

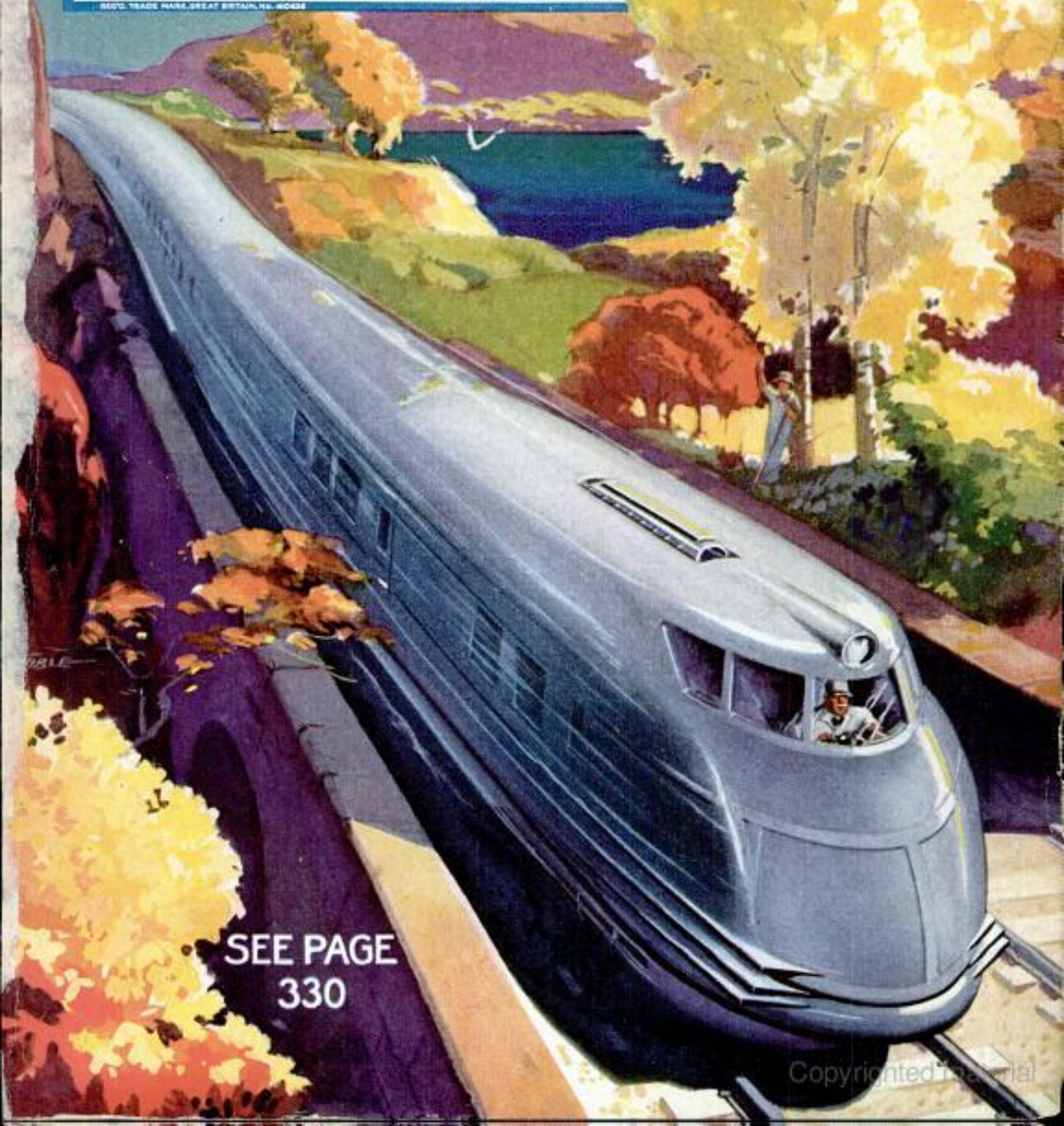
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- 5 Pays steadily; no lean seasons.
- 6 Big profits to be made in smallest town or largest city.
- 7 Absolutely no experience needed to be successful.
- 8 No expensive equipment needed. Your whole investment will be less than your first week's potential income.

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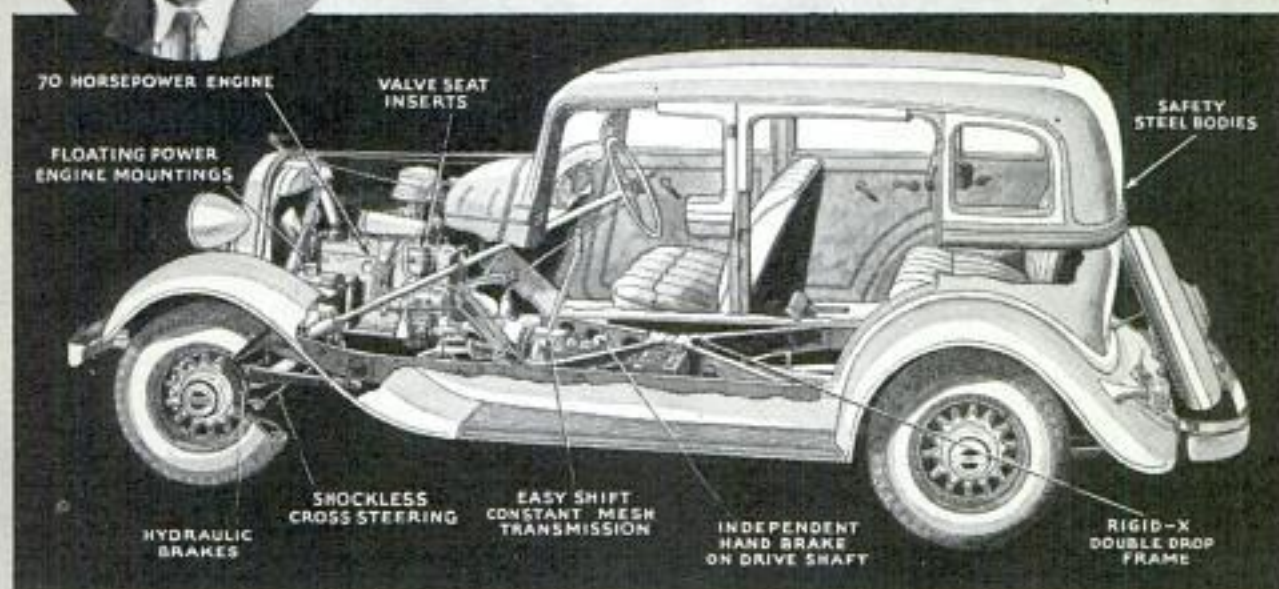
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Again, countless occasions arise outside of the office—leases, insurance, inheritance questions, domestic affairs, taxes and trust agreements are but a few—on each of which you may lose unless you know something of law.

Again, legal training gives you what the business world prizes highly and rewards liberally—a keen, analytical mind, the ability to judge shrewdly and to act with surety.

But whether you want law for personal and business values, or intend to prepare for a bar examination, the same problem confronts you. How can you acquire that knowledge?

You can't go back to school or spend years in a law office. But there is one road open to you—*home study*—a road that some of the greatest leaders have traveled—men like Lincoln, Grant, Disraeli, John Marshall, Coolidge—who mastered this important subject in hours that otherwise would have been wasted.

It can be done, of course—thousands have done it—yet what you want to know is—can you reasonably hope to do it? Will it hold your interest, or will you find it drudgery? And—most important of all—will you really benefit by it?

You are quite wise in asking these questions—in holding your decision until they are answered.

And these paragraphs are written to help answer your questions so far as LaSalle law training is concerned. Let's get right down to facts.

## 80,000 Others Have Proved It for You

*First:* LaSalle has been successfully training men and women in law for twenty-five years—more than 80,000 individuals. Some of these are now successful lawyers and judges—others are owners of business, presidents and general managers, department managers, etc. Their names and addresses are readily available for your direct investigation.

*Second:* Out of this experience in training so many, LaSalle naturally has perfected the material and methods of teaching law by home study. No matter what your situation, your handicap, your education, your needs and desires, etc.—we have already trained some man in similar circumstances.

## A Most Remarkable Law Library

*Third:* Since text books are of such importance in any study of law, the LaSalle Law Library was prepared by more than twenty law professors—leading teachers in our greatest resident law schools—and three lawyers. Five of these professors—including the editor-in-chief—have been deans of their schools. One of the editors is now president of a great state university. Also, among the writers of the special lectures are two U. S. Senators, a former U. S. attorney-general, and a Supreme Court Justice of the State of New York.

More, these men—in preparing this Library—kept in mind always that it was to be used for home study. They knew it was for men like you—busy men who would study it at night, on trains, in spare moments in offices or stores—men who must find it clear and engaging, yet complete and reliable. So they wrote directly, simply, interestingly.

## Problem Method Interesting and Practical

*Fourth:* This training is *personally* applied to you under lawyer-instructors, members of the bar who give *full time*.



These men check your work, guide you, and instruct you at every step according to your individual needs. You study under a definite, clear-cut plan involving continual use of the Problem Method. Thus you learn by actually handling legal problems, analyzing cases, and making legal decisions—not by merely memorizing rules.

*Fifth:* In certain permitted states, each year, LaSalle-trained men pass the bar examination with honor. And if you are interested in Law for your business success—as most of our members are—we would like you to read a booklet called "Evidence." In it hundreds of business men and lawyers tell you exactly what this training has meant to them in more money and advancement. There is no charge for this book. It is yours simply for the asking. Just fill out and mail the coupon below.

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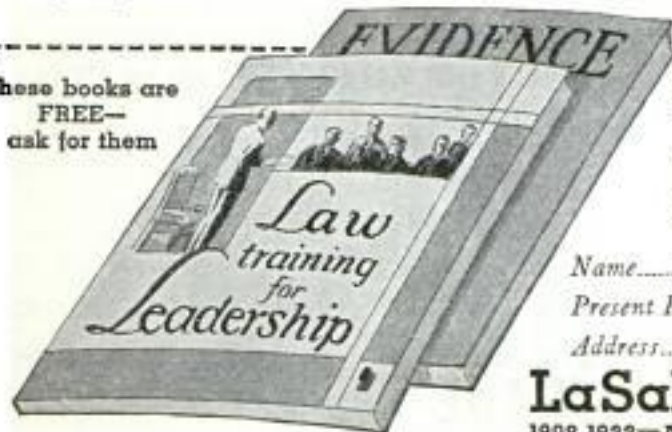
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But if you ARE that man, let us assure you that whatever your circumstances, your handicaps—we will successfully teach you Law at home, and help, in every possible way, to turn your study into higher pay and advancement.

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# He's finished high school



## WHAT WILL YOUR SON DO NOW?

We're talking to parents, especially those who, regardless of present circumstances, had made no serious plans for their sons going to college after high school graduation. What we have to say will also interest parents who made plans but have seen them shattered by unforeseen forces.

There was a time when a boy could step from high school graduation into a job. The boy who does it today is fortunate indeed. The inability to do it is not always a reflection on his ambition or his ability. In many cases the job is not there.

The economic horizon is brightening—there's no doubt about that—but there are millions of trained men, with families dependent upon them, waiting to fill jobs as they materialize. All the organized forces of society

and government are working to solve the unemployment problem.

At the moment it's a serious outlook—and a sad one for the boy. He is willing to work but cannot find work to do. He is at the peak of his energy and his enthusiasm. Shall he begin life in bitterness, or in brooding over his fate, or make associates and acquire habits that would have never tempted him in normal times?

Your greatest responsibility to that boy is TODAY! He needs your advice and your guidance more than he ever needed it before.

Why not, then, encourage him to devote a systematic portion of his spare time to the study of something which will engage his thoughts and—more important—give him training which will be of inestimable benefit to him in the years ahead? This study can give him a new vision of life, inspire him to greater achievements. Apprenticeship is

still necessary, but employers prefer young men whose attitude and preliminary training qualify them to adapt themselves readily to the employer's needs.

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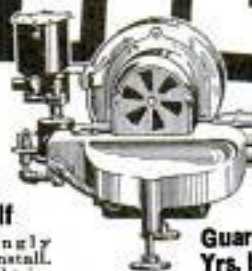
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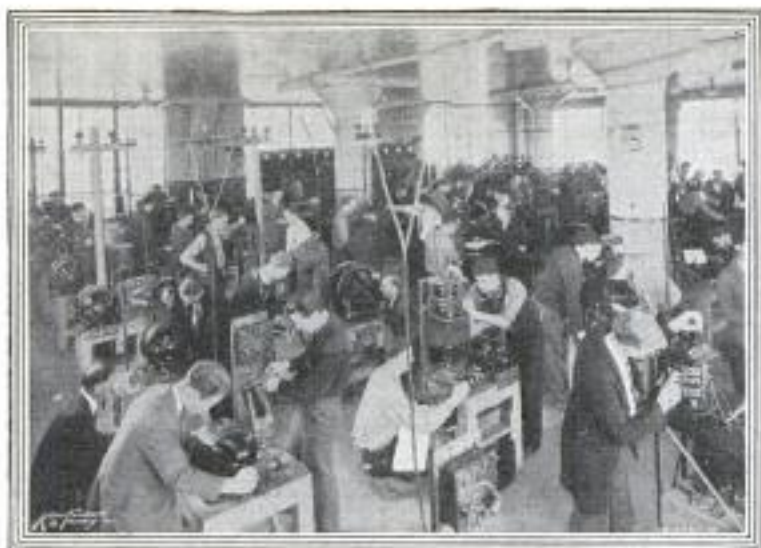
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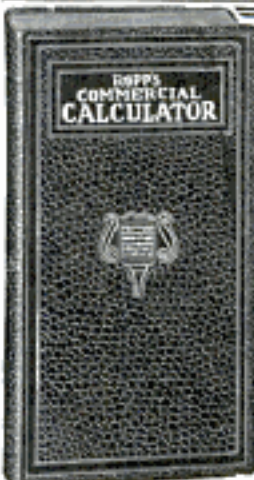
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**EVER** Take a bath? We mean real exhilarating sulphur baths. Heretofore millionaires traveled far for sulphur baths. Now multitudes enjoy McCogh's clear skin Sulphur Soap, containing 55% pure sulphur for joyous sulphur bathing at home. All toilet uses. Genuine opportunity. Fast repeater. McCogh, 223F East 78th, New York.

**NEW** Transparent neonlike indoor, outdoor electric beer signs, rainbow changeable signs. Beer signs 4c, retails 25c. Clean up now! Dept. 36, Lowy, 8 West Broadway, New York.

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**MAKE** Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

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**GENUINE** Gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 458-H North Clark, Chicago.

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**NAME** Plates, number plates, signs, etc., hand engraved, easily sold with large profit. Brett Bros., Windthrop, Mass.

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**SELL** Orizol concentrated mouth wash tablets. Eliminate bad breath. Carried in purse. Retail 25¢. Big profits—repeat business. Free samples and details. Orizol Co., Dept. P-11, Fitchburg, Mass.

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**DISTRICT** Manager wanted—must be responsible and able to finance self to reasonable extent. This is a strictly legitimate, fast money making business that will bear full investigation. Old company highly rated. References given and expected. Manufacturer, 2441-49 Western Avenue, Chicago, Illinois.

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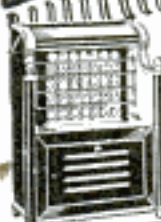
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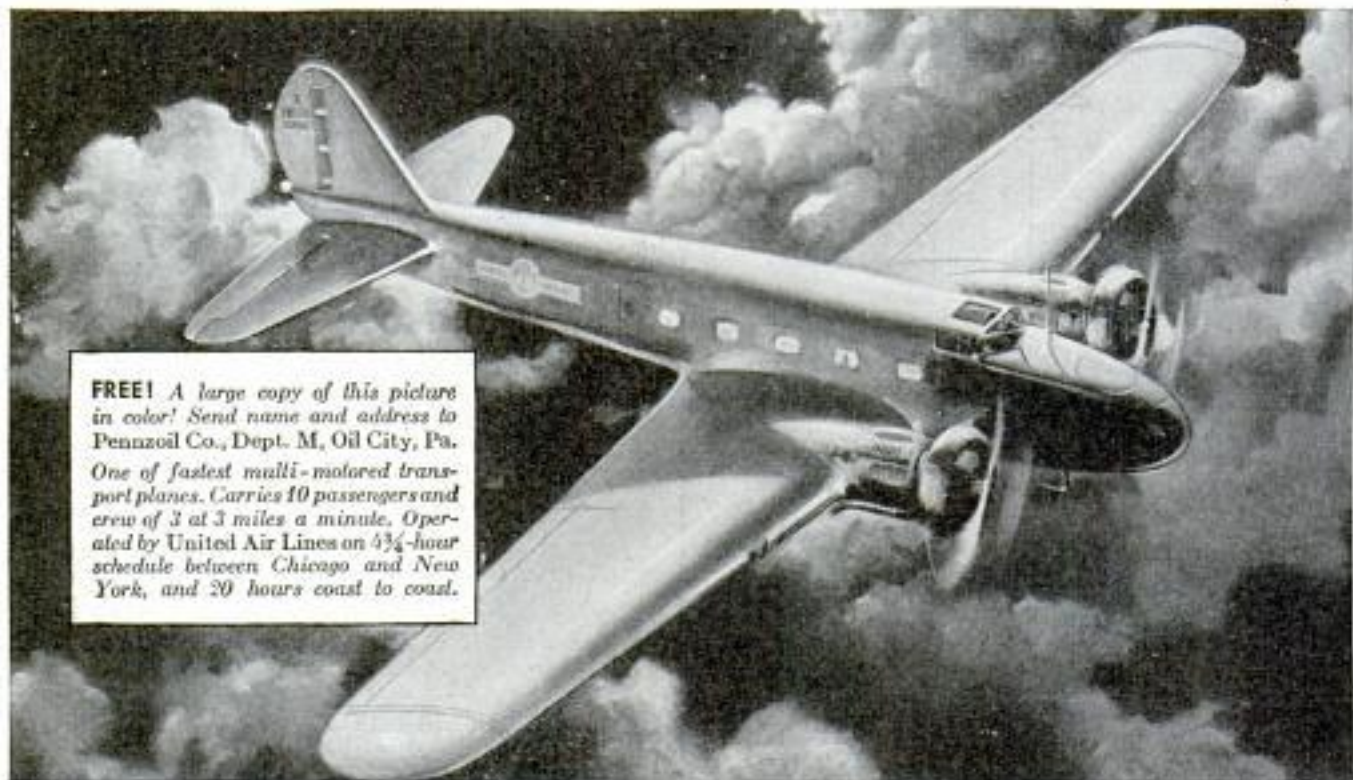
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**FREE!** A large copy of this picture in color! Send name and address to Pennzoil Co., Dept. M, Oil City, Pa. One of fastest multi-motored transport planes. Carries 10 passengers and crew of 3 at 3 miles a minute. Operated by United Air Lines on 4¾-hour schedule between Chicago and New York, and 20 hours coast to coast.

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The actual experience of motorists everywhere proves that you, too, will save money three ways with *Tough-Film* Pennzoil. Because it ends the wasteful "drag" of sluggish oil, it saves up to 12% on gasoline. Its extra toughness and strength cut repair bills. And it saves on oil because every filling lasts longer.

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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 60

SEPTEMBER, 1933

No. 3

C 1038.

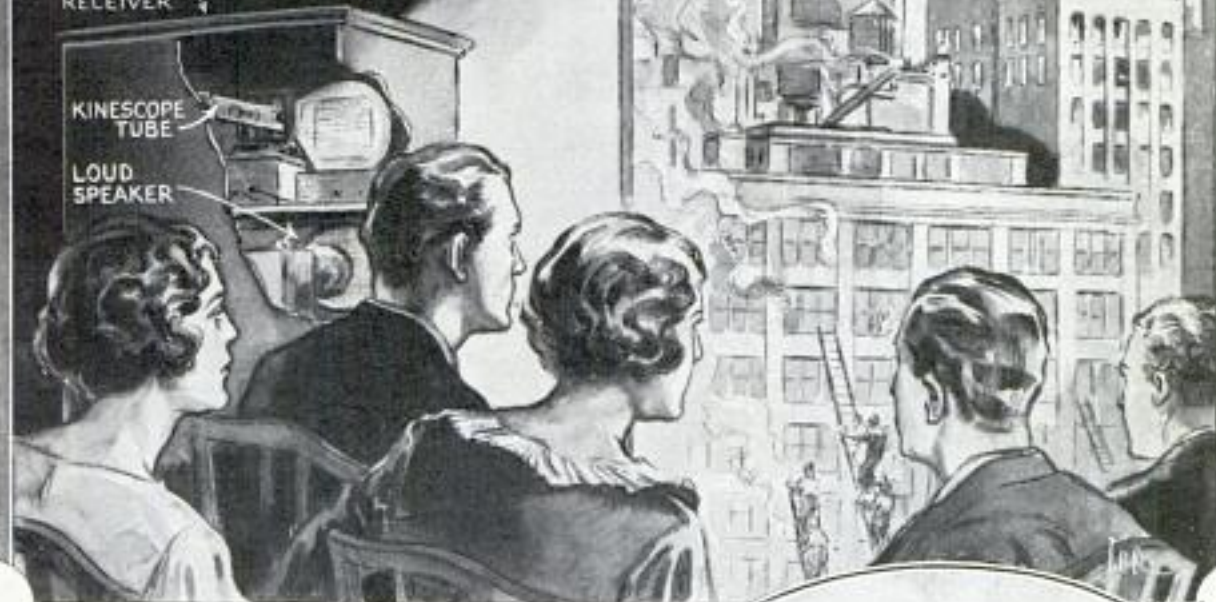
## "MOSAIC" TELEVISION for the HOME

REPRODUCTION IN COLOR ON LARGE  
SCREEN OF EVENT ACTUALLY HAPPENING

RADIO  
RECEIVER

KINESCOPE  
TUBE

LOUD  
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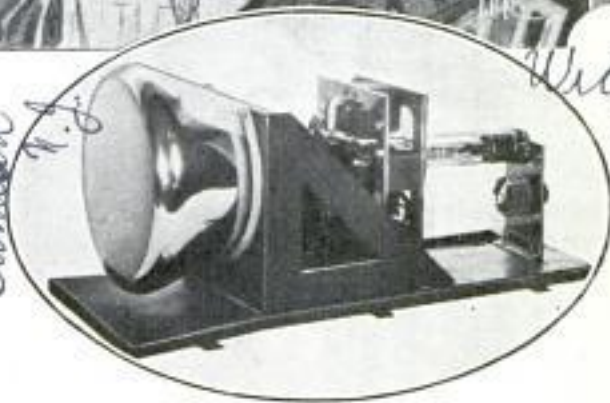
TELEVISION is ready for the home!

This is the emphatic statement of Dr. Vladimir K. Zworykin, backed by all the resources of the RCA-Victor company, which has pioneered in television research.

After thirteen years of intensive application, Doctor Zworykin has developed a system of transmitting and receiving television images without the use of traditional whirling disks, motors and flying spots. The new "mosaic" system differs from all the previous ones in that the entire process does not involve one mechanical moving part—only electrical apparatus is employed by it.

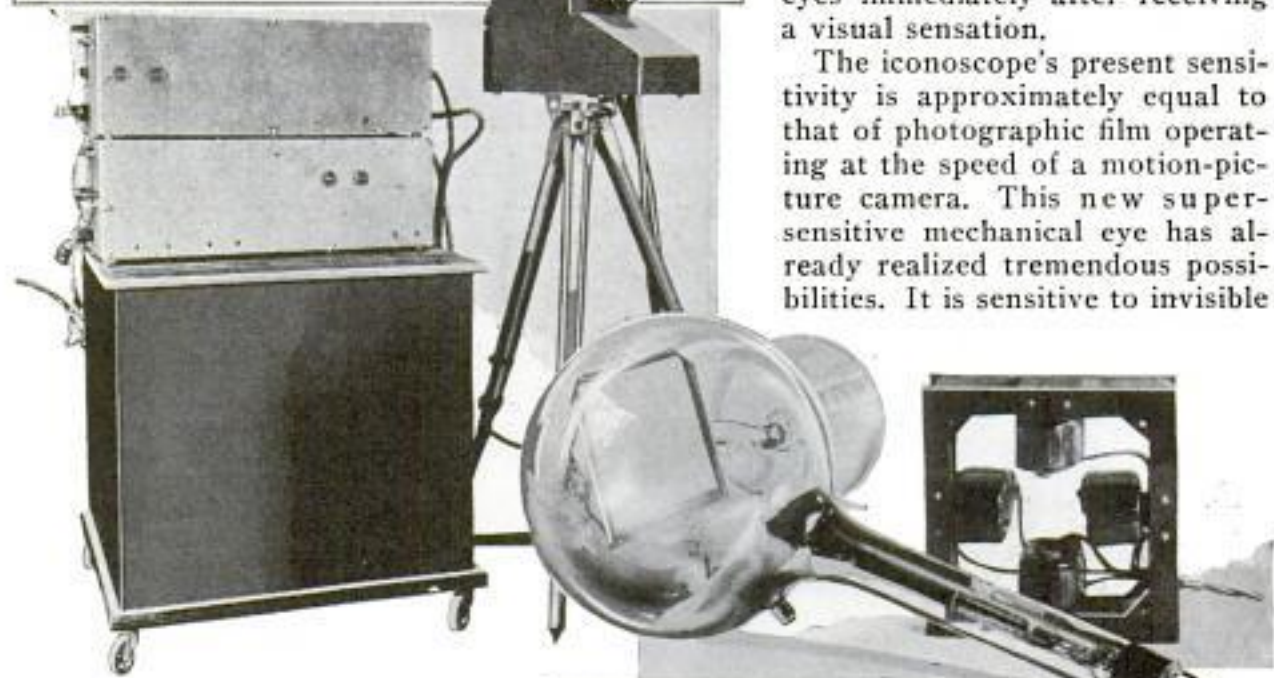
The system is immediately practical for home reception and receiving apparatus

*Research Engineer.*



Above, Receiving Apparatus for "Mosaic" Television, Showing Family Viewing and Hearing Event as It Occurs; Below, the Kinescope, or Receiving Tube

is within the means of the average American workingman. The one obstacle at present is the means of financing the necessary transmitting buildings and equip-



ment. Television itself still may be imperfect, but it now stands on a sure footing.

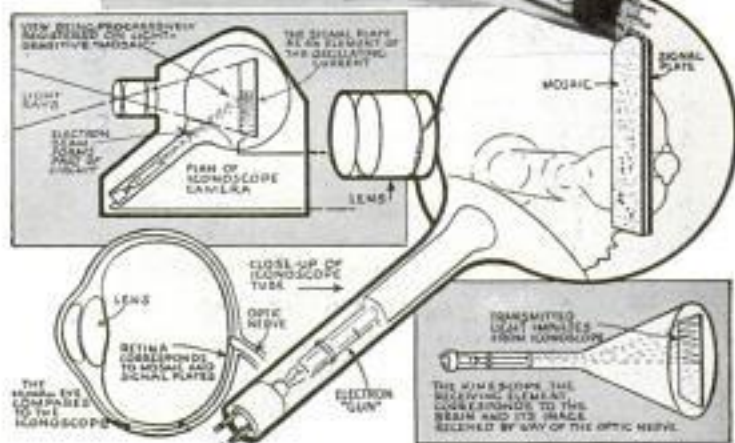
The recent advance of the television art is best explained by a comparison between the old mechanical scanning system and the mosaic system. The latter realizes an actual ten-per-cent efficiency in the reproduction of images. But at the same time, this ten per cent represents an efficiency 7,000 times greater than the mechanical system formerly used.

Doctor Zworykin's mosaic sys-

tem is based on the action of a compact and portable camera, resembling a moving-picture camera. Its vital part is an ingenious tube which he calls the "iconoscope." The neck of the tube contains an anode, cathode and grid. High-speed cathode rays are fired by an electron "gun" in the neck toward a mosaic signal plate in the body of the tube.

The iconoscope is science's nearest approach to the human eye. It sees an image in its entirety, not merely a small spot at a time. It has what Doctor Zworykin describes as "memory," and continues to see an image after it has disappeared, just as you see it when you close your eyes immediately after receiving a visual sensation.

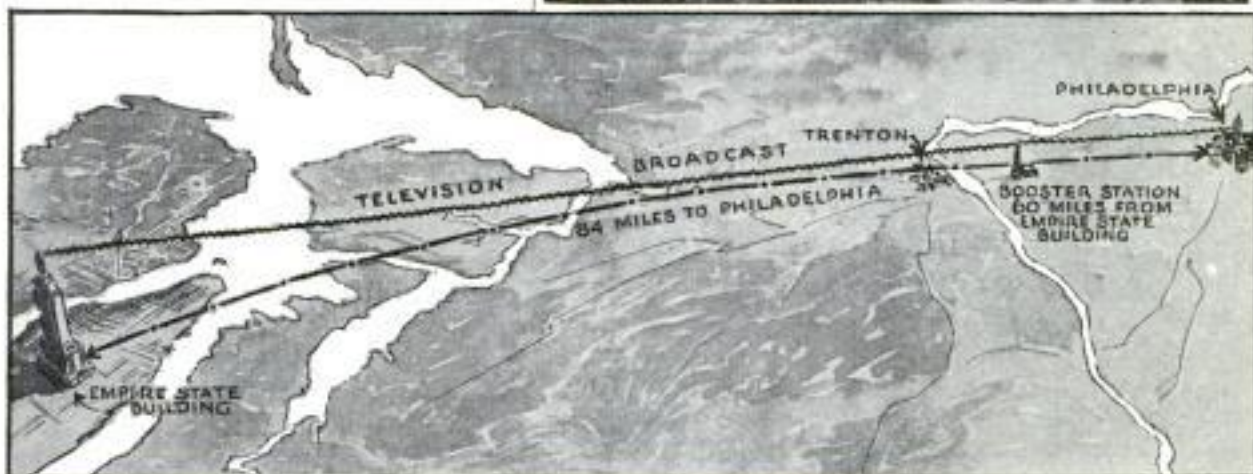
The iconoscope's present sensitivity is approximately equal to that of photographic film operating at the speed of a motion-picture camera. This new super-sensitive mechanical eye has already realized tremendous possibilities. It is sensitive to invisible



Above, Iconoscope Camera and Amplifying Unit; Below, Iconoscope Vacuum Tube and Diagram Showing Operation

light waves, such as ultra-violet, and infra-red. One immediate possibility is its use as an ultra-vision device for seeing what is not visible to the human eye even through a microscope. Thus it is expected that we shall soon reveal many mysterious and microscopic reactions and processes which have heretofore escaped our notice. The range of man's eyesight is likely to be widened so that he can peer into and record nature's darkest secrets.

The iconoscope's military value is incalculable. It places in the hands of combatants an instrument for seeing enemy maneuvers carried out under cover of dark-

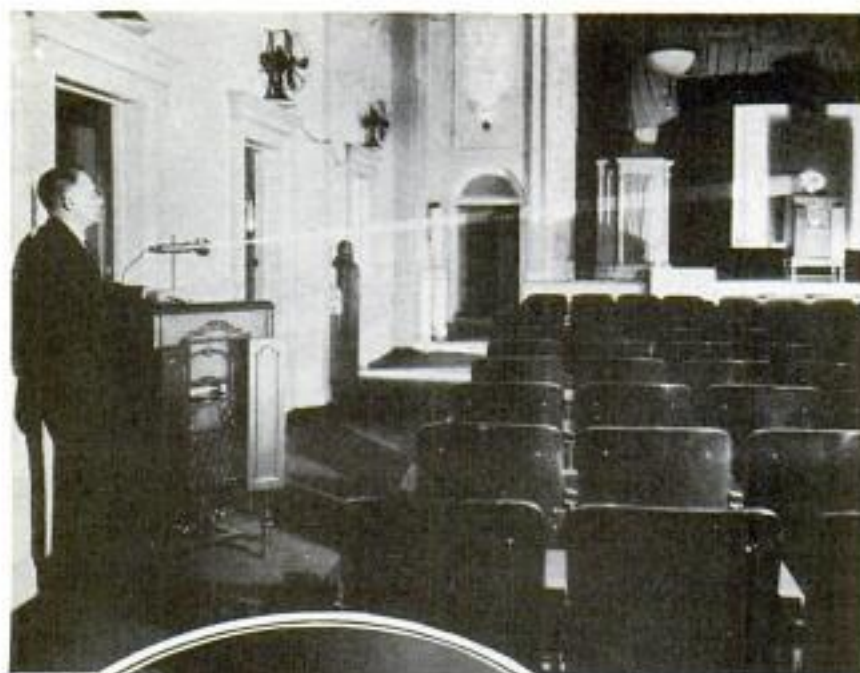


ness. The portable television camera makes it possible for an aviator to fly over enemy lines at night and visualize the secret maneuvers for his superior officers stationed behind the lines. Television camera lenses secreted at strategic points would give commanding officers a constant graphic description of operations in no man's land at night.

The heart of the iconoscope is a device corresponding to the millions of rods and cones behind the human retina. This device, a signal plate, is a sheet of mica, four by five inches, which is the host to 3,000,000 photo-cells, or electric eyes. Each cell in this mosaic is microscopic, 10,000 of them occupy only one square centimeter. All 3,000,000 of these photo-cells are contained in a vacuum tube whose bulb is eight inches in diameter.

The iconoscope is the chief part in the

Top, How "Mosaic" Television Can Be Used in War; Center, Booster Station Plan; Below, Using with Microscope to See Tiny Objects in Motion



Above, Showing How Speech May Be Transformed into Beam of Light, Transmitted to Photo-Electric Cell and Converted Back to Original Form; Below, Demonstrating Cathode-Ray Television Set

scheme of transmission; the chief part of the receiving end is the kinescope. The iconoscope corresponds to the human eye; the kinescope is the brain. Both these devices have cathode-ray tubes which fire powerful beams of electrons. In the transmitting end the cathode rays are fired against 3,000,000 photo-cells which convert this energy into short radio waves which are broadcast; in the receiving end the cathode rays are fired against a fluorescent screen which shows us the moving image. Simply the system does this—it converts a moving picture at the transmitting end into radio waves which are turned back into a moving picture at the receiving end.

The whole apparatus is decidedly simple; merely a portable cathode-ray camera and a pair of boxes containing the amplifiers at the transmitting end; and a small simplified radio receiver and amplifier at

the receiving end. According to Doctor Zworykin, the immediate future of television will be separate from sound broadcasting. The present broadcasting band from 200 to 550 meters is impractical for television. Television broadcasting and its associated sounds will probably occupy waves about six meters long. In the ultra-short wave spectrum many thousands of television transmitters could be operated simultaneously without interference.

But the range of ultra-short television waves does not extend beyond the horizon. It is believed that one transmitter of this kind can transmit clear images over a radius of about sixty miles; therefore, the televising of a single event may require scores of transmitters if the whole country is to be covered. Unlike sound transmitters, the television stations cannot be linked by wires. This complicates nationwide television broadcasting. It may be necessary to have convenient repeating stations at numerous points.

Two separate systems of broadcasting are now contemplated. The sound and television systems will probably parallel each other on radio waves far apart. For complete sound and sight reception each home will have two receivers, one for sound and the other for television. Subsequently it will undoubtedly become possible to harmonize and join the sound and sight system into one. In the beginning, moving-picture films will probably play a large role in the television art. The present television apparatus is admirably suited for broadcasting from celluloid images.

Doctor Zworykin now is trying to perfect a television camera that will operate in darkness, making it possible to televise scenes in dark streets, auditoriums, studios and theaters. Although the present television receiving set projects an image on a relatively small space, it has much greater possibilities. The definition is so

(Continued to page 126A)

Cont. Th. W. [redacted] Jr.  
400 1/2 Co. [redacted]

© 999. International Model 12-1 325

Popular Mechanics  
Mayton, Ohio  
SIMPLE INVENTIONS  
EARN FORTUNES ©1052

International  
Transfer Co.  
606 Spruigen  
Chicago

Inventors of the simplest devices have often reaped fortunes from their efforts. It is said the toy, "Dancing Jim Crow," yielded its inventor \$75,000 a year while the man who invented the roller skate realized more than \$1,000,000. Rubber tips for lead pencils yielded the man who thought of it \$100,000 a year, and \$2,500,000 was realized by the inventor of shoe laces. The ordinary umbrella earned more than \$10,000,000 for its inventor and the man who made the first steel writing pens received an enormous fortune. The inventor of the metallic heel plate for shoes sold 143,000,000 a year and realized more than \$1,500,000 in royalties. Women also have been made rich by inventions. One woman devised a baby carriage and enriched herself \$50,000 a year, another, living in South Africa, invented a curling iron which brought in a yearly income of \$40,000.



Wide World

Used at Verona Pa

Flanges in Front and Behind Keep Pneumatic-Tired Truck on Rails; Flanged Wheels Can Be Elevated for Operation on Road

by Pennsylvania Rd.  
for back maintenance work  
at Pittsburgh

**TRUCK FOR HIGHWAY OR RAILS HAS FLANGED WHEELS**

Adapted to operation on highway or railway track, a half-ton truck is equipped with small flanged wheels at front and rear to hold its tires on the rails. When the truck leaves the track for operation on the road, the flanged wheels are raised about four inches.

©1005

**MINERAL PASTE FOR MENDING MAKES PERMANENT REPAIR**



Characterized by its ability to stick to anything and to stick any two things together, a new mineral base cement makes permanent repairs, regardless of weather conditions and changes. The paste contains nothing to dry out, crack or deteriorate, since it has no organic ingredients. Aside from its use as an adhesive, the cement can be employed as a smooth, hard permanent coating or filling, because it is practically a liquid porcelain. It may be used for patching tile work, covering bare spots in vitreous enamel, filling cracks in porcelain and crockery and the like. For industrial purposes, it is sprayed or dipped, while for household or small-shop uses, it is applied with a brush or knife.

White  
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**FORD OIL GAUGE AND AMMETER COMBINED ON DASH**

Embodying an oil-supply indicator and an ammeter, an instrument devised for the Ford automobile fits into the ammeter opening on the dash, thus serving a dual purpose. Installation is quick and easy, since there are no holes to drill and nothing to fit. With ample oil supply and pressure, the indicator shows "on." In case of oil failure, the indicator flashes "off." A special luminous-color finishing process makes the signals stand out without glare. A clicking sound warns the driver when changing from on to off.



Henry L. Crowley & Co, Inc.  
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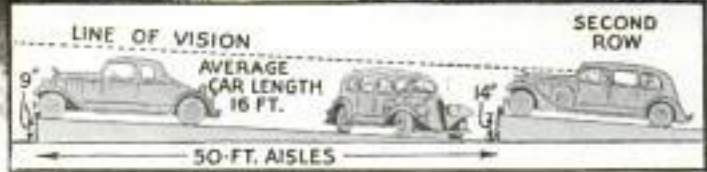
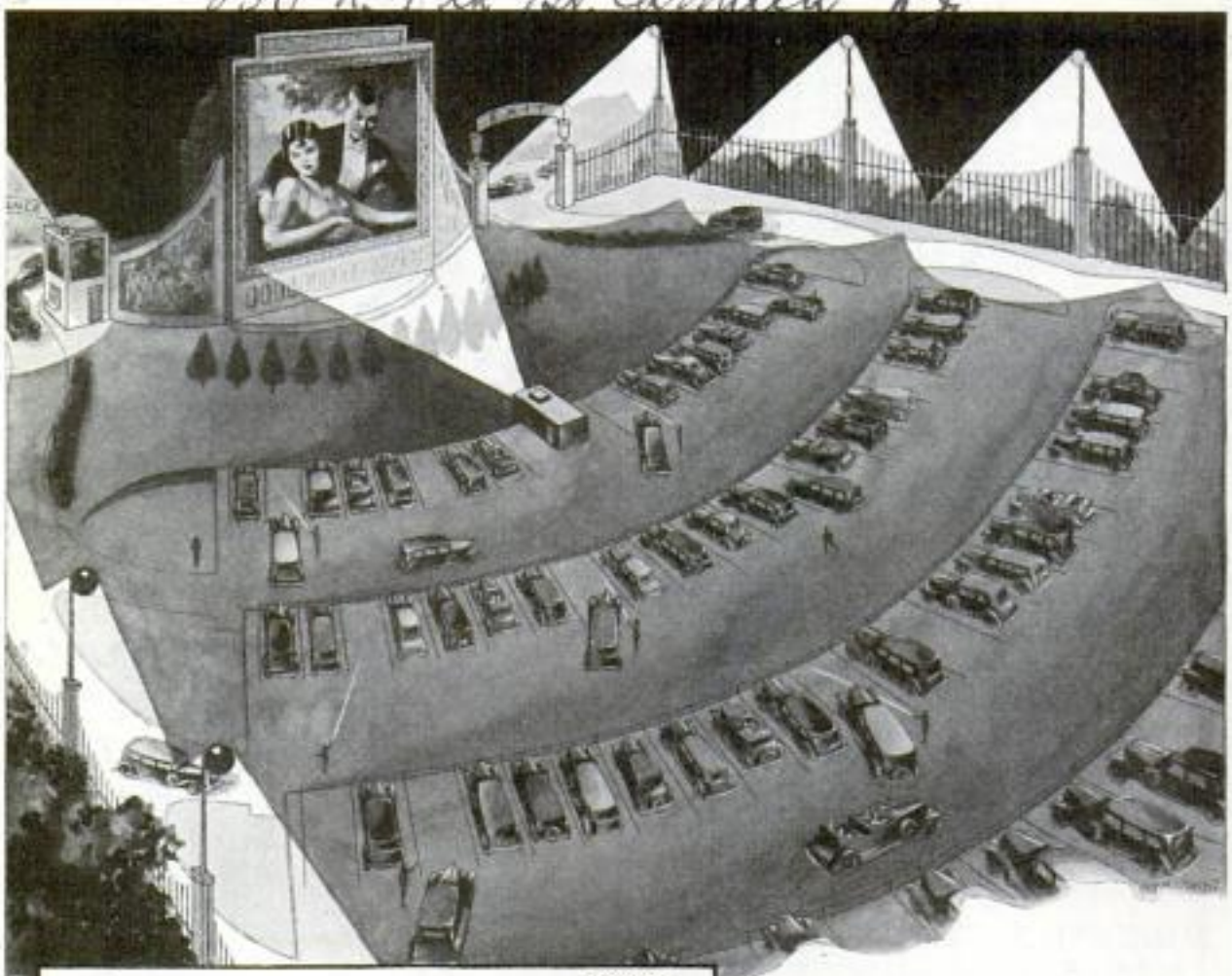
326

POPULAR MECHANICAL

Park on Theatres, Inc.

# Drive-In Movie Holds Four Hundred Cars

230 N. 7th St. Camden N.J.



Outdoor Movie Theater Where Motorists View and Hear Talking Pictures without Leaving Their Cars; Autos Are Parked on Seven Rows of Grades so Each Person Has an Unobstructed View through Windshield or Window

Central Airpark Pat. # 1,909,537  
Near  
see Oct. 1935 # 528

Motorists can sit in comfort in their own cars and enjoy the movies at a drive-in theater in Camden, N. J. This outdoor talking-picture theater accommodates 400 cars so that about 1,600 persons can view a performance without leaving their automobiles. This is made possible by seven rows of grades inclined so that vision from the rear car is not impaired by those in front. The cars are parked at the front of each row on a five-per-cent grade. Each aisle is fifty feet deep, giving ample room for cars to enter and leave, and the theater is entirely surrounded by trees. The motor-movie fans, even though seated in the last row, 500 feet from the screen, have no difficulty in seeing or hearing. The screen is sixty feet wide and a new method

of controlled directional sound carries the words or music to each car with equal, modulated volume. The outdoor theater is expected to appeal particularly to those who do not like to drive through downtown districts to attend a movie.

## MATHEMATICS AS SURGICAL AID MAY REPLACE THE KNIFE

C 969  
Patients in the future may be given chemical and electrical treatments, based on mathematical calculations, instead of being subjected to the surgeon's knife. That is the prediction of Dr. George Crile, of the Cleveland Clinic, after extensive study and experimental work along this line. Doctor Crile, himself a surgeon, says

Cleveland Ohio  
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that present-day medical theories will give way to mathematical equations, with exact measurements supplanting the age of hit-and-miss guesswork. Looking forward a century, Doctor Crile sees biochemistry and biophysics replacing the scalpel, converting the medical and surgical art into a precise business, and he draws this picture: "One hundred years ago, dangerous accidents were rare. Today, in our civilized network, a greater number of deaths are caused by the machinery of our civilization than occurred in the American army fighting in France. We are at war with the machinery of our civilization. One hundred years ago, we were killed by our ignorance. Now we are preserved and we are killed by our intelligence, by our science and by our invention. What of the next period? The nature of protoplasm will soon be expressed in mathematical equations. Cancer, which consists of protoplasm, will be understood, and we hope, prevented and cured."

Magazine Stand Has Small Drawer on Top for Storage Convenience



*Martinsville Novelty Co  
Martinsville, Va.*

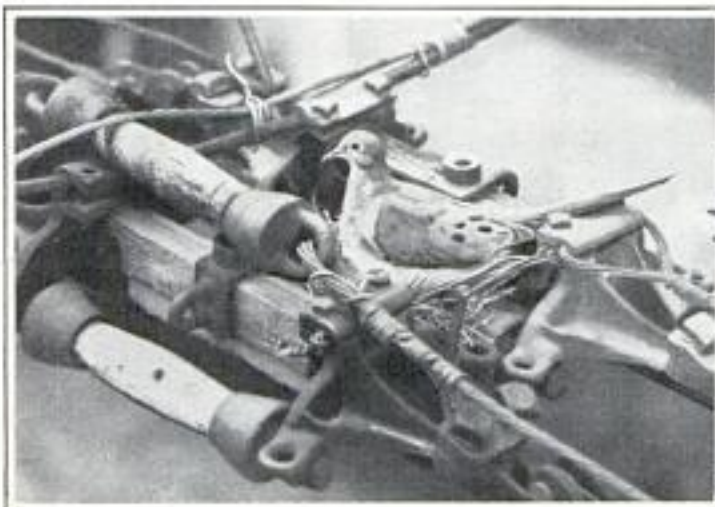
**MAGAZINE STAND HAS DRAWER FOR SMALL ARTICLES**

Adaptation of the magazine stand to an additional use is accomplished by one manufacturer who has produced a stand with a drawer on top. Matches and other small articles may be stored in the drawer, while magazines and newspapers may be placed as in the ordinary rack or stand.

**DOVE NEST IN TROLLEY WIRES SAVED BY MOTORMEN**

Because motormen were careful to shut off the power, a dove raised a family in a nest among the trolley wires of an American city. The nest was placed on a small platform between two high-voltage wires, right on a "breaker." If the motorman fails to turn off the power at a breaker, there is a flash. Just one flash would have destroyed the bird and the nest.

*C 10 19*



With Sudden Death All around Her, This Dove Raised a Family on a Circuit Breaker in the Power Line Carrying High Voltage

**ACID RECLAIMS WOOL IN RAGS FOR A SECOND USE**

*C 10 31*

Waste clothes and rags can be turned into textile fibers for a second use by a carbonization process that reclaims all the wool. Vegetable matter, such as cotton and linen, is destroyed by hydrochloric acid fumes but wool is undamaged. When a wool suit is held in the fumes a short time, the cotton stitchings are reduced to brittle carbon compounds and the suit falls in pieces. Old clothes that have been dried carefully are placed in a huge airtight cylinder to which the fumes are admitted. In four hours, the smartest suit is reduced to a pile of woolen cloth without a trace of cotton or linen fiber. After cooling, the rags are given a vigorous shaking in a machine called a duster. A grinding machine completes the operation by ripping each bit of cloth into fibers to use for new cloth.

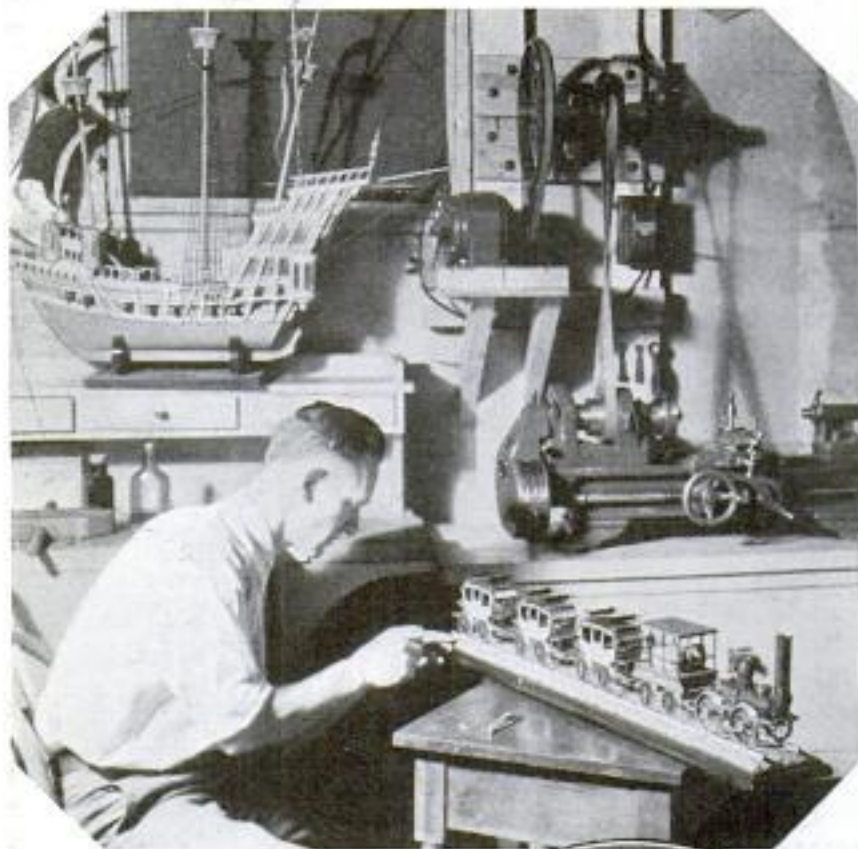
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*Comdr. J. McLaughlin  
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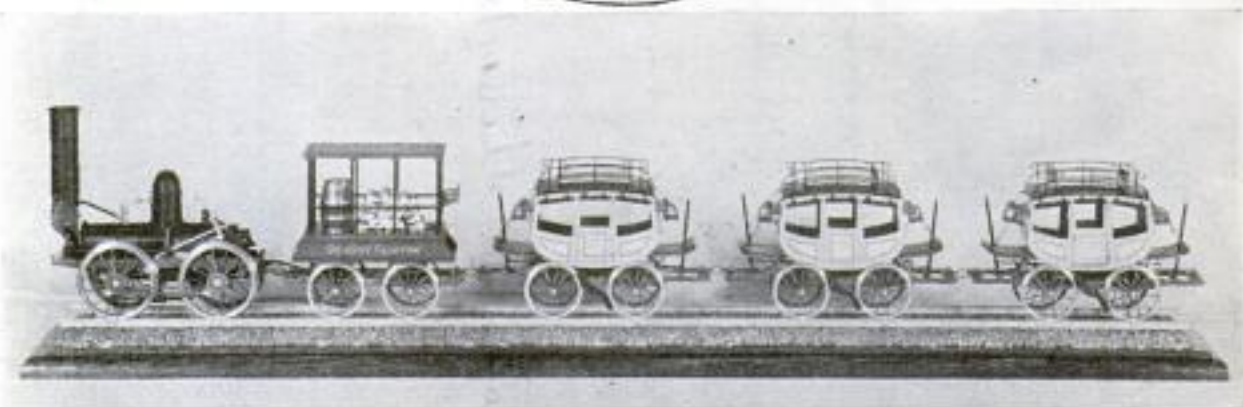
## Prize Train Required Eight Months Work



Hundreds of hours of exacting application and the making and assembling of more than 2,000 metal and wood parts, some so tiny a microscope was needed to form them, were involved in building the De Witt Clinton train model which won the \$1,000 first prize in the



international competition recently conducted by Popular Mechanics Magazine. The man whose model was selected by the judges as the most faithful reproduction of this historic train is Ivar E. Nordstrom, of Falconer, N. Y., forty-two years old, a commercial artist who has been building models as a hobby for seven years. He worked three or four hours every day for eight months constructing his train, employing leisure time from his profession for the job. Although much of the work was with metal, Mr. Nordstrom had never worked with this material on a lathe before, his previous models being made of wood. He began building models as a hobby in 1926, his first effort being a Spanish galleon which shows signs of the artistry and craftsmanship which earned him the train-model prize. Later he constructed several other ship models, one of



Ivar E. Nordstrom, Commercial Artist, Who Built the Prize-Winning De Witt Clinton Train Model, and His Home Workshop; Below is a View of His Completed Train Which Took the First Prize in the Contest Conducted by Popular Mechanics Magazine

C1082

C1004

which won second prize in a national contest, and then built a stage coach. At present he is working on two historic ships, not for competition, but for his own amusement. Those who finished the train model have good reason to be proud of their efforts for it represents one of the most difficult tasks ever presented to model builders. It involved working with both wood and metal and thus offered to builders a vast amount of valuable experience in the arts and crafts as well as challenging their perseverance, ingenuity and all-around craftsmanship. Of the more than 2,000 parts, about seventy-five per cent were made solely by hand methods and assembled in the same manner. Since the model was on a one-half-inch scale, this involved working with extremely tiny parts. Many contestants devised ingenious jigs and other fixtures to aid them in difficult phases of construction, but even these could not supplant entirely the necessary hand work on all units of the train, from the close machining to one one-thousandth of an inch on the locomotive to the difficult wood work on the coaches. Despite these tremendous obstacles, the train was built by model makers representing virtually all ordinary vocations and by craftsmen of all ages, one contestant being in his teens and another more than eighty. Some of the builders even overcame physical handicaps. One man, suffering from tuberculosis of the spine, constructed the model lying in bed, another is deaf and a third had the handicap of a crippled hand to overcome.



One-Room Air Conditioner Is Operated by Electricity; It Cools in Summer, Heats in Winter

**ELECTRIC UNIT CONDITIONS AIR WINTER OR SUMMER**

For conditioning the air in one room, winter or summer, an electric unit is on the market. The device, housed in a cabinet that conforms to the latest office and home-furnishing schemes, was produced by the General Electric company to cool and dehumidify the air in summer and to warm and humidify in winter. In addition, it filters, circulates and ventilates.

*Schenectady, NY*

**AIRPLANE IS SLOW AS A SNAIL COMPARED WITH EARTH**

C1046

Compared with the earth, the fastest airplane travels at only a snail's pace. Prof. Alfred Joy, astronomer at the Carnegie Institution's Mount Wilson observatory, says he has found the earth is whirling about the center of the galaxy, its star system, at a rate of 9,000 miles a minute. It also is revolving about the sun at 1,100 miles a minute besides turning about on its axis once a day. Professor Joy has also obtained new evidence that the galaxy is like the far-away spiral nebulae, other star systems, photographs of which reveal them to resemble great, spinning pinwheels. They are unlike pinwheels, however, in that the stars near the center are turning about at greater speed than those at the outer edges.

*Pasadena, Calif*

**CANDLE PROTECTED BY GLOBE IS SAFE FOR HOME**

Protected by a globe, a new type of candle and holder can be used with safety in the home. When carried about, the flame is prevented from coming in contact with curtains or other inflammable material by the globe. Each candle burns ten hours. A patented metal disk holds the candle firmly in the base of the lamp.



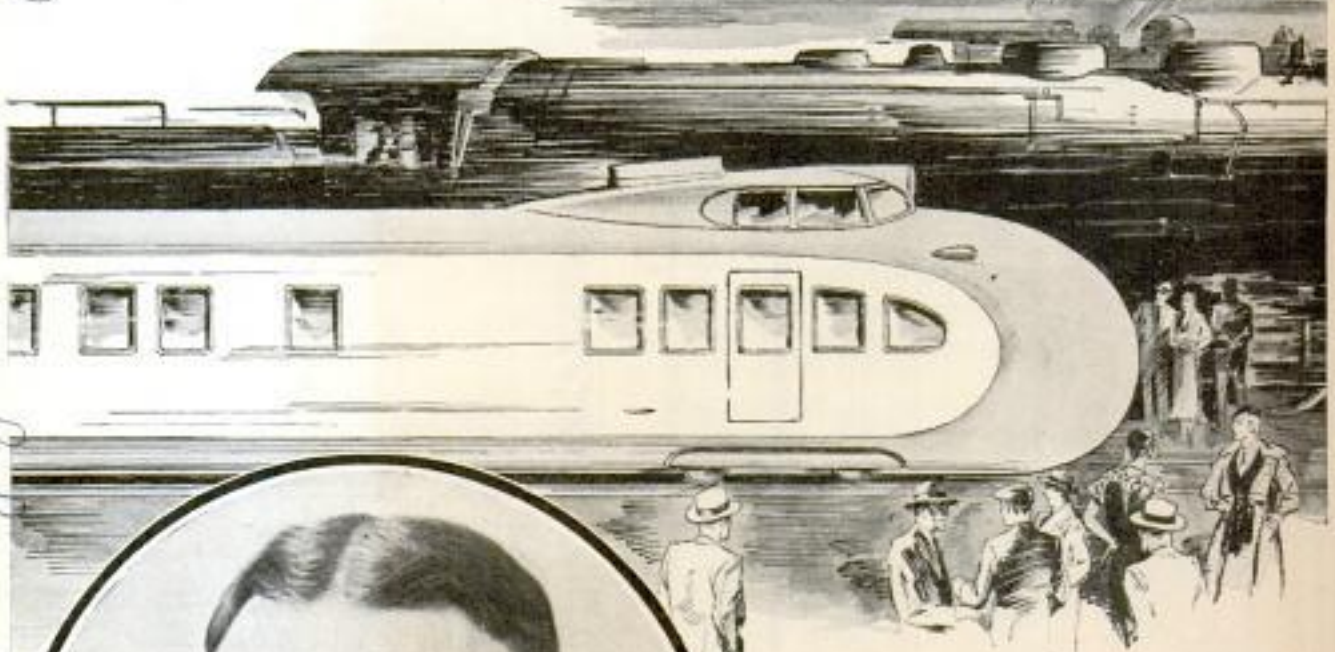
C1084

*June 1933*

*Diamond Candle Co  
 Ave. 1075 Metropolitan  
 Ave Brooklyn, NY*

Built by Pullman Car and Mfg Co Pullman  
 O/O 8/9  
 system  
 Amaha  
 rebr  
 Bldg. Chicago for Union Pacific

# The IRON HORSE



Above, Stages in Development of Iron Horse with Super-Train in Foreground; Circle, E. E. Adams, Designer of the Train

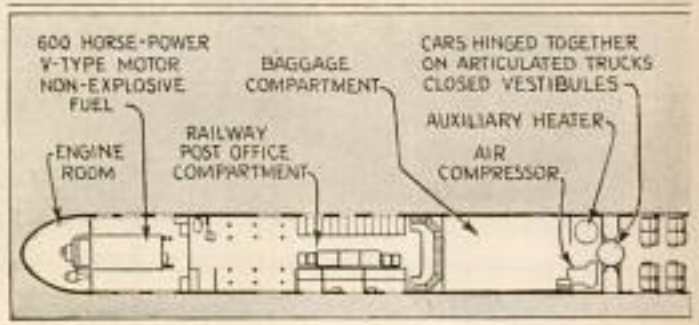
*U. P. Union Pacific*  
 trains now in operation requires sixty-one hours for the same trip. Even with scheduled stops and operation at moderate speed on curves, the new train will reduce running time from the Great Lakes to the Pacific by fifty per cent or more.

Awakened from a Rip Van Winkle period of inactivity by increasing losses of passenger traffic to the airplane, the bus and the private automobile, the railroads are pepping up the Iron Horse, putting it on a weight-reducing diet, making it easier-riding and changing its appearance inside and out. There will be little

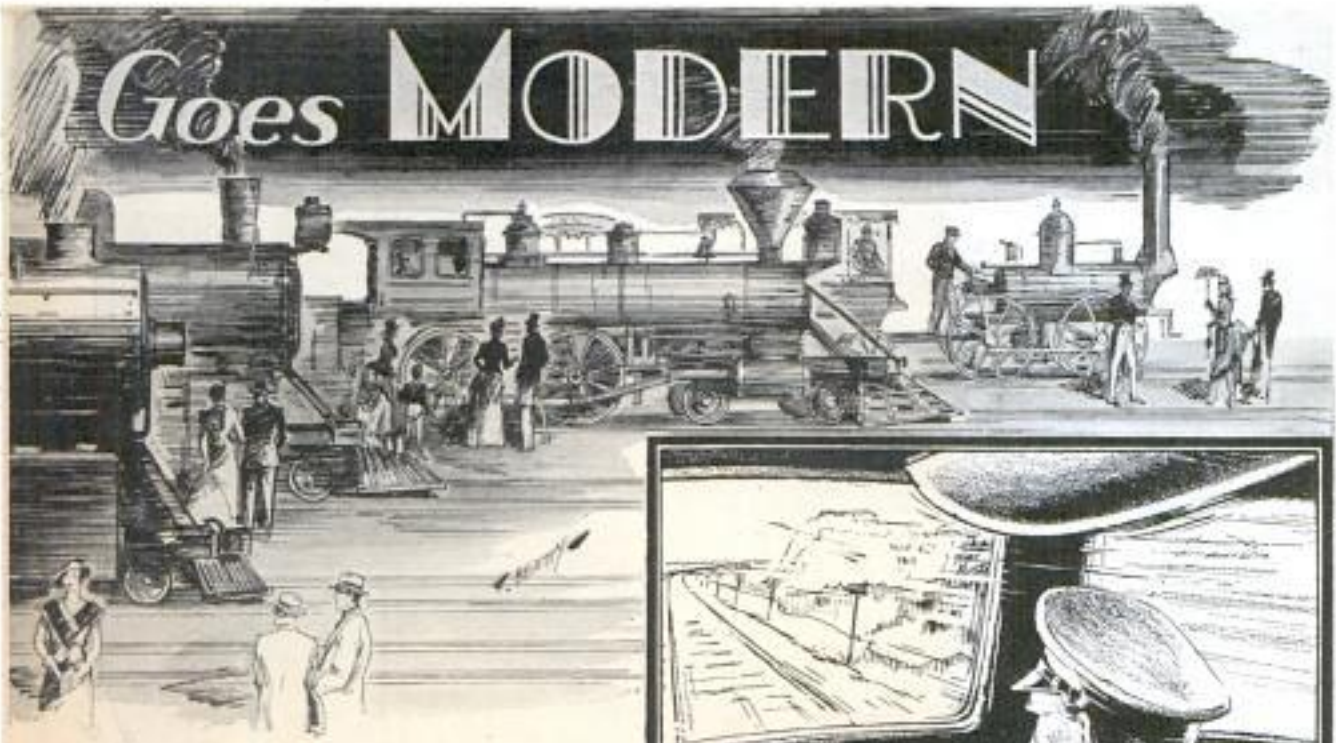
By JULIAN LEGGETT

**S**PEEDING quietly along at ninety to 110 miles per hour like an elongated, aluminum bullet on wheels, a super-train will offer fast, comfortable, safe and probably more economical transportation to the American public late this fall.

Only a 600-horsepower engine will drive this three-car rail flyer, yet at top speed, without stopping, it could cover the 2,298 miles between Chicago and Los Angeles in approximately twenty-one hours. In comparison, one of the fastest limited



C/089

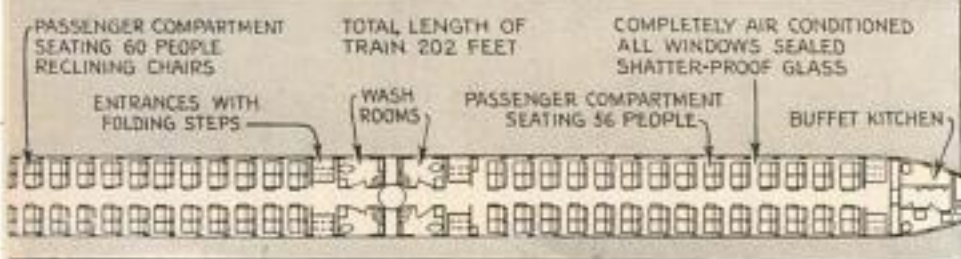


to remind you of the noisy, expensive steam engine when this trim speedster pulls out of Chicago on its first run shortly after December 1.

The secret of the train's speed may be found in the advanced methods of streamlining employed to reduce resistance to the wind. From the first car, with its front shaped like the nose of a modern air-transport



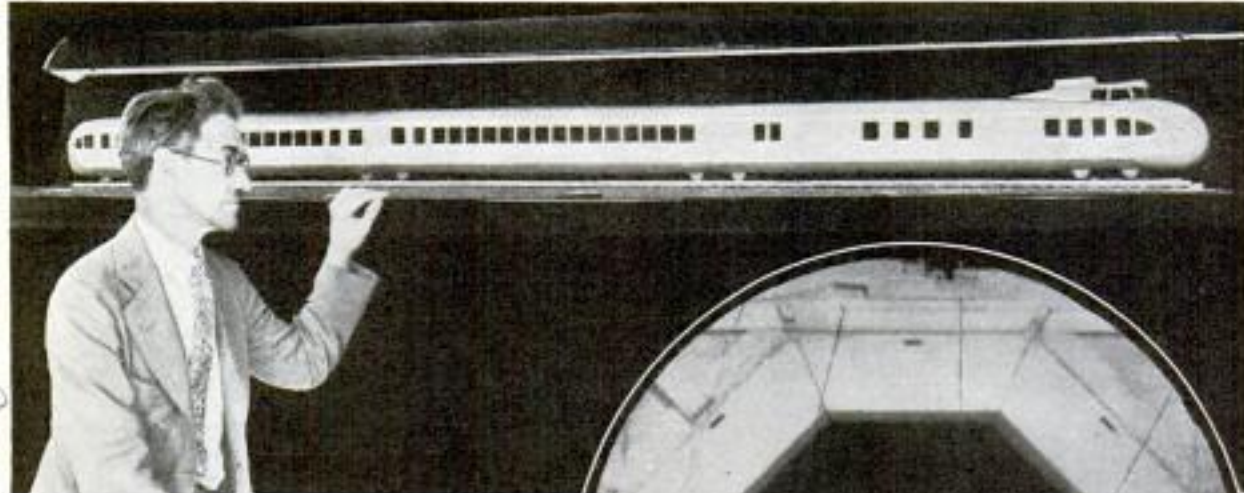
Above, Drawing of Driver at Controls; Left, Model Shows How Super-Train Will Appear; Note the Flowing Lines That Reduce Wind Resistance



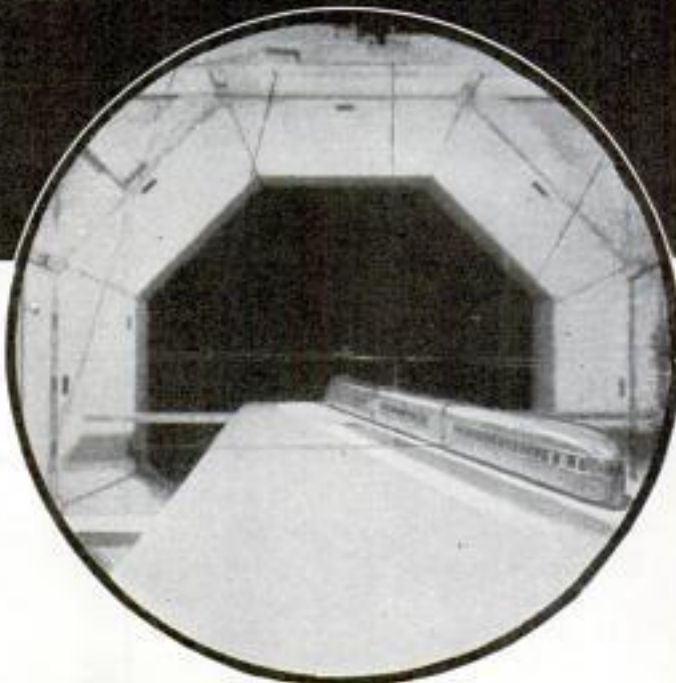
ship, to the rear of the third car, the lines are flowing. Windows of shatter-proof glass are to be set practically flush with the outside of the cars, wheel trucks will be covered to carry out the smooth surface required in streamlining and bells, whistles and running lights will be recessed carefully.

The job was far from easy. Many models were

*Pullman Bldg. Chicago*



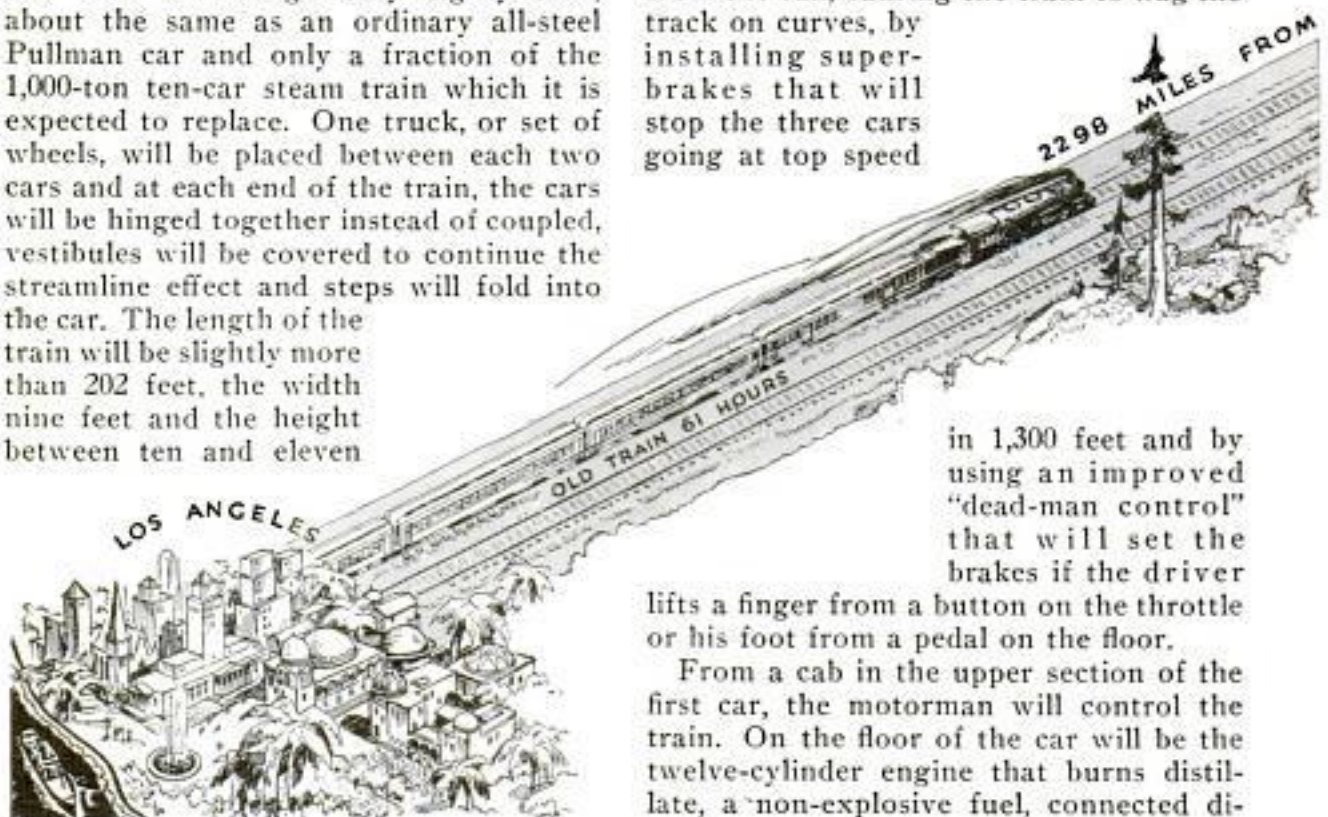
Top, Model Builder with the Miniature "Wheeled Bullet"; Right, How Model of Train Is Tested in Tunnel to Determine Wind Resistance.



tested in wind tunnels, changes made here and there and tested again and again before the design was selected by E. E. Adams, vice president of the Union Pacific system, as the one on which his company would spend more than \$200,000 in its search for higher speed at lower cost per mile. And that design is being followed by the Pullman Car and Manufacturing company in building the three-car train.

Constructed of aluminum alloy, the entire train will weigh only eighty tons, about the same as an ordinary all-steel Pullman car and only a fraction of the 1,000-ton ten-car steam train which it is expected to replace. One truck, or set of wheels, will be placed between each two cars and at each end of the train, the cars will be hinged together instead of coupled, vestibules will be covered to continue the streamline effect and steps will fold into the car. The length of the train will be slightly more than 202 feet, the width nine feet and the height between ten and eleven

feet. Safety will be attained by building the cars only nine and one-half inches from the rail, causing the train to hug the track on curves, by installing super-brakes that will stop the three cars going at top speed



in 1,300 feet and by using an improved "dead-man control" that will set the brakes if the driver

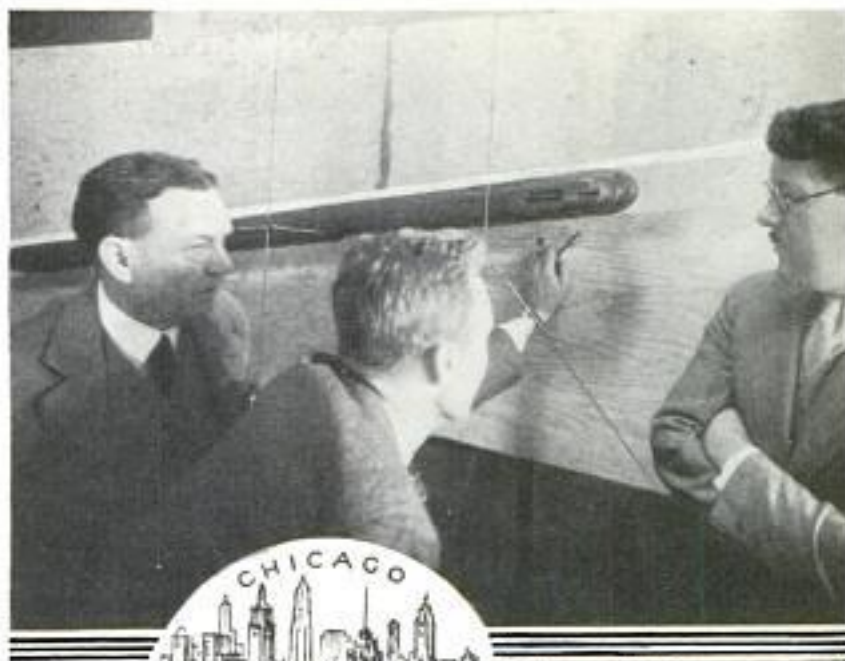
lifts a finger from a button on the throttle or his foot from a pedal on the floor.

From a cab in the upper section of the first car, the motorman will control the train. On the floor of the car will be the twelve-cylinder engine that burns distillate, a non-explosive fuel, connected di-

C1089

rectly to an electric generator supplying power to two motors mounted on the axles of the forward truck. Supply tanks, beneath the car floor, will carry enough distillate for a 1,200-mile run, eliminating frequent stops for fuel.

The power car also will contain a thirty-foot railway postoffice and a large baggage room. Sixty passengers may ride comfortably in the second car, while reclining chairs will accommodate fifty-six more in the third car, which also houses a buffet-kitchen for serving meals to passengers in their seats. All cars will be completely air condi-



LOS ANGELES TO CHICAGO

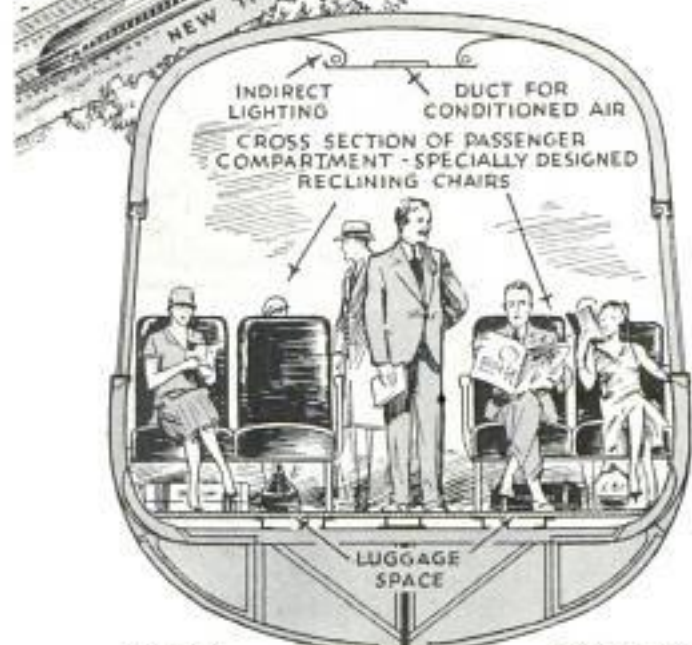
NEW TRAIN ABOUT 21 HOURS



tioned. Windows will be sealed to exclude noise, dirt and dust. Roller bearings, heavy body insulation, liberal use of rubber in the trucks and the probable use of a resilient wheel will improve riding qualities, in addition to reducing noise in the passenger compartment. The engine in the power car will operate in comparative silence.

Since 1920, the railroads have been losing passenger traffic to many other forms of transportation. This loss has been charged by some authorities as due to the railroad's failure to keep up with the times in the matter of speed.

Early in 1933, executives of the Union Pacific decided that a radically different type of passenger equipment would be necessary and they placed the problem in the hands of Vice President Adams. His solution is incorporated into a model now on exhibition in the Chicago and Northwestern's booth at A Century of Progress. To railway executives examining this model and studying its many possibilities, the super-train sounds the death knell of the giant passenger locomotive and its high operating costs, and heralds a new era in transportation.



BOTTOM OF CAR 9 1/2 INCHES ABOVE RAIL      WIDTH OF CAR 9 FEET      TOP OF CAR 11 FEET ABOVE RAIL

Top, Union Pacific Official and Scientists Study Effect of Wind on Model; Note How the Miniature Train Is Suspended

C 1009

Exhibit of University of Amsterdam  
Holland, World of Science



Resembling a Book in That It Opens in Sections, This Model of Body Is Easy to Study

### MODEL OF HUMAN BODY OPENS LIKE A HUGE BOOK

Opening up like a huge book, a model of the human body at the World's Fair reveals the workings of the body, section by section. The spectator turns the "pages" to see nerves, tissue, muscle, bone and other mysteries, much as though he were reading a story.

World's Fair

Mantleville Press Bureau  
6245 St. of  
Newport 1957

### NIGHT PUTS PLANTS TO SLEEP BY STOPPING SUN'S ACTION

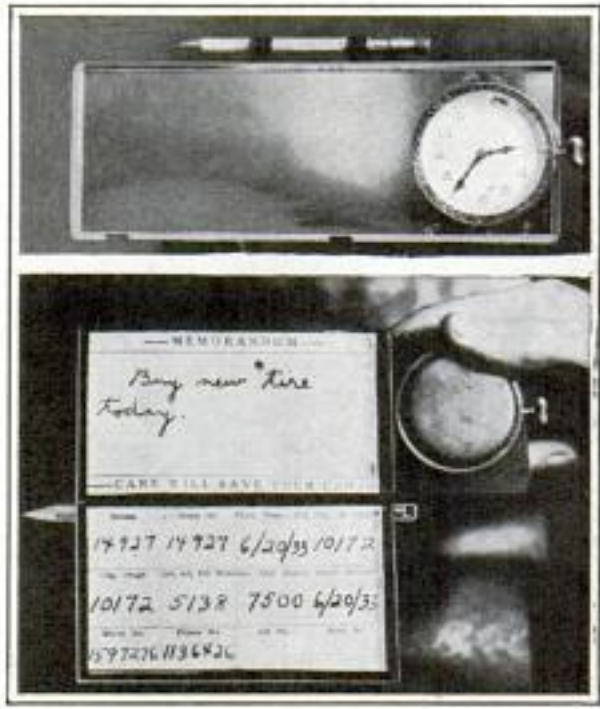
When night comes, plants go to sleep. That is, in the sense that during darkness one of the principal life activities of all plants is suspended, that of manufacturing starches and sugars from water and carbon dioxide. All plant life, with the exception of certain lower forms, is dependent upon sunlight for growth. The green coloring matter of the plant, chlorophyll, is able in some mysterious manner to utilize the radiant energy of sunshine in the formation of raw materials for the plant's growth. The carbon dioxide of the air and the moisture from the soil, plus sunshine, are the basic materials from which all vegetables, trees, fruits and flowers of

the world are fabricated. When nature turns off the sunlight each day, the process, called photosynthesis, stops. The sunlight factory closes up. In this respect the plant may be said to sleep, although the substances made during the day are used during the night by various parts of the plant. Experiments indicate that some forms of artificial lighting at night may stimulate the process of photosynthesis.

### BACK OF AUTO MIRROR HOLDS MEMO PAD AND PENCIL

c941

On the back of a rear-view mirror now offered for the car is a booklike memorandum pad intended to remind the motorist when to change oil and make other adjustments. It is made in two parts, hinged together like a book, the hinge extending along the lower edge of the mirror. The complete unit is mounted on a swivel bracket, and when the mirror is reversed, and the back opened up, the memorandum pad is brought into position. A pencil is held in clips at the top of the mirror and cards are inserted in grooves at the rear to form the writing surface. One of the cards has spaces for speedometer readings or the time at which certain changes are to be made, the other card being for more general notations.

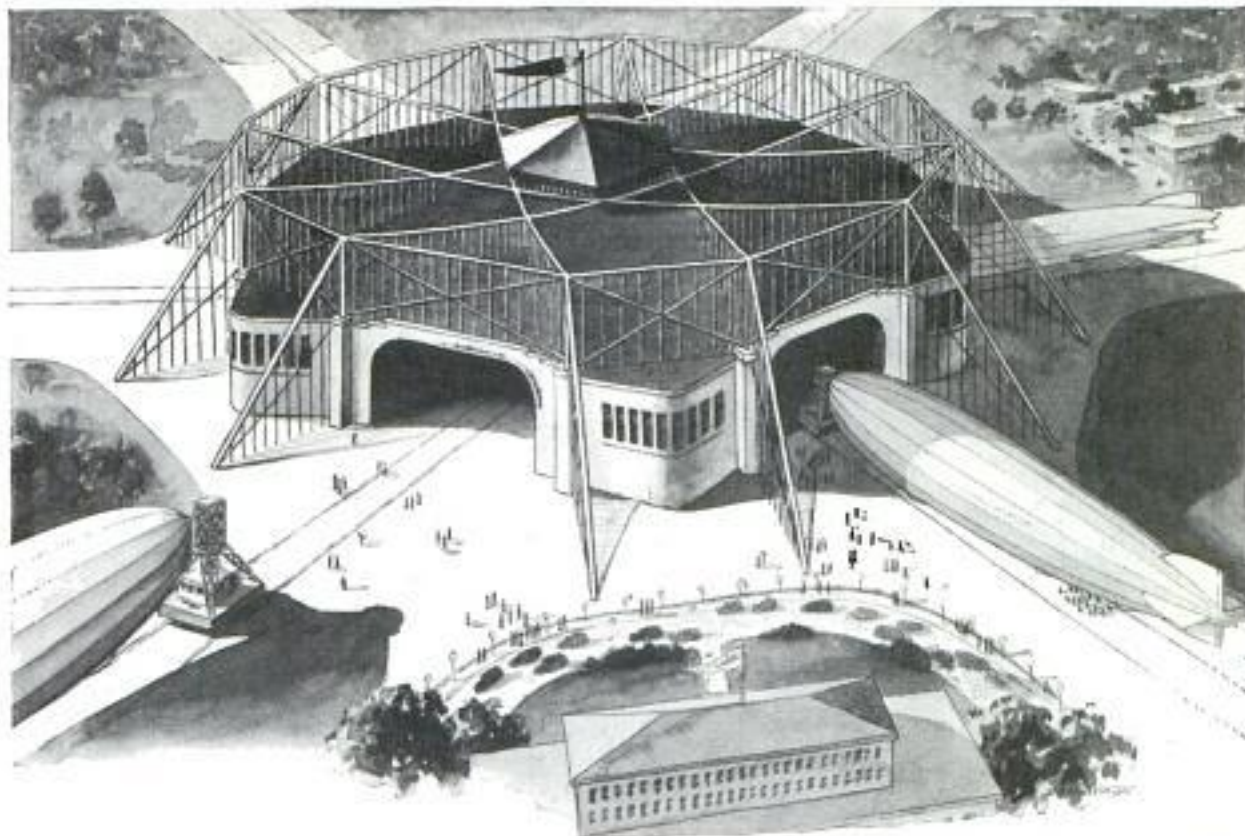


Auto Mirror with Pencil at Top, and a Folding Memo Pad with Removable Cards on Reverse Side

Service Div., American  
Agricultural Chemical Co.  
420 Lexington Ave  
New York

Keith & Keith Motor  
Car Co. Mayville  
Copyright material  
1/4





Drawing of "Floating-Roof" Airship Hangar Shows How Great Dirigibles May Be Housed with Aid of Mobile Landing Mast; Wings on Two Sides Reduce Force of Wind to Facilitate Placing the Craft in the Hangar

*Ans. Hans J. Kutschbach  
Parchmentplatz 20. Berlin Land.  
Unter Seebrunn*

**"FLOATING-ROOF" AIRSHIP HALL TO REDUCE LANDING RISK**

Danger of landing an airship in bad weather may be reduced materially by a hangar or hall with a "floating" roof designed by a German architect. The structure will have a hexagonal ground plan for airships to approach from any direction. Two outside parts of the wall will cut off the wind so that the ship may enter in comparative calm. To counteract the possibility of turbulence caused by the roof, the inventor proposes the insertion of a steel-wire netting between the cable-carrying system and the skin of the roof to absorb dangerous winds. The outside walls will be of solid construction, while the roof will be suspended as a flat cupola on an arrangement of cables.

*C964*

**ADJUSTABLE AUTO SEAT TILTS TO COMFORTABLE ANGLE**

Any form of automobile seat can be equipped with an adjustable mechanism which permits the seat to be tilted to the most comfortable position. The seat proper is supported by two angle irons, one on

each side. Each iron has a long slot near its forward end and is provided with lugs between which there is a roller, near the rear end. The roller moves in a channel secured to the floor and at the forward end of the channel is a curved, slotted bracket extending above the floor on each side of the seat. There is a transverse tube under the seat and a rod extends through it, passing through the slots in the angle iron and brackets, terminating at one end in a handle. When the handle is pushed



down the seat is locked in the position to which it has been adjusted. Thus it can be moved forward or back and its inclination can be changed through a considerable angle.

It is claimed that when unlocked, the seat naturally assumes the position which will be most comfortable for the person occupying it. The seat can also be swung forward around the bracket to give access to the rear seat.

*Automobile endevine  
6/17/33*

*Ans. E. Brosset,  
Montbeliard (Doubs)*

*new York representative -  
Bernard B. Bacharach  
964 St. Nicholas new York*

c 983  
336



Easy to Apply. This Waterproof Cement for Sealing Cracks in Auto Top Comes in Handy Tube

### CRACKS IN AUTO TOP REPAIRED WITH CEMENT IN TUBE

For sealing cracks at the molding on automobile tops, a flexible waterproof cement is being produced in tube form. A long tip on the tube makes application easy. The material resembles varnish, but turns to a dull black, when dry, much like the color of top material used on autos.

### BEEES SEE ULTRA-VIOLET HUES INVISIBLE TO MAN

Bees are able to distinguish small, intricate patterns in ultra-violet colors, as well as in most of the colors visible to man. This fact has been established in experiments by Dr. Frank Lutz of the American Museum of Natural History. Other experiments have shown that many flowers, the wings of many butterflies, and other things in nature have patterns in ultra-violet that are invisible to human eyes. Thus bees, and probably other insects, move in a world of beauty that man cannot see or even imagine. A bee's eye is radically different from that of a human, having no rods or cones and being far simpler in its elements. In one test, Doctor Lutz worked with a colony of bees nesting in the wall of a building on an island. A small hole in the outside was

the only entrance. Doctor Lutz prepared cards on which were painted patterns in black and white, some in ultra-violet white and some a white that does not reflect ultra-violet light. Each card was pierced with a hole the size of the opening to the nest. By placing a card with a certain pattern over the entrance, Doctor Lutz established an association in the bees' "minds" between that pattern and the entrance. When the cards were shifted, the bees ignored the new pattern and flew to the old in an attempt to get into the nest.

c 1020

### READY-MADE RUBBER EARPIECE AIDS HEARING AT LOW COST

Made of flexible rubber, a soft earpiece for use in audiphones, which is an aid to hearing, has been developed. The earpiece fits the average ear, resulting in a great saving. Since 1924, a midget receiver has been in use, but the hard-rubber earpiece had to be fitted exactly into the external ear, calling for the services of ear specialists. Because of the perfect fit, the arrangement was ideal, but expensive because each mounting had to be made individually. In order to reduce the cost, the ready-made earpiece was developed after a long series of tests which included the taking of several thousand plaster ear casts. Observations and measurements resulted in the adoption of four different sizes of ear attachments as sufficient to fit



Made to Fit the Average Ear. This Inexpensive Earpiece Is an Aid to the Hard of Hearing

all ears of normal formation. Since the earpiece is of soft rubber, fitting it to the individual is easier.

Bell Telephone Laboratories  
463 West 125th Street  
New York

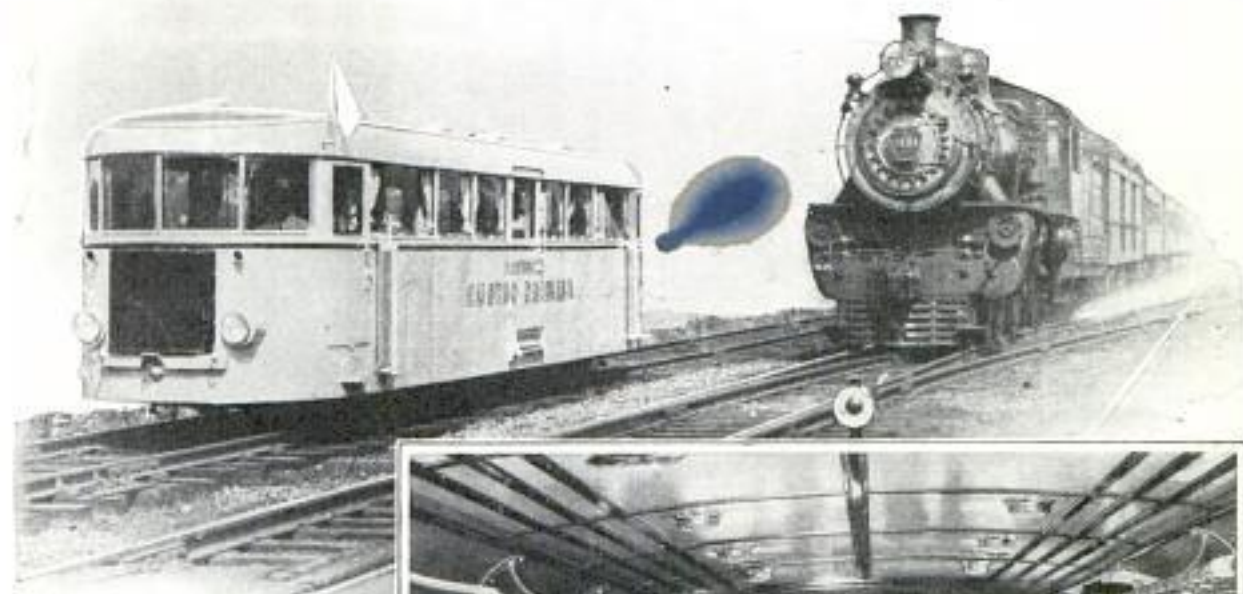
Chicago - 2100 Astor Ave.  
Brynswick, Ga.

New York

N.Y. Times 7/13/33

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# Fast Rail Car Meets Challenge of Auto Bus



*Wide World*

Top, Rail Car Speeds Along beside Crack Express Train; Bottom, Inside the Car



Meeting the challenge of the automobile bus as a means of transportation, a new rail car has been tested at seventy miles per hour in the United States. Equipped with pneumatic tires and driven by two gasoline motors, the car weighs only 20,000 pounds and has a passenger capacity of forty-two. Fuel consumption is about one gallon to seven miles, demonstrating the economy of operation, as compared to the giant locomotive and heavy coaches of the standard railroad train. Since 1920, the railways have lost about seventy per cent of their passenger traffic to the highways, this continuing in good times or bad. To prevent further loss, the first rail car was produced for branch-line travel. In the brief space of five years, it has been transformed. At first it was merely the cheapest means of holding what little branch-line passenger traffic that remained. Despite early engine failures and despite the lack of comfort, the rail car demonstrated its ability to save from fifty to seventy per cent of branch-line passenger-haulage costs. Now comes the im-

proved rail car, quiet, fast, comfortable and economical, to its job of building traffic. With unobstructed access to the heart of a city, with no traffic policeman to stop it, with a perfect road of its own and with its size and proportions subject to no legal restrictions, the rail car must be accepted not merely as a means of competing with the auto bus, but also as an important phase in the evolution of railway transportation.

## SHATTER-PROOF GLASS FOUND IN LABORATORY ACCIDENT

When a chemist accidentally dropped a test tube several years ago, the glass cracked, instead of shattering. Under close examination, the glass was found to contain cellulose. Thus was conceived shatter-proof glass, made possible by using celluloid as a binder.

*Long Island railroad Cleveland Plain Dealer*  
6/11/33  
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c933 Amb Rene Lemhard  
Timmerweg No.  
Berlin - Steglitz, Germany.

# Avalanches Made



**T**HUNDERING down the sides of mountains in many parts of the world, snowslides cause scores of deaths and millions of dollars worth of damage each year. During the World War, 60,000 soldiers were killed on the Alpine front, but of this number, 8,000 were swept to death by avalanches on a hotly contested mountain, the Pasubio, in a single winter, thus proving the destructiveness of snow as compared to bombs, high-powered rifles and other instruments of war.

Efforts to combat the snowslide have been of the hit-or-miss variety, generally speaking, each community endangered by avalanches building its own protective barriers. Such a system could hardly be expected to be more than moderately successful.



Top, Left, Placing Dummy; Below, Awaiting Slide; Third, Here It Comes; Bottom, Dummy Swept Away; Bottom, Right, Sounding with Snowslide Drill for the Body of a Person Buried in the Snow

# to Order!

Not until Professor-Doctor Paulcke, of the University of Karlsruhe, Baden, Germany, undertook to solve the problem did science make much definite progress. Professor Paulcke, well-known Alpine climber and geologist, established "nature laboratories" in which scientific, systematic research could be conducted. One of the first tasks was an examination of different kinds of snow to provide an explanation of the causes of snowslide formations and of the many varied forms in which snow



Right, Dummy Prepared for "Death" by Worker (Shown at Right); Bottom, How Snowslide Drill Catches in Buried Person's Clothing to Assist Rescue Operations



occurs. One cubic yard of freshly fallen snow weighs about 180 to 250 pounds, but if the snow sets and is changed by various influences, the weight increases to 300, 500 and sometimes 2,000

pounds. Successive falls in the course of a year result in the snow being piled up in layers. The lowest stratum naturally rests

on the surface of the earth, with upper strata piling on the altered surfaces of older snow layers. Each of these strata is to a great extent a natural sliding surface, which varies in its degree of "slipperiness." Therefore, a correct appraisal of their condition is essential to any judgment of the danger of snowslides.

Professor Paulcke, therefore, examined the changes which take place continually after a snowfall from the top downward, on both surfaces of individual strata and from the surface of the earth upward, in order to ascertain their importance in avalanches.

Changes taking place from the upper surface in a downward direction are caused by variation in temperature, inten-



sity of the sun's rays according to the height of the mountain and by the wind. Special attention was given to the question of how these factors influence the formation of snowslides. In the investigations, surprising discoveries were made, as for instance, the great speed at which the structure of freshly fallen star-shaped snow crystals changes according to conditions. On this fact were based further tests as to the tendency of the snow to form snowslides.

It had been thought that water melted from the surface of the snow by the sun's rays penetrated the snow layers and trickled away in the earth, but this was found erroneous. Instead, the water runs down the mountain side and imparts to the snow a tendency to form landslides. Aniline powder strewn in the high mountain regions appeared later in the lower areas.

To find what changes go on in the crystalline structure of the snow, Professor Paulcke invented a snow-sounder, which consists of an aluminum rod with three-inch slits cut in it. With this device, it is possible to test the mass of snow at different depths to determine its liability to slide, almost ideal for ski wearers because

avalanches sometimes are started by only the weight of a man walking on the snow.

In another experiment, Professor Paulcke made his own avalanches by sawing off large masses of snow with wire ropes to see what tendencies these masses had toward formation of snowslides. Protective works were constructed to determine how strongly the air pressure of the snow would affect them, and to learn what form of construction is most suitable for deflecting snowslides. Life-size dummies placed in the path of artificial slides were used in experimenting with rescue apparatus that the professor developed to a high degree of efficiency. After being buried by the snow, the dummy was located with the snow-sounder or drill, which caught in its clothing, and was



Top, Setting Up Microscope; Center, Different Kinds of Snow Crystals; Bottom, Professor Paulcke's Daughter Demonstrates Aluminum Rescue Shovel

pulled to the surface by the professor's party in what would correspond to the "rescue" of a human being.

**CATFISH GIVE QUAKE WARNING BY NERVOUS ACTIVITY**

Catfish give definite warning some six hours before an earthquake occurs, two Japanese scientists, Dr. Shinkishi Hatai and Dr. Noboru Abe, have discovered. Usually the most placid of fish, they become very nervous and "jumpy" a few hours before a shock. The two scientists, after noticing that catfish in pools were unusually susceptible to slight stimuli before earthquakes registered, began testing the fish by tapping on the supports of the aquarium three times a day with a finger or knuckle. They found that when no earthquake was impending, the fish moved lazily. But about six hours before a shock the fish would jump when the supports were tapped and swim about. Over a period of several months, it was found that the catfish had been correct in eighty per cent of their quake predictions. The scientists believe that their catfish are made sensitive before earthquake shocks through some electrical changes in the earth. Only when the aquarium was electrically grounded, through the drain, were the fish sensitive to approaching shocks.

probably also agree to Washington



Inventor of Toy Headlamp Is Shown with Glass "Aggies" from Which He Obtained the Idea

**GLASS MARBLES TO TOY LIGHTS IS PATH OF INVENTOR**

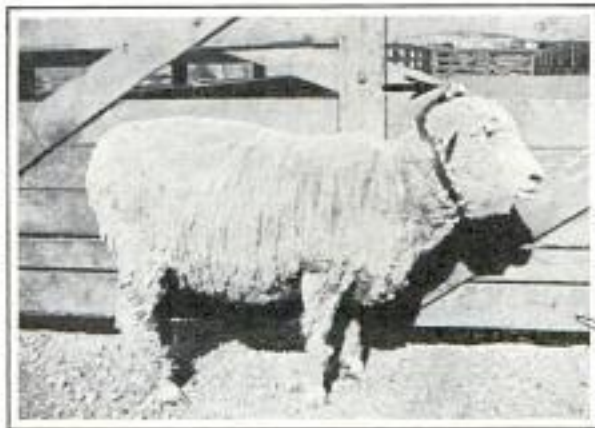
When toy manufacturers recently found a demand for lighted toys, such as pocket flashlights, miniature autos and motorboats, lamps for such purposes were unsatisfactory. They gave light, but lacked adequate control. What was needed most was a tiny lamp that would emit a powerful spot of light, resist breakage and operate from a single dry cell small enough to be installed in the toy. Marvin Pitkin, Nela Park scientist, got an inspiration from watching boys play marbles. Some of the marbles were clear-glass "aggies." After a little study, an order was placed and a quantity of aggies soon arrived. When attached to the stem tubing, these aggies provided just the light "spot" required. Then came the long period of tests and study that resulted in a way to do the job. Now, the new toy lamps are ready. Rated at 1.25 volts and 0.3 ampere, the tiny bulbs are most unbelievably rugged and the amount of light emitted from them is surprising.

Nela Park  
General Electric Co.  
Cleveland Ohio  
Theodore Koldge

**HEADLIGHTS PLACED ON SHEEP FRIGHTEN COYOTES AWAY**

One Montana rancher has equipped his sheep with electric headlights to reduce losses due to coyotes and mountain lions. Collars are placed around the necks of several animals in a flock. Each collar has a small electric light, a reflector and a flashlight battery. When the beasts of prey see the red lights bobbing among the sheep, they are frightened away.

CS27



Arrow Points to Small Electric Light Bound to Sheep's Head to Frighten Away Coyotes

J. H. Rossell  
Madison Valley  
rancher

**RUBBER USED IN MAKING PAINT INCREASES ITS RESISTANCE**

Chlorinated rubber, said to be a valuable ingredient for the manufacture of paints, is being produced in Germany after many years of research. The material imparts resistance to the product.

Theodore Koldge  
at Ammendorf bei Halle  
(Plant organized in Hamburg)  
Zeigofan, Es in b. H.

a a

957  
1342

*Imperial Entomology*  
*South Kensington, Eng*

*Georgia Avenue Branch Washington Mechanics Savings Bank*



Photo Points Out Protective Devices in Teller's Cage; Note the Gun Port at Extreme Right and Tear Gas Releases on Floor

### BURGLAR-PROOF TELLER'S CAGE PROTECTS BANK'S FUNDS

One Washington, D. C., bank which has been robbed several times now has a teller's cage equipped with every modern device to forestall a bandit raid. The front is of bullet-proof glass with sides of steel and a top of bullet-proof wire mesh, so the cashier is protected from gunfire from any direction. There are also guns and gun ports ready for instant use, and in addition a flood of tear gas can be released by stepping on a button with either foot.

### MAN CAUSES INSECT PLAGUES BY POOR FARM PRACTICES

That man can blame only himself for plagues of grasshoppers and locusts has been established by world-famous authorities on the subject. Dr. J. R. Parker, of the United States department of agricul-

ture, says that cultivation of crops of lush vegetation beside unplowed roadside and fence-row strips tends to make the grasshopper more numerous in North America than in the days before agriculture, when all the land was unbroken. The uncultivated areas offer ideal hatching grounds for these insects. Adjustment of farm practices is considered advisable in the war against the grasshopper. Dr. B. P. Uvarov, of England, after studying the locust problem in Asia and adjacent island areas, blames poor agricultural methods for insect plagues. The introduction of semi-Europeanized methods in the Philippines and the East Indies has resulted in a shifting agriculture, leaving abandoned fields as breeding grounds for locusts, which cross to other islands.

### NON-DETACHABLE CAPS FOR PASTE TUBES

Collapsible tubes, such as are used for tooth paste or shaving cream, can now be obtained equipped with non-detachable caps which cannot fall off and become lost. The non-detachable cap is turret-shaped and rotates around a shoulder on the neck. When an aperture in the cap is turned to coincide with one in the tube, the contents can then be ejected. A lug provides an automatic stop to indicate the open position. Another turn and the tube is closed. When the user buys the tube, the opening in the top is sealed shut to keep the contents fresh. The container is opened by puncturing the top with a peg.



Names and addresses of manufacturers of articles described in this magazine will be furnished by our Bureau of Information upon receipt of return postage.

*Science News Letter*

*Science News Letter*

*6/24/33*

*Anchor Caps Closure*  
*Co., 22 Irving St.*  
*Long Island City, N.Y.*



# Hay Dehydrator on Car Serves Wide Area



Giant Plant for Turning Hay into Nutritive Meal

for drying is produced, three concentric rotary-dryer drums, a hammer mill, two

Mounted on a railway flat car, a dehydrator for new-mown alfalfa can be moved easily, serving a wider territory and insuring uniform production. The plant, weighing 123,000 pounds with the flat car, is made of several units, including a rotary-flame oil furnace in which the heat

collectors, and gasoline engines to operate various units. Green alfalfa, fresh from the fields, is passed through the dehydrator, its color and vitamin content are sealed in and a nutritive meal is bagged, virtually right in the backyard of the farmer living near a railroad.

Herald and Examiner 6/23/33

C954

## HYDROGEN PUTS LIGHT IN STAR BY ACTION OF ITS ATOMS

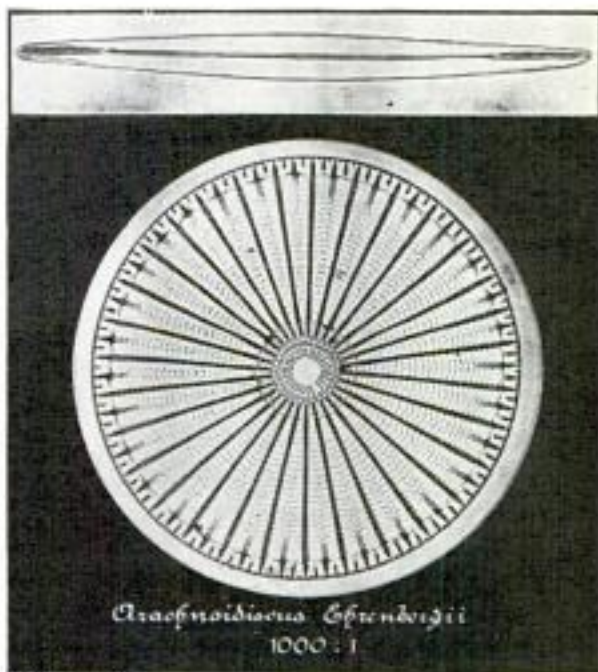
Not only is about one-third of a star's weight due to hydrogen, but the star is supplied with heat and light by the continual breaking up and rebuilding of the hydrogen atoms. That is the belief of Dr. Walter S. Adams, director of Mt. Wilson observatory. Doctor Adams says that in their earlier history, stars may have been made entirely of hydrogen clouds. Later, hydrogen atoms condensed to form heavier elements like oxygen, carbon, iron and the like. During this process, enormous energy was released, keeping the star hot and radiant. Spectroscopic study of ionized particles or atoms which have lost their electrons has revealed these secrets of the stars.

Pasadena Calif C956

## SMALLEST THING HAVING LIFE HELPS TEST MICROSCOPE

Two types of diatoms, one-celled animals or plants, the smallest living things in the world, are magnified hundreds of times before it is possible to photograph them. By magnifying the smallest 2,400 times, it is brought so close to the eye that

the "ribs" or vertical lines in the diatome are distinct. These ribs measure only one four-hundredths of the diameter of the human hair. Another diatome, when magnified 1,000 times, is used in testing the flatness of the field of a microscope. Diatoms are found in fresh and salt water.



*Arachnoidiscus Ehrenbergii*  
 1000:1

Top, Form of Diatome Magnified 2,400 Times; Bottom, Another Form, Magnified 1,000 Times

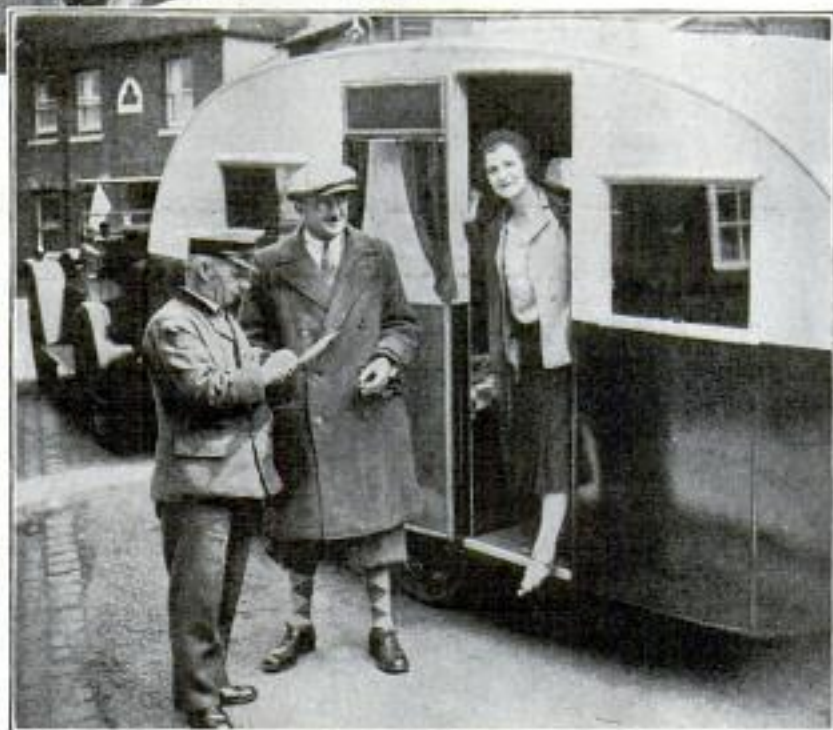
# Comforts of Home in Latest Motor Caravan



out that the atoms of uranium have been exploding at regular intervals no matter how severe their treatment, whether plunged into boiling rocks or chilled by glacial cold. This geologic clock counts years by accumulation of atoms of lead, produced by regular explosions of atoms of uranium. By chemical analysis, it is possible to pick this clock out of mineral imbedded in rock and

*Acme* © Planet News, Ltd.  
Just a Few Steps Up to Sleeping Quarters Atop This Touring Car; Note How Shelter Is Braced; Right, Trailer Really Is a Home on Wheels

Many of the comforts of home are to be found in vehicles entered in the latest motor caravan in England. One entry consists of an automobile and trailer completely equipped for touring. The trailer is a small home on wheels, with comfortable seats, a table, bed and even curtains at windows and door. Streamlined to reduce wind resistance, the trailer presents a trim appearance. Another participant in the caravan built sleeping accommodations on top of his sedan auto. A small ladder enabled the driver and companion to reach the beds, which were sheltered by a canopy.



## URANIUM IS A GEOLOGIC CLOCK TICKING AWAY THE AGES

Uranium is a geologic clock ticking away the ages as accurately as an ordinary watch marks the minutes. This explanation of this element has been given by Prof. C. S. Piggott, of the Geophysical laboratory, Washington, D. C., who points

count the ticks, thus finding out how long that geologic timepiece has been in that particular place. This element is really a group of eight clocks all ticking simultaneously, for there are eight kinds of uranium atoms or uranium isotopes, all producing lead at different speeds. Lead is composed of sixteen different kinds of lead atoms and one can now be recognized from another. Lead, itself, is divided into two great classifications. One sort was produced since the earth was born from the sun. This was from uranium on this earth. The lead of mines was produced

Chicago Tribune  
6/22/23

C878 H. Holland  
1635 E. 55th St  
345

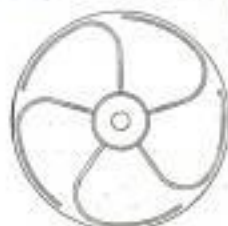
Cleveland Ohio

from uranium in the sun, a sun clock giving vistas of time before even the earth was in existence. "We have every confidence," said Professor Piggott, "that we shall be able to count the ticks and read the message sent from the vastness of astronomic time. It seems fair to assume that uranium existed in material of the sun before this earth was created, and a considerable part had already disintegrated into lead." By probing in this manner, some scientists estimate the age of the earth at between one and three billion years.

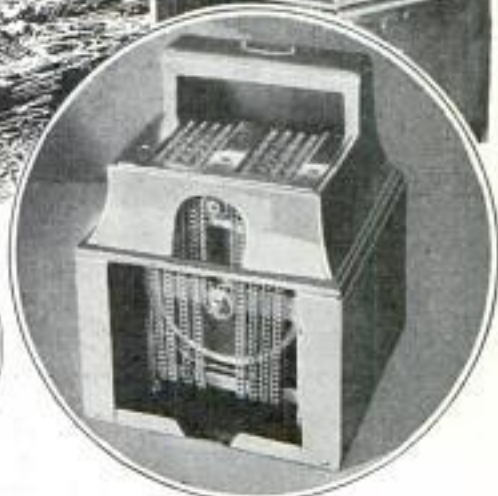


**GLASS BRICK USED IN GAS STATION** C892

One filling station in Columbus, Ohio, is constructed of glass blocks which are hollow, six-sided units with plain surfaces about the size of bricks. The blocks are translucent, but not transparent, and can be made in a variety of colors. They are annealed for greater strength and can be replaced if one is broken or cracked, although they do not break easily. One of the greatest advantages of this type of construction is in the lighting. Even in direct sunlight, shadows are eliminated and they admit a soft, diffused light. The fact that they are hollow and hermetically sealed keeps out heat. Illuminating such a structure at night is easy since the interior lights enhance the exterior effects.



WATER WHEEL



Leaves and Trash Are Cleaned Out of Curb Catch Basin by Device That Has Wheel Run by Rain Water

**CHAIN RUN BY WATER WHEEL KEEPS CATCH BASIN CLEAN**

Clogging of the tops of curb catch basins by trash and leaves is prevented by an automatic cleaner operated by the water as it pours into the storm sewer. The cleaner consists of a water wheel connected through a gear ratio of twenty to one to an endless chain conveyor. The water pouring into the catch basin causes the wheel to revolve and this in turn moves the chain carrier toward the curb at the level of the pavement. This motion carries trash to the curb and, as the chain passes from lateral to vertical motion, the load is dumped and carried down an incline to the depository below. The unit is set beneath the surface so the chains are flush with the street and is easy to remove for cleaning or repair. The wheel is so arranged that water does not remain in it, thus preventing it from freezing during cold weather.

Columbus, Ohio  
6009 S. Columbus Ave  
Columbus, Ohio



Made of Glass Blocks. This Illuminated Filling Station Is Visible for Long Distances

Ohio Oil Co.

C955 Cont. C. W. Clayhoff, 125 1/2  
Rose St., Burbank, Calif.

# The LATEST in



Scientists Working Out Application of New Forecast System; Right, Map on This and Opposite Page Shows Movement of Air Masses

DEVELOPED and demonstrated secretly, a revolutionary system of weather forecasting promises to displace present methods. Irving Krick, instructor of meteorology, is responsible for its practical development under the supervision of Dr. R. A. Millikan, director of California Institute of Technology, and Dr. Theodor von Karman, aviation expert. Working with Western Air Express, Krick instituted the system from data supplied by the United States weather bureau, and a year's test has resulted in increased efficiency in air-line operation.

The theory is that atmospheric disturbances are caused by the interactions of air masses, brought together in the general circulation of the atmosphere. There are two principal zones of activity, one the "cold front," where violent atmospheric movements take place, and the other the "warm front," which is safe for operation of aircraft.

In plotting air masses, and their boundaries on a weather map, the areas of bad weather may be anticipated accurately from twenty-four to forty-eight hours in advance. Properties of the types of air involved determine the type of weather, its intensity, the area which it will cover and the rapidity of movement.

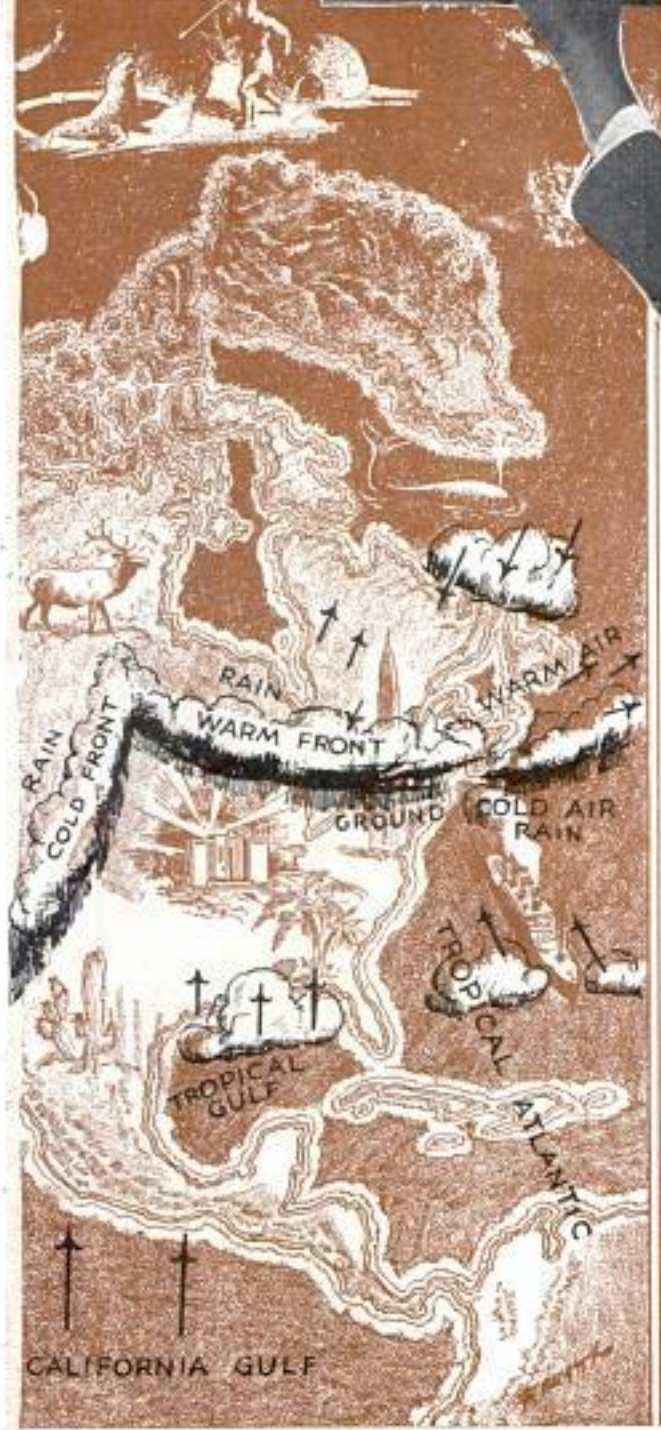
The boundaries between the air masses are sloping surfaces and may be plotted on a map where they intersect the ground. They may extend for hundreds of miles and will move on an average of twenty-five miles an hour when well developed. The exact speed is, however, dependent upon the properties of the air masses involved. The danger of flying through a cold front is very great and Doctor von Karman



# WEATHER Forecasting



Instrument for Determining Elevation of Clouds Helps to Classify Different Air Masses



believes the convergence of three cold fronts off the New Jersey coast caused the "Akron" disaster.

This new system adds a third dimension to weather analysis and forecasting, highly important to the pilot because the state of the free atmosphere is more vital than surface conditions. Basis for the system is that large bodies of air travel over the earth's surface for long distances from their points of origin and still retain the physical properties attained at their source.

A cold front is generated when an outbreak of cold air from the polar regions sweeps south or southeastward underrunning a warm current from tropical regions. These outbreaks of cold air often have a depth of 30,000 feet. When they force their way into a warm current, a compensating flow northward of the warm air is induced, the process giving rise to a low-pressure area. When a cold front forms, the cold air aloft pushes ahead of its position at the surface due to the greater friction at the ground. This causes violent overturning in the free air with



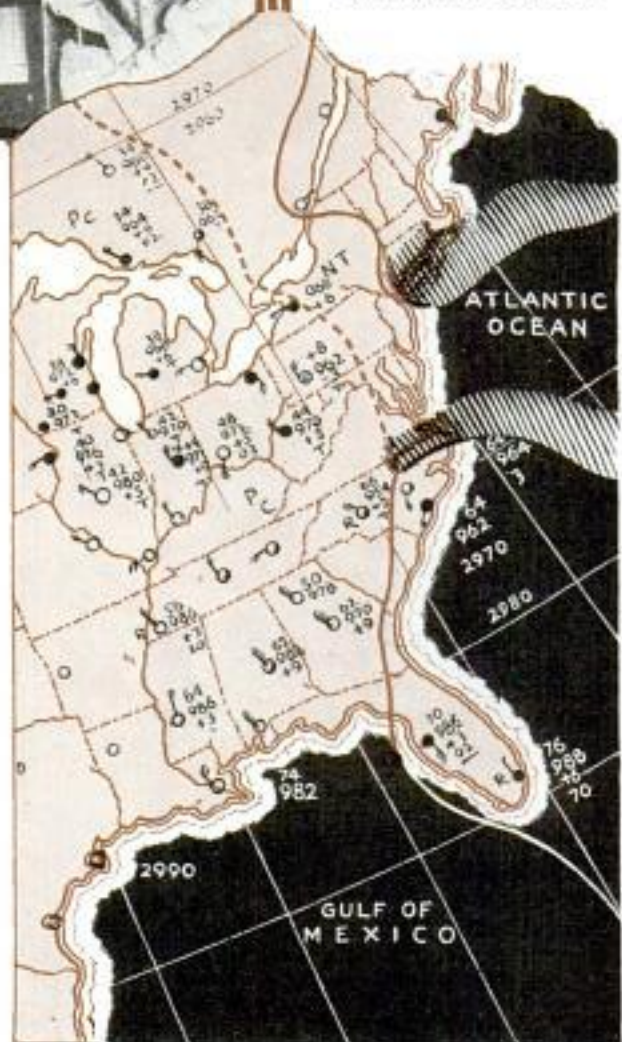
The air-transport pilot needs to know at what level clouds will form; whether they will extend to heights impossible to fly over; whether the clouds are close to the ground; when and where turbulent conditions exist so that he can avoid them; what effect mountains and other ter-

the formation of horizontal whirls often having the intensity of tornados. This area may extend hundreds of miles as it sweeps across the United States.

If the warm air is sufficiently moist, the vertical motion it undergoes causes it to expand and rain will fall. The cold front is commonly called a squall line. These violent disturbances may be predicted with great accuracy hours in advance, provided a knowledge of the air masses involved be available.

Cold-air masses frequenting the United States originate over the North Pacific ocean, North Atlantic ocean and between Hudson Bay and Alaska. Warm-air masses start from the northern part of the trade-wind belt between the Hawaiian islands and Lower California, over the Atlantic ocean between the Azores and the West Indies, over the Gulf of Mexico, over southwestern United States in summer, and in late summer and early fall over the Gulf of California.

Present methods of weather forecasting reveal to pilots only the length and breadth of atmospherical disturbances and only a general forecast of the weather six hours ahead can be made. The new system adds a third dimension, which gives a vertical distribution of the weather disturbances. Demonstration has proved that weather anywhere in the United States can be forecast on an hourly basis almost to the mile from twenty-four to forty-eight hours in advance.



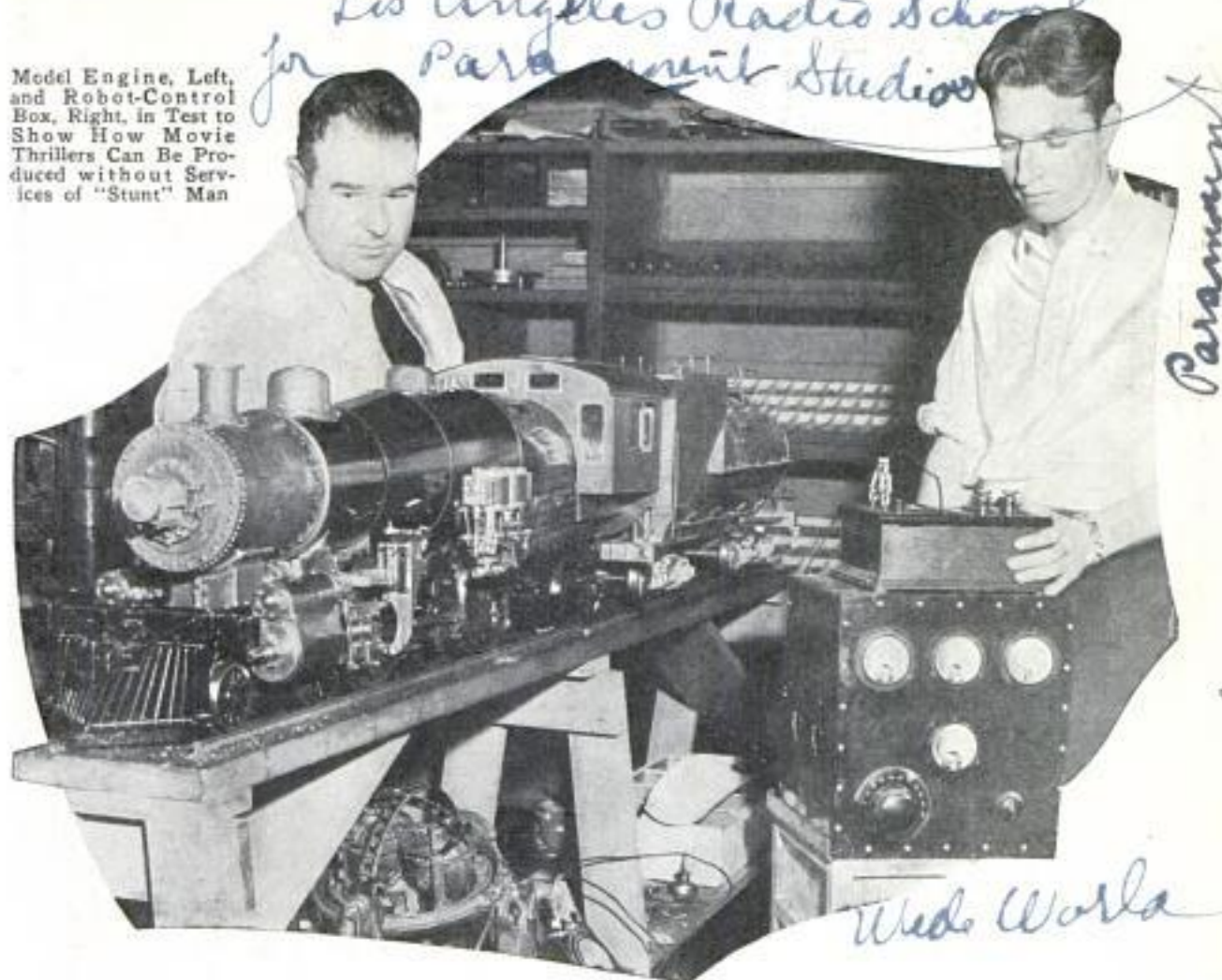
Top, Scientists Preparing New Kind of Weather Forecast Map; Bottom, the Finished Map

rain in his vicinity will have on the air masses moving over them, and where on his route cold and warm fronts exist. This information can be ascertained definitely through the new method by instruments on the plane itself.

(Continued to page 126A)

2818 Built by Harry Reynolds  
 and Howard Esterson  
 POPULAR MECHANICS 349  
 Los Angeles Radio School  
 for Paramount Studios

Model Engine, Left, and Robot-Control Box, Right, in Test to Show How Movie Thrillers Can Be Produced without Services of "Stunt" Man



Paramount Studios

Weds World

**ROBOT STUNT MAN OF MOVIES CAUSES THRILLS BY RADIO**

Airplanes may be maneuvered in mid-air or made to crash, and trains, motorboats and automobiles may be started, stopped, turned to the right or left and caused to wreck, by a new-type of radio remote control developed to help provide new thrills for the movies. The "invisible stunt man" controls almost any engine equipped with apparatus to receive directional impulses from the transmitting

equipment. The remote control is light enough to be used in a small airplane. A miniature train, built to one-inch scale, was used in testing the robot for adaptation to the motion-picture industry. Until now, specialists in producing film thrills have risked their lives, and some have died. The cost of stunts has been high and thrills necessarily have been limited by the stunt man's desire to escape death. The robot should be productive of spectacular pictures heretofore only dreamed of by writers and directors.

2945  
**ISOLATION OF LEPROSY GERMS BRINGS VICTORY NEARER**

Another step toward the conquest of leprosy has been taken with the isolation and cultivation of the germ outside the body. This has been announced by the Leonard Wood Memorial for eradication of that disease. Scientists also have succeeded in developing a method by which

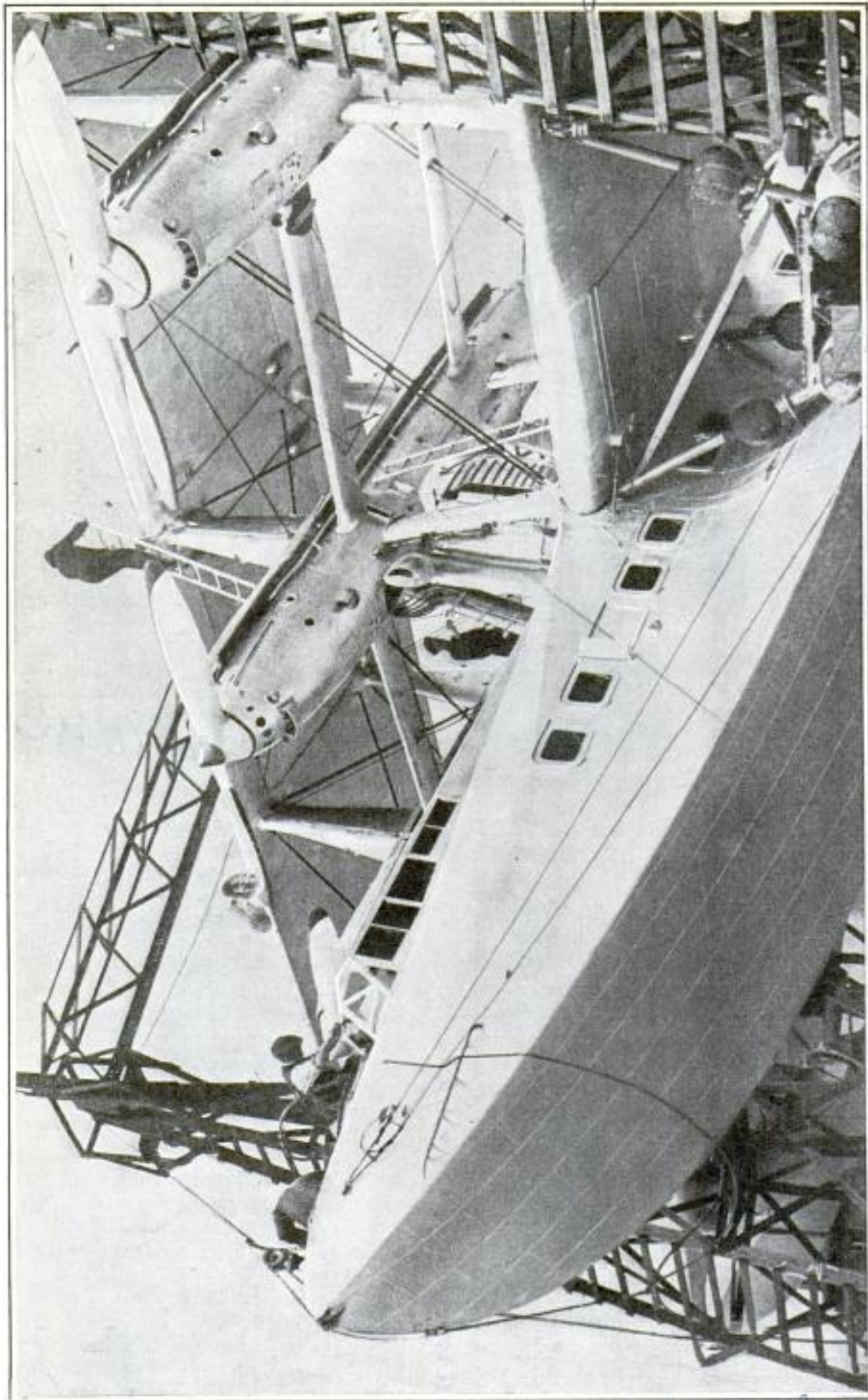
fresh strains of the organism can be started at any time from leprosy tissues. In 1872 a Norwegian bacteriologist discovered the germ believed to be responsible for leprosy, but the mere establishment that leprosy is a germ disease was of little value in its conquest until the germ itself could be taken into the laboratory and studied. This is now possible under the most ideal conditions.

Washington, D.C.

Dr. Malcolm H. Doyle  
 U.S. Dept. of Health  
 Dr. Carl O. McKinley  
 Dean of Geo. Washington  
 Univ. Medical School

Dr. Malcolm H. Doyle  
 U.S. Dept. of Health  
 Dr. Carl O. McKinley  
 Dean of Geo. Washington  
 Univ. Medical School

C962 Built at Rochester, England



Here Is Great Britain's Latest Aircraft for Use in Time of War; Said to Be the World's Largest Military Plane, the Flying Boat Is Powered by Six Engines for Open-Sea Reconnaissance; Note the Giant Hull; Workmen Are Shown Putting on the Finishing Touches

Wide World

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Science News Letter e854 Currier and Imlander

6/24/33

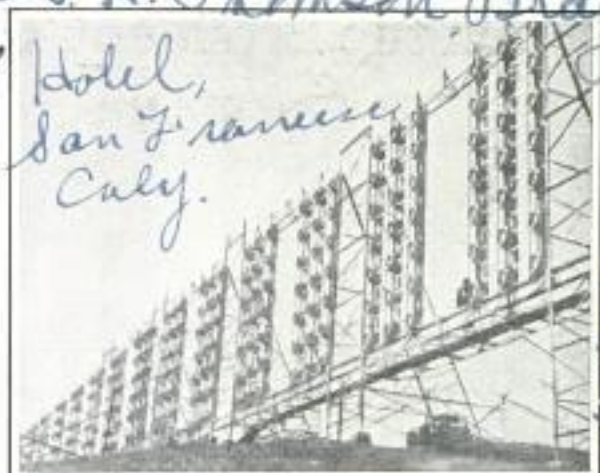
c981

to H. Thomson Prayton

**CHEMICALS CHANGED BY SOUND PRODUCED AT HIGH PITCH**

Sounds can cause chemical changes of many different kinds if the sounds are intense enough, according to Dr. Earl W. Florsdorf and Dr. Leslie A. Chambers of the University of Pennsylvania school of medicine. Most of the sounds used in their tests were shrill as well as intense, but one type of apparatus produced a sound only two octaves above middle C on the piano. The sounds, projected into liquids, coagulated proteins, broke down ethyl acetate to produce acetic acid, cracked vegetable oils with the generation of acetylene gas and to a slight extent decomposed starch to produce glucose. An egg subjected to high-pitched sound apparently was soft-boiled in a few minutes without raising the temperature. All the changes take place quickly, some in a fraction of a second. Drs. Florsdorf and Chambers believe them to be due to a momentary kinetic, or speeding up, effect on the molecules involved, affecting them in much the same manner as heating.

Philadelphia



Hotel, San Francisco Calif.



Fourteen Messages Can Be Flashed at Fifteen-Second Intervals by This Giant Electric Sign

Com. Leming Mitchell 107 Hazelwood Ave. San Francisco

**BOARDS ARE NAILED TO STEEL IN HOME CONSTRUCTION**

Boards and insulation can be nailed to the steel framework of a new kind of house. An ordinary steel nail, driven into the metal frame stud, follows the groove in the stud and clinches itself firmly in place. It may be withdrawn later without injury to the stud. This feature permits use of the framework for temporary structures. A home of this type can be erected

c904

by any carpenter from the usual set of plans. Its fire-resisting construction results in lower insurance rates and in greater protection against vermin, termites, fungus and musty odors. The steel framework does not warp or sag and is highly resistant to vibration and wear, requiring less upkeep for houses in which it is used.



NAILED IN STEEL

**LARGE CHANGING ELECTRIC SIGN IS VISIBLE FOR TEN MILES**

Visible for a distance of more than ten miles, a giant electric sign capable of flashing fourteen messages at fifteen-second intervals crowns a lofty hill near south San Francisco. There are twenty letter sections, each of which has twenty-one light boxes which may be combined to form any letter or number. Each light box contains fourteen sixty-watt lamps, or 5,880 in all, their brilliance being magnified by a lens in front of each box. The automatic device combining the lights to form letters is controlled by a small electric motor. The sign is 388 feet long, twenty-two feet high and contains fifteen tons of structural steel and concrete. There are more than ten miles of wiring and a mile and one-half of cable in it, and the electricity required to run it would illuminate 350 average-size homes.

As long ago as 500 B. C., Persia had a highway system with permanent signs.

Science Letter

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Day Chicago 0164

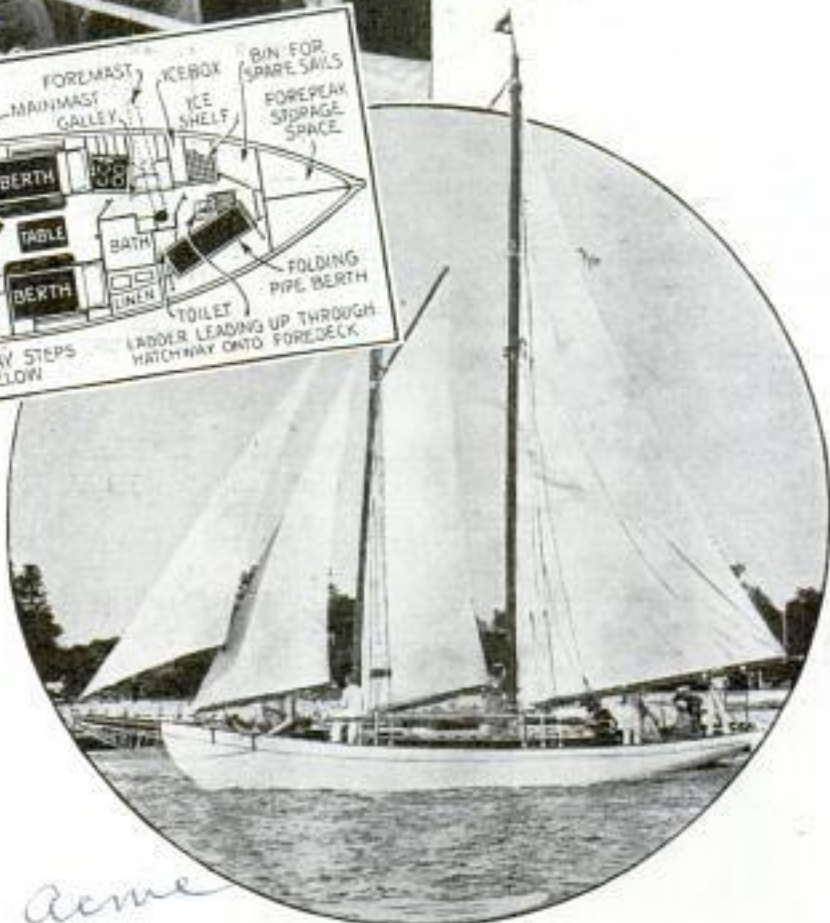
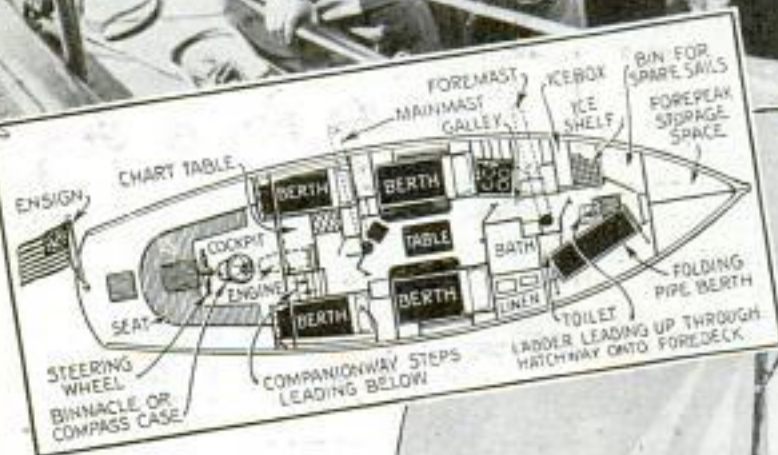
Strain-Steel Corp 6100 Melrose Ave Detroit Mich.

# When the President Takes the Helm of Yacht

Boat built by Lord Lawley Sons Corp  
Newport News



the main cabin is a state-room. The cabin is equipped with a folding table, heater, electric lights and several lockers. Forward from this cabin is a galley equipped with stove, ice chest, water pump, sink and shack locker and opposite it is a modern bathroom. On both sides of the state-room are large berths and there are others in



President Roosevelt, a lover of boats, enjoyed a recent holiday piloting the trim schooner, "Amberjack II," along the New England coast. The "Amberjack" would delight the eye of any sailor, for it would be difficult to find a sturdier or more seaworthy craft of the same dimensions. Although she is only forty-five feet long, the President might have sailed her across the Atlantic quite safely, for she was built especially for the transatlantic race of 1931 and on that crossing ran into bad squalls and heavy seas, but finished fifth in the race although she was the smallest boat competing. Her accommodations are comfortable and even roomy despite her size. There is a large main cabin and on each side of it a broad bunk. Adjoining

the forecabin together with bins and storage space for equipment. The steering wheel, where the President spent much time, is canted so the helmsman may remain seated while manipulating it, and at the same time easily read the compass, which is just in front of the wheel in the center of a roomy cockpit.

*Acme*  
Top, President Roosevelt Seated at Wheel of Vacation Ship; Center, Diagram of the Craft; Bottom, the Vessel Under Full Sail

Cont. Paul Conant,  
Western Press Bureau

POPULAR MECHANICS

2988 Built to order  
only, 2/10 down  
with order. no cat. 353

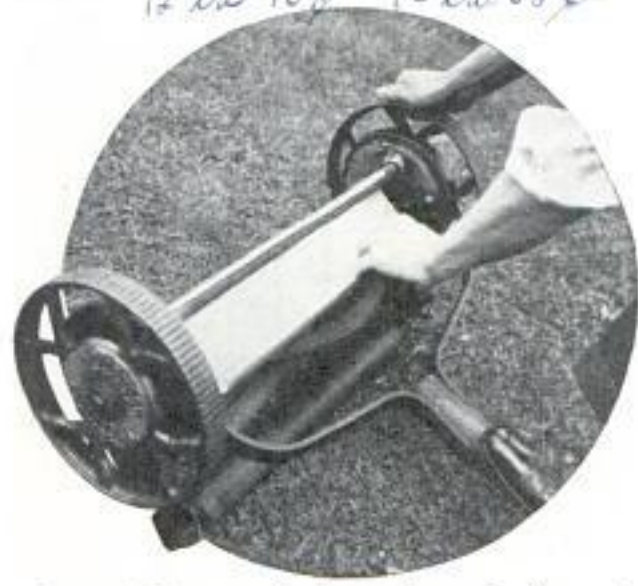
620 Templeton Bldg  
DIKES TO FRESHEN SALT LAKE  
FOR POWER PURPOSES

"De-salting" America's great Salt Lake in Utah is being considered in connection with a proposal for obtaining cheap power. The lake, of no use except as a tourist attraction, is nearly thirty per cent saline, seven times saltier than the sea. Freshening part of it would provide power for refining metals at a cost far below the present rate. The method is simple, calling only for construction of dikes from an island to the mainland at a cost of about \$1,000,000. In about two years, the eastern part of the lake will freshen itself, while the western section will get saltier and saltier, according to scientists who have studied the proposal.

SHARPENER FOR LAWN MOWER  
EFFICIENT YET SIMPLE

Simple in application, yet thoroughly practical and efficient, a new sharpener for lawn mowers puts an edge on the blades in sixty seconds. The sharpener is a sheet of rust-proof steel faced with a sheet of fast-cutting carborundum cloth in the right grit to give the blades a keen edge. The device is hooked over the cross-bar of the mower while the wheels are clear of the ground. With one hand, the operator presses the abrasive cloth against the blades while he turns the wheel of the mower to revolve the blades. In one minute the mower is sharp, ready for use.

12 in 50¢ 16 in 65¢



Improved Sharpener for Lawn Mower Is Shown in Operation; Turning the Wheel Grinds the Blades

The Carborundum Co  
Nagara Falls, N.Y.



This Tiny Airplane Motor, Shown with Its Designer, Has Only a Twelve-Inch Propeller

THIRTEEN-INCH PLANE MOTOR  
USES HALF SPOON OF OIL

Slightly more than thirteen inches high, an airplane motor of the radial type uses one-half teaspoonful of oil in its gravity and splash system. The tiny engine, which actually runs, has a twelve-inch propeller. Push rods are made of tool steel and are adjustable. The motor has a starter, carburetor and fourteen spark plugs. It is valued at \$2,800, by its designer and builder, F. W. Gradinier.

FASTEST PIECE OF MACHINERY  
FAR EXCEEDS EARTH'S PULL

Exerting a centrifugal force nearly 3,000,000 times greater than that of the earth's gravitation, an ultra-fast centrifuge has been developed for speeds as great as 666,000 revolutions per minute, or nearly one billion per day. This device, the fastest piece of machinery in the world, is made of a special alloy of chrome nickel steel, one of the toughest materials known. At high speed, the centrifuge causes metals to re-crystallize. When an alloy of lead and silver is placed in the hollow center of the device, which is shaped like a top, the lead is spattered out, leaving the silver.

Demonstrated by Dr. J. W. McOraia, Prof. of Chemistry, Stanford

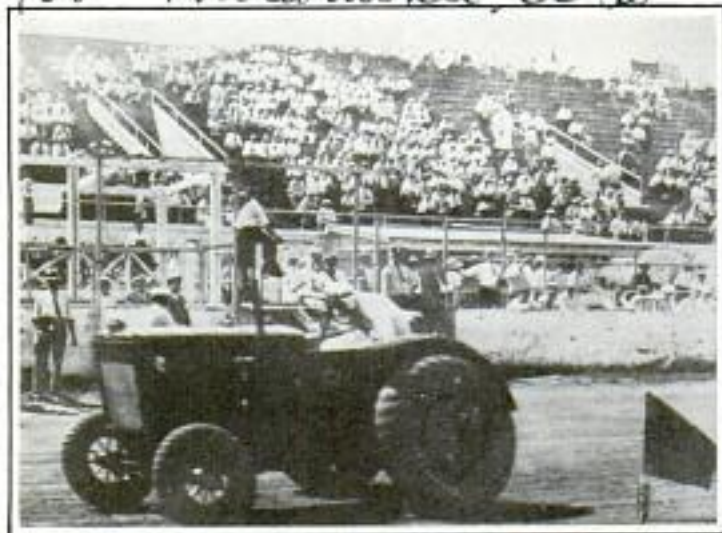
Dr. W. F. W. Gradinier 5511 Fountain Ave  
5445 Sunset Blvd Hollywood, Calif.  
at American Assoc for Advancement of Science

Alles Chalmers mfg Co

Staniel zoologes

C968 Milwaukee Wis

C1014



Tractor with Air Tires Capable of Making Thirty-Five Miles an Hour; It Has a Four-Speed Transmission

WORK ON FARMS SPEEDED UP WITH FASTER TRACTORS

Work on farms may be speeded up considerably in a short time by the recent development of faster tractors. Once slow-moving vehicles capable of traveling only three or four miles an hour, farm tractors are now being built to travel on highways at a speed comparable to that of a motor truck. In a test recently, one of these "racing" tractors with air tires was unhooked from a plow and driven onto a speedway where it averaged better than thirty-five miles an hour for five miles, then went back to its plowing. Such a tractor enables the farmer not only to speed up his field work, but to use the same vehicle to haul a trailer-load of produce to market. A four-speed transmission permits a wide range in rates of travel, varying from five miles an hour or less when hooked to a plow to thirty-five miles an hour on the road. Low-pressure tires are used which operate equally well in the field or on the pavement. It is estimated the increased speeds eventually will mean a saving of 125,000,000 hours a year to American tractor owners and another saving of \$10,000,000 a year in fuel costs. Tests have been made that show an increase of over twenty-seven per cent in acreage plowed when air tires were used in comparison with steel wheels, and a saving in fuel of more than twenty-three per cent. Higher-speed farm equipment is also being designed to work with the faster tractors.

CRADLE OF DEEP A TOMB DECLARES SCIENTIST

Ocean depths, instead of being inhabited by strange monsters, actually contain only bacteria and plankton, microscopic marine plants, according to Dr. August Krogh. Fish and other organisms comparatively high in the scale of life could not live at great depths, the scientist asserts, because they could find nothing to eat and because the temperature would be unhealthy. Complete darkness, tremendous pressure and a low constant temperature of about zero to three degrees centigrade are the conditions on the ocean's

floor, Doctor Krogh said, and he pointed out that fish would be able to adapt themselves to the pressure and absence of light, but the low temperature would reduce greatly their metabolism. Much of the food in the "cradle of the deep" would be of no service, since fish and crustaceans have not the ability to extract dissolved organisms from the sea water.

San Diego Tribune 12/1/37

TABLE WITH DOUBLE-DECK TOP HAS STORAGE SPACE

Storage space for used dishes is provided by a table with a double-deck top. Beneath the regular top is a smaller one that does not interfere with persons seated at the table.



Table with a Double-Deck Top Which Provides Extra Space for Storing Used Dishes

Algoma Wood Product Co, Algoma Wis

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# Getting Ahead *in the* WORLD

**S**UCCESS comes from being able to do some one thing superlatively well, not from a mere willingness to try "anything." More than ever before there is a demand for trained men—education wins. Fortunately, education is available to everyone through home study, practical schools, night classes and free libraries. Walter Chrysler started life in a railway roundhouse. He got his education by mail from a correspondence school. Lack of a university degree need be no hardship in life. Consider the lives of Edison, Cyrus McCormick, Westinghouse and the Wright brothers—all men who worked first with their hands and then with their brains. These were men of action and of courage without any knowledge of things that "can't be done" imbibed from university textbooks. Their motto was: "Nobody ever gets anywhere by waiting—let's go!" And each one helped to change the face of civilization.

## *The Trained Man Wins*



**"I**T is always possible to get a job or to create one," declares a great educator. The world is full of unfilled needs. Whenever any service is being done badly, or not at all, whenever we see crudeness, inefficiency, waste or disorder, these conditions are signals that there is a need waiting to be filled. "Have you any opening?" is the worst possible approach to a payroll because it indicates a lack of both confidence and imagination. And the only answer the employer can make is: "There is nothing now, but you may leave your name and address." Just a few months ago, the head of a nationally known electrical school sent a promising graduate to apply for a position which he knew was open and for which the student was particularly fitted. Despite his qualifications, he was turned down and came back completely discouraged. "You go back there," the principal told him and say exactly this: "I know I can do this work for you better than anyone else, and to prove it I'll work a month without pay." He not only got the job but was put on the payroll at once and made good from the start. Realize in applying for work that you are selling yourself and do it from the viewpoint of what you can do for your employer.

## *Jobs for the Asking*



**I**F we have perfected the machine only to be drowned in a flood of goods we cannot consume, what then will chemical training avail a young man who has his way to make in the world? Disquieting questions like this worry not only students of chemistry, but of every branch of engineering and the arts. Young men are not dismayed by prophecies of doom. Their self-confidence discounts the future, but still such questions are often expressed. The answer has been given by William Haynes, of New York, who points out that the use of horsepower per person increased ten times from 1790 to 1870, but that the consumption per person since has increased only five and six-tenths times. Surprising enough, this rate of increase has been steadily declining for the past sixty years. On the other hand, there was an actual gain of 1,280,000 workers in manufacturing plants between 1920 and 1930. Meanwhile, the importance of chemicals in industry has been rapidly increasing or at a rate nearly twice as fast as the extensions in the use of mechanical energy. Even energy production itself may be-

## *What Price Chemical Training?*

come a chemical operation, since the atomic force in a pound of uranium is equivalent to 320,000 pounds of anthracite coal. And in the future some of our most important natural products are certain to be considered as chemicals. Why burn a ton of coal that costs \$5.00 which will produce coke worth \$4.50 and by-products worth \$4.50? Even farm crops seem destined to become chemical raw materials. And every step forward creates new opportunities.



**H**OW do you tell whether a man is going to be a winner?" I asked an important executive. "The first question I ask myself is whether he does the job in hand well," he replied. "The next is: Can he get along with the men who work beside him? After that, is he loyal? Is he reliable? Is he square? He can be all of these things, but if he can't get along with his fellow workers, he is a handicap to himself and to the office. All the brains and loyalty and hard work in the world won't offset the fact that a man lacks the ability to get along with the men around him." Remember that any business organization is like an orchestra. Unless each one does his part willingly there can be neither harmony nor success. No matter how big or successful an organization may be it always has room for a producer—a man who can do a thing better than it is being done.

*Picking  
a  
Winner*



**T**HERE is no security, remarks Henry Ford, in wealth. The only security is in knowledge, experience and ability. In times of change and stress, the value of these qualities increases, while that of our other possessions declines. Imagination, persistence and hard work, hitched to a trained mind, will pay dividends in health, happiness and success in these days just as they always have for past generations. But in the olden days the law was, "Work or starve." Today the rule is "Think or perish." That is the New Deal. Machines, with both their problems and their poetry, have freed the sweating backs of workers, and at the same time have created countless new opportunities for service. One hundred years ago a trip from New York to Chicago would have taken months, but it would have involved no work except your own and that of a couple of straining oxen. Today this same trip may be made in a few hours, but it requires the combined services of hundreds of persons—aviators, engineers, radio dispatchers, teletype operators, stewardesses, ground attendants and weather experts.

*This Is the  
Day of  
Opportunity*



**F**ROM London comes the prediction of the end of the steel age with reinforced plastics gradually replacing metal for automobile bodies, airplane fuselages, yacht hulls and buildings. Already the stage has been reached when the strength of plastic products is comparable to that of iron and steel, according to H. B. Potter, of the Society of Chemical Industries. "Cement in itself was of little use to builders as a main structural material until it was reinforced," says Mr. Potter. "By reinforcing plastics we look forward to materials not only as strong, but considerably lighter than those now in use in industry. I look forward to molding the hulls of yachts and aircraft of fireproof plastic, and walls of homes which will be fireproof, scratchproof and unstainable." And so new industries are being born and new opportunities created.

*Chemistry  
Threatens  
Steel Age*

**“WHAT** good is that?” a skeptic asked Benjamin Franklin after he had described his feat of drawing electricity from the air down the wet string of a kite. “What good is a new-born baby?” he retorted. And so might be viewed the historic achievement of Gen. Italo Balbo, Italian Aviation Minister, in piloting his air armada of twenty-four planes from Rome to the Century of Progress Exposition at Chicago. Who can tell what this achievement will mean in drawing nations closer together, its effect on war, peace and disarmament or the advancement of aviation? But one thing seems assured and that is that it brings nearer the time when swift planes will span the ocean with both mail and passengers. Already air passenger schedules are in regular operation between Europe and South America.

*Balbo's  
Great  
Achievement*



**“IT** appears to be natural for human beings to overestimate any woes they may be suffering and to conclude that their predecessors never had corresponding troubles,” says F. D. Moulton, noted statistician. But during the time industry has been at a low level, the work actually done in producing what we require is enormously greater, per capita, than was ever done by our predecessors. For example, 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 amount of work done by electricity is no more remarkable than its low cost. During the past year the equivalent of the mechanical work a man can do in a day of ten hours was actually done at an average cost of about two cents. That is, a mechanic at nearly any job could earn enough money in the brief interval during which he could hold his breath to buy as much mechanical work as he could do in a day of ten hours. The applications of science have made a new world, a glorious world, but one whose possibilities we unfortunately are not able fully to realize. We should realize our blessings, and again make use of powers the applications of science have placed in our hands.



**I**N the life of anyone who has passed his fellowmen—who has achieved distinction and fame—one finds this outstanding fact: He worked. He applied himself diligently. He took advantage of every opportunity. But even the brain of Edison would have availed him nothing if he had not practiced. Success is nothing more than practice in the right direction. The habit of success may be acquired by anyone. It consists of right thinking plus practice. In the end repetition means perfection and the result is success.

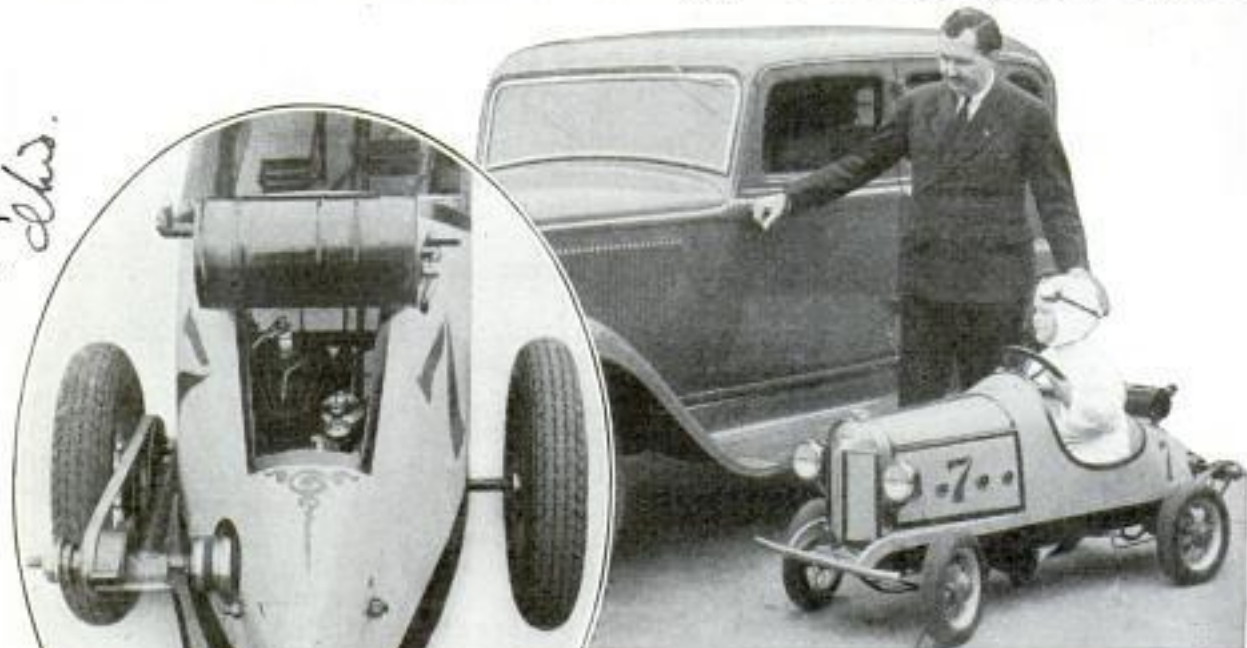


**A**CCORDING to the old maxim, the other fellow's field always looks the greenest. In this country criticism of the government, the financial system, the congress can be heard everywhere. And yet that system, whatever may be said about it, has produced the highest standard of living found anywhere in the world. Cold statistics show that the average income per capita for the whole world in 1930 was \$153. For the United States alone it was \$657. Of forty-eight countries included in the tabulation, twenty-six have a per capita income of less than \$100 a year.

—THE EDITOR.

# Child's Car with Real Engine Is Easy to Drive

*Wholesale American National Co Toledo, Ohio*  
*Director of Research*



Top, Real Car for Child; Left, View from Above Shows Engine and Gas-Tank Arrangement

Simplicity of control and economy of operation are two features of a child's automobile that is driven by a small engine. Designed by R. K. Lee, of the Chrysler corporation, the baby car has a mileage record of more than sixty miles to the gallon of gasoline. The transmission is two-speed, with a belt drive and de-clutching arrangement for starting the engine independently of the rear wheels. There are two pedals, one to engage the clutch and the other to release the clutch and put on the brake. Gasoline is controlled by a screw-thread valve on the engine independently of the rest of the controls. Since it is a two-cycle single-cylinder engine, it does not fire every stroke unless there is a load applied that will absorb the power. Thus is provided ample governing. When in low gear, the car has power sufficient to draw a wagon carrying two grown persons, in addition to the driver and the 110-pound weight of the car. Steel construction adds to the safety. The designer's son, for whom it was built, started driving the car before he was four years old. After a couple of weeks, he was

able to work all controls properly. Owing to the extreme light weight, it is possible for the car to collide with any rigid body, the force being taken up on the bumper, without causing discomfort to the young driver or damage to the car. The possibility of a market for such autos has been suggested by automotive officials who have seen the Lee product.

## PYRAMIDS HELPED TELL TIME FOR ANCIENT MEXICANS

Built by the ancient Aztec Indians, the carved pyramid of Tenayuca, in Mexico, once served as a sun dial that accurately marked the moment when the new year began. The Mexican New Year was July 26. This fact was discovered by Sr. Ignacio Marquina, whose attention was drawn to a possible relationship between the sun and the pyramids when he surveyed the archaeological sites of Mexico. He noticed that the angle at which principal pyramid temples faced was apt to be followed by all monuments and buildings of a city. He also observed that in southern Mexico, the buildings generally were square to the four-world directions and facing astronomical west, exactly between the two points where the sun sets in the summer and winter solstices. But farther

*Mexican government Archaeologist*



Science News Letter  
6/17/33

c995 J. Isilmann  
Ltd. 221

POPULAR MECHANICS

359

High Sh. Smithwick  
FOOT TREADLE DRIVES GRINDER  
AND GRINDSTONE

England  
No. 10 agent  
Knaea

north, he found the main pyramids skewed a little from facing west. They faced slightly northward, the angle of deviation varying with the latitude of the city. At Tenayuca, Sr. Marquina measured the angle which the setting sun makes with the center of that pyramid. He measured it for summer and winter solstices, the spring and autumn equinoxes, and the two times in the year when the sun passes overhead. It was strikingly demonstrated that the building looks directly into the setting sun on May 16 and July 26 of every year. Those are the two days when the sun crosses overhead in the zenith. On those days there is a moment when an upright object casts no shadow because the sun is directly above it. This sign, so easily observed, is the simplest way of marking the passing of a year. In addition, Sr. Marquina found that stars important to Mexican Indians in their religion were stars whose lines of sight coincided with sun lines of the pyramid.



Grinder in Combination with Grindstone Is Shown in Operation; Note the Foot Drive

c996  
WALLS MADE OF COAL BLOCKS  
USED IN BUILDING

Sixty-five tons of coal were used in constructing the walls of a building in West Virginia. The twelve-inch walls are rough-hewn blocks of coal laid with white cement, while the pilasters at the two front corners are of coal sawed by hand to a smooth surface and laid with black cement. The pilasters are flood-lighted from the base, making them stand out in bold relief at night. A heavy coat of varnish gives a glossy finish and protects the coal masonry from the effects of the weather.

Combining a fixed grindstone with a detachable flexible-shaft small grinder, a new foot-treadle grinder is particularly adapted to the home workshop. It operates at 3,000 revolutions per minute. The large stone produces a fly-wheel effect when the small grinder is used, insuring maintenance of a uniform cutting speed regardless of the rhythm of the operator's foot.

BOOKS DETERIORATE IN ACIDS  
FROM CITY'S AIR c1003

Acid from the city's atmosphere causes rapid deterioration in the paper of books stored in libraries. The United States bureau of standards ascribes this deterioration of city books to the presence in the air of small amounts of sulphur dioxide, an acid-forming gas resulting from the combustion of fuels and from certain industrial processes. Concentrations of two to nine parts sulphur dioxide to 1,000,000 parts of air cause marked deterioration of paper in 240 hours. The bureau suggests washing the air before admitting it to libraries.

Emb. Inquith Conly  
986 S Pennsylvania  
St. Denver Colo



This Building Contains More Than Sixty Tons of Coal; the Walls Resemble Stone, but Are Rough-Hewn Blocks of Coal

Williamson, W. Va

Miscellaneous Book  
no. 140 5x

c977

M. M. Hunt  
405 City Hall  
Los Angeles Calif

4142 1/2 Broadway St. N.Y.C.



Here's How New Copy Holder for Typewriter Handles City Directory or Other Heavy Book

**COPY HOLDER FOR TYPEWRITER TAKES TEN-POUND BOOK**

Copy weighing several pounds is held for the typist by a device equipped with adjustable sliding rests. The holder will take a book weighing ten pounds or more. The rests at the back of the frame hold the book in place and keep the face of the book flat. The machine has a marker which can be moved evenly up or down by using a small hand wheel. A release bar returns the marker to the top of the holder, out of the way, when a page is to be turned.

**HARDEST PART OF SEA FLYING IS TRAINING FOR IT**

c986

What is the hardest part of transatlantic or transpacific flying? The average person thinks immediately of the danger, the nerve-wracking vigil at the controls or the battle with fate during that long period without sleep. To those aviators who have braved the unknown, none of these things is consequential, because the actual flight is but a trifle compared to the months of planning and training, of studying and working that they have gone through before the take-off. For more than a year before James Mattern started

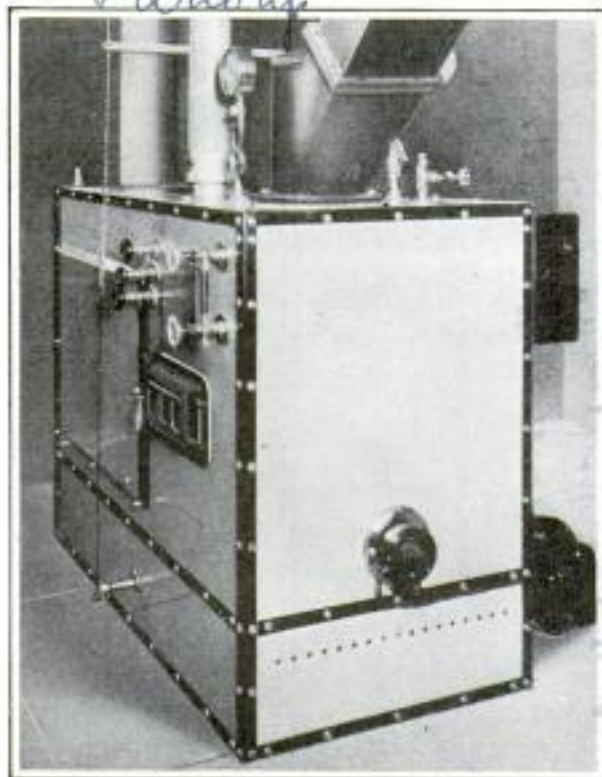
on his attempt to fly around the world alone, he prepared for the trip. The last two months before the start were spent on a cattle ranch as a cowhand to toughen his muscles for the long hours of flying. Wiley A. Post and Col. Charles A. Lindbergh spent many hours just sitting in the cockpit of their planes on the ground, building up their nerves to the monotony of an ocean flight. Thus the hardest thing about ocean flying is training for it.

c997

**FURNACE CONDITIONS HOME AIR FOR WINTER OR SUMMER**

Air in the home may be heated in winter, cooled in summer, humidified or dehumidified and washed by a furnace recently placed on the American market. The plant also provides hot water and running ice water, in addition to operating the kitchen refrigerator and the clothes drier in the laundry. A considerable saving in fuel is claimed, in comparison with the ordinary furnace which only heats and provides hot water in the winter months. Firing is automatic. Nothing has to be done from the time the hard coal is placed in the bin until the ashman comes, once in three months, to empty the ash hopper.

Parsons



This Trim-Looking Furnace Makes the Home Livable All Year by Conditioning the Air

Genl. Ernest W. Fair 801  
S. W. 39th St  
Oklahoma City, Okla.

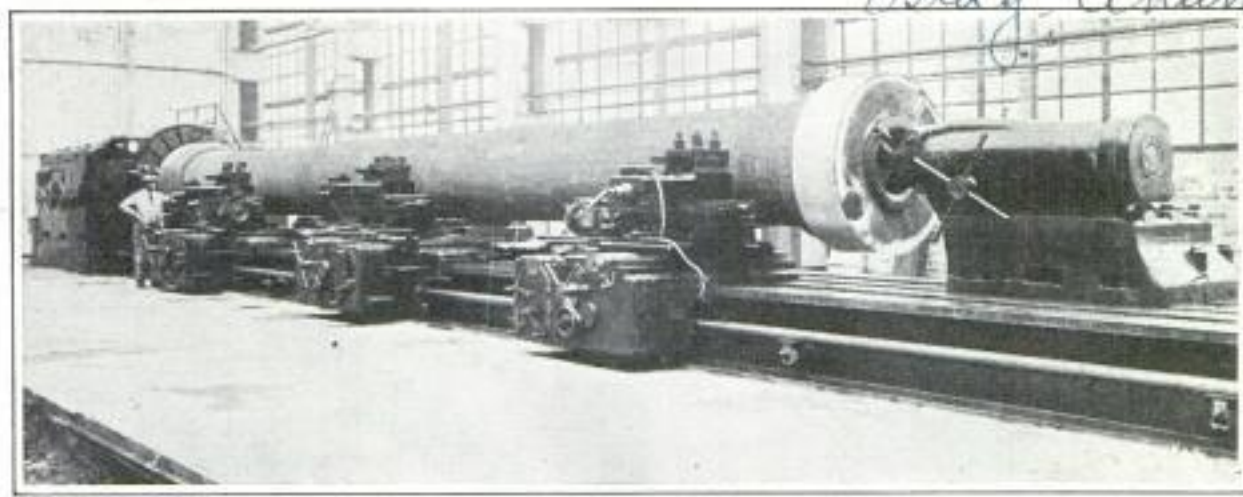
Philadelphia and  
Reading Coal & Iron Co.  
Reading Terminal Phila

0972 Schuss. Defries A. Is Russeldorf  
Germany.

U.S. Schuss-Defries 2 Mountain Square

# Big Center Lathe Handles Hundred-Ton Jobs

Bldg. Cincinnati Ohio



A 150-Ton Center Lathe with a Bed Ninety-Five Feet Long; the Height of Its Center Is Thirty-Nine Inches and It Is Driven by a 350-Horsepower Motor

Since the days when cutting tools were made of plain carbon tool steel, machine-tool design has progressed by leaps. One leap was the development of high-speed steel, and another has resulted from the introduction of cemented-carbide cutting tools. However, many of the heavy machine tools of largest sizes yet in service were built in the carbon-tool era, and with these old machine tools still in use, "farming out" exceptionally large heavy jobs is costly. A German firm has produced a series of heavy machine tools of the cemented-carbide type of which the center lathe pictured is an example. The length of its bed is ninety-five feet and the height of the center is thirty-nine inches. It weighs 150 tons and is for machining jobs up to 100 tons in weight.

water which would fall later as rain. Under existing conditions, the rainfall that does occur is lost, as the rivers flood for a time and then dry up, due to deforestation in the watersheds and along the banks. If this surplus water could be impounded in man-made lakes over the desert, it is claimed that the climate would be altered.

U.S. News 6/24/33

## TRAILER LINK ABSORBS SHOCKS FROM ROAD AND AUTO

Shocks in starting and stopping are said to be absorbed by a trailer link devised by R. C. Halier of Chicago. A double-spring arrangement features the link, which connects the trailer to the auto or truck for towing purposes. While only a small bolt

936 N. Lockwood Ave

Tel. Austin 4681

## GIGANTIC LAKES TO BRING RAIN PROPOSED FOR DESERT

Millions of acres of land may be brought under irrigation for cultivation, and rainfall may be increased over 1,092,000 square miles of desert in the Union of South Africa under a plan now being considered. It is proposed that the several rivers and streams be diverted to create gigantic lakes in the Kalahari desert. The late Prof. E. H. L. Schwarz, an outstanding geologist, suggested the plan, pointing out that the creation of huge lakes would increase the amount of rainfall, as the sun would have an opportunity to draw up



Hookup for Trailer Is Absorber for Road Shocks; Auto Is Connected at the Right

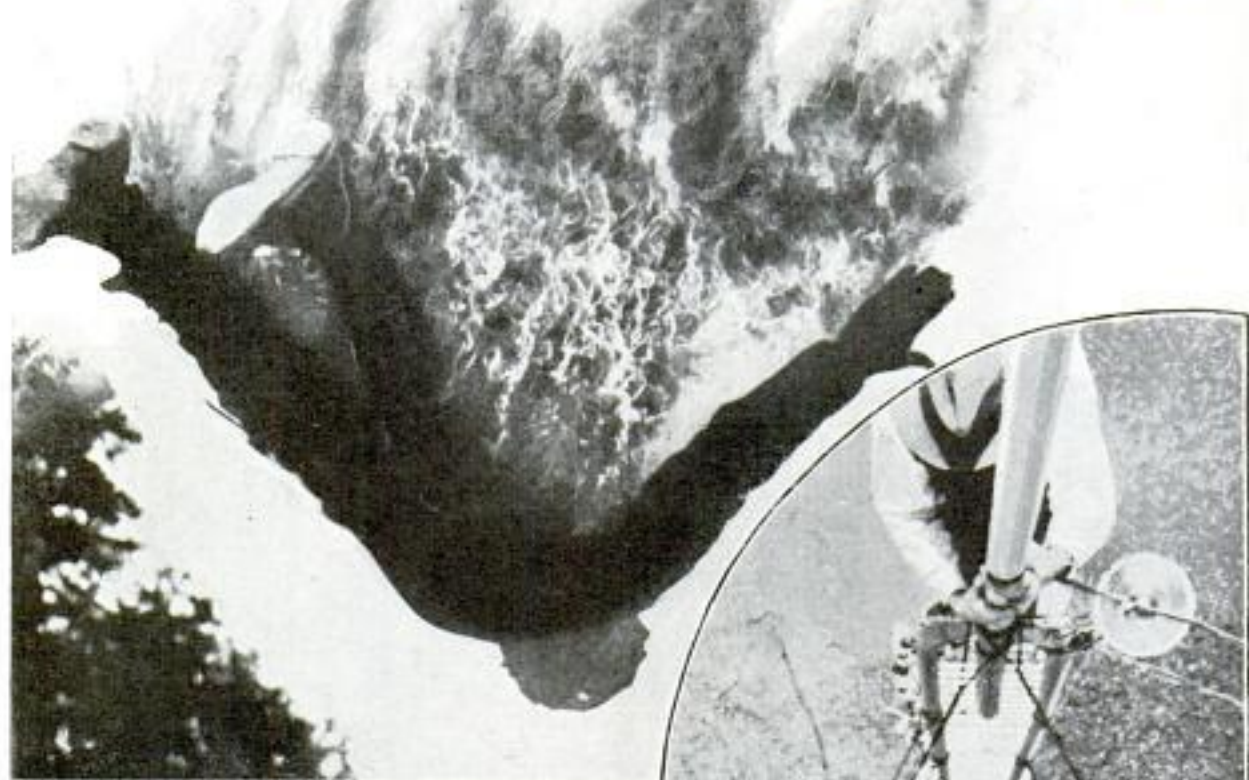
completes the connection, it is large enough to handle trailer loads of more than one ton. A swivel joint increases the flexibility of the link for side and up-and-down movement.

reported to Dept. of Commerce

Consult General Irving  
N. Linnell  
Capetown, South Africa

c932 Jeff Harris, c/o The San Antonio  
Light, San Antonio, Texas

# The Real



OF all the death-defying exhibitions, fire-diving is one of the most dangerous, because the diver has no nets, no insurance and no safety devices. One mistake closes the show.

Briefly, the exhibition consists of a blind leap backward off a 100-foot pole, with gasoline-soaked clothing aflame, into a burning tank fourteen feet across and five feet deep.

Capt. Ben Mouton, who made the first "back lay-out" fire-dive in 1926, is the veteran in this field, having made upward of 600 dives. He and his student, Capt. Leo Simon, and others of the school owe their continued existence to a secret that has been carefully guarded for the seven years in which such exhibitions have been given.

The trick is the manner in which the diver "aims" himself at the tank below. He stands backward on the edge of the perch, a small plank atop the pole, with his hands on his hips, his toes on the edge of the perch, and his heels entirely off the perch. By looking downward he aims through his heels, which are touching each other, military fashion, sighting along his legs and through the triangle of his heels

Top, Off the Perch with Clothes Aflame; Right, Diver's View of the Tank from the Top of the Ladder, More Than 100 Feet High

# HELL-DIVERS

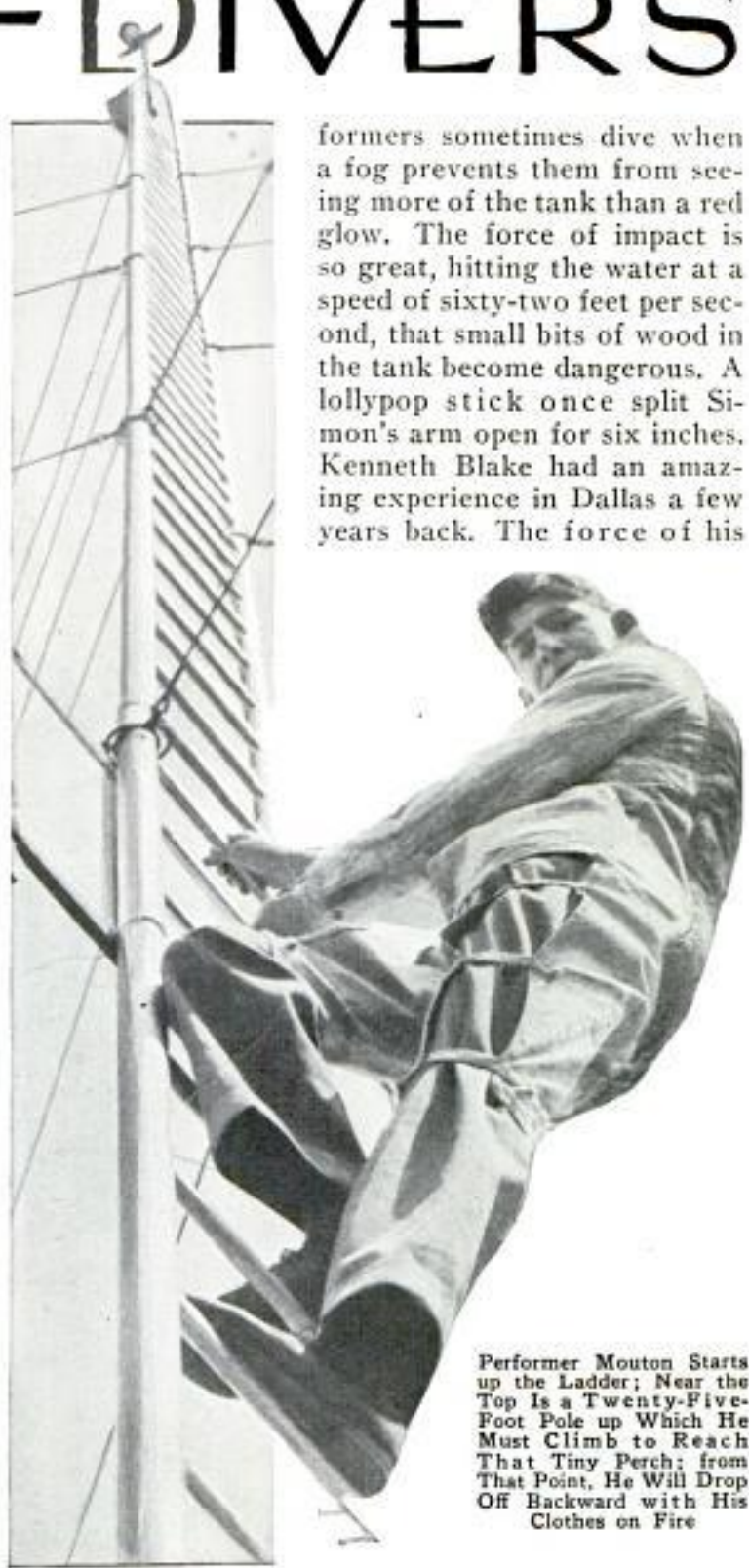
like a hunter sighting along a gun barrel. Slowly he adjusts his body until his heels "sight" the exact center of the tank. Then he gives a signal, the oil-covered tank below is set afire, he applies a torch to his gasoline-soaked clothing and falls backward, turning in the air and hitting feet down in the tank.

The moment of greatest concentration and danger is when he starts to fall. The slightest half-inch movement of the perch would be fatal. Consequently the diver's greatest fear is that the wind will sway the perch or that some spectator will lean on a guy wire. For this reason, most divers have tent hands guard all guys during the dive.

If the diver waits too long after the gasoline is poured over him, he flirts with another danger. The gasoline and the air form a gas pocket under his clothing which frequently explodes just as he "leans back" off the perch. The diver must remember not to wait too long after his suit is ignited to jump. Occasionally he stays on the perch until the heat becomes unbearable, forgetting that he will continue to blister as he drops through the air.

"Just before I set fire to my clothing, I steel myself not to kick when I dive backward," according to Simon, who has averaged three dives a week for three years. "While I am in the air and about thirty-five feet above the ground, I turn so that, for one fraction of a second, I see the blazing tank beneath me. At that instant I relax and hit the water like a rag."

If the diver stiffened his body when he hit the water, he would shatter his spine. Once in the tank he bends forward and his feet swing him back to the surface. Per-



Performer Mouton Starts up the Ladder; Near the Top Is a Twenty-Five-Foot Pole up Which He Must Climb to Reach That Tiny Perch; from That Point, He Will Drop Off Backward with His Clothes on Fire

formers sometimes dive when a fog prevents them from seeing more of the tank than a red glow. The force of impact is so great, hitting the water at a speed of sixty-two feet per second, that small bits of wood in the tank become dangerous. A lollypop stick once split Simon's arm open for six inches. Kenneth Blake had an amazing experience in Dallas a few years back. The force of his

fall split the tank and the walls fell away so that Blake found himself sitting on the waterless tank bottom.

From Steve Brodie's day to the present, the official record for plain diving (without fire) has climbed from the 125-foot



Fourteen-Foot Tank at Which Diver Aims

Brooklyn bridge to the present 230 feet, which was unofficially broken in Japan last year by a 245-foot dive. A non-professional diver recently made a dive reputed at 300 feet from an airplane into a bay.

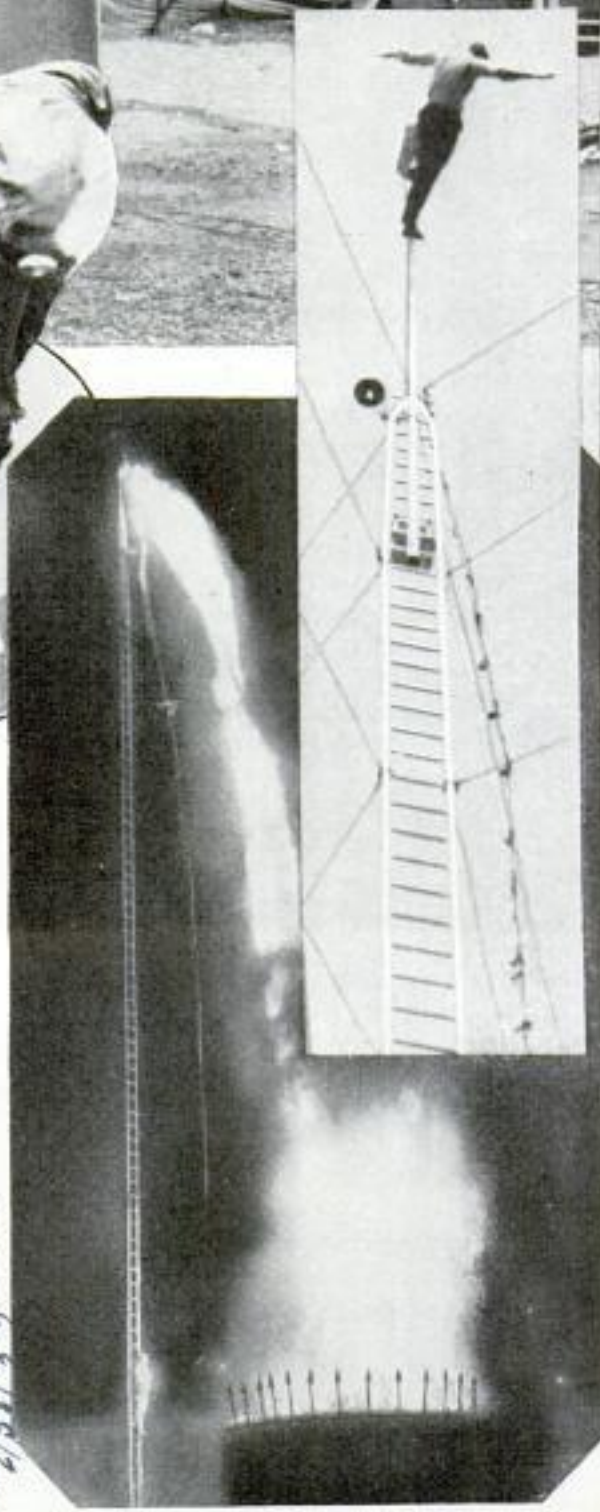
The fire-diver is frequently nervous an hour before the dive, but seldom after the band is playing and the crowd is watching; then he hasn't time to get scared. Divers do get rather tired, however, of having people ask them seriously: "Did you ever miss the tank?"

**'WATCH DOGS' DRAW LIGHTNING TO MEASURE ITS FORCE**

Small metal "watch dogs" have been placed near high-power transmission lines in Pennsylvania to attract lightning. When lightning strikes the power-line towers, it also hits the metal watch dogs, causing their molecules to snap into parallel lines and magnetizing them. By measuring the amount of "straightening" in the molecules, engineers determine the amount of current in the bolt. From an examination of fifty watch dogs, it has been found that the average bolt carries about 25,000 amperes, compared to the 500 amperes necessary for operating an electric train.

e1028  
C. M. Fough  
and W. W. Lewis  
General Electric Co  
Schenectady, N.Y.

Herby Gagner



Center, Left, Diver Sighting at Tank; Right, Stunting Before the Dive; Bottom, Fiery Leap at Night

Fisheries Advisor to  
Siamese Government

C 1001 Chas. R. C  
Halfer,  
936 N. Lockwood Ave

POPULAR MECHANICS

365

Smithsonian Institution 7/3/33

**CURIOUS CREATURES OF SIAM  
FEARED BY NATIVES**

Weird curiosities of nature, feared by natives as spirits, were found in remote sections of Siam by Dr. Hugh M. Smith as he collected zoological material for the Smithsonian Institution. In the mountains of northern Siam, Doctor Smith pitched camp on a river bank covered with a living carpet of daddy longlegs, with legs nearly three inches long. The entire surface of the land seemed to be in motion. When the creatures became active at dusk, they made a noise like falling raindrops as they moved over dried leaves on the hillside. On one expedition, Doctor Smith ascended a reputedly "haunted" mountain. On the grass-grown summit, he found pine and chestnut trees garlanded with hanging orchids and with lithe gibbons leaping among the branches. This cloudland forest contained chattering monkeys, barking deer, several species of squirrels, including one rare giant form, bamboo rats, porcupines, and black bears with nests in chestnut trees where they fed on the nuts. There were flocks of imperial pigeons and various other birds not found elsewhere. On an island off the western shore of the Gulf of Siam, Doctor Smith found a strange white squirrel.



Chicago  
Tel  
Acker  
4681

Small Engine at Right Drives This Arrangement for Lighting a House of Fourteen Rooms

**TINY MOTOR RUNS LIGHT PLANT  
FOR FOURTEEN-ROOM HOUSE**

Constructed almost entirely of second-hand materials, a homemade light plant to serve a large house has been devised by Raymond C. Halfer of Chicago. A tiny motor, only one and one-half horsepower, drives the generator, which was taken from a Ford automobile. Two second-hand auto storage batteries, two used Ford fuses, a throw switch, sixteen thirty-two candlepower Ford headlamp bulbs, inexpensive reflectors, an ammeter, sockets and necessary wiring complete the outfit. Eight lamps are supplied current from each battery. Operating costs are low, about \$1.50 per month for the plant, which was installed in a fourteen-room summer-resort home. At the end of six months, the repair costs amounted to about one dollar, this being for work on the little one-cylinder engine. A feature of the outfit is that the motor, which is fastened firmly to its own individual base, can be disconnected from the generator and used for other work around the farm or summer home. While the plant operates well with the secondhand motor, the builder pointed out that a new engine probably would result in a reduction in running costs. The outfit can be converted for 110-volt purposes.

**VENTILATOR FOR CLOSED CARS  
IS STREAMLINED**

Several different makes of cars can be fitted with a window ventilator which differs from the conventional windshield wing in that it is molded into the streamlines of the car, is permanently installed outside the car on the front door, and is not adjustable. Installation is accomplished by drilling eight holes in the outer flange of the front door and bolting the ventilator to it. The glass in the ventilator is set at a slight angle to the glass in the door, which, when the car is in motion, sets up a partial vacuum causing a flow of air from the inside of the car out.



Vacuum Tube

over 94 - \$15.50

Handpalle Hershey Corp  
Teak Products Dist  
Palmolive Bldg. Chicago

ways motor sold by  
Whipple. The  
Motorcycle manual  
1227 W. Jackson Blvd  
Chicago

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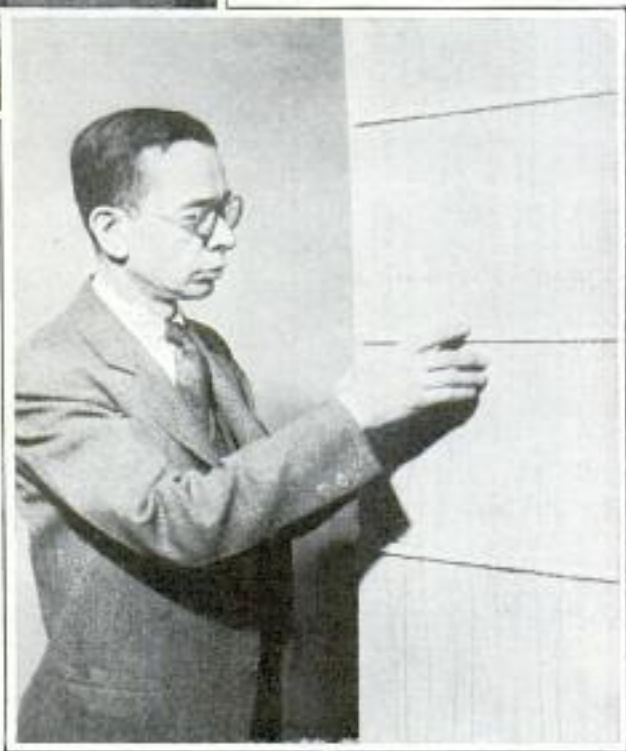


the walls, about twenty per cent by evaporation and the rest to the air. If the walls and ceiling are the same temperature as the body, there can be no radiation and to be comfortable, the air must be much cooler to increase the transfer of heat to the air. Thus, by heating the walls and ceiling to eighty degrees by electrical current flowing through wires in the pan-

Top, Measuring Heat Given Off by the Body and by Wires in Wall; Right, Wiring Installed

### WIRES IN WALLS HEAT ROOM WITH AID OF HUMAN BODY

Using the human body itself as the principal source of indoor heat and keeping the body comfortable by controlling the body's radiation of heat is suggested by L. W. Schad, of the Westinghouse Electric and Manufacturing company, as the result of tests in that company's laboratories. The walls of the experimental room are heated electrically and fresh air, taken directly from the outside, is led in through ducts in the ceiling. There is a warm, comfortable feeling in the room with the air in the fifties and the walls at eighty degrees Fahrenheit. In a room heated by present-day methods, air in the fifties feels decidedly cool. Under normal conditions, a human being gives off about 400 British thermal units per hour, enough to warm about three pints of water from room temperature to the boiling point. This normal emission of heat is given off by radiation to cooler walls and objects. If the loss of this heat is reduced, we feel warm, and if increased, we feel chilly. Comfort regulation, therefore, is a question of controlling heat emission from the body. This can be done by adjustment of air temperature, humidity and radiation. Of the 400 British thermal units given off by the body, about forty-four per cent is through radiation to



els, loss of heat from the body is checked, while bringing in cool, fresh air produces a sense of comfort seldom experienced under present heating arrangements.

### "GUN" FIRED AT HEART OF ATOM TO FREE GREAT ENERGY

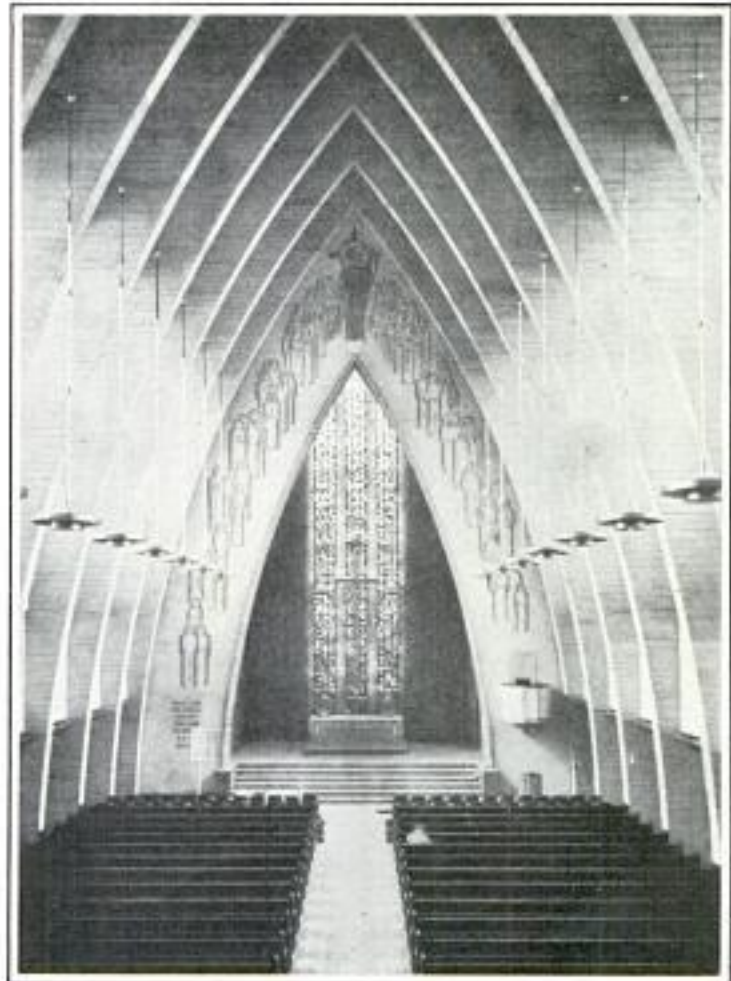
Release of enormous stores of energy has been accomplished by firing a new kind of "gun" at the heart of atoms. The weapon is known as the "Deuton," which is the mysterious nucleus of the recently discovered heavyweight hydrogen, which has a mass twice as heavy as ordinary hydrogen. Whirling these deuterons by means of one of the most powerful magnets in

Research Laboratories  
P. A. Pullshur

c 959



the world, until they attain an electric charge of 1,330,000 volts, these "bullets" are fired into the heart of an atom. The marksmanship is poor, only about one in 1,000,000 striking the target. But the one that does hit the mark liberates about 1,000 per cent of the energy put in. When these bullets hit the nucleus of the lithium atom, they break down one of the many potential walls which guard the energy stored up within the atom and release alpha particles, or helium nuclei, having an electric charge of 12,600,000 volts, or nearly ten times greater than the deuteron. This atomic energy liberator was developed at the University of California by Prof. Gilbert N. Lewis, Prof. E. O. Lawrence, Dr. M. Stanley Livingston and Dr. Malcolm C. Henderson.



Looking Toward the Altar in One of Germany's Most Modern Churches; Note the Unusual Treatment of the Interior

on Heringgoller Idam

*Berkeley* *8952*  
**JAR CAP EASILY REMOVED WITH TABLE KNIFE**

Nothing except a table knife is required to remove the cap from a glass jar if the top happens to be one of the knife-opening kind. This cap has a wide groove in the raised top which permits the insertion of an ordinary kitchen knife. The powerful leverage thus obtained enables the housewife to open easily the most tightly sealed jar. All that is necessary is to insert the knife and turn. After the seal is once

*the cap*



Jar Cap with a Groove in the Middle Which Can Be Opened Easily with a Table Knife

broken, the top can be screwed on tightly by reversing the action.

*Armas - Allinas Idam Co,  
Toledo, Ohio*

*Acme*  
**ULTRA-MODERN CHURCH DESIGN USED IN GERMANY**

Advanced in design, Berlin's newest church is ready to receive its congregation. The architecture is ultra-modern, even for buildings other than a church. It is the work of Professor Hoeger, designer of the Chile house of Hamburg.

*C1049*

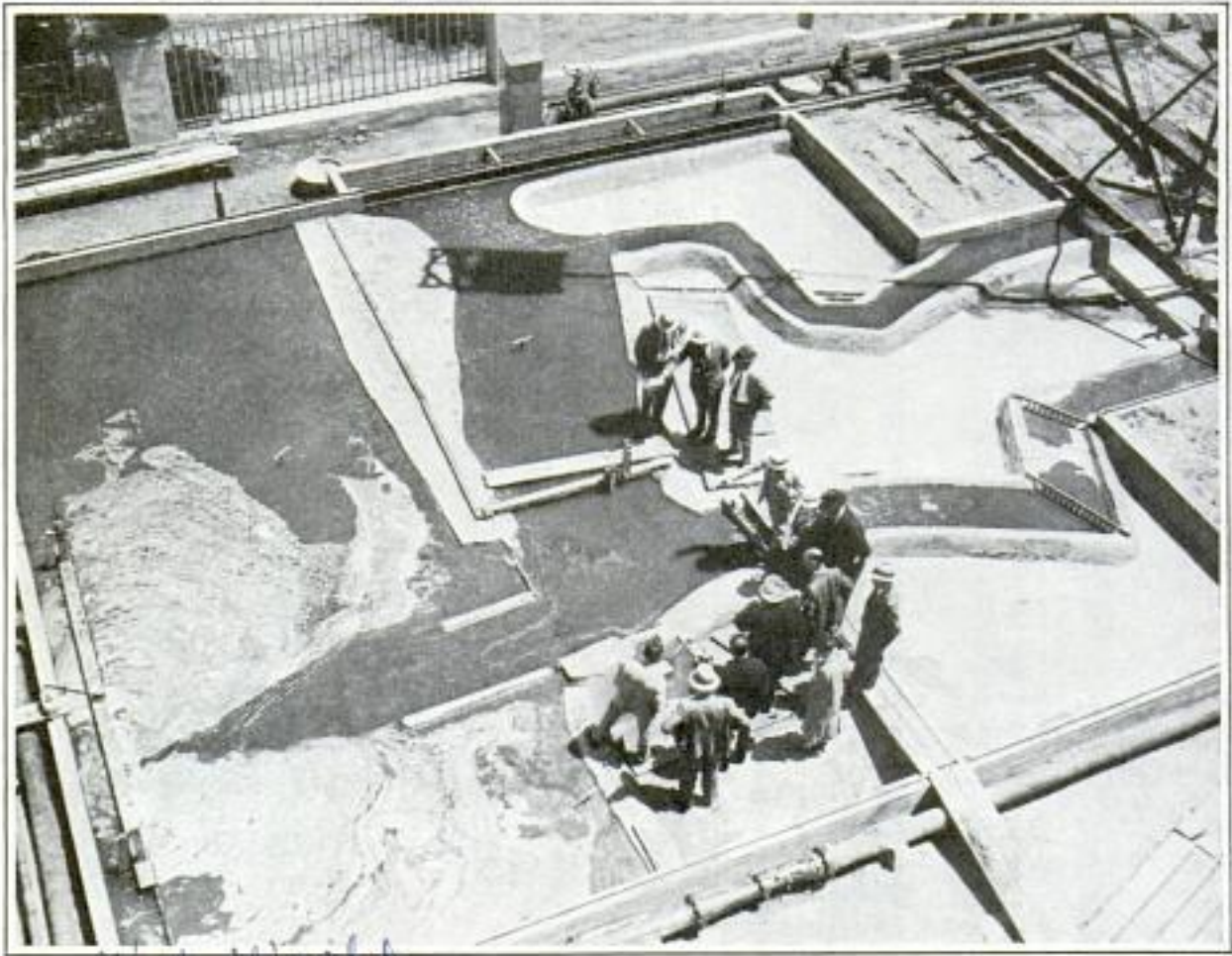
**CAMERA AIDS TRAFFIC STUDY BY RECORDING FAULTS**

*Following Highway Eng*  
 Moving pictures of traffic in motion, taken with definite time intervals between photographs, are used in studying the causes of traffic jams. Bruce D. Green-shields, of the University of Michigan, who originated the method, sets his camera at right angles to the road, trained on two poles or other objects a known distance apart. Each auto photographed appears in two pictures and the distance it has moved in a given time is determined.

*Highway Eng Dept.*

2987

# Mimic Flood in Model Tests Control Project



*W.D. Wall*  
 Scientists Are Shown Studying the Effect That Floods Would Have on Proposed Control Works; This Scale Model of a California Bay Helps to Show What May Be Expected; a Wave-Maker Also Is Used

Using scale reproduction in miniature of the Alamitos bay district of California, scientists send a mimic flood down its waterways to test its effects on present and proposed flood-control channels, jetties and beaches. The model is complete, even to beaches and piers. A wave-maker simulates action of the surf from the seaward side. By means of the tests, accurate information is obtained on the carrying in of silt and debris by the San Gabriel river, and in erosion on adjoining beaches. The model, covering 2,000 square feet, is set up at the California Institute of Technology.

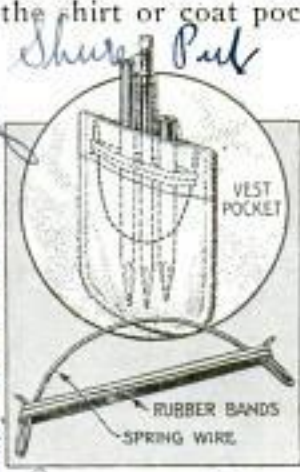
*Pasadena, Calif.*  
**OIL IN WASTE GAS RECOVERED BY ABSORPTION PLANT**

Experiments for recovering additional naphtha from the millions of feet of natural gas going to waste in one Canadian oil field have been successful. By means

of an absorption plant, one operator is recovering naphtha at the rate of 124,000 barrels per year, valued at nearly \$375,000.

*2958*  
**RUBBER BANDS HOLD PENCILS IN SHIRT OR COAT POCKET**

Pencils can be kept from falling out of the shirt or coat pocket, when the owner stoops over, by rubber bands stretched across the opening in a half-circle of wire under tension. The pencils, or other small articles, are inserted between the rubber bands after the wire device has been fitted into the pocket.



*in Long Beach, Calif.*

*(Cont. Montague) 1013*

*Turner Valley, 40 miles S.W. Calgary, Alberta*

*West G.P. Inc. Chicago*

*Eger Bait Co., Bartow, Fla.*

**SODIUM-VAPOR ELECTRIC LAMP  
 BETTER AS STREET LIGHT**

More efficient than the ordinary street-lighting bulb, a sodium-vapor electric lamp gives a yellow glow that provides from three to four times as much illumination, for the same amount of electricity consumed, as the best tungsten filament lamp. Because of the effect on the eyes of the yellow glow, the aid to vision is said to be sixteen to twenty times as great as that of ordinary electric lights. The sodium lamp consumes eighty watts of electricity and gives 600 candlepower of measurable light. A feature is that the lamp gives a glow that casts no appreciable shadow from obstacles placed in its path. This is favorable for night automobile driving because objects and obstructions along a road will stand out in bold relief in the sodium light, without the blinding glare of other systems of high-intensity direct lighting. In European tests, autos have been driven at fifty miles per hour along a sodium-lighted highway with their headlamps turned off. The bulb is about the size of the ordinary incandescent lamp and contains a small amount of neon gas and metallic sodium. When the filament is heated by a current passing through it, the neon glows with a reddish light, which changes to a brilliant yellow as the sodium is vaporized.

described by H. Calverell, Pres. N.Y. Job

**COMBINED TIRE VALVE AND CAP  
 FITS AUTO BIKE OR TRUCK**

Combining the tire valve and cap into one leak-proof device, a two-in-one air valve fits any standard stem on automobile, truck or bicycle. After removal of the cap and plunger core, it is easy to install the device. Inflation of tires is quick and positive, and proper inflation is maintained longer. The unit is threaded for a hand pump. Replacement of valve cores is eliminated. Double seating seals the air inside the tire, preventing leaks.



Replacement of valve cores is eliminated. Double seating seals the air inside the tire, preventing leaks.

Capital Mfg. Co. Suite 201  
 304 N. Pearl St. Indianapolis, Ind.

Capital Mfg. Co. Suite 201  
 304 N. Pearl St. Indianapolis, Ind.



Bird Cage Made by German Metal Workers. Which Has a Clock in the Bottom



**CLOCK IN BOTTOM OF BIRD CAGE  
 ENCOURAGES SONGSTERS**

German peasants of the Black forest are skilled in making metal work of intricate design, and one of the pieces they offer is a bird cage with a clock in the bottom. It is claimed the birds become accustomed to the chimes and usually begin to sing as the clock announces the hour.

Wed. Work

**NOTHING FALLS TO PIT BOTTOM  
 DUE TO EARTH'S MOTION**

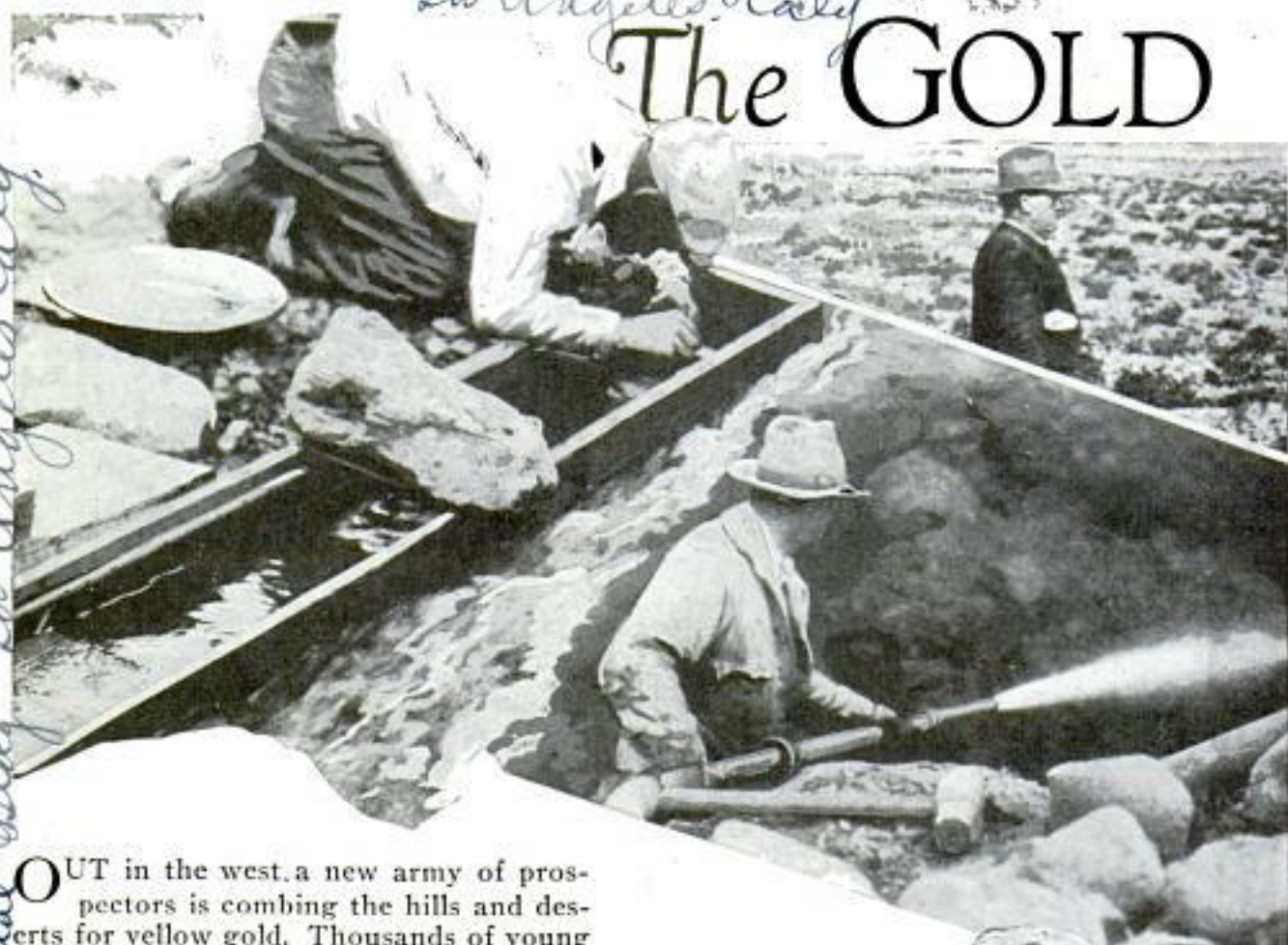
Due to the earth's motion, nothing can fall to the bottom of the deepest mine shaft. A wrench dropped from the mouth of the shaft was found lodged against the side of the shaft several hundred feet down. Later, the Michigan College of Mines conducted tests along this line, using a marble suspended by a thread about twelve feet below the mouth. When the marble was motionless, the thread was burned by the flame of a candle. The marble fell, but only to a point 500 feet down, where it stopped on the east wall. The test was made at the Red Jacket shaft of the Big Calumet and Hecla copper mine.

C930  
 Cnd. Kenneth P. Wood, 110 N. 49th St. Platte

at Calumet  
 Copyright material

C788  
Cmt. Thomas E. Stinson Jr  
1450 S. Spring St  
Los Angeles, Calif

# The GOLD



General information on prospecting, assaying, equipment, *Wesco Assayers, Subroad Terminal*  
Bldg. Los Angeles Calif.

**O**UT in the west, a new army of prospectors is combing the hills and deserts for yellow gold. Thousands of young men have joined the rush of '33. Some of them are prying into river beds for nuggets and dust and others are boring into the ground in quest of veins of ore.

Only a part of the gold in the west was uncovered in the exciting days of '49. For one thing, the early miners sought only the rich bonanzas. Low-grade ore and ore that held its gold locked up with other minerals were considered worthless. Scratching on the surface, the first gold seekers missed many rich deposits. Today trained prospectors are finding valuable veins in areas that have been gone over time and again.

Also, hundreds of square miles of barren hills and deserts in the southwest are being prospected for the first time. Although the country is rich in minerals, the early gold seekers were restricted to forty-mile circles around the water holes, for a burro could carry only enough water to last that far. Today areas that used to be inaccessible are now only a few hours from civilization. In California, as one example, new roads have opened the Coxcomb mountains, the Calico range, and

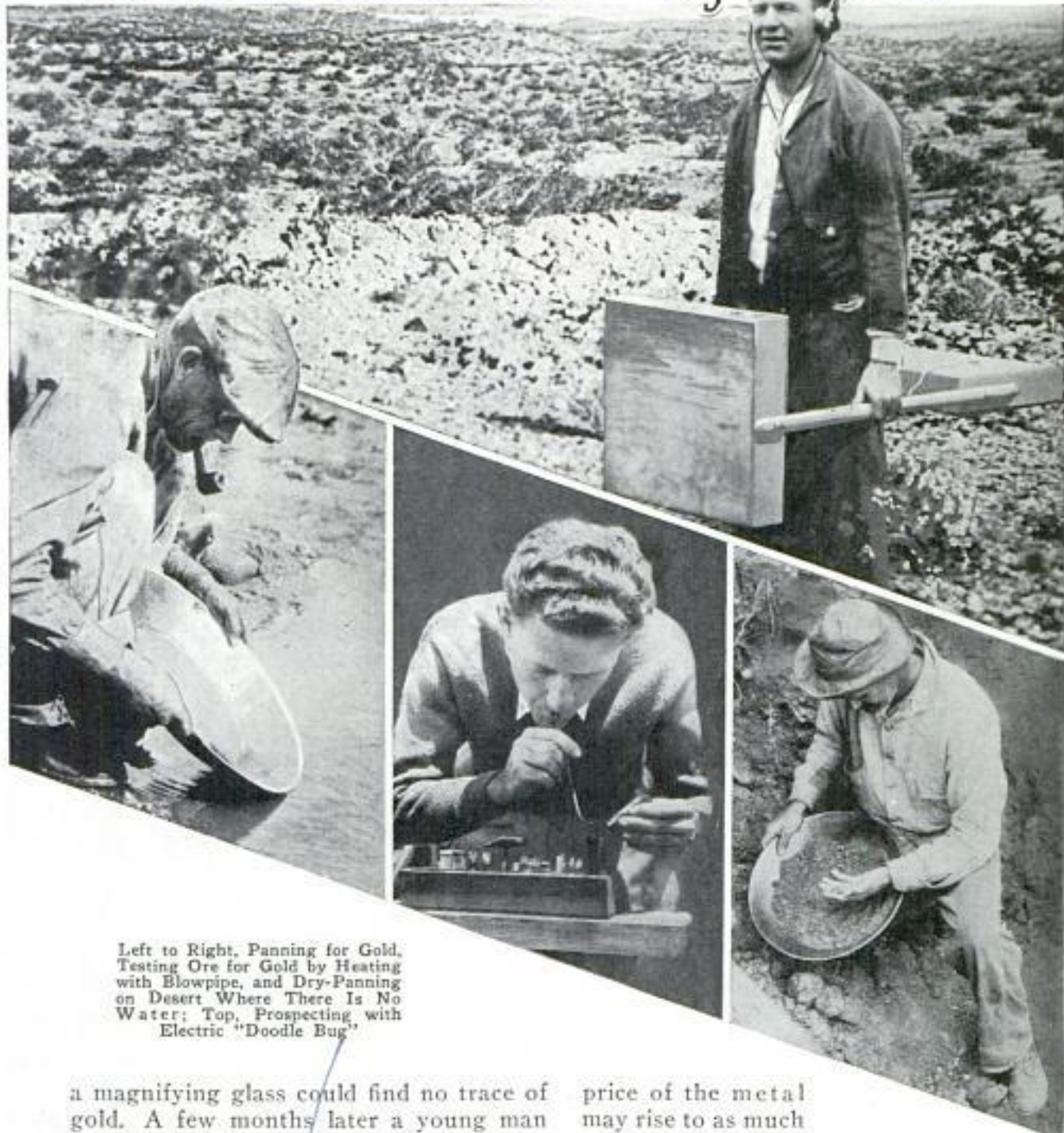


Top, Picking Out Flakes of Gold Retained in Sluice Box, and Washing Down a Gold-Laden Gravel Bank; Below, Examining Ore through Cobalt-Colored Glass

the Bullion and Chocolate mountains to hundreds of prospectors. Another reason why gold is still waiting is that few of the old prospectors recognized good ore when they saw it. A man who knew mother-lode quartz looked for that alone, although gold occurs in many other types of ore. Not long ago a grizzled prospector stumbled on an outcropping of weathered rock. He chipped off a few samples but under

Blowpipe outfit - Denver C 788  
 Zinc Clay Co.  
 1912 Champion - Denver Colo

# SEEKERS of '33



Left to Right, Panning for Gold, Testing Ore for Gold by Heating with Blowpipe, and Dry-Panning on Desert Where There Is No Water; Top, Prospecting with Electric "Doodle Bug"

a magnifying glass could find no trace of gold. A few months later a young man tapped at the same ledge with his prospector's pick. Even a complicated field test failed to indicate gold, but he played safe by staking out a claim and mailing a sample to an assay office. The ore proved to be rich in "rusty gold" that revealed its identity only in the assayer's fire.

Pure gold has a standard value of \$20.67, and monetary experts believe that if the gold content of the dollar is reduced the

price of the metal may rise to as much as forty dollars an ounce. A few years ago when the cry for more gold came thousands of men began to wash the precious stuff out of western rivers. Even sands that had been panned and sluiced by earlier miners were re-worked. This year the search is taking a different direction. Men who have been washing out placer gold are turning to hard-rock prospecting, seeking the ledges

Melatrope Sales Co  
 Dept. P 1040  
 Broadway

Los Angeles, Calif.



Above, When Concentrates from Panning Contain Gold, a Trail of Colors Is Exposed by Dribbling Material from Horn Spoon into Pan of Water

that furnished the gold to the streams.

Prospectors can earn a minimum of half a dollar a day by panning for placer gold but they stand a chance to make a small fortune if they find a ledge of gold ore. With a fifteen-dollar-a-month grubstake a man can spend all his time hunting the richer veins. Ore that runs ten dollars a ton can often be worked at a profit, and sometimes a gold hunter stumbles on a ledge that assays several thousand dollars a ton.

A prospector on the hunt for a ledge selects a stream and pans for "colors." If

the particles of gold are rough and unworn the chances are that it is of local origin and that the ledge is on higher ground upstream. Dry channels that carry water only during spring floods are prospected by dry panning, swirling the dry sand around in the gold pan and spilling out the light materials until only heavy concentrates remain. Three tests determine gold: it is yellow and heavy, it flattens instead of crushes under a hammer, and it is not affected by nitric acid.

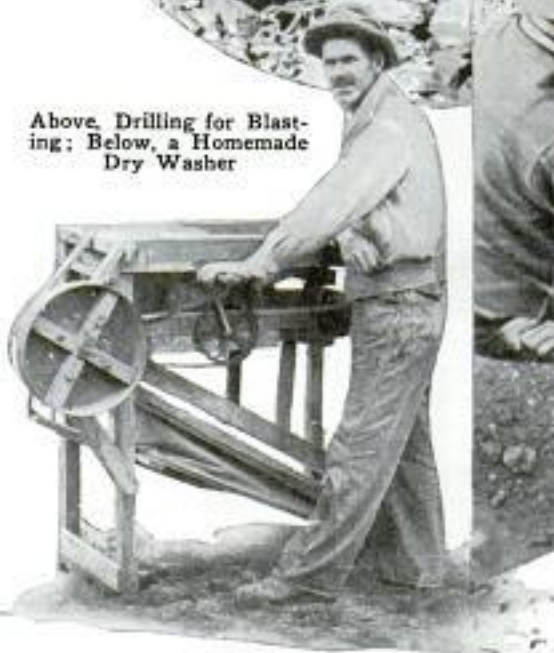
The prospector works his way upstream until he reaches a place where no gold can be panned out. Then he takes to the sides of the valley. Old prospectors had a superstition that the

right-hand branches of a stream, facing down, were the richest, so the wise prospector today pays more attention to the hillsides on the left hand.

Following a trail of gold to its source is easy if pilot stones from the ledge are



Above, Drilling for Blasting; Below, a Homemade Dry Washer



Above, Tamping in a Stick of Dynamite Preparatory to Loosening Yards of Rock

C988

found in the stream bed. The pilot stones contain fine flakes of gold, or may be colored green with copper or black with manganese. As the prospector makes his way upstream the pieces of float become larger and less worn. Then, when no colors can be panned from the river sand, the prospector looks for pieces of float on the adjoining hills. They may lead straight to the ledge. If the ledge is hidden, the prospector trenches the ground until he finds it or until he reaches the conclusion that it has been covered by a slide. A change of surface vegetation indicates a change of formation where the vein may lie. If a spring is in the vicinity it is probable that it flows from a vein which may be mineralized. Rich veins are porous.

A rough idea of the



1942 Chamisa, Oregon



Typical prospector and his companion exploring Old River Channel



Top, Breaking Up Ore Sample for Chemical Test; Below, Using Hydraulic Outfit Which Is More Rapid Than Panning by Hand; Left, Identifying an Ore by Comparing It with Samples

Denver Fire Clay

value of ore is found by crushing one pound of the rock until it sifts through a cheesecloth screen. Then the ore is panned in the gold pan and examined for colors. One flake of gold the size of a pin head is worth a cent, and ore that yields one cent a pound or twenty dollars a ton is valuable. In the average mine only one part

in 70,000 parts of vein material is gold. A cubic yard of vein weighs two tons, and an eighteen-inch vein weighs one ton every square yard.

Gold is traditionally associated with white quartz but prospectors now know that many other types of rock may carry gold in large quantities. In the show window of a western assay office recently were displayed samples of ore from a dozen different mines. One sample looked like slag from an open-hearth furnace, another

(Continued to page 123A)

Minerals - Ward's Natural Science Establishment  
302 N. Broadman, Red



Stringed Instruments without Sounding Boards; Right, Device That Replaces Sound Box

### PURE-TONED ELECTRIC VIOLIN HAS NO SOUNDING BOARD

Lacking a sounding board but productive of pure, even tones, a new violin is equipped with a small electromagnetic pick-up concealed under the instrument's bridge. When the violin is played, the vibrations of the strings and bridge are converted into electrical energy by the magnetic pick-up and carried to an amplifying unit and loud speaker. The output of the instrument can be plugged into the amplifier of any home radio set without the aid of additional apparatus. A variable tone and volume control changes the timbre at will. Volume to fill a large auditorium is available. The inventor, Victor Pfeil, expects to adapt the pick-up to cellos, guitars, and other stringed instruments.



the air wave blown off at the time of the collision was so great that men and even horses were knocked over 500 miles away, and meteorological stations 800 miles away registered the gust of wind. After the meteorite had struck, the atmosphere was filled with a cloud of silvery dust which spread over western Siberia and was visible in eastern Europe. Fortunately it fell in one of the most desolate regions of the entire world. The first expedition to search for the meteor was started in 1921 but it was not until 1927 that the actual site seems to have been found. Far away from the actual point of impact, evi-

### SEARCH FOR HUGE METEORITE WHICH SHOOK THE EARTH

Some idea of what might happen if some planet should collide with the earth may be obtained from an exploration of what did happen when a mere fragment from outer space struck the earth twenty-five years ago. The largest meteorite known to have hit the earth in modern times fell

*San Diego Union*  
*6/14/33*

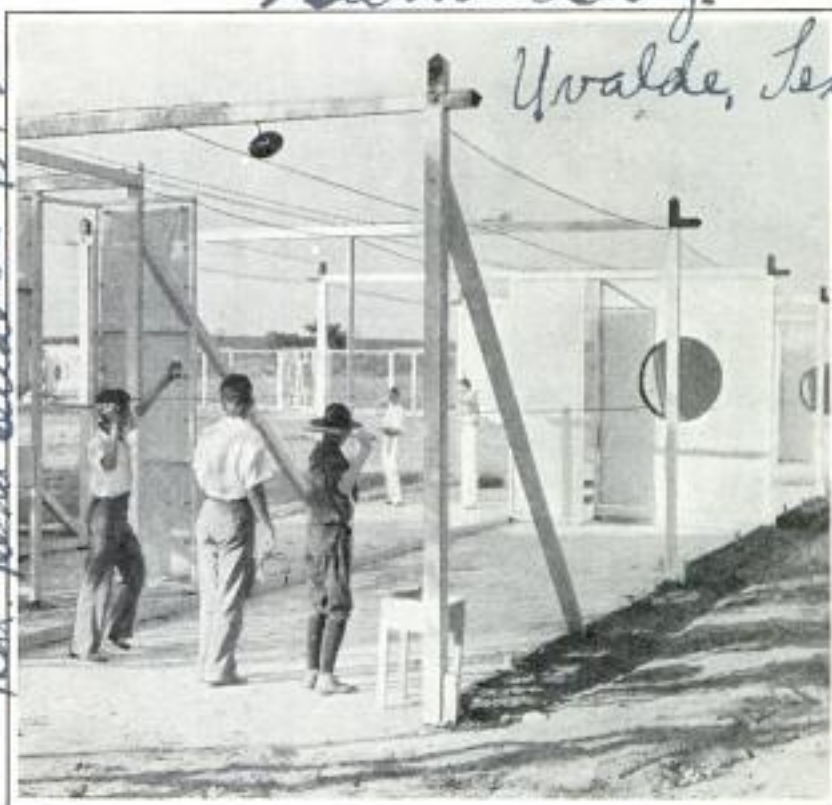


c946

c908 Am. Dr. Ed  
Estes,  
Harner Bldg.

dence of the damage done by the projectile is apparent. The wind force felled trees for miles around, these having been hurled to the ground with their tops pointing away from the place of contact, and forming a great circle scores of miles in circumference. The upper sides of the trees are scorched, the theory being that a wave of burning gas swept over the forest, then was dissipated in the atmosphere. It is not yet known how deeply the meteorite penetrated the earth, but there is evidence that there was a disturbance of underground waters. Now the site of the fall is a marsh, possibly produced by the welling up of the waters due to the tremendous pressure of the blow. Aerial photographs have been taken of the region and an effort is to be made at excavation although discovery of the meteorite may require a major mining operation. The small craters can be explored more easily.

Not paid serial 664432



Uvalde, Tex

Players Ready to Bat Ball through Hoop Shown at End of the Net-Inclosed Alley; This New Game Is Becoming Popular in Amusement Parks

### HOOP BALL GAME TESTS SKILL AND BUILDS HEALTH

Testing the player's skill while it builds his health, a hoop ball game is being introduced for use in amusement parks. The game is played in an alley inclosed by wire netting. The alley is terminated by a canvas-covered framework. In the center of the canvas is a circular opening, called the hoop, through which a ball is batted from various distances. Five balls are played at each hoop by each player. Three are known as score balls, one as the record ball and one as the prize ball. All score balls are recorded to the player's credit upon passing through the hoop. If the score ball strikes the bounce board and rebounds to a point behind a penalty line, it counts against the player. However, this penalty score may be removed by batting the record ball through the hoop. The prize ball, if hooped, scores the same as the highest score ball passing through the target. The game is fascinating and at the same time is beneficial in that it brings the player out of doors but does not subject him to over-strenuous exercise necessary in some forms of sport.

### WEIGHT FOR GOLF-CLUB HEAD TEACHES HOW TO SWING

As an aid in learning how to swing, a weight for attachment to the golf-club head is being used in practice. When fastened to the club, the device's extra weight teaches automatically the "follow through," making the player swing properly by pulling the club through. In addition the weight slows down the back swing. With practice, it helps to develop the habit of grooving the swing. When the weight is removed from the club for a game, the player finds it easier to swing and follow through in approved form.

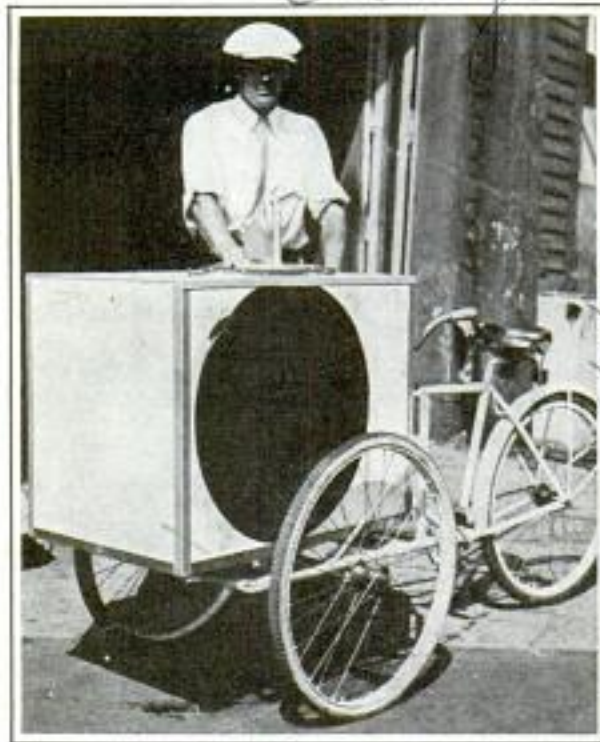


12.00

B. W. Knight, N.Y. Co  
450 E. Ohio, Chicago

c 911  
376

J. B. Howland  
2620 Sheffield Ave  
POPULAR MECHANICS  
Chicago



Ready-to-Serve Drinks from Refreshment Stand Carried on Front of Three-Wheeled Bicycle

### DRINK STAND MOUNTED ON BIKE SERVES WIDER TERRITORY

Mounted on a three-wheel bicycle, a new kind of refreshment stand enables the operator to serve a much larger territory. The stand has compartments for serving liquids, such as orange drinks, and for ice cream or sandwiches. Six gallons of liquid and from 200 to 300 sandwiches may be carried at one time. A special frame on the cycle can support as much as 600 pounds. Exceptionally good speed is possible on the foot-propelled vehicle, in spite of the weight of the stand and the vendor. The stand is made of metal and wood.

### FASTER QUIETER STREET CAR HAS IMPROVED PICK-UP

Considerable reduction of noise, increase in speed, improved pick-up and better brakes are features of a street car which has been tested in Brooklyn, N. Y. Rubber replaces leaf and coil springs, and is used in making the wheel less noisy. The overhead-trolley wheel running on the power wire is said to be the most distinguishable sound made by the car, but engineers have even reduced this noise by staggering the poles supporting the wire. One type of brake tested in Brooklyn em-

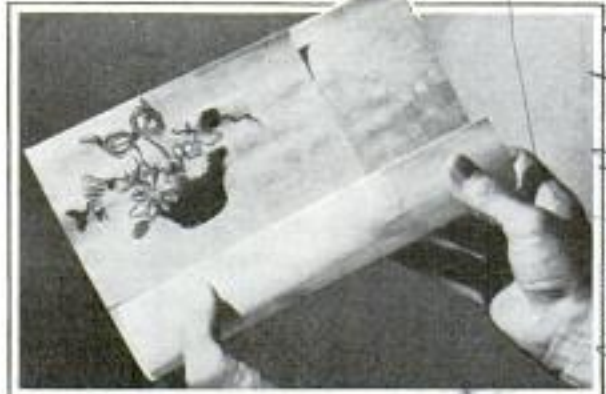
plays an armature revolving in a magnetic field. Control of the magnetic field actuates the braking system. With better brakes, the car's speed is stepped up about fifty per cent over the thirty-mile pace of the ordinary street car. Pick-up is almost twice as fast as now possible.

### FRESHNESS OF FISH REVEALED BY ELECTRIC TEST

For the protection of purchasers, a method of testing haddock for freshness has been developed by the bureau of fisheries. The theory of the method is that the relative freshness may be determined by an analysis of the protein elements. The test is made by taking a small quantity of fish flesh and grinding it, adding certain chemicals to produce an electric current. The amount of chemicals added to obtain a predetermined voltage indicates the condition of the fish. The test makes it possible to determine approximately the length of time that haddock will remain in good marketable condition. This is important because as many as 250,000,000 pounds of haddock have been marketed in a year.

### DOILY MADE OF WOOD VENEER LOOKS LIKE CLOTH

Doilies for the table are being made of wood which resembles cloth in appearance, particularly when decorated with floral designs. The wood doilies are made of Sitka spruce, cut one-eightieth of an inch thick. The material is as thin as pa-



Wood Doily for the Table Made from Piece of Sitka Spruce One-Eighth of an Inch Thick

per and so pliable that it can be used also like paper for typewriting.

Hoquiam High School  
Domestic Science Class  
Hoquiam, Wash.

Revised Commerce 6/10/33

Developed by James M. DeMan and Maurice C. Stanley, Technological

Chicago Tribune  
June 8, 1933  
Announced by Guy A. Richardson, Chicago  
Surface Lines, 234 S. Clark.

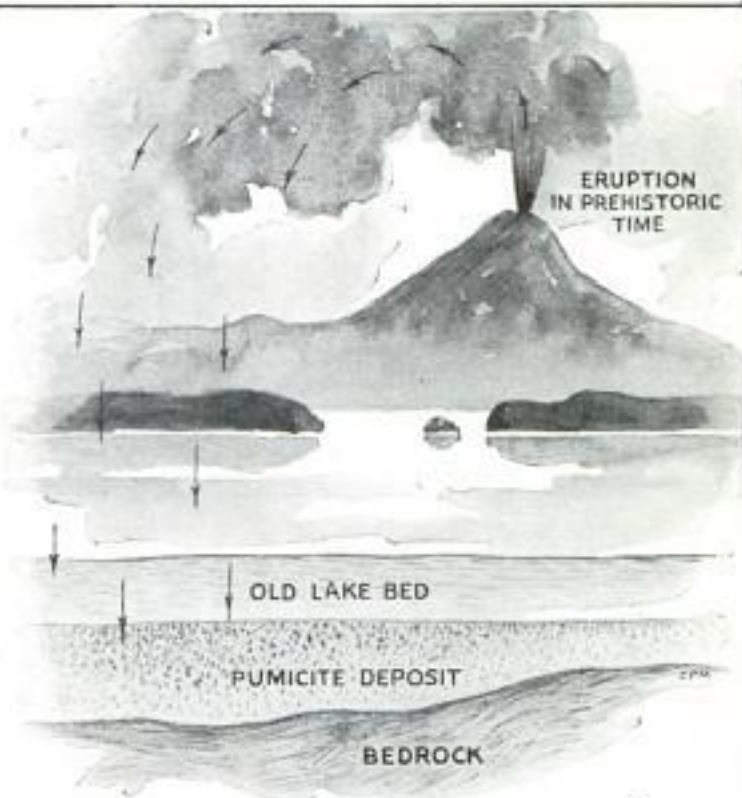
© 1958  
d.w. James W. Van Meter  
101 North St. Andrews Place  
Los Angeles, Calif



**M**ILLIONS of years ago, on this continent, volcanos played an important part in making the land as we see it today, and many are familiar with the cinder cones, lava beds and basaltic rock formations remaining as evidence of the mighty upheavals of prehistoric times.

Lying buried in the earth, however, are deposits of pumicite, a material which, at the time the volcanos were active, was transmitted through the clouds that issued from the belching craters, and was precipitated on the earth in fine dust, often many feet in depth. Much of it fell on the surface of lakes, which the ensuing ages have long since evaporated to desert wastes. Such deposits, air-floated and washed free of impurities, have long been covered with an overburden of soil, and are now located only by drilling.

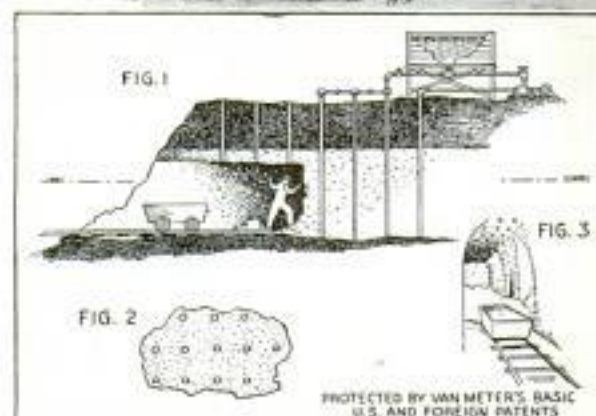
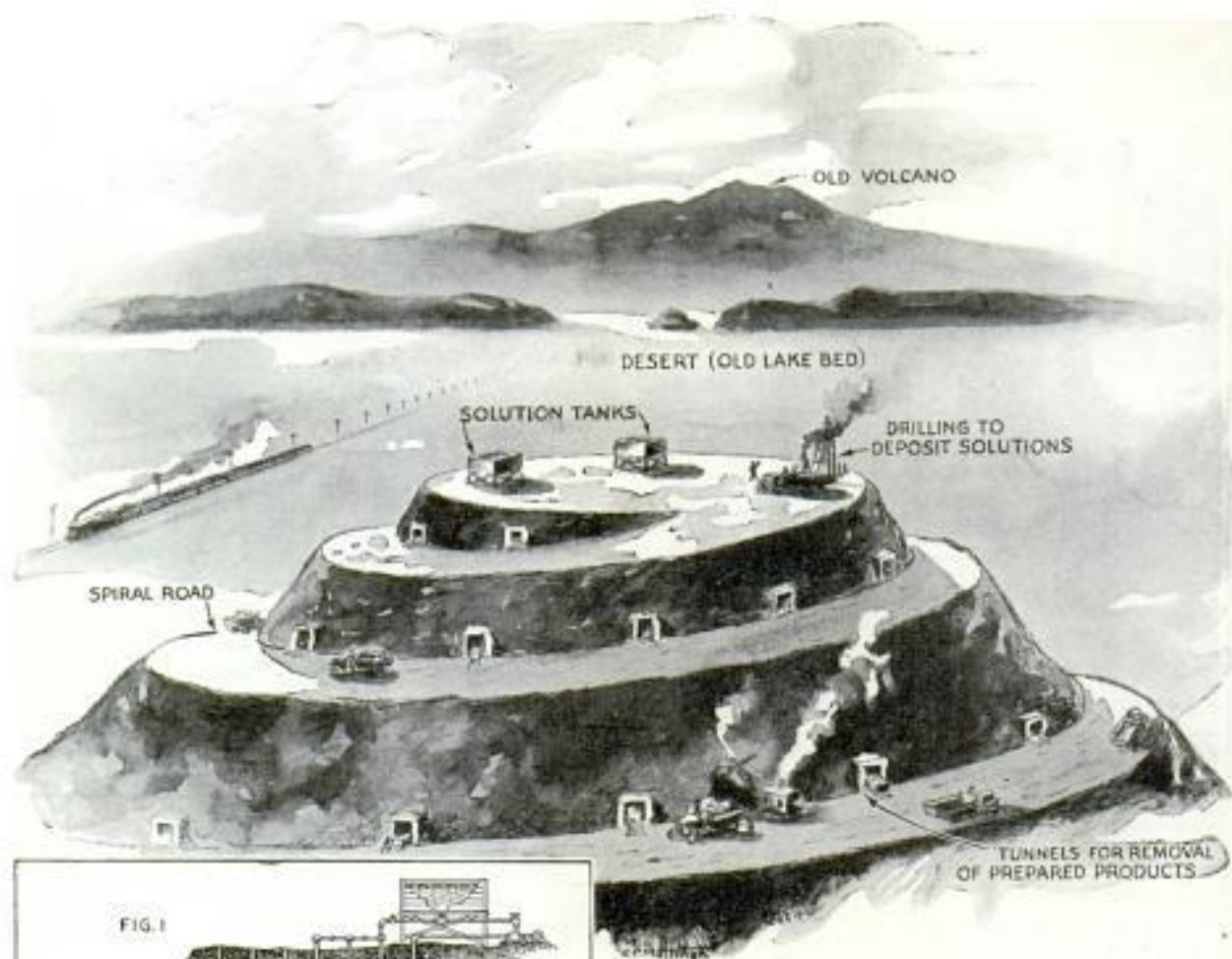
First used as an abrasive, then in the aggregate of plaster and concrete, pumicite has steadily increased in importance to industry and manufacture. In its natural state, this material is composed of microscopic particles of volcanic glass,



Top, Dusting an Orange Grove from an Airplane; Below, Diagram Showing Where Volcano Left Pumicite Deposit

being the froth blown from a blazing inferno during eruption.

As found today, it is sufficiently consolidated to be mined without the necessity of timbering the tunnels and drifts through which it is removed. When ex-



Diagrams Showing How Chemical Solutions Are Introduced into Pumicite Deposits, Forming a Series of Man-Made Mines, Each Yielding Its Own Product

posed to the action of the elements, however, it rapidly disintegrates to a very fine powder. It is highly absorptive, readily taking up one-fourth its weight in water.

Being of volcanic origin, it has a peculiar affinity for metallic elements, or their chemical solutions, such as salts of iron, copper, or zinc, and does not react in their presence. Because of this fact, and its extremely fine particle size, it is the best adapted, of all natural products, for chemical dusting, an industry of growing importance, operated on a large scale today.

Airplanes scatter tons of this material and, in a single day, thousands of acres of vines, melons and other growing crops are dusted for control and extermination

of insect pests, leaf hopper, red spider and aphid, as well as fungus and parasite growths, such as the powdery mildew. This activity saves millions of dollars annually in food production.

The increasing demand for this material has resulted in a new development in the method of its recovery and treatment. James W. Van Meter, internationally known metallurgical and industrial engineer, has recently evolved a method whereby pumicite is treated chemically before it is removed from the earth.

A natural deposit is bored at intervals, and chemical solutions are introduced to impregnate the mass, in place, while in its solidified state. This method not only effects uniform permeation by the solutions under the most favorable conditions, but provides a natural, weatherproof and light-proof storage receptacle, of unlimited capacity, from which can be withdrawn, as required, many different products having various predetermined properties.

*George Purring*  
*Herbert*  
*Pa*

Nature, having guarded this material in its purest state for centuries, now holds in safe deposit, and at no cost to man, a wide variety of useful products required in the arts and industries. The deposit can literally be "planted" to order, and a series of miniature mines established which will yield building material, fertilizer, insecticidal dust, of any required chemical content, as well as water-purifying material and brilliantly colored base, body and glaze for making tile and pottery. Trucks and steam shovels remove, from a single source, such a diversity of material as has never been found in nature in such close proximity. Industrial and chemical plants often accumulate an excess of some by-product such as scrap metal, acids or chlorine. This surplus can now be converted into solution and stored in a natural deposit of this highly absorptive material for future use and profit. Mr. Van Meter was a pioneer in the recovery of metals by flotation, and now reverses the process and re-deposits them in the earth.



Thirty-Three-Foot Cabin Cruiser Built on Top of Garage, the Only Room Available to the Builder

1926  
**MOUTH LIGHT FOR THE DENTIST IS FREE FROM SHADOWS**

Dentists are given a "third hand" by using a mouth lamp which illuminates the patient's mouth completely without shadows. The lamp is attached to the lower jaw and hence need not be manipulated



by the dentist who has both hands free for work. Owing to the flexibility, the lamp follows every movement of the head, so it is unnecessary to adjust it repeatedly, once it is in place. It can be disinfected or boiled, so it can be kept free of germs.

1928  
**BOAT BUILT ON TOP OF GARAGE MANY MILES FROM WATER**

Although his home is several miles from the nearest river, a Pennsylvania man decided to build a thirty-three-foot cabin cruiser and selected the roof of his garage

as the scene of operations because that was the only space he had large enough for the undertaking. The roof is sixteen feet above ground and the boat extended several feet over either end before it was completed. The craft was then lowered to a truck and hauled to a stream several miles distant for launching.

**VOLT TESTER WITHOUT LAMPS PROTECTS THE USER** 1926

Accurate tests of voltage may be made with a new device that requires no lamps.

The tester is simple to operate, one wire being placed on each side of the circuit. The indicator shows the voltage. Alternating current is identified by a slight vibration of the indicator. Heavy insulation prevents danger to the test operator.



*Wife of Emb. Harry J. Kutzbach  
12800 1st St. Philadelphia  
Pa.*

*Arnold Bernickow  
16 Flotow St. Berlin  
Schterfeld U. Germany*

*Square Company  
6060 Raymond St  
Detroit, Mich*

2733



*Warner*  
Illuminated Violin Played by Manipulating Lights of Various Colors Controlled by a Hidden Operator

**VIOLINS ARE PLAYED BY LIGHTS OF DIFFERENT COLORS**

Illuminated violins played by the use of colored lights were featured in a moving picture recently produced. The instruments were made to sound by controlling lights of various colors manipulated by an unseen operator.

*2939*  
**DOG RESCUED FROM ICE FLOE BY CREW OF CABLE SHIP**

The crew of the Western Union cable ship, "Cyrus Field," has a big Newfoundland dog as its mascot and proudly boasts that it is the only canine ever rescued off an iceberg. The cable ship encountered a heavy ice field off the coast of Newfoundland late in May and lookouts were posted to seek signs of clear water ahead. One of them sighted what he at first thought was a seal but which the telescope revealed as a weak and half-starved dog. The ship set out to the rescue, plowing through the heavy ice floe until it approached the

animal. But the dog, frightened by the noise as the vessel ground through the ice, ran away each time the boat drew near. Finally he attempted to jump to another piece of ice and fell in the water. The ship was turned with difficulty, closing the ice so the animal could clamber on it. There he lay exhausted until the boat came alongside. The crew nursed back his strength and named him "Berg." It is believed he was one of a team of five dogs cut away from a sledge, several weeks previously, by seal hunters when the ice cracked off Horse island, 140 miles north of where he was found. Apparently his companions perished, but "Berg" lived, possibly by killing and eating seals, while his ice cake was blown by gales forty miles to sea.

*2856*

**HOOD FOR AIR REGISTER STOPS FURNACE DUST**

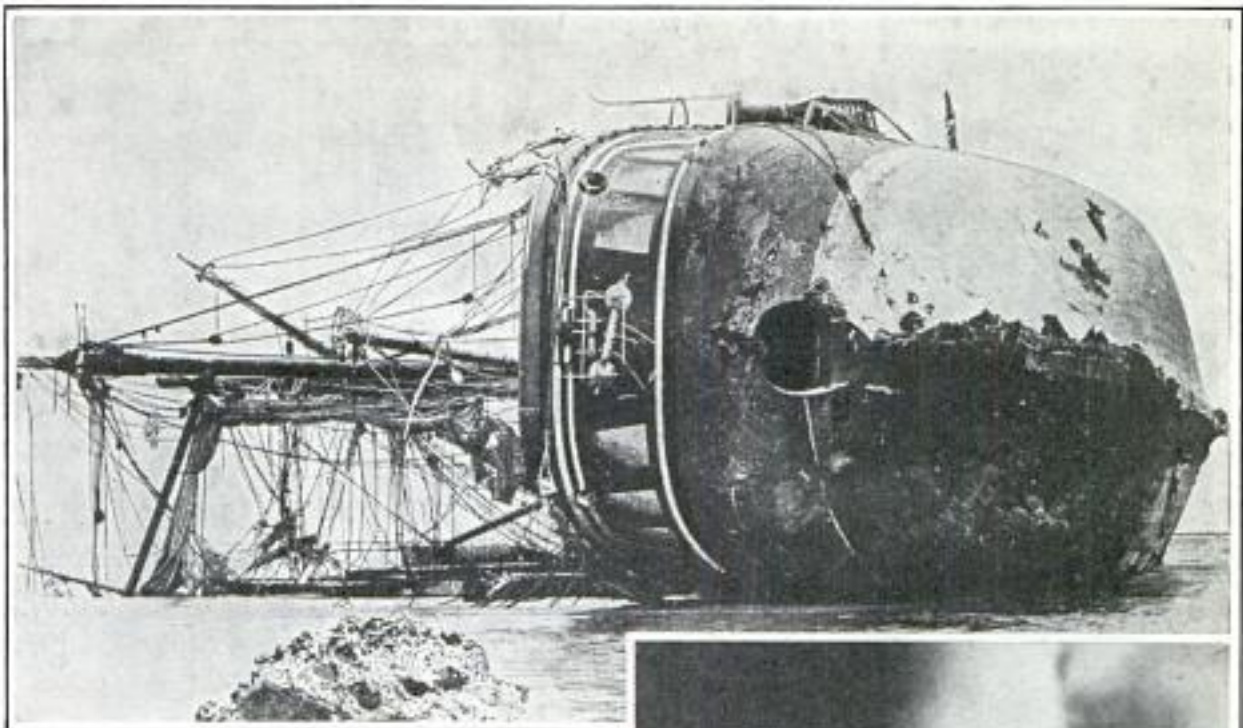
Smudged walls and dust-filled air are prevented in homes with warm-air heating systems, by hoods fitting over each register. The appliance consists of a light metal frame to which is attached a cloth-covered wire screen. With the hood in place the air from the register strikes the screen before entering the room. Soot, dust and dirt cling to the cloth and the clean air is directed evenly across the floor first, instead of rising immediately to the ceiling. The hood does not interfere with free movement of air through the pipes, nor does it diminish the size of the register opening. Installation is made without removing registers from walls and the cloth is easily detached for cleaning purposes.



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

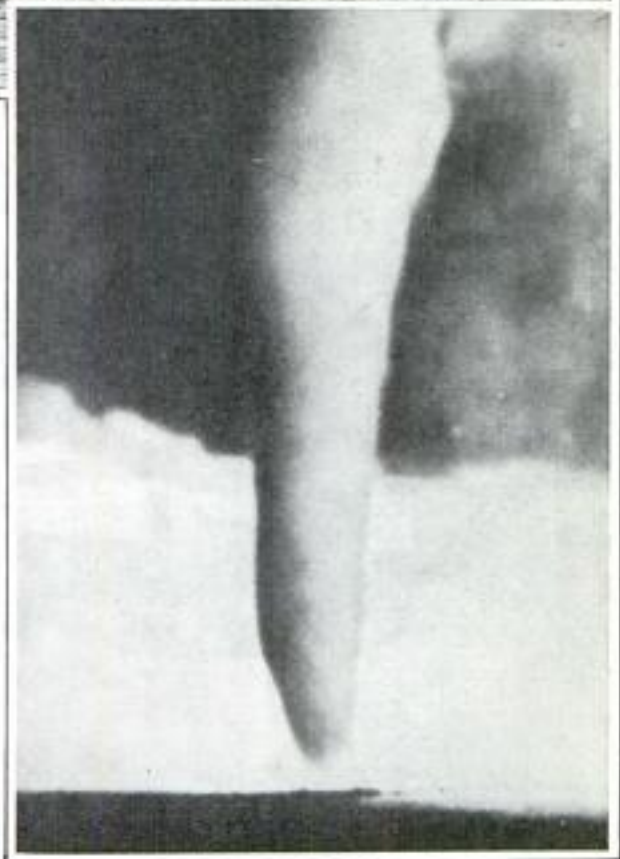
*Registers. Screen Hood G. P. Concord Ar. S. W. Canton Ohio*

## Hurricane Force Found Too Great to Harness



Ship, Weighing Thousands of Tons, Is Mute Evidence of Hurricane's Force; Right, Typical Tornado

Man-made means of controlling tropical hurricanes appear fantastic when the vast energy generated by terrific winds is taken into consideration. The only measurement ever made, with any degree of accuracy, of these winds was that of a typhoon off Japan, according to Dr. W. J. Humphreys of the United States weather bureau. In that test, it was found that power was generated at the rate of 1,200 billion horsepower per hour, which was released at 27,000,000,000 horsepower per hour. To break up or counteract this force with battleships, one of the control means suggested frequently, it would require 24,000,000 of them firing 1,000-pound shells at the rate of ten per minute at a velocity of 3,000 feet per second. Such a fleet would overwhelm the oceans. Standing tunnels of sheet metal 100 feet high or more, belching smoke rings from explosions, also have been suggested. But the difficulty is that puffs or jets of smoke do not start storms, as sponsors of the idea believe. A third difficulty in breaking up hurricanes by artificial means is that no one knows within 100 miles, or a day or two of the time, a hurricane will strike a given spot. A hur-



ricane is produced when a quantity of humid air near the earth's surface ascends. Dry air breaks up terrific winds, a fact on which are based many control schemes.

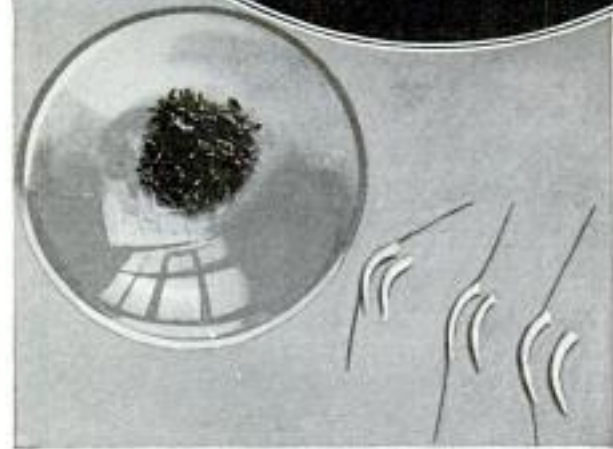
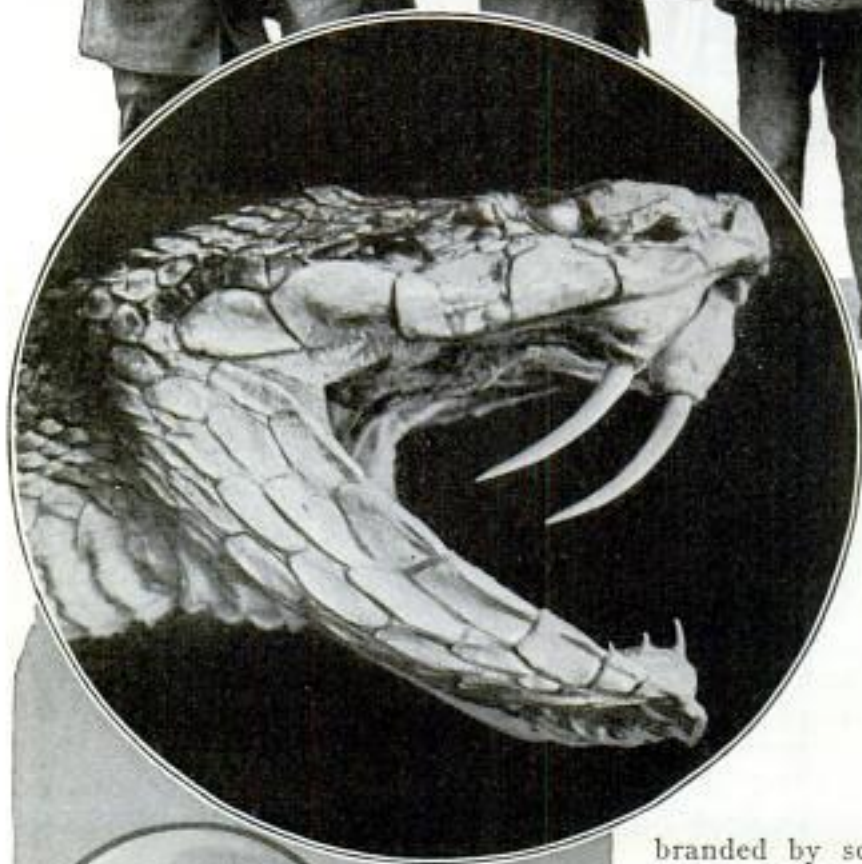
It is more economical to buy tire casings in pairs, since the non-skid grip of a new tire is offset by the smoothness of a worn companion tire.

Washington, D.C.

c816

Comd. James M. Chalfant  
 Island Viper  
 Nyack, N.Y.

# Those SNAKE



Top, Handling Giant Anaconda; Center, Venomous Bushmaster's Head; Bottom, Circle, Dried Venom for Snake-Bite Serum; Right, Poisonous Fangs

**F**ROM medieval times have come stories of monstrous sea serpents, creatures which rose up out of the deeps to engulf ill-starred ships. Actually, the greatest recorded length of a regal python, considered the world's largest serpent, is thirty-three feet.

Other strange stories about snakes have been branded by science as myths. Can the mud, or hoop, snake take its tail in its mouth, rear itself vertically, and escape by rolling away? Nonsense, says the scientist. Does the female garter snake swallow its young to protect them from attack? The answer is that no female snake ever makes any effort whatever to protect its young. Does the yard-long milk snake steal milk at the source? Perhaps, if you can imagine a cow patiently enduring the needlelike teeth of the snake during the milking process!

Is the blacksnake an exterminator of rattlesnakes? As a matter of fact, the two live together most peaceably. Lacking



# STORIES!

venom and the power of constriction, the blacksnake has no other choice. When you strike it with a stick, does the "glass snake" or "joint snake" fly to pieces? Hardly, he simply abandons his tail, and hurries off to grow a new one.

Is Ireland the only place in the world utterly without snakes? We shouldn't overlook Hawaii. Will snakes refuse to cross a hair rope so that if you are surrounded with one



in your sleeping bag, no snake will come near you? The western cowboy long believed this but scientists say hair ropes are no more snake-repellent than other things believed to be effective—as the mountain ash, gourd, and horse-shoe geranium, or fresh-slaked lime, cayenne pepper and powdered sulphur.

Do giant pythons swing down through the foliage, seize wild cattle, crush them in their coils, and swallow them? No, because a twenty-foot python can barely manage an eighty-pound pig, while a thirty-foot python might possibly engulf a white-tailed deer, or a 150-pound hog.

But what of snake charming? On the authority of Raymond L. Ditmars, curator of mammals and reptiles at the New York Zoological Park, this is no myth, there is really something to it.

"The sort of 'snake charming' you see in the circus is usually a fraud, seeing that the pythons or boas the husky blonde drapes around her neck and body are per-

(Continued to page 125A)

Right, South American Boa Constrictor; Center, Snake with Its Eggs; Bottom, Extracting Venom by Squeezing Snake's Head

C866 *Emb. Jeff Davis of*  
*The San Antonio Light*  
 San Antonio, Texas

384

POPULAR MECHANICS

C883

Model of the Ancient San Jose Mission at San Antonio Constructed to Aid Workmen in Restoring the Structure to Its Former Beauty



**SCALE MODEL OF OLD MISSION AIDS IN RESTORATION**

Engineers in charge of the reconstruction of the ancient San Jose mission at San Antonio, Tex., have built a scale model of the structure, about five feet high, on the mission site to aid them in planning the restoration. The beautiful mosaic, tile and painted color schemes of the original mission have faded, but have been determined by research and the colors have been applied to the model as a study for craftsmen on the project. Workmen found that modern paints would not adhere to the walls of the old structure, and have adopted the mixture of ground flagstone, milk, salt and other primitive materials used for decoration by those who founded the mission.

sage in cipher. Instead of the letters of the message, those on the outer disk are written when it is desired to send a secret message. The letters of the inner disk represent a keyword, which can be chosen in advance. French army cipher experts succeeded in solving a message written with this machine only after several thousand words of material had accumulated and after several weeks' work with electric calculating machines. For ordinary purposes the messages written with it are almost unsolvable.

**CIPHER MESSAGES PRINTED BY DISK MACHINE**

So light that it can be carried in the hand, a new machine produces a cipher so complicated that the same combination will not occur again in more than ten billion messages. The device has been adopted by the French ministries of war and agriculture and by the Paris bourse for transmitting stock-exchange data in secret code. It consists of a brass box, six inches in diameter, with an actuating handle at one side and two disks on the face. Around the outer disk runs a double alphabet and around the inner disk are the letters from A to W. A third alphabet appears around the face of the machine, corresponding with the letters of the outer disk. The letters on the face of the box represent the message before it is enciphered; those of the outer disk represent the mes-



*Emb. Cuyabano*  
*Pratt. 265 Brooklyn N.Y.*  
*Emb. Fletcher*  
*Emb. Lagrange*

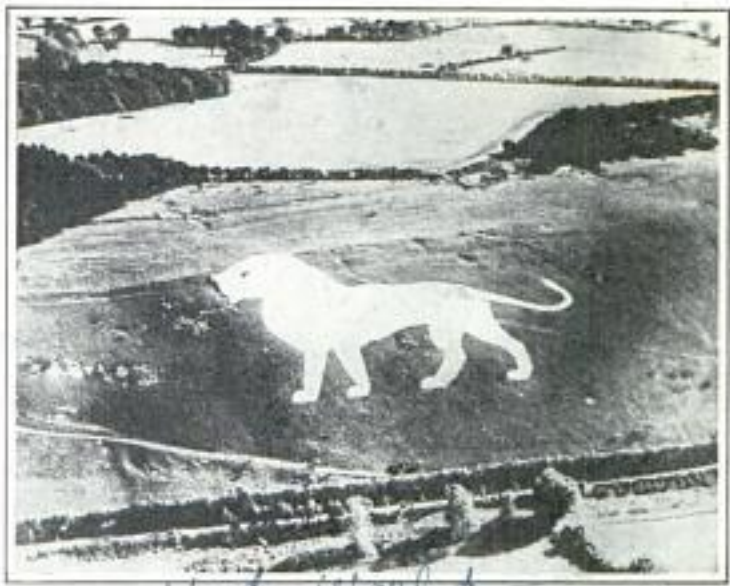
*Emb. Lagrange*  
 94. Rue St. Lazare,  
 Paris France

C978 Pub from  
Roche, William C. McHugh  
3108 Michigan

C294

### ROAD IN SOUTH AMERICA LINKS THREE NATIONS

South America's longest modern motor highway, extending over 2,300 miles, now links Venezuela, Colombia and Ecuador. This international road permits through travel from La Guaira, Venezuelan port on the Atlantic, to Guayaquil, Ecuador's Pacific coast port, and in addition to linking the capitals of the three nations, provides rapid communication facilities between seven Venezuelan states, nine Colombian departments and nine Ecuador provinces. The road also opens up large sections of virgin country of vast natural wealth, including Colombia's rich mineral regions of gold, silver and platinum as well as her important coffee sections. Bogota will be easily accessible for tourists as also will be the Muzo emerald mines near that city.



This Huge Figure on Ground Near Zoo Serves to Warn Aviators from Approaching Too Close and Frightening the Animals

### HUGE LION'S FIGURE MARKS ZOO TO WARN AIRMEN

As a warning to airplane pilots against low flying, a huge chalk figure of a lion has been cut in the ground near a British zoo. If planes are flown too near, animals in the zoo are frightened by the roaring of the motors.

### WRENCH FOR FIVE PIPE SIZES NEEDS NO ADJUSTMENT

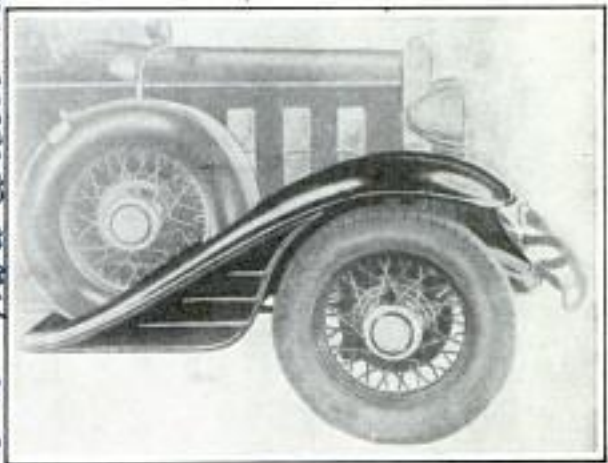
Constructed to fit five different sizes of pipe, a set wrench needs no adjustment.



The tool fits one-quarter, three-eighths, one-half, three-quarters and one-inch pipe. A curved head with teeth on the inside edge grips the pipe and holds it firmly for all the usual operations.

### SKIRTS FOR OLD AUTO FENDERS GIVE MODERN APPEARANCE

Some of last year's autos can be made to look like 1933 models by the addition of fender skirts, thus making the fenders resemble those of the latest cars. The skirts also serve to protect the car from the front-wheel bombardment of gravel and mud. Fittings are included for easy attachment to fenders and frame.



Fender Skirt Can Be Attached to Old-Model Automobile to Give Appearance of the Latest Type

### HYDROGEN AND OXYGEN IS FUEL FOR ECONOMICAL MOTOR

Germany has developed a motor using a mixture of hydrogen and oxygen as fuel instead of gasoline. It is claimed this motor can be operated at less expense with hydrogen than with either gasoline or oil, but to attain this low operating cost it is necessary to use a new pressure process for the production of hydrogen. A hydrogen-operated Diesel motor was built in Berlin recently and sent to England where it is said to be operating satisfactorily.

Reported by Trade  
Commissioner William  
Laugherty, Berlin

Steel City Machine Co. / 207 Columbus Ave

Dept. of Commerce

Germany  
A. Berlin  
Motor

Spoke Machine & Lamping Co.  
1200 W. 76th St. Cleveland, Ohio

C838 Westinghouse Electric & Mfg. Co.  
E. Pittsburgh, Pa

Dr. Phillip Thomas  
Research Engineer



Modern William Tell  
Shoots Light at Sensitive  
Cell to Explode Apple;  
Bottom, Terrific Flame  
Cuts Motor Frame

# MAGICIANS

MAGIC, as practiced from the earliest times, always has been a very practical affair. The ancients believed in its power to bring game into their nets and rain to their crops, to give skill in war, in love and in the hunt, to inflict or ward off misfortune, illness and death, in short, to improve their whole mode of living. Specialists, men and women to whom secrets of the art came down through the generations, wove their strange spells and performed mystic rituals.

Today, the magician carries on, perhaps largely for entertainment purposes. More powerful than any trick he may perform are the works of modern civilization's real "magicians," whom we know as the research man, the scientist and the engineer. These magicians have no wonder-working wand, yet at their command and touch are produced things more miraculous than ever dreamed of by the ancient witch doctor or tribe conjuror.

Everything we use today may be credited, at least in part, to these men and women, working in the more than 1,600 research laboratories of the United States. After hours, days and sometimes years of experiment and test, the laboratory worker sees for the first time the wonderful things that all the following world will see a few years hence.

To be used on Pennsy  
 electrified trackage  
 between New York and Washington

As  
 Ele  
 kno  
 f  
 e  
 p.  
 p.



for manufacturing power from electric  
 motors & driving wheels. 52 in diameter  
 91 teeth. made by Pullwell works, Pittsburg Mo

# of the LABORATORY



Top, Checking Giant Ring Gears; Bottom, When Lightning Strikes the Transmission Line

weather and light controls and hundreds of other things—all have been created to improve living conditions, yet many of them have come with the suddenness of the ancient magician's "Presto, change!"

Inventors have played their part, of course, but we no longer depend entirely upon the independent inventor for advances in civilization. In the last thirty years, research and development have been organized and carried on by trained experts in the universities, scientific foundations and particularly in the world's industrial laboratories.

The research laboratory, in which the modern magician weaves his "spells," has three main functions to perform for the manufacturing company; to improve the existing product, to develop new things and to do advanced work which will increase the store and knowledge and find application in new fields at some future day.

Instead of a wand and incantations over strange powders, the research worker performs his "magic" with microscope, test

The radio, the telephone, the automobile, the airplane, the "electric eye," hundreds of household and office appliances,



discoveries been limited to the electrical field. What oil actually does in a bearing at work, how springs can be strengthened, how vibration in giant turbine blades may be reduced, how magnetism behaves under many conditions, how noises may be detected and reduced or eliminated, why metals react in certain ways to strain and stress, how metals look under the micro-camera, whether air currents flow like water and whether they can be photographed—these are some of the subjects undertaken in the laboratory.

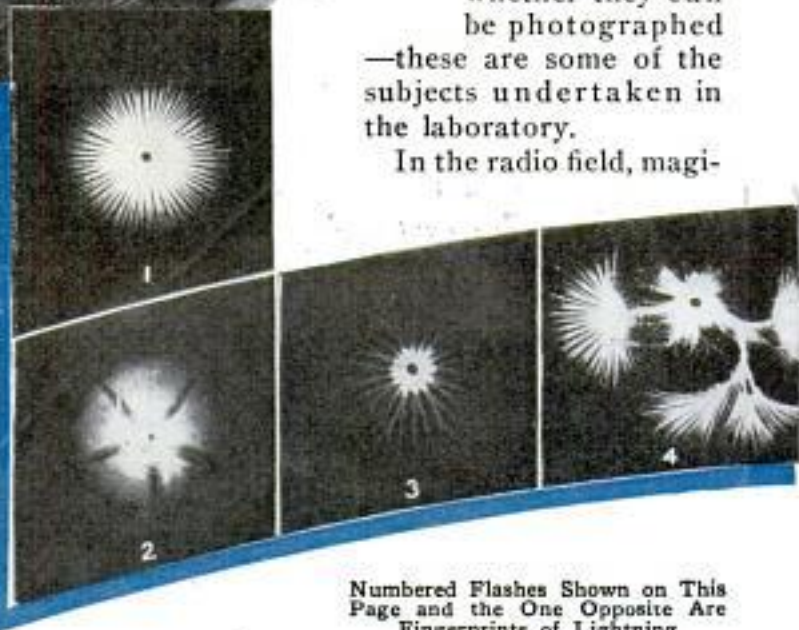
In the radio field, magi-

Metals Tell All About Themselves under This Photo-Micrograph Apparatus

tube, measuring instruments of all kinds and hours of intensive study and experiment. All pioneer research is speculative and much of it is worthless, but out of the mass of effort come not only new and wonderful things for man's use but also increased knowledge of physical, chemical, metallurgical and mechanical phenomena.

Research, under that name, is nearly thirty years old at the Westinghouse Electric and Manufacturing company, which operates one of the five major laboratories in the United States. The thing, itself, is as old as the company, for it was the investigation of the mysterious alternating current that first led the air brake's inventor, Westinghouse, to organize the electric company in 1885. In 1904, a separate department was formed for research and in 1910, it was isolated from the plant. Facilities and space were more than doubled in 1930.

Out of these laboratories have come many discoveries, new materials, processes and new useful information, just as other laboratories have contributed to mankind's comfort. By no means have these



Numbered Flashes Shown on This Page and the One Opposite Are Fingerprints of Lightning

cians like Freeman and Kimmell, Mourontseff and Ulrey, Knowles and Zworykin, have played a leading part in developing one of the world's leading industries. They have produced efficient tubes for transmission and reception of radio waves and for television. KDKA, the pioneer broadcast station, was erected by Westinghouse and serves today as a laboratory for improvement of the world's radio programs.

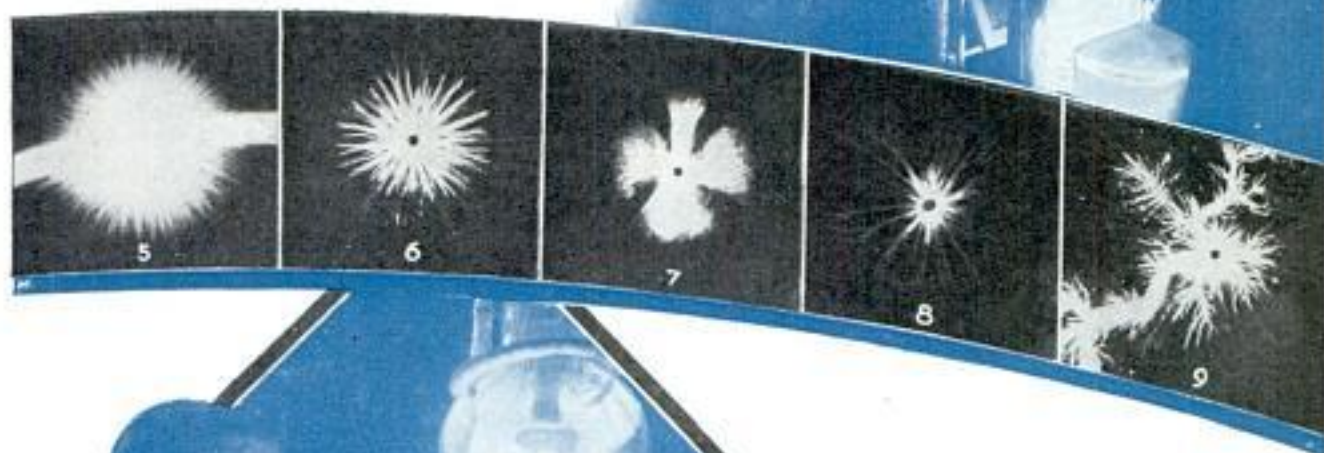
To Dr. Joseph Slepian's research may be credited many inventions dealing with the arresting of lightning and with controlling high-power electrical charges. Perhaps his greatest contribution to safe-

Earl Putnam, Pa

2838



Top, Left, Fine Dry Sand Helps Scientist to Find Out What Goes on Inside a Piece of Steel When It Is Stressed Beyond Its Elastic Limit; Top, Right, Cutting Natural Quartz Crystals in New Way to Improve Control over Radio Station's Wavelength; Bottom, Left, Power Grid Tube That Handles 900,000 Watts, the Power of a Locomotive



ty is the "deion" circuit breaker which blows a fierce electric arc into a maze of circular copper paths, which it is unable to hurt because it spins around them at incredible speed. In a hundredth of a second, this circuit breaker interrupts currents ten times as great and a hundred times as powerful as any oil-less breaker. From this work came the tiny household circuit breaker, replacing the fuse plug, and a lightning arrester consisting of nothing more than a small-bore fiber tube, empty, through which lightning jumps, with power current following, and extinguishes

Can handle  
 900,000 watts  
 developed by S.D. Knowles

C 2 38  
390

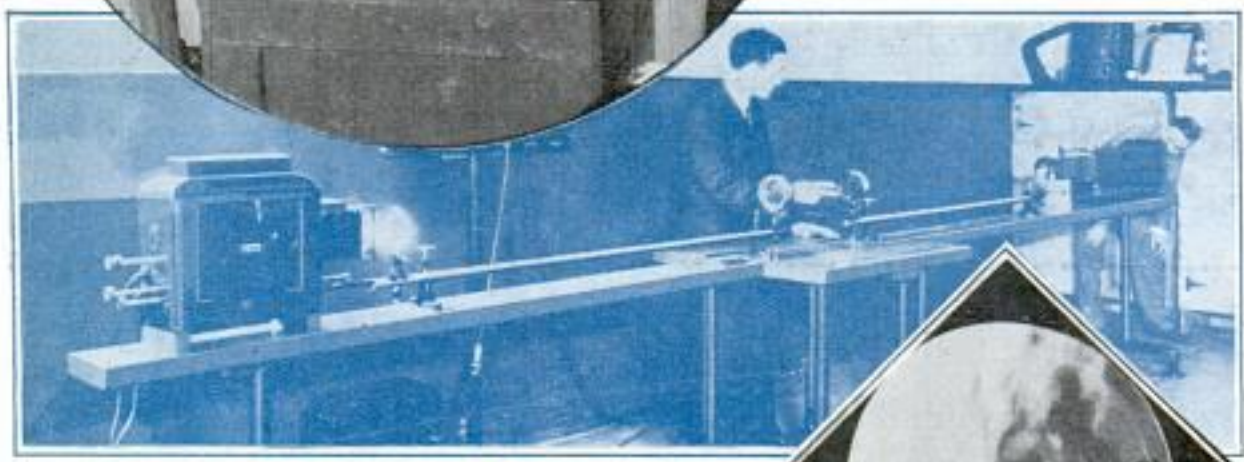
*Westinghouse will not give further details.*



*Suggests Radio*

as tube filaments. Even music has not been immune. With a few dollars worth of radio devices, Hitchcock reproduces synthetic chimes, the low notes of which sometimes require a ten-ton bell, at a dollar a pound. An instrument that duplicates the effects and tones of a three-octave pipe organ has been built out of a few oscillating tubes, two amplifiers and a keyboard at a fraction of the organ's cost.

Control of temperature and humidity, development of ultra-short wave devices to kill bugs or cure people, talking mo-



itself in the gases given off by the tube material.

Trygve Yensen's patient study and experimental work have brought metals of which highly efficient transformers are made, saving millions of dollars of electric current formerly lost through leakage. Just ahead lies a new field. Why is iron magnetic? If these magicians solve the problem, it offers the hope of putting together new magnetic alloys exactly as they are wished, perhaps of developing magnetic steels of super-excellence and smaller and more efficient electrical machinery.

Contributing a major development to the manufacture of radio tubes, Dr. E. F. Lowry discovered an inexpensive alloy which works even better than platinum

*Westinghouse*  
Top, Control for Vertical Parking Machine for Autos; Center, Device for Looking at Air Currents; Inset, Photo of Air Flowing around the Fingers

tion pictures, measurement of noises by an electrical "ear," devices for studying the behavior of gear teeth in machines operating at high speed, torture of metals to produce better, applications of the electric eye—these are a few additional accomplishments of the modern magician.

Toiling day after day, the laboratory worker is exploring unknown fields, blazing new trails and actually preparing the wonders of tomorrow.



*N.Y. Herald Tribune  
6/15/33*

*C918 Standard Engineering  
Works  
4343 Lincoln Ave  
St. Louis, Mo*

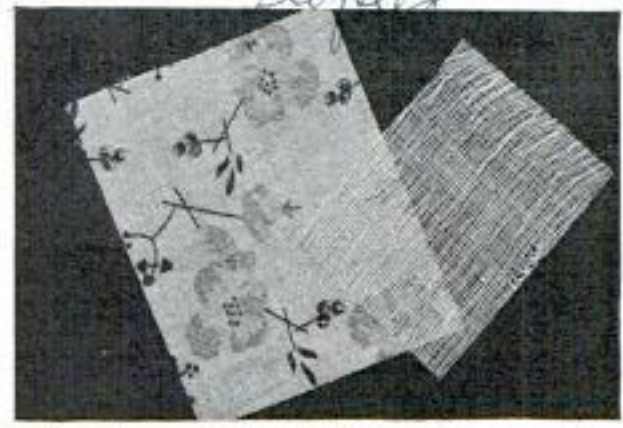
*Byron American Medical Assoc  
in Milwaukee 6/15/33*

**BURNED FACES ARE MADE OVER FROM PHOTOGRAPHS** *C936*

Human faces burned beyond recognition can be made over by surgery from old and recent photographs, according to Dr. Howard L. Updegraff of California. Plaster models also aid in the restoration. When eyelids are burned away, new ones can be made of skin from other parts of the body. Eyebrows and eyelashes can be made from fragments of the scalp, while noses and ears, almost obliterated, may be restored by manipulation of the skin. A tannic-acid bath treatment for widespread body burns is said to be effective in saving the lives of persons injured by gasoline explosions, ignited clothing or extensive scalds. Pointing out that the bath provides a method of preventing infection, Dr. Donald B. Wells says that he believes most deaths from burns are due to infection alone. The bath relieves pain to such an extent that scrupulous cleaning of the burned areas is possible.

**FABRIC ON CELLOPHANE SHEET HAS MANY PURPOSES** *C874*

Surfaced with cellophane, a new material can be used in dozens of ways. It not only cuts like cloth, but can be sewed and pleated on the sewing machine like any other fabric. The material is easy to keep clean because the cellophane finish sheds dust and because it can be cleaned easily with a damp cloth. Adding to the attractiveness of drapes and trimmings for the room is the glazed surface of the fabric. The material is made in a variety of colors and designs by cementing cloth to continuous sheets of cellophane.



Left, Cellophane-Surfaced Fabric; Right, Foundation Material for This New Cloth

*The Lobbeckmeyer Co.  
3301 Monroe Ave  
Chicago, Cleveland, Ohio  
222 N. Bank*



Icing a New Type of Room Cooler; Fan Creates Circulation While Filter Cleans the Air

**ROOM COOLED BY ICE AND FAN IN PORTABLE CABINET**

Temperature reductions of twelve to fifteen degrees can be obtained by use of a portable room cooler. Ice and an electric fan are used in its operation. The cooler may be equipped with an ozonator to produce mountain-air conditions indoors. A filtering bag collects dirt, dust and germs through action of the fan, which draws them into both sides of the cooler near the bottom.

**ALUMINUM PAINT SAVES FUEL FOR HOT-WATER TANK** *C910*

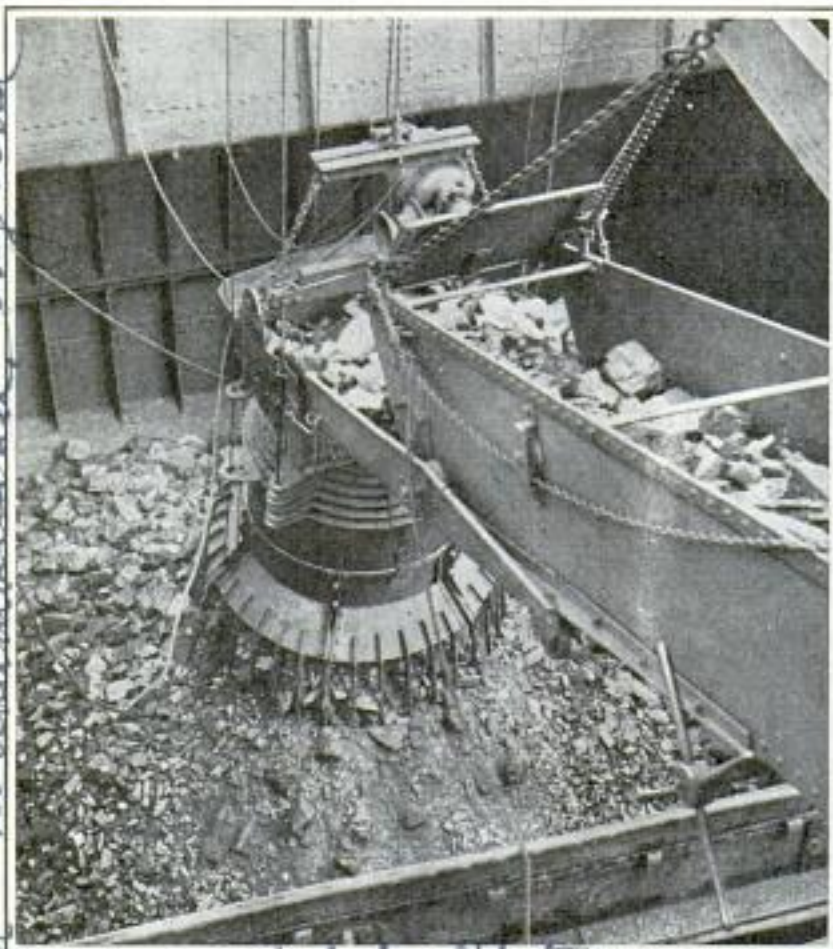
Fuel bills may be reduced by painting the exterior of the hot-water tank with aluminum paint, which forms a metallic film that acts as insulation. The paint is applied with brush or spray gun. It dries to a polished silvery finish that is attractive and durable. When soiled by dust and dirt, the finish may be restored to its original brightness by washing with soap and water.

*Aluminum Company  
of America  
Pittsburgh Pa*

*\$1.75  
11.00*

*Kool a Room*

Bromfield Collieries Ltd., Angle  
Harbour, Northumberland, England



Stream of Coal Is Shown Moving into Hold of Ship without Breaking; New Automatic Loading Device Does the Work

### LOADER HANDLES COAL ON SHIP WITHOUT BREAKAGE

Lump coal is loaded aboard vessels in England without breakage by means of an automatic loader handling a wagonload at a time. The usual practice has been to drop the fuel into the hold from a considerable height, which broke it up. With the loader, the coal is fed in a continuous stream from the wagon and down a spout, then to the spreading apparatus which is telescoped as the hold is filled.

### NINE-TENTHS OF LARGE CITIES IN NORTHERN HEMISPHERE

No accurate list of the world's cities of 100,000 or more population has been made, but the number is somewhere between 525 and 575. This estimate is made by Prof. Charles E. Colby, of the University of Chicago, who points out that urban census figures from China, Brazil and some other regions are unreliable. With corrective estimates, the total of cities in

old geography section  
American Association  
for Advancement of Science

the 100,000 class is 563. Of these, ninety-two per cent are in the northern hemisphere, seventy per cent occupy maritime positions and thirty-four per cent are on the sea coast. There are five "cluster" areas, showing maximum urban congestion—metropolitan London, the Lancaster-Yorkshire area in England, the Ruhr district, metropolitan New York and metropolitan Boston. There are also sixteen areas of secondary congestion.

0916  
**STEEL PINS CAUGHT IN "BASKET" NEAR WORK**

Hurling steel staff pins, dropped from speeding trains, are caught in a wooden "basket" built beside the tracks of the Grand Trunk railroad at a small station in Indiana.

The pins are used to lock or unlock seven miles of tracks so that only one train at a time may operate on that part of the system. To make sure that no collisions occur, the staff pins, picked up on one station, lock the track against another train until the pins are tossed off



Megaphone-Shaped Device Catches Steel Pins Used in Locking Stretch of Tracks

at the second station to be used in unlocking the track. At night, the mouth of the pin catcher is lighted. The engineer or other trainman makes ready with the

between Sedley  
and Valparaiso

Valparaiso and  
George E. Harrison

pin, which is about twelve inches long and one inch thick, as the train approaches the catcher. When the train speeds by, the pin is tossed into the mouth of the contrivance. Under such punishment, the basket lasts only a short time. At the bottom of the catcher, which slopes from a five-foot mouth to a diameter of two feet, is a hole through which the pin is withdrawn by the station agent for operating the track controls.

e867

**LIGHTS ON TOOL TRAY  
SAVE REPAIR TIME**

For the garage or home workshop, a portable standard for lights and a tool tray are combined in one compact unit. It consists of a framework of iron pipe mounted on rollers, a tray for tools and five angle light reflectors. Outlets for plugging in electrically operated tools are located in the pipe fittings forming the side supports. The tool tray can be set across the bottom framework of the stand or suspended from the upright supports at a height of about three feet, thus eliminating the need for stooping.



Rack Holding Battery of Lights for Repair Work Also Has Space for the Mechanic's Tools.

*Nela Park Engineering  
Dept. General Electric Co.  
Cleveland, Ohio*



Nearly 600 Pieces of Marble Were Used in the Making of This Bust; All Were Cut and Installed by Hand

**TINY PIECES OF MARBLE MADE  
INTO HUMAN "PORTRAIT"**

Constructed entirely by hand, a bust made by William G. Piccoli, Chicago artist, contains 596 pieces of marble. The material was gathered from seven different countries. After the tiny bits of marble had been fashioned by hand, they were fitted together to form the features, in the manner of working a jigsaw puzzle.

**AUTO IS STALLED BY MOSQUITO  
ENTERING CARBURETOR**

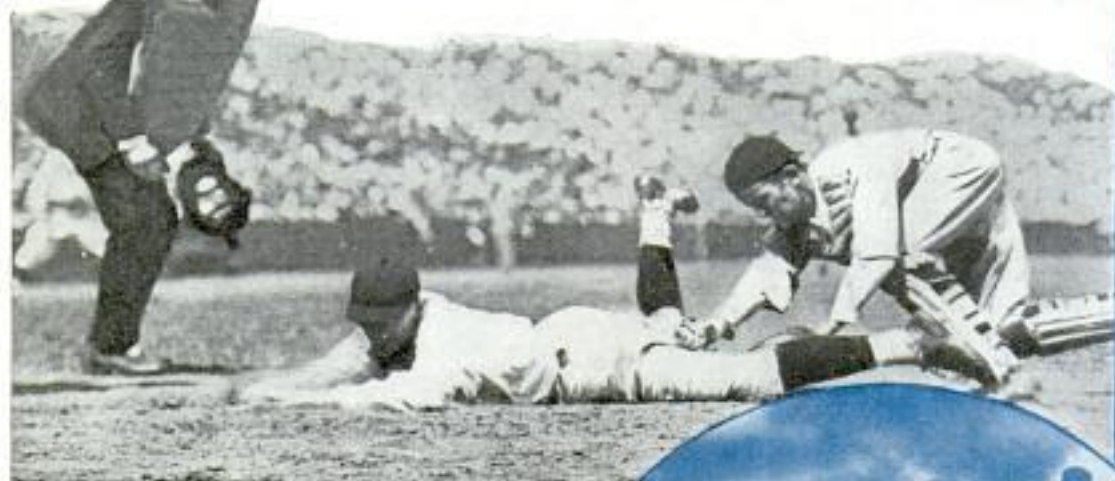
C963

If a mosquito attacked a new straight-eight automobile, which would win? Answer—the mosquito, if it attacked the right spot, as a Chicago car owner will testify. He became alarmed when he noted an increase in gasoline consumption and a tendency of the motor to "roll" at idling speed. A test indicated the trouble was in the carburetor and a mechanic probing with a pair of tweezers brought out a large mosquito. Removal of the insect corrected the rolling and decreased the fuel bill. Butterflies also have stalled cars by clogging the radiator.

*Magee-Weber*

© 830 Cont. Emile C. Schürerbacher  
22 E. 69th St  
New York

# Can YOU Believe



**I**F you trust your eyes today, you are living in a world of illusion. The huge moon you see low on the horizon seems to shrink as it mounts into the heavens. Your short friend is dressed to appear taller than he really is. Even the columns of the building that you enter appear to be straight when they are really inclined inward.

Right around you there is being spun a vast web of deceiving illusions by architects and builders, by dressmakers and tailors, by painters and stage artists, by magicians and automobile manufacturers and by many others who have utilized the discoveries of science to deceive your vision.

There are two general classes of visual errors. The first is hallucination, or seeing something that is not actually there. The second illusion is a misleading perception of something actually seen, and this occurs to us often in the course of a day. So much so, in fact, that science has discovered that we actually want to be visually deceived.

"There are certain general illusions which deceive most of us naturally" states Director M. J. Julian of the Better Vision Institute. "Sometimes the optical mechanism itself is at fault, sometimes the intellect fails to interpret correctly the true picture transmitted to it by the eye. Many



Top, Umpire Says "Safe" but Your Eyes Say "Out"; Bottom, Where Mirages Are Found

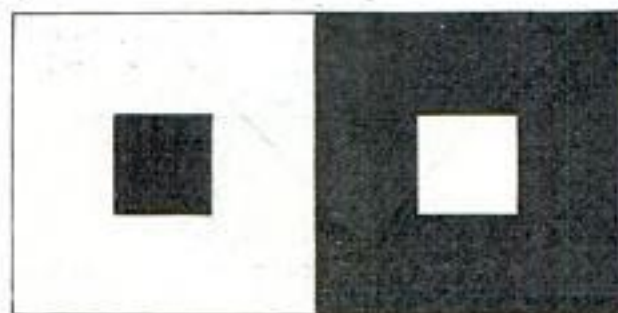
of the ordinary optical illusions should be understood so that they can be guarded against. For instance, long objects appear longer when they are upright than when they are horizontal—a tree looks taller when it is standing than when it is lying on the ground. A bright object appears larger than a dull one, and a red-colored object appears larger than one of any other color of the same size.

"Masses change the appearance of straight lines. The beam which surmounts the columns of the Parthenon of Athens, for example, had to be constructed with a long upward curve so that it would not

# Your EYES ?



Top, Left, Moon Deceives Eye; Left, Height of Hat Crown and Width of Brim Are Equal; Bottom, Left, White Square Is Same Size as Black One, Although the White Appears to Be Much Larger



appear to be sagging. The condition of the atmosphere may change the appearance of objects. On very high mountains, where the atmosphere is exceptionally clear, inexperienced persons are apt to underestimate distances because of the absence of the usual haze."

Even highly trained observers are apt to be misled. Police detectives do not even trust their own skilled vision in determining the height of the criminals but view them in front of ruled lines. Without this guide, wide or narrow lapels, double or single-breasted suits, plain or striped material in the cloth might create a deceptive impression of their height and weight.



Top, Right, Ultra-Fast Camera for Testing Illusions; Bottom, "Parallel" Columns Often Lean to Center and Would Meet if Extended Upward



"The umpire and the referee have had more than their share of criticism provoked by unfair sportsmen who are masters in the creation of illusion," states Jim Crowley, veteran referee. "An unscrupulous boxer can adjust his trunks with a high waistline to make a fair blow appear foul. Or after being struck a fair blow above the belt, he can quickly clutch his groin and give the impression that he was struck there. So quickly does his opponent withdraw his arm after having delivered the blow that all but the referee and highly trained observers are deceived."

"When you hear, see and touch a friend, you receive three different impressions, all of which are totally unlike yet which all mentally blend into one general impression of that friend," says Prof. Florian P. Glass, psychologist. "Science has discovered that touch discriminates differences as small as one-twentieth, hearing as small as one-fiftieth and sight, with the light-adapted eye, differences as small as one-two-hundredths. According to Coblenz, of the United States bureau of standards, the dark-adapted human eye is 300,000 times more sensitive to dim light than is the thermopile, the most sensitive physical instrument."

Proving that sight is much faster than



Top, Left, Camera Proves Eye Is Quicker Than Hand; Top, Right, Mountain Is Miles Farther Away Than It Seems; Bottom, Note Image in Eye

the sense of touch, a motion-picture camera capable of operating at 2,000 frames per second or at 125 times normal motion-picture speed, was used to photograph a blindfolded subject. The film showed that the subject's hand was not removed from a burning cigaret until twenty-six-hundredths second after the cigaret began to burn, while other pictures taken of the same subject, not blindfolded, showed that the eye closed thirteen-hundredths second after a light was flashed in front of it.

The speed with which your vision works ahead of your other senses may contribute to illusions. Noted psychologists and attorneys state that many a witness in court

C 830



Top, Right, Racing Uses Precision Timing; Bottom, Left, Eye Closes 13-100 Second After Seeing Flash; Bottom, Right, Hand Moves in 26-100 Second After Being Burned

that science can develop accurate measuring devices which will bridge the gap between physical vision and the mental impression. In this, science is making headway slowly but surely. One comparatively recent development is a photo-electric exposure meter which accurately tells us the exact exposure to give a film in taking a picture.

Many fantastic stories of ghosts and apparitions are prompted by people whose eyes have deceived them and who became frightened and acted before they took a "second look." When a distraught mother claimed that an invisible vampire was sucking the blood from her child, investigators decided to trap the "vampire." They

told the mother to do the next afternoon exactly what she had been doing when the vampire made his first appearance. They discovered that she had been making a red dress, sitting in the sunlight near the window. When she turned to look at her child, after having looked at a bright-red light on the dress cast by the sun, she had become temporarily "red blind" and saw her child as pale and bloodless.

This condition is the "after-image" which scientists assert has been the cause of many visions and apparitions through the centuries and has been used by dealers in the supernatural, who have discovered that this law of light and color can completely deceive the vision as well as the

*Western Electrical Instrument Corp 619 Greengardenway New York N.Y.*

is an "innocent liar." One psychologist, in staging a mock accident and testing forty observers, found that only one out of the forty reported accurately what he saw, while twenty-five per cent of the observers were so wrong that they would have been classed as liars in court.

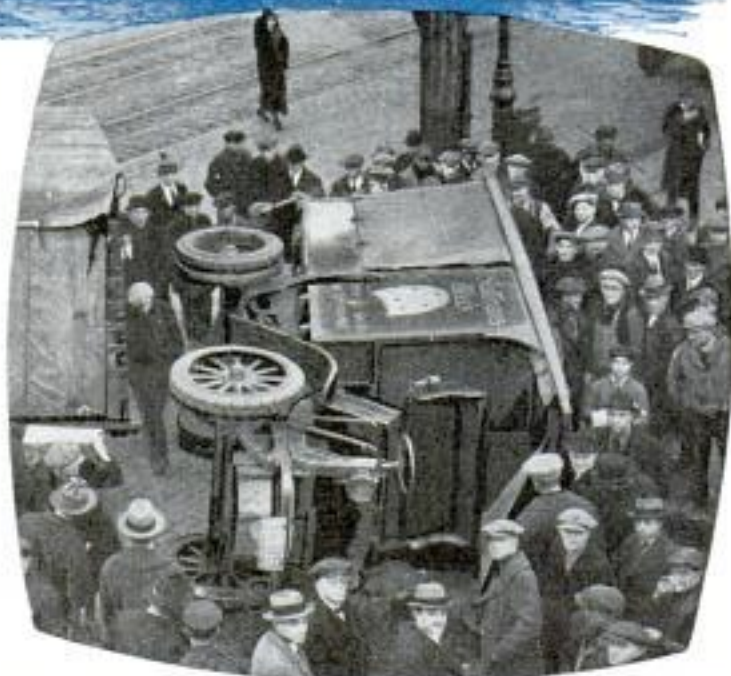
How far do your own eyes deceive you? Science has found of all the sensual impressions carried to the brain, about eighty-five per cent come from the eyes, and approximately eighty per cent of all physical action is guided by vision. It is vital therefore to train our vision to see accurately and to develop and use our judgment and intellect in conjunction with our visual perception, pending the time



houses. In the early days of camouflage ships were painted to blend into the distance but while they could deceive the eyes on a dull day, they could not do so on a bright day with the same color paint and vice versa. As science learned more about the subject, this was changed to create greater deception to

judgment. Sailors are regarded as extremely superstitious, and yet science has definitely traced some of the "phantom ships" and other manifestations they have "seen" to natural conditions whose principles are now known. The phantom ship might well be a mirage and the sailors who saw it did not err in their judgment for their eyes "saw" what had been presented to them. You probably have seen one of these mirages. While motoring over paved streets the distant pavement ahead may appear to have pools of water on it, especially in summer, or a pedestrian crossing in front of the car ahead of you may seem to have no feet, the feet being replaced by sky.

As a result of its discoveries, science is paying more attention to the creation of illusion in both war and peace. The World War witnessed the appearance of the defensive measure of camouflaged boats and



Top, Trickster Creates Illusions by Making "Passes" to Divert Eye from White Ball; Center, Camouflaged Ship; Bottom, Could You Describe Accident Accurately?

the eyes. Patterns were evolved that seemed to alter the perspective of the ship so that the submarine torpedo man had difficulty in determining the course to fire his torpedo. Colors were used, such as



C920

reds and blues which are seen by the eye at different distances. In industry, science is busy adapting illusions which influence your daily life and add to your enjoyment. Even you are contributing to deceiving the eyes of other people by choosing a "speedy looking" or "roomy looking" automobile or a hat which will make your face appear thinner or stouter.

Seeing is deceiving. And seeing is also believing. How far can you believe your eyes?

C935

**HAND CAR TRACK OILER SPEEDS UP WORK**

For oiling railroad-track fastening, a semi-automatic device has been produced by Irving Rugg of the Boston and Maine railroad. A hand-car carries the equipment, which consists of a seven-gallon pressure tank with a foot tire pump, an air gauge, and two three-eighths-inch hose attached to a tee connection at the top of the tank. To the hose is fitted a length of pipe with spray and nozzle for applying the oil. Tests show that the oiler is more

*State Line, N.H.*

*Cent. H. M. Sidney  
Shell River, N.H.*



Replacing the Hand Method of Track Oiling, This Outfit on Hand Car Speeds Up the Job

economical and faster than hand-oiling track devices.



*del*

Formerly a Conservatory, This Structure Made of Old Wine Casks Now Serves a Small Congregation as a Church

**CHURCH MADE OF WINE CASKS STANDS IN VINEYARD**

Originally a conservatory built of old wine casks, a quaint little church stands in the redwood region of California. The structure, surrounded by a vineyard, is in the center of a grape-growing area.

*Calhoun, Asto Sonoma County*

**GAS TANKS MADE CRASH-PROOF WITH RUBBERLIKE LINING**

*C965*

One of the greatest hazards in aviation, fire resulting from broken gasoline tanks, has been partly overcome by the development of a tank which is virtually crash-proof. The metal tank is lined with a substance which has the physical characteristics of rubber, but is not affected like rubber by gasoline and other solvents. While the use of this substance as a lining enables a gasoline tank to withstand a terrific jolt, no ideal method of sealing it inside the tank has been found as yet. Thus far, it has been necessary to mold it to fit the tank's interior and a satisfactory cement is now being sought.

*Theokal Corp.  
Yardville, N.J.*

c859  
400

And. H. Walter  
Brand  
Vienna Austria

POPULAR MECHANICS



Note Microphone Held against Throat in Hook-Up That Improves the Voice in Singing

**MICROPHONE TIED ON THROAT AIDS IN SINGING**

Attached to the throat so that it rests next to the larynx, a small microphone aids in singing by carrying the movements of the larynx to a loud speaker in the form of sound waves. The microphone and the loud speaker are two units of an instrument devised by a Vienna engineer to enable anyone to have a well-sounding singing voice provided that he knows enough to hum a melody.

**HAND-OPERATED TUBE CUTTER REPLACES HACKSAWS**

Hacksaws, flaring tools and scrapers are eliminated by using a hand-operated tubing cutter which looks like a small clamp. The handle is heavy and round and has conical-pointed ends which, when forced in the end of the tube, give the proper flare for fitting into the coupling piece. A pointed blade screwed to one end of the tool can be inserted in the tube to scrape away rough edges after cutting. The tubing rests in a V-shaped groove, and a wheel secured to a screw does the cutting. The tool is revolved around the tubing which is in a vise, and pressure is applied to the wheel by turning the handle.



Trinitite Mfg. Co. Inc.  
55 Ansbury St.  
Roxbury, Boston, Mass

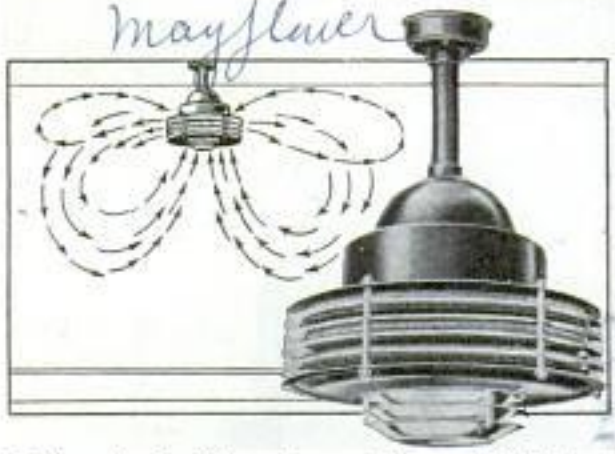
Developed by Rockland  
and Rockport Lime Corp  
Rockland, Maine  
c976  
**QUICKLIME IN CELLOPHANE BAG DOES NOT ABSORB MOISTURE**

One of the greatest obstacles to shipping quicklime has been the fact that it absorbs moisture out of the air and swells in volume tremendously when kept in storage for even short periods. This trouble has been overcome by using containers lined with moisture-proof cellophane. In this type of bag, lime may be stored for a year or more without taking on extra moisture, and as a result the usual hazard of having the lime heat up or swell and break out of its bag is eliminated. Another recent development is a process of waterproofing the lime itself so that once it has been slacked and used as mortar, it absorbs no more moisture. Masonry bound with such lime will retain its strength.

Moisture-proof Cellophane  
Embure State

**COOLER ATTACHED TO CEILING CONDITIONS AIR IN ROOM**

For conditioning the air in one room, a new cooler is suspended from the ceiling.



Ceiling Air Conditioner Leaves Floor and Wall Space to Be Used for Other Purposes

saving the floor or wall space ordinarily required for such devices. Instead of blowing a high-speed air current into the room and depending upon its force to diffuse the air, the cooler quietly pushes the cooled air out through deflectors in a horizontal direction, allowing the air to fall of its own weight. The device not only lowers the temperature and circulates the air, but removes excess humidity. Water taken from the air is automatically pumped from the small reservoir in which it accumulates. The cooler is entirely automatic. A low-speed silent fan is operated by a small motor at little cost.

Trupcar Mfg Co  
Weymouth, Mass

Litche Wenzelle 40.

C 903 General Electric C 896 Harry D I mind  
 POPULAR MECHANICS Dept. of Highway 401  
 Schenectady, N.Y. Harrichedy P.C.

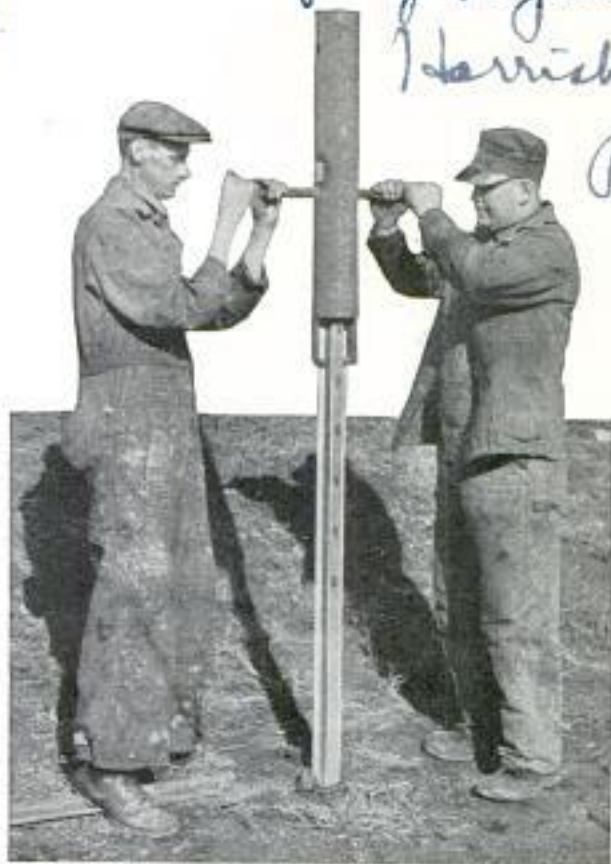
Review June 19 33

**IF MOLECULES WERE WATER  
 EARTH WOULD BE FLOODED**

If each molecule in a five-inch glass bulb should be converted into a drop of water, the United States would be submerged to a depth of 500 feet. Conversion of the molecules of air in a few more bulbs to water would be sufficient to flood the entire earth. Dr. Irving Langmuir points out that there are about twenty-five sextillion molecules of air in such a bulb under ordinary atmospheric pressure. After a condensation pump has been used to remove all except one out of every 100,000,000 of these molecules, there still are left 250 trillion. If these were converted into water drops, there would be enough water to raise the level of the Great Salt Lake about one-sixteenth of an inch. Going further, refined laboratory methods make it possible to remove all except 250 million molecules from the bulb. If these were converted into water drops, there would be only enough left to cover a tennis court to a depth of one-sixteenth of an inch, rather small compared to the whole United States to a depth of 500 feet. Thus, Doctor Langmuir illustrates the progress made in exhausting the air in the bulb for electrical or other purposes.

**FAST THREE-WHEELED AUTOS  
 CLASSED AS BICYCLES**

Classified as bicycles and therefore tax-free, three-wheeled autos that develop speeds close to fifty miles per hour have been produced in Germany. They are operated by two persons each and are of the modern lines.



Post Driver Is Easily Handled by Two Men; Few Blows Are Needed to Set Post

**HAND-OPERATED POST DRIVER  
 REPLACES SLEDGE**

Operated somewhat like a pile driver, a two-man drop hammer replaces the sledge and cap in driving posts. The hammer is similar to a section of heavy pipe. It fits as a sleeve over the post and has handles for raising and lowering it. Its weight, which is ample to drive the post into the ground, is dropped from a short height, and only a few blows are necessary.

NO BLOW-OUTS  
 PROTECTION



# At HOME

you are poring over road maps, routes or time-tables, an air-minded friend drops in.

"Why not fly?" he suggests, and describes the modern, high-speed transports, comfortable cabins, radiotelephones, light beacons, weather data, radio direction signals, plane inspections and other developments and safeguards of commercial aviation. You find your trip will take less than five hours by air compared with twenty or more by land, and may cost you less than the fastest and most luxurious form of land travel. So you decide to fly. Your first flight will offer a never-to-be-forgotten experience that you will enjoy it all the way. You know in advance some of the "tricks" of the trade. For, after all, flying depends

hour have  
The cars hold  
are built along

for raising a  
sixty pounds,  
when it is dr  
and only a few

890



TIRE RESISTANT T  
HAS BUILT-IN PRO

Protection against blow-outs is built into a new automobile tire in the form of a special compound ply that resists internal heat and friction. Separation of rubber from fabric blamed by tire technicians for most premature tire failures, is said to be reduced sharply by the extra ply. Tests at high speeds on all kinds of roads for hours reveal that the new tire has about three times the blow-out protection of standard tires. In one cross-country run, the tires became too hot to touch, yet the trip was completed without tire trouble.

Latest Baby Auto in Europe Has Three Wheels and Escapes Taxation by Being in Bicycle Class

*Used World*  
*maker unknown*

*B. F. Goodrich Co.*  
*Akron Ohio*



Top, Passengers Boarding an Air Liner; Below, Once in the Air, the First Thing to Do Is Relax.

By H. W. MAGEE

**S**UPPOSE you are planning a thousand-mile trip. Perhaps it's business. Or it may be a long-anticipated vacation. While

402

will thrill, but more if you of the sensation, and a few the seasoned air traveler most of the pleasure of flying on the flyer.

First of all, you will be amazed at the simplicity of making a reservation. A telephone call to the nearest air ticket or telegraph office is all that is necessary. Your ticket is delivered to you in advance, together with your itinerary and all other essential information for your journey. And from the time you board a limousine or taxicab for the airport, you are relieved of responsibility by a staff of alert men and women eager to serve you.

# in the AIR

Stewardess Serving Luncheon to Passengers on a Modern Transport Plane

"Courtesy costs little," explains Lester D. Seymour, president of American Airways, "and it pays big dividends. Aside from physical comfort in flight, we recognize the importance of the passenger's mental attitude, and exert every effort in order to make each flight an enjoyable experience."

Your baggage is checked and loaded on the ship for you, your meals



Individual Heaters, Ventilators, Ash Receivers and Lights Add to Comfort; Left, Air Passenger Trying Jigsaw Puzzle

aloft or on the ground are served without charge, your wants in the air are anticipated by a pretty stewardess who is also a trained nurse, or by your co-pilot,



Wide Comfortable Chairs and Plenty of Leg Room Are Features of Modern Airplanes



Top, Dozing Passengers Are Contented Customers; Below, One of the Newest Transport Planes

and your cab is waiting for you at the termination of your journey. Along the way you will find air stations with every modern convenience, and in the air you will be astonished by the amusements and diversions available for your entertainment.

At the airport you will hear your plane announced and the "All aboard" given as casually as though you were boarding a train. As you walk down a covered runway to your ship with its idling motors, your heart may be skipping a beat with excitement now and then, but you will find every one radiating confidence from the grinning porter to the smiling pilot and his mate.

In the cabin your stewardess assigns you a seat, hands you a late edition of the local newspaper or your favorite magazine, gives you an air traveler's packet containing chewing gum and cotton—the

latter for your ears if you want it—and arranges your hat and coat. Nothing to do but enjoy the flight, you decide, as you lean back in a roomy seat and stretch your legs.

And you are right—but do you know how to enjoy your flight? Gazing from your window, you see a signal given, the cabin door slams, motors pulse into life and the ship jogs down the field to the runway. Your stewardess comes by to adjust your seat to the most comfortable position, asks you to fasten a safety belt to hold you securely during the run down the field and tells you smoking is permitted as soon as you are aloft.

At the head of the runway there is a dramatic pause, then one motor roars with throttle open and the other suddenly takes up the refrain. Just testing the motors, smiles the stewardess, if you seem perturbed. Another pause, and the engines roar in unison, you feel a surge of power, wheels bite into the gravel. You're off!

You watch the flying wheels until the plane lifts itself into the air, then you see daylight under the still spinning wheels and realize with a start that you are actually flying. The ground recedes so rapidly that you have difficulty in identifying the little building below as the big air station you have just left. You settle back to try to analyze confusing sensations. Just how does it feel to fly?

Down below, the patterns of ground



crawl slowly past. You are surprised that at 150 miles an hour you have no sensation of great speed and remember how it felt when you had the old bus up to seventy once. There is no rush of air, and there are no telephone poles whizzing past, no means of calculating speed except the quivering needle of the air speed indicator up front and the slowly moving panorama below.

How about height? Do you feel dizzy looking down through a half mile of space? Not at all. The ship seems as solid as a mountain, the ground is so far away everything appears dwarfed. You seem to be floating in a remote but very substantial world of your own.

At the take-off, the motors seemed noisy, but you are accustomed to the hum in a few minutes and find you can converse with ease with a passenger across the aisle. You examine the gadgets beside your seat. There is an individual ventilator and heater, a reading light, an ash tray and a button to summon the stewardess. After fifteen minutes the novelty has abated, and you unfasten your belt and settle back to watch the great vista of scenery.

From this point it's up to you to make or mar your trip. If you came to the airport with nerves atingle over the coming experience—and who isn't excited by his first flight?—your nervousness has likely persisted through the beginning of the trip. Now is the time to settle those nerves. If you don't, you may be a victim of that most disagreeable of flying discomforts—air nausea.

(Continued to page 120A)

Smoking Is Permitted,  
Except on the Ground,  
and So Is Nose Pow-  
dering

One of the Modern Airports Such as the Flying Traveler Finds Wherever His Ship Makes a Stop



# Cottage on Wheels Shows Modern Products



Interior and Exterior Views of the Cottage on Wheels Which Shows Application of Various Building Materials

To overcome the difficulty experienced by many prospective home owners in trying to visualize completed homes from penciled sketches and raw materials, a cottage on wheels has been constructed as a mobile building exhibit. The house shows a wide variety of building materials applied and finished. The unit, mounted on a truck, is thirty-three feet long and cost more than \$20,000 to build. The exterior is shingled and painted white. An individual light plant furnishes power for electric fixtures, and gas is supplied for a stove. The windows show a variety of sash, casements, screens and weatherstrips in use. Interior walls and ceilings are pan-

eled with wallboard, plasterboard, plywood, tile and other finishing materials. Insulation and building papers are shown in cut-outs, and on the floor is demonstrated the use of various types of covering. Window draperies, easy chairs and a radio add charm to the little home, and its utility is demonstrated by a wealth of household equipment, including a sink, gas stove, refrigerator, washing machine, gas-steam radiator, incinerator and oil burner.

## AUTO SAFETY INCREASED BY SWIVEL HUB AND BRAKE DISKS

Greater safety for the automobile is said to be obtained through the use of new steering and braking mechanism developed recently. In the steering arrangement, the front wheels of the auto, bus or truck are attached to a device known as a swivel hub, instead of resting on spindles. This hub is fastened to the axle beam by means of two studs which project from the inner rim of the hub and fit into corresponding slots in the axle beam. The studs replace king bolts and steering knuckles of the conventional axle and likewise allow it to turn freely. The outer rim of the swivel hub contains a series of roller bearings upon which the wheel revolves. Because of its larger area and sturdy construction, the swivel hub is said to make a more rugged mounting for the front wheels than does a spindle. Road shocks are absorbed in the hub instead of being transmitted through the steering column, while wheel tramp and vibration are reduced. Braking is accomplished by a new method made possible by the axle construction. Ordinary brake shoes are eliminated. When the brake pedal is depressed, the friction disks are brought together and braking pressure is exerted against the wide area of a middle ring instead of against a narrow rim, improving stopping qualities.

Reported by G. H. J. Lambert, Lambert Eng Corp. Detroit Mich

List of participating companies in auto lab

Subst news 6/11/33

Cleveland Plain

C848 Built by

C901.

Dealer  
6/11/33

POPULAR MECHANICS

407

### AUTOMATIC DIMMER FOR AUTO MAY SOLVE PROBLEM

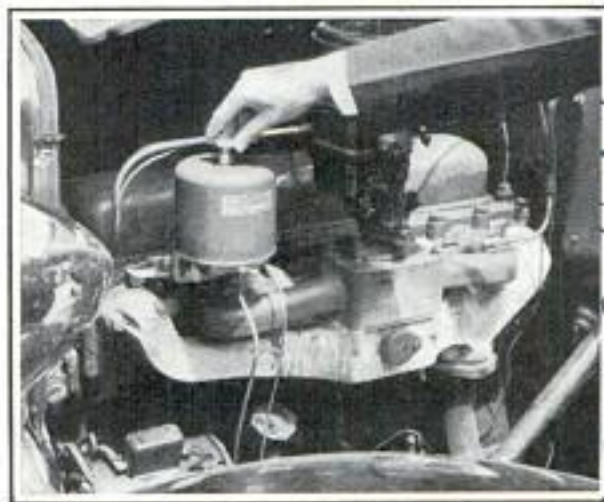
no manufacture on market

Automatic dimming of automobile headlights may solve the problem of night driving. Such an invention has been tested under varying conditions. A very sensitive plate in the headlights causes automatic dimming when acted upon by the rays of an approaching automobile. The plate is said to cut the full light circuit and close the dimmer system. Even street lights operate the device, so sensitive is the plate. Thus, instead of dimming his lights each time he meets another auto, the driver is left free to handle the steering wheel and other controls vital to safety.

C884

### STONE FILTER FOR MOTOR OIL REMOVES TINY PARTICLES

Particles as small as two ten-thousandths of an inch, or one-fifteenth as large as those that pass through felt and metal filters, are removed from motor oil by a stone filtration device. The stone is made of scientifically selected minerals with certain chemicals baked in to neutralize acids. The device consists of a metal container surrounding a hollow cylindrical block of the stone. The oil enters the container around the outside of the stone, filters through thousands of tiny pores to the hollow center and leaves through a central pipe. Impurities that collect on the stone are removed by a revolving brush turned by a knob on the outside. Sediment is removed through a drain plug at the bottom.



New Kind of Filter, Shown Installed in Automobile, Has Porous Rock on Inside



Huge Globe for Ornamenting Private or Public Land Is Made of Concrete; It Carries Map

### BIG GLOBE MADE OF CONCRETE BEARS MAP OF WORLD

Carrying a map of the world, a large globe made of concrete has been constructed as a yard or garden ornament. The globe has no interior structure. The shell is two inches thick. With a diameter of four feet and a circumference of about twelve feet, the globe weighs 1,000 pounds.

### FIVE LANGUAGES STILL A BABEL OF THOUSANDS OF DIALECTS

If persons speaking the 860 languages and the 5,000 dialects of today could be gathered in one place, there would be utmost confusion, a modern Babel. Europe has eighty-nine languages, Asia 123, Africa 114, America 117 and the islands of the Pacific and Indian oceans 417. Probably the most remarkable linguist the world has ever known was Guiseppe Caspar Mezzofanti, who acquired 114 languages and dialects. Born in 1774, Mezzofanti died at Rome in 1849.

Chemical Automotives Products Co. 1302 N. Halsted Chicago

Cont. Kenneth P. Wood 49th. Photo

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929

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© 824 Ideas Manufacturing Co

408

due Take POPULAR MECHANICS  
new Holstein Wis

### POWER-BELT PULLEY ON AUTO DRIVES MANY MACHINES



Top, Power Unit in Place on Front of Auto; Bottom, Unit Connected to Farm Machine

Conversion of the Ford auto or truck to purposes requiring belt power is made possible by a device that is attached to the front of the vehicle. For the farm, it is adaptable to threshing, wood sawing, corn shelling, water pumping, cotton ginning and other jobs, while the contractor, well driller and others find it useful. The belt pulley, measuring six by six inches, has a speed equal that of the auto or truck motor and produces twenty horsepower. It is installed on the front frame and may be cranked into or out of gear in ten seconds. A six-blade fan, replacing the regular fan, provides adequate air flow for the biggest job in warm weather. A square hole in the end of the crankshaft fan pulley accommodates the end of the drive shaft of the device. The regular crank ratchet, removed when the replacing pulley is attached, is inserted in the front end of the power attachment to provide engine-cranking accommodations. The cranking in or out of gear of the attachment is done with the lug end of the

regular crank. Once the special fan pulley is installed and the attachment alined with the crankshaft on the front, the entire power unit can be put on or taken off in five minutes. Use of the power unit does not prevent the car or truck from serving its usual purposes.

© 982

### SMOKE SIGNALS THE ENGINEER AND MAKES OWN RECORD

If a slight puff of smoke goes up the stack of a New York store, bells ring in the firerooms, a sign flashes on the chief engineer's desk and the time and duration of the smoke are recorded automatically. This signal arrangement helps to prevent occupants of buildings near by from being annoyed by excessive smoke. A photoelectric relay unit operates the various alarm devices. From the smoke records, made by a curve-drawing galvanometer, can be determined when smoke occurred, how often, and for how long a period it lasted during the day.

*Baltimore, Fifth Ave*  
**PLANE WINGS ON CRANKSHAFT  
ROTATE TO LIFT CRAFT**

Rotating wings on a crankshaft provide the lifting power in an airplane not equipped with a propeller. In 1928, a German inventor, Vincent Wisniewski, produced a model plane of this type and was granted a patent. High speed and the ability to move backward, forward or to hover

*Berlin architect.*

Revolving-Wing Aircraft for Which Patent Has Been Issued; Note Absence of Propeller



*Wide World* © Wide World Photos  
are claimed. Landing and take-off are almost vertical. The crankshaft is built in at a right angle to the fuselage.

*118.5.5.118  
B adger*

*Power June 19 33*

c 765 Cont. William Atherton De Puy  
2212 - 31 at Place, S E  
Washington, D C

# WHY We Use DOLLARS



**WHY** was it that the thirteen American colonies, upon becoming a nation, adopted a currency based on dollars rather than the shillings and pounds of the mother country? What was the origin of this American dollar which has become the strongest money unit in the world?

The colonies were, of course, British colonies, but they could not get British money because it was so scarce that even Englishmen did not have enough of it with which to transact ordinary business. Money, then as now, was based on precious metal, mostly silver, and very little of it was being produced anywhere in the world.

When Spain opened up Mexico and Peru she laid her hands upon all the precious metal she found. The ships of Spain bore back to the mother country such quantities of gold and silver, particularly silver, as the world had never known before. The English turned pirate and ravaged the Spanish Main, seizing what they might. Spain turned her precious metals into coin and built ships, fitted out expeditions, sailed the seven seas, came almost to dominate the world. Spanish money flooded the western settlements and came to be so much more plentiful than English money that the colonies got used to it, and thus came to like it.

These Spanish coins were pieces of eight, none other than familiar American dollars by another name. The dollar started in 1516 with the Count of Schlick who lived in Saint Joachim's thale, or dale,



**OUR DOLLAR** was first called **JOACHIMSTHALER**, then **THALER**, and **DALER**, finally called **DOLLAR** by the English.

**PIECE OF EIGHT**, a Spanish coin, was a dollar of another name, "TWO BITS, FOUR BITS," etc., derived from **PIECE OF EIGHT**.

**Cross-Shaped Copper Coin Used by Natives in Interior of Africa Had Value of One Slave**

Bohemia. After diligently working a silver mine on his estate, he became possessed of considerable quantities of the metal which he made into coin. Joachim was the patron saint of this dale, and when Schlick made his coin, he stamped the figure of that devout gentleman on it and called it Joachimsthaler.

This coin became popular and found its way over into Germany where its name



Top, Money-Shipping Room of U. S. Treasury; Left, Stone Coin of Island of Yap; Right, Wampum of Indians Also was Used by First White Settlers as Money; Bottom, Coins of Croesus, First Containing Gold

was shortened to thaler. When the drift of trade carried it into the low countries the Dutchmen spoke of it as a daler. The English, finally seizing upon it, called it a dollar.

This coin was a dollar to the British and so were other coins of a similar size made by representatives of other nations. When the Spanish began to flood the west with pieces of eight, the English-speaking colonists called the coins dollars.

The colonists liked this Spanish dollar, so when they set up their own currency they made the basic coin a dollar rather than a shilling or a pound. It is really still a piece of eight and that is the reason that a quarter of it to this day is called "two bits" and a half of it is called "four bits."

There was a time when

the armor worn by knights was quoted in oxen. Oxen were money, as were sheep and pigs, because, in the life of that time, they were universally desired. Money in Latin came to be "pecunia" which goes back to "pecus," meaning cattle. The Greeks used the copper

pot for trading in their markets. Then some smart young tradesman decided that instead of using pots as money, it would be better to cut up the metal from which they were made and use it. He began to buy with bits of copper. It was the first actual money in the world.

Silver came to take the place of copper about two centuries before the time of Cæsar and dominated the monetary world for 2,000 years.

The Greeks made the first coins of precious metal, some 700 years B. C., using electrum, a combination of gold and silver. A man called Croesus, who so impressed himself on his



c 880

Warren Williams

day and time that his name is still a household word, was one of the early coiners.

Marco Polo, returning from China, wrote in his memoirs of various far-eastern communities, that "the people used paper money." Various nations emulated these Chinese but nowhere has printing-press money long served a proper purpose except when it has been made redeemable in precious metals.

With most of the world off the gold standard, the subject of an international money unit is receiving widespread consideration. There is, for example, the metric gram of gold worth 66.45 cents. If the gram of gold were adopted as the international dollar and currencies were so adjusted that they readily could be converted into it, a great step would have been taken to facilitate easy-money conversions all around the world.

c 889

**ARMORED CAR "TRAPS" BULLETS TO PROTECT BYSTANDERS**

If bandits attack an armored car which wears a "blanket," the innocent bystanders need have no fear of being hit by ricocheting bullets. Over the crucible-steel armor plate is a shell of aluminum and a layer of insulating material which trap the bullets and prevent them from rebounding. The aluminum shell also makes it possible to streamline the body while the insulation keeps the interior cool. The driver's compartment is separated from the interior by a steel shield, and if he is captured the guards have a control panel in the cash room which enables them to cut off the ignition and gasoline and lock the emergency brake.

Wesley Pittsburgh Railway Co



Armored Car Covered with Aluminum Shell and Insulation Material to Keep Bullets from Rebounding



maker unknown

Latest Water-Sports Craft Has Own Small Motor That Is Strapped to Operator's Back

**MOTOR-DRIVEN RUBBER BOAT USED IN WATER SPORTS**

Propelled by a small outboard motor, a new kind of water craft has made its appearance on the Pacific coast. It consists of a rubber surf float, with a suspended seat, and the motor, which is strapped to the operator's back. Supported by the float, the operator starts his motor and rides through the water at moderate speed.

**LARGE AMOUNT OF LIQUID FUEL USED ON AMERICAN FARMS**

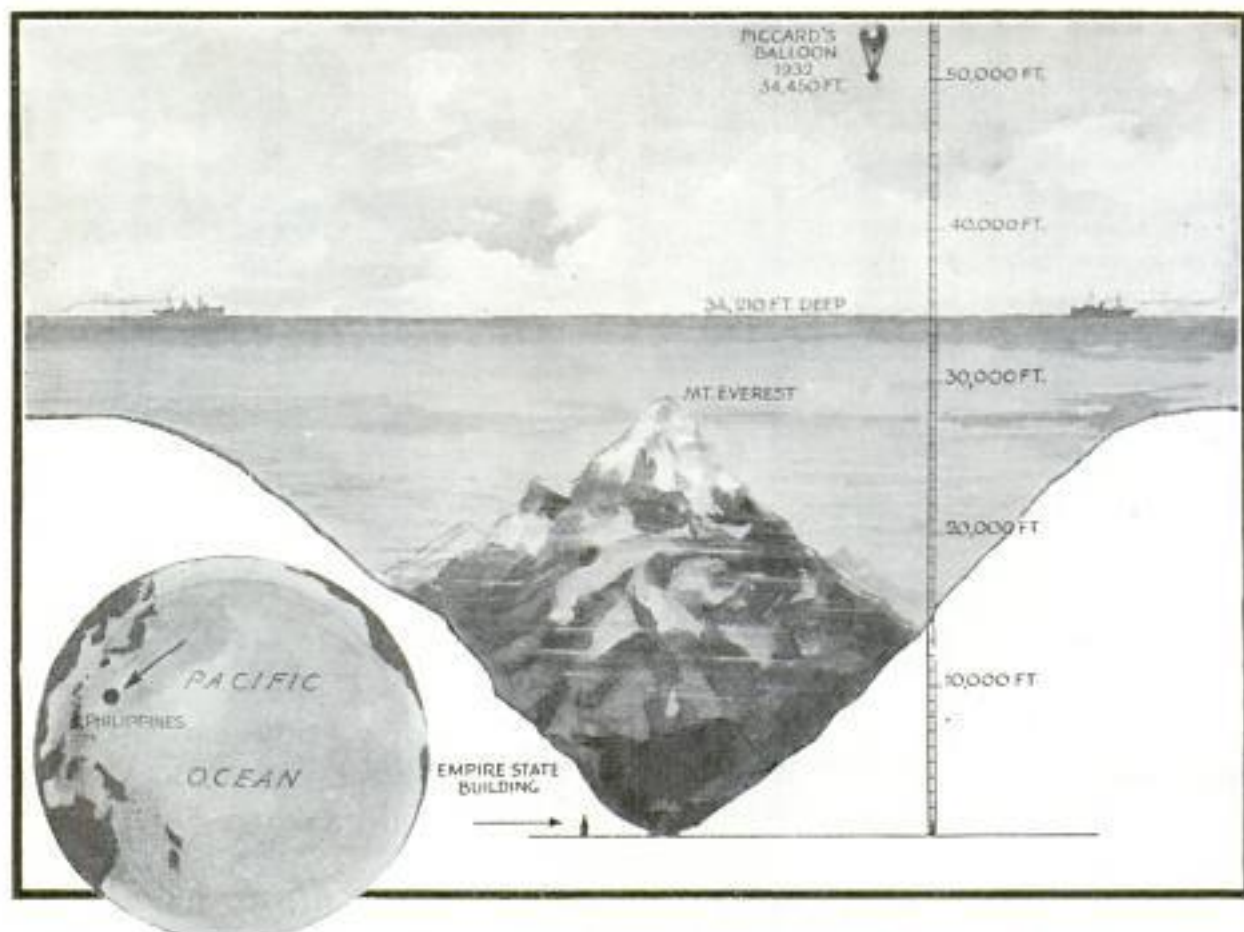
c 924

More than 2,125,000,000 gallons of petroleum fuels, including gasoline, kerosene and distillate, together with about 90,700,000 gallons of lubricating oils were used on farms of the United States in 1930. More than half of the fuel and oil was used in automobiles. The department of agriculture estimates that automobiles consumed one quart of oil for each 100 miles and trucks one quart for each fifty miles. In 1930 there were approximately 4,135,000 automobiles, 900,000 trucks, 920,000 gas tractors, 1,131,000 stationary gas engines, 61,000 harvester threshers and 270,000 electric-light plants on farms of the United States.

Press Service 6/10/33

Built by Isustgo Schaefer Co. 4180 Lorain Ave Cleveland Ohio

Bureau of Engineering Washington, D.C. Copyrighted Material



Map Shows Location of Deepest Spot in the Pacific, and Compares It with Mt. Everest, 29,002 Feet High, the Empire State Building, 1,250 Feet High and Piccard's Balloon Flight of 54,450 Feet

**DEEPEST SPOT IN THE PACIFIC OVER SEVEN MILES DOWN**

By means of the sonic depth finder, a new deep spot in the Pacific has been discovered near the coast of Japan. The depth is slightly more than 33,000 feet, approaching the deepest known point of 34,210 feet near the Philippine islands. Contrasted with the highest mountain, Mt. Everest, with an elevation of 29,002 feet, this deepest spot gives a span of about twelve miles in variations in the earth's crust. The trench near the Philippines is more than seven miles deep.

**ARTIFICIAL WORM FOR FISHING RESEMBLES REAL BAIT**

Closely resembling real worms, artificial bait is being produced for the fisherman. When stretched and placed on a smooth surface, the synthetic worm actually crawls. No rubber is used in its manufacture. The artificial bait is made of fish food, under a secret process, and is suitable for catching many kinds of fresh-

water fish that are attracted by night crawlers. A feature of the worm is that it never spoils. It may be drawn to any suitable diameter for fishing, by rolling it between the palms. The bait always remains soft and pliable under normal conditions.

**METAL-CUTTING TIP ON SCREW MAKES ITS OWN THREADS**

Equipped with a metal-cutting tip, a new screw will bore its own threads in-



stead of merely pushing the metal aside. Two flutes, or grooves, resembling the grooves on a tap, form cutting edges on the threads of the screw. As the screw is turned, these cutting edges

make their own threads. This screw is made with standard threads, and locknuts can be placed on them if desired.

*Kellogg Switchboard Supply Co. 1966 W. Adams, Chicago*

*c909 send 50¢ jar  
Hur Frame Bait Co  
Fremont, Ohio*



C 906

Dept. of Commercial Laws

**REVISION OF PATENT LAWS AIDS FRENCH INVENTORS**

Proposed revisions of the French patent laws call for extension of the life of a patent from fifteen to twenty years, thus giving the inventor more protection. Until now, an invention in France has been considered the property of an employe-inventor, unless otherwise specified in his labor contract. The revisions propose compulsory co-ownership of employe inventions. Chemical products have not been patentable as such, but it is suggested that any new product shall be considered as being derived from the first process to be patented until a new process is patented. Foreigners must apply for a patent through a resident representative whose qualifications shall be defined by decree. An invention already patented abroad may be patented in France.

*Press memo 6/10/33*

*shown at Reformatum and Radio Lounge*



*Acme*

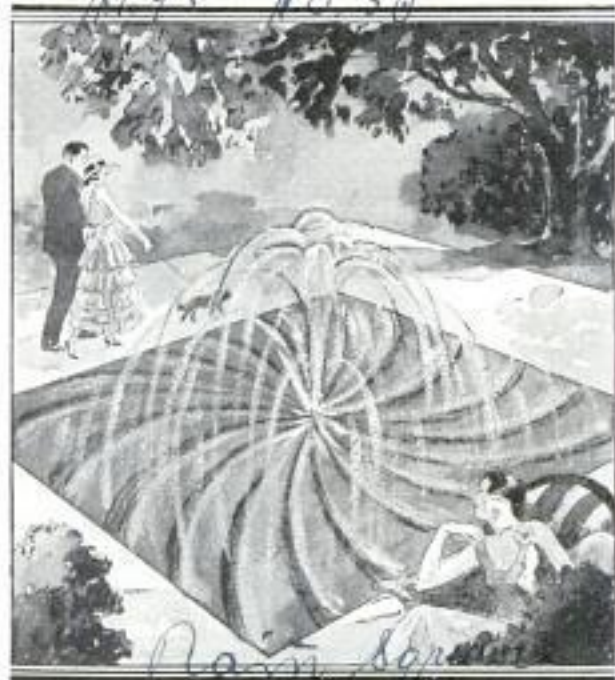
Easy Chair with Radio Receiver Built into One Arm Where It Is within Reach of the Occupant

*No further information*

**LAWN SPRINKLED IN SQUARES INSTEAD OF CIRCLES**

Improved lawn sprinklers, which spray in squares instead of circles, are available for sprinkling areas ranging from three to thirty-six feet square, depending on the water pressure. Set on bearings, the sprinkler operates at the slightest pressure.

*C 897*



Showing Pattern of Spraying Area of Sprinkler

*L. H. Linnox Hoover  
Steel Ball Co Acme  
Arbor, Mich*

**RADIO RECEIVER IN CHAIR ARM SAVES MANY STEPS**

For the lazy person who dislikes to leave his easy chair to adjust the radio, a combination chair and receiver is being offered. It is known as a radio chair and the receiver is built into the arm. Thus the listener in the chair merely drops a hand over the side to tune in.

**PILOT'S STABILITY MOST VITAL TO SUCCESS IN AIR**

That stability is the most valuable prerequisite for a successful airplane pilot is a theory upheld in recent studies by naval medical officers. It was found that the factors of intelligence and concentration apparently had no influence upon an individual's ability to qualify as an aviator. Reaction time was found to be of little or no value. Analysis of the crashes of 640 individuals who qualified as aviators during the study disclosed that 372 persons who were adjudged good material by psychological tests had eighty-two accidents due to the fault of the pilot. In the same length of time, 268 pilots adjudged poor material by psychological examination had 116 accidents due to fault of the pilot. With stability considered the necessary trait, psychological tests were made along this line. Using this form of examination, the examiners were seventy-two per cent correct in predictions as to the success or failure in a group of 1,305 individuals.

*C 914*

*Baltimore Sun 6/11/33*

*Leut. Com. Chs  
Lefroy*

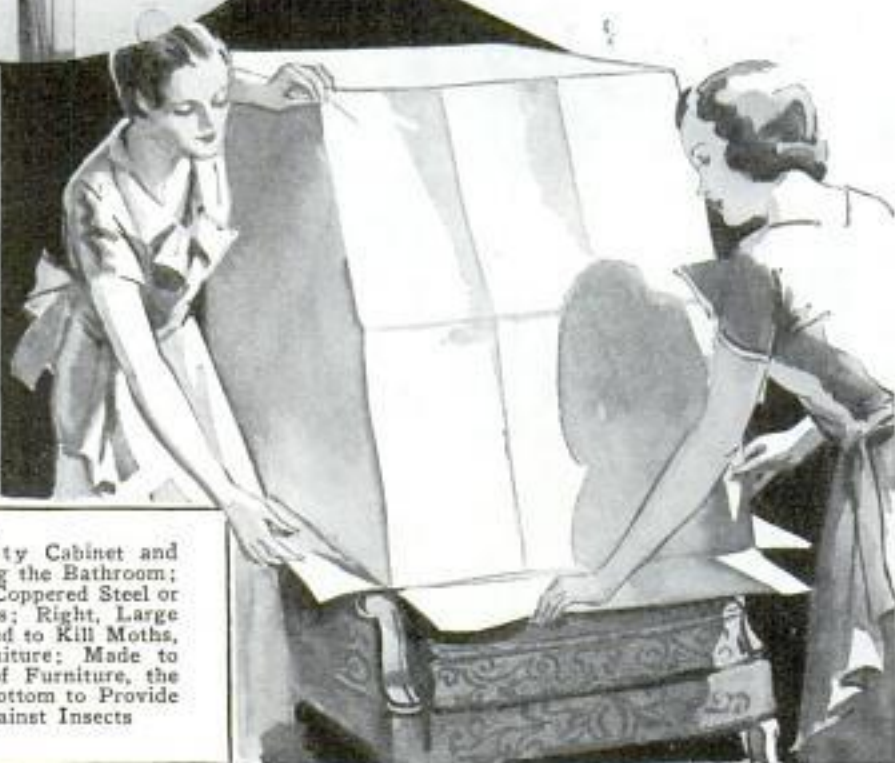
# Making HOME



Left, Aluminum Asparagus Cooker; Cutaway Drawing Shows How the Asparagus Stands "Heads Up" in the Top Section, the Sides of Which Are Perforated; in the Bottom, Water Boils Fifteen to Eighteen Minutes, Cooking the Tough Stalk Bottoms While the Steam Drifts Upward to Cook the Tips; the Vessel Can Be Used for Other Vegetables



Above, Convenient Hanger Bracket Requires No Nails or Screws for Fastening to Woodwork; Photo Shows Hanger in Use for Supporting Birdcage; It Is Suitable for Many Other Purposes and May Be Moved About Easily



Above, Combination Utility Cabinet and Tank Cover for Modernizing the Bathroom; It Is Chromium-Plated on Coppered Steel or Can Be Supplied in Colors; Right, Large Paper Bag, Specially Treated to Kill Moths, Protects Upholstered Furniture; Made to Fit Average-Sized Pieces of Furniture, the Bags Are Flanged at the Bottom to Provide Complete Protection against Insects

# TASKS A PLEASURE



Two-in-One Cooking Plate Is Designed to Heat Two Utensils from One Burner, Thus Saving Fuel; Air Vent Prevents Monoxide Gases from Forming; Aluminum Construction Is Conducive to Thorough Heating



Top, Club Chair with Comfortable Arm and Back Rest Can Be Moved Easily Because It Folds Compactly with One Motion; Bottom, Glow-Type Ultraviolet Lamp for Keeping the Canary Healthy; Its Soft Light Is Not Injurious to the Eyes; Small Transformer for Converting House Current, Can Be Placed on the Floor or Elsewhere



Above, Small Shift Lever Controls Machine so That Operator May Sew Forward or Backward, Eliminating Turning the Cloth to Reverse the Line of Sewing; Below, Self-Starting Siphon Removes Cream from Milk; Siphon Is Inserted into Bottle of Settled Milk to Withdraw the Cream Suitable for Whipping; When the Cream Is Off, the Device Stops Working



*A. L. Elliott  
2018 Agden  
Denver Colo*



This House Was Cut in Half to Make Room for a Road When the Owner of the Building Refused to Move It

### HOUSE CUT IN HALF TO PROVIDE ROOM FOR A HIGHWAY

In improving a New Jersey road, a re-survey showed a residence to be partly on the highway. The owner refused to move, so condemnation proceedings were instituted, and part of the house was cut away and removed. The owner continues to occupy the other half.

### ELECTRICAL TRACKS TEST GAIT AND SHOW FOOT DEFECTS

Invisible electrical footprints on a metal floor are enabling scientists to track down many human ailments. The tracks represent a development expected to be useful in treating infantile paralysis, rheumatism, fractures involving the feet or legs and various foot ailments causing lameness. The idea also can be applied in unmasking cases of feigned lameness, and makes possible for the first time an accurate test of walking gaits, showing how a person's feet move and distribute weight on a floor. Electrical contact points are attached to the shoes on the heels, the middle, outer edge of sole and under the great toe. Wires lead from these to a recording machine. As the subject walks along an aluminum-covered board, a circuit is produced. Lights flash on diagrams of the soles of two feet on a screen, showing exactly how the soles are making con-

tact with the floor. Automatic records are kept of each step, showing how lameness affects the gait. Tests of gaits of women wearing heels three and one-eighth inches high showed that the heel and great toe touched the ground with the middle part of the foot wobbling without support. Persons feigning lameness can be detected because their imitation gait is never twice the same.

### STEEL-MITT HANDCUFFS CONTROL THE UNRULY

Constructed of steel and weighing about three pounds per pair, a new type of handcuffs fits on the hands like mittens. The cuffs open at the wrist to admit the hands, a hinged section snapping back in place to be locked by a key. A small chain with adjustable handcuff lock goes around the wrist to prevent a small hand from being withdrawn. A four-inch chain holds the mitts together at the palms, while a length of chain around the prisoner's body holds the hands close to the body to prevent use of the steel mittens as a club. Tips of the fingers and thumbs are left free through openings in the mitts, giving



Showing How New Handcuffs Cover the Prisoner's Hands; Useful in Handling Unruly Captives

the prisoner limited use of his hands. The handcuffs are designed for use in transporting unruly prisoners.

(Soap in sheet form is being produced in packets like cigaret paper)

*Sanior township,  
Morris County*

*Spurn by Dr. R. Plato Rochester  
Schwab, Univ. of Rochester  
Medical School, 1923*

*My Herald Tribune  
6/13/37*

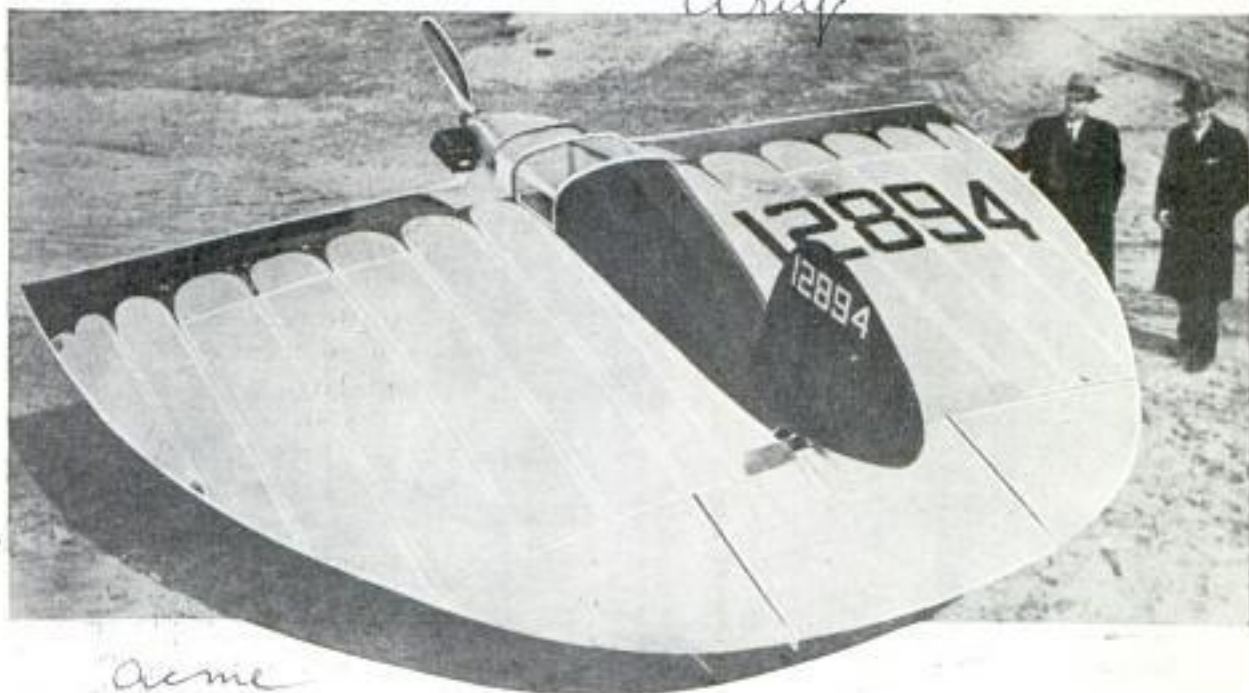
*Sanior*

*Satchell  
Callyn & Co  
325 W. Huron  
Chicago*

*see 976. Dec. 1927*

C817 Dr. Cloyd L. Snyder  
 of Municipal Airport  
 POPULAR MECHANICS  
 South Bend  
 Arup  
 dud

Plane with Semicircular Wing Can't Tailspin



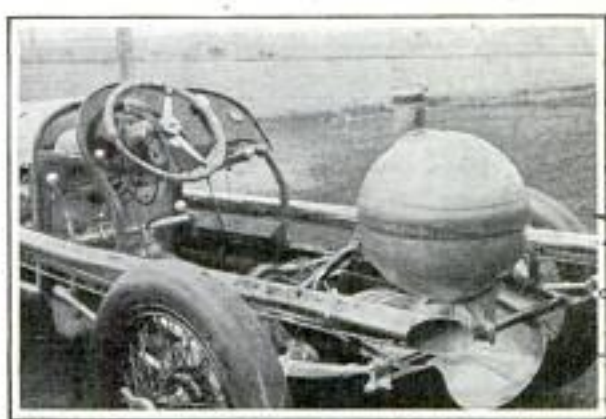
Airplane with Semicircular Wings Which Claims a Top Speed of More Than Ninety Miles an Hour and a Landing Speed under Twenty-Five; the Wing Span Is Nineteen Feet

Tailspins and flatspins are said to be impossible with an aircraft, known as the "Arup," recently flown for the first time at South Bend, Ind. The craft has a wing span of only nineteen feet, but a chord of fourteen feet, the wings being semicircular. The over-all length is fifteen feet and four inches and its weight in flight is 780 pounds. It has a top speed of ninety-seven miles an hour, but the landing speed is only twenty-three miles per hour.

found pairs of electrons formed by the gamma rays given off by thorium. The positive electrons so formed unite with negatives to form photons or light again.

BALL-SHAPED GASOLINE TANK CUTS WIND RESISTANCE

Racing cars are now being equipped with gasoline tanks shaped like spheres to increase streamlining and decrease wind resistance. Such a tank, holding fifteen gallons, not only allows the last drop of fuel to pass through, but prevents unbalancing sometimes caused by the swish of fuel as the car speeds through a turn.



Spherical Gasoline Tank on Racing Car Which Decreases Wind Resistance and Prevents Unbalancing

MATTER CREATED FROM LIGHT AND COSMIC RAYS

That tangible matter is being created out of light and cosmic rays that come to earth from outer space is indicated by recent experiments in the United States and in England. Conversion of mass of the stars to produce light and heat has been the favorite way of explaining their long life. Now evidence is accumulating for the reverse process, the creation of matter out of radiation, not in the distant stars but here on earth. No bulky matter is formed, apparently, only electrons. Such evidence is contained in the bursts of electrons due to cosmic rays observed by Dr. Carl D. Anderson at the California Institute of Technology. Doctor Anderson

Parasena Calif

Dr. J. P. Appenheimer  
 Dr. Milton Plesset  
 National Research Fellow

C954  
 Comb. Jack Ceynar  
 6134 Carrollton Ave  
 Indianapolis, Ind

Chester Isardner  
 driver of Alden Sampson car

Rooftop Garages Perched on Hillside Homes

*Cont. West Block to United Airpark  
Co. of Calif. United Airpark, Burbank*

*Calif*



Some of the "Pent-House" Garages Perched on the Roofs of Hillside Homes in Hollywood; Corkscrew Streets Spiral around the Hills and Many Homes Stand on the Sides with Roofs at Street Level; So the Residents Reversed Ordinary Procedure and Put Garages on Top of Their Homes; Some of These Three-Story Vertical Houses Have Bedrooms on the Ground Floor, Living Room and Library on the Second and the Kitchen under the Roof, with the Garage Piled on Top, All of Which Adds to the Impression of Visitors That Everything in the Movie Colony Is Upside Down



Cleveland Plain Dealer

6/11/33

POPULAR MECHANICS

899

### AUTO SPEED ONLY AN ILLUSION AT STREET INTERSECTION

When a driver approaches an intersection, an automobile coming from the right appears to be moving at a much faster pace than actually is the case. This is an optical illusion produced by the action of the two cars in approaching the intersection at about the same time. Often, when the auto from the right travels toward the center of the street, it seems to speed up, but actually it may be slowing down. Drivers meeting another auto under such circumstances usually find it best to be guided by the illusion and to retard speed, thus avoiding danger of a collision.

### SUIT FOR WALKING ON WATER AIDS IN LIFE-SAVING

Buoyant enough to support a man in upright position, a new life-saving suit permits its wearer to literally walk on the water. The suit, weighing only twenty-eight pounds, can be adjusted in fifteen seconds. It is equipped with a flashlight system for use in darkness. Entirely waterproof, the suit will not tip over or sink, even if it became filled with water. Propellerlike devices on each leg aid the wearer to walk in water at a speed of four or five miles an hour.



Suits That Support the Weight of the Body Upright in Water Are Shown as Wearers Approach Shore

Arthur L. Scott  
Ferdale, Mich

879. Dry-Casey Jackson, D

1155

San Diego, Calif 419



Piston Insulated with a Layer of Asbestos to Reduce Heat and Improve Motor Performance

### INSULATION FOR PISTON SAVES OIL AND REDUCES HEAT

Better combustion, a saving in motor oil and less wear on cylinder walls are claimed for an insulated piston now offered for automobile engines. The piston has a layer of asbestos, one-eighth inch thick, held to the top by a cast-iron plate, hot-riveted on by hydraulic pressure. The asbestos reduces heat and this improves motor performance, it is claimed, since less carbon forms under the piston rings.

### SUN AND WIND MAKE GYPSUM IN NEW MEXICO

Wind and sun, working together for centuries, have manufactured countless tons of pure gypsum in south central New Mexico, piling the white sand to an average depth of twenty feet over an area 100 miles square. These gypsum dunes are 100 feet high in some places. Recently a portion of this area was set aside by presidential proclamation as a national monument, while another portion was reserved for commercial development.

Charlotte Observer 6/11/33

C608  
420

Com. George F. Paul  
537 S. Dearborn

Cheray



Inventor Is Shown in Overhead Rail Car That Attains High Speed; It Is Driven by a Propeller on Power from the Rail

### AERIAL CAR WITH PROPELLER RIDES OVERHEAD RAIL

Suspended from an overhead rail, an aerial car with a propeller has attained speeds over 150 miles per hour in tests by its inventor, Louis Archet, of Paris. Power is supplied by the rail on which move the two twenty-four-inch wheels of the car hanging below. In turn, the rail is supported by cables suspended from pylons 200 yards apart. The car is twelve feet long.

### LIGHTNING RODS GUARD TREES AND BUILDINGS NEAR BY

Trees can be protected from lightning by placing a terminal at the top and connecting this, by means of copper strips, to copper cable buried in the ground. Long shank screws are used in fastening the strips of copper to the tree. This form of lightning rod will carry terrific electrical

discharges direct to the ground, thus saving valuable trees from destruction. Trees are excellent conductors of electricity because they contain so much moisture. Because they attract lightning, trees tend to protect buildings near by from bolts, but often the lightning will strike the tree and then jump to the metal rain spout on the house, causing considerable damage.

### BUBBLE BOUQUET COMES BACK AS AN ART

CS15

Revived from the gay nineties, bubble bouquets were exhibited at a recent flower show in a southern city. The art flourished some thirty years ago. Bubble bouquets are nothing more than simple bouquets of flowers submerged in water. Flowers for this purpose should be selected for individual form, color and outline, as the pansy, lily, tulip, violet and iris. The bouquet is tied with twine so each blossom stands alone so far as possible. The ends are cut short and attached to a piece of iron, lead or a stone, heavy enough to hold the bouquet steady when immersed. Bits of moss or fern may be wrapped about the weight to conceal it. The bouquet is placed upright in a deep glass dish, such as a soup plate, and submerged in the bathtub. Then a clear glass bowl, such as a fish aquarium or candy jar, is also submerged in the tub and fitted over the bouquet, the entire operation taking place under water. Finally the plate, with the bowl fitted over it, is brought to the surface. Surplus water is allowed to remain around the edges. Within a short time, tiny bubbles begin to form on the edges of the flowers and, after ten or twelve hours, each flower and leaf is outlined with little droplets, resembling strings of pearls.



CS94

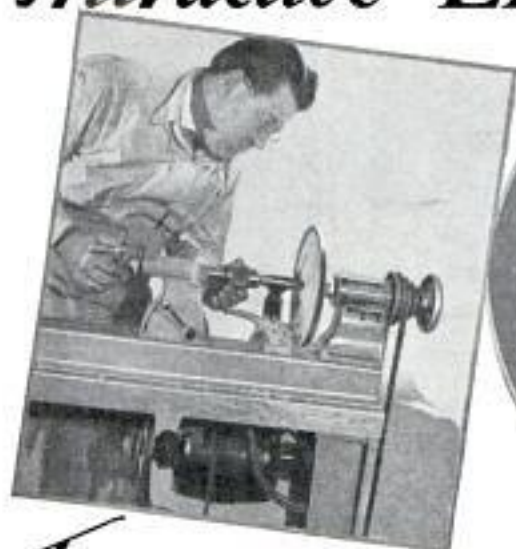
Com. L. S. Eckhardt  
2047 N. Park Cr.  
Phila

Com. Geo. A. Watson  
Southern News Service  
Box 2489, Birmingham Ala



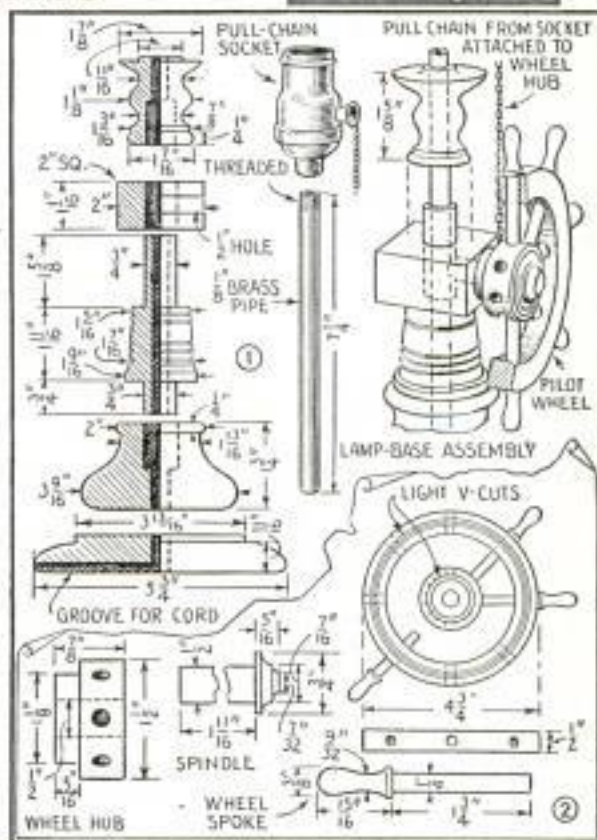


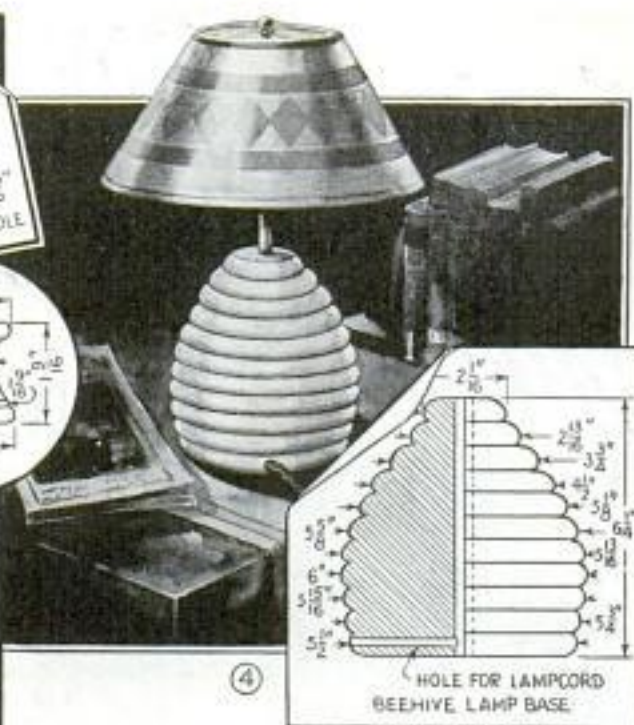
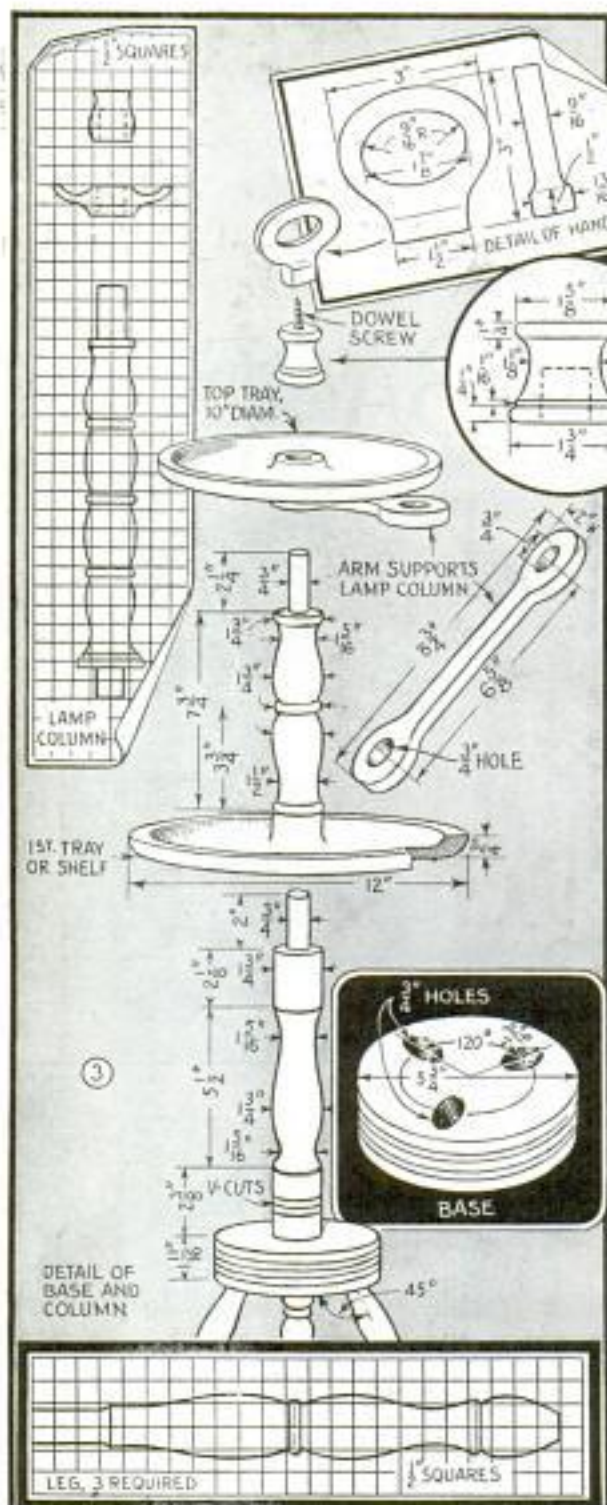
# Attractive LAMP BASES



## Turned on Your Lathe

LAMP bases of unusual design may be turned almost completely on your lathe. The mariner type, on which a miniature ship's wheel is rotated to turn the light on and off, is detailed on this page. The base is made from five pieces of hardwood such as maple or birch, as in Fig. 1. After the parts have been turned, the hole taking the wheel spindle is drilled in the fourth member and a  $\frac{1}{2}$  by  $\frac{1}{4}$ -in. groove is cut from the center to the edge of the first member of the base. Also, it is better to drill the  $\frac{13}{16}$ -in. hole for the  $\frac{1}{8}$ -in. pipe before assembling the parts. The pipe is  $7\frac{1}{2}$  in. long and one end is threaded with a  $\frac{1}{8}$ -in. pipe die so that a standard lamp socket can be screwed on. No socket harp is used, the shade being of the spring-clip type which clamps directly on the light bulb. Fig. 2 shows the various parts of the wheel. The spokes are inserted through holes drilled in the rim and hub, and are glued in place. Be sure that the wheel is true before allowing the glue to set. The





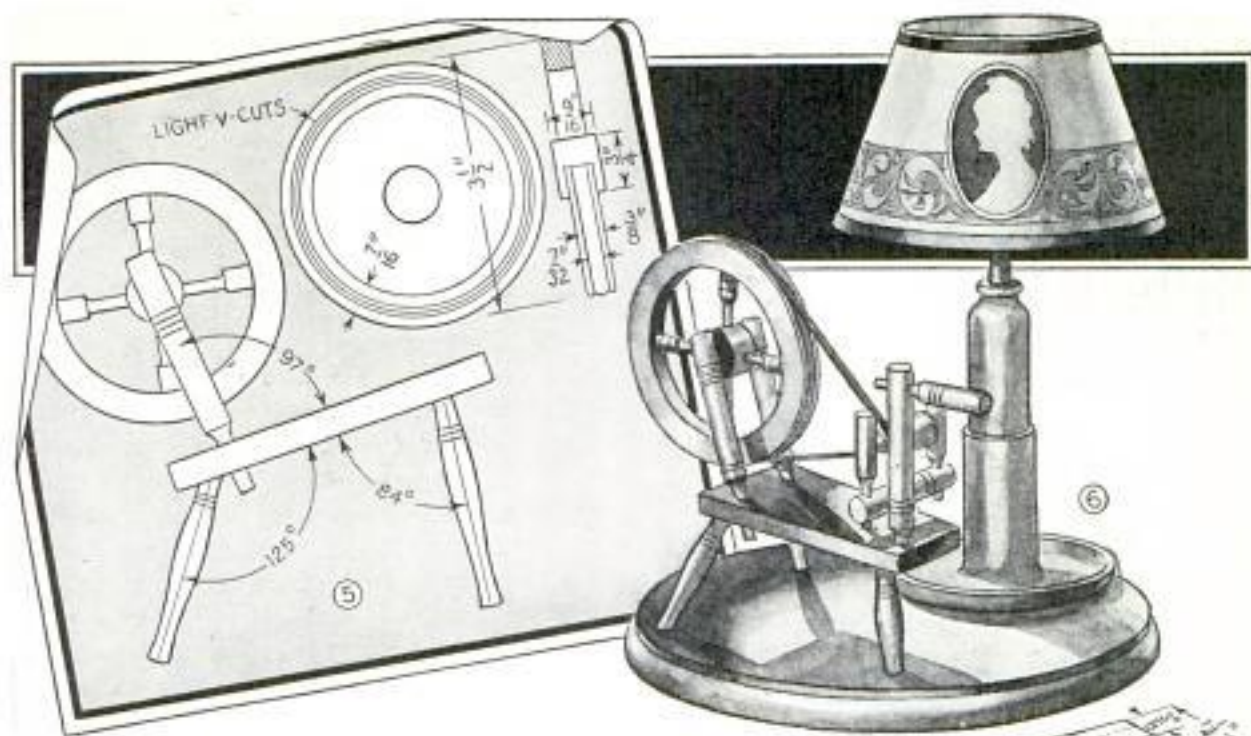
pull-chain from the light socket is attached to the shouldered projection of the hub after which the wheel is fitted to the lamp base. Turning the wheel in opposite directions switches the light on and off.

Fig. 3 details a lamp and stand combination adapted from the early American muffin stand, of which there are many variations, the lamp being supported on an arm under the top tray. All turned parts are of hard white maple. The three legs are turned first, then the base from  $1\frac{3}{4}$ -in. stock. To drill the holes in the base, make a guide which pivots on a dowel inserted in the center hole of the base. A pilot hole is drilled through the guide at an angle of  $45^\circ$  or slightly less, the pilot hole being the same diameter as those to be bored in the base. The guide insures that all three holes will be the same distance from the center and also that they will be bored at the same angle.

Another novel and attractive design is the beehive lamp shown in Fig. 4. The base consists of eleven disks of  $\frac{9}{16}$ -in. stock, glued together concentrically. After mounting the assembled disks in the lathe, turn the edge of each to the contour shown. Brass pipe, socket and shade are fitted in the manner described before.

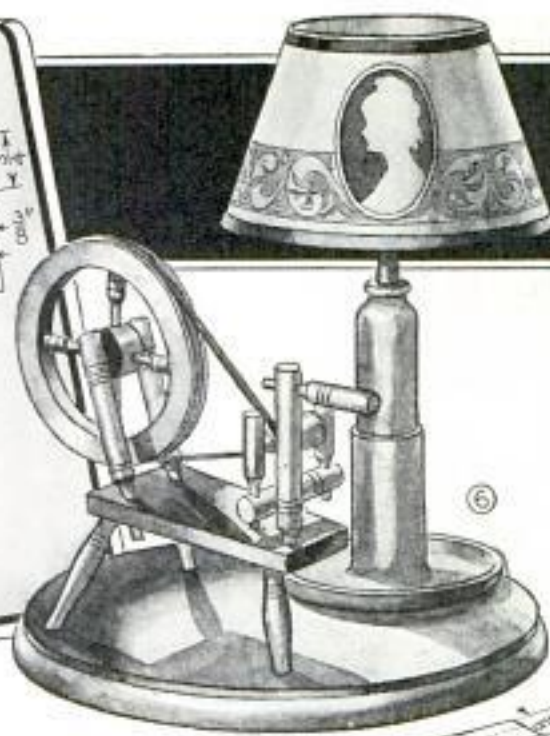
Still another popular design is the spinning-wheel lamp shown in Figs. 5 to 8 inclusive. Aside from the wheel rim and base, the spinning-wheel parts are turned



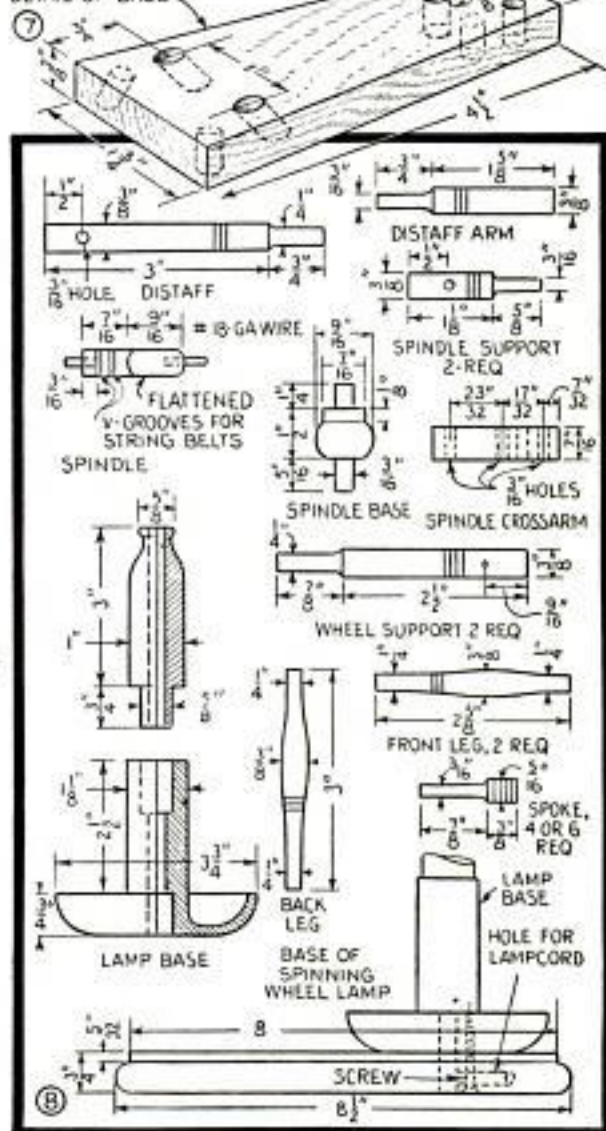


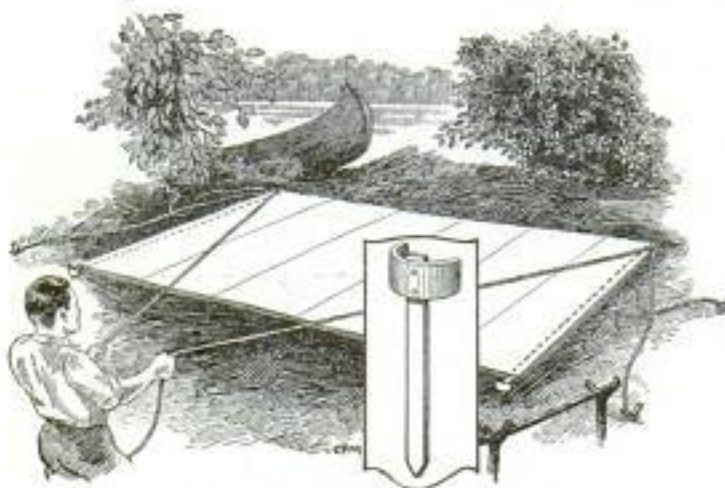
from  $\frac{3}{8}$  to  $\frac{1}{2}$ -in. dowel rod. First, the wheel rim is turned from a disk of  $\frac{1}{2}$ -in. stock, then the hub and spokes. Either four, six or eight spokes may be used in the wheel as desired. Only the hub is drilled to take the spokes, the outer ends being glued to the inner edge of the rim. The holes taking the legs should not break through the top of the base but all holes drilled from the top side go clear through. A hole taking a No. 18 wire is centered through the hub and the wheel supports, and also through the spindle supports in the positions indicated. This done, the parts are assembled to complete the wheel. The lamp base is designed to simulate as nearly as possible the old-time tallow-candle holder. The detail, Fig. 8, shows the column turned in two parts, which makes it easier to drill the hole taking the brass pipe carrying the socket. The base for the lamp and wheel is turned  $8\frac{1}{2}$  in. in diameter. A hole for the lampcord is drilled in the base. The spinning wheel is attached to the base by drilling shallow holes to take the legs. A spot of glue in each hole will hold the wheel securely.

A colonial maple finish is appropriate for any of the lamp bases described. This is done by staining with golden oak and wiping the surfaces quickly before the stain dries in order to avoid too dark a shade. Then apply two coats of shellac, and rub down the finish.



DETAIL OF BASE





Tent Raised by One Man with Specially Prepared Stakes That Hold End Poles in Position

### Tent Raised Single-Handed

One man can easily raise a tent by using two specially prepared stakes. They consist of lengths of heavy flat iron having the lower ends pointed, and curved pieces riveted to the upper ends. To raise a tent, lay it out as shown with the ridge and end poles in position. Then drive the prepared stakes into the ground at the lower end of the end poles. Drive two stakes at each end of the tent and tie ropes to them to hold the tent when it is raised. Now, with two long ropes tied around the pins in the end poles, the tent can be raised and staked down.

### Paint Kinks for Model Makers

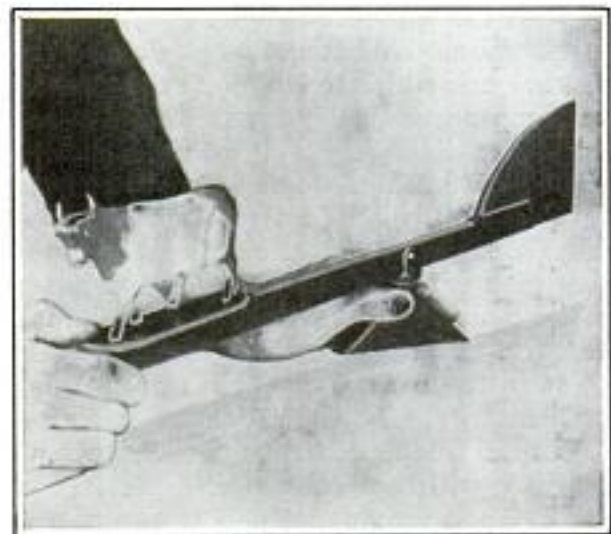
Model makers can reduce paint costs by mixing their own paints in the quantities needed. First mix linseed oil, 1 pt., turpentine, 1 $\frac{3}{4}$  oz., and Japan drier, 5 teaspoonfuls, and keep it in a bottle labeled "paint mix." Then get a 1-lb. can of white lead and one tube each of the following stock colors ground in oil: Medium chrome yellow, medium chrome green, Prussian blue, venetian red, lampblack, raw umber, raw sienna, burnt sienna, and French ocher. By using the above colors alone or in combinations, you can produce almost any color or tint desired. The following tints can be made by combining the colors, the proportions given being only approximate, as colors ground in oil vary in tone strength according to quality: fawn, raw umber; buff, raw umber, 1 part, raw sienna, 3 parts; rose buff, raw umber, 1 part, raw sienna, 3 parts, and burnt sienna, 1 $\frac{1}{2}$  parts; tan, raw sienna;

drab, raw umber, 1 part, raw sienna, 2 parts; golden brown, venetian red, 1 part, raw sienna, 16 parts; ivory, French ocher; colonial yellow, French ocher, 1 part, medium chrome yellow, 2 parts; putty, lampblack, 1 part, medium chrome yellow, 1 $\frac{1}{2}$  parts; greenish silver, lampblack 1 part, medium chrome yellow, 1 $\frac{1}{2}$  parts, medium chrome green, 6 parts. Over new wood one need not bother to tint the priming coat. If the job is small, take white lead and work it to the proper consistency with the paint mix, and then

add a few drops each of oil and turpentine to each ounce of paint. For the second coat, mix white lead as before and reduce with turpentine, omitting the oil. For the third and successive coats, thin the lead with the paint mix to a brushing consistency. To obtain gray, tint the second and third coats to the proper shade with lampblack. Remember that an ounce of white paint tinted with a tiny bit of lampblack will change white to gray.

### Celluloid Animal Used as Ornament on Weather Vane

Attractive weather vanes can be made by using small celluloid animals for the ornaments, which are mounted on the



Weather Vane, Ornamented with Celluloid Animal and Mounted on Sensitive Pivot, Responds to Breeze

vanes with brads and glue. The crossbar of the vane is pinned to a ball-bearing caster shank which serves as a pivot.

### Bleaching Cane Chair Bottoms

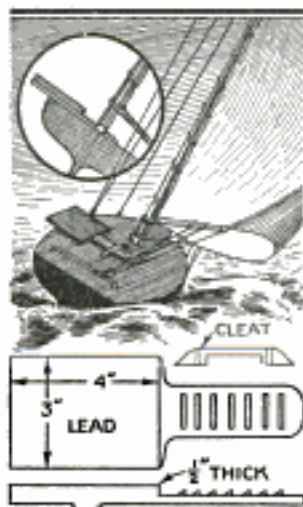
Light-colored caning in chair bottoms may be bleached to its original color by first washing it with good soap, and then applying a solution consisting of oxalic acid (poison), 2 oz., dissolved in water, 1 qt. The solution should remain on the cane until the bleaching is completed, after which it is washed off. When thoroughly dry, the cane may be protected with a thin coat of clear lacquer or varnish. The solution may also be used to bleach plain, wooden table tops or other wooden articles that have become discolored. If the acid is washed away with water after the bleaching has been completed, there is no danger of poisoning.

### Keeping Grasshoppers Out of Garden

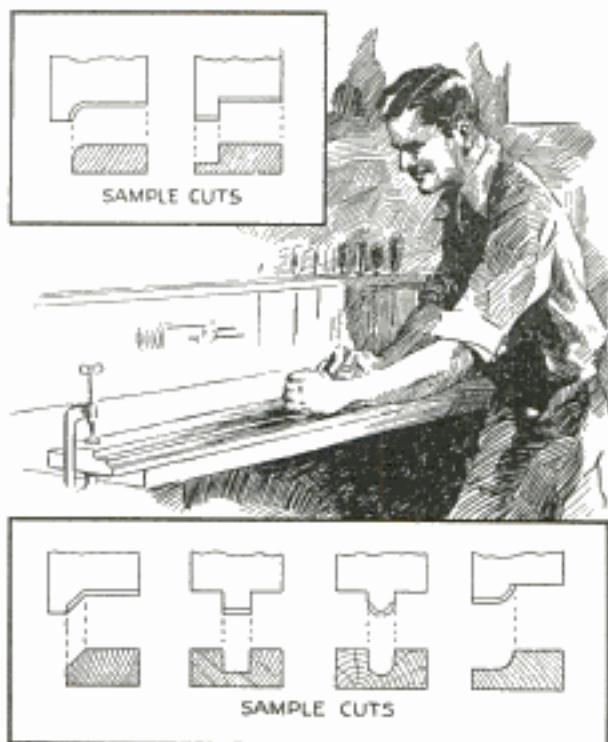
A western gardener, whose crops had been damaged by grasshoppers, prevents recurrence of this trouble by planting a strip of rye along the exposed or uncultivated side of the garden. By the time the insects have eaten the rye, the brief span of their lives is over and the more valuable crop is saved.—F. D. Hartford, Denver, Colo.

### Adjustable Balance Keeps Model Sailboats from Listing

In recent junior sailboat regattas, it was found that an adjustable lead balance helped to keep the boats from upsetting in a strong wind. The weight is cut to the size and shape shown, and is held in position by a cleat screwed to the deck of the boat. By adjusting it to project over the windward side of the boat, a fairly even keel can be maintained.



☐ A worn-out clock can be used in the sick room to indicate when medicine is to be given a patient by setting the hands at the proper position.



Hand-Plane Irons Ground to Various Shapes Permit Plane to Be Adapted to Many Uses

### Plane Irons Altered to Cut Grooves and Rabbets

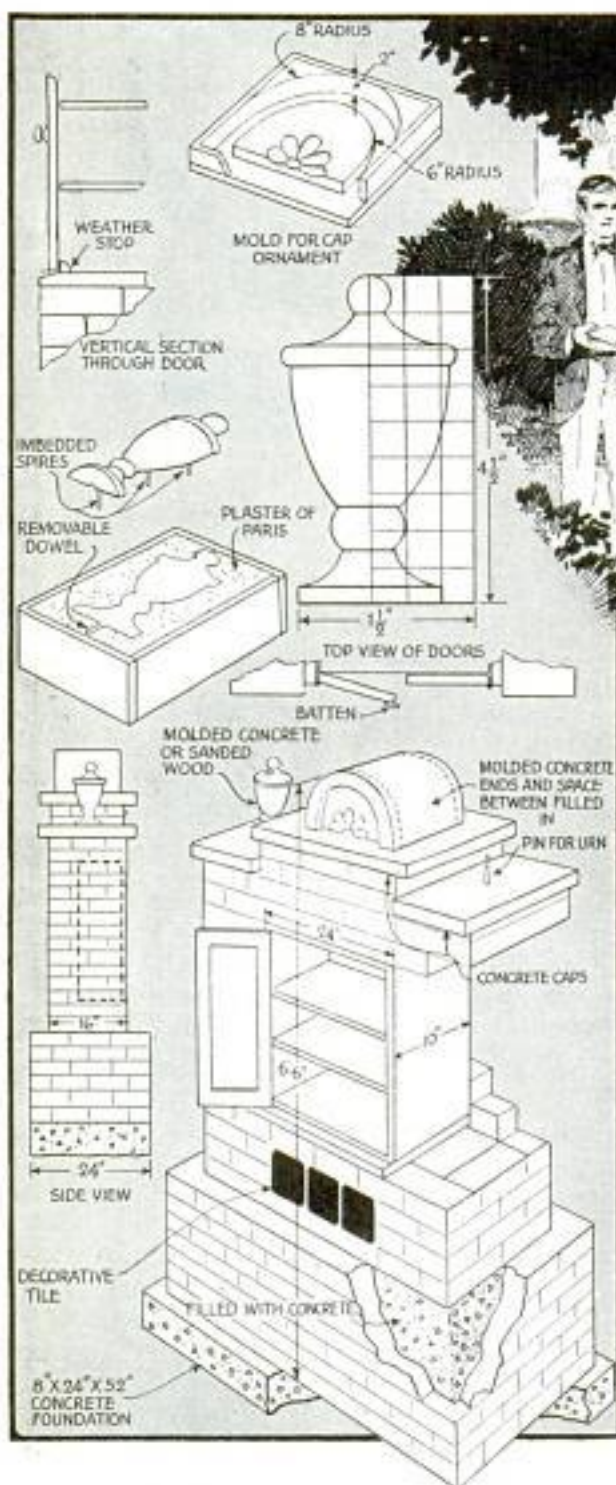
By grinding plane irons to various shapes, you can use them for cutting grooves, rabbets, moldings, etc. After grinding, the cutting edges are finished on a slip stone or a slowly revolving grindstone. It is necessary, of course, to clamp a straightedge to the work to serve as a guide for the plane.

### Valve Grips from Caster-Wheel Cups

Large hardwood caster-wheel cups make good substitutes for broken grips on radiator valves. All that is necessary is to drill a large hole in the center and two smaller ones to take the lugs on the valve stem. Most of these castor-wheel cups are of tough wood, and will stand considerable more strain than the regular valve grips. They can be obtained in any novelty or five-and-ten-cent store.



# Build This Castilian Library in Your Garden



the concrete for the foundation, use cement, 1 part, sand, 2 parts, and gravel, 3 parts. The base, or pedestal, is made of single-width brick, and is filled with concrete flush with the top. The bookcase contains two shelves and is made of wood surrounded by brick at the sides and rear. Two doors close the front, a strip of molding forming a weatherstrip just inside the bottom of the doors. Note that the front of the bookcase sets back 1 in. from the edge of the brick. Three flat concrete caps and two urns surmount the brickwork, pins being imbedded in the side caps to hold the urns in place. If these are molded, use a mix of cement, 1 part, and clean, dry sand, 5 parts. The molds should be a fine-grained wood, such as sugar pine or redwood, and should be sanded inside to provide a smooth surface free of grain marks. White paint is effective for the inside of the bookcase, but the doors will be more attractive if stained in dark, weathered finish. Clinging vines, such as English ivy or woodbine, planted so that they grow up and cover the brickwork, will add to the beauty of the library.

Simulating the old Castilian type, this open-air library will provide an attractive and practical addition to your garden. It is constructed of concrete and rough brick, and the decorations are molded from concrete. If you do not care to attempt the molding, they can be turned from wood and treated with plastic paint and sand to resemble stone. In mixing

☐ A soft, broad paintbrush is handy for dusting tops of doors and in corners.

### Visual Means of Checking Water Pump on Outboard Motor

Most small outboard motors discharge water from the cooling system through the exhaust pipe, which makes it difficult to tell whether or not the water pump is working. To eliminate all guesswork, insert a short piece of glass tubing somewhere in the cooling system so that the circulation of the water can be seen. Most motors have a rubber hose at some point in the system, which can be cut and the tube installed. If it is difficult to see the water moving through the glass tube, insert a short piece of fine copper wire with a colored bead tied to one end, the wire being held in place by hooking it over the edge of the tube before the latter is inserted into the hose. If water is flowing through the system, the bead will bob around and can be seen through the glass. —J. S. Petersen, Toledo, Ohio.

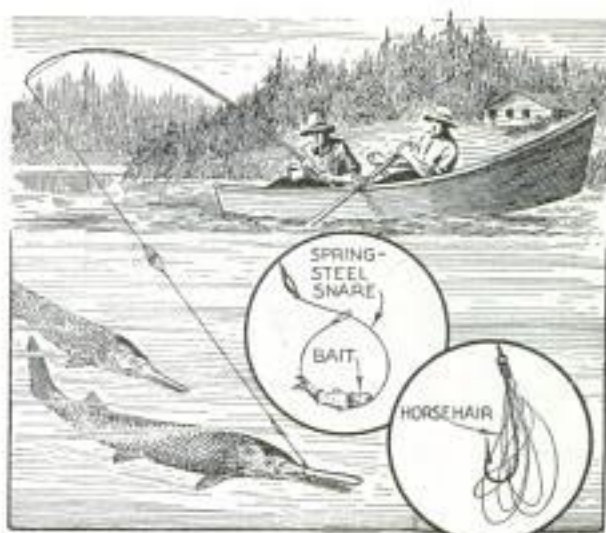
### Sections of Inner Tubes Keep Luggage Rope Tight

When luggage is tied on the running board of a car, the rope often loosens enough to let the bundles rattle or slip out entirely. If sections of old inner tubes are fitted with wire fasteners as shown, and tied in the ropes, they will maintain a tension that will keep the ropes from loosening and hold the bundles securely. —Harold F. Benson, Denver, Colo.



### Polishing Tarnished Copper

Tarnished copper may be quickly cleaned and polished by rubbing it with a piece of cloth that has been dipped in a paste made by thoroughly mixing powdered oxalic acid, 1 oz., rottenstone, 6 oz., and powdered gum arabic, ½ oz. After these have been mixed, add sweet oil or olive oil, 1 oz., and work the mixture into a smooth paste. Then add water, 1 oz., a few drops at a time, while stirring thoroughly.



Risk of Injuring Your Hands When Garfish Swallows Hook Is Reduced by These Methods

### Two Methods of Catching Garfish

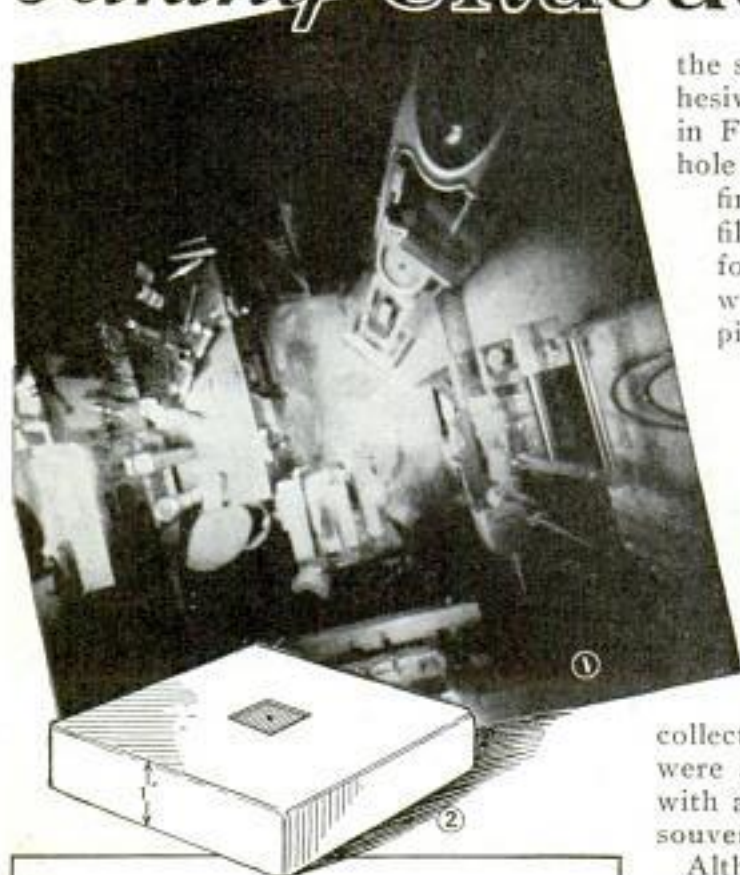
To minimize the risk of injuring the hand when removing a hook from the mouth of a garfish, you can make a snare from a 24-in. length of No. 12 spring wire. It is baited as shown, so that when the fish takes the bait, the snare will tighten around the upper part of its mouth. Tension on the line holds the wire taut until the fish is pulled into the boat. Another method is to tie horsehair around a hook so that when the fish takes the bait, its teeth will become entangled in the hair and it may be lifted from the water.

### Flashlight Lens Makes Powerful Magnifying Glass

Mounted in a tin holder, a lens from an old discarded flashlight will serve as a powerful magnifying glass. The tin is cut to the shape shown, and the glass is held in place by means of tabs soldered to the holder. A lens of this kind, because of its short focal length, will also be found useful by microscopists and others having work of a similar nature. —Malden G. Isles, Lockport, N. Y.



# Taking Unusual Photos



the safety cover of a film roll, using adhesive tape to fasten the edges, as shown in Fig. 7. In the center of the paper a hole was punched with a needle. That finished the lens and, with a piece of film inserted, the camera was ready for use. A wide rubber band was wound around the box and over the pinhole to keep out light.

Instead of waiting for nightfall to change films, the camera was reloaded in an improvised dark-room which consisted merely of a heavy blanket which light could not penetrate. Loading was thus done in daylight, as shown in Fig. 8. When the photographer returned home, he developed his pinhole-camera films and was surprised to find that he had a good

collection of interesting prints. True, they were a bit more fuzzy than those made with a regular camera but they served as souvenirs of an exciting vacation.

Although you may never encounter such an emergency, you can have a lot of fun at any time by building pinhole cameras of various kinds. Happily, pinhole lenses have no definite focus, so that they will work at almost any distance from the film. By constructing a pinhole camera as in Fig. 6, you can make telephotos, that is, you can use it to photograph distant objects so that they seem comparatively close. Figs. 4 and 5 show what can be done. In this case a regular camera and a telephoto pinhole camera were mounted side by side. The latter shows only the circular portion of Fig. 4, considerably enlarged. A telephoto camera of the pinhole type can be made from a section of large cardboard tube and an empty cut-film box, as in Fig. 6. Both are painted inside with black India ink, and the box is then fastened to the end of the tube with adhesive tape so that light cannot enter at the joint. The bottom of the box directly under the end of the mailing tube was cut out and a cardboard disk was fastened with adhesive tape over the open end of the tube. The pinhole lens was then made in exactly the same way as al-



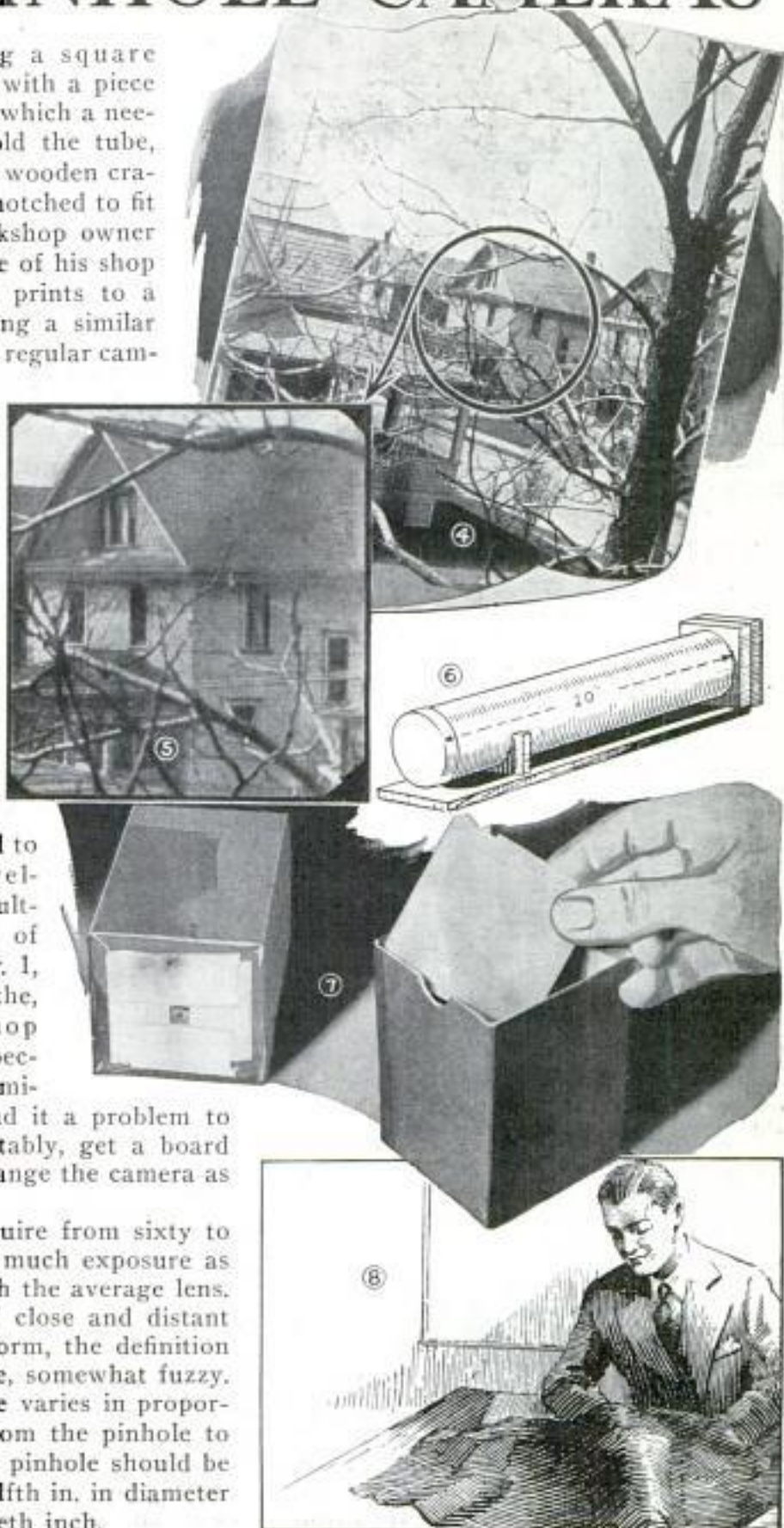
**A**FTER losing his camera when his canoe upset, and being left with several rolls of film at camp, an amateur photographer faced the prospect of returning home from a vacation trip without any photographic evidence to show his friends. Then he spied a cardboard fishing-reel box, and the day was saved. A small hole, about  $\frac{1}{2}$  in. in diameter, was cut in the center of the box bottom, and over it was fastened a piece of black paper taken from



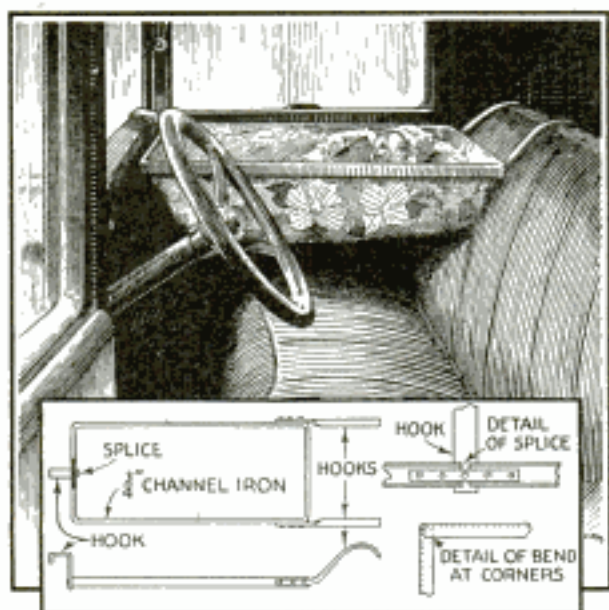
# *with* PINHOLE CAMERAS

ready described, cutting a square hole and covering this with a piece of black paper through which a needle is punched. To hold the tube, you can make a simple wooden cradle having crosspieces notched to fit the tube. A home-workshop owner wished to take a picture of his shop as he wanted to send prints to a friend who was planning a similar shop. Experiments with regular cameras not proving satisfactory, he finally solved the problem by making a wide-angle pinhole box, Fig. 2, in which the lens was little more than an inch from the film. Mounting this against the ceiling, he uncovered the lens, turned on all of the shop lights, and went to supper. When he returned a half hour later, he covered the lens, retired to the darkroom and developed the film. The resulting negative, a print of which is shown in Fig. 1, showed the bandsaw, lathe, jigsaw and other shop tools in amazing perspective. When you try a similar experiment and find it a problem to mount the camera suitably, get a board and stepladder and arrange the camera as shown in Fig. 3.

Pinhole cameras require from sixty to one hundred times as much exposure as a camera equipped with the average lens. Although definition of close and distant objects is equally uniform, the definition is, as mentioned before, somewhat fuzzy. The size of the pinhole varies in proportion to the distance from the pinhole to the film. At 16 in. the pinhole should be approximately one-twelfth in. in diameter and at 10-in., one-fortieth inch,



### Baby Bassinet for Your Coupe

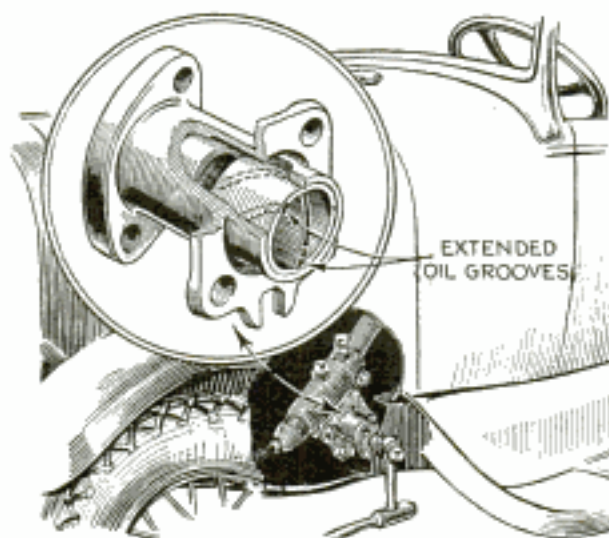


Bassinet Hung between Cowl and Seat of Coupe Provides a Place for the Baby to Sleep

This bassinet provides a sleeping place for a baby in a coupe or roadster and leaves room for two adults. A channel-iron frame is made and fitted with hooks to fit over the cowl and the top of the seat, rubber tubing being slipped over the hooks to protect the finish. Strong cloth to match the upholstering is fastened to the frame to complete the bassinet.—Wm. F. Saunders, St. Louis, Mo.

### Improving Lubrication of Model-A Ford Steering Gear

Model-A Fords sometimes become hard to steer, due to lack of lubrication in



Extending Oil Grooves in Model-A Ford Steering-Gear Bushing Eliminates Hard Steering

the steering-gear shaft bushing where it passes through the car frame. This is caused by the clogging of the passage originally intended to carry lubricant from the gear housing to the bushing. To eliminate this trouble, dismantle the steering gear and extend the oil grooves in the bushing so that they run into the housing. This lets the lubricant enter the bushing directly from the housing instead of passing around through the passage.

### Stomach Operation on Fish Determines Proper Bait to Use

In order to determine what bait fish are striking the best on certain days, one fisherman takes several different kinds of bait on his trip. As soon as the first fish is caught, he opens its stomach to see what kind of food it has been feeding on during the last few hours. In this way, he can bait his hook with the proper bait and be more assured of a good catch.

### Table Forks Used as Fruit Juicer

An emergency fruit juicer can be made by placing two table forks together as shown, and then twisting the fruit around them in the same way as is done on a regular juicer. This



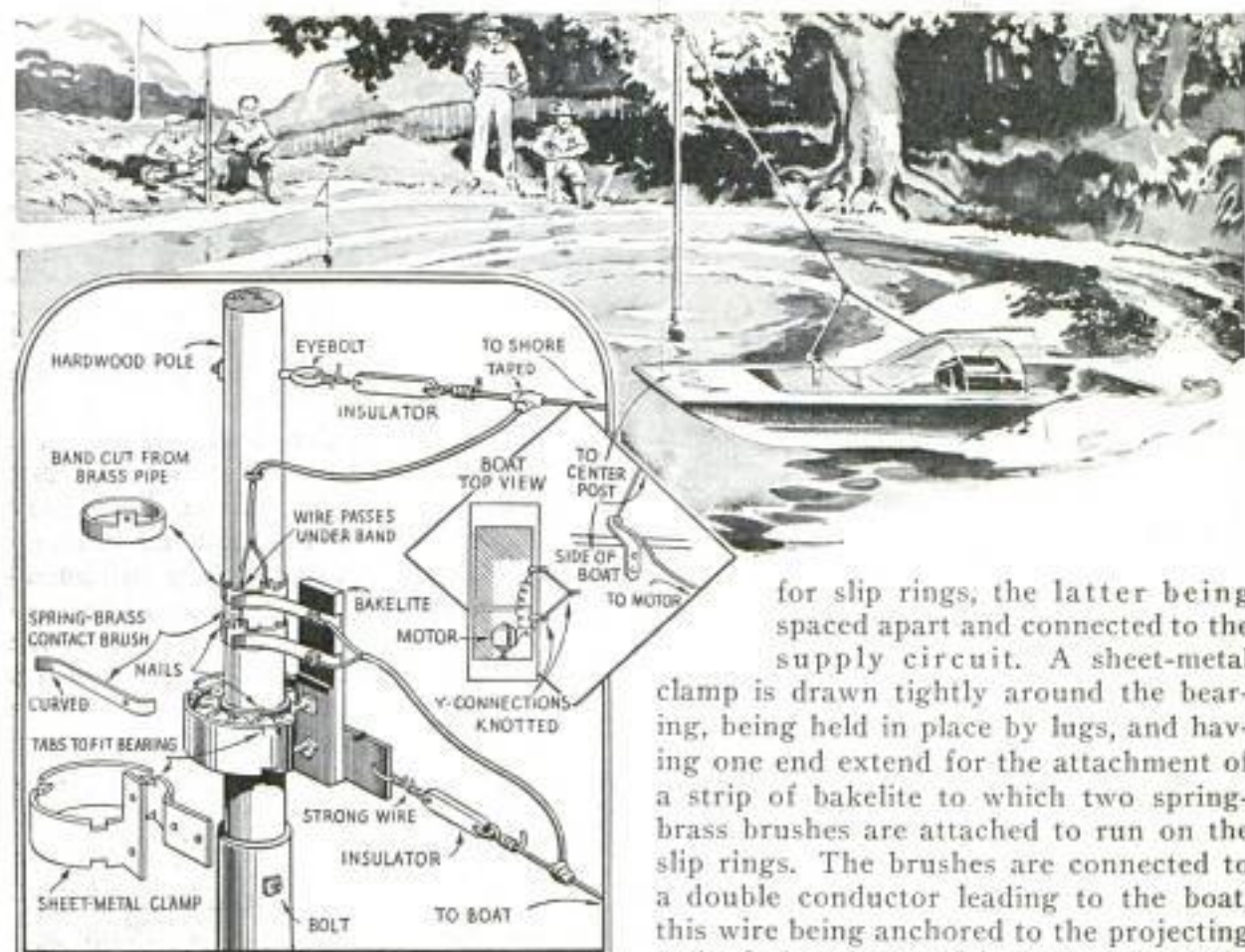
trick is especially useful on picnics when a juicer is not likely to be available.

### Plier Handles Insulated with Old Phonograph Record

Old phonograph records make good insulation for handles of electricians' pliers. Heat a piece of the record until it is soft, and pound it out to a thin sheet with a wooden mallet and, while it is still hot, mold it around the handles of the pliers.

Laundry starch dampened with water and applied liberally will remove iodine spots from most kinds of cloth.

# Model Boat Runs on House-Lighting Circuit



Running in a circle around a pivot set in a pool, this model boat is powered by a motor operated on a 110-volt supply line, and attains high speeds. The post consists of a length of pipe in the top of which a short hardwood pole is bolted. The pole carries a ball bearing and two brass bands

for slip rings, the latter being spaced apart and connected to the supply circuit. A sheet-metal clamp is drawn tightly around the bearing, being held in place by lugs, and having one end extend for the attachment of a strip of bakelite to which two spring-brass brushes are attached to run on the slip rings. The brushes are connected to a double conductor leading to the boat, this wire being anchored to the projecting end of the clamp with an insulator between, as shown. The detail shows the Y-connection to the side of the boat. If the sides of the latter are metal, insulate the points of attachment to prevent a short circuit. A small 110-volt electric motor is used to propel the boat, and a switch on the shore controls the power supply.

## Eliminating Breakage of Spectacles at Hinged End

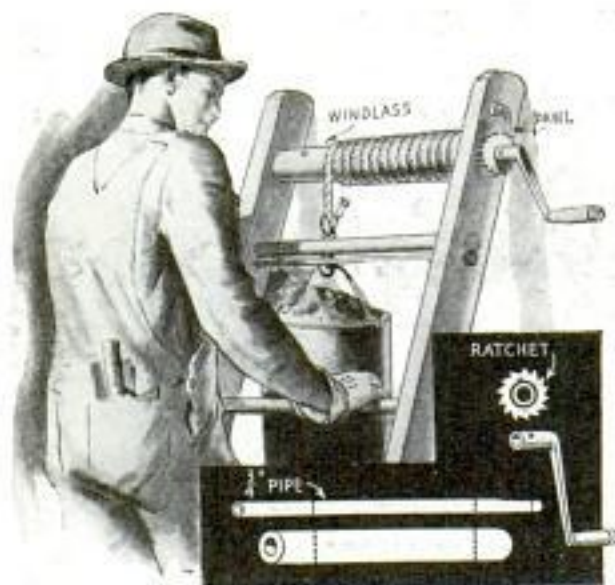
Rimless spectacles are often broken at the outer edge because of a sudden shock produced by the projecting point at the hinged end of one of the bows coming against the other part of the hinge when the spectacles are taken off the head. This trouble can be eliminated by filing off the point so



that the hinge can swing free. After this has been done, care should be taken in handling the spectacles, so that they do not swing and strike some near-by object. —I. Clyde Cornog, Philadelphia, Pa.

## Aluminum Polish and Cleaner

Aluminum can be cleaned and given a beautiful luster by polishing it with a mixture of tallow, 4 oz., turpentine, 2 oz., and emery flour, 1 oz. The polish is best prepared by first melting the tallow, after which the turpentine is added, and lastly, stirring in the emery flour. A cloth or brush may be used to apply the polish.



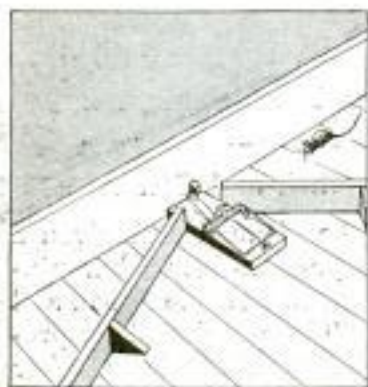
A Small Windlass on Your Ladder Will Be Found Handy for Raising Heavy Loads

### Windlass Improves Ladder

Mounted between the rails of a ladder, this small windlass is useful when heavy work is to be taken to the top of the ladder. Holes in the rails take a length of pipe, over which is fitted a wood roller for attachment of a rope. A crank and ratchet wheel are fastened to one end of the pipe, and a pawl is screwed to the outside of the rail to engage the wheel as shown.—A. H. Waychoff, Phoenix, Ariz.

### Simple Setup Outwits Mice

If you have mice around your home that seem too clever to be caught in a trap, try this trick. Set two pieces of 6-in. stock on edge on the floor of a room, in the position shown, so that one end of each piece is about 2 in. from the baseboard with a gap between them to take a mouse-trap. Small blocks nailed to the sides of the pieces will keep them from falling over. Now place the baited trap in position between the pieces with the trigger end butting against the baseboard. When a mouse enters a room, it usually stays close to the



wall and in so doing encounters the boards, which serve as a guide to the trap.—R. S. Andrews, Paulsboro, N. J.

### Newspaper Print and Drawings Transferred to Other Paper

Cartoons, illustrations and other printed matter can be transferred from newspapers to plain unglazed paper by painting them with a solution of liquid soap, 2 oz., potassium carbonate, 3 dr. and water, 1 pt. After the newsprint has been moistened with the solution, lay it face down on the paper to which it is to be transferred, and rub the back with the bottom of a spoon. In making the transfer, it is important that all parts of the paper be thoroughly rubbed and that the papers do not slip during the operation. Printing will be reversed by this process and it will be necessary to transfer a second time if the printing is to show up correctly. This process will not work with most magazine printing because of the difference in the inks and paper used.

### Slipping Bridge Lamps Easily Repaired

Bridge lamps that depend on a binding effect between the frame which supports the lamp and the standard to hold them in position, sometimes become worn so that they slip. If a few very shallow notches are filed in the standard, this trouble can be eliminated. The notches should not be much deeper than a deep scratch, otherwise it will be difficult to move the frame on the standard.



### Polish Increases Life of Linoleum

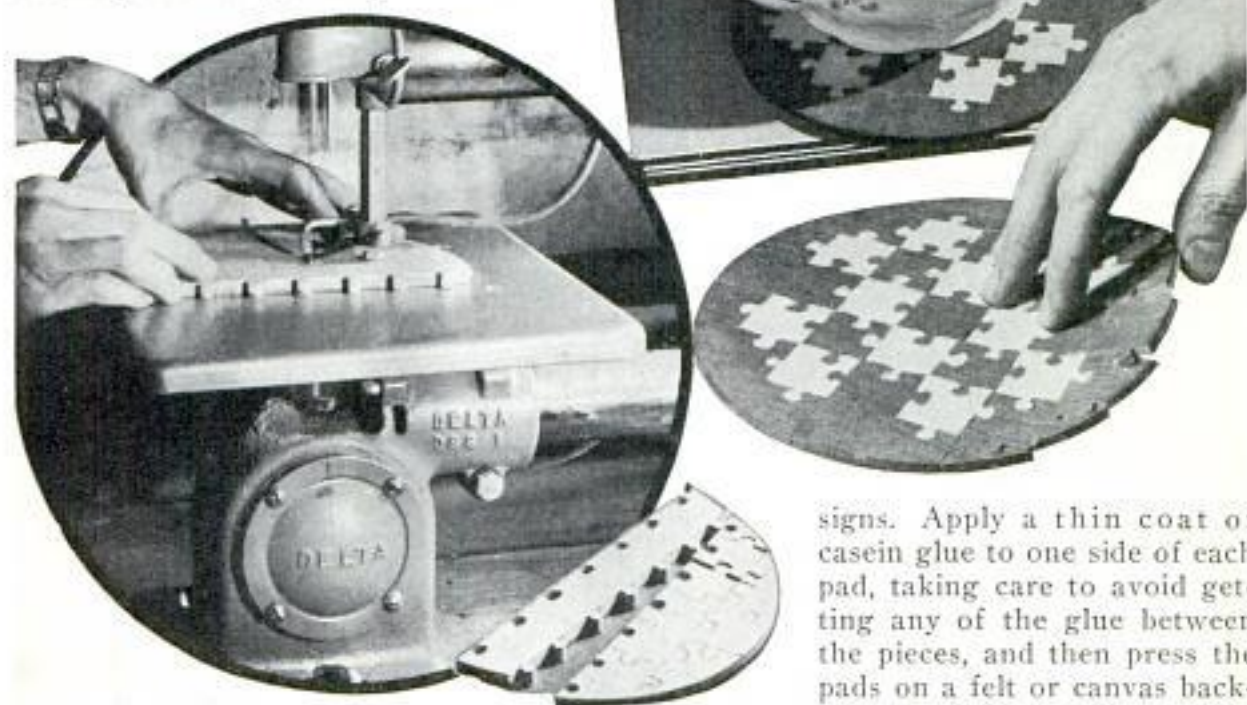
Linoleum can be given a hard, lasting finish, which will protect it from wear, with a polish made by melting together ceresin wax, 1 oz., paraffin, 2 oz., and turpentine, 4 oz. When these ingredients are thoroughly mixed and partly cooled, add benzine, 1 oz. All the ingredients in the polish are inflammable and should not come in contact with an open flame.

*Dr. J. S. Speiden & Co.  
117 Liberty St. N.Y.  
Limer & Amend*

*3rd Ave and 18th St N.Y.  
308 454 26*

## Jigsawed Table Pads of Wood Are Flexible

Interlocking in jigsaw-puzzle style, these wood pads can be used to protect the top of your table from hot dishes and flower pots. They are cut from two different kinds of  $\frac{3}{8}$ -in. plywood, preferably walnut and birch. The pieces are tacked together along the edges in the waste stock outside of the portion to be used, or, if they are not warped, you can glue them together temporarily with rub-



ber cement. Scribe a circle about 7 in. in diameter on the piece of light wood and then lightly pencil 1-in. squares, making each square interlocking with adjacent ones. As soon as you have finished sawing out the squares, two pads may be assembled, each consisting of alternate pieces of light and dark wood, or, if desired, you can arrange the pieces to form other de-

signs. Apply a thin coat of casein glue to one side of each pad, taking care to avoid getting any of the glue between the pieces, and then press the pads on a felt or canvas backing.

When dry, trim off the excess cloth, finish the surface of the wood with fine sandpaper, and apply a light coat of shellac which may be rubbed down smooth. You can produce such pads in quantities by cementing four to six disks together and sawing them all at one time. If you do not have different-colored woods available, some of the pieces can be stained.

### Reducing Your Gas Consumption

Economy in gas consumption can be had by diligent use of the simmer burner on your gas stove. This burns only a small amount of gas and produces enough heat to keep a pot simmering sufficiently for cooking purposes, as rapid boiling is usually unnecessary and only wastes gas. It is best to bring the food to the boiling

point over a large burner and then put it over the simmer burner to finish cooking. There are utensils on the market that fit together and permit cooking different kinds of food at the same time. Potatoes can be baked on an asbestos mat placed over the simmer burner, with a pan inverted over them to retain the heat. Keeping the bottoms of the utensils free from grime will also help to effect economy.



Consisting of Two Canoes Bolted Together, This Outboard Craft Was Used on a 1,000-Mile River Tour

### Outboard Motor Drives Two Canoes

Bolted together by means of four cross-pieces and powered by an outboard motor, these two canoes form a rigid craft, which was used for a 1,000-mile tour of rivers in the Mississippi valley. A canvas guard stretched between the boats keeps out spray and waves. The canoes can also be used individually, as it takes only a few minutes to set up or break down the combination.—Stanley Tess, Wyoming, Ill.

### Knotless Sack Tie from Rubber Band

A rubber band cut from an old inner tube makes a good tie for sacks from which some of the contents are occasionally taken. A small block is tacked to the band, which is then doubled around the top of the sack and looped over the block as shown. Besides holding the sack securely closed, the band makes it unnecessary to tie and untie a knot each time the sack is opened.—F. W. Bentley, Jr., Missouri Valley, Ia.



### Cutting Small Wood Fittings

Thin, narrow strips of wood for model work can be cut with hand tools as follows: Make a miter box 4 or 5 in. in width. You need not cut the miters. Now suppose you want a strip of wood  $\frac{1}{8}$  by  $\frac{1}{4}$  by 2 in. First square a piece of stock to 2 in., butt the end against the forward end of the box, and cut off a thin piece, thus truing up the edge. Now draw a line for a  $\frac{1}{8}$ -in. cut, and place the work in the box, adjusting the edge of the saw teeth to cut to the outer edge of the line. Do not force the saw, but let its weight do the cutting. Then draw a line to make the  $\frac{1}{4}$ -in. cut and repeat the process. Always make a narrow cut first and keep the box free of sawdust. If the bottom becomes scored from repeated sawing, fill in the cuts with wood dust and shellac to avoid splintering thin pieces of wood when the saw cuts through and drops into the cut.—Robert Stahler, Portsmouth, Ohio.

### Steel Toe Plate Keeps Screen Spring from Marring Door Frame

Tacked to a screen door, a steel toe plate will keep the spring from marring the wood of the frame. It also prevents the coils from catching on the frame when the door opens wide.



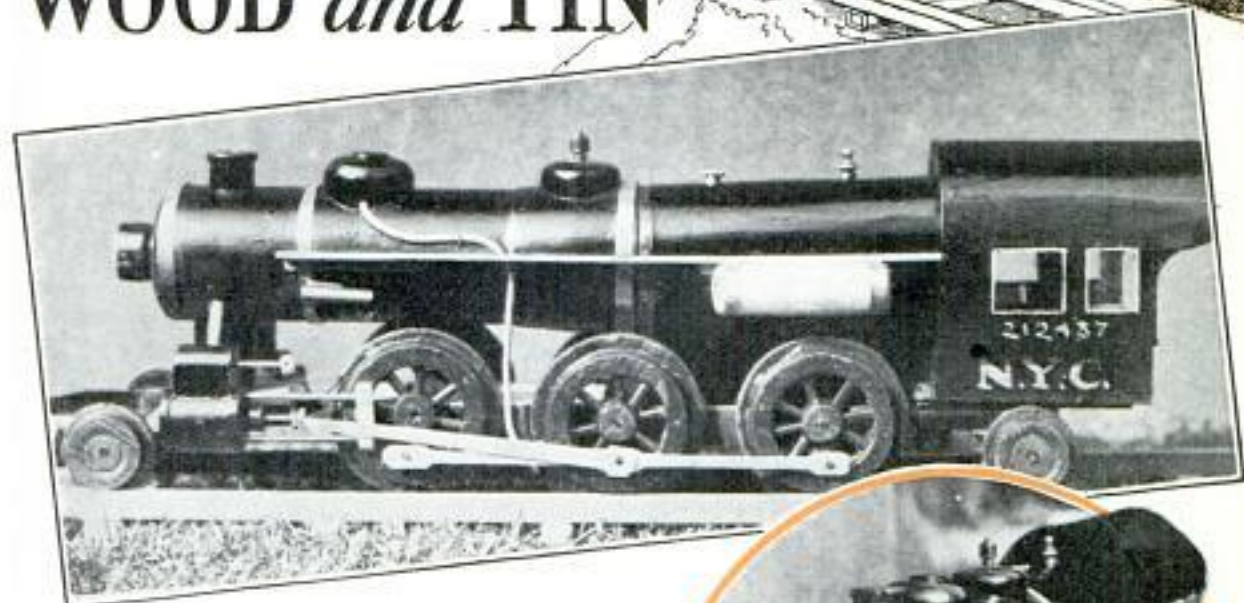
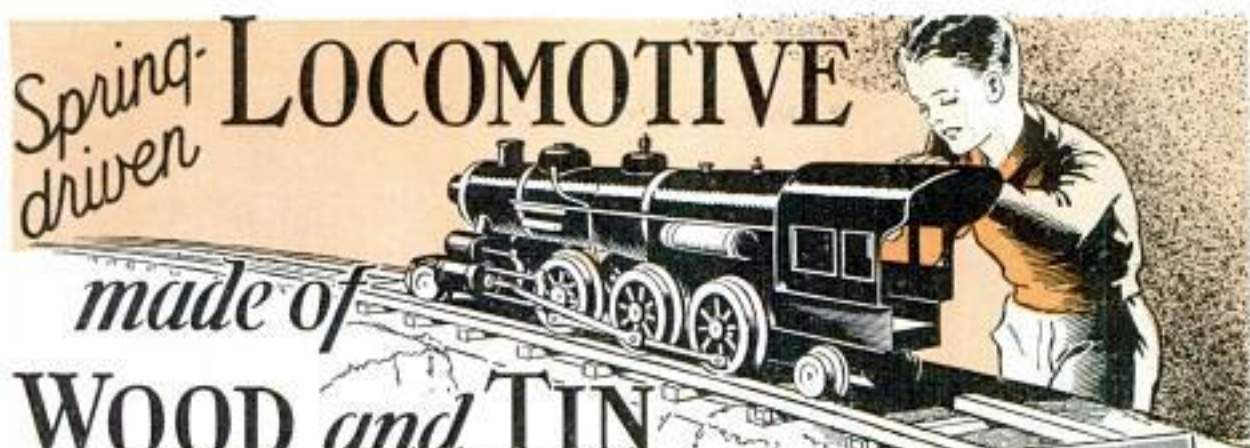
### Child's Shoe Protected by Rubber When Pushing Coaster Wagon

A section of an old inner tube, slipped over the foot with which the boy pushes his coaster wagon along, will prove quite effective in saving the shoe sole. The rubber costs practically nothing and it can be quickly removed from the foot when the child is not using the wagon.

☐ Pure benzine should be used to clean watch hairsprings.

# Spring-driven LOCOMOTIVE

*made of*  
**WOOD and TIN**



**T**HIS model locomotive not only makes a very attractive mantelpiece ornament for a boy's den, but will also run for a considerable distance on a track when equipped with a suitable clockwork motor. It is 21 in. long, 6 in. high and with the motor weighs a fraction over 4 lb. The track gauge is 3 in.

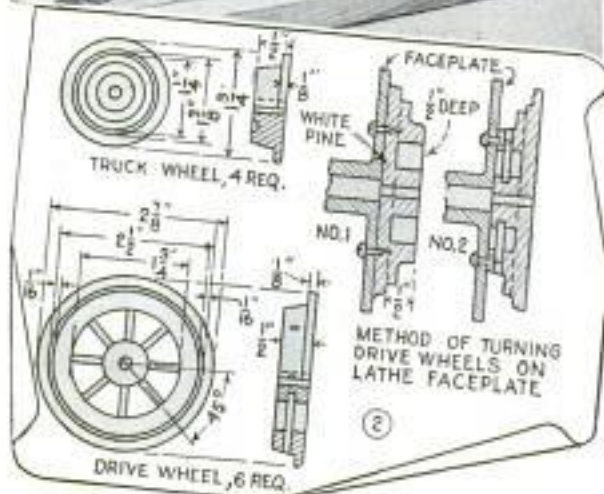
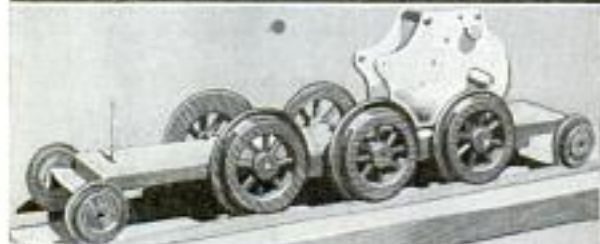
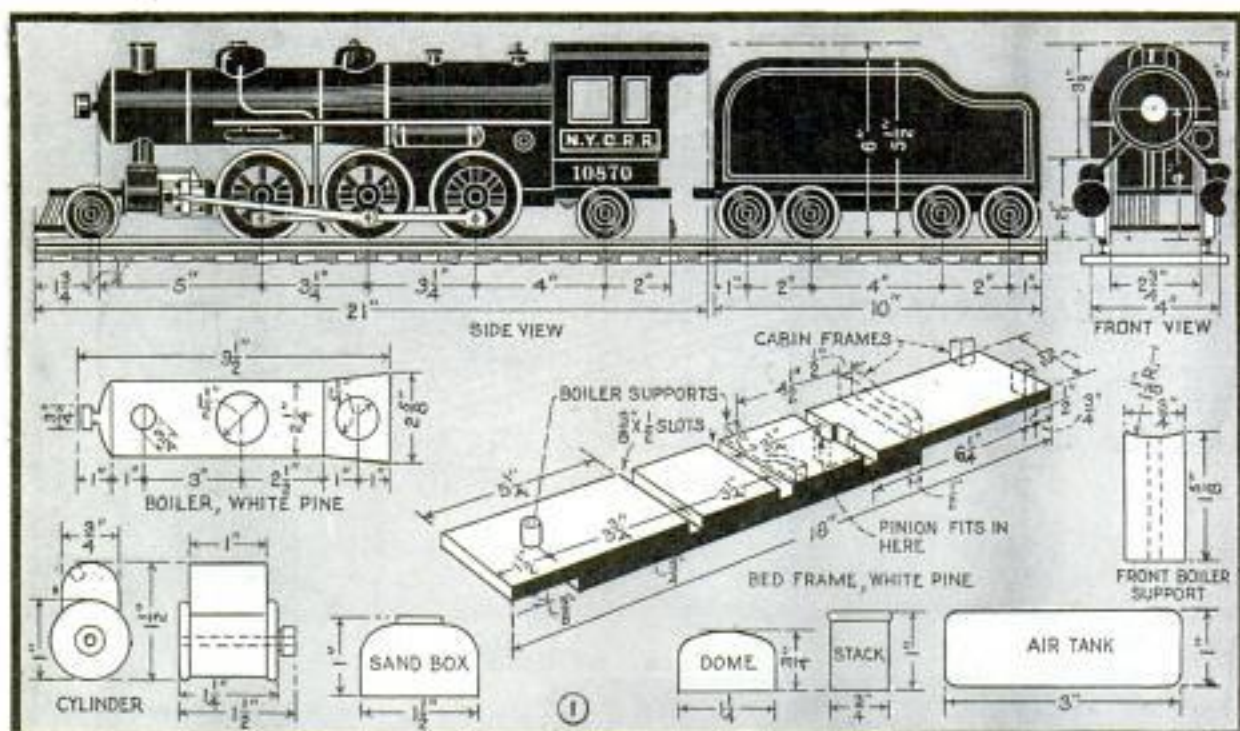
Practically the entire locomotive is made of wood with exception of the tin cab and motor housing, or rear part of the boiler. Axles, of course, are steel or brass rod, and duralumin is used for front and rear truck frames. Duralumin has been found more satisfactory for this purpose than galvanized or brass sheet metal, and can be had through automobile supply houses. For the power plant you can pick up a phonograph motor at a second-hand shop, or some strong clockwork that has been used in a well-built mechanical toy.

Use white pine for the wooden parts. Begin with the bed frame, Fig. 1, which is the backbone of the entire job. In the central portion are three transverse



notches spaced as shown, in which the axles are installed. Bearings are made of perforated bars from a toy construction set. Note that the frame is undercut at each end to receive the trucks.

Next turn the wheels, as in Fig. 2, beginning with the smaller size for the trucks. Turn each individually on the lathe faceplate so that the center hole can be cut true. To do this a piece  $\frac{3}{4}$  in. thick



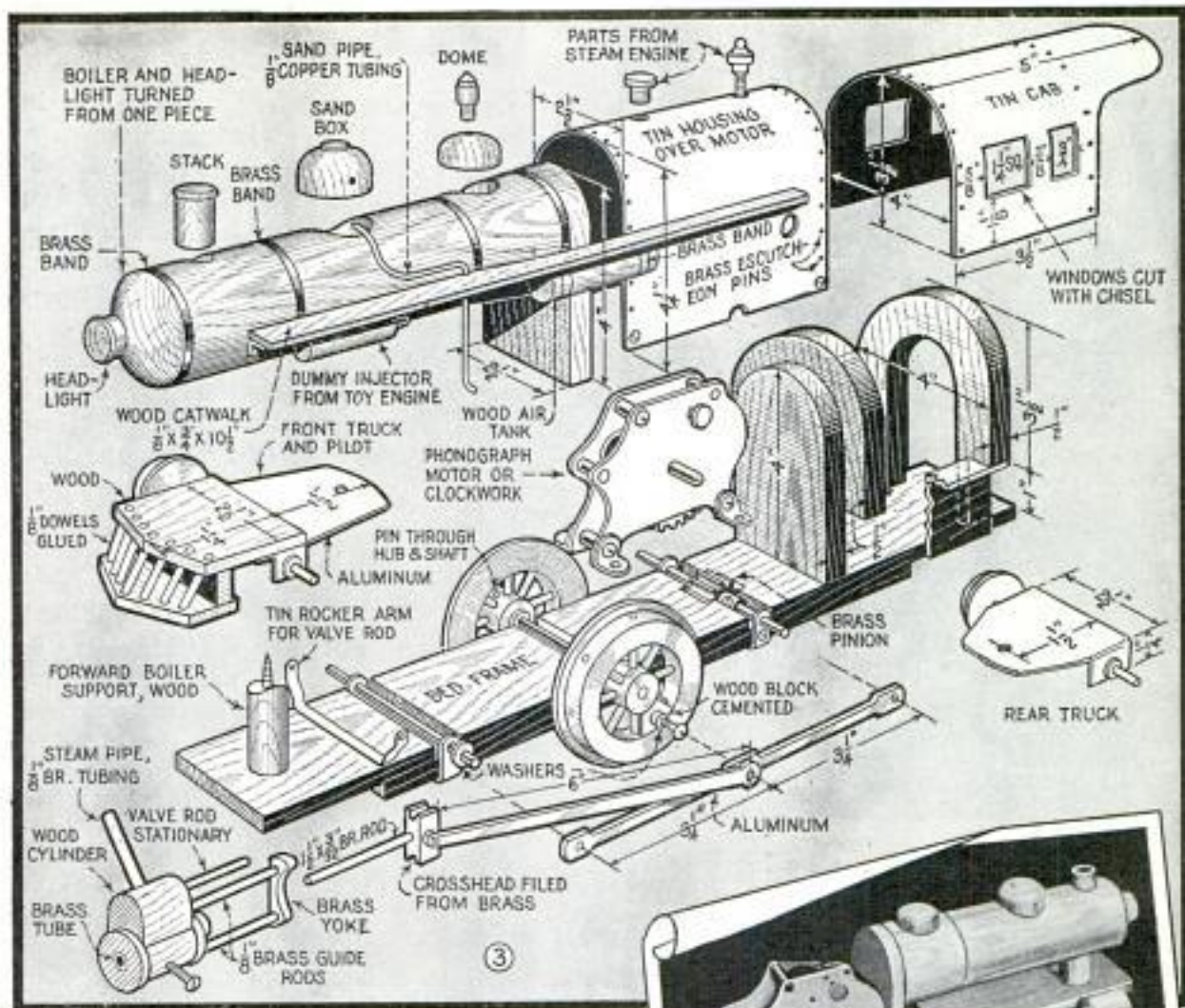
is roughed out to a 4-in. disk after which it is screwed to the faceplate with three screws. It may be necessary to drill special holes in the faceplate so that they will come in the rim of the wheel. With a very sharp tool, the rim and hub are turned to a depth of  $\frac{1}{2}$  in., allowance being made for the  $\frac{1}{8}$ -in. flange. While still on the faceplate a  $\frac{5}{16}$ -in. hole is drilled for the axle. Lay out locations on the rim for the eight spokes, which are  $45^\circ$  apart,

and drill  $\frac{1}{8}$ -in. holes through the rim and about  $\frac{1}{16}$  in. into the hub. Maple dowels are used for spokes, and they are glued in place with model-airplane cement, or ambroid. Now reverse the work on the faceplate, using the axle hole to center it, and turn away the waste on the back side of the wheel. Take very light cuts toward the end of this operation. Put the six drive wheels on  $\frac{5}{16}$  by  $3\frac{1}{4}$ -in. axles to see if they run true in the bearings. Later, in final assembly, small holes are drilled through the hub and axle at an angle, and a brad is inserted as a key.

Turning the boiler and other cylindrical parts is next. The headlight is turned on the same piece. Holes to receive the stack, sand box and dome are bored to a shallow depth with an expansion bit. It is important to keep your turning tools very sharp and to sandpaper the job well. Also, polishing with an oil-soaked rag rubbed in hard until it smokes, gives a splendid surface for the paint, to come later. The cylinder and valve-chest are made in two pieces, with a dummy stuffing-box on one end. The cylinder is drilled for a brass tube in which the piston rod slides.

Frames for the cab and the rear boiler support are shown in Fig. 3. You now have enough finished material to proceed with assembly. First of all, fit the motor to the bed frame so that the large gear on



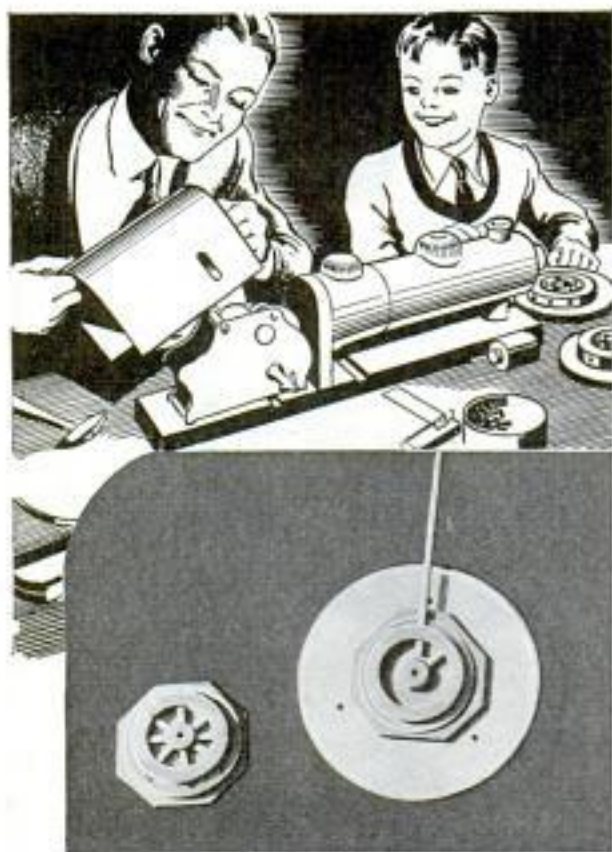


the spring drum meshes freely with a small pinion on the rear drive-wheel axle. The pinion used in the original model was taken from a standard toy construction set, as were all the axles.

With the motor located and tested, screw it to the bed frame and build up the boiler and cab frame. It is best to do all this work before putting on wheels permanently, as they are easily broken if a screwdriver or hammer slips. A long screw goes up through the bed frame and toward boiler support into the boiler, and the rear end is secured as shown. Cut a tin or duralumin housing to go over the motor and form rear portion of boiler. The cab is also made of tin or duralumin, and windows are cut with a cold chisel. Lay the sheet on a piece of flat lead and cut by striking light blows with a hammer. Note that both trucks swing on an axis to compensate for the curves in the track, as this is a rather long locomotive. There should also be some play between the drive

wheels and the track for the same reason.

Assembly of the piston and rod mechanism is not as intricate as it may appear. The piston slides in the tube in the cylinder, the forward end secured to a cross-head sliding between guides. The connecting and tie rods are made of sheet aluminum or duralumin but, lacking either material, galvanized iron or sheet brass will do. Crank pins on each drive wheel are screwed into small triangular blocks, which are cemented to two of the spokes. See that the crank pins on the other side are set just 45° ahead or behind the first set, to avoid a dead center in the drive thrust. Bear in mind that there should be a small washer between each wheel and its bearing, and do not rest content until every moving part runs freely, but without undue looseness, as friction at these points



will reduce the speed of the locomotive.

Fitting up small parts on the boiler can now be completed. A section of  $\frac{1}{8}$ -in. copper tube is bent to shape for a feed pipe from the sand box to the central drive wheel, and a few fittings from a toy steam engine, such as safety valve, filler cap and whistle add to the finished appearance of the locomotive. Two short  $\frac{1}{4}$ -in. brass or copper tubes are set in holes in the valve-chest and boiler respectively, to serve as live steam pipes, and catwalks along the sides of the boiler also improve the effect, with a dummy injector and compressed-air tank below it.

Painting this job is of greatest importance. The entire length of boiler and cab is done in black brushing lacquer. After three coats, the brass bands are put around the boiler, with here and there a row of brass escutcheon nails driven in to represent rivets. Do as much of the painting as possible before the final assembly, as this will insure a neater job.

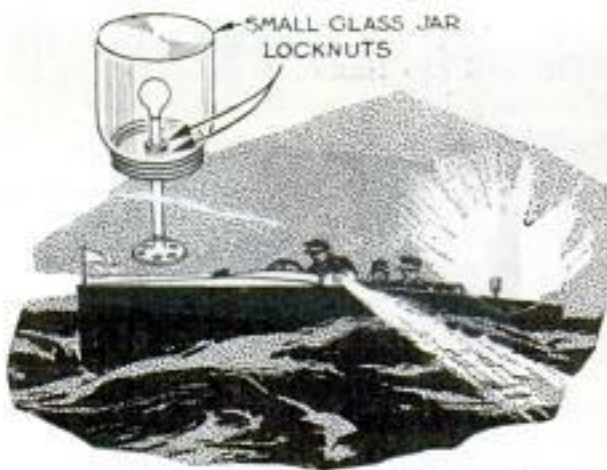
Fig. 3 also shows a suitable tender, which can be made of tin or duralumin and wood. The entire job is really very attractive and reminds one of the model locomotives used in the miniature sets when making motion pictures.

### Methods of Packing and Carrying Equipment on Long Portages

If you are contemplating a long trek into the woods, the following methods of packing and carrying your equipment will be useful. For two people, a frame of light poles can be carried on the shoulders and the luggage tied to it. First, place two poles on the ground parallel to each other, and space them far enough apart to fit nicely on your shoulders. Then lash a number of light, strong sticks across the poles, starting about 3 ft. from each end. Basswood, willow, elm bark, or the light root tendrils of ground pine and hemlock will do for lashings if no string is available. If only one person is making the trip, get an alder stick that will curve comfortably about the neck and shoulders. This is usually not difficult to find in portage country. Trim off the stick so that the ends crook up at a good angle and make strong lashings about the boxes to be carried. Thrust the upturned ends of the stick, or yoke, through the lashings at the top side. Now lift the load to the top of a fairly high stump or rock, ease the whole load off onto your shoulders and continue on your way.

### Boat Stern Light Made from Fruit Jar

An efficient stern light for a boat can be made from a pint fruit jar. An electric lamp is mounted on the deck by means of a pipe flange, nipple and lamp socket. The threads on the nipple are lengthened to



Inexpensive Stern Light, That Will Pass Official Inspection, Made from Small Glass Fruit Jar

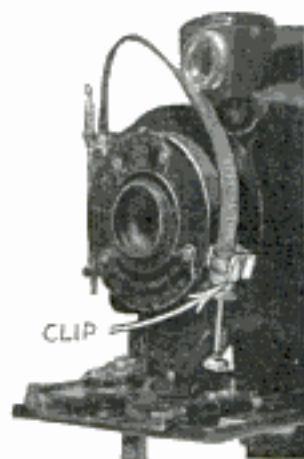
take two locknuts to which the lid of the jar is fastened as shown.

### Cleaning Rust from Guns

Guns may be cleaned with a mixture consisting of machine oil, 2 parts, dissolved in benzine, 1 part. Rust can be removed from the inside or outside of gun barrels by scouring them with a piece of oakum attached to the cleaning rod and saturated with a compound made by mixing paraffin oil, 4 oz., turpentine, 1 oz., and benzine, 1 oz. After all traces of rust have been removed from the barrel, it should be washed with a swab dipped in a solution consisting of caustic potash,  $\frac{1}{2}$  oz., dissolved in water, 1 qt. The barrel is then thoroughly rinsed with water and dried with cotton. To prevent rusting, the cleaned part should next be oiled with any good grade of gun oil. In using the caustic-potash solution, care should be taken to apply it only to the rusted parts.

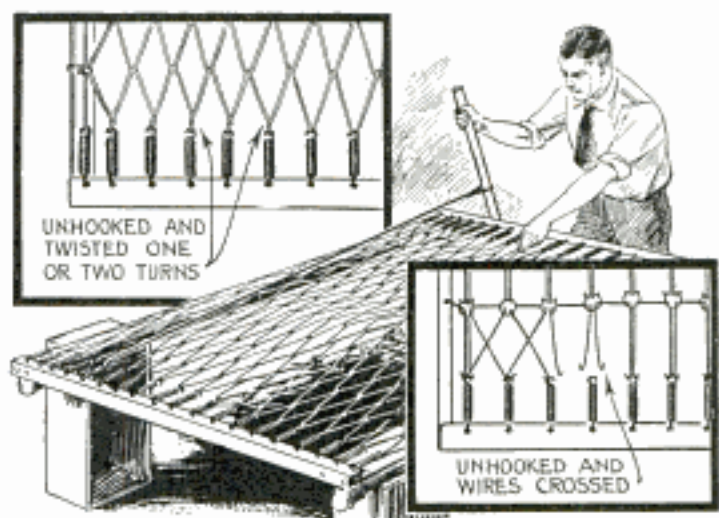
### Clip Holds Cable Release on Camera

Bolted to a camera lens holder, a fuse clip provides an easy and satisfactory means of fastening the end of the cable release to keep it from becoming entangled in the mechanism when not in use. When drilling the hole for attachment of the clip, care should be taken, of course, not to puncture the bellows.—Ronald Ives, Upper Montclair, N. J.



### Sharpening Safety-Razor Blades

Dull razor blades can be made almost as good as new with a simple sharpener made by applying a film of vaseline on the coarse side of the strop and rubbing some jewelers' rouge into it. This makes a hone for sharpening the blade, after which it is finished on the regular stropping side of the strap. One application of abrasive will last for a long time.—L. J. Rautio, Ashland, Ky.



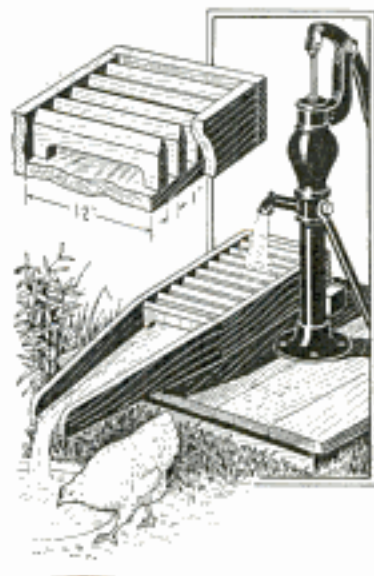
Sag Removed from Bed Spring by Restoring Tension in Coil Springs at Each End

### Rejuvenating Flat-Type Bed Springs

Sagging bed springs of the type shown can be repaired by taking up the slack in the wires where they are fastened to the coil springs at each end of the bed. To do this, a stiff wire is hooked to one of the coil springs at one end, and then by means of a lever attached to the wire at the other end of the bed, the coil is stretched until the wires running to it can be unhooked. They are then twisted or crossed as shown, depending on the type of spring.

### Antisplash Drain Trough for Pumps

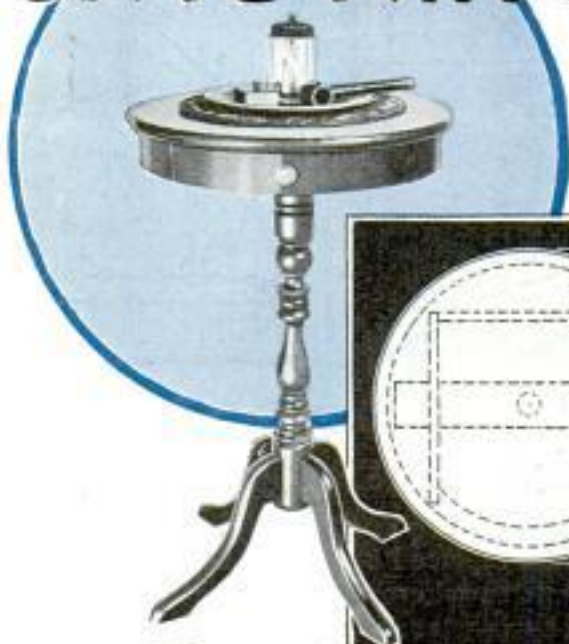
This antisplash trough is fitted with baffle boards and is useful at pumps where some means is usually provided for draining waste water off the well platform. The baffle boards are cut out on the lower side, as illustrated, to permit the water to run under them, yet keep it from splashing over the platform as is the case with an ordinary trough.



☛ Moth balls distributed in the runways of moles are effective in driving them away.

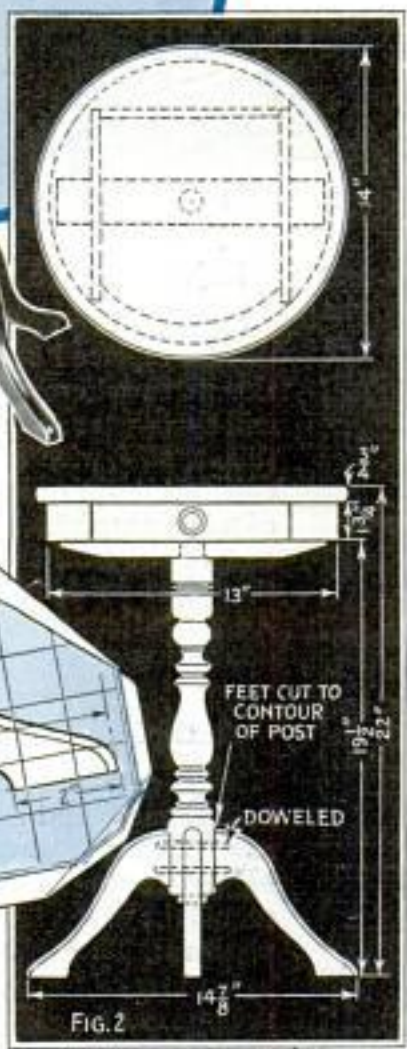
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# SMOKING STANDS *in*

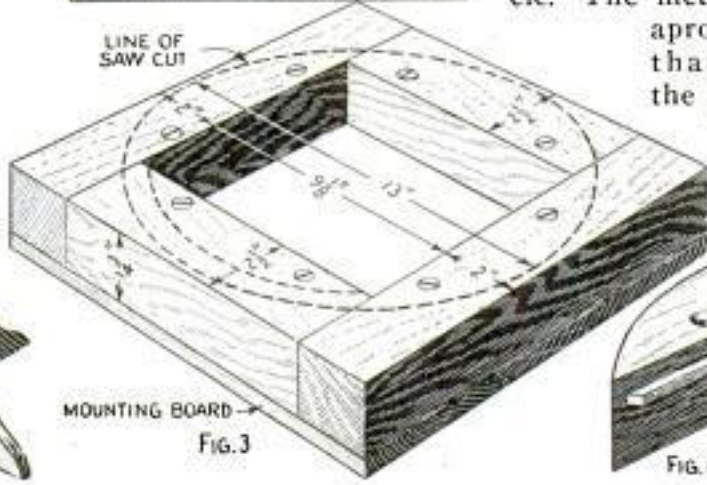
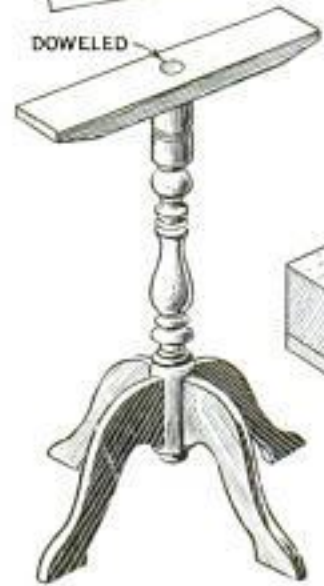


THESE smoking stands are patterned after the ever-popular drum and crow's-nest tables of colonial days. The pedestal is the same for both. The drum type, shown in Fig. 2, is not a veneering job, but is built of solid stock, cut to shape.

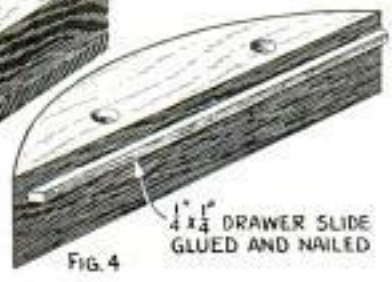
Pieces for the top will probably have to be glued up for width as in Fig. 12, care being taken to match up color and grain. In gluing up the stock be sure to use handscrews to draw the stock against the clamps, to avoid a wind or twist. Disks of this size can be sawed on a band or jigsaw very accurately, by placing an auxiliary wood table over the metal one. A brad driven into the wood table serves as a pivot. The stock is mounted on this pivot and revolved against the saw. The pivot must be placed on a line with the front of the saw and a distance from it equal to the radius of the required circle. A plane and sandpaper are used to round the edges of the top.



The apron for the drum table is sawed from four blocks, as shown in Fig. 3. The four pieces are screwed to a mounting board of scrap wood, taking care that the screws are placed inside the circle.



The method of sawing the apron is the same as that used for the top, the pivot being placed  $\frac{1}{2}$  in. nearer the saw than before

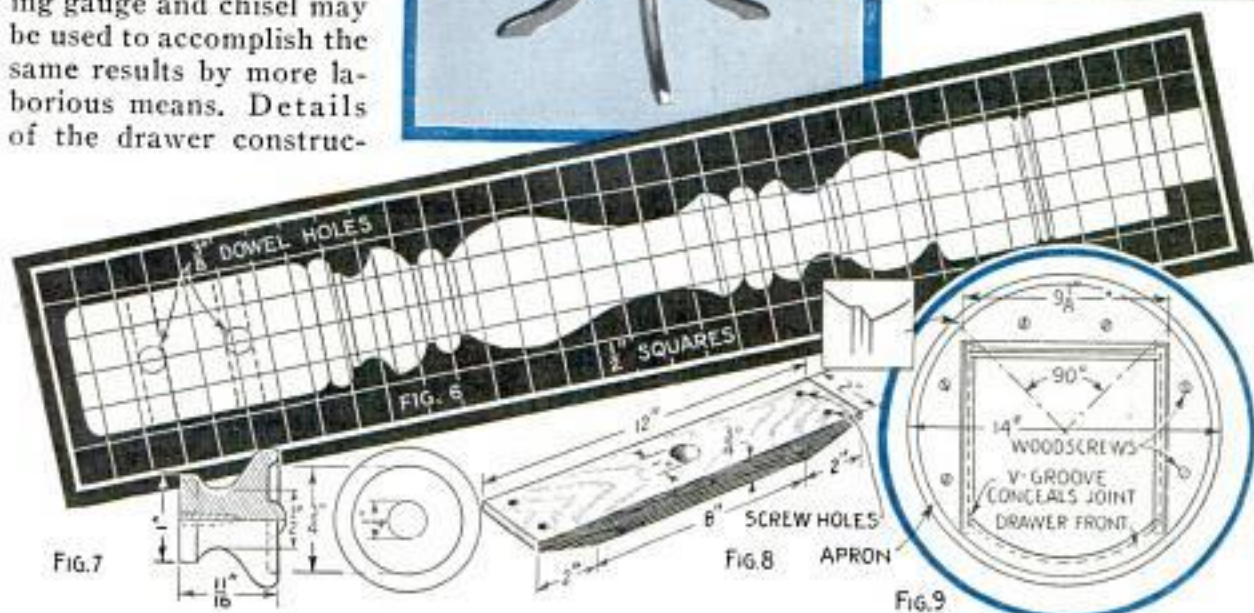
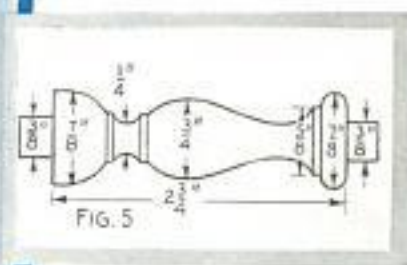


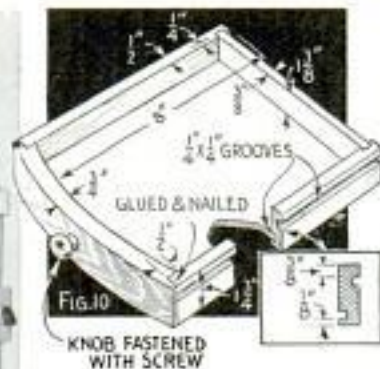
# Colonial Design

By R. O. BUCK

Lane Technical High School, Chicago

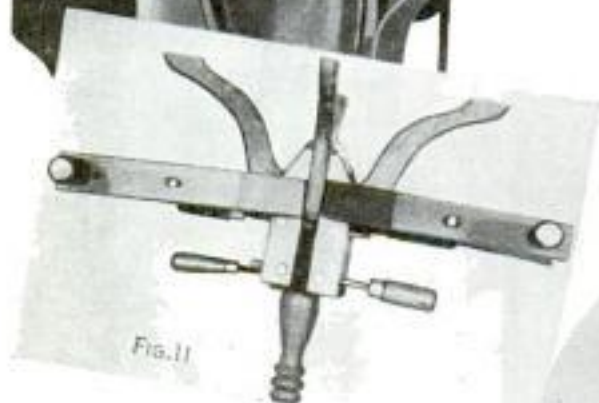
because of the smaller diameter. After the apron pieces are sawed they are removed from the scrap wood and planed smooth along the curve, then mounted with glue and screws to the underside of the top piece as in Fig. 9. V-shaped grooves are cut at the joints to give the appearance of a drawer front at both front and back, the real purpose being to hide the joint. The drawer is hung on slides, which are glued and tacked to the side pieces, as in Fig. 4. The construction of the drawer is more or less standard, with the exception of the front, in which it is necessary to rout a groove that holds the bottom. To do this a  $\frac{1}{4}$ -in. routing bit is mounted in the drillpress or mortising-machine spindle, and the curved front, guided by strips, is fed past it. Of course, a marking gauge and chisel may be used to accomplish the same results by more laborious means. Details of the drawer construc-





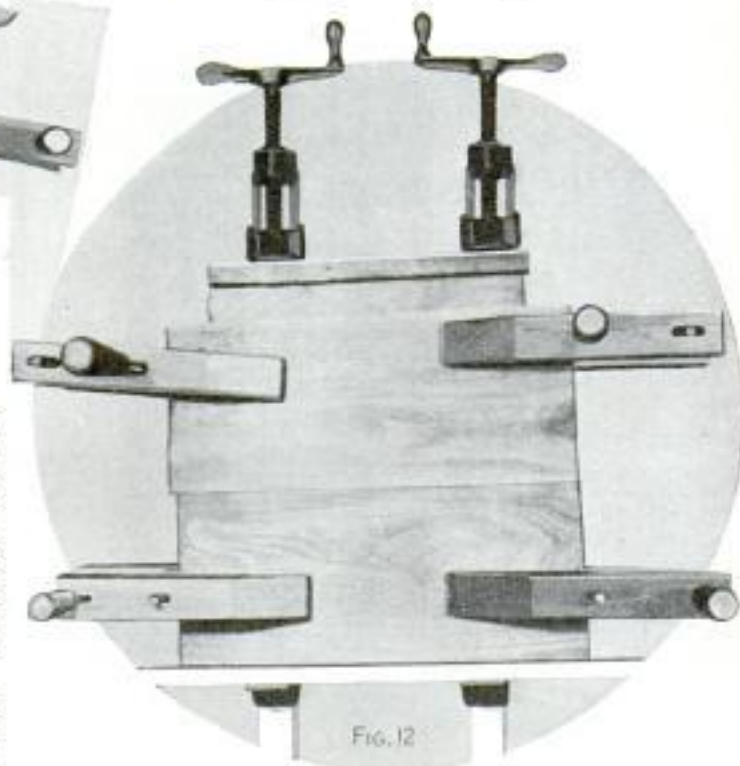
is lost if the curves and edges are not cut sharp. In sanding, be careful to avoid blunting and otherwise destroying the beauty of the turning. The dowel holes in the feet can be drilled more accurately on a drillpress also. Turn the table in a vertical position and clamp the foot in place. The portion of the foot next to the post must be made concave, using a file or sandpaper drum, to fit the post. After the top edges of the feet have been rounded and the pieces well sanded, they can be glued to the post. Two opposite feet are glued in place first and the glue allowed to set before adding the other two. The method for clamping is shown in Fig. 11.

The crosspiece for the drum table is shown in Fig. 8. It is glued over the dowel on the upper end of the post and screwed



tion are given in Fig. 10. The pattern for the feet is given in Fig. 1. Cut out a pattern of stiff paper which can be tacked onto the stock before sawing. Pile up four pieces of  $\frac{3}{4}$ -in. stock and brad them together, placing the brads in the waste parts. Then saw the four feet at the same time.

The turned post is dimensioned in Fig. 6. A piece of 2 by 2 by  $16\frac{1}{2}$ -in. stock is required for this piece. The feet are doweled to the cylindrical bottom portion of the post, so holes for these dowels should be drilled while the piece is still square. Drill the holes on a drillpress if one is available, as it is difficult to get them exactly vertical by hand drilling. The holes are drilled entirely through the piece in both directions. Much of the beauty of a turned spindle or post



to the side pieces forming the apron. The drawer knob is detailed in Fig. 7. The table is assembled by fitting the drawer into place and fastening the top to the pedestal. Glue a short dowel into a hole in the underside of the top, to prevent the drawer from being pulled out entirely. Be sure you are through working on the drawer, however, for once installed, the drawer

cannot be removed. The pedestal of the crow's-nest table is identical to that described, with the exception that a 4-in. square block is placed on the top of the post instead of the cross brace. The turned post should be made shorter also. The upper disk is the same size as for the drum table but the lower one is only 13 in. in diameter. Six turned spindles, the design for which is shown in Fig. 5, are used to separate the two disks. The spindles are arranged in three pairs, 2 in. apart on centers, and spaced  $120^\circ$  on a circle.

### Small Wood Turnings Made Without a Lathe

Small wood turnings, such as guns, railings, and wheel spokes for use on models, may be quickly made from dowel rod without a lathe if you have a hand or breast drill. Cut the pieces of dowel a little longer than needed, chuck one end in the drill, and fasten it in a vise. Now, with a round file, or a piece of sandpaper wrapped around a stick, shape the work as it is turned with the drill. If you have an electric drill, the work, of course, is much faster.—R. Stahler, Portsmouth, Ohio.

### Quick Releasing Rope Hitch for Tying Boats to Cleats

This method of hitching an anchor rope to a cleat has the advantage of being released instantly by pulling on the free end of the rope. It is wound once around the



cleat, after which it is brought up over the top and then down under the end of the cleat. The end of the rope is then doubled and pulled back under the top turn as shown. The greater the pull on the rope, the tighter the hitch holds.—John M. Totten, Dallas, Tex.

Drain tile and similar objects that are awkward to handle can be carried by the use of an iron bar, bent to a U-shape: one end of the bar is inserted in the tile and the other serves as a handle.



Your Bridge Hand Neatly Displayed in a Coil-Spring Holder on Edge of Table

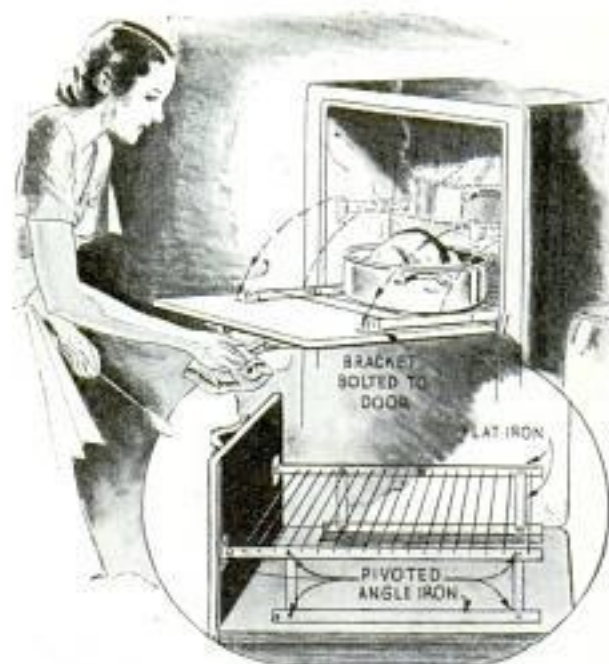
### Holder Keeps Playing Cards Neatly Displayed

Consisting of a strip of spring brass and a coil spring, this holder keeps your cards neatly displayed. One end of the brass strip is bent over double to hold the spring, while the other end is bent to grip the edge of the table.

### Emergency Clamp from Pair of Pliers

A pair of double-pivoted pliers can often be used as an emergency clamp for holding small parts while gluing them together. Set the pliers in the pivot hole that gives the largest opening of the jaws. Then place the jaws over the work, and clamp them tightly by means of a heavy rubber band over the handles as shown. The tension of the jaws on the work can, of course, be increased, as desired, by doubling the band.





This Attachment Reduces Chances of Being Burned When Removing Roasts from a Hot Oven

#### Oven Attachment Moves Contents Forward as Door Is Opened

By using this attachment in your oven, it is not necessary to reach inside to pull out a hot roast. A flat-iron grating is pivoted to the oven door, and is supported by legs, which are in turn pivoted to pieces of angle iron that rest on the oven bottom. In use, the grating moves forward and rests partly on the oven bottom and partly on the door, when the latter is opened. Then, when the door is closed, the roast automatically resumes its original position in the oven.

#### Portaging with a Canoe

Carrying a canoe across a long portage is hard work unless you know the tricks of doing it. One man can easily carry a fairly light canoe if he lashes the two paddles to the center and bow seats, parallel to the sides of the canoe and about 3 in. from the gunwales. Then, standing close to the right side of the boat, the paddles are gripped midway between the seats and the canoe is swung up over the head so that the paddle shafts rest on the shoulders. The center and front seats are a bit forward in balance of the canoe, which tends to tilt the front upward far enough to see ahead.

#### Can Increases Efficiency of Microphone

While experimenting with a little button microphone of the unmounted kind, I found that better results were had if the instrument was soldered to the bottom of a coffee can. The sound vibration is collected by the can and carried to the bottom and picked up by the microphone. The can should be about 5 in. in diameter so that the bottom will not be too rigid.—M. L. Wendel, Lockport, N. Y.



## BLUEPRINTS for Our Boat Fans



You can now obtain a complete set of blueprints on our 16-ft. outboard cruiser, "Roamer," for a dollar. Order No. 765 to 770 incl. Also, six prints, No. 840 to 845, on our 14-ft. outboard runabout, "Hi-Ho," can be had for the same price. Besides these, there are other boat prints in our total collection of 380 prints, of which a list will be sent upon receipt of 3 cents postage. A sample print (not open to choice) with forty completed projects pictured, and a list, will be sent for 10 cents. Address Blueprint Department.



### Releasing Snagged Fishing Tackle

It is a good idea to take a small ball of carpenters' chalk line on a fishing trip to aid in loosening your tackle should it get caught on a sunken log, or in a drift pile. If this happens, tie a small rock to the end of the chalk line, and then above this make a 10-in. loop, tying the line so that the knot will not slip. After drawing the fishline taut and setting the rod in the bank to hold it, throw the weight out over the spot where the tackle is caught. Now, by manipulating the line, you can usually engage one of the hooks in the loop and pull the tackle loose, or if the snag or brush has rotted, you can pull it out.—B. C. Robinson, Newcomers, Ohio.

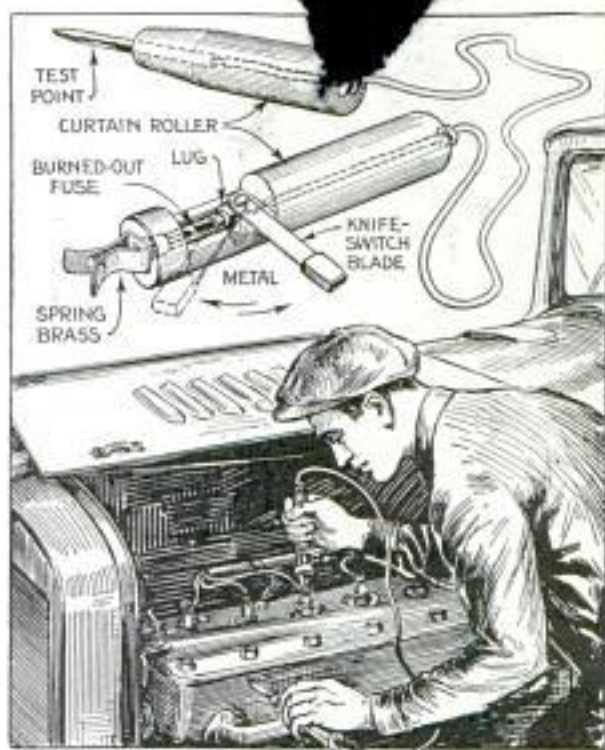
### Incense Burned in Electric Heater

Electric heaters having the heating elements wound around porcelain tubes, with one of the lead wires running down inside the tube, can be used as incense burners. The incense is placed inside the tube where it comes in contact with the hot wire and smolders. This also assures that all the incense will be burned, which is not always the case when the lighting is done with a match.



### Rings Hold Tennis Shoes Together

Rings, such as are used to hold the pages in a loose-leaf note book, will be found handy for keeping a pair of tennis shoes together when not in use. Just fasten one or two of the rings in the eyelets, as shown in the photo, and your shoes will stay together better than when tied with the laces, which often become knotted so that it is almost impossible to get them untied.



Visual Spark-Plug Tester Made from Two Sections of a Curtain Roller and a Burned-Out Fuse

### Tester for Spark Plugs Improved from Burned-Out Fuse

This spark-plug tester is made from two sections of a curtain roller and a burned-out fuse, which has the points approximately the same distance apart as the points of a spark plug. Both sections are drilled lengthwise in the center to take an insulated wire, which connects with a test point in the end of one section, and with a brass lug installed in a cut-out part of the other section. The fuse is fitted between the lug and a screw, which holds a spring-brass contact on the other end of the roller. A knife switch is screwed to the lug so that it can be pushed down to contact with the ring on the roller. When the tester is used as shown, the spark can be seen to jump across the points of the fuse, or by closing the switch, the fuse can be shorted out of the circuit.

### Tracing through Heavy Opaque Paper

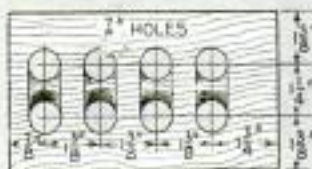
Drawings may be traced through heavy opaque paper by painting it with pure benzine. This will render the paper temporarily transparent, but if there should be impurities, such as oil or grease in the benzine, a permanent grease spot or transparency will result.



# CAMEL DERBY

*interests*

# YOUNG *and* OLD



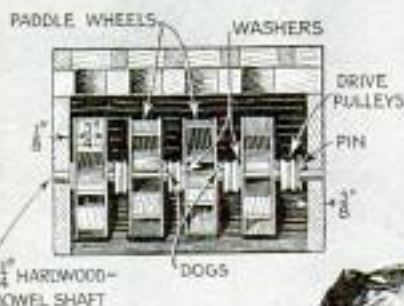
ENTRY PLATFORM



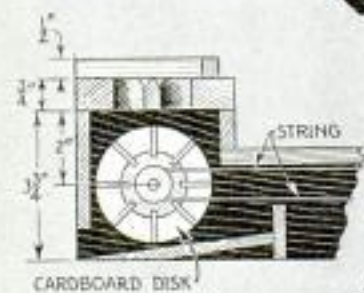
CHUTE



CHAMFER



HARDWOOD-DOWEL SHAFT



CARDBOARD DISK

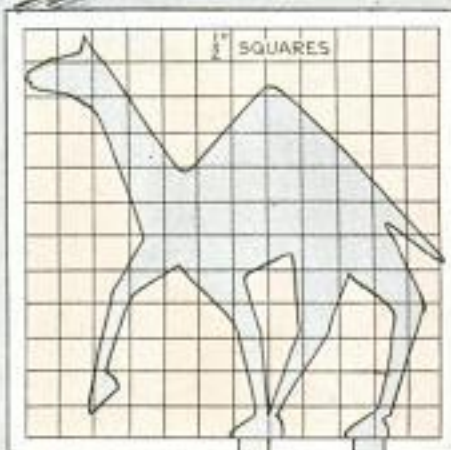


STAPLE DOG

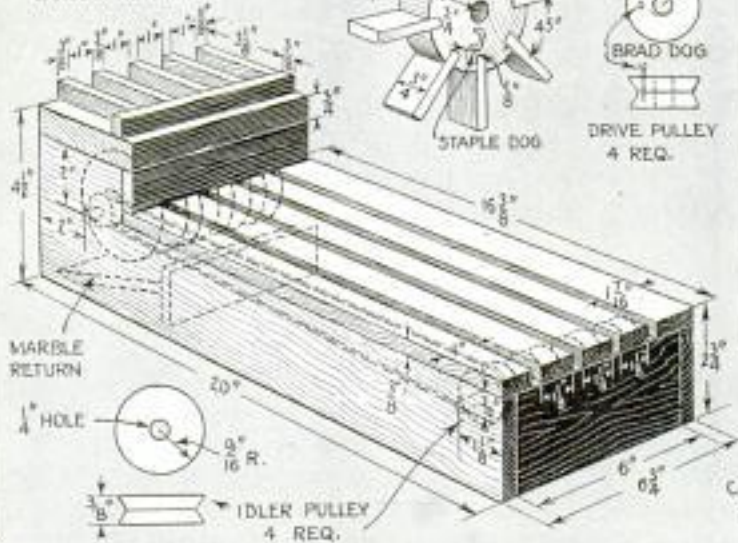


BRAD DOG

DRIVE PULLEY 4 REQ.



1/8" SQUARES



MARBLE RETURN

HOLE

IDLER PULLEY 4 REQ.

CAMEL BASE 4 REQ.



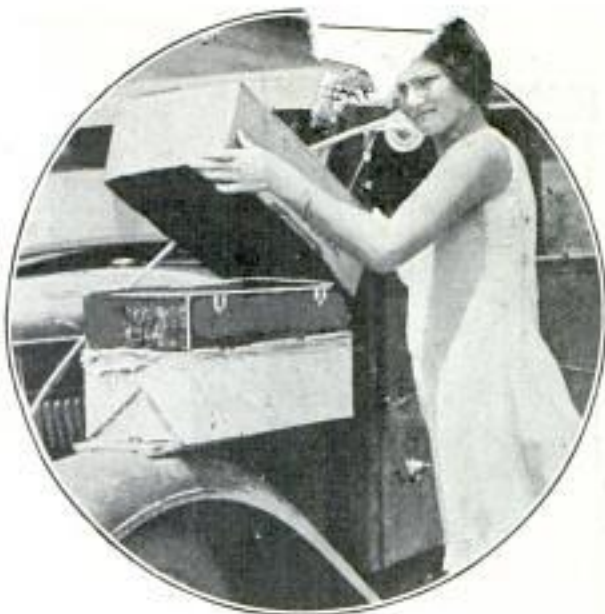
### How to Make the Camel Derby

Chance and skill are featured in this exciting camel Derby, in which four animals move either forward or backward, depending on the skill of the player. The base is a box closed on top by five strips of wood spaced  $\frac{1}{4}$  in. apart, to form grooves, in which the camels slide. A raised section at the end houses four eight-blade paddle wheels which, upon receiving a steel ball as motive power, revolve and operate string belts, which in turn move the camels. These wheels are made by cutting equally spaced slots squarely across the rim of four wood disks and gluing paddles into them. Cover both sides of the wheels with cardboard disks and mount them on a hardwood-dowel shaft. Four pulleys with V-grooves are mounted on the shaft at one side of each wheel and have a brad driven into each to serve as a dog, which engages with a staple on the paddle wheels. Washers are placed between the wheels and pulleys to reduce friction. Four idler pulleys are mounted on a shaft at the other end of the box. Each has a washer at either side and is held in place by brads through the shaft. The top of the entry platform has eight holes drilled in pairs, each centering on its paddle wheel. With a gouge, round off the part between the holes. The chute for delivering the balls to the platform is made as shown in upper right-hand details.

### Hot Paraffin Prevents Desk Drawers from Sticking



Desk drawers sometimes stick because the unprotected wood in the sides absorbs moisture and swells. If a thin coat of hot paraffin is brushed on the sides, the drawers will slide smoothly.



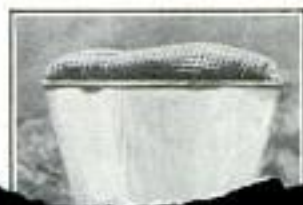
Shipping Carton Slipped over Ice Box on Car Provides Extra Insulation and Saves Ice

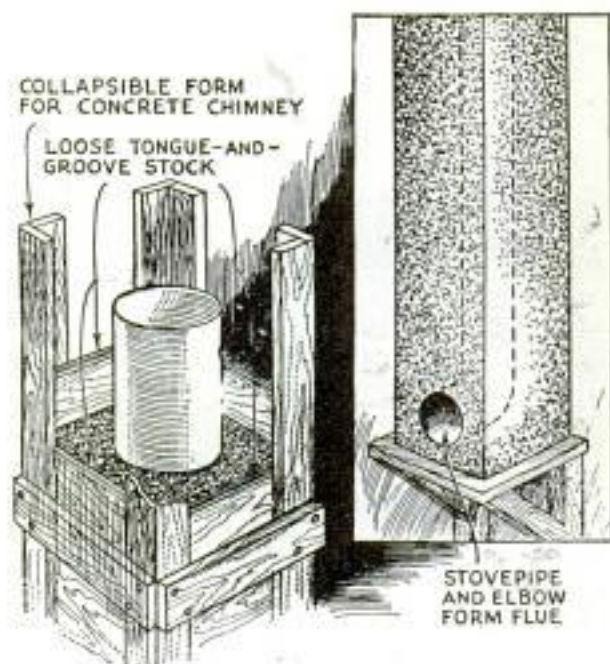
### Carton Increases Efficiency of Ice Box on Car

If you keep the carton in which the ice box for your car or camp is shipped, you can use it to increase the efficiency of the box when it is in use. The bottom of the carton is removed so that it can be inverted over the box as shown. This increases the insulation of the box.

### Light Signals Improvised from Large Tin Cans

When a cave-in suddenly appeared in a highway, a number of flare pots were quickly improvised from large tin cans. The signal was visible until the source could be located. Each can was filled with kerosene.





Stovepipe Makes Good Inside Form for Building Concrete Chimney; It Is Not Removed

### Stovepipe Used as Form in Building Concrete Chimney

Ordinary stovepipe makes a good form for the smoke hole when building a concrete chimney. After completing the chimney, it is not necessary to remove the pipe. The outside form consists of loose tongue-and-groove stock held together by four corner pieces. A few cleats nailed to the latter hold the form together, so that it is easily removed when the concrete has set. —Thomas Moore, Detroit, Mich.

### Letters and Designs Etched in Glass

Lettering and designs may be etched in glass with a solution of hydrofluoric acid dissolved in water.

After the glass is etched, the solution is washed off with water. After the glass is washed, it is placed in a solution of potassium dichromate.

The solution is then washed off with water. The glass is then placed in a solution of potassium dichromate.

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ing fluid. After etching and washing the glass, the wax may be removed by immersing the work in hot water, or it may be washed off with gasoline.

### Fish Bait Kept Alive in Cool Box

One veteran fisherman keeps soft-shell crayfish and shrimp in a fresh, soft condition for fish bait by keeping them cool. To do this, a tin can, with a few small holes punched in the bottom, is set in a wood box and the space around the can is filled with moss from a swamp, or aquatic moss taken from the bottom of a pond. The bait is then distributed through the moss and the can is filled with cracked ice. The box should have a lid to keep the ice from melting too fast.

### Wedge Binds Wall Plug in Position

Screws are easily anchored in a brick or concrete wall, if a hole is first drilled into the wall for a wood plug, which has one end notched to take a small wedge. As the plug is driven into the hole, the wedge strikes the bottom and spreads the end of



the plug, binding it against the sides of the hole. If a little glue has been applied to the wedge, it will be almost impossible to pull the plug out of the hole after the adhesive has dried.

### Clip Holds Hinged End of Hasp Flat against Door

Clothing is often soiled or torn by the free end of a hinged hasp on a door. To hold the hinged end of the hasp flat against the door and prevent this trouble,

a clip taken from a dry cell can be used under



... of the  
... of the  
... when the  
wood is thorough-  
ly dry, this trouble  
can be prevented. The paraffin penetrates  
the wood and acts as a lubricant besides  
preventing it from absorbing moisture.  
Surplus paraffin may be scraped from the  
surface.—M. L. Wendel, Lockport, N. Y.

... of lighting  
... should be provided.  
Each can was partly filled with kerosene,  
after which the top was crushed in against  
a folded piece of burlap bag, which served  
as a wick. When lighted, the pots could  
be seen from a long distance, and they  
burned for several hours.—Frank W.  
Bentley, Jr., Missouri Valley, Iowa.



☛ A short length of rubber tubing slipped  
over the end of a live electric wire that  
has been disconnected, will prevent short-  
circuiting it.

with a stick. Care should be taken not to get the acid on the skin as it will cause sores that are hard to heal. Only a small amount of the solution should be mixed at a time as it does not keep unless stored in air-tight lead, or wax, bottles. The glass to be etched should be painted with a warm wax made by melting together tallow, 1 lb., and yellow ceresin wax, 2 lb. The design may be scratched into this wax coating and the etching fluid applied with a swab. If more convenient, the wax-coated glass may be dipped into the etch-

ing fluid. An old key may be slipped under the rigid part of the hasp to engage the free end when the door is unlocked.—F. W. Bentley, Jr., Missouri Valley, Ia.



### Removing Grease Spots from Fabrics

Grease spots can be removed from clothing with a solution made by dissolving glycerin, 1 oz., strong ammonia, 2 oz., and ether, 1 oz., in the order given, in distilled water, 1 pt. The completed solution should be shaken vigorously before using. The material to be cleaned is laid out on a flat surface and is rubbed with a sponge soaked in the solution. After the spot has been softened, it may be washed out with clean water. Benzine paste, which is exceptionally efficient in removing all kinds of grease, is made by dissolving castile soap, 3 oz., and sodium carbonate,  $\frac{1}{8}$  oz., in water, 15 oz., with the aid of heat. When the solution has cooled, add strong ammonia,  $\frac{3}{4}$  oz., and stir thoroughly. One pint of benzine is next added in small quantities while stirring the solution vigorously. If desired, a few drops of oil of wintergreen or bergamot may be added. The paste should not be used close to an open flame as it is very inflammable.

### Heater Fan Cools Interior of Car

When warm days come and the car heater is no longer needed, it is often possible to remove the heater fan and mount it in the rear part of the car as shown, to

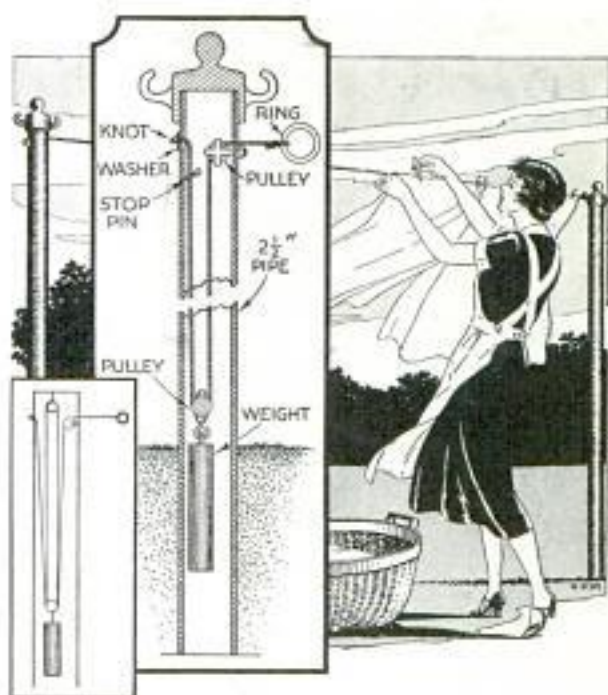


Heater Fan Removed and Fitted with Wire Guard Used to Circulate Air inside Closed Car

circulate the air in the interior. A guard should be fitted over the fan blades.

### Clothesline Stored inside Standard

To protect a rope clothesline from the weather, use pipe standards and install a pulley arrangement inside one of them to pull the line down when not in use. A weighted pulley is suspended inside the standard from the rope, which is threaded through holes near the top of the stand-



Weighted Pulley Pulls Clothesline inside Pipe Standard When Line Is Not in Use

ard, one end being fitted with a washer and knotted to keep it from pulling through the hole. The other end of the rope runs over a second pulley bolted rigidly to the side of the standard to prevent the rope from being frayed on the edges of the hole. A clothesline about 16 ft. long can be accommodated in this way, depending on the length of the standards. A longer line can be had by using the arrangement shown in the left-hand detail, in which the weight is carried by a double pulley and a third pulley is attached to the cap of the standard.

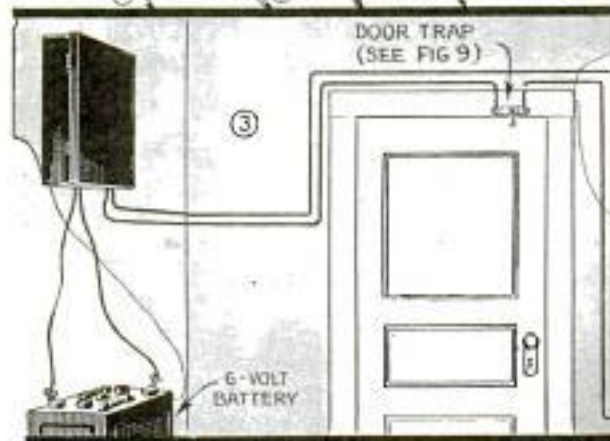
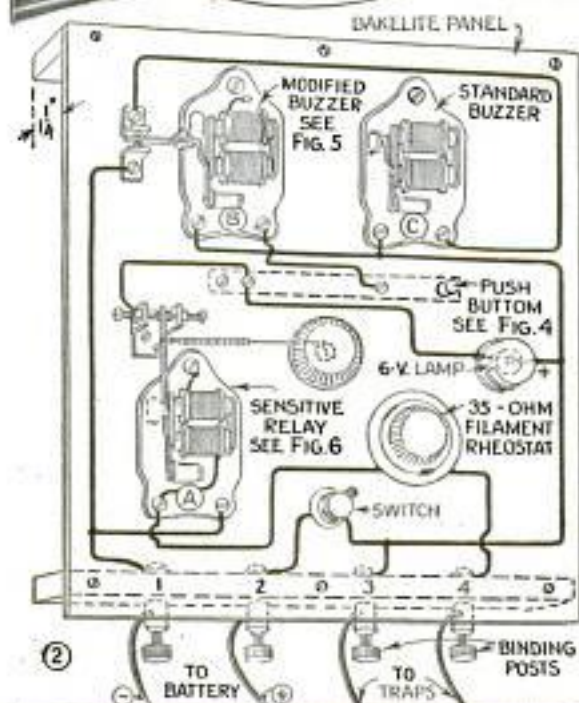
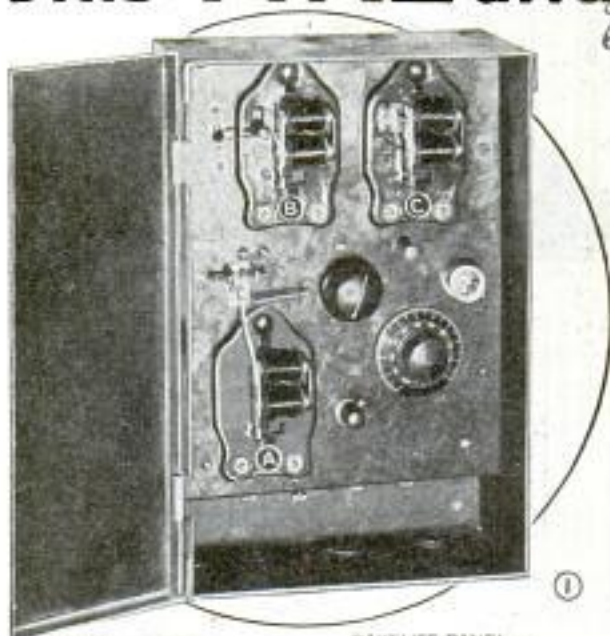
### Reflector Saves Current on Toaster

A saving of current can be effected, when browning only one slice of bread in a double electric toaster, by putting a metal reflector on the open side. This retains the heat so that the bread is toasted in a much shorter time. The toaster, with the reflector in place, can also be used as a radiant heater. The reflector may be a piece of brightly polished tin or aluminum fitted with a knob so that it can be handled when hot.



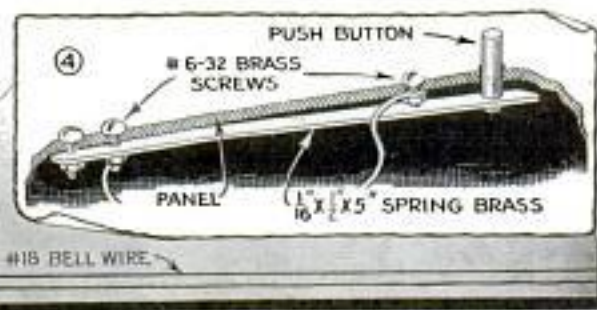
Photo electric cells } General Electric Co  
 Schenectady, N.Y.  
 Westinghouse Electric  
 Mfg. Co.  
 Pittsburgh, Pa.

# This FIRE and BURGLAR



At a cost of less than two dollars you can build this modern, efficient alarm system which will warn you at the instant any part of your premises is molested. The tricks of criminals, such as cutting wires, turning off the power, or jumping wires before forcing a window, will set off the alarm. At an additional cost of about four dollars a sensitive photo cell can be added, which will warn you if an intruder comes through an open window or flashes a light to get his bearings. A simple telephone transmitter may also be included to signal at the slightest sound. The system can be made to serve as both a fire and burglar alarm at night, and by throwing a switch and making one adjustment it becomes a fire alarm only during the day.

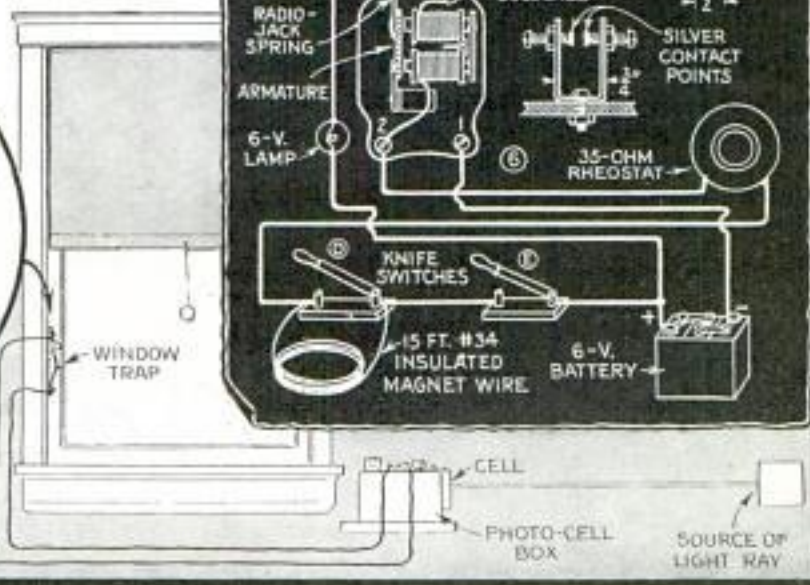
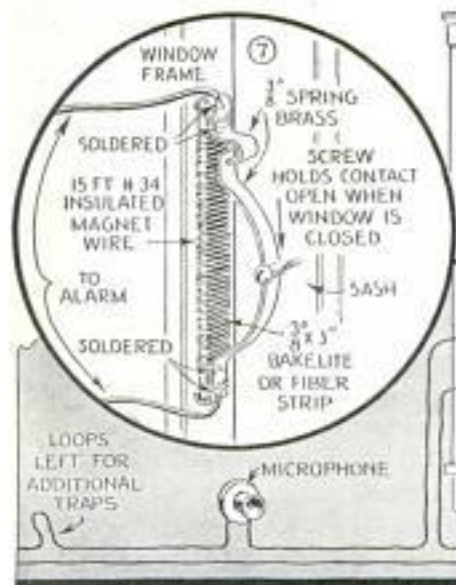
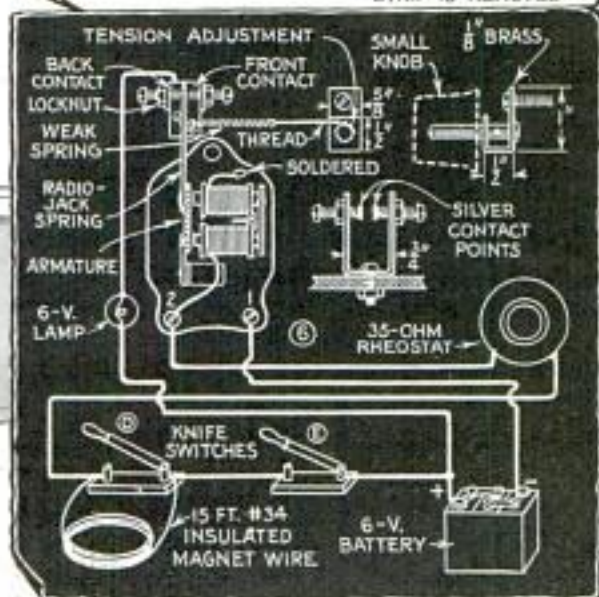
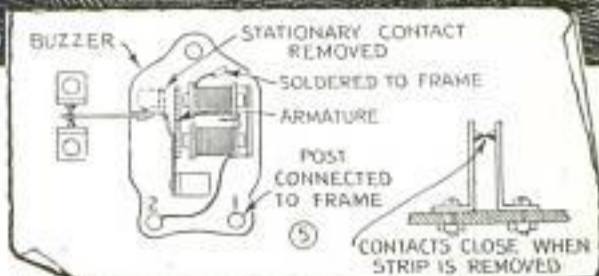
The instrument panel may be mounted in a sheet-metal fuse box as shown in Fig. 1. The buzzer (or bell) marked C is used to sound the alarm and it is not altered in any way. The one marked B is used as a stick relay, that is, a relay which will turn on the buzzer but will not turn it off. This buzzer is altered as shown in Fig. 5. The buzzer marked A is also changed as detailed in Fig. 6. It is used as the sensitive unit and its armature will normally stand between the contacts shown without touching either one of them. Any change whatever in the traps or wires connected to this relay will cause the armature to touch one or the other of the contacts which are connected to the stick relay B. Even though the armature may make its connection only for a fraction of a second, that will be enough to cause the stick relay to start the buzzer. After this it does not matter what the intruder does, the buzzer will continue to ring until it is

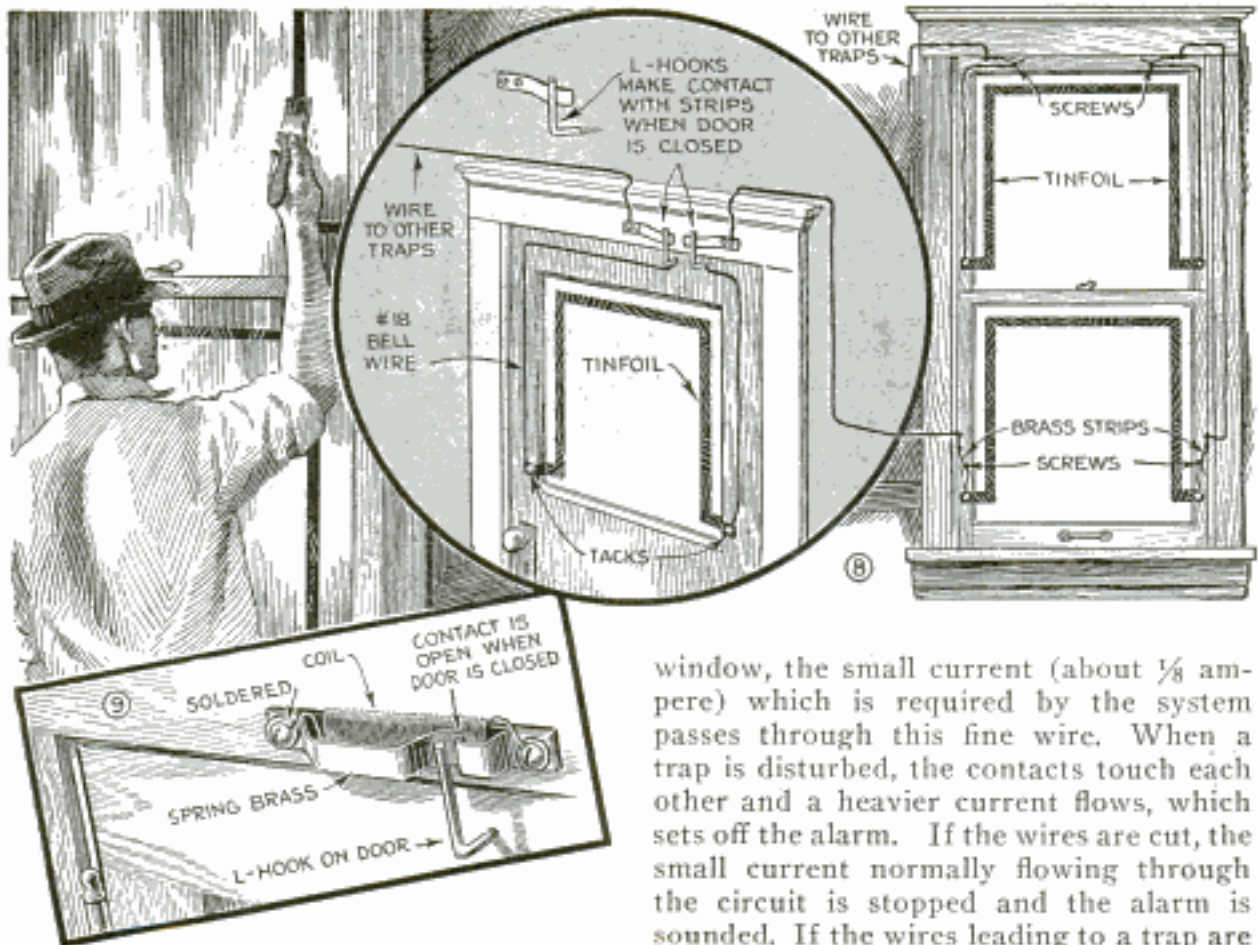




# ALARM is FOOLPROOF

turned off. When making the changes shown in Fig. 6 it is very important that all work be done with care, as the sensitiveness of the outfit depends on how well this unit works. To test and adjust this relay, connect it as shown, setting the rheostat so that all of its resistance is in the circuit, that is, when the knob is turned until the sliding arm just makes contact with the first turn of wire. Next close the switch marked E and adjust the spring-tension knob until the light does not burn. When this has been done you may close the switch marked D. If the relay is adjusted correctly the lamp should light. If it does not, the switch should be opened and the spring tightened slightly but not sufficiently to cause the lamp to light. As a final test, open switch E while switch D is open to see if this will cause the lamp to light. If it does not, adjust the back contact until it does. Closing switch E should now extinguish the lamp. When the adjustments are complete closing either D or opening E should cause the lamp to light. When your relay will do this, the wiring may be completed as shown in Fig. 2. All connections should be soldered. The push but-





ton detailed in Fig. 4 is held down while adjusting the alarm system so that the buzzer will not ring.

After the unit has been assembled and wired, the terminals of a 6-volt storage battery or a 6-volt dry-cell battery are connected to the binding posts 1 and 2, Fig. 2. The switch is left open when the alarm is not in use. It may also be used to turn off the buzzer when the alarm sounds. Burglar-alarm systems should not be connected to the house-lighting circuit as this would make it possible for an intruder to enter safely after turning off the power. The binding posts marked 3 and 4 are to be connected to the traps.

The traps used with this alarm may be homemade or the standard type of open-circuit trap sold for a few cents if the ends of a coil consisting of 15 ft. of No. 34 insulated magnet wire are soldered to the two sections of each trap as shown in Fig. 7. This detail shows how a window trap is made from spring brass, while Fig. 9 shows the same principle applied to a door. When these traps are connected in the circuit and held open by the door or

window, the small current (about  $\frac{1}{8}$  ampere) which is required by the system passes through this fine wire. When a trap is disturbed, the contacts touch each other and a heavier current flows, which sets off the alarm. If the wires are cut, the small current normally flowing through the circuit is stopped and the alarm is sounded. If the wires leading to a trap are "jumped," the result will be the same as if the door or window were opened.

Approximately fifteen traps may be connected to the system although it will work equally well with one. When installation is complete the system must be adjusted. To do this press down the push button and while holding it down turn on the battery switch. The lamp will probably light. The rheostat is next turned carefully until the light goes out. There will be found one position of the rheostat which will cause the lamp to go out and turning the rheostat either way will cause it to relight. To test the efficiency of the installation try a door or window. If the alarm does not sound, the spring tension should be slightly increased. To reset the alarm, turn off the battery and place the insulating strip on the stick relay between the contact points and turn on the battery. When new traps are added, or if it is desired to leave a window or door open during the night, the rheostat will have to be readjusted while holding down the button as previously explained. Of course, you can place a trap so that it functions when the window is opened to a predetermined

height. Windows may be fixed as shown in Fig. 8 so that breaking the glass will sound the alarm. Strips of thin tinfoil are glued to the glass and connected, as shown, in such a pattern that a crack in the glass will break the circuit. By placing traps in the windows so that raising them will give a warning, and also by installing the foil as shown, it is practically impossible for a burglar to gain entrance without being detected. In wiring a building for an alarm system it is a good plan to get a spool of No. 18 bell wire, connect one end of it to one of the alarm-box binding posts and string it to the closest location where protection is desired, leaving a generous loop for making connections and proceeding by the shortest path to the next location without cutting the wire, finally connecting the other end of the wire to the remaining binding post of the alarm system. See Fig. 3. To install the traps, the loops of wire are cut and the ends connected to the trap.

If you wish to have the alarm set off by a sound, place a telephone transmitter as close as possible to the expected source of noise and connect it into the circuit exactly as if it were a trap. When the transmitter is used, a little more care will be required in adjusting the sensitive relay.

A very efficient selenium type of photo cell admirably suited for burglar-alarm uses can be purchased for about four dollars. When connected as shown in Fig. 10, these cells will set off the alarm if anyone passes between the cell and the light. The relay to be used with the cell may be easily made. All parts should be made accurately to assure sensitiveness. The rheostat shown in the diagram is a 5,000-ohm radio volume-control rheostat. When the photo-cell outfit has been assembled, it is adjusted, while batteries are disconnected by tightening the relay spring knob until the arm will just make connection with the back contact. When the relay armature is gently pressed against the front contact, the space between it and the relay core should be slightly less than the thickness of a sheet

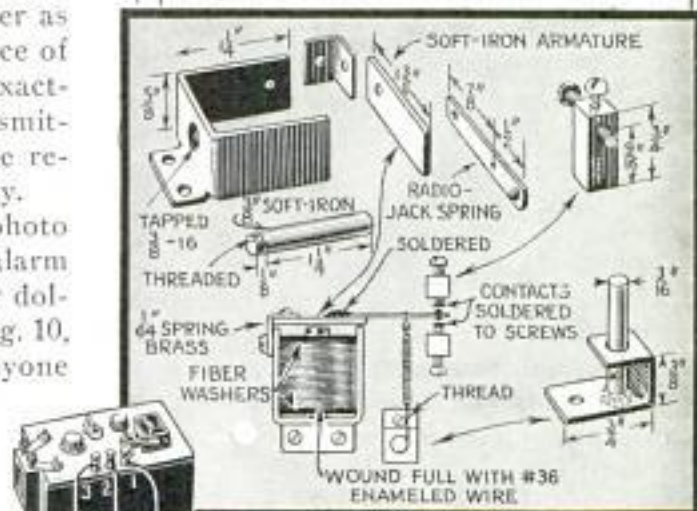
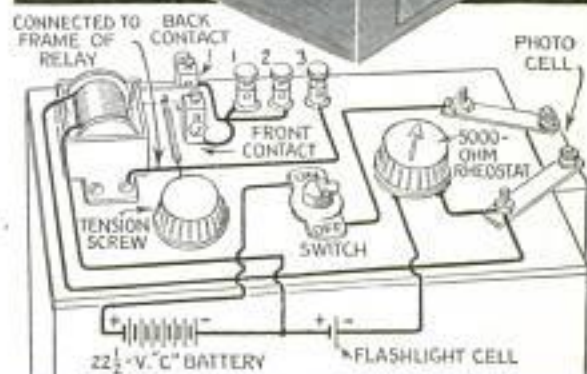
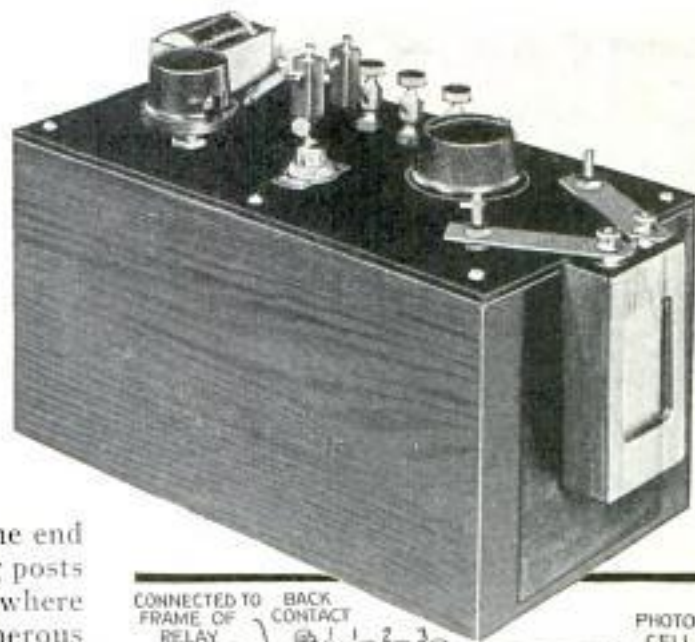
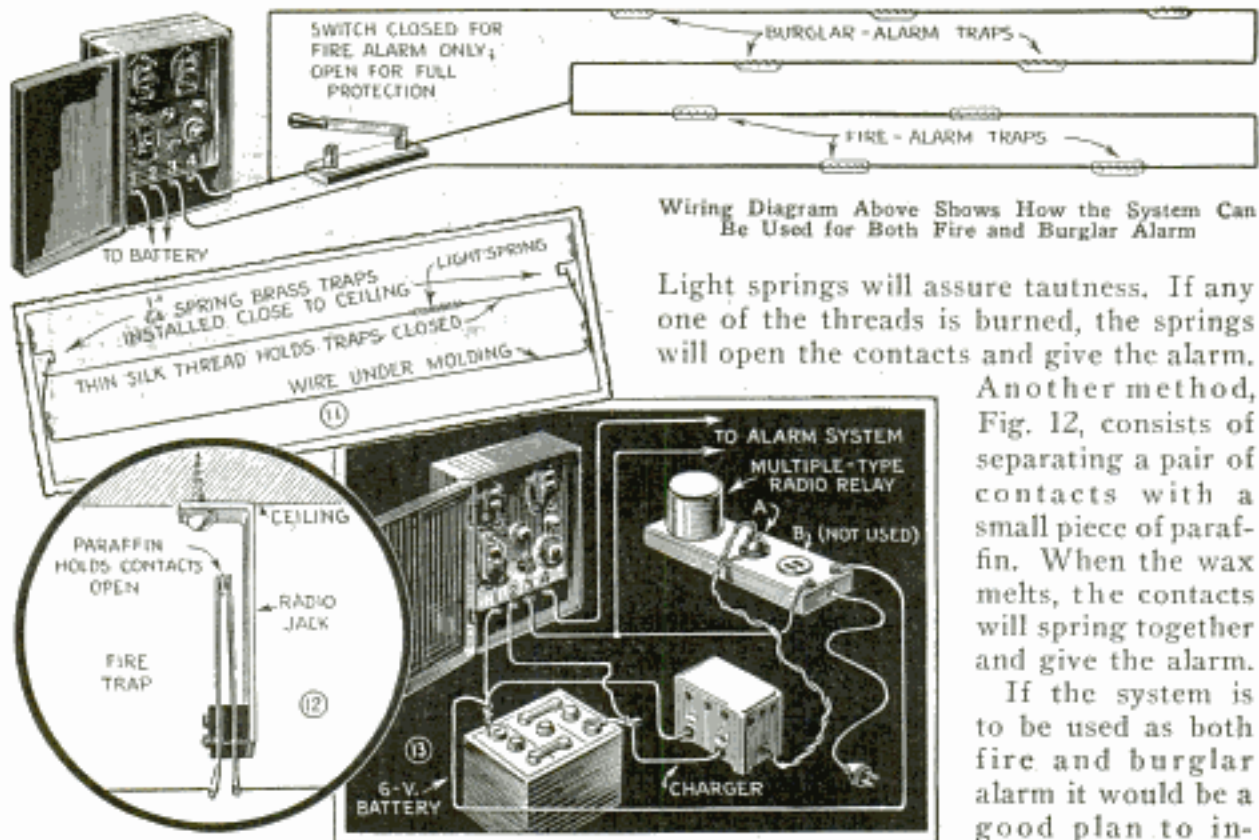


Fig. 10. This Homemade Light-Sensitive Unit Can Also Be Installed in the Alarm System



of thin writing paper to prevent sticking. The amount of movement of the armature should be as small as possible. Next connect the batteries and, with the cell protected from light, adjust the rheostat until the armature is in contact with the back contact. If a light is now focused on the cell the armature should move to touch the front contact. The



Wiring Diagram Above Shows How the System Can Be Used for Both Fire and Burglar Alarm

Light springs will assure tautness. If any one of the threads is burned, the springs will open the contacts and give the alarm.

Another method, Fig. 12, consists of separating a pair of contacts with a small piece of paraffin. When the wax melts, the contacts will spring together and give the alarm.

If the system is to be used as both fire and burglar alarm it would be a good plan to include a switch so

lower diagram of Fig. 10 shows a method of connecting two flashlight bulbs and a dry cell to the relay contact to make adjustment easy. To use the photo-cell trap, place it at the desired location and focus a beam of light on the cell so that a person passing through the beam will throw a shadow on it. The light may be connected to the electric line, then the alarm will go off if anyone turns off the power. To make the connections, cut the signal circuit line exactly as if you were going to add a trap and connect the wires to binding posts numbered 1 and 3. No connection is to be made to the post marked 2. If you wish to place the photo-cell trap in a window so that the rays from a prowler's flashlight will set off the alarm, connect the wires to binding posts marked 2 and 3 only. When connected in this way the alarm will be set off as soon as daylight shines on it.

Without change a fire-alarm system may be connected to this outfit so that an alarm will be sounded in the event of either fire or burglary. Methods of making fire traps are shown in Figs. 11 and 12. In Fig. 11 silk threads are stretched across rooms to be protected so that they will normally hold the alarm circuit closed.

that both alarms will operate during the night, and by closing a switch only the fire alarm will be in operation during the day. If this plan is used it will be necessary to readjust the rheostat in the alarm cabinet when the change is made. After the system has been installed and tested, you will know the point at which to set the rheostat for day and night operation.

In using the system the battery should be kept well charged, as the rheostat adjustment will have to be changed if the battery gets too low. If you have one of the trickle chargers and relays of the type used on battery-operated radio sets, you can connect it so that it will charge during the day when the alarm is not in use and automatically turn itself off when you turn on the alarm system. The power-control relay should be of the multiple type as the amount of power required by the alarm is not sufficient to throw a series type of radio power-control relay. Connections for an automatic charger using old radio parts are shown in Fig. 13.

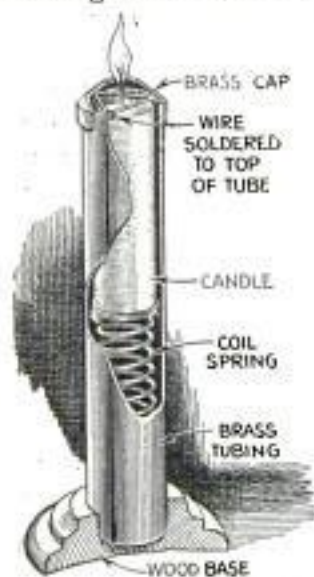
Local reductions of density in photographic negatives may be effected by rubbing them with a small piece of cloth dampened with alcohol.

### Cleaning Books with Bread Dough

Dust and dirt may be removed from the edges and bindings of books by rubbing them with bread dough. The well-cooked, but doughy, bread inside the crust of fresh rolls is also excellent for this purpose. In applying it, rub the soiled book with a ball of the dough, which may be used until it is saturated with dirt. Grease spots on the pages may be removed by repeatedly applying benzine, taking up the excess with blotting paper.

### Brass Holder Keeps Candle Flame at Uniform Height

This candle holder is novel in that the candle is placed inside where a coil spring keeps it at a constant height against the top. The holder is a length of brass tubing fitted snugly in a wood base. Three wires, soldered across the top of the tube, hold the candle from being pushed out, and a brass cap, having a  $\frac{1}{4}$ -in. hole drilled through its center to take the candle wick,



is slipped over the open end for the sake of appearance. A few small holes are drilled through the tube just below the cap to admit air so that the candle flame will burn brightly. The tube is removed from the base for inserting a new candle into the holder.—Chas. Tyler, Chicago.

### Household Insect Powder

An effective non-poisonous powder, which will destroy cockroaches, water bugs, and similar pests is made by thoroughly mixing borax, 9 oz., starch,  $2\frac{1}{2}$  oz., plaster of paris, 2 oz., and cocoa,  $1\frac{1}{2}$  oz. The powder is sprinkled around the places where the pests are known to be. In using any bug exterminator, it is a good idea to continue its use for several days after the bugs have disappeared to insure permanency.



Camp Bedding Stored on Floor of Car Provides Foot Rest and Keeps Out Heat from Muffler

### Camp Bedding Stored on Floor of Car

A good place to store camp bedding is on the floor of your car between the front and rear seats. The bedding should be folded into a bundle about 6 or 8 in. thick, and it can be placed in a canvas bag to prevent it from becoming soiled. This provides a good foot rest for the occupants of the rear seat, and also helps in keeping out heat from the exhaust muffler.

### Roller Aids in Removing Contents from Tube Container

A piece of sheet metal or spring brass, formed into a small cylinder, provides a good roller for squeezing out the contents from a tube container. The metal strip from which the roller is made should be about the same width as the flat end of the tube and of sufficient length to roll up into a cylinder about  $\frac{5}{8}$  in. in diameter with a lap of  $\frac{1}{4}$  in.—F. E. Hosmer, Long Beach, Calif.



Parts { Powertone Electric Co } Bruno Laboratories  
 164 Washington New York City 20 W. 23 rd New York  
 Hammarlund Mfg Co  
 424 W 33rd New York

# SHORT-WAVE for DX Doublet



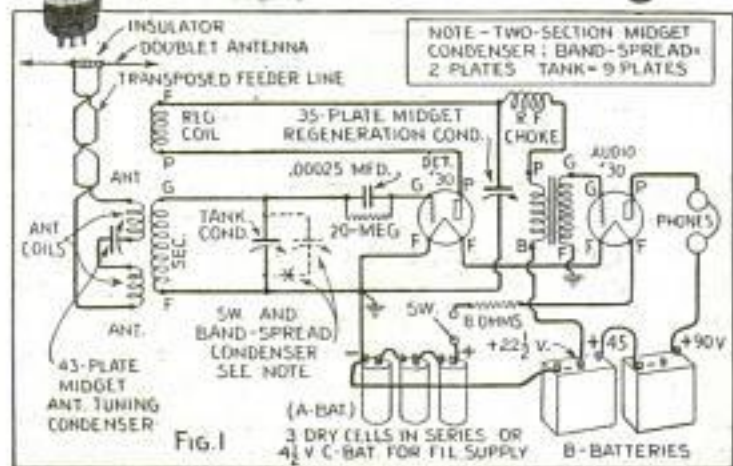
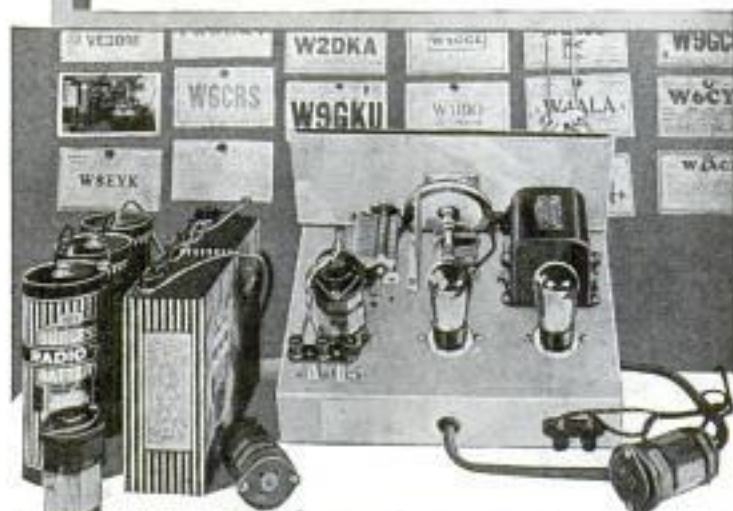
**Q**UICKLY assembled at low cost, this efficient little 2-tube battery-operated short-wave receiver, for use with a doublet antenna, will please the critical short-wave listener as well as the beginner. Anyone who can solder two wires together can build and operate it. The doublet antenna is merely two antennas hooked together, with the lead-in wires crossed over insulating blocks at regular intervals.

Standard parts are used and these are available even to the drilled panel and base. The complete set of parts, with one ready-made plug-in coil, costs \$14.70. This cost may be reduced by making your own coils. The low-drain 2-volt tubes make dry-cell operation practical and the B-batteries last many months. The circuit is the type used by Don C. Wallace, winner of the Hoover Cup awarded for DX short-wave reception.

This complete 2-tube receiver forms a foundation unit to which a second audio stage will be added for loud-speaker use. Later, the layout can be easily changed over for all a.c. operation. The

original parts are retained except for a few minor details.

The schematic diagram, Fig. 1, is given for checking purposes and for those who prefer it to the simplified, or X-ray, type shown in Fig. 2. The front panel controls are indicated in Fig. 3. The coil and tube sockets are mounted under the base, the large holes, F and F, at the left, as shown in Fig. 2. The front panel is screwed to the base and the various parts mounted just as shown in this diagram. A material list, describing each part, is available upon application if desired. The 35-plate regeneration condenser is mounted on the front panel below the base. The 43-plate an-

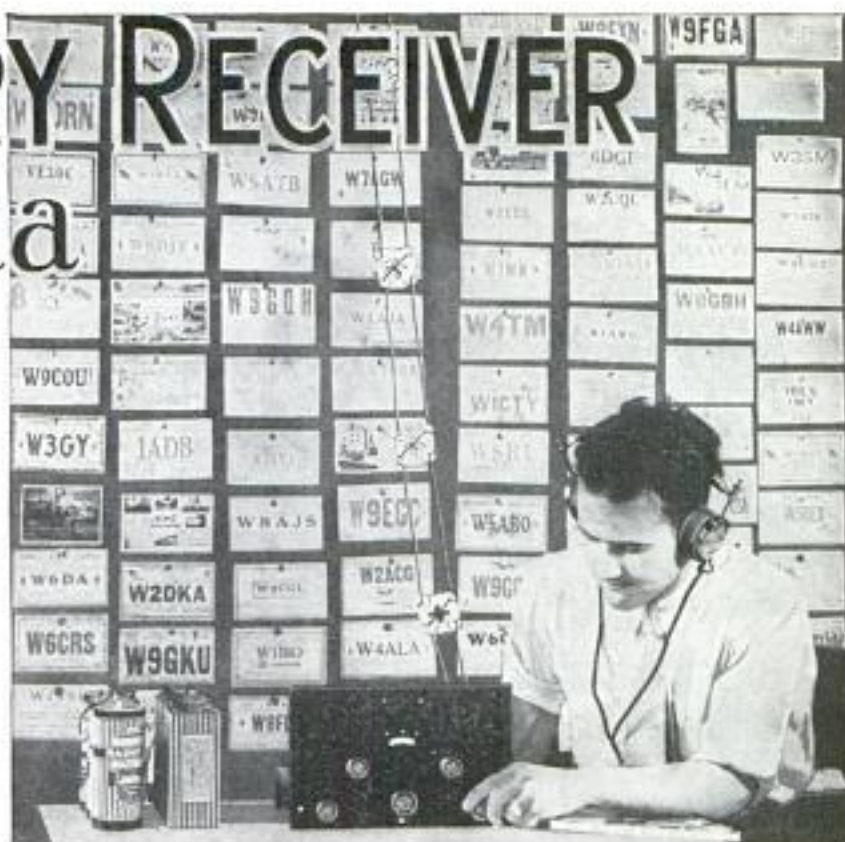


# BATTERY RECEIVER

## Antenna

Antenna-tuning condenser is mounted, with insulating washers, on the panel slightly above the base. The tuning-dial knob, at lower center, rotates a grooved disk that engages the dial which is mounted directly on the shaft of the 2-section midget condenser. The 2-plate section of this condenser is used for spreading the tuning range in crowded amateur bands.

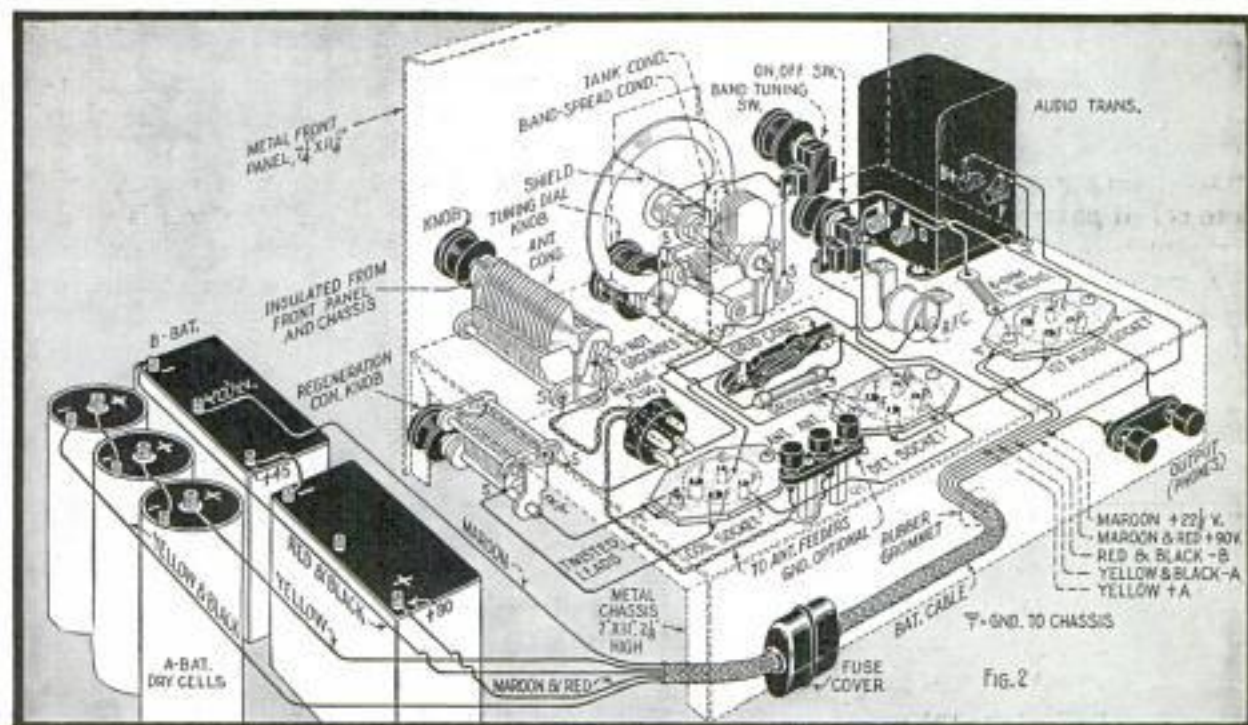
Insulated phone posts are mounted at the rear of the base, and posts for the antenna feeders and optional ground are elevated above the base on a strip supported by metal bushings. The wiring is done under the base and run up through holes to the terminals above. Stranded hook-up wire, with push-back insulation, is used. The rotor plates of all



the variable condensers are common with the frames, which are grounded on the panel, or chassis, with the exception of the antenna tuning condenser. Stator, or stationary, plates are indicated by S and the rotors by R.

Soldering lugs, for grounding the leads

(Continued to page 118A)



# Homemade Sensitive Relay for Electric Eye

## PART II

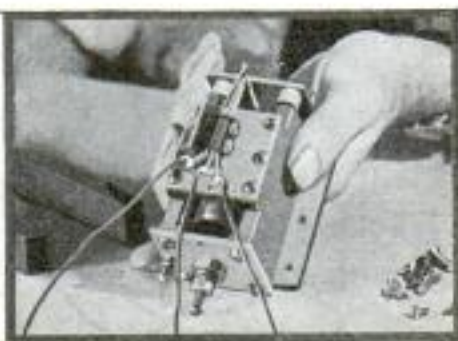
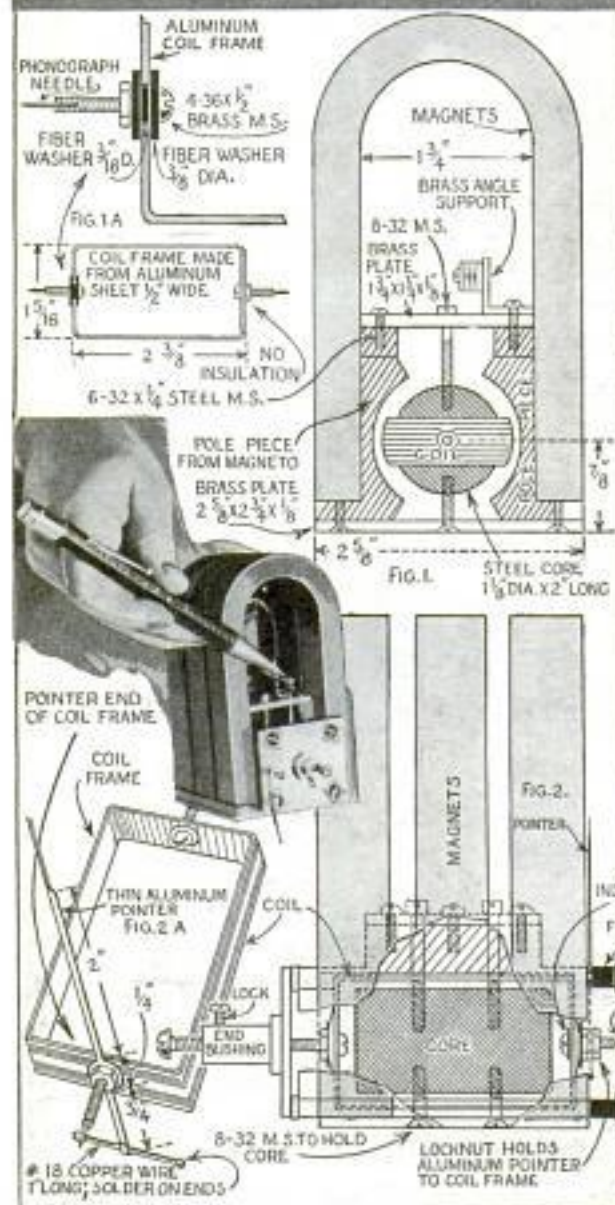


THIS sensitive relay is made from an old telephone magneto. The one shown was a Stromberg-Carlson unit, but any make may be used by varying the dimensions. Remove the magnets after first marking them so that they may be replaced exactly. Fig. 1 shows brass plates screwed to the top and bottom of the cast-iron pole pieces, also an iron core and movable coil in position. The core is made from a 2-in. length of  $1\frac{1}{8}$ -in. steel rod. It is suspended between the pole pieces with four 8-32 machine screws.

A piece of sheet metal is bent around the core piece as a spacer so that the two will just slip into the round hole between the pole pieces. Holes for the screws are drilled through the brass plates and into the core with a No. 28 drill, and tapped for the 8-32 screws, which are then inserted. The end of the pole piece and core is then marked for position. The screws, core and spacer are now removed and a No. 18 drill is run through the tapped holes in the brass top and bottom plates. The core is then replaced without the spacer and centered.

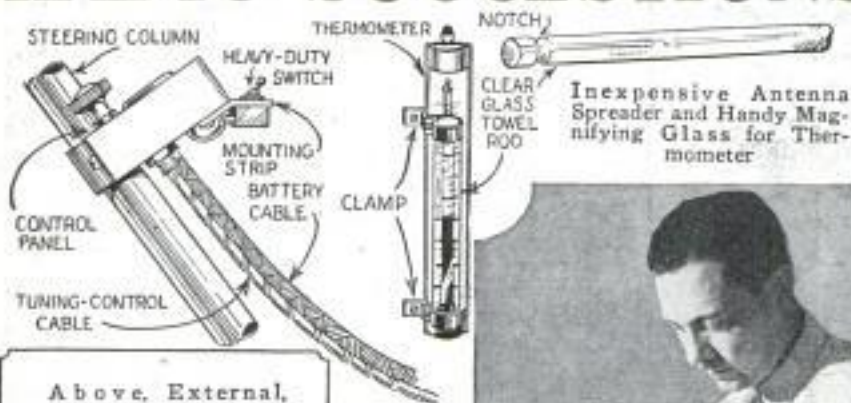
The coil frame detailed in Fig. 1A is formed around a block of hardwood. Two 4-36 brass machine screws hold it in shape. These screws are drilled to take phonograph needles for pivot points. The method for drilling is shown in Fig. 3. One of these screws is insulated from the aluminum frame as shown in Fig. 1A. The coil frame is covered with thin paper, using collodion as a cement. The coil is wound evenly with No. 38 enameled wire with as many turns as will allow the coil to turn freely between the pole pieces. The coil

(Continued to page 116A)





# Practical - - - - - RADIO SUGGESTIONS

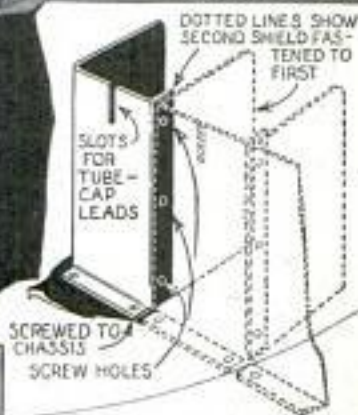
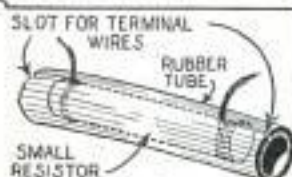


Inexpensive Antenna Spreader and Handy Magnifying Glass for Thermometer



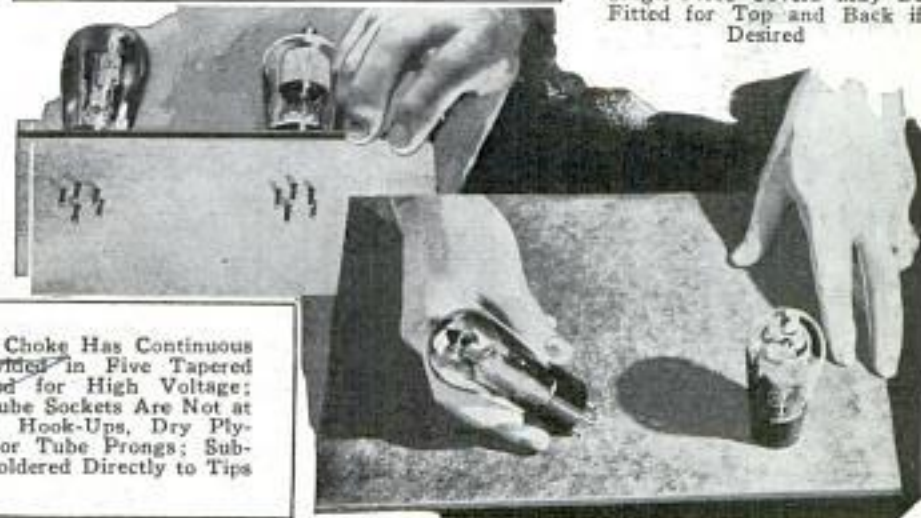
Above, Rubber Grommet Insulates Screen-Grid Lead to Prevent Vibration Noises; Below, a Handy Mounting Strip for Small Fixed Resistors

Above, External, Heavy-Duty, a.c. Filament Switch Easily Installed to Replace Noisy Switch in Auto-Radio Remote Control



Upper Left, Insulating Small Resistor in Portable or Auto Receivers; Right, Universal Output Transformer Replaces Transformer in Any Dynamic Speaker; It May Be Used to Match High and Low-Range Speakers for Dual Operation

Above, Simple Sheet-Metal Screen-Grid Tube Shields Easily Installed in Unit Form; Single-Piece Covers May Be Fitted for Top and Back if Desired



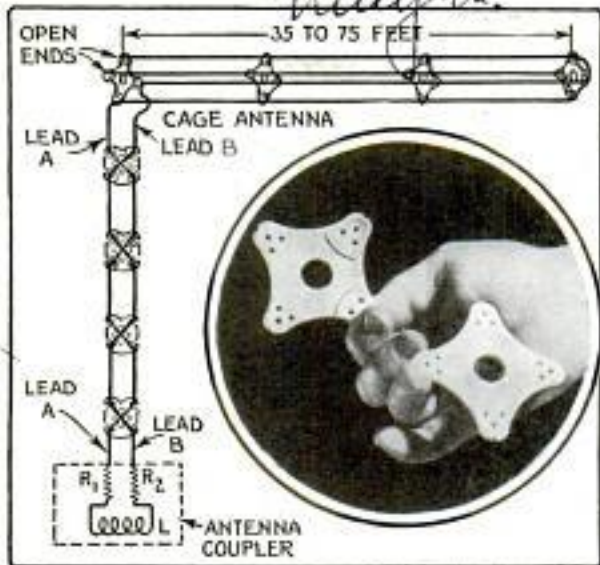
Left, Heavy-Duty R.F. Choke Has Continuous Universal Winding Divided in Five Tapered Sections, Base Insulated for High Voltage; Right, When Suitable Tube Sockets Are Not at Hand for Experimental Hook-Ups, Dry Plywood May Be Drilled for Tube Prongs; Sub-panel Connections Are Soldered Directly to Tips

Sherman's Electrical Supply Co.  
500 W. Sherman St.

National Company  
61 Sherman St. Malden Mass

C 4562

Lynch Mfg Co  
51 Vespa St  
New York



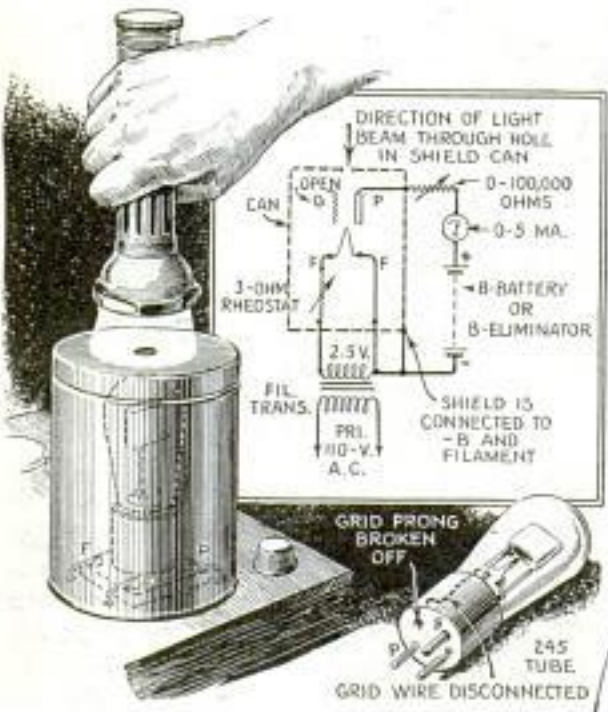
Low-Loss Insulators and Diagram for Cage Antenna

**Cage Antenna with Transposed Lead-In**

This cage-antenna system, a favorite commercial receiving type, has great pick-up range, is non-directional and free from man-made static. The transposed lead-in was described in the June issue. Leads A and B are easily traced through the Lynchite insulators to the open ends of the cage. These insulators are now available for home installations.

**Output Tube Used as a Photo Cell**

The ordinary type '45 output tube has photo-electric properties under certain



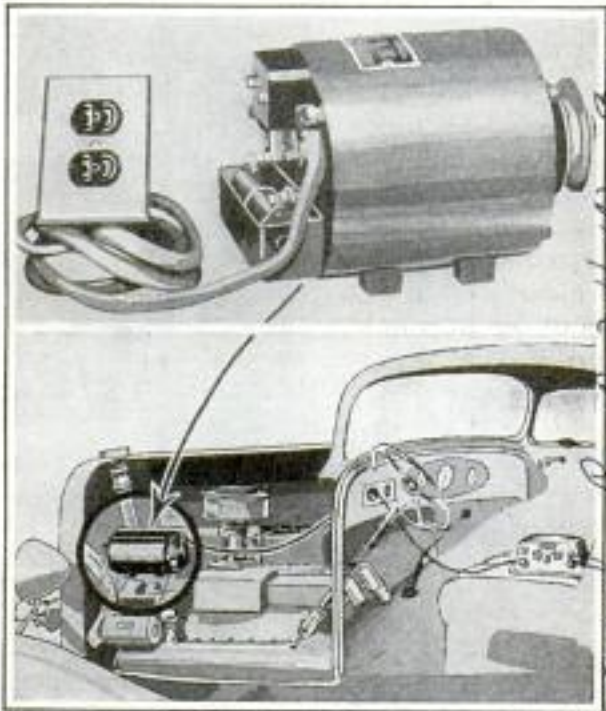
Wiring Details for Photo-Cell Experiment

conditions. Using this simple circuit, a flashlight, directed on the tube, will cause sufficient increase in plate current to operate a sensitive relay. The grid prong is broken off and the hole drilled out so that the grid wire hangs free in the base. The filament rheostat and plate-voltage resistor are adjusted to the best low value that gives the highest milliammeter reading when the flashlight is directed on the tube. Best B-voltage value is found by trial.

C 4565

**Unit Operates A.C. Midget Set in Car**

Powered from the fan belt, with no battery drain, this unit delivers 110 volts a.c. to the instrument board of your car. It is mounted at the head of the motor in such a position that a grooved wheel rotates



Above, Complete A.C. Power Unit; Below, Installed in Car for Operating A.C. Radio Receiver

with the fan belt. The model shown will supply sufficient current to operate any a.c. receiver and will light two 25-watt lamps in addition. It may be used on a motorboat and may also be equipped with a motor which operates from a 32-volt farm-lighting plant.

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.

D. Mudgett Co.  
 224 W. 30th St.  
 New York, N.Y.  
 Change to see ad March 1935 P. 141a

Radio Chassis Inc  
420 18th St. N.Y.C.



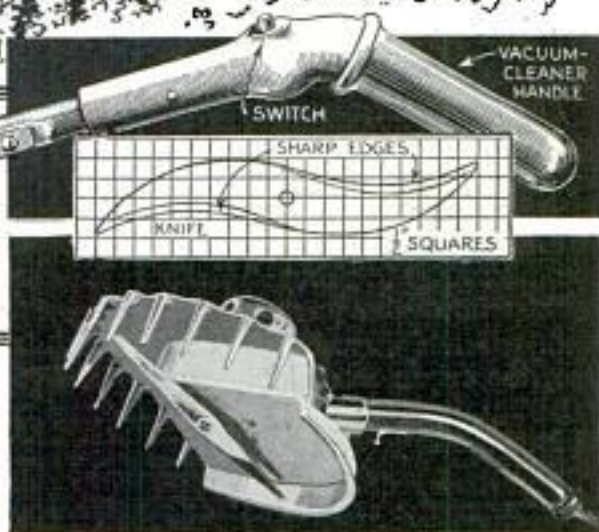
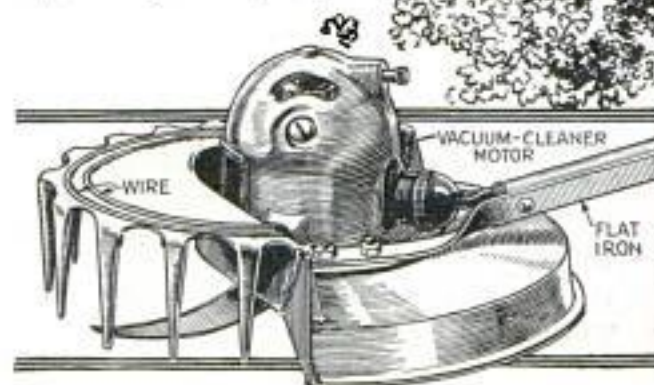
# Electric HEDGE TRIMMER

## *uses Vacuum-Cleaner Motor*

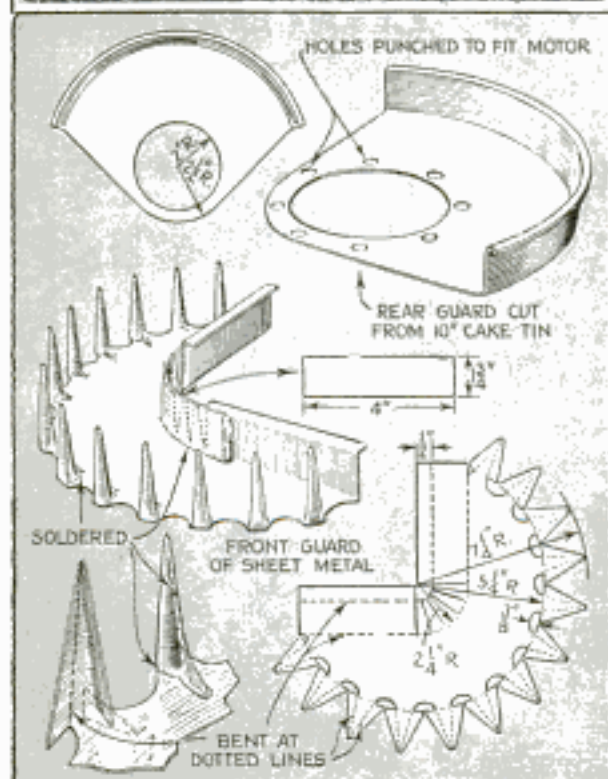
By H. J. HUNT

WITH this electric trimmer you can cut the sides and top of a hedge accurately and quickly, and the time saved in using it will more than compensate you for the work of making it. All you need is an old vacuum-cleaner motor, its handle, a 10-in. cake tin and some sheet metal, a piece of hardened and tempered steel about  $\frac{1}{16}$  in. thick, and enough extension cord so that you can reach all parts of the hedge when the cord is connected to a convenient outlet.

The cake tin is cut to form the rear guard, which is bolted to the motor. As there is variation in the size and shape of different motors, no dimensions can be given here, and the guard will have to be adapted to the par-



ticular motor used. The front guard is made from a piece of sheet metal cut as shown in one of the drawings. Triangular notches are made along the edges, and



the points are then bent over and soldered, forming a row of prongs that allow the branches of the hedge to pass between them. The front guard is then soldered to the rear guard along the straight edges, which are bent over at right angles.

The approximate size and shape of the knife are shown in the crosshatched drawing, which also shows where the edge is ground sharp. Two lengths of  $\frac{1}{8}$  by 1-in. flat iron are bolted to the motor to hold the shortened vacuum-cleaner handle, which should be provided with a switch if this is not already fitted with one. In use, the trimmer will give surprising results and will cut through branches up to  $\frac{3}{8}$  in. in thickness. Hold the trimmer with both hands, one near the motor and the other near the switch. After you become

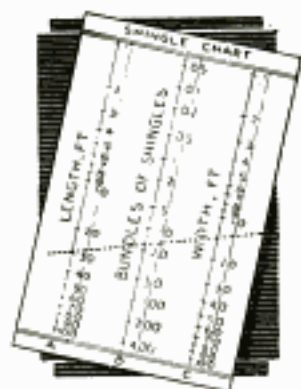
accustomed to using the trimmer, which will, of course, require some practice, it will be a comparatively easy matter to do a job of cutting that cannot be equaled with a pair of ordinary hand shears.

### Spray to Eradicate Insects from Trees and Plants

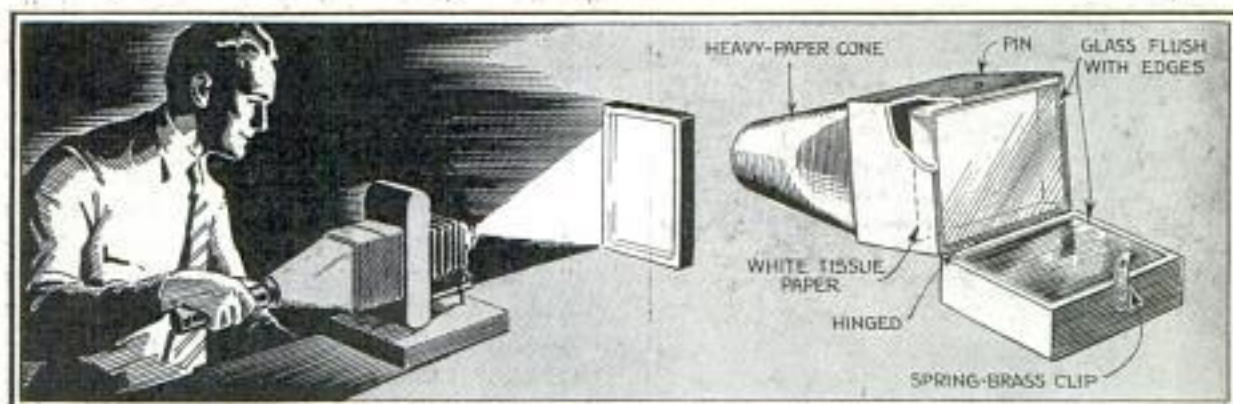
An efficient, non-poisonous spray that will quickly destroy most plant and tree insects, consists of an emulsion of water, kerosene and soap. The concentrated solution, which is diluted just before use, is made by dissolving laundry soap, 1 lb., in water, 1 gal., with the aid of heat. After the soap has been thoroughly dissolved, and is still boiling hot, slowly pour it into kerosene, 2 gal., while stirring vigorously. The stirring should be continued until the white emulsion has cooled to room temperature. This will require about 10 or 15 min. For use on plants, one part of the emulsion should be diluted with 20 parts of water and stirred thoroughly, immediately before use. Fruit trees and vines may also be sprayed with this insecticide by diluting one volume of the liquid with ten volumes of water.

### Chart Used to Determine Number of Shingles Required for Roof

This chart is useful in figuring the number of bundles of shingles required to cover a roof of a given area, and is based on the rule, "Four bundles of shingles, when laid 5 in. to the weather, will cover an area of 100 sq. ft." After measuring your roof, run a straight line across the chart from the number in column A, that is equivalent to the length of your roof, to the number in column C that is equivalent to the width. The figure where the line intersects column B will be the number of bundles required. For example: An area 15 by 30 ft. requires 18 bundles, as indicated by the dotted line where it intersects column B in the drawing.



## Snapshot Enlarger Fitted with a Flashlight



Enlargements of snapshot negatives are easily made with this enlarger, which utilizes a small camera in connection with a flashlight. To prepare the enlarger, make a lightweight frame. Saw this in two, hinge the two sections together, and fit a piece of glass flush with the inside edge of each one, as shown. Next, stretch a piece of tissue paper over one end of the frame to diffuse the light, and, after removing the back, fit it to the camera. The other end

of the frame is fitted with a cone of opaque paper, the small end of which is just large enough to admit the lens end of a flashlight. In use, the negative is held between the two pieces of glass, and the focusing is done by means of the camera bellows. It is best to first turn on the flashlight and regulate the length of exposure with the camera shutter. If a darkroom is not available, a dark closet can be used as a good substitute.

### Light Signal Substituted for Bell on Typewriter

In noisy offices where it is difficult for typists to hear the bell on their typewriters, a light signal can be rigged up by using a flashlight lamp and cell. A switch is made from strips of copper, one of which is attached to the bell clapper and the other to the frame



of the machine, both being insulated from the metal and arranged so that they make contact when the clapper strikes the bell. The cell should be kept in the wrapper and may be attached to the machine with a radio-ground clamp or with a hose clamp. Wiring is as follows: One wire is soldered to the cell casing (the zinc side) and runs to one terminal of the lamp socket, located on the front of the machine. The other terminal of the lamp socket

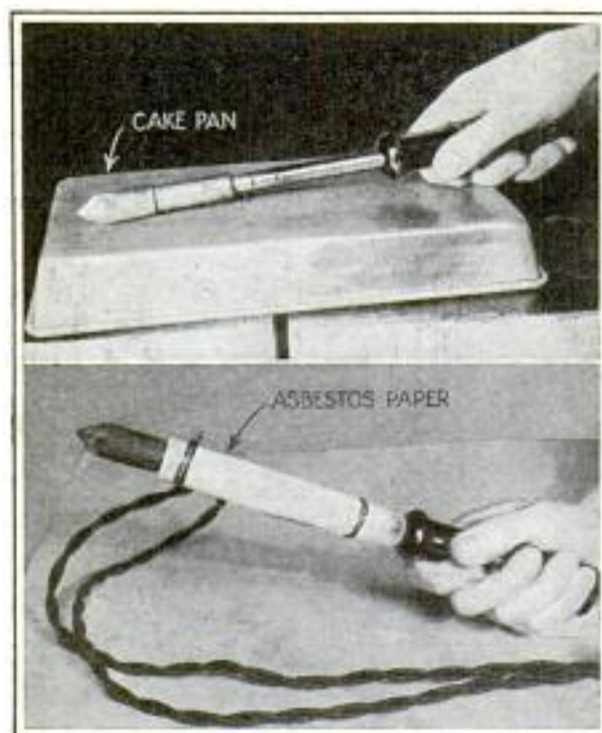
goes to one side of the switch, while the opposite side of the switch is soldered to the terminal of the cell.—Chas. K. McCluskey, Mt. Vernon, Ohio.

### Coin Assures Uniform Crosshatch Lines on Drawing

By using a coin inside a triangle you are assured of even spacing of the lines in crosshatching a drawing. The coin is held inside the triangle with the tip of one finger while the line is made, and then it is moved to the right, as indicated by the dotted lines, and the second line is made, repeating this procedure until the work is done. The width of space between the lines is determined by the size of coin used.



☛ A dull milling cutter wears out faster than a sharp one and does poor work.



Tin Pan Helps Keep Soldering Iron from Overheating, and Asbestos Paper Aids in Keeping Iron Hot

### Two Kinks That Help in Soldering

The trouble of constantly retinning soldering irons, when used on a large job, can practically be eliminated by placing the copper on a large cake pan when the iron is not in use. In this way, a large radiating surface is provided and the iron is kept at a minimum heat when not in use. Where the iron is too small for the work, and the heat is conducted away quickly, it is a good idea to concentrate all the available heat at the point, which can be done by wrapping the shank with asbestos paper so that there will be little heat loss by radiation into the air.

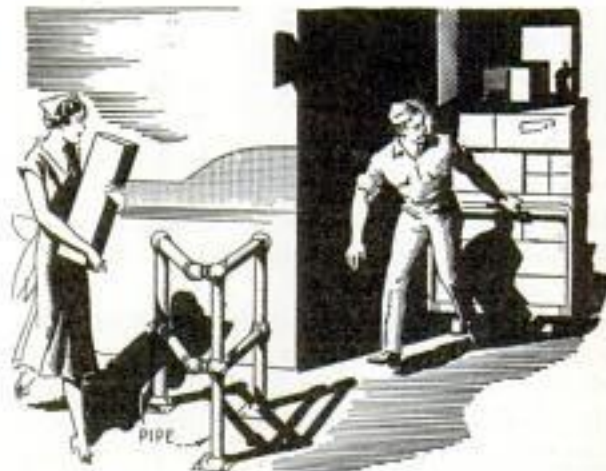
### Fire Prevention on Motorboats

In view of many explosions occurring on gasoline yachts and boats, it is important to take precautions against such accidents, keeping the boat absolutely clear of gasoline fumes by thorough ventilation. The fumes of gasoline are heavier than air, and will enter a boat through an open hatch, companionway or port, after which they sink to the bilge. Three per cent of these fumes and ninety-seven per cent of air form a highly explosive mixture. A teacupful of gasoline in the bilge has a potential explosive power of 5 lb. of

dynamite. Ventilators going through the deck of a boat to exhaust heavy gasoline vapors that lie in the bilge, should extend all the way down to the bilge. This arrangement was not shown in an article published on page 807 of our May issue, Fig. 8, where the ventilators were shown going just through the deck. The National Board of Fire Underwriters require that 3-in. or larger ventilating pipes, running down all the way to the bilges, be placed in all four corners of the engine room, and that these pipes be made so that they cannot be closed. While a boat is running, an explosion rarely takes place as the suction of air into the carburetor constantly removes the fume-laden air in the engine room, except the heavy gases that may lie low down. The most dangerous time is when the boat has been running for some time and then stopped. When stopped, no water circulates around the cylinders, which consequently grow hot. In some of the old engines, gases also come from the crankcase. In the installation recommended above, there is always sufficient circulation from aft forward or forward aft, according to the way the boat may be lying.

### Guard Prevents Colliding at Blind Corner in Factory

In a large factory building where accidents frequently occurred at the intersection of two passageways, which formed a blind corner, the trouble was eliminated by placing a pipe guard at the corner. This made it necessary for anyone approaching the corner to walk around the



Guard at Intersection of Passageways in Factory Building Helps Prevent Collisions

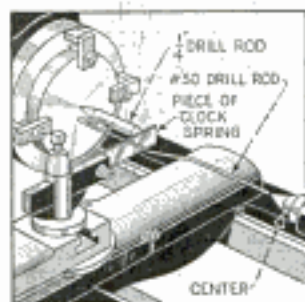
guard and thus see a truck that might be coming along the other passage in time to avoid a collision.

### Sealing Stoppers in Bottles

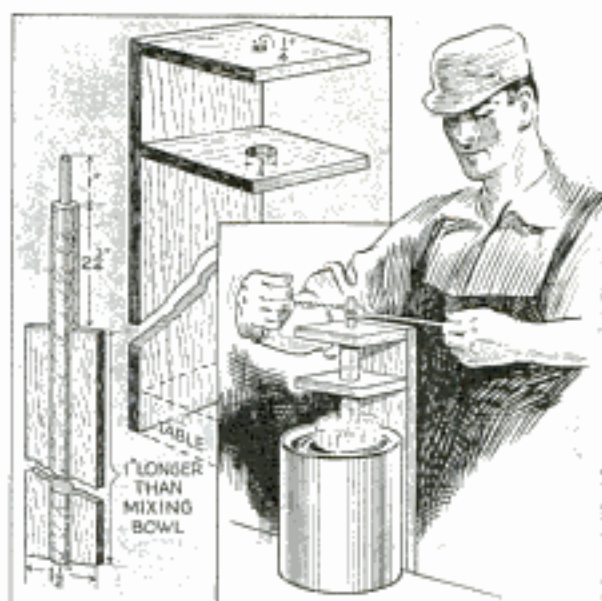
Corks may be sealed into glass bottles for shipping, or for ornamental purposes, by dipping the neck of the bottle into a capping fluid. To make the fluid, dissolve white rosin, 2 oz., in ether, 4 oz., and mix this solution with ordinary collodion, 6 oz. The fluid may be colored by adding a small amount of aniline dye. If the dye is transparent, a small round label may be glued to the top of the cork before dipping it into the fluid. This method produces a neat finished job at little expense. When not in use, the bottle containing the fluid should be kept tightly corked. If a string is wrapped twice around the cork and one end is allowed to project during the application of the capping fluid, it will be easy to remove the coating by pulling the string when the bottled contents are to be used.

### Centering Gauge for Lining Up Work on Lathe Faceplate

I have used this little gauge for several years in centering work on the faceplate on my lathe, and have found it accurate.



A 2-in. length of  $\frac{1}{4}$ -in. drill rod is pointed at both ends and drilled in the center to take one end of a 10-in. length of No. 50 drill rod, which is bent as shown, to line up horizontally with the end of the pointed piece. In use, the work is centerpunched, and is fastened on the faceplate. One end of the gauge is placed in the punch mark where it is held by means of a piece of clock spring also centerpunched to take the other end of the device. The spring is bolted to a piece of steel held in the tool holder. If the center of the work is out of line with the centers of the lathe, there will be a noticeable wobble between the free end of the gauge and the tailstock center when the lathe is turned.—M. L. Lowenhardt, New York City.



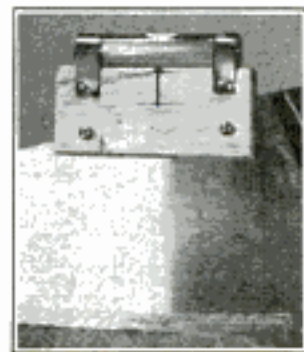
Dry Glue Quickly Mixed with Device Operated by Pulling Alternate Ends of String

### A Homemade Glue Mixer

Glue is quickly mixed with this device, operated by pulling on alternate ends of a string wrapped around the top of the paddle shaft. The paddle support consists of two pieces of wood screwed at right angles to a vertical piece, which is in turn screwed to the back of a bench. Other details are clearly shown in the drawing.

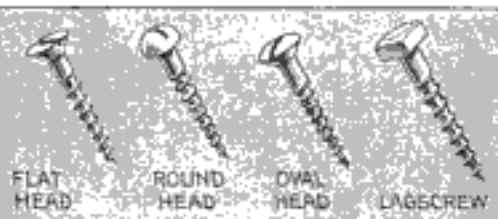
### Level on Saw Aids in Cutting Notches

Clamped to the top edge of your saw blade, a level will aid greatly in cutting true notches. Brass clips hold the glass on a wood block slotted at the lower edge to fit on the back of the blade so that the glass is held parallel to the cutting edge of the saw. Set-screws are used to hold the assembly in place, which may also be adjusted so that the glass is in a horizontal position when notches must be cut at an angle.—R. Marran, Kansas City, Mo.



Whenever a horizontal steam pipe is reduced in size, there should be a drip to avoid partly filling the larger pipe with condensed water.

# The TRICKS

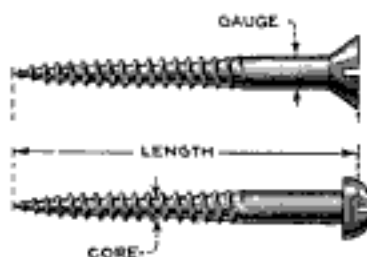


**N**EXT to glue, screws offer one of the best means of joining wood. The application of screws to cabinetmaking and joinery of various types is almost universal where enduring strength and rigidity are essential. The illustrations show the various types of screws in common use. The flat-head screw is used on work where it is desired to sink the head flush with the surface and where the wedging effect of the countersunk head is not likely to cause splitting of the work. A round-head screw can be driven very close to the edge of the work without danger of splitting, and where it is either necessary or desirable that the heads show in the finished work, the round or oval-head screw is generally used. The oval-head screw is often driven over a washer especially made for the purpose, with a depressed center into which the head fits neatly. Dowel screws are convenient for joining a long turning in sections such as that often used in making a coat hanger or costumer. The lagscrew is familiar to every one, but the hanger screw or bolt is perhaps not so universally known though it is readily obtainable. One end of the hanger bolt is threaded with a wood-screw thread, the other end with a standard-bolt thread. Two applications of the hanger bolt in joining the rails and stretchers of a bench frame are shown in the details. If desired, the lagscrew can be used in the same way.

WOOD - SCREW SIZES



GAUGE	DIAMETER	BODY DRILL NO.
0	.058	33
1	.071	49
2	.084	44
3	.097	40
4	.111	35
5	.124	1/2"
6	.137	28
7	.150	24
8	.163	19
9	.177	15
10	.190	10
11	.202	5
12	.215	3/32"
13	.229	A
14	.242	D
15	.255	F
16	.269	I
17	.281	L
18	.294	3/8"
20	.321	P
22	.347	S
24	.373	1/2"



THE LEAD HOLE DRILLED FOR THE SCREW SHOULD BE 70% OF THE CORE DIAMETER, IN SOFTWOODS, AND 90% IN HARDWOODS, TO DEVELOP THE MAXIMUM STRENGTH OF THE SCREW.

USE SOAP OR BEESWAX AS A LUBRICANT WHERE NECESSARY FOR EASY INSERTION

WHERE HOLDING POWER IS UNUSUALLY IMPORTANT, SELECT SCREWS WITH THIN, SHARP THREADS, ROUGH, UNPOLISHED SURFACE, FULL GAUGE AND SHALLOW SLOTS

LENGTHS MADE IN EACH GAUGE

LENGTH	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/2"	1 3/4"
GAUGES	0-4	0-8	1-10	2-12	2-14	3-14	3-16	4-18	6-20
LENGTH	2"	2 1/2"	2 1/2"	2 3/4"	3"	3 1/2"	4"	4 1/2"	5"
GAUGES	6-20	6-20	6-20	8-20	8-24	10-24	12-24	14-24	14-24

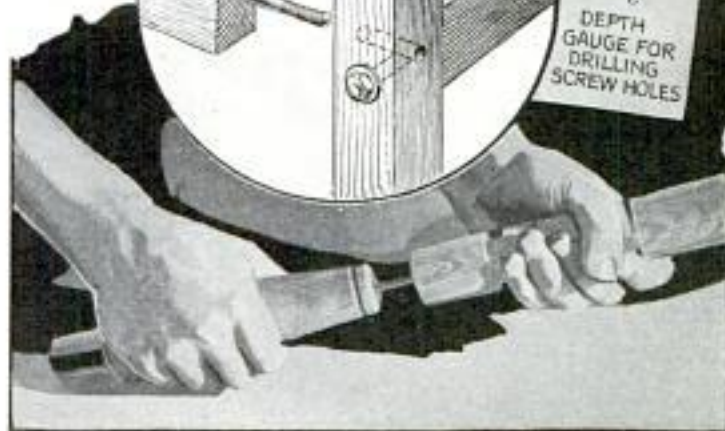
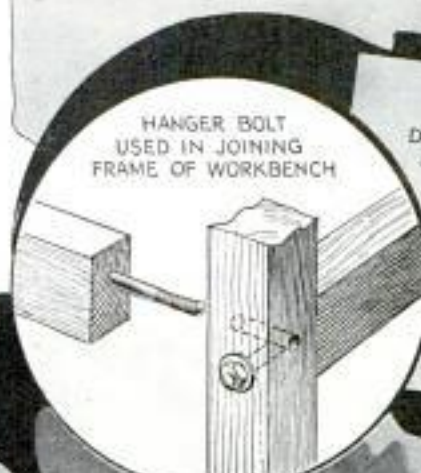
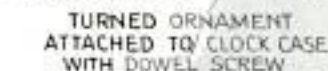


# of DRIVING SCREWS

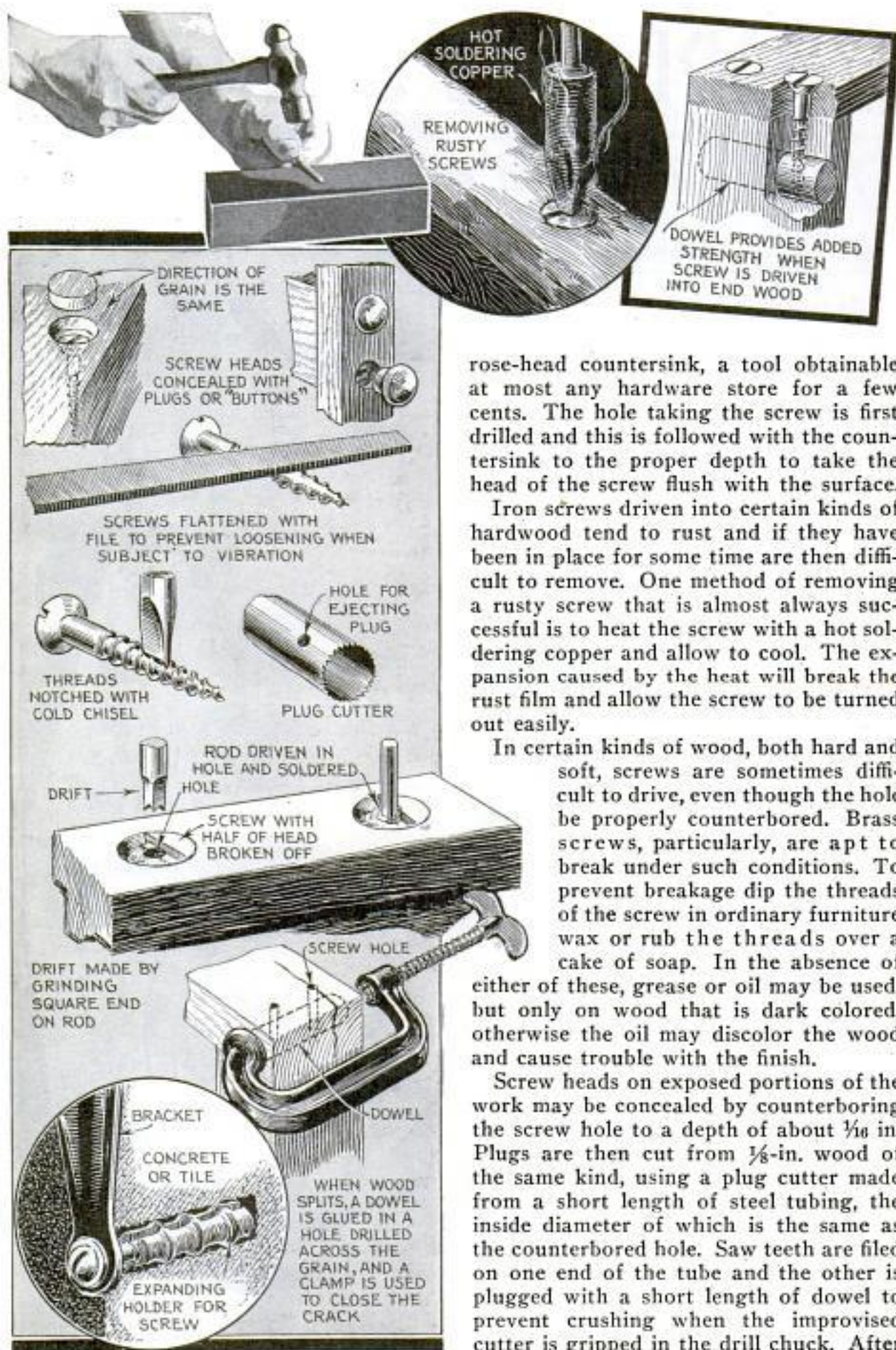


screwdriver bit are tapered, which shape is proper for driving iron screws but is likely to twist out of the slot in the head of a brass screw, owing to the softness of the metal. If a large number of brass screws are to be driven it will help greatly if the bit is altered, as shown, by grinding back the bevels so that the two sides are perpendicular to the flat point of the bit. This gives a better grip in the slot of the brass screw, does not damage the bit in any way and works fully as well when driving iron screws with flat, round or oval heads. Also, the screwdriver bit should fit the screw being driven. If the bit is too wide it will tear the wood and mar the surface when driving a flat-head screw flush. It is always best to have several sizes of screwdrivers in the tool kit, unless you have one of the automatic type, which is fitted with several sizes of bits.

In driving screws in hardwood, the hole taking the screw should always be counterbored, the greater diameter slightly larger than the unthreaded portion of the screw and the smaller or lead hole slightly greater in diameter than the body or core of the screw between the threads. In this way the screw will drive easily without danger of breakage, and its holding power is fully as great as if it were forced into the wood. When driving screws in soft wood, however, it is best not to counterbore, but to drill a hole slightly smaller in diameter than the full body of the screw. Due to the softness of the wood, the screw will drive easily in an undersize hole and, moreover, the wedging effect of the wood fibers will tend to hold the screw in place in the same way as a nail. Flat screw heads are countersunk with what is known as a



*Handwritten text:*  
 - Elco Tool & Screw Corp. 1820 Broadway -  
 Park Rd. 4th - Parker Wire Woods Co.  
 150 Washington, Worcester Mass



rose-head countersink, a tool obtainable at most any hardware store for a few cents. The hole taking the screw is first drilled and this is followed with the countersink to the proper depth to take the head of the screw flush with the surface.

Iron screws driven into certain kinds of hardwood tend to rust and if they have been in place for some time are then difficult to remove. One method of removing a rusty screw that is almost always successful is to heat the screw with a hot soldering copper and allow to cool. The expansion caused by the heat will break the rust film and allow the screw to be turned out easily.

In certain kinds of wood, both hard and soft, screws are sometimes difficult to drive, even though the hole be properly counterbored. Brass screws, particularly, are apt to break under such conditions. To prevent breakage dip the threads of the screw in ordinary furniture wax or rub the threads over a cake of soap. In the absence of either of these, grease or oil may be used, but only on wood that is dark colored, otherwise the oil may discolor the wood and cause trouble with the finish.

Screw heads on exposed portions of the work may be concealed by counterboring the screw hole to a depth of about  $\frac{1}{16}$  in. Plugs are then cut from  $\frac{1}{8}$ -in. wood of the same kind, using a plug cutter made from a short length of steel tubing, the inside diameter of which is the same as the counterbored hole. Saw teeth are filed on one end of the tube and the other is plugged with a short length of dowel to prevent crushing when the improvised cutter is gripped in the drill chuck. After

the screw has been driven, a drop of glue is placed in the hole and the plug driven in with the grain running the same direction as that of the work. Counterbored holes may be plugged with buttons as shown, where the raised button does not detract from the appearance of the work.

Screws tend to loosen after a time when used on work that is subject to vibration. There are several methods of preventing this as shown in the illustrations. One method is to simply flatten the threads with a hammer. The square shoulder thus formed tends to keep the screw from loosening or turning out. If time permits, a somewhat better method is to file the threads flat or cut notches in the threads with a cold chisel as shown.

It sometimes happens that half of the head will break away just as the screw is tightened on the wood. Two effective methods of removing a screw broken in this way are shown in the details. If done carefully, the surface of the work will not be defaced in any way. The improvised drift is generally effective, but if this should fail a short length of rod, which is soldered in the hole center-drilled in the broken screw, will provide a means of turning it out.

When the nature of the work makes it necessary to drill screw holes accurately and uniformly to a certain depth, cut a piece of dowel rod to such length with relation to the drill that when locked in the chuck the bit will run to the required depth. Then run the drill through the dowel lengthwise and leave it on the bit.

#### Extension Shank for Cold Chisels

An extension for chisels and punches, permitting them to be used in places otherwise inaccessible or hard to reach, can be made from a length of steel rod and a sleeve of steel tubing. The sleeve is held on the end of the extension by means of a



pin and is slipped over the end of the chisel or punch. By keeping on hand a number of extensions varying in size, you can adapt your chisel to almost any job.



Funnel Bent to Take Two Bottles of Oil Saves Time in Filling Auto Crankcase

#### Double Funnel for Filling Crankcase

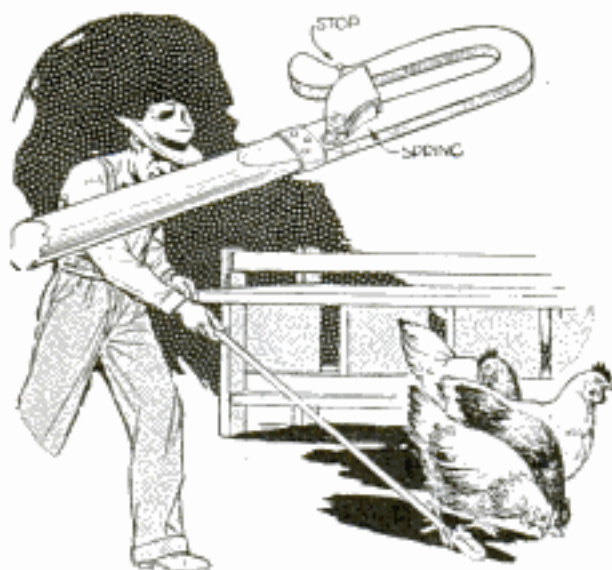
To save time when a customer asks for two quarts of oil, one service-station operator made a funnel that holds two quart bottles. An ordinary tin funnel is bent as indicated, to take the necks of two bottles, and is inserted into the filler opening of the crankcase. In this way, the operator can wait on other customers while the oil is draining from the bottles.—G. E. Hendrickson, Argyle, Wis.

#### Combination Butt and Miter Joint for Baseboards



Baseboard joints at corners will have the appearance of being mitered if the joint is cut as shown in the drawing. The end of one board is mitered about 1 in. down from the top edge, after which the remaining part is undercut as shown by the dotted lines in the drawing. The end of the other board is also mitered an equal distance from the top edge and is chiseled out. This produces a combination miter and butt joint when the boards are joined.—J. Pazareno, Laurier, Man., Can.

☛ To find a hidden rivet in a cast-iron handle, apply some muriatic acid on the handle; this will cause the rivet to turn brown so that it can be plainly seen and driven out.



Chickens and Other Fowls Are Easily Caught and Held Securely with This Catcher

### Chicken Catcher Made from Iron Rod

Fowls are not likely to get away when caught by the leg with this catcher, which consists of a length of  $\frac{1}{4}$ -in. iron rod flattened at one end and bent to the shape shown. The edges of the flattened part should be rounded to prevent injury to the chicken's legs. A pawl fitted with a light spring working against a stop pin keeps the end of the hook closed.

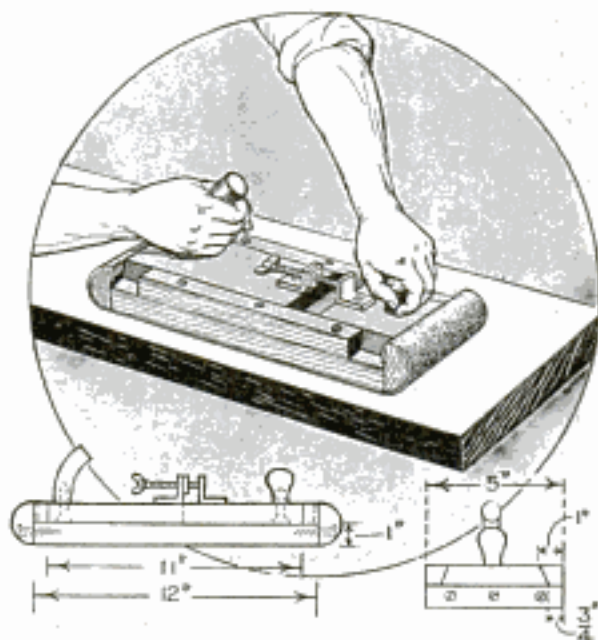
### Protecting Tools and Instruments from Rust

Fused calcium chloride can be used to prevent tools and instruments from rusting if they are stored in air-tight cans or containers. A few lumps of calcium chloride are placed in a wide-mouth, uncorked glass bottle, which is then set in the can with the tools. The calcium chloride rapidly absorbs moisture from the air. After some months of use, the chemical will have collected so much moisture from the air that it has changed to a liquid. It should then be replaced, or renewed by heating it until the water has evaporated. Fine instruments, such as balances and micrometers, that have become rusted may be cleaned by rubbing them with a soft cloth moistened with a rust solvent, which is made by mixing equal parts of oleic acid, ammonia, and denatured alcohol. After mixing, this solution should be filtered through cloth to remove any particles of foreign matter that might scratch the work being cleaned. When the rust

has been removed, the instruments should be polished with precipitated chalk, which is applied with a soft cloth moistened in fine oil. Tools that cannot be stored in a dry place may be protected from rust by coating them with a paste made by melting together lard, 8 oz., and pure rosin, 1 oz. When cool, add enough benzine to make a paste. This should be applied in a thin, even layer with a soft cloth.

### A Homemade Sanding Plane

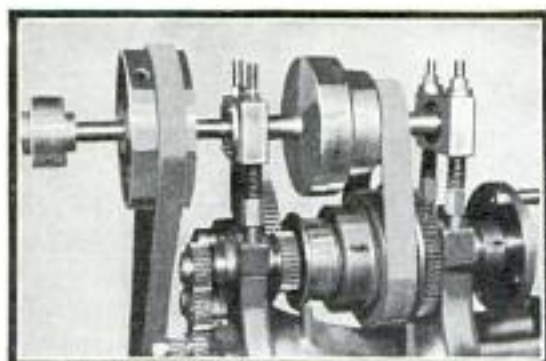
Here is a sanding plane that can be made from scrap material with common tools. A piece of 1 by 5-in. stock, surfaced on the bottom, is used as the base while lengths of quarter-round molding, glued together, are then screwed to the ends of the base. Along each side of the top surface of the base are wood strips, beveled on the inside, and two blocks are cut to just slide between them. A knob is attached to the front to serve as a grip for the left hand, while the rear block holds the main handle. An angle bracket is screwed to each block, as shown, one having a nut soldered on to take a thumb-screw, which pushes against the opposite angle iron, separating the blocks. A strip



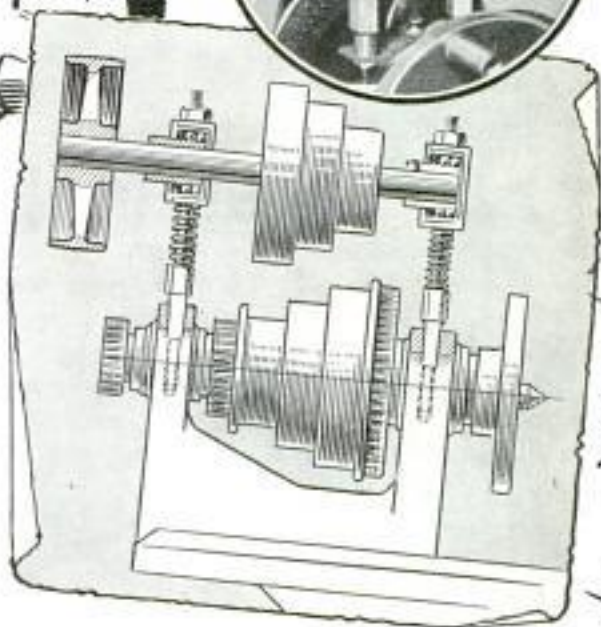
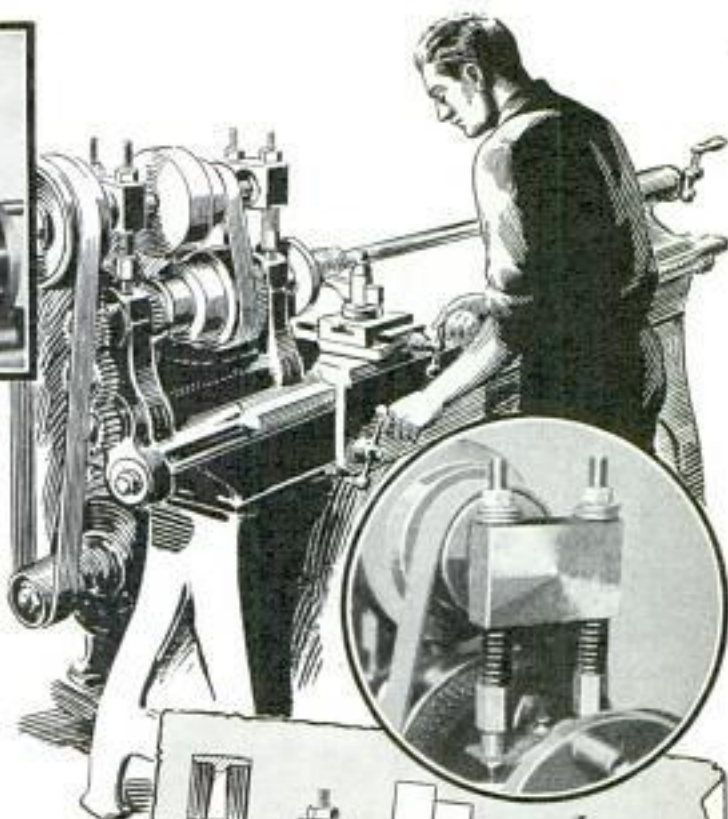
A Large Piece of Work Can Be Quickly Surfaced with This Homemade Sanding Plane

of sandpaper brought over the ends of the plane can be securely clamped between the blocks and the end pieces.—W. C. Wilhite, Hornsby, Ill.

## Countershaft on Lathe Head Reduces Noise



Installing a home workshop in a cellar or attic usually involves problems in eliminating noise, some of which is made by the countershaft of a lathe. To reduce noise to a minimum, the countershaft may be mounted directly on the head of the lathe, tension springs being used to absorb most of the vibration. To do this, special studs are turned from  $9\frac{1}{4}$ -in. lengths of cold-rolled hexagonal stock, threaded at both ends to replace the ones holding the bearing caps of the lathe shaft. The ball bearings are a matter of choice, the ones used in this case being of the self-aligning type, costing less than two dollars each. It is also easy to adapt ordinary ball bearings to the job. The bearing housings are turned from cold-rolled stock. There is nothing tricky about this work except fitting the bearings to the shaft. Here a snug push-fit must be produced, and the bearings forced in place on an arbor press. If such a tool is not available, a heavy vise makes a good substitute. The design of the little caps or facing plates over the ends of the bearing housings will depend on the type of bearings used. Those shown were designed for use in connection with ordinary bearings. If a self-aligning bearing is used, it will be necessary to make larger holes in the plates. Otherwise they remain the same. The springs may be wound on a lathe or purchased. As a matter of fact, it may be cheaper to purchase them, as the wire from which they are wound is rather difficult to obtain. The pulley on the end of the countershaft is optional. In this case, the lathe was used in connection with research work in designing new ma-



chinery and the pulley was found handy when it was desired to belt up a machine for a test run.

### Imitation Silver Plating

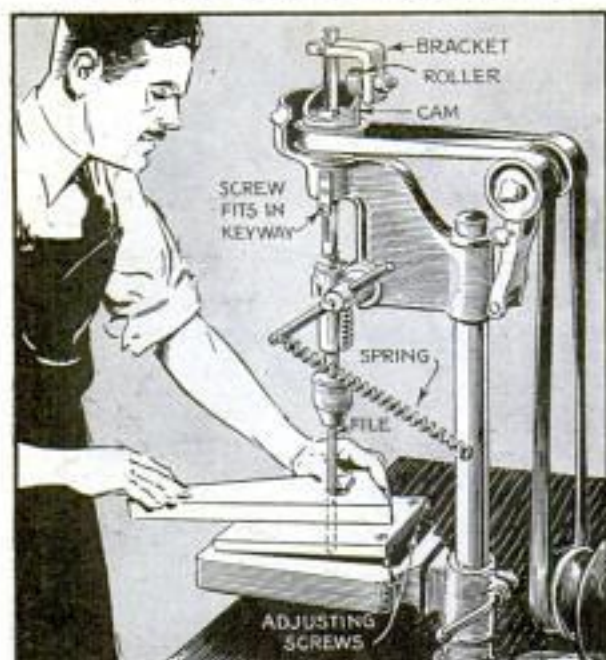
Good imitation of silver plating can be had by rubbing the surface of the metal to be plated with a cloth dipped into a paste made by rubbing together tin powder, 1 oz., and mercury, 4 oz. After these have been rubbed smooth and even, add precipitated chalk to form a paste. This will produce a coating resembling silver.

*Reader says they will not melt mercury forms an amalgam that causes K. radiated*

*Ever - instead  
3rd Area and the New York  
Denver Fire Clay Co. 1942*

*Chamberlain*

### Drillpress Used as Filing Machine



Drillpress Altered So That Spindle Automatically Moves Up and Down for Filing Dies

One workman in a small shop rigged up a drillpress so that it could be used to file dies, by arranging the spindle so that it moved up and down. To do this, the key in the driving pulley was removed and a cam was fitted over the pulley with screws. The cam determines the stroke of the file and can be made to suit the work. A roller to contact with the cam was fastened to the spindle by means of a bracket. The spindle is kept from turning by another bracket which is screwed to the drillpress frame, and has a screw soldered to one end to fit the keyway in the spindle. A spring attached to the hand lever keeps the roller in contact with the cam. To file the proper clearance on dies, a plate with two adjusting screws supports the work on the drillpress table.

### How to Lubricate Wire Rope

Maximum service can be obtained from wire rope only when it is properly preserved and lubricated. In selecting a lubricant, consideration should be given to the kind of work performed by the rope. The lubricant should not contain acids or other ingredients that might corrode the steel, and it should be capable of ready penetration through the spaces between the strands. The oil film should also be readily self-spreading and highly adhesive

as well as water repellent. A general rule for selecting a lubricant for wire rope is that the higher the speed at which it operates, the lighter the lubricant. For low-speed installations, a heavy petroleum oil or grease having a viscosity of approximately 1,000 seconds at 210° F., and applied hot, will give good results. For high-speed hoisting ropes, such as mine hoists, a lubricant having a viscosity of 400 to 500 seconds at 100° F. gives good service when automatic lubrication is employed. In all cases, viscosity should be such that the lubricant will cover the rope and penetrate thoroughly, but not thin enough to run off the rope. If the lubricating is done by hand, a sheepskin, having the wool thoroughly saturated with oil, is held around the rope as it passes by.

### Golf Tees Aid in Explaining Difficult Plays to Football Team

Football coaches will be able to clarify complicated plays to their teams by setting golf tees in the ground to represent the men of two teams. Different-colored



tees are used for each team. The small sharp-pointed pegs are readily set up on any spot on the field and the colors

make it easy for a large group to closely observe the different moves.

### T-Wrench Improvised from Two Ratchet Wrenches

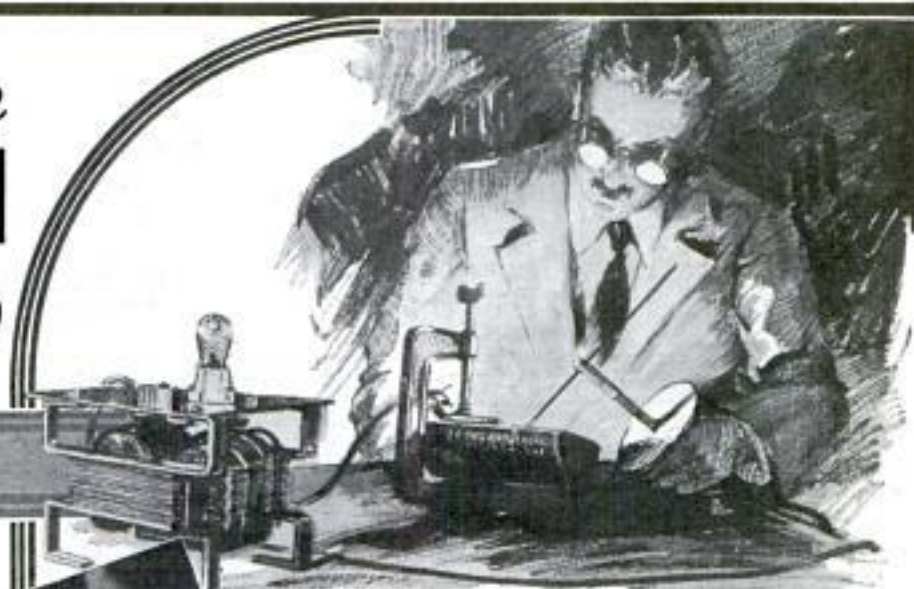
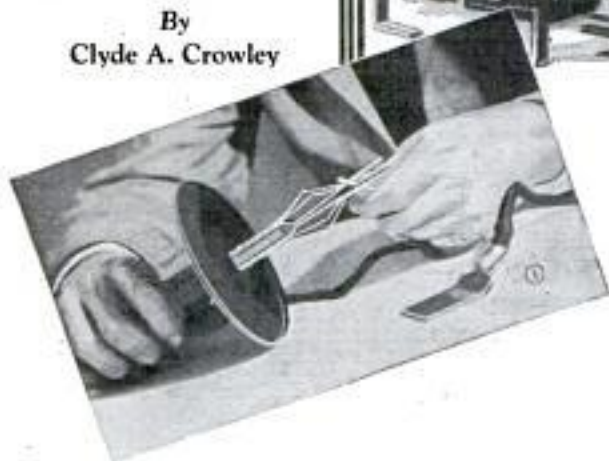
By using two ratchet wrenches on the extension rod of a socket set, you can make a ratchet T-wrench. This arrangement will be found handy for getting into places where an ordinary T-wrench cannot be used. The wrench is especially useful for loosening studs on heads of car motors.—W. R. Cleveland, Joliet, Ill.



# Electric ARC WELDER

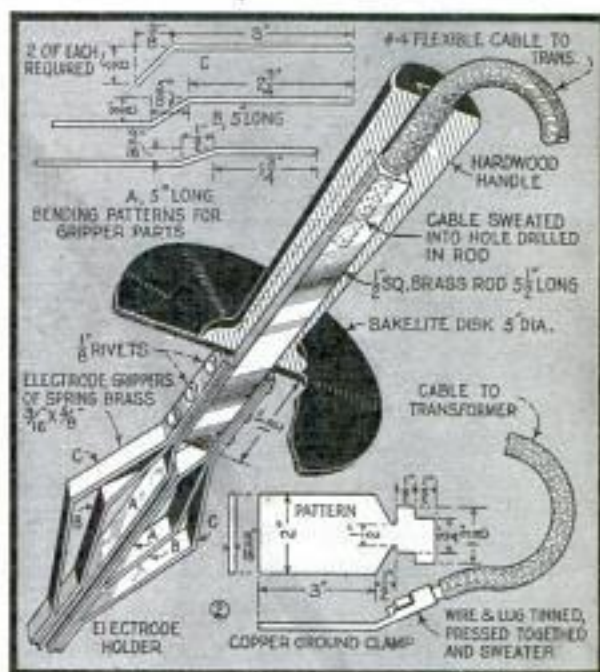
For the  
Small  
Shop

By  
Clyde A. Crowley

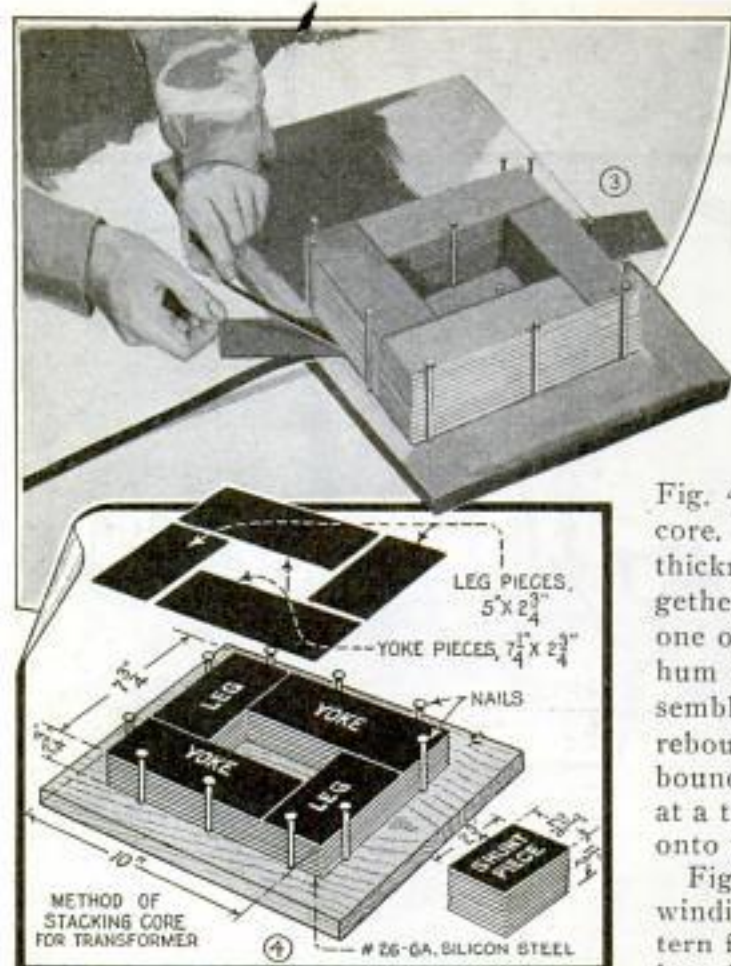


WITH this easily constructed arc welder, which operates on 110-volt, 50 or 60-cycle alternating current, you can weld sheet metal up to  $\frac{3}{16}$  in. in thickness, and rods as large as  $\frac{1}{4}$  in. in diameter. If a 220-volt a.c. service is available, a slight change, which will be explained later, will enable you to weld sheet metal  $\frac{1}{4}$  in. thick, or rods  $\frac{1}{2}$  in. in diameter. This welder will not work on direct current and if it must be operated on 25-cycle alternating current, you will have to make the changes described at the end of this article.

The welder consists of a specially designed auto transformer, a ground clamp and an electrode holder. The electrode holder and ground clamp are shown in Fig. 2. The wires which connect them with the transformer must be large in order to carry the large current required for welding. Two No. 4 B. & S.-gauge flexible cables each 8 ft. long will be satisfactory.



If this size is not at hand, four No. 10 flexible wires may be used to make up each lead. If this method is followed, strip the insulation from one end of each wire for a length of about 3 in. and twist them all together. Next, repeat this operation at the other end and you will have a cable large enough to carry the welding current. In connecting the cables to the electrode holder and ground clamp, it is very important that all parts be perfectly clean and bright and that the wires make contact with a large surface of the metal. It



to make the core. The leg pieces are cut 5 by  $2\frac{3}{4}$  in., and the yoke pieces  $7\frac{1}{4}$  by  $2\frac{3}{4}$  in. in size. A pile of each size,  $5\frac{1}{2}$  in. thick, will be required to make the core. In addition, a pile of pieces cut  $2\frac{3}{4}$  by  $2\frac{3}{8}$  in. and  $1\frac{1}{2}$  in. thick will be required for the compensating shunt shown in Fig. 4. The shunt is used to adjust the transformer so that it will automatically reduce its voltage after the arc has been struck. A board with nails driven into it such as is shown in

Fig. 4 makes a handy jig for piling the core. When the core has been piled to a thickness of  $2\frac{3}{4}$  in. it should be bound together with friction tape on both legs and one of the yokes as in Fig. 3. To prevent hum in the finished outfit, the bound assembly should be squeezed in a vise and rebound as tightly as possible. The unbound yoke pieces are next removed, one at a time, so that the coils may be pressed onto the legs.

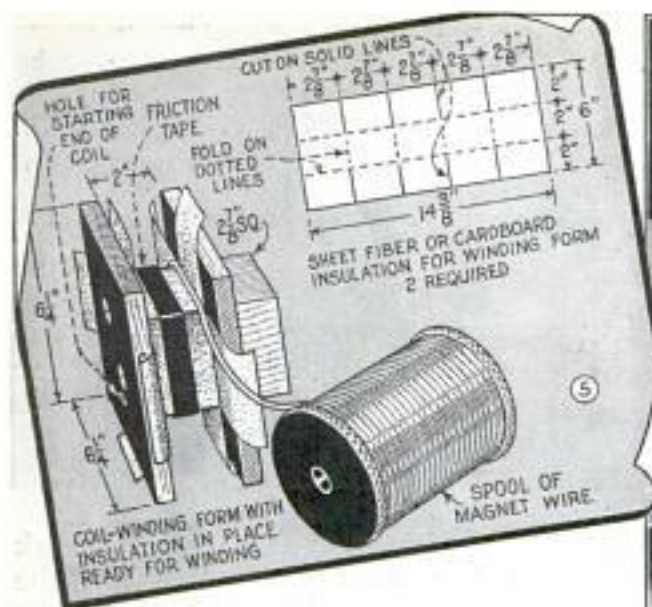
Fig. 5 shows dimensions for a coil-winding form used as in Fig. 6, and a pattern for cutting sheet fiber or tough cardboard to serve as insulation for the coils. One of these insulating pieces is placed on the winding form, as shown in the illustration, before winding each coil. The first coil, or line coil, is wound with exactly 44 turns of No. 8 double cotton-covered (d.c.c.) magnet wire. This coil will require about  $4\frac{1}{2}$  lb. or 60 ft. of wire. When the coil is complete, it may be slipped off the form after removing the end block. The coil is next bound with tape, Fig. 9. The other or welding coil is wound in the same manner from No. 4 d.c.c. wire. Fifty-one turns of this wire are required. If wire of this size is not at hand, four strands of No. 10 wire may be wound on at the same time, as if they were one wire. All of the starting and finish ends should be soldered together, which will produce a winding equivalent to one No. 4 wire. If the latter size wire is used, 14 lb. or 85 ft. will be required. If four No. 10 wires are used, 13 lb. or 350 ft. will be required. When the coils have been wound and taped they may be slipped over the legs of the core and connected as in Fig. 7. In this diagram, lines have been used to represent the coils so that the direction of the

is a good plan to tin all parts with solder before pressing them together and sweating in the joint. If the joint is poorly spliced it will heat and probably melt the solder. Long battery cables available from any battery-repair shop may also be used.

The auto transformer used to supply the welding current is a  $1\frac{1}{2}$ -kilowatt outfit and will furnish 60 volts to the welding arc when it is first struck. However, the construction of the transformer is such as to cause this voltage to drop automatically to about 20 volts after the arc has been started. At this voltage the outfit will deliver a maximum of about 75 amp., which is suitable for a large variety of welding work. When the welder is working at its maximum capacity it will draw about 28 amp. from the line. With this type of transformer the primary volts multiplied by the primary amperes gives volt-amperes instead of watts. The volt-ampere rating is higher than the watt rating.

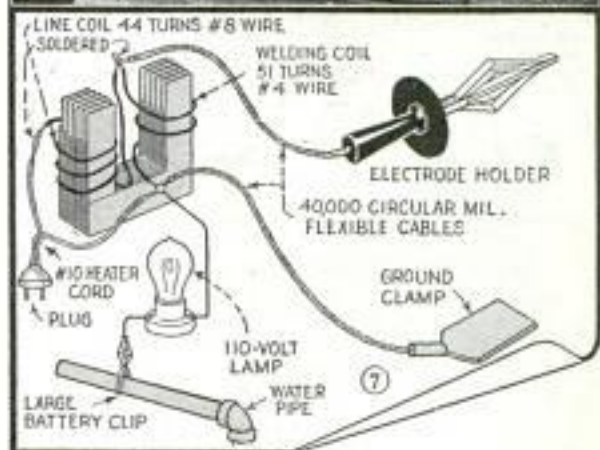
The transformer core is built up from No. 26-gauge silicon steel. A total of approximately 80 lb. of steel is required. Fig. 4 shows how the steel is cut and stacked



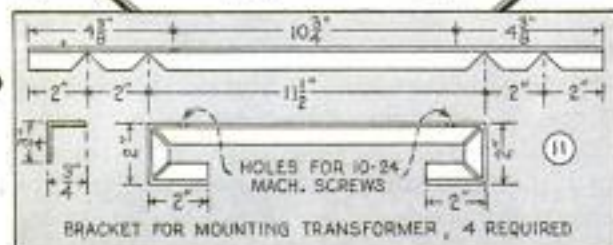
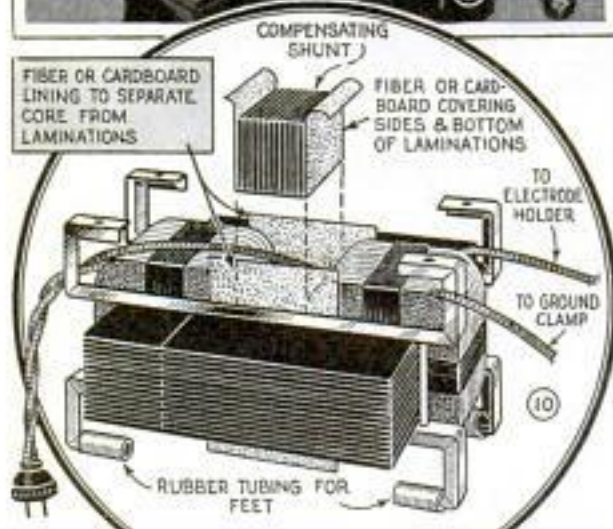
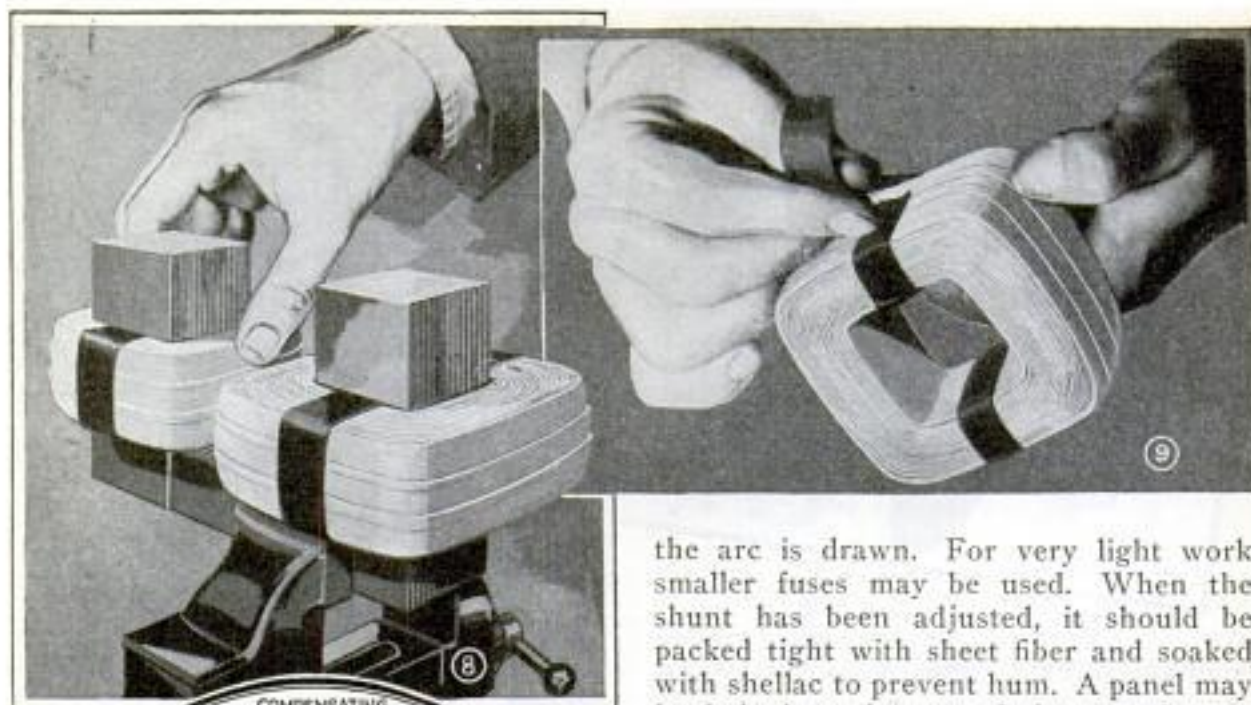


windings will be made clear. Install the coils so that their turns run in the direction shown and carefully make the connections as indicated. It is important that the diagram be followed accurately, as a mistake in connecting will cause the transformer to blow fuses and be altogether useless. All splices should be carefully made, soldered and taped. A poor splice will get hot and may prevent the welder from working. The lamp shown in the diagram is connected so that it is easy to tell when the attachment plug is inserted in the outlet in the correct position. One wire of the electric line is grounded, and it is important that this wire be connected to the welder so that it is directly hooked to the ground clamp. If this caution is unheeded a dead short resulting in a blown fuse will occur when the ground clamp is attached to work which is grounded. If the lamp lights when the welder is plugged into the line it is only necessary to remove the plug, turn it around and re-insert it. When it is in the proper position the lamp will not burn.

Fig. 11 shows the dimensions and method of forcing rugged brackets for clamping the transformer and mounting the bakelite or sheet-fiber panel. In Fig. 10 the brackets are shown securely bolted in place. If rubber tubing is slipped over the bottom ends of the mounting brackets they will act as pads to prevent vibration from being transmitted to the bench or work. After the coils have been fastened in place the whole assembly should be



dipped in varnish or shellac. It should be left in the varnish long enough to soak through the coils. When thoroughly dry, the shunt iron may be inserted as shown in Fig. 10. Enough iron should be inserted to fill the space between the coils. When this is in place, and the connections have been made as shown in Fig. 7, the outfit is tested. To do this, select a piece of sheet steel to weld, connect the ground clamp, and insert a  $\frac{1}{16}$ -in. welding rod in the holder as in Fig. 1. Wearing goggles to protect the eyes from the dangerous ultraviolet light of the arc, you may proceed to plug in the cord so that the lamp does not burn, and touch the welding rod to the work and immediately withdraw it about  $\frac{1}{8}$  in. A little practice will be required in handling the arc. The arc should be short but large in size. If you are un-



able to produce an arc after a few trials, remove a few sheets of the iron inserted between the coils and replace it with sheets of fiber so that the remaining iron is tight and does not vibrate. This procedure should be repeated until an arc suitable for welding is produced. The more iron used in the shunt the less the welding voltage, and the less iron the greater the welding voltage and current. Enough iron should be left in the shunt to prevent blowing 30-amp. fuses when

the arc is drawn. For very light work smaller fuses may be used. When the shunt has been adjusted, it should be packed tight with sheet fiber and soaked with shellac to prevent hum. A panel may be bolted to the top of the transformer which provides a good place to mount the ground-test lamp.

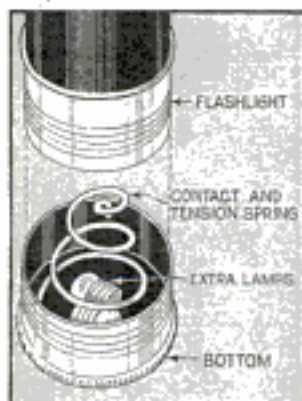
If 220-volt, 60-cycle current is available, the transformer may be made to operate with only 14 amp. from the line by winding the line with 138 turns of No. 12 d.c.c. wire instead of 44 turns of No. 8 wire. This will require 5 lb. of wire. The other coil and the core are made the same as for operation on 110 volts. If 220 volts are used more iron may be removed from the shunt to produce a more intense welding current.

For 110-volt, 25-cycle current, the core will have to be made up from yoke pieces  $8\frac{7}{8}$  by  $3\frac{1}{2}$  in. and leg pieces  $5\frac{3}{4}$  by  $3\frac{1}{2}$  in. in size. A pile of each size 7 in. thick will be needed. The shunt iron will be cut  $2\frac{7}{16}$  by  $3\frac{1}{2}$  in. A pile  $1\frac{1}{2}$  in. thick will be required, which will be about 90 lb. of silicon steel. The line coil is wound with 59 turns of No. 8 d.c.c. wire and the welding coil is wound with 71 turns of No. 4 wire. This will require about 8 lb. of No. 8 and 20 lb. of No. 4 wire. For operation on 220-volt, 25-cycle current, use the same core size and welding coil as for 110-volt, 25-cycle current, but wind 189 turns of No. 12 wire on the line coil, or about 9 lb. of wire. The size of the mounting brackets will have to be changed to fit this large-sized core.

In using the welder, coated or cored arc-welding electrodes are best, although with a little practice ordinary uncoated

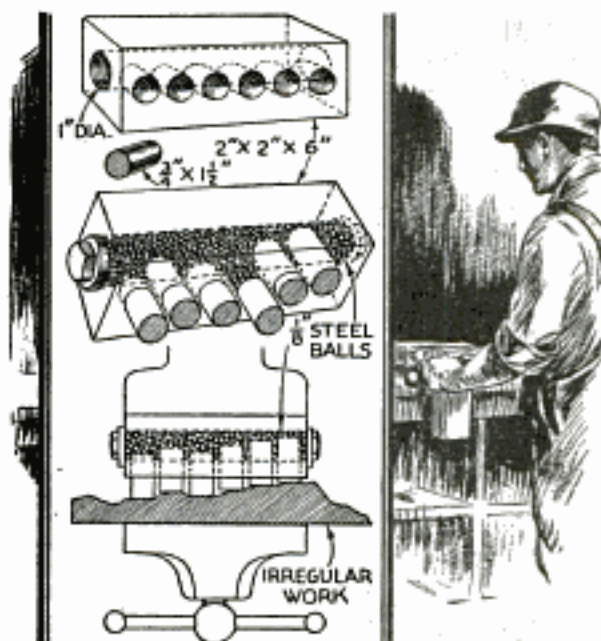
electrodes may be used. The  $\frac{1}{32}$ -in. rod is suitable for work up to  $\frac{1}{8}$  in. thick. For very small work No. 18 soft-iron wire may be used as electrodes. Work to be arc welded should be cleaned and freed from scale and oxide. The ground clamp should be fastened to the work with a stout clamp, as close to the weld as possible. If the arc is too large for small work the ground clamp may be placed farther from the weld to reduce the current. For some purposes a carbon or graphite electrode is preferred to welding rod. If this is used, place the carbon pencil in the electrode holder instead of the welding rod. The welding rod is then fed into the arc with the other hand. For brazing, use brazing rod or brass rod instead of welding rod and sprinkle borax over the cleaned work before drawing the arc. Bronze welding may be executed with this equipment if special bronze-welding rod and flux are used. In welding sheet metal, the tendency of the work to warp may be eliminated by first tacking the pieces together with spots of metal at the ends, middle, and a few intermediate points. After this, weld the space between a pair of the tack welds at one end of the seam, and then skip to the other end of the work. By alternately welding at first one end and then the other warpage may be eliminated.

#### Extra Lamps Stored in Flashlight Case



It is well known that the usefulness of a flashlight battery can be prolonged by using a lamp of smaller voltage when the battery weakens. By carrying one or two extra lamps in the bottom of the flashlight case under the spring they will always be available when needed. The lamps should be wrapped with cotton or tissue paper to prevent them from breaking.

Two parts of tallow and one part of neat's-foot oil, melted together, make a good belt dressing.



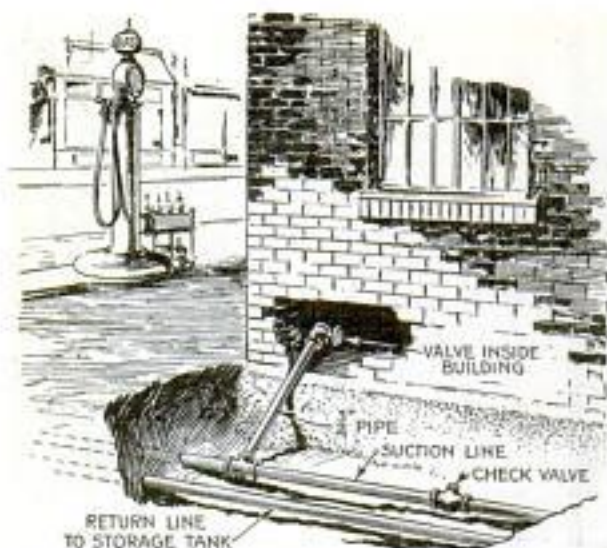
Jig That Consists of Pins Bedding in Small Balls in Steel Block, Holds Irregular Work in Vise

#### Small Jig That Holds Irregular Work in Vise

Here is a jig that will hold irregular objects in a vise, automatically adjusting itself to the surface of the work. The jig is a steel block with a 1-in. hole drilled through it lengthwise and several smaller holes drilled through one side to break into the larger one, which is then tapped at both ends for steel plugs. Steel pins are inserted in the small holes, after which the large hole is filled with small hardened steel balls. In use, the jig is held against one jaw of the vise, and is tightened up against the work, the small balls permitting the pins to adjust themselves to the irregular surface of the work.

#### Rubber Hose Used in Place of Conduit in Cement Floors

Rubber hose is a good substitute for conduit for running electric wires through concrete floors. The hose is easier to handle than rigid metal conduit, and has been found satisfactory. Before pouring the concrete, lay the hose in place, taking care not to make any sharp bends. After the concrete has set, the wires may be fished through the hose in the usual way. The hose will last for years, and can be installed at the time of building in a fraction of the time required for the bending and laying of rigid conduit.



Air Valve Installed in Suction Line Protects Service-Station Pump against Gasoline Theft

### Service-Station Pumps Protected against Burglary

An effective way to protect a gasoline pump at a service station against burglary is to install a tee in the suction line on the pump side of the check valve and then run a length of pipe on an upward slant to an air-tight valve inside the station building. By simply opening the valve, air is admitted to the line, which, of course, renders the pump useless.—G. B. Sherard, Decatur, Ala.

### Improving the Reading Glass

When a reading glass is used as a magnifier, better results will be obtained if some means is provided to shade the top of the glass. This is easily done by using a pint cardboard container with the lid and bottom removed. Cut a small hole through the side near the bottom. Then unscrew the handle of the glass, and put the glass inside the container and screw on the handle through the hole.



A Reading Glass Can Be Improved by Mounting It Inside of a Cardboard Tube

### Semi-Metallic Packing for Valves

Heat-proof metallic packing for use on hot-flange joints such as gasoline-engine exhausts and steam-pipe flanges, or for packing boxes on steam engines is easily prepared as follows: Mix aluminum bronze powder with steam-engine cylinder oil to the consistency of paint. Then impregnate asbestos rope with the mixture and use it in the same way as regular packing. The mixture is also good for use as a dressing on flange gaskets and all kinds of pipe threads.

### Tools Kept in Drawer on Stepladder

Sliding in guides screwed to the underside of the top of a stepladder, this drawer keeps your tools where they are convenient when needed. If the drawer is partitioned, nails, screws, etc., can also be kept in it. A catch should be provided to keep the drawer closed when carrying the ladder.



### Reddish-Brown Finish Applied to Steel and Copper

Boiled linseed oil can be used to produce a reddish-brown finish on articles made of copper, iron, or steel. For copper, first rub the surface of the article with a piece of cotton waste saturated with the oil, and after this treatment, apply a thin coat of the oil and set the article out in the open air to dry. Iron or steel articles must first be copperplated before applying the finish. To do this, clean the work by boiling it in a strong lye solution for a few minutes, and then plate by immersing it in a solution of copper sulphate to which has been added a small amount of strong sulphuric acid. After thoroughly rinsing the work, the finish is produced by the same method used for the copper.

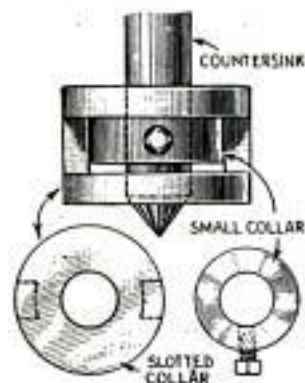
## A Darkroom Timer for Panchromatic Films



This darkroom timer has been found highly efficient for use when handling panchromatic films, which require total darkness for developing. It is a wood box fitted with a lid and it must be light-proof. A photo timer is inserted in a hole at one end, while a peep hole is cut in the other, and is covered with dark-green celluloid. On the inside of the box, a flashlight lamp, reflector and battery are wired to a push button on the outside, the reflector being arranged so that a push on the button will throw light on the face of the timer, which is seen through the peep hole. The box should be coated with flat, black paint, inside and out, to reduce reflection.

### Depth Gauge for Countersink Tool

Uniformity of depth, when countersinking holes for rivets, is assured by using this gauge. It consists of a large and a

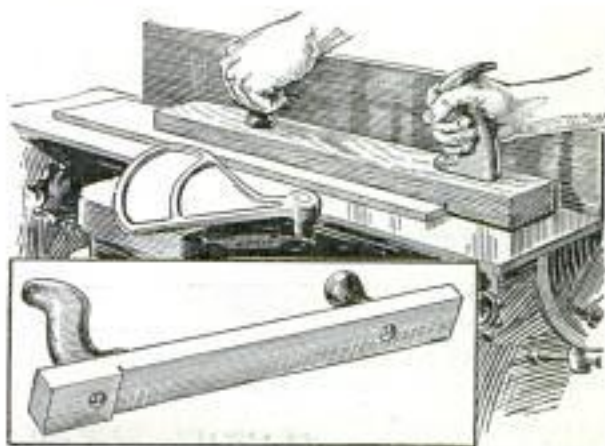


small steel collar, the latter fitting snugly over the countersink where it is held with a setscrew. The larger collar, which is the thicker of the two, is slotted on opposite sides and is cut out in the cen-

ter to fit loosely over the smaller one. The space shown between the collars determines the depth of the countersinking.

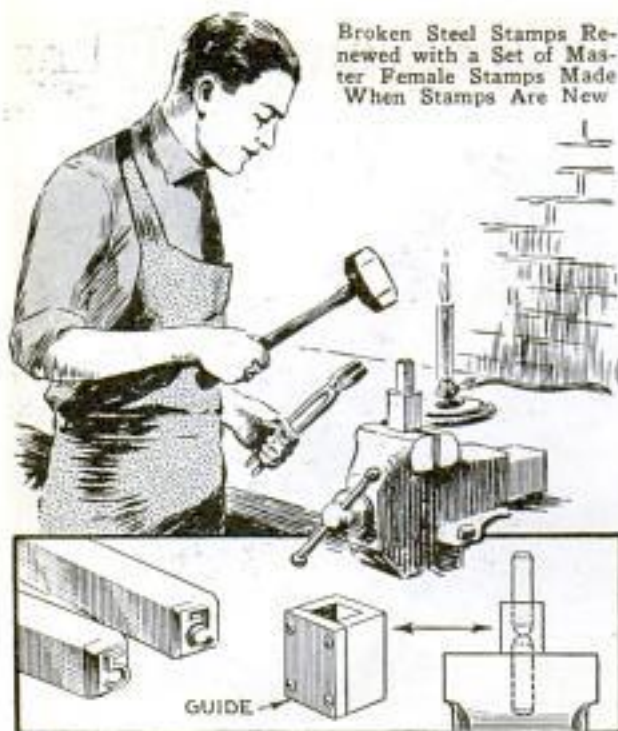
### Device Holds Thin Stock for Planing

Thin stock can be pushed over a jointer without buckling and without any danger of accidentally injuring the hands by us-



This Device Prevents Buckling of Thin Stock When Pushing It over Jointer

ing this device. It consists of a length of 1 by 2-in. stock surfaced on the bottom to leave a  $\frac{1}{8}$ -in. projection at one end, which holds the rear end of the work as it is pushed over the jointer. A handle is fitted on the top near the heel and a grip is screwed to the other.—C. A. Peterson, Chicago.



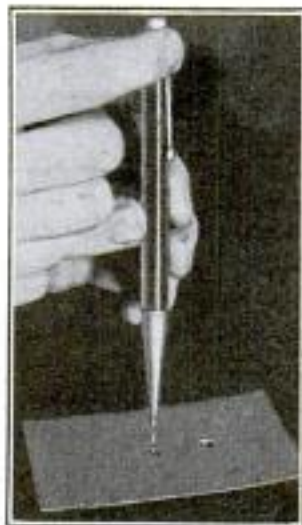
Broken Steel Stamps Renewed with a Set of Master Female Stamps Made When Stamps Are New

### Renewing Broken Steel Stamps

As broken steel stamps are rather expensive to replace, it is a good idea to make up a female set from square drill rod for renewing any of the stamps that may be broken. To make the female set, bevel one end of the drill rod and heat it to a cherry red. Then, after clamping a stamp in the vise, set the heated end of the rod on the stamp, using the guide shown to hold them together, and strike the rod a few sharp blows with a hammer. This makes an impression of the stamp in the end rod, which is then hardened and thoroughly tempered.

### Pencil Serves as Chuck for Pin Drill

When a chuck for holding a pin drill is not available, one can be quickly improvised by using a cheap automatic pencil. The drill is placed in the end of the pencil where it is held with a drop of solder. When finished with the drill, it can be removed by melt-

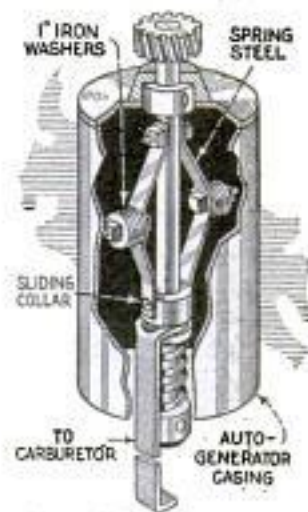


ing the solder, after which the pencil is laid away for future use.—M. L. Wendel, Lockport, N. Y.

### Governor for Old Auto Engine Made from Car Generator

In rigging up an old model-T Ford motor to run a woodsaw, I made a governor for the motor from the car generator. This was done by removing the field and armature coils and substituting a governor assembly for them. Two strips of spring steel were bolted to the armature shaft and to a sliding collar, four 1-in. iron washers being bolted to the center of each strip to serve as weights. The collar was grooved to take the notched end of a narrow piece of flat iron, which passed through a slot in the end of the generator and to the carburetor. A light coil spring was also placed between the collar and the armature bearing to provide smooth accelerating action.

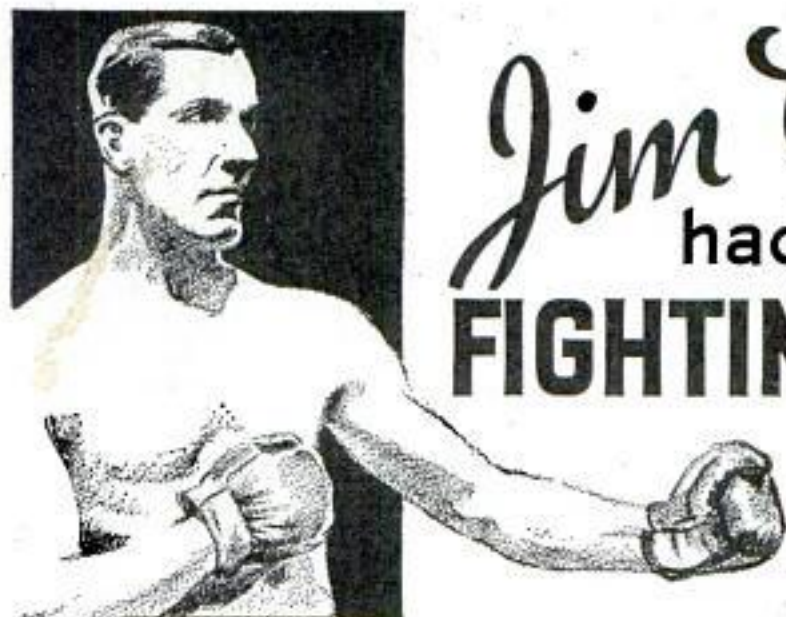
Adjustment of the governor was obtained by adding or removing some of the washers. However, a screw adjustment could be had if a large steel washer is placed between the spring and the armature bearing so that a setscrew, driven into a tapped hole in the end of the generator casing and bearing against the



washer, could be used to increase or decrease the spring tension against the sliding collar.—R. Horvath, Honey Creek, Wis.

### Repairing Slate and Marble Panels

Slate and marble switch panels and bench tops that have been chipped may be repaired by filling the chipped place with a thick paste made by adding slate or marble dust to water glass. The paste should be pressed into the cleaned crack with a putty knife and smoothed down level with the surrounding surface. After setting, the surface may be polished with emery.

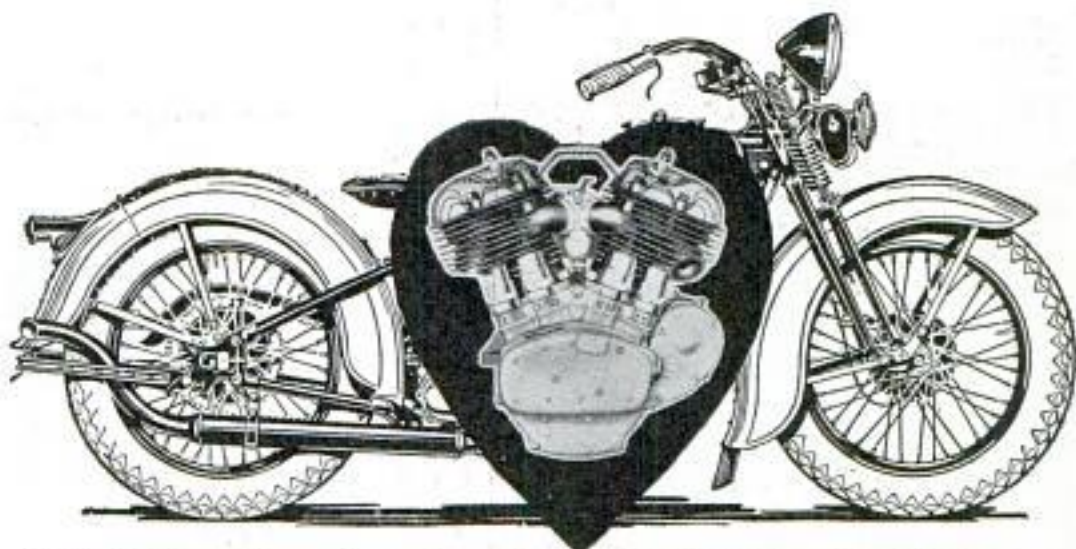


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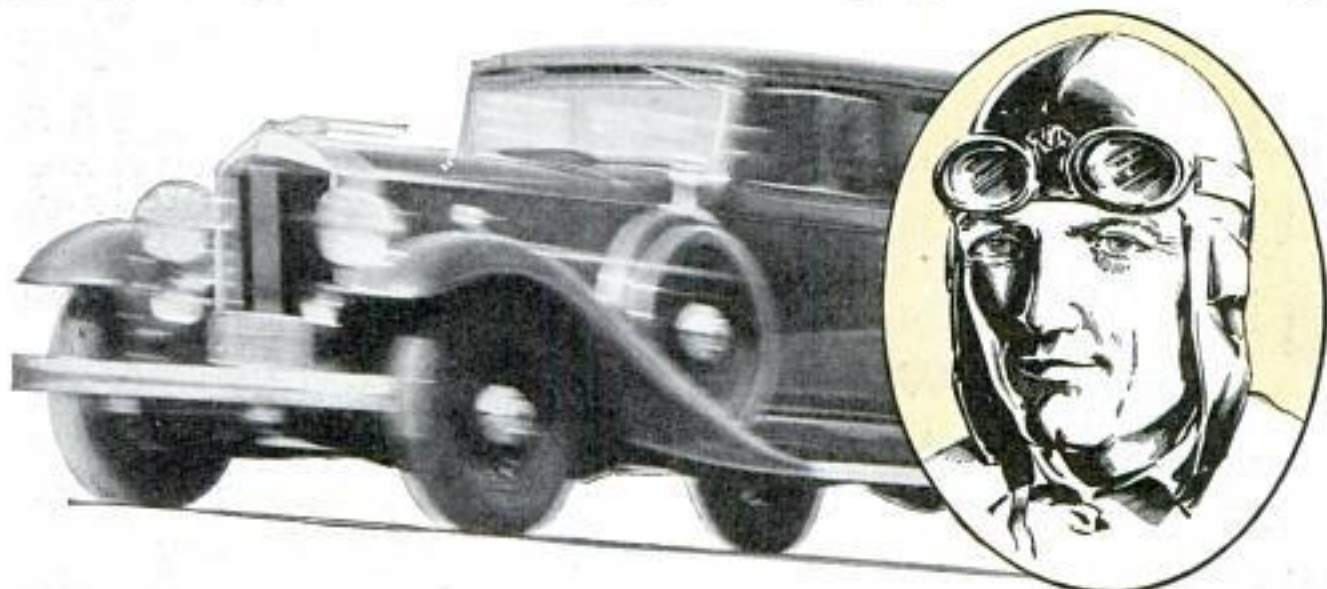


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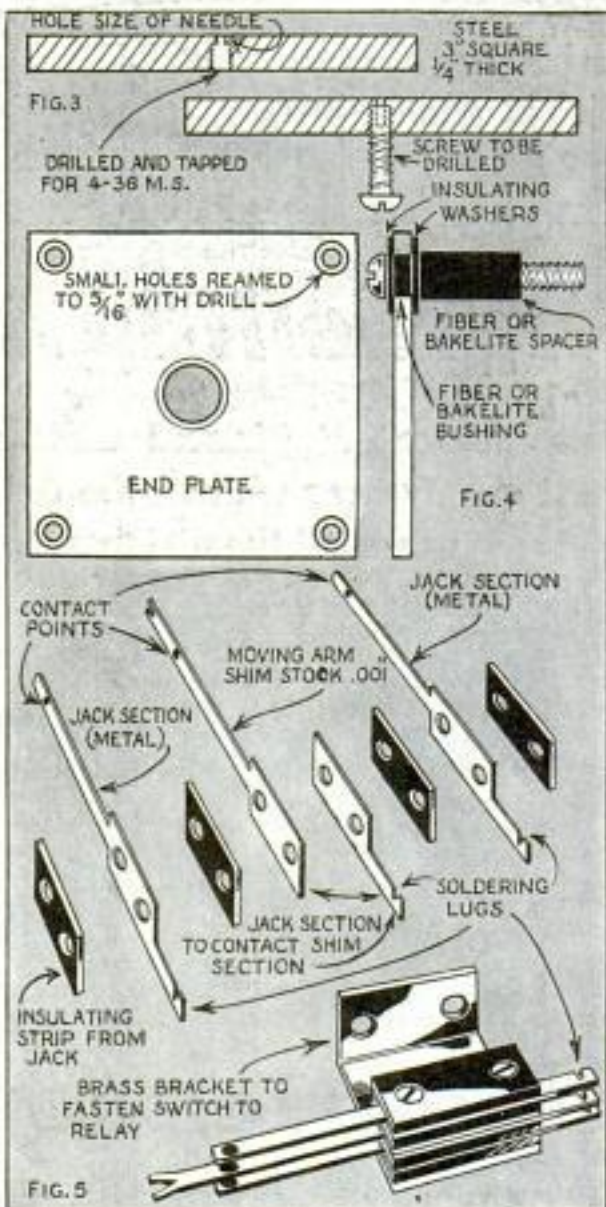
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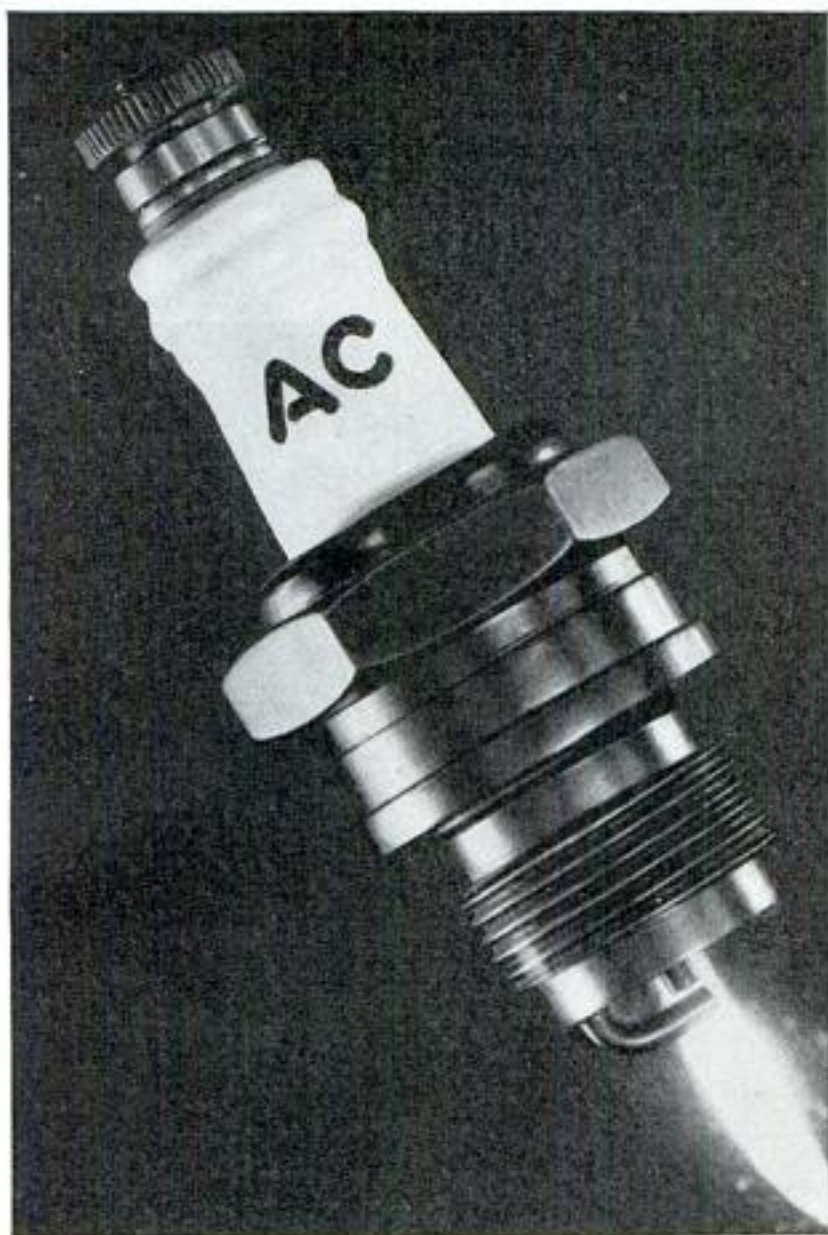
(Continued from page 458)

ends are soldered to the brass screws.

The moving pointer arm, which throws the switch contacts, is shown in Fig. 2A. The coil is balanced with drops of solder on the small crossarm. The center pivot holes in the end plates, Fig. 4, are reamed and tapped  $\frac{3}{8}$ -24. End bushings, threaded to fit, are 1 in. long, drilled centrally and reamed for 8-32 screws. The hole in one end of each bushing is reamed  $\frac{1}{4}$  in. in diameter to a depth of  $\frac{1}{2}$  in. The steel screws are center punched for the needle pivots. Fig. 4 shows the method of insulating one end plate. A binding post is screwed to each of these plates.

The contacts are made from an old radio jack reassembled as shown in Fig. 5.





\*

\*

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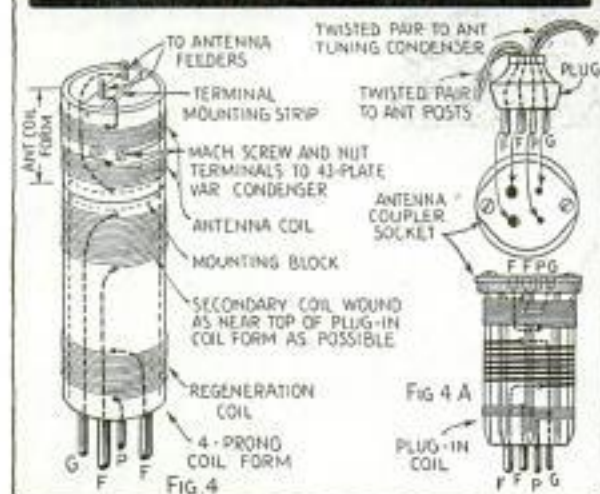
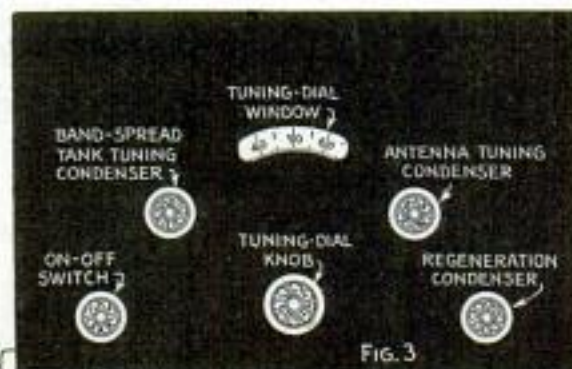
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## SHORT-WAVE BATTERY SET FOR DX DOUBLET ANTENNA

(Continued from page 457)

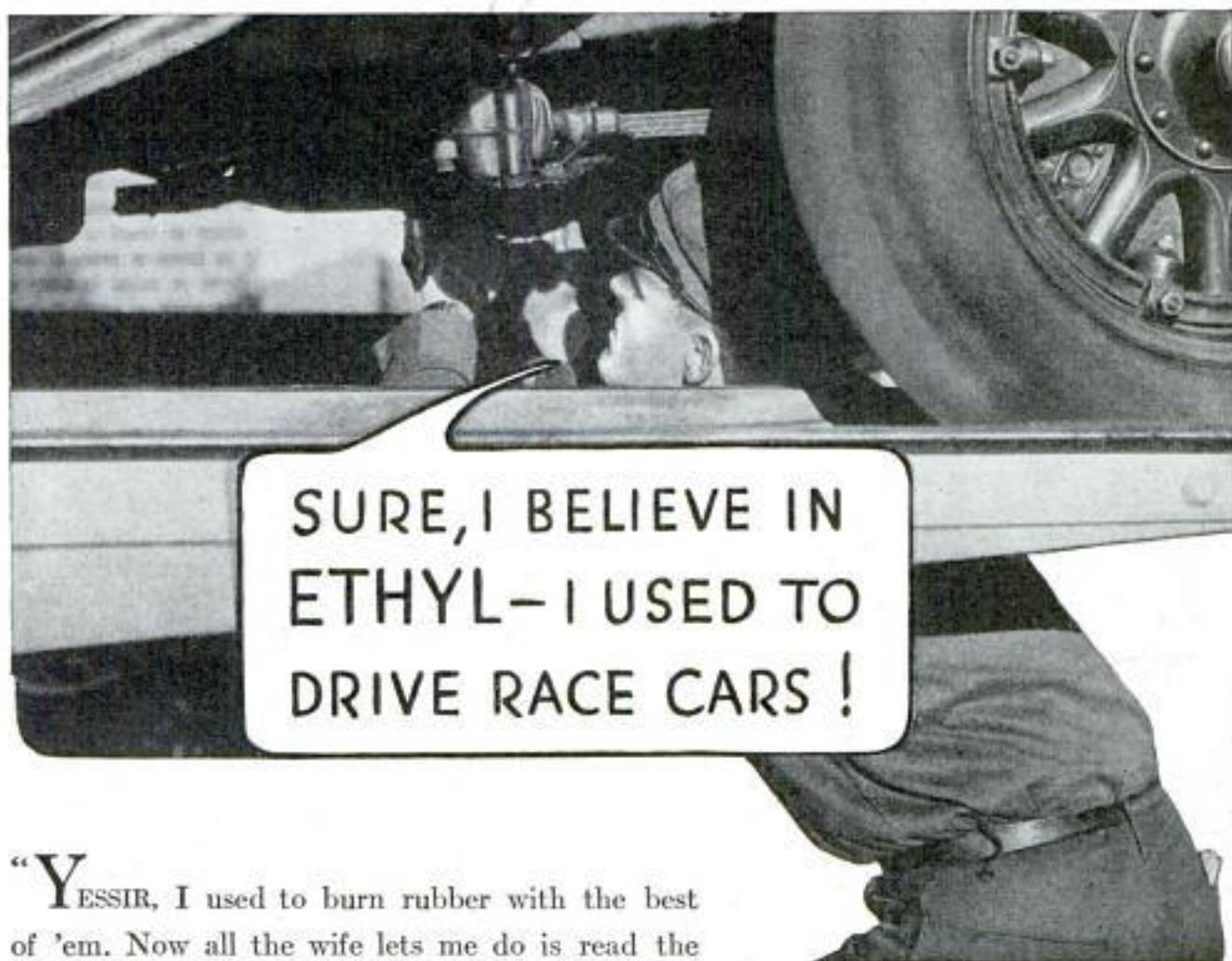
indicated, are placed under a mounting screw of each socket. The .00025-mfd. grid condenser and gridleak are supported away from the base, on the underside, by soldering the terminals directly to the de-



tector-socket G post. A color-coded battery cable is inserted as shown, and the leads soldered to the points indicated.

Four plug-in coils cover all ranges from 20 to 200 meters. The homemade type is shown in Fig. 4 and the ready-made variety, with the coupler plug, in Fig. 4A. The builder is advised to buy, or make, the 75 to 150-meter coil first. Use No. 22 d.c.c. wire, winding all coils in the same direction; antenna coils, 8 turns each; secondary, 28 turns and regeneration coil, 26 turns. Ordinary plug-in coil forms are used, with a short extension for the antenna coils.

Tuning directions, antenna construction, further coil data and the added audio stage, will follow next month. A large blueprint of the simplified wiring diagrams will be available at that time. The pentode amplifier unit to be described is suitable for use with any small battery receiver.



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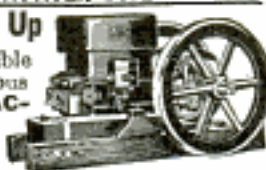
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## AT HOME IN THE AIR

(Continued from page 405)

Dr. E. H. Padden, flight surgeon for United Air Lines, ascribes much of the air sickness of first-timers to a combination of fright and excitement. The remedy is so simple it can be expressed in one word—relax. But you must learn how to relax. Merely sitting with folded hands is not enough, for a dozen other muscles may be rigid. A pilot gives his passengers a simple formula.

"Just imagine you're a bag of meal," he tells them. "Don't try to balance the ship. That's my job. If the plane rocks, rock with it. If it loses altitude, don't try to stay 300 feet up. You're coming along anyway, so you might as well go willingly. Lean back, close your eyes, and imagine you're traveling over a very smooth but resilient highway. You'll be surprised how easy it is to 'kid' yourself."

And his advice is good. Thousands of experienced air travelers who suffered from nausea at first have not been sick for years. Why? They are no longer excited by a trip, they have become accustomed to the "feel" of the ship and they have learned to relax. Some of them sleep through an entire trip. They have their "air legs," just as the ocean traveler gets his sea legs under him.

Harris M. Hanshue, president of Western Air Express, says exhaustive studies have shown air sickness is due to nervousness of first-timers and to excessive vibrations reacting on the fluid of the inner ear. His company and others have made exhaustive tests to determine the causes for excessive sound and vibration and find the remedies. As a result much of this trouble has been eliminated.

Under unfavorable flying conditions when the ship rocks in rough air, even a seasoned traveler may become ill. He usually makes the mistake of keeping it to himself. If you do get sick, don't try to hide the fact. Summon the stewardess. She knows just how you feel and just what to do and has the remedies aboard to bring you relief.

Your first landing will also offer its quota of new sensations and there are a few tricks you can employ here also. First-timers may experience unnecessary ear discomfort or pain when landing. The

(Continued to page 122A)

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## AT HOME IN THE AIR

(Continued from page 120A)

reason is simple, particularly if you have been flying at high altitudes. There the air is rarer than on the ground. As you descend, the pressure increases. Unless the pressure in the inner part of the ear equalizes itself with that outside, your ears may "roar" or ache.

Many passengers never experience this trouble, but if you do, the remedy is also simple. The gum the stewardess gave you when you started was intended to keep you swallowing and this tends to keep the ear passages open. If that isn't enough, hold the nose and swallow or exhale. Better still, simulate a yawn. This action also opens the air passages.

Now a word about eating. The air lines feed you en route—but that is no reason to gorge yourself. If mealtime comes while you are in flight, the stewardess serves an appetizing variety of sandwiches and fruit. But you won't find heavy foods on the menu. If you land to eat, you select your own food. But if you possess one of those stomachs which must be "humored," you'll leave the heavy eating until the trip is finished. You will enjoy both trip and food more.

If you tire of the scenery—and you will on a long trip because you miss the detail—you have only to call the stewardess. Magazines, cards, cigarets, puzzles, writing materials and food are all available. If you want to sleep, there are pillows and blankets, a reclining chair and the drone of the motors to lull you to slumber.

A final hint about baggage. The air lines allow you to carry thirty pounds on your ticket, but don't carry the limit unless you must. Air travel is clean, the cabins are comfortable and you do not require as many clothes. Some travelers stow all they need in a brief case. Remember that you can make a thousand-mile trip in half a day, spend the rest transacting business, and be home the next day.

And getting home from your first air trip will probably offer the biggest thrill of all. You'll meet an acquaintance who "keeps both feet on the ground."

"What! Back already? How'd you do it," he'll inquire.

Then you can reply very casually, "I flew," and feel superior for the next hour while you answer his questions.



## THE GOLD SEEKERS OF '33

(Continued from page 373)

resembled green slate, and a third looked like a common boulder. Only two samples resembled quartz, but all of them were heavy with gold.

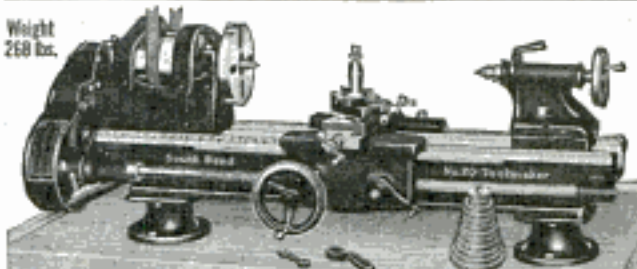
Knowing where to go to hunt for gold increases a prospector's chance to find it. Although the ores may be found in unexpected districts, prospectors who confine themselves to areas in which gold has already been found are most apt to make a strike. The United States has gold, silver, and copper belts that are just as well defined as are the oil belts.

Prospectors have rough-and-ready rules by which they estimate the mineral possibilities of a district. They know that metalliferous veins may be found in igneous firm-formed rock and rarely in water-formed ground. In a granite country the prospector looks for tin and molybdenum, in a hornblende formation he looks for asbestos, copper, silver, and gold. In volcanic regions all the precious metals and many semi-precious gems are often found. "The more unusual colors there are in the hills, the richer the country is apt to be," is the way one prospector puts it. Areas that contain various rock formations in close proximity are almost certain to have mineral wealth.

Instead of seeking new strikes, some prospectors are using their wits to wring more gold out of fields that are apparently exhausted. Some of them specialize in exploring old mines, seeking the continuations of pinched-out veins. Two men in Arizona have taken tons of valuable ore out of an abandoned mine by erecting timber supports and knocking down the thick pillars of ore that had been left to support the roof. Another group uses dynamite and a block and tackle to move huge boulders in worked-out placer fields. Then they pan the rich dirt that earlier prospectors had been unable to reach. Some have found thousands of dollars worth of dust and nuggets by exploring the downstream faces of ledges that reach across streams. Contrary to popular belief, placer gold collects at the foot of the downstream side of a ledge riddle instead of at the upstream foot. One ingenious miner tunneled under the seventy-five-year-old courthouse of a California mining com-

(Continued to page 124A)

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## THE GOLD SEEKERS OF '33

(Continued from page 123A)

community and was cheerfully removing sacks of pay dirt when he was discovered by officials who investigated the strange settling of the building.

Early this year a graduate of a Los Angeles mining school went on a prospecting trip through southern Nevada. Although he was seeking gold he kept his eyes open for valuable minerals of any sort. He failed to find a ledge of gold ore but he did discover two outcroppings that ran high in silver values, and the ledges were richer than the average vein of gold ore. Most gold-bearing regions contain other metals, and alert prospectors are sometimes rewarded by finding deposits of other minerals. Gold and silver, copper, lead, zinc, quicksilver, platinum, manganese, tin and nickel are only a few of the minerals they seek, but gold in paying quantities is found in only sixteen states.

A compact mineral-testing kit that can be stowed away in a small space costs only a few dollars and enables a prospector to test his samples in the field. A complete kit includes a magnifying glass, knife with magnetized blade, gold pan, steel mortar and pestle, blowpipe, candle, charcoal block, match stick with short length of thin platinum wire twisted to one end, cheesecloth screen on wire hoop for sifting, glass test tubes, and a set of fifty mineral specimens to assist in identifying samples. Nitric acid, sulphuric acid, hydrochloric acid, ammonium hydroxide, cobalt nitrate, borax, and washing or baking soda are carried in small bottles. A steel drill and a forge for sharpening it, a prospector's pick, and dynamite are also usually carried.

To identify an ore you first compare it with the set of specimens and examine the richest parts under the magnifying glass to make the comparison more certain. To test with the blowpipe, reduce a little of the ore to powder in the mortar and place a pinch of it, with three times its bulk of soda and charcoal, in a cavity scraped in the charcoal block. Heat the mixture with the blowpipe until a speck of metal and perhaps an incrustation appear in the cavity. Some reactions are: gold, yellow and malleable; silver, white and malleable; bismuth, white and brittle; lead,

(Continued to page 125A)

Memory of Mr. Clay Glover, 1942  
 Memphis, Tenn.

## THE GOLD SEEKERS OF '33

(Continued from page 124A)

white and malleable; antimony, white and brittle, fumes white.

To test the ore by color, loop the end of the platinum wire attached to the match stick, heat the loop in the candle flame, dip in borax, heat again, dip in the powdered ore, and heat once more, forming a bead of material in the loop. The bead turns orange while hot if iron is present, blue for cobalt, green for copper, and violet for nickel.

A mining claim extends for 300 feet on each side of a vein and for 1,500 feet along its course, about twenty acres. After a prospector has made a strike, he posts a notice of location at the discovery point. The notice must contain the name of the claim, the name of the locator, feet claimed each way from the discovery, width on each side of vein, the direction of the general course of the vein, reference to natural objects to assist in identifying corners, and the date. A rock monument or post is erected at the discovery point and at each of the four corners, and a copy of the claim notice is recorded at the county courthouse. Any citizen can stake a mineral claim.

## THOSE SNAKE STORIES!

(Continued from page 383)

fectly harmless," Dr. Ditmars explains. "Pythons have no poison, you know, and the ones used in the show world are nearly always of the light-colored type, not nearly so irritable and hard to tame as the dark python.

"Lower-caste Hindu snake charmers are likely to be fakers as regards the use of music. One fake that I have repeatedly demonstrated for the amusement of my friends right in my own home with specimens brought from the park is the famous oriental 'cobra dance.' The cobra isn't dancing. He is nervously shifting his own position constantly as he follows the movements of the man. Certain kinds of music or sound vibrations can not only attract a snake but make it absolutely helpless for the time being.

"I once had a young Hindu try the effect of his sitar, an Oriental stringed instrument, upon a king cobra. The serpent

(Continued to page 126A)

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### THOSE SNAKE STORIES!

(Continued from page 125A)

was plainly attracted by the high, whining music of the sitar. Suddenly, as a certain chord or pitch was obtained, the cobra collapsed for a few seconds. Next day we tried again, and the Hindu managed accidentally to hit upon that same pitch three times. On each occasion the king cobra collapsed.

"Experimenting later with radio music, I secured the same effect with a certain note in some incidental piano music. I am convinced that certain Hindus possess the secret of the tone or pitch of music that renders the cobra helpless, and also that they can produce it at will. This explains snake charming."

### THE LATEST IN WEATHER FORECASTING

(Continued from page 348)

Information now received through the weather bureau from hundreds of reporting stations on both coasts and from ships at sea is almost adequate for the new method. Establishment of "upper air-sounding" stations, requiring the ascension of planes to procure accurate information, will bring the system to its highest efficiency.

This method makes it possible to predict tornados, cold waves and other disturbing weather influences hours in advance, and may result in saving hundreds of lives and reducing property damage.

### "MOSAIC" TELEVISION FOR THE HOME

(Continued from page 324)

sharp and clear that images can be enlarged to the size of a moving-picture screen. The room does not have to be dark to see the images, and bright, glaring lights are not necessary at the transmitting end. Doctor Zworykin's television camera operates in broad daylight.

Doctor Zworykin states that the mosaic system which he has devised can transmit television images in colors, if a wider transmitting band is used. He also sees the possibility of televising the front pages of important newspapers and transmitting them to other cities where matrices can be made and placed on rotary presses.



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28x5-00-19	1.60	1.60
28x5-00-20	1.60	1.60
28x5-20-18	1.65	1.65
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28x5-20-20	1.75	1.75
28x5-40-18	1.75	1.75
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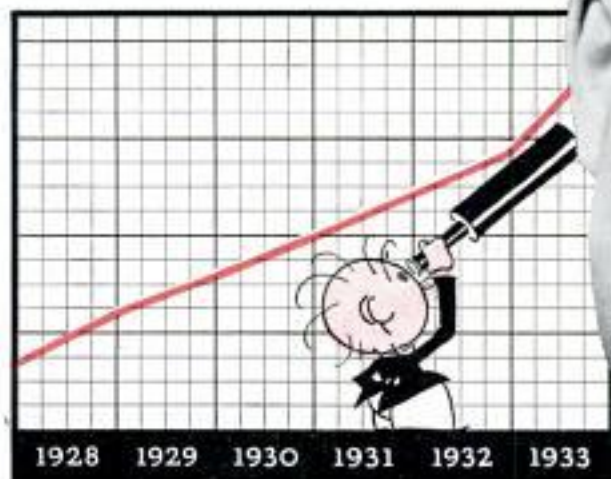
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# Here's one sales curve that points the right way

by "Singin' Sam"



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Here's what Barbasol sales have been doing, thank you.

Yes sir—thanks to all you millions of men who have the good judgment to know a smooth, soothin', comfortable shave when you *feel* one—Barbasol has been selling *bigger* and *bigger* year after year.

When you look at this, you can't blame a lot of the Brush and Lather boys for climbin' on the Barbasol bandwagon and goin' in for *creams*.

And the more the merrier, I say. It just hastens the time when *everybody*'ll agree

that the messy old shaving brush is as out-of-date as a bustle.

Then it's just a matter of who makes the best cream—and I can tell you the answer to that.

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So, folks, when you decide to lay down your trusty old brush and start shavin' by the modern method, go all the way. Ask for, and be sure you get, real Barbasol in the red, white and blue barber pole package. The Barbasol Company, Indianapolis, Ind.



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