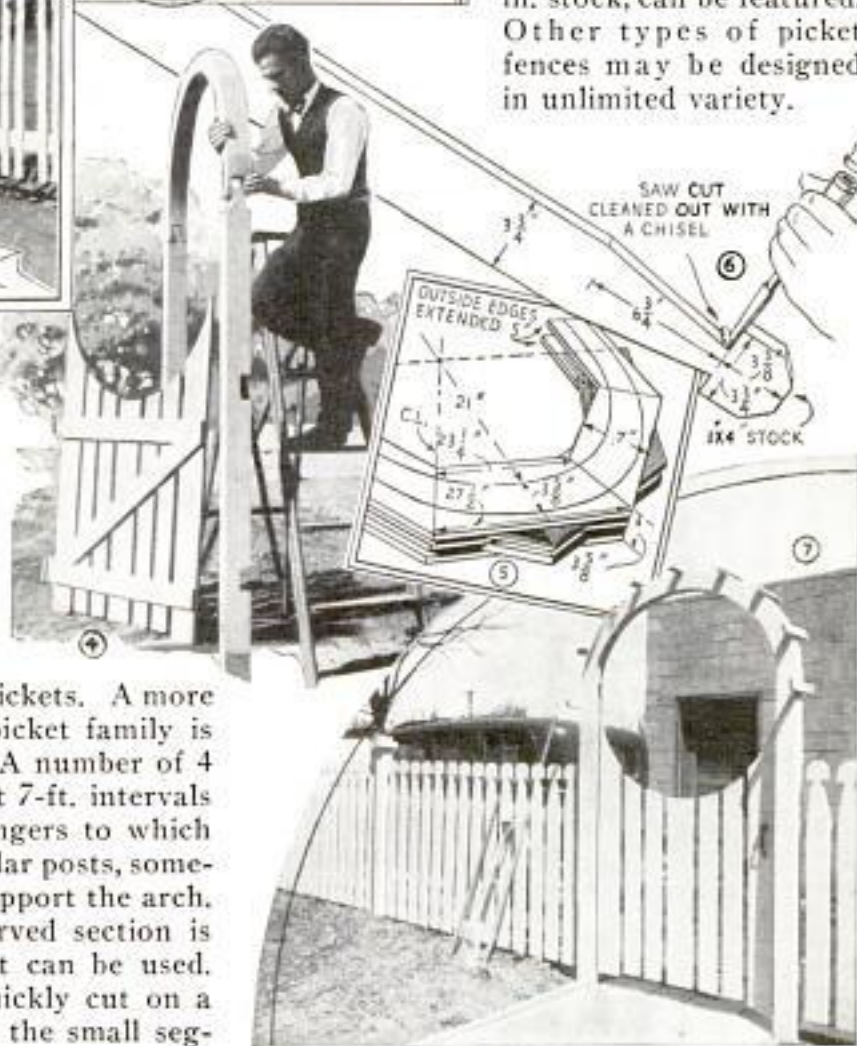


# Fencing for the Home Grounds

PICTURED to the right, in Figs. 1 and 2, is a neat form of fencing which is equally attractive on either side. Stock material, which goes into its construction, is as follows: 4 by 4-in. posts, 1 by 3-in. top girders, and 1 by 2-in. vertical slats. Notice that one of the 1 by 2-in. strips is edge-nailed to each side of each post to furnish a nailing edge for the horizontal timbers. The curved strips at the top are sawed to shape on a bandsaw while the flat sections over the curves are simply bent into position.



Bed the posts 15 in. in concrete, or soak them well with creosote to prevent wet rot, and set directly in the ground. For the simple fence shown in Fig. 3, drill holes in 1 by 4-in. stock and then rip the boards in two, as shown, to get each pair of pickets. A more pretentious fence of the picket family is pictured in Figs. 4 and 7. A number of 4 by 4-in. posts are spaced at 7-ft. intervals to take the 2 by 4-in. stringers to which the pickets are nailed. Similar posts, somewhat longer, are used to support the arch. Fig. 5 shows how this curved section is made. Any style of picket can be used. The one shown can be quickly cut on a circular saw, chipping out the small seg-



ment of wood which will be left with a wood chisel, as shown in Fig. 6. The post tops can be cut in the same manner, or the simpler style of using 4 and 6-in. squares of 2-in. stock, can be featured. Other types of picket fences may be designed in unlimited variety.



Basement Door Cut in Two and Hinged in Center

### Altering Basement-Entrance Door Makes More Space in Kitchen

In my home, the kitchen is small and the door to the basement entrance opened against the wall where I wanted to place the gas stove. The door, when opened, also partly covered a window and shut out some of the light. To overcome this trouble, I sawed the door in half as shown and hinged the two parts so that they could be folded together and would then occupy much less space than the single door. Heavy butt hinges were used for this purpose.—Dan Courtney, Chicago.

### Finger Cots from Toy Balloons



If finger cots are not at hand when needed, they can be quickly made by cutting off the ends of toy rubber balloons. These are available in most drug and candy stores.

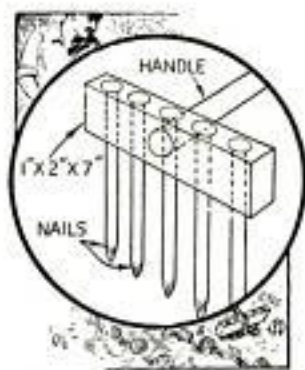
If the cot is too small, inflating the balloon several times before cutting it off will stretch the rubber. The cots will slip on the fingers easily if they are moistened.

### Imitation Gauges for Models

To simulate miniature gauges for models, such as steam gauges, speedometers, tachometers, air-speed indicators, etc., the following idea may be used: With black india ink, draw a circle representing the gauge face on the blank, white area of an old glossy photo print, and around the inside of the circumference, draw short lines at regular intervals to represent the graduations. The indicator hand may also be sketched in. From a short distance, the gloss of the paper makes the gauge appear to have a glass face.

### Garden Rake Made of Nails

Rakes handy for cultivating beds of flowers and small vegetables are easily made from a piece of wood, a few nails, and a broomstick, which is used for a handle. The wood is drilled in the center for the broomstick, after which small holes are drilled through it edgewise to take the nails. If a neater job is desired, the holes can be counter-bored to take the nail heads and then plugged with small dowels. When the ends of the nails wear off they can be pointed with a file.



### Sawing Painted Lumber

When sawing old lumber that has been painted, it should be run against the saw with the painted side down. If both sides are coated, the paint should be scraped off on the upper side. This saves the teeth from direct contact with the coated surface, which will quickly dull them, especially if there are several coats of paint.



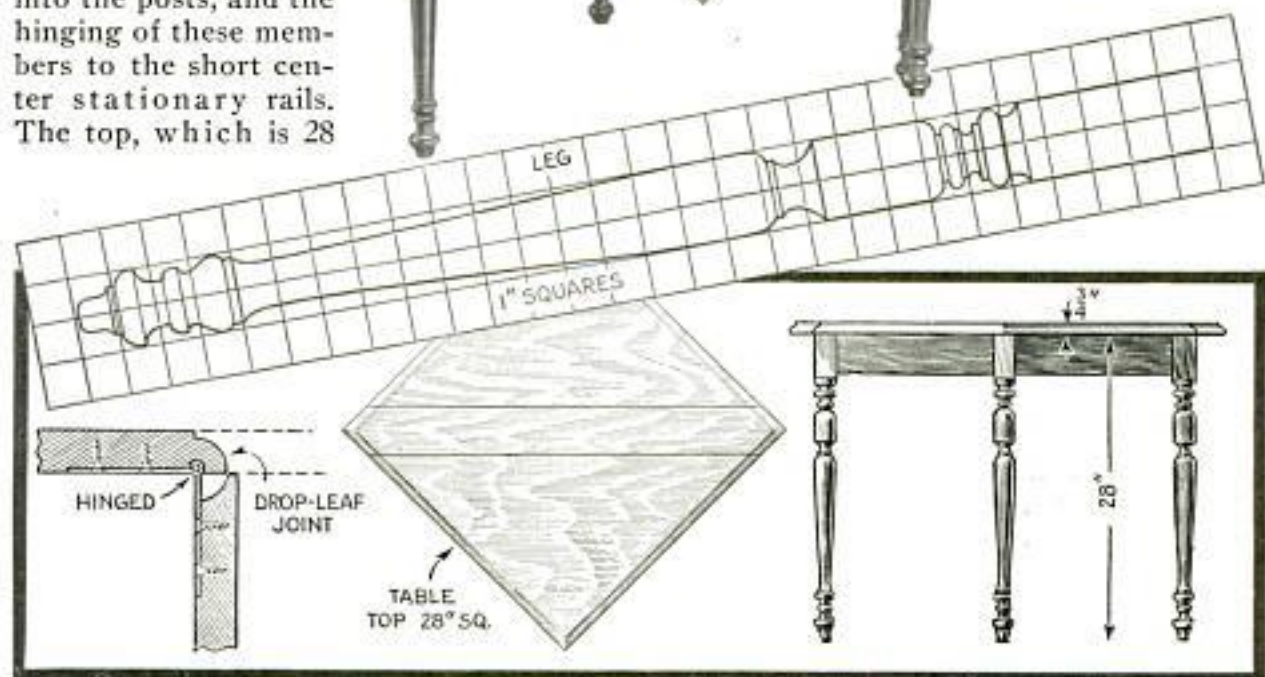
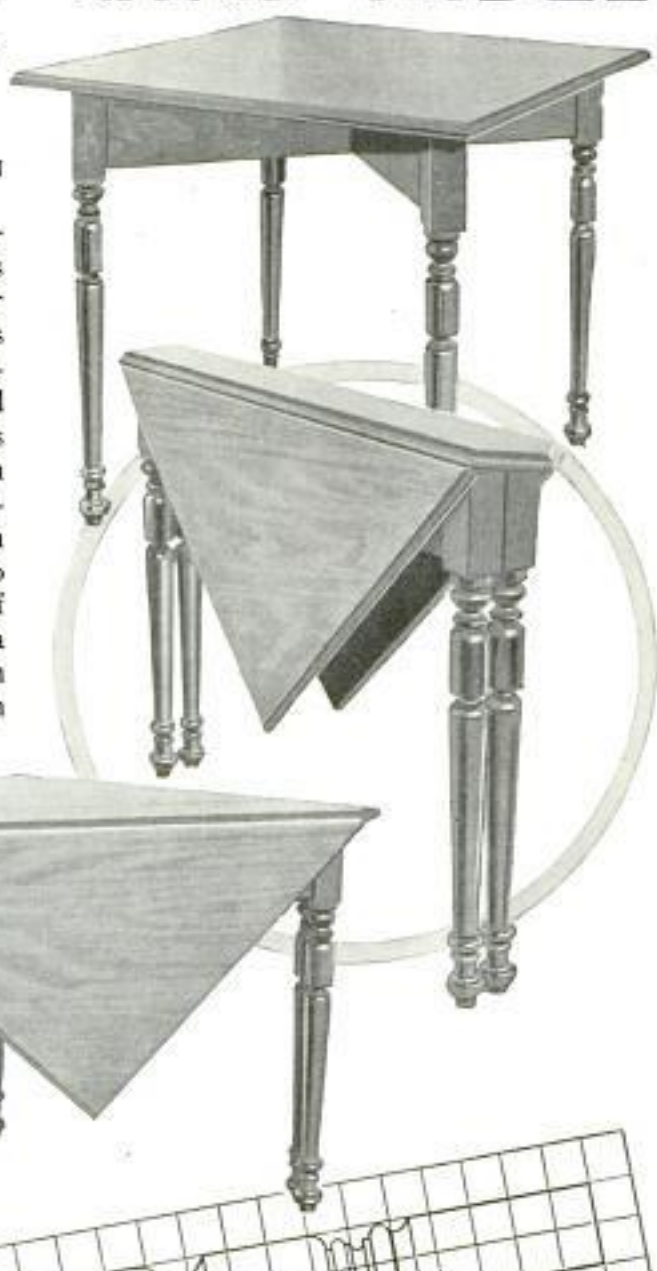
# A DROP-LEAF CARD TABLE

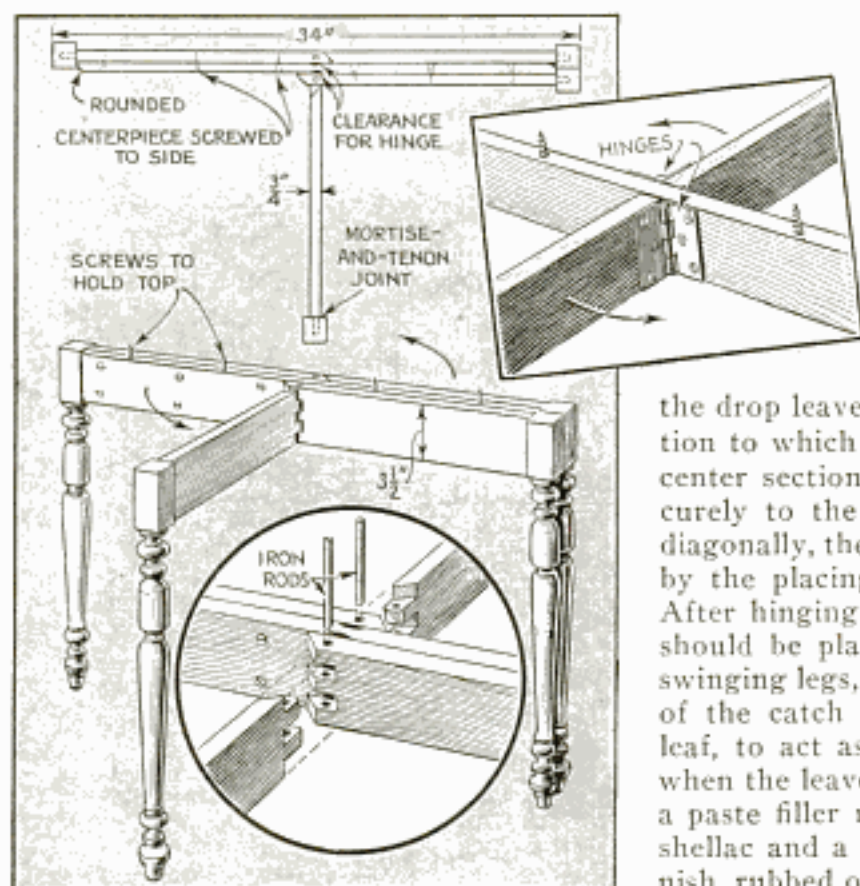
## *of General Utility*

BY H. L. WEATHERBY AND H. C. McLENDON

WITH the leaves dropped this card table is very compact, and occupies but little space in a closet or behind larger pieces of furniture. The construction is not difficult but calls for one item of construction that the average amateur will probably not be familiar with, and that is the finger joint, or table-leaf joint, which was used a great deal by craftsmen of earlier periods and is found occasionally in modern furniture. For the craftsman who has not experimented with this type of joint it would be wise, perhaps, to make a practice fitting before tackling those on the table itself. If desired, you can use an ordinary butt hinge as a substitute.

Mahogany is the wood recommended for the job, because it works well and finishes beautifully. The legs should be turned first and then the long center rail fitted, after which comes the fitting of the short rails into the posts, and the hinging of these members to the short center stationary rails. The top, which is 28





in. square, is made up of boards glued together, bound on the edges with a narrow

### Antique Verdigris Finish for Brass and Copper

Antique green and bronze finishes may be produced on the surface of copper or brass by stippling it with a solution consisting of copper nitrate, 4 oz., sal ammoniac, 4 oz., and calcium chloride, 4 oz., dissolved in water, 1 gal. If a large surface is to be colored, the work may be dipped into the solution. Applied with a stippling brush, the finish may be made to resemble colors frequently observed on bronze statues, which have been exposed to the weather for years. If the solution tends to run and make intricate design work difficult, it may be thickened to the consistency of paste with copper carbonate, and applied with a brush having the bristles set in rubber. As soon as the finish has reached the desired shade, it should be lacquered to prevent further action of the solution. The lacquer also prevents a glossy surface, which often occurs after oxidized copper has been exposed

piece mitered at the corners and grooved or doweled into the edges and ends of the top. This piece, if fitted and glued carefully, adds to the appearance of the table and helps greatly to prevent warping. After building up the top, it is sawed diagonally twice, forming

the drop leaves, leaving a 4-in. center section to which the leaves are hinged. The center section of the top is fastened securely to the center rails by screws set diagonally, the heads of which are covered by the placing of the short center rails. After hinging the leaves, a friction catch should be placed in the ends of the two swinging legs, with the corresponding half of the catch on the bottom side of the leaf, to act as a stop and also as a lock when the leaves are raised. For the finish, a paste filler rubbed in well, followed by shellac and a good grade of rubbing varnish, rubbed out to a velvety finish, leaves little to be desired on mahogany or walnut. Where soft woods are used stain should take the place of filler.

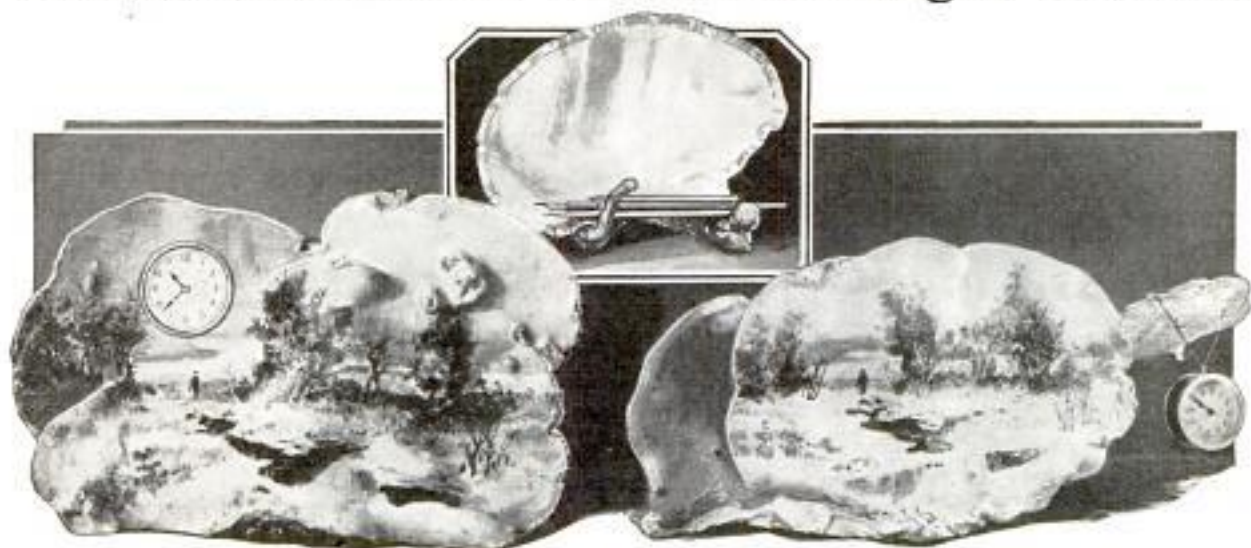
for a long period of time. Articles finished in this manner may be waxed by rubbing the lacquered surface with beeswax and polishing with a tampico wheel running at a low speed. Another method of waxing is to dissolve paraffin in Venice turpentine and apply the solution with a brush. When dry, it may be polished with a flannel cloth.

### Guide Helps Beginner in Rowing Boat

Bent as shown and clamped over the side of the boat, a guide of iron rod will help the beginner in rowing to overcome the tendency to dip the oar blades too far below the surface of the water. The rod should be at least  $\frac{3}{8}$  in. in diameter so that it will not be bent out of shape by pressure on the oars.



## Useful Ornaments Made of Fungus Growth

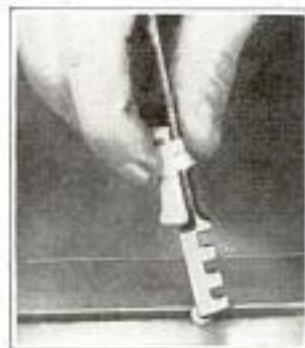


Many decorative articles may be made from fungi found on decaying stumps and logs in the woods. The varied shapes of the fungi make them readily adaptable to clock holders, inkstands, pencil sets, and other decorative uses, a few of which are shown. A little landscape painting on their surfaces will give them depth. Some of the fungi have a white surface with a

dark-brown color underneath. By scratching the white surface with a pointed instrument, you can produce a burned-wood effect. Some of the fungi may be gouged out to make bric-a-brac boxes, while others may be made into trays. The pieces may be trimmed so that they will stand up, or a base may be made of plaster of paris. —Adolph Link, Maywood, Ill.

### A Finger Grip on the Glass Cutter

To prevent the fingers from getting sore when using a glass cutter, provide a grip, which is part of a wooden spool held on the shank with tape or rubber bands, as shown. It may be necessary to enlarge the groove to fit the shank.—F. W. Bentley, Jr., Missouri Valley, Ia.



### Artificial Haunt Attracts Fish

Fish, such as perch, crappies, bluegills, bass and pike can often be encouraged to collect in schools by providing a brush haunt in a weed bed under the surface of the water. To do this, get a scrubby sapling from the near-by woods, and tie a heavy rock to the butt so that the tree can be sunk in the lake to stand in a vertical position with the ends of the top branches projecting above the water to mark the

spot for future fishing. After a few days, schools of small fish will collect around this brushy covert and attract the larger fish that come there to feed on the smaller ones. In the evening hours, drift your boat quietly out to the haunt, and when a baited hook is dropped into the water, you are almost sure to get a strike.

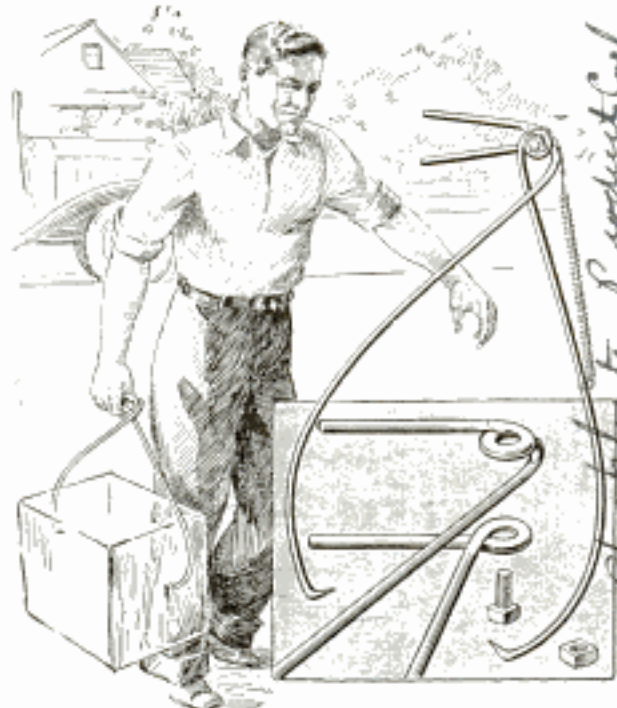
### Acid Containers from Cream Bottles

Cream bottles incased in sheet lead make excellent acid containers. The lead is molded closely around two of the bottles, and a sheet of it is also applied to one side as a brush holder, as shown. The



base of each unit is made flat, the weight of the lead keeping the assembly from being accidentally upset.—Jos. C. Coyle, El Centro, Calif.

*La Motte Chemical Product Co  
The Cornish Bldg  
Baltimore Md*

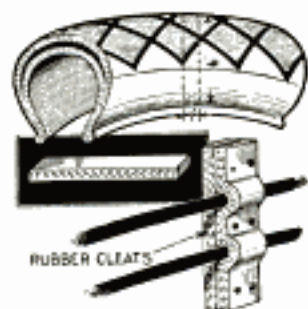


Iron-Rod Tongs for Carrying Ice and Objects Difficult to Grip with the Hands

### A Homemade Pair of Ice Tongs

A strong pair of ice tongs are easily made from two iron rods bent as shown, and pivoted together by means of a bolt. Two ends of the rods are bent to form a handle, while the others are bent at right angles and pointed for gripping the ice. The tongs are also useful for carrying other objects that are difficult to grip with the hands.

### Rubber Cleats Hold Electric Wires



made in this way are good insulators and have the advantage of being unbreakable.

Strips cut from an old auto tire make good cleats for holding electrical wires. They are placed between two of the strips, which are then nailed in place as shown. Cleats

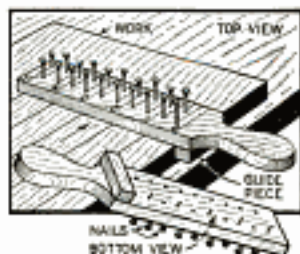
### Fertilizer from Chemically Treated Garden Debris

By chemically treating dry leaves and other garden debris to hasten decay, a rich, odorless fertilizer, for use on either a lawn or flower bed, can be had within a

few weeks. The debris is piled in layers, each about 1 ft. thick. On top of each layer is sprinkled, at the rate of 1 pt. to each 12 sq. ft., a mixture of acid phosphate, 2 parts, ammonium sulphate, 3 parts, and hydrated lime, 1 part. After treating the pile, wet it with water, keeping it moist throughout the process of decay. The above chemical proportions are not critical, but they will decompose the pile within a much shorter time than natural bacterial action. Fertilizer of this kind is especially suited for mulching flower and seed beds containing plants that depend upon natural fertilization.

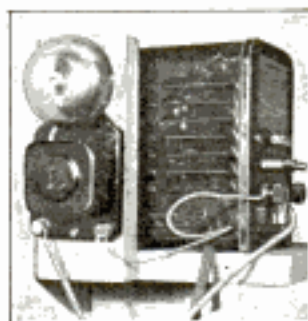
### Multiple Marking Gauge Made of Wood and Nails

On jobs requiring a number of strips or rails, a gauge that marks several lines at once will be found useful. It can be made in any size to suit the work, and consists of a piece of wood, one end of which is shaped to form a handle, while nails, to serve as marking points, are driven into the other end. A crosspiece, or guiding strip, is screwed to the underside of the handle as shown. The gauge is set by driving the required nails so that they project on the opposite side of the wood.



### Battery Charger Operates Doorbell

Many people have on hand old battery chargers of the dry-plate type that can be plugged into the house-lighting circuit and used as transformers for ringing doorbells. The chargers pass about the correct amount of current to operate a bell, and they will last indefinitely. In wiring,



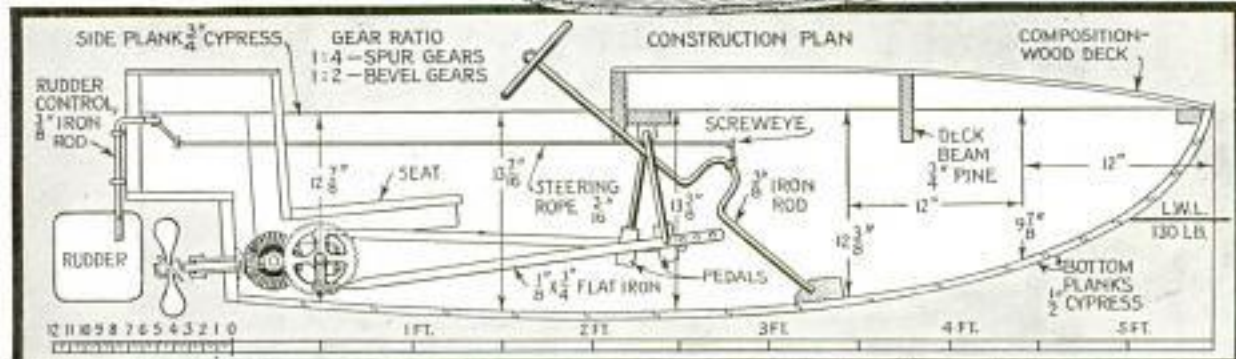
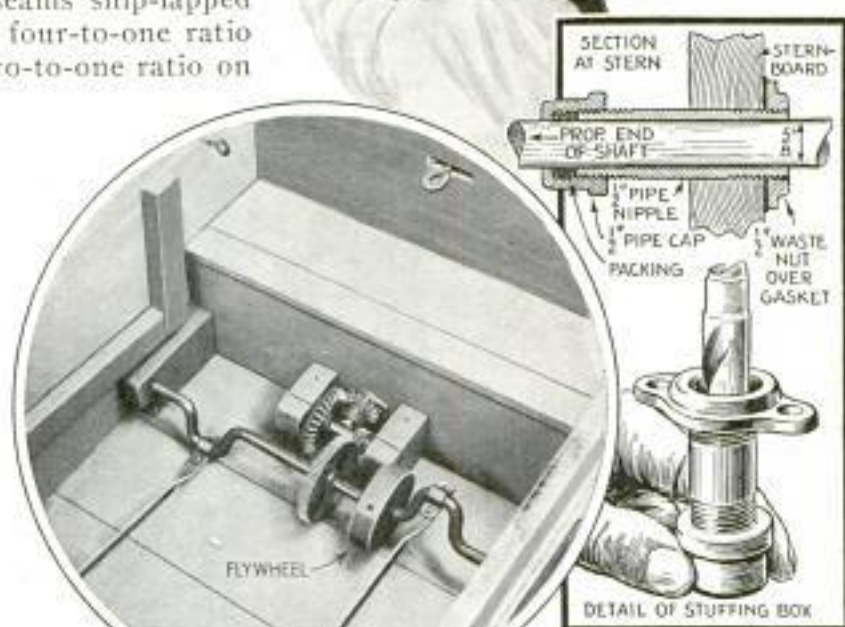
connect the bell to the output binding posts on the charger and arrange the wires leading to the electrical supply so that a push-button, can be connected to one of them.

# A Pedal-Drive Sea Sled

## "WATER BUG"



YOU will get plenty of fun in this midget boat using the simple pedal method of propulsion. The lumber, preferably cypress, is 1½-in. stock. The bottom planks run straight across, with the seams ship-lapped and set in marine glue. A four-to-one ratio on the spur gears and a two-to-one ratio on the bevel gears, give about 300 turns at the prop when pedals turn 35 or 40 r.p.m. The stuffing box is a ½-in. pipe nipple fitted with a cap and a waste nut. A hole is drilled through the cap, after which the cap and pipe are reamed for a 5⁄8-in. shaft. The gear and flywheel are fitted before shaping the crank throws of the 5⁄8-in. crankshaft. Bearings are hardwood blocks soaked with oil. Straps of 1⁄8-by-3⁄4-in. flat iron connect the crank throws to the pedals, which are hung from metal brackets on a cleat across the center. The 8-in. propeller is made of heavy sheet metal and is held between two nuts.





This Improved Garden Cultivator Costs Very Little to Make and Is Easy to Operate

### Front-Wheel Assembly of Bicycle Makes Garden Cultivator

You can make a garden cultivator by utilizing the fork, handlebars, and front wheel of an old bicycle. A U-shaped piece of flat iron, which carries the cultivator shovels, is clamped to the fork, and is braced to the wheel hub. If an old bicycle tire is available, it is a good idea to put it on the wheel to protect the rim, although it is not necessary.—Fred W. Schneider, Towaco, N. J.

### Window Shutter Directs Breeze into Bedroom

In my home the bedroom window faces south, and as most of the night winds blow from the west, I fixed one of the shutters to direct the breeze into the room.



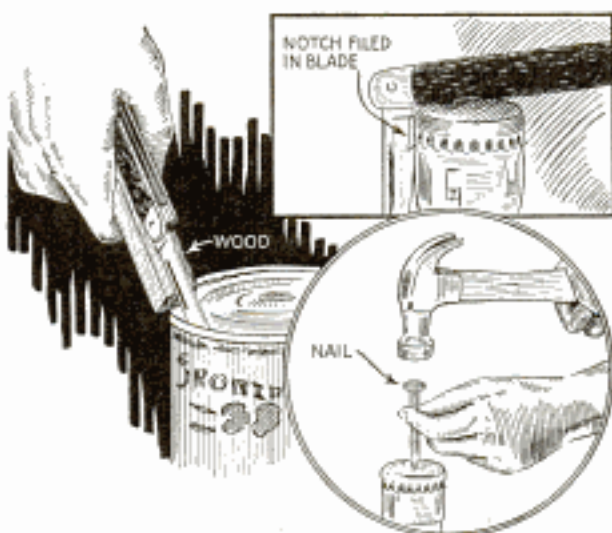
This was done by using a long hook and a screweye to hold the shutter at right angles to the window. It was surprising how much cooler the bedroom was with this arrangement. The shutter panels are solid.—M. Q. Lott, Baton Rouge, La.

### Dust Removed from Camera Bellows with Vacuum Cleaner

Dust is easily removed from the inside of camera bellows with a vacuum cleaner by fastening an oilcan spout to the end of the hose. The spout is fitted snugly by wrapping the threaded end with friction tape. Another method is to drill the center of a cork to take the spout and insert the assembly in the end of the hose. The small end of the spout should be about  $\frac{1}{8}$  in. in diameter for best results. A nozzle of this kind is also handy for cleaning ship models and other delicate pieces that cannot be cleaned with the regular attachments of a vacuum cleaner.

### A Few Tricks to Remember When on Picnics

If you have forgotten to take a can opener on your picnic or outing trip, an old jackknife can be used as a substitute. Hold a small block of wood against the back of the knife and use it in the manner shown. A notch previously ground in the heel of the blade will also make the knife



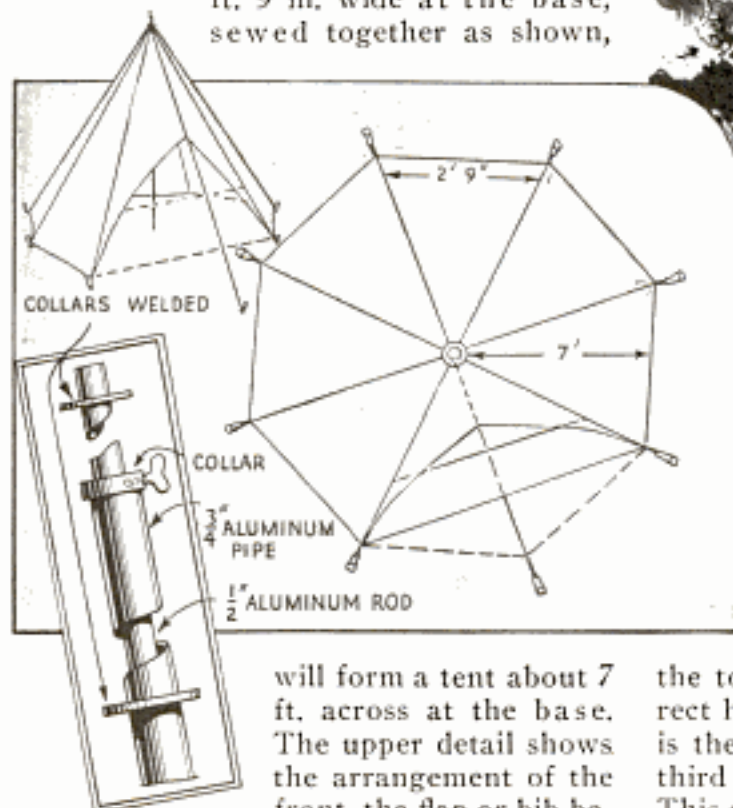
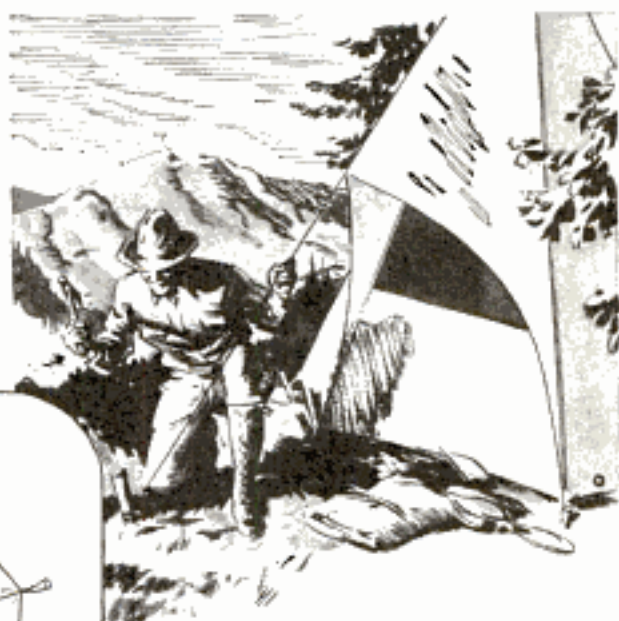
Cans and Bottles Opened with Old Jackknife When No Opener Is Available

serviceable for opening bottles. In the absence of a knife, a hole made through the cap with a nail will serve the purpose if the bottle contains a carbonated liquid.

☞ Cane chair seats that have sagged may be tightened and brought back to shape by washing them with hot, soapy water and then setting them outside to dry.

## Camping Tent for Two Carried in Your Pack

This lightweight tent, which is easily carried in a pack, and has ample room for the accommodation of two people, has no walls. It is fastened by one guy rope at the front, while each sector seam at the base is fitted with tent-peg cords securely sewed to patches which reinforce the cloth. Six 7-ft. triangular pieces, each 2 ft. 9 in. wide at the base, sewed together as shown,

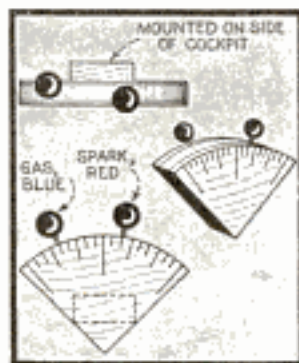


will form a tent about 7 ft. across at the base. The upper detail shows the arrangement of the front, the flap or bib being sewed to the seams where the side sections are joined. Equal lengths of aluminum rod and pipe make up the tele-

scoping center pole, the total extension length of which is determined by the size of the tent. A collar welded to the rod near the top, supports the tent, while one welded to the pipe about 3 in. from the bottom, serves as a stop when driving the pole into the ground. In erecting the tent, the rod is slipped through the hole in the top and the tent is raised to the correct height to allow for staking. The pole is then locked in position by means of a third collar, which fits loosely on the rod. This collar is fitted with a thumbscrew and rests on the top of the pipe when the pole is extended to hold the tent.—S. H. Cooke, Vancouver, B. C., Can.

### Imitation Throttle Levers for Small Scale-Model Planes

Mounted on the inside of a cockpit, realistic imitation spark and throttle levers for scale-model planes can be made from a block of wood and two pins having different-colored heads. The block is shaped as shown, after which the pins are stuck into it to simulate



the levers. A few notches cut on the side of the block improve the effect.—V. M. Bilson, Washington, D. C.

### Locating Leaks in Pipe Lines

Pumped into gas, water, or steam pipes, ether provides a simple method of locating leaks, which can be readily detected by its odor. Attach a bicycle or automobile air pump to an outlet in the pipe system by means of a reducer and tire valve. Then remove the piston from the pump, pour in a little ether, and force it into the system by pushing the piston into the barrel of the pump.



Height of Walls Quickly Measured by Using Measuring Tape Attached to Yardstick

#### Simple Method of Measuring Height of Walls in Room

By attaching a measuring tape to the end of a yardstick, it is easy for one person to measure a distance that is greater than the reach of his arms. This method has been found helpful when measuring the height of a room, but can also be used to determine horizontal distances.

#### Rack to Hold Wrenches Made from Valve Springs

Screwed to a wall or the back of a workbench, this rack provides a handy place to keep your straight wrenches, screwdrivers, etc. To make the rack, groove the top of a piece of wood to receive a few old valve



springs, which are fastened in position by means of eyebolts. The space between the coils allows easy insertion of the tools, yet holds them tightly.—Dr. S. H. Rynkiewicz, Kingston, Pa.

#### Radiator Keeps Oil Cool When Driving in Desert

In order to keep the oil in my car motor from getting too hot while making long trips across a desert, I mounted a small radiator just behind the fan. I then disconnected the oil-return line leading from the crankcase to the filter and installed a line from the crankcase to the top of the oil radiator, and from the bottom of the oil radiator to the filter. This installation keeps the oil about the same temperature as the water in the radiator. The temperature seldom gets up to 195° Fahr.—O. W. Timm, Glendale, Calif.

#### Sheet Metal Improves Lawnmower

A piece of sheet metal fitted over the roller of a lawnmower so that it extends into the bed of the grass catcher will help the cutting blades to throw the grass farther back into the catcher. The sheet metal also keeps the grass from falling on the roller when the catcher is nearly full.—Grover Brinkman, Okawville, Ill.



#### Tool Made from Razor Blades Cuts Paper into Strips

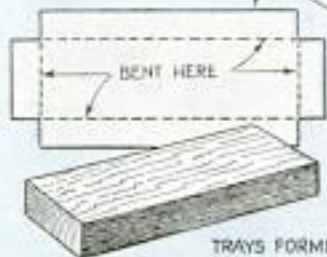
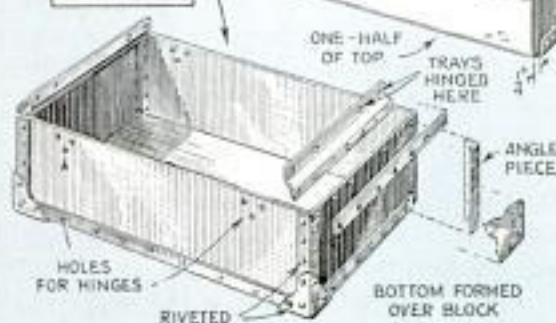
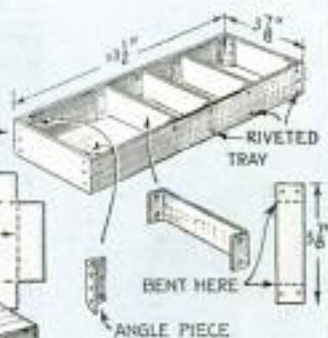
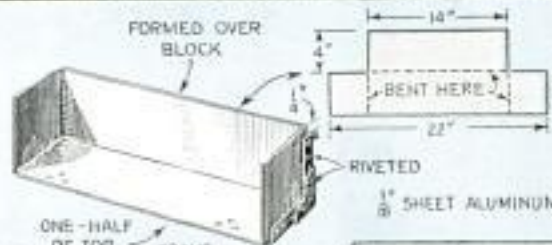
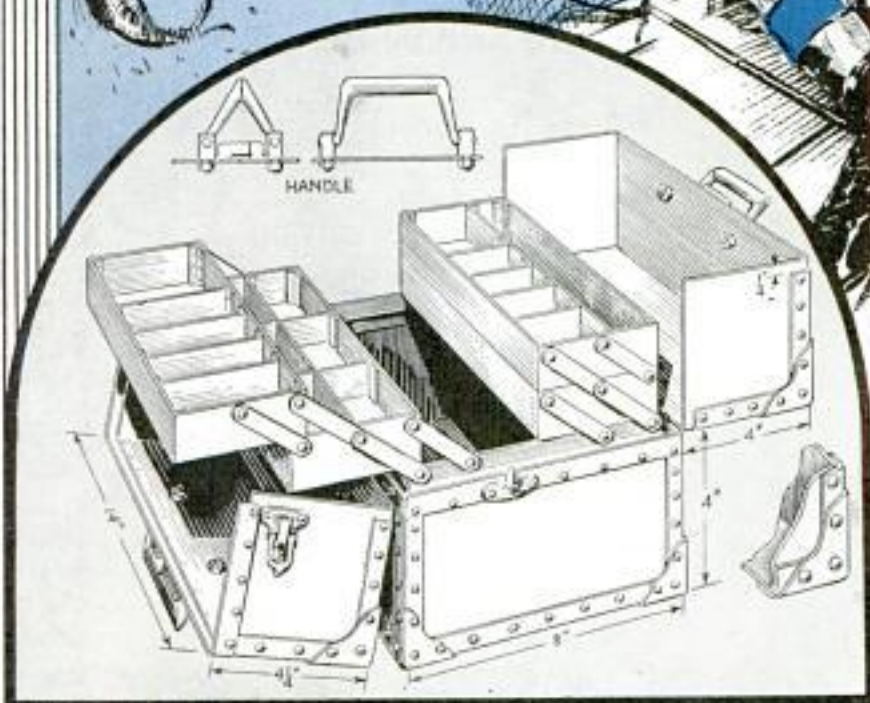
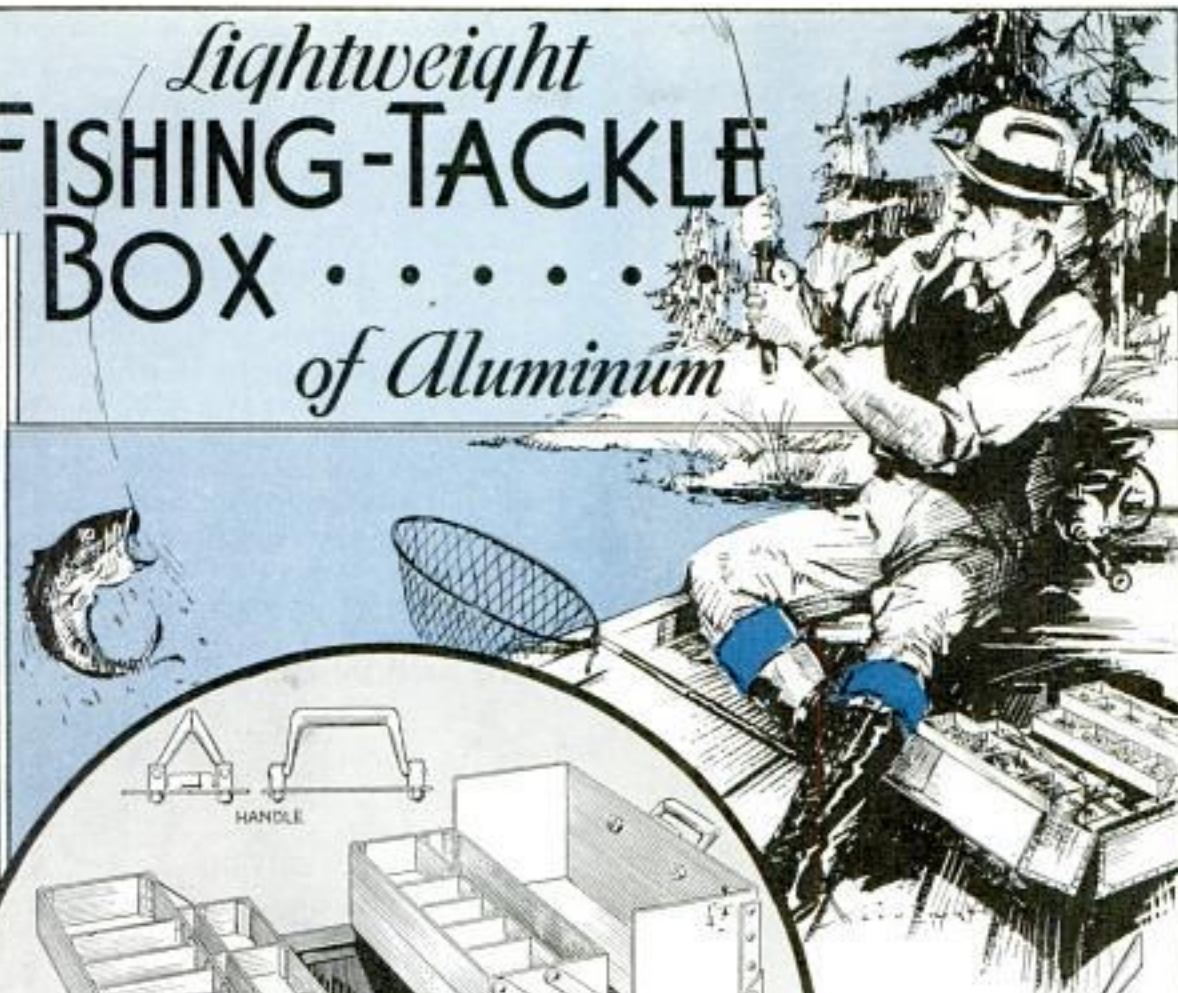


This little tool, consisting of four safety-razor blades and a handle, is useful in cutting strips of crepe paper for decorative purposes. The handle is cut from 1-in. stock on a bandsaw, and the cuts in the end that hold the razor blades are made slightly curved with a jigsaw so that the blades bind when inserted. This binding effect holds them in position as very little pressure is needed to make the tool cut.

Small children are not likely to kick through a screen door if the lower half is covered with two layers of wire mesh.



# Lightweight FISHING-TACKLE BOX . . . . . of Aluminum





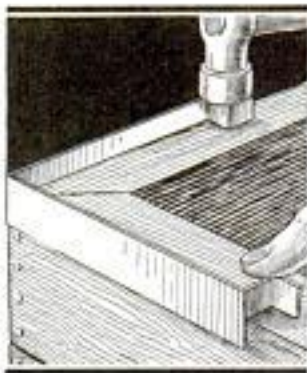
Large Concrete Tile with Ends Closed and Shelves Fitted Inside, Provides Efficient Iceless Refrigerator

### Concrete Tile Used as Refrigerator

Mounted on a suitable base, a large concrete tile makes an efficient refrigerator where ice or electrical cooling equipment is not available. The rear end of the tile is closed with a 2-in. wall of concrete reinforced with wire mesh, while the front end is fitted with a door, the hinges of which are imbedded in the edge of the tile. Shelves are fitted on the inside for the accommodation of food dishes. Dampening the tile will aid in keeping the interior cool.

### Metal Clip Strengthens Box Corners

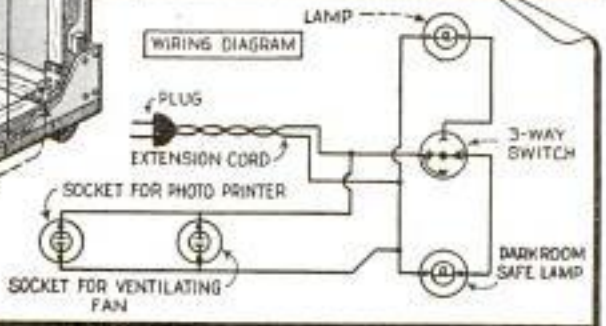
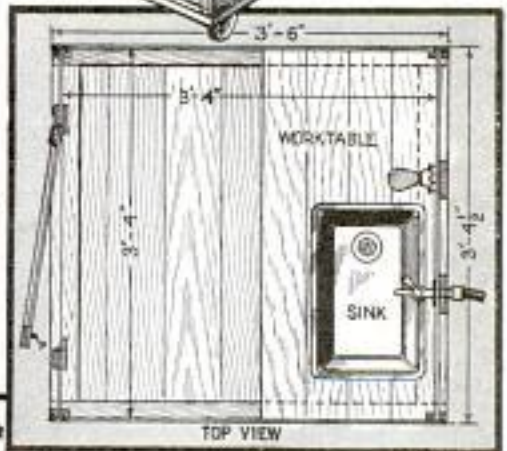
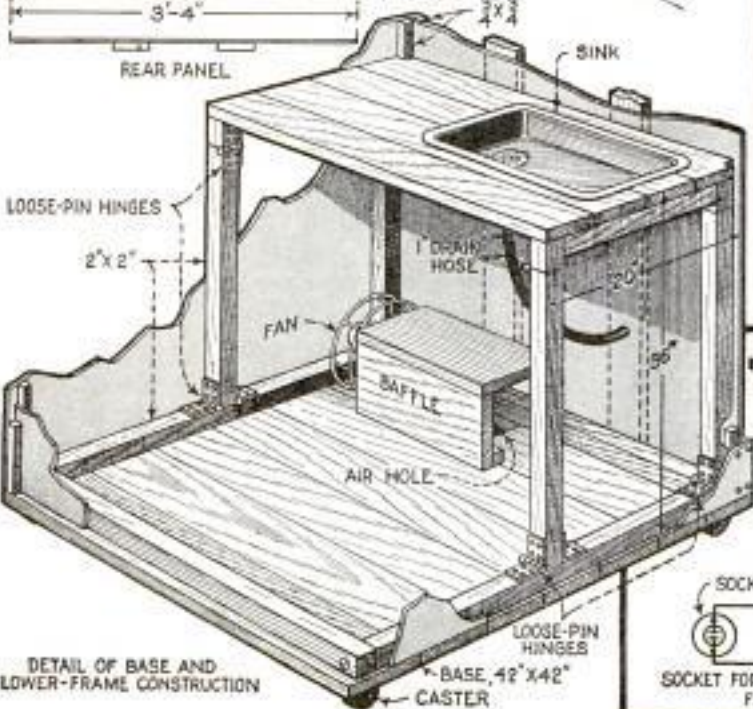
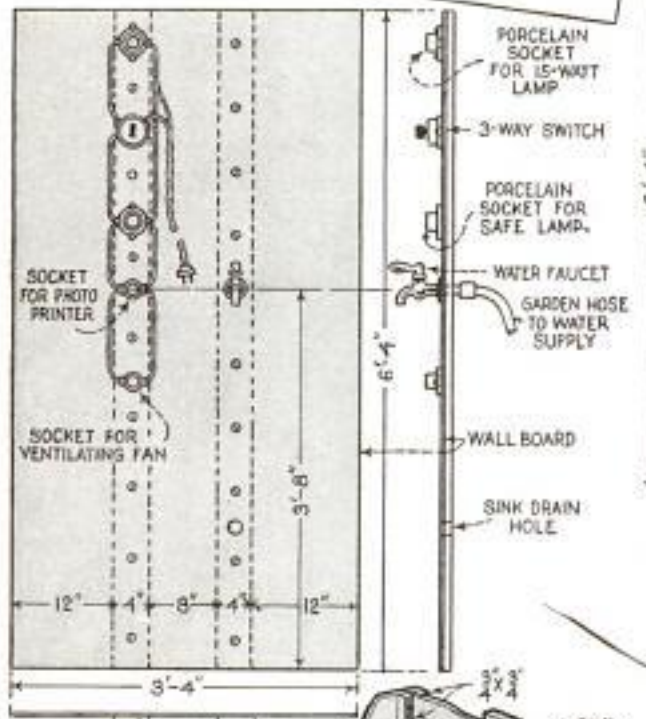
Corners of boxes, crates and chests will be reinforced by using this type of clip. It is made from a strip of sheet metal about 1 in. wide and 5 in. long, bent at right angles in the center. The ends are split lengthwise in the center and one half is removed. The remaining part is then bent as shown, after which the clip is placed in position around the corner to be strengthened, and the bent ends are driven into the top edge of the box.



### A Convenient Portable Darkroom

The portable darkroom shown on the opposite page was designed for the photographer who cannot spare space for a permanent installation. Running water is supplied to the sink by attaching the hose to a faucet. To take care of refuse, the sink drain is fitted with a length of garden hose, the end of which may be stuck in the cellar drain when the darkroom is in use. To afford adequate electric power for lights and printing, an extension cord is connected to the lighting circuit. All of these quickly detachable service connections may be coiled up and hung on a hook on the outside wall of the darkroom when it is not in use. To simplify construction and to provide rigidity, steel angle pieces such as are sold in all hardware stores are used throughout. If the darkroom is to be used for extended periods, a small electric fan may be installed to furnish a supply of fresh air. The baffle will prevent the entrance of light from outside. All holes for pipes, hose and wires should be carefully sealed with plastic wood or patching plaster to prevent the entry of light. In connecting the three-way switch, it is important that the wire from the extension cord be attached to the switch contact which is shorted to an adjacent contact as shown. The front panel which contains the door should be made with care to avoid the entrance of light. The method shown will make a good job and if the wood strips are painted when the work is completed, warping is not likely to cause cracks. The demountable construction used in this darkroom makes possible to dismantle it quickly for convenience when moving. To produce a good acid-proof finish for the wood top of the work bench, paint it with two coats of a solution made by dissolving 4½ oz. each of copper sulphate and potassium chlorate in a quart of water. The solution should be applied boiling hot, with a brush, allowing each coat to dry thoroughly. When the last coat is dry, apply two coats of a finishing solution made by mixing 5¼ oz. of aniline oil and 6¼ oz. of concentrated hydrochloric acid in a quart of water. This solution should also be painted on while boiling hot. When the last coat of the finishing solution is dry the table should be washed with hot soapsuds and polished.

# Photographer's *PORTABLE* DARKROOM



### Improved Envelope Carries Two Classes of Mail



Large and Small Envelopes Combined to Make One Container for Carrying First and Third-Class Mail

Both first and third-class mail may be enclosed in a combination envelope made as follows: A slit is cut in the front side of a large envelope and a smaller one is inserted into it so that the flap projects outside. A strip of gummed paper holds the smaller envelope securely inside of the larger one.

### Intake-Manifold Hot Spot Causes Engine Trouble

The occurrence of almost continuous backfiring of a car motor through the air intake of the carburetor often indicates serious trouble in the intake-manifold hot spot. Generally this occurs under heavy load in hot weather. On some types of

hot spots, a burned gasket will allow a leakage of hot gases into the intake passage, which fires the new charge before it reaches the cylinders. In other cases, a thin spot in the wall of the manifold separating the exhaust and intake passages causes pre-ignition of the fuel charge in the intake. If the trouble is due to an overheated engine, allowing it to cool will be sufficient. But if the trouble is due to a defect, the engine will show no sign of overheating, although it may be necessary to load it fairly heavy in order to cause the trouble to develop. A check for the trouble is best made by removing a hot spot from an engine that is operating perfectly and substituting it for the faulty one.—A. H. Vance, Harshaw, Wis.

### Punch Marks on Side of Pan Aid in Cutting Pie Uniformly

Evenly spaced prickpunch marks on the outside of a pie pan will aid in cutting a pie in pieces of uniform size. With a pair of calipers, divide the outside circumference of the pan into the required number of



parts and then prick it with the punch as shown, supporting the inside edge on a piece of metal to prevent it from being dented.—W. L. Wendel, Lockport, N. Y.

## BLUEPRINTS ON BOATS



Six complete marine and construction blueprints on "Hi-Ho,"—a 14-Ft. Outboard Runabout described in our February, 1933, issue, can be had for \$1. Order No. SN 840 to 845, incl. Also, there are many other boat blueprints, including rowboats, in our total collection of 380 prints, of which a list can be obtained for 3 cents to cover postage. A sample print with pictures of 40 completed projects will be sent for 10 cents. Address Blueprint Department.

### How to Land a Big Fish without Net or Gaff

Did you ever lose a large muskellunge or pike because your net or gaff was not at hand for landing it? If so, the following method can be used to prevent this from happening again. Play the fish until you can bring it close to the boat. Then transfer the rod to the hand nearest the fish's head, and while grasping the rod firmly, press the thumb hard on the spool of the reel. Reach out slowly with the other hand and grip the fish by the spine where the gills terminate. The fish will writhe and twist, but there will be little actual struggle as this grip partly paralyzes it. Do not release the grip until you have the fish safely on a stringer, as the moment it is released the fish will go into action again and you may be injured by the hooks on the plug. The best way to string the fish with one hand, after laying the rod where it cannot be dragged back into the water, is to twist the fish around so that its underside is facing you, holding its head even with your chest, and cut a slit through the thin membrane directly below the jaw bone. This makes an opening so that you can insert the stringing cord and tie a loose slipknot, which can be drawn snugly around the lower jaw.

### Novel Furniture Decorations Made from Pencil Turnings

Furniture decorations having the appearance of inlays, delicately bordered with hair lines of color, can be quickly turned from pencils with an ordinary pocket sharpener. The paint on the pencil determines the color of the border. The decorations should be applied to the work with shellac, and then covered with several coats of clear varnish.—Jack Modroch, Cleveland, Ohio.



Microscope Specimens Enlarged and Projected on Screen with Aid of Spotlight

### Projecting Microscope Images on Screen

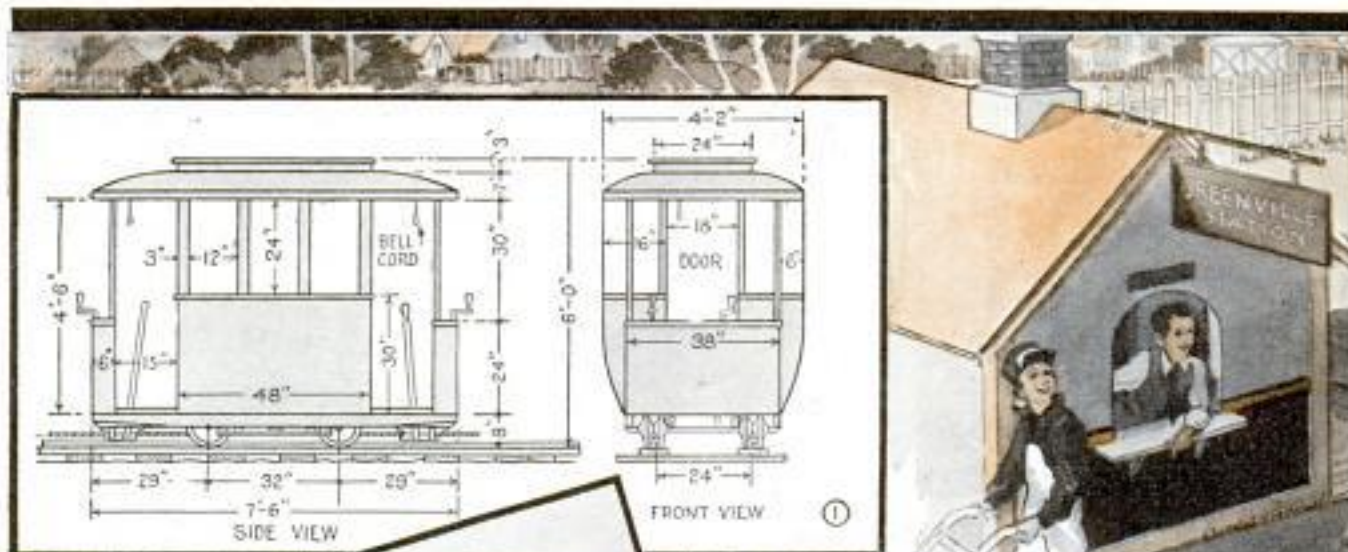
Teachers who do not have a machine for projecting images as seen through a microscope, can improvise one by using a 500-watt spotlight. The light is directed on the mirror under the specimen table, and is reflected up through the lens onto a screen or a piece of paper held above the barrel of the instrument.

### Iron Rods Strengthen Boat Transom

It is a good idea to provide some means of strengthening the transom of a boat before mounting a heavy outboard motor on it. This can be done by drilling two holes through the width of the stern board to take two 1/2-in. galvanized-iron rods. This will prevent the board from breaking off and thus losing the motor. Wooden plugs should be driven into the ends of the holes to prevent the entrance of water.



☛ An old pair of hair clippers is handy for trimming the bottom edge of a worn whisk broom.



# Backyard CABLE

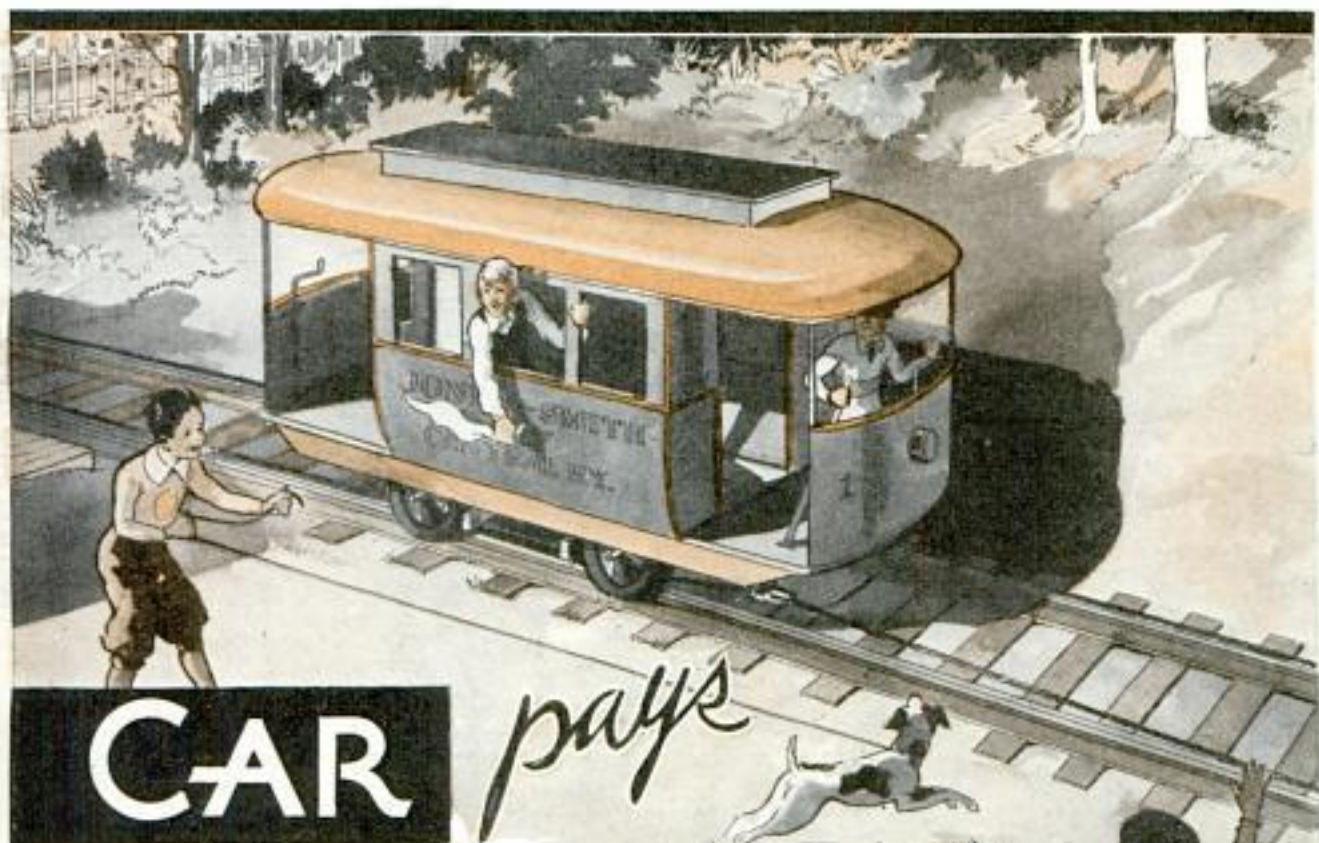


hold of the cable, can be released instantly; in fact, it is arranged so that the motorman or "gripman" must hold the lever back to keep the car in motion. As soon as he lets go, the car slows down of its own accord. Traveling out from the power house, the car picks

up one cable and on the return grips the other. The gripping device is extremely simple, being two grooved bronze blocks so arranged that by moving the lower one forward by means of the hand lever, the cable is pinched securely, but without injury to it. When the car is at a standstill the cable slides free through the grip blocks and guide pulleys.

Standard coaster-wagon wheels are used in pairs, and they straddle the rail. The frame is built up on four parallel two-by-fours with an X-frame in the center, Fig. 5, and is floored with  $\frac{3}{4}$ -in. material. Construction details on the car are given in Figs. 1 to 4 inclusive. The curved sides are formed by ribs cut as shown and cov-

**I**N principle this backyard cable car operates just like the famous cable cars of Chicago during the nineties, with continuously running cables between the tracks and a power house at the end of the line. The gripping device, which takes



# CAR

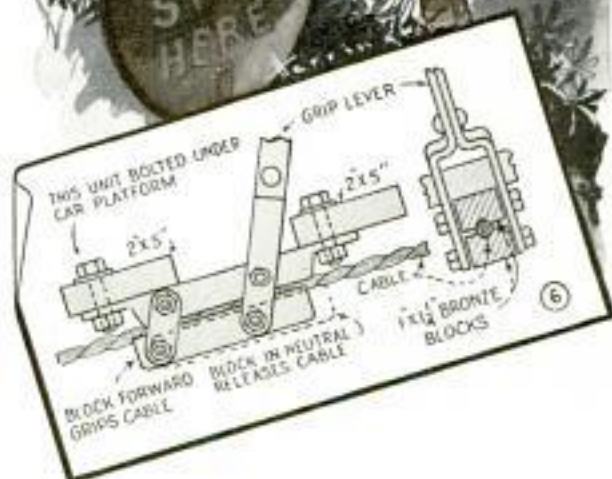
*pays*

# Dividends

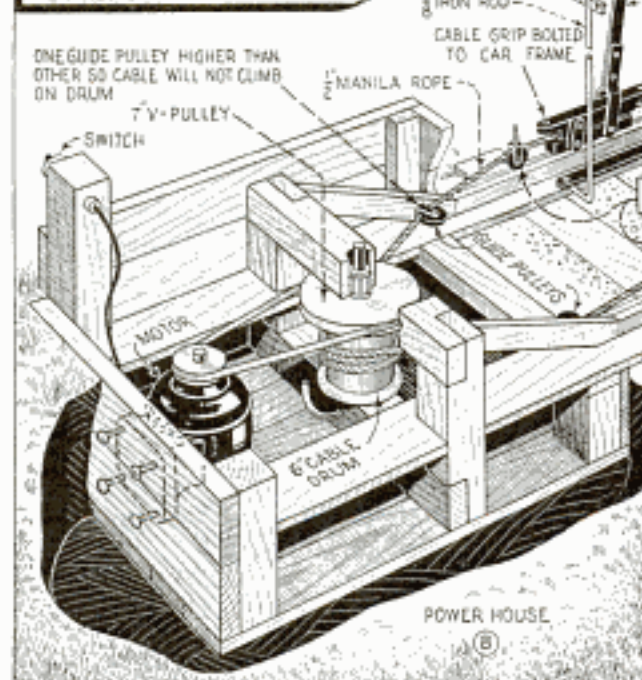
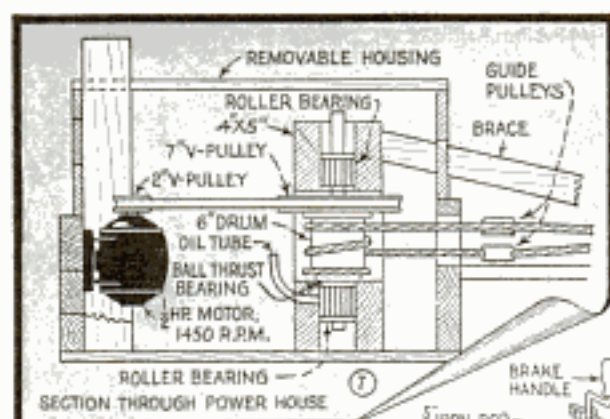
ered with pressed wood. The corner posts and door frames are surfaced two-by-twos, and other frame members are  $\frac{3}{4}$  by 3-in. material. Roof beams are curved, being cut from  $\frac{3}{4}$  by 7-in. stock 50 in. long, and covered with pressed wood. The cupola on top of the floor is built up as shown, and roof over platform ends is covered with separate pieces at the corners. Pipe standards support the roof overhang, and the aprons are of galvanized sheet reinforced with a flat-iron bar along the top, to which the brake-lever bracket is bolted.

The gripping device is illustrated in Fig. 6. It consists of two bronze blocks with V-grooves. The upper block is bolted to the car frame under the platform, and the lower block can be moved forward or back by the grip lever. In moving it forward the running cable is gripped securely in the V-grooves without injury, and without jerking, thus relieving strain on power-house motor as well as on the car and passengers. In case a flexible steel cable is used, the grip blocks should be of steel.

There is a brake crank handle on each

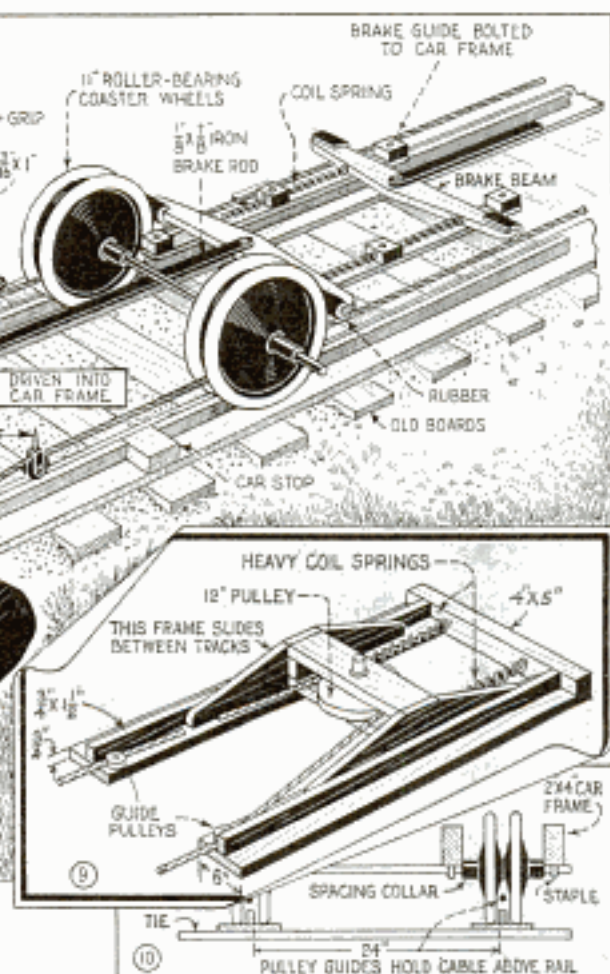


platform, operating the corresponding brake, which is a wood brake beam with brake shoes made of sections of garden hose. Coil springs hold the brakes away from the wheels when not in use, and a flat-iron bar link connects beam to brake



The pulley should run on roller bearings or bronze bushings with adequate provision for lubrication.

Build the track as shown in Fig. 8. The rails are  $\frac{3}{4}$  by 6-in. boards with a  $1\frac{1}{2}$ -in. strip on edge in the center, so that the



lever. The gripping device is bolted under the platform so that the cable slides through it just above the upright rail, and between the paired wheels. A guide pulley in front of the grip lifts the cable off the rail so that it will be in proper line for gripping. When the car has passed, the cable lays along the inside track, sliding along the smooth boards. Grips are installed on each platform to take up the cables, for which  $\frac{1}{2}$ -in. manila rope will be found satisfactory. It must be expertly spliced so that the joint will not jam in the grip blocks. It is a good idea to stretch the cable first by towing a car with it for a short distance. In order to keep it tight in operation, an end-of-the-line tightener, as illustrated in Fig. 10, can be used. It consists of a strong, rigid frame carrying an idler pulley, the entire unit sliding between the rails and having two heavy-coil tension springs to keep the cable taut.

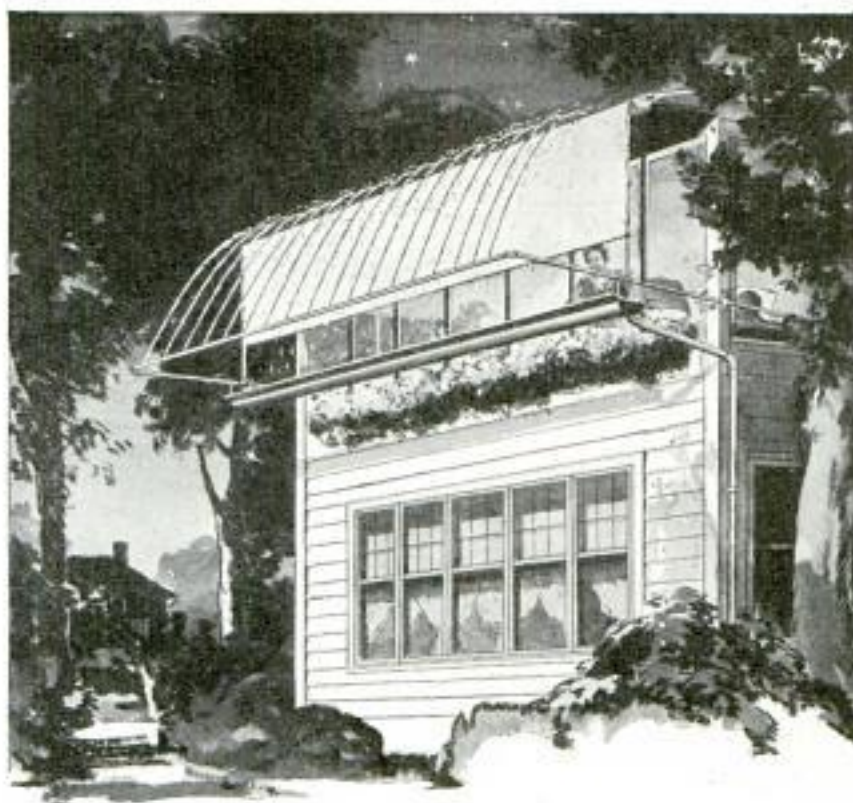
wheels straddle it. The distance between upright rails should be 24 in.

A sectional view of the power house is illustrated in Fig. 7. A standard  $\frac{1}{2}$ -hp. motor will be satisfactory; fitted with the size pulleys and drum indicated, it will give the car a speed of slightly over 7 m. p. h. If a lower speed is desired, use a larger V-pulley on the top of the drum and vice versa for greater speed. It is important that the power-house assembly be properly installed, and one with some experience in hooking up power reductions should do the job. Roller bearings are recommended for the upright shaft that carries the cable drum, and straight bronze bushings will do very well also. But provision must be made to keep both bearings thoroughly lubricated.



## Evaporation of Water Cools Sleeping Porch

Rapid evaporation of water running down a canvas curtain helps considerably in reducing the temperature on a sleeping porch. This method of cooling is especially effective when evaporation is hastened by prevailing winds, which was the case with a southern home owner, who has used this method satisfactorily. The water flows through a pipe, which is perforated with numerous small holes to throw a fine spray. It is supported about 4 ft. below the eave and about 3 ft. from the side of the porch. The curtain is suspended from the edge of the roof, covering the eave gutter, and it is held in position by two pipe supports at each end to which it is securely lashed. Weights may be attached to the lower edge, or this may also be lashed to a length of pipe held horizontally between the two vertical end pieces. Colored awning cloth will help make the arrangement attractive, besides



serving the purpose as well as plain canvas. The surplus water drains off into a gutter placed under the lower end of the curtain and is carried down a conductor pipe to the garden. In this way, surplus water is not wasted, but is used for watering the garden.—T. J. Byrne, Tulsa, Okla.

### Simple Method of Assembling Springs



Automobile springs are readily assembled without the use of a vise or clamps as follows: Arrange the leaves as shown,

insert the center bolt and turn down the nut slightly. It is then an easy matter to twist the leaves around in a parallel position and tighten the nut to hold them in place for attachment to the car.—George M. Zimmerman, Northville, Mich.

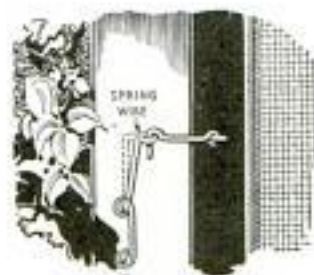
### Increasing the Life of a Night Light

If the night light in your home burns out frequently, use a lamp double the

voltage required, and it will not be likely to burn out. A 40-watt, 220-volt lamp used on a 110-volt circuit will consume only 10 watts and will produce a light equal to a 10-watt lamp of 110 volts.—C. A. Swanson, Antigo, Wis.

### Adjustable Latch for Screen Door

Screen-door frames sometimes swell or shrink so that it is difficult to fasten the hook. This trouble can be overcome by screwing spring wire, bent as shown, to the casing in place of the screw eye used to engage the door hook.





Card Table for the Summer Camp Made from Bamboo Stick and Two Barrel Heads

### An Improvised Card Table for Your Summer Camp

During an idle hour at a summer camp, one of the members made a sturdy card table from a section of a bamboo fishing pole and two barrel heads. The piece of bamboo was split at both ends so that they could be spread apart and nailed to the barrel heads.

### Inexpensive Pen-and-Ink Sketches from Photo Negatives

Pen-and-ink sketches may be made cheaply from photographic negatives by using the following process. Get a negative of fairly good contrast and place it, with a piece of blueprint paper, in a printing frame or between two pieces of glass held firmly together. Allow bright sunlight, or artificial light, to shine through the negative from 30 to 60 seconds, depending on the density of the negative and the brilliancy of the light. The correct length of time for exposing a negative is found by experiment. If artificial light is used, expose the paper for approximately 10 min. in the light of a 60-watt lamp held about 4 in. away from the glass. After the exposure is made, remove the blueprint paper from the negative in a fairly dim light, and trace the details of the picture with waterproof ink. It is a good idea to have a print at hand for reference. Then dip the paper into cold water or hold it under running water. If the proper exposure has been made, the image will fade

away in a few seconds leaving the ink sketch. It is practically impossible to have all of the blue disappear from every print, but a small amount is not objectionable in most cases. Hang the sketch up to dry for about 15 or 20 min., after which the necessary retouching is done.

### Imitating Ribs on Wings of Wood Airplane Models

Ribs on wings of model airplanes made of solid wood can be simulated with fine thread and narrow ribbon. First, dope the thread in position for each rib, and after it has dried, dope the ribbon over each thread to imitate the tape used to cover the fabric where it is sewed to the ribs. Start at the trailing edge of the wing, carry the thread and ribbon around the leading edge and back to the trailing edge.

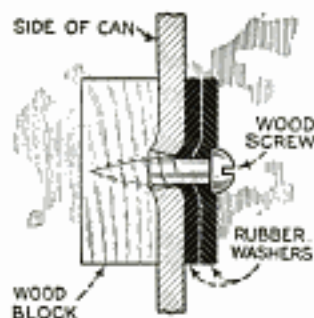
### Covers for Refrigerator Freezing Pans Made of Cloth



Frost on the inside of a refrigerator freezing compartment collects food odors, and if it drops into the freezing pans, the contents will be contaminated. This trouble can be prevented by providing the pans with cloth covers held in place by means of drawstrings. If the covers are dampened before using, the moisture will freeze in the cloth and seal the pans.

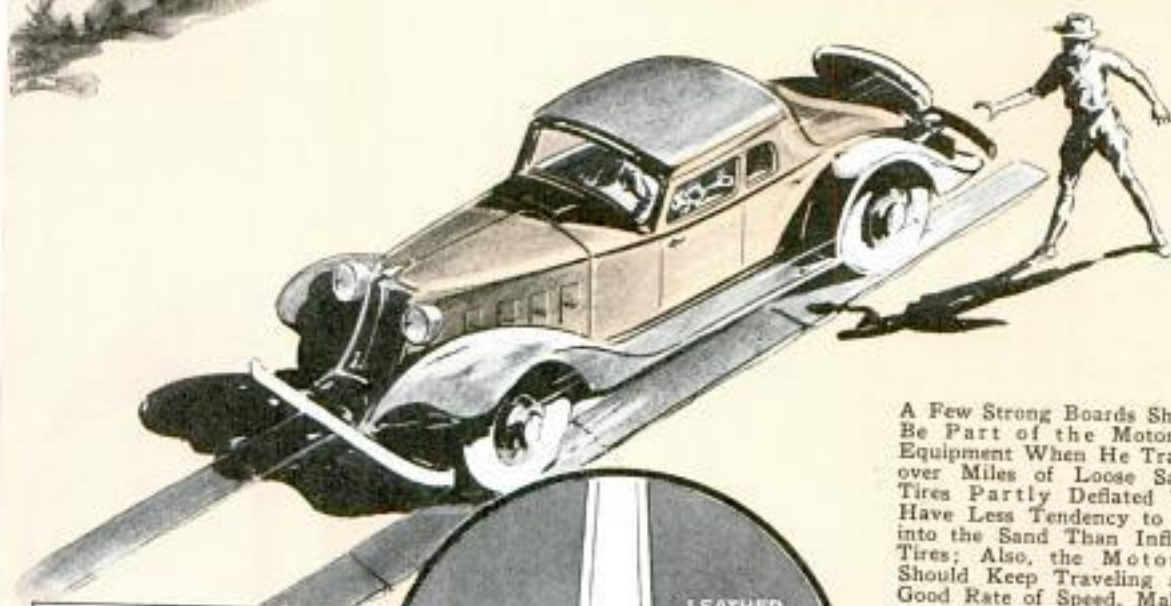
### Repairing Hole in Metal Container

An emergency repair for a small hole in a metal container is easily made by using a small wood screw, a wood block and a couple of rubber washers. From the inside of the container, the screw is inserted through the washers and the hole and then driven into the block on the outside. The washers pulled tightly against the hole will seal it.



# Tips for the

# DESERT MOTORIST



A Few Strong Boards Should Be Part of the Motorist's Equipment When He Travels over Miles of Loose Sand; Tires Partly Deflated Will Have Less Tendency to Dig into the Sand than Inflated Tires; Also, the Motorist Should Keep Traveling at a Good Rate of Speed, Making as Few Stops as Possible

Piece of Heavy Leather or Even a Wrapping of Bacon Rind, Substituted for a Burned-Out Connecting-Rod Bearing, Will Keep You Going for Miles



Hose Conducts Evaporated Water from Radiator to Closed Tank on Running Board; the Overflow Pipe Must Be Closed and the Radiator Cap Fitted with a Nipple

PARTLY DEFLATED



Small Gaff on End of Casting Rod Helps in Landing Large, Fighting Fish

### An Aid in Landing Large Fish

One fisherman fitted a small gaff on the end of his casting rod, and when a fish is reeled within reach, he hooks the gaff into its mouth. This assures landing a fish that might otherwise get loose. The barb is filed off the gaff, and silk cord is used to bind it to the rod, the wrapping being coated with varnish to hold it in place.—A. H. Waychoff, Phoenix, Ariz.

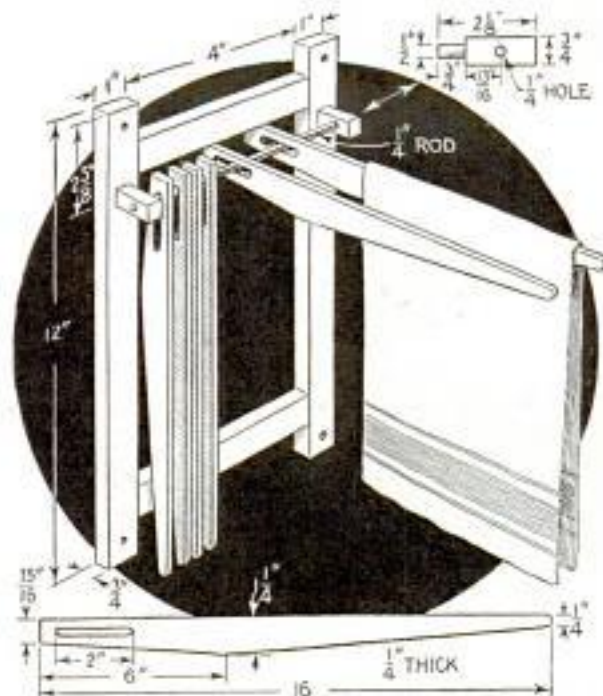
### Tools for Turning Model Parts Made from Saw Blade

Tools for duplicating small model parts, such as balusters, stanchions, deadeyes, etc., are easily made from old hacksaw blades. These tools are, of course, suitable only for wood. First, anneal the blade by heating it to a cherry red and then cooling it slowly in coal or wood ashes. When the steel cools, grind off the teeth and cut the steel into a number of 1-in. sections or "blanks." Scratch the profile of the part to be duplicated at the end or side of one of the blanks, and, with small round and triangular files, shape the cutting edge of the tool to conform to the marked profile. Then drill two holes in the blank for woodscrews with which it is attached to a wood handle. Harden the tool again by heating it to a straw-red color and plunging it into cold water. Then temper by applying heat back of the cutting edge until the steel assumes a purplish color, after which it is immersed in water to cool. You can now finish shaping the cutter with a small V-shaped slipstone. A

stick of hardwood,  $\frac{1}{2}$  in. square and 6 or 7 in. long makes a good handle. Bevel one end to provide sufficient clearance under the cutting edge of the steel blade and attach the latter in place. Adjust the toolrest of your lathe so that the tool will enter the work just below its horizontal center.

### This Towel Rack Takes Little Space When Arms Are Folded

Made of hardwood, this towel rack is screwed to a wall and consists of a frame which supports a number of arms that fold flat against the wall when not in use. The arms are slotted at one end and are pivoted on an iron rod supported at each end by wooden blocks, which are doweled to the frame. When the arms are raised up, the slots permit them to be pushed back so that the ends rest under the top crosspiece which holds them in a horizontal position. For kitchen use, you can sand and varnish the wood, using no stain, or a couple coats of lacquer or enamel, to



Arms on This Towel Rack Fold Down Out of the Way When Not in Use

match other furniture, may be applied.—George Crawford, Troy, N. Y.

Tests show that fresh eggs deteriorate as much in three days when kept at  $98.6^{\circ}$  Fahr., as in twenty-three days when the temperature is maintained at  $44.6^{\circ}$  Fahr.

*H. E. Boycher, Inc.  
150 Lafayette, New York*

# "POLLY-WOG"

## A Model . . . . . Outboard Racer

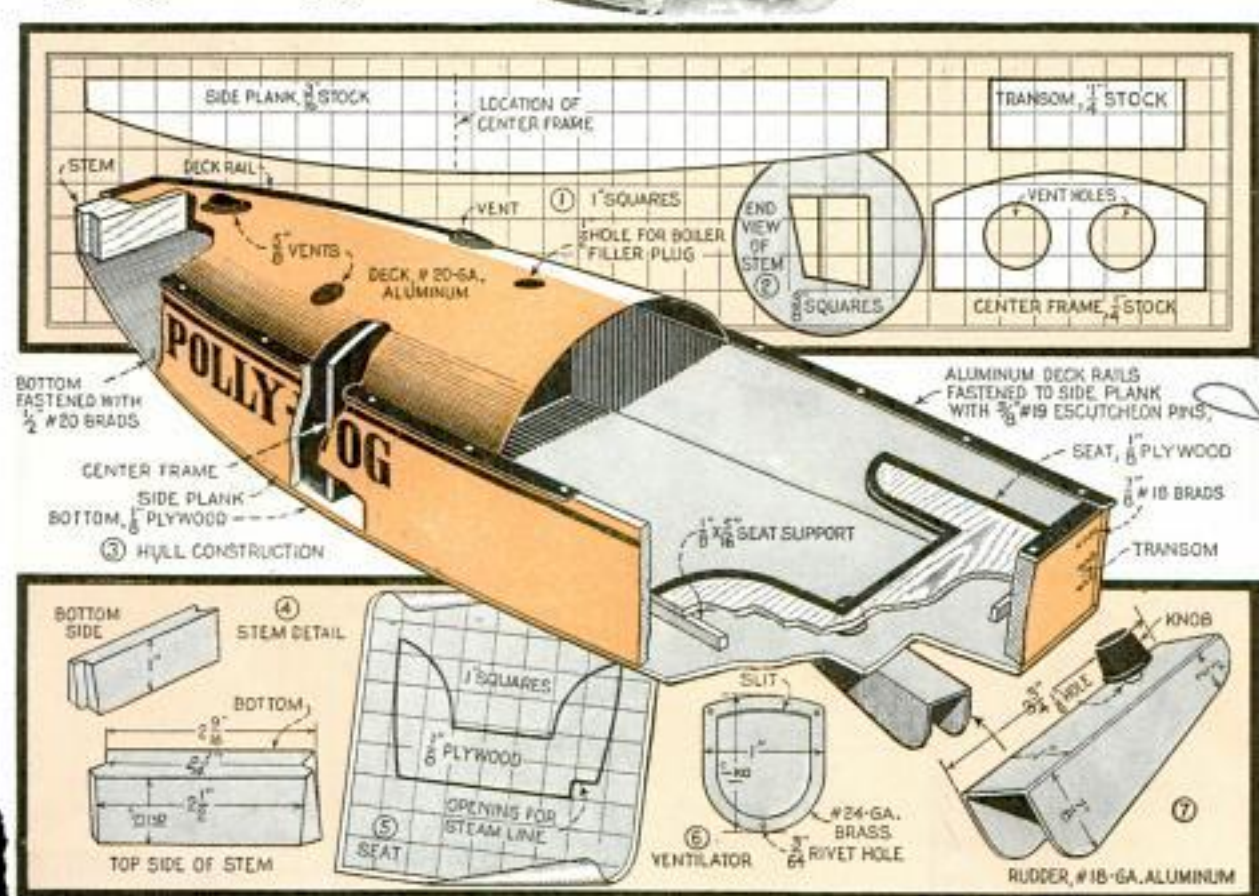
HERE it is—a scooting, rarin'-to-go water speedster with a cruising range of nearly one mile at a seven-mile clip. It is 23 in. long, has a pram hull, a 2-in. propeller and a twin-cylinder oscillating steam engine.

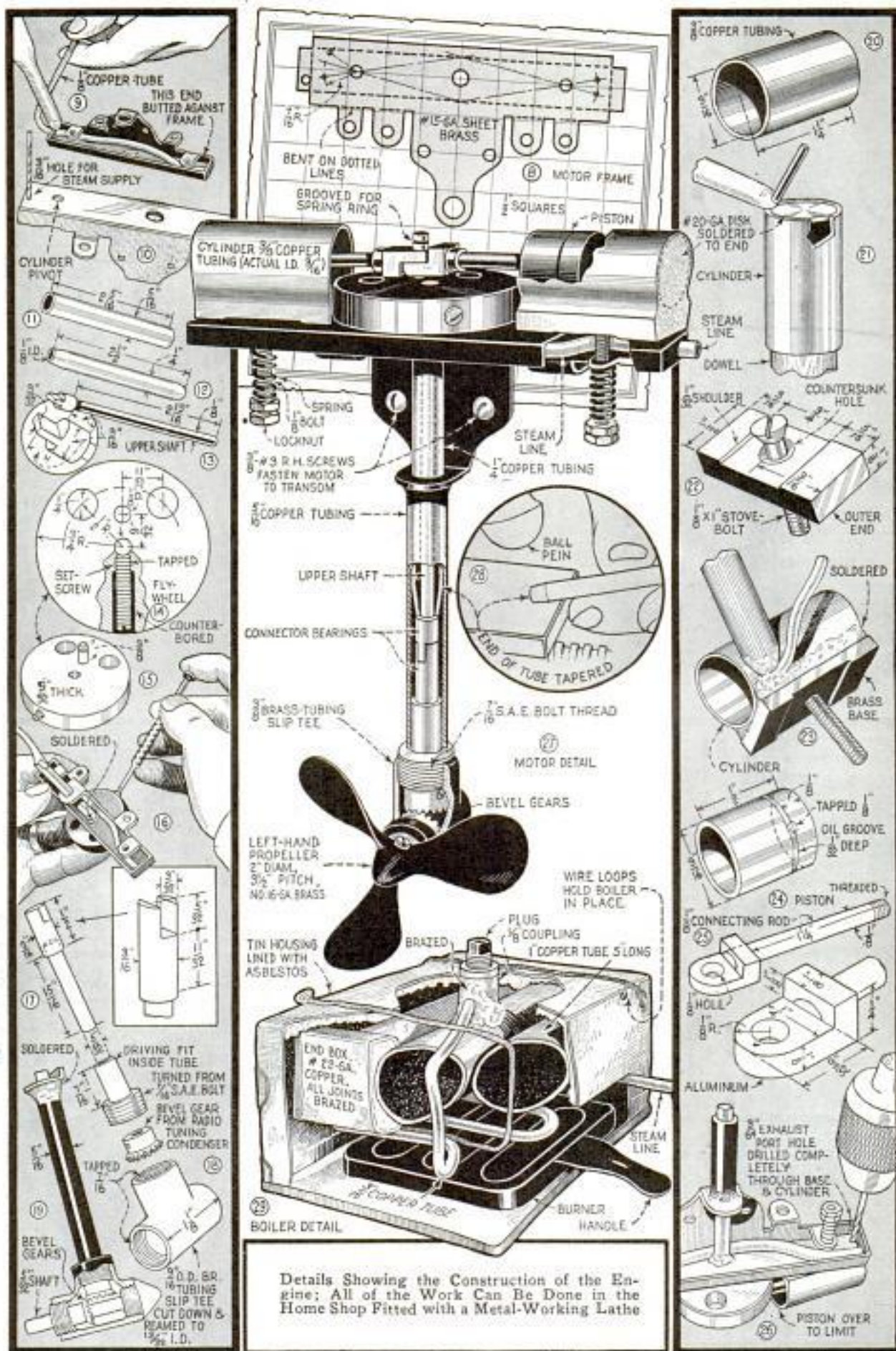
Construction work is started on the hull as detailed in the drawing below. Waterproof glue should be used at all joints below or near the water line. While the drawing lists the proper wood sizes for best efficiency, slightly thinner or thicker stock can be substituted if desired. Thus, if 1/8-in. plywood is difficult to get in your locality, you



This Little Speedster, Powered with a Two-Cylinder Oscillating Steam Engine Driving a 2-In. Propeller, Is Capable of Markable Speed; a 1-Oz. Supply of Solidified Alcohol Will Give the Boat a Cruising Time of Nearly 20 Minutes

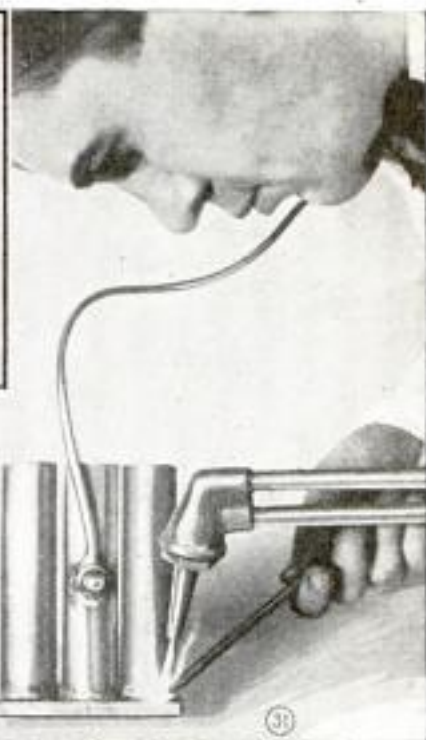
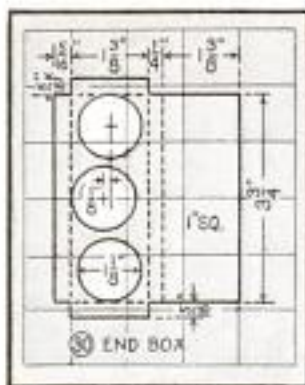
*23 inches  
Playthings, Inc.  
150 Lafayette  
New York*





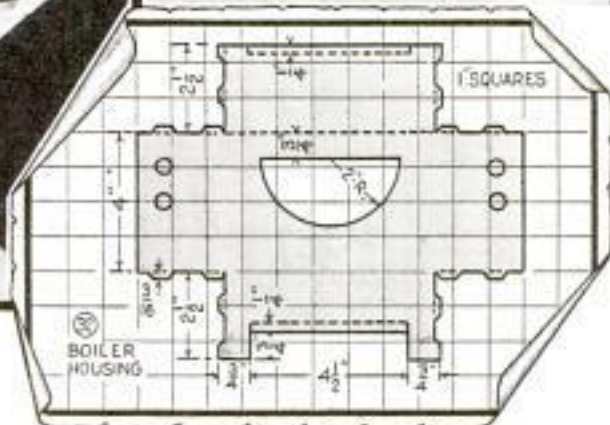
can easily substitute wood such as is used in orange boxes. A section from an aluminum stovepipe does excellently for the deck; the rudder can be of any metal of fair stiffness.

Excellent steam and spring out-board motors can be purchased at nominal cost, or, you can go whole loaf and make everything yourself—right down to the last



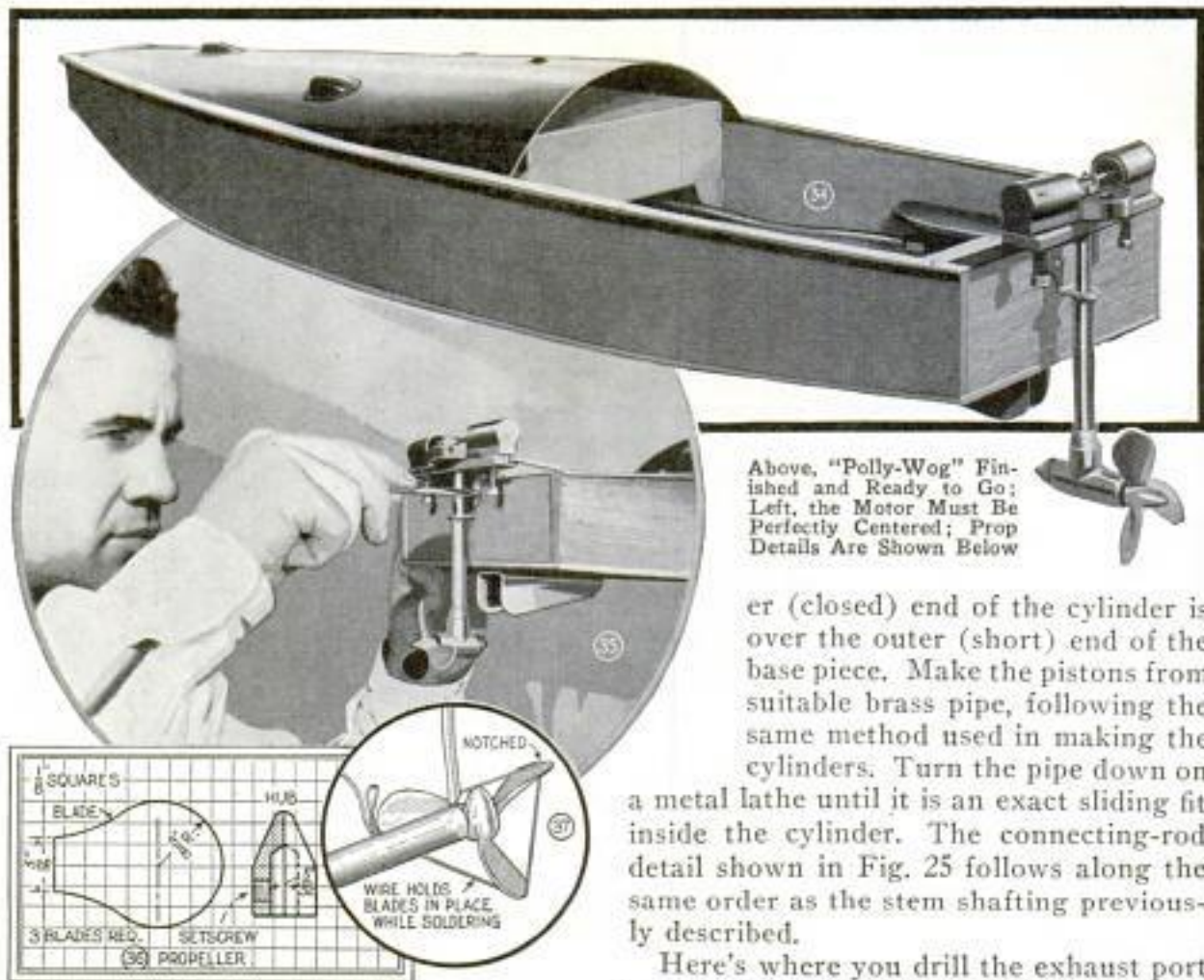
piston rod. Start by making the motor frame, as in Fig. 8. Do not drill any of the holes indicated until the piece is bent to the proper shape as certain sets of holes must be in line when the frame is completed. The  $\frac{3}{8}$ -in. intake and exhaust holes at either end are best left alone until the work is further advanced. Fig. 9 shows the next operation—fitting a 10-in. copper tube, which is the steam line. This is soldered in place as near as possible in line with the indicated position of the intake ports. The latter can be drilled at this time, the opening extending through the frame and into the tube, as in Fig. 10.

You start to make the bare frame look like a motor when you add the stem and shafting indicated in Figs. 11 to 19. The smaller of the two copper tubes (Fig. 12) is tapered at either end so that it will fit snugly into the frame at the top and furnish a bearing at either end for the upper shaft. This tapering can be done with a ball-pein hammer (Fig. 28), drilling the



hole afterward with a  $\frac{1}{8}$ -in. drill. The connector bearings on both the upper and lower shafts are turned to the proper size and burned on, that is, the piece is heated to a dull red and is then driven onto the shafting. Do not omit the two  $\frac{1}{4}$ -in. holes shown in the flywheel drawing (Fig. 14), these being essential in order to offset the weight of the piston rods.

Fig. 16 shows the assembly of the small tube (Fig. 12), the flywheel (Figs. 14 and 15), and the upper shaft (Fig. 13), the shaft running up through the tube and into the flywheel where it is fastened with a setscrew. After this assembly has been made, the larger tube (Fig. 11) should be driven into place until it comes tight against the frame. You will have to dress down the outside of the small tube and the inside of the larger one in order to



Above, "Polly-Wog" Finished and Ready to Go; Left, the Motor Must Be Perfectly Centered; Prop Details Are Shown Below

er (closed) end of the cylinder is over the outer (short) end of the base piece. Make the pistons from suitable brass pipe, following the same method used in making the cylinders. Turn the pipe down on a metal lathe until it is an exact sliding fit inside the cylinder. The connecting-rod detail shown in Fig. 25 follows along the same order as the stem shafting previously described.

make this possible. Inside the large tube is slipped, first, the lower shaft (Fig. 17), and then, a driving fit, the stop shoulder shown in Fig. 18. The latter piece is a  $\frac{7}{16}$ -in. S. A. E. bolt, turned down to the dimensions given.

The underwater housing (Fig. 18) is fashioned from a  $\frac{3}{8}$ -in. (outside diameter) brass-tubing slip tee. This is really about  $\frac{5}{16}$  in. outside diameter, so it can be safely reamed out to  $1\frac{1}{2}$  in. inside diameter. This opening will readily admit the two small bevel gears (you can get these from old tuning condensers, water and electric meters) and leave enough metal to take the threads for the  $\frac{7}{16}$ -in. bolt studs, which close the ends.

Jumping to the head end of the motor again, you will need two lengths of copper tubing (hard drawn) of the size shown in Fig. 20. One end of each tube is carefully sealed with a metal disk, as shown in Fig. 21. These are the cylinders. Each one is mounted on a base piece (Fig. 22) and is securely soldered. Note here that the out-

Here's where you drill the exhaust port—but—don't do it until you have checked everything carefully. The piston must be over to the limit (away from the hole position) as shown in Fig. 26. The hole, which extends through the base and the cylinder, must be placed exactly so that when the cylinder swings to the opposite side, the hole in the base piece will come exactly in line with the intake hole previously drilled.

Fig. 29 is a cut-away view of the boiler. There is nothing very difficult here although you may have to take the brazing job to someone equipped for this work. The two end boxes (Fig. 30) are made first; then the tubes are brazed into position, as pictured in Fig. 31. The boiler housing (Fig. 32) is fashioned from tin, bent to shape and lined with asbestos as shown in Fig. 33. Any shallow pan capable of holding slightly over 1 oz. of solidified alcohol will do for the burner.

Fig. 34 is the completed "Polly-Wog"—all set to go. The motor must be securely fastened to the exact center of the transom with four  $\frac{3}{8}$ -in. screws, as shown in

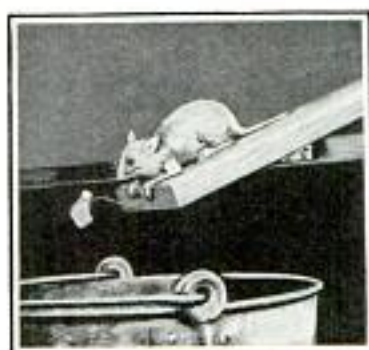


Fig. 35. The prop, 2 in. in diameter by  $3\frac{1}{2}$ -in. pitch, is best purchased. However, if you like, there's the detail in Fig. 36. The hub is turned to the shape shown and three saw cuts are run in, equally spaced around the circumference, and at a  $30^\circ$  angle with the centerline. Each of the blades is nicked slightly at the outer edge so that a length of wire can be used to hold the pieces together while soldering.

### Simple Precautions to Take When Rebabbiting Bearings

Newly babbitted bearings are frequently loose and unsatisfactory unless a few precautions are taken when pouring them. The bearing to be babbitted should first be thoroughly cleaned with gasoline, and all traces of water removed before the babbit is poured. If the bearing is large, it is a good idea to heat the casting to the melting point of the babbit before pouring so that it will contract while the babbit is cooling, instead of expanding as would be the case if the metal were poured into the cold casting. This procedure will assure a tight-fitting bearing free from internal vibration. If a bearing must be poured into a cold casting, the babbit should be of the expanding type containing enough antimony to make a tight fit.

### Self-Setting Trap Drowns Rats



Hinged to a box or a table top and properly baited, this rat trap drowns its victims. It consists of a piece of wood hinged slightly off center so that when the rodent walks out to get the bait, the weight tips the trap down and drops the rat into a pail of water set underneath. The trap then returns to its former position.

Several brightly colored rubber balloons tied in fruit trees with long strings so that they can sway in the breeze will keep birds from feeding on the fruit.



Vertical Slats in Porch Railing Made Removable by Holding Them in Place with Notched Pieces

### Removable Railing Saves Time in Painting Porch

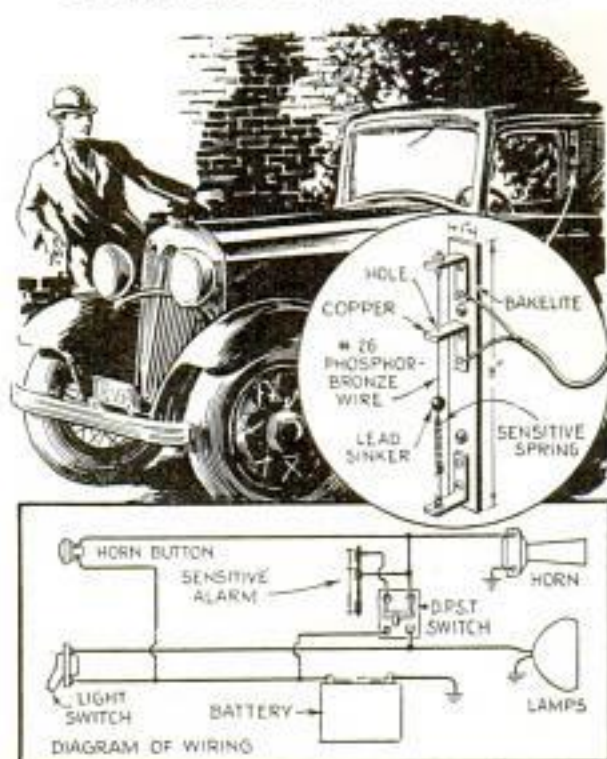
To facilitate painting the railing around my porch, I made the vertical slats removable. The rails are made of  $1\frac{1}{4}$ -in. stock, and have strips  $\frac{3}{4}$  in. square nailed near the outer edges for the slats to fit against, where they are held by notched pieces of  $\frac{3}{4}$  by  $1\frac{1}{4}$ -in. stock screwed to the rails.—Joseph Minarovich, Berwyn, Ill.

### Rubber Grips on Garden-Tool Handles Protect the Hands

To avoid blistering his hands when using a hoe or rake, one gardener made a pair of rubber grips from a piece of old inner tube and slipped them over the tool handles as shown. When properly adjusted, the grips serve as pads, and eliminate friction between the handles and the hands. If your hands are unusually tender, thin pieces of felt, cemented to the rubber, will help.



## Correction on Auto-Theft Alarm



Vibration of Tight Wire in Alarm Causes Horn to Blow and Headlights to Flicker

In view of an error in the wiring diagram of an article entitled "Burglar Alarm for Your Car," which appeared in our May issue, we are herewith publishing the corrected diagram. Notice that a double-pole single-throw switch is used to break the circuit when it is not used for alarm purposes. The device can also be improved by using phosphor-bronze wire and copper contacts, to minimize arcing, and a lead sinker, attached at the point indicated, will tend to give the wire a more positive movement. It is also better to run one of the wires to the upper bracket instead of the bottom one, as the latter arrangement allows the current to pass through the coil spring.

## Adjustable Holder for Scaling Fish



Two large fish hooks, with the barbs filed off, a couple of nails, and a rubber band are used by a Wisconsin sportsman for holding fish while scaling them. One of the hooks is nailed securely to the top of the bench, or even a post, and the other is attached to the rub-

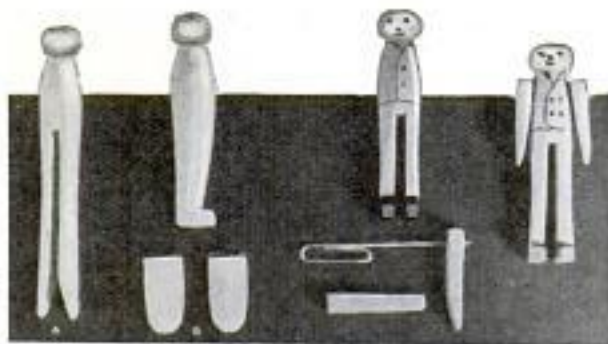
ber band. In use, the stationary hook is fastened in the fish's tail and the other one in its lower jaw. The band is then stretched to slip over a nail driven into the bench near the head of the fish.

## Developing Photographic Prints and Negatives Quickly

Where speed is important, photographic films and prints may be fixed in the hypo bath in a fraction of the usual time required by using a bath consisting of hypo, 15 oz., and ammonium chloride, 4 oz., 50 gr., dissolved in water, 100 oz. Although this solution is rapid, it does not last long, and should therefore be renewed frequently. To determine when this, or any other hypo bath, is exhausted, immerse a strip of bromide paper into it, in the darkroom, for the usual length of time required for fixing, and rinse it in water. The paper is next dipped into a 1-per-cent solution of sodium sulphide. If it turns brown, the hypo should be renewed. The sulphide solution should not be used in a room where film or printing paper is stored.

## Clothespins Used to Make Toy Figures

Toy men with movable arms are easily made from clothespins. The lower part of

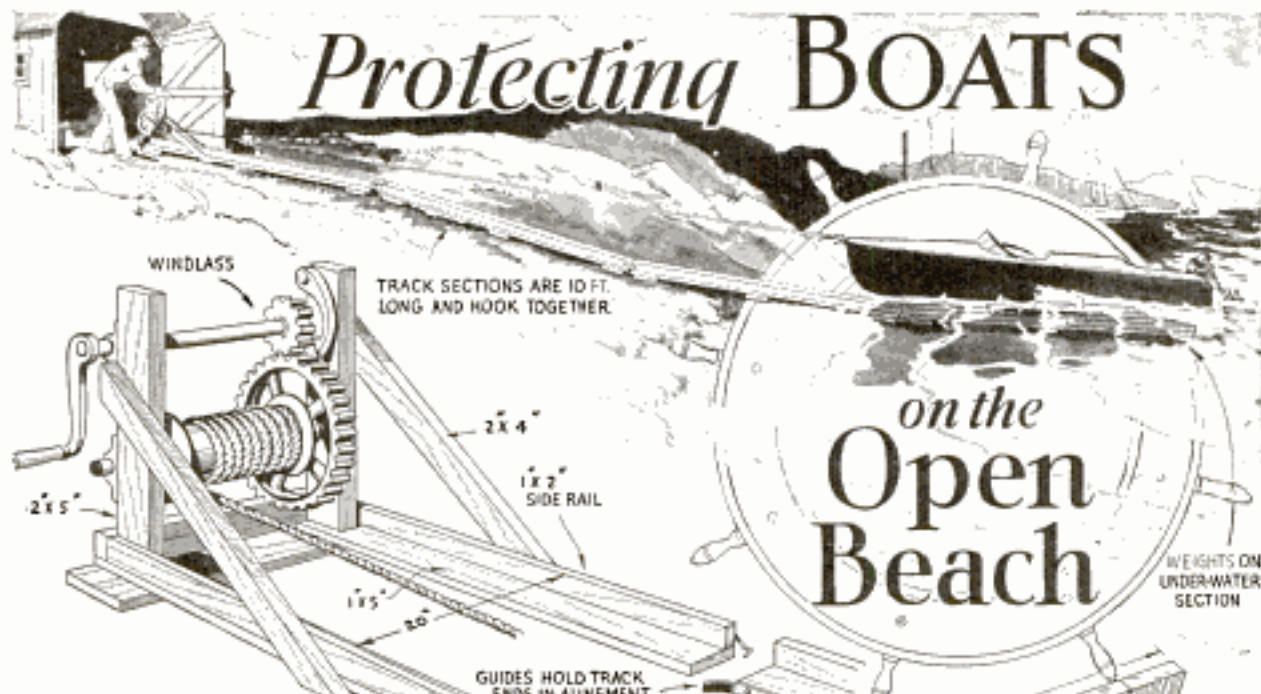


Realistic Toy Figures That Have Swinging Arms Can Be Made from Ordinary Clothespins

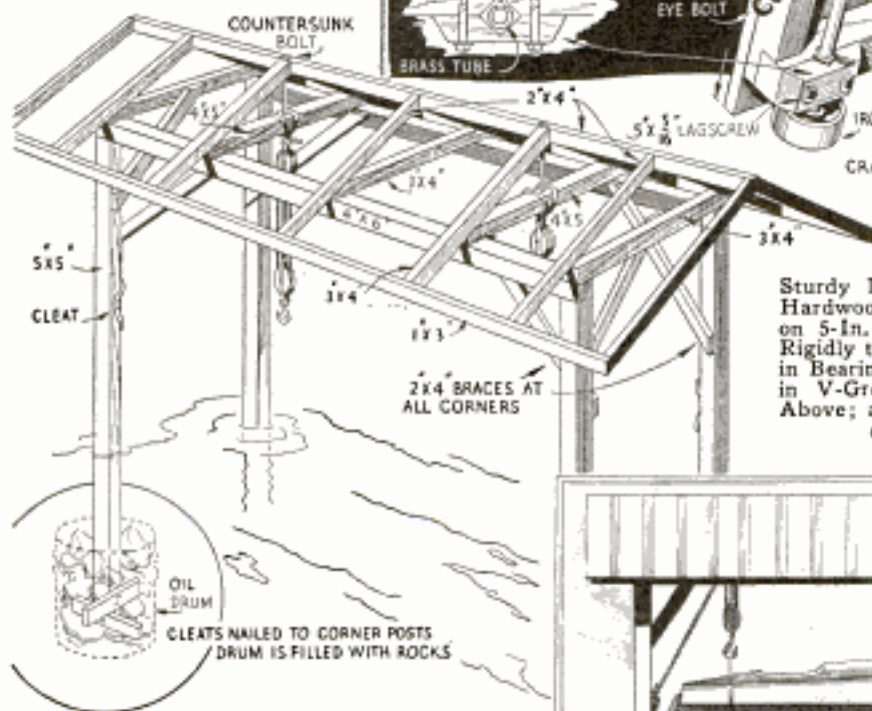
the pin is sawed off and the pieces are pivoted in position to form arms, using a wire paper clip for a pivot. The remaining lower part of the pin is shaped to simulate the feet and legs. Painting in the eyes and mouth, with a little striping to imitate clothes, completes the job.

Men who work on ladders will find that pieces of old garden hose nailed or tied to the rungs, serve as comfortable pads.

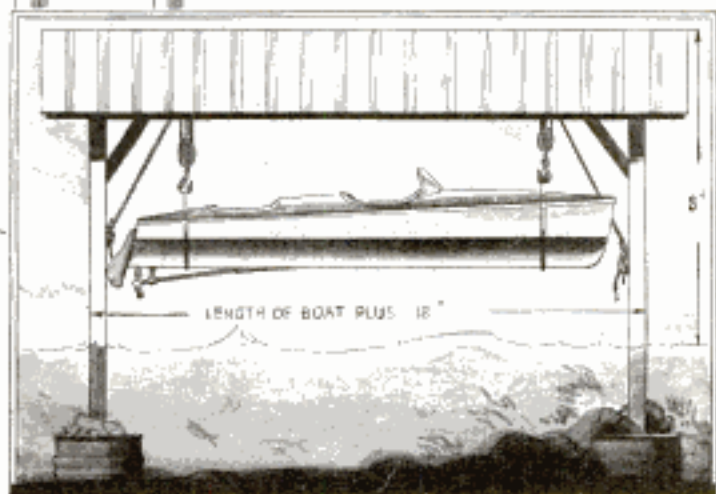
# Protecting BOATS



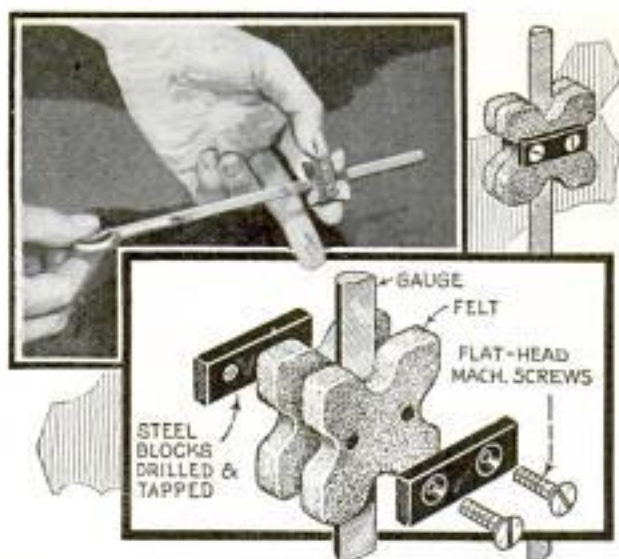
Above, a Windlass and a Portable Track, Made in 10-Ft. Sections for a Dolly or Small Truck, on Which a Boat Can Be Hauled Out of the Water to a High and Dry Spot on the Beach, or into a Boathouse Where It Will Be Protected from the Tides



Sturdy Dolly, Which Should Be Made of Hardwood, Such as Maple or Oak, Rides on 5-in. Truck Wheels That Are Attached Rigidly to the Axle; the Latter Are Carried in Bearings Made of Brass Tubing, Clamped in V-Grooves as Shown in the Drawing Above; an Oil Reservoir Is Provided as Indicated in the Center Detail



Covered Structure for Swinging a Boat Up Out of the Water; It Is Built Entirely of Timber and Has an Awning-Cloth Top, Which Can Be Removed During Winter; the Corner Posts, Fitted with Cleats at Their Lower Ends, Are Set in Old Oil Drums Which Are Filled with Rocks to Hold Them in Place, as There Is Very Little Surface Against Which the Waves Can Beat



Permanent Felt Wiper on Oil Gauge Saves Time in Looking for Cloth to Clean Gauge

### Felt Wiper for Car Oil Gauge

This wiper is always at hand for wiping an oil gauge of the rod type on cars such as the model-A Ford, and consists of two pieces of felt, clamped around the gauge by means of two small steel blocks and screws. The wiper is a permanent part of the gauge and saves time in looking for a cloth to wipe the gauge before testing the oil level in the crankcase.—N. E. Niles, Joppa, Md.

### An Improved Camp Boiler



If you need a double-boiler on your fishing or camping trip and none is available, try this improvised one. Cut a square piece of birch bark and fold it to form a shallow, square dish, fastening the corners together with a needle and thread or with small slivers of wood. Then get two forked sticks, split their ends and slip them over the edge of the bark container. Set a water pail, half full of water, on the fire and support the bark container over a cross-piece as shown.

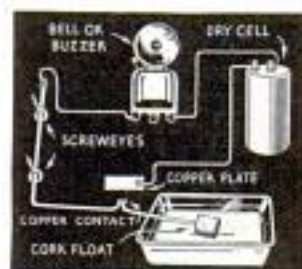
☛ Soap bubbles that will rise almost vertically can be made by filling them with gas; this is easily done if the blow pipe is attached with a rubber tube to a gas jet.

### Flower Seeds Stored in Cellophane

Small cellophane bags are handy for storing flower and garden seeds. These will keep out moisture and it is easy to see what kind of seed the bags contain without opening them. The bags can be purchased at a small cost, or they can be made by folding squares of cellophane and cementing the bottoms and sides together. Folding the tops over and creasing them will keep the bags closed.

### Bell Rings When Refrigerator Drip Pan Is Filled

A bell can easily be hooked up to give a warning when your refrigerator drip pan is filled so that it will not be forgotten. The drawing shows the wiring arrangement. One terminal of the bell is wired to a dry cell and the other is connected to the end of a small rod or heavy wire bent at right angles and pivoted to the underside of the refrigerator by means of screw-eyes. A cork float is cemented to the other end of the rod, which terminates in the pan. As the pan fills with water, the float raises the rod so that the two copper contacts come together and ring the bell.



### Spring Makes Steel-Wool Holder

A good holder for steel wool, which eliminates danger of the hands being injured, can be made from a 2-in. length of a closely coiled spring. To feed the wool out as needed, a piece of sheet iron is



shaped as shown, and the corners are rounded off. A second piece of sheet iron is bent to a U-shape and is soldered to the center of the first piece for gripping the wool.

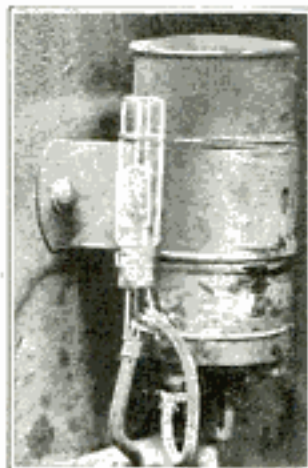
### Catching Grasshoppers for Fish Bait

Grasshoppers are considered good fish bait, but are not often used because of the difficulty in catching them. However, this is easily done at night. Take a flashlight and play it around large weeds, which apparently blinds the grasshoppers momentarily so that they can be caught. Crickets are also good bait, and can be caught by the same method. They are usually found along walks, around posts, and under old boards.—J. W. Reynolds, Mattoon, Ill.

### Mercury Switch Shuts Off Ignition When Car Turns Over

Connected in the low-tension wire leading to the coil of an automobile, this mercury switch automatically opens the ignition circuit and lessens the chances of fire in case the car is turned over in an accident. To make the switch, half fill a small glass bottle with mercury and cork it, pushing two small nails through the latter so that they extend about  $\frac{1}{8}$  in. inside the bottle. Be sure the nails do not touch

each other. After mounting the bottle on the coil bracket, disconnect the low-tension or "hot" wire from the coil and solder it to one of the nails. Then solder the end of another wire to the other nail and attach it to the low-tension terminal of the coil.



### Wire-Mesh Pockets Increase Uses of Electric Fan

By attaching two wire-mesh pockets on the back of the guard around an electric fan, to hold moth balls, you can quickly drive the fumes to all parts of a closet. A fan so equipped can also be used to spread the fumes of deodorants, or it can be used to relieve head colds by putting wads of cotton saturated in an inhalant in the pockets so that the fumes can be spread in all parts of the room in which the ailing person is sleeping.



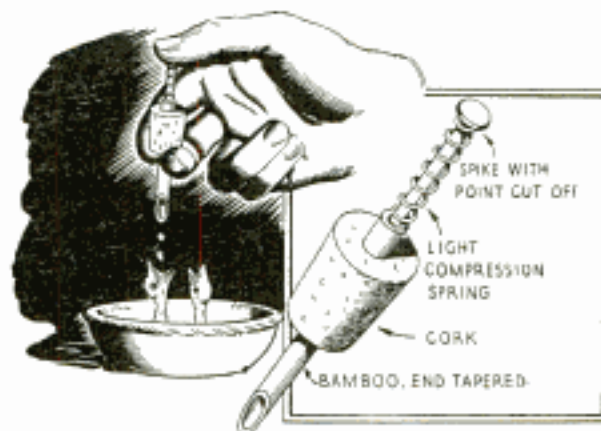
Soap Scraps Utilized by Putting Them in Screw-Top Can and Letting Water Run through It

### Utilizing Scraps of Soap

Scrap pieces of soap may be utilized by placing them in a screw-top can that has a hole in the lid and several holes punched in the bottom so that the water can run through it. The can may be attached to a hose, as shown, or it can be screwed to a faucet by soldering a hose connection to the lid.

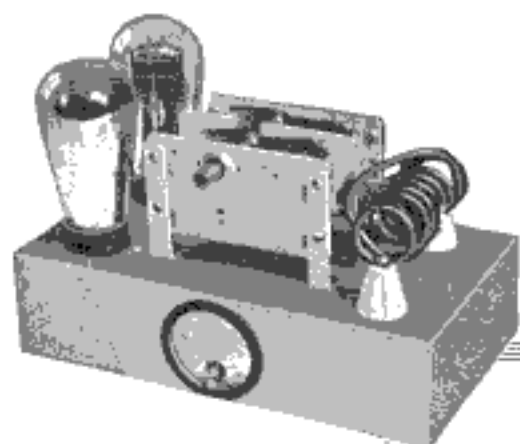
### Feeding Device for Orphaned Birds

Administering solid foods to young, orphaned canaries has always been a problem that is easily solved with this feeding device. It consists of a cork drilled through the center to take a small tube, which is tapered at the lower end. A small spike, to serve as a plunger, is inserted into the tube with a light compression spring under the head. In use, the tube is filled with food, which is dropped into the bird's mouth by means of the plunger.



Young Canaries Readily Take Solid Food from This Improved Feeding Device

## Five-Meter Receiver and Simple Transmitter



### PART II

TO complete the assembly of the 5-meter receiver described in the July issue, the audio transformer, resistors and fixed condensers are mounted under the subpanel. The supply leads are brought out to a 7-prong jack and cable, as shown in Fig. 1, or binding posts may be used if preferred.

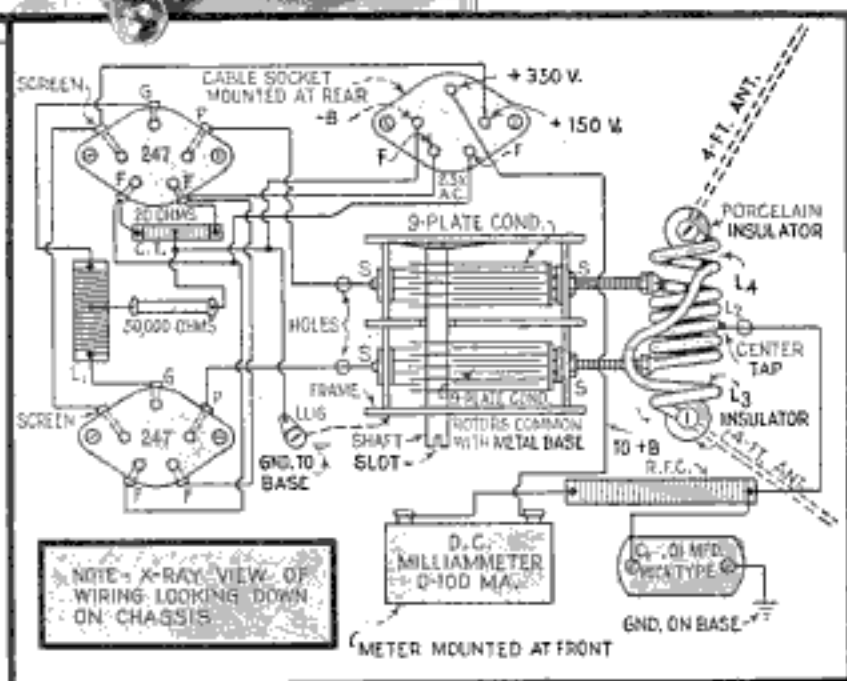
Coils  $L_3$  and  $L_4$ , for the receiver oscillator, are both random-wound on a small form. This consists of three  $1\frac{1}{2}$ -in. thin bakelite, or fiber, disks, drilled at the centers to clear a 6-32 machine screw. The disks are assembled on the screw with  $\frac{1}{4}$ -in. lengths of  $\frac{1}{4}$ -in. fiber tubing between. The machine screw should extend beyond the form so that it may be held in a hand drill after the retaining nut is in position. The drill is placed in a vise for winding the coils. Coil  $L_3$  consists of 700 turns of No. 32 d.s.c. magnet wire. Small holes, for anchoring the start and fin-

ish ends, are drilled near the outer edge of the disks. Coil  $L_4$  is wound with the same-size wire and consists of 1,175 turns, wound in the same direction. The starting turn of  $L_3$  goes to the plate and the finish to positive B 45 volts. The starting end of  $L_4$  goes to ground and negative B, and the finish to the grid. An enlarged blueprint of all diagrams for the receiver and transmitter is available if desired.

To tune the receiver, the band-setting condenser,  $C_2$ , is used to locate the part of the band you wish to listen in; the tuning is then done with the dial on the front panel. The 2-plate condenser,  $C_1$ , is used to adjust the antenna. The type-37 tube at the rear is the detector. The receiver has good volume and will operate a small magnetic speaker on most signals. It is housed in a sheet-metal box 8 in. long, 7 in. high and 6 in. wide.

The transmitter is a very simple tuned-grid

(Continued to page 116A)



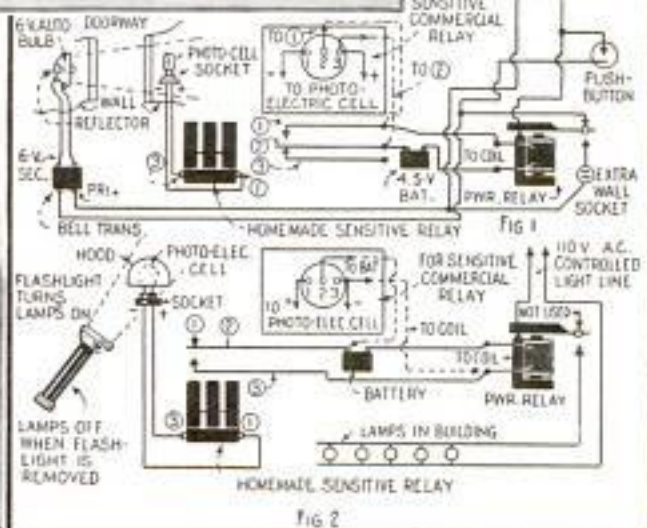
Weston Electrical Instrument Co.  
619 Franklin Street Newark

# ELECTRIC EYE RADIO or LIGHTS

Controls n.g.

**A**UTOMATIC control without the aid of amplifying tubes, expensive batteries or auxiliary apparatus opens a new and interesting field to the experimenter. Sufficient current is developed by the small photronic cell, shown below, to directly operate a sensitive relay which in turn actuates a larger relay. Numerous practical applications are possible with slight variations of the hook-ups given in the diagrams. The cell is housed in a bakelite case and two prongs are provided for plugging it into a standard UX radio-tube socket. The upper sketch in Fig. 1 shows how this socket is wired so that the polarity of the cell may be easily reversed.

The relays may be arranged so that a beam



of light directed on the cell will close the power-line circuit or, the interruption of a steady light source will have the same effect. Fig. 1 shows a hook-up so arranged that the interruption of a beam of light across a doorway will close the 110-volt house-lighting circuit to operate any electrical apparatus that is plugged

(Continued to page 118A)

e 4555

Lynch Mfg Co  
711 General Motors Bldg  
POPULAR MECHANICS  
New York City



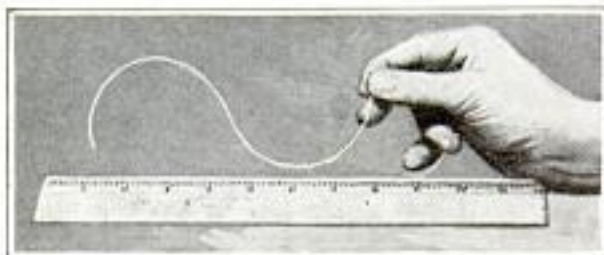
Transposition Blocks and Necessary Parts for Short-Wave Doublet

### Short-Wave Doublet Antenna Kit

The necessary parts for building a doublet receiving antenna, of the type described in the June issue, are now available in kit form. It consists of 8 insulators, 15 transposition blocks, a doublet coupler and 200 feet of suitable stranded, enameled antenna wire. In the usual short-wave receiver the coupling-resistor unit may be mounted on the underside of the chassis near the antenna-coil socket. The primary-coil leads from this socket are then connected directly to these resistors. A few feet of twisted lampcord is used to connect the other end of the resistors to the transposed feeder line.

### Wire Model of Ultra-Short Wave

This model of an 18-centimeter radio wave shows the type of ultra-short wave used in recent radiophone experiments. Such waves travel like light and may be reflected in the same manner.

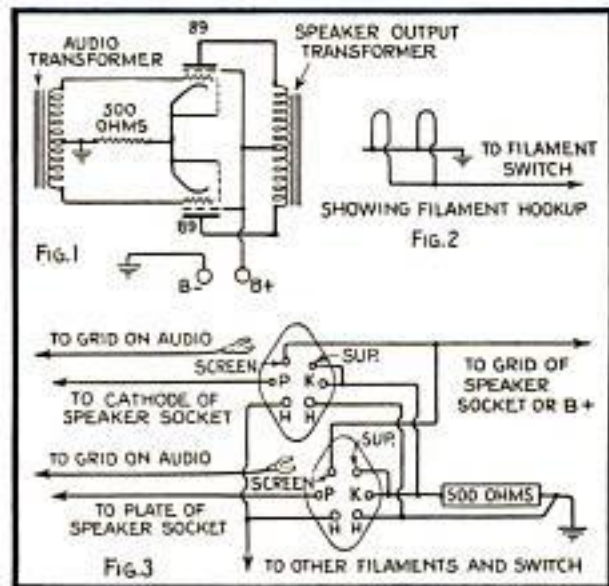


### Homemade Lens Disks for Television

The only difference between a lens disk and a hole-type scanning disk is that the holes of the latter are enlarged and fitted with small convex lenses. The optical center of each lens must occupy exactly the same position as the center of the holes. These small lenses are now available to experimenters for a few cents each. Lens disks make possible the projection of television images on a screen very much the same as motion pictures are projected.

### New Output Tubes for the DX Auto Receiver

Those who built the DX auto receiver that appeared in the May and June, 1932, issues can easily alter the set for the new type-89 output tubes. These tubes make a decided improvement in the output of auto receivers of this description. All that is necessary to change this set over for the 89 tubes is two 6-prong wafer-type sockets and two screen-grid clips. The schematic diagram is given in Fig. 1, the fila-

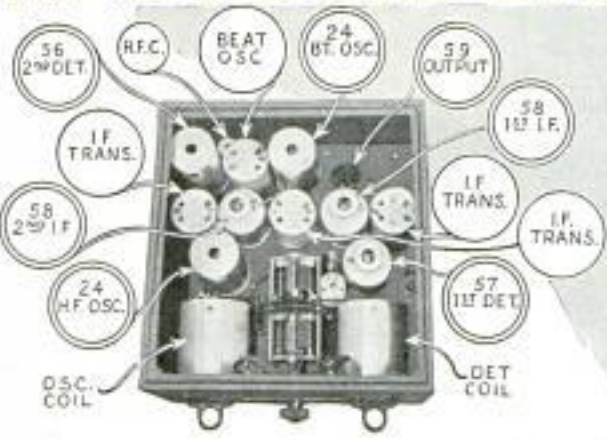


ment hookup in Fig. 2, and the simplified wiring diagram in Fig. 3. After these changes are made, the B-negative lead is grounded directly to the metal base instead of going through the 500-ohm resistor to ground. The 50-mfd. electrolytic condenser is not used in the new hookup. The 89-tube requires less space, draws less current, minimizes motor noise and provides full power output.—Frank Lund, Chicago.

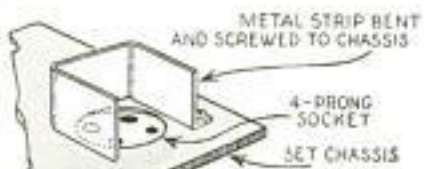


*© 4529 National Company  
 Inc. 61 Sherman  
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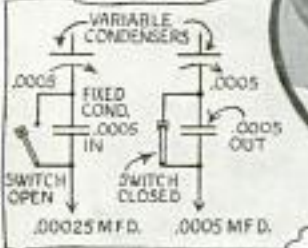
# Practical RADIO IDEAS



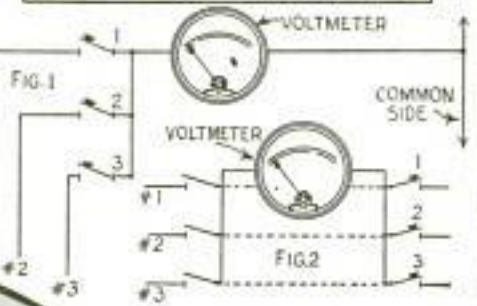
Seven-Tube Amateur Short-Wave Super Employs Front-of-Panel Coil Changing, Single Control, National Full-Vision Dial and Optional Quartz Crystal, Single-Signal Operation; Tube Arrangement Shown at Left; Lower Left, Doorknob as Handle for Reamer



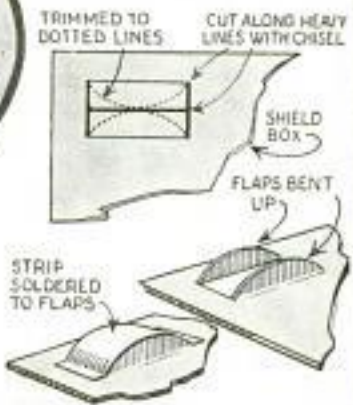
Tube for This Socket Has Pin Removed; Guard Prevents Insertion of Other Tubes Requiring Different Filament Voltage; Below, Neutralizing Indicator; Small Insulated Coils Pass Inside Tank Coil



Insert Photo, Mica-Type Moisture-Proof Fixed Condensers, Having Machine-Screw Terminals, Are Easily Mounted Directly on Tube Sockets or Chassis for Short Connections; Left, Fixed Condenser in Series with Variable for Reducing Capacity without Removing Plates



Single Meter and Push Buttons Check Three Circuits; Fig. 2, Switch Jacks for Individual Circuits

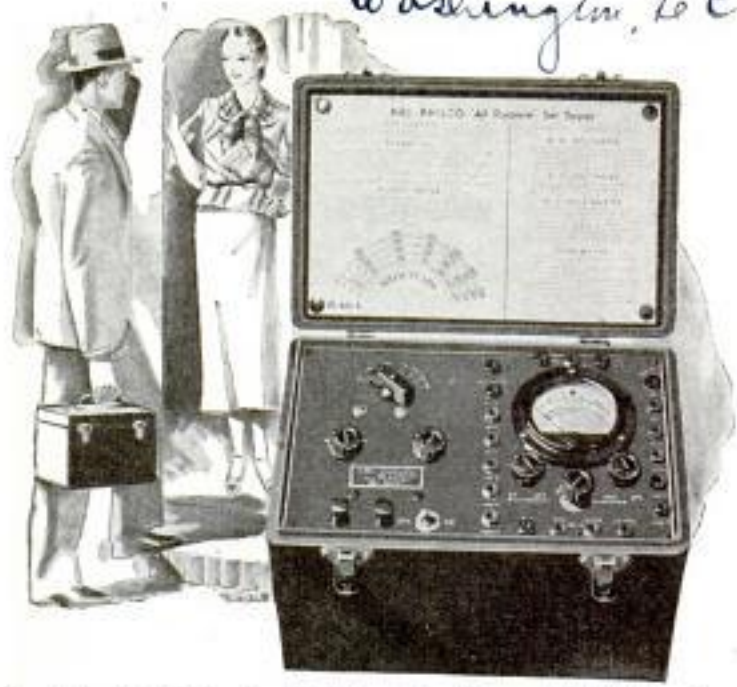


Above, Enlarging Shield Box to Clear Tube or Condenser Rotor; Left, Clip Leads for Resistors

*003250  
 Sangamo Electric Co Springfield, Ill*

C4548  
300

National Radio Institute General Electric  
16th and O Sts Co Schenectady  
POPULAR MECHANICS NY  
Washington, D.C.



Portable Set Tester for Checking Any Type of Radio Receiver  
Includes Capacity Meter, Tube Tester and Shielded Oscillator

### Service Man's All-Purpose Set Tester

For universal use on a.c., d.c., automobile or battery receivers, this self-contained tester covers all frequencies and voltages. Designed by the engineers of the National Radio Institute and Philco Radio and Television Corporation to aid service men, this set tester meets all the new requirements made necessary by rapidly changing receiver and tube design. Going back to first principles it involves the isolation of the defective circuit and the detection of the defective part. It combines 5 a.-c. and 5 d.-c. voltmeter scales; 3 d.-c. milliammeter scales; 3 ohmmeter and 5 a.-c. output-meter scales.

### Tuning the Short-Wave Receiver

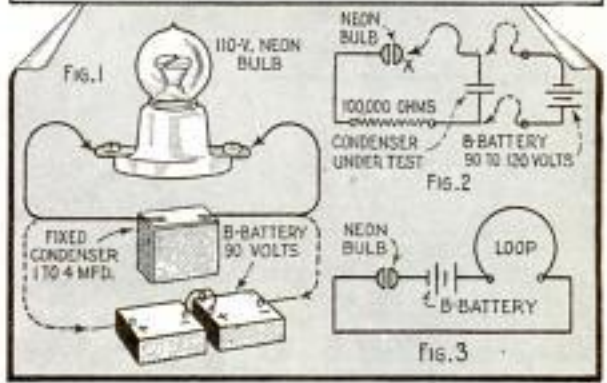
Owners of some short-wave receivers have noticed that at certain points on the dial, dead spots appear for no apparent reason. These are often avoided by lowering the capacity of the antenna-coupling condenser. If this should result in a loss of signal strength, it is better to experiment with different antennas until the correct length is found.

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.

### Radio Uses for Neon Bulb

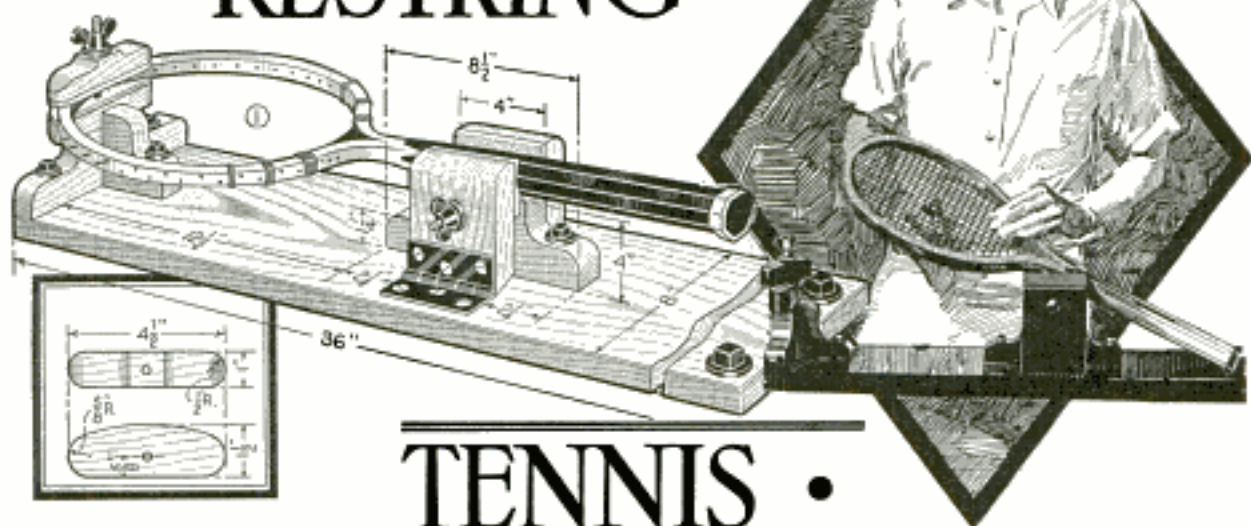
Small neon bulbs fitted with a screw base may be obtained for a few cents in many electrical shops. These bulbs will glow on about 110 volts either a.c. or d.c. Fig. 1 shows how a fixed condenser may be charged from B-batteries and then connected to the neon bulb, which will glow for an instant as the condenser discharges. As a polarity indicator, when connected across the B-battery, the brightest electrode is the positive side. For approximate resistance measurements a condenser is charged, as shown in Fig. 2, the flexible lead X is then connected to the bulb and a slow count is taken while the neon bulb discharges the condenser through the 100,000-ohm resistor.

Resistors of unknown value are then substituted and the former count is used as a checking standard. Fixed-condenser capacity values may be approximated in the same manner. Fig. 3 is for detecting minute r.f. currents; enough B-battery is connected in series with the small loop and bulb to almost make the bulb glow. When this arrangement is brought anywhere near an r.f. oscillator the bulb will glow.





## *EXPERT* tells how to RESTRING

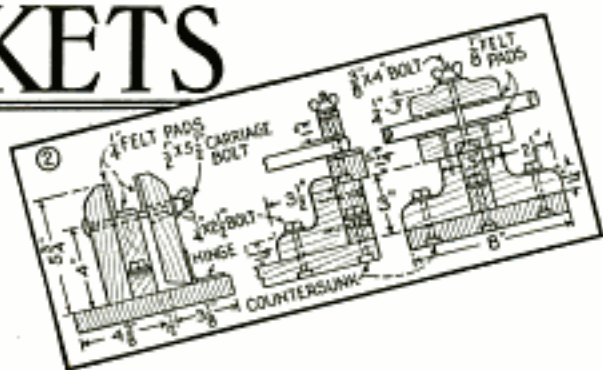


By T. R. CONNER

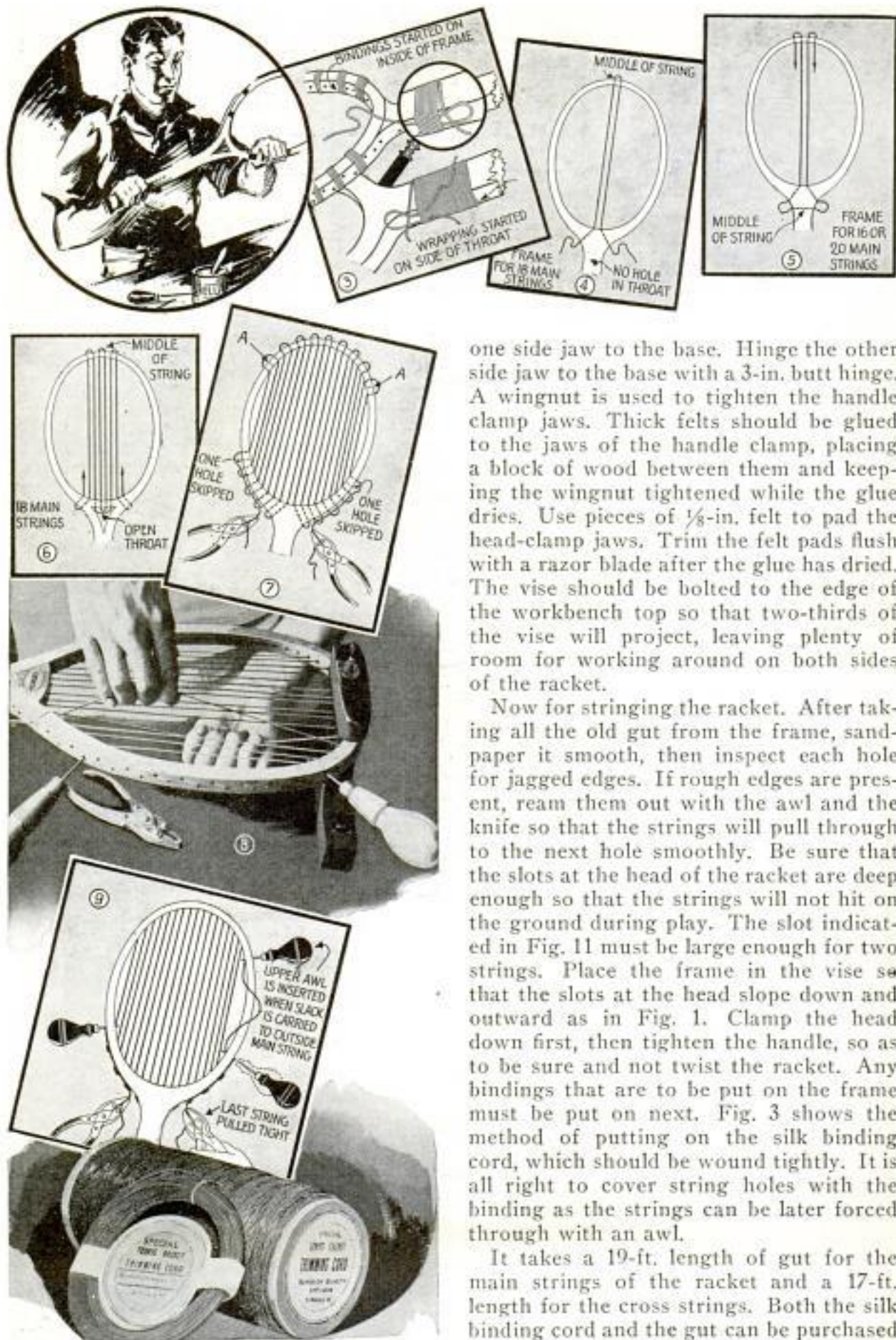
## TENNIS • RACKETS

**BY** restringing tennis rackets yourself, you can save over half of the regular cost and also be sure of getting the strings to just the desired tension. A vise, four blunt awls, a pair of pliers with parallel-acting jaws, a pointed knife for trimming the gut and a short wooden dowel about an inch in diameter, for pulling strings tight, are the only tools needed.

A vise, as shown in Figs. 1 and 2, which will hold the handle firmly and clamp down the head to keep it from bulging out of shape and spreading the throat, is the most important tool. The wood parts can be cut from a 1 1/4 by 8 by 53-in. piece of hardwood. After the parts have been sanded smooth, fasten the head-clamp support to the brace with two 2 1/4-in. No. 12 screws, then bolt them to the base. Glue should be used in fastening the wood



parts together. Drill a 3/8-in. hole through the two head-clamp pieces for a 3/8 by 4-in. bolt with the head countersunk flush with the bottom of the lower clamp, which is then fastened to the support, using two 3-in. No. 12 screws. Screw the stationary jaw of the handle clamp to the support with three 2 1/4-in. No. 12 screws. Drill a 1/2-in. hole through these two pieces as shown and next cut the slot in the hinged jaw to allow free play. The center rear support for the handle is bolted to the base and a 3-in. screw is used to fasten



one side jaw to the base. Hinge the other side jaw to the base with a 3-in. butt hinge. A wingnut is used to tighten the handle clamp jaws. Thick felts should be glued to the jaws of the handle clamp, placing a block of wood between them and keeping the wingnut tightened while the glue dries. Use pieces of  $\frac{1}{8}$ -in. felt to pad the head-clamp jaws. Trim the felt pads flush with a razor blade after the glue has dried. The vise should be bolted to the edge of the workbench top so that two-thirds of the vise will project, leaving plenty of room for working around on both sides of the racket.

Now for stringing the racket. After taking all the old gut from the frame, sandpaper it smooth, then inspect each hole for jagged edges. If rough edges are present, ream them out with the awl and the knife so that the strings will pull through to the next hole smoothly. Be sure that the slots at the head of the racket are deep enough so that the strings will not hit on the ground during play. The slot indicated in Fig. 11 must be large enough for two strings. Place the frame in the vise so that the slots at the head slope down and outward as in Fig. 1. Clamp the head down first, then tighten the handle, so as to be sure and not twist the racket. Any bindings that are to be put on the frame must be put on next. Fig. 3 shows the method of putting on the silk binding cord, which should be wound tightly. It is all right to cover string holes with the binding as the strings can be later forced through with an awl.

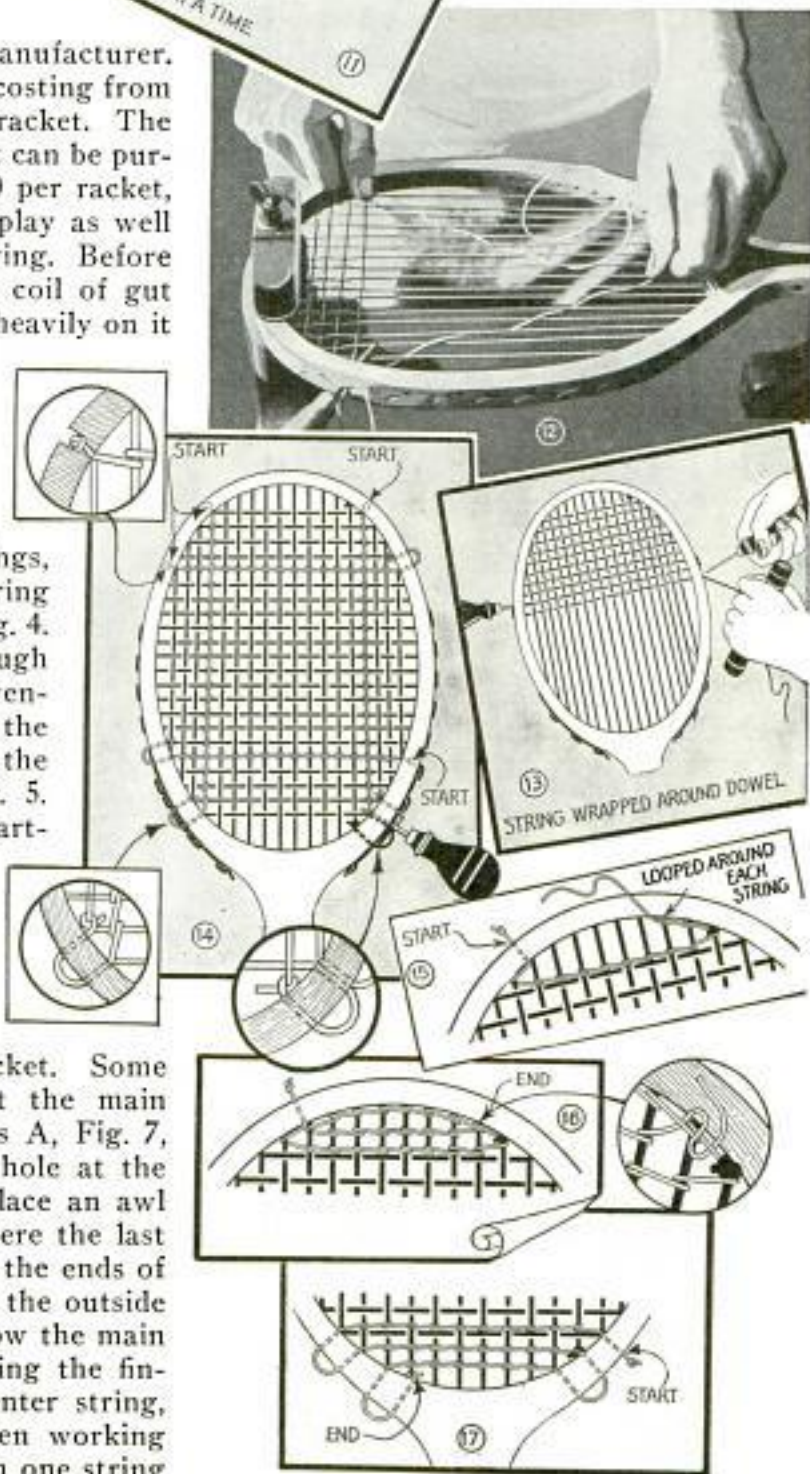
It takes a 19-ft. length of gut for the main strings of the racket and a 17-ft. length for the cross strings. Both the silk binding cord and the gut can be purchased



Figs. 11 and 12 Show How to Weave the String Diagonally to Prevent Gut from Fraying

from any sporting-goods manufacturer. Genuine gut comes in grades costing from about 80 cents to \$4.50 per racket. The new silk strings on the market can be purchased from 50 cents to \$1.50 per racket, and will give satisfaction in play as well as being much easier to restring. Before starting to string, loop each coil of gut around some object and pull heavily on it so as to remove excess stretch and also its tendency to curl up.

Next, wax the main string with a piece of paraffin so it will slide easily through the holes. If the frame has eighteen main strings, thread the two ends of the string into the frame as shown in Fig. 4. If the racket has a hole through the throat, it has sixteen or twenty main strings; start so that the middle of the string will be at the hole in the throat as in Fig. 5. Fig. 6 shows the method of starting the main string in the open-throat models. Thread the main string loosely back and forth in the racket until the ends come out as in Fig. 7, skipping the last hole at the shoulders of the racket. Some frames are designed so that the main string goes through the holes A, Fig. 7, but in most frames the last hole at the head is skipped as shown. Place an awl at each side of the racket where the last string comes out, then thread the ends of the string under the loops on the outside of the frame. Fig. 8 shows how the main strings are tightened by placing the fingers on the middle of the center string, pulling the slack from it, then working the slack with the fingers from one string





to the next to the side of the racket. Then insert an awl as in Fig. 9, remove the awl at the shoulders, and with the pliers, pull the last string tight, thus pulling all the slack outside the frame. Replace the lower awl and, starting at the center again, repeat this process on the other half of the main strings. If the string slips back when the awl is inserted, sandpaper the point or moisten it. Be very careful, however, when putting in awls not to pierce or cut the strings. Each half of the racket should be tightened alternately in this manner about four times for a medium tight job and seven or eight times for an extra tight job. However, only high quality strings should be pulled up extra tight. The frame usually will round considerably when the main strings are tightened, but when the cross strings are put in it will be pulled back to its former shape. Be careful to keep the tension of the respective strings on each half of the frame exactly the same as the other side, otherwise the racket will be pulled out of shape. The tension of each string can be determined by plucking the string and noting the tone.

After the main strings have been pulled up tight to an even tension, take out the awls and the pressure will lock the ends of the string. Start the cross string as shown in Fig. 10 and lead it over the first main string. Weave it across the racket to the corresponding hole on the other

side and tie a single loop knot as shown. Wind the string around the dowel and pull it up tight. Insert an awl to hold it from slipping back, then weave the string to the corresponding hole across the frame. Figs. 11 and 12 show the way to diagonally weave the string to prevent the gut from fraying. Always be careful not to let the string kink or unravel as this weakens it. Pull the string tight with the dowel and insert another awl as in Fig. 13. Continue this process, fastening the last cross string, Fig. 14. Trim ends of string neatly, but be careful not to trim them too short. Straighten all the strings up in the racket, using a blunt awl. Fig. 14 also shows the method of lacing the strings with trimming

cord to keep them from moving in the racket during play. However, this is not necessary, and can be omitted. The silk trimming cord at the top and bottom of the racket adds much to its appearance. Figs. 16 and 17 show how the trimming is put on the head and Fig. 18 illustrates clearly the method of trimming the throat. If trouble is experienced in pushing the cord through the holes, use an awl to ream holes larger. Finally, brush the strings with a light coat of one part of pure white shellac diluted with two parts of alcohol. This preserves the strings and protects them from moisture.

#### Punch Removes Broken Drill



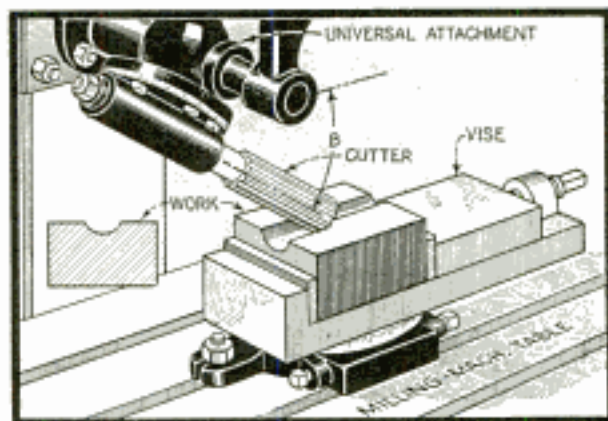
When other methods fail, a broken drill can be removed from a hole by drilling a second hole at right angles through the work to contact with the bottom of the hole being drilled, and using a punch as shown to loosen the drill. While this method is not always desirable, the hole drilled for the punch can usually be filled with a good iron cement.

### Tool for Turning Crankshaft of Motor While Adjusting Bearings

To facilitate turning the crankshaft of a car motor while adjusting the connecting-rod bearings, I rigged an old steering wheel and substituted it for the hand crank. The wheel was welded to one end of a  $\frac{3}{4}$ -in. iron rod, and a small piece of steel, cut to fit the end of the crankshaft, was welded to the other end. By using the wheel in this way, I was able to reach up and turn the crankshaft without crawling from under the car.—C. I. Wagner, Washington, Ia.

### Making Milling Cutter Cut Oversize

Having a groove to cut in some work, and no cutter of the correct size available, I used a smaller tool with the set-up shown. By tilting the tool at an angle so that it cut at the corners only, I was able to cut the groove with the smaller tool. A little calculating will determine the correct angle at which to set it, as shown at B.—Charles Kugler, Philadelphia, Pa.

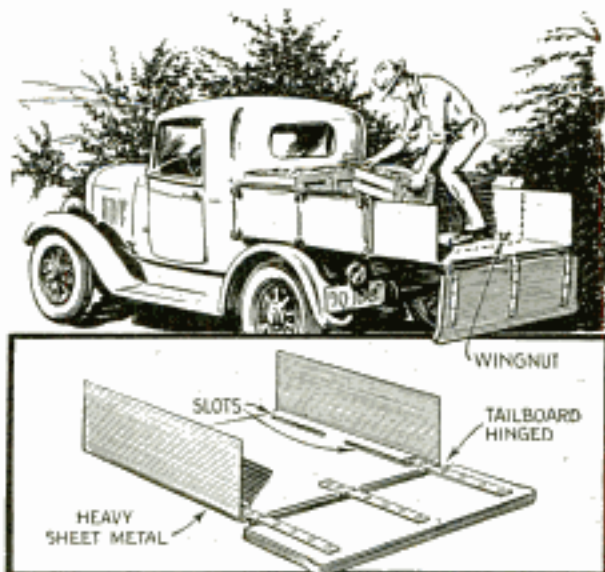


Milling Cutter Made to Cut Oversize by Tilting It at Angle to Cut Only on Corners

### Eliminating Rattles in Car Windows

Window rattles in cars can be eliminated by inserting a small flat spring between the felt channel and its retainer, at the top near the molding. A piece of spring 2 in. long is sufficient and it exerts no strain on the mechanism used to raise and lower the window.

☞ A woodscrew can be locked firmly in place by enlarging the slot in the head to take a wire staple driven into the wood to straddle the screw.



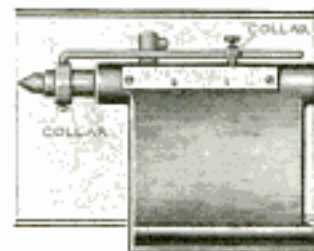
Adjustable Extension Body Enables Light, Bulky Loads to Be Hauled on Light-Delivery Truck

### Extension for Body of Light Truck

Telescoping inside the regular body, an adjustable extension body of heavy sheet metal will be found useful for hauling bulky loads of light weight. Two opposite edges of the sheet metal are bent up at right angles to form sides on the extension, and four bolts, working in slots cut in the bottom, hold it in place. The tailboard is removed from the truck, and is fastened to the rear end of the extension body.—H. C. Thomas, Royal Oak, Mich.

### Scale Attachment Simplifies Boring and Reaming on Lathe

Here is a simple attachment for a lathe that will enable you to bore or ream a hole to a given depth without stopping the machine to take measurements. A scale is screwed to the side of the tailstock, and a collar, fitted with a rod, which is bent so that it extends above and parallel to the scale, is fastened on the tailstock spindle. A smaller collar, fitted with a pointer, is attached to the end of the rod. In use, the boring tool is just started into the edge of the work, and the pointer is set at zero, after which the tool is fed into the work to the desired depth as indicated by the scale.



# Effective SIGNBOARDS *for the*



**T**HE attention-value of a roadside signboard depends almost as much on its location as on the design, and expensive ones are not always the most effective, by any means. If a well-turned-out job is

crowded in with several others, or has a confusing background, it will not catch the eye as quickly as a simpler and more isolated board farther down the road. Some designs require a background of foliage, preferably evergreen, while others are at their best in the open. The silhouette type of road sign comes in the latter classification.

The Old Dutch Mill, on which constructional details are given, is simple to make and can be duplicated on a larger scale if desired. The signboard and mill are made of  $\frac{3}{4}$ -in. material. On the back of the tower a cleat is attached to afford a substantial support for the bolt which serves as an axis for the revolving wheel. An oil chamber is drilled through hub and brass bushing, the hole being filled with oil-soaked cotton and corked up. This will supply lubrication for several months and prevent squeaking. The effectiveness of



# ROADSIDE MERCHANT



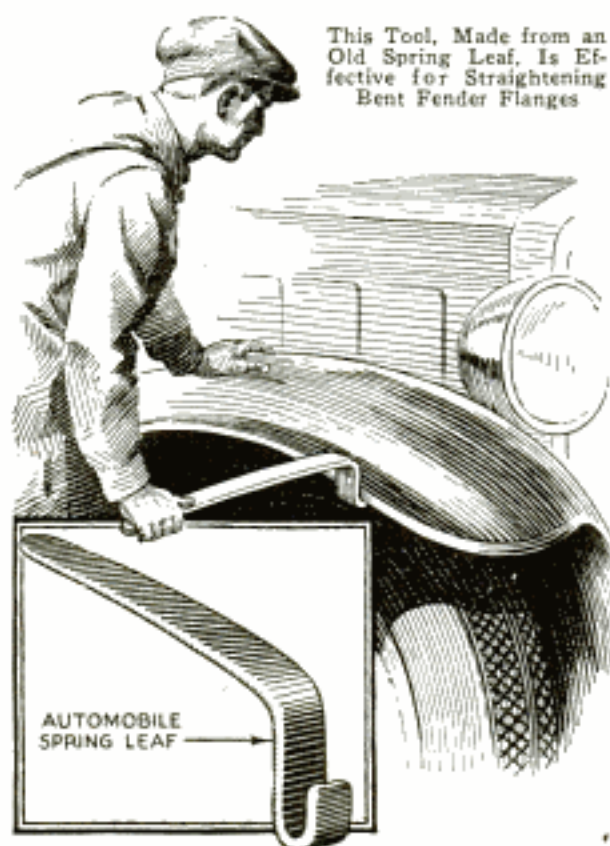
this sign is enhanced by a good paint job. White letters on a blue background will make the words stand out distinctly. This and all other outdoor painted signs should have a coat or two of spar varnish.

The huge egg, also shown in detail, will attract instant attention to the signboard just above it. Such an egg requires some work, but is well worth the effort. A rough frame is constructed of five round "bulkheads," which are covered with lath. The ends are made as shown, and the whole is then covered with strips of tar paper cut cigar-shaped and in turn covered with wire mesh. The plaster coating will take care of the irregularities. Proceed just as you would plaster a house and work toward as nearly an egg shape as possible. The nest should be made of cornstalks or some coarse growth resembling grass so that the proportions will be maintained. Ordinary straw would be entirely too fine for an egg of these monstrous proportions.



"Hot dogs" are an ever-present tidbit and the competition is very great, so that the small vendor who would get more than the average of this trade must have a striking signboard. A puppy sign that will catch the eye of the motorist at all times is also shown. This is very easy to copy and is about as inexpensive as an effective sign can be.

Suggestions on both of these kinds of signs are shown at the top of this article.



This Tool, Made from an Old Spring Leaf, Is Effective for Straightening Bent Fender Flanges

### Tool for Straightening Fender Flanges

While there are several tools designed for straightening flanges of automobile fenders, this one is highly efficient and is easily made from an old spring leaf. Heat the leaf to a cherry red and bend it to the shape shown in the detail. Then heat it again and quench it in a bath of oil to restore the original temper to the steel.

### Reclaiming Worn Linotype Matrices

Large linotype matrices wear more quickly than the smaller ones, due to their greater weight, and soon list slightly while riding to their respective channels, where they often fall flat at the entrances. This trouble can be overcome by filing away a

triangular part of the metal at the bottom of the matrix as indicated by the dotted lines. The weight of the matrix thus is reduced, and it will last for many months. When filing the metal, care should be taken not to remove any part of the lower letter.

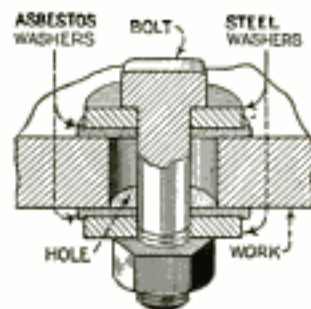


### Oiling Harness Preserves Leather

The following method of oiling a harness is suggested by the extension service of the University of Nebraska. First take the harness apart, brush it thoroughly, and put the straps in a basket made of woven wire. Then lower the basket into a 10-gal. container into which has been poured lukewarm harness oil, 5 gal. Let the harness remain in the solution until bubbles no longer rise to the surface, after which it is removed and allowed to drain. If it is not possible to dip the harness, wash it and then rub the oil into the leather before it dries.

### Holes in Iron Reduced in Size with Heat

It is possible to reduce the size of holes in iron and steel a few thousandths of an inch by repeatedly heating and cooling the metal. Plug the hole with a bolt, over which are slipped two steel and two asbestos washers as shown. The bolt should be considerably smaller than the hole to allow for expansion of the metal. Heat the assembly until it is red-hot and plunge it into a pail of water, repeating the operation until the hole is of the desired size. As the water cannot enter the hole, its walls remain hot when the rest of the metal contracts in cooling, which tends to make the hole smaller.



### Preventing Valves from Sticking in Valve-in-Head Motor

Valves in light valve-in-head cars frequently stick due to carbon deposits on the stems and in the guides. Such trouble can be greatly reduced by removing the valve and countersinking the top of the guide hole in the motor head. This provides a place to retain oil, which assures the valve stem being well lubricated at all times. It will also be found that a frequent application of penetrating oil assures better valve action and greatly lessens the tendency of valves sticking.

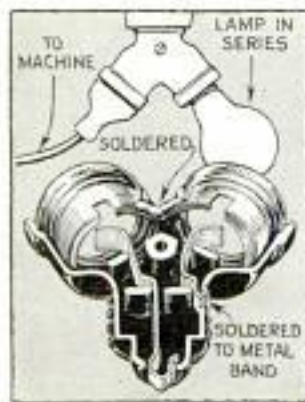
## Rubber-Cushioned Floor Absorbs Vibration



Rubber from old auto tires was used to absorb vibration from a dance floor built on the concrete roof of a large hotel in New Jersey, so that there would be no disturbance to the guests in the rooms below. Tires were cut into short sections, which were slipped over the under edges of the floor joist and nailed in position so that the rubber supported the entire floor. Heavy paper was next laid over the joists under the floor boards to absorb any additional vibration of the air. This idea could be used in factories or other large buildings where it is desired to stop machine vibration from traveling to other floors.—Paul M. Cope, Atlantic City, N. J.

### Two-Way Socket Contacts Changed to Series Connection

With slight alteration, a two-way electrical socket can be used as a means of quickly installing a lamp or other resistance in series with a machine or tool. All that is necessary is to take the socket apart and change the contacts as shown, soldering together the two threaded sleeves in the top of the



socket. In this way, the current passes through the resistance before it reaches the machine.—S. Hundevadt, Chicago.

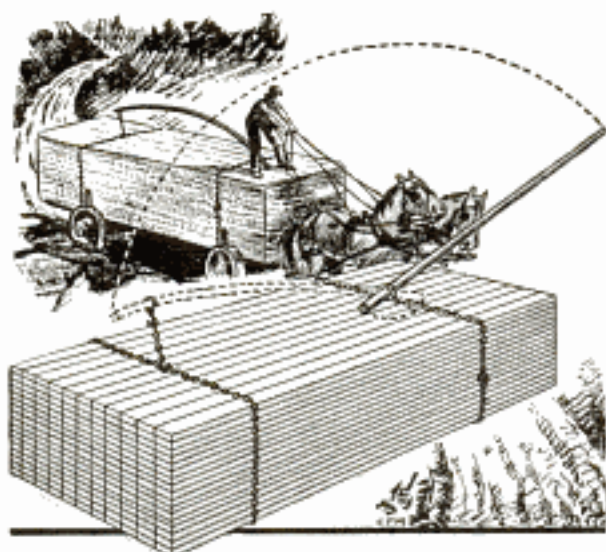
### Fly-Paper Holder Made of Wire

Disliking the inconvenience of spreading sheets of fly paper about his counter and showcases, a grocer made a holder for each sheet by twisting two wires together and spreading the ends apart to form feet. The end of each foot was bent to form a hook to hold the paper in a curved position as shown.



### Oil Treatment Preserves Walls of Log Cabin

Peeled logs in a cabin wall will crack and grow dull if not properly cared for. After they have been cured by the sun and wind, apply two coats of boiled linseed oil, which will last until the next summer, when the treatment should be repeated. Use a paint brush for this purpose. The first coat should be well brushed into the logs. The second coat may be a little thicker than that of the first one. Logs treated in this way are protected against wood borers as well as checking or cracking.



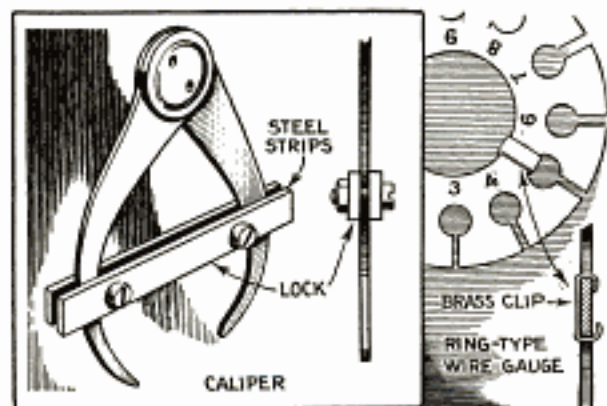
Pole and Chains Used to Bind Large Loads of Lumber on Wagon to Prevent Slipping

### Binding Load of Lumber on Wagon

The following method of binding lumber on a wagon is used by some lumber companies to assure that the load will not spread and fall off. A chain is bound around each end of the load, after which a pole is inserted under the rear chain and twisted around until it is tight. The pole is then brought over as shown by the dotted line, and is tied to the front chain.

### Two Simple Gauge Tricks

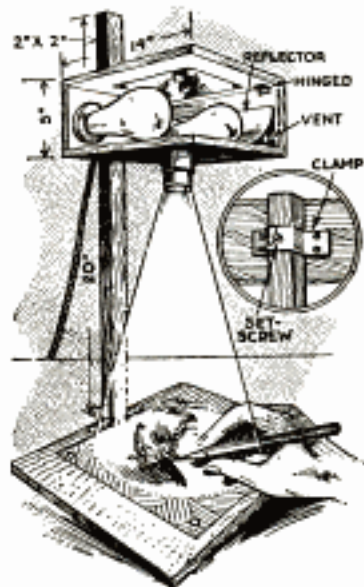
One shopman improvised a lock for the legs of his calipers to prevent them from slipping after they were set to gauge a number of duplicate pieces which were being turned in a lathe. The lock consisted of two steel strips clamped over the legs by means of machine screws as shown. Another method used to prevent error in selecting stocks of wire, was to put a brass clip on the wire gauge.



Locking Calipers and Marking Wire Gauge to Prevent Possible Error in Gauging Duplicate Parts

### Copying Projector for Artists

Artists will find this simple projector useful, as a picture or drawing can be projected on paper and quickly traced. The projector proper is a small box arranged to slide on a vertical support fastened to a base, thus permitting various degrees of enlargement. Two 50-watt lamps provide illumination, and pieces of tin, placed at the lower corners of the box, reflect the light on the picture, which is tacked to the underside of a lid hinged to the top. Holes are drilled through the sides behind the reflectors to allow the heat to escape. The lens is double convex, 2 in. in diameter, and may be taken from a reading glass. It is mounted at the outer end of a brass tube consisting of two telescoping parts, one of which is tightly cemented in a hole in the bottom



of the box as shown. The inside surfaces of the box are painted with a mixture of shellac and lampblack to eliminate cross reflection. The projector is fastened to the vertical support by means of a V-shaped clamp of strap iron, fitted with a setscrew, as shown in the insert.—Philippe LaFee, Columbus, Ohio.

### Nickelplating without Electricity

Instrument parts and small tools may be easily nickelplated without using electricity by first cleaning them and then boiling them in an aluminum pan containing a plating solution. Carbon tetrachloride or gasoline may be used to remove the heavy grease, while lye,  $\frac{1}{4}$  lb., dissolved in water,  $\frac{1}{2}$  gal., makes a good solution in which to boil the work to remove all of the grease. After this treatment, rinse the work and immerse it in a dilute acid solution to remove corrosion. This solution is made by pouring a small quan-

tity of commercial sulphuric acid into  $\frac{1}{2}$  gal. of water. Do not pour the water into the acid, but drop the acid slowly into the water. Next, add 2 or 3 oz. of nitric acid. During cleaning and plating, the work should be suspended with a copper wire, as finger marks will prevent the plate from adhering. The plating solution is made by dissolving, with the aid of heat, nickel ammonium sulphate,  $10\frac{1}{2}$  oz., and ammonium chloride, 21 oz., in 1 qt. of water. After the chemicals have dissolved, add strong ammonia, a few drops at a time, until red litmus paper turns blue when dipped into the solution. If the paper is not handy, add the ammonia slowly until the color of the solution is an intense blue green. The solution will keep indefinitely if stored in a tight bottle, it only being necessary to add ammonia from time to time to replace that which was lost while in use. It is a good idea to keep the work being plated in constant movement so that spots will not form. This solution plates rapidly and produces a nickel coating which adheres strongly and can be polished.

### Utilizing Gravity in Spray Painting

For painting structural steel before it leaves the shop, one firm uses large paint buckets with conical bottoms. These have pipe connections fitted with valves at the center of the cones to take the paint hose. The buckets are supported on three chan-



Improved Paint Containers Hoisted Near Ceiling to Utilize Gravity in Spray Painting

nel-iron legs, and are hoisted to the shop ceiling to provide ample pressure.

### Table with Graduated Sides Aids in Cutting Glass



Glass Cutters' Table Has Adjustable Straightedge Which Is Clipped to Graduated Guides along Edge

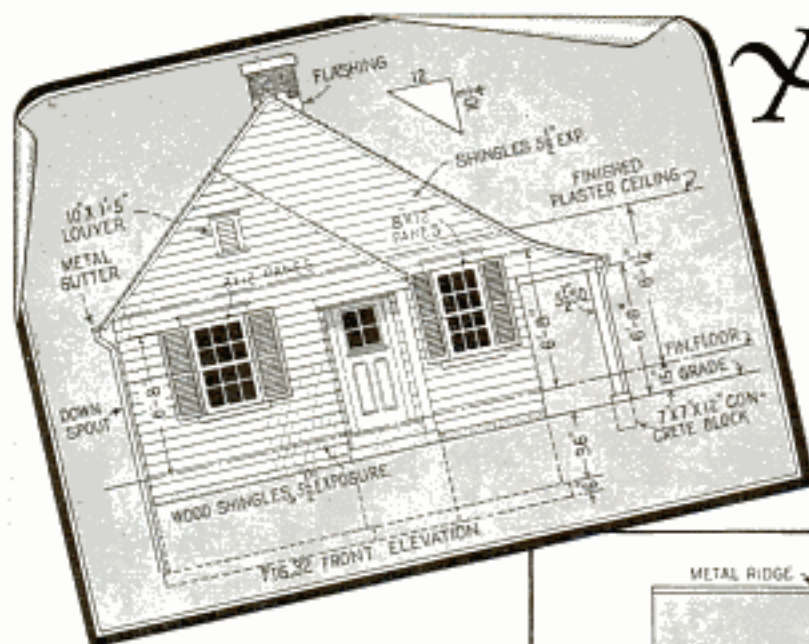
Time can be saved in shops where considerable glass cutting is done by using this table. It is made of 1-in. stock and has yardsticks screwed to the edges to form graduated guides. Two paper clips of the kind shown are cut and bent as indicated so that they can be screwed to the ends of the straightedge, which can then be slid back and forth between the guides and can be securely held in place at any point along their length by means of the clips.—Chas. C. Jensen, Minot, N. Dak.

### Treatment of Wood Fence Posts to Prevent Rapid Decay

Life of soft-wood fence posts can be increased considerably by treating them with creosote by the following method: If the posts are green, remove the bark and stand them on end in the shade to cure for several months. Then boil them for at least an hour in creosote, covering 3 or 4 ft. of the posts. This can be done conveniently in an old oil drum from which the top is removed. After boiling, place the posts in a second dip of creosote, at a temperature of 80 to 100° F., keeping them immersed for a couple of hours.

☐ The growth of chicks can be increased by adding yeast to a ration containing 75 per cent of cereal products.

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850. 855



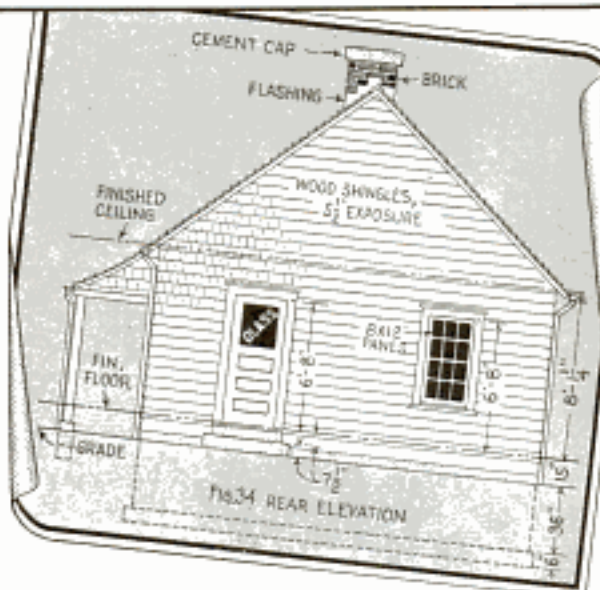
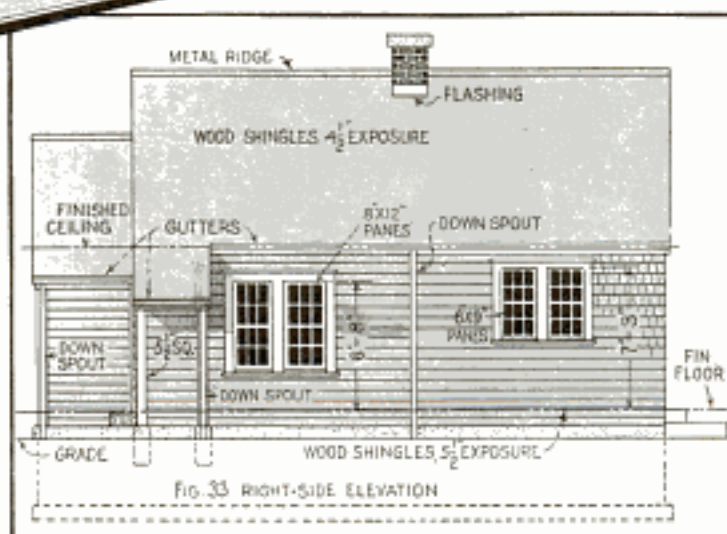
# A COZY

lines, indicates how the flue is tipped so that it comes out at the center of the cement cap. The space between is filled with small pieces of brick and mortar. Brick and mortar are also used to stop off the flue lining at the bottom. A 5-in. stovepipe opening should be

## PART II

**I**N the first installment of this article, which appeared in our July issue, the framing and sheathing of this attractive little house were covered. The elevations are shown in Figs. 32, 33, 34 and 36. A careful study of the figures is suggested so that you may get a better idea of the appearance of the finished building. The chimney starts 5 ft. above the finished floor. By starting the brickwork at this point, rather than below the floor, considerable material and labor are saved, and the space that would be occupied by the lower part of the chimney can be made into a convenient storage case, as shown in Fig. 37.

An 8 by 12-in. tile flue lining should be used for the entire length of the chimney. It is not a difficult matter to lay the brick for the chimney when you have the lining as a guide. Be sure, however, that all joints in the lining are well filled with mortar so that there will be no gas leaks. Fig. 35 shows a portion of the chimney above the ceiling. Notice that it widens out at the top so that it straddles the ridge of the roof. The lower courses require seven bricks each, the upper eight bricks. You should figure four and one-half courses to the foot in order to determine how many bricks are required for the chimney. The lining, shown in dotted



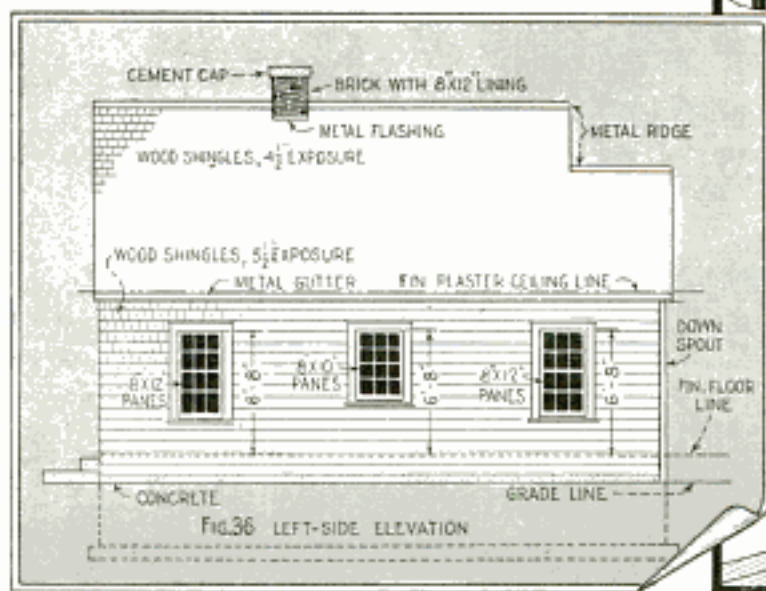
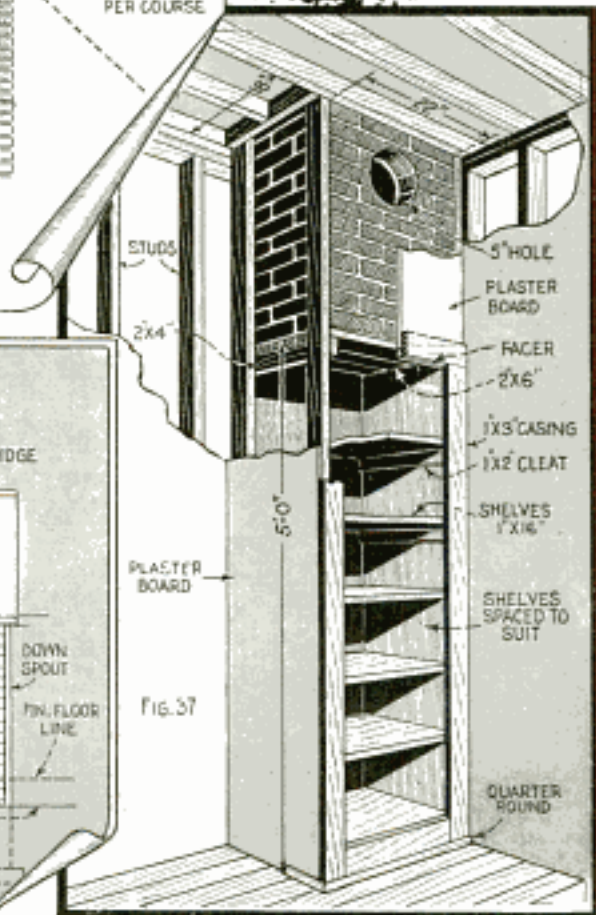
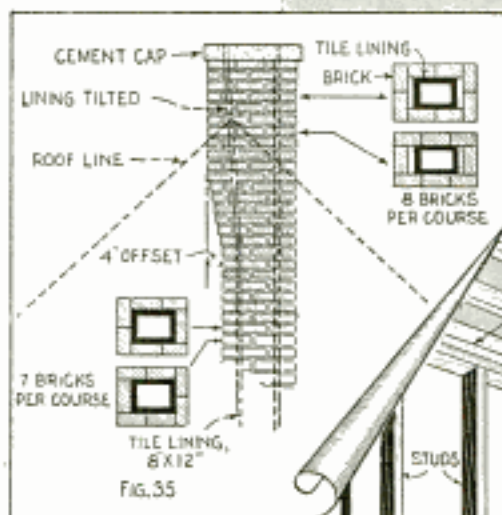
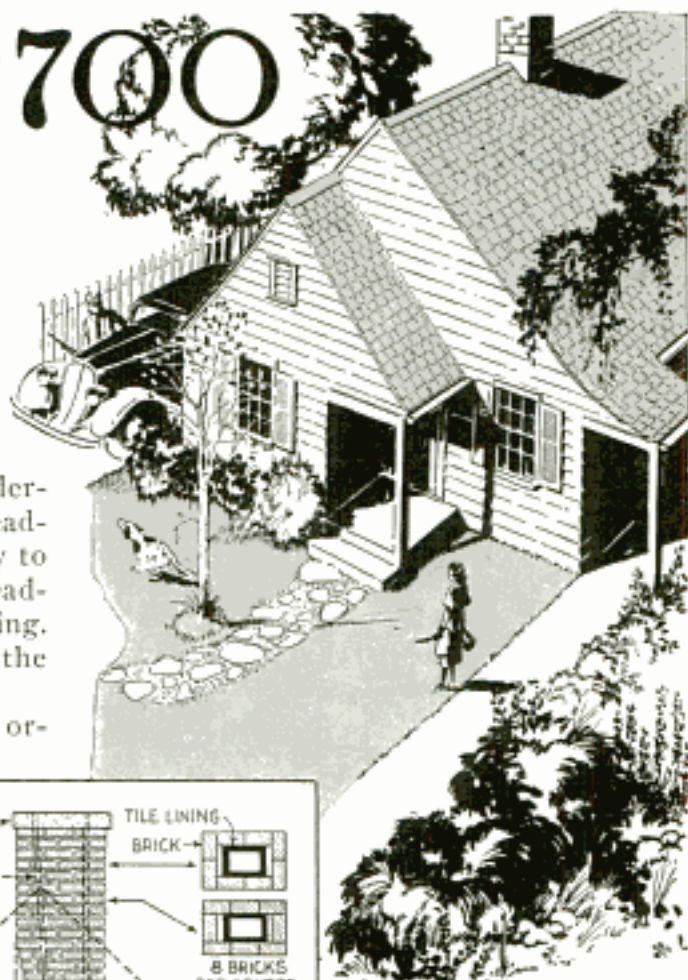
left in both the kitchen and dining-room sides of the chimney, but the openings should not be opposite each other. Score the openings in the flue lining with a cold chisel, so that they will break out as evenly as possible. Metal flashing is worked

# HOME for \$700

By R. O. BUCK  
Lane Technical High School, Chicago

between the courses of brick, as shown in the elevations, to make a water-tight joint between the chimney and roof. The framing that is used to support the chimney and carry it through the ceiling must be very strong, and the floor joist underneath it should be braced with three headers, to prevent sagging. It is necessary to cut away one ceiling joist and put a header across to frame the chimney opening. A similar opening is also made for the scuttle in the hall ceiling.

The boxing of the eaves is next in order. You will find by studying the elevations that the entire eaves on the left side are boxed as shown in Fig. 38, but on the right side only the eaves of the main structure are boxed in this manner. The right eaves of the extended portion are faced in a manner similar to that used in the gables, shown in Fig. 39. The eaves are so simple



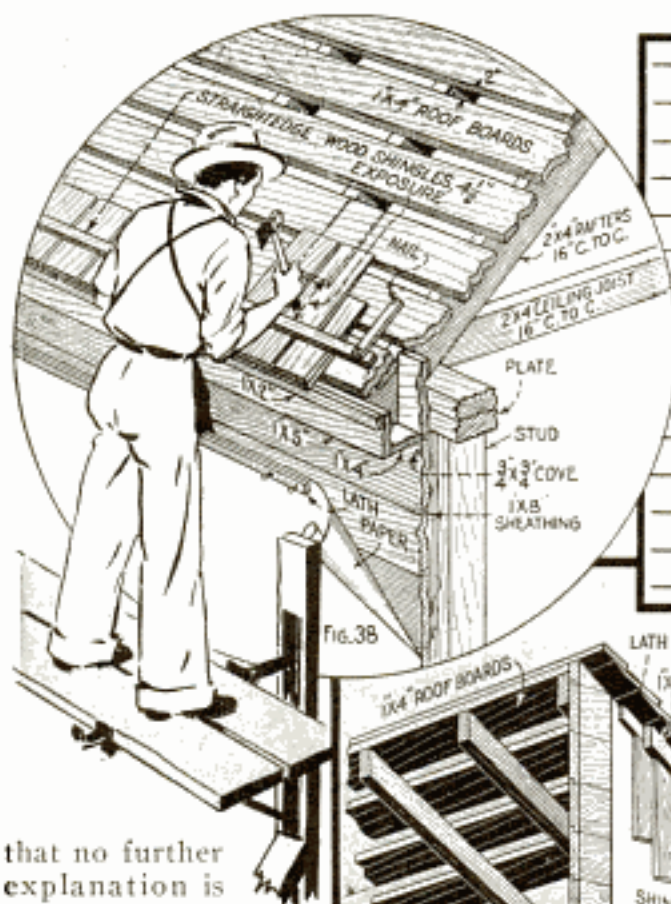


Fig. 38

that no further explanation is necessary.

In shingling the roof, the shingles are started at the bottom with a double course, and the butts are extended down about 1 in. over the 1 by 2-in. molding. The overhang at the gables is shown in Fig. 39. The shingles are to be laid  $4\frac{1}{2}$  in. to the weather and each one is nailed with two 3-penny galvanized shingle nails. All joints should break at least  $1\frac{1}{2}$  in. and no break should occur directly above another in any three consecutive courses, so that all the nails will be covered. Space the shingles about  $\frac{1}{4}$  in. apart on the roof. For appearance sake, it is necessary that the courses be lined up. This can be accomplished easily by means of a straightedge temporarily tacked onto the roof. By nailing a piece of lath to each end of the straightedge as shown in Fig. 38, the nails can be placed so that the holes made by them will be covered.

The window and door frames must be properly "set" in order to have the doors and windows work freely. All of the windows for this house are of the type commonly called "check rail" that is, they

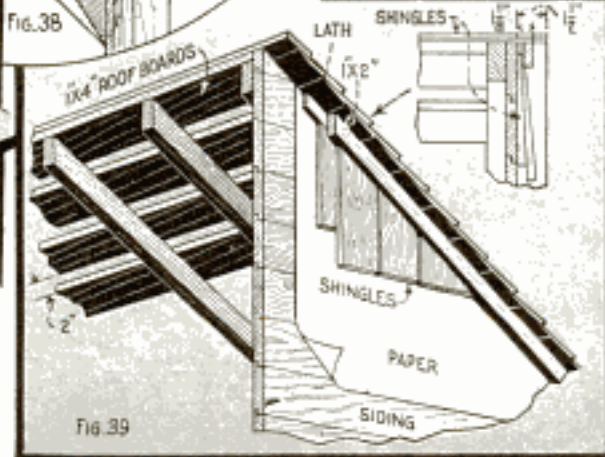


Fig. 39

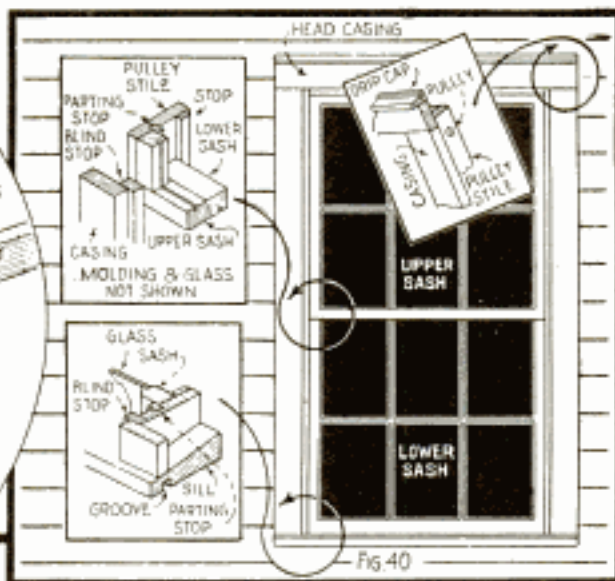
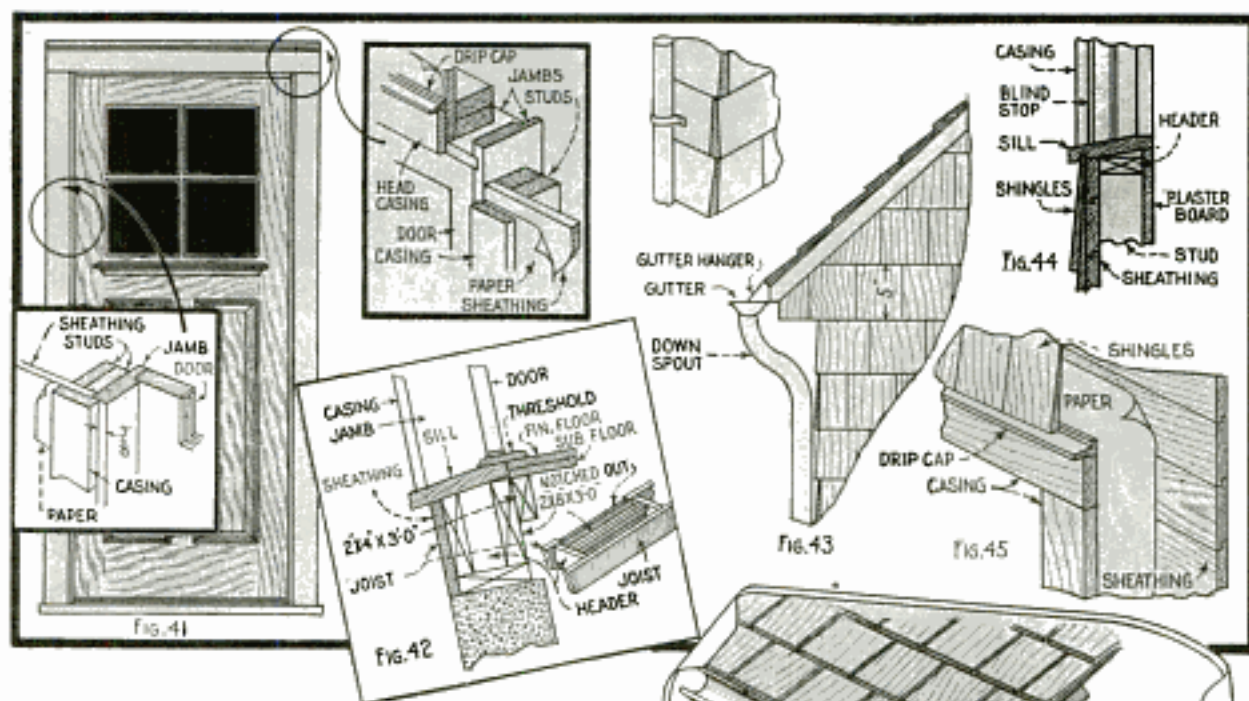


Fig. 40

each consist of two sash, which, when closed, are forced against each other at the center rails by the sash lock. Fig. 40 shows a window and frame of this type, also details showing how the various members are assembled. Frames are usually

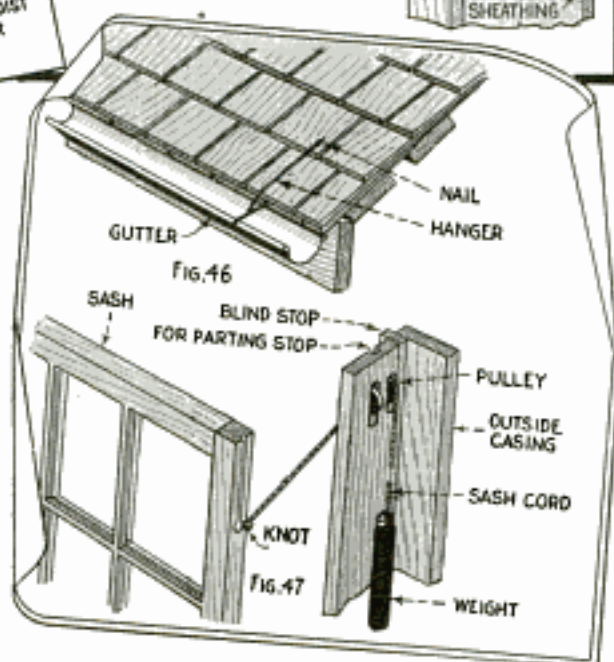
shipped "knocked down" and are either assembled at the local lumber yard or on the job. Start by nailing the sill, head and two side jambs together, and squaring them up. Two diagonal cleats should be nailed across the corners to hold them in shape. Next, nail on the outside or "blind" stops, the casing, head casing and the drip cap. The parting stops should be temporarily tacked into place so that they may be removed for installing the upper sash. Before setting either door or window frames, a strip of building paper about 12 in. wide should be tacked all around the stud openings so that it will form a good lap with the paper that is to be put over the sheathing and under the shingles. This is very important. When installing the window casings, be sure that they are set in the center of the stud openings and are plumb. Small pieces of wood may be driven under and at the sides of the frames to space them. Fasten with 8-penny casing nails and set the heads below the surface



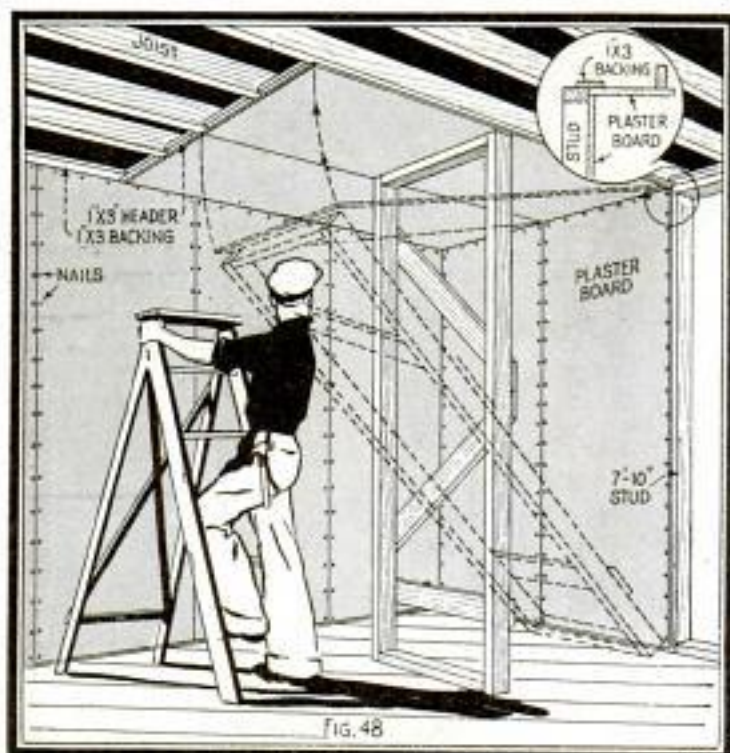


for puttying. Keep the sills as nearly the same height as possible, so that the courses of shingles will come out the same at the bottoms of all of them. Fig. 41 shows an outside door. The frame is set up and braced in a manner similar to that used for the windows. The outside casing is set back  $\frac{3}{8}$  in. from the face of the jambs to form a stop for the screen or storm door. Notice that the top of the joist must be cut away so that the door sill will be level with the finished floor, as shown in Fig. 42. Headers are also added to support the floor and sill at the inner edge. The threshold should not be placed until you are ready to hang the door.

The side walls are to be covered with 16-in. wood shingles, laid 5 in. to the weather. These shingles should be stained far enough in advance so that they will be dry when used. Use 3-penny galvanized nails, two to each shingle. As they are stained and less exposed to the weather, wall shingles can be laid close together. Building paper should be placed on the walls over the sheathing to make the building wind-tight. The paper should be held smoothly in place by means of lath, until the shingles are placed. See Fig. 38. No water table or corner boards are used on this house so the shingles should be started 1 in. below the bottom edge of the first course of sheathing, to form a lap between the concrete wall and the sheathing. Lay the first course of shingles dou-



ble as was done on the roof. Fig. 43 shows how the shingles are "capped" at the corners. Every alternate shingle on the wall is lapped over the other as indicated by the shaded portions. When laying wall shingles, have an even number of courses from the bottom up to the window sills and from the sills to the tops of the frames, if possible, even if you have to alter the 5-in. exposure slightly, as a slight variation will scarcely be noticeable and in this way you will avoid a course of short pieces, which might break off easily. Be sure to place your shingles well up into the grooves in the underside of the window sills. See Fig. 44. The shingles lap down over the drip caps at the top of the door and window frames as shown in Fig. 45. The eave gutters are then hung



the parting stops back into place. The inner stops should not be placed until the trim has been installed, so nails are driven into the jambs at each side to hold the lower sash in place temporarily. The hinges for the outside doors are mortised into the frames and doors in the usual way. Be sure that your door just clears the threshold. A priming coat of paint should be applied to doors and windows as soon as they have been installed, to prevent weathering and warping.

The inside of our house is to be lined with "ceiling height" plaster board. This material has the advantage in that you can apply it



as shown in Fig. 46. Hangers should be placed every 4 ft. and the gutter should have a slight pitch toward the downspout. The concrete porch floor and platform may be laid at any convenient time after the exterior has been shingled. When the concrete has set, the temporary bracing used to support the porch and gateway roofs may be replaced by the permanent 5½-in. posts.

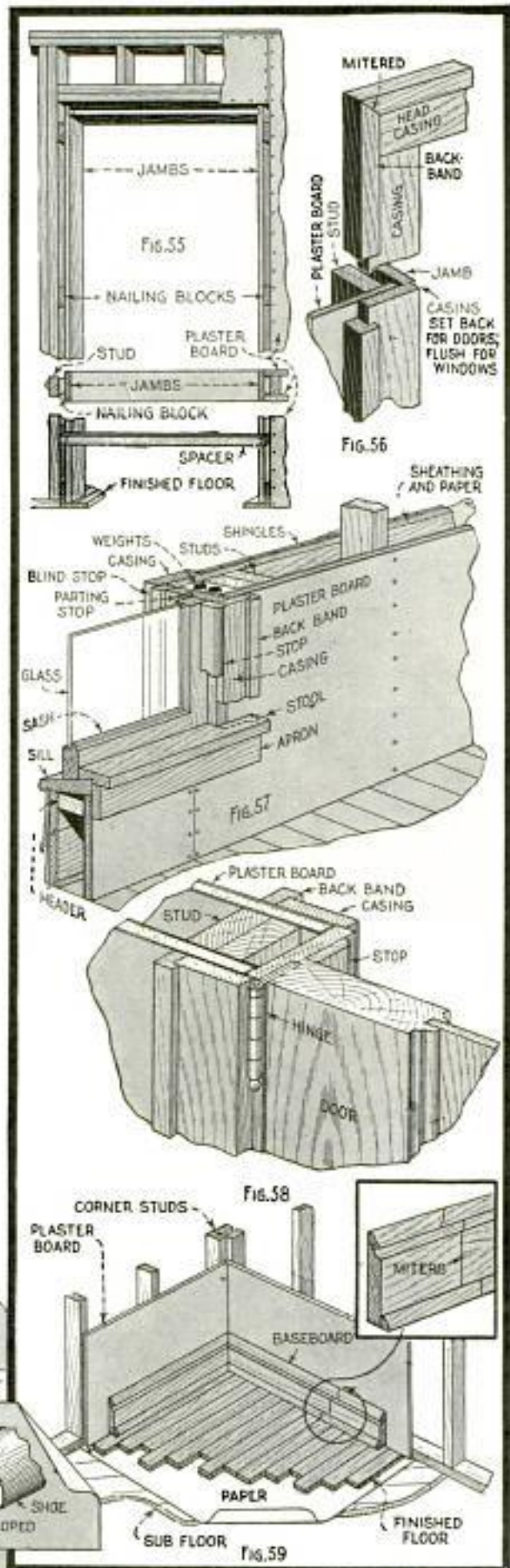
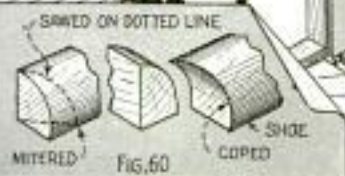
You are now ready to hang the window sash and install the outside doors so that the building may be closed. Sash are made somewhat larger than the frames in which they belong, to allow for fitting on the job. Plane the edges just enough to allow them to be raised and lowered easily. Avoid fitting too loosely as they will rattle. Install the top sash first, as this goes to the outside, then install the sash cord and weight as shown in Fig. 47, tacking

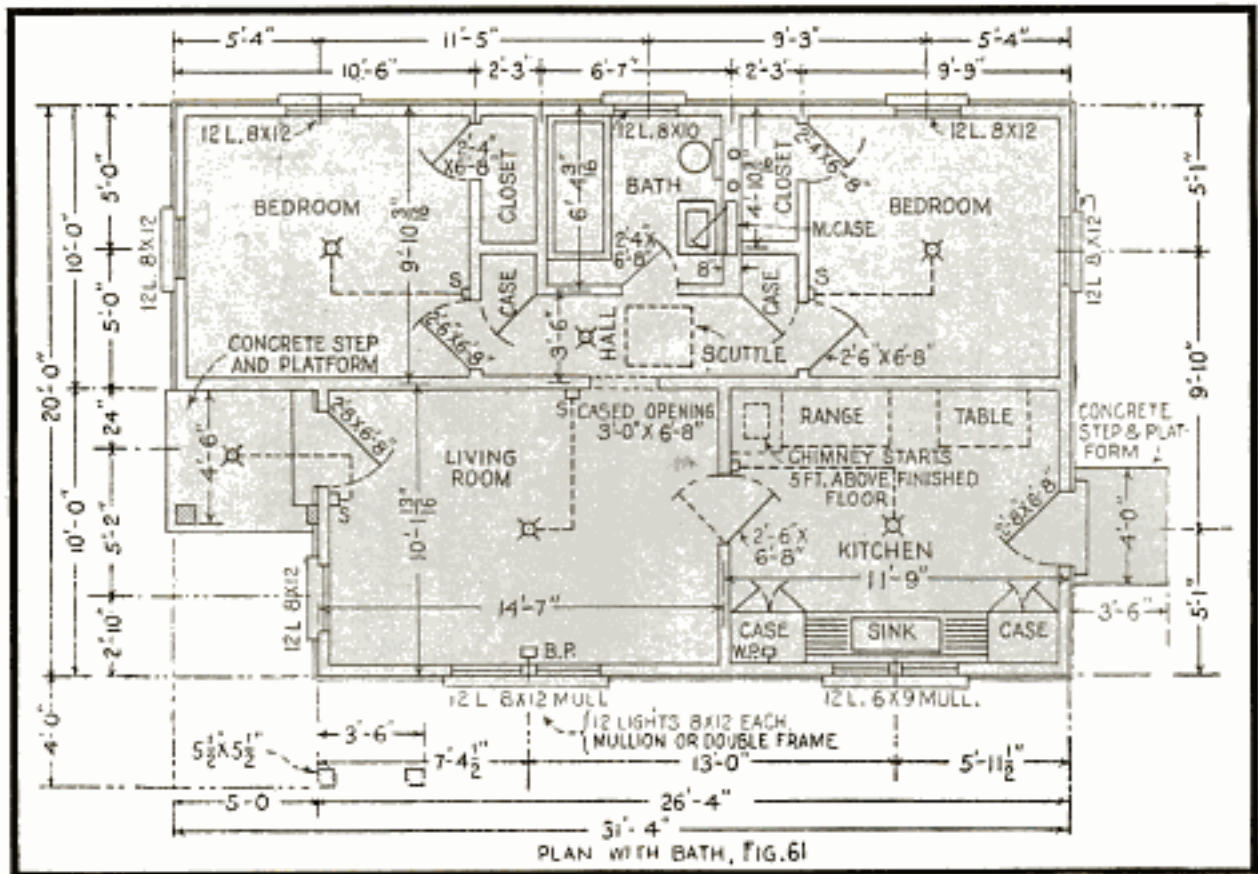
yourself and it makes a strong, smooth, fire-resisting wall,

which is in every way equal to lath and plaster. In order to provide a place to nail the plaster board onto the ceiling, backing strips are nailed to the tops of the plates in a manner similar to that used at the studs, as described in the first installment and shown in the circular detail of Fig. 48. The plaster board should be nailed to the walls first so that the top of the boards will provide a ledge on which the ends of the ceiling pieces can be rested while nailing. Because of the size and weight of these pieces, it will be necessary to rig up a "helper" to hold the material in place while nailing. Fig. 48 shows how the helper is used. A space of ¼ in. should

be left between all adjacent edges of the plaster board, and all sides must lap over a stud or joist at least  $\frac{3}{4}$  in. Start nailing the boards at the center of one edge, working toward the ends. The 3-penny nails should be placed about 4 in. apart around the outside and 8 to 12 in. apart inside the board. An ordinary hand saw is used to cut the board for fitting around the openings. The  $\frac{1}{4}$ -in. space between the boards should be filled with the plaster filler provided for this purpose. In order to make the joints between the boards less visible under wallpaper, a strip of sign-painters' canvas, 1 in. wide, is pasted over all the joints. This may be omitted on painted walls. In order to provide for the installation of plumbing at some future date, it would be well to install fixture supports so that it will be unnecessary to remove any plaster board later. These are simply pieces of 1 by 6-in. stock nailed between joists as shown in Fig. 49. Similarly you will require supports for the sink, lavatory and toilet tank, and electric fixtures which you will undoubtedly wish to install later. Fig. 50 shows a switch-box support and Fig. 51 a ceiling-fixture header. The proper location for both the plumbing and lighting-fixture supports is shown in Fig. 61.

The specifications on which this house was figured called for clear yellow pine or fir flooring. This has been specified, rather than hardwood, not only to keep down the cost but also because it makes a very satisfactory floor. However, hardwood flooring may be substituted for an additional cost of less than twenty dollars. When laying the finish floor, be sure that all scraps of lumber, plaster and litter are





cleaned off the subfloor so that you have a smooth surface to work on. Lay a length of building paper on the subfloor on the side where you are starting the flooring. The other strips of paper, which should lap about 4 in., are not laid until you have nearly covered the preceding ones, so that the paper will not be torn. As the subflooring has been laid diagonally, the finish flooring may run parallel to any wall. Start the first strip of flooring about  $\frac{1}{4}$  in. away from the wall to allow for swelling. This practice should be followed on the other three sides of the room also. The baseboard and shoe will cover this space. Be sure that the strip of flooring is laid straight across and check every third or fourth board to keep a straight line. A scrap piece of flooring is generally used to protect the tongue when the pieces are driven together with a hammer as in Fig. 52. If a piece is sprung it may be necessary to draw it up with a chisel, using it as shown in Fig. 53. Considerable leverage is obtained in this way. Flooring is nailed at every joint and more often if necessary. Use 8-penny finishing nails, driven at a  $55^\circ$  angle as shown in Fig. 54. A nail set is used to drive the heads of the nails flush with the surface of the tongue so that they

will not interfere with the match of the next piece. The color of the pieces of flooring should be matched as far as possible. Joints should be broken and pieces shorter than the span between two joists should be avoided. Short ends and less desirable pieces can be used to advantage in the closets. After the flooring has been laid, it should be scraped and sanded. Lay building or news paper over your finished floor to protect it until varnished.

The inside door frames are set in much the same manner as the outer ones, and it is equally important that the frame be plumb. As there is no sill, a temporary brace should be placed across the door as shown in Fig. 55, to insure this. Note the use of nailing blocks between the frame and the studs. Hanging the interior trim requires considerable care and accuracy. Our trim is the back-band type shown in Fig. 56. In putting the trim on a window the procedure is as follows: cut the stool so that the ends will project beyond the back band of the side casings, and so that the edge is flush with the sash as shown in Fig. 57. Nail the stool in place and set all nails. The side and top casings are next cut and installed so that the inside edges are flush with the faces of the jambs. The

back band is cut with a miter at the top. The stops, which should not be nailed permanently until you are sure the sash will work freely, are also mitered at the top. Inside doors are cased on both sides. Fig. 58 is a section of a doorway. Notice that the door casings are set back  $\frac{1}{4}$  in. from the jambs to allow room for the hinges. The cased opening from the living room to the hall is handled in the same way except that no stops are required. The base molding is of the three-member type, consisting of a cap, base and shoe. The base is nailed into place first, starting at one corner of the room and working around, followed by the shoe and cap. If it is necessary to splice the pieces, a mitered joint should be used as shown in Fig. 59. Notice that the joint does not occur at the same place on the three members. The joints at the corners of the base should be coped out rather than mitered, as this type of joint allows for expansion. Fig. 60 shows how a joint is coped. As stated in the first installment, provision has been made for adding a bathroom to our house. Fig. 61 shows a floor plan that includes a bath. By comparison with the original floor plan, you will notice that only the partition between the closets and the one at the back of the hall case need be removed to provide the bathroom space. New closets are taken out of the bedrooms. It is suggested that the two partitions just mentioned be laid on the finished floor so that if this change is made, only a few nail holes will remain, and these can be covered with linoleum. All outside trim should be given three coats of good paint. After the first or priming coat, all nail holes are puttied. The interior trim should be given one undercoat and two coats of semi-gloss enamel. The floors require two or three coats of good floor varnish.

#### Tumbling Barrel Made from Tin Can

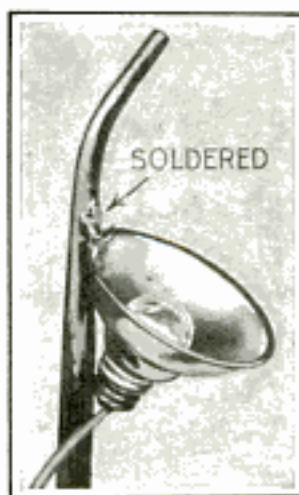
When no tumbling barrel is available, one for use in a lathe can be improvised from a square can having a tight-fitting lid. Lugs are soldered to two corners of the can as shown, one being center-drilled to fit the tailstock center, and the other rounded so that it can be held in the chuck. In use, the parts to be cleaned are put in the barrel together with a quan-



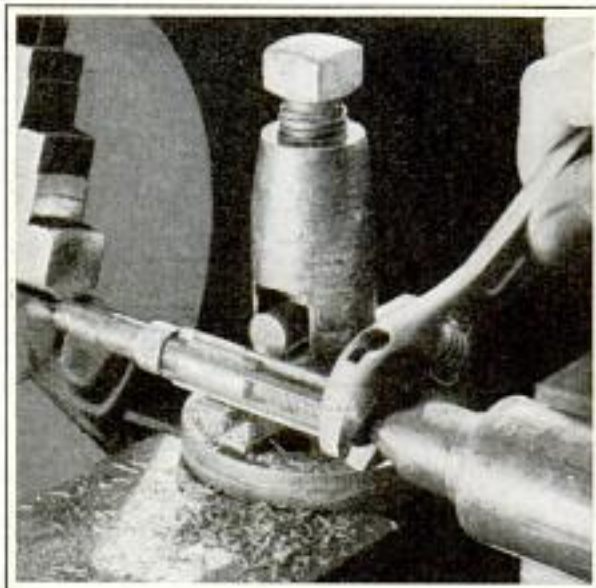
LUGS SOLDERED TO CAN  
Large Tin Can with Lugs Soldered to Two Corners Used as Tumbling Barrel in Your Lathe

tity of small shot and thick, soapy water, and are tumbled for two or three hours. For polishing soft metal, such as brass, hardened-steel shot is best, but for removing black scale on hardened-steel parts or for rounding off corners, lead shot charged with emery powder should be used. The shot is charged by rotating it together with the emery powder in the barrel for a half hour, after which all the loose powder is screened off. This should also be done from time to time to rid the shot of grit. The lathe should be driven at a slow speed. The barrel does the best work when it is about one-third full.

#### Small Lamp on Can Spout Aids in Oiling Machinery



A night watchman who kept a large printing press oiled overcame the difficulty experienced in locating the oil holes in the dim light under the machine by attaching a small lamp on his oilcan. The reflector and socket of a flashlight were soldered to the spout. One wire leading from the battery, which he carried in his pocket, was grounded to the can and a second wire was soldered to the center contact of the lamp.



By Using a Reamer Mounted Between Centers You Can Do Milling and Planing on a Lathe

### Milling and Planing with a Lathe

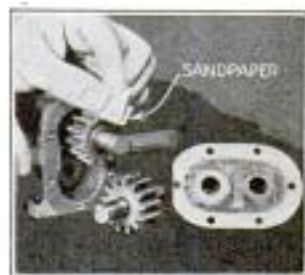
A reamer can be used for simple milling or planing jobs in a lathe. You can use either a one-piece or an adjustable-blade reamer, the latter being more suitable in many cases. It may be mounted between centers and driven with a dog, or the shank can be held in a chuck and the other end steadied by the tailstock center. The manner of mounting the work will depend, of course, on the type of work. Small shafting can be held in the toolpost by blocking it up to the proper height, while various other articles can be mounted on the carriage with clamps. The work should be placed behind the reamer and moved toward the front of the lathe when a cut is being taken on the top.

### Anti-Slip Soles Attached to Shoes When Working on Roofs

Men who work on roofs covered with wood shingles or composition roofing can fit their shoes with anti-slip soles by driving sharp-pointed steel tacks, about  $\frac{1}{4}$  in. long, through two pieces of  $\frac{1}{8}$ -in. leather and strapping them to their shoes. The pointed ends of the tacks project through the leather enough to engage the roof and prevent slipping. When working on slate roofs, about the only safe method is to use a rope, one end of which is fastened to the ridge of the roof and the other end to your body.

### Increasing the Life of Gear Pumps

Many years of service can be added to gear pumps by frequently cleaning the gears of solid matter that collects between the teeth and will eventually ruin the pump if left there. This can be done with fine sandpaper, taking care not to remove any of the metal. After cleaning, the pump should be thoroughly washed in gasoline to remove all traces of the abrasive before assembling. When pumping dirty water or other liquid that contains hard particles, it should be carefully filtered before passing through the pump gears.—Minor E. Tracy, Lockport, N. Y.

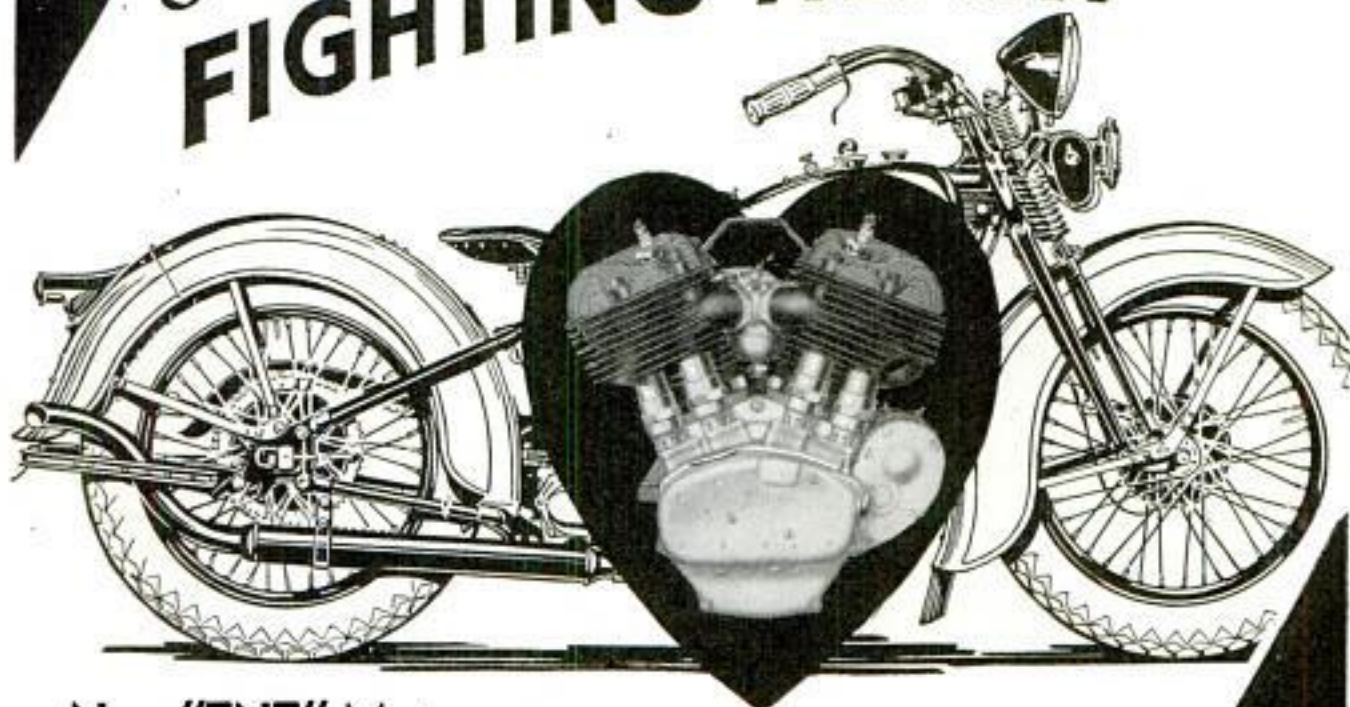


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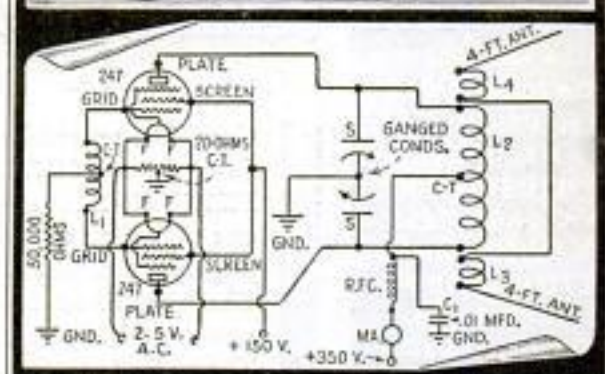
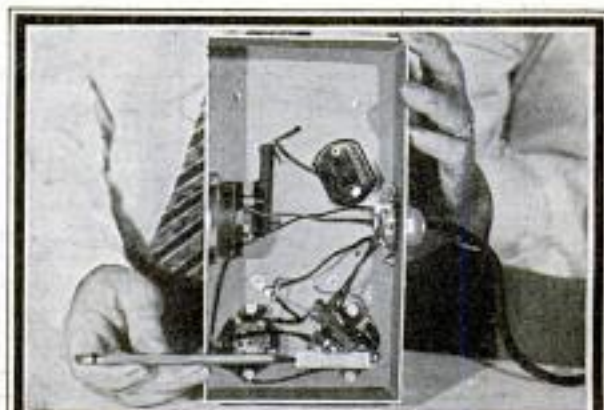
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## FIVE-METER RECEIVER AND SIMPLE TRANSMITTER

(Continued from page 296)

tuned-plate type with a fixed grid coil. The X-ray view on page 296 shows the wiring and all parts in their relative positions on the metal base. This base is 9 1/2 in. long, 5 1/4 in. wide and 2 1/2 in. deep. The tuning condenser is made from a 2-gang .00035 mfd. unit by removing alternate plates so that there will be four stator and five rotor plates, double spaced, in each section.

The grid coil L<sub>1</sub> consists of 10 turns of No. 20 c.c. wire wound on a threaded, insulated form 1/2 in. in diameter. An old



resistor form is ideal for the purpose. This coil is connected under the base directly to the grid terminals of the tube sockets and is self-supporting. Care must be taken that the connecting leads are exactly the same length. Turns may be added to or removed from this grid coil to obtain the best output in the part of the band you decide to use. The same number of turns must be maintained each side of the center tap.

The plate coil L<sub>2</sub> and the antenna-coupling coils, L<sub>3</sub> and L<sub>4</sub>, are made of 3/16-in. copper tubing wound over a form 1 in. in diameter. The plate coil consists

(Continued to page 118A)



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## FIVE-METER RECEIVER AND SIMPLE TRANSMITTER

(Continued from page 116A)

of 5 turns, spaced  $\frac{3}{16}$  in., and is supported on  $1\frac{1}{2}$ -in. machine screws directly on the stator section of each condenser. The rotors are common with the frame, which is grounded directly to the metal base. The antenna-coupling coils are one turn each, formed from a single length of the copper tubing, in the manner shown, and supported by means of two small stand-off insulators. These insulators are spaced so as to place the single turns about  $\frac{1}{2}$  in. from each end of the plate coil. Heavy wire may be used for the self-supporting antenna lengths. The r.f. choke consists of 35 turns of No. 32 d.s.c. wire, each turn spaced  $\frac{1}{16}$  in. on a  $\frac{1}{4}$ -in. bakelite rod,  $2\frac{1}{2}$  in. long.

A 5-prong cable plug is used to connect the necessary voltages indicated on the schematic diagram. The filament supply is a 2.5-volt transformer, and the plate supply can be obtained either from B-batteries or a B-eliminator. The transmitter may be keyed by inserting the key in series with the grounded center tap of the 20-ohm resistor. A suitable modulator unit and pre-amplifier for phone use will be described in a coming issue. This unit will also be suitable for public-address work.

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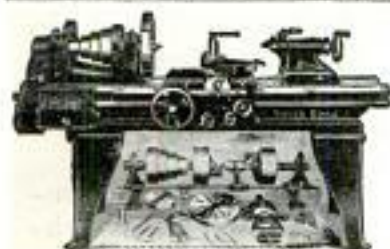
(Continued from page 297)

into the extra wall socket. The room can be floodlighted and a radio set, or electric phonograph, turned on, as shown in illustration at lower left. The sensitive relay may be the Weston miniature type, shown with the cell, or the homemade variety indicated in the diagrams. The construction details for the latter will appear in the September issue.

The power relay is operated with a C-battery; this relay will handle 100 watts at a maximum of 120 volts. The push button indicated in Fig. 1 is pressed to reset the relays for the next visitor. Fig. 2 shows the circuit arranged for flashlight operation, enabling a night watchman to temporarily floodlight the interior of a store when making his rounds.

(To be continued)

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## THE MAN WHO PILOTS THE PILOT

(Continued from page 245)

dispatcher must make these calls exactly on the dot, a delay of even ten seconds resulting in a reprimand. In good weather, each pilot reports every twenty minutes, in bad weather each ten minutes.

The weather is the popular topic of conversation when these pilots and dispatchers talk. No time is spent in salutations, for every second around the face of the dispatcher's clock is apportioned. The pilot gives his position, altitude, visibility, weather conditions and any other flight information. He receives information about the weather ahead and any orders.

The pilot, approaching an area of poor visibility, does not take a chance and trust to luck. He calls his dispatcher and finds out exactly what conditions he is entering. He may find, for instance, that fog or clouds are only local and the sun is shining ten miles beyond. He sometimes finds that while conditions ahead do not seem bad, a storm is moving in and the dispatcher warns him of this hazard.

Thus the pilot in the air is kept posted on the weather ahead, the dispatcher on the ground knows the weather which the pilot has encountered and this information is incorporated in the general weather map for the area. As a ship nears the dispatcher's station, the man who pilots the pilot goes out on the field, plugs in a remote-control phone and advises the pilot as to the condition of the field, and acts generally as an extra pair of eyes and ears for the descending ship.

In an emergency, the dispatcher has an ace or two in the hole. Suppose he calls the pilot and the pilot fails to respond. He does not wait a while. He gets busy. It may be that the ground transmitter is not functioning, so he checks on the meters or asks another ground station if his message can be heard.

It may be, too, that the plane transmitter is out. The dispatcher communicates with the nearest Department of Commerce weather broadcasting station requesting that a message be transmitted to the pilot asking that he call his station at once. If this brings no results, the dispatcher's next move is to get in touch with the nearest Department of Commerce radiotelephone station of the type located at important

(Continued to page 122A)

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## THE MAN WHO PILOTS THE PILOT

(Continued from page 120A)

landing fields, to contact the pilot. The intermediate airport station transmits on long waves whereas the pilot uses short waves, but both have long and short-wave receivers.

If the pilot is still missing, the dispatcher has just about proved that the plane's radiotelephone equipment is temporarily out of service for some reason. His final step, and one that seldom fails to locate a plane, is to request the caretakers at all Department of Commerce intermediate fields to report the time the plane passes over.

So there is no such thing as a pilot getting "lost" because the hunt starts the minute he fails to report on schedule. If he were to make a forced landing, he would notify the dispatcher of the fact and state his position. Immediately the dispatcher is on the alert to get a message from the pilot after the latter has landed.

Automatic devices are relieving the dispatchers of some of their responsibilities. Recently a field localizer, a radio beam to lead the pilot down to the airport, once he has reached his destination, has been developed. Later it is hoped there will be runway localizers, so the flyer will not only be brought to the field, but to the proper runway on that field. Experiments are also being conducted by the Department of Commerce with a "slant beam," giving the pilot the proper angle of glide to make a landing when he is over the field.

Of course the dispatcher still plays his part, despite these mechanical aids. He can, for instance, talk to a pilot over the same radio beam which is being used by the flyer to follow down to the field through a fog. With such aids, blind landings on fields obscured by fog should soon be practicable.

But it probably will be a long, long time before any mechanical device will be found to give the pilot the security he feels when he hears the friendly voice of a dispatcher in whom he has confidence assuring him that what looks like a foot of snow on the airport is after all, just a flurry which hardly covers the runway. That's why the pilot knows what he's dropping into before he "sets her down." His dispatcher told him.



## FIVE MILES A MINUTE <sup>409</sup>

(Continued from page 181)

breaking plane was a matter of "cleaning up" the streamlining. Now the engineers believe they have approached the last word in cleanliness of design. From now on, they say, increased speed will be almost entirely a matter of more horsepower. The result is that most of the racing pilots are retaining the planes they used last year. One pilot has put different boots on the wheels, another has more thoroughly streamlined the landing gear, and a third has changed the shape of the wing roots. One flyer experiments with variable-pitch propellers, and another tries different sizes of engine cowling to increase his top speed. Nearly all of the planes, this year, will have thin plywood covering on the wings instead of fabric. The plywood takes a high polish that reduces resistance and is not so apt to be stripped from the ribs by the speed.

With the problems of design practically solved, engineers are concentrating on the motors. The junior wasp with which Turner made a new east-west transcontinental record was "souped up" from its original 300 horsepower to 550 horsepower. Doolittle's wasp with which he created the present world-record landplane speed of 294.38 miles per hour, delivers 800 horsepower as compared with its normal rating of 420 horsepower. The increased power is obtained mainly by additional supercharging.

Within a few years, Turner predicts, speed pilots will fly from Los Angeles to New York in six hours, as against the present record of ten hours and nineteen minutes. The plane that will make such a record, he says, will be of essentially the same design as the present racing planes, equipped with an engine several times more powerful than those now used. The plane will have retractable landing gear.

In view of such a plane, with a top speed in the neighborhood of 500 miles an hour, why is it that to date man has flown faster in seaplanes than in landplanes? A landplane unencumbered by pontoons is theoretically much faster than its aquatic companion, but the seaplane record is more than 100 miles an hour more than the landplane record. There are a number of reasons, according to aviation leaders. In-

(Continued to page 124A)

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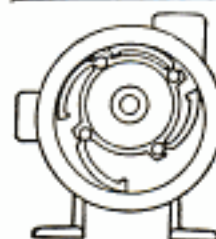
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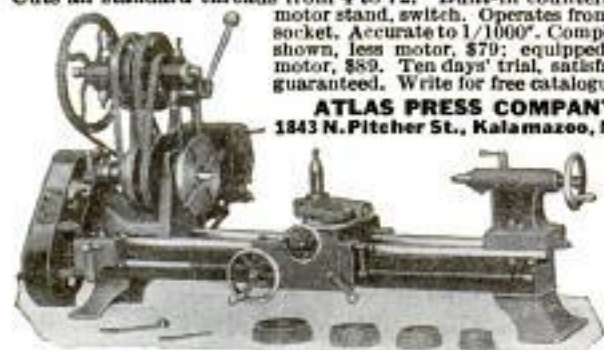
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5709  
**FIVE MILES A MINUTE**

(Continued from page 123A)

ternational competition for the prized Schneider seaplane cup led nations to construct speed machines that land on the water. Now that England has won permanent possession of that trophy, attention is focusing on landplanes once more. Aside from the straightaway speed dashes to break the world records, there are two major free-for-all races in the United States each summer. One is the transcontinental speed dash for the Bendix trophy and the other is the 200-mile closed-course race for the Thompson trophy for which contestants must fly 225 miles an hour in order to qualify.

Engineers are ready to build a landplane that would break the seaplane record but no airport in the world is suitable for it. The speed seaplanes require several miles of smooth water for taking off or landing, and a concrete runway of similar length must be built for the landplane that attacks the world record. Speed pilots can barely land inside the confines of the average airport today. They prefer to land on the concrete take-off runway, for the planes have no shock-absorbing gear. If a wheel should strike a stone the plane, landing at about 100 miles an hour, would be thrown into the air and turned over.

Eight of the nine leading race planes in 1932 were low-wing monoplanes. Commercial aviation is already following the lead of the speed planes, and practically all of the commercial planes under construction are low-wing monoplanes. Leading the way to faster transport records, Frank Hawks has left the ranks of the out-and-out speed pilots and is flying his "Sky Chief," capable of crossing the country with half a ton of mail, without stopping, in twelve hours.

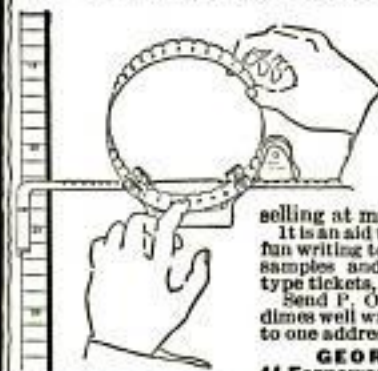
6887

**FLOWERS MOVE LIKE FINGERS**

Plants do not go galloping over the landscape like the animals which prey on them, but plants do have the power of movement nevertheless. The five sepals of the rose, for instance, are closed tight around the bud, like the five fingers of a hand, before the flower opens. But when the bloom is ready, the sepals fold back as decisively and naturally as fingers, with a lifelike motion startling to the beholder.

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## ROUGH-RIDERS OF THE WAVES

(Continued from page 237)

the boat itself. Some lacquered the bottom and then waxed or rubbed it down with pumicestone to get a pianolike finish that would decrease friction. Others varnished and smeared the bottom with graphite to help the boat through the water. Each year has brought new forms of construction, with science giving Century and other boat builders valuable tips. The latest craft is little more than a shell that skips along the water on its tail, yet is able to withstand tremendous strain.

How fast these baby speedsters will be able to go within a few years is something no one attempts to predict, but they're getting faster and faster, demanding more skill from their rough-riding skippers.

## THE WORLD UNDER A LENS

(Continued from page 205)

Life in a fluid calls for the use of slides on which you have constructed a cell.

Make it a habit to keep both eyes open. An eye shade cut from tin and mounted at the top of the draw tube will be very helpful. Use the eye causing the least fatigue and rest frequently.

When the subject is transparent, place your microscope with a window to one side or with your lamp directed toward the mirror. Insert the slide beneath the clips with the specimen in the center of the stage aperture, avoiding fingerprinting the slide or the lens. Adjust the mirror to illuminate the object centrally and evenly. Using the lowest magnification, turn the focusing knob until the objective is about one-fourth inch above the slide, place the eye just above the eyepiece and focus upward slowly. The subject will gradually appear and may be sharply defined by careful adjustment of both illumination and focus. Opaque material must be illuminated from above. Shifting the position of the lamp will produce interesting changes in appearance.

Interpretation of what you see must be left to your own initiative and resources. Facility in the manipulation of your instrument will entice you on to many fascinating pastimes, such as collecting a slide library, photo-micrography, projection and specialization in a field of particular interest and possible profit to yourself.

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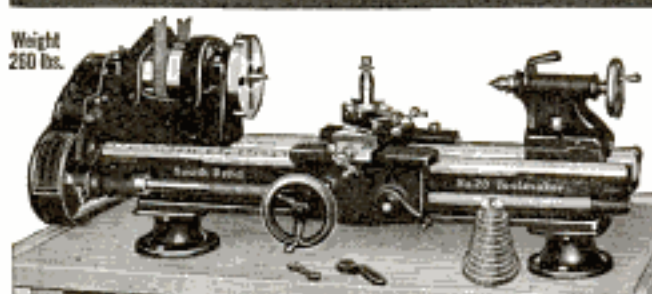
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**HOME TRIAL**

### THEY'VE GONE AUTOMATIC

(Continued from page 213)

fort required being the depressing of this treadle. Somewhat similar action is obtained in those systems employing vacuum power to actuate the brakes. Here the driver is assisted in his work of pressing the brake shoes into engagement with their respective drums. It is air pressure rather than actual suction that really actuates the piston of the power brake.

A driver today can go the length of a metropolis without once touching the clutch pedal. Even on the lowest-priced cars he has no fear of clashing gears because automatic synchronizers make for perfect shifts. Now he can also drive all day without considering the gears at all. The self-shifter attends to that.

Steering effort on a ten-ton truck was found to be normal at around 150 pounds. With the aid of an air-power steering unit this pressure was reduced to ten pounds. It is a possibility on passenger cars to aid the driver in parking or whenever in a tight place requiring physical effort.

With all of these innovations it is significant to note that provision is made in most cases for a return to the usual manual control should the automatic action fail for any reason.

A simple installation of a special switch makes it possible to have the parking lights flash on at the legal time. Or you can pre-select your favorite ether entertainment so as to pick it up on the car receiver regardless of whether you're in the midst of traffic or rolling along the open road. Hydraulic fluid now feeds automatically to the master cylinder of the Pascal type braking system. It is but a short step to the motor that will take on extra supply of oil from its own lubricant reserve tank. The chassis now lubricates itself, and it is not even necessary to pull out a plunger.

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