

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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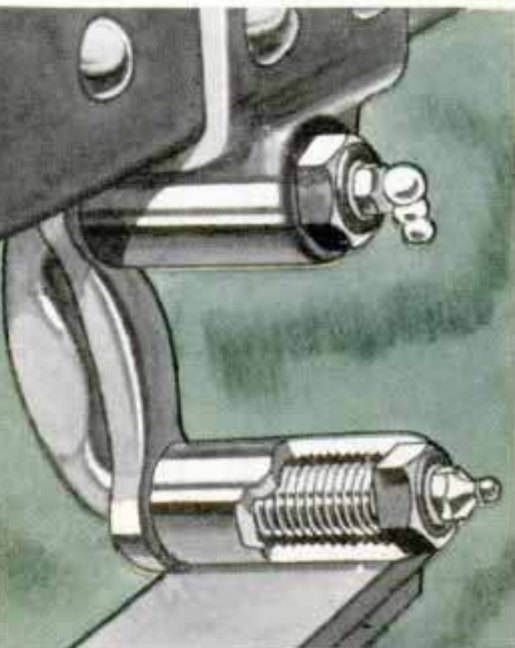
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Marfak saves the grinding wear. It lasts! It stays in place and holds its excellent lubricating qualities for hundreds of extra miles.

The Texas Company is the only company that makes Marfak



The threaded "U" shackles must have a special lubricant to guard against rapid wear. For this, Marfak is ideal.

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"My Car Rolled over 5 times —with ME inside!"

A CERTIFIED INTERVIEW WITH "HELL-DRIVER" BILLY ARNOLD



"I'VE BEEN A HELL-DRIVER for years. But this unexpected accident was by far the most hair-raising experience of my life."

"It took more than luck to save my life . . . it took a Safety-Steel Body"

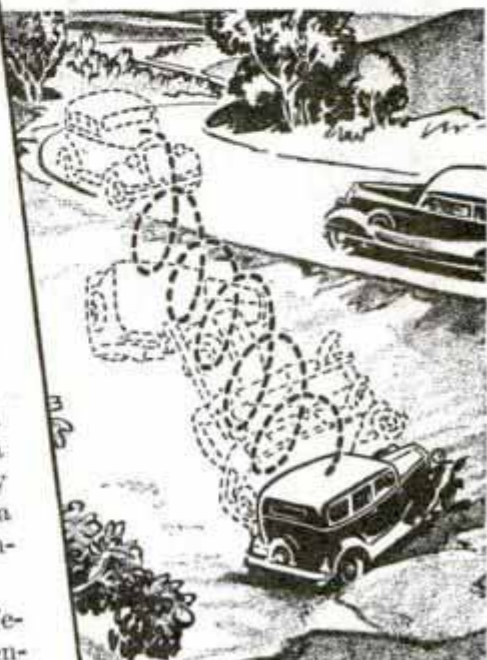
ROAD CLEAR... rising curve ahead. Suddenly... but let Billy Arnold tell it in his own words:

"Suddenly another car swept around the curve. It meant a crash or the gully. I took the gully."

The diagram shows how he bounced down the hill. "I wouldn't give a plugged nickel," says Arnold, "for my chances in any low-priced car but a Plymouth. Its Safety-Steel Body undoubtedly saved my life!"

Hydraulic Brakes assure extra safety. And patented Floating Power engine mountings and Individual Wheel Springs make Plymouth more comfortable on any kind of road.

Any Dodge, De Soto or Chrysler dealer will demonstrate Plymouth.



"I SWERVED to save the other car and plunged. Down I went . . . turning over and over five times!"



BILLY ARNOLD AND HIS SON with the new De Luxe Plymouth Sedan. Plymouth is the only car in the low-price field with *all* four of the features you need. Duplate Safety Plate Glass *throughout* for the lowest extra cost in the industry.

IT'S THE
BEST ENGINEERED
LOW-PRICED CAR

THE NEW PLYMOUTH

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"YOU'RE CONNECTED!"

SMILING, the installer takes his leave. He's been courteous, careful & quick. He knew just where the telephone should go. Just how to place it so that nothing should be marred. And now—"You're connected!"

A few days ago, having a telephone in this house was only an idea. A husband talked it over with his wife. They decided to go ahead. Now the telephone is a reality — tangible, delightful, vitally important to the family that lives here. Tonight Mother can visit with her friends, talk to relatives miles away, call the doctor should he be needed.

A new neighbor has been linked with the millions of other telephone equipped homes that make America one neighborhood. Another household has discovered the security and convenience brought by the Bell System's unified service of communication.

BELL TELEPHONE SYSTEM



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Popular Mechanics Magazine

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June, 1934

Vol. 61, No. 6

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The West Point of the Air

THE government flying school in Texas is turning out a new breed of American war eagle. These army aviators are being trained to hunt in "packs." Team work, which is another term for formation flying, is the creed today. In the July issue you will find sixteen pages in color—the first of two such sections—picturing the experiences of these student flyers from the day they enter the Randolph field school as fledglings until they emerge a year later as war birds ready to take their places among the shock troops of the air.

Next Month

OLD Mother Earth is being made the victim of scientific pick-pockets. With a touch too delicate to disturb the lightest sleeper, geophysical prospectors are frisking Mother Earth for the diamonds, gold, silver and such other valuables as she may have concealed on her person. Read about this world-wide treasure hunt in the next issue.

Robot Warships

OUT through the Golden Gate steamed a lean gray destroyer with not a man aboard. Yet the craft picked its way, like a dog on a well-scented trail, through the besetting shallows, its engines purring and its wheel turning without the touch of a human hand. Read in the next issue how Uncle Sam's warships are being directed by remote control and what this means in peace time and in time of war.

Gold in Your Attic?

DO you know you may have a hidden treasure resting in your attic? Hundreds of well known American books have, through the years, become valuable. You may have had one or more of these books in your family for years without realizing its worth. In the July issue you will find how to determine the value of your old books and where to find a market for them.

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"Old.. BUT LOOKS NEW!"



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The sooner any car is Simonized, the better. The finish must have this mighty protection to make it stay beautiful.

Millions know that nothing else guards a car's beauty like Simoniz. Harder, more durable—it protects the finish in all weather. Makes it last longer, and keeps the colors from fading.

Always insist on Simoniz and Simoniz Kleener. Hardware, auto accessory stores and garages everywhere have them. Nothing takes their place, so refuse substitutes.

Motorists Wise
SIMONIZ
 KEEPS CARS BEAUTIFUL

Simonizing your car is amazingly easy. A few quick strokes with the wonderful Simoniz Kleener makes a dull car sparkle like new. Restores lustre quicker, safer, easier. Then apply Simoniz and your car will stay beautiful.



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You hear it everywhere—

"CLEANED

SPARK PLUGS SAVE MONEY"



**DIRTY OR WORN
PLUGS WASTE GAS**



Before Cleaning *

After a few thousand miles, oxide coating, soot and carbon coat spark plug insulators—wasting gas and impairing performance.



After Cleaning *

The new AC Method removes all oxide coating, soot and carbon. Insulator is clean as new—saving gas, restoring performance.

*An unretouched photograph.



Attendant: "If you're using more gas than you think you should, have your spark plugs cleaned. Dirty plugs will waste as much as 10 per cent of gas."



Mother: "I hope the car will start."
Sonny: "Dad had the spark plugs cleaned, Mother. That's all that the car needed when it didn't start the other day."



Father: "Say—we don't need a new car! I had the spark plugs cleaned and you'd think this was a different car. It has pep now!"



Driver: "It's 'oke', Boss. The shop cleaned the plugs last night and the old truck is pulling the way it did when it was new!"

Clean spark plugs stop the waste of 1 gallon of gas in 10! The oxide coating which forms on *all* plugs causes intermittent missing (often not noticeable) especially at high speed and on hard pulls. *Every time a plug fails to fire, gasoline is wasted!* But—have your spark plugs thoroughly cleaned by the new AC Method, and the gas waste is stopped—and power and pep are restored. If you do it *now*—you may win a new Ford, Chevrolet, or Plymouth—FREE!

You are entitled to a Free Car Contest Entry Blank when you have your spark plugs cleaned by the new AC Method. The Blank carries full details. Get yours today. *Don't delay!*

MOST DEALERS, GARAGES and SERVICE STATIONS are equipped with AC SPARK PLUG CLEANERS

All better dealers, garages and service stations have an AC Spark Plug Cleaner and are registered as official spark plug cleaning stations.

PROMPT AND EFFICIENT SERVICE

AC Cleaning Stations are the most reliable, most efficient organizations in their line of business. They'll clean your spark plugs in a few seconds—only 5 cents a plug.

PLUGS CLEANED WHILE YOU WAIT

Get Official Entry Blank—YOU may win a new Ford, Chevrolet, or Plymouth, FREE!

Tune in on RAYMOND KNIGHT and his CUCKOOS BROADCASTING THE AC SPARK PLUG DERBY

A big variety show—and full information on the Free Car Contest. Weekly winners announced. NBC Blue Network . . . every Wednesday evening . . . coast-to-coast.

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Flint, Michigan

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33 $\frac{1}{3}$ % EASIER TO DRIVE



● Nothing is more important in the safe operation of a motor car than steering and braking.

Reduce the number of other motions a driver has to go through—such as gearshifting and clutch manipulation—and it becomes proportionately easier to concentrate on the essentials. Driving becomes proportionately SAFER, simpler and more enjoyable.

Reo has relieved motorists of many of these extra motions by abolishing the gearshift lever. The REO SELF-SHIFTER reduces clutch operations immeasurably. In the new Reo you go from second to high and from high back to second without even being aware of the change. Automatically the speed of the car determines the ratio.

Your hands are free for the wheel—your *work* is reduced at least one third.

Standard Reo passenger car prices are now as low as \$795 at factory, plus tax.



WRITE today for copy of our interesting booklet, PROOF, containing enthusiastic comments of Reo owners. Also detailed explanation of Self-Shifter operation.

See and drive the new Reo Flying Cloud for 1934—a brilliant triumph in aerodynamic streamlining and long life construction. Amazingly low prices.

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NEED MONEY?

—here's a way to get it without
having to pay it back!

HOW does this sound? . . . 25, 50, 75 per cent more than your present salary—possibly even two or three times the amount of money you're getting today—for the rest of your business life.

—not a loan—not an advance—nothing you have to return or pay back, but your own money—your cash to do with as you please.

Is it interesting? All right, here's the way:

Make an investment in the greatest, the surest profit-making possibility you ever heard of—your own self.

Train yourself definitely for the job ahead, or for a larger job somewhere else—build your ability to do more and make more for your employer.

Invest some of your spare time—at home—nights: the money cost compared to the possibilities of increasing your earning power is almost nothing.

Train under the LaSalle Problem Method—learn by doing—that's the interesting—the practical way.

Can you do it—are you fitted? Other men—average men—men from every walk of life and every vocation have increased their ability and their earnings through investing spare evening hours at home.

How would you like to have the experience these men have had? Here are a few striking cases out of thousands from our files who turned bleak futures into cash realities through LaSalle training.

250% Increase in Income

For instance, H. F. Lofquist, now a star Seattle salesman for Elliott-Fisher equipment, was working for an oil company—at a small salary and with little chance for promotion. Before completing half his LaSalle training in Higher

Accountancy, his income doubled and now it is 250 per cent larger.

Incidentally, sales contest prizes won by Lofquist have paid for his training several times.

Doubled His Income

F. V. Tiernan of Washington, D. C., was employed by the Government—with little prospect for advancement. Passing a window in which was exhibited LaSalle training material, he stopped, investigated and enrolled for Modern Salesmanship.

Like Lofquist, his income jumped before he finished the training—and today it is 103 per cent greater than when he enrolled. More important, he sees even better prospects ahead.

Now Has a Profession—and More Money

E. A. Bachman, now a successful attorney of Chattanooga, Tenn., was a clerk in a retail store—who found in LaSalle training the aid which enabled him to get full value and full reward for his ambition and industry. Against obstacles that would have stopped most men, he studied Law at home nights, passed the bar examination and began to practice.

The First Step—Get the Facts

There's a coupon below for men who are sincerely interested in themselves. Men who want to get ahead and are willing to invest an evening or so a week for the sake of a permanently increased earning power.

You can't lose anything by sending—the time to act is when you have the urge. All you are doing is investigating—the judging comes after you have all the facts—and can't be done before. Mail the coupon now for full information—sent without cost or obligation.

LaSalle Extension University

LaSalle Extension University, Dept. 664-R, Chicago, Ill.

I would welcome an outline of the LaSalle training plan, together with a copy of "Ten Years' Promotion in One," all without obligation.

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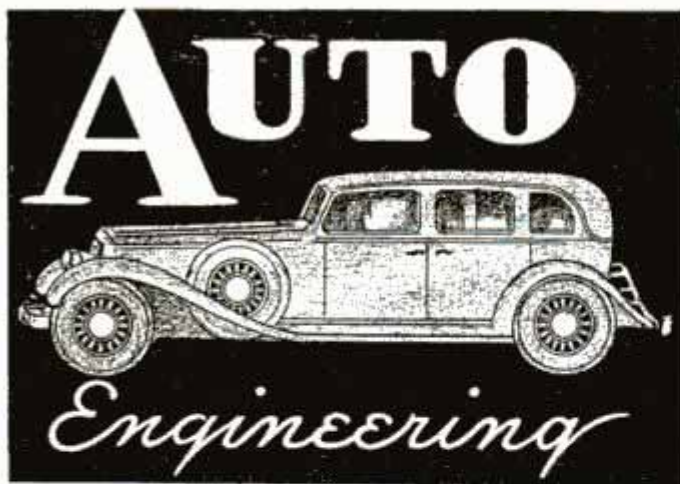
This One



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The leaders of the next ten years will be determined in the next ten months.

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23 Million Car Owners Need You

THIS will be the greatest year in history for GOOD automobile mechanics, men who know their "stuff" and can correct any auto fault.

Over 23 million car owners will need work done and will have the money to pay for it. Complete overhauling jobs will be common. It's up to you to know all cars, be able to fix anything that comes up. If you can do this you'll get a fancy price for your work and make more money than you've made in years. These 6 big Auto Books which we offer to send free for examination tell you everything you need to know and do it in such a way that you can easily understand it. The jiffy index lets you put your finger right on the information you want immediately without long reading or study. Don't miss this opportunity.

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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.

The International Correspondence Schools, the largest and oldest institution of its kind in the world, have been providing ambitious men with the training they needed for over forty years. The boy just out of high school is ideally prepared for study of any of our 300 courses. If you'd like, one of our vocational counsellors will discuss—*personally*—your boy's problem with you and him. This coupon, marked and mailed, will bring complete information—absolutely free! Study the coupon—it may be the beginning of a useful career for your son.

Ralph E. Neess
President

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University"

BOX 5509-H, SCRANTON, PENNA.

★ Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X: ★

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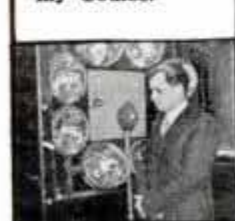
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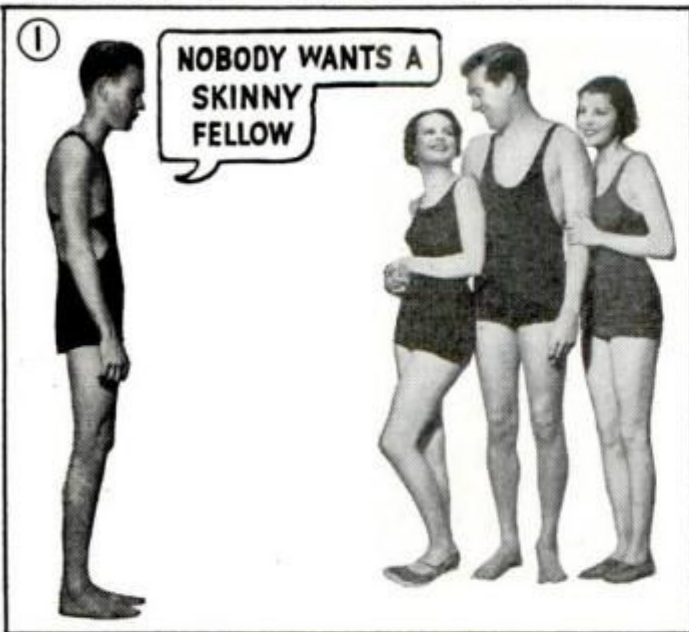
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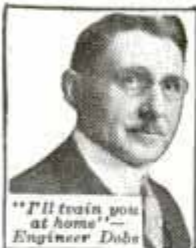
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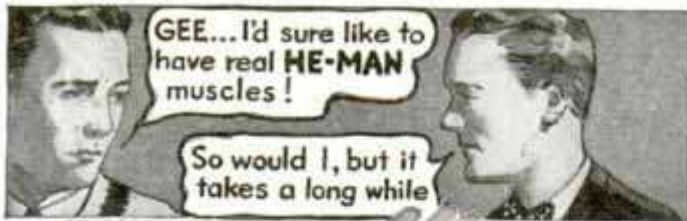
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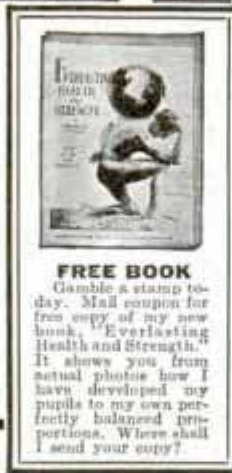
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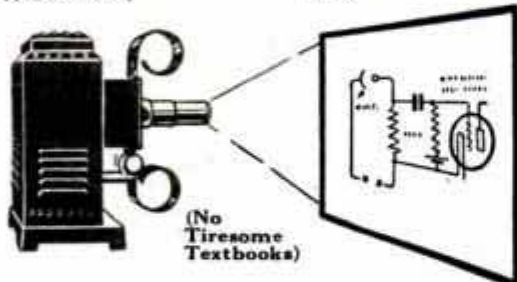
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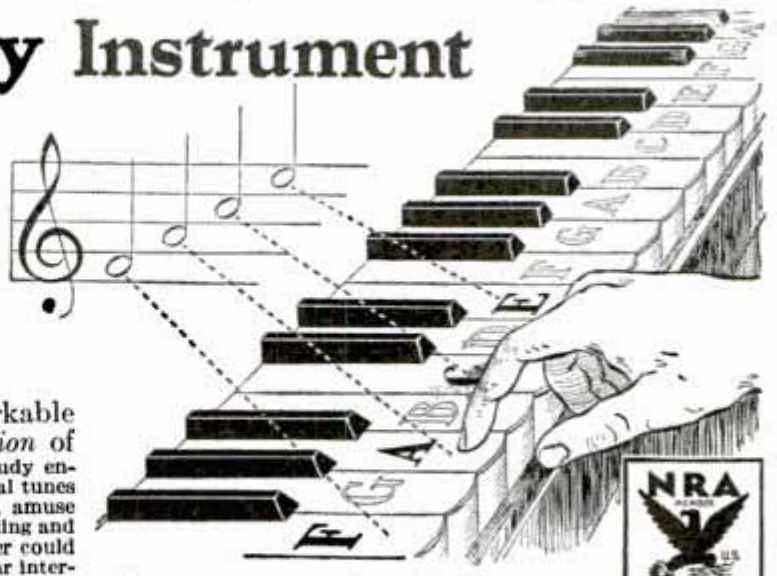
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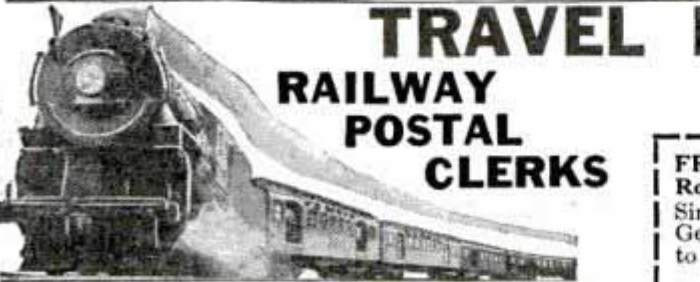
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INCOME From your camera instead of expense. Low cost home course teaches you to make photographs for magazines, newspapers, advertisers. Tremendous demand. Earn good money wherever you live. Free book. Universal Photographers, Dept. 104, 10 West 33rd St., New York.

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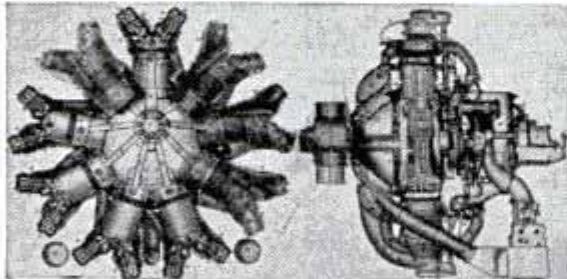
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Member Penn. Grade Crude Oil Ass'n., Permit No. 2

REFINERY-SEALED CANS now available. Both cans and bulk Pennzoil are SOLD UNDER BOND to guard you from substitutes.

TOUGH-FILM PENNZOIL

MAKES CARS GO FASTER..SAVES ON GASOLINE



*He that hath a trade
hath an estate and
he that hath a call-
ing hath an office..
of honor and profit*

Benjamin Franklin

D46 *all 10.00*
some newspapers, 220 E 42nd, N.Y.C.



LIFELIKE figures, realistic costumes and mechanical innovations are reviving interest in the ancient art of producing marionette and puppet shows—See Page 878.

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE AND CANADA

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 61

JUNE, 1934

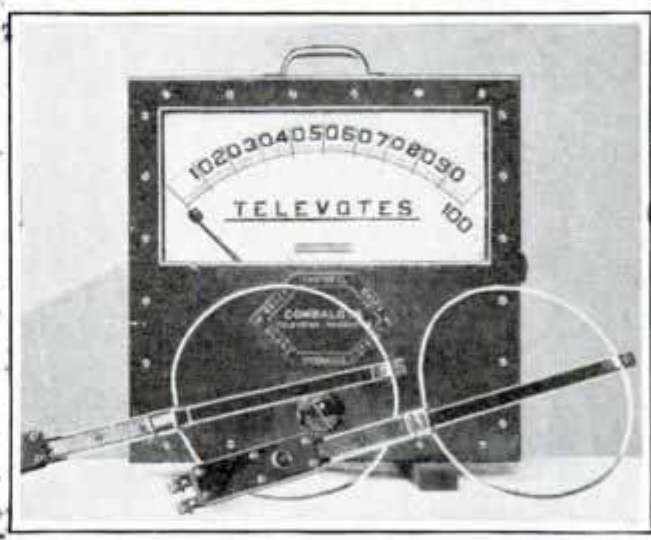
No. 6

12448



NO problem of the commercially sponsored radio broadcast is more vital than the determination of listener response. What percentage of people like a program and what per cent do not. If the president asked his radio audience to vote "yes" or "no" on an important question how valuable it would be if he could learn the trend of opinion on the topic by the next morning; and with no more trouble to the listener than the mere pushing of a button on his radio set.

The answer to such questions appears possible with an invention of Dr. Nevil Monroe Hopkins of New York University which allows a radio listener to register

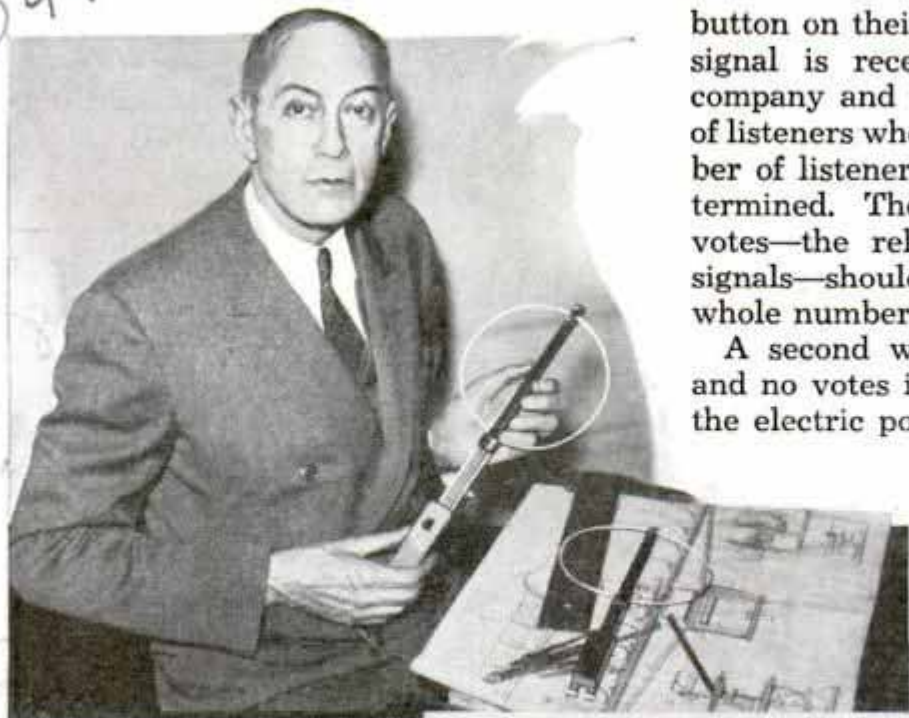


Above, Radio Voting Tabulator as It Would Look in a Theater; Below, the Complete Apparatus

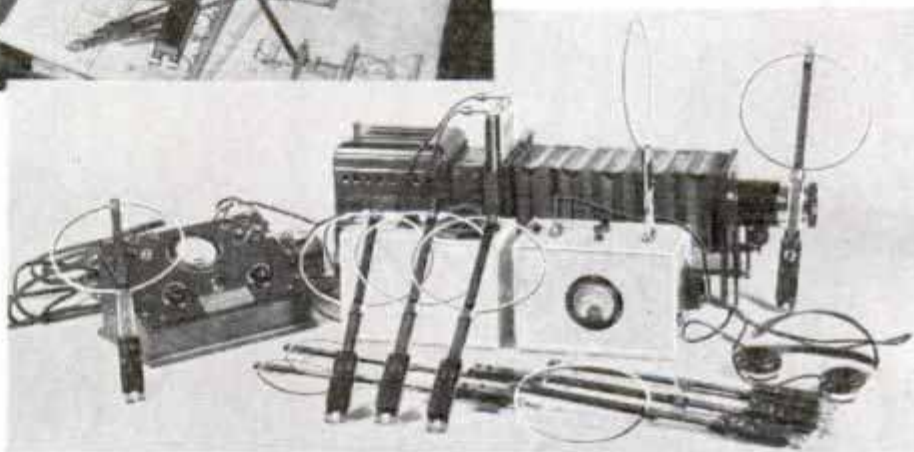
Conf. Robert D. Potter, 10 New York Herald Tribune New York

New York City

D 448



Left, Dr. Hopkins Holding a Hand Radio Voting Apparatus; Below, Projection Equipment for a Small Hall



his approval or disapproval of a program by "talking back" to the broadcasting station. The "talk-back" mechanism is the result of seven years of secret experimentation in which commercial and government scientists have participated. A large electrical company is now considering the invention from a practical standpoint. It is estimated that in quantity production the new talk-back device would cost only a dollar and could be attached to any radio set.

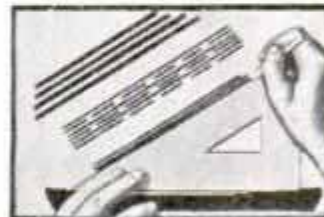
Dr. Hopkins has devised two ways of working out the problem of radio-audience reaction response. The first involves the use of small compact short-wave radio transmitters—of set wave length—attached to each receiving set. When the members of the invisible radio audience are asked to express an opinion they first press a button that sends a short-wave signal through the air. The total intensity of this short-wave signal formed by the thousands of little transmitters is picked up by the broadcasting company and its strength determined with a watt-meter, a device for measuring power. The readings on this meter are calibrated in terms of the total number of listeners who are tuned in.

Next the listeners who approve of the topic at hand are asked to press the "yes"

radio sets. Pushing the button to indicate that one is listening in increases the line load. While the gain for any one set would be small the aggregate increase is measurable. The gain in line load for yes and no votes can likewise be determined.

SECTION LINER OF "BAKELITE"
D 42 / AIDS DRAFTSMAN

Constructed of laminated "Bakelite," a new instrument for use on the drawing board is an aid to production of perfect crosshatching. While the material is light, the instrument is strong, flexible and conforms to the thickness of the triangles. It is intended for use with present T-square and triangles. Easily operated, the instrument eliminates eyestrain. It is said to meet requirements for a practical section liner.



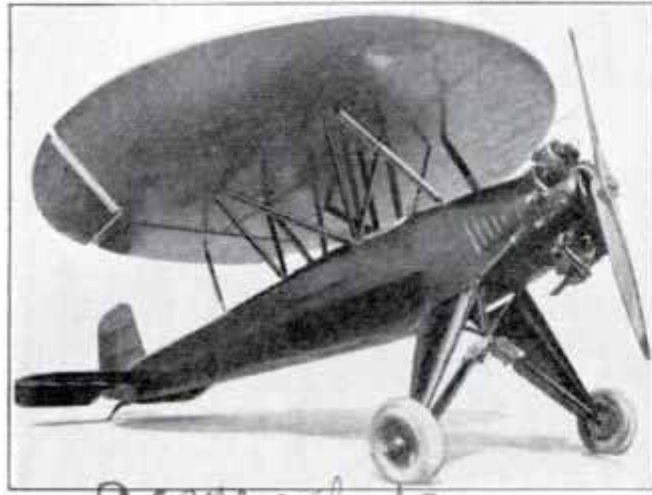
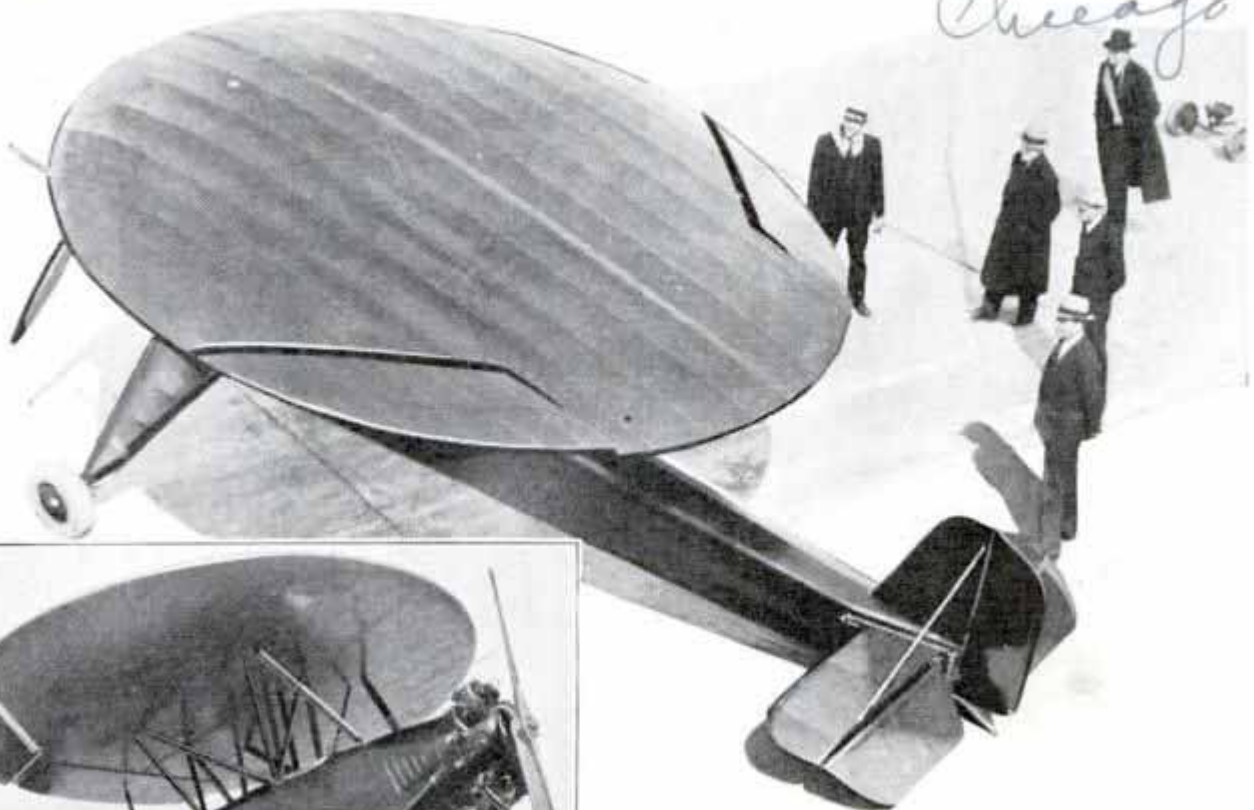
The Nelson Section Liner 727 2 7+1 11

3-embodiment 7-4-39

Built by - Paul Henech

Ray Stein, C. Burkland, Chicago

Round Wing Helps Plane Land at Low Speed



Top, View of Circular Wing Plane from Above; Left, View of Wing Supporting Structure

Fitted with a single round wing, the latest plane designed for safe operation comes to earth more slowly than a parachute and lands in a twenty-five foot circle at a sixty-degree angle. The craft has a maximum speed of 130 miles per hour with two passengers. It is powered by a 110-horsepower Warner motor. The circular wing is attached to the fuselage by braces in the manner of the usual high-wing monoplane. In addition to ailerons fitted to the outer edges of the wing, there is an elevator controlled by the pilot, as are the elevators on the tail. In test flights, the ship was stalled at considerable height, but instead of plunging to earth in a spin, it sank slowly like a parachute.

Acme - Club

bent wheel. Hammering the wheel into the shape of the block results in accuracy of pitch, eliminating the chance of vibration from the propeller. The blocks are made in a double series, for right or left hand wheels, and in sizes to make repairs on all wheels, from the smallest outboard to those thirty-six inches in diameter.

BLOCK FOR BOAT PROPELLER MAKES REPAIRS EASIER

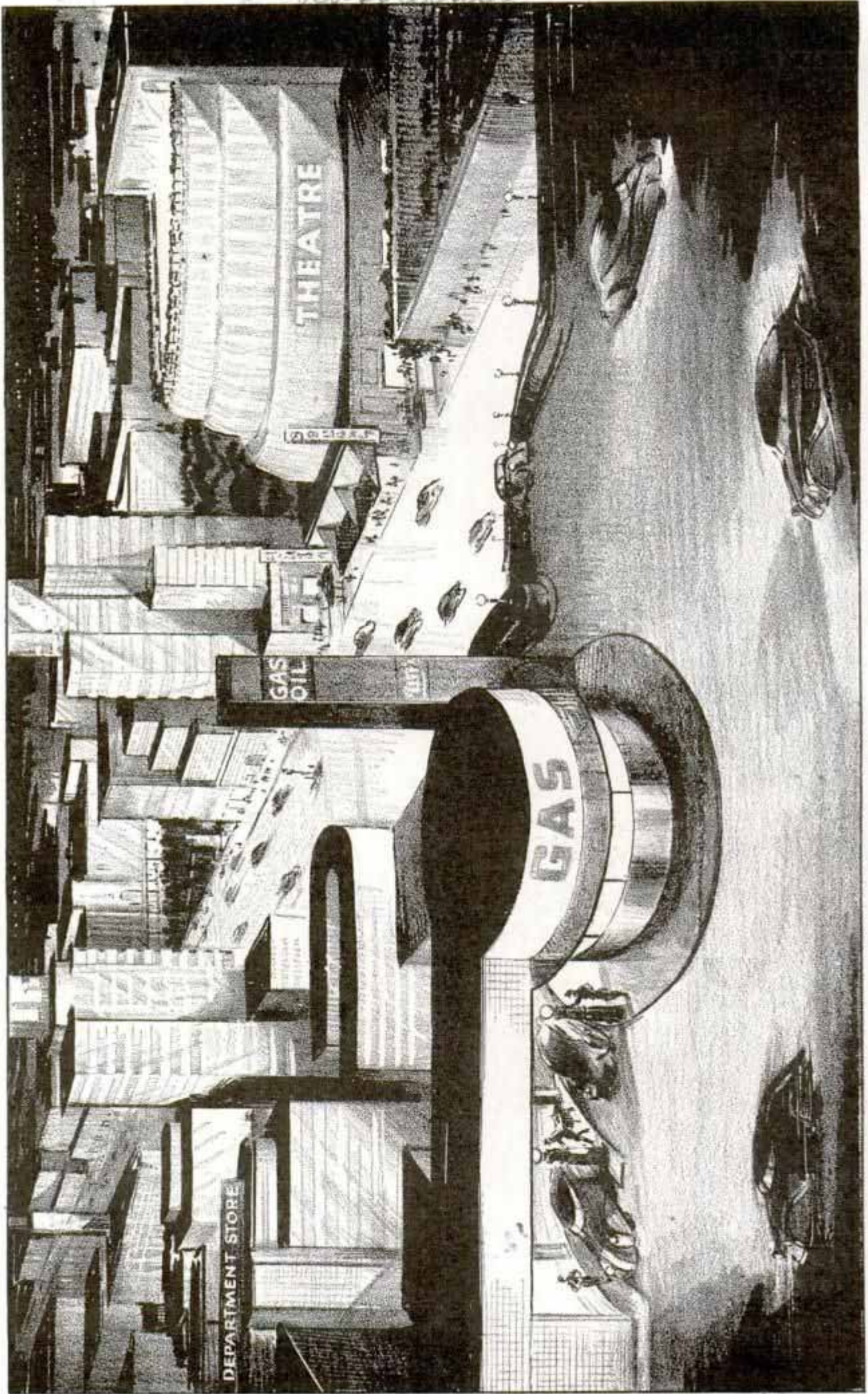
Repairing the boat propeller is made easier by means of a pitch block which is used as a master gauge in straightening a



Fitting Boat Propeller Blade to Special Form Reveals Deviation from True Shape

Michigan Wheel Co. Rapids

D 449 se. app. steel and glass unit



Artist's Idea of the "City of Tomorrow," Constructed of Glass in Steel Frames; a Practical Process for This Work Is Being Used in Building a New York Filling Station, Similar to the One Shown in the Foreground; the Glass Walls Lend Themselves to Unusual Lighting Effects

se. app. steel and glass unit

STEEL AND GLASS UNITS LATEST FOR BUILDING

Structures with glass walls sealed in steel frames may be erected by a new process, the latest in the building field. In actual construction, mastic is placed on all four sides of each glass unit, usually six-by-six inches, and this unit is placed between horizontal steel ribs called "purlins," fastened to uprights or previous facing of brick, cement or wood, which, with vertical anchors on the sides not taken care of by the purlins, provides a water and wind proof joint. Construction is simple and quick. Expansion and contraction of the glass is allowed for in the "spring grip" of the purlins and vertical anchor strips. The method makes possible the use of glass units three-eighths of an inch thick, varying in surface area to meet requirements. The ease of installing indirect fixtures, from which unusual lighting effects may be obtained, is another advantage.

STREET INDICATOR FOR BUS AIDS TRAVELING PUBLIC

Designed to eliminate confusion over failure to understand the conductor's or driver's announcement of street names, an indicator has been produced for motor bus



Top, Name of Next Cross Street Appears on Indicator; Right, Closeup Shows Interior of the Indicator

or street car. It shows, fully a block before the next stop, the name of the street. Small and compact, the indicator is operated by a hand or foot lever. It is installed within full view of passengers.

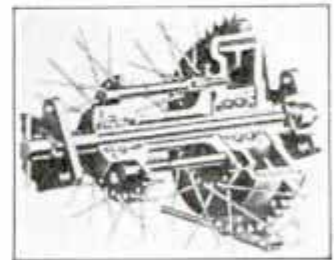
Radio Receiver Attached to Belt Which Enables Officer on Beat to Receive Police Messages

RADIO SET ATTACHED TO BELT AIDS OFFICER WALKING BEAT

Officers walking a beat can receive police radio messages by using a radio set consisting of a receiver built as an integral part into a wide leather belt to which the officer's gun and other equipment are attached. The man on the beat carries his receiver with him and hears the messages sent from headquarters through earphones.

DETACHABLE REAR WHEEL AIDS MOTORCYCLE TIRE REPAIRS

Motorcycle tire repairs are simplified by a rear wheel which can be detached without disturbing the driving assembly. By taking off one nut, pulling out the axle shaft and loosening three bolts, the wheel is released, leaving the brake drum, driving sprocket, chain and brake adjustments undisturbed. Formerly it was necessary to disconnect the chain, brake rods and brake mechanism in removing the wheel.



Inventor: W. S. Shaver
 219 2 19 41

Indian Motorcycle Co

1821892-18792
 steel glass

camp party has mud and cannot be located.

D 288

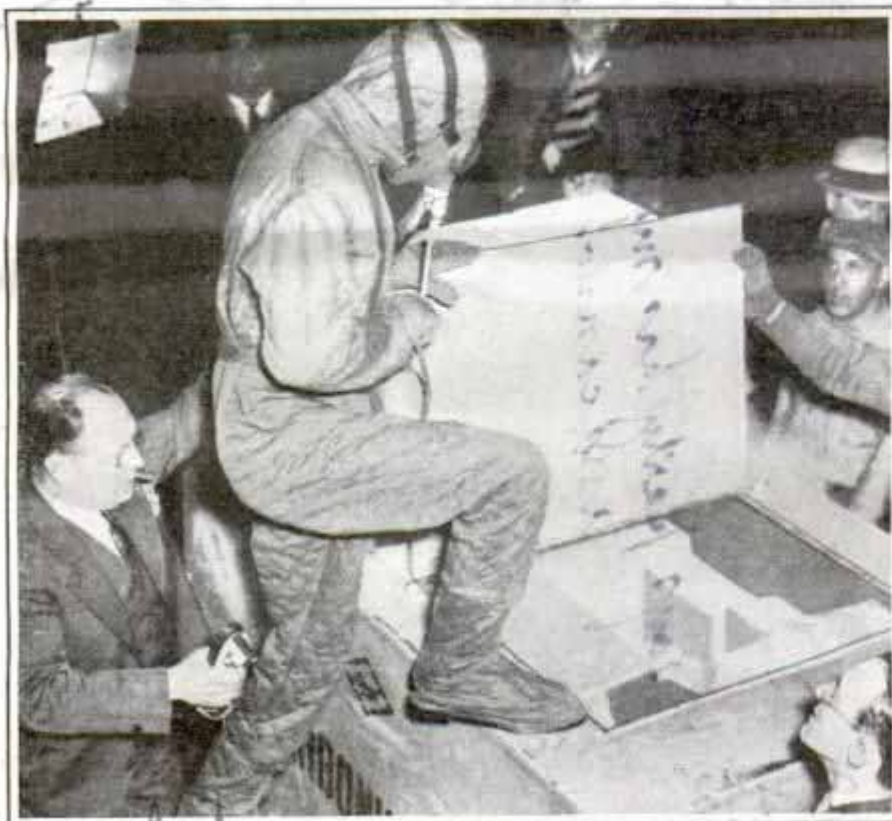
D 449

D 492

D 454

D 288
 See Jan. 1934-107
 Reserve Radio M...
 1528-38
 ac. 7 minor
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 1935-442

Stratosphere Suit Tested in "Dry-Ice" Tank



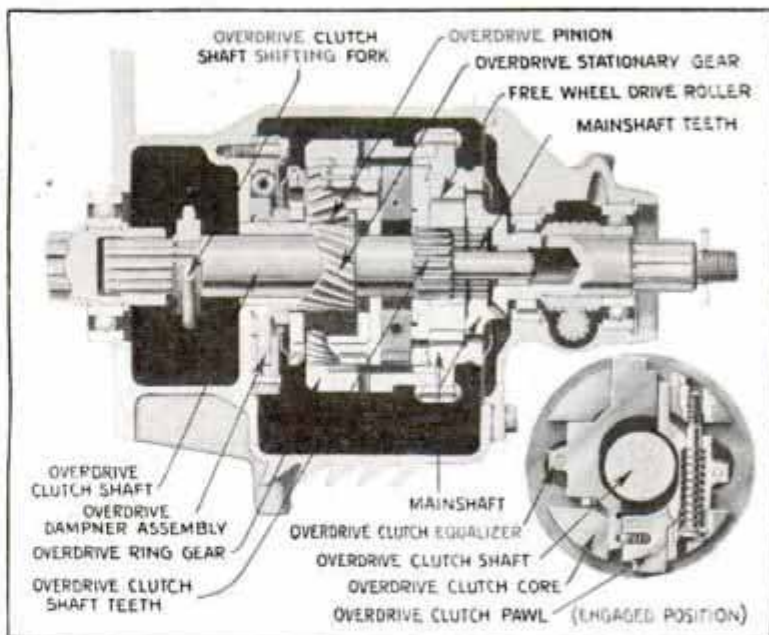
club
Stratosphere Flyer Entering Tank of "Dry-Ice" with a Temperature of 110 Degrees Below Zero to Test Special Flying Suit

How would you train for a flight to the stratosphere? Mark Ridge, Massachusetts aviator, who plans an airplane trip into the region of rare air and intense cold high above the earth, did it by entering a tank filled with carbonated ice to maintain it at a temperature of 110 degrees below zero, much colder than any temperature he will encounter in the stratosphere. He had a special suit made to protect him from the cold and intended to stay in the tank for half an hour to determine if the uniform would keep him warm. The cold did not bother him but he emerged after a brief stay because the fumes from the ice penetrated the mask he wore.

OVERDRIVE SAVES ENGINE AT HIGH SPEEDS

Strain of driving at high speeds is reduced in the automobile engine by means of an overdrive device on one of the 1934 models. The unit is provided to reduce the ratio of engine speed

to car speed above forty miles per hour, without the manual shifting of gears. When the overdrive is in operation, the engine speed is thirty per cent slower than propeller-shaft speed. In conventional drive, the engine speed and propeller-shaft speed are the same. The reduction in engine speed not only adds to the life of engine parts, but decreases fuel consumption. A planetary gearset, at the rear of the transmission, with a self-contained free-wheeling unit, makes up the overdrive. Its engagement is controlled by the engine speed and the free-wheeling unit and it does not function when free-wheeling is locked out by



Cutaway View of Overdrive Mechanism, with Arrows Pointing to Various Parts; Note Simplicity of the Arrangement

on the same number of engine revolutions that would be required to carry it 1,000 miles in conventional drive.

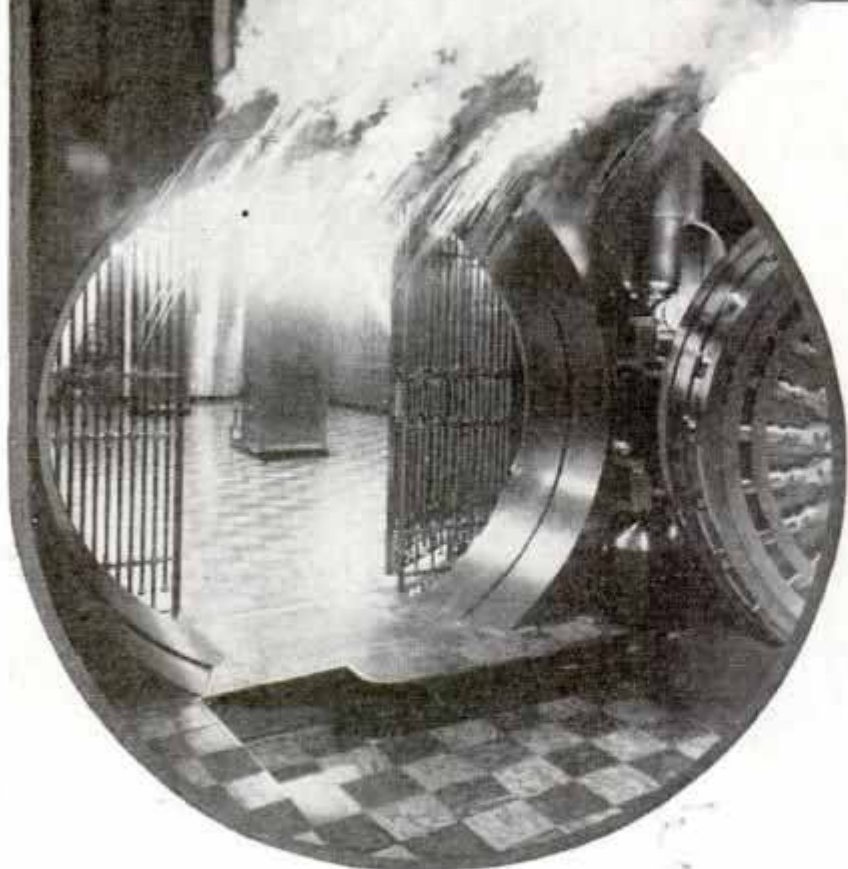
Chrysler Sales Corp. use

W. W. Worcester

D5/4

Ethyl-Dow Chemical
Co. Kure Beach, N.C.

GOLD



TEN years ago commercial extraction of any of the score of valuable elements present in the ocean was as impossible as alchemy. Today it is an accomplished fact in the production of bromine, a vital ingredient in the manufacture of anti-knock gasoline.

"And I feel safe in predicting that within the next decade—and possibly even within the next year—we will be able to recover gold, silver, radium and all the other untold wealth from the sea," says Thomas Midgley, vice president of the Ethyl-Dow Chemical company, whose research promises this modern miracle.

Midgley, who received the William H. Nichols medal of the American Chemical Society for his discovery of knockless gasoline through the application of tetraethyl

Top, Water Intake of Plant Which Extracts Bromine from Sea Water; Below, Vaults Like This May Some Day Hold Gold Extracted from Ocean

Ethyl-Dow Chemical Co.
Kure Beach, N.C.

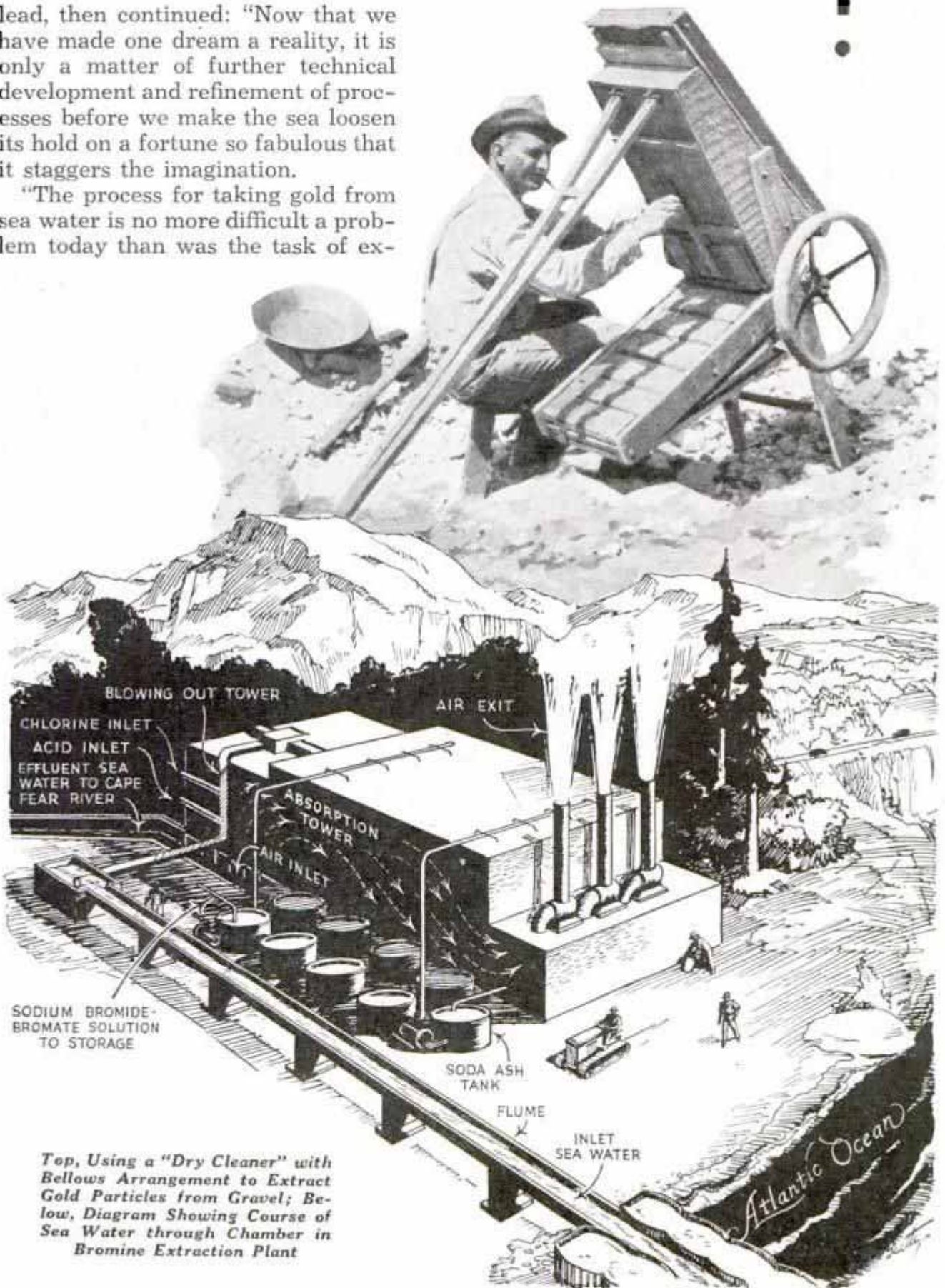
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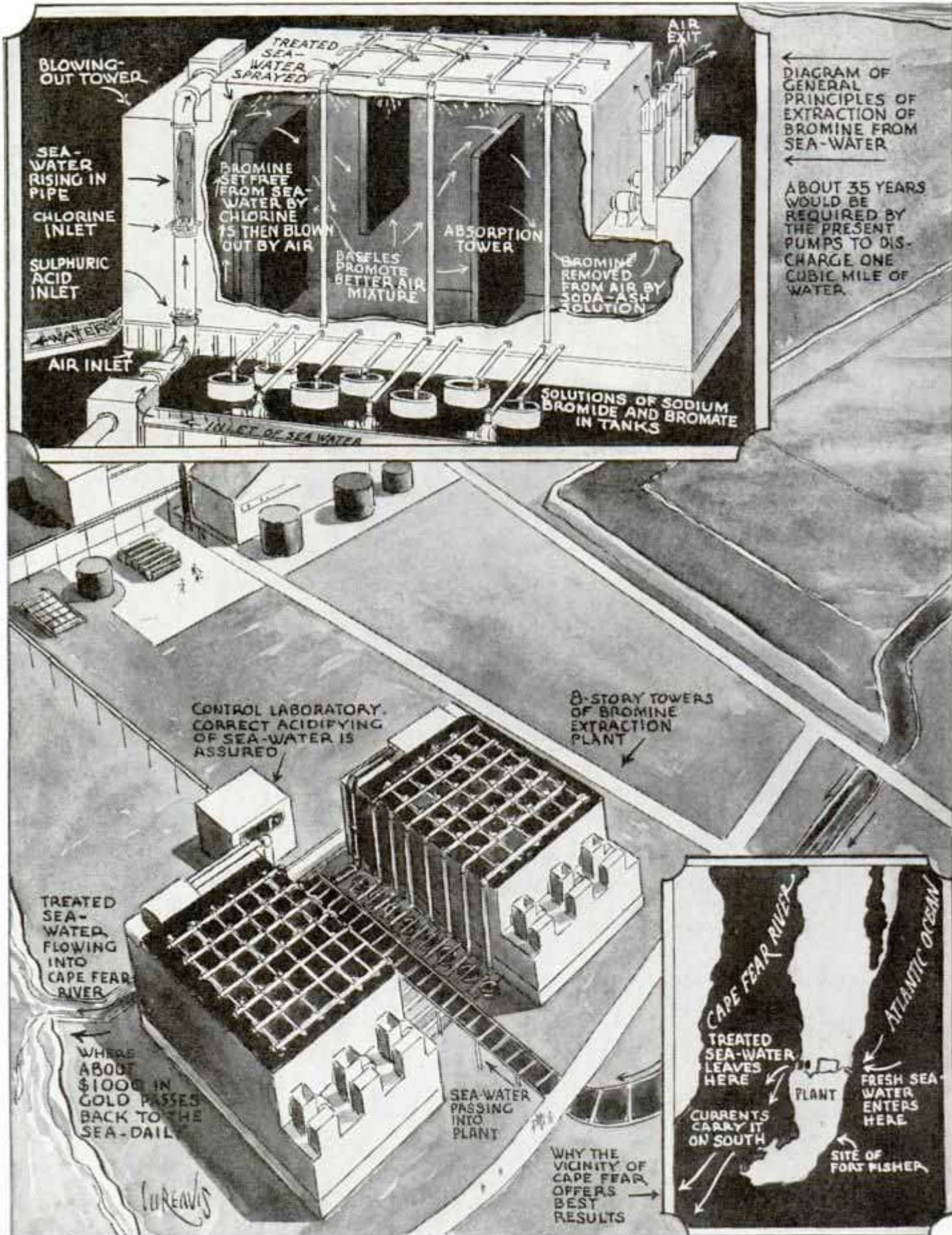
lead, then continued: "Now that we have made one dream a reality, it is only a matter of further technical development and refinement of processes before we make the sea loosen its hold on a fortune so fabulous that it staggers the imagination.

"The process for taking gold from sea water is no more difficult a problem today than was the task of ex-



Top, Using a "Dry Cleaner" with Bellows Arrangement to Extract Gold Particles from Gravel; Below, Diagram Showing Course of Sea Water through Chamber in Bromine Extraction Plant

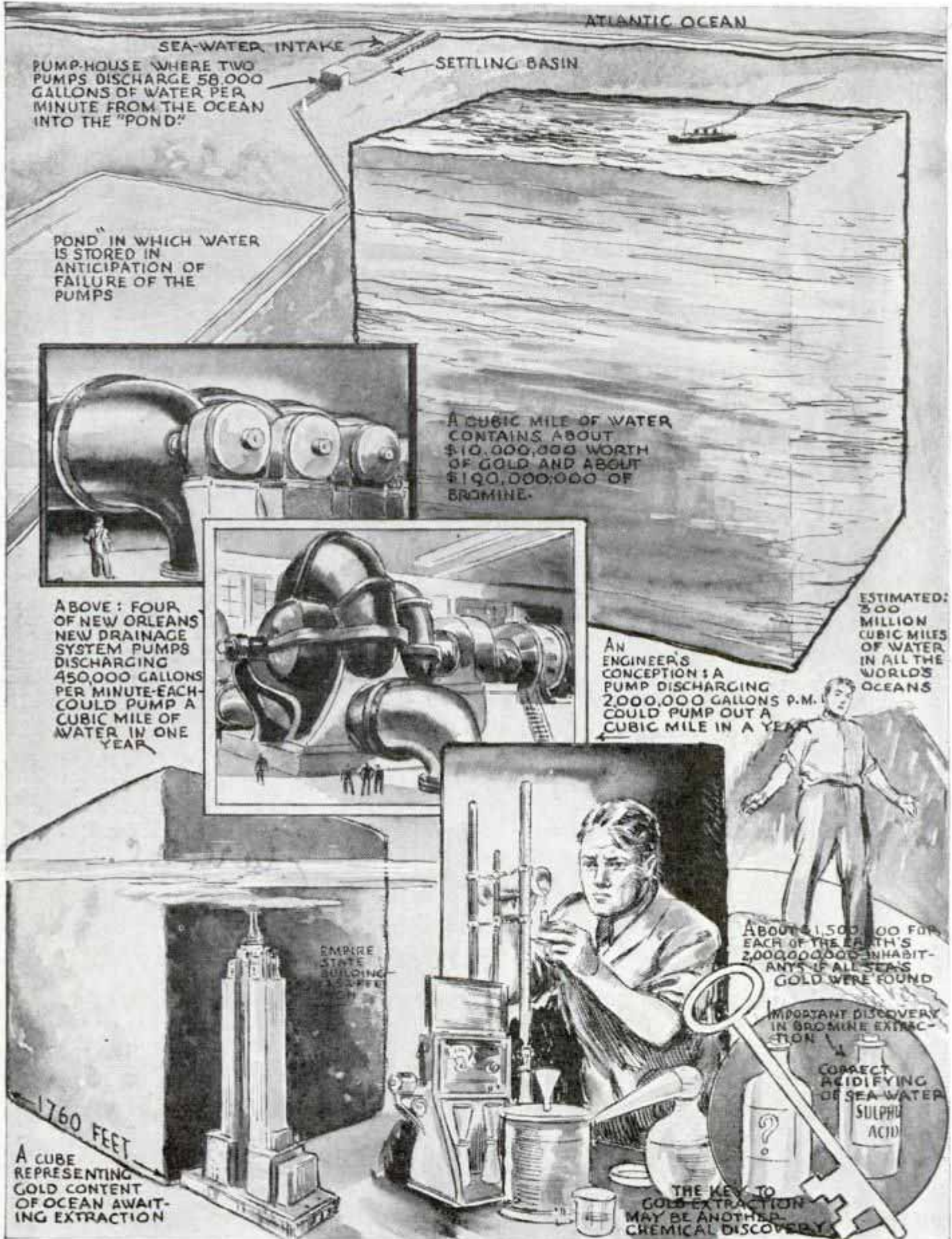
This Plant Extracts Bromine from Sea Water



Bromine Extraction Plant; Sulphuric Acid and Chlorine Are Added to Sea Water to Release the Bromine Fumes Which Are Absorbed under a Shower of Soda-Ash Solution

0314

Some Day the Oceans May Yield Their Gold



ATLANTIC OCEAN

SEA-WATER INTAKE

SETTLING BASIN

PUMP-HOUSE WHERE TWO PUMPS DISCHARGE 50,000 GALLONS OF WATER PER MINUTE FROM THE OCEAN INTO THE "POND"

"POND" IN WHICH WATER IS STORED IN ANTICIPATION OF FAILURE OF THE PUMPS

A CUBIC MILE OF WATER CONTAINS ABOUT \$10,000,000 WORTH OF GOLD AND ABOUT \$190,000,000 OF BROMINE.

ESTIMATED: 300 MILLION CUBIC MILES OF WATER IN ALL THE WORLD'S OCEANS

ABOVE: FOUR OF NEW ORLEANS NEW DRAINAGE SYSTEM PUMPS DISCHARGING 450,000 GALLONS PER MINUTE-EACH COULD PUMP A CUBIC MILE OF WATER IN ONE YEAR

AN ENGINEER'S CONCEPTION: A PUMP DISCHARGING 2,000,000 GALLONS P.M. COULD PUMP OUT A CUBIC MILE IN A YEAR

ABOUT \$1,500,000 FOR EACH OF THE EARTH'S 2,000,000,000 INHABITANTS-IF ALL SEA'S GOLD WERE FOUND

IMPORTANT DISCOVERY IN BROMINE EXTRACTION
CORRECT ACIDIFYING OF SEA WATER
SULPHURIC ACID

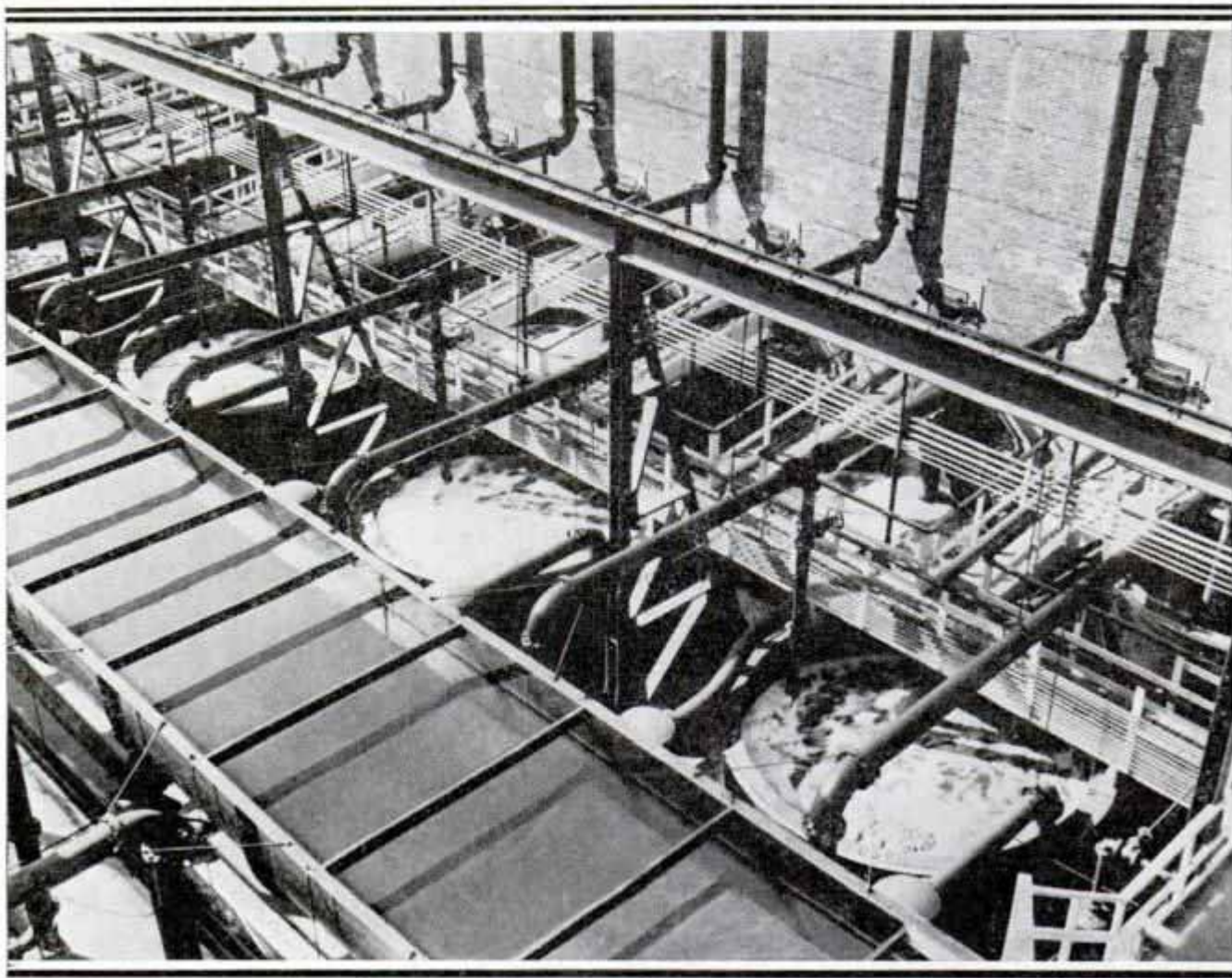
THE KEY TO GOLD EXTRACTION MAY BE ANOTHER CHEMICAL DISCOVERY

EMPIRE STATE BUILDING 1,250 FEET HIGH

1760 FEET

A CUBE REPRESENTING GOLD CONTENT OF OCEAN AWAITING EXTRACTION

If All the Gold in Sea Water Could Be Recovered, the Ocean Would Yield Enough to Make Each Man, Woman and Child a Millionaire if the Riches Were Evenly Distributed



Looking Down on the Bubbling Tanks of Bromine Solution after It Is Freed from Sea Water; Some Day Gold May Be Recovered from the Sea by a Somewhat Similar Process

tracting bromine ten years ago. Tomorrow we shall probably be wondering how we overlooked some simple discovery that will unlock the door.

"In fact, the sea is the greatest storehouse of wealth on the earth. Once the secret of tapping it is known, it will give man an inexhaustible treasure house of riches he will be able to draw on for thousands of years without striking bottom."

Bromine is used in synthetic chemistry, medicine and the color industry, but its chief value at present is in the manufacture of what motorists know as "ethyl."

It is a dark reddish-brown non-metallic liquid never found free in nature but occurring in spring waters, salt deposits and certain silver ores in addition to sea water. Heretofore it has been commercially prepared from bittern, the residue left after salt has crystallized. The Ethyl-Dow company has been working for years on the problem of producing bromine directly from sea water, its most logical source.

"As everyone knows, sea water is slightly alkaline," Midgley explains. "To make it give up its bromine, it is only necessary to shift it to the acid side. In our plant we accomplish this by adding a small amount of sulphuric acid."

The Ethyl-Dow plant for the production of bromine, near Wilmington, N. C., is a series of sealed chambers in which occurs an amazing metamorphosis through chemical prestidigitation. Located almost at the ocean's edge, the plant draws its "raw material" through a large canal into which the sea water gushes and booms like the surf. In the first chamber the water receives its injection of sulphuric acid to make the subsequent transformation possible. Then, in another room, chlorine is added. Chlorine and bromine, which is in the water in the form of sodium bromide, are related. The chlorine, however, is the more active and soon joins with the sodium, "kicking the bromine out."

As soon as the bromine starts to emerge

D5140

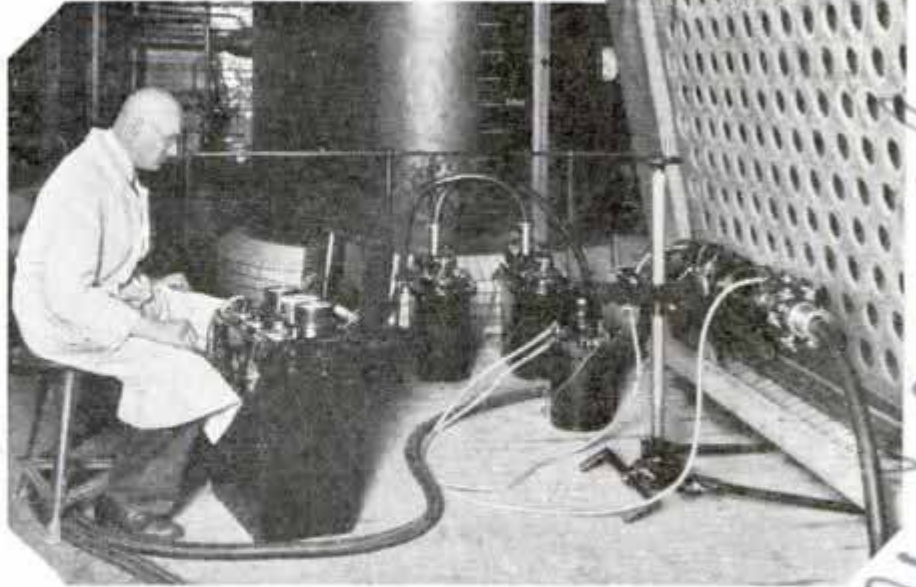
*Es. Berlin
Siemens & Halske*

in a combination of gas and solids looking something like smoke, the water is pumped to the top of the bromine towers and poured down in a fan-shaped shower. A current of air is forced through this shower, not strong enough to carry away the spray but sufficiently strong to blow the bromine fumes into another chamber. Here a shower of soda-ash solution is sprayed from the roof. The soda ash has an affinity for the bromine, precipitating bromide-bromate, which is commonly known as mining salt. This is pumped into the ethylene dibromide building, where it is made into ethyl fluid.

One factor making the extraction of gold at the Ethyl-Dow plant a probability of the near future is the theory that in extracting the bromine, the gold content in the sea water becomes ionized, or electrically conductive. Since gold in its native state in the water exists in the form of a colloidal suspension, it is much more difficult to remove than bromine, but if it becomes ionized, it could be filtered by making it adhere to some cheap chemical substance.

One of the chief obstacles to the profitable extraction of gold from sea water has been the prohibitive cost of pumping. With the water already running through the plant for the elimination of bromine, gold could be made a by-product. The water pumped up in the course of one day in the bromine process contains more than \$1,000 in gold. It also contains, in varying quantities, radium, silver and many other valuable elements.

There are 600,000,000 pounds of bromine in a cubic mile of water. In the Ethyl-Dow plant, 15,000 pounds a day are removed from 30,000,000 gallons of water, or approximately \$2,000,000 worth of bromine annually. In that same cubic mile of water there is \$10,000,000 in gold and there are approximately 300,000,000 cubic miles of water in the oceans of the world.



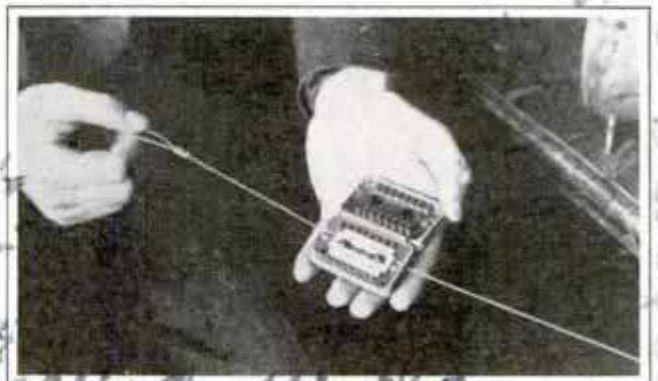
Operator Is Shown Turning Portable X-Ray Machine on Steel Plate for a Test; Heavy Insulation Protects the Operator from Injury

PORTABLE X-RAY APPARATUS TESTS STEEL PLATES

Heavy steel and iron plates can be tested without transporting them to a laboratory with the aid of a portable X-ray apparatus which can be moved to the place where the plates are made or are to be installed. The machine is safe, all parts being well insulated.

SHARPENER PULLED ON THREAD WHETS RAZOR BLADES

Pulling the latest razor-blade sharpener along a thread causes a cylinder to rotate, whetting the blade in a few seconds. The sharpener is about the size to fit comfortably in the hand.



Small Cylinder Rotates as Sharpener Is Moved Along Thread, Quickly Whetting the Blade

The rotating cylinder holds a dull blade in the right position for quick sharpening.

Berlin makes

no agent here

D497

D395
814

"Anti-Flat" Inner Tubes Make Driving Safer



Left, Tube with Reinforcing Rubber to Prevent Damage When Tire Is Run Flat; Center, Driving Nails into Tire; Right, Removing Nail from Tube Which Is Self-Sealing, Keeping Air from Escaping

Increased safety for the autoist is built into two inner tubes which are being produced commercially. One tube may be run flat for short distances, permitting the driver to move his car to a safe place for changing tires. It is made of black and gold rubber. The black rubber forms the

bulk of the tube, with the gold compound vulcanized over the inside circumference to resist chafing. The tube is puncture-sealing, incorporating plastic gum on the inside surface of the tube wall. When a hole is made in the wall, the gum flows into it, preventing air leakage.

Wheel Rolled on Road Map Determines Auto Mileage



Mileage along any route may be determined in advance by rolling an indicator along the route on an automobile map. The body of the machine is a set of gears with five to one reduction, with the measuring accomplished by a traction wheel. The indicator may be adapted to maps of all scales by proper graduation of the traction wheel to a particular scale. It can be carried in the pocket.

GRASSHOPPER INCREASE SEEN

Warning that grasshopper trouble might be expected in six northwestern states this year resulted from a government survey of grasshopper eggs in the soil of those areas. Increased numbers of the pests may be expected in Montana, Nebraska, Wyoming and the Dakotas, and possibly in Minnesota, where an effective control program has been carried on for two years. Grasshopper damage in North Dakota in

Indicator Determines Distance of Auto Trip When Rolled on Highway Map

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Maps of Meter Mfg. Co.

Lee Strong, Bureau of Entomology

1933 amounted to more than \$10,000,000. Three species of 'hoppers have been entrenching themselves during the years when financial difficulties prevented local agencies from doing a good control job. A fourth species, the Rocky Mountain locust, also is expected back this year. Nature, by means of cold, wet weather in the spring sometimes takes over the control job.

2/21/34

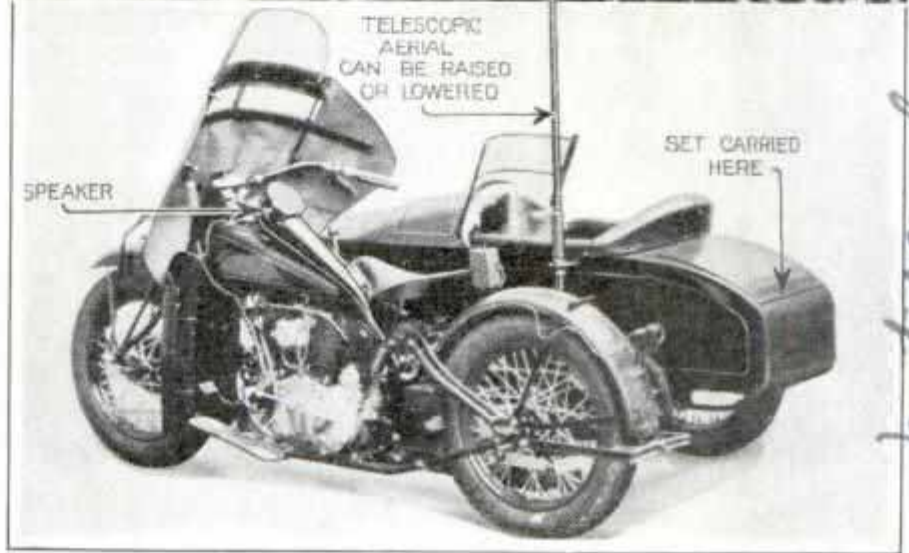
Used in main State Highway Police



Springfield, Mass. motorcycle

D466
NEW BRAKE LINING
"BURNED IN"
BY GRINDER

Bus and truck operation is made safer by a cutting machine that "burns in" new brake linings before the vehicle leaves the repair shop. After taking the inside measurement of the brake drum with calipers, the lining is placed on the brake shoe to correspond to these measurements. Then the lining is ground true and smooth by small carborundum wheels rotating around the axle shaft, resulting in a perfect fit between the shoe and drum.

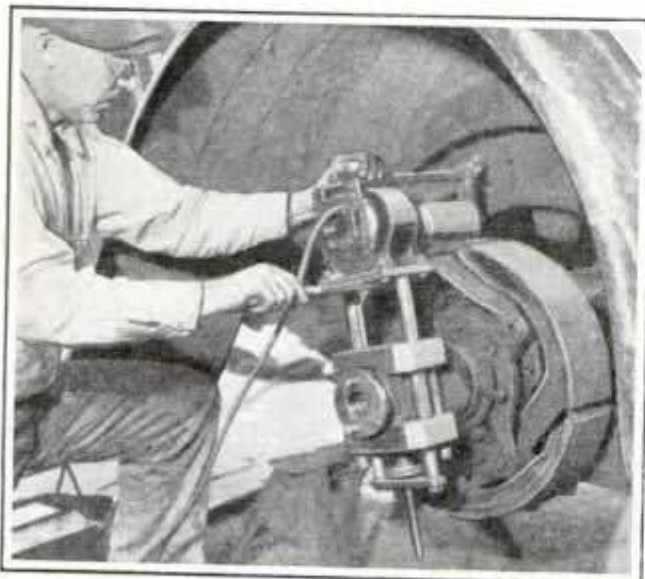


Top, Motorcycle Policeman Makes Note of Message Delivered by Radio; Bottom, Telescopic Aerial Rod for Motorcycle Radio

RADIO FOR POLICE MOTORCYCLE
FITS ON HANDLEBARS

So compact that it can be carried in a steel insulated box on the handlebars, a new short-wave radio receiver has been developed for the use of motorcycle policemen. The set is protected from road shock by being suspended on springs inside the box, which rests on sponge-rubber shock absorbers. Electrical power is supplied by the motorcycle battery. Long steel tubes extending to the front mudguard of the motorcycle act as braces and also form an aerial. Spark plugs of the engine are insulated to prevent interference.

Adhesive tape with a waterproof backcloth is being produced for outdoor use or in surgical cases where frequent washing is necessary.



Device for "Burning In" New Brake Lining Before the Truck or Bus Takes the Road

Martin Schreiber
 Public Service Coordinator

1934 Banner of you can do it
 how to do it

Red Cross Products Ltd.

Rainbow Seen from Plane Is Circle of Color



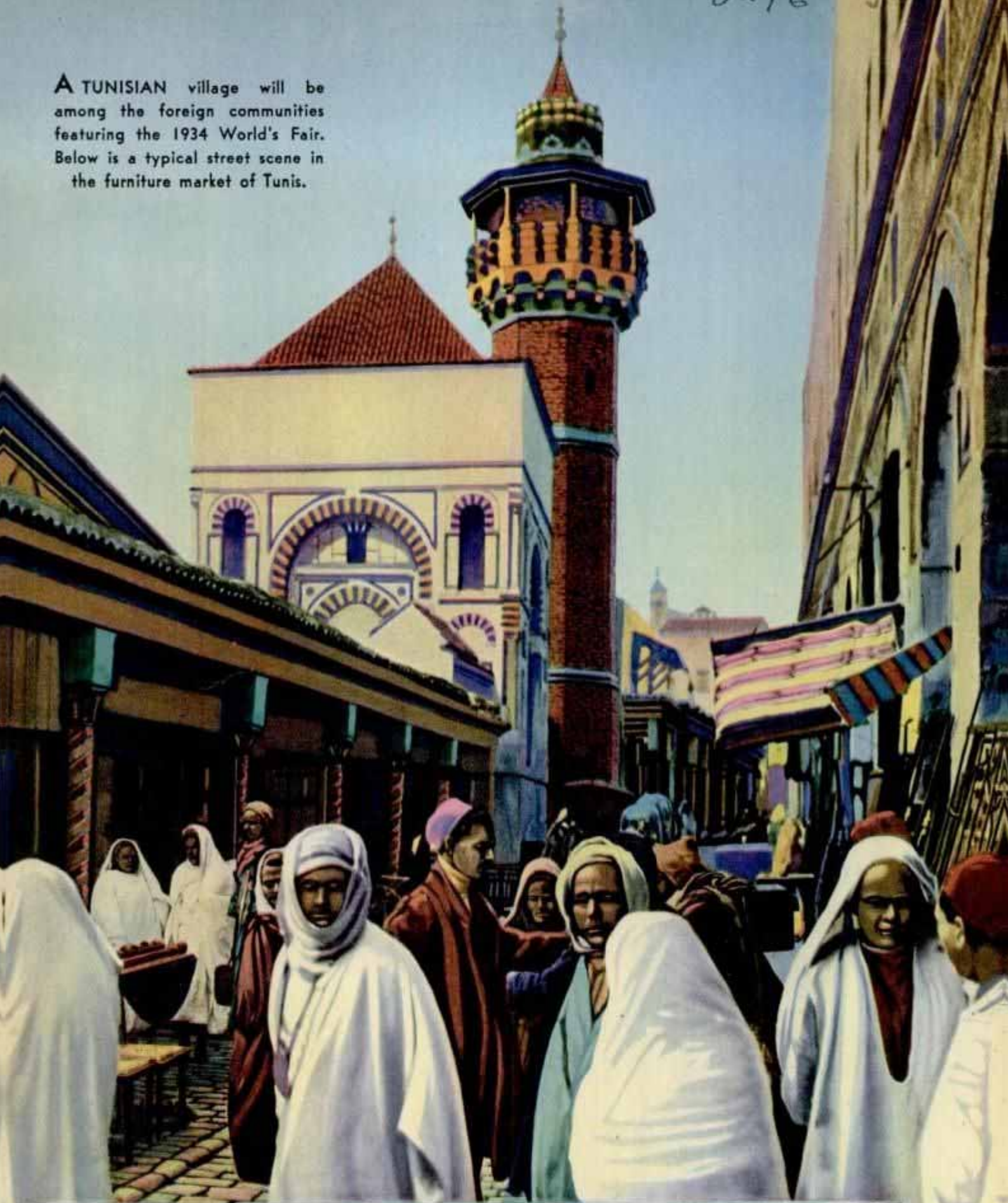
Drawing Showing How Rain-Circle Appears from Plane with Shadow of Ship in Its Center; the Circle Forms on Banks of Clouds beneath the Ship

Viewed from the ground, the rainbow is one of the most beautiful of nature's spectacles, but from the sky a similar phenomenon is even more magnificent. A few transatlantic flyers and other aviators have been lucky enough to see the sight, among them Miss Amelia Earhart and her aviator and mechanic on her first crossing of the Atlantic. Late in the afternoon of the first day they saw ahead, not a rainbow, but a rain-circle lying flat upon the top of a fog bank below them. The ship was then flying at an altitude of between 4,000 and 5,000 feet and all around the circle of luminous colors tumbled a mass of clouds of

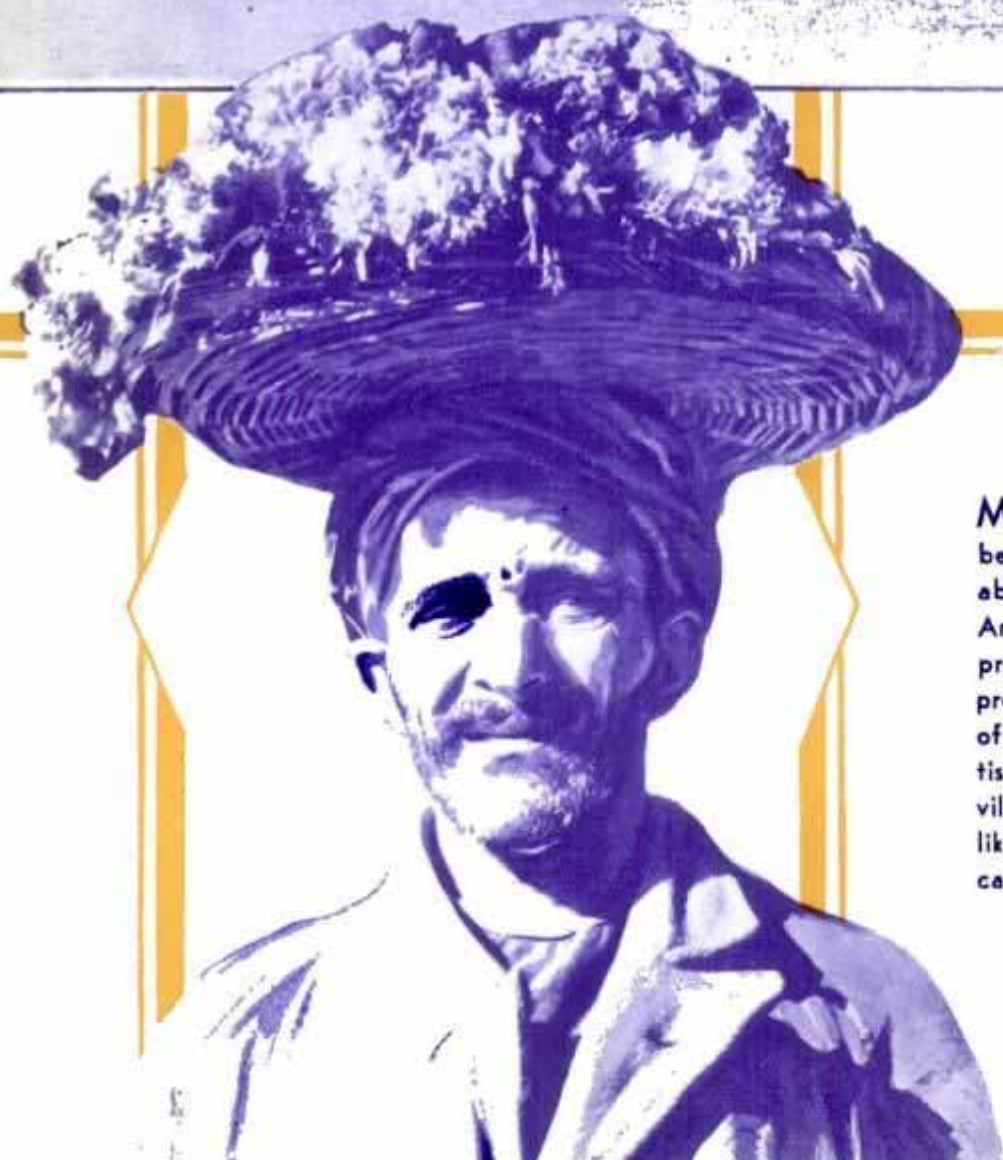
varying hues lighted by the rays of the evening sun. From the clouds ahead the shadow of the plane was refracted into the center of the rain-circle. Other flyers have reported seeing a similar sight and it is also sometimes glimpsed from mountain tops when the sun is near the horizon.

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

A TUNISIAN village will be among the foreign communities featuring the 1934 World's Fair. Below is a typical street scene in the furniture market of Tunis.

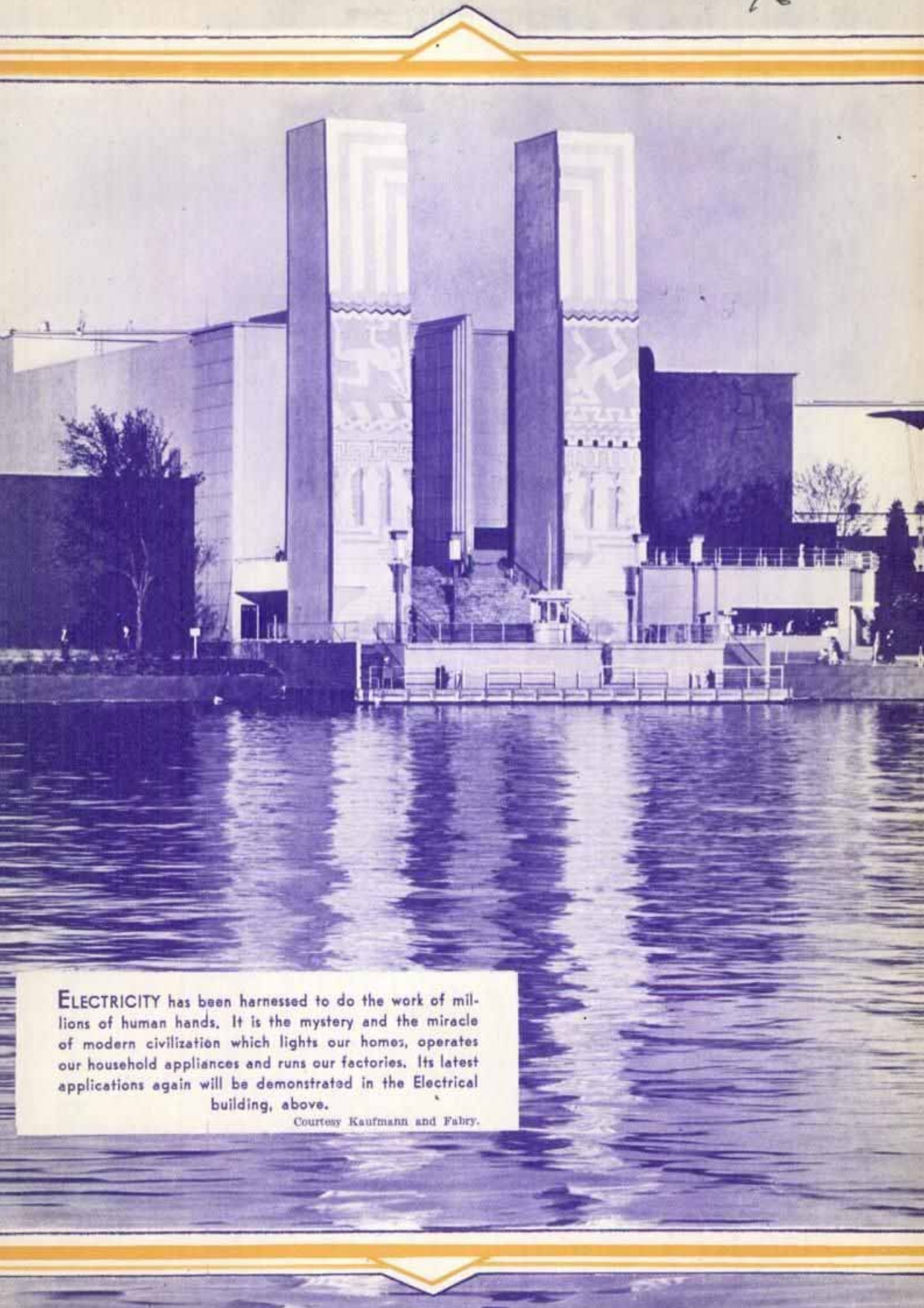


The New
CENTURY of PROGRESS



MANY more animated exhibits will be seen in the Hall of Science, shown above, than were presented last year. An effort has been made this year to present the dramatic story of the progress of science from the viewpoint of the layman, rather than the scientist. Left, visitors to the Tunisian village may encounter typical natives like this Tunis flower merchant who carries all his wares on the top of his head.

Copyright Publishers Photo Service.



ELECTRICITY has been harnessed to do the work of millions of human hands. It is the mystery and the miracle of modern civilization which lights our homes, operates our household appliances and runs our factories. Its latest applications again will be demonstrated in the Electrical building, above.

Courtesy Kaufmann and Fabry.

PART of the Belgian village which charmed Fair visitors last year and gave the cue for building other foreign communities.

D 296

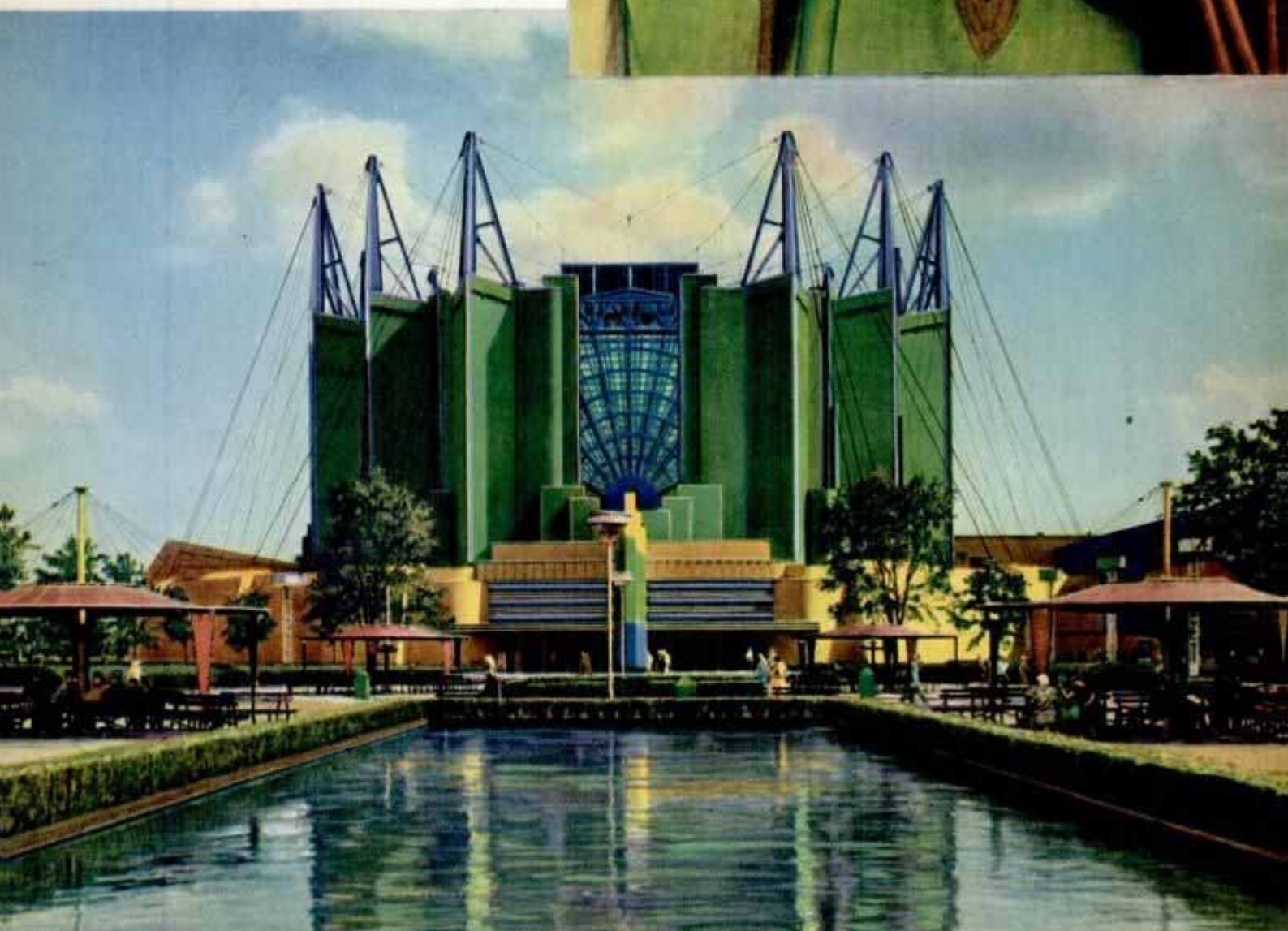


Roberts, 420 3 Locust
St. Phila (Ohio)

HOW would you like to make a trip around the world in a day, stopping for an hour or two in England and France, seeing the sights of Italy, Spain, Ireland and Switzerland, paying a visit to Germany and China and catching a glimpse of such out-of-the-way places as Tunis and Morocco?

This is part of the lure of the Century of Progress for 1934 which has been transformed into an international exposition by adding to the wonders of industry and science shown last year more than a dozen foreign villages, each a faithful miniature of the nation it represents.

RIGHT, an Arab sheik such as may inhabit the Tunisian village. Below, the Travel and Transport building with its "sky hooks" supporting the roof.





THE "Sky Ride," above, again will give visitors an aerial thrill. Left, the Illinois Host building, a symphony in symmetry.

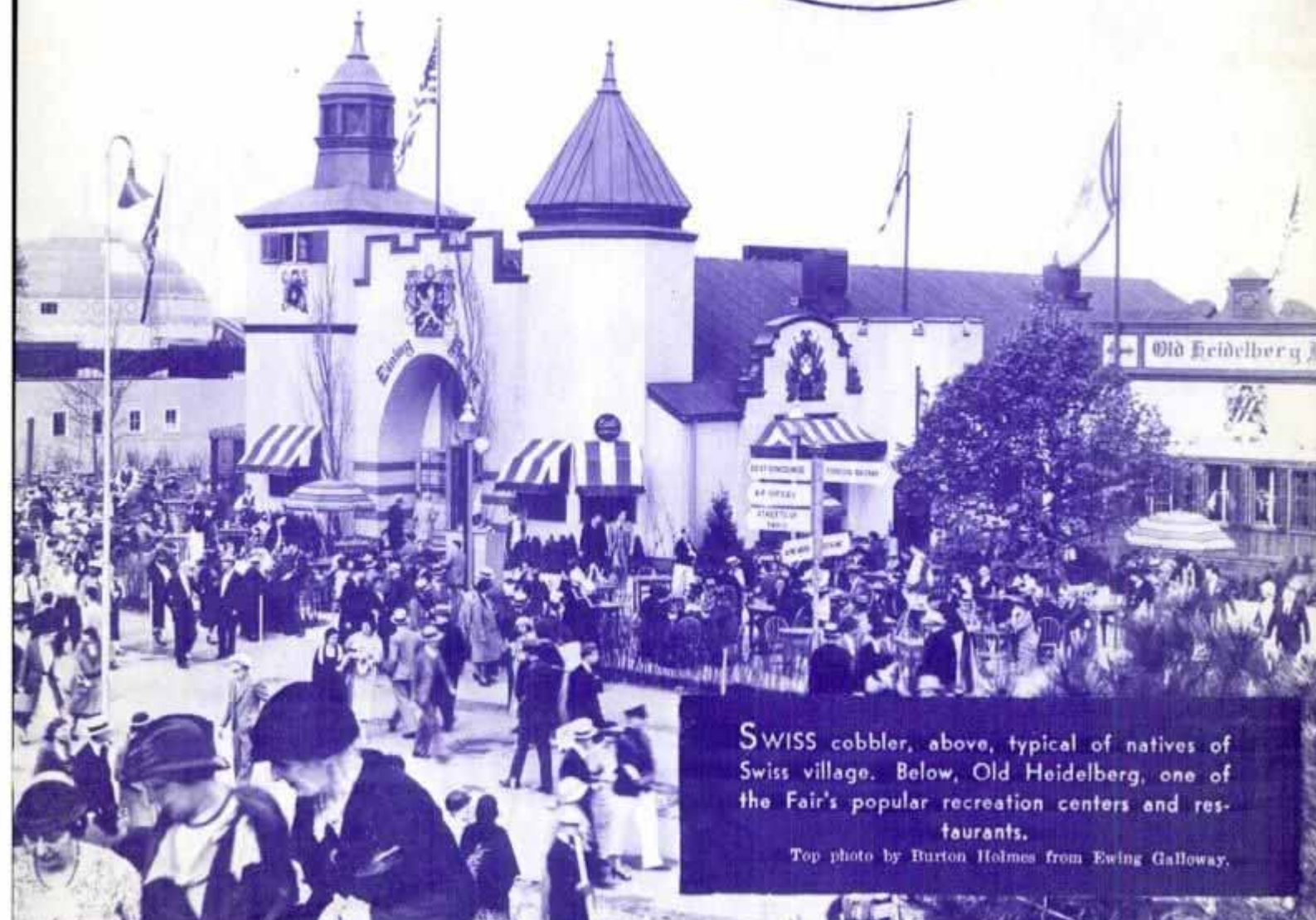
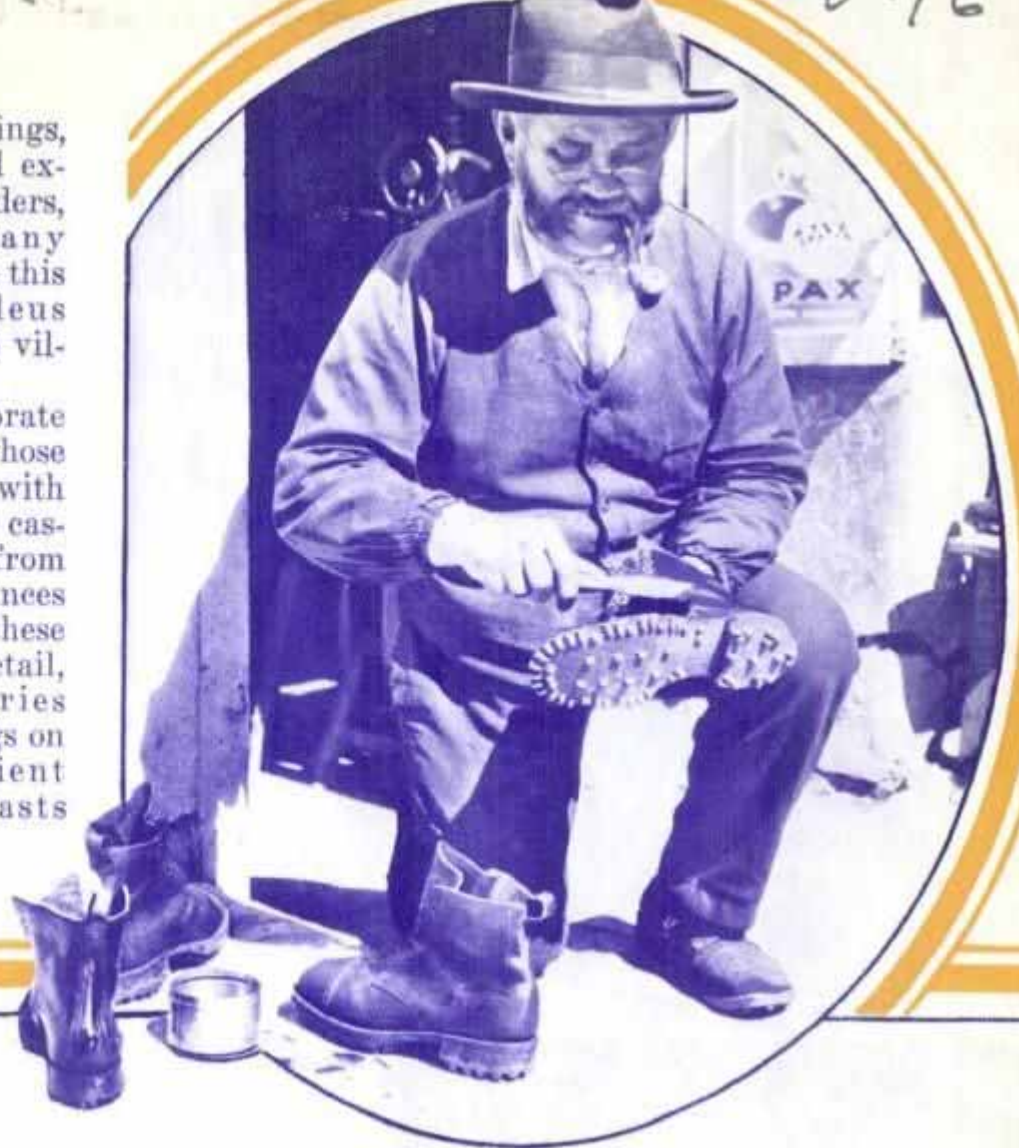
These foreign communities, depicting the architecture, industries, customs and dress of most of the principal countries of the world, will give visitors an insight into other nations which could be obtained otherwise only by expensive travel or by weeks of intensive reading and research.

The mediæval Belgian village of last year which charmed millions of visitors with its age-weathered stone towers, winding cob-



bled streets, quaint buildings, old-world population and exact detail of life in Flanders, gave the cue for the many picturesque communities this year and forms the nucleus about which cluster these villages of the nations.

One of the most elaborate is the Spanish village whose three acres are covered with reproductions of historic castles and other structures from the six most famous provinces of Spain. To produce these feudal towers in exact detail, architects and antiquaries made moulds and rubbings on the spot from the ancient buildings themselves. Casts



SWISS cobbler, above, typical of natives of Swiss village. Below, Old Heidelberg, one of the Fair's popular recreation centers and restaurants.

Top photo by Burton Holmes from Ewing Galloway.



ABOVE, one of the sights of the 1934 Fair will be a Swiss village with inhabitants in native costume. Below, one of the entrances to the exposition.

were made in plaster from the moulds, and these casts formed the models for making exact duplicates and providing the same coloring. Native people wind through the old streets lined with Spanish workshops and restaurants.

Reminiscent of the Moorish conquests is the Tunisian village, a typical North African hamlet with its "souks" or bazaars, a mosque where a priest calls the faithful to prayer and an Arab theater presenting native entertainment and music. Appropriately near is the "Oasis," representing a Bedouin village on the edge of the great desert. Bedouin war dances,





ABOVE, jugglers in the Chinese theater. Native entertainers feature the exhibit of many countries. Below, the Chinese pavilion with its ornate carvings.



D 296

drills of the French Foreign Legion and native craftsmen hammering their silver and brass ornaments will greet visitors here.

The entrance to old Italy is a reproduction of the gateway of Signa with a tower representing the Campanile of San Gimignano. Here the visitor finds himself in the Piazza Benito Mussolini, with the Vias Marconi and Cristoforo Colombo to his left and right while before him rises an antique temple. A leaning tower from Bologna, a reproduction of a feudal tower of the thirteenth century is another feature.

The Swiss Alpine village has as background a reproduction of the mountains with

D296



THE Old English village will be as typically British as this street scene.

synthetic snow, chalets and St. Bernard dogs. This village is a reproduction of the older portions of Berne where Swiss watch makers, yodelers and native dancers entertain visitors. Nearby is the German Black Forest

village, a winter scene with synthetic snow and icicles, snow covered hills and a frozen mill pond in the center for ice skating all summer long. Air conditioning plays an important part in carrying out the illusion of cold



A TYPICAL Fair crowd wending its way along the Avenue of Flags which changes its color daily as various nations are honored.



GERMANY'S Black Forest village will display cuckoo clocks. Here is a typical clock peddler and his wife, dressed like characters in a comic opera to advertise the timepieces.

D 296



THE Swiss village will feature minstrels like these who, in their native land, go from one community to another and entertain tourists by yodeling and playing their mandolins and other musical instruments. Then they pass the hat. Below, a corner of the colorful Social Science hall, typical of the new architecture brought into prominence by the Century of Progress.





A CORNER of one of the main exhibition buildings with the tower of the Hall of Science and one of the towers of the imposing Sky Ride rising in the background.



weather by maintaining the buildings of this group at low temperatures. Around the mill pond are shops showing German home industries.

The French village this year represents a section of the old Montmartre quarter of Paris and the England of the sixteenth century is brought back in the Old English community which includes a reproduction of part of the famous Cheshire Cheese Inn of London, resort of Samuel Johnson and his literary cronies. Sulgrave Manor, ancestral residence in England of George Washington's family, the cottage of Anne Hath-
(Continued to Page 124A)



ABOVE, street musician from Barbary coast, typical of entertainers found in some of foreign villages. Right, Oriental girls in native costume.



A BOVE, model of Ford exposition building. The cylindrical section, representing gears, will be given the illusion of motion by using colored lights. Right, tower of Belgian village

D 296



0296

HERE are the 150-foot triangular towers of the Federal building which again will house the government exhibits. These towers represent the three great divisions of government.

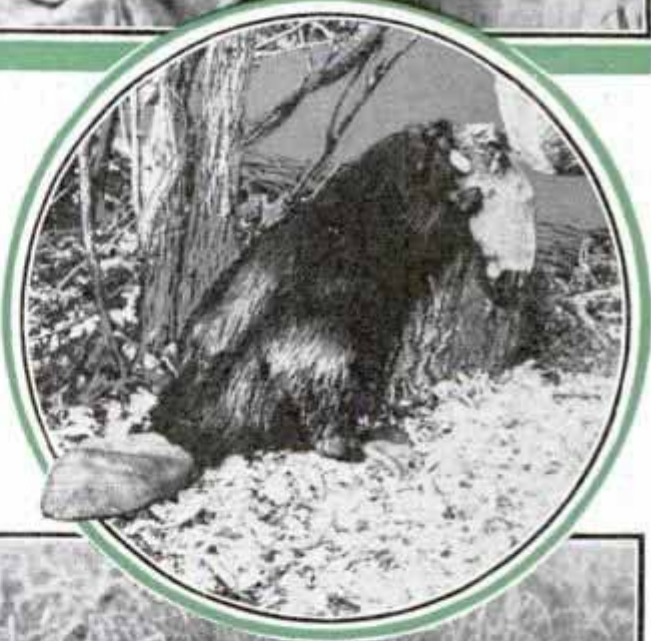
Commissioner Bldg. Toronto 2, Ont
Canada

D374

Beavers Staging a Comeback

BEAVERS may once more become the basis on which all furs are valued if experiments now being conducted by the National Parks branch of the Canadian government are successful. Once the coin of the realm, beavers became so scarce that today no white man may trap them in the Dominion, and Indians may do so only in limited areas. Beaver fur is scarce, where once it was the standard on which all fur dealings were based.

In order to bring the beaver back to its once multitudinous population, studies are being made of beaver life to find the best ways to increase its numbers. Besides being a valuable fur-bearing animal, the beaver is considered by government authorities as one of the best means toward forest-fire prevention, for it has been found that in regions in which the beaver is populous the least fires occur, and in those where the beaver has been wiped out by hunters and forestry



Top, Grey Owl, Indian Naturalist, Feeding a Baby Beaver; Right, Felling a Tree; Below, Tame Beaver Coming Ashore for Lunch



Handwritten text at the bottom of the page, possibly a signature or note.



Beavers Like Other Things Besides Leaves and Twigs; This One Is Nibbling at a Jelly Roll

He has gone so far in this study, that where he has found orphaned beaver kittens he has fed the youngsters from a bottle and even a syringe, giving them milk diets. As they grew older he fed them boiled rice, apples, and other foods not found in the woods. The beavers fed in this way have thrived. Grey Owl has learned also that the animals can be transported from one section of the country to another without harm. He has on several occasions taken them with him in boxes in his canoe, and on wagons and trains.

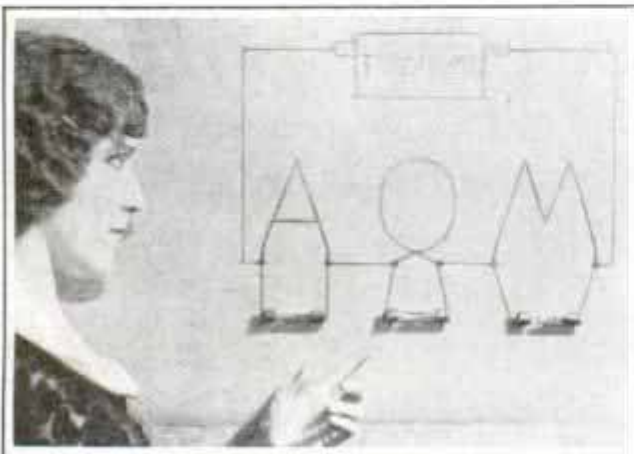
operations, the greatest fire hazard is to be found.

A half-breed Indian named Grey Owl has been made the official doctor and nurse of the beaver. He goes to the various parks of the government where the beaver is found in some numbers and then studies the habits of the animal. He has made friends with the beavers wherever he has gone, so that they come to him at his call, invade his house, and become attached enough for him to find out what foods besides twigs and leaves they like best and which are most nourishing.

Other experiments have shown that beavers brought up from kittens on special foods and kept in a tank in a cottage for the winter will in summer go back to the streams and the woods, to fell trees, build dams and lead their natural life.

Grey Owl's activities as guardian of the beavers include the breeding of strong virile colonies. Through trapping, the interbreeding among some of the colonies has weakened their resistance to weather and other animals. In such cases beavers from vigorous colonies are brought in to strengthen the weaker groups.

"Cut-Out" for Neon-Light Sign Reduces Fire Hazard



"Cut-Outs" Connected to Letters of Neon-Light Sign to Shunt Out Defective Units

Damaged or defective neon units are shunted out by employing a simple "cut-out" which greatly reduces the fire hazard in the use of such displays. The cut-out is connected with simple clips across each neon letter or unit of letters. In the event of failure of one section of neon, a fuse is melted and a pair of contacts close, allowing the balance of the sign to function normally but preventing the flickering and buzzing common to cases of uncontrolled transformer voltage. It is easy to replace fuses and it is claimed the device, to a great extent, will help keep transformers from burning out.

Sidney Wood, 1130 W. 10th Ave

0355

MOWER SHARPENER ON TRUCK IS COMPLETE BUSINESS

Operating a light truck in which is mounted a power-driven sharpener for lawn mowers, a Wisconsin man goes after business and does the work on the spot. The sharpener is efficient, automatically sharpening the blades and cutter bar together to produce an excellent cutting edge. The sharpener is said to do the work faster than similar devices. Removal of the handle from the mower is unnecessary. With one wheel slipped off, the mower is clamped in the sharpener and the power turned on. Several different chucks are provided to adapt the sharpener to all sizes and styles of mowers. The sharpener is available in motor or belt-driven models for installation in trucks or machine

*Daley Mfg Co.
11-15 Main St. N.E.
Minneapolis, Minn.*



Traveling Shop Consists of Small Auto with Lawn-Mower Sharpener Built on Rear Deck

shop. A grindstone attachment also may be obtained for use with the outfit.

AUTO SPRING COILS DEFY ALL TORTURE TESTS

D117

Coil springs in the front-wheel suspension of one 1934 automobile are made of a super-strength steel alloy. In tests, the springs have been subjected, under hydraulic pressure, to 1,800,000 "ups and downs," without breaking. This is more action than the springs would receive in

Plymouth motor



This Steel Rod Is Twisted into a Coil Only a Few Inches Long for Use in Modern Automobile

ten years of use on an average motor car. Each spring is rolled out of a steel rod 147 inches long, actually longer than the wheelbase of the automobile for which it is intended, the Plymouth. The spring is part of the new independent wheel suspension system which increases comfort for driver and passengers.

CLOCK LIKE STUDENTS' GLOBE TELLS TIME AROUND EARTH

D369

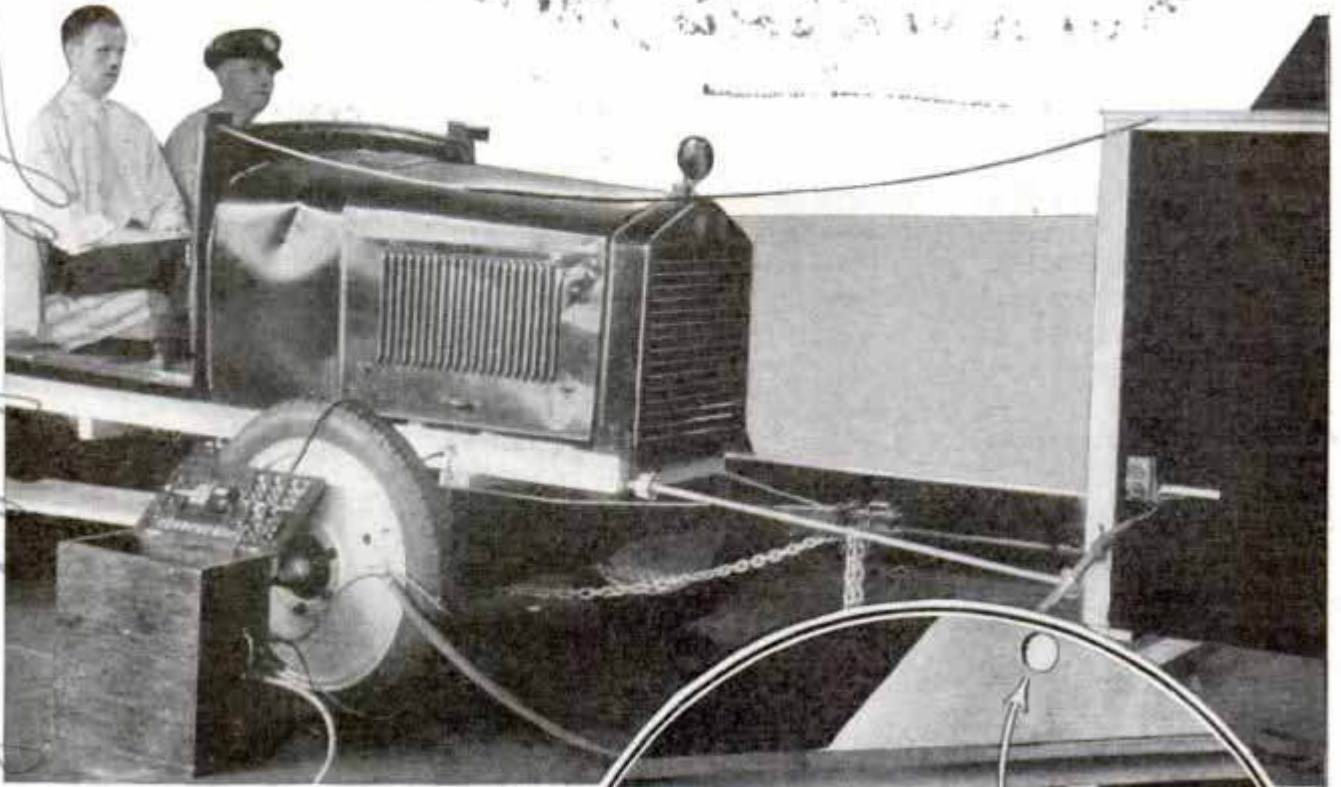
Shaped like the globes used in geography classes, a "world clock" tells time for any place on the earth. It is encircled by white bands to denote hours, minutes and seconds, which rotate in opposite directions about the sphere. Time is found by noting where a vertical line from any particular point on the map intersects the "hands." The year, month and day also are shown.



Minneapolis, Minn.

fr. Mr. Frank J. ...

Toy Car on Moving Road Tests Driving Skill



Dummy Car for Testing Driving Skill; Right, Toy Car and Moving Highway Screen Watched by Driver Tested

Accurate tests of the ability of automobile drivers are made at Iowa State college with the aid of a dummy car and a toy auto beneath which a miniature highway moves. The person tested sits at the wheel of the dummy car and looks into a miniature stage across the front of which is a bar with a toy auto attached to it. The steering wheel of the dummy car controls the toy car and the accelerator controls the speed of the moving road. The moving highway consists of an endless leather belt on which is painted a road which winds, branches, comes to intersections or goes straight. Since the belt moves from back to front, it passes under the car attached to the rod, giving the same effect as though the toy car were traveling forward over the road. Part of the test is to steer so the toy car will be directly over the right side of the road as the highway passes beneath it. In addition the driver must observe directional signs flashed at the back of the stage and a stop and go signal at the top. Errors are count-



ed by the examiner and an automatic check is made of the steering. It has been found that the observant, quick, cool driver invariably makes the best score.

D324

GAME SCORER KEEPS TIME FOR BASKET BALL FANS

Mysteries of timing and scoring will be revealed to both the audience and players by a mechanical scoreboard designed for basket ball. It is ten feet long and seven feet high, containing nearly 7,000 parts. In the center is a three-foot stop watch

Dr. A. P. Lower, associate professor of psychology
 Ames, Iowa

D343

445 N. 7th East D 364
 Logan, Utah
 Hayes
 Eva House
 Mrs. Steer
 Eng.

which times the game by minutes and seconds. As the hand of the block ticks off the last second of the game, it automatically fires the closing gun. On each side of the clock is an eighteen-inch clock, one indicating time-out periods and the other the ten-second backcourt rule, called the "off goal timing." Each timepiece sounds a signal as the period ends. Beneath the timing units, which are controlled from the officials' table, is the scoring section of the board, subdivided for home and visiting teams. Team and individual scores are shown, enabling the fans to keep up with the scoring of each player. The control unit is connected to the scoreboard by a cable containing 102 wires. Fifty-two push buttons control the scoring section and three tumbler switches control the time. Plug-in units which fit into the palm of

10% Physics Dept. Wash

State Agricultural College Logan



The Facial Expression of This Model Is Controlled by Motor Which Causes It to Smile or Frown

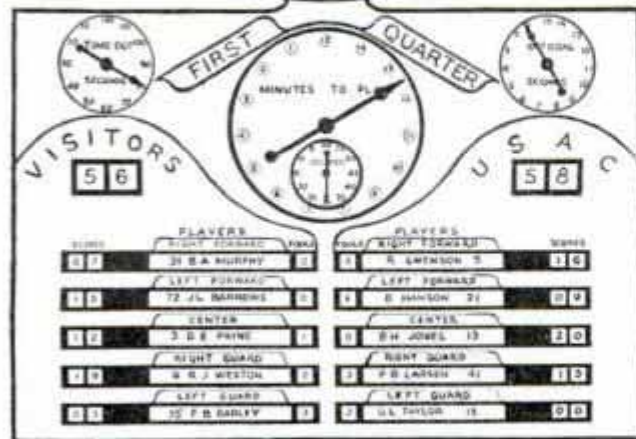
EXPRESSION OF MODEL'S FACE CHANGED BY MOTOR

Lifelike changes of expression are produced in the face of a model head made by a sculptor. The facial expression is controlled by a tiny motor and as the motor runs the face first smiles, then sneers and finally becomes coy or demure.

D404

ELECTRIC PENCIL SHARPENER

Capable of putting points on twenty pencils per minute, an electric pencil sharpener starts automatically when a pencil is inserted in it and stops itself when a point is made. A primary circuit breaker starts the motor when the pencil is inserted and stops it if the pencil is withdrawn for any reason, while a secondary breaker stops the sharpener when the point is made without wasting any of the pencil. Crowding or pushing a pencil stops the motor before the point is broken.



Basket Ball Scoreboard Being Moved for Game; Bottom, How Board Presents Essential Data

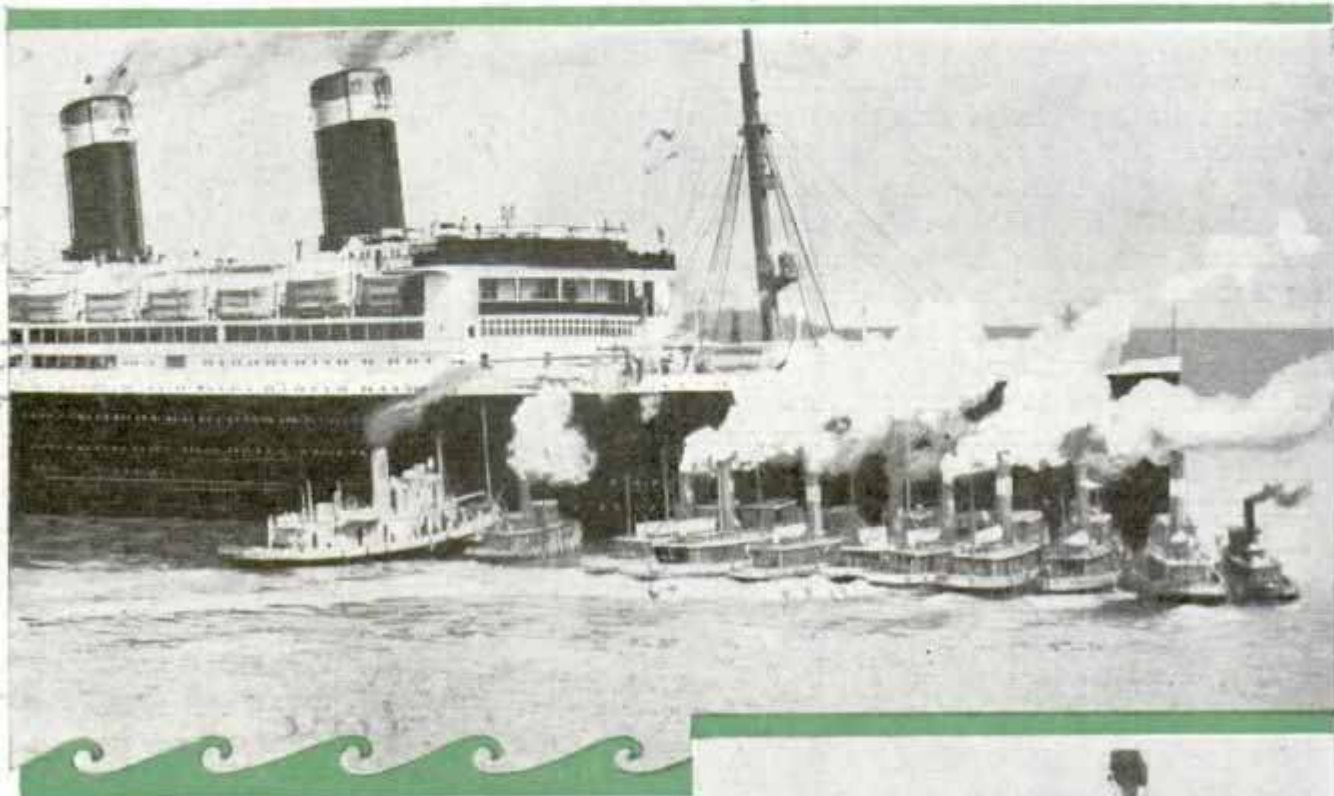
the hand make possible the subdivision of control between timekeepers and scorers.

C. P. Bohland, 902
 Shelby Ave St Paul

Courtesy of Pollock & Co. Industrial

166
 1941-1923
 Dated Paul

COWBOYS *of the* DEEP



By EMILE C. SCHNURMACHER

"COWBOY" of the deep, the modern tugboat, deliberately looks for trouble. Such is the code of the tugboat men that, besides "riding herd" on \$1,500,000,000 worth of shipping, salvaging \$15,000,000 worth every year, speeding the arrival and departure of liners, they still find time to hunt trouble. And in finding it they have contributed many heroic chapters to the epic of the sea.

Thousands of improvements have been made upon the steamship since the invention of the "Clermont," but science has not devised anything that will prevent a graceful greyhound at sea from changing into a lumbering elephant in the harbor. Marine engineers have gone a long way toward solving the problem by improving the tugboat to such an extent that in a fight with the elements it is capable of taking charge of a ship many times its size and tonnage.

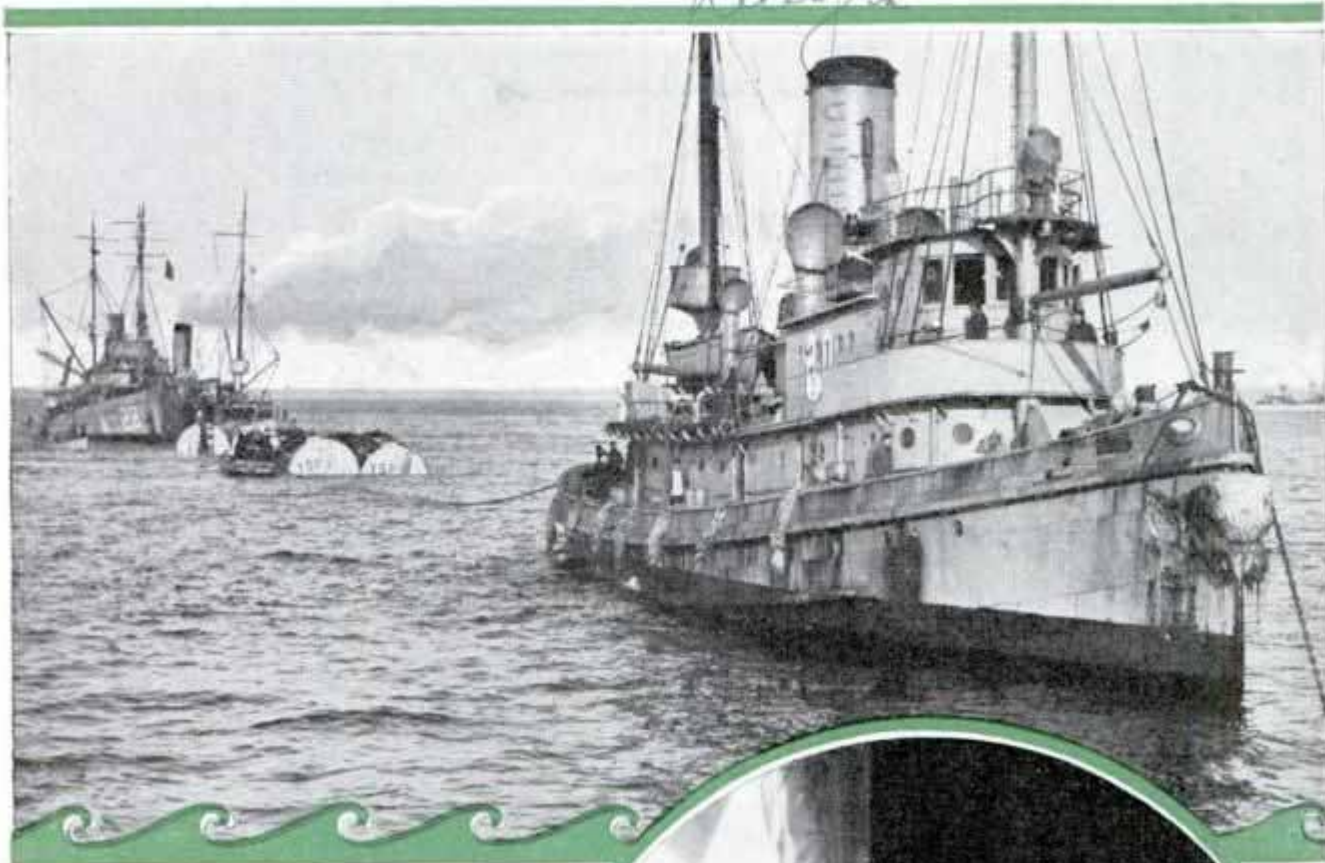
So important indeed has the tugboat become, according to John Sullivan, chief operations office of the Dalzell Towing Line, that if it stopped its daily "roundup"



Top, Tugs "Riding Herd" on the "Leviathan"; Bottom, Handling the Historic "Constitution"

21 State Street

22 E 69 H St
New York



for a week, the country would be virtually at a standstill, with food, fuel and other necessary commodities tied up in warehouses, trains or in ships.

Despite its squat and ugly appearance, the modern tugboat has been equipped by science with the most sensitive controls to be found in any boat. These are a vital necessity in maneuvering a liner into midstream, because even a slight error might result in destruction of the tug or serious damage to the liner. Tugboat engines, tremendously compact power plants, are rated at 800 and more horsepower, every bit of which is used when a boat is nosed into midstream, creating a tremendous obstacle which must be pushed, its length and depth acting as a dam to the wall of water behind it.

Telegraph apparatus, powerful marine glasses and other modern devices make it possible for the cowboys of the deep to gather quickly to herd one of their ungainly charges into a berth. It is one of the unpardonable sins of tugboating to be



Top, Towing Submarine "S-4" After It Had Been Raised from Bottom of Sea; Bottom, Dispatcher Keeps Tugs Operating on Schedule

late, and very few delays in New York harbor can be traced to any of the more than 700 tugboats that ride a watery range of 622 miles. Short-wave radio, like that used by police, has not as yet made its appearance on tugboats but is prophesied for the near future.

In the course of a day's tour, a tugboat may have to tow a blazing tanker, change



SS. PRES. ROOSEVELT. CLEAR. BAR. WIND. WEST. 15
 .CLOUDY..LITE.FOG.VIS .SLIGHT
 4

Top, Tugs Keep Traffic Moving;
 Center, Typical Message Giving
 Position of Liner; Bottom, Dis-
 patcher Keeps Eye on the Tape

the position of half a dozen freight ships and keep a rendezvous with other tugs to dock a 20,000-ton liner. All of these assignments must be carried out promptly in spite of the fact that the huge incoming liner may have battled heavy seas and be two or more hours late as a consequence.

Sitting at a window in a shack at Sandy Hook with a telephone in front of him, a marine watcher scans the sea with powerful glasses. Other trained observers are located at City Island, Quarantine, the Battery, Coney Island and other points of

vantage for observing craft entering the harbor of New York. Suddenly the Sandy Hook observer picks up his telephone to report the "Queen of Bermuda" which he recognizes by her lines long before he can see her name on the bow.

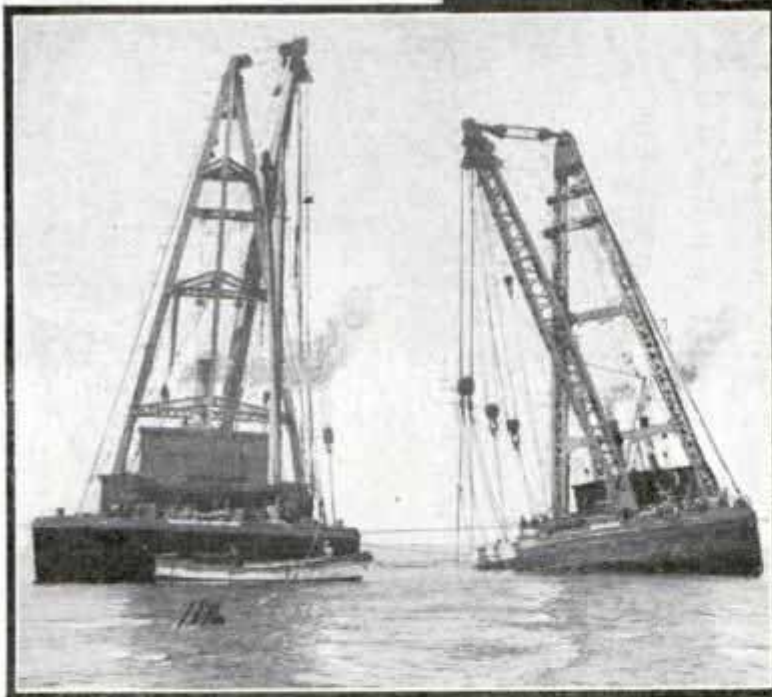
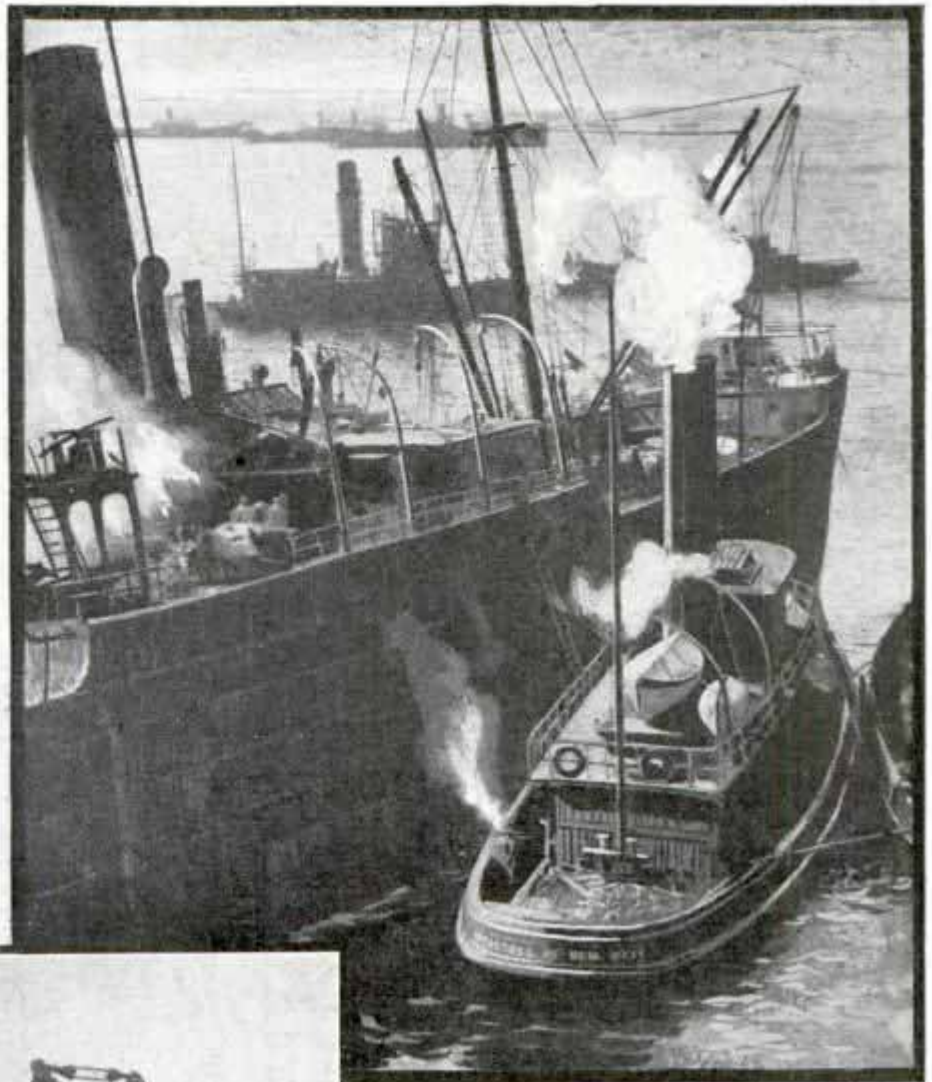
A few minutes later in the office of the Dalzell Towing Line, as well as in the offices of the other companies operating tugboats in New York, the telegraph ticker punches this message on a typewritten tape "... Queen of Bermuda ... passing ... Sandy Hook ... bound in."

Sitting in front of a huge chart of the harbor studded with many pins, each pin denoting one of his tugboats, Benjamin Brady, the dispatcher, locates tugs Three, Four and Seven on the chart. Tug Three is towing a railroad float loaded with freight cars from Long Island to Manhattan. Tug Four is moving coffee ships from their berths to a warehouse pier. Tug Seven is in the East river jockeying a fruit ship into a sailing position. All three of them have been assigned to berth the "Queen of Bermuda."

The dispatcher's phone rings and the

captain of tug Three reports from the nearest shore station that he has finished his task. The dispatcher glances at the ticker again. There is still time, for the ticker will notify him when the observer at Quarantine reports the vessel from that position. Tug Three is told to report back by telephone in half an hour. In the meantime it proceeds to a water plug to take aboard forty tons of water for its high-pressure boilers.

A short while later tugs Four and Seven report and receive their orders. When the "Queen of Bermuda" approaches pier 95 all three tugs are waiting to receive her and nose her gently into her berth.



*Top, Handling a Blazing Tanker Imperils the Tug;
Bottom, Tugs with Powerful Derricks Attempt to
Raise Sunken Submarine*

Although the cowboys of the deep for the most part ride a "local range," they are capable of traveling across the ocean. There are quarters aboard each tug to accommodate a crew of ten, although when riding the local range the crews generally

sleep ashore. The longest tow on record was made by the Dutch tugs, "Zwarte Zee" and "Witte Zee," which towed a 17,000-ton floating drydock, 584 feet in length, from the Tyne, England, to Wellington, New Zealand. As it was necessary to keep the unwieldy structure at sea as much as possible during the 14,000-mile tow, the tugs had to be bunkered alternately, one steaming ahead to the nearest port while the other continued towing.

"Because of the unexpected situations that constantly occur and because of the towboat's habit of looking for trouble, promotion comes quicker to a towboat man than in any other type of vessel, if he shows ability," says Mr. Sullivan.

"The waterways have witnessed more epics of towboat men's heroism than could be told in many volumes. There is, for ex-

(Continued to page 124A)

D316.

Manikins of Flexible Plastic Will Not Break



low-temperature brine through pipes placed in 116 wells driven in two concentric circles around the site of each shaft. After four months, the ice machine had frozen solid circular walls around the shaft sites, forming a shell that extended to the clay bed eighty-five feet below high water. Within this shell, the un-

see March 1933 369

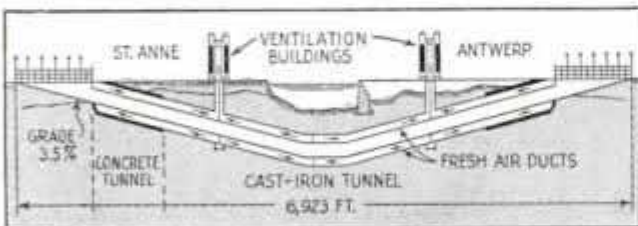
Display Figures Made of Flexible Material Which Will Not Break as Man at Right Is Showing

Manikins and other decorative figures formerly made of wax are being formed of a new material known as "flexique" which has the plasticity and appearance of wax combined with a durability greater than papier mache. This material can be shaped or molded into any sort of figure or design, it is claimed, and will not break even if hurled to the floor or stepped on. Many colors and combinations are possible and the color is inlaid so the figures are easy to clean. Arms made of such material will stand much stretching and twisting without permanent distortion.



ICE-MAKER HELPS SINK SHAFTS EIGHTY-FIVE FEET DEEP

Two great ventilation shafts for the new 6,923-foot vehicular tunnels at Antwerp,



Drawing of Great Tunnel under Construction at Antwerp, Showing Ventilation Buildings

Belgium, were sunk by a novel method. A refrigeration plant was used to circulate

frozen ground was excavated without the use of caissons or bracing. Then the shafts, made of reinforced concrete, were sunk, one on each side of the river.

D241 PRINT FOUR COLORS AT ONCE

Engraving four different letterheads at one impression, using two kinds of paper stock and printing four different colors at the same time, can be done by presses

Cont. L. W. Schaphorst
45 Broadway

Leased thru (royalty)
Nelson MacKenzie

Sweeney Service 2/5/34

equipped with a new feeder. A production of 5,000 letterheads per hour is claimed. Continuous production is made possible by elimination of racking and by special inks which dry under a heat treatment within twenty seconds. Cost is less than half that for hand-fed presses, but is five times faster. The engraving process is not affected by climatic conditions, static electricity or shrinkage of paper.

dnd. J. J. Dwyer

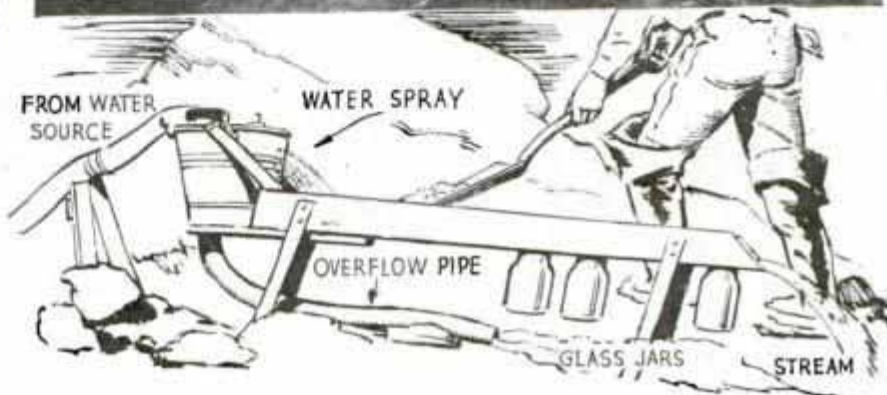


Standard Metal Products
 Co., 130 W. Louisiana St.
 Denver, Colorado

D 397

FOOT-REST BRACKET IS ADJUSTABLE

Draftsmen and others who work on high stools are made more comfortable if the stools are equipped with metal foot rests. The rest is hooked over the rungs of the stool and is adjustable. If the user has short legs, the short bars are attached to the top rung, but if he has long legs the short bars are placed on the lower rung of the stool, thus lowering the rest three or four inches.



Homemade Sluice Box for One-Man Gold Mining; Sketch Shows Simplicity of Construction; Note Use of Fruit Jars to Facilitate Recovery

SLUICE BOX WITH FRUIT JARS IS AID TO GOLD MINER

Recovery of more gold than is usually obtained by panning is claimed for a sluice box equipped with fruit-jar riffles. The one-man mining machine consists of a wooden box on legs, one dozen half-pint glass jars, a water pail and several feet of canvas hose. The box is just high enough to make the shoveling of gravel easy. With the box placed so that the mouth of the hose is upstream in the creek, a constant flow of water is obtained. After the water fills the pail to a certain level, it begins to spray the gravel in the box with the correct force to facilitate the separation of gold grains from the gravel. Contents of the jars are visible so that the value of the ore may be estimated easily. The riffle jars have the added advantage of holding quicksilver without amalgamating or the trouble of scraping in cleaning up. The outfit may be disassembled and folded for carrying when the day's operations are completed.

\$1.50

Brand at 1214 Arch St
 Phila

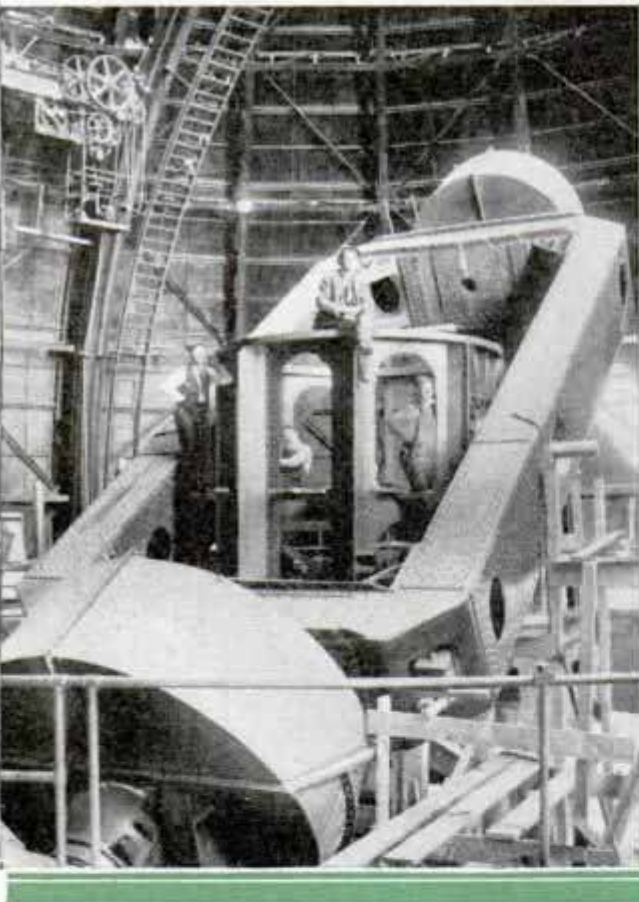


Bracket Which Provides Foot Rest for Stool When Attached to Rungs as Shown

DeLancey Sales Corp

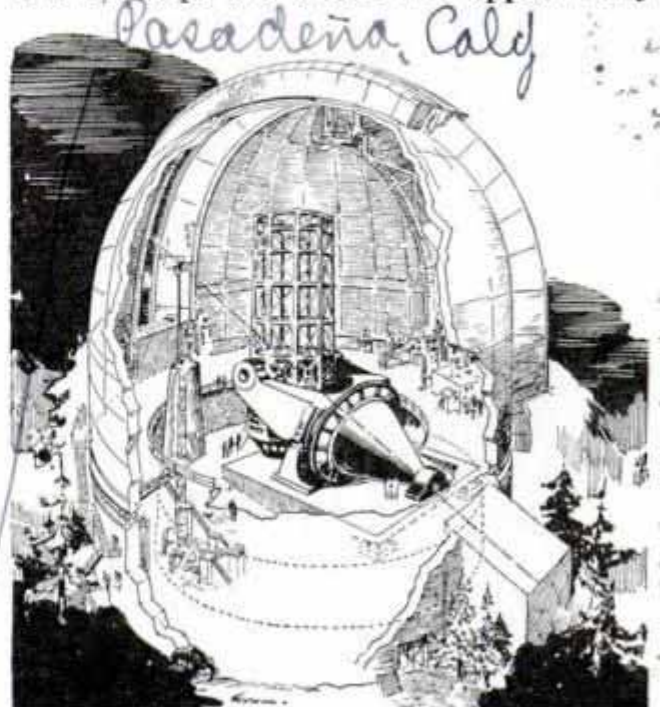
D 399.

The WORLD'S



Looking at the heavens with the aid of the most extraordinary piece of glass ever poured, they may make discoveries that will completely change man's conception of the universe.

After years of research the men in charge of building the monster instrument for the California Institute of Technology are now at work. Astronomers estimate that the mirror, 360,000 times more powerful than the human eye, will magnify the moon and planets 10,000 times. Through the telescope the moon will appear only



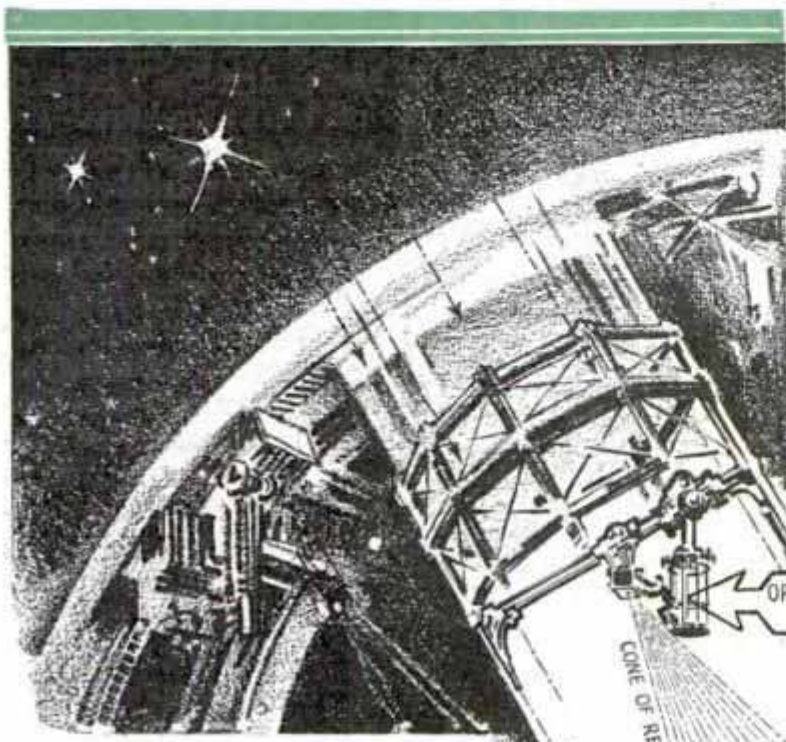
Top, Photograph Made with 100-Inch Mount Wilson Telescope; Below, Erecting the Instrument

A GROUP of American astronomers soon will experience one of the greatest scientific thrills of the century. On the night the world's most tremendous telescope is completed they will take turns peering into a tiny, brilliant eyepiece.

Cont. Thos. E. Stinson, Jr. Los Angeles, Cal.
10555 Hollywood Ave.

813 Santa Barbara

made at Corning Glass Works, Rochester, N.Y. D 379
BIGGEST EYE *Corning N.Y.*



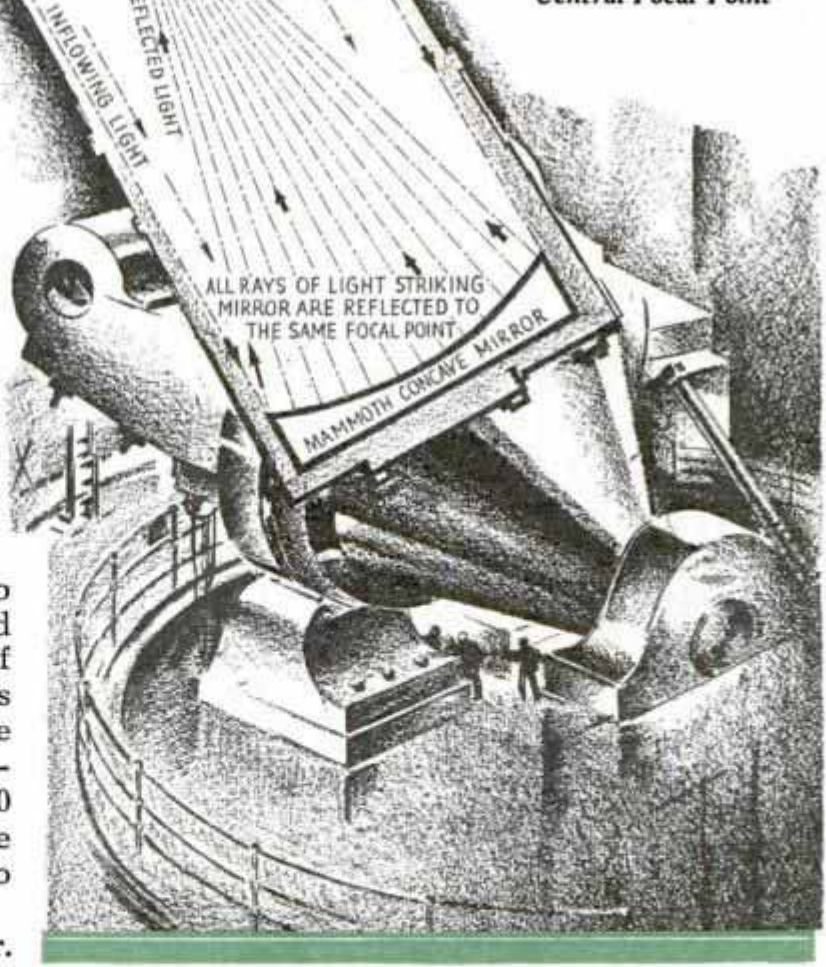
York which provided the \$6,000,000 telescope fund. Drs. J. A. Anderson and Francis G. Pease of the Mount Wilson observatory are in charge of the work.

Instead of gathering light by lenses, all large astronomical telescopes use a curved mirror to gather the light from a star and focus it at one point inside the barrel of the telescope. There a prism diverts the light to a point outside the barrel, or a flat mirror returns the gathered light

twenty-five miles away, at which distance large buildings could be easily seen. The 100-inch telescope on Mount Wilson, only half the diameter of the newest instrument, can detect a candle flame 5,000 miles away. With the aid of this telescope approximately 2,000,000 nebulae, each as crowded as the Milky Way, have been found. It can peer into space a distance of 400,000,000 light years.

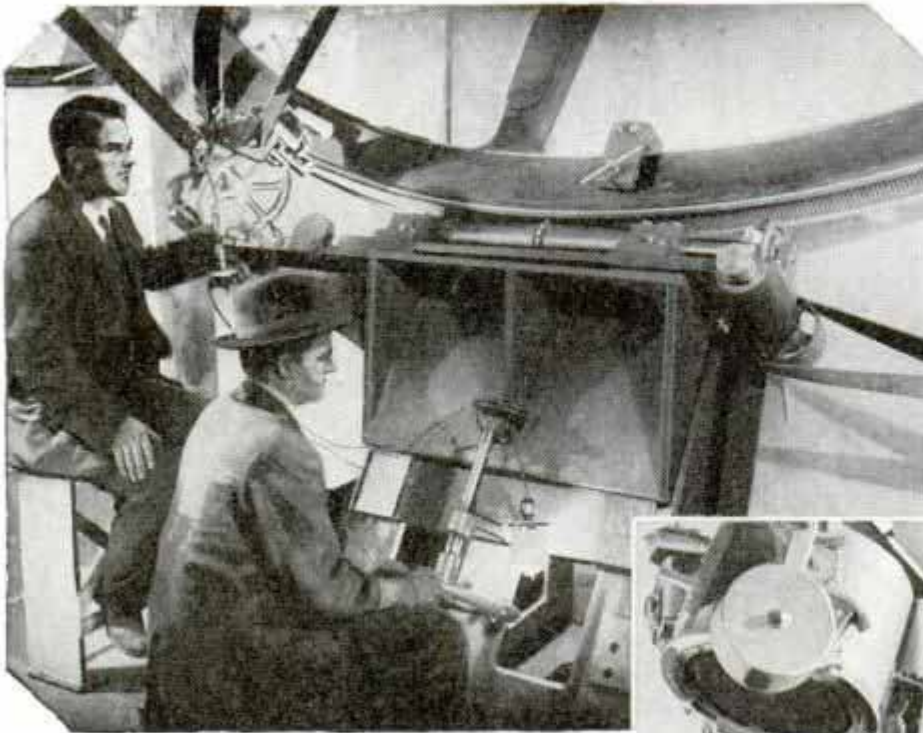
The new telescope, astronomers hope, will penetrate at least three times farther into space, thus opening an unexplored sphere thirty times the size of that now sounded. Already tasks that appeared insurmountable have been overcome in constructing the curved mirror that has 240 square feet of surface and is to be smoothed to an accuracy of two one-millionths of an inch.

Under the guidance of Dr. George Ellery Hale, who built the 100-inch telescope, leaders in many branches of science are co-operating with the International Education Board of New



Drawing Shows Position of Operator inside Tube of the Giant New Telescope; Note How Light Is Reflected by Mirror to Central Focal Point

through a hole in the center of the giant mirror. A striking feature of the new telescope is that for the first time an observer



Top, Cutting Teeth in Worm Wheel That Keeps Telescope Pointed at a Star

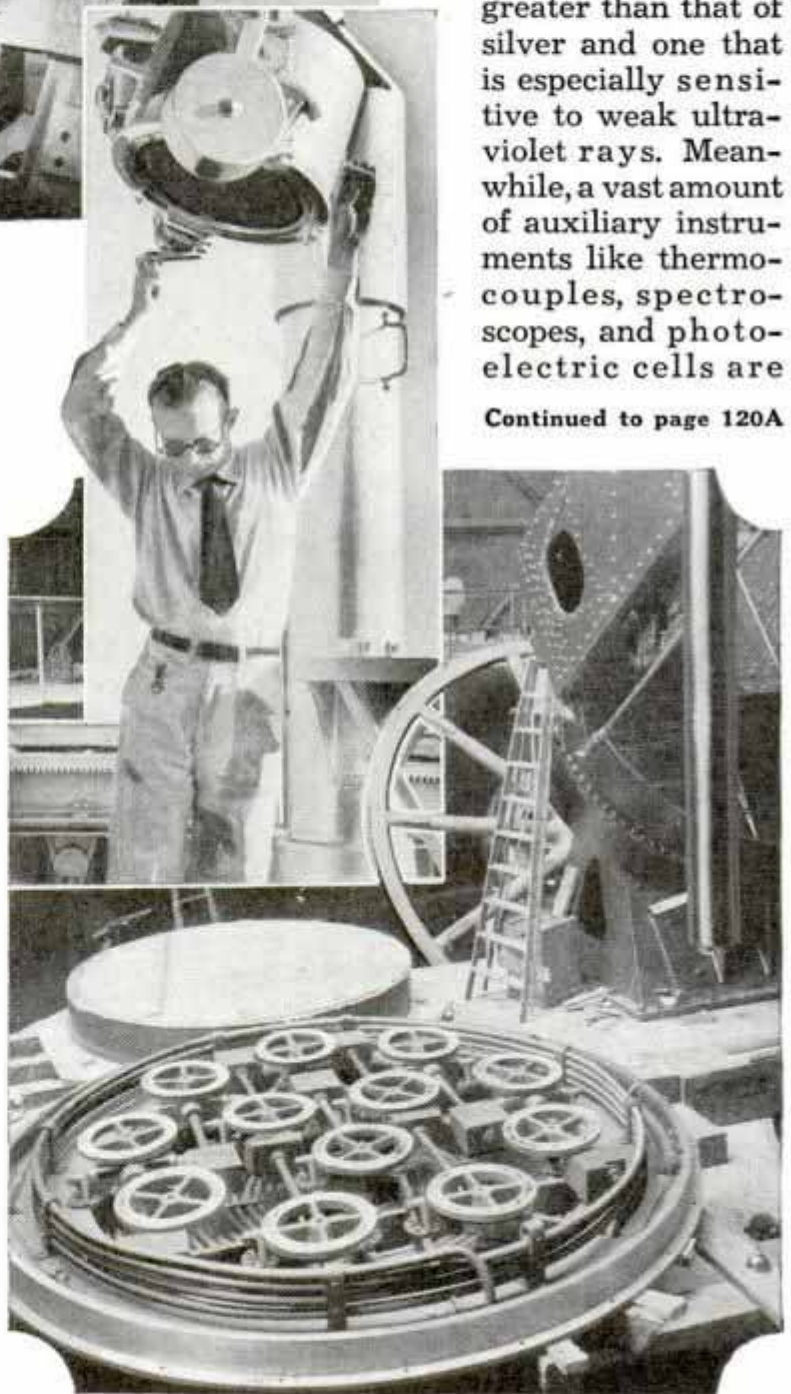
will be able to sit inside the tube, directly in the path of the incoming light, for in spite of the shadow the observer will cast on the mirror, less light will be lost than if the rays were shunted outside.

The most crucial part of the project—that of making the giant reflector—is now well under way. The problem was to find a material that could be ground to the necessary accuracy and that would remain unaffected by atmospheric changes. Glass and fused quartz were tried but a super pyrex borosilicate glass finally was selected after a trial mirror 120 inches in diameter, the largest ever made, was poured, allowed to cool and examined. The giant 200-inch disk of this substance was poured recently. Instead of a deep disk, the mirror is comparatively thin, with an intricate system of ribs and webs on the back to give the surface strength and to provide grips for the metal backing. Even in this thin form, the completed mirror will weigh nearly twenty tons. Months will be required for the mirror to cool, after which it will be ground and polished. In the final stages polishers will

work less than an hour a day. Otherwise the heat from their bodies might affect the curve on the surface.

Instead of silver, the new mirror will be coated with aluminum. Inside a huge vacuum chamber individual atoms of aluminum will be deposited on the glass surface, giving it a reflective power greater than that of silver and one that is especially sensitive to weak ultraviolet rays. Meanwhile, a vast amount of auxiliary instruments like thermocouples, spectroscopes, and photoelectric cells are

Continued to page 120A



Center, Adjusting Reflecting Mirror to Direct Sun Rays through Prism; Below, System of Disks Supporting Large Telescope Reflector

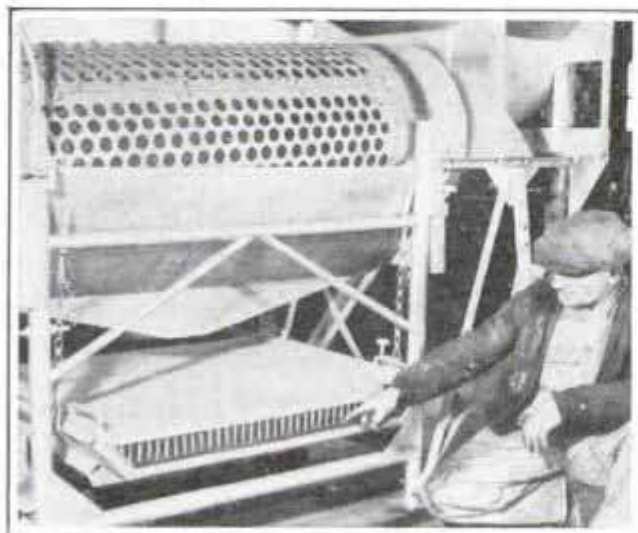
Ancient Pirate Gun Is Reclaimed from Sea

Weighing 150 pounds and resembling a cannon more than a firearm, a huge, brass-barreled, portable field piece has been recovered from the sea, where a pirate lost it, and added to a collection of ancient guns in Pasadena, Calif. The gun was one of those used by the pirate, Hippolyte de Bouchard, when he and 400 followers sacked Monterey in 1818. In returning to their ship, the men lost this gun when a small boat overturned. In later years it was recovered by fishermen who saw it on the ocean floor at low tide. Another firearm almost as remarkable is a gun with a very long barrel used by Spanish settlers in hunting. They believed that the longer the barrel, the further the ball would carry, and so used long-barreled guns to kill game at long range. The long gun has an over-all length of about ten feet.



Left, Long-Barreled Gun Used by Spanish for Long-Range Hunting; Right, Heavy Field Piece Recovered from Sea Where Pirates Lost It

Fingers Agitate Placer Dirt and Recover Most of Gold

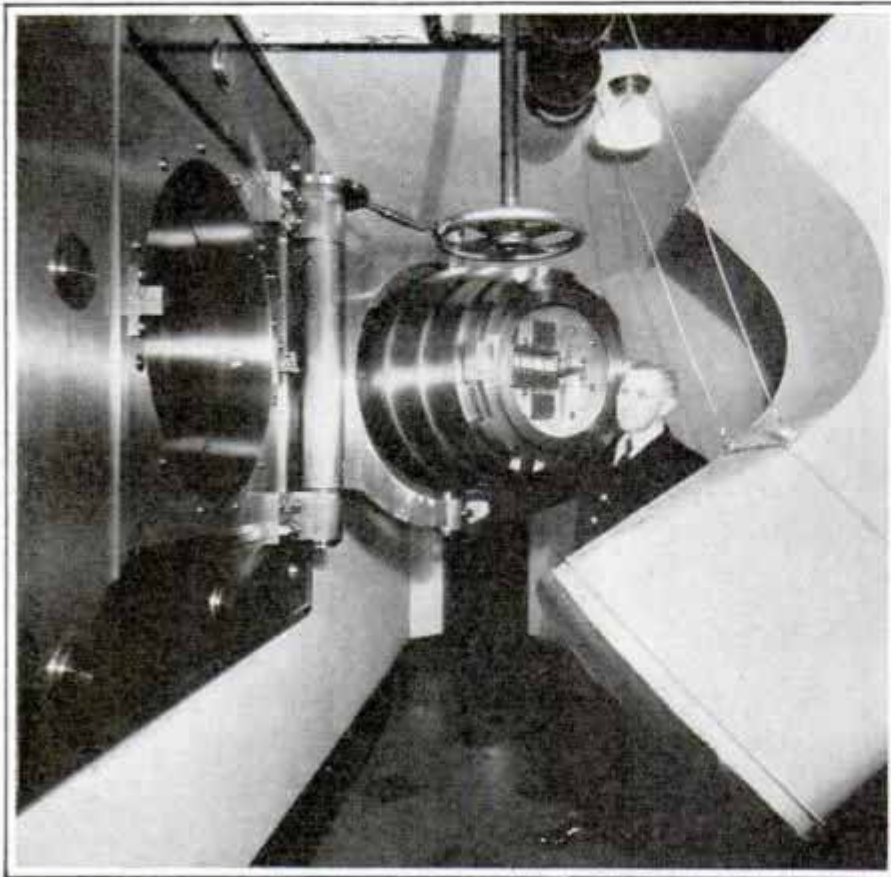


Fingers Agitate Dirt in Pan to Recover Gold

More than ninety per cent recovery of placer gold, as compared with the usual fifty per cent, is claimed as the operating efficiency of a new machine for placer mining which makes possible the profitable working of ground heretofore considered too low grade to pay. The mechanical miner contains 1,700 fingers suspended in the moving riffle pan, the fingers keeping the placer dirt mixed with water, thus permitting the heavy gold to settle freely. With this apparatus, even clay base dirt can be worked successfully. Ten cubic yards can be handled per hour with a one and one-half horsepower motor and the machine is of knockdown construction.

E. C. Toothaker, 448 Josephine

Underground Bank Vault Is Air Conditioned



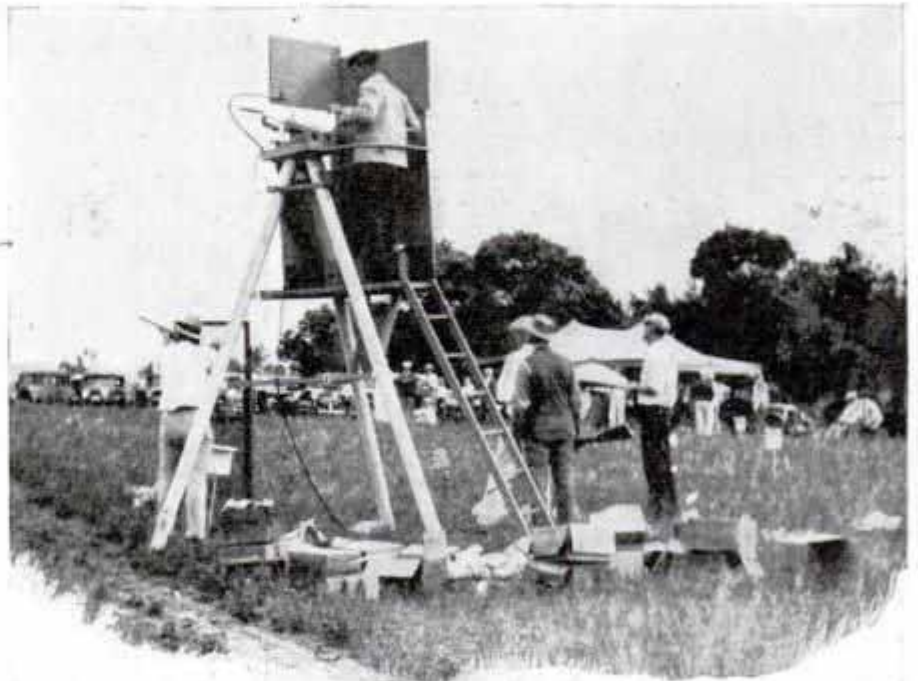
Emergency Door of Underground Bank Vault and Elbow of Pipe Which Is Raised in Front of It to Connect Air-Conditioning System

Air conditioning has been applied to a New York bank vault located two stories below the street level, making the vault the most comfortable place in a Manhattan skyscraper. A system of forced ventilation was built into the vault but the high humidity made it uncomfortably warm in summer despite this circulation. When it was decided to install Westinghouse air-conditioning equipment, the engineering features presented a problem because the thick steel walls made air ducts impossible. Advantage was taken of the existing ventilating system by installing a condensing unit adjacent to the ventilating blower. Two cooling coils were placed within the air duct on the discharge side of

the blower and two were placed in a pressure chamber which is a part of the duct outside the vault. When the main vault door is opened, an emergency door is also opened and a large elbow of pipe is raised into position over the emergency doorway, connecting the external duct system to the vault. From this doorway another system of ducts distributes the cooled air in the vault.

CLAY PIGEON TRAP IS PORTABLE

Operated by electricity, a portable clay pigeon trap may be set up in thirty minutes. Trap, switches, batteries, wire and other parts can be carried in an auto to any spot for shooting. The outfit weighs 450 pounds. There are two traps, one low and the other high, for "skeet" or straightaway shooting. Traps are set behind steel blinds for protection.



Electric Trap in Use; Note That It May Be Erected Anywhere, Being Set Up in a Few Minutes; It May Be Used for "Skeet" Shooting

Arthur Roth, Roth, Wisconsin

*Continental Safe Depoent Co
38 Broad St.*

Rochester, Kent, England.

Military Flying Boat Has Wings Like Bird



Great Britain is experimenting with a giant military flying boat with a wing span of sixty feet and powered by two steam-cooled engines. One of the unusual features of the craft is the wing design for they are set at an angle so that they greatly resemble the wings of a bird in flight.

Rolls Royce



Rolls Royce

MONTH-LONG DAY PREDICTED

D 163

Hundreds of millions of years hence, the day on earth will be as long as the month, due to the retarding effect of tidal friction on the earth's rotation. Dr. Josef J. Johnson, of the California Institute of Technology, who has been studying the subject, says that when the day and month become equal, the earth always will present the same hemisphere toward the moon, as even today the moon presents one side continuously to the earth. The two bodies will revolve as though attached to the opposite ends of a rigid pole, the result of the gradual slowing down of the earth under the pull of

© Planet News - *acme*

Two Views of England's Latest Military Flying Boat Powered by Two Streamlined Engines; Note Wings Set Like Those of Bird in Flight

solar tidal friction. Dr. Johnson concludes that the day will not become longer than the month. Present day knowledge of the plasticity of the earth's interior leads him to the conclusion that the "rigid-bar" situation will continue indefinitely. Tidal forces will, through isostatic deformation, raise a permanent tide in the body of the earth which will keep the day in step with the month forever. Half the earth will never see the moon and the other half will always have the moon in its sky.

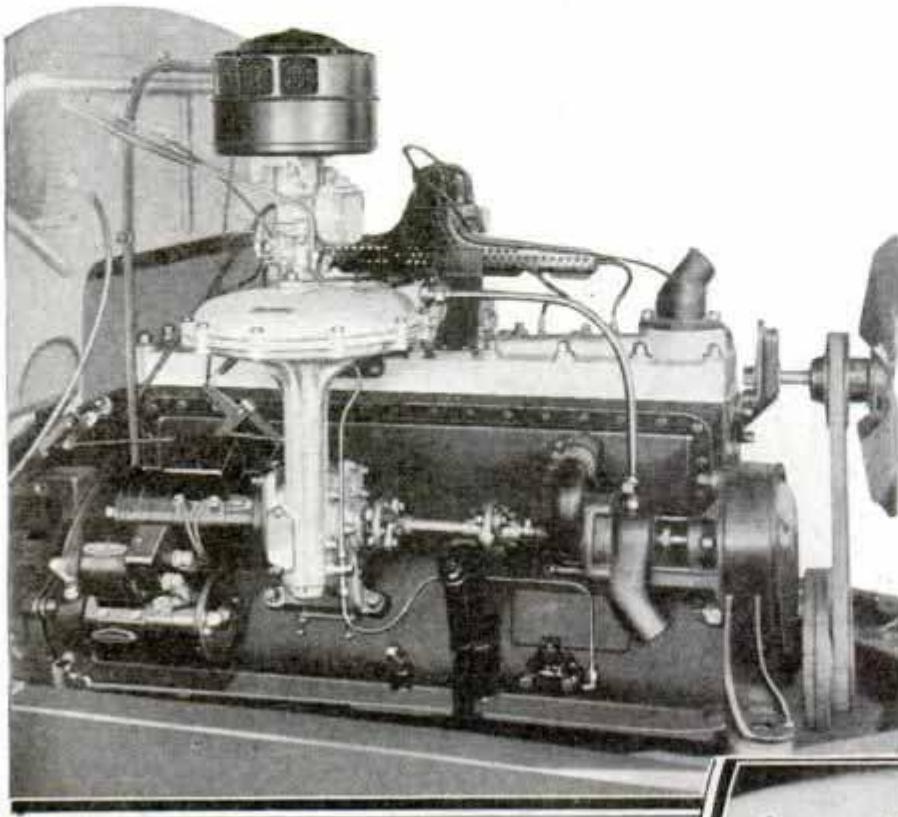
Science Service 1/23/34

Pasadena, Calif. 1229

115 Walbridge Road
Hartford, Conn

D301

HARNESSING *your* CAR'S



operate many appliances on alternating current.

Heat still is wasted. Immediately after the average engine starts, its exhaust pipe registers around 900 degrees Fahrenheit. Efforts to harness this heat in winter have been hindered by the difficulty of heating a car directly from the exhaust without contaminating the air with carbon monoxide. Now comes steam heat. A small amount of water in a coil around the exhaust pipe is heated to steam which is carried to a small radi-

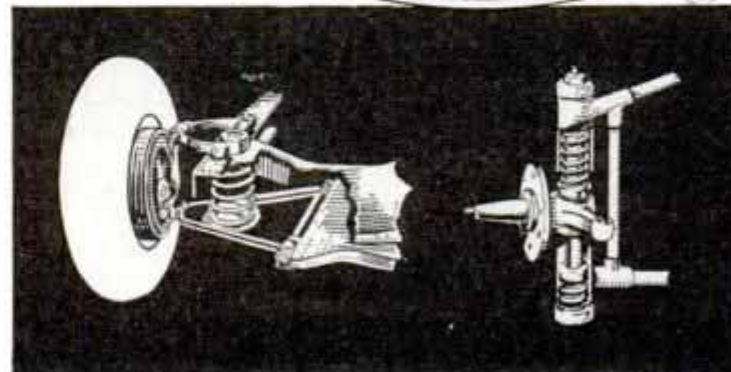


THROUGH harnessing even a small portion of what now goes to waste the automobile industry expects within the next few years to provide the motorist with many new comforts and conveniences. Nothing substantiates this more than the uses to which engineers have put those forms of energy which only yesterday were lost.

Starting with the discovery that intake suction of the motor could be used to operate a windshield wiper there has been a constant procession of uses for this energy. Atmospheric pressure, rather than the power of the suction, provides the energy for such devices as automatic clutch control, fuel feed and booster brakes so there is no sacrifice of engine efficiency.

Because of the demand for more electrical energy to operate radios, twin horns, defrosters and more lights, there has been developed a generator capable of delivering more current. It is air-cooled, cannot burn itself out readily and lessens the possibility of battery failure.

It is also possible to equip any car with a generator producing 110-volt current to



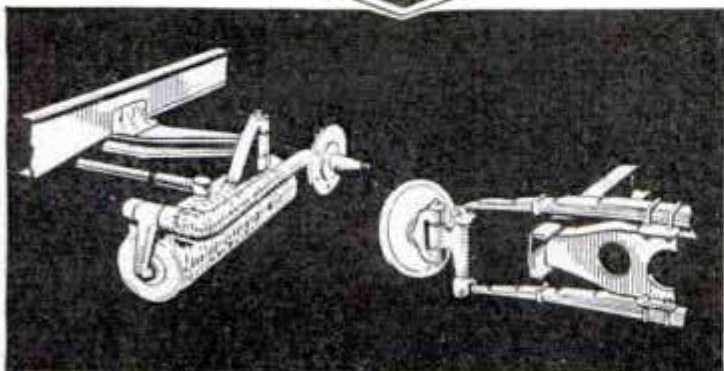
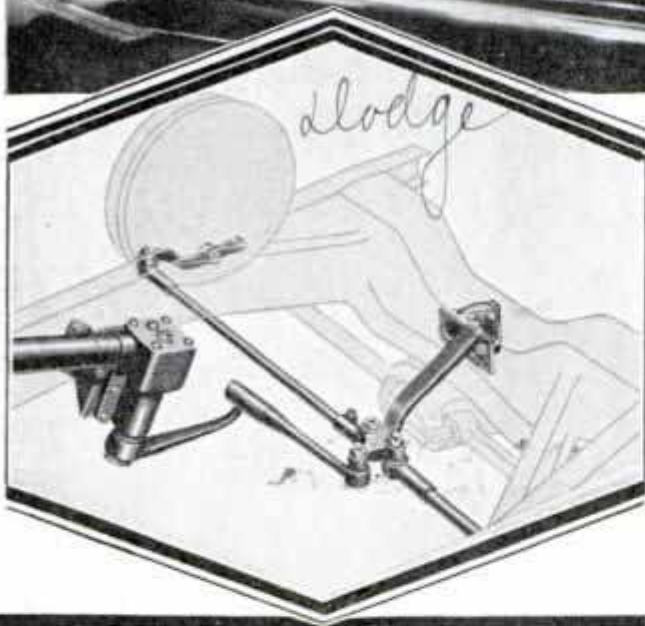
Top, Supercharger for Increasing Power; Center, Windshield Wiper; Bottom, Forms of Wheel Suspension

see Ill. 1133.870

m Abraham custom & for 1934
 Welco-Remy Corp
 Anderson Blvd

Handwritten notes: "301", "Help. Start. design varies", "write makes for further date"

WASTED ENERGY

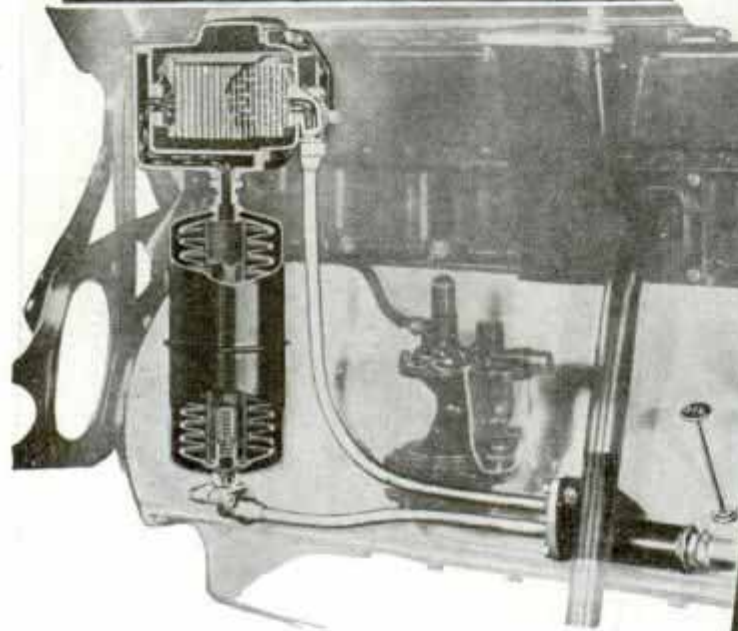
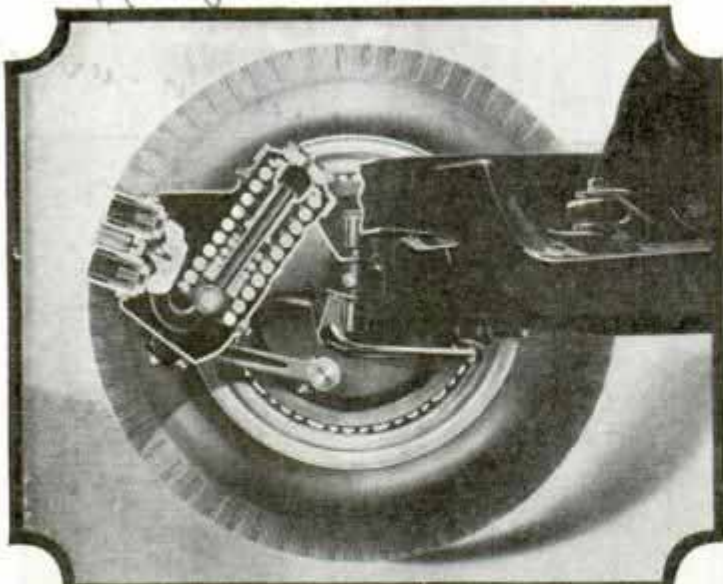


Top, Gauging Ease of Steering; Center, Cross-Steering System; Bottom, Variations of Wheel Suspension

ator under the dash. When engineers began to use water to heat the car they speculated as to what additional uses water could be put to. Thus we have the new oil-temperature regulator, a special radiator in which water passes heat to the oil in cold weather and takes heat from the oil in hot weather.

Engineers are becoming more and more skillful in putting surplus energy to work. An automatic lubricating system takes advantage of the jolting of the car. Up and down motions actuate a plunger which pumps oil in small quantities to the chassis. While momentum is harnessed to make stopping the car merely a matter of using the brake pedal as a "valve," this form of energy is being used in other ways. Clutch control of the latest type is made more efficient by letting momentum act upon a pendulum. This weight swings in accordance with the car's movements, controlling air pressure so the clutch engages at a rate corresponding to the demands of any particular starting situation. In one type of braking system utilizing three shoes per

D. 301
1934 Pontiac



Top, Left, Mounting Cutaway; Bottom, Left, Oil Temperature Regulator; Top, Right, Brake and Pressure Selector; Bottom, Super-Generator

Terraplan
Audson

wheel, momentum is employed to assist the wedging shoe to "dig" more firmly into the drum when the other two shoes are brought into contact by the brake pedal.

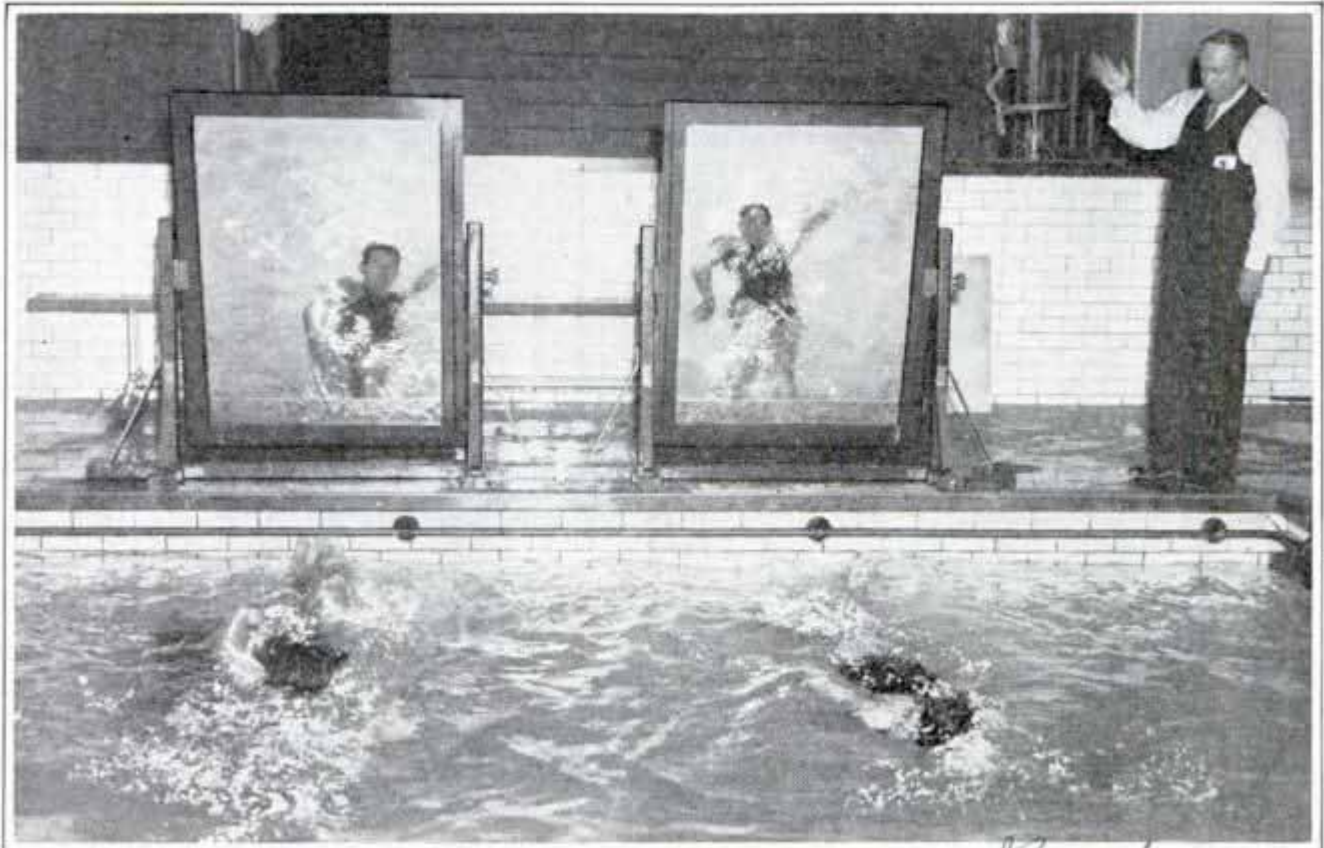
There is considerable centrifugal surge when cars round curves. Oil is thrown away from the pump in some cases, while in others it is forced into lighter lines where excessive pressure causes vibration. By harnessing this energy it should be possible to improve the lubrication system.

When engineers took advantage of the fact that water rises as it heats there was no need for a water pump. That was known as the thermo-syphon cooling system. At present there is constant forward surging of water when brakes are applied. With a different construction it might be

possible to effect considerable circulation of the cooling fluid by means of the car's motions.

Gravity came into the picture as one of the harnessed energies when the down-draft carburetor became standard equipment. Gas vapor, being heavier than air, tends to fall. By introducing the vapor in the way it travels more naturally, there is more probability of an increase in the amount of vapor that can be admitted to the cylinders. Even the wind that whistles past the car is being utilized. Already it serves to exhaust stale air in the car. On one car a door in the side of the hood permits cool air to reach the carburetor.

Swimmer Sees Mistakes Reflected in Mirror



Swimmers Practicing Strokes in a Pool and Watching Their Actions in Mirrors Which Aid Them in Observing Their Own Mistakes and Correcting Them

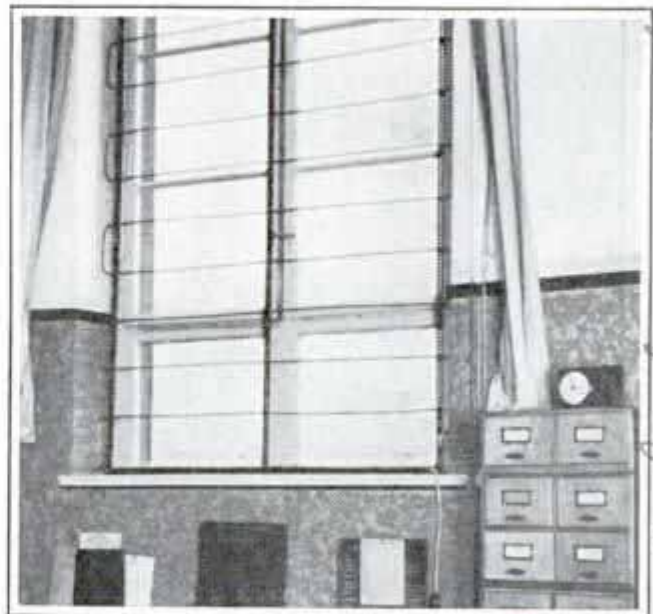
Keystone

Swimmers at the City College of New York are correcting mistakes in their strokes with the aid of large mirrors. These mirrors are placed at the edge of

the pool where the swimmer can observe his own actions as he tries various strokes, thus seeing errors concerning which he might otherwise be oblivious.

Heater Cables for the Window Increase Room Comfort

Cold drafts from large windows may be eliminated and comfort increased by the installation of electric heater cables around and across the windows. The system, which has been tested in Germany, uses only six watts for raising the temperature one degree over a space about forty inches square.



No H.O. agent known

AIR CLEARS WAY FOR PILING

In preparing supports for large buildings, some contractors drive heavy steel casings into the ground, sometimes a hundred feet deep. Then a blast of compressed air is turned into the steel casing, blowing out the dirt in the shell. Pouring the shells full of concrete follows. The foundations are built on top of these pilings.

D 378

*Cont. John E. Hylor,
501 Broadway Av.*

Wiring Arrangement to Prevent Drafts

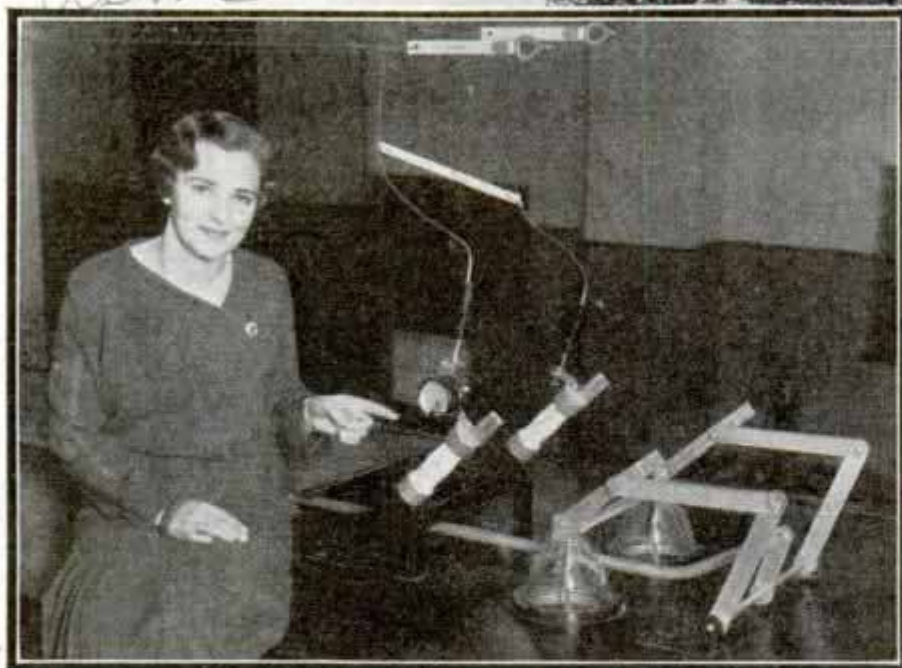
*Siemens-Schuckert Works,
Berlin-Siemensstadt*

Pacific Radiophone Turns Time Topsy-Turvy

D288



Acme



Acme

Above, Java Radio-Telephone Station and a 10,000-Watt Vacuum Tube and Rectifier Tube Used in California Transmitting Station; Left, Switch Which Connects American Voices with the Far East

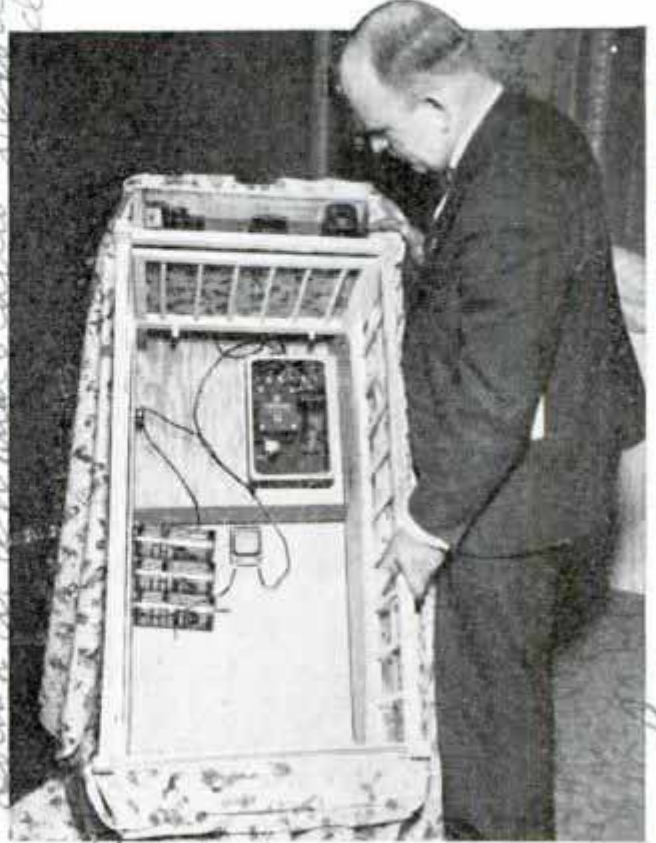
Yesterday becomes today and today is tomorrow when you use the transpacific radio-telephone service opened recently between San Francisco and Java and Sumatra, in the East Indies. The first spoke

in this wheel of Pacific radiophone service was set up in 1931, with San Francisco as the hub and Hawaii as the other end. A year ago the 7,000-mile Philippine island spoke was added. Now you can talk to Java, 8,700 miles distant and to Sumatra, 9,450 miles away. The Manila and East Indies circuits cross the international date line, so this telephone service has two Sundays each week and two New

1731 Belmont Ave. Chicago

Year's days in each year. A Javan calling a San Franciscan on Monday morning is likely to find the American just home from Sunday church services, but the American who puts in a call for Java on Tuesday hears the news from that country which has occurred on Wednesday. At Dixon, Calif., a ninety-foot "diamond" antenna transmits the electric-voice waves to a "pine-tree" antenna near Bandung and a Bandung antenna of the pine-tree type transmits to a diamond antenna at Point Reyes, Calif. The Dixon transmission spreads like a funnel to cover both Java and Manila and also can serve Japan when service opens later. To reach Sumatra, a second radio-telephone link is connected at Bandung to the transpacific channel. Calls to Java have been made since 1931 over a roundabout circuit eastward, half way around the world, 14,500 miles long from San Francisco to New York to London to Amsterdam to Bandung. San Francisco and Pacific coast towns are connected with the Dixon and Point Reyes stations by long-distance telephone lines.

BABY CRIB HAS ELECTRIC EYE TO FOIL KIDNAPERS

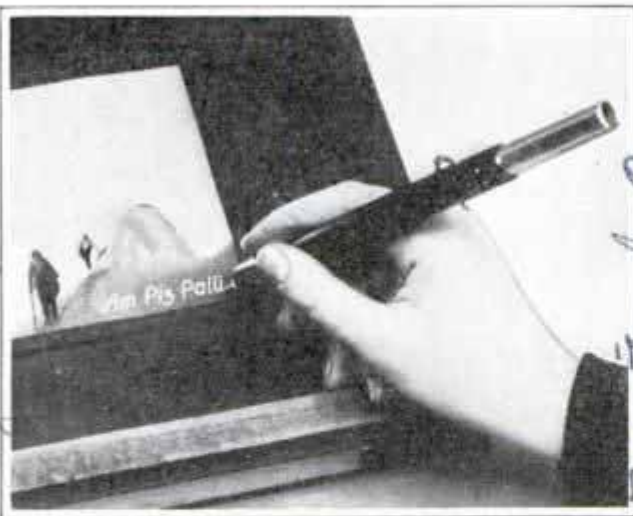


Crib Equipped with Invisible Light Unit and Electric Eye Connected to Relay and Alarm

WRITING ON FILM MADE EASY WITH ELECTRIC PENCIL

D391

Writing on film or photograph negatives is made easy by using an electric pencil which can be operated by a flash-light battery or by using a transformer. The



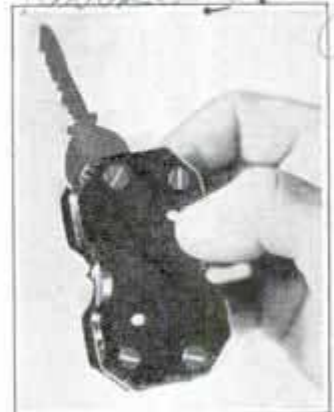
Electric Pencil Operated by a Flash-Light Battery Which Writes on Photographic Negatives

current heats the crayon which does the writing and makes it easy to form the characters which cannot be wiped away as is the case with some forms of writing.

Protection from kidnapers is offered by a baby crib equipped with automatic alarm devices which sound if the occupant is disturbed. The crib has an infra-red light unit at the foot and photo-electric cells at the top. An interruption of the rays of invisible light made by someone leaning over the crib causes a relay to operate and ring an alarm bell.

PUSH BUTTONS RELEASE KEYS

Keys are released automatically by a compact pocket container. The case has space for four keys, each of which springs out ready for use at the press of a button. The four buttons on the face of the case are numbered, so it is easy to select the right key. The case holds keys for the car, garage, and home.



No. 48 agent known

Zwietusch Co.

G. Zwietusch & Co. 1500 N. Salinas St.

Burson Key Container Co. Inc.

1731 Belmont Ave. Chicago
 Laboratories
 Dr. Cheung

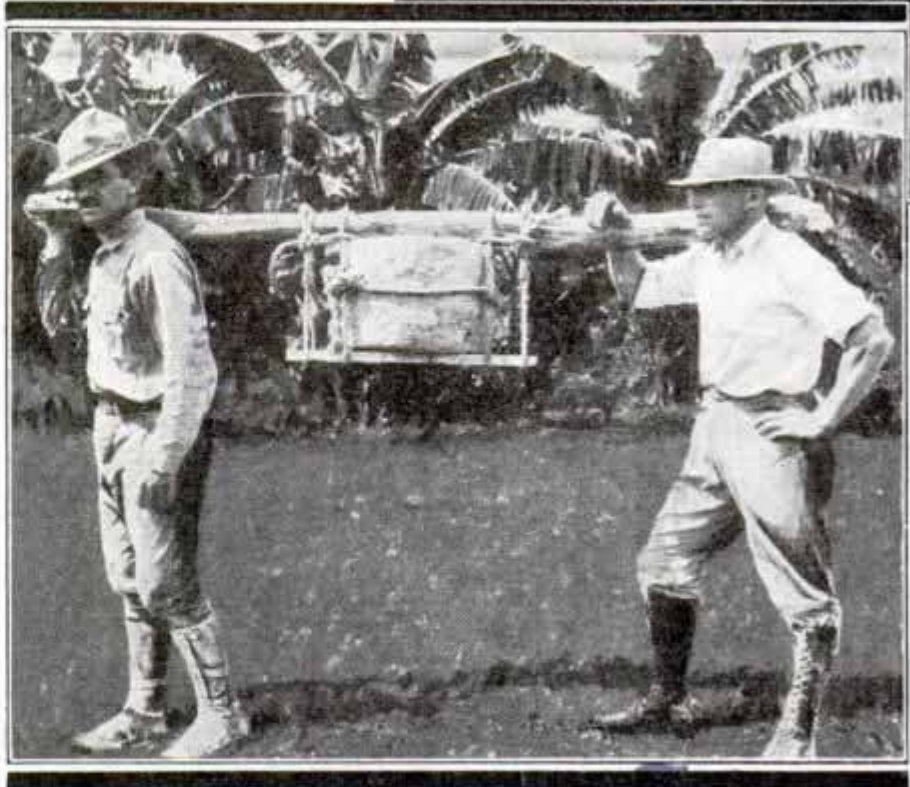
D. B. ...

The LAST of the EXPLORERS

THE adventurers of this century are the archaeologists. Theirs is the thrill of finding the new, the strange, and the startling. Trekking through jungles, skimming alligator infested streams, plowing through sands, delving in old caves, the modern archaeologist can find more thrills than the big game hunter of Africa or the airman of the ocean's watery wastes.

Expeditions sent from Washington recently uncovered stones with inscriptions unfolding stories of a people whose very existence was unknown before America was discovered. The Spaniards overwhelmed them and the conquered people dropped into obscurity. Now, however, their history is being uncovered, and the world is learning the tale of the Maya people of Central America, who were cultured and religious, with a learning of the arts and sciences far surpassing the peoples of Europe.

The Peninsula of Yucatan contains the secrets of that great race. Only bit by bit have adventurous scientists wrested it from the past. The "five crazy Americans" of the Mason-Spiden exploring expedition recently discovered another of the lost cities, a great fortress built between 1000 and 1500 A. D. Forty yards away was a great pyramidal structure of rising terraces, its roof forty-five feet above the ground. Here grotesque grinning faces decorated the corners. The Maya engineers built for time and eternity else their structures would not have endured the creeping jungle and the obliterating power of the tropics. There is Tezna, for instance, an



Emb. Arthur Vincent
1231 So. St. N.W.,
Washington, D.C.
Wilson, Route 608

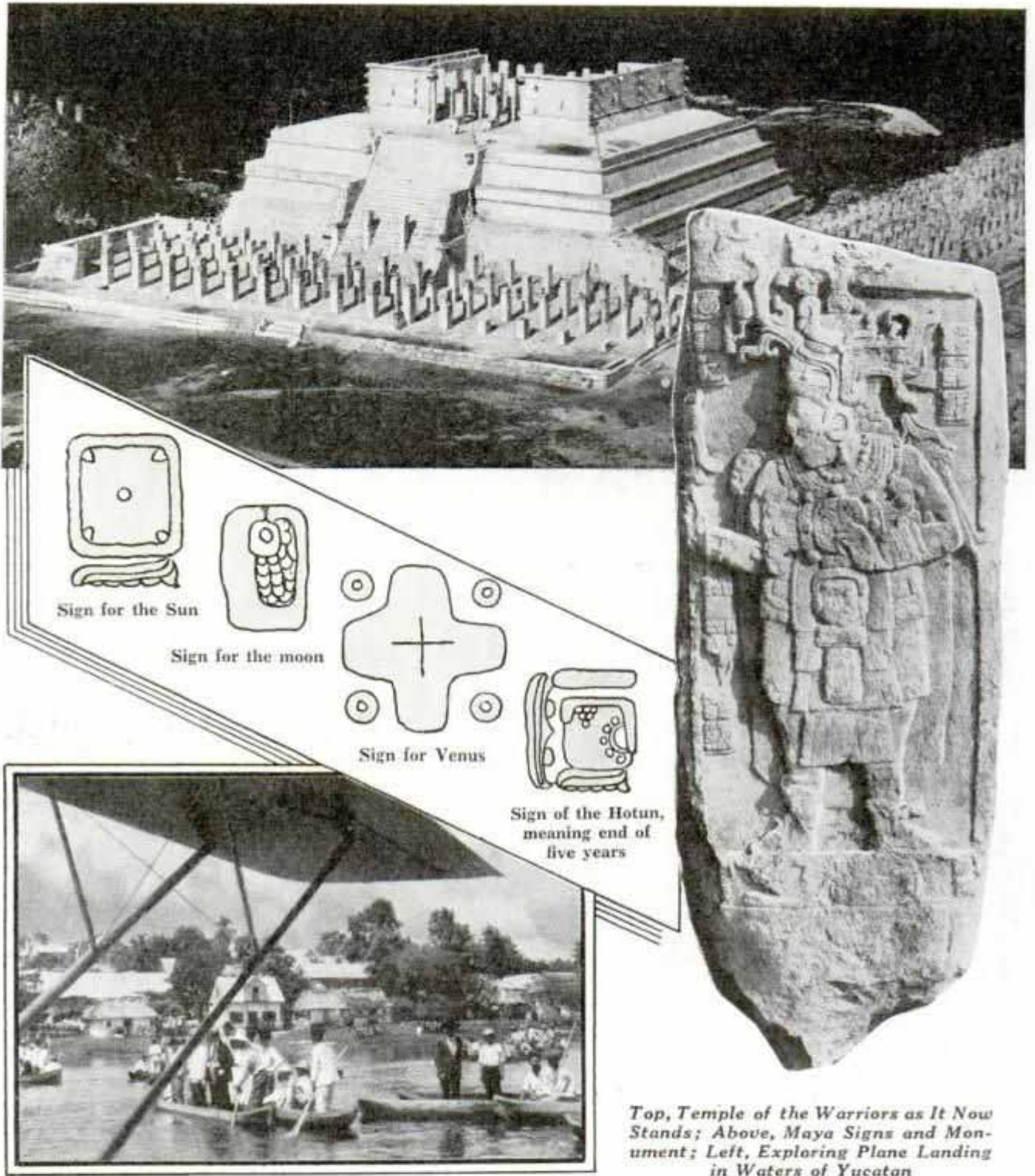


Above, Artist's Sketch of Typical Maya Temple, Based on Description of Ruins by Archaeologists; Left, Explorers Carrying Away a Stone Container Which Held Jewels of Maya People

important outlying city of the old Maya empire. It is a great acropolis more than five hundred feet on a side, having on its summit five impressive temples surrounding an immense sunken court.

Several score large and small cities and towns have been located in the jungles of Yucatan showing that the old empire was mighty and powerful, with arts and crafts as superior as those of ancient Egypt. It is in these cities that scientists hope to find a key that will unlock the story of the rise and fall of a great nation.

The whole of Yucatan seems filled with these lost cities. Some are unimportant. Others are yielding priceless treasures in jewels and art, and still others are yet to be explored. That the Maya people were intelligent and cultured there is now no doubt. The Spaniards who suddenly swooped down upon them were children in comparison. Maya rulers offered the Spaniards cotton shirts and, later, jewels. Cotton was one of the great gifts of the Maya nation to the world. At that time it was unappreciated. The jewels only were



Top, Temple of the Warriors as It Now Stands; Above, Maya Signs and Monument; Left, Exploring Plane Landing in Waters of Yucatan

desired. It was largely because Europe had turned mechanical that the Spaniards were able to win the bloody battles provoked by their destruction of the border cities. Scientists now believe that the Maya people had no metal tools nor even so simple a mechanical contrivance as the wheel. They had no beasts of burden, and the great limestone blocks of the giant temples were cut with stone tools and put in place by man power alone.

The Maya nation had nothing so deadly

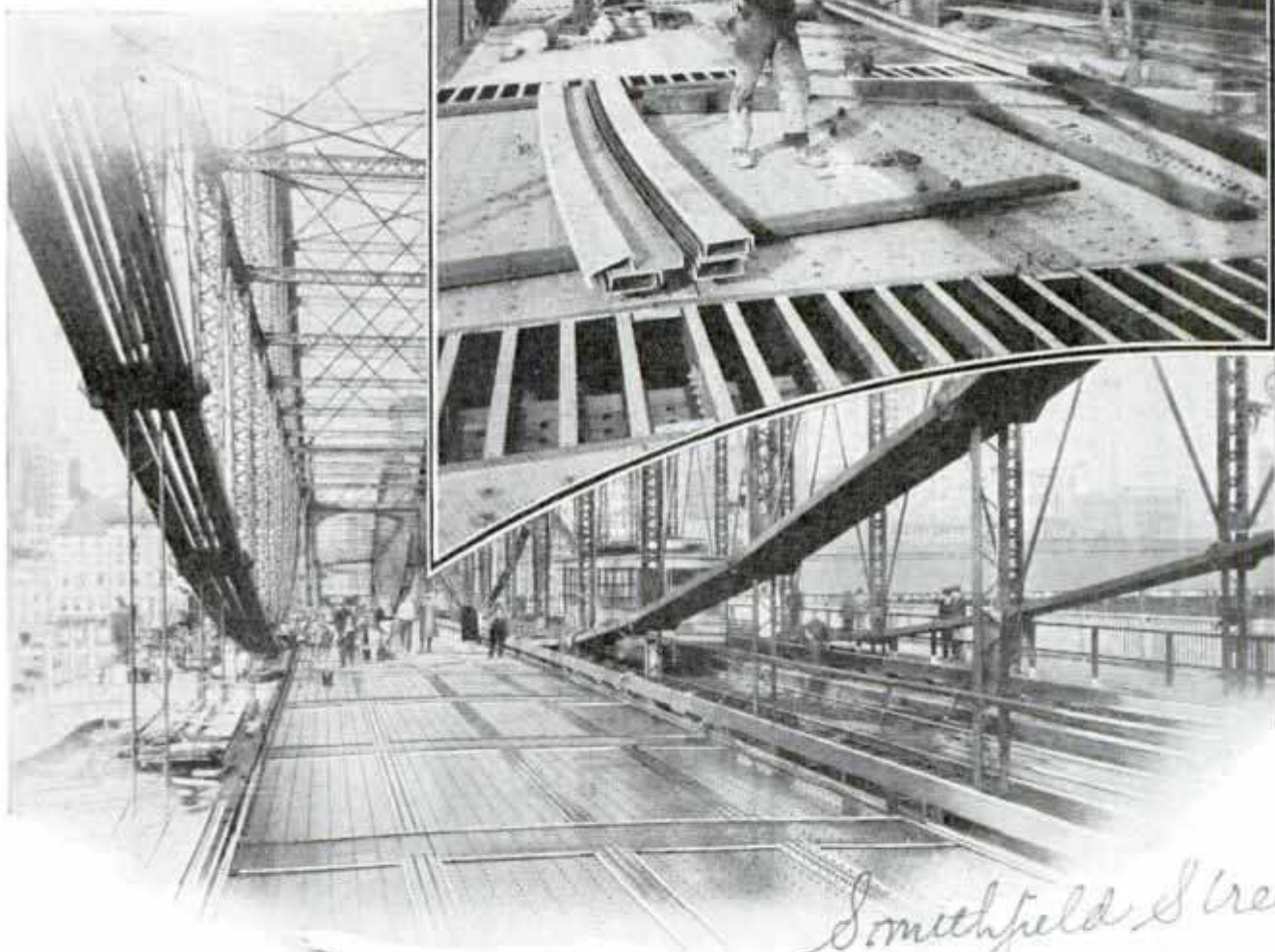
in battle as the guns of the Europeans, but it was years later before Europeans began to realize that the already crumbling civilization, given its death blow by the soldiers of Spain, had possessed great cultural achievements that put them to shame.

For example, the Maya people were far more accurate in their counting of time than the people of the old world. Their calendar shows at a glance, for instance, just how many days have passed since the

(Continued to page 120A)

Aluminum Alloy Bridge Floor Saves Weight

By reflooring an old bridge with an aluminum alloy instead of the steel formerly used, Pittsburgh has been able to make the repaired structure almost as good as new and to obtain many more years of use from it. The bridge had been used for years by electric cars, automobiles and pedestrians and engineers decided its useful days were nearing an end.



Much Weight Was Saved by Replacing the Steel Floor of This Pittsburgh Bridge with One of Aluminum Alloy; Note the Ease with Which a Workman Carries a Big Section

However, someone suggested that if the heavy steel flooring could be replaced with a lighter material which would be as strong or stronger, the structure might be reclaimed. The problem was solved by using a special aluminum alloy which is 750 tons lighter than the floor it replaces. It is also stronger and can carry a heavier volume of traffic than was possible before.

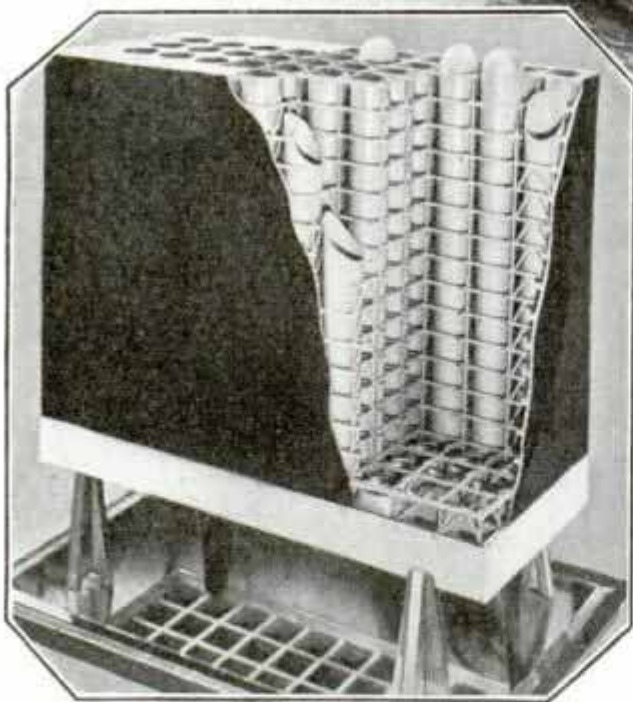
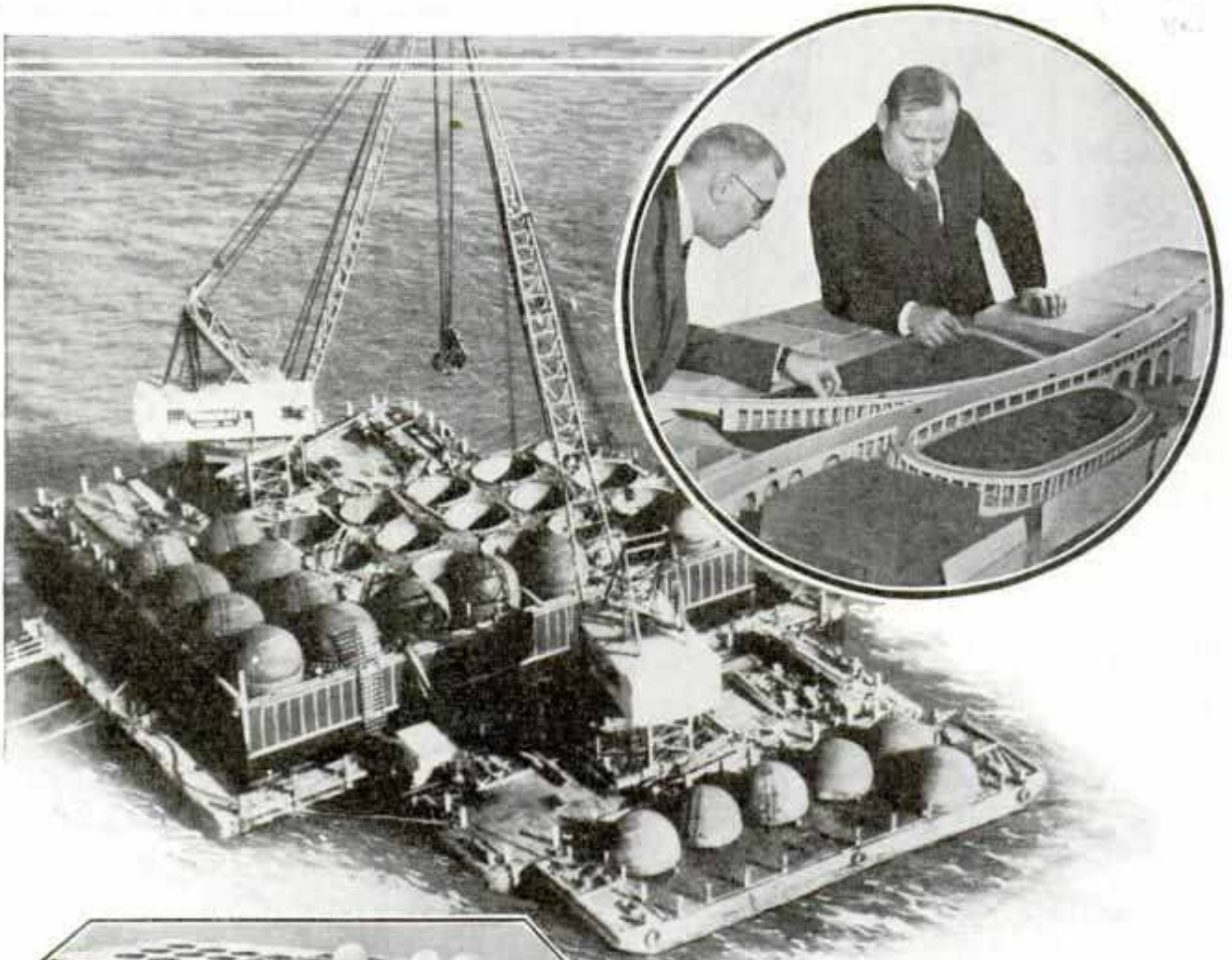
Over the aluminum alloy deck is spread a coat of cold rolled asphalt held in place by the rivet heads and figured surface of the metal. Alloy channels used in the work were twenty-one feet long but weighed only 104 pounds as compared with 292 pounds for a steel member of the same dimensions, making a saving of almost two-thirds in weight.

of America, of Aluminum
 1956. Sewell Bldg Pittsburgh Pa.

*Emb. Robert S. Sherrett Mountain
 Co., Maplewood, N.J.*

Smithfield Street.

Putting Feet under World's Biggest Bridge



Above, Caisson of San Francisco-Oakland Bay Bridge and Model of Approach; Left, Model of Central Anchorage Caisson

Ponderous feet are being placed in the bay from San Francisco to Oakland to support the seven-mile bridge which, when completed in 1937, will cost \$72,000,000 and carry 50,000,000 passengers a year in eleven traffic lanes on two decks. To make up

four of the giant's feet, or caissons, 13,000 tons of steel are needed, enough to build the hull of an ocean liner. Each caisson is assembled at Oakland, towed to position and filled with concrete to form the "sea legs" for the mammoth bridge. The caissons, built up of steel pipes fifteen feet in diameter, are inclosed by a wooden casing, the bottom having a cutting edge helping the mass to sink down to bed rock. The pipes are fitted with dome heads and air valves so they can be filled with water or air, thus controlling the buoyancy and allowing the structure to settle to rock bottom by its own weight. Dredges dig out the mud from underneath, three months being required to sink a caisson. When finally on bottom, water and mud are pumped from the pipes, they

are filled with concrete and the inclosing wooden walls are removed. The four caissons composing the feet for the deep-water section required more than four miles of fifteen-foot steel pipes, shaped and assembled with nearly twenty-five miles of electric welding. More than 1,300,000 board feet of lumber were used, sufficient to build 120 five-room bungalows.

D 363

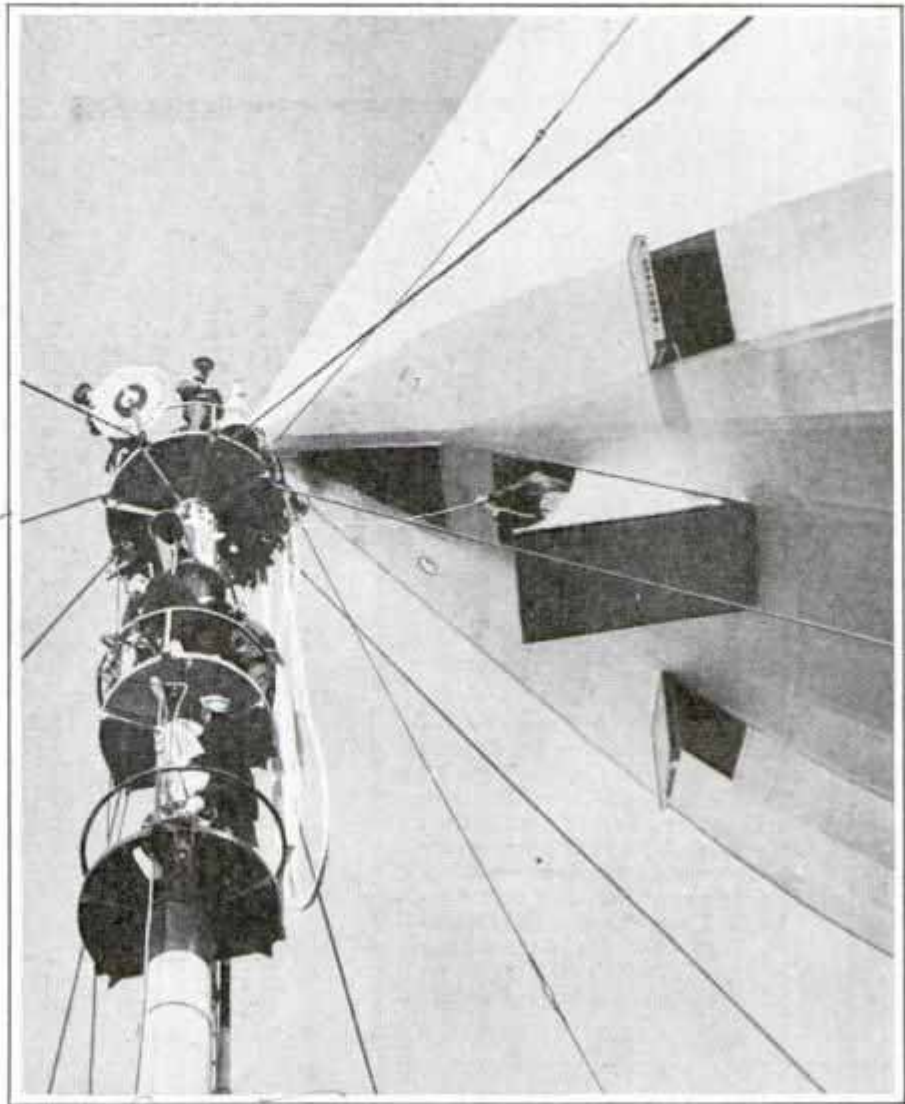
MICROSCOPE WITH FOUR EYEPIECES

One microscope is now equipped with a four-eyepiece attachment for monocular observation instead of the usual one. The quadruple eyepiece revolves on its support so that each piece can be brought into use without the observer changing his position. This and other attachments together with the deeply recessed limb of the stand facilitate the examination of both large and small objects without the necessity of making so many adjustments.



This Microscope Has Four Eyepieces so Arranged That Each Can Be Brought into Instant Use

Carl Zeiss, Inc.
155-5th Ave



Looking Upward as Nose of the "Macon" Is Made Fast to Mooring Mast at Pacific Coast Base, Enabling the Craft to Ride Out a Storm

"MACON" FLEES FROM STORMS TO SAFETY OF MAST

When warnings of stormy weather are received aboard the great dirigible, the "Macon," her officers turn the nose of the craft toward the giant mooring mast of the Pacific coast base, if the "Macon" is within close range. Once tied to the top of the mooring tower, the "Macon" is able to ride out severe storms.

D 387 San Diego, Calif

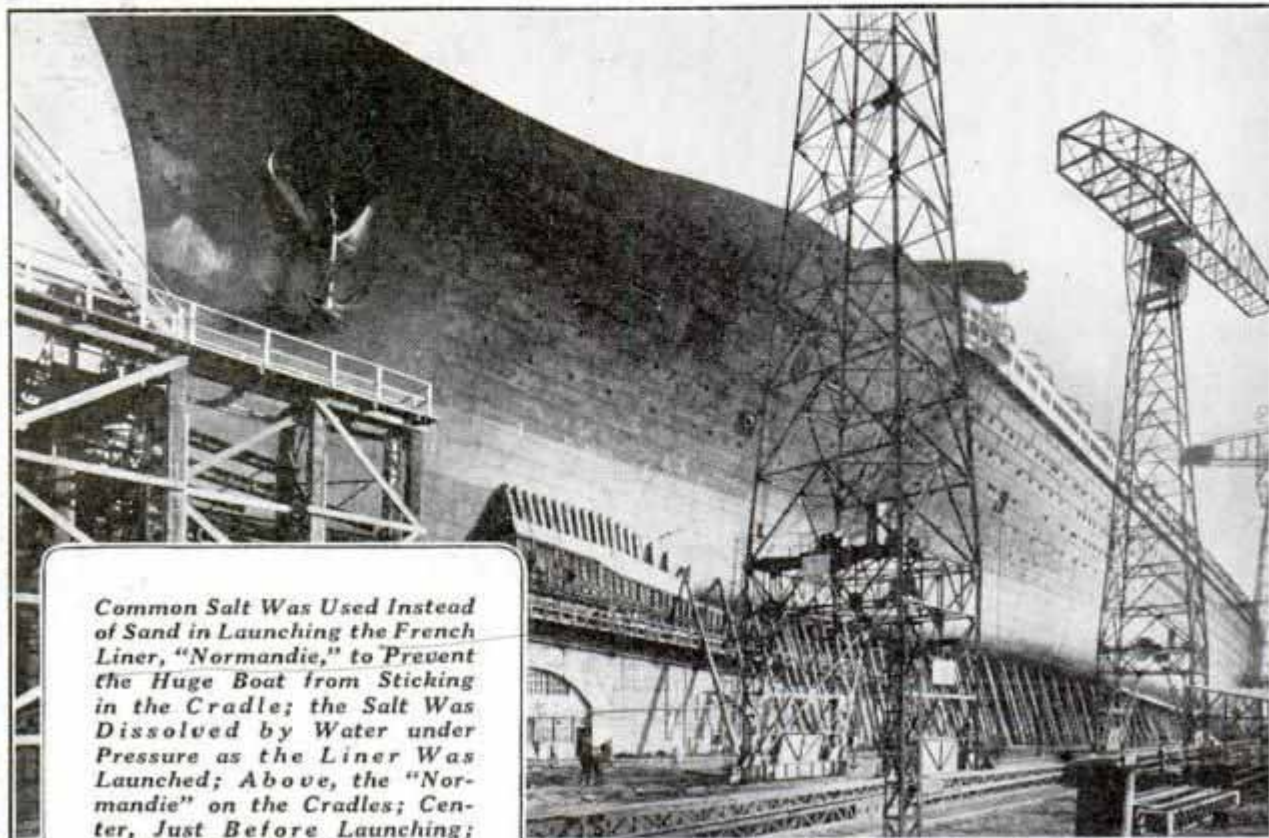
IMPERISHABLE RECORDS

Indestructible records of picturesque and historic places in England are being preserved for future generations by printing etchings on clay. After the clay is fired and glazed, the etchings are printed on the tiles, each of which is six and one-half inches by five and one-half inches. A new method makes possible the production of strong line and delicate color.

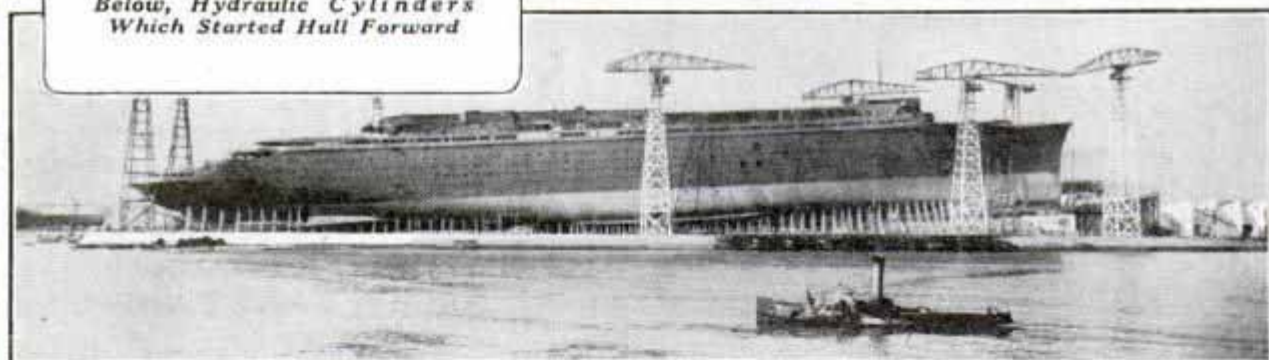
Embodied by British Industries Ltd. London
Discovered by Donald Maxwell, for a council

*Colombier 24 Bean Road
Beverly Heath, N. Loudon, Ind.*

Salt Solves Problem of Launching Big Liner

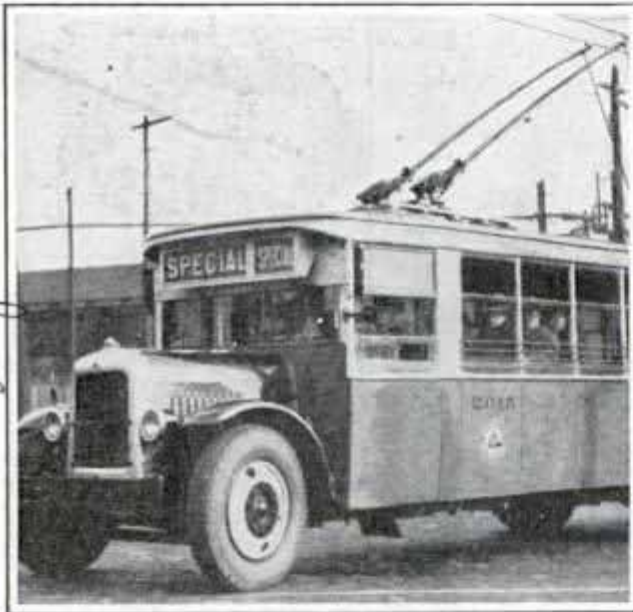


Common Salt Was Used Instead of Sand in Launching the French Liner, "Normandie," to Prevent the Huge Boat from Sticking in the Cradle; the Salt Was Dissolved by Water under Pressure as the Liner Was Launched; Above, the "Normandie" on the Cradles; Center, Just Before Launching; Below, Hydraulic Cylinders Which Started Hull Forward



**ELECTRIC TROLLEY HELPS BUS
TO CLIMB STEEP HILL**

Motor coaches climbing a six-per-cent grade from a ferry terminal at Weehawken, N. J., to the top of the Palisades are aided in making the hard pull by an electric trolley. The buses are of the gas-electric type, being equipped with driving motors which, in ordinary operation, obtain their power from the gas-driven generators of the vehicles. Each bus is also equipped with a pair of trolley poles, and a dual control enables the operator to shift from gas-electric to direct drive from the trolley line. At the foot of the hill the driver shuts off the gas engine, places the poles on the trolley wires and switches over the control. The bus is then run to the top of the hill as a trackless trolley



Motor Coach Equipped with Trolley Which Boosts Its Power When Climbing Steep Hill

car. At the top, the trolley poles are lowered and the bus runs on its own power.

**SONG OF BIRD "PHOTOGRAPHED"
TO REVEAL VOICE SECRETS**

Scientific analysis of the voices of birds is made possible by using a strob-camera developed by Dr. Milton Metfessel of the University of Southern California. This apparatus "photographs" the songs of birds and thus records the range and vibrations of their voices for future study. The singing of a bird in a cage causes a neon light to vibrate and these vibrations are recorded on a whirling disk as a stream of



Equipment Used in "Photographing" the Songs of Birds and Recording Range of Their Voices

dots. This device aids in revealing the remarkable technique of the bird singers whose tremendous range of tones far exceeds the reach of the human voice.

**SEDIMENT TRAP CATCHES DIRT
IN AUTO RADIATOR**

Silt and dirt which gather in automobile cooling systems cannot block a radiator if it is equipped with a semi-automatic sediment trap. The trap is installed in the water circulating system and is equipped with a handle which is given a few turns every thousand miles. The handle causes two knifelike blades inside the device to revolve, each blade passing flatly over opposite sides of a fine mesh screen. All water in the cooling system passes through the screen and foreign substances are filtered out. Rubber hose shreds may become enmeshed in the screen but are cut off by the blades and drop into the sediment trap at the bottom. Removing a plug drains the dirt from the trap.



Berkeley, Calif

Ans. W. J. Abidine
1716 720 Colorado

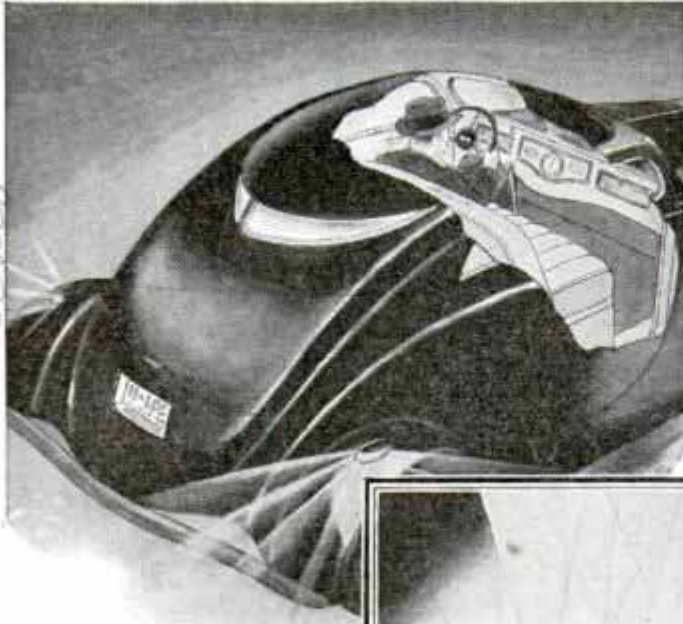
Electrical equipment essential Electric Co Schemmately N.J.

D 403

D 406

D 382

Better Auto Lights Add to Safety at Night



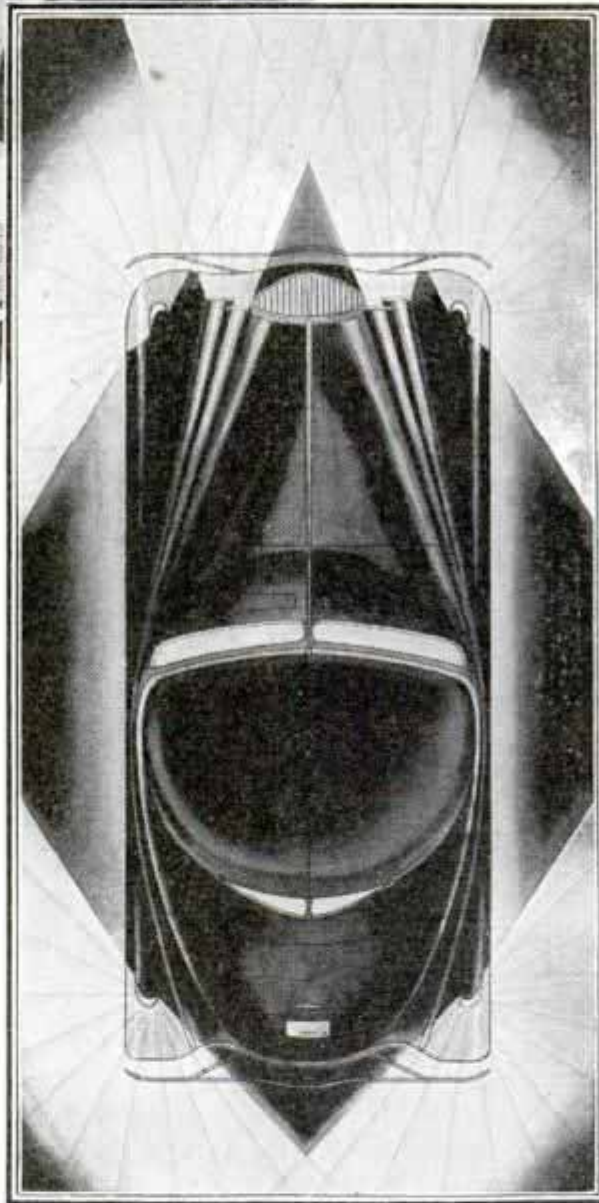
from all angles. Marker lights showing to the front give a better indication of the width of the car in passing. Showing to the sides, the markers reveal the dark side of the road when approached from the side. Markers showing to the rear indicate the car width, speed and distance, when approached from the rear. The license plate must be illuminated, of course. Streamlining is bringing the desirability of recessing the registration plate out of the wind

stream, in which position it can be illuminated better from a separate lighting unit than from a combination rear

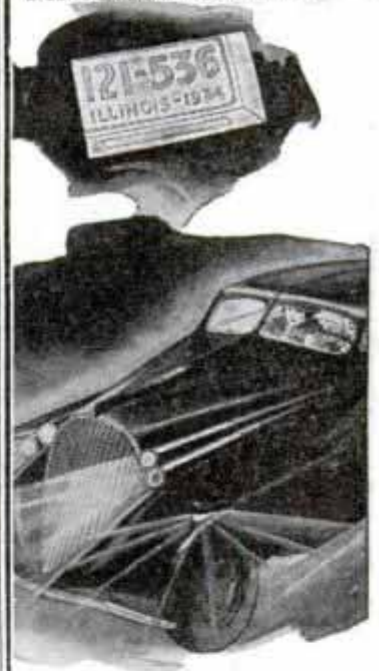


MAP LIGHT

If the automobile is well lighted, night driving is safer, more comfortable and relaxing, according to engineers of the General Electric company. The headlamps should provide a beam for the clear road, a meeting beam that gives considerable light on the right roadside and non-glare light on the left, and a lower beam for use on lighted highways and streets. For the headlamp has been developed a prefocused bulb which permits the use of smaller headlamps without loss of efficiency. If units of the former conventional size are used, the new bulb makes possible one-third more light from the same candlepower of filament. For safety, the automobile should be marked



LICENSE PLATE ILLUMINATED



Sketches Show How Engineers Believe the Automobile Should Be Lighted for Safety; Note Interior Illumination at Top, Left, and Exterior Lighting Arrangement Illustrated at Center and Bottom, Right

lamp and license-plate illuminator. Interest in light signals to indicate change in direction is growing and at least one state requires them on commercial vehicles. Lighting the interior of the car also is important.

lamp and license-plate illuminator. Interest in light signals to indicate change in direction is growing and at least one state requires them on commercial vehicles. Lighting the interior of the car also is important.

Nela Park Engineering Dept. Cleveland Ohio

150 N. Scott St. Chicago

Oak Park, Ill.

CHOCOLATE CANDY IS BRUSHED TO IMPROVE APPEARANCE

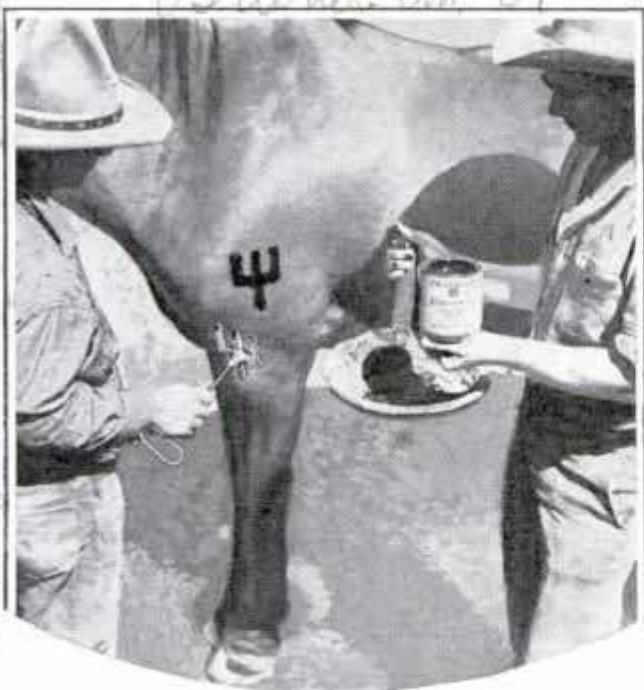
Chocolate candy which stands exposed to light for some time takes on a grayish hue. Such candy usually is considered stale although actually, it is claimed, it is not spoiled except in appearance. Recently machines have been developed which rotate badger hair brushes over the candy, "dusting" off the grayish substance, known as chocolate oxide, thus restoring the candy to its original fresh appearance.

only Esornell & Sons

BRANDING FLUID FOR LIVESTOCK REPLACES HOT IRON

Replacing the hot iron, a liquid resembling paint is being used for branding cattle and horses. It is a chemical compound that smells like creosote. An iron in the form of the brand desired stamps the liquid on the animal's body. Later, the hair on the stamped lines comes out and the red upper skin turns white, forming a permanent brand. The process is painless.

Brand 'm 01'



© Charles J. Belden
Painless Branding of Livestock Is Accomplished by Using Penetrating Chemical Solution

FLASH LIGHT HELPS TO FOCUS CAMERA IN DARKNESS

Focusing a camera on an object in darkness is made possible by means of a small electric flash light in the form of a plate holder. When attached to the camera, the



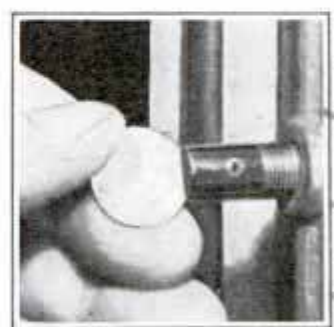
Focusing a Camera in the Dark Is Made Easy with This Flash Light in the Form of a Plate Holder

device casts light directly through the lens which in turn refracts the light on the object to be photographed. This refracted light projects a filament image in the center of which appears a small, sharp dot of light as the focusing point. The device is expected to be of special service to press photographers and others who desire to take pictures at great speed and under the trying conditions of darkness or dark interiors. Previously, focusing under such conditions was accomplished while an assistant held a lighted match or a flash light near the object to be recorded. By the new method two persons are not required to make a picture in darkness.

D437

MIDGET VALVE FOR RADIATOR IS ATTACHED WITH COIN

Nothing except a coin is needed for attaching a diminutive valve to the steam radiator of a home heating plant. The valve is one and one-half inches long, is threaded to standard size and extends only half an inch when inserted. Air is expelled through a hole which is closed automatically by action of the steam on a self-contained thermic spring.



Midget Valve Co

M. Franklin & Co. by Derimold, Eye Lock Exchange, Life & Lock Exchange, Speer Co.

D32 N. Wacker Drive Chicago

Midget Safety Valve Co. Linden, N.J.

Sold by F.W. Woodworth, maker of Concentrate, Chicago

Clarence B. Mitchell, 921 E. Esplanade

The MOST DANGEROUS

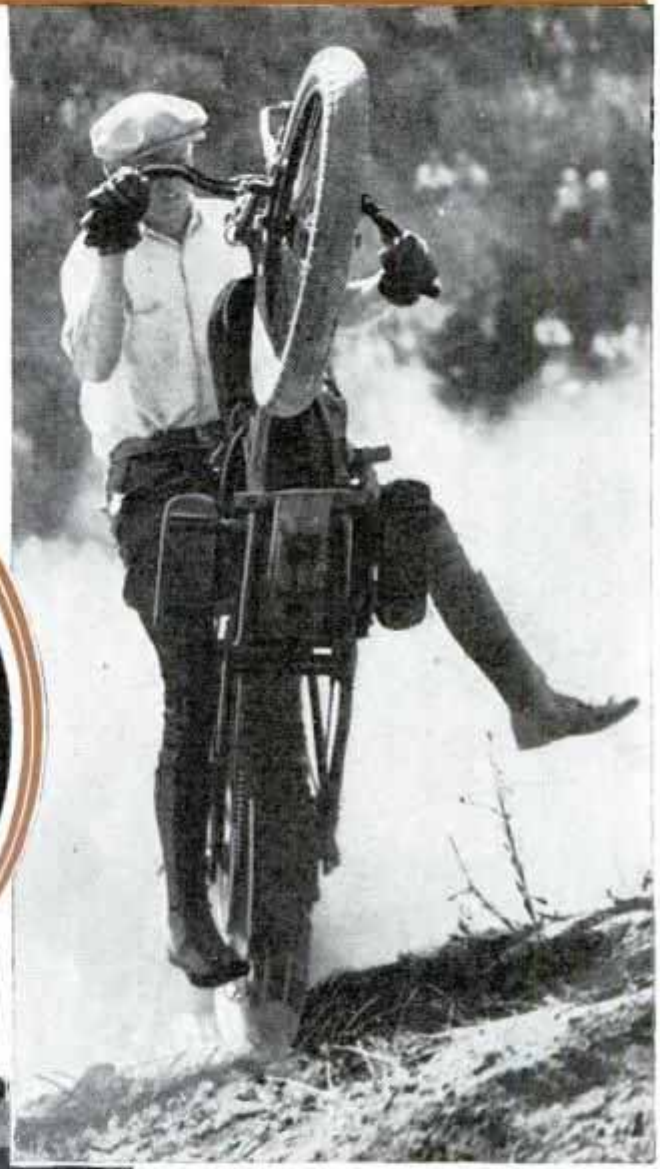


Despite These Peaceful Home Scenes, Accidents in the Home Caused 29,500 Deaths Last Year

By **WALTER E. STEWART**
Box 30, Seaview, N.J.
NAME six neighboring families. In your own, or one of these, this year will be committed at least one disabling accident. If past records hold good, it will cost you or your neighbor \$148 to pay the doctor and for lost wages. The National Safety Council's records show that in 1933 accidents in the home accounted for 29,500 deaths, a close second to the 30,500 deaths causes by automobiles. If you are an average citizen, the rugs on your floors are the cause of seventeen times as many accidents as all the electricity in your home. Small rugs skid on slippery floors, worn spots hook unwary heels, and curling edges stub the lifting toe. Vacuum cups or non-slip pads under small rugs, judicious mending for the worn spots, and a bit of proper reinforcing for the curling edge are the remedies.

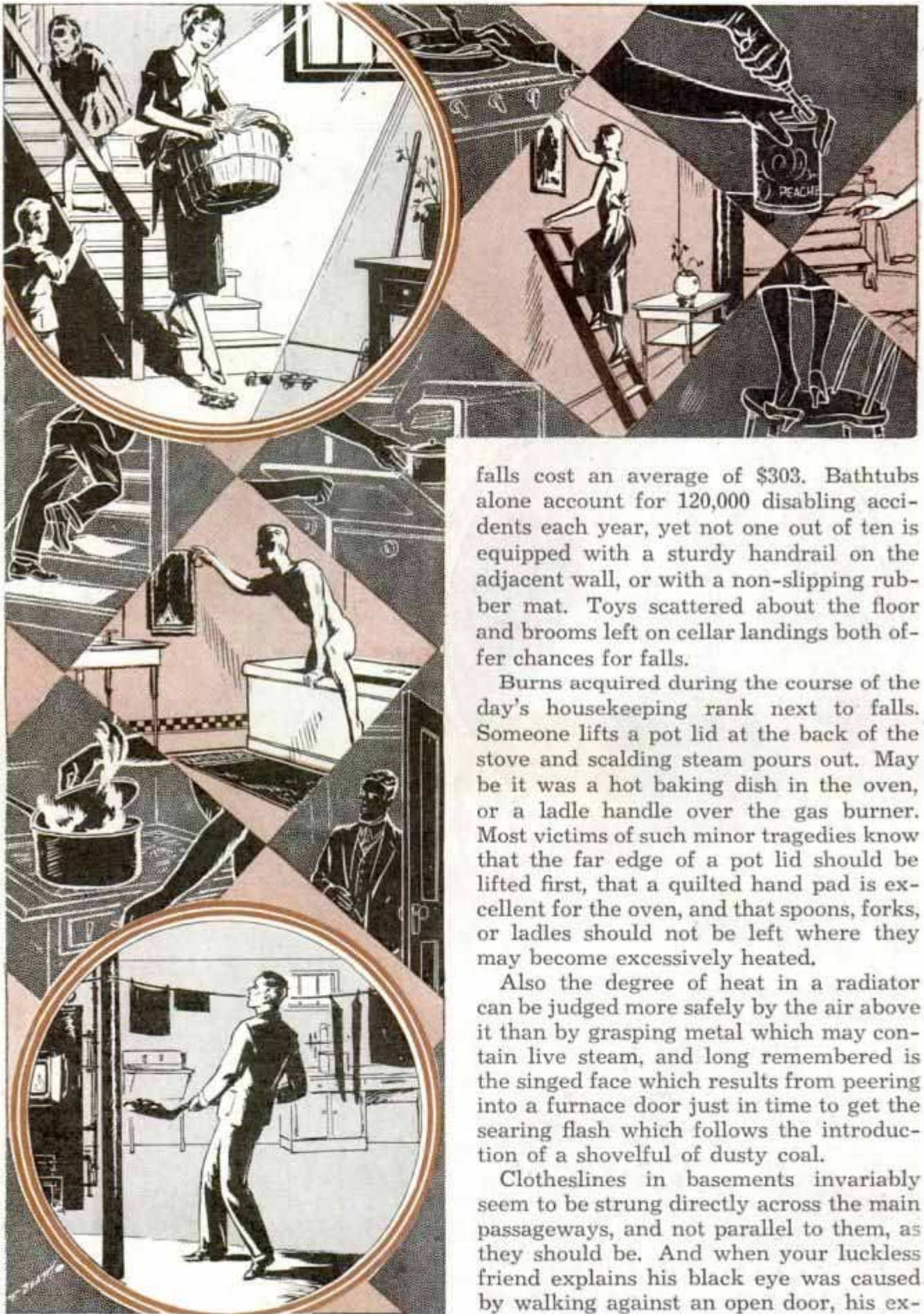
More than half of all the serious accidents in your

PLACE *in the* WORLD



These Men Lead Dangerous Lives, but You May Face Hazards Just as Great in Your Own Home

home will be caused by falls. You may hook your toe under a loose stair tread, fall upstairs and break a kneecap. Or perhaps your cellar stairway is ill-lighted and has no handrail. If so, you can confidently look forward to a bad fall and an average financial loss of \$132. The most expensive tumble likely to occur in your home will be due to use of a flimsy chair for a step-ladder. Figuring the cost of a good ladder at \$3.50, one upset of the chair will buy eighty-six of them, for such



Here Are a Dozen Common Causes of Accidents in the Home, Each of Which Might Be Avoided by a Little Forethought

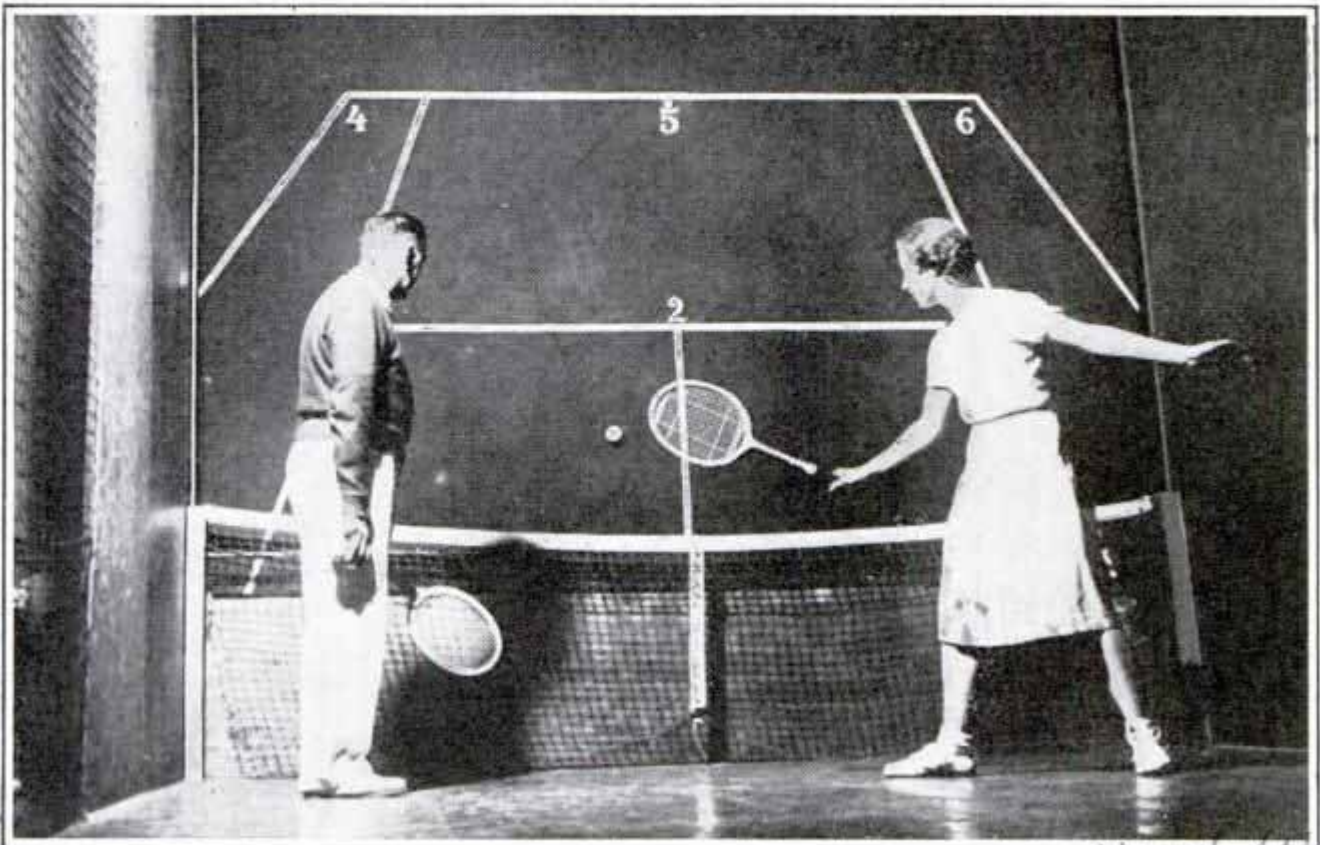
falls cost an average of \$303. Bathtubs alone account for 120,000 disabling accidents each year, yet not one out of ten is equipped with a sturdy handrail on the adjacent wall, or with a non-slipping rubber mat. Toys scattered about the floor and brooms left on cellar landings both offer chances for falls.

Burns acquired during the course of the day's housekeeping rank next to falls. Someone lifts a pot lid at the back of the stove and scalding steam pours out. May be it was a hot baking dish in the oven, or a ladle handle over the gas burner. Most victims of such minor tragedies know that the far edge of a pot lid should be lifted first, that a quilted hand pad is excellent for the oven, and that spoons, forks, or ladles should not be left where they may become excessively heated.

Also the degree of heat in a radiator can be judged more safely by the air above it than by grasping metal which may contain live steam, and long remembered is the singed face which results from peering into a furnace door just in time to get the searing flash which follows the introduction of a shovelful of dusty coal.

Clotheslines in basements invariably seem to be strung directly across the main passageways, and not parallel to them, as they should be. And when your luckless friend explains his black eye was caused by walking against an open door, his explanation is probably true. Far more black eyes do result from open doors in passages and hallways than from fists.

Parlor Tennis "Court" Helps Master Game



Tennis "Court" for Indoor Play; the Living Room Serves as Half the Court and a Screen Opposite the Net Represents the Half to Which the Player Is Serving

One German tennis professional teaches his pupils the rudiments of the game on an indoor court which is partly real and partly imaginary. The room itself serves as half the court and on the opposite side of the net is a screen laid out as a back-

ground to represent the other half. On the floor are marked off footprints showing the action in serving, and the pupil is taught the proper form before trying the game outdoors. The indoor layout also serves as a practice court.

D304. Small Mortar Spreader Does the Work of Three Men

Rapid laying of mortar is made possible by the development of a spreader which

does the work of three men. It consists of a boxlike container for the material and a spreader mechanism operated by a crank, and is rolled along the brick surface as the crank is turned.



Mortar Spreader Operated by Turning a Crank; It Does the Work of Three Men

D279. SEAPLANES HUNT SALMON EGGS

Salmon eggs are being hunted by seaplanes of the Canadian department of fisheries. The planes inspect spawning areas in the streams of British Columbia, and report as to whether the parent fish have been reaching the spawning areas in adequate numbers, whether the grounds have been well seeded with eggs and whether additional conservation steps are necessary to maintain stocks of salmon.

Comte Montagne

W. G. Wifflmoth

The Spiner

Used to be



How Part or All of Photograph May Be Made Invisible by Swabbing with Special Fluid

FLUID MAKES PHOTO INVISIBLE UNTIL WATER IS APPLIED

Photographs may be rendered invisible by swabbing with a solution now on the market. Then the pictures can be brought back into view by wetting the finger in water and rubbing the paper.

DIAMONDS IMBEDDED IN TOOLS MADE OF "CARBOLOY"

Diamond-impregnated tools, made of a cemented carbide called "Carboly," are replacing tools in which a single diamond is mounted for grinding and drilling. Diamond is peculiar in that it has no melting point and that it cannot be welded to any other body. However, under certain conditions, Carboly

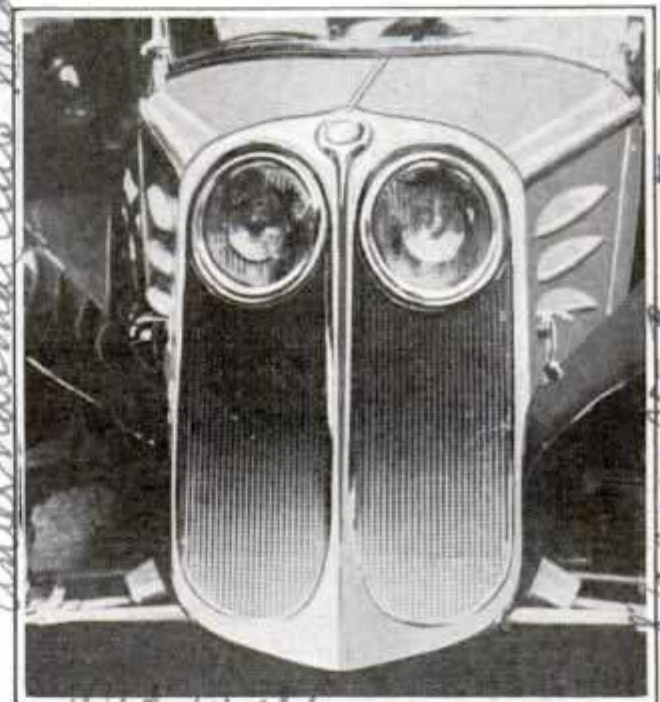


has a peculiar affinity for diamond. The material for the new tools is made by mixing powdered metallic Carboly ingredients with crushed diamond. At a temperature far below melting point of the metallic ingredients, the particles of metal coalesce, forming when cold a mass

of Carboly in which diamond particles are imbedded. In making drills, only a single surface layer of larger diamonds is used. Research designed to obtain maximum efficiency from the industrial diamond by eliminating breakage and loss from holders was conducted in the laboratory of the General Electric company.

LIGHTS SET IN AUTO RADIATOR GIVE APPEARANCE OF EYES

One foreign sports car has its headlamps set side by side in the front of the radiator instead of in the conventional places between radiator and fenders. The changed



Sports Car with Headlamps Set in Front of Radiator Where They Look Like Big Eyes

position gives them the appearance of two giant eyes as the car approaches.

VEST POCKET PAPER PUNCH CUTS STANDARD HOLES

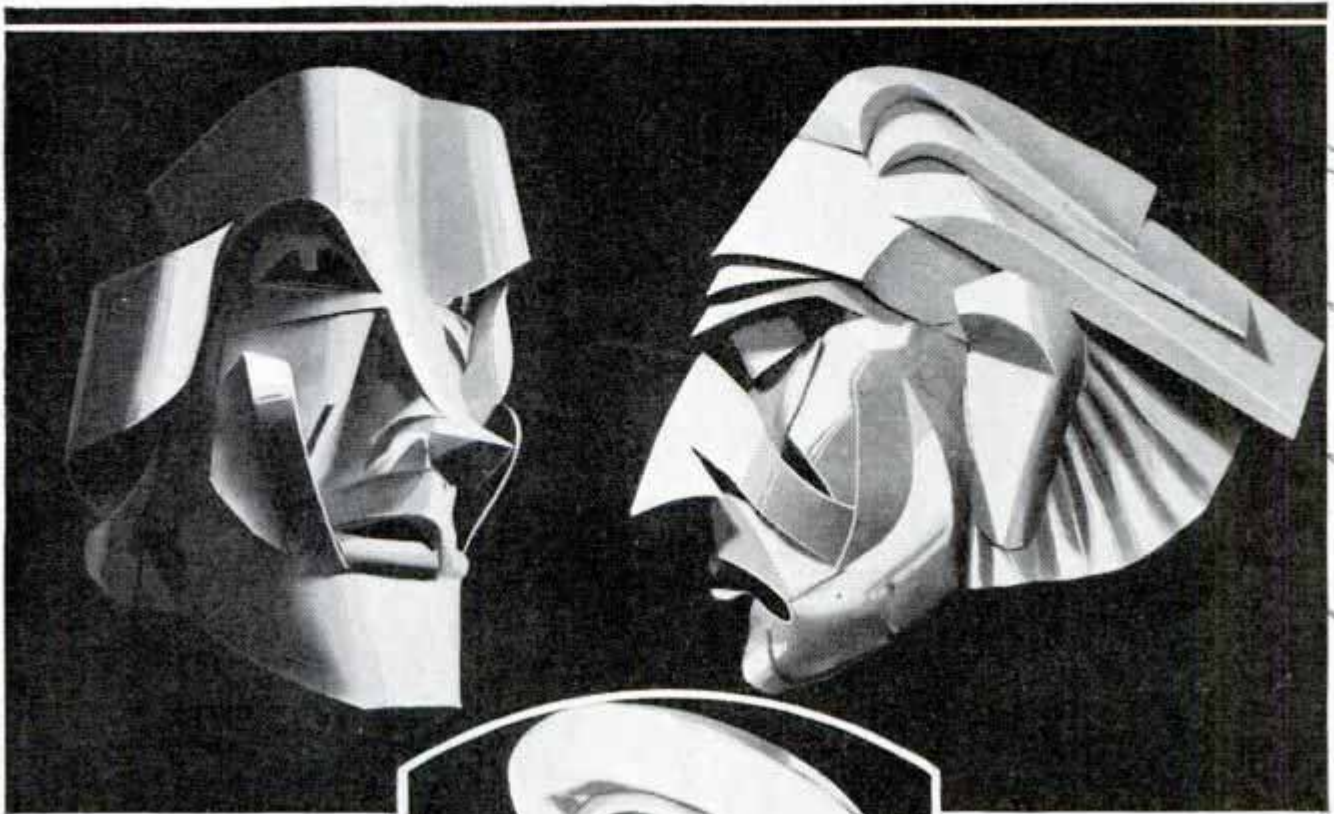


So small that it slips easily into a pocket, a paper punch is simple to operate. It cuts a standard size hole when a sheet of paper is inserted between the two lips and a spring plunger is pressed.

International Research Laboratories 622 W. Riverside
Research Laboratories General Electric
Chemical

1612 Neptune Ave
D3A
D425
D436
175-5th Ave
metal
10 cents
George P. Stephenson

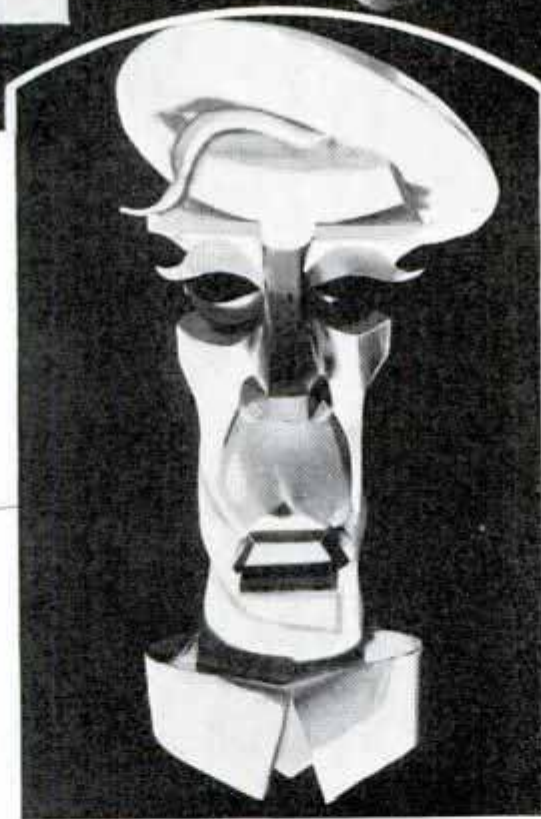
Grotesque Heads "Carved" from Pasteboard



© Amalgamated Pressphoto Assn.

Samples of Masks Made from Either Cardboard or Sheet Metal with Scissors and Clips

Masks and heads bearing a striking resemblance to the persons caricatured are "carved" from plain cardboard or tin sheet metal by a Polish sculptor and painter. Scissors and paper clips form his only tools in fashioning the grotesque figures which have attracted attention in European art circles and won him praise.



mented brazen plaque back. Light reflected from the face of the mirror produces a squatting image, from the outlines of which flash rays of light. Close examination fails to show any sign of engraving or etching. As explained by an electrical scientist, the process is simple. The oriental maker first punched the design on one side of a thin sheet of softened metal. This made the punch marks harden the metal through the thickness of

Com. Edward Lumber, Lumber Feature Service, 28 W. 47 St. N.Y.C.

MYSTERY OF "MAGIC MIRROR" SOLVED BY HIDDEN LINES

What causes certain Oriental mirrors to project the outlines of gods or goddesses upon a darkened surface as they reflect light has been explained after a long search for the lost secret. One of these mirrors, acquired by an English ship's surgeon in the Far East, is circular, with a white burnished metal face and an orna-

the sheet so that the design, although invisible on the reverse side, still exists. The reverse side was then polished on a buffer, whereupon the hard-metal surface resisted the polishing process, which resulted in the design standing out about one-hundred thousandths of an inch, invisible to the eye. If the picture on the obverse side is now polished off, a new design can be etched in its place, the mirror still retaining its "magical" properties.

Cont. Welkins

D416

115 Walbridge Road
Hartford, Conn

MILE-a-Minute



to lift forty such cars three feet into the air. That is ten times the number the same car would lift in a similar collision going at twenty miles an hour—a good argument for learning to think as fast as you drive.

How many drivers realize that as the speed of the car increases there is a virtual increase in its length? Based on average stopping distance, it has been estimated that at a mile a minute a car occupies 263 feet of highway in addition to its own length. At twenty miles an hour it needs only thirty-eight feet plus its length.

Even worse than the reckless driver who tries to do sixty where it is possible to travel only thirty miles per hour safely is the fellow who can't drive sixty miles per hour safely with every physical condition favoring him. He simply has not learned how to handle his car, but he tries fast driving because he observes the fast driving of competent drivers.

Put a skillful, fast-thinking driver at the wheel of a car and he can put it through its paces with a high factor of safety. He is able to think a mile a minute when driving a mile a minute and his performance suggests that the greatest

AUTOMOBILE accidents the past four years have killed nearly 125,000 persons and injured 4,000,000 others. These appalling figures indicate that if we are to enjoy touring speeds of 100 miles per hour with safety, the first step is to avoid exceeding the mind limit.

Hazards increase with speed. A car traveling sixty miles an hour, hitting an object and stopping within three feet, exerts a force sufficient

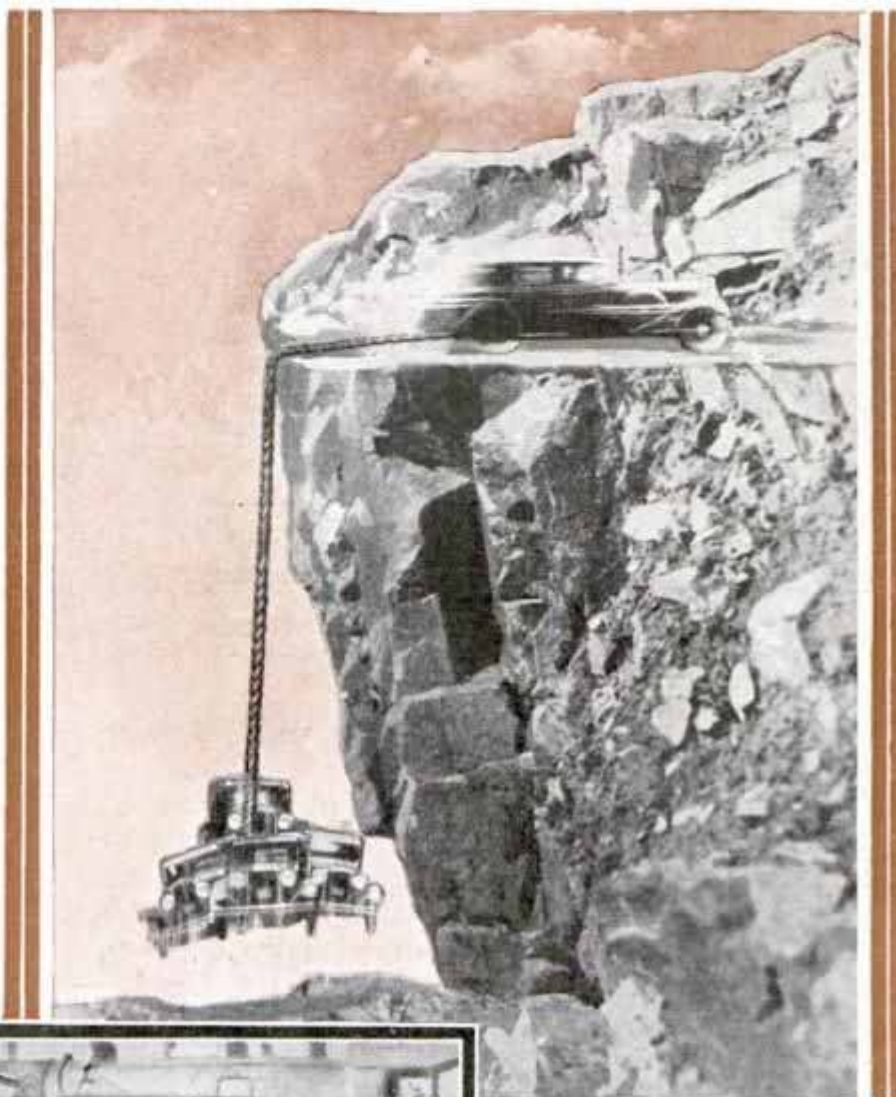


Top, Driving Off This Building Is No Worse Than Hitting a Stone Wall at Sixty Miles an Hour; Below, the Faster You Go, the More Highway Space Your Car Takes Up

THINKING

safety device that can be added to any automobile is a driver to match it. There are too many 1924-model drivers in 1934-model cars.

Safety devices galore have been incorporated in automobiles, but accidents have continued to increase. Pressed-steel frames, anti-skid chains, shock absorbers, bumpers and horns headed the list, which has been growing ever since. But do you know that at a mile a minute you must blow your horn long in advance to give the other fellow time to react, or even to hear you? Electric lights cut down night-driving accidents when introduced, but today



Top, the Force of a Collision at Twenty Miles an Hour Would Lift Four Cars Three Feet; Below, Excess Speed Is Seldom Realized until an Emergency Occurs

Electric starters seemed to banish the fear of stalling, but newer developments make it necessary to guard against a dead motor. If free-wheeling and your car is not equipped with an automatic re-starter, you must be ready to re crank if your motor stalls while coasting down hill. One driver who depended on the vacuum booster attached to his braking system

they may inspire overconfidence. Driving sixty miles an hour with forty-mile-an-hour headlights is dangerous. If you can't stop in the distance visible ahead, then you might as well be driving blindfolded. tem found the car did not slow down when he was free-wheeling. His motor had stalled and there was no suction to operate the booster. Another driver switched off his motor and depended on his brakes on



The Power Skid Is Newer Than the Side-Sway or Braking Skid, but Is Handled the Same Way—Steer in Direction Rear Wheels Are Sliding

killed by automobiles! Horsepower and speed have increased faster than the ability of the average driver.

Some of the trouble is due to not understanding the newer features. It is unreasonable to expect to go around curves fast on a warm day with the shock absorbers given the "soft-drive" adjustment. This invites swaying and skidding. Where shock absorbers are adjusted automatically, it is also necessary to provide for lag in the thermostatic adjustments when going from one kind of road condition to another.

a down grade. The grade was steep and he narrowly averted a bad accident.

When four-wheel brakes were introduced in 1921, it appeared that high speed would be reasonably safe because everyone would be able to stop in time. Unfortunately only a few drivers handle their cars as if they still were dependent on two-wheel brakes. Try that idea and see how it saves trouble. You will never find yourself calling on your brakes to give you their maximum stop. The more powerful the brakes, the more careful you must be in their use. Sudden stopping upsets more cars than actual collisions.

If your car struck a stone wall at sixty miles an hour, the impact would be similar to driving it off a twelve-story building. You can obtain the same result by driving into another car, if you are each doing a mere thirty. Such comparisons fail to emphasize that the important thing in preventing a collision is clear thinking. This thinking must be accelerated in proportion to the increase in speed.

Since 1923 we have had balloon tires, safety glass, vacuum brakes, synchromesh transmission, automatic ride control, X-bracing of the frame, the steering modulator and centrifuse brake drums—all safety steps helping to lessen the possible number of accidents. In that time, however, more than 250,000 persons have been

It is likewise possible to throw a car into a skid by carelessness in shifting down with a modern transmission if the road is wet or slippery. Easy shifting prevents accidents, if properly used, but if you shift to second and let the clutch in too fast, it is like slamming on the brakes.

D 445
"NIGHT STICK" IS ILLUMINATED FOR POLICE SIGNALS

Making it easier for police officers to signal drivers or pedestrians, an illuminated "night stick" has been produced. It



Lincoln Park
Policeman Directs Traffic with "Night Stick"

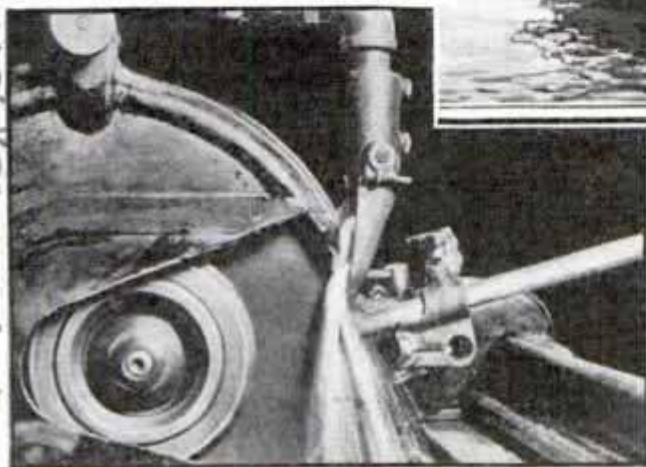
consists of a flash light with a cylinder of red celluloid attached around the end containing the bulb.

Shaver Dr. Warrington, det.
made by H. S. Stiles, 209 3/4
makes such a name

Carbon—King of Diamonds—Rules Industry

Modern industry's use for industrial diamonds is increasing every year. Prices have advanced from \$20 per carat in 1920 to \$50 in 1934. Truing of abrasive wheels for precision grinding in every industry has brought the industrial diamond business up from ten million dollars in 1920 to

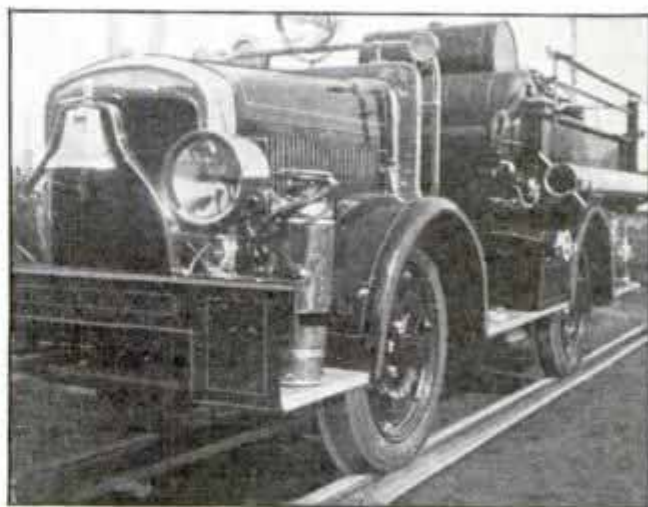
Right, Sifting Diamond-Bearing Gravel in a River in Brazil; Below, Using Carbon for Truing an Emery Wheel



are assorted and graded. They are then sold to mining, diamond-drill contracting companies and manufacturers all over the world.—By Henri Brevet.

D446 FIRE ENGINE FOR USE ON RAILS PROTECTS NAVY DEPOT

Since there are no motor roads to the United States navy ammunition depot in the Hawaiian islands, a fire engine for use at the depot was built to operate on the railroad already in service there. The engine rides on rubber tires, its wheels being flanged to hold the rail. With a capacity



Flanged Rubber-Tired Wheels Adapt This Fire Engine to Operation on Railroad Track

thirty million this year. Few people know that industrial diamonds are used in the manufacture of automobiles, engines, pumps, gears, copper wire, optical instruments, in marble sawing, in fact, too numerous articles to mention. Gigantic structures such as the Empire State building, the George Washington bridge, and the Boulder Creek dam in Colorado are built with the necessary aid of the diamond drill. The diamonds used for drilling up until 1926 were mostly black diamonds, found only in Brazil. Black diamonds, known under the name of carbon, are of volcanic origin—the hardest material on earth. The price of carbon depends upon its quality. The carbons are not mined and marketed as the African diamonds, which are called bortz. The Brazilian carbons are mined by natives who find them in river beds, and between rocks through blasting. They take them to Rio de Janeiro, or Bahia, where "importers" from Holland, Belgium, England and France come to bid on their goods. The importers take the rough carbons to Europe where they

of 500 gallons, the engine carries all equipment necessary to combat fire at the ammunition depot.

Con. Brevet & Co. 320 Wrigley Bldg. Chicago

St. New York Wrigley Bldg. Room 320

Peter Pirechy & Sons

Houses Put Together Like Toy Building Sets

House now being built - Children's Baker's Home of Southern California, 77th and Victoria Los Angeles



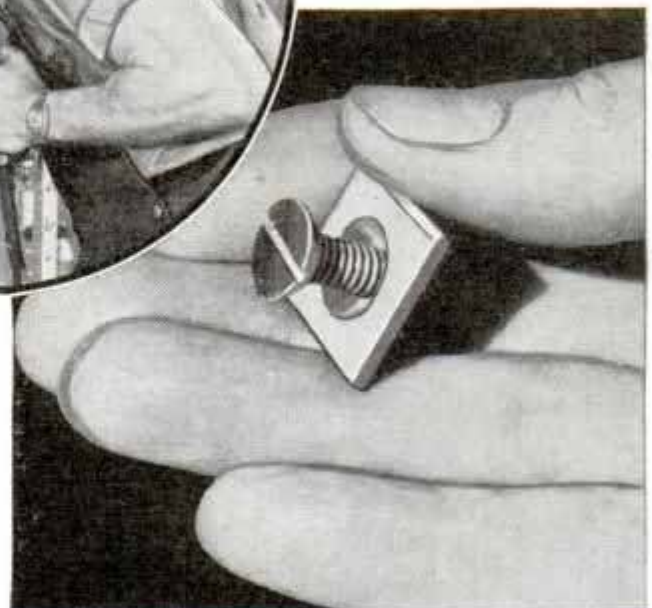
Punched steel pieces may be put together like the parts of toy building sets in the construction of houses and other frame structures. All joists, roof trusses, window frames and trim, door jambs and bracings are punched, stamped and shaped out of galvanized sheet steel, which is rust-resisting. The metal "building blocks" are adaptable to substitution for wood framing. Cut-out portions of the framing provide space for electrical conduits, water pipes, gas pipes, plumbing lines and heating systems, well hidden but strongly trussed against movement by the steel partitions to which they are tied with metal bands. Special galvanized bolts hold

the various pieces in place. Metal corners of the door jambs and trim are welded to prevent the possibility of pulling apart under strain. Prongs punched through the metal pieces at intervals provide for attachment of metal lath for stucco and plaster. Lightness of the pieces is obtained by stamping out excess steel. All parts are fabricated from architectural plans at the factory and are put together on the job.

THREAD LUBRICANT OF LEAD RESISTS EXTREME HEAT

Extreme heat generated by machinery operating at high speed is said to be resisted successfully by a thread lubricant that contains about fifty per cent metallic lead, almost colloidal in fineness. The lubricant is used to keep threaded joints from freezing or corroding together. Due to the high lead content of the substance, a film of metallic lead forms between the

threads, effectively preventing galling and acting as a seal, helping to hold high pressures. At high temperatures, the lead may melt, but if below the vaporization point of lead, which is a bright



Top, Steel "Building Blocks"; Center, One Step in Putting the Pieces Together; Bottom, Special Galvanized Bolt for Fastening Pieces

Wm. C. ... Clarence St. Los Angeles, Calif. D 227 Armite Laboratories 1900 E. 65th Los Angeles Calif.

cherry red, the metal stays in the joint as a liquid. On cooling, the lead resumes its solid state, ready to act as a lubricant when the pipe is unscrewed.

D 42 2.

"DRY-ICE" LOWERS BIG TANK INTO SMALL SPACE

Dry-Ice, solid carbon dioxide, may be used for lowering heavy machinery into cramped space or where overhead cranes cannot be operated. Recently, the engineer of an ice-cream plant solved the problem of "spotting" a rectangular welded steel brine tank, weighing 6,500 pounds, on a flat foundation. Six blocks of Dry-Ice were evenly spaced on the foundation and the tank lowered by jacks onto the blocks. At this stage, the friction between the tank bottom and the



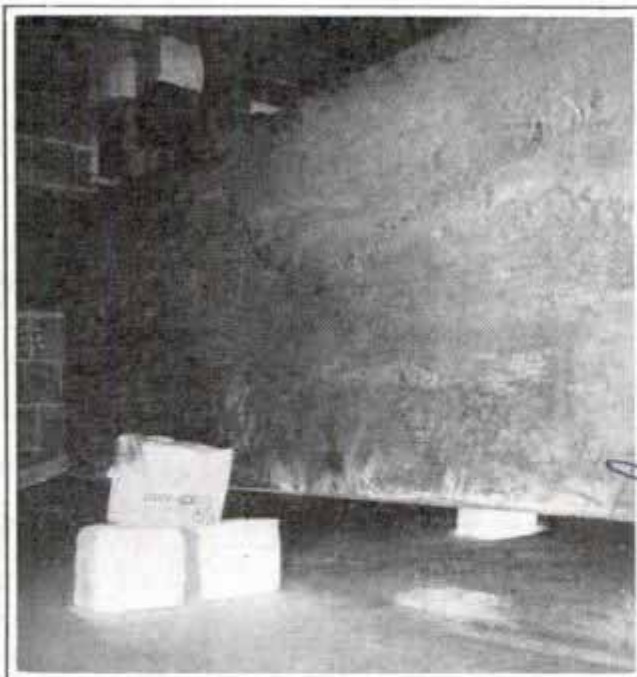
Landing Wheels of Great Britain's Biggest Passenger Plane Being Rolled into Position; the Ship Will Accommodate Forty Passengers

HUGE LANDING WHEELS CARRY BRITAIN'S BIGGEST PLANE

Great Britain's largest passenger plane, the giant "Scylla," now nearing completion, will be supported by landing wheels taller than a man. The ship is so large that it was assembled outdoors because no hangar big enough to accommodate it could be found.

RAZOR RUN BY BATTERY IN HANDLE

Nothing more than a simple flash-light battery in the handle is needed to operate the tiny motor of an electric safety razor now produced in Germany. The motor moves the blade to and fro at high speed and no pressure against the face is required in shaving. Blades are easily replaced and the battery and motor compartment is waterproof, so the razor can be cleaned under a water tap.



Melting Block of "Dry-Ice" Is Shown under Tank at Right, with Larger Blocks at Left

Dry-Ice was so slight that the tank could be moved into exact position by one man. Then it was blocked to prevent shifting and allowed to settle to its final position as the Dry-Ice melted.

being assembled at Rochester, N.Y. Androme, Rochester, N.Y.

Wade Works

Wade Works

no U.S. agent known

American Dry Ice Corp. 215 E. 112 St. New York

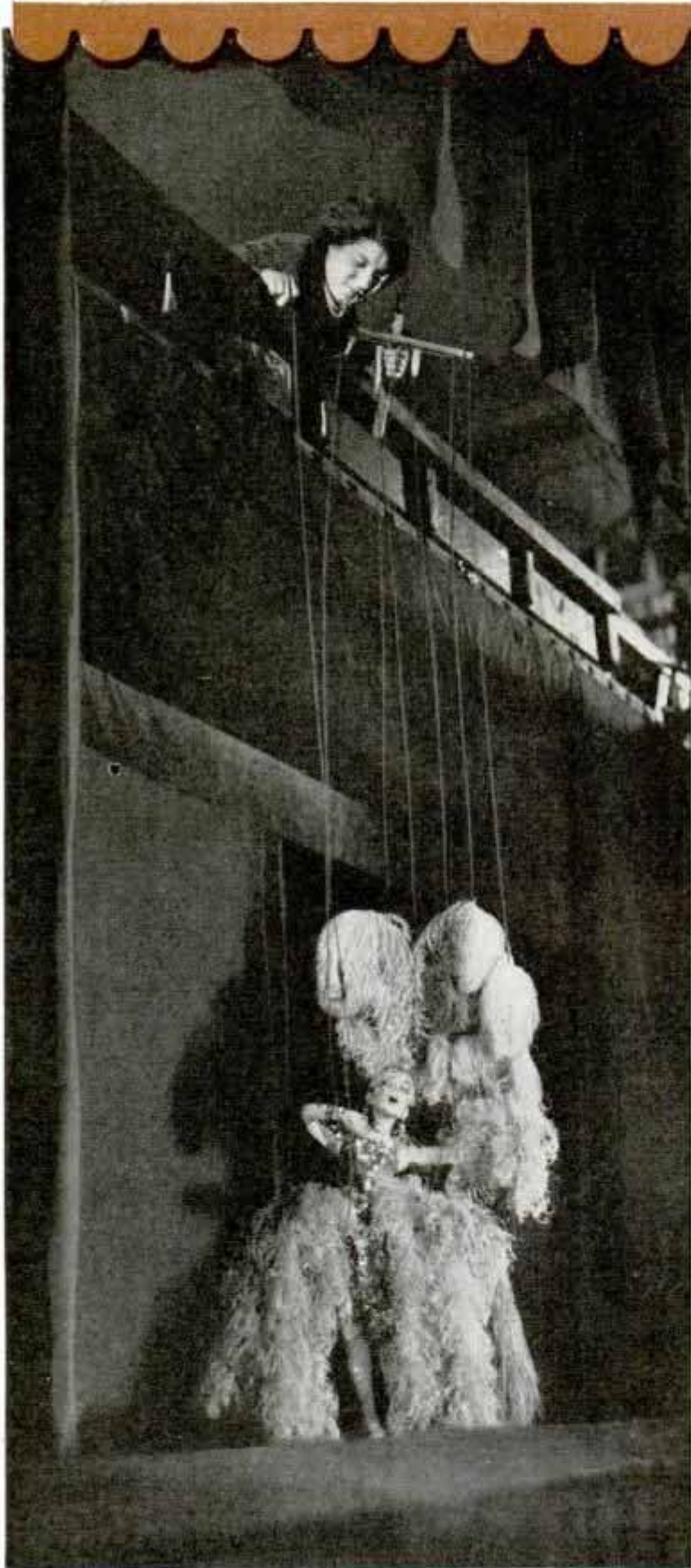
Kasch-Werke Weilbrunn a.

D 46 3
220 & 42nd St. New York

Behind the

see front.

SCENES



Note the Elaborate Costume of This Marionette as It Burlesques the Steps of a Dancer

THE ancient art of puppetry, one of the world's oldest forms of entertainment, is gaining renewed popularity, due to the introduction of mechanical innovations and the assistance of such modern developments as the radio, short plays produced on phonograph records and the remarkable stage-lighting effects now possible.

As a source of amusement, puppets and marionettes date back to centuries before Christ. They have been found in the tombs of ancient Egypt and they have played their solemn roles in the religion of Oriental countries for hundreds of years. Now marionette troupes are touring America again. Today's marionette performance, however, bears little resemblance to the rag dolls with sagging knees dragged grotesquely across a little stage in a Punch and Judy show of years ago.

The modern marionette is a marvel of careful balance and design. Joints are painstakingly formed with just the right degree of freedom to lend naturalness to the little figures, weights are carefully distributed to insure balance and motion, and costumes are made with as much care and thought as though they were to be worn by a prima donna.

Vienna today has a "figure theater" where little robot actors move about with grace that seems wholly human and natural. Music and intricate lighting effects serve to heighten the illusion as the lavishly costumed marionettes are moved about the miniature stage by means of wooden rods from below instead of strings or wires from above. These figures kneel, sit, rise with dignity, raise and lower the hands gracefully and look up or down expressively, since even the eyes have motion. Re-

with the PUPPETS



Above, Group of Performing Marionettes; Below, These Little Actors Are Imitating the Actions of Movie Stars They Are Costumed to Represent

markable scenic effects are produced with chemical crystals which seem to change and grow before the eyes of the mystified audience.

Audiences today are startled to see a marionette clown climb a pile of tables like an acrobat, balance himself until he tumbles down with a clatter, then inflate a balloon until it becomes so big he floats across the stage in midair. A concealed bicycle pump is the answer to the balloon trick and a clever puppeteer with a complicated control stick accounts for the table stunt. A seemingly simple action by mario-



Such spectacles require not only carefully constructed figures but an expert group of puppeteers.

While the making and manipulating of marionettes is an art in itself, it is not difficult to master the rudiments. One of the most complicated figures ever produced, for instance, is a gorilla made by an Ohio high-school boy. It has forty-seven control strings and by the aid of tiny weights can be induced to snarl, move its eyes, wrinkle its nose, raise and lower its eyebrows, open and close its mouth, walk on its hands and pick up objects from the floor.

For the shop worker, the making of puppets and marionette shows offers an interesting hobby that may develop into an income. It costs nothing to start, because a



Above, These Marionettes Appear in the Movies; Below, Lucille Fink, Chicago Girl Who Has Developed a Business Out of a Marionette Hobby

nettes may require weeks of experiment by the puppeteers. In one show a doll passes a letter to another figure. The marionettes borrowed a trick from the magicians for this. Two letters were used, and at exactly the right moment, one letter was yanked into the sleeve of the giver and the other was lowered into the hand of the receiver.

Marionettes are being molded or cast to represent famous personages, then the little actors imitate these people in characteristic poses often startlingly lifelike. Short plays on phonograph records are being presented by marionettes, the phonograph supplying the words while the robot actors go through the parts. The same is true of radio which also has been used to furnish the music for a marionette girl chorus as it executes intricate dance numbers in perfect time.

wisp from the rag bag becomes a robe for a king, the top of a tin can is a shield or a plate, and when Cinderella wishes for a coach, in rolls a dressed up cigar box, accompanied by a puff of smoke blown by the unseen puppeteer.

are no special records.

One-Man Bulldozer Builds Mountain Roads

Roads are being dug and gouged out of the sides of mountains by a one-man machine consisting of an adjustable and angle-blade bulldozer operated by a tractor. Such an outfit can build a road ten to twelve feet wide by digging off the upside of the mountain and filling in the lower side. The bulldozer can handle boulders, undermine small trees and move seemingly impossible masses of material.



Adjustable Bulldozer Run by a Tractor Which Builds Mountain Road by Digging Off the Upper Side and Filling in the Lower Side

D266
STEAM-VAPOR GUN REMOVES PAINT

Paint may be removed from automobiles, trucks, exteriors and interiors of buildings and many other surfaces by means of a vapor "gun" which ejects steam or steam-chemical solutions under high pressure. The device is self-contained, generating its own steam in a

generator coil connected to the water or solution tank. A one-quarter horsepower electric motor, which is controlled by a hand switch, operates the air blower, a rotary fuel oil burner and a rotary water or solution pump. The burner jet provides heat for the generator coil. The gun may be used for cleaning off grease, for sterilizing and deodorizing.



Top, Chemical Vapor Gun for Removing Paint Is Shown in Operation; Note Light-Colored Section from Which Paint Has Been Blown; Left, Sketch of Equipment

D368
WHEEL PUMP INFLATES TIRE AS AUTO TRAVELS

Leaky tires may be kept inflated while the automobile is in motion by means of a pump which is attached to the wheel. As the wheel turns, air is forced into the hose and past the valve stem, keeping up pressure until a repair station is reached. The device has gears, piston rod, valve, air chamber and rubber hose.



Ironclad National Harvester Co

*Commercial Road + ...
Harvester Co. East Chicago
Ill.*

Woodruff Trailblazer

Homestead Valve Mfg Co

Chas. Loren Bush

D 3 40.

4425 Broadway 545-5th Ave
New York

TURNING a HOBBY



Left, Father Operates the Amateur Movie Camera While Mother Holds a Calico Dog to Keep Baby Smiling; This Photo Is One Step in Keeping a Pictorial Record of the Child, from Its Birth to Manhood; Thousands of Families Are Keeping Similar Records

By FRED C. KELLY

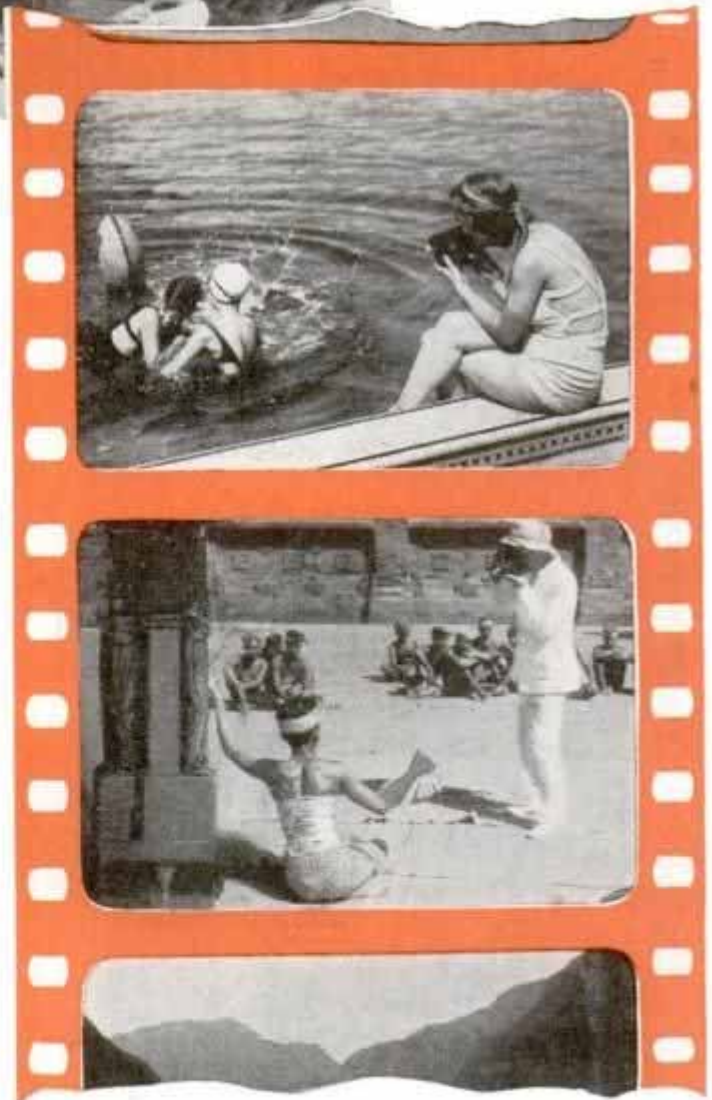
Hickory Hollow Pennsylvania

ONE day, Ralph R. Eno, employed in New York as wallpaper salesman, noticed in a show window the first popular-priced motion-picture camera he had ever seen.

"If people would only show more interest in my wallpaper," he thought to himself, "I would buy a movie camera and have a lot of fun with it." On further reflection, he decided to buy the camera and projector anyhow.

With a natural artistic sense, in a few weeks he had become an expert in making amateur movies. When he showed his pictures to friends they recognized them as better than other amateur movies they had seen. The explanation was that Eno knew what to leave out and how to rearrange pictures with a view to a natural unfolding of scenes. In other words, he was a good film editor. Then he began to experiment with titles. One day he wondered if he could do his work even better under instruction. He inquired but found no one in that line of work.

At that moment was born an idea. "If

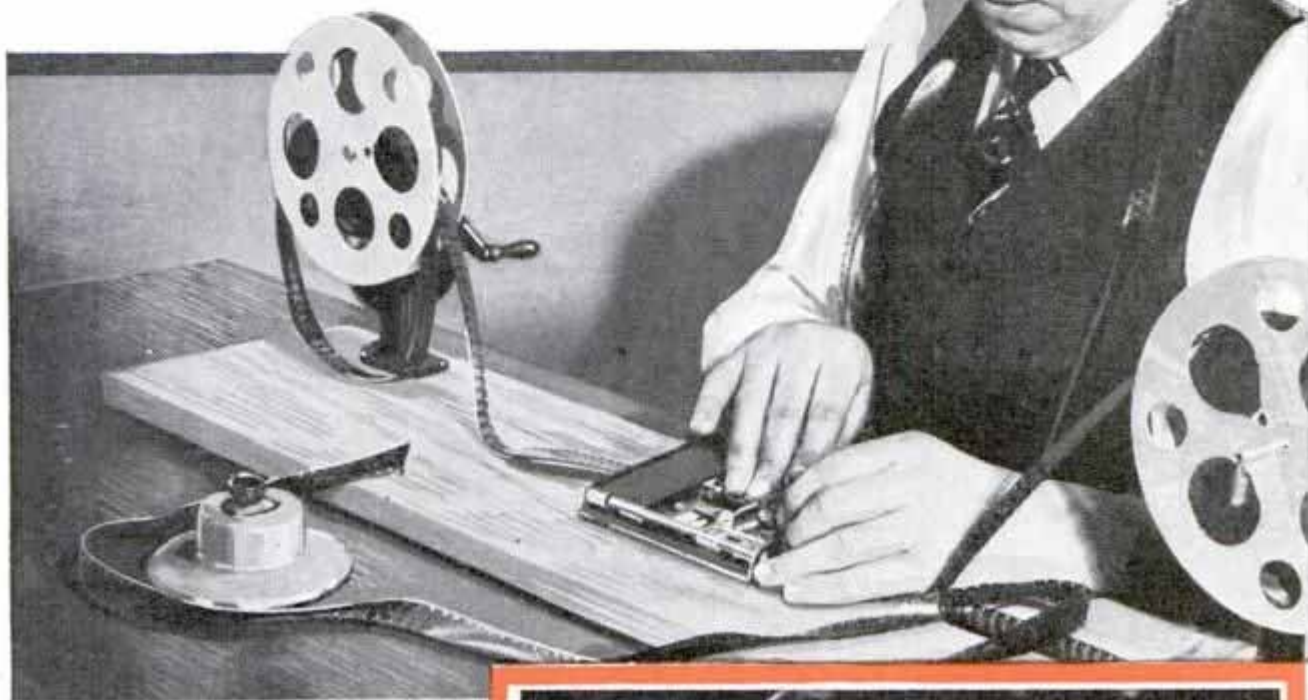


Scenes Like These in the Same Film Strip Must Be Cut Apart and Placed in Proper Sequence to Make Amateur Movies Interesting

D 370

into MONEY

Top, Amateur Film Editor at Work on Strip of Film Brought in by Customer; Bottom, One Step in Building Up Titles for Scene in Amateur Film



there has been no such profession as amateur film editor and title builder, there's going to be one from now on," said Eno to himself, "and I'm it."

So he went to dealers in photographic supplies and obtained their promise to put him in touch with anybody needing titles or editing, but they had little faith in finding any demand for such services.

Nevertheless, Eno did meet a man, a millionaire, who had been traveling about the world and had about nine miles of film. It contained interesting material about far-away places, but the pictures were in a jumble. In other words, like many another amateur, he had lost interest in his pictures because the job was incomplete.

Eno worked for many weeks, rearranging pictures and inserting artistic titles. At times the man was shocked at the ruthless manner in which Eno omitted yard after

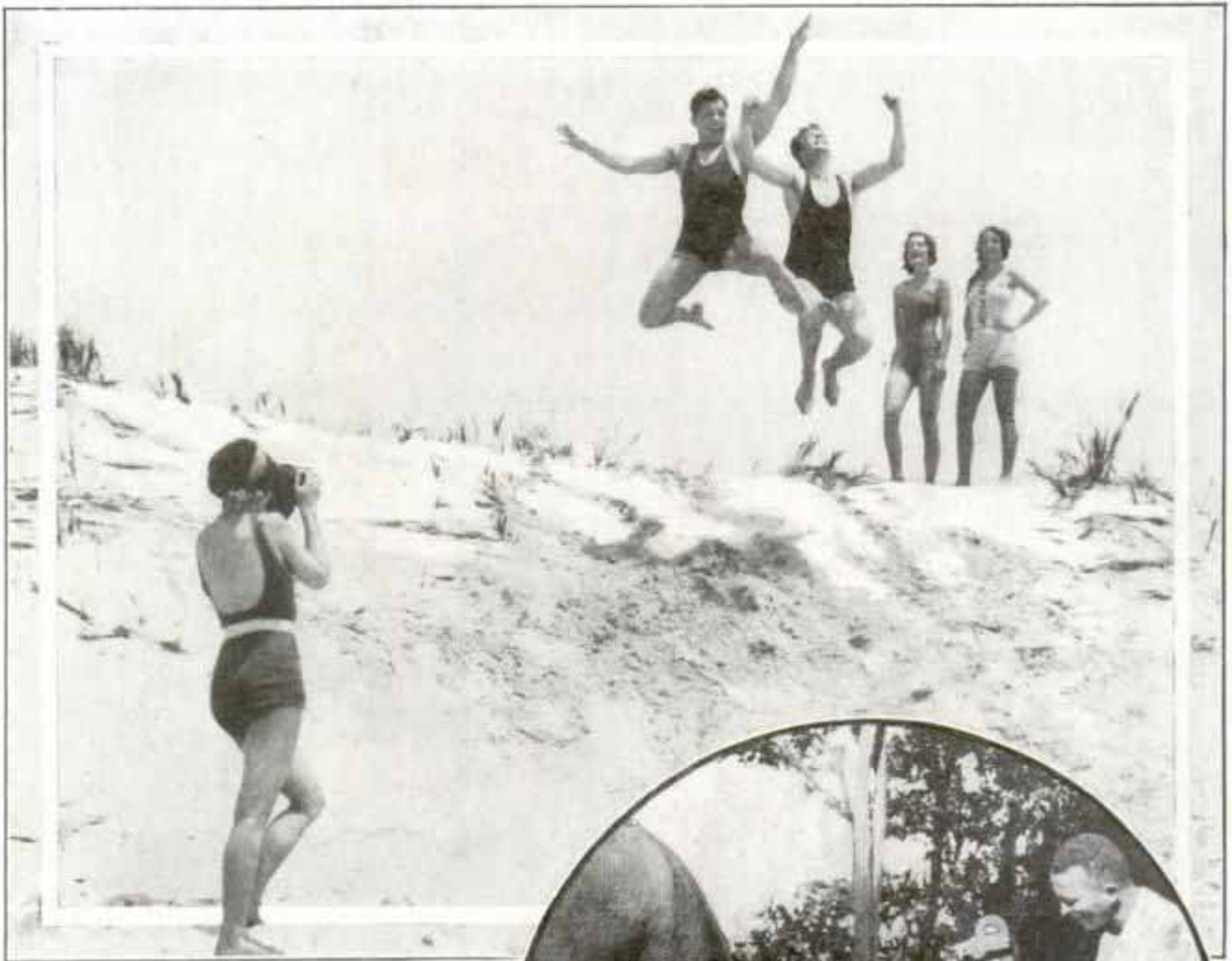


yard of his material. But when the job was done, he was so pleased with the result that he paid the bill, about \$9,000, without a protest.

With his profit on this job, Eno opened an office in a Broadway building and on the glass door was printed: "Film Editor and Title Builder."

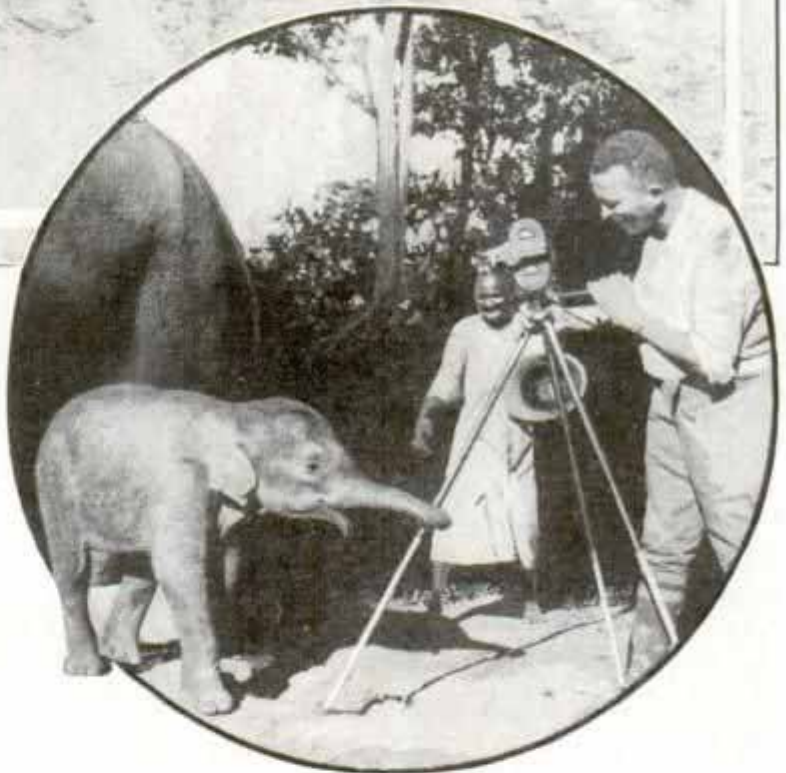
That first customer told his friends about Eno and today his callers actually get in one another's way.

Eno's customers are by no means con-



fined to the wealthy. Scores of them are humble clerks whose hobby is making a permanent record of activities of their children as they grow up. One such film is an amazing piece of editing. It shows a little boy from the time he was a few hours old until he was a husky big youngster, and yet this life story unfolds so gradually that the boy appears to grow right before one's eyes. He goes from one room to another after a toy and when he returns he is a wee bit bigger! The father hopes to have a filmed story of this lad's life from birth to manhood. Thousands of people are keeping pictorial family records, Eno says. He gets such films for editing from all parts of the world and recently was working on one from Tasmania.

During the depression, Eno's business showed a great increase. When men are idle or discouraged they turn to their hobbies to help them forget their troubles. A man can't buy films if he has no money;



Top, "Sky-Larking" for Vacation Movie; Bottom, Baby Elephant Places the Tripod

but so long as he has any funds left, he will do without something else for the sake of cultivating his hobby. Moreover, when he can't afford new pictures, he is all the more interested in trying to improve what he has already taken.

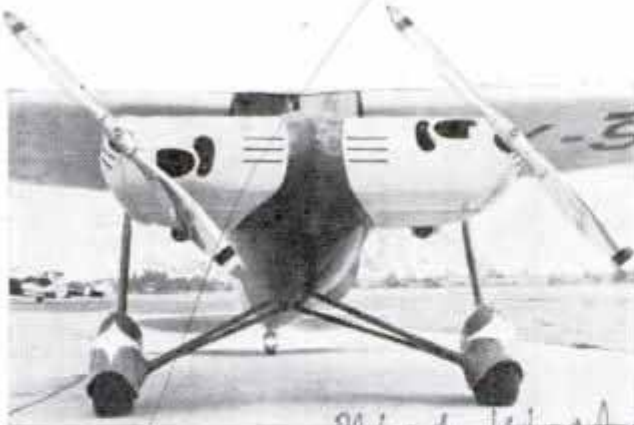
At all events, this man who stumbled upon a new profession, now has so many customers he is compelled to make appointments days ahead.

**HIGH-SPEED MERRY-GO-ROUND
TAKES GERMS FOR RIDE**

One of the latest devices for studying the invisible living world is a merry-go-round for microbes, the tiny passengers being photographed as they ride. The merry-go-round is no larger than a butter plate but whirls on a cushion of air at rates up to 20,000 revolutions per minute. A camera, so small it is built into a microscope, snaps a picture each time a rider goes by at full speed. Moving pictures made with the apparatus reveal what happens to germ cells of marine animals under such rough handling, and it is hoped the equipment will aid scientists in their search for the secret of the cell

**PLANE MOTORS SET ON SIDES
TO REDUCE RESISTANCE**

High efficiency is claimed for a twin-motored plane, recently tested, which has its motors mounted on their sides in the nose of the plane. This method of mounting, it is claimed, reduces head resistance of the motors to about half of that created by a single radial-motor installation. This plane is the latest work of Allan H. Lockheed, pioneer designer and builder, who has spent four years designing and con-



Wind Resistance Is Reduced by Placing the Two Motors of This Plane on Their Sides

structing a ship which he believes is best adapted to serve the air-transportation needs of today.

SOLES CEMENTED ON SHOES

Shoes may be resoled or half-soled without nailing or sewing by means of an electrically heated hand press. With a last inside to keep the shape, the shoe is placed



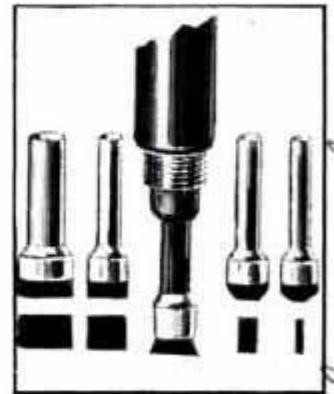
Electric Press Enables Operator to Cement Soles on Shoes; Lower Section Is Heated

on a hot-water cushion of chrome leather, rubber-lined. This cushion conforms to the shape of the last as the pressure is applied. The heat quickly dries the cement by which the new leather sole is attached.

BRUSH-TIPPED FOUNTAIN PEN

USED FOR MARKING

Used like a fountain pen but tipped with one of four sizes of brushes, a new device for marking packages and crates and for lettering is available. It is filled with ink in the manner of a fountain pen, and four special inks are used in it. The instrument can be used on any surface but glass.



No scientist has yet found a way of seeing through the clouds which always hide the planet Venus.

displayed at Ameygon been for advancement of science at Harvard

Harvey Princeton Univ. Princeton, N.J. qualified Lomis D44, Tuesday Park N.J.

San Diego Union 12/21/33

D294

D255

Barge Electric Shoe Cement Press, Inc., 29 Myerson Rd, W

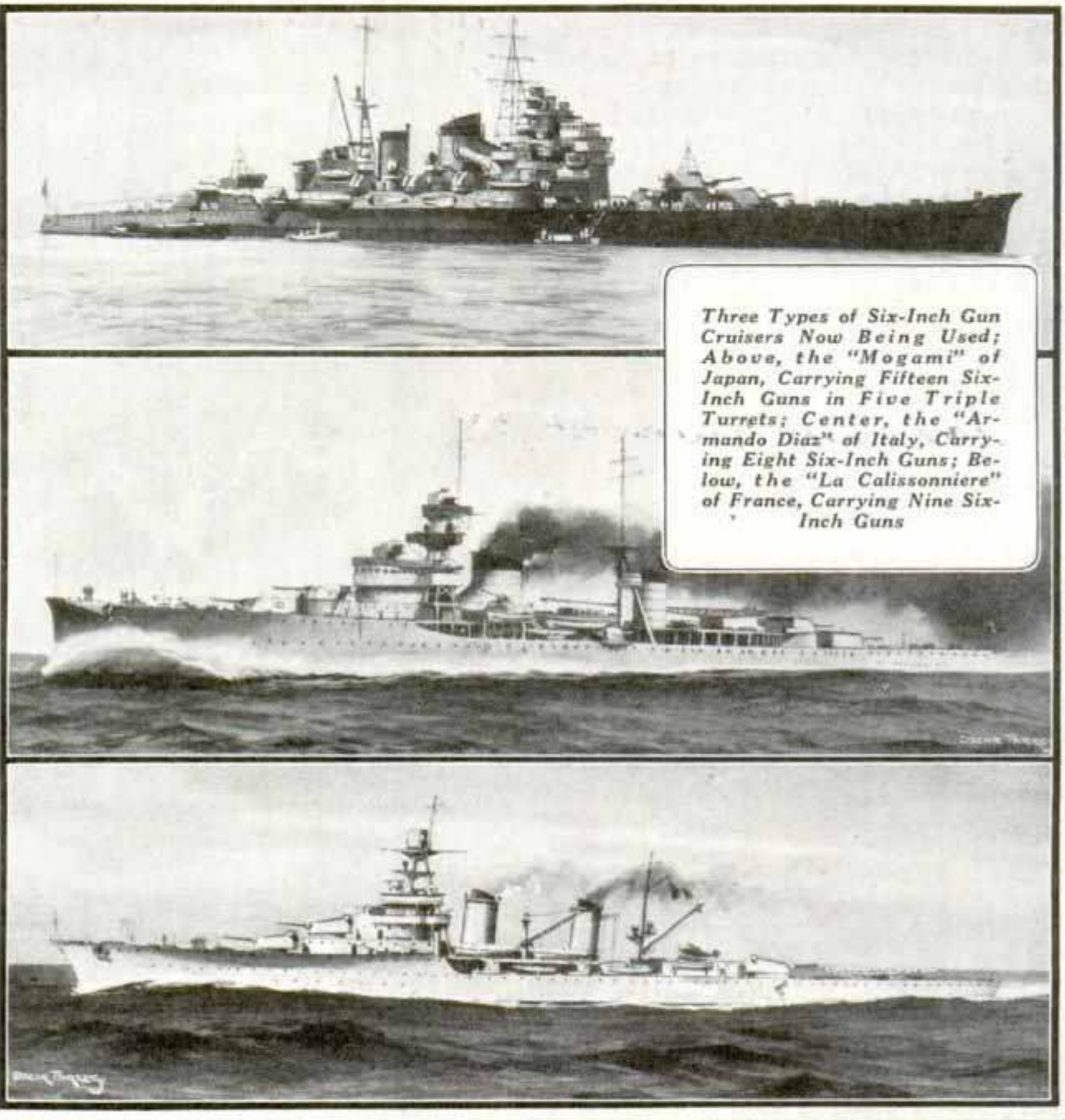
Scene Letter 3/3/34

Lockheed Aircraft Corp

Patent Trading

12 Han's Crescent, London, & W. L. L. L.

Nations Vie for Best Six-Inch Gun Cruiser



Three Types of Six-Inch Gun Cruisers Now Being Used; Above, the "Mogami" of Japan, Carrying Fifteen Six-Inch Guns in Five Triple Turrets; Center, the "Armando Diaz" of Italy, Carrying Eight Six-Inch Guns; Below, the "La Calissonniere" of France, Carrying Nine Six-Inch Guns

In order to comply with the limitations of cruiser tonnage under the naval treaty and still turn out ships in numbers, the nations of the world have turned, in recent years, to building six-inch gun cruisers instead of the heavier craft on which they were concentrating formerly. As a result, nations are competing today to turn out the best ships of this class. Japan opened the bid for supremacy with its "Mogami" class, consisting of six boats of 8,500 tons displacement, each carrying fifteen six-inch guns in five triple turrets as well as six five-inch guns amidships. Each boat

will carry a battery of torpedo tubes, two catapults and engines delivering 90,000 horsepower to give thirty-three knots. The reply of the United States has been the "Brooklyn" class of four vessels with a displacement of 10,000 tons each. It is reported these vessels likewise will carry fifteen six-inch guns in five triple turrets but at an expense of 1,500 tons additional displacement as compared with Japan. Great Britain is producing the "Minotaur" class cruisers of 9,000 tons displacement as well as three ships of 7,200 tons displacement carrying eight six-inch guns and

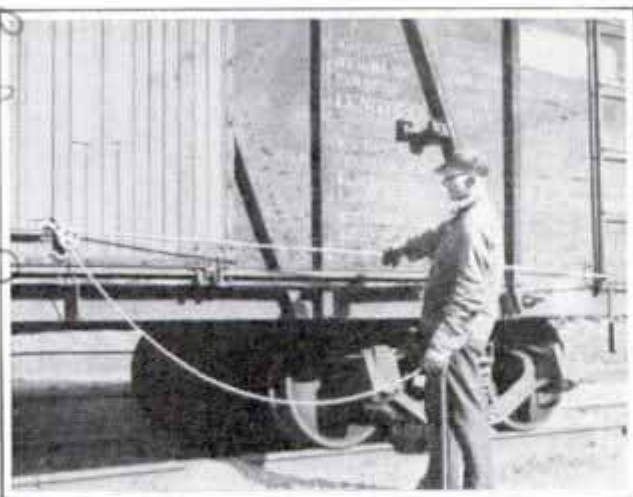
twenty-six smaller ones, eight torpedo tubes and two planes. The 72,000-horsepower engines will deliver 32.5 knots. Three other boats of 5,200 tons displacement will carry six six-inch guns and six torpedo tubes. In Italy where speed is the prime object, the "Armando Diaz" class cruiser of 5,080 tons with 90,000 horsepower has reached a speed of 39.8 knots. Six such ships will carry eight six-inch and twenty-five smaller guns along with four torpedo tubes and a space for planes. The boats will have a cruising radius of 2,500 miles at twenty-five knots. France has six 7,729-ton lightly armored cruisers of the "La Calissonniere" class under way. Each will have nine six-inch guns, 84,000 horsepower and a speed of thirty-one knots. Each ship will have a catapult and landing mat to reshipe planes from aft when under way.

The Training Safety Service Co. Baverston, Ohio.

D 339.

OPENER FOR FREIGHT CAR DOOR IS OPERATED BY ONE MAN

Handled easily by one man, a device for opening the doors of a freight car exerts a ton of force when its operator applies a 100-pound pull. Warped doors may



Warped Doors of Freight Cars Are Opened Easily by Exerting Moderate Pull on the Chain

be opened or closed quickly and safely. The tool is made of cast electric steel and twist links welded chain.

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



This Man Sits While Walking as He Propels a "Bicycle" Equipped with Legs Instead of Wheels

STILT CYCLE HAS TWO LEGS INSTEAD OF WHEELS

Wooden legs replace the wheels on a stilt cycle made by a Los Angeles man who proudly boasts that he can now sit down while walking. The two legs are pedaled like a bicycle, the rider balancing on a seat at the end of a vertical bar.

FENDER IRONER SAVES TIME ON AUTO BODY REPAIRS

D 360

Dents can be ironed out of fenders, doors and other parts of automobile bodies by means of a compressed-air tool that does the work in less than half the time required by hand methods. Dolly and support springs of the ironer are designed to suit all shapes of fenders and metal body work. Removal of fenders is unnecessary in most cases.

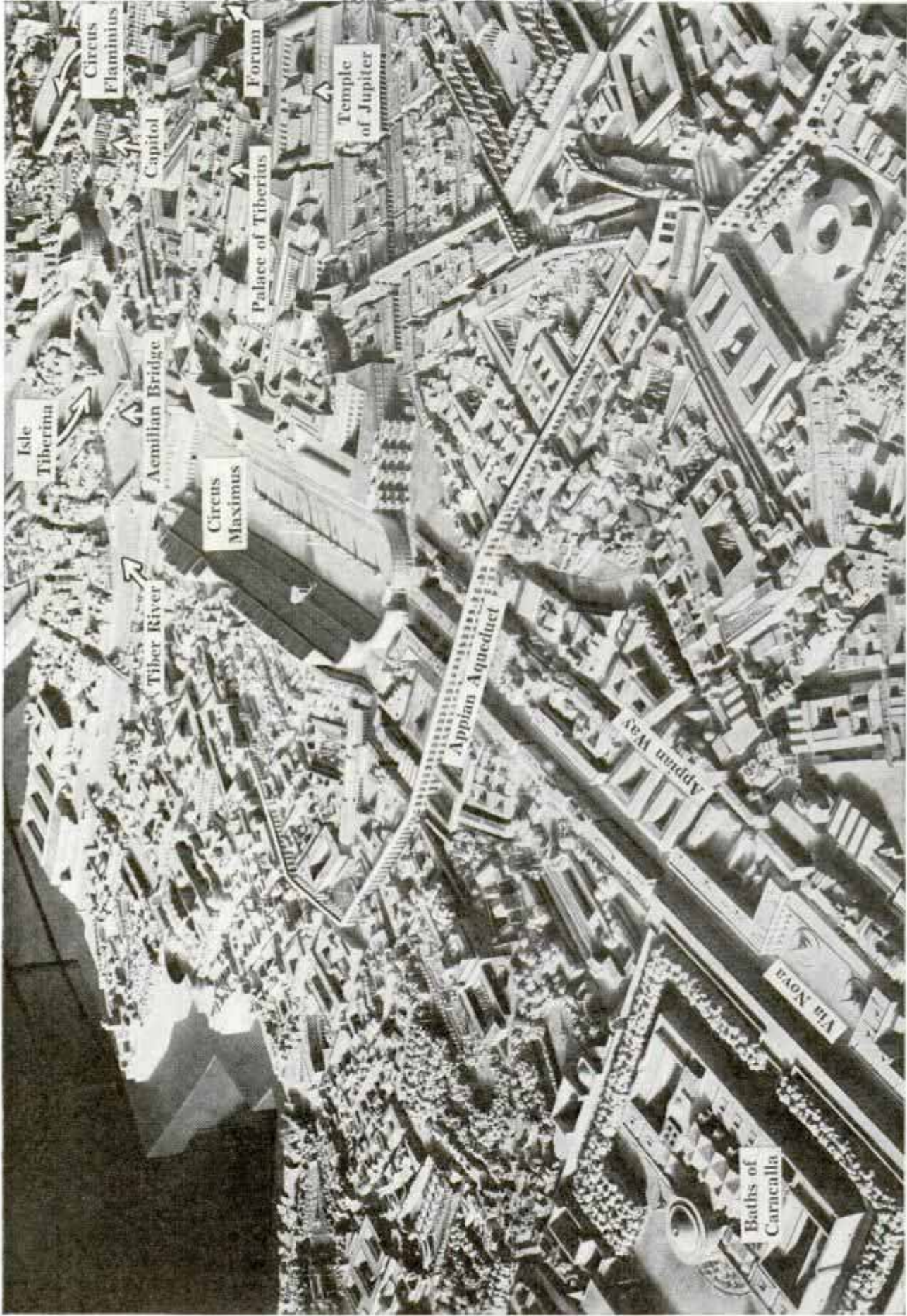


Fender Ironer Co.
27 Plaster Hill Road

Photo copyright says party created has moved and dumped.

30 Rue Jouffroy Paris France

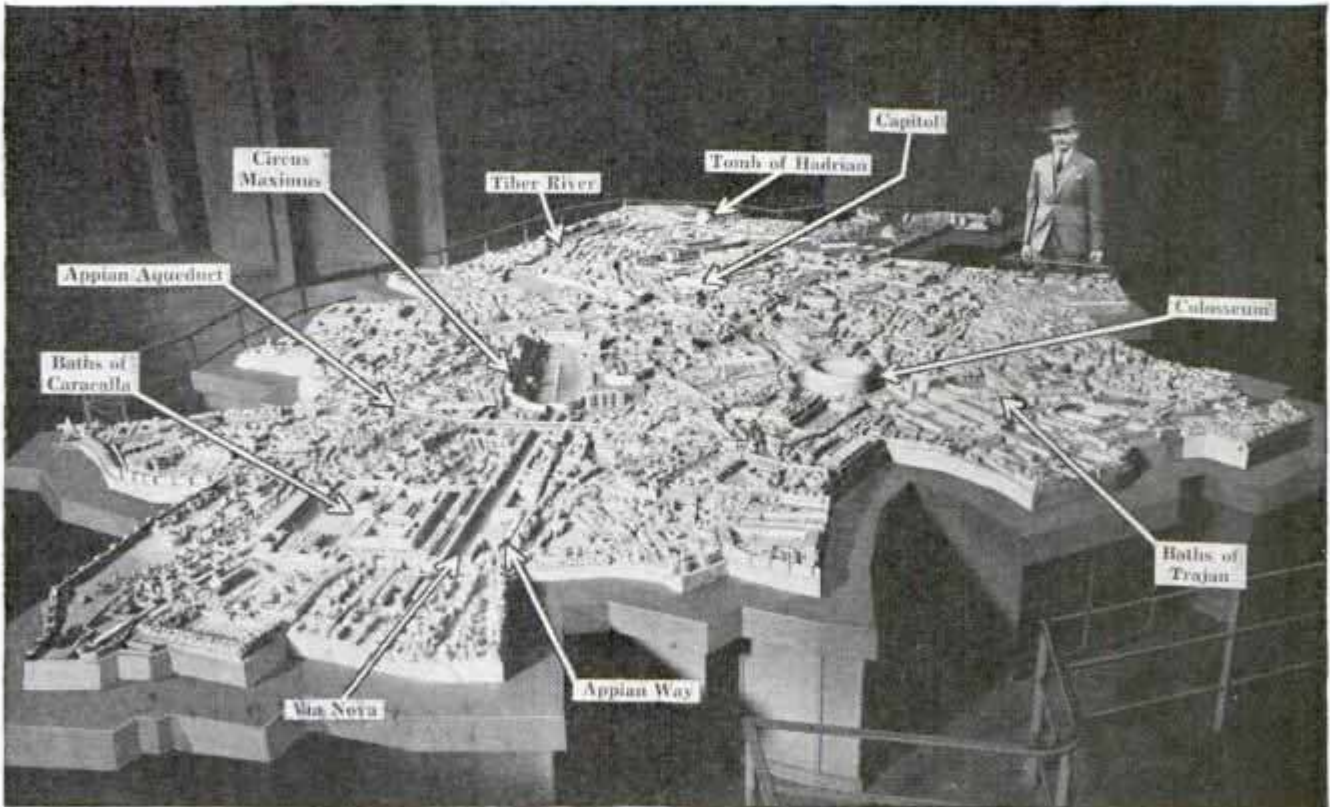
see opposite page



Close-Up of a Section of the Plaster Model of Rome of the Fourth Century, Showing the Great Detail in Which the City Has Been Reproduced in Miniature; Note the Many Historical Structures and Landmarks

see opposite page

Model of Rome Took Thirty Years to Build



Model of Ancient Rome, Twenty Feet Wide and Forty Feet Long; More Than Thirty Years Were Spent by an Architect in Constructing It

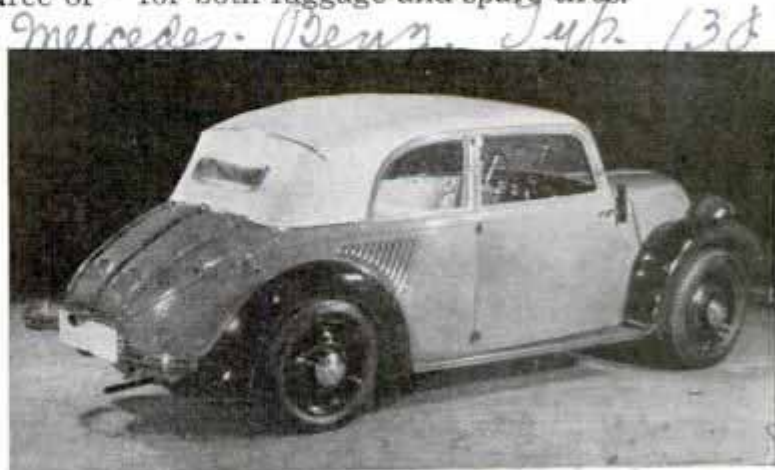
After more than thirty years of work, a French architect, Paul Bigot, has completed a stupendous task, the building of an accurate relief map of Rome as it was about the fourth century, A.D., when the city was at the peak of its power. At that time Rome was the center of as much of the world as was then known. It had gathered the riches of conquered countries and was crowded with temples, palaces, shrines and stadiums. Few of these have escaped destruction but most of the structures have left a trace, either in book or in stone, and M. Bigot carefully studied every source of Roman history before attempting to construct this ancient city as the Cæsars knew it. The plaster model of the Eternal City is twenty feet wide and forty feet long and thousands of little blocks represent the monuments and buildings of the past. The scale is one to 400 and three-fourths of the city is represented. Every detail is carefully reproduced so that looking at the model gives the same impression, it is claimed, as though the observer had been able to fly over the Rome of an-

cient days and view the city from an airplane. The model has been placed for exhibition in the Paris institute of art and archæology.

D-461

AUTO WITH ENGINE IN REAR HAS BAGGAGE IN FRONT

In order to permit of more thorough streamlining, front and rear, one German automobile has its engine mounted behind the front seats where baggage is usually carried. Under the front hood is a space for both luggage and spare tires.



Baggage Is Carried under the Hood in Front in This Streamlined Car with its Rear-Mounted Engine

Mercedes Automobile

den Linden 50-1, Berlin, Germany



This Scale Not Only Records the Weight but Delivers a Short Sales Message in Addition

SCALE DELIVERS SALES TALK WHEN IT RECORDS WEIGHT

In addition to recording the correct weight, one scale now produced also delivers a short sales talk when a person steps on it. A phonograph record is started by stepping on the scale platform and delivers a ten or fifteen-word suggestion to purchase some article. The message does not become monotonous as seventy-five variations can be placed on one record.

"LOGS" OF SAWDUST AND OIL ARE USED AS FUEL



Sawdust and oil are being mixed and compressed into logs for use as a fuel which, it is claimed, offers as much heat as the best grades of coal, is easy to store and handle and does not soil hands or clothing. The logs are

formed of a multitude of disk-shaped layers which can be easily broken off in any sizes desired. Small pieces of the logs also make good kindling.

GUNS AIMED WITHOUT SIGHTS ARE MORE ACCURATE

Accuracy of anti-aircraft gunners of the 243rd Coast Artillery, Rhode Island national guard, has been improved by deliberately preventing them from using the standard cross-hair sights. Instead, tracer bullets are used in target practice. The gunners watch the tracers and correct the firing position accordingly. Firing at an airplane-towed sleeve target in the usual way, the gunners secured seventy hits in range practice. Then metal shields were taped to the water jackets of the guns,



Two Views of Sightless Machine Guns, Showing Screen Attached to Jacket of Gun

preventing the gunners from using the cross-hair sights, and tracer bullets were used, the sleeve target showing 226 hits.

Tests have shown that tropical fish are kept healthy by adding vitamin D to their diet in the form of viosterol.

Robophone Inc. 188 W Randolph
Chicago 4-20

Pres-to-Logs Co
Attn. Col. Danborn

Capt Robert W. Gordon, U.S. 17th Field Artillery

D 318

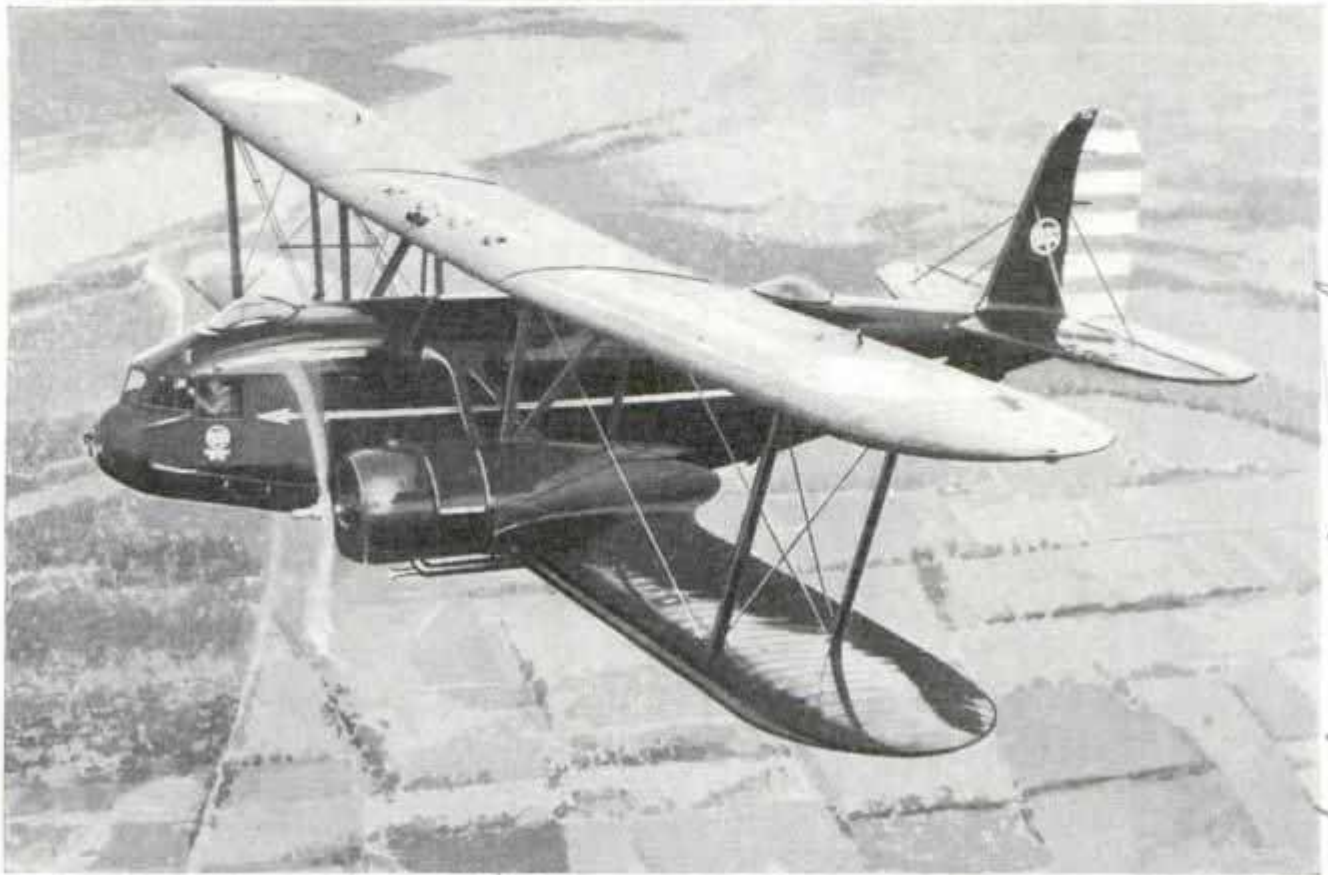
Major J. Staucher
3rd Ballahon

Washington

Wells Fargo Bldg.

Science Service
2/12/34

Fastest Bomber in the Orient Built for China



to be demonstrated by Commanded Frank Hawkins

Acme
 American-Built Bomber Which Has Been Delivered to China and Will Be the Largest in the Orient; It Has a Speed of 170 Miles an Hour and a 1,200-Mile Cruising Radius

China now boasts the largest and speediest bomber in the Orient, an American-built Curtiss-Wright ship with a top speed of 170 miles per hour and an eighty-two-foot wing span. The plane can also be used as an ambulance or for a troop transport. It has a cruising radius of 1,200 miles and carries a crew of six.

knife. The metal fixtures may be obtained complete with blueprints for construction of the frame.

D 326 FOLDING FRAME FOR QUILTING OCCUPIES LITTLE SPACE

Little space is occupied by a quilting frame that may be folded and stored in a corner or in a closet. The frame consists of metal ends which are telescopic so that the quilt can be laid out in the full square or rolled up to any width desired for the convenience of workers. The work may be set level or inclined. Frame ends can be adjusted by sliding to obtain the length desired. Roll poles may be removed with the work intact, rolled up and set in the corner. The frame ends fold like a jack-

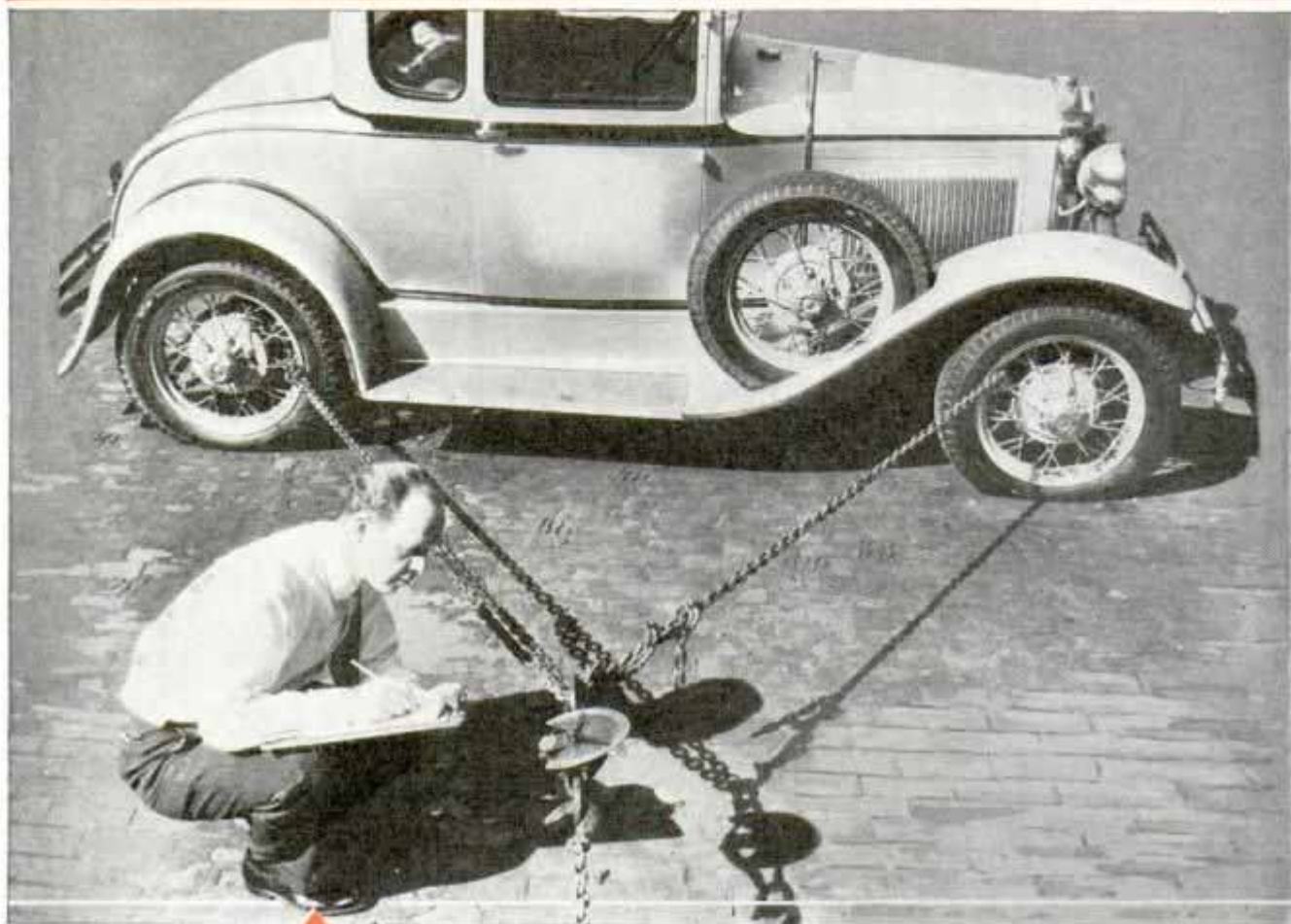


Demonstrating How Quilting Rack May Be Rolled to Facilitate Work on the Material

A. W. Knutson, 228 W. North St.

1032 Florida Ave
Akron Ohio

TIRES *that* MERELY



Top, Measuring Force Required to Cause Tires to Skid Sidewise; Below, Measuring Tire Noises

THE latest thing in tire design is a tread whose song has been reduced to a mere whisper so that the driver of a 1934 car can enjoy really quiet transportation.

The new tires remind old-timers of the ribbed tire of many years ago, whose tread surface was smooth except for several parallel grooves running around the circumference. The new tires include such additional features as wavy grooves instead of perfectly straight ones, and rows of buttons flanking each side of the wall. One motor-car company specifies that its tires be made with ribs having rounded edges instead of square, sharp ones, to reduce howling when negotiating curves.

It is to the campaign against noise that the ribbed tires owe their return to popularity. Motor-car manufacturers have been waging war against rattles and rumbles and squeaks for years, so that today, thanks to such things as improved engines, rubber mountings, constantly oiled springs

WHISPER

and other anti-noise devices, the modern automobile is remarkably quiet. About two years ago the point was reached where the noisiest part of a new car was its tires. Tire engineers found that they had to become sound experts. The B. F. Goodrich Rubber company was one of the first to attack the noise problem. Valuable information that eventually led to redesigning of treads was obtained by an "electric ear" mounted in a test car so that tire noises could be picked up and measured.

Tires in action were studied to learn just what happens to the tread. It was revealed that every part of a tire on a car traveling at sixty miles per hour strikes the road

*Alison
Oliver*

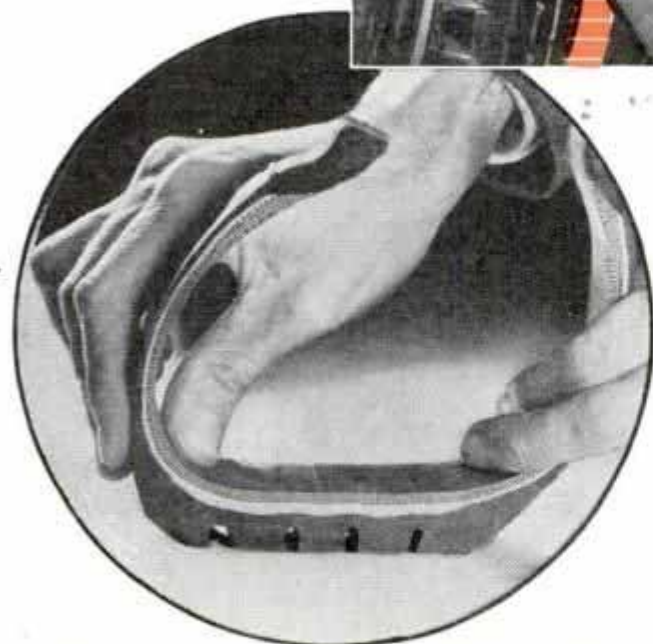


Above, Demonstrating How Heat Is Generated in a Tire; Left, Ribbed-Tread and Button-Tread Types of Tires

surface thirteen times every second. This is as if every spot on the tread were being struck with a trip hammer nearly 800 times a minute. Tires have to be built to keep such blows from deflecting them

more than twelve per cent of their height. With present motor-car cruising speeds in the sixties, and often the seventies, the tires must be able to withstand much punishment, and do it without complaining too much.

The rapid hammering a tire receives at high speeds generates heat. A simple experiment will indicate this. Hold a rubber band against your lip. It feels cool. Now grasp its ends and rapidly stretch and relax it. After a few seconds, hold the band against your lip once more. It is noticeably warm. Imagine a tire, with its greater mass of rubber, and with the forces involved many hundred times as great,



Showing Action of Ribbed Tire on Wet Surface; First Rib Wipes Water Away so Others Can Obtain a Grip on the Dried Surface

(Continued to page 122A)

*Telefons-Schreiber
Werke, Berlin-Siemensstadt.
Germany.*



Berlin Firemen Carry This Portable Light into Burning Buildings; Note Battery Carried on Back

**PORTABLE LIGHT FOR FIREMEN
SUSPENDED FROM SHOULDERS**

Fire fighters in Berlin are equipped with portable searchlights which they carry with them into burning buildings. The light is suspended from straps attached to the shoulders, the straps also supporting a battery carried on the fireman's back.

**HAND GRINDER WEIGHS LESS
THAN TWO POUNDS**

Capable of high-grade work, a hand grinder operating at 15,000 revolutions per

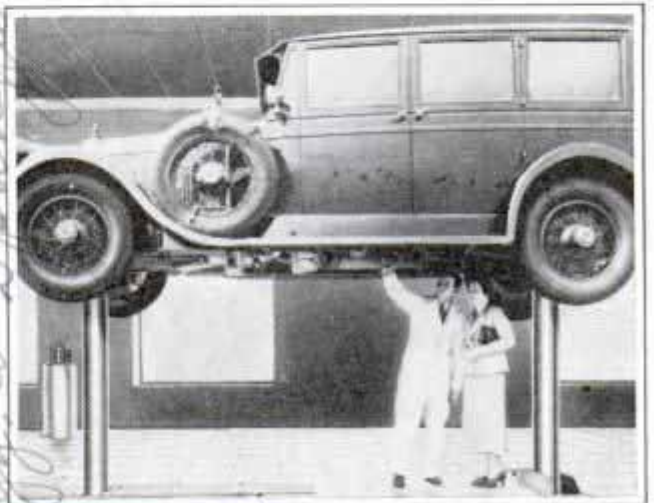


Lightweight Electric Grinder Is Handled as Easily as Pointing a Pencil

minute weighs one pound and ten ounces. It is powered by a one-fortieth horsepower motor. The grinder is balanced so that it may be directed in the manner of pointing a pencil.

**TWIN POSTS LIFT AUTOMOBILE
FOR EASY INSPECTION**

Inspection of the automobile for repairs or greasing is made easy for the owner and the mechanic by a twin-post lifting machine. Compressed air and electricity supply the energy for lifting the car high enough for a tall man to stand beneath. The machine is adjustable to any wheel base, the front post being moved lengthwise until its cradle is under the front axle of the automobile. When not in use,

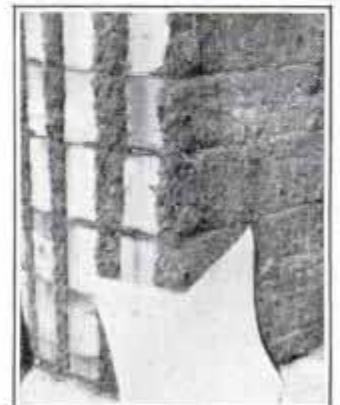


This Lift Makes It Possible to Inspect the Auto without Getting Grease on Clothing

the tops of the posts are flush with the floor, permitting use of the space for other purposes. More working space for the mechanic is made available, either for greasing or repairs.

**BARK FROM REDWOOD TREES
MADE INTO SHINGLES**

Shingles are now being made from the bark of the giant redwood trees of California, formerly considered a waste product by lumber mills. The bark is pressed into bales and sent to plants where it is rolled into sheets, saturated with hot asphalt and coated with various colors or blends of slate, the finishing process being that of cutting the various shapes in which it is to be applied.



no 8 Sagent. iron

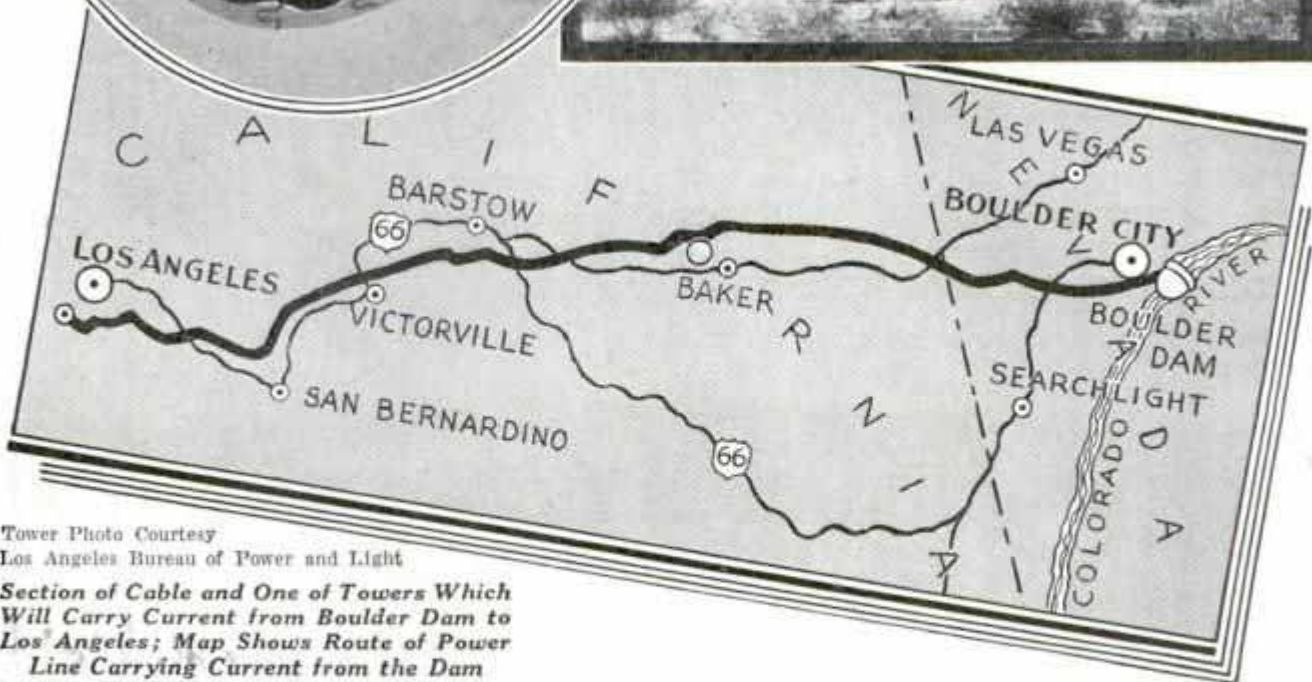
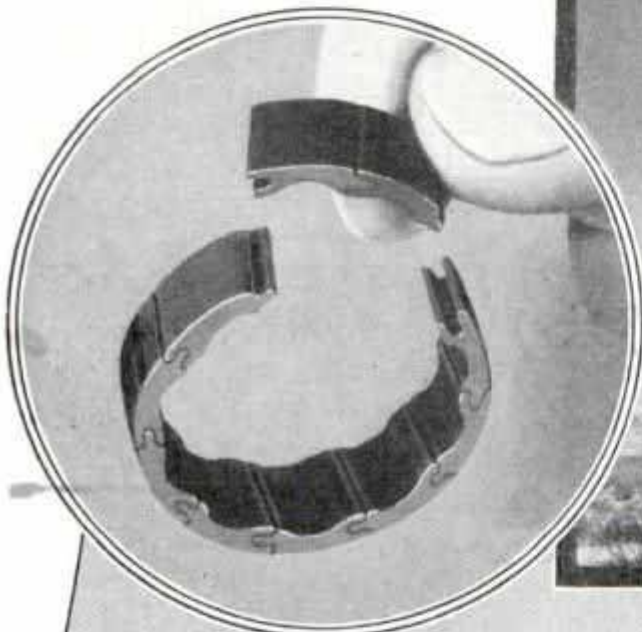
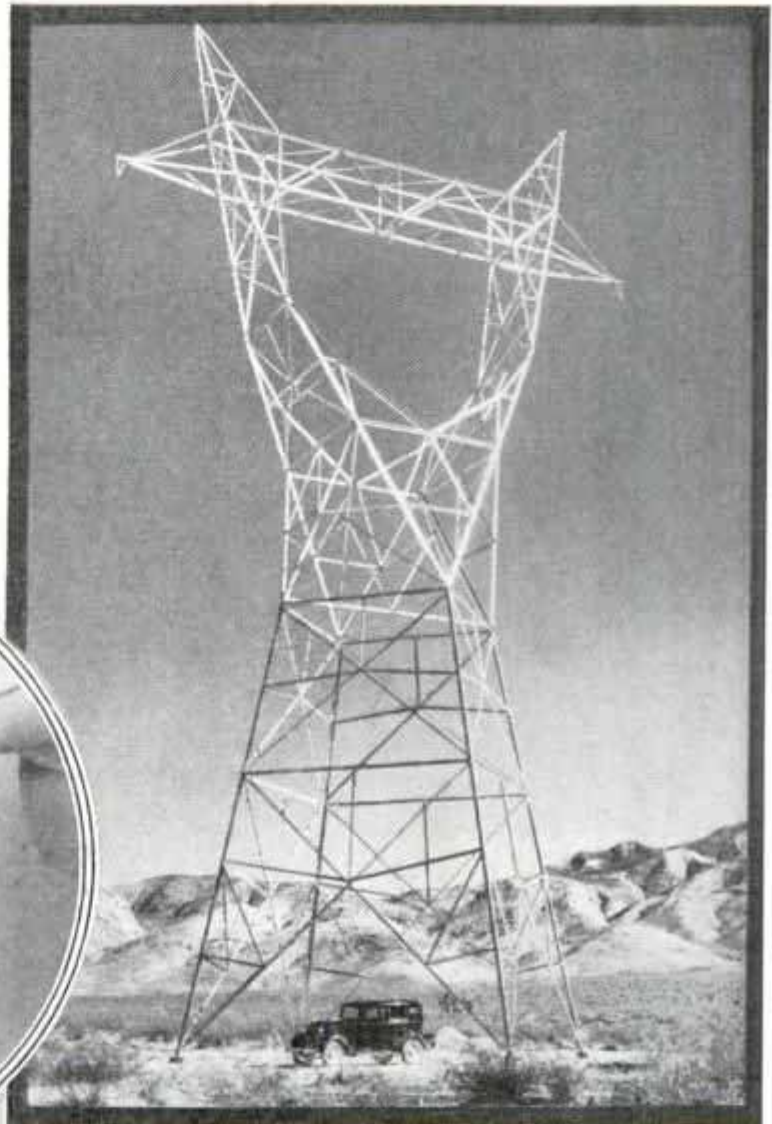
Werner Mfg. Co. of New York

*Dumore Mfg Co
95-16 1st St. N.Y.C.*

Certain-tyed Products

Hollow Cable to Carry Boulder Dam Power

Streaking across mountains, deserts and valleys, a super-transmission line of hollow-copper cable will carry current from Boulder dam on the Colorado river into Los Angeles. The huge power conductor actually will handle its load of energy over twin lines with separate towers, each line supporting three cables. The line will stretch for 270 miles, thus calling for 1,620 miles of cable, or 13,000,000 pounds of copper. The six cables will cost



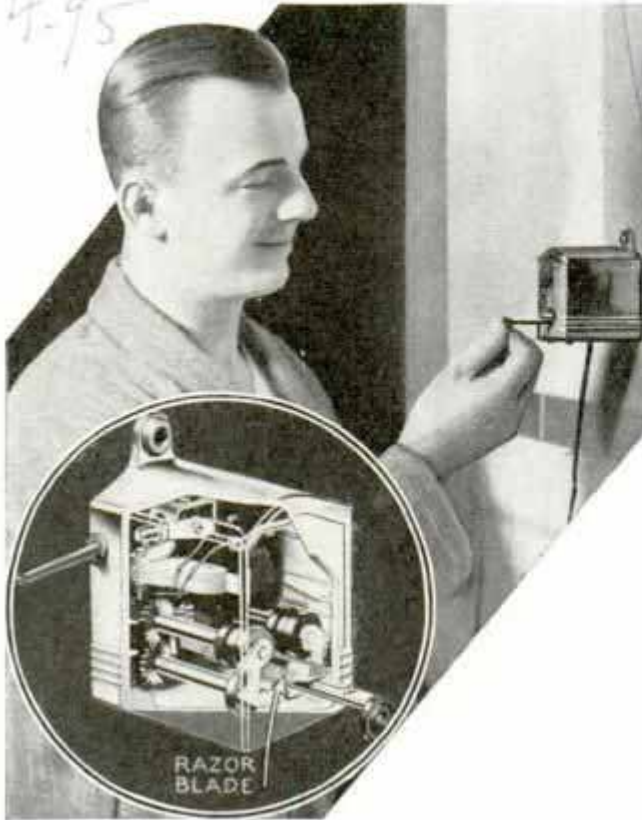
Tower Photo Courtesy
Los Angeles Bureau of Power and Light

Section of Cable and One of Towers Which Will Carry Current from Boulder Dam to Los Angeles; Map Shows Route of Power Line Carrying Current from the Dam

\$2,500,000 and will carry an electrical load of 300,000 volts. The cable is being turned out in sections about one mile long and is formed of flat copper strips which inter-

lock but still retain enough flexibility to permit winding on large drums for transportation on muleback. It is expected the line will be completed early next year.

ELECTRIC HONE AND STROPPER FOR SAFETY-RAZOR BLADES



Sharpening Blade in Electric Device on Wall; Inset, Drawing Showing Its Interior Construction

Safety-razor blades may be honed and stropped quickly at the same time by means of an electric machine that can be hung permanently on the wall. The device plugs into any handy electric-light socket. Both edges of the blade are honed and stropped at the same time. A built-in automatic switch starts and stops the motor at the proper time while the blade is being sharpened.

TRANSFORMER IS ADJUSTABLE

Adjustable to any voltage between zero and 130, a lightweight transformer is available for an almost unlimited number of uses. The voltage may be regulated by turning a dial. While the dial figures are approximate, the voltage varying somewhat with load, very close adjustment is possible. The control is uniform and there is no heating trouble. The



maximum power loss is about thirty watts. No special knowledge or electrical skill is necessary for operating the transformer, which is adapted to speed adjustment of voltage sensitive motors, to brilliancy control of lighting systems and to under and over-voltage testing of socket-power devices of all kinds.

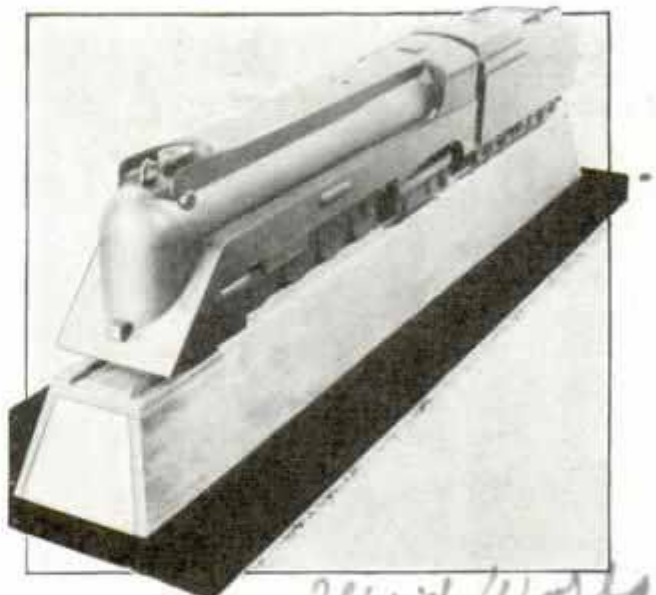
METAL HOLDER FOR WELDING AIDS IN ANGLE WORK

Welding two pieces of metal at an angle without help is made possible for the lone craftsman by a holder in which the work is fastened. The pieces are held firmly in contact until welding is complete.



ENGINE WITH FLOWING LINES CUTS WIND RESISTANCE

Wind resistance is expected to be reduced by thirty-five per cent through the use of a streamlined locomotive designed for the Canadian National railway. In addition to its flowing lines, provision is also made for a device intended to lift the



Model of Streamlined Locomotive Whose Flowing Lines Are Expected to Reduce Wind Resistance

smoke clear of the engine cab, thus insuring better visibility for the engine crew and less smoke and dirt for the passengers.

Developed in laboratories of National Research

*14th and Clark
D305
\$4.95*

*Port Elizabeth
with Blue*

D323

D341

D311

*General Radio Co.
30 State St.
Cambridge, Mass.*

Producers Field, Pellsburgh Pa

Signal Pistol Guides Pilot to Airport in Fog

When a plane became lost in a mixture of fog and smoke over Pittsburgh, Penna., recently, its pilot was guided to earth by means of a Very signal pistol, invented during the World War for the purpose of signaling ground troops from the air. On this occasion, the pilot could see straight down, as though looking through a stove-pipe, but had no forward vision. This prevented him from locating the airport, although mechanics at the field could hear the plane. Attempts to contact the pilot by radio failed. Finally, a Very pistol and ammunition boxed in 1918 were found. One of the mechanics loaded the pistol with shells, which contained red, white and

Showing How Signal Pistol (Circle, Left) Was Used to Guide Lieut. Harry Coursey (Circle, Right) to Earth; Private Anthony Parti, Bottom, Signaled the Plane



green flares, and fired directly at the sound of the plane. At the sixtieth shot, a green flare exploded just over the plane, bathing it in light. Although somewhat alarmed, the pilot decided that someone was trying to guide him to earth. After circling a few times, the pilot detected sparks and smoke along the trajectory of a shell. Following this trail with his eyes he saw the mechanic firing at the

plane and he dived right "into the gun barrel," landing safely.

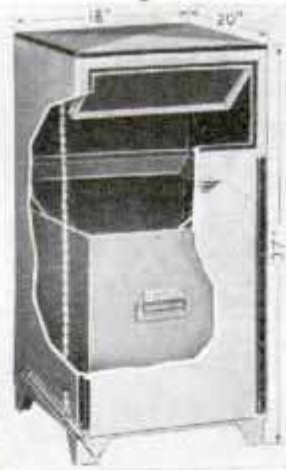
MAKING



Combination Cupboard and Dining-Room Table Which Can Be Converted from One to the Other without Moving the Dishes; Simple Locking Devices Hold It Rigid in Either Position



Below and Right, a Dust-Proof Ash Receiver for Furnaces and Home Heating Plants; This Metal Container Prevents Dust and Dirt from Escaping and Settling over the Basement; Note How the Door Is Opened by a Foot Pedal, Thus Leaving Both Hands Free to Wield the Shovel



Above, Jar and Bottle-Top Opener Attached to Underside of Shelf; Top Is Wedged between Knurled Stud and Side of Groove



Coil Cord for the Electric Iron Which Stretches to Nine Feet; It Can Be Used to Advantage on the Electric Toaster, Percolator or Room Heater; the Cord Is Always Out of the Way

HOME TASKS *a Pleasure*



Above, Compact Bathroom Scale No Larger Than a Book and Weighing only Five Pounds; Right, Mixing Fork with Prongs Like Knife Blades for Chopping Fruits and Vegetables, Cutting Noodles and General Kitchen Use; Cutting Edges Are Along the Bottoms of the Prongs



Above, Electrical Appliance Cord on an Automatic Reel; When Not in Use, It Is Disconnected, Given a Gentle Pull and Rolls Up and Disappears in the Wall



Left, Steel Combs Clean the Bristles of This Carpet Sweeper and the Brush Cleans the Combs When Direction Is Reversed; Right, Ice Box with Hopper-Type Ice Chamber and an Air-Circulation System Which Allows User to Control Temperature by Varying Quantity of Air Flowing around a Fixed Area of Exposed Ice



Research, York
are and 66 Y.L.
new

may bite them. For two years, medical research scientists of the Rockefeller Foundation have applied their vaccination technique in a practical manner. Yellow-fever virus made safer by at least 100 passages through white mice is used. Also human blood from those who have had the disease or have been vaccinated is injected without ill effects. There results an active immunity similar to that caused by an actual attack of the disease. Latest efforts are directed toward making injections easier and less costly in human blood. The Pasteur Institute in Paris has used the blood of immunized horses in its yellow-fever vaccinations.



Artist with Some of the Objects He Has Fashioned from Old Straw Hats; Note Miniature of Italian Field Cart Drawn by Donkey, at Right

OLD STRAW HATS ARE CARVED INTO DECORATIVE OBJECTS

Old straw hats are carved into decorative and artistic objects by an Atlantic City, N. J., man. Among the pieces are a replica of the "Santa Maria," one of Christopher Columbus' three ships, and a miniature reproduction of an Italian field cart. The artist uses this method of salvaging straw hats left in his establishment and unclaimed by their owners.

SERUM FOR YELLOW FEVER GIVES TWO-YEAR SAFETY

Two years of immunity from yellow fever are provided by serum now in use by missionaries, government officials and scientists whose work takes them into regions where mosquitoes carrying the fever

Dr. W.A. Sawyer

D335

ODD LEVER PLOW IS OPERATED BY FOOT

Japanese farmers are still using an odd implement in preparing the soil for planting. It is a combination of a lever and a plow. With his foot, the farmer drives the share into the ground, then lifts a bushel of soil by a quick movement of the lever.



Pulling Down Lever Handle Causes This Odd-Looking Plow to Lift Bushel of Soil

Carl Alaimo

Lucie Service

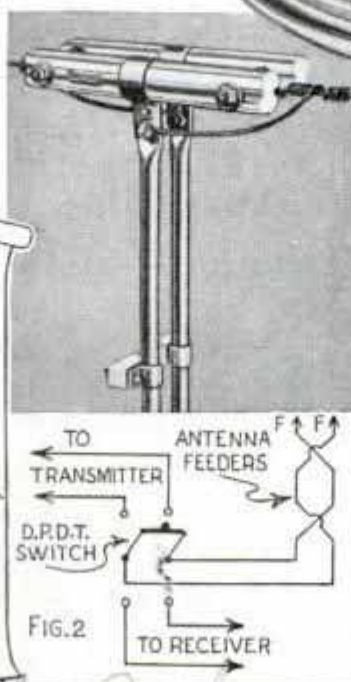
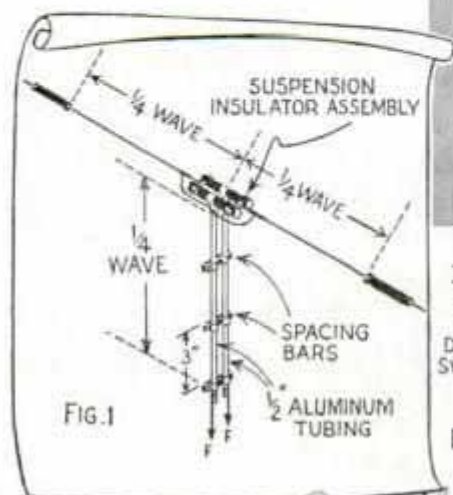
D197

Paul's Photo



LOW-LOSS DOUBLET ANTENNA for Short Waves

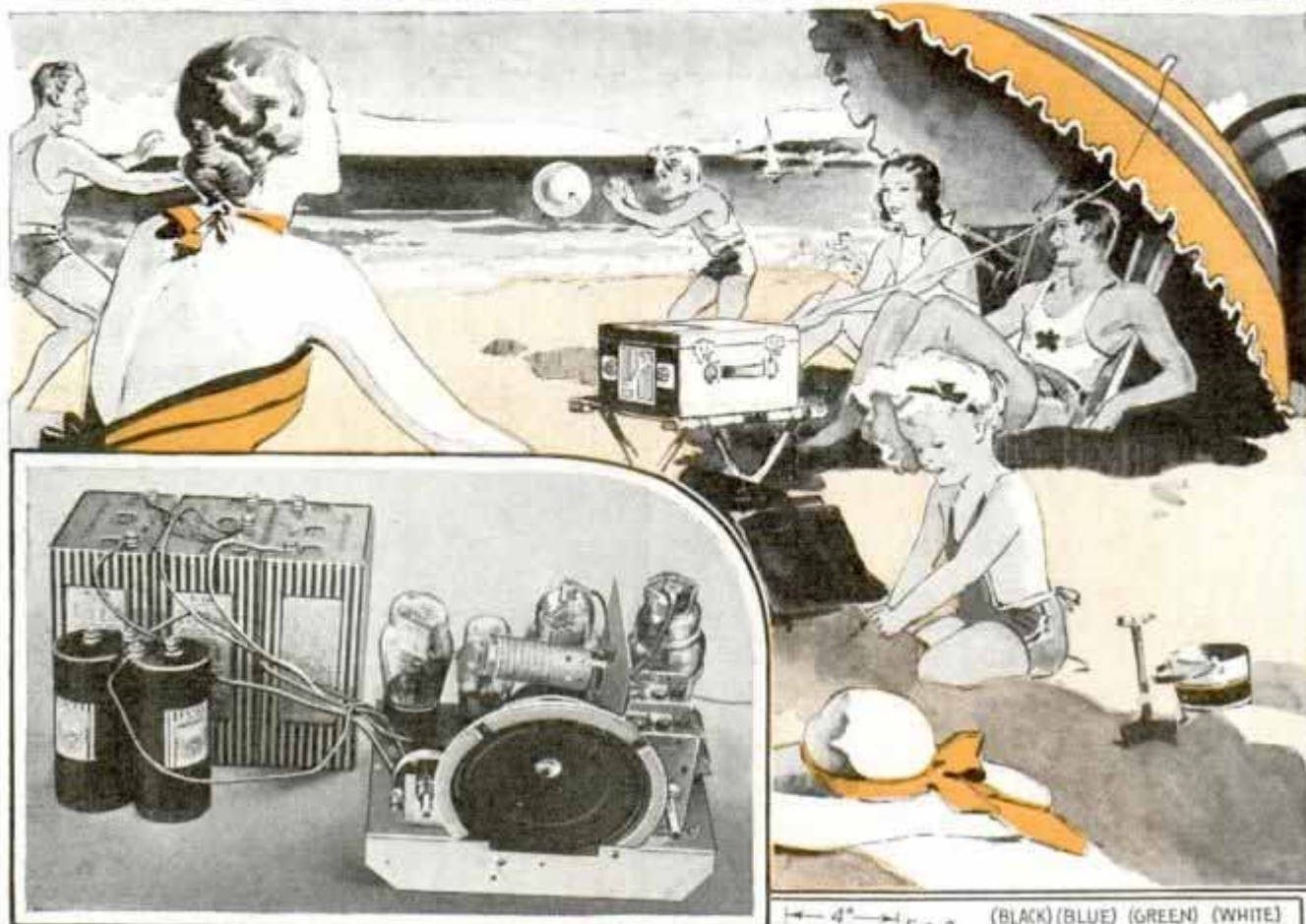
THE doublet type of antenna is now generally recommended for short-wave reception and, when properly constructed, as shown in Figs. 1 and 2, it also makes a highly efficient transmitting antenna. A doublet is merely two ordinary single-wire antennas joined together with an insulator. The lead-in wires, or feeders, are brought down from this connecting insulator and transposed, crossed one over the other, at regular intervals by means of suitable porcelain insulators. These feeders may be any length and, when frequently transposed, will cancel out all man-made interference that might be picked up on the way down to the receiver. When the ordinary doublet is used for transmitting there is a reflection loss at the junction of the antenna and feeder line. This is due to an unmatched impedance condition between



the feeders and the antenna. The doublet-antenna kit shown in the photos offers a simple method of matching the antenna and feeder line. It makes use of a quarter-wave section made of 1/2-in. aluminum tubing, and suitable insulators are provided. All the good points of the transposed feeder system are retained and the range is greatly increased. The insert photo and diagrams are self-explanatory and all the necessary parts are available to construct this efficient combination receiving and transmitting doublet

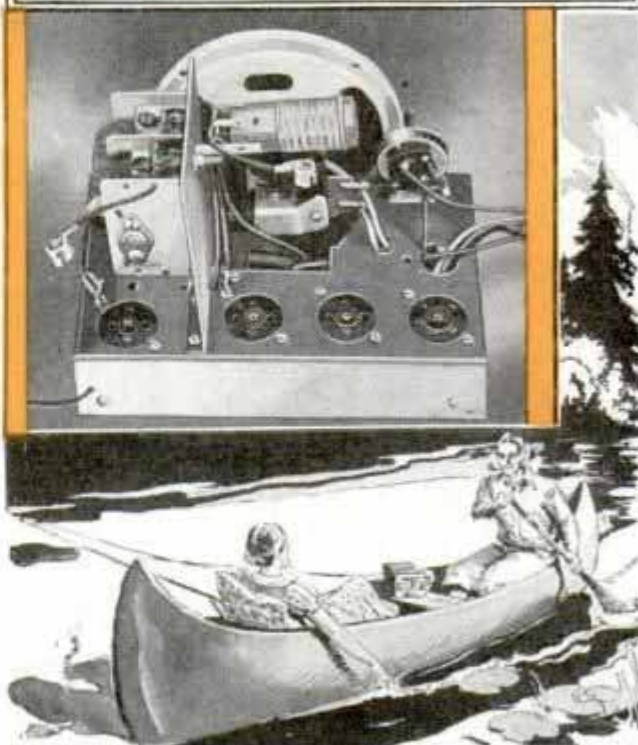
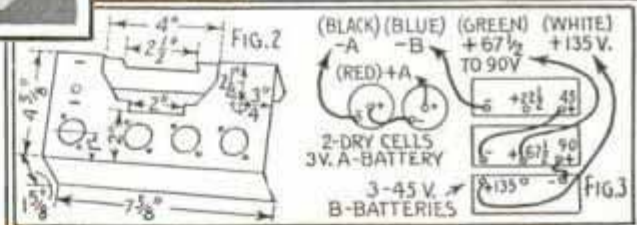
E. J. Johnson Co. Washington

Four-Tube PORTABLE



THIS vacation receiver is easily portable for beach, picnic and boat use or wherever a self-contained set, independent of power lines, is required. It is exceptionally easy on batteries, simple to build and the parts are not expensive. Distant stations come in with good loud-speaker volume and the tone is quite satisfactory for a portable receiver. It is offered to the readers of Popular Mechanics Magazine in answer to many requests for a simple construction article on a compact set of this description. There are no trick circuits and the parts have been carefully selected for maximum results.

The simplified wiring diagram, Fig. 1, shows the connections looking down on the tube sockets from above with all parts in their relative positions, as shown in the lower photo on the opposite page. The base is made of $\frac{1}{16}$ -in. sheet metal which may be aluminum, steel or eraydo. The dimensions are given in Fig. 2. The holes for the wafer-type tube sockets are $1\frac{1}{8}$ in. in diameter. These holes, and the cutout





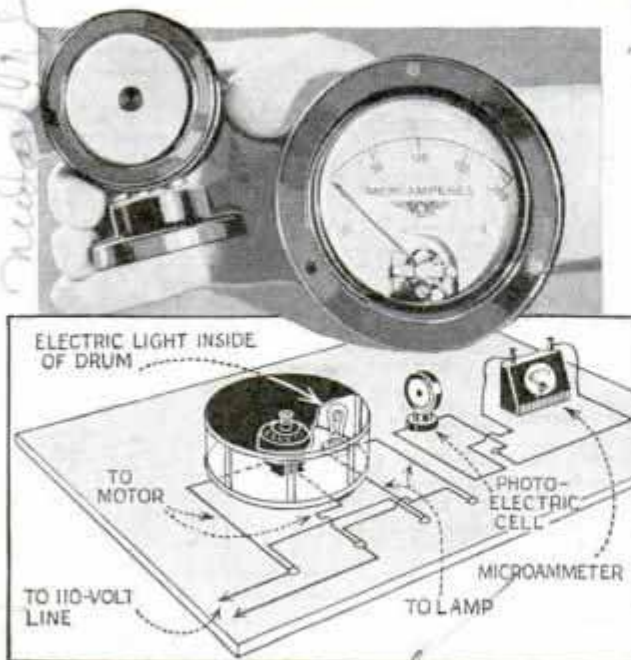
Simplified Tube Checker Tests All Tubes without Additional Adapters

Eighteen Sockets in Tube Checker

No longer is there any need for worrying about your tube checker becoming obsolete because of the new tubes recently introduced and those that may follow. Eighteen sockets are provided in this tube checker, 11 of which are wired to test all of the present tubes, some 90 in number. The remaining 7 sockets are spares, and may be wired in to test additional tubes when, and if, they appear on the market.

Experimental Photo-Cell Hook-Up

This photo-electric cell of the disk, or front-wall, type transforms light energy



Upper Left, Photronic Cell Plugged into Standard Socket; Below, Wiring Diagram for Paper Tester

directly into electrical energy without the use of extra apparatus or batteries. Its response to light variations is instantaneous and sufficient current is developed to directly operate sensitive relays. Other numerous applications are possible, one of which is the paper tester shown in the sketch. Six different grades of paper are fastened over holes cut in a heavy cardboard drum. For temporary purposes the motor can be omitted and the drum mounted on a wooden dowel rod so that it may be turned by hand. The light from the lamp, placed within the drum, passes through the paper under test before it strikes the cell. The meter readings will vary according to the relative translucency of the paper and are always the same for that grade.

Converter Operates A.C. Sets

C 4637 on Light Plants

This low-drain radio converter, for operating a.c. receivers on 32 and 110-volt d.c. lighting plants, comes complete with an attachment cord and remote control switch. The switch is provided with an extension cord, making it possible to start and stop the converter from the receiver. To install, the radio set cord is plugged into a receptacle on the base.



Regeneration on Short Waves

The regeneration control on short-wave adapters or converters, used with broadcast receivers, is really a sensitivity control and the voltage applied to the detector tube should be carefully adjusted to insure smooth operation. If filament tubes are used, a rheostat should be connected in series with one side of the filament supply. In some cases a 100,000-ohm variable resistor in series with the screen or plate supply to the detector tube will smooth out regeneration and improve reception.

Radio-frequency choke coils should be mounted away from metal objects and at right angles to inductances.

Vertical text on the left margin: Precision instruments Corp. 614 Freshmeadow Ave. Newark, N.J.

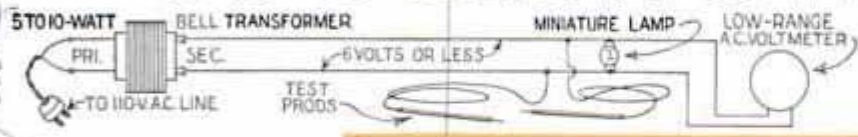
Vertical text in the middle margin: Radio Engineering Co. Newark, N.J.

Western

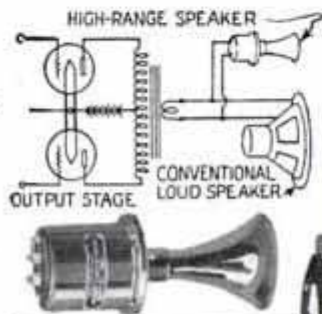
The Electrophone Corp. 2019 B. Rittenhouse Square Philadelphia

122 W. New York St. Cincinapolis, Ind.

PRACTICAL RADIO SUGGESTIONS



Above, Set Checker for Finding Open Circuits or Locating Grounds in R.F. Coils; Lamp Dims as Grounded Turn Is Approached



Above, Small High-Range Speaker, of Piezoelectric Crystal Type, Connected across Ordinary Loud Speaker Improves Tone Range; Right, D.C. Converter and B-Eliminator Now Available for Operating Any A.C. or Battery Receiver on 32-Volt Farm Lighting Plant; the Converter Supplies 110 Volts A.C. at 100 Watts and the B-Eliminator Has an Output of 200 Volts D.C. at 40 Mils.; Below, Plugs and Sockets for Heavy Inductance Coils

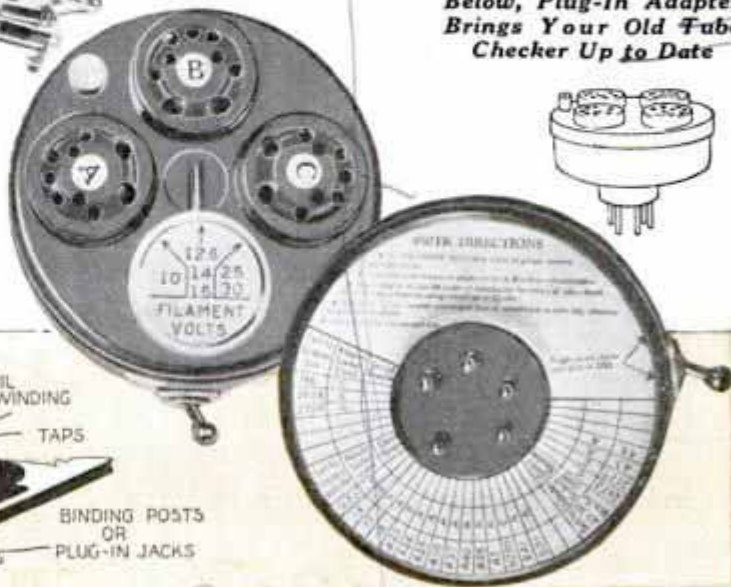
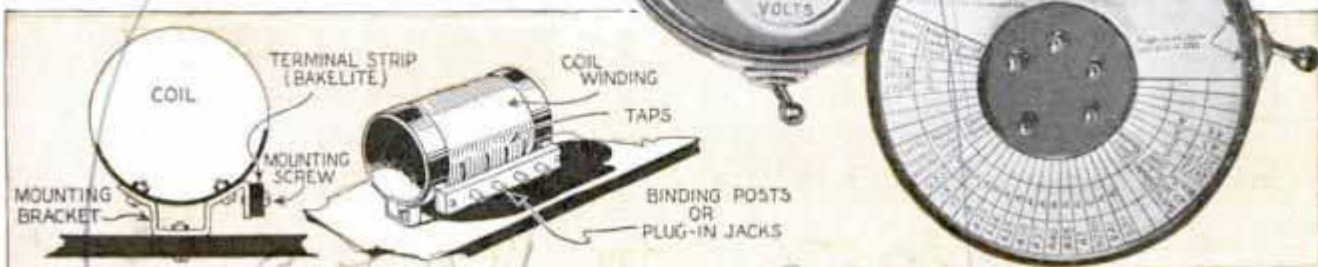


Electric Soldering Iron Employs Removable Cartridge-Type Heating Element; Suitable Wattage May Be Selected for Any Particular Kind of Work



Left, Handy Clip for Test Connections to Machine Screws, Made from Brass, or Phosphor-Bronze, Strip and Fiber Tubing; Below, Homemade Coil Mounting and Terminal Strip from Scrap Material

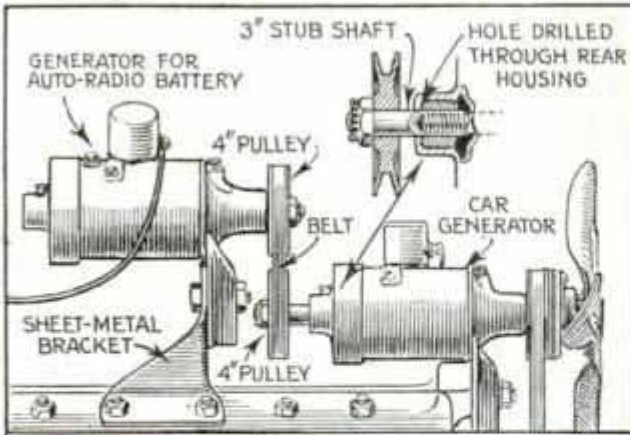
Below, Plug-In Adapter Brings Your Old Tube Checker Up to Date



4661. E. J. Johnson Co. hme. made. 905

445 23 Alden P. W. Co. 715 Center. D. Rochester, N.Y. 140 Crystal St. Brooklyn

Hamtramck Detroit Mich

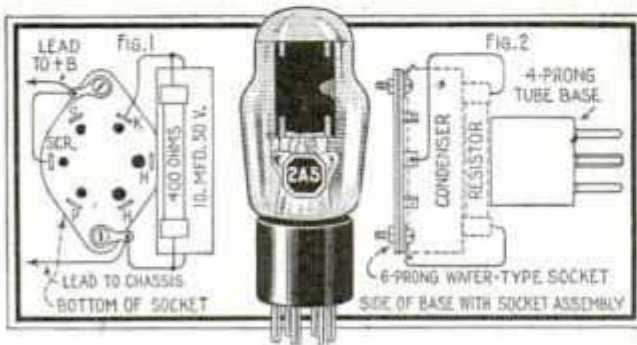


Additional Generator Installed; Above, Shaft and Pulley Details

Double-Generator System for Auto Radio

When auto-radio receivers are to be operated over long periods of time, or continuously as in police cars, the drain on the car battery presents a difficult problem. This was solved by the police department of Lincoln, Nebr., with a separate battery and an auxiliary generator mounted on the motor. The rear housing of the car generator was drilled for the extension shaft and pulley to which the second generator is belted, as shown.

Adapter for Using New Output Tube



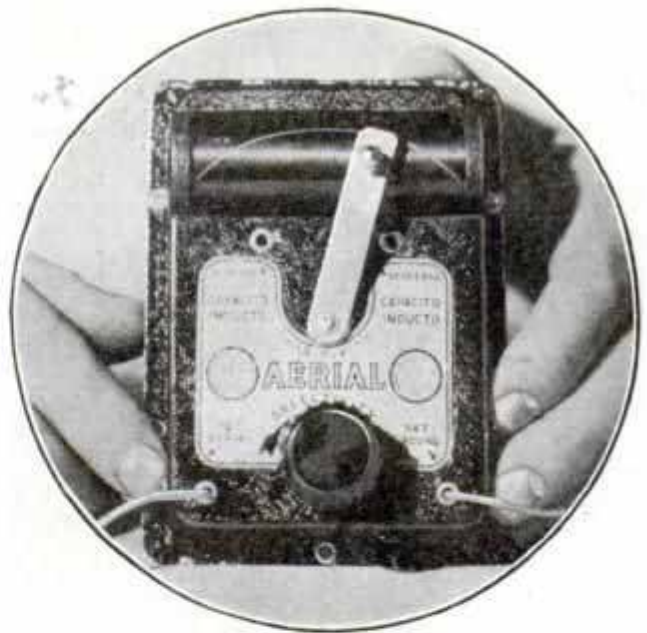
If your receiver employs a single type-245 tube in the last audio stage, greater

amplification may be obtained by substituting a 2A5 output tube. This homemade adapter will enable you to insert the new 6-prong tube in the present 4-prong socket without changing the set wiring. A 6-prong wafer-type socket, resistor and a tubular dry-type electrolytic condenser are wired as shown in Figs. 1 and 2. The lugs on the socket should fit inside the 4-prong tube base and leads from G, P, H and H are soldered in the usual grid, plate and filament prongs of the base. These connecting leads also hold the base and socket together.

04560

Antenna Substitute Is Adjustable

The coil and condenser in this variable antenna eliminator are so arranged that interference from strong local broadcasting stations may be avoided. No outside antenna is required and the unit is claimed to have about the same capacity as that of



Antenna Eliminator Showing Lever and Knob for Tuning Out Interfering Stations

an ordinary 75-ft. installation. The connections are quite simple; one lead is to be connected to a water-pipe ground, another wire goes to the antenna post on your set and a third lead is connected to the regular ground post on the receiver.

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.



AMATEUR MECHANICS

"HALF-PINT"

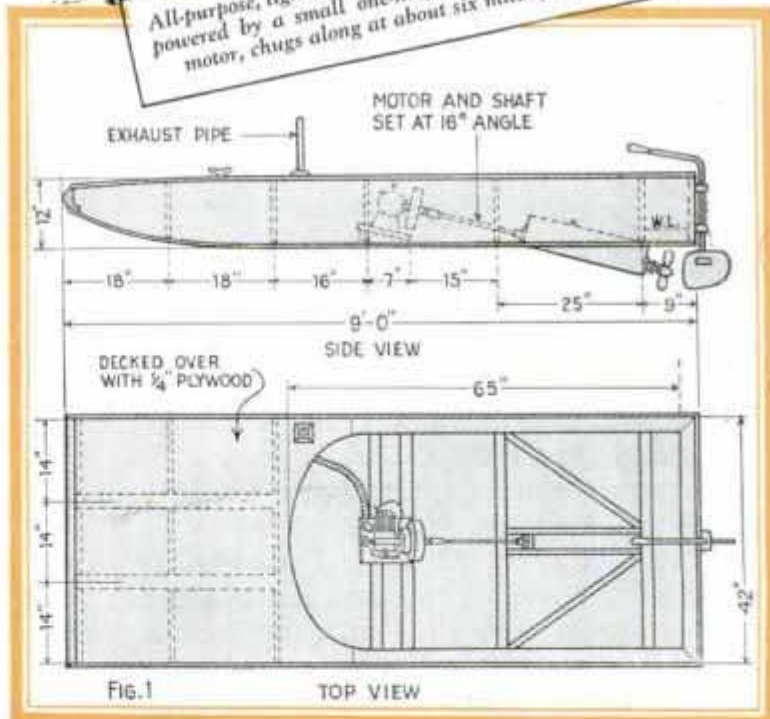


a small simplified sea sled

All-purpose, lightweight boat, made of plywood and powered by a small one-half horsepower gasoline motor, chugs along at about six miles per hour

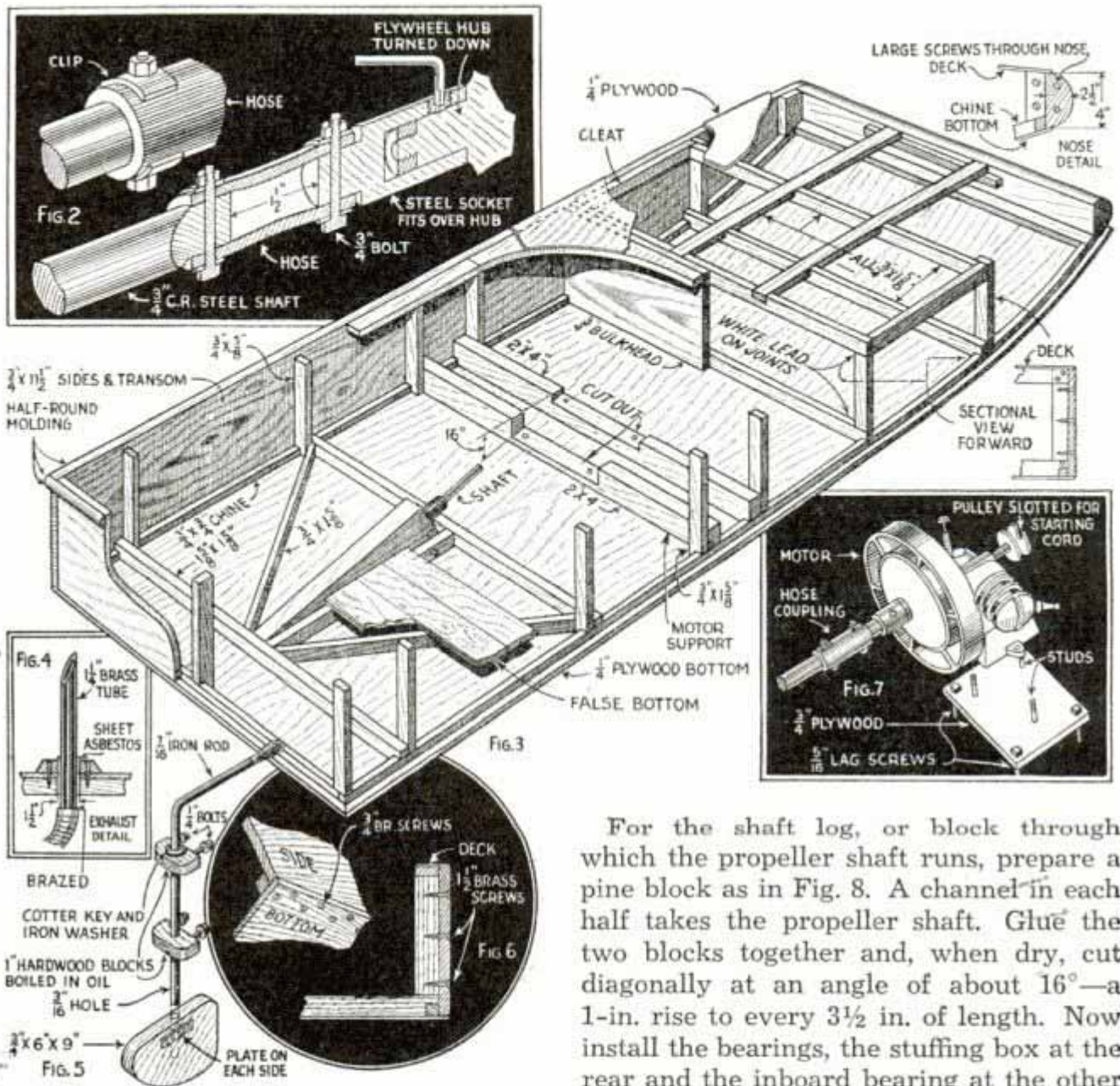
PLYWOOD, preferably the waterproof kind, a small amount of miscellaneous stock and a tiny gasoline motor is all you need to make "Half Pint." The original, capable of carrying three persons, was quite a sensation at Balboa bay, Calif., where even the old boat builders expressed genuine interest. Built in a garage, it was taken 50 miles for its first dip and has never developed a leak. This little sea sled can be easily carried on your car, and fishermen and tourists will find it ideal for use on remote lakes having no boating facilities. It is only 9 ft. long and very light.

Over-all dimensions are given in Fig. 1. The sides are 3/4-in. pine. After cutting it to shape, screw on the chine with 1 1/4-in. flat-head brass screws, spaced about 4 in. apart, when all contacting surfaces have been liberally painted with white lead. The nose is a cross member planed down and rounded as shown in Fig. 3. The sides are fastened to it with two large flat-head



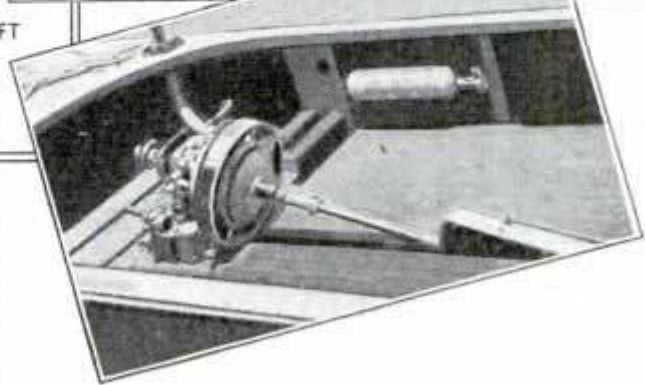
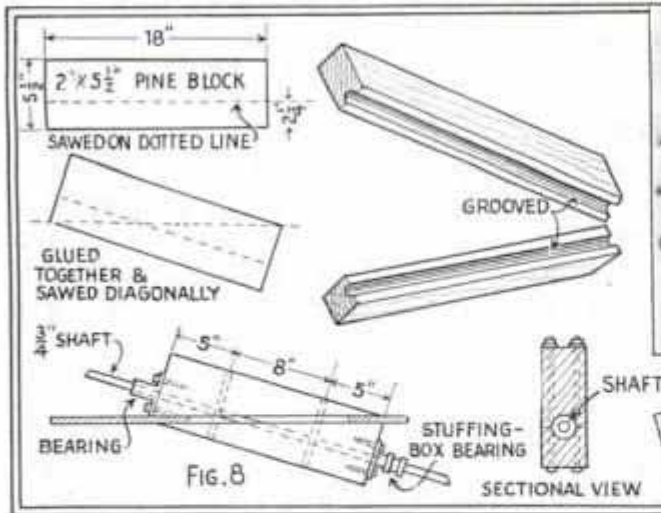
Jacobsen Mfg Co Racine, Wis

Utilimotor - Johnson Motor Co



screws, countersunk. Apply white lead liberally before screwing down permanently. The transom, or stern piece, is of the same material as the sides, with chine, etc. Put temporary diagonal braces across the top, to keep the structure square, and turn upside down. Apply white lead along the bottom edges and chine, and lay a 1-in. strip of muslin over the joint. Over this place the 1/4-in. plywood bottom. It should be painted on the inside before screwing down permanently. Use 3/4-in. brass screws, staggered 3 in. apart, one screw in the side and the next in the chine, alternately. The cross frames should be put in next. Note that there is a bulkhead at the second frame from the nose. When the deck is on, this makes a large water-tight compartment.

For the shaft log, or block through which the propeller shaft runs, prepare a pine block as in Fig. 8. A channel in each half takes the propeller shaft. Glue the two blocks together and, when dry, cut diagonally at an angle of about 16°—a 1-in. rise to every 3 1/2 in. of length. Now install the bearings, the stuffing box at the rear and the inboard bearing at the other end. Put the two triangular blocks together with pieces of wood between them just the thickness of the bottom. Put the propeller shaft through the bearings so that it alines properly. When the shaft turns freely clamp the block together for drilling bolt holes. The log should then be located in the bottom of the boat. Use white lead and a muslin gasket where the lower half of the log fits against the bottom of the boat. Also apply white lead and cloth gaskets under the bearing flanges where they fit against the ends of the shaft log. Brace with cross members and diagonals on the bottom, inside of the boat. White lead is put under all cross members, by the way, and the bottom screwed to them from the underside with 3/4-in. brass screws. After the shaft log is in place, the 2 by 4-in. engine supports



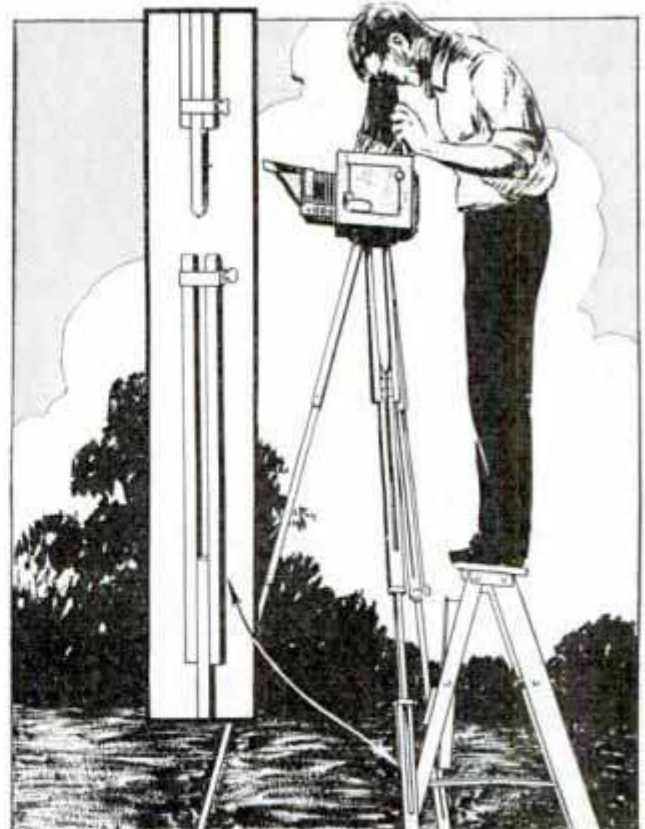
are installed. A section is cut away so that a $\frac{3}{4}$ -in. plywood board will set at an angle of 16° when screwed to it. By bolting the engine to this board and moving it forward or backward, the engine and propeller shaft can be alined accurately. When location is determined, cross members are marked and screwed in place.

A deck of $\frac{1}{4}$ -in. plywood, already painted or shellacked, is fitted over the top framing. There should be no "raw" or unpainted wood anywhere on the entire

boat. Connection of the motor and propeller shaft is made as in Fig. 2. Wood bearings boiled in oil have been found cheaper and just as practicable as iron ones for the rudder. A 5-in., 10° pitch propeller will be satisfactory.

Lightweight Extension Legs Improve Camera Tripod

With these extension legs slipped over the feet of your camera tripod, you will be able to take photos 5 or 6 ft. above the usual height, depending, of course, how long you make the extension legs. Each one is built up of three hardwood strips, one of which is nailed between the other two as shown in the detail. The upper ends of the legs are fitted with clamps for attaching them to the tripod feet. As a precaution to prevent the legs from accidentally slipping too far up on the feet, holes are drilled through the latter 3 in. from the ends to take wood pins which project about $\frac{1}{2}$ in. from each side. If the extension legs are used to raise the camera to any great height, they should be made of heavier stock than the regular tripod so that the assembly will be sturdy enough to prevent the camera from wobbling.—Tex Wiley, Waukegan, Ill.



These Tripod Extension Legs Pack into a Neat Bundle and Are Easily Carried

☛ The burner of an acetylene bicycle lamp, fitted to an ordinary gas jet, will produce a very hot flame.



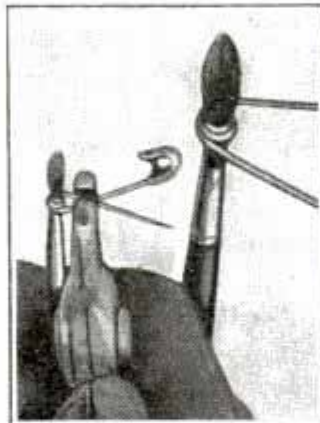
Slanting Partitions Bolted to Sides of Mortar Box Save Labor in Mixing Concrete

Partitions Inside of Mortar Box Aid in Mixing Concrete

To save labor when mixing concrete by hand, divide the mortar box into three or four compartments with sloping partitions. Put the sand, gravel and cement in one end and then pull it over each partition with a hoe, which will mix it thoroughly. This method is much easier than shoveling the concrete from one end of the box to the other.

Safety Pin Tightens Hair in Small Art Brushes

To prevent hairs from falling out of cheap art brushes pinch the ends of the brush ferrules, which is easily done with a safety pin. Get one in which the eye will just slip over the end of the ferrule of the brush. Then cut off the ends of the pin and, with a pair of pliers, squeeze them tightly together around the ferrule.

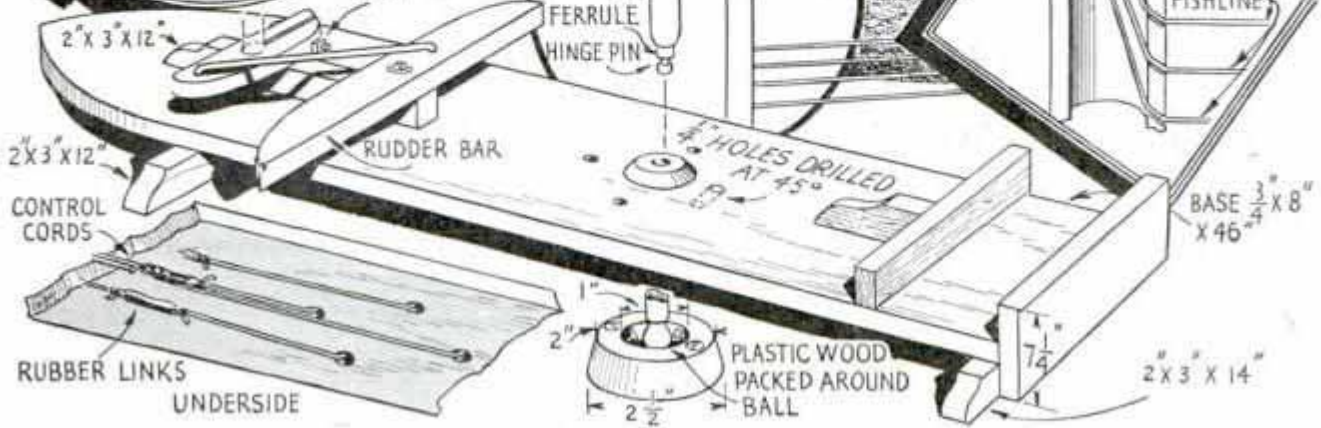
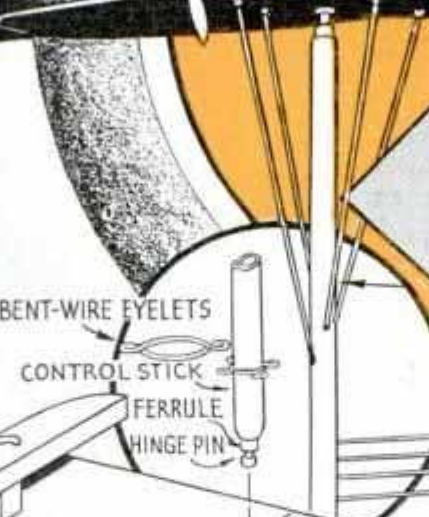
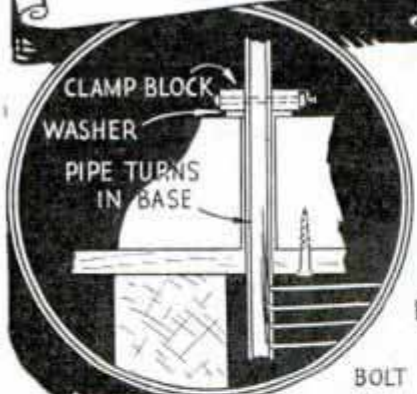
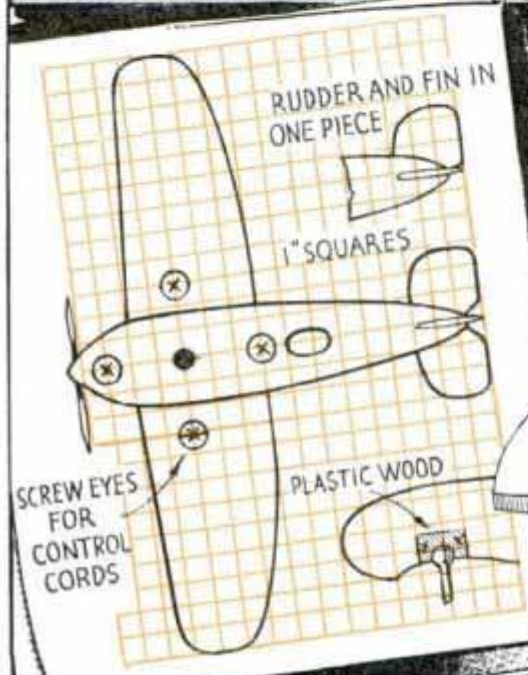
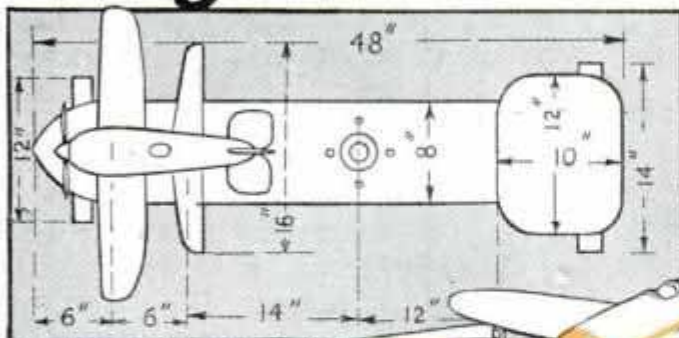


☐ When paper sticks to a negative during printing, remove it by soaking it in the hypo bath, sacrificing the print rather than the negative.

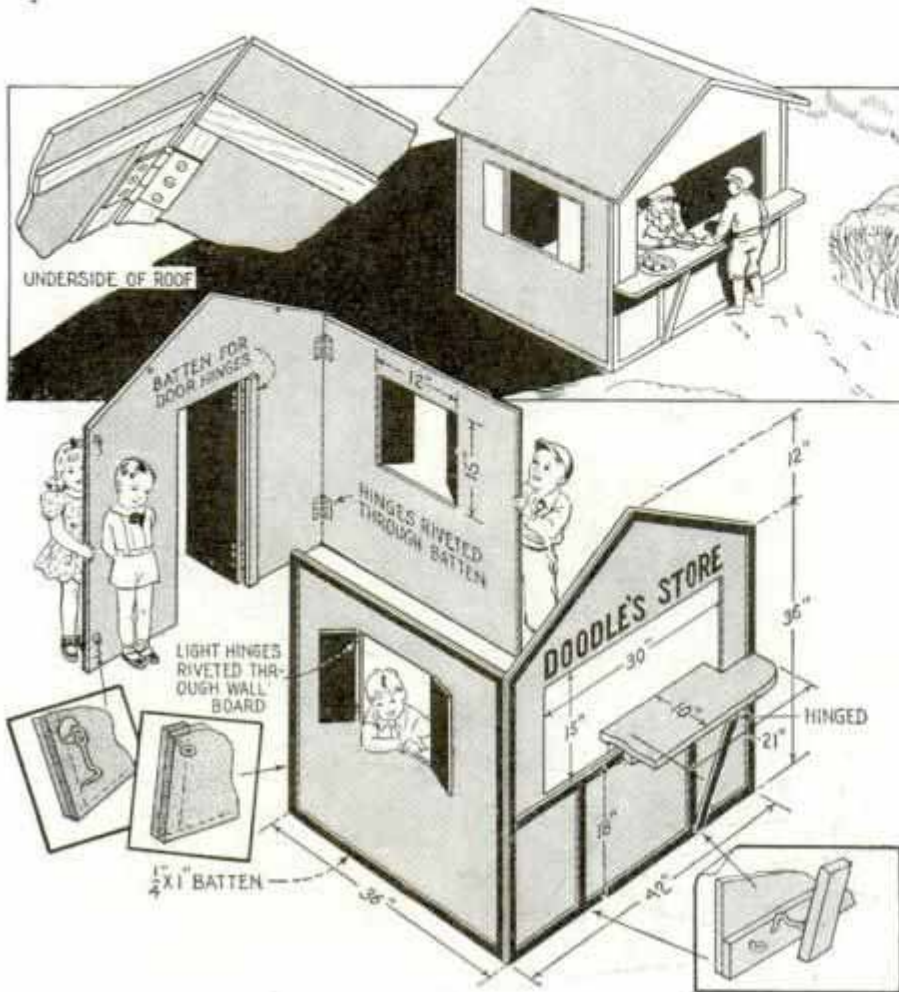
Pilot Trainer Shows Flying Essentials

Simulating actual flight conditions, flying fundamentals are easily grasped with this miniature outfit. The control stick is used to put the plane in a position to bank, climb or descend, while the foot rudder bar will make it turn to right or left. The principle is the same as in a real plane. The construction is comparatively simple. General dimensions are given on the opposite page and can be altered to suit individual cases. In a brisk wind the tiny propeller will turn and you will get some real thrills of flying, as the plane will seem to zoom and dip. The rudder bar is connected by a link to the clamp block so that a push with the right foot causes the plane to turn to the right and vice versa. The control stick is a 14-in. length of broomstick, with a ball-head hinge pin set in the lower end. The ball moves in a plastic-wood socket, forming a neat universal joint. Galvanized wire is bent to form four eyelets to which the control cords are tied. A close-up of the universal joint is also shown. A wooden cup is turned on the faceplate of a lathe, and small brads driven into the inside so that about $\frac{1}{8}$ in. protrudes. The ball of the hinge pin is then clamped so that it is exactly in the center of the cup, and plastic wood is packed around it. The ball should be oiled first to prevent the plastic wood from sticking to it. When hard, the hinge pin can be twisted, so that the ball turns freely in its socket. Four holes are drilled at a 45-degree angle, for the control cords. The edges should be smoothed with jack-knife and sandpaper so that they will not chafe the cords. The latter should be of a good grade silk fishline. The small model plane is mounted on a similar universal joint on the top of an 18-in. length of $\frac{1}{2}$ -in. I.D. pipe. Holes are drilled at an angle for the control cords, as shown, and the edges are carefully smoothed. The control cords are connected so that two of them, one to a wing and one to the nose, have rubber links inserted to equalize and keep them taut. These links should be of $\frac{1}{4}$ -in. rubber bands about 2 in. long. Use three in each set. White pine is used for making the plane. The fuselage is turned on a lathe, and wing and tail assembly whittled and planed. Painting and striping the trainer to suit completes the job.

Toy PILOT TRAINER



This Play Store Folds Flat When Not in Use



This Play Store Is Made from Hinged Sections of Wall Board, Which Are Reinforced with Wood Battens for Rigidity

Made of cheap wall board, this play store can be folded flat and put away when not in use. A sharp knife will serve to cut the wall board, which is then reinforced around the edges with wood battens. The doors and windows are also reinforced with battens. Each end of the store is permanently hinged to one of the sides, and hooks and screw eyes are used to fasten the hinged sections together. The two sides of the roof are also hinged together at the ridge and are reinforced with battens as shown in the upper detail.

Hints That Help in Calcimining

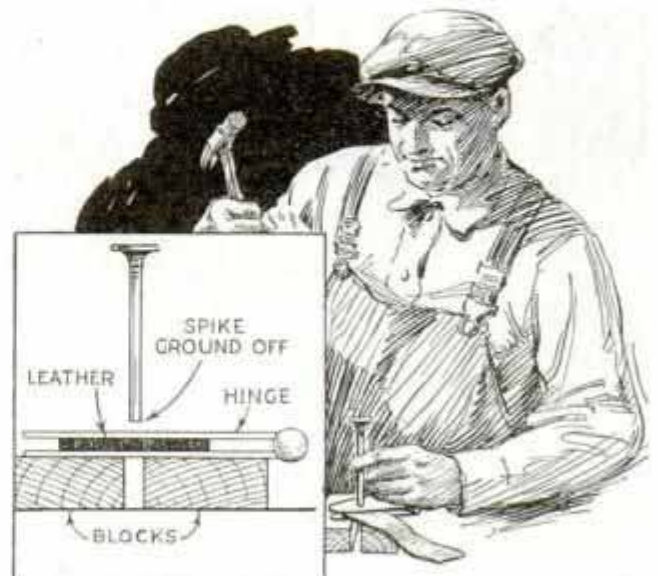
Where calcimining is to be done over wallpaper that does not have pronounced figures, it is often possible to do satisfactory work with only one coat. In this case, the glue is melted and is mixed with the calcimine in the proportion of glue, 1 or 2 lb., to calcimine, 4 lb., depending on the condition of the wall. The glue will not

discolor the daintiest tint, if a good grade is used. If a color is desired that is not available in the regular ready-prepared calcimine, tints may be made up, or colors deepened, by using show-card colors that have been water mixed. It is necessary to use care in mixing the colors. This has been found of particular service in making up deeper colors than the usual calcimine tints for stippling purposes.—Leonard A. Crain, Rochester, N. Y.

Leather Punch Made from Hinge and Spike

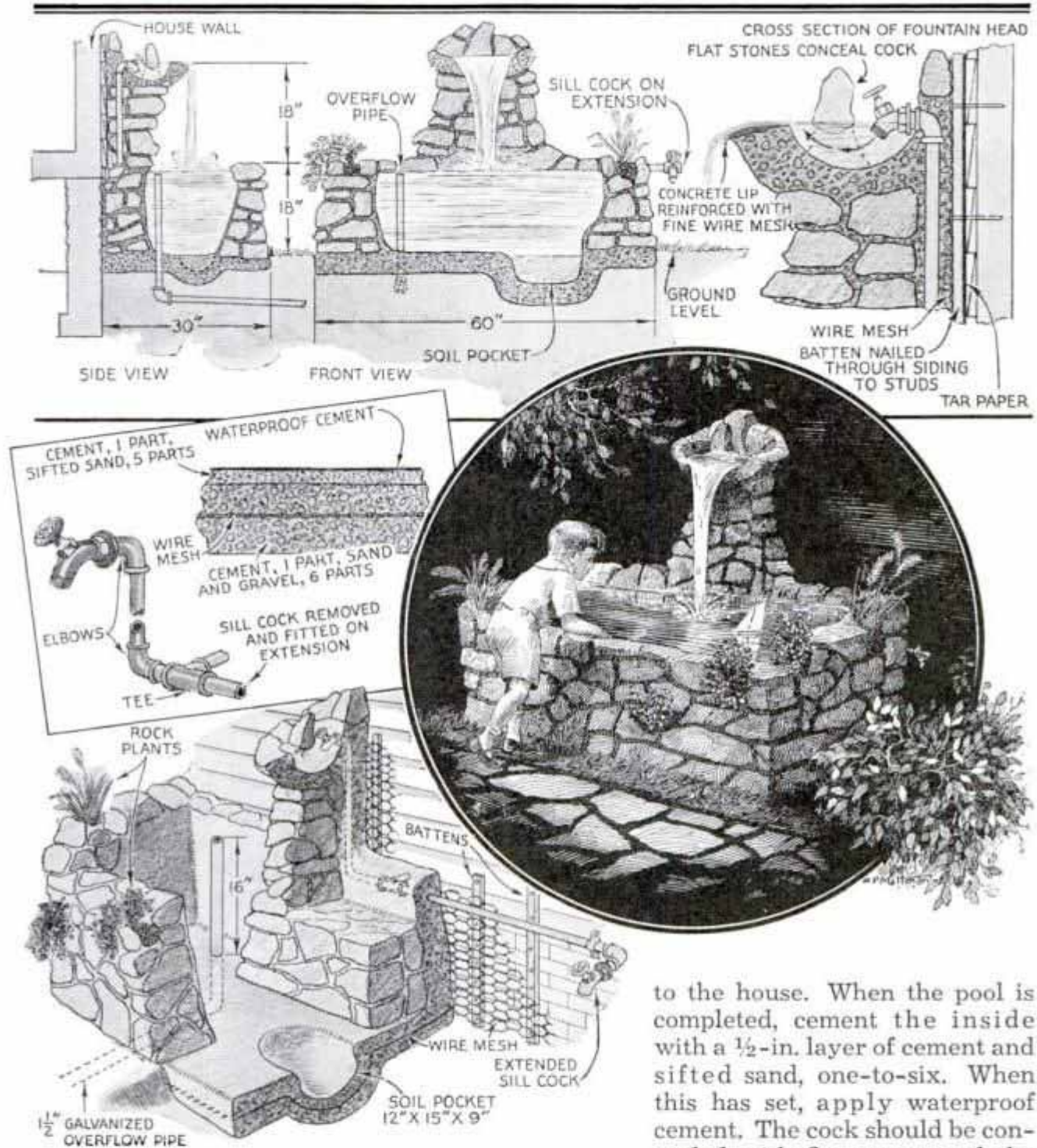
When a punch is not at hand for making holes in leather, a neat job can be done with a spike and a hinge, being sure that the holes in the halves of the hinge line up when it is folded. The end of the

spike is ground off square, the leather is placed between the folded halves of the hinge and the spike is driven through one of the holes. This will make a hole in the leather just the size of the spike.



Holes Can Be Easily Punched through Leather by Using a Hinge and Spike

Wall Fountain and Pool Take Small Space



Here is an attractive and inexpensive wall pool with a waterfall. Excavate an area about 30 by 60 in., about 6 in. deep and build the walls of large and small stones, preferably flat ones. A few pockets are left between the stones to hold soil for sedums and other rock plants, which will add to the beauty of the completed job. The wall against the house is almost entirely concrete with stones along the top. The concrete is anchored with wire stapled to battens which in turn are nailed

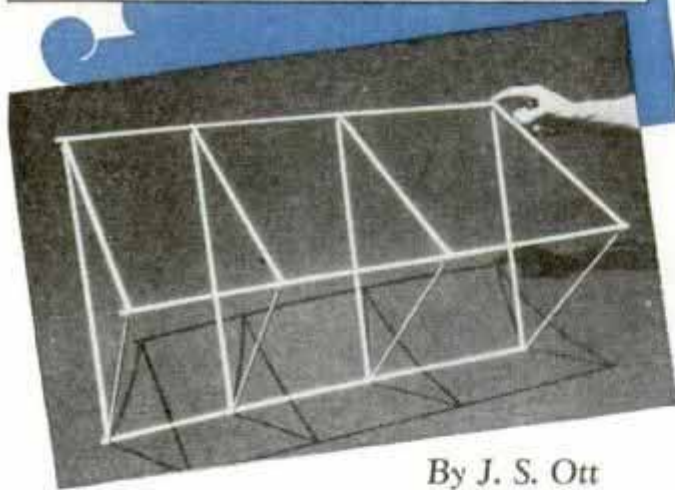
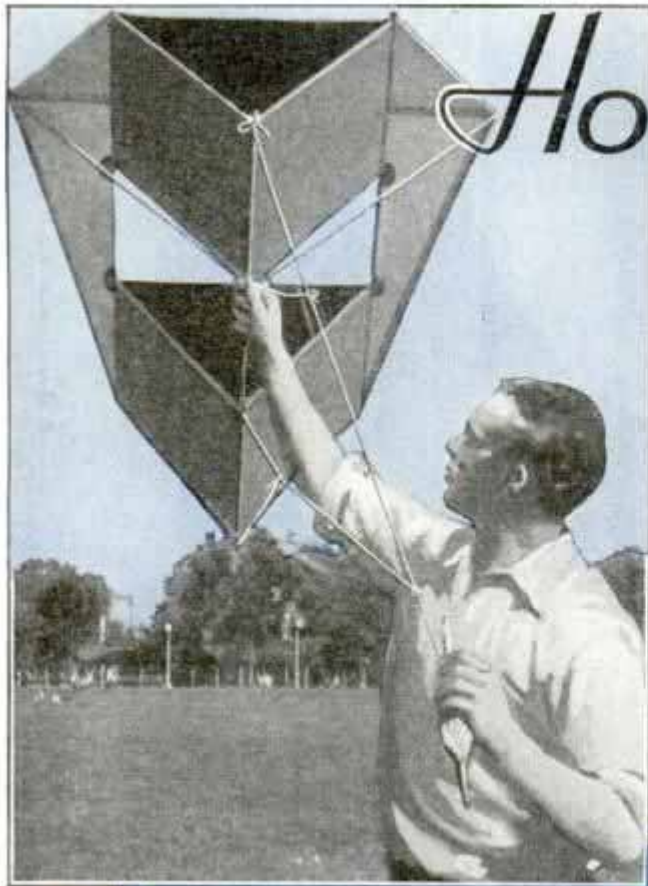
to the house. When the pool is completed, cement the inside with a $\frac{1}{2}$ -in. layer of cement and sifted sand, one-to-six. When this has set, apply waterproof cement. The cock should be concealed with flat stones and the

run-off basin should have a lip. The proper shape of the run-off can be determined by experiment, adding a little cement here and there to produce the sort of waterfall you prefer. The cock in the fountain-head basin permits regulation of the water for best results and the overflow pipe can be so arranged as to drain onto the shrubbery or garden.

☞ When toasting bread over a camp fire, it is best to cover the fire with a tin pan.

L.L.B. 61

How to make



By J. S. Ott

BOX kites varying in size from midgets to mammoths, to be used for either sport or utility, can be built by anyone at small expense. Such variable factors as material, thickness of the frame, weight of the twine, and other information on construction, are all given in a handy chart. Photo enthusiasts may use this method to obtain interesting aerial views by suspending the camera from a frame tied to the flying twine. For advertising purposes, banners can be lifted high into the air, a 6-ft. kite being capable of keeping a weight of from 5 to 8 lb. aloft. However, this capacity varies and is, of course, mainly dependent on the wind. To get a 6-ft. kite

into the air and keep it there, requires a breeze that will give a pulling strain of about 18 lb. on the twine.

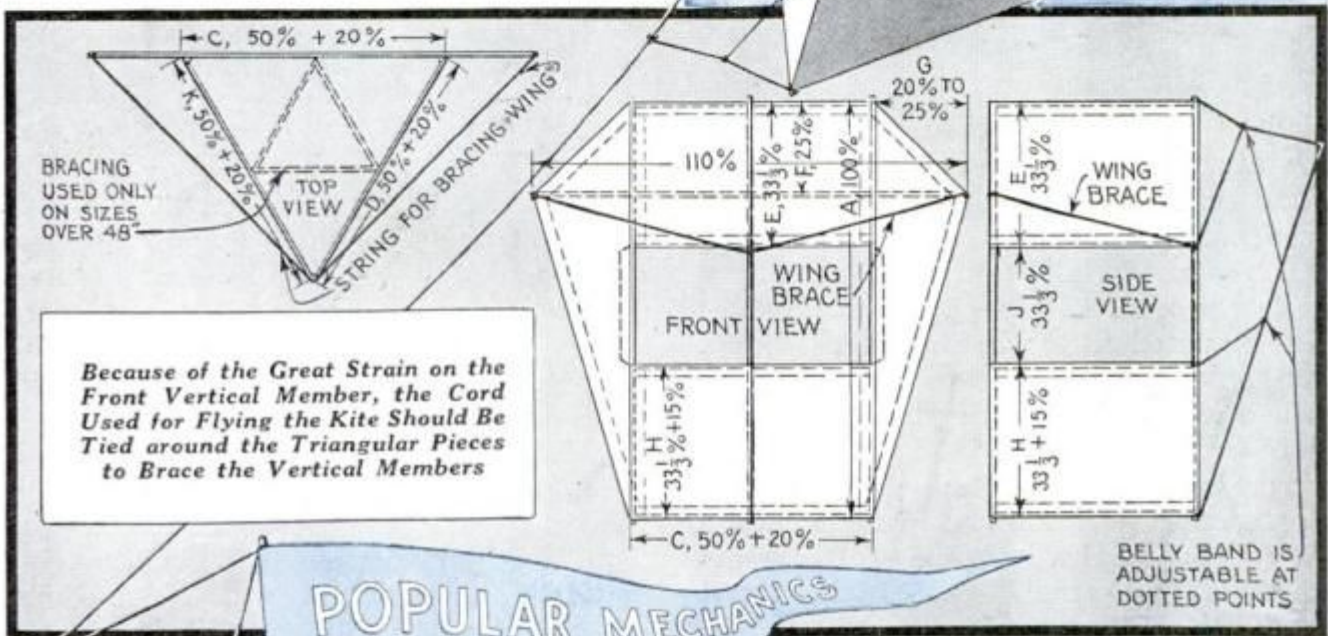
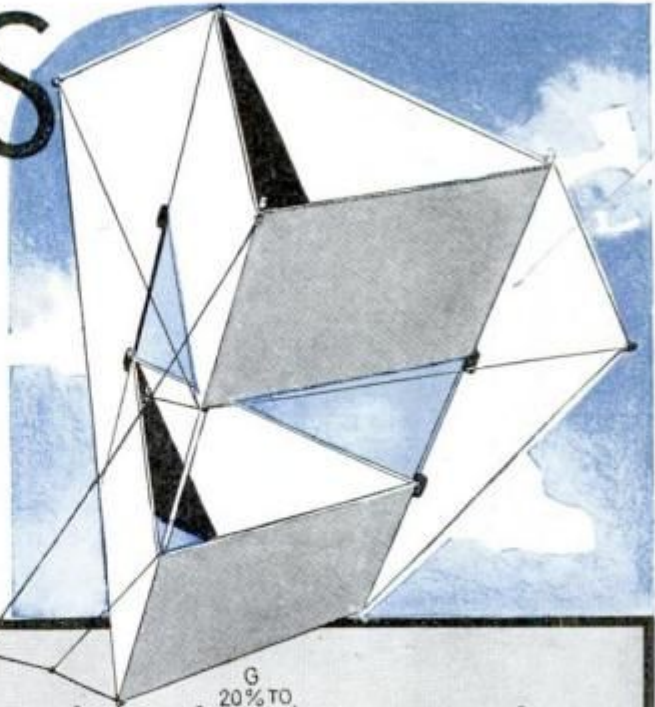
For best results when carrying banners, the bellybands are adjusted so that the kite will fly almost vertically above you, and the load will swing directly beneath it. If the kite were flown at a 35° or 40° angle, the actual pulling power would be a little greater, but the weight of the banner would then cause the twine to sag much more than it would when the kite is flown in a vertical position. Material used for an advertising banner should be the lightest goods obtainable, preferably about 4 oz. per square yard. A banner 3 ft. wide and 24 ft. long would weigh 2 lb. plus the weight of the paint required for illustrating it. The widest part of the banner should be tacked to a 3/8-in. stick which is tied to the flying twine and is also fitted with two cords to carry an 8-oz. weight as shown in one of the illustrations, the purpose of the weight being to hold the stick in as much of a vertical position as possible, which in turn keeps the banner floating at an even keel.

In constructing a kite, the first step is to get the proper material and prepare the triangles, four in number, around the vertical members. The parts used for the triangles should fit snugly against the vertical members by cutting small angular pieces off the ends. Refer to the top view for the relation of vertical and triangular members. The four braces comprising the back of the kite should be cemented at each joint with a good grade of wood cement and temporarily held in place with pins until all of the triangular sections have been attached and securely tied in position. After the triangles and the vertical sections have been completely assembled, they should be set aside and allowed to dry. As soon as the triangular framework is dry, this portion of the kite should be covered. Select the proper grade of paper as specified in the table, and cover the triangles in

568 894

BOX KITES

one piece, overlapping about 2 in. On the inside of the triangles, cement a strip of paper about 2½ in. wide, over and against the vertical members, in order to reinforce and hold the paper rigidly at these points. On the 5 and 6-ft. kites, short vertical members are placed between the horizontal triangular members at three points, meeting the small triangle, which is placed inside of the large triangle, as shown in



BRACING
USED ONLY
ON SIZES
OVER 48"

TOP
VIEW

FRONT
VIEW

SIDE
VIEW

Because of the Great Strain on the Front Vertical Member, the Cord Used for Flying the Kite Should Be Tied around the Triangular Pieces to Brace the Vertical Members

POPULAR MECHANICS

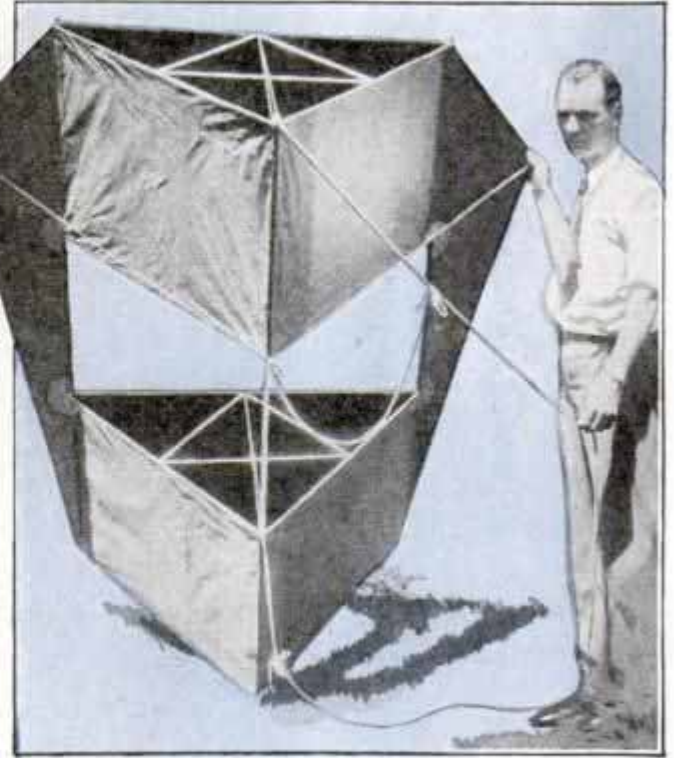
BELLY BAND IS
ADJUSTABLE AT
DOTTED POINTS

the top view. After the two triangles have been covered, the wings are cemented in place. The wing is cemented to the front of both triangles for a distance of 1½ in. and at the open section the paper folds around the string at the outline of the wing. As there is considerable strain on the front vertical member of the kite, it is important that the flying twine be attached around the four triangular sections to embrace the vertical pieces of the frame. This will prevent the kite from being pulled apart in a breeze, which incidentally occurred during experiments to determine the strength of these kites and the best method of bracing them. Flying large kites is usually no one-man

8-OZ.
WEIGHT



job, the 6-ft. model requiring the combined strength of three huskies to hold it in a good wind. Great sport can be had by using a runner and parachute dropper. The runner is arranged so that it cannot fall off the string. However, it may be removed by opening the axle clips holding the axle which in turn slides through a brace on each of the wheels. The length of the runner is 8 in. and the main body is ½ in. square. The slot running lengthwise is ¼ in. square. Four side braces may be constructed from thin plywood, aluminum or light tin. Note that a part of the body flange is cut away to allow the wheel to set down evenly with the bottom of the slot through which the twine travels. This prevents the wheel from catching and



binding. Two small stubs of thin wood are attached on each side of the body about midway between the two front guides. The stubs hold a cardboard wing which catches wind that drives the runner up to the kite. Three small wood guides are cemented to the bottom of the body. The holes in the guides should all be drilled alike. A piece of piano wire, .032 in. in diameter, bent to the required shape for the trip, is passed through the guides. The cardboard wing and parachute are pierced by the lower piece of trip wire, which is then pulled through the lower hole in the front guide and is ready to be

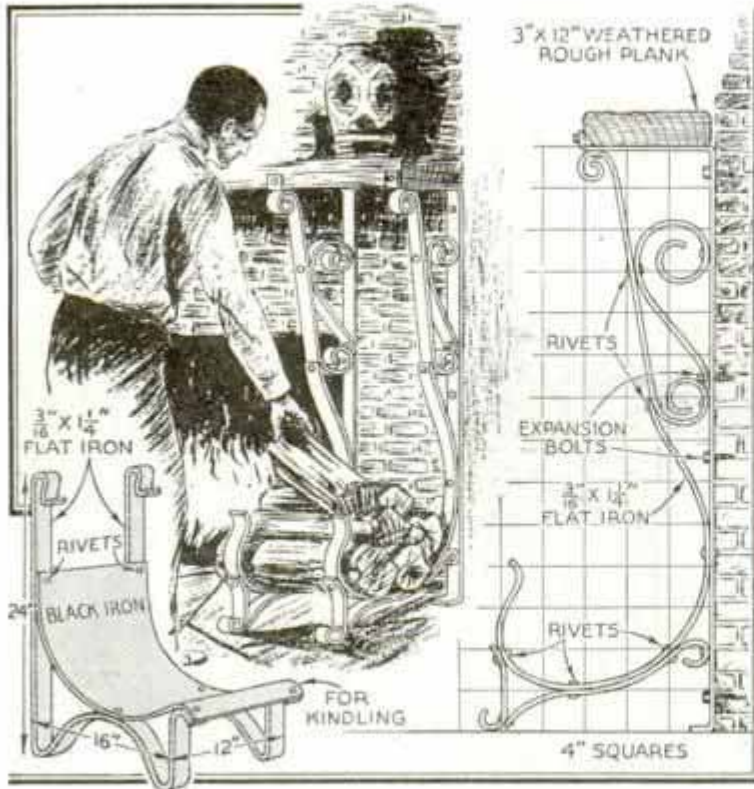
sent on its way. A simple parachute can be made from an 18 or 24-in. square of tissue paper. Attach four threads, one and one-half times as long as one side, to each corner and tie them together as shown. To prevent the threads from becoming tangled, a small cork is placed at the knot. Attach this cork by cutting four slots and slipping the threads into them. If a small weight is attached below the cork, the threads will untwist immediately upon the release of the parachute, and the chute will open quickly.

Table of Measurements, Stock Thickness, and Weight of Twine for Various Size Kites

(See drawing for reference of letters and proportions)

Height A 100%	Width B 100 to 110%	Triangles C-D-K, 50% plus 20%	Wing G, 20 to 25%	Height of triangle (upper) E 33 1/3%	Height of space (middle) J 33 1/3%	Height of triangle (lower) H 33 1/3% +	Size of spruce or pine frame	Size twine
12	12 to 13	7.2	3	4	4	4	3/32 sq.	No. 60 thread
18	18 to 20	10.8	4 to 5	6	6	6	1/8 sq.	Light store string
24	24 to 26	14.4	5 to 6	8	7 to 8	8 to 9	5/32 sq.	Store string
30	30 to 33	18.	6 to 7	10	9 to 10	10 to 12	3/16 sq.	No. 18, 42-lb. twine
36	36 to 39	21.6	7 to 9	12	10 to 12	12 to 14	1/4 sq.	No. 24, 56-lb. twine
48	48 to 53	28.8	10 to 12	16	13 to 16	16 to 19	5/16 sq.	No. 36, 86-lb. twine
60	60 to 66	36.	12 to 15	20	16 to 20	20 to 24	3/8 sq.	No. 48, 110-lb. twine
72	72 to 79	43.2	15 to 18	24	19 to 24	24 to 29	1/2 sq.	No. 60, 150-lb. twine

Note: Allow 15% extra for height of triangle H on kites under 4-ft. size. Thickness of triangle bracing is only 60% of the thickness of regular frame size. Use polished cotton twine where twine is referred to. Numerals in chart indicate size in inches. Covering material: Tissue paper for kites from 12 to 24 in. in height. 30 and 36-in. sizes have No. 30 Kraft paper triangles and tissue-paper wings. 48 to 72-in. sizes have No. 40 Kraft paper triangles and closely woven cloth wings.



These Attractive Log and Kindling Racks of Flat Iron Will Be Found a Great Convenience around the Outdoor Fireplace

Novel Fireplace Fuel Racks Made of Flat Iron

Unusually attractive fuel racks for the outdoor fireplace can be made from flat iron in the manner shown. If you have a small forge, this is a job you can do yourself, laying out the work as shown in the squared detail for the combination mantelpiece bracket and log rack. Use $\frac{3}{16}$ by $1\frac{1}{4}$ -in. flat iron, or heavier, and rivet or weld where indicated. If the fireplace is already built, the brackets can be anchored with expansion bolts. Note that the portable kindling rack has a black iron bottom. This rack can be built in to balance the log rack on the other side of the fireplace.

Young Plants Started in Fish Bowl



of plants before they are planted outdoors. By covering the opening of the bowl with a piece of glass and keeping the soil wet,

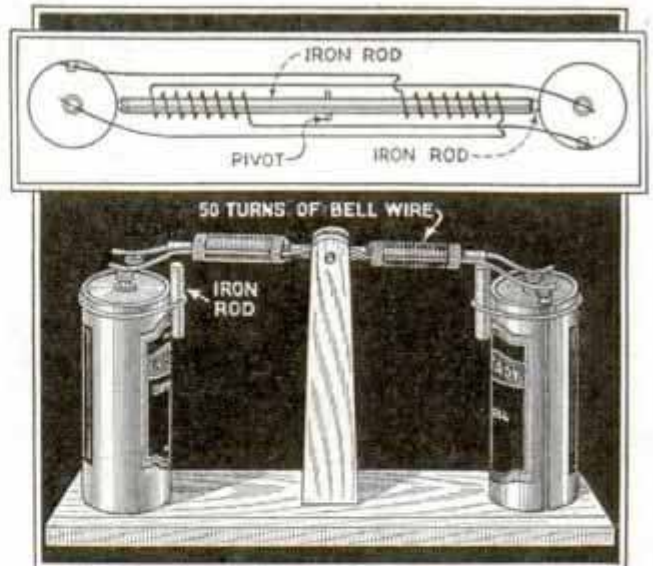
An old fish bowl containing a small amount of soil can be used as a miniature hot house for starting the root growth of slips and sprouts

sufficient moisture and a uniform temperature can be maintained inside.—Ray J. Marran, Kansas City, Mo.

Model of Henry's Electric Motor

Consisting of two dry cells, an iron-rod rocker beam and two coils of 50 turns each of No. 18 bell wire, this oscillating motor is a model of the first electric motor built by Henry in 1851. The ends of the right-hand coil run along the beam to the opposite end where they contact with the binding posts of the left dry cell, while the extending ends of the left-hand coil contact with the dry cell at the right in a similar manner. A short iron rod is fastened to project vertically from the top of each dry cell, directly under the pivoted rod. When the ends of the right coil make contact with

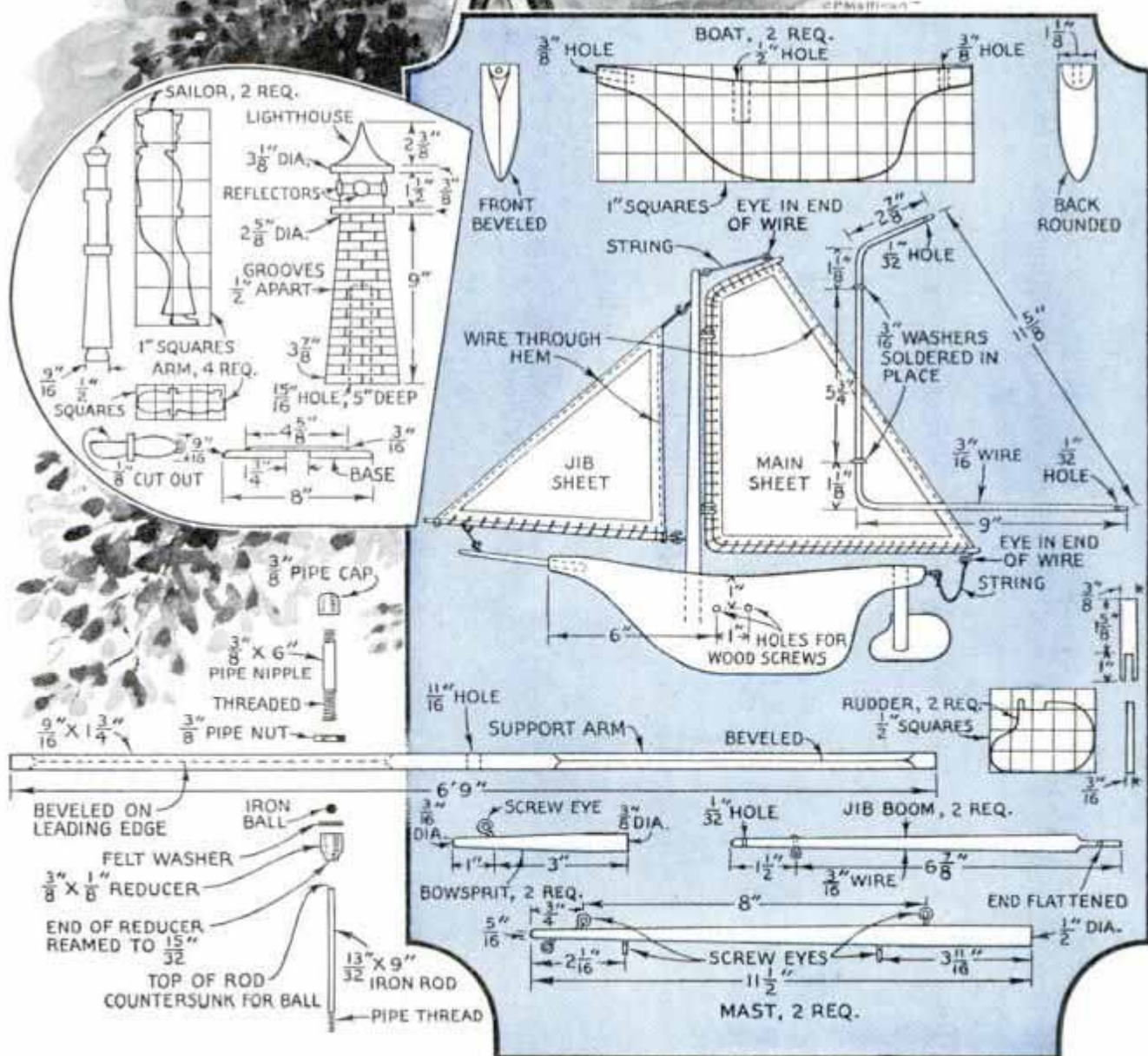
the dry cell at the other end, the coil becomes energized and magnetizes the iron rod so that the right end pulls itself down against the short projecting rod. This action breaks the contact with the left dry cell and, at the same time, causes the wires

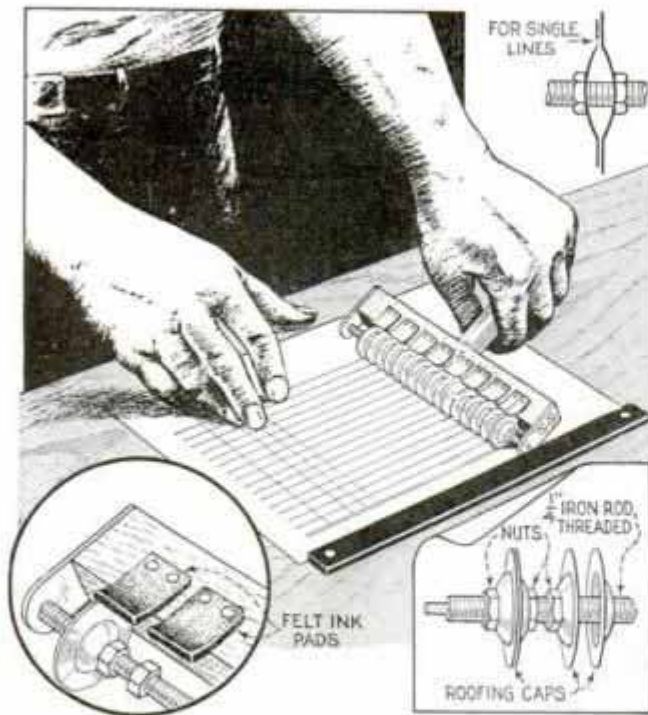


Method of Getting Reciprocating Movement from Two Dry Cells and Improved Electromagnets

on the right to touch the dry cell below, which energizes the left coil with the result that the left end of the rod is pulled down. This making and breaking of contact causes the beam to oscillate.—Raymond B. Wailes, Bethesda, Md.

Garden Sail Race Rotates in a Light Breeze





Paper Forms Having Both Equally and Irregularly Spaced Lines Are Readily Ruled with This Tool

Improvised Tool Rules Special Forms

Here is a little tool that makes quick work of ruling special forms on paper. It consists of a number of roofing caps spaced as desired by means of nuts on a threaded shaft, the latter being pivoted to a wood handle, which has heavy sheet-metal strips screwed to the ends to serve as bearings.

Small pieces of felt tacked to the top side of the handle to rub on the upper edges of the caps serve as ink pads. Care must be taken in selecting the caps to see that all of them are exactly the same diameter, otherwise only the largest ones will touch the paper when ruling. If narrow single lines are desired, trim off the edge of one of the caps in each pair as shown in the upper right-hand detail, so that only one of them touches the paper.

Pockets Filled with Sand Hold Tent Flaps Taut

Annoyance of having the flaps of his tent blow open unless fastened each time he passed in or out, caused one camper to sew pockets of heavy canvas on the lower corners of the flaps



and fill them with sand. The weight of the sand keeps the flaps hanging taut. The pockets are emptied before moving the tent and are filled again at the next location.—G. E. Hendrickson, Argyle, Wis.

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SERVING TABLE *and* TEA CART *that can be folded*



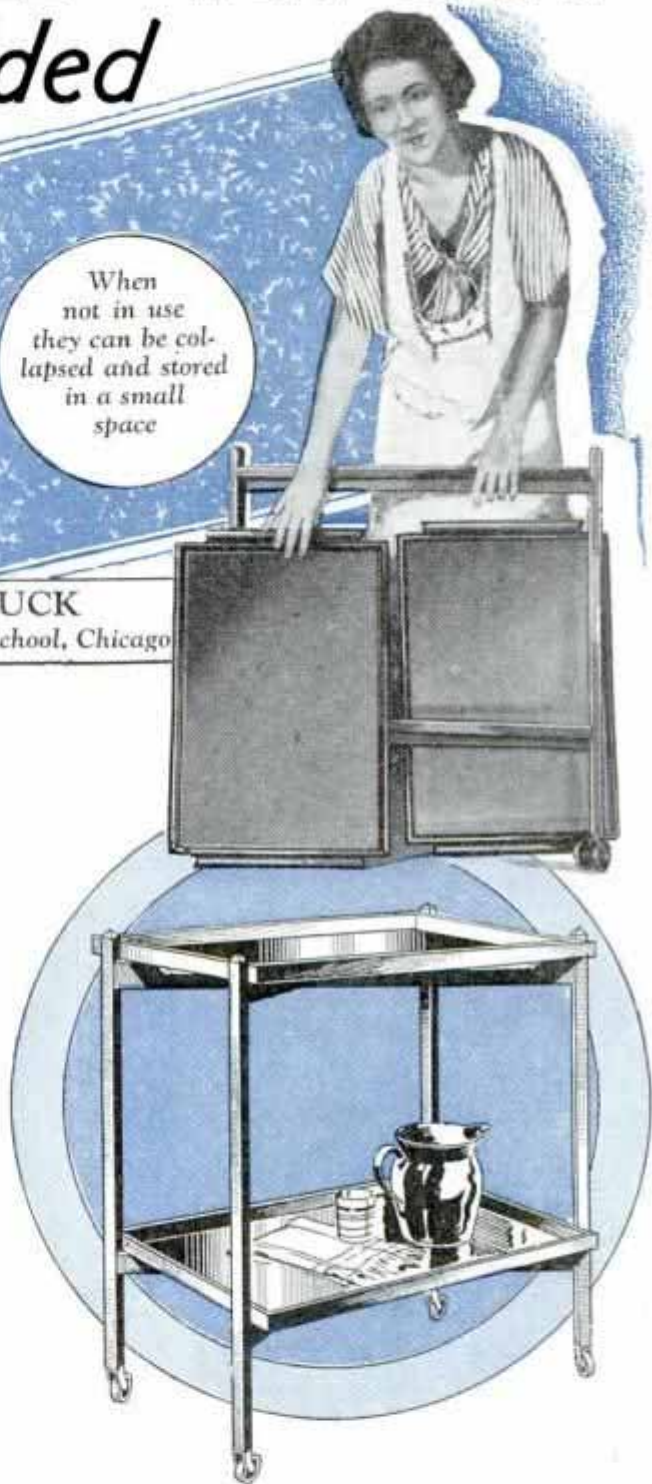
When not in use they can be collapsed and stored in a small space

By R. O. BUCK
Lane Technical High School, Chicago

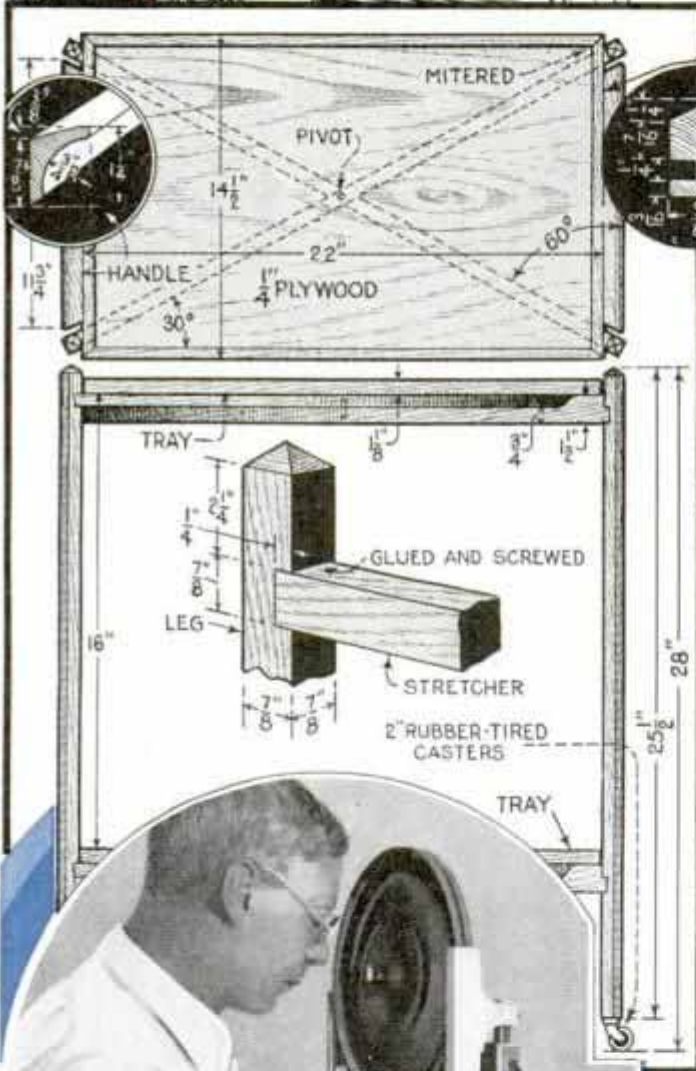
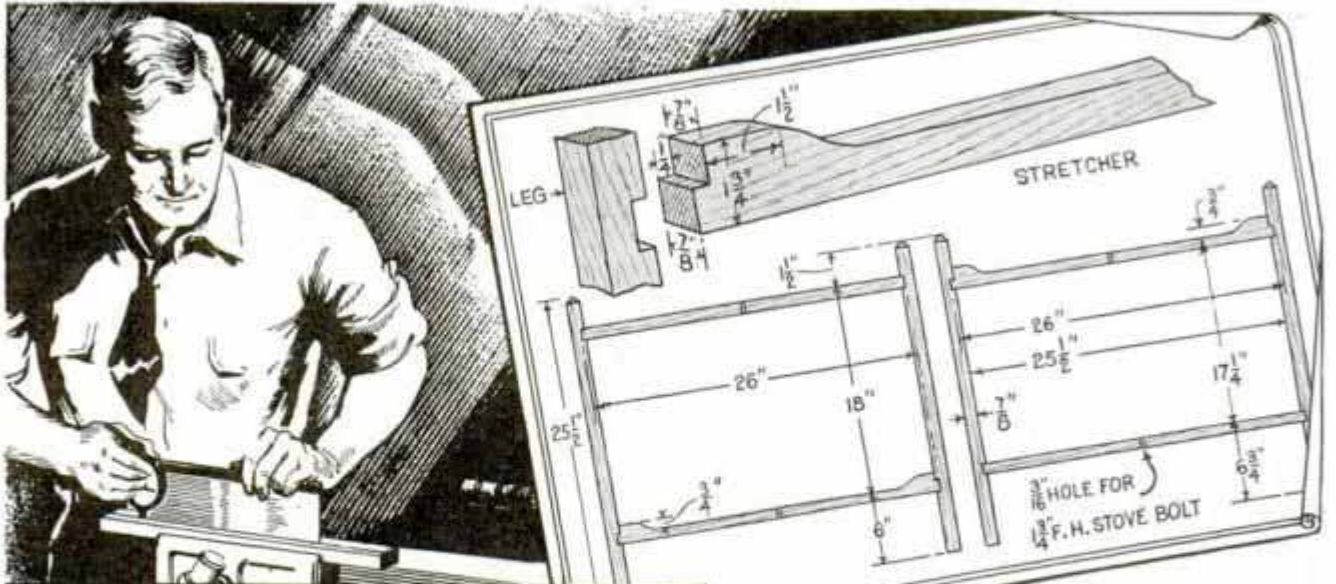
IF you live in a small apartment where space is at a premium, you will find a folding serving table and tea cart highly convenient, for they can be readily stored in a closet or behind a door, when they are not in use.

The top of the serving table is made of $\frac{1}{2}$ -in. plywood which is finished off on the edges with a banding of thin stock. On the underside of the top, and hidden by the banding, is a simple mechanism which allows one set of legs to slide toward the other when folding. The guide pieces are simply strips of hardwood in which a tapered rabbet is cut, by means of a back saw. Notice that the rabbet is $\frac{1}{8}$ in. wide at one end and $\frac{3}{8}$ in. at the other but has a uniform depth of $\frac{5}{16}$ in.

The legs of the table should be made of hardwood also as soft wood would soon wear at the pivot point and allow the table to wobble. The lower ends of all four legs are cut to an angle of 30 degrees but two of the tops are rounded and the others cut at the angles. A metal "finger" is used to carry the legs along the rabbet in the groove pieces. A piece of strap iron $\frac{1}{8}$ by 3 in. is drilled and countersunk to take two No. 6, $\frac{5}{8}$ -in. screws, bent to a right angle. The angle to which the upper end is cut off can be found by placing the piece

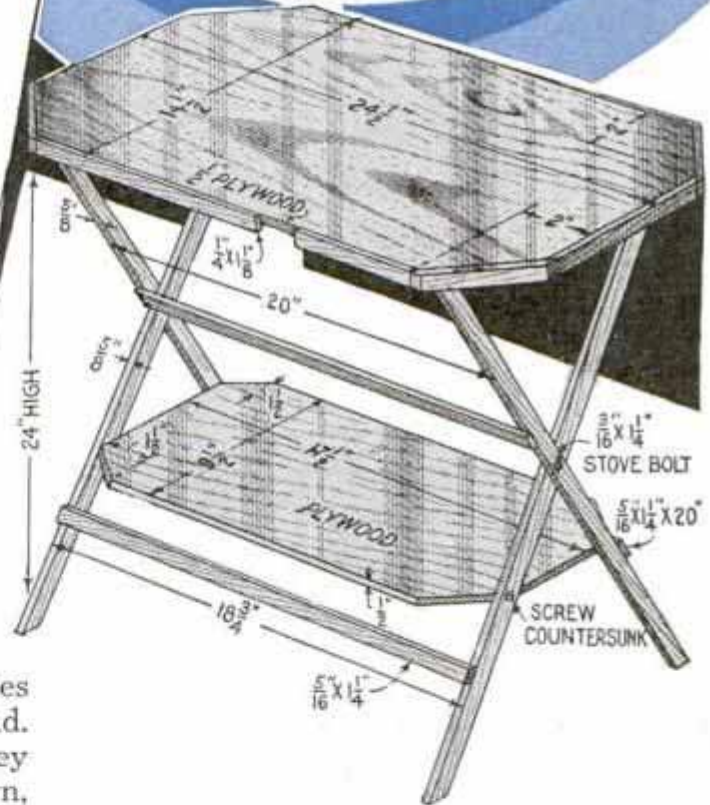
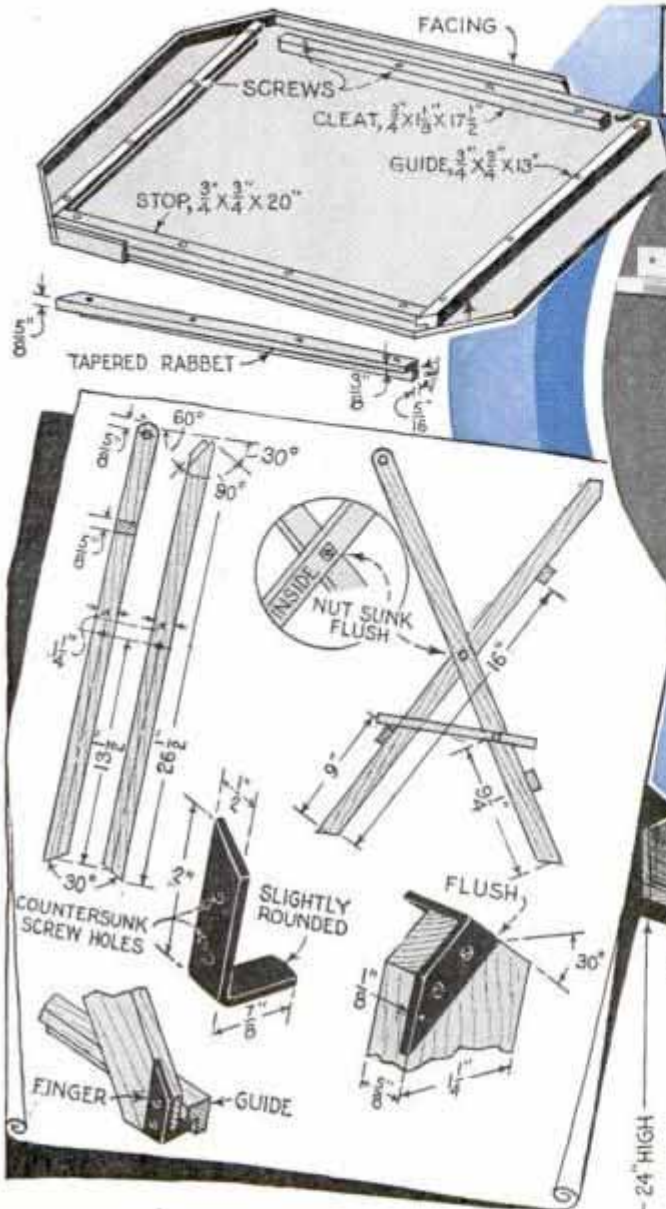


in the recess in the leg, and marking. Notice that the metal comes flush with the wood at both the side and top. The pivot bolts which fasten each pair of legs together, are threaded into nuts sunk flush with the surface on the inner side of the leg. This is necessary so that the lower shelf can be raised when folding. One of the illustrations shows this detail and also the location of the cross rails which sup-



port the shelf and fasten the legs together. In order to have the sliding mechanism move freely, it is essential that the table be square and true. Screws are used throughout the construction, with the exception of the banding, as the parts are subjected to considerable strain, especially when folding. The final step in the assembly is to fasten on the cleat to which the legs are pivoted. This is screwed to the underside of the top.

For the tea cart hardwood should be used as the framing is very slender. The two trays are simply set on the stretchers when the frame is extended. The handles on the trays maintain this spacing. All that is necessary to fold the tea cart is to remove the two trays and swing the legs together. The legs should be made first and the housing notches marked on them from the dimensions given. These notches are cut with a back saw and chisel. The stretchers are of two types, the first simply a square piece, screwed and glued into the notch cut into the leg. The second type has a raised portion at each end to compensate for the thickness of the rail which slides over it. The sawing of the curve may be done conveniently on a band saw or by hand, if a band saw is not available. The shape of the tray molding is given in a detail. The shape is so simple that it can readily be made by hand with a plane and sandpaper



or, if you wish, a more elaborate type may be substituted. A deep groove is plowed into the inner faces of the tray moldings to house the bottom. The corners are mitered, then glued and nailed. The molding for the handles is also simple and can be made by hand. As the handle pieces serve as spacers, they are cut at an angle of 60 degrees as shown, to conform to the angle at which the legs are placed. The handles should be screwed to the trays.

Rubber-tired casters can be obtained from the larger dime stores or furniture supply houses for less than a dollar a set.

Making Ship Model Flags

If ship-model flags are not bound in some manner, the edges of the fabric soon ravel and become unsightly. Doubling the cloth and sewing a seam to prevent this is

suitable for larger flags, but with tiny pennants, etc., sewing is rather difficult and the results are usually unsatisfactory. By using the following method, all flags can be neatly turned out: The flag is first laid out on a piece of fabric larger than the finished flag is to be, and a line of clear lacquer is applied to the waste cloth, just outside of the flag edges. This provides a binder for the fabric threads and, when the lacquer is dry, the flag can be cut out without fear of raveling.



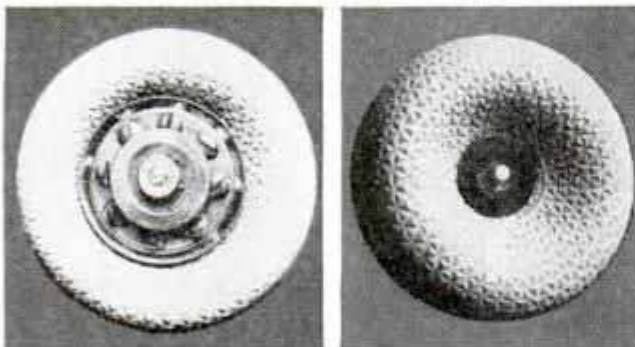
Appearance of Lattice Fence Improved by Setting Potted Plants in the Rectangular Openings

Potted Plants Improve Appearance of Lattice Fence

The appearance of a lattice fence having large rectangular openings will be greatly improved if potted plants are set in the spaces as shown. Wood disks with blocks nailed underneath to straddle the lattice boards support the pots, and they can be moved from one opening to another.

Rubber Balls Used to Make Air Wheels for Models

Air wheels for models can be made from hollow rubber balls. Select balls that are fairly stiff and punch small holes on opposite sides for the axles, which are inserted with a metal washer on the outer end. A second washer is slipped over the



Air Wheels for Models Made by Inserting Axle through Center of Hollow Rubber Balls

posite sides for the axles, which are inserted with a metal washer on the outer end. A second washer is slipped over the

other end and is pushed up tightly against the ball to compress it to the shape shown. The inside washer can be soldered to the axle to hold it in place.—L. Gordon Loos, Havelock Town, Colombo, Ceylon.

Metal Lacing Holds Box Together

Metal belt lacing makes a strong attractive corner fastening for wooden boxes. The sharp points of the lacing are driven into the corners of the box and the usual metal rod joins the two sides together. Removal of one of the rods permits the four sides of the box to be straightened

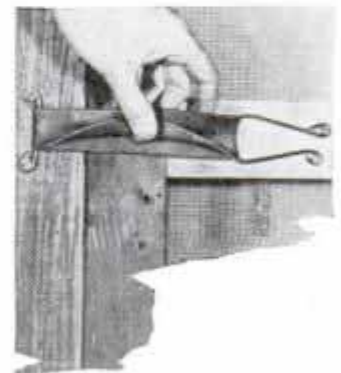


Metal Belt Lacing Makes Corner Fasteners for Boxes and Permits Them to Be Taken Apart

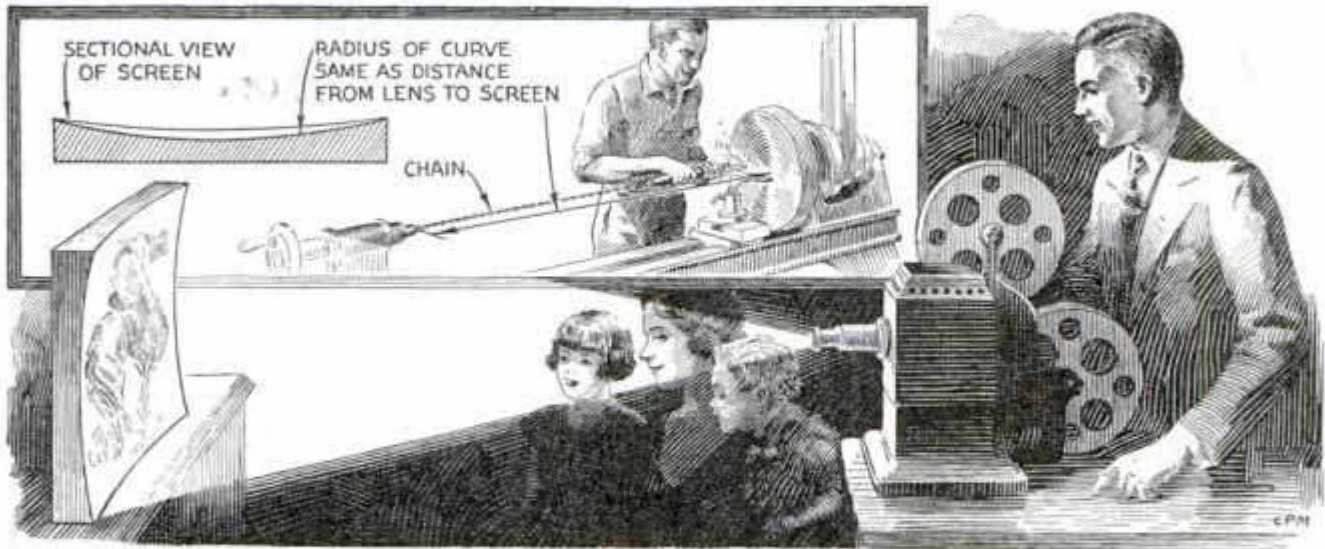
out as one flat unit and, when all four are removed, the sides are entirely separated. The top and bottom may also be fastened in this manner.

Section of Inner Tube Serves as Door Spring

An emergency screen-door spring can be had by cutting a strong rubber band from an old inner tube and then fastening it to the door and casing with two lengths of wire, which have eyes bent on the ends for screws. This method is especially handy on summer cabins when a regular spring is not available.—Ray J. Marran, Kansas City, Mo.



Curved Screen Gives Stereoscopic Movie Effects



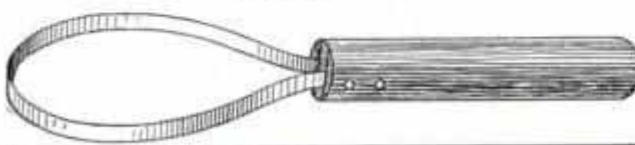
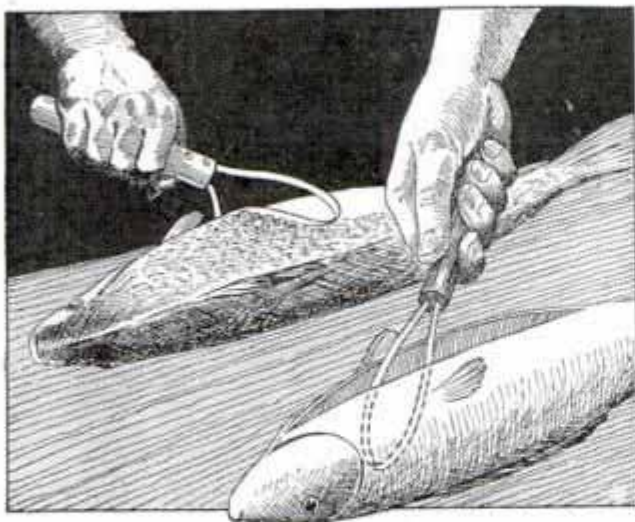
I have found that, in home movies, effects resembling stereoscopic pictures, unattainable on a flat screen without the use of a special film, or other equipment, is possible with a small screen having a curved surface. It is turned on a lathe,

using a turning tool attached to a chain fastened to the tailstock center, in order to assure a uniform arc. The radius of the curve must, of course, be the same as the distance from the projector lens to the screen.—R. V. Stratford, Beatrice, Nebr.

Handy Fish-Scaling Tool Made from Old Clock Spring

Sharpened along one edge and fitted to a handle, a 12-in. length of an old clock spring makes a good flexible tool for scaling and cleaning fish. The ends of the spring are annealed and then drilled for rivets with which it is attached to a han-

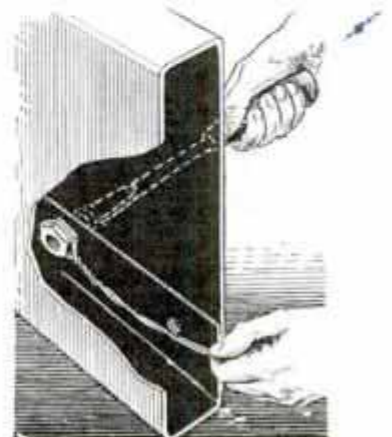
dle. In use, the tool is pressed against the body of the fish and is pulled forward so that the sharp edge will scrape off the scales. To remove the entrails, the fish is slit along the underside, after which the tool is inserted as shown. The spring will fit snugly inside the fish along the backbone and ribs so that the cleaning is done by one sweep of the hand.



Fish Are Quickly Cleaned with This Tool, Which Consists of a Clock Spring Fastened to a Handle

Wire Wrench Holds Nuts

On one job, I had several small stove bolts to tighten, but could not reach the nuts to keep them from turning with any tool at hand, so one was quickly improvised from a length of wire. I held one of the nuts in a vise and bent the wire around the flats, twisting the ends together to form a handle as shown. —J. F. Goodman, Stockbridge, Mich.



Fred L. Pidgeon 131 Coleridge St. East Boston Mass

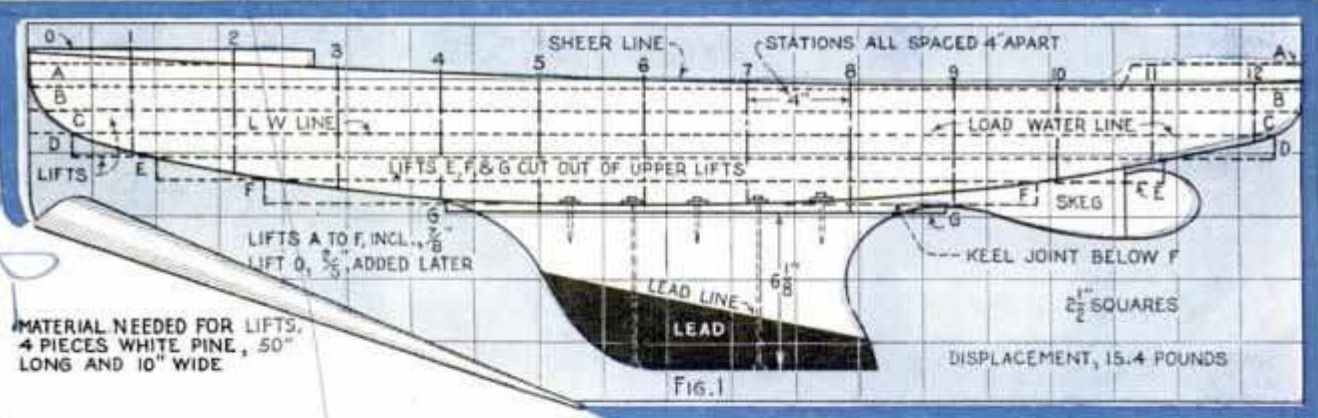
"Zip"-a Marblehead Class

By George Baron



In this article, Mr. Baron, winner of the U. S. Championship Trophy for the International "A" Class model yachts at Port Washington, L. I., July 1933, presents complete details on building "Zip". This model racing yacht of the Marblehead class is an improvement over the author's "Torpedo", which in 1933 took second place in the 50-800 National Championship Races in the Mid-West Association Fall Regatta held at Chicago

Eugene Ledyard Cheney, Pres. Sargatuba Meet.



MODEL yachting is increasing in popularity every year. There are now over fifty organized model-yacht clubs in the United States, and several in Canada. Twenty-eight of the larger clubs belong to the Model Yacht Racing Association of America, which is a member of the International M. Y. R. A. These clubs hold local club races, inter-club races, district championship races and a U. S. National championship race. The two most popular classes of yachts are Class-A International and the Marblehead 50-800 class. The latter is the type chosen for this article on account of size and weight, which runs from 10 to 12 lbs., and the simplicity of the

rating rule, which has made it very popular in school manual-training classes. The successful builder will have the advantage of owning a boat of a recognized class. The rule simply is: Boat shall be 50 in. long and carry not more than 800 sq. in. of sail. No metal fin-keels and no overhanging rudders are allowed. The model we are going to build will be about 48 in. long at the LWL (load water line). Fig. 1 shows the boat in profile. The marked section stations Nos. 1 to 12 are 4 in. apart and the lifts A, B, C, D and E are cut from $\frac{7}{8}$ in. stock, which is the size of so-called 1-in. lumber. Some lumber does not come full $\frac{7}{8}$ in., only $1\frac{1}{16}$ in., in

Model Racing Yacht

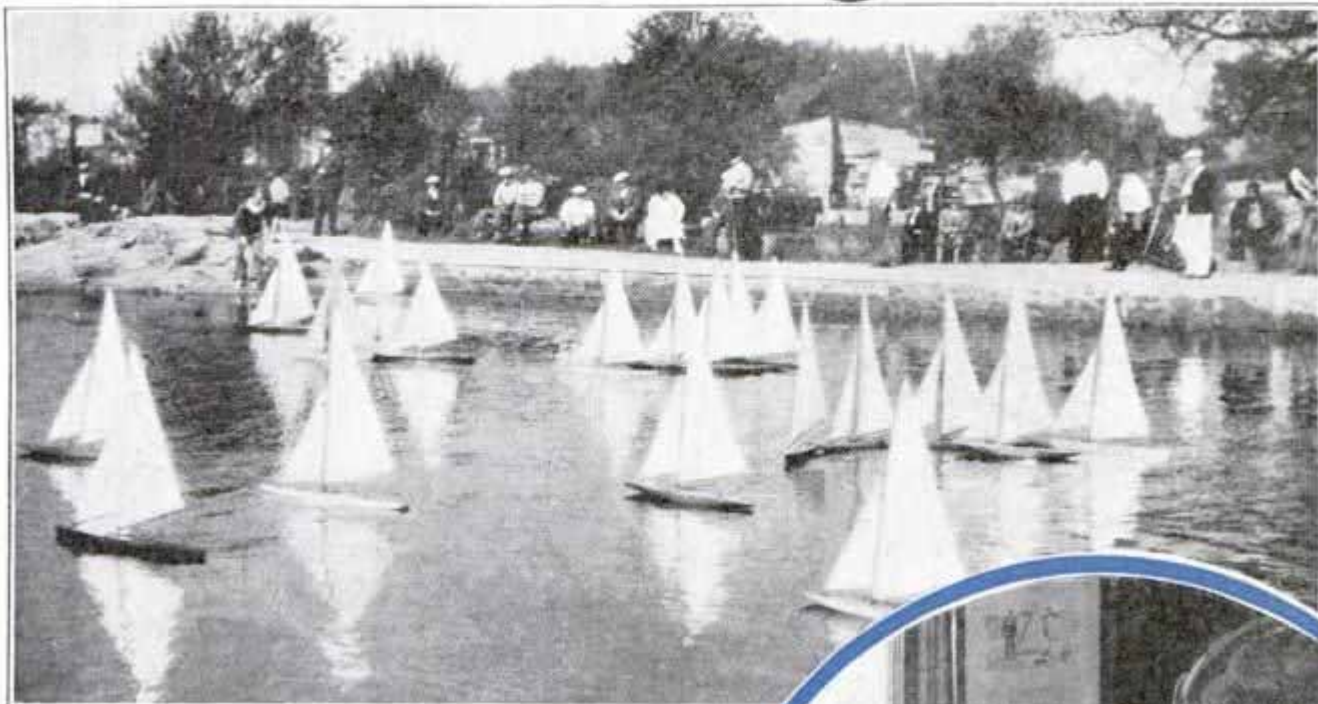


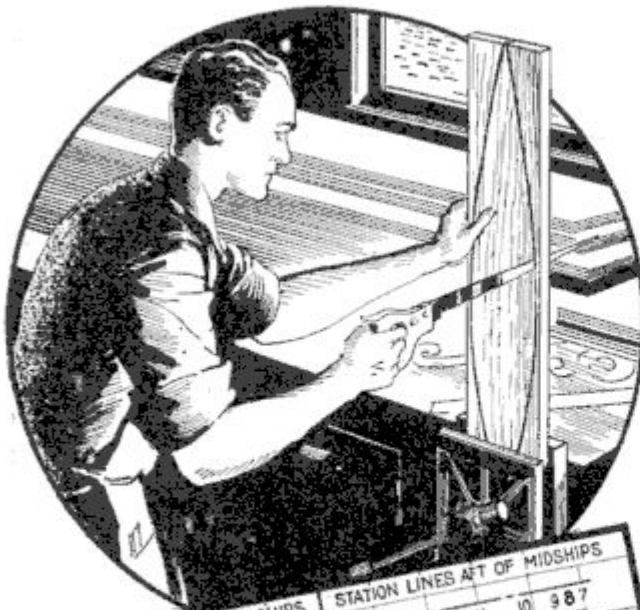
Photo Courtesy A. R. Brown

Showing the Popularity of Model-Yacht Sailing at Red's Pond, Marblehead, Mass.

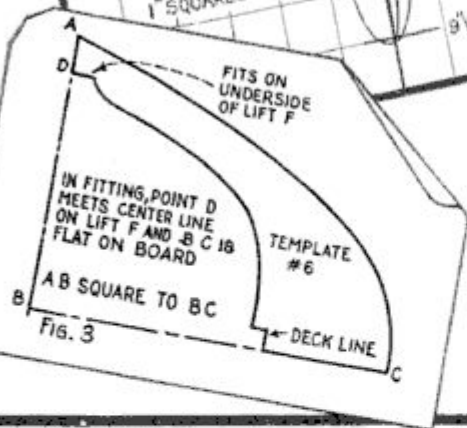
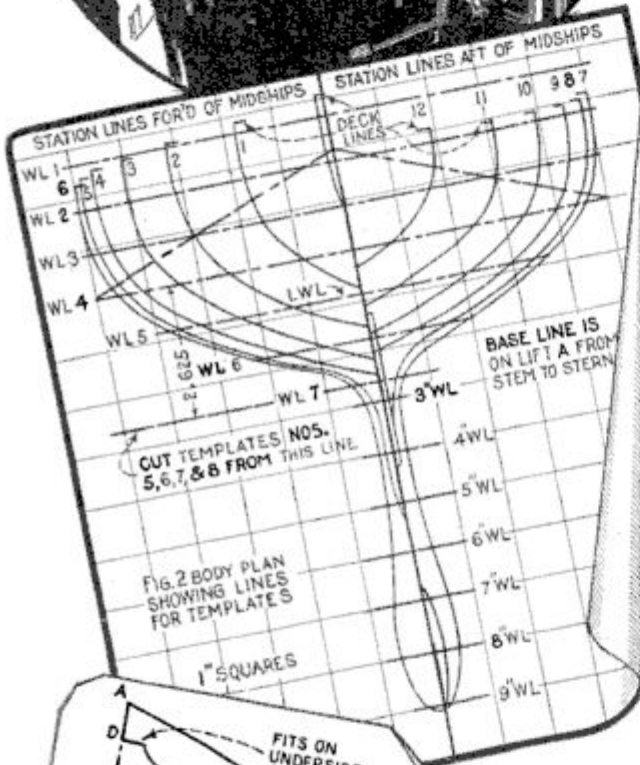
which case you will need another full lift instead of the short lift O. The method of assembling the hull is called the "bread-and-butter" method, which saves a lot of hard work as most of it is done on a jig saw. It also saves money as the lower lifts, E, F, G, and also lift O, and the keel will come out of the upper layers. Four pieces of white pine, free from knots and cross grain, each 50 in. long and 10 in. wide, or 16 ft. 8 in. total, are required. Saw off lengths of 50 in. and mark the center line on both sides and each end, and then mark off stations Nos. 1 to 12, 4 in. apart, square across. Get a roll of ten-cent store glazed shelf paper, which can be used for tracing from Popular Mechanics blueprints covering the building of this boat. Fig. 4 shows the deck line and water lines. Fold a length of the paper and make a straight crease, unfold and lay the crease along the center line, fasten with thumb tacks, trace the deck line, and the lines for the inside cut of lift A. Also mark the position of all sections Nos. 1 to 12. Fold the paper again and cut out the outside shape with the paper doubled,



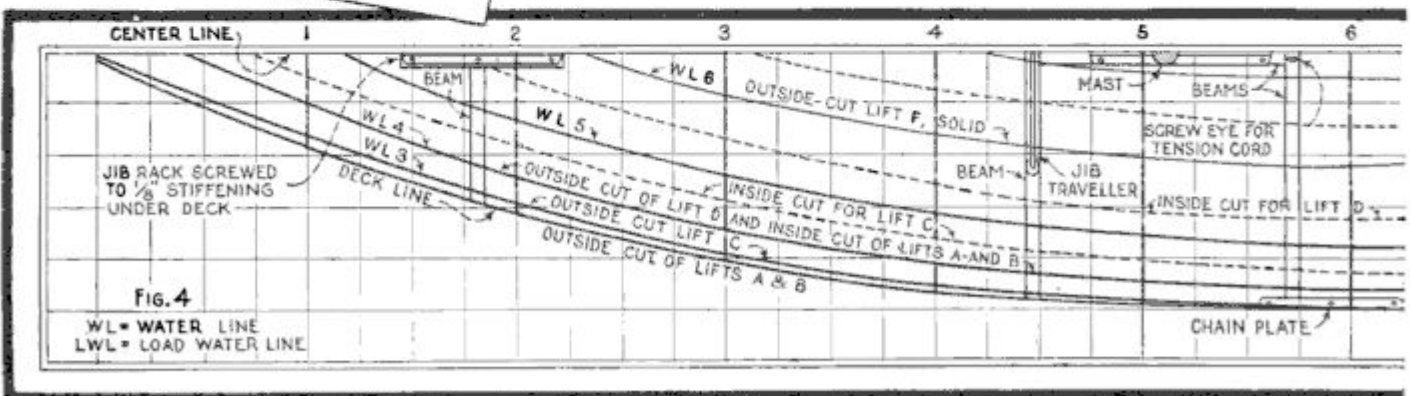
which will give you two sides. Now mark the inside-cut line on the second half of this pattern, and continue across the section lines as they are only on one half as far. Mark the pattern lift A. Repeat this method for lifts B, C and D. Paste the patterns on the wood, being sure that the center line and section lines on the wood correspond to the paper pattern. Now cut the outside shape on the jig saw, being sure not to cut in too far; the closer you can



keep to the line, the less you will have to cut by hand. After sawing the outside, finish with a small plane exactly down to the line. Then mark continuation of the cross-section lines down the sides. To start the inside cut, drill a small hole to insert the saw blade, and be sure to keep inside the line as you will need the piece left over for one of the lower lifts. After you have two pieces finished, you can start gluing. Use casein glue. Start by gluing lift A to B (lift O will be left till last). Be sure that all marks coincide. Clamp the lifts together, or better still, clamp them down on a bench or flat board, and leave to dry for several hours. While waiting, you can be cutting the next lifts. Proceed in the same manner down to lift F. Lift G will be included in the keel. You now need a building board, which can be built up of several pieces, 50 in. long and 16 or 18 in. wide. Be sure that it is flat and even, as a warped board may cause considerable inaccuracy in the hull. Mark the building board with a center line and all section lines, and number them. Fasten the boat upside down on the board with two screws driven into the solid ends at the bow and stern, from the underside of the board. When doing so be sure to match up all the section lines on both the boat and the building board.

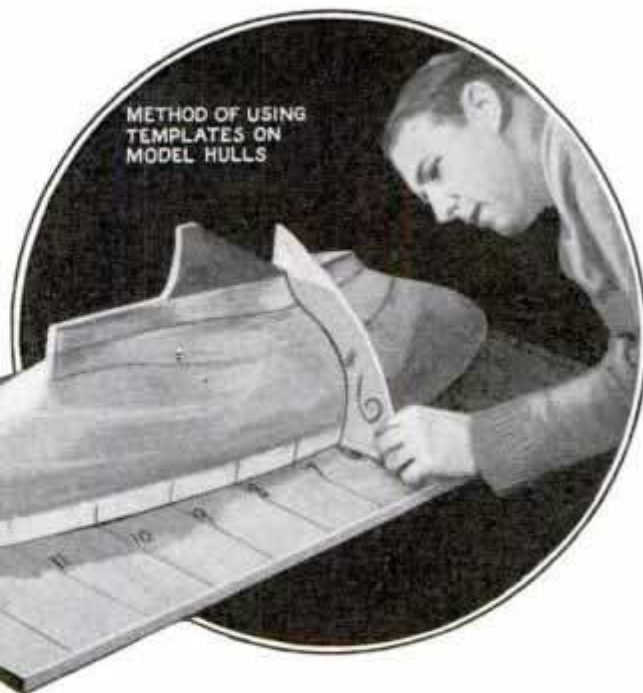


From Fig. 2 trace patterns of templates, using the same paper as before, and paste on pieces of 1/8-in. plywood. Thick cardboard will do but is not so suitable as plywood. Then cut out the templates on the jig saw, and mark each one according to its station number. All templates are cut to the same base line. The shape of the templates is shown in Figs. 3 and 5. In all, you will have twelve templates, cut to the curvature of the finished hull, at the various station lines. Shaping the hull is next.



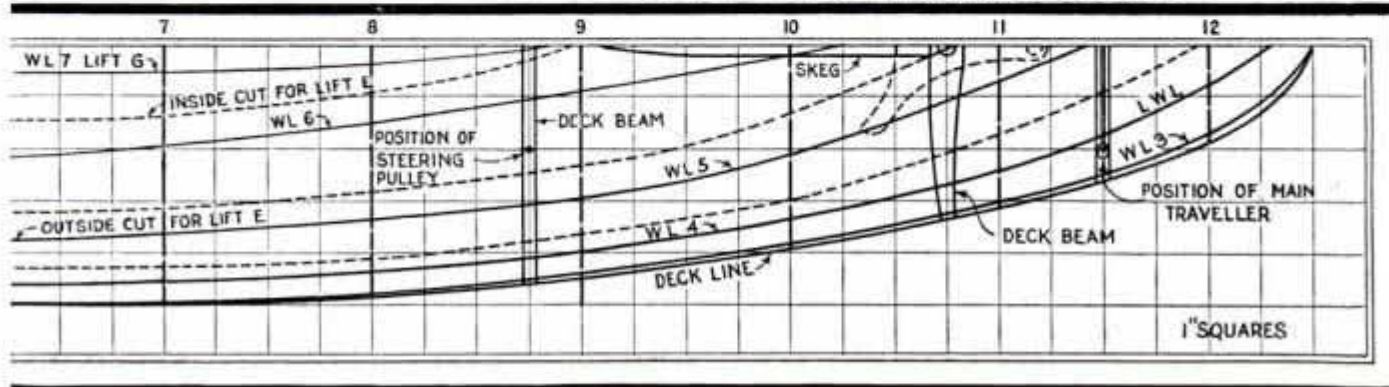
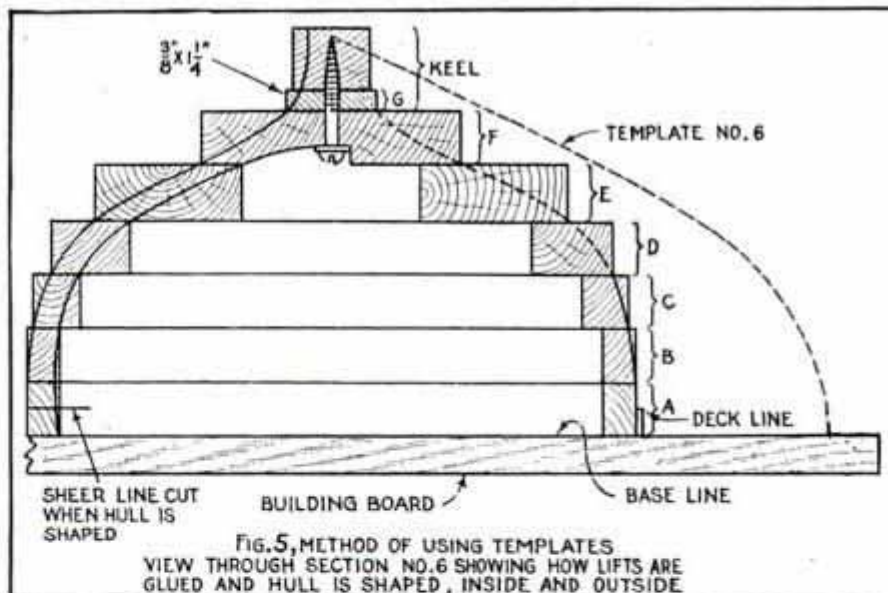
Rough carving is done with a chisel, working toward the ends. Fit the end templates first, and avoid going too deep and forming hollows. After the rough is taken off, a 3½-in. plane is the best tool to use. The keel should be fitted at this stage. That part below lift G and down to the lead line can be made of 7/8-in. wood on edge. The lead pattern can best be made by following the bread-and-butter method, using water lines (WL) 6, 7, 8 and 9. See Figs. 2 and 6. Cut to the line marked "lead line" and temporarily join to the rest of the keel.

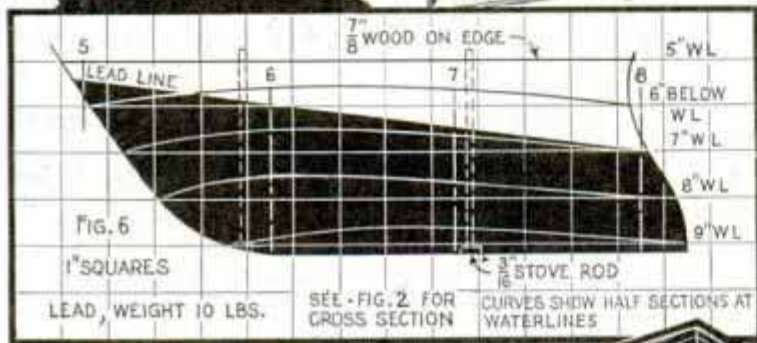
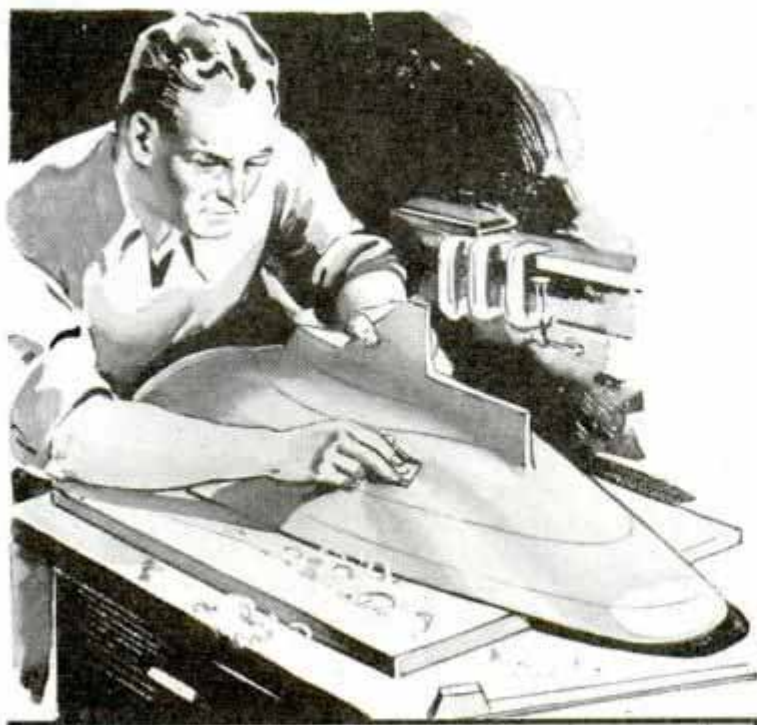
Now add on lift O and mark the sheer line, taking the distance from the base line to the top at each section from Fig. 2. Mark the line with a thin flexible strip of wood, and cut the hull down to the line, finishing with a small plane. Before sanding the hull, the inside is hollowed out as shown in Fig. 5. Leave the top side about 5/16 in. thick to allow for deck beams and deck. A little further down you can cut the hull 3/16 to 1/4 in. thick, except where the keel and skag join, where it should be 5/16 in. full. The keel is screwed on from the inside of the hull with 2½-in. No. 10 round-head brass screws, using washers on the inside. Casein glue should also be used at the joint. Be sure that the keel is perfectly straight and square be-



fore fastening it, otherwise your boat will not sail true on both tacks. Holes should be drilled through the keel pattern and hull for 3/16-in. stove rods that are threaded at both ends.

You are now ready to cast the lead, for which you need two boxes. See Fig. 7.

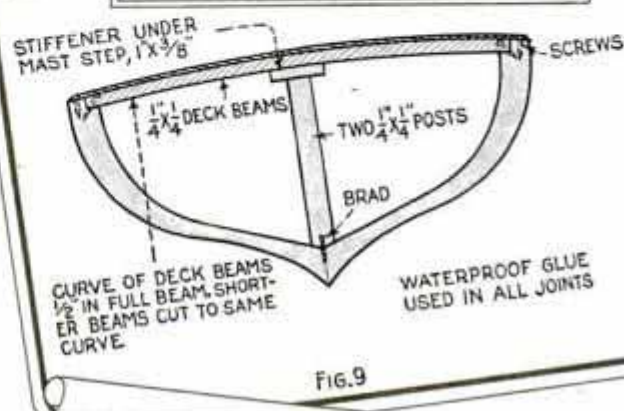
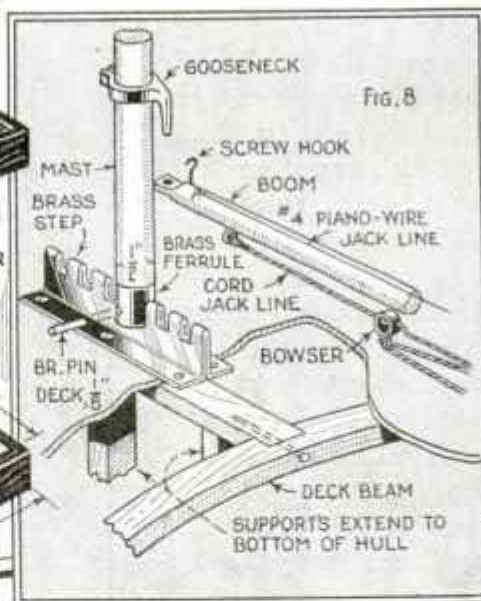
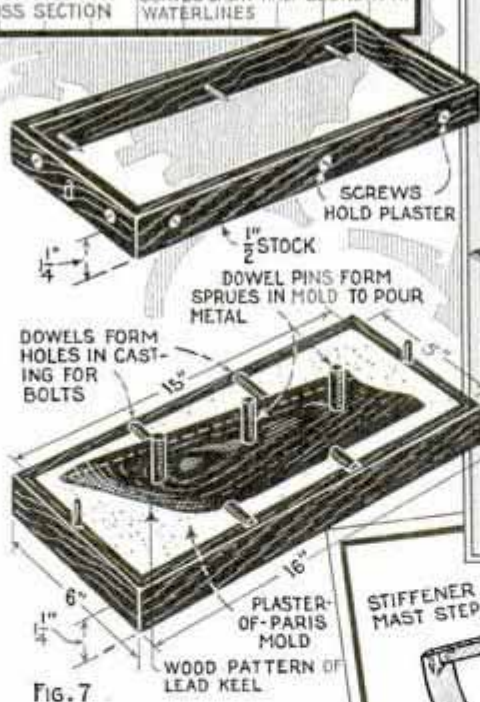




wax paper and place the second box in position, grooves for the rods also having been cut in the edges. Three 1/2-in. dowels should be fitted into the pattern to leave a hole for pouring and two vent holes. Now fill with plaster. When it has set hard, separate the boxes, remove the pattern and put in a warm, dry place until thoroughly dry, as the hot lead would turn any moisture to steam and spoil the mold, besides being dangerous. When ready to pour the lead, take the two rods out of the pattern and place them in grooves in the lower box, clamp both boxes together and pour till the lead comes to the top of the three holes. When joining the lead to the keel use casein glue and tighten up the bolts, using washers inside the hull. Give the bolts a coat of grease. The skag can now be added as shown in the upper detail of Fig. 12.

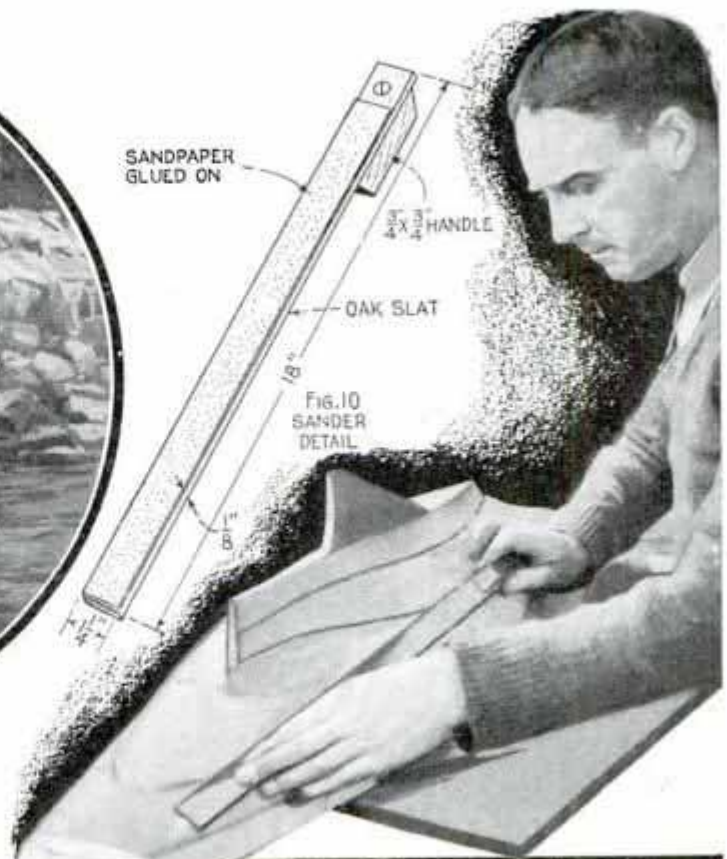
Before putting in the rudder

Drive screws through the sides to hold the plaster in position. Dowels are fitted into the sides of the lower box to fit holes drilled in the sides of the upper one. The pattern is then suspended in the lower box by dowel rods slipped into the bolt holes already drilled, the dowels being laid on the edge of the box in grooves the depth of which is one half the thickness of the rod. The pattern is given a light coat of grease to prevent the plaster from sticking. Fill the bottom box with plaster of paris and smooth off flush with the top. When thoroughly dry, cover the exposed plaster with

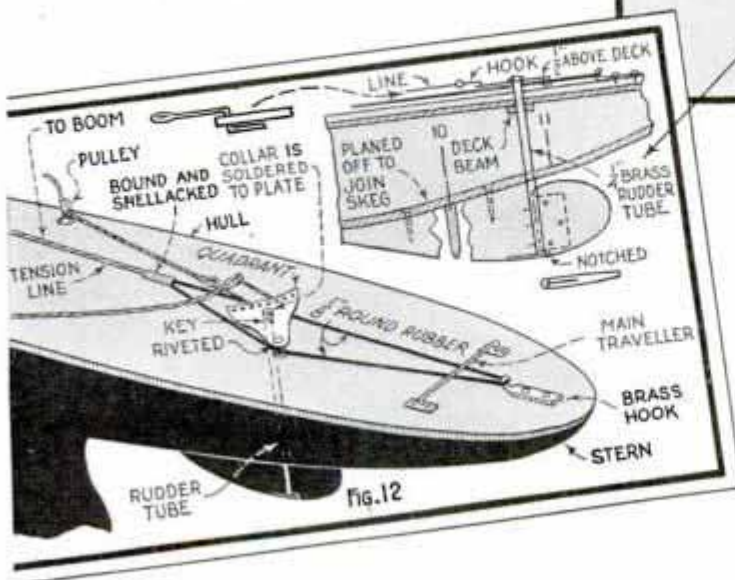
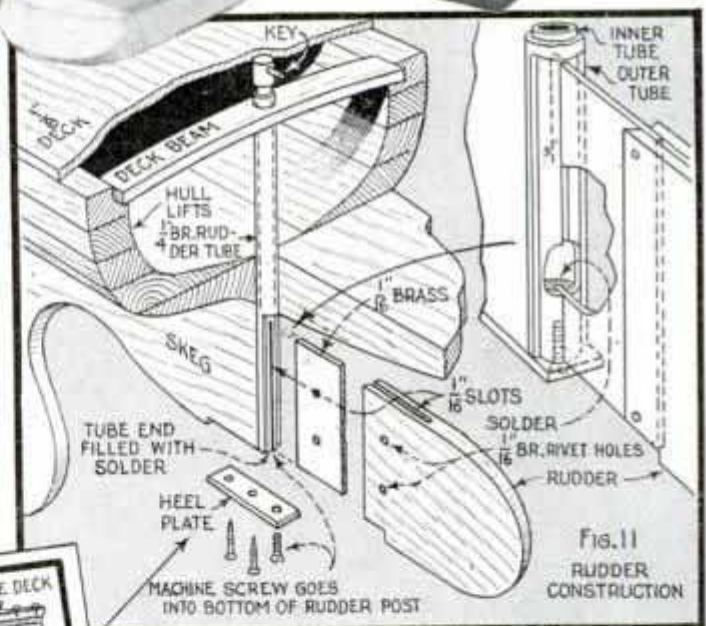


CURVE OF DECK BEAMS 1/2" IN FULL BEAM, SHORTER BEAMS CUT TO SAME CURVE

WATERPROOF GLUE USED IN ALL JOINTS



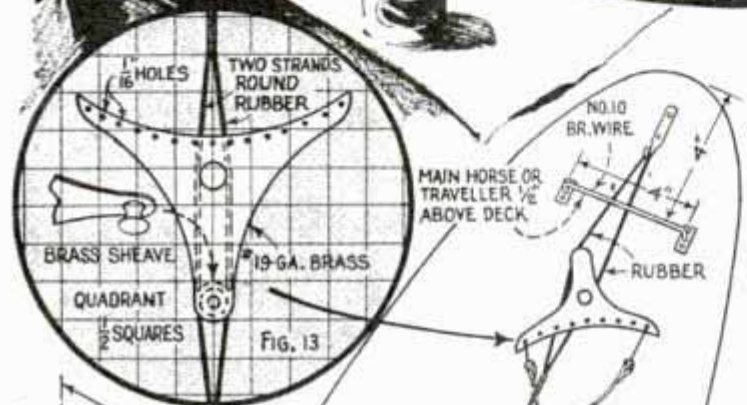
tube, insert the deck beams spaced as in Fig. 4. The center deck beams should have a rise of $\frac{1}{2}$ in. All the shorter beams will have the same curve. The two beams near the mast position are joined by another beam, which is braced by posts to support the mast, which does not go through the deck. Now fit the rudder tube, Fig. 11. From the outside, drill a $\frac{1}{8}$ -in. hole just behind the skeg. Be sure that it is in the center. Then from the inside, increase the size of the hole to $\frac{1}{4}$ in., which is the outside size of the tube. The latter must project $\frac{1}{4}$ in. above the deck beam. Mark where it comes out below the hull. Take out



and saw the lower end of the tube in half to this mark. The back end of the skeg is then hollowed with a round file to fit the tube, which is screwed into position, after having given the back of the skeg and hole through the hull two coats of ambroid or waterproof glue. Fitting the skeg and the rudder post is really one operation. The rudder is carried on another piece of tubing that fits in the rudder tube. It should be about $\frac{1}{2}$ in. longer than the



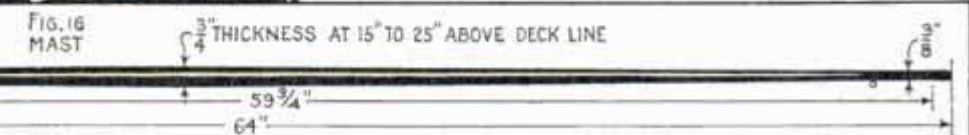
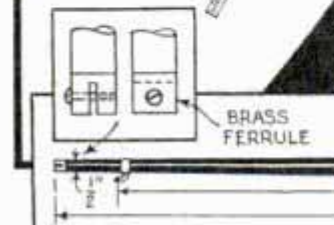
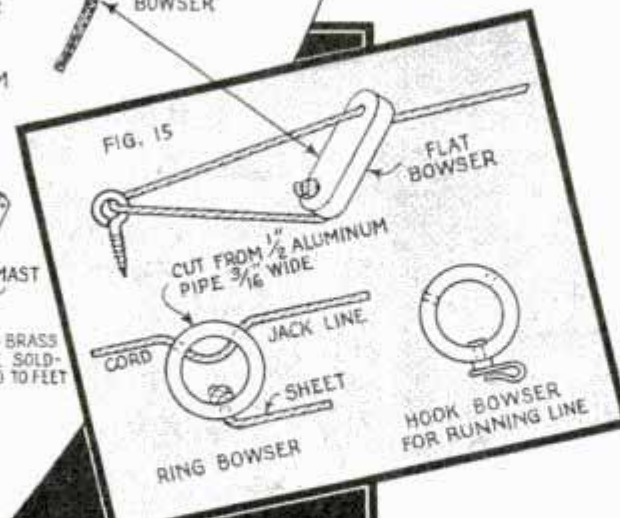
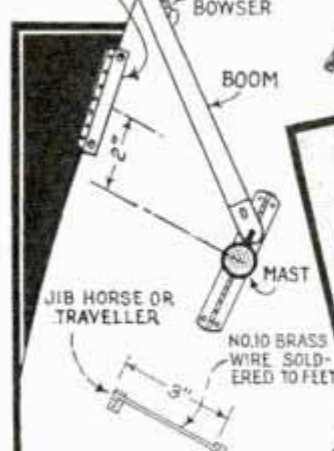
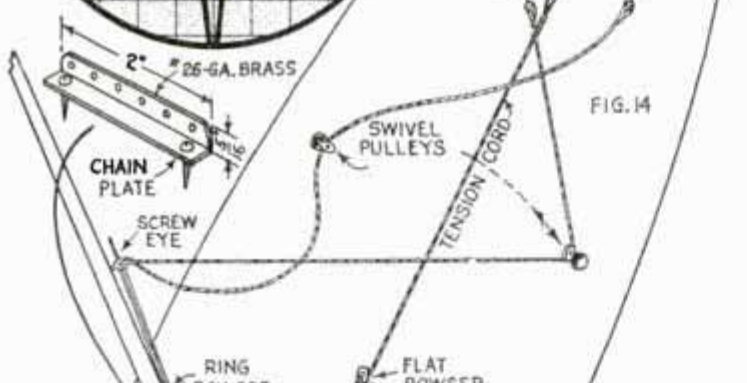
latter to carry the quadrant. Make a saw cut at the bottom of the tube and solder in a fin of sheet brass. The rudder is made of wood and is sawed to take the brass fin. It is then grooved to fit the tube before joining. Use waterproof cement, drill two small holes, and fasten with wood screws driven in from opposite sides, after which they are cut off and riveted. The bottom of the tube is soldered up and tapped for a screw, which holds it in position on the heel plate. Before putting on the deck, the wood intended for it must get two or three coats of spar varnish on the underside. Also varnish the inside of the hull. Use $\frac{3}{8}$ -in. No. 2 brass screws, as shown in Fig. 9, and apply a good coat of white lead at the joints. Counter-sink the screws, and cover the heads with a $\frac{1}{8}$ -in. strip of mahogany or a painted stripe.



The chain plates, Fig. 14, the jib rack, Fig. 18, and the mast step, Fig. 8, are made of sheet brass. The quadrant, Fig. 13, has a brass sheave made from tubing with a $\frac{1}{2}$ -in. disk soldered on the end. Pulleys and turnbuckles can be purchased from model supply houses. Bowsers can be substituted for turnbuckles, and agate

leads from fishing rods will serve as pulleys for steering lines. The construction of bowsers is shown in Fig. 15. Figs. 12 and 14 show the position of the steering fittings and the relative position of the mast, chain plates, travellers and other parts, while Fig. 19 shows the arrangement of the main-sail boom.

Wamsutta sailcloth comes in different weights



and widths and costs from 75 cents to one dollar a yard.

Allow $\frac{1}{4}$ in. for the hem on the leach (back edge) of each sail and bind the other edges with linen tape $\frac{1}{2}$ in. wide. Both cloth and tape should be shrunk before cutting. The sails are hooked to the tight jack lines and very little pull is needed to keep them in position. Common dress hooks are sewed to the sails at 3 or 4-in. intervals. Mast details are shown in Fig. 16.

When the boat is completed, sandpaper the entire surface, finishing with a very fine grade. The hull should have two priming coats of paint and two or three of finishing enamel, while the deck should have three coats of spar varnish. Rub each coat with very fine "wet-or-dry" sandpaper. Masking tape can be used to get a straight water line. A useful sander can be made by gluing $1\frac{1}{4}$ -in. strips of sandpaper on strips of flexible wood about 18 to 24 in. long as in Fig. 10.

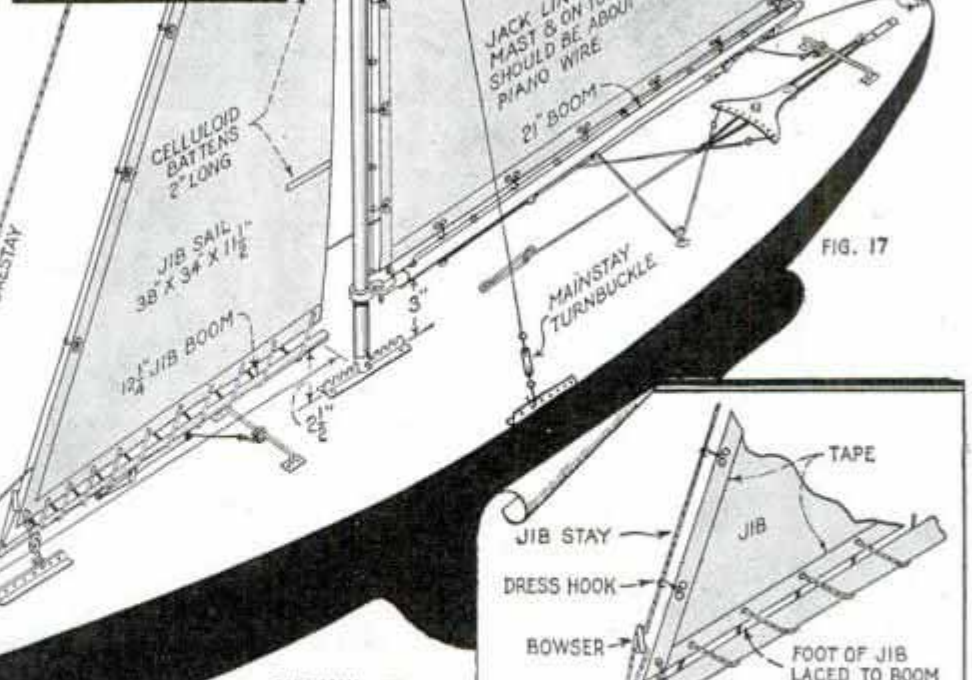
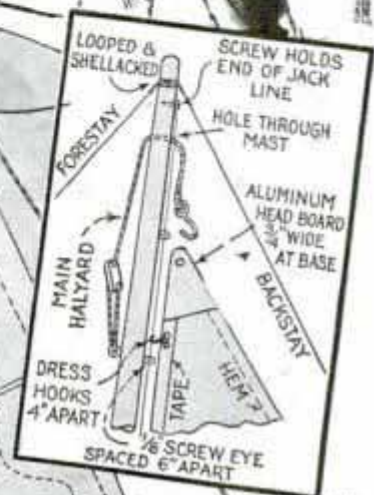
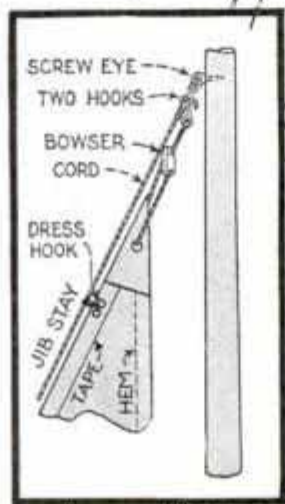
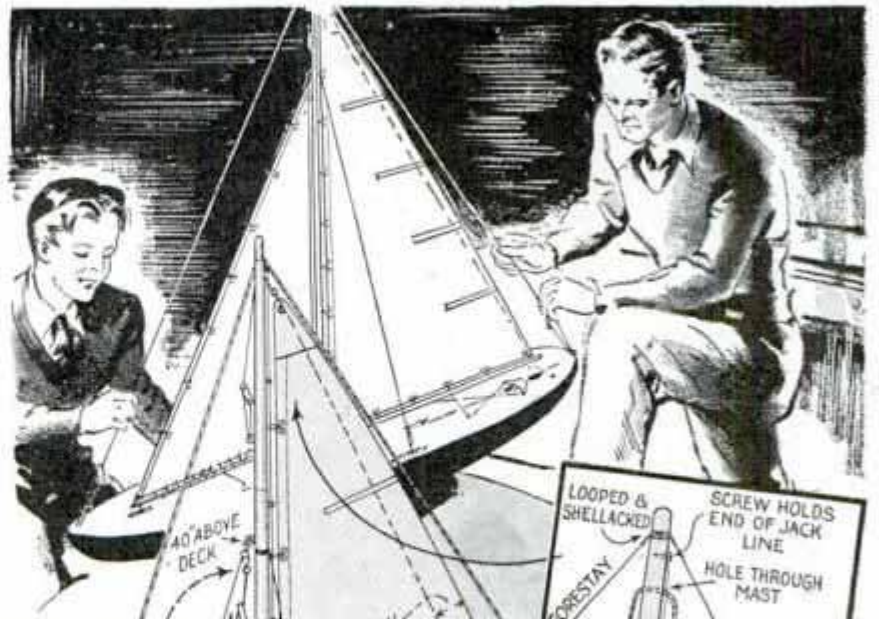


FIG. 17

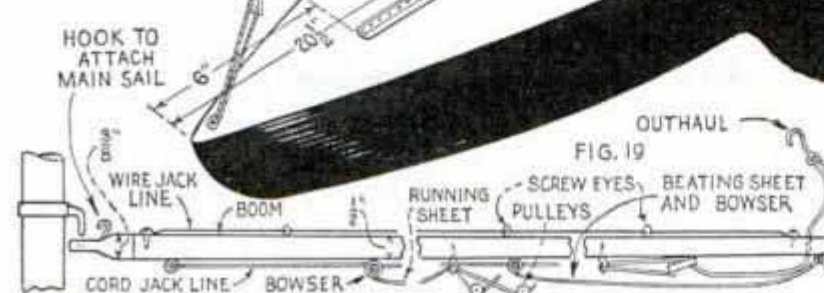


FIG. 19

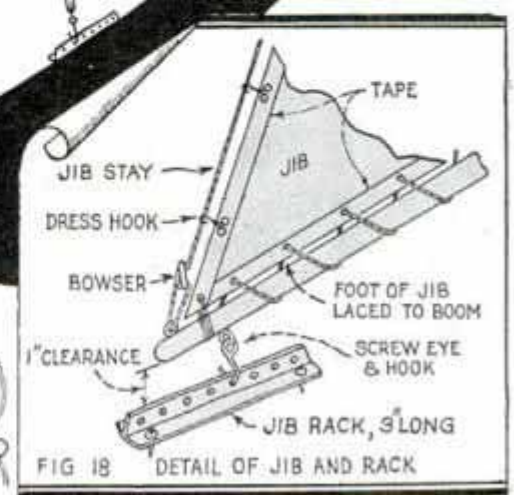
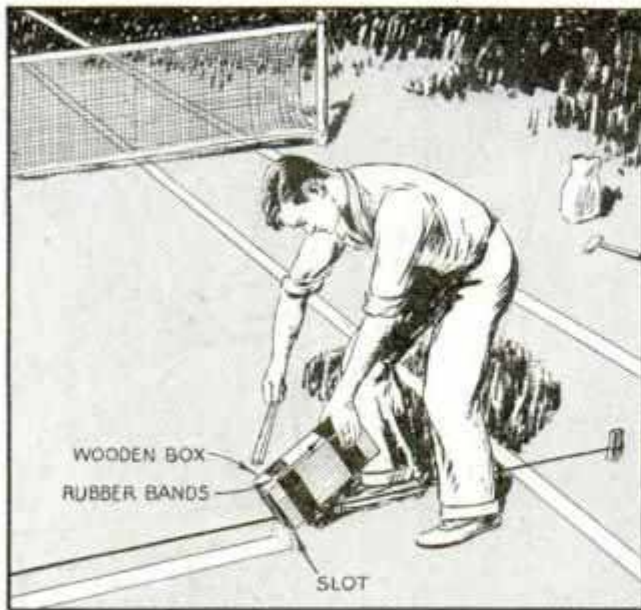


FIG. 18



For Marking Tennis Courts, a Lime Sifter Can Be Quickly Improvised from a Cigar Box

Emergency Field Marker from Old Cigar Box

When a regular field marker is not at hand for marking off a tennis court, get a cigar box, cut a narrow slot at one corner and fill it with lime. A couple of strong rubber bands around the box will keep the lid closed. In use, hold the box with the slotted corner toward the ground and tap it lightly with a stick to shake out the lime as you walk along the guide line.

Safety Pin Holds Cuttle Bone in Bird Cage

When a piece of cuttle bone is slipped between the wires of a bird cage, it often falls out, which, besides frightening the



bird, makes it necessary to remove the cage to get the bone out. A holder that will grip the cuttle bone securely can be made from a large safety pin. Cut off the head and point of the pin, and, with a pair of pliers, bend it to the shape shown in the detail. Slip the holder over the cuttle bone and catch the hooked ends of the pin on two of the vertical wires of the cage.

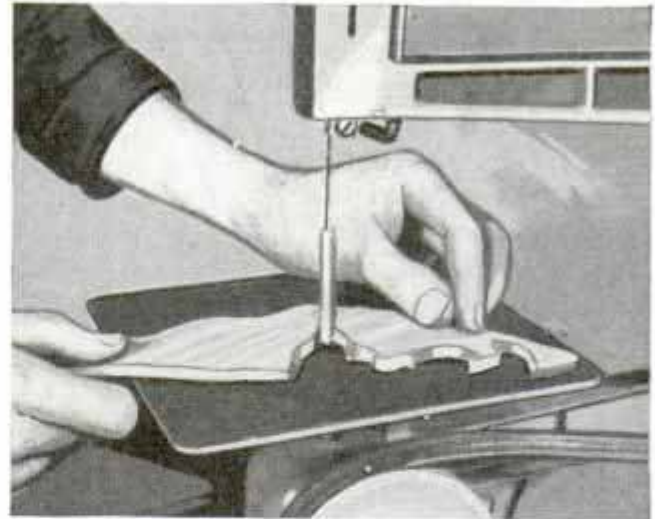
Automatic Lubricator for Overhead Door Rollers

Oiling overhead door rollers is a job often neglected because it is usually necessary to take an oilcan and climb up a ladder to reach them. Here is a practical little device that does away with this work as it is automatic in action. Wind a length of stovepipe wire to form a conical-shaped holder, and tack it just above the roller when the door is in the closed position. Fill the holder with waste saturated with oil, which will then slowly drop off the lower point of the wire onto the roller.—Frank W. Bentley, Jr., Missouri Valley, Ia.



Sanding Work on a Jig Saw

Round abrasive sticks for sanding the edges of work on a jig saw can be made easily by gluing fine sandpaper to dowel rods which are then attached to the ec-

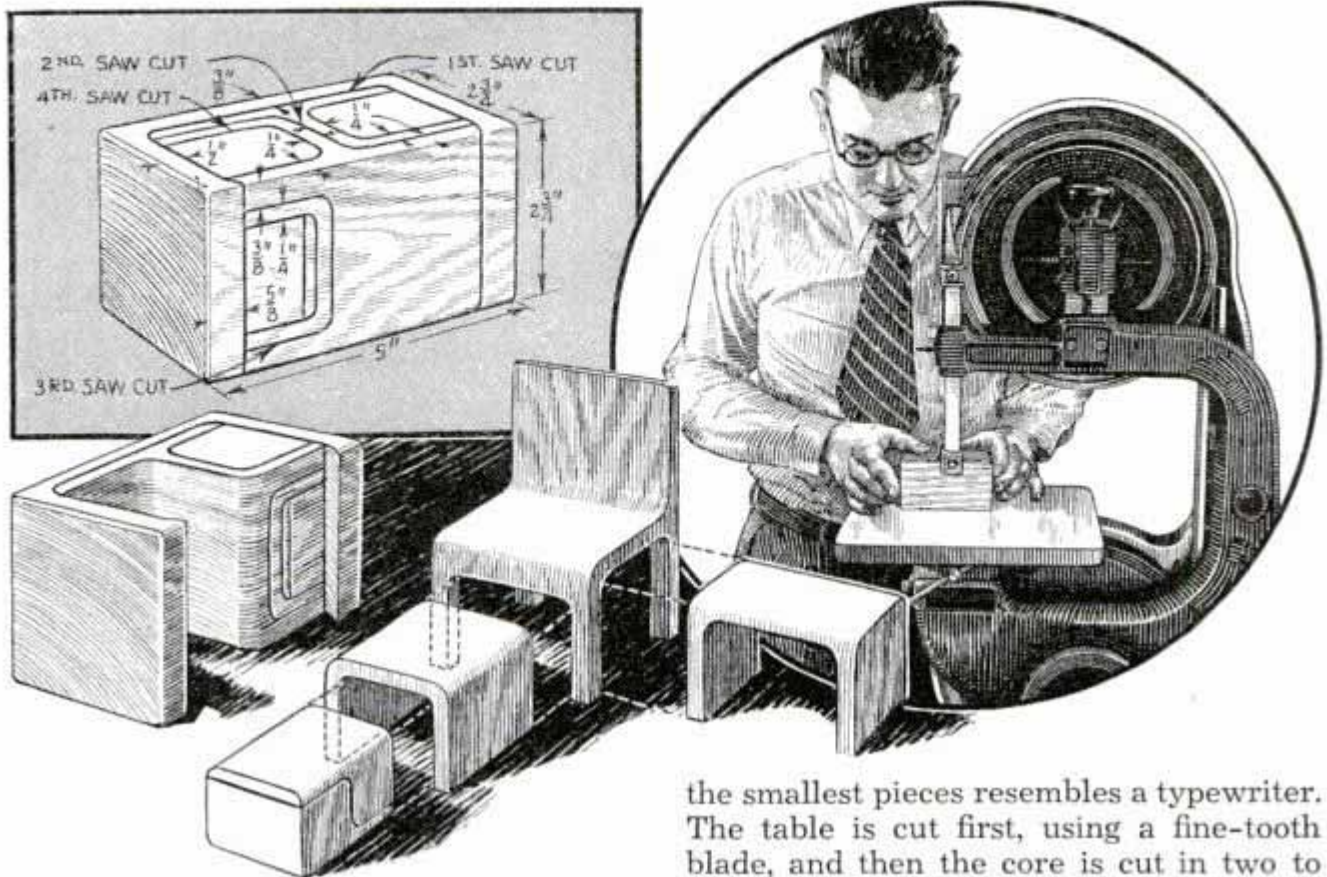


Sandpaper Glued to Dowel Rod Held in Jig Saw, Is Handy for Sanding Intricate Work

centric arm of a jig saw. The end of the dowel can easily be shaped to fit any jig-saw chuck.

☞ A package of paper picnic spoons kept in your medicine cabinet are handy for measuring medicine and can be thrown away after using them.

Doll Furniture Cut Out of a Hardwood Block



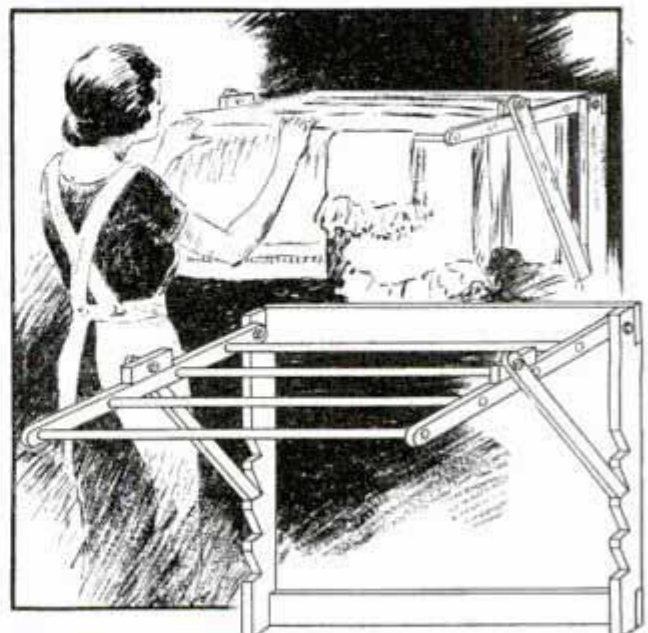
The novelty of this doll-house furniture is that all the pieces are bandsawed out of a single hardwood block without any waste. As you will see by examining the drawing, there are two chairs and a table, besides end tables, footstools, etc. One of

the smallest pieces resembles a typewriter. The table is cut first, using a fine-tooth blade, and then the core is cut in two to form the inside surfaces of the two chairs. The end tables and footstools are next sawed out from the portion under each chair. When finished, the pieces may be sanded and either painted to suit, or they may be given just a coat of shellac.—F. Mix, Chicago.

Folding Rack for Drying Clothes Near Stove or Radiator

Conveniently located near a stove or over a hot-air register, this collapsible clothes-drying rack is always at hand, yet out of the way when not in use. It is easily made, and consists of a simple wooden frame that may be hung on the wall or permanently screwed in place. To the top end of this frame the rack is pivoted, while braces on the side members of the rack serve to support it. The lower ends of the braces fit notches cut in the side members of the frame and permit various adjustments.—I. W. Dickerson, Charles City, Ia.

☞ To keep water from running under a tent pitched on sloping ground, dig a trench on the high side and connect it with trenches on adjoining sides so that water will run around the tent.



This Clothes-Drying Rack Can Be Screwed to a Wall and Folds Flat When Not in Use

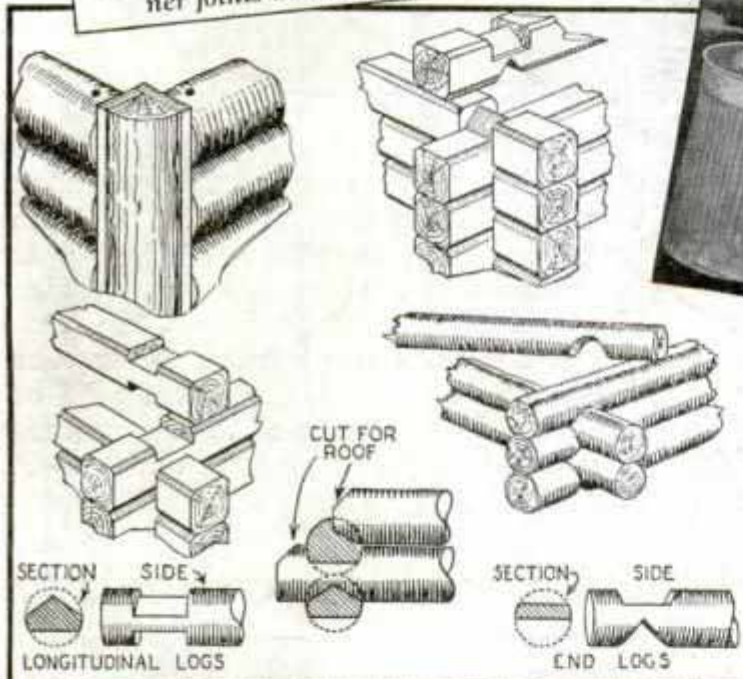
Building



Above, logs hewn with flat sides so corner notching is not necessary. Below, butt and interlocking corner joints that are rigid



To protect logs against damage from insects, spray with a solution of one part creosote and three parts kerosene



YOU can build a log cabin of cedar, spruce, hemlock, tamarack, juniper, birch, poplar, hickory, oak and pine. Hardwoods are satisfactory but difficult to handle. Bark improves the appearance but is subject to insects and borer infestation. When bark is left on the trees, they should be cut in the winter when the sap is down and, logs cut during warmer weather, when destructive insects are on wing, should be painted or sprayed with a repellent such as a mixture of one part of creosote to three parts kerosene. Bark can be removed readily when the sap is rising in the spring by girdling the tree or log every 4 ft. and making a vertical cut so that an ax blade can be slipped under the bark. Logs should have little or no taper and may vary from 6 to 10 in. in diameter

a LOG CABIN

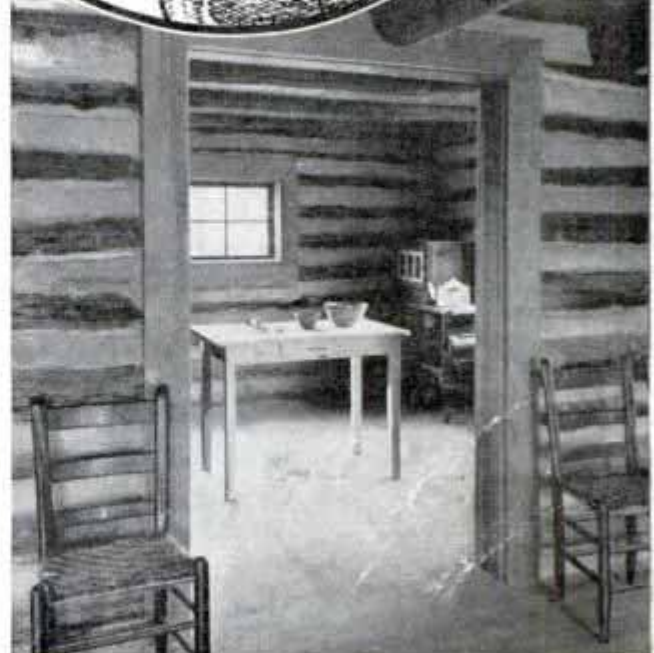


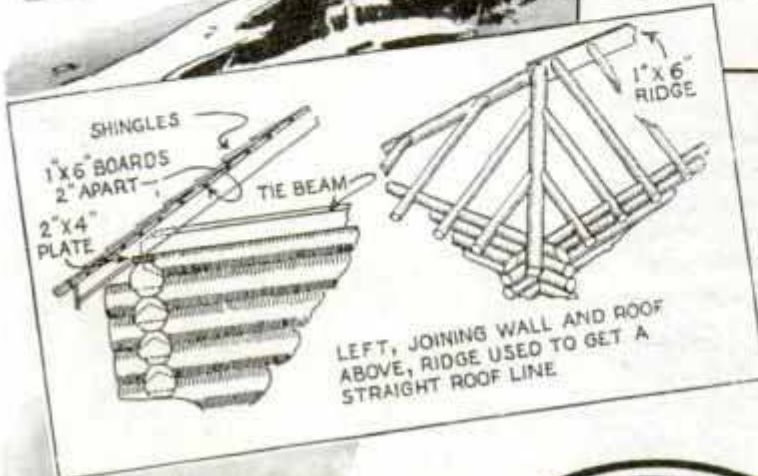
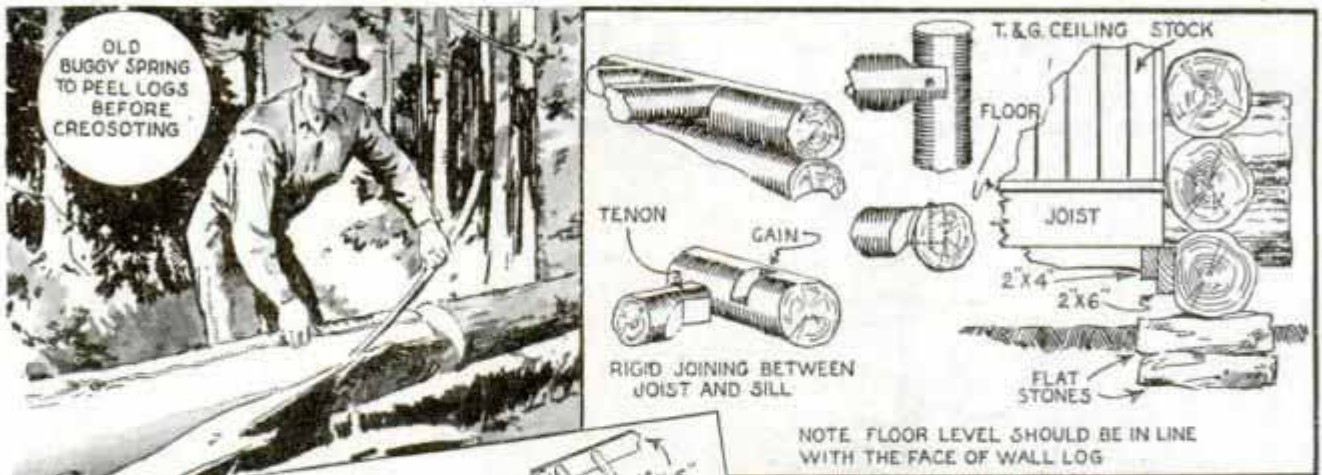
Caulking with Oakum, cotton waste or Spaghnum Moss keeps cabin comfortable both summer and winter

at the small ends and should be 1 to 2 ft. longer than the side of the cabin, depending on the type of lock joint used at the corners.

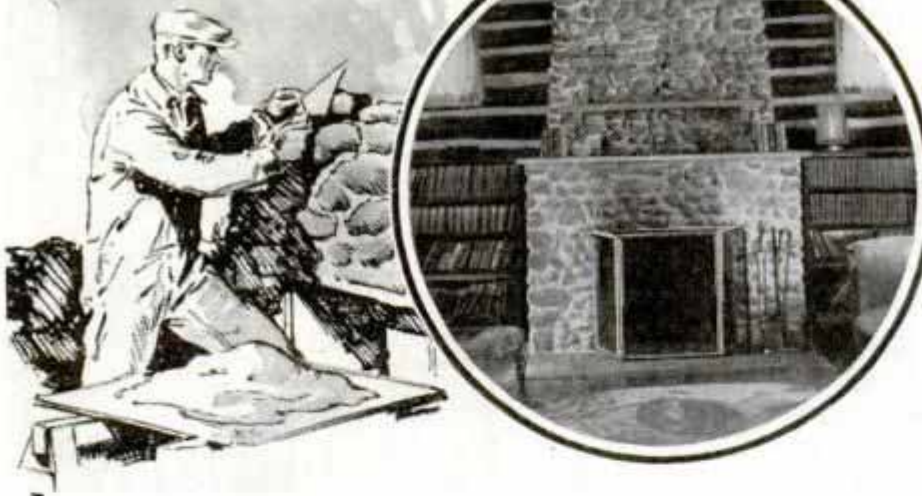
For a permanent cabin, a concrete foundation is advisable. Holes, properly screened, should be provided for ventilation under the floor. The simplest footing for a temporary cabin consists of two large stones placed on compact ground to form each pier. A single rock in contact with the earth will "sweat," which in time will rot the wood. Or, a hole 3 ft. deep and 2 ft. in diameter is filled with small broken stones on which larger stones are placed. Wooden posts 10 to 12 in. in diameter, with the lower ends creosoted and bedded on flat rocks, will also make good piers, although more durable piers can be built of masonry or concrete.

The strongest logs should be used for sills and first tiers. The sill should have its upper surface hewn flat and about 3 in. wide. The other logs should be hewn flat top and bottom so that they will lie close together. In laying the wall, the butts and





EFFECTIVE USE OF ORDINARY FIELD STONES FOR MAKING ATTRACTIVE FIREPLACES



tops should alternate to keep the wall level. Where the ends are not locked, and at every 9 ft. in the length of the wall, the top log should be fastened to the one under it by boring a 1½-in. hole through the upper one as well as through one-half of the thickness of the underlying one, and then driving in a hardwood pin.

When the tops of the windows and doors are reached, the log just above these openings is cut out before laying the following tier. The openings may be cut later and the door and window frames installed. Floors of temporary cabins may be of clay and sand, packed hard. Puddle

logs—logs laid on the ground with their top surface hewn flat—are also used for floors. Permanent cabins should have log or lumber floor joist. Joist logs, laid 2 or 3 ft. apart, should be about 6 in. in diameter for 12-ft. spans or less, 8 in. for 16-ft. spans and about 9 in. for 20-ft. spans. The flooring for a 20-ft. span should be crowned

2 in. at the center to allow for subsequent sagging. Framing should be 2 in. from chimneys to prevent charring.

The roof should be ¼ to ½ pitch to shed water quickly. The former is a slope of 22½°, and the peak is one-half the length of the span above the plate. One-half pitch is a slope of 45°, and the peak is one-half the length of the span

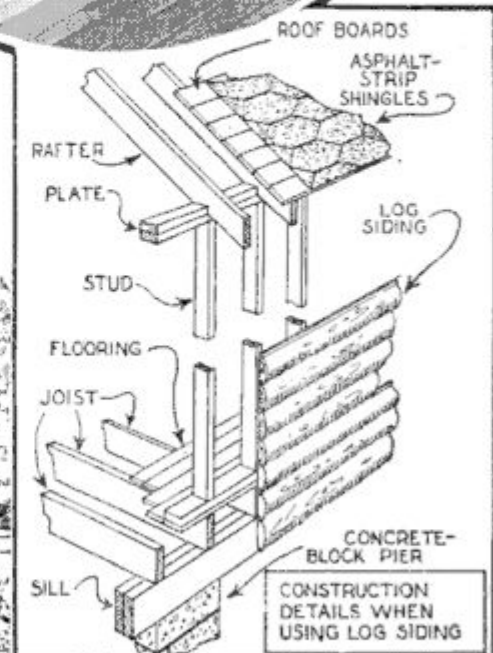
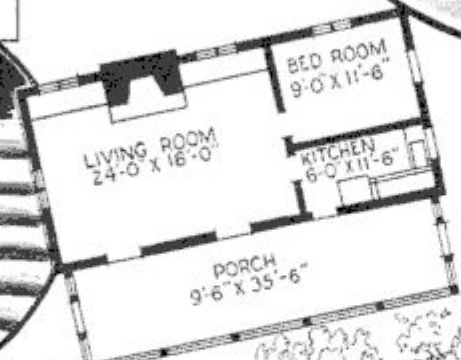
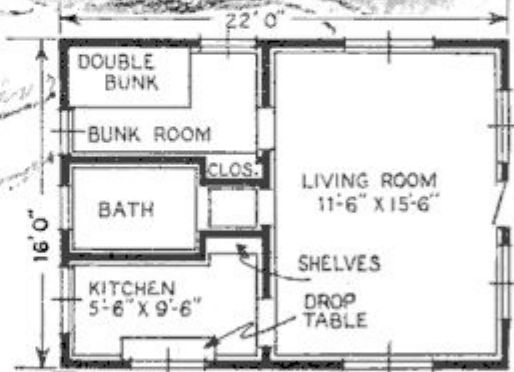
above the plate. Poles from 4 to 6 in. in diameter are satisfactory for rafters. Roof sheathing is nailed over the rafters and shingles applied, doubling the first course at the eaves. Shingles should be laid 4½ in. to the weather on a ¼-pitch roof, and 5½ in. on a ½-pitch roof. One thousand shingles with a 5-in. exposure will cover 130 square feet. Ribs, valleys, and hips should be covered with 12-in. strips of tin or heavily tarred felt before laying shingles, and the chimney should be flashed. The ridge consists of a 4-in. pole with a V-shaped groove or it may consist of two 6-in. saddle boards nailed together to form

Shelton V. ... 900 - 1st National Bldg. Bldg. Minneapolis

a V. A safe chimney is built of masonry with two or more flues with terra-cotta linings. It should be at least 20 ft. high so that it will draw well.

Chinking of cracks is done after the logs have dried out. If the logs have wide spaces between them, slabs of stone bedded in clay, set at an angle of 45 or 60° in lime or cement mortar are used. If the logs are laid close, the chinks are often calked with cotton waste, oakum or Spaghnum Moss formed into the joints from both sides of the log with a wooden wedge or calking iron and mallet. For the inside chinking, pieces of quarter round may be nailed into position. Or, you may nail in strips of metal lath and fill up the crevices with cement mortar.

Where timber is not plentiful and the cost of building a log cabin would be a prohibitive factor, imitation log cabins can be built by using special siding. This is less trouble than felling trees, stripping off the bark, and hauling them to your site. The siding has a rounded face on one side and is nailed to studding as shown. In this method of construction, standard building practice is followed in setting up the framework and in laying the floor and roof. If you desire, the inside of the cabin may be finished with wall board.



*minn
New York 1206 Graybar Bldg
Chicago - 208 S. La Salle
Los Angeles Petroleum
Securities Bldg*

Garden Hose Aids in Making Pool



Garden Hose Used as Template to Lay Out Garden Pools of Irregular Shape

A length of garden hose was utilized by one gardener as a template for laying out a garden pool. The hose was laid out on the ground to correspond with the desired shape of the pool, after which a few small stakes were driven into the ground to hold the hose in position. It is best to use a shovel or spade when working near the hose to prevent possible damage.

Loose Contacts on Electric Iron Repaired with Wire



The contacts inside of the plug of an electric-iron cord sometimes lose their springiness so that they do not grip the prongs on the iron securely. When this happens, the prongs can be slightly enlarged by wrapping them with bare copper wire of suitable thickness. The wire is sweated to the prongs, being careful to clean the latter and to use flux

to make the solder adhere. The prongs are then filed down of excess solder so that they will fit the contacts of the plug.

Forming Eyes on Ends of Small Coil Springs

When you need an eye bent on the end of a small coil spring, try the following method of forming it: Slip the end of the spring over the edge of a tobacco tin so that one turn of the wire projects over the side. Then, while pressing down on the spring with a coin or other piece of metal, bend the end of the spring upward, with the blade of a knife, to form a neat eye.



Guide Line on Jig-Saw Table Aids in Cutting Work

Scribed in the center of a jig-saw table, parallel with the blade as shown, a line will aid the operator in making straight cuts in short work. When the guide line



Line Scribed in Center of Jig-Saw Table Aids in Keeping Work Lined Up

on the work is placed directly over and kept parallel to the scribed line, a straight cut is assured.

☐ Dust and lint are readily removed from dark colored clothing by rubbing the cloth with a piece of dampened chamois skin.



How to use COLD CHISELS



by
W. Clyde Lamme

COLD chisels differ from wood chisels in their action on the work and the shape of the point or cutting edge. This consists of four bevels, two on each side. See Fig. 7. If the tool is to work properly, opposite bevels must be the same angle with relation to the center line or axis of the tool. The top end of the body should be ground to a slight bevel as in Fig. 4. When hammer blows spread the top end, the bevel should be reground and the top crowned slightly. If the top of the chisel is allowed

to spread, due to constant hammering, it is difficult to strike it squarely.

As the cutting edge is largely dependent on the type of work to be done and the kind and hardness of the material to be cut, no general rule can be given for grinding the bevel. For example, if you cut mild steel rods or bars, the combined angle of the bevels at the cutting edge should be slightly greater than 90 degrees, if the stock is heavy and a deep wedging cut from both sides is necessary to sever



it. If the stock is thin, $\frac{1}{4}$ in. or under, a smoother cut will result if the angle of the bevels is slightly under 90 degrees, that is each bevel measuring approximately 35 to 38 degrees with the center line of the tool. In a general way the same is true when cutting malleable-iron stock. When cutting softer materials such as brass, the bevel may be longer, which results in a smoother cut without damage to the edge.

Sharpening the cold chisel requires the greatest care. Rough grinding is best done on a fine emery wheel, as in Fig. 2. During the grinding process the tool should be dipped in cold water every few seconds to prevent drawing the temper. Always grind against the edge on both bevels to prevent feathering. The sharpening should be finished on a very fine oilstone until the wire edge is removed. The cutting edge should always be ground square across with exception of the corners which are slightly beveled. Some cold chisels tempered for certain purposes can be filed,

but it is not advisable to sharpen with a file if a grinding wheel is available. Sometimes, however, if the chisel edge is badly nicked, it is safer to take off the excess with a file, and then finish the rough grinding on the wheel to avoid drawing the temper at the edge.

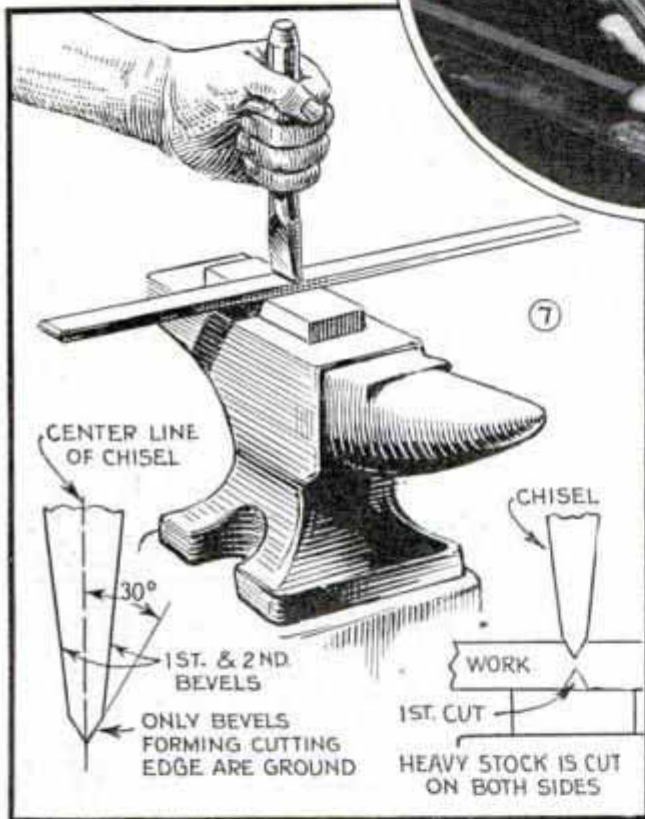
To save the edge of the chisel when cutting thin material, place a small piece of soft stock directly under the point at which the cut is to be made. When cutting a long piece of bar or rod on an anvil, lay the bar across the face of the anvil and place a short piece of narrow bar stock directly under the point at which the ma-



terial is to be cut, as in Fig. 7. Very thin stock can be more accurately and cleanly cut by clamping the chisel in the vise with the edge up and laying the material to be cut on the edge of the chisel with a thicker piece of bar stock placed on top, as in Fig. 1. Striking the latter with the hammer prevents damage to the thin material and also protects the chisel.

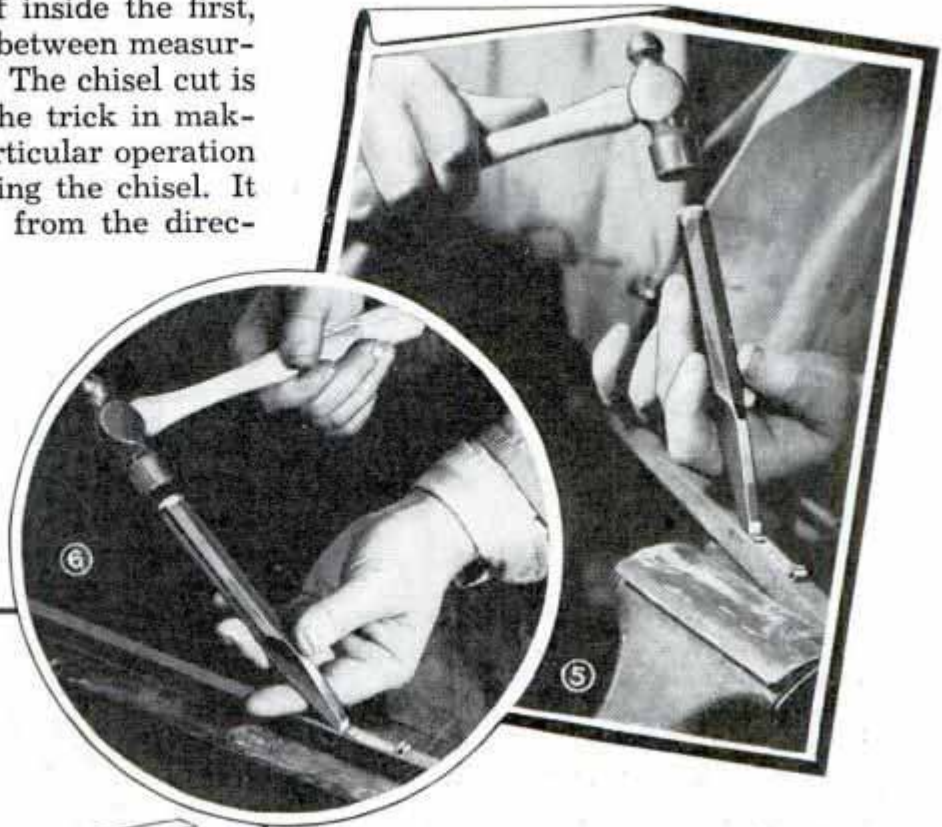
Occasionally it is necessary to cut an opening in heavy sheet stock the size of which will not permit the use of a hacksaw. Due to the V-cut of the cold chisel the exact size of the opening is first laid out and indicated by scribed lines. Then

parallel lines are laid off inside the first, as in Fig. 3, the distance between measuring approximately $\frac{1}{16}$ in. The chisel cut is started at one corner. The trick in making a clean cut in this particular operation is in the manner of holding the chisel. It is inclined slightly away from the direction in which the cut is to progress along the gauge line, and at the same time is slanted inward. This position gives a shearing cut. Do not strike a heavy blow; a series of lighter ones can be directed



with greater exactness and effect. Just before the corner of the tool cuts through the stock, move it about half the width of the cutting edge along the gauge line and drive it to the same depth. Continue this series of cuts around the stock to be removed, following the inner gauge line. Then stand the chisel almost vertically and cut through all around. A few strokes with a file will finish the edge as true as if it had been cut with a hacksaw.

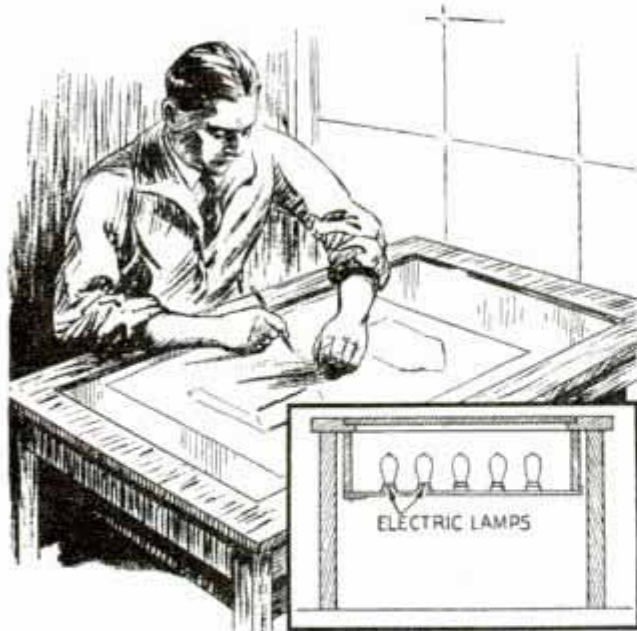
The cape chisel, the round nose, and the diamond point are designed for chipping and squaring operations on work that has been partly finished by other means. When



cutting a small recess for which an ordinary cold chisel is too large, make a chisel from the square stock sold as lathe tool blanks. This material is especially hardened and tempered and when ground to the proper form makes an excellent chisel for delicate operations on small parts. Drifts for squaring small holes can also be made from the same blanks. The cape chisel and the round-nose chisel are used principally for chipping and recessing flat surfaces, see Figs. 5 and 6. The diamond-point chisel finds a use in this same work and for squaring operations in recesses and channels. An electrician's or plumber's chisel will be found handy for cutting thin sheet metal, due to the wide bit and the thin cutting edge.

White-Enamel Figures Improve Counting Machine

Poor visibility of figures on a counting machine in a press room where it was necessary to read hundreds correctly to separate the work into lots of that number, was greatly improved by outlining the ciphers with white enamel. The other figures were left black. White ciphers indicated hundreds readily, allowing the operator to read the counter without distracting attention from feeding the press.



Drafting Table with Glass Top and Electric Lamps Underneath Saves Time When Tracing

Glass-Top Tracing Table Saves Time in Drafting Room

In a drafting room, when it is necessary to retrace old drawings, considerable time and strain on the eyes can be saved by using a glass-top table having a bank of electric lamps mounted underneath the glass. Three switches at the front of the table are so connected that part or all of the lamps can be used as needed. In using the table, a sheet of celluloid may be placed between the glass and the work to provide a suitable working surface for compass or divider points.—H. L. Lackman, Philadelphia, Pa.

Sickle Guard Used as Staple Puller

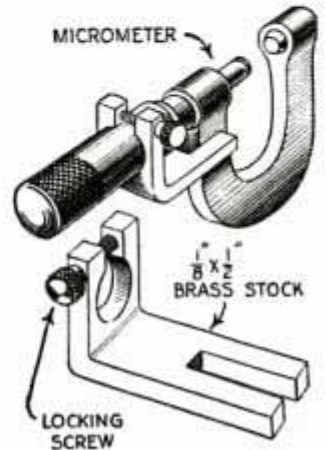
An old sickle guard taken from a mower will be found handy for pulling fence staples. In use, the pointed end of the guard is inserted behind the staple and the other end is tapped with a hammer, thus forcing the staple out of the post. It is a good idea to grind off part of the rounded end where the hammer strikes to prevent it from glancing off the



guard and injuring the hand.—Wilbur Calhoun, Isleta, Ohio.

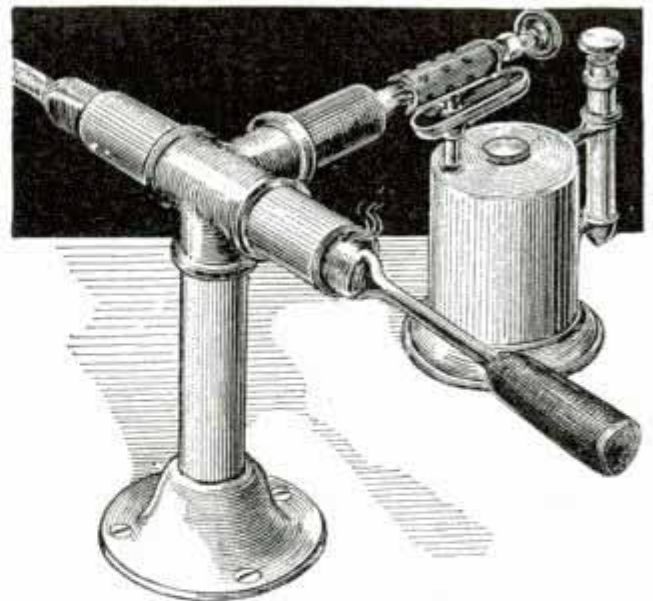
Clamp Locks Adjustment on Micrometer

Many micrometers are not equipped with a locking feature and when used to gauge duplicate work, much time is lost in checking the tool to see that the setting has not slipped. A piece of brass stock slotted at one end to straddle the micrometer and drilled at the other end to slip over the handle of the tool, and then bent as shown will serve as a clamp to hold the adjustment at any desired setting. The drilled end of the stock should also be slotted and fitted with a locking screw to fasten the clamp to the handle.



Jig Aids in Heating Two Soldering Irons with a Blowtorch

In order to facilitate the use of two soldering irons on his workbench, one workman uses the assembly of pipe and fittings shown. It consists of a floor flange, a four-way fitting, three short nipples and



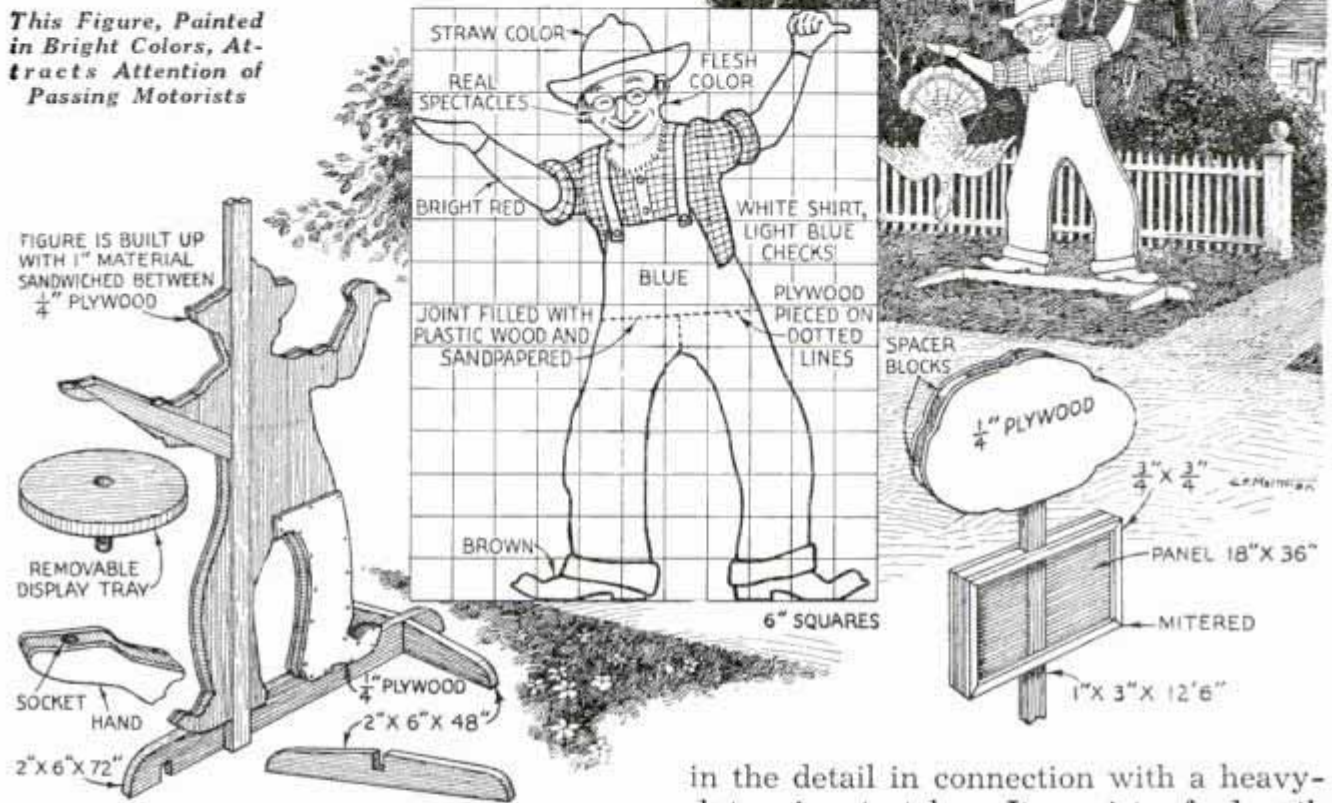
Made from Pipe and Fittings, This Jig Facilitates Heating Two Soldering Irons with a Blowtorch

one longer one. The irons are inserted into opposite ends of the device, while a blowtorch flame is directed into a third opening to heat both irons simultaneously.

Roadside Salesman Holds Farmer's Wares

This jolly farmer invitingly holds out to passing motorists a turkey, pumpkin, tray of grapes, basket of eggs, or whatever is in season. His friendly smile and neat appearance encourage the motorist to halt and look over his stock. His real specta-

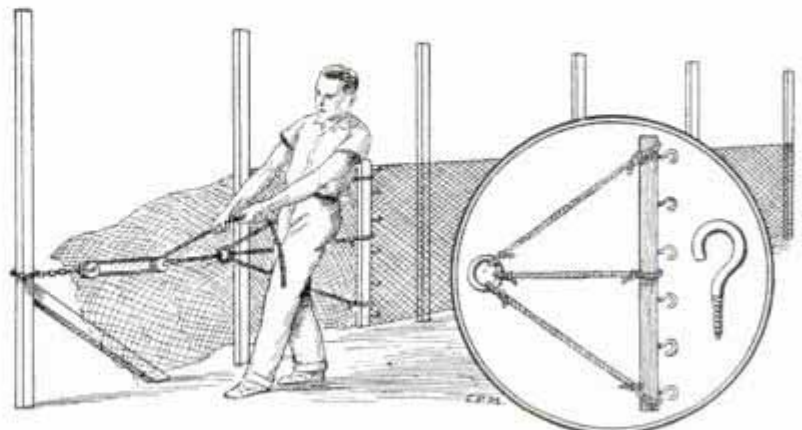
This Figure, Painted in Bright Colors, Attracts Attention of Passing Motorists



cles give him a lifelike expression. The built-up construction makes it strong without being too bulky to take in at night. The core of the figure is made of 1-in. material with a post of the same material running up through the center to support the signboards. Then a plywood covering is added and the wood is given two or three coats of paint, especially the edges of the plywood. A removable tray is provided when products are to be displayed in baskets. The rectangular signboard is for removable panels or sheets of oilcloth lettered with current products and prices.

Stretching Heavy Wire Mesh on Fence

Heavy wire-mesh fencing, such as is used to inclose tennis courts, can be stretched easily by using the attachment shown



An Attachment That Aids in Stretching Heavy Wire Mesh around a Tennis Court

in the detail in connection with a heavy-duty wire stretcher. It consists of a length of 2 by 4-in. hardwood in which several large screw hooks are driven to grip the wire mesh. The attachment is fastened to the wire stretcher by means of a heavy iron ring and three lengths of stout rope. As there is considerable pull exerted by the stretcher, the corner posts should be well braced.—G. Schrader, St. Jean, Quebec, Canada.



Ends of Boards Projecting from Lumber Pile Provide Means of Climbing to Top

Boards Projecting from Lumber Pile Serve as a Ladder

In order to climb to the top of a lumber pile without carrying a ladder around with him, a yardman in Wisconsin leaves the ends of some of the boards project at regular intervals when the lumber is being piled. The projecting ends of the boards serve as steps by means of which the top of the pile can be reached quickly.—G. E. Hendrickson, Argyle, Wis.

Medicine Dropper Keeps Sign-Painters' Brush Charged with Ink

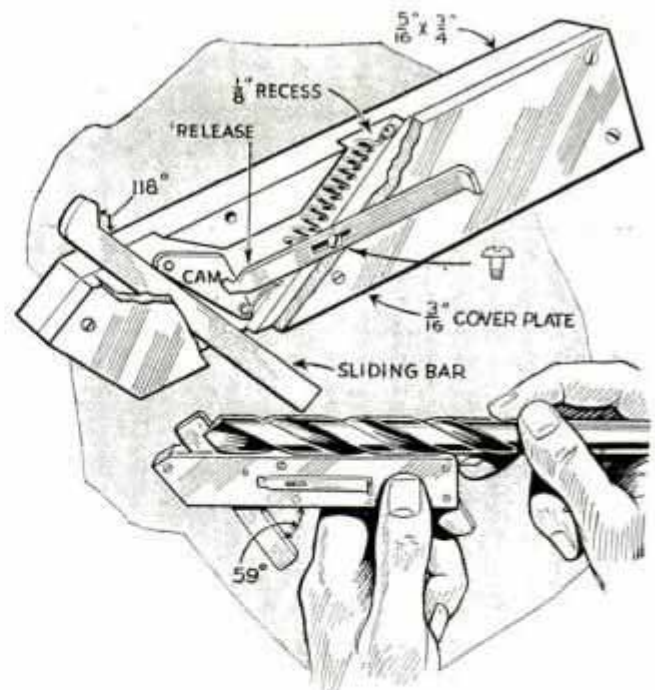
Fastened to the handle and ferrule of a sign-painter's brush with rubber bands as shown, a medicine dropper, when filled with ink or paint, serves as a means of easily keeping the brush inked. A light squeeze on the rubber bulb of the dropper will charge the brush with just the right amount of ink or color. The dropper is handy for



card painting or for rough art work.—Frank W. Bentley, Missouri Valley, Ia.

Self-Adjusting Gauge Speeds Up Drill Grinding

This drill-grinding gauge contains two distinct and improved features. It is instantly self-adjusting and self-locking, and has a hooked sliding bar, which permits gauging to a definite surface or edge. The body of the gauge is made of steel milled out as shown. A channel to seat the slide flush at the approved angle of 59° and a flat to contain the clamping cam and the spring confining piece, are recessed to a depth of $\frac{1}{8}$ in. The clearance for the draw spring is purposely made at an angle, first, to permit easy milling with a radius cutter and secondly, to allow the end of the spring to be secured under a screw that is accessible. The slide is nicely finished, hardened and tempered, the included angle of the hook being 118° . Though the spring is light, when it is in tension it causes the pivoted cam to pinch the slide quite firmly. A cover plate is screwed to the body and is fitted with a sliding piece, which releases the cam when the thumb is applied to it. In use, grind one lip to the correct angle, using the gauge with



This Gauge Enables You to Quickly Grind Drill Lips at the Required 59-Degree Angle

the slide extended. Then set the gauge to the newly ground lip, release the slide and lock when it rests on the lip by gravity. Reverse the drill lips and note amount of stock to be ground off the second lip to make it uniform with the first one.

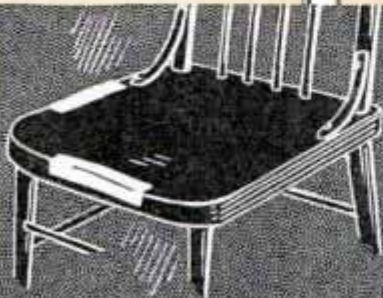
ADHESIVE TAPE

has many handy uses



174

STREET NUMBERS



TEMPORARY REPAIR FOR
SLIVERED CHAIR SEAT



WARNING COLLAR
ON POISON BOTTLES

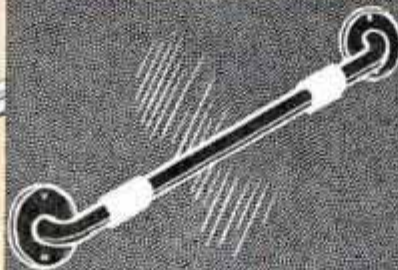


EXTENSION FOR
SHORT PENCIL



STRIPE

MASKING TAPE
FOR FURNITURE AND
AUTO STRIPING



NON-SLIP RINGS
ON TOWEL BAR



HOLDING THINGS
ON GLASS



SUBSTITUTE FOR
FRICTION TAPE



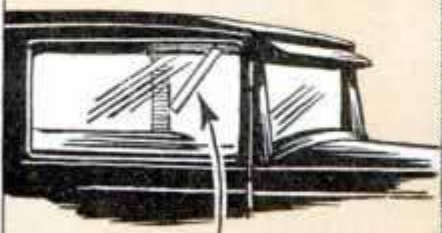
BACK

FRONT

HANGERS ON
SMALL PICTURES



REDUCING SIZE
OF FINGER RING



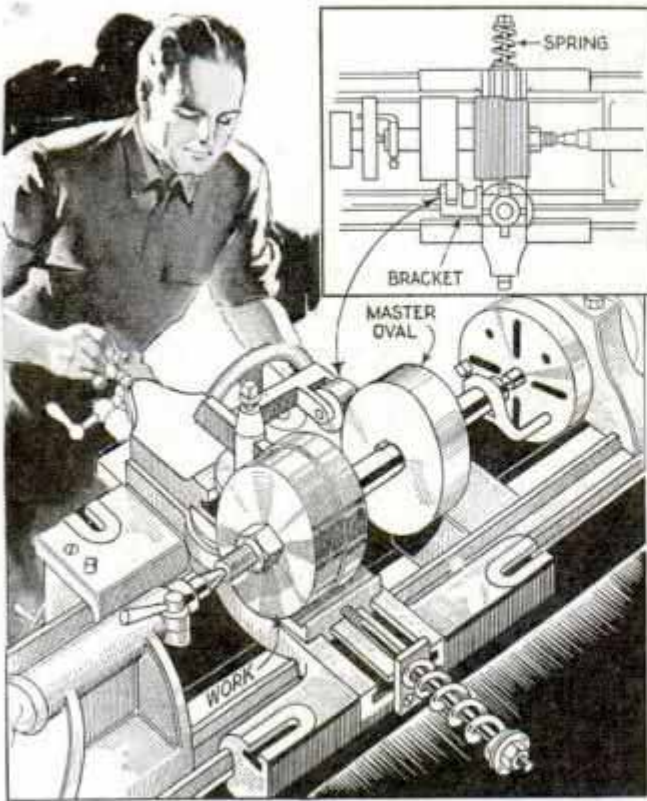
TEMPORARY REPAIR
FOR AUTO OR
OTHER GLASS



IDENTIFYING TOP SIDE
OF KEY



NON-SLIP
HAMMER HANDLE



Setup Using a Master Pattern for Turning Ovals and Other Shapes in a Lathe

Turning Oval Work in a Lathe

An order calling for a large number of oval pieces to be cut from $\frac{1}{8}$ -in. sheet steel was sent into the shop, and, no punchpress being at hand, I turned them in a lathe. To do this, a master oval of the right size was made and was keyed to a mandrel. A bracket, which carried a roller to contact the master oval, was bolted to the lathe cross slide, the cross-feed screw of the latter being removed and a long bolt and compression spring substituted for it as shown. In this way, the roller was held in contact with the master oval by the spring so that the turning tool shaped the work to the same contour, a number of disks being stacked together. This setup may be used in turning work to a variety of shapes, provided a master pattern is first made.—Chas. Kugler, Philadelphia, Pa.

Killing Algæ in Swimming Pools

Algæ, such as frequently grow in swimming pools, may be destroyed by adding copper sulphate, $\frac{1}{2}$ oz., for each 100 cu. ft. of water in the pool. In order to assure uniform distribution of the chemical, it should be weighed out carefully, after measuring the pool and calculating the

amount needed. The chemical is then placed in a cloth sack or bag and is pulled back and forth across the bottom of the pool until completely dissolved. Copper sulphate should not be used in aquariums containing fish.

Shellac Prevents Knot on Sash Cord from Slipping

Knots on the ends of sash cords sometimes become untied and allow the end to fray. This trouble can be prevented by tying the knot tightly and then dipping it into a bottle of shellac. The latter will dry rapidly and will hold the knot securely. If necessary, two or three coats of shellac may be applied.



Cotton-Seed Hulls Fill Joints in Concrete Roads

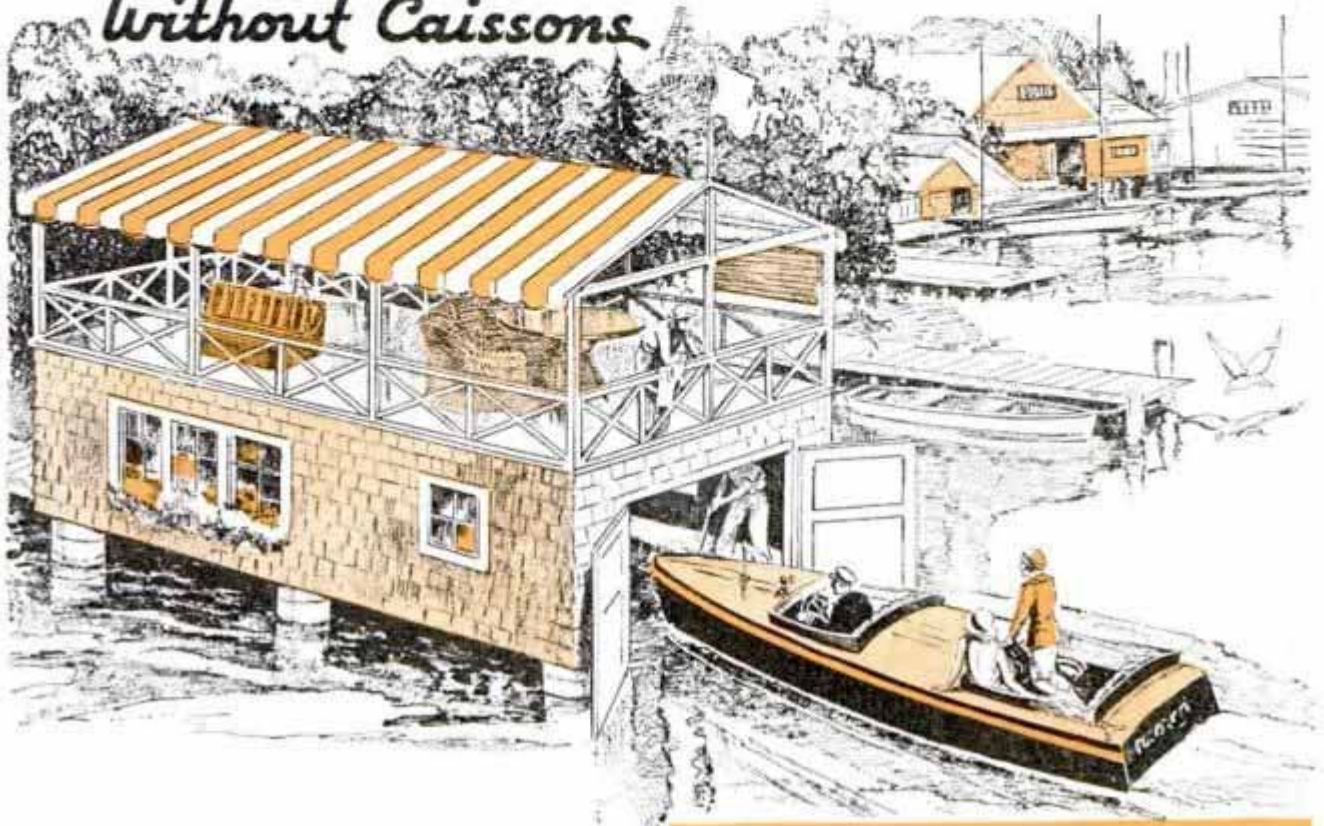
Cotton-seed hulls are being mixed with asphalt filler and tamped into expansion joints in concrete roads constructed in arid regions. It is claimed that the spongy nature of the mixture takes up expansion of the concrete without bulging above the road surface. It is also impervious to moisture. A bottomless V-shaped trough holds the material while it is being tamped.



Cotton-Seed Hulls Mixed with Asphalt Used to Fill Expansion Joints in Concrete Roads

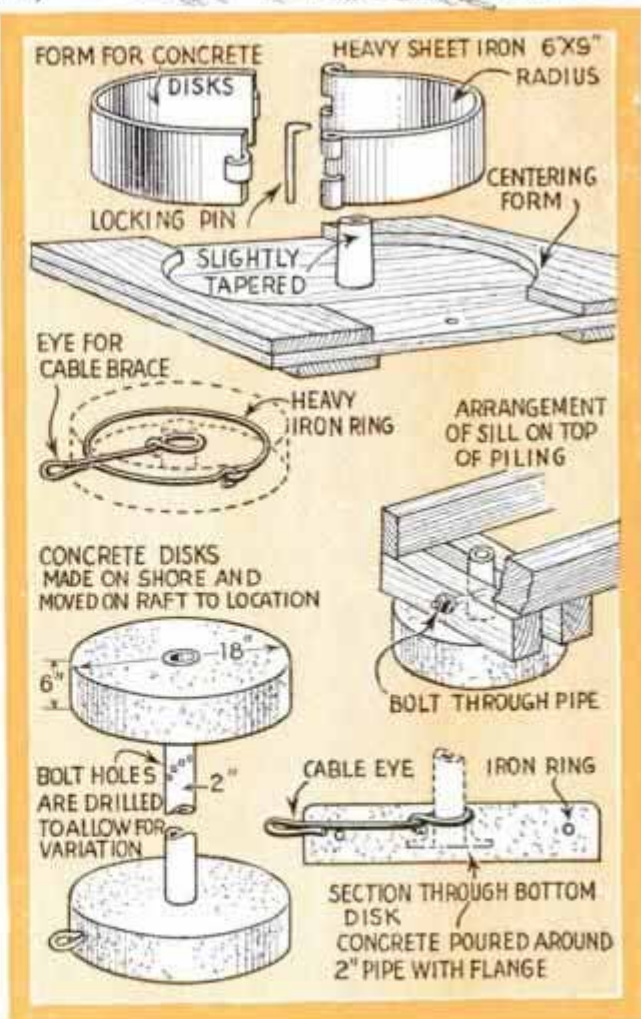
CONCRETE BOATHOUSE PILING

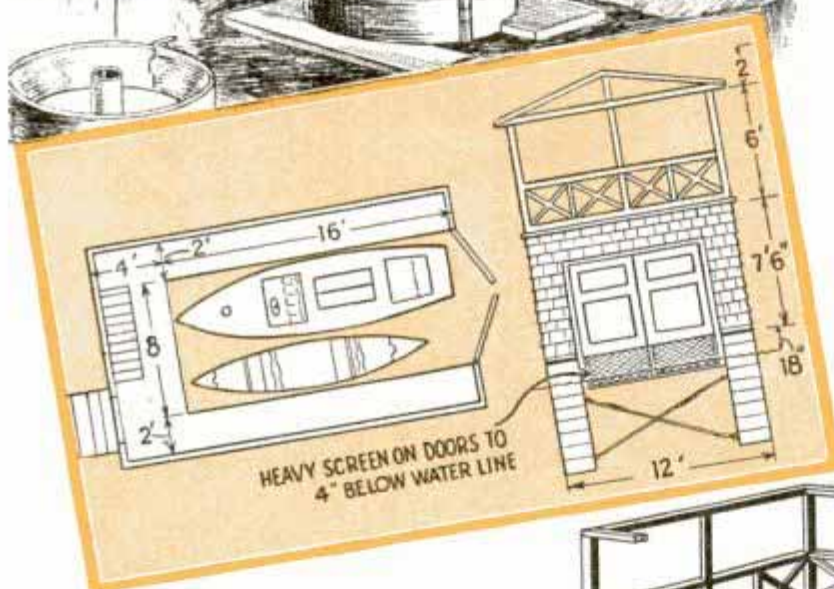
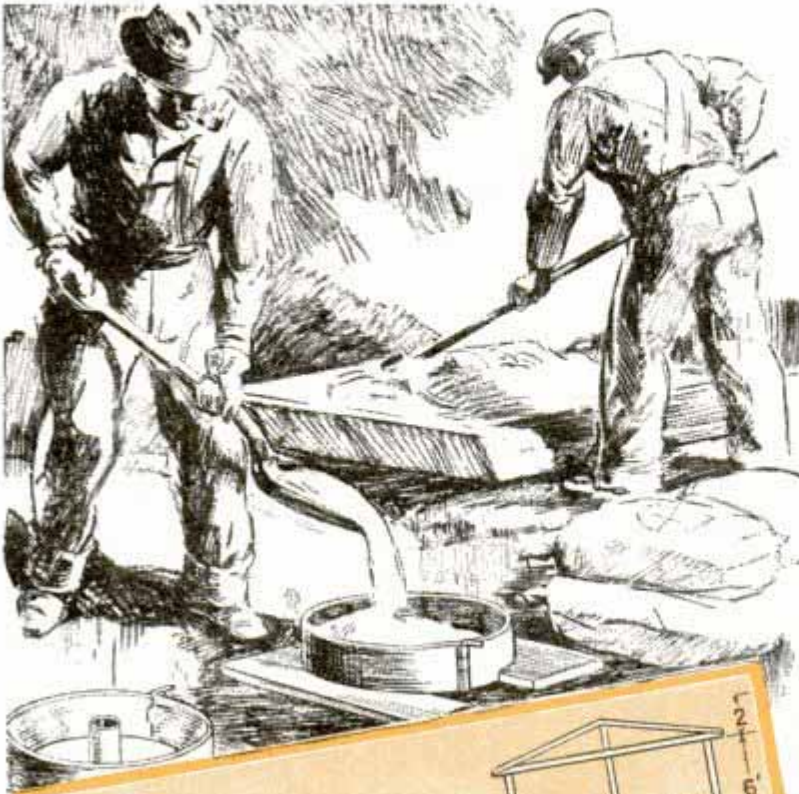
Without Caissons



HERE'S a simple method of making sturdy concrete piling for boathouses, docks and similar structures. Briefly, a length of galvanized pipe with a flange on the lower end is cast in a disk of concrete and set in its final location in the water. Other disks are then made in a mold and, like doughnuts on a stick, are slipped over the pipe until the desired height is reached.

The concrete is all mixed and poured on shore, and when the disks have set, they are taken out on a raft or scow and put in position. They are made not too heavy to be handled by two men. The mold consists of two curved, heavy-gauge iron pieces forming a complete circle when joined together, 18 in. in diameter and 6 in. thick. A tapering core in the center forms a hole, and centering blocks are provided on the removable base. Heavy iron rings, or several strands of baling wire, should be set in the concrete to reinforce them. Eyes for the cables that brace the piling are made of stout bar iron. The galvanized pipe should be cut to lengths to bring the sills of the boathouse or wharf about 18 in. above the surface of water at highwater mark. Sills are bolted to the pipe in the manner shown,

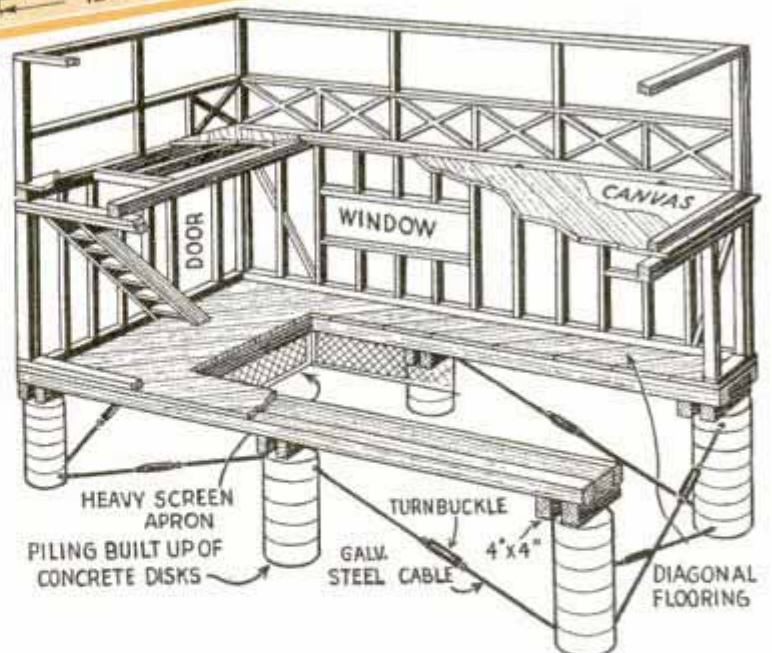




the entire weight of the structure, however, resting upon the concrete column. A strong mixture for this job is $3\frac{1}{2}$ parts gravel, $2\frac{1}{2}$ parts of sand and 1 part cement. It is a good idea to apply several coats of waterproof enamel to the disks above the waterline and two of them just below the waterline.

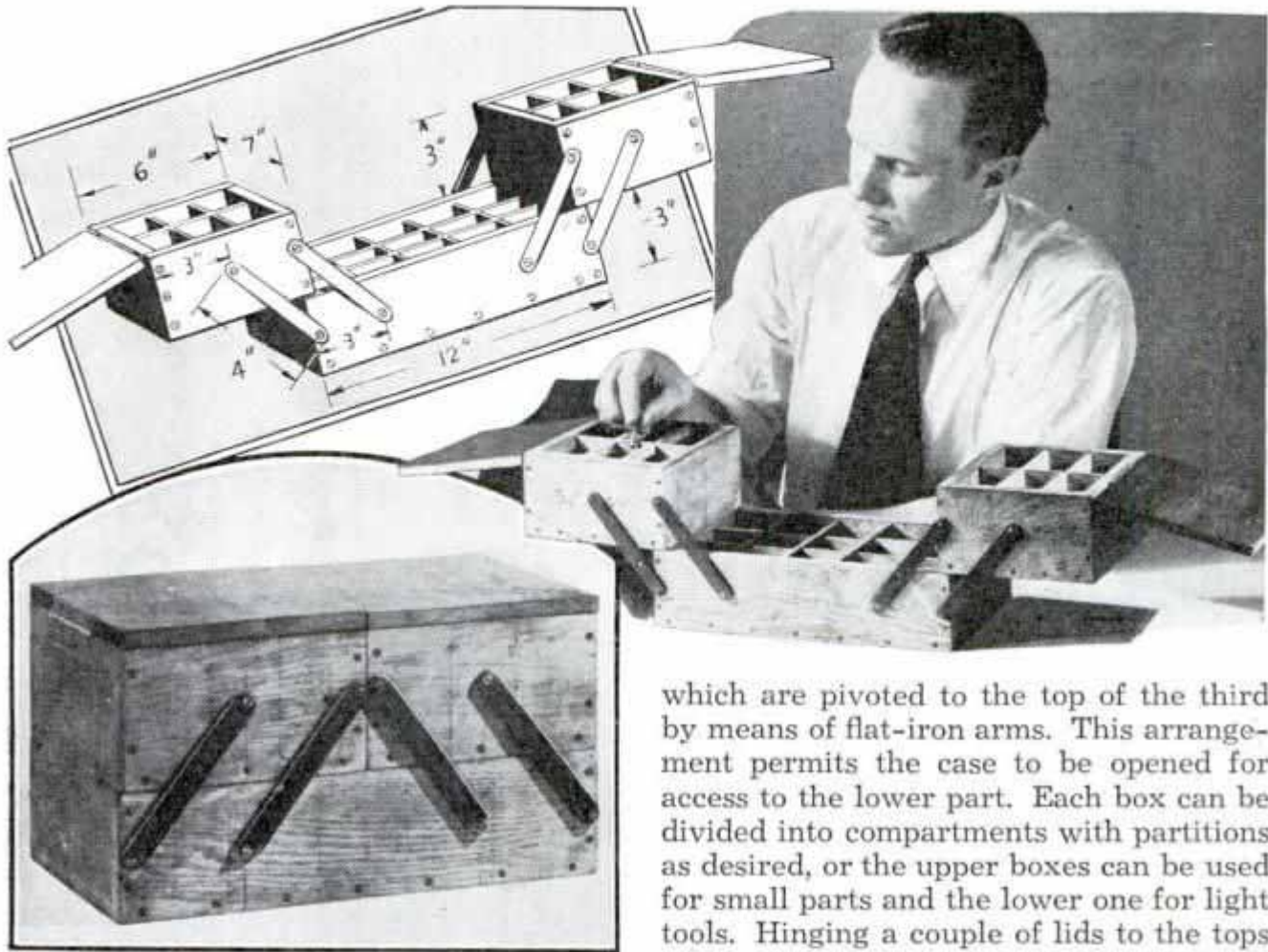
An application of the use of this novel piling is illustrated in the boathouse. This is designed to be located out from shore in sufficient depth for the boats to be sheltered, plus an allowance for the cable stays, or braces. It is to be reached by a wharf, or bridge. On the roof is an area large enough for porch furniture, luncheon tables, and even dancing. It is shaded by a brightly colored awning and has a

canvas-covered floor, to which several coats of paint are applied. Assuming that the boathouse is to be located in water not over 5 ft. deep, bathers can set the pipe uprights and base without difficulty, because they are very easy to handle under water. Once located, they are conveniently assembled and trued up by means of the cables and turnbuckles. Sills are installed as shown, and flooring laid on diagonally. Around the mooring well is an apron of heavy screen, as well as on the lower portions of the doors. In localities where there is a possibility of theft, this apron could be carried down to the bottom. The construction of the boathouse follows standard practice, and the outside should be shingled because it is the most satisfactory treatment of any building on or near the water. The shingles will eventually take on a beautiful weathered silver tone, far more picturesque than any paint job.



However, if you desire, the shingles may be stained, either by brushing or by dipping. In case the latter method is used, it is a good idea to set the shingles to drip over a trough that will return all excess paint to the bucket.

Hinged Trays Quickly Open Small-Parts Case



which are pivoted to the top of the third by means of flat-iron arms. This arrangement permits the case to be opened for access to the lower part. Each box can be divided into compartments with partitions as desired, or the upper boxes can be used for small parts and the lower one for light tools. Hinging a couple of lids to the tops of the upper boxes completes the job. A handle can be had by fastening the free ends of the two lids together with a heavy hook and screw eye, and then screwing a couple of grips to the lids at this point.

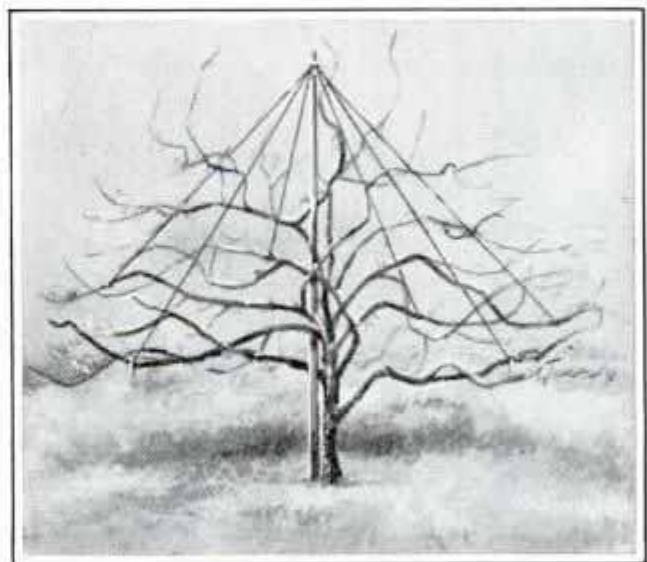
Carpenters, plumbers and mechanics will find this case handy for assorted bolts, screws, nails and other small parts. It consists of three wooden boxes, two of

Method of Supporting Loaded Branches of Fruit Trees

To support heavily loaded branches on my fruit trees, I erected a pole close to the tree trunks and tied the branches to it. It is a good idea to wrap a strip of leather or old inner tube around each branch before attaching the cords, in order to protect the bark. The supporting cords are entirely concealed by the foliage, and the pole need not project above the tree top.—Willis H. Sargent, Rutland, Vt.

Waterproofing Solution for Blueprints

To waterproof blueprints and give them a sheen and greater legibility, rub them with a soft cloth that has been dampened with a solution of rosin, 50 grains, paraffin, 100 grains, and turpentine, 1 oz.



Heavy Branches on Fruit Trees Supported by Cords Tied to Vertical Poles Set Close to the Trunks



Feed Boxes Hinged to Manger Are Easily Cleaned before Feeding Livestock

Easily Cleaned Feed Box

Feed boxes installed in a horse stable are usually nailed permanently in position on the manger. This method not only makes it difficult to remove accumulations of chaff, corn cobs and other rubbish, but also induces neglect of proper sanitation. To avoid this, one farmer has the boxes hinged to the manger so that it takes but a moment to dump the trash into the feed alley.—G. E. Hendrickson, Argyle, Wis.

Improved Tool for Cutting Large Paper Disks

Mounted on a wooden base, a casement adjuster and a safety-razor blade make a handy tool for cutting large paper disks.



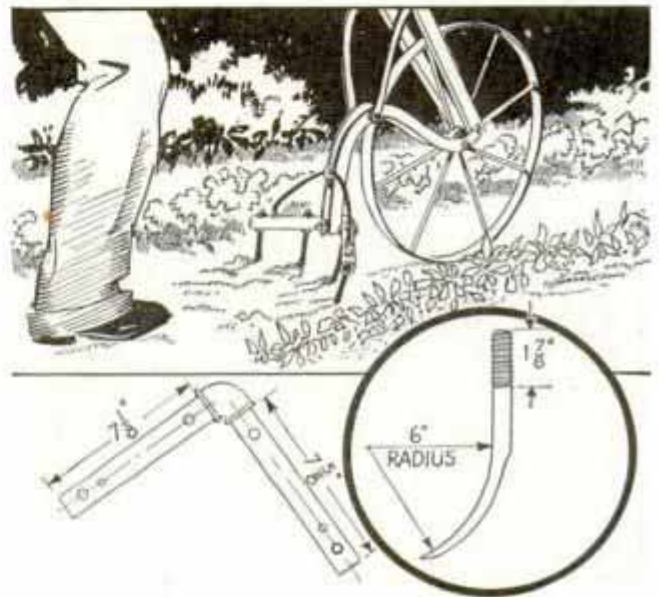
The razor blade is soldered to the free end of the adjuster, after which it is set to the proper radius.

Thus with one hand holding down the base of the tool, the razor blade is moved with the other to cut the disks.

Homemade Cultivator Attachment for Garden Plows

Cultivators furnished with most hand garden plows require two trips between

plant rows that are 18 to 20 in. apart, but with this attachment only one is necessary to do a good job. For the teeth, use four pieces of $\frac{1}{2}$ -in. steel. Thread one end and heat and flatten the other, making the face of the teeth flat and the back rounding for rigidity. Then bend them to the shape shown, and harden them slightly so that they will hold an edge without nicking easily. The frame to carry the teeth consists of two lengths of pipe joined at right angles by means of an elbow and drilled for the threaded end of the teeth, which



Made of Pipe and Steel, This Garden Plow Attachment Saves Time in Cultivating Rowed Plants

are attached with nuts, one on each side of the frame. The cultivator is attached to the plow with a clamp bolt and then braced.—B. Van Buskirk, Sheridan, Ind.

Bushing Worn File Handles

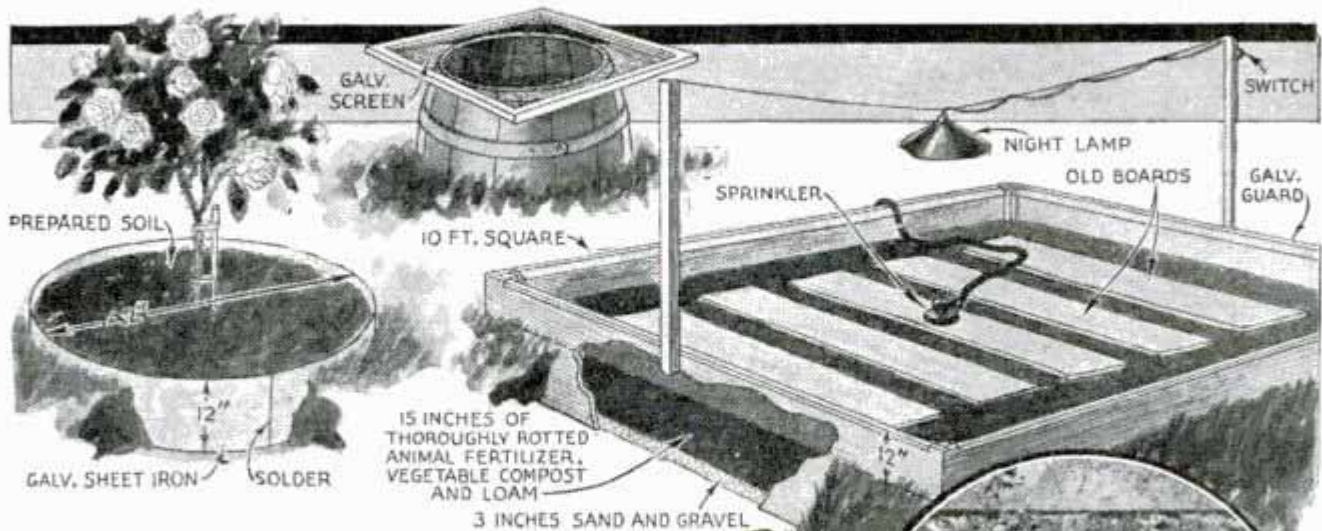
Worn holes in file handles can be bushed by driving a short section of lead pencil



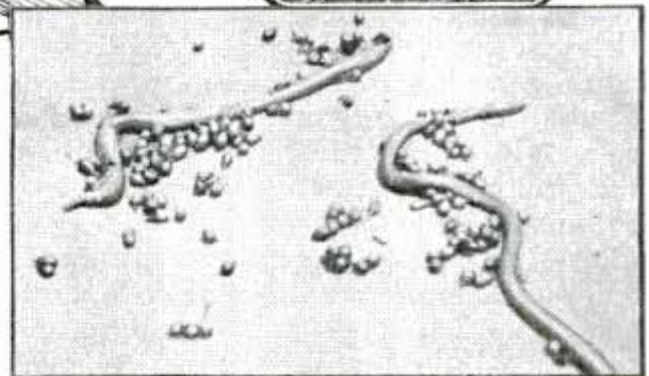
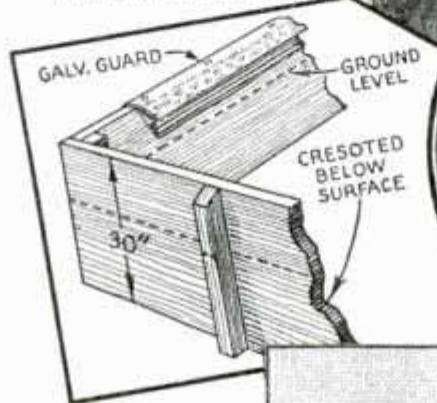
into them and then forcing the file tangs home. When the tang enters the plugged hole, the pencil will split in half and grip the tang firmly. This method is also handy when you wish to use a small file and only

a large handle is available. The pencil is removed for a large file tang.

Raising Worms to Sell for Fishermen's Bait



Already a few fish-worm ranches are operated on a paying basis, and anyone near a summer resort can make his own breeding farm and sell worms to fishermen for bait. Build a breeding pen about 10 ft. square, having a wood inclosure and prepared soil. The fence is set 15 in. below the surface, the wood first being creosoted to prevent rot. It should extend about 12 in. above the surface and the top should be capped with a 4-in. strip of sheet metal set at an angle to prevent the worms from crawling out in the dark. To further prevent this roaming tendency an electric light and reflector may be provided. On the bottom of the pit lay about 3 in. of fine gravel for good drainage. Over this fill in prepared soil, consisting of 1 part of animal manure, 1 part of vegetable compost, both thoroughly rotted, and 1 part of loam. This mixture should be well worked over, so that it does not pack or heat. Sprinkle thoroughly so that the entire mass is damp, and then plant the worms. Lay old boards on the ground, which will cause the worms to collect under them. In dry weather the plot should be sprinkled daily, giving it a thorough soaking, but not so much that the water stands in pools on the surface. Under these conditions the worms are very prolific. They mature in four months after hatching, and breed three times a year. The female lays over 200 eggs a year, and there are four to eight



young in each egg. A smaller breeding pen for home use consists of half of a barrel with the head out, set part way into the ground and filled with the same treated soil as the larger pen. At night it is covered with a weighted screen, as shown. A professional worm rancher, William F. Kerl, of El Monte, Calif., states that roses are greatly benefited by earthworms aerating the soil in which the bushes grow. The proper method is to sink a galvanized sheet collar around the roots, and then fill with fine gravel and prepared soil just like the breeding box.

Sharp contrasts in photos taken on extremely cloudy days may be had by using process panchromatic film for the negative.



Large Rings Machined from Sheet Brass with End Mill in Drill Press

Large Brass Rings Machined on Drill Press

In a small shop we had a job of turning a number of large rings from sheet brass, and as the lathe at hand was not large enough, the work was done with an end mill on a drill press. The sheets were first clamped on the drill-press table. Then a hole was drilled through them to start the end mill, and the center was machined out, using a handle in one of the table slots to turn the work by hand. Before removing the clamps, four others were used to hold the work from the inside, after which the outer clamps were removed so that the outside surface of the rings could be machined off. Depth of the cut was governed vertically with the drill-press spindle, and horizontally by shifting the table.—Chas. Kugler, Philadelphia, Pa.

Adhesive Tape Serves as Depth Gauge on Drill Bit

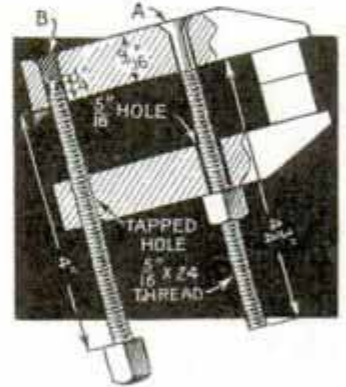


bit at the proper distance from the end. If wrapped tightly, the tape will not slip.

If you are going to drill a number of duplicate holes in some work, and have no depth gauge, try the following kink: Get a piece of adhesive tape and wrap it around the drill

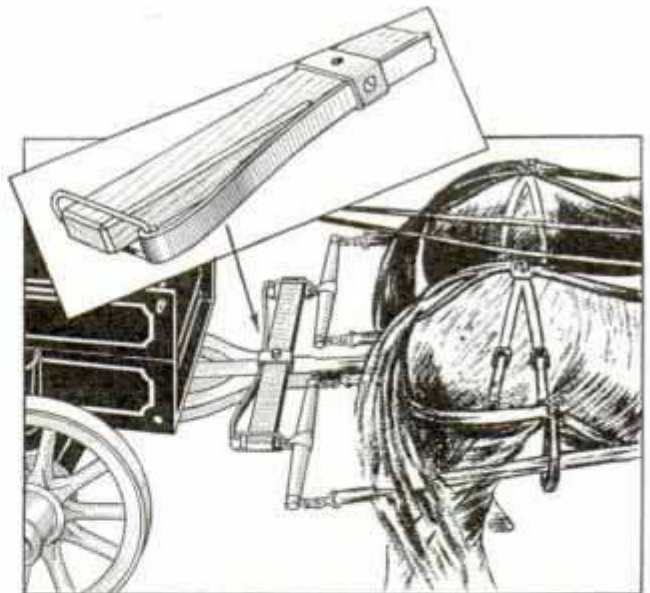
Altering Tool-Makers' Clamps Makes Them More Useful

By changing a pair of tool-makers' clamps as shown, you will find them more useful than they were originally. The screw head fits rigidly in a hole A, while the opposite hole in the other bar is reamed for a loose fit. Hole B is plugged, after which it is drilled out to take the end of the rear screw as shown in the drawing. The opposite hole in the other bar is reamed and is then tapped for the screw.—Ben Hemmings, Chicago, Ill.



Spring Doubletree Prevents Jerks on Horses' Shoulders

The main leaf of an old auto spring bolted to the back of a doubletree, as shown, will absorb many jerks that would other-

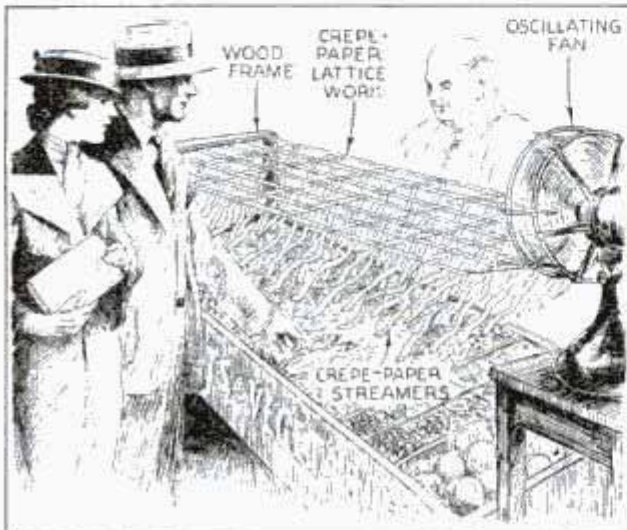


Car Spring Leaf Bolted to Doubletree Helps Absorb Jerks on Horses' Shoulders

wise come on the horses' shoulders. The singletrees are fastened to the eyes in the ends of the spring by means of iron loops, the ends of the doubletree projecting through them. When moving a load, the ends of the spring rest against the doubletree, which then takes the pull.—A. H. Waychoff, Phoenix, Ariz.

Crepe-Paper Streamers Keep Flies Out of Vegetable Bin

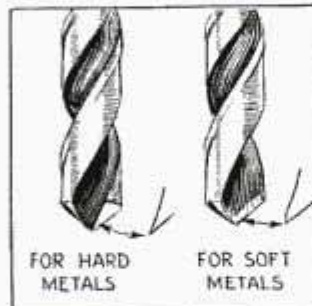
To keep flies out of his fresh vegetables, one grocer made a fly chaser of crepe-paper streamers, which were agitated with an electric fan. The streamers were tied to each joint of a lattice-work frame, also made of crepe paper. If desired, a more permanent frame can be had by using strips of rubber. As the fan oscillated, the frame moved from one side of the display to the other.—A. K. Brill, Peoria, Ill.



Flies Kept Away from Fresh-Vegetable Display with Streamers Made of Crepe Paper

Grinding Drills for Soft Metal

Drills used for steel and other hard metals are generally ground so that the cutting edge tends to dig into the work. This method of grinding is correct for hard metals, but when holes are drilled in copper, aluminum and other soft metals, the drill will dig in to such an extent that it will either stall or break. In most cases drills can be made to cut soft metals smoothly by grinding away the actual cutting edge so that it scrapes rather than cuts. The extent to which this scraping must be carried depends entirely on the relative hardness of the metal. Hard brass may require very little scraping action while lead will require the maximum possible. The thickness is also a factor to be considered.



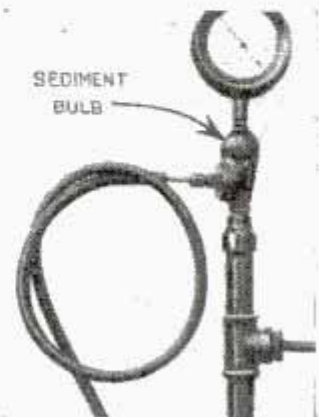
Platform Used as Safety Measure in Hanging Fixtures on Lamp-Posts of High Suspension Bridge

Traveling Platform for Hanging Lamp Fixtures

In hanging the fixtures on lamp-posts that adorn the new St. Johns suspension bridge over the Willamette river at Portland, Ore., the contractor used this wheeled platform as a precaution against the danger of workmen accidentally falling into the river, which is 200 ft. below the bridge. The platform has a V-shaped notch to fit around the lamp-post, and sturdy rails.

Filter for Compressed-Air Lines

Air lines should have a trap installed in them between the compressor and the tool to filter moisture and dust. A sediment bulb taken from an old model-T Ford is handy for this purpose. The bulb can be attached into the line by means of pipe nipples and reducers. A pet-cock is provided for draining.—F. W. Gordon, Redondo Beach, Cal.



Why Your and how to



tubes. Never apply paint or enamel to the radiator core as this acts as insulation. Insects and other foreign material that accumulate between the fins when driving may be removed by playing a stream of water through the radiator from the rear as in Fig. 7. Also be sure that the fan belt is functioning properly. If it is so loose that the fan can be rotated

by a flip of a finger, it should be tightened. If the belt is worn or frayed, it should, of course, be replaced.

A defective radiator hose, the inner layer of which has collapsed, may impede the flow of water, especially in thermo-siphon systems.

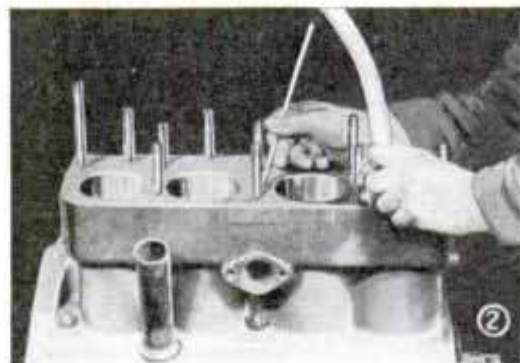
A faulty water pump

may also cause trouble. Loose shaft packing may cause a loss of so much water that the water left soon boils, or it may let air in at high speed which is then mixed with the water. The resulting fine bubbles increase the volume of the water and the excess is lost through the overflow. Incidentally, water filled with air is not an effective cooling medium. The cure is to renew the pump-shaft packing and perhaps the shaft too, if it is rough. While working on the pump, be sure that the drive pin of the impeller is not sheared. This has been the cause of many mysterious overheating problems.

If overheating is caused by sludge in the cooling system, a good flushing-out may correct the trouble. Drain the radi-

IF you were preparing for some strenuous exercise on a hot summer day, you certainly wouldn't put on a couple sweaters and an overcoat. Yet many motor cars are being operated in summer heat under even greater handicaps—and still their owners wonder why they overheat. In the case of your motor, the "overcoat" is the insulation formed by anything that retards heat dissipation from the engine through the cooling system, such as stoppage of air currents through the radiator or accumulated deposits of lime and sludge inside the water jackets around the motor block.

First of all, be sure that the air passages through the radiator are clear. Your license plate should be so placed that it does not interfere with the air stream. Emblems and other decorative insignia mounted on the radiator, as shown in Fig. 3, also have a tendency to cut down air circulation. Bent fins may be straightened by using a pair of flat-nosed pliers, Fig. 6, care being taken not to injure the radiator



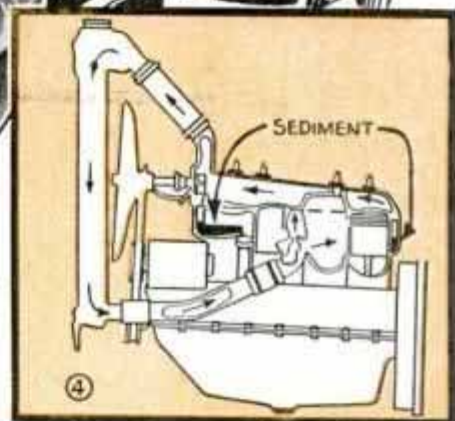
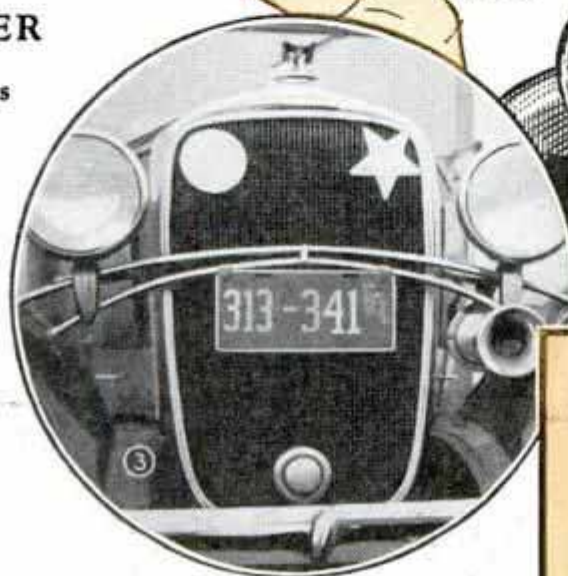
Car OVERHEATS

cure it



By C. E. PACKER
Member Society of
Automotive Engineers

ator, preferably immediately after several miles of running, and refill it with a solution composed of 1 lb. of washing soda to each gallon of water. If you are going on a trip after putting in this solution, so much the better. Otherwise let it remain in the circulation system for a few hours, not over twelve, and run your motor moderately fast at regular intervals to keep the solution circulating freely. The soda tends to loosen scale and sludge from the radiator and the water jackets of the block. After draining out the solution, flush the radiator thoroughly with clear water several times to remove all traces of the soda. If this solution does not clean the radiator sufficiently, possibly the water jackets are heavily coated with lime. In this case, it is best to have a competent mechanic trace the trouble. He usually uses a diluted-acid solution to dissolve the lime. The radiator is removed, the filler hole is plugged, Fig. 5, and the solution is poured into the radiator. After standing a few minutes, the solution is poured out and the radiator is flushed thoroughly. However, if you wish to do the work, here are a few more suggestions: Sediment in the water jackets, as indicated in Fig. 4, keeps them from being effective to their full depth. This should



be loosened by running a stiff wire down into the jackets and then flushing thoroughly with water. Of course, the cylinder head is removed when this is done, as shown in Fig. 2. Foreign matter inside radiators may retard the flow of water through the tubes. Scale from the water jackets and bits of rubber from the hose connections, as well as other particles, sometimes lodge on the upper ends of the radiator tubes. The only sure way to clear this out is to turn the radiator with its filler neck down, place a hose in the bottom connection, and let the water run hard for a few minutes, as shown in Fig. 1. Clogged tubes greatly reduce the cooling capacity of a radiator. Replacing them is a job for a professional service man.

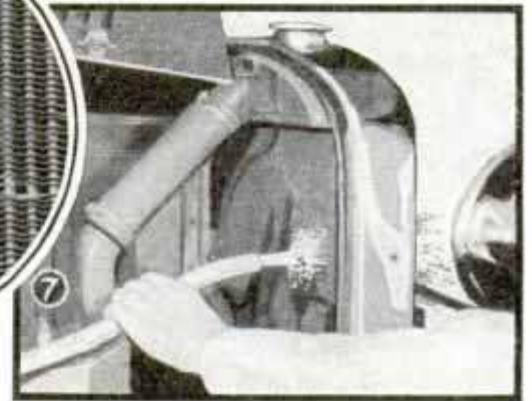
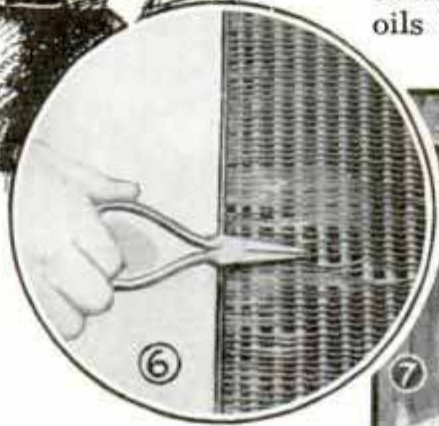
Sticking or poorly seated valves will lose power and cause an engine to over-



heat if driven hard. The only cure in such a case is to free the valves, grind them in, and be sure that they are set and timed to factory specifications. An improperly timed spark is frequently the cause of overheating. If retarded, a great area of cylinder wall is exposed to the flame of the explosion and an excess of fuel is used. The cure, obviously, is to set the spark to factory specifications. In this connection, it is also well to see that the manual spark advance is properly adjusted and that the automatic advance is working. A carburetor that is set too rich or lean may also cause overheating, as a rich mixture burns slowly and thus gives off an excess of heat to the cylinder walls, while a lean mixture results in an intensely hot, blue flame that frequently burns the exhaust valves. The carburetor should be adjusted so that the engine neither "gallops" when idling nor "spits back" when suddenly accelerated. Dragging brakes require an excess of power which tends to overload the engine to the point where it overheats. The car should roll freely when pushed on a hard, smooth, level surface. A slipping clutch generates

heat and lets the engine race. Such a clutch should be flushed out with kerosene, adjusted or relined as necessary to stop the trouble.

The viscosity of the cylinder oil used is also a factor to be considered in overheating problems. It is best to use only the oil recommended by the manufacturer of your car. Oil that is too thick will not distribute evenly and certain parts of the engine are likely to run dry, causing excessive friction and wear. On the other hand, oil that is too thin may allow metal-to-metal contact between the pistons and cylinder walls and a loss of compression. The tendency of engineers now is more toward thinner oils than in the past, the oils being specially processed so



that they will not break down under severe conditions. With new cars, and old cars that have been overhauled, the engine is often so stiff that parts bind and it lacks power. Such a condition generates excessive heat from friction, and the engine also tends to run hot as a result of the extra fuel burned to make up for the loss of power. The best procedure is to idle the engine until it is broken in, or else drive the car slowly. Also, with new and overhauled engines, a thin grade of oil should be used.

The way in which a car is driven frequently has much to do with overheating. The owner of a free-wheeling car may overdo that feature. He may "giv'er the gun" and then coast. Driving this way heats the water while the motor is being run fast, and prevents sufficient cooling when coasting, as the water pump is then going too slow. However, the newer cars

with free wheeling have cooling systems large enough to take care of extreme driving conditions. Driving up a long hill, or through sand or mud, where the engine slows down in high gear, often causes cars to heat excessively. When pulling hard in high gear, the engine is burning up more fuel than usual because it is working harder, and yet the water pump and the cooling fan are running slowly.

Water Pail Made from Old Inner Tube

An emergency water pail for auto owners to carry in their tool kits can be had by cutting handles on the ends of a sec-



Section of Inner Tube Having Hand Grips Cut on the Ends Serves as Water Pail

tion of old inner tube as shown. Such a pail is handy for filling radiators. Or, if you are camping, it will serve as a fire pail. It is also convenient for carrying water from a spring to the camp.

Deflating Inner Tube with Spout of Oil Can

The spout of an oil can will be found handy for deflating an inner tube to repair it. Just insert the small end of the spout into the puncture and then roll up the tube as shown. The spout also serves to mark the location of the puncture while the patch is being prepared.



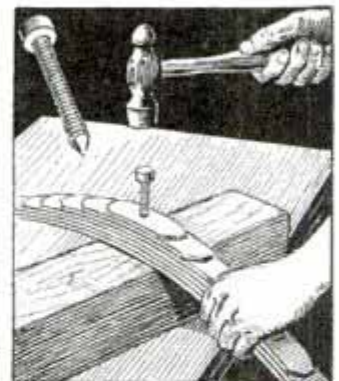
Wax Coating Prevents Exposed Metal of Car Fender from Rusting Until Repainted

Protecting Unpainted Spots on Car Fenders

If a scratch or dent has bared the metal on your car fender, and it cannot be repaired immediately, coat the damaged spot with wax to prevent it from rusting. If the bared metal is left exposed any length of time, it will rust deeply and make refinishing a difficult job. When ready to apply the finish, remove the wax coating with gasoline, as paint or lacquer will not adhere to a waxed surface.

Car Spring Easily Assembled with Pointed Center Bolt

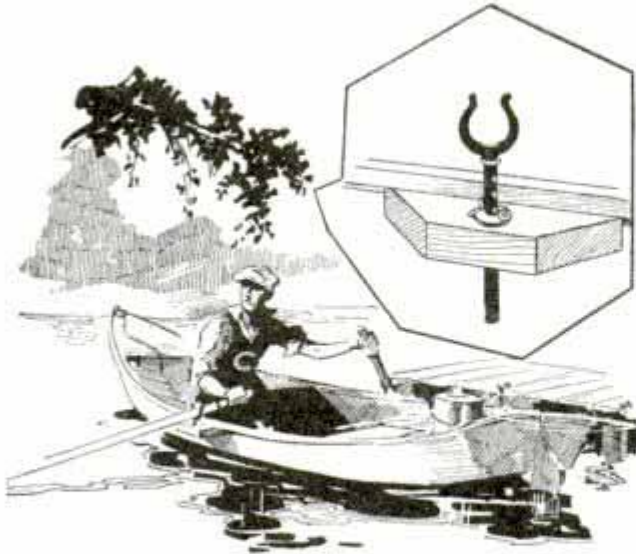
Leaves of a car spring are sometimes hard to assemble because the holes in the center of each one cannot be lined up accurately to take the bolt. If this bolt is pointed and the holes in the leaves lined up as



accurately as possible, it can usually be driven into the holes by tapping it lightly with a hammer. Carefully done, this will not cause much damage to the threads on the bolt.—A. H. Vance, Chicago.

☐ A lintless cloth dampened with gasoline is handy for removing grease from generator commutators.

Adjustable Oarlocks for Rowboats



Adjustable Oarlocks Enable Boat Renters at Lake Resort to Adjust Height of Oars to Suit

Noting the difficulty of many persons to accommodate themselves to the height of the oarlocks on his boats, and that too deep or too shallow rowing was often the consequence, one manager of a lake resort made all of the oarlocks so that they could be instantly adjusted to suit the reach of the rower. To do this, small holes were drilled through the shanks of the oarlocks at 1-in. intervals to take cotter keys, which rested on metal washers as shown in the detail. The cotter keys were spread just slightly so that the keys could be removed easily to make the adjustment. It is a good idea to attach the keys to the side of the boats with short lengths of furnace chain so that they cannot be accidentally dropped into the water in making the change.—G. E. Hendrickson, Argyle, Wis.

The Next Issue

DRESSING UP YOUR HOME FOR LOOKS AND VALUE

How many out-of-date homes can be greatly improved in both appearance and value by making a few changes that are relatively simple and inexpensive, such as new entrances, modern windows and dormers.

IDEAS FOR MAKING MONEY AT THE BEACH

Constructional details of popular articles used on the beach and in the water, which are easy to make in your workshop and can be rented to bathers.

THE TRICKS OF REPAIRING A CANOE

Patching the planking, re-covering with canvas, mending seats and replacing broken gunwales, are some of the simple repairs that will save your old canoe.

PLAYHOUSES MADE OF WALL BOARD

Inexpensive outdoor playhouses covered with ordinary wall board which is effectively protected against the weather by applying several coats of paint.

QUEEN ANNE VANITY MIRROR

Small drawer cabinet and mirror combined in a single, attractive unit which is just as suitable for use on a chest of drawers as it is on a dressing table.

A PORTABLE BELT SANDER

How often have you wished for a small belt sander? Here's a homemade one driven by a small motor. It can be plugged in at any convenient outlet.

STOPPING CAR RATTLES

A story of vital interest to every automobile owner as it shows where squeaks and rattles originate, and how this annoyance can be effectively overcome.



Rarin' to Go!

HERE'S the ruggedness and spirit of the cow-pony combined with the grace and speed of the racehorse.

There's 36 real horsepower in that big, high-speed motor — rarin' to go when you crack the throttle. No bronco buster ever had a mount to compare with the 1934 "Fighting Heart" Harley-Davidson!

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Here is a mount to be proud of, with its Air-Flo styling and striking color combinations! Economical in operation and maintenance, too.

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But have you ever stopped to think that *you*, too, may have habits just as irritating to other people as those of the key juggler or coin jingler are to you?

And more important than that, those

habits are a sign of jangled nerves. And jangled nerves are the signal to stop and check up on yourself.

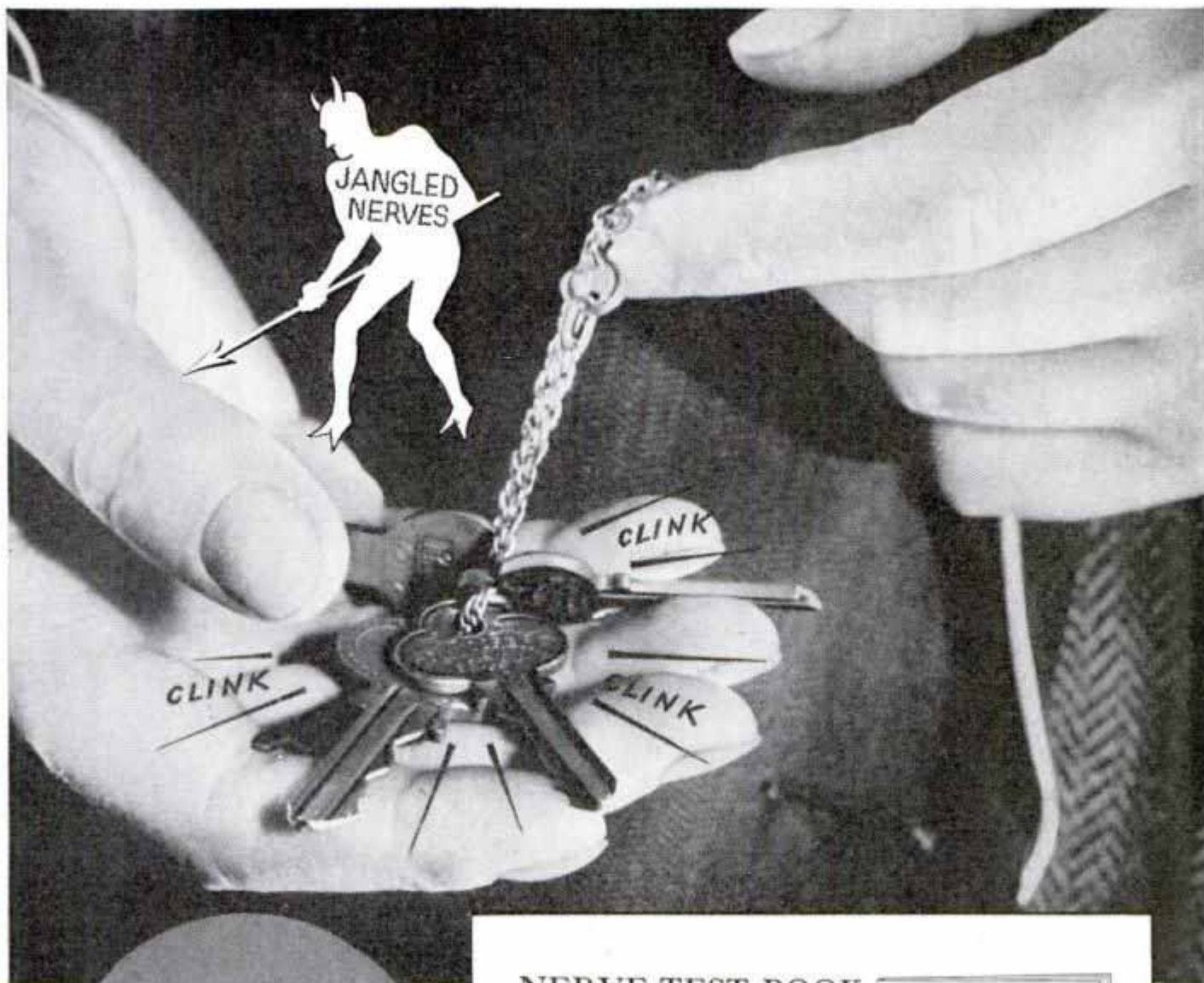
Get enough sleep—fresh air—recreation—and watch your smoking. Remember, you can smoke as many Camels as you want. Their costlier tobaccos never jangle the nerves.

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Glostora softens the hair and makes it pliable. Then, even stubborn hair will stay in place of its own accord.

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Glostora also keeps the scalp soft, and the hair healthy by restoring the natural oils from which the hair derives its health, life, gloss and lustre.

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Glostora
FOR THE HAIR

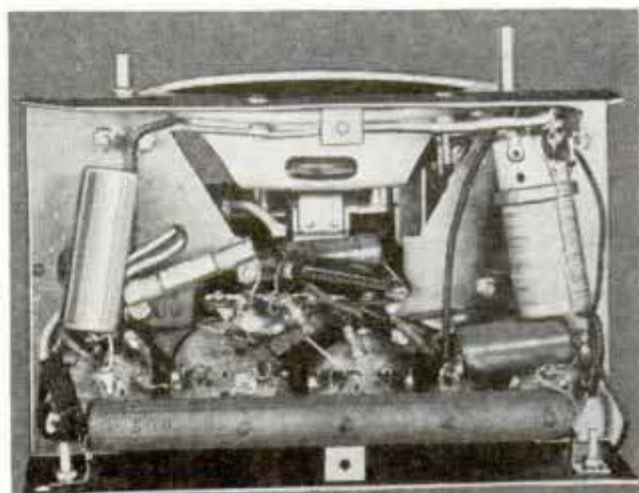


FOUR-TUBE PORTABLE BATTERY RECEIVER

(Continued from page 903)

filament switch is mounted on a bracket and screwed to the base at the right of the speaker as shown in the rear view photo.

The metal shield, at the right of the ganged condenser unit, is $4\frac{3}{8}$ in. high and $3\frac{1}{2}$ in. wide. When making this shield, allow for a $\frac{1}{4}$ in. bend $1\frac{1}{2}$ in. long for a mounting bracket. The r.f. coil is mounted on this shield, directly over the rear of the speaker unit, by means of a $1\frac{1}{4}$ in. angle bracket. The fiber terminal strip, mounted under the base, directly across the rear edge of the speaker cutout section, is for convenience in wiring. The use of this strip greatly simplifies the wiring. All connections are made with No. 22 hook-up wire with push-back insulation. The va-



Underside View, Antenna Coil at Upper Right and Voltage Divider Below

rious small fixed resistors and condensers are provided with pigtailed leads of fairly stiff wire which hold them in any convenient position.

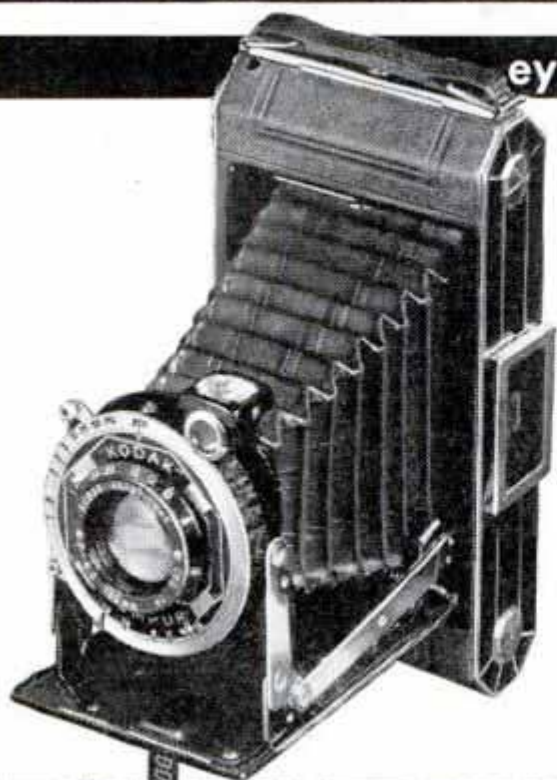
No C-batteries are required as the necessary C-bias is automatically obtained by means of a 560-ohm Ohmite voltage divider. The taps are already arranged for the various resistance values specified so that no checking will be necessary. This resistor unit is provided with mounting brackets which are fastened to the rear of the base. A complete material list of the original parts may be obtained without charge upon application.

The circuit is of the tuned r.f. type employing a screen-grid power detector with two resistance-coupled audio stages. The drain on the 3-volt dry-cell A-battery is

(Continued to page 118A)

f.4.5 lens • 8-speed Compur shutter • action front

eye-level finder • built-in self timer



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in the **1934 KODAK SIX-20**

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Precision... a detailed view of the lens and shutter, including the self timer, the focusing lens mount, the Compur shutter with its 8 speeds.



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KODAK "SS" PAN FILM

Kodak Super Sensitive Panchromatic Film has extreme speed, full color sensitivity. It is the ideal film for indoor snapshots... three times as fast as ordinary film under artificial light. Ask your dealer for Kodak "SS" Pan Film.



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Western prices slightly higher.

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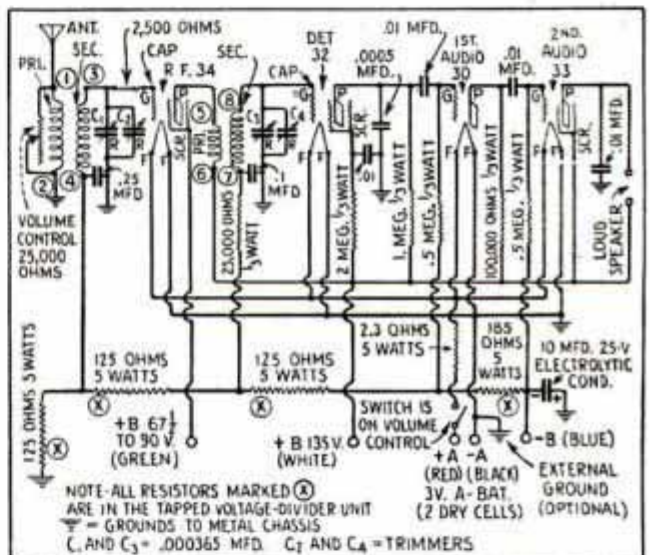
\$99⁵⁰
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ALL PRICES INCLUDE DELIVERY, INSTALLATION, ONE YEAR FREE SERVICE

FOUR-TUBE PORTABLE BATTERY RECEIVER

(Continued from page 116A)

only .43 of an ampere and 15 milliamperes on the B-battery at 135 volts. The three 45-volt B-batteries, Fig. 3, are of the portable type, 2½ by 4¼ by 5¾ in., and the dry cells are a new portable 1½-volt variety, about half the size of the ordinary No. 6 dry cell. When completely assembled in the carrying case, the weight is about 15 pounds. The inside dimensions of the case are as follows: 5¼ in. deep, 7⅞ in. wide and 10⅜ in. long. There is an added clearance of ⅞ in. in the lid which fits down snugly on the B-batteries. Holes 3½ by 4¼ in. are cut in one end and the top for the metal speaker grills which are backed with cloth. A slightly larger case may be used. A large blueprint of the dia-



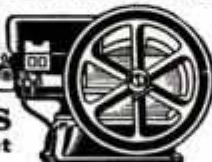
Schematic Diagram of Portable Battery Receiver

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2 H-P to 30 H-P

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SIZES 300 WATTS UP

Direct Current Models as low as \$99. No battery used to start the engine. Easy to install. Available from stock. Ideal for farms, camps, lake homes, and commercial purposes.

D. W. ONAN & SONS, 933 Royalston Ave., Minneapolis, Minn.

grams is available; those wishing it should specify blueprint R-198. Thirty feet of flexible cloth-covered antenna wire is permanently connected to the antenna terminal No. 1 on the coil. This antenna may be thrown out and fastened at any convenient point near the set; when not in use it is rolled up and tucked in the case. In some locations it may be necessary to connect a ground lead to the negative post of the A-battery. In a boat this lead could be dropped in the water; on land the ground can be obtained with a short metal rod. Under ordinary conditions this ground will not be required. If microphonic tube noises are encountered, place a rubber or metal howl-preventer cap over the top of the detector tube.

*His BETTER JUDGMENT
advises him:*

"NEXT TIME GET ETHYL"

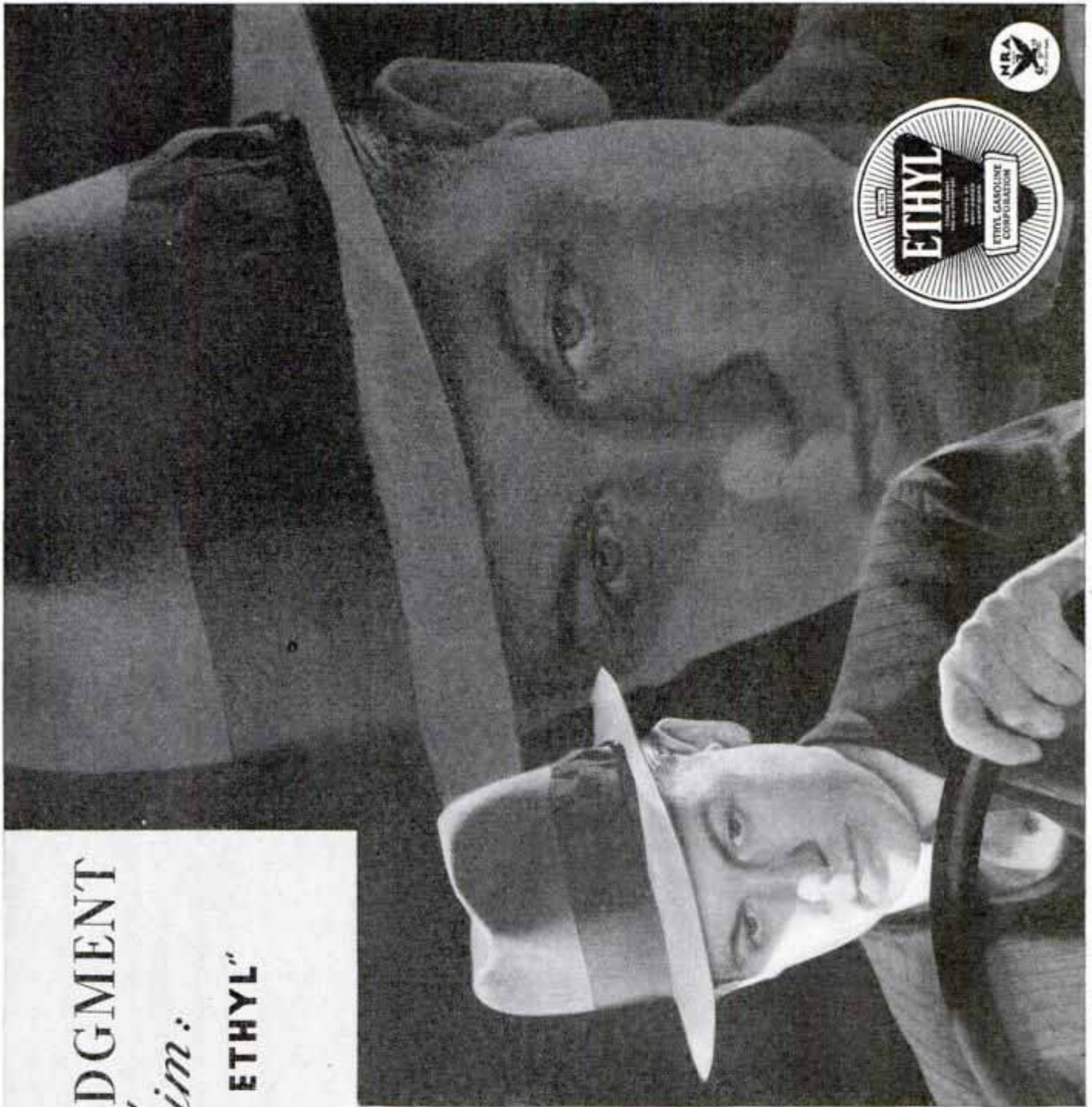
HE KNOWS that in business it's an invariable fact: "You get just what you pay for—no more and no less." And now as he drives his car along, his *Better Judgment* reminds him: "The same holds true of gasoline. You can't get Ethyl quality at regular price."

Whether you paid \$500 or \$5000 for your car, isn't it sound economy to make the most of that investment, every minute and every mile that you drive? Particularly, when Ethyl costs only 2¢ a gallon over regular gasoline. Less, on the average, than \$1 a month! Ethyl Gasoline Corporation, New York City.



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Ethyl contains sufficient lead (tetraethyl) to make it the world's quality motor fuel.



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D 300

THE LAST OF THE EXPLORERS

(Continued from page 858)

event from which it was counted. If we read a date on our own calendar it is not obvious how many days have passed since the birth of Christ.

The Maya nation had two systems of numerical notation which were not greatly different, except simpler, than our Roman numerals and our Arabic numerals. Discovering these facts it is possible to read the dates on their monuments and in their temples; thus we know their age. Digging in some ruins, Yucatan scientists found fragments of a tobacco pipe, which, when fitted together, formed a complete and beautiful specimen. Sir Walter Raleigh is credited with the introduction of tobacco into the civilized world, but the Maya people had used it for centuries along with pipes.

The mystery of the origin of this highly civilized race, who built pyramids and temples comparable to the greatest in Egypt, is one of the most baffling science has ever tried to solve. Sometime between 1000 B. C. and 200 B. C., their dates show that they reached Central America.

They were certainly an agricultural people. Indian corn was their chief food even as wheat is today in America. Pottery making was early in their national life along with the polishing and cutting of precious stones. The cultural arts grew at a time that Europe was a barbarous people. When Christ was teaching in Palestine the stone temples and monuments were raised. Already the calendar had been developed along with mathematics.

During the next three centuries the Maya people grew in might, building many cities. These were artistically constructed and laid out, with plazas, courts, reflecting pools, temples, palaces, roads, walks—all in a region that is now an almost trackless jungle explored only by scientific adventurers and the seekers after chicle.

Now, two great secrets are being sought—where the Maya people came from and what caused their downfall. Already this latter is partially known. Evidences are being found that indicate periods of depression and suffering. Overgrown cities could not be supported by the Maya farmers—the high cost of living defeated a people whose attainments are the marvel of archæology.

THE WORLD'S BIGGEST EYE

(Continued from page 846)

being built. Among other unique devices is a solar furnace consisting of mirrors and burning glasses with which astronomers hope to focus the sun's rays and obtain a heat approximating the 6,000 degrees centigrade temperature of the sun's surface.

The ponderous fork-type mounting from which the telescope barrel will swing is also being designed. Huge motors and cylinders of compressed air will move the whole base under the control of an astronomical clock so that after the instrument has been pointed at a star, it will automatically follow the object as the earth turns. A change in temperature of only a few degrees would influence the "figure" of the mirror, throwing its focal point out, so the huge dome is to be double-walled to prevent the entrance of heat during the daytime. The mirror will remain covered and protected when not in use, and water circulating around its mounting will keep the mass at the same temperature as the outside air when the shutters of the dome are rolled back. The mirror will never be used to observe the sun, for the hot rays might permanently disfigure its surface.

Contrary to accepted notions, the telescope will rarely be used for visual observations of the stars. Photographic plates are infinitely more sensitive to light than the human eye. By means of time exposures astronomers can obtain pictures of stars so faint the eye would never detect them. In the future astronomers will make their greatest discoveries in the photographic dark room.

Instead of trying to make the telescope increase the size of star images, astronomers hope that it will condense them to the tiniest pin-points of light. No telescope powerful enough to show the shape of a star can be built and the goal of the telescope builders is to achieve an instrument in which even microscopic vibration is absent.

Nearly as important as the mirror itself is the site at which the telescope is to be erected. A place where the stars twinkle less is sought. Twinkling is caused by unequal densities in the air, giving a fuzzy appearance to star photographs. The choice now has narrowed down to one of four mountain tops.



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The new Gem Micromatic has just taught seven million *more* men to shave correctly.

This "Little Barber in a Box" won't let you use the choppy, scuffing stroke responsible for so many irritated skins and twisty beards.

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either single- or double-edged blades and Gem makes *both* to fit the same holder.

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Enclosed find 25c for complete trial Gem set with a single- and a double-edge blade and the same gold-plated Gem Micromatic Razor now featured in regular \$1.00 outfits.

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TIRES THAT MERELY WHISPER

(Continued from page 893)

going through the same thing, and you may marvel that it stays together at all. That is why the 1934 tires contain improvements not visible to the eye, such as better adhesives to hold the cords together.

Mechanical perfection of automobiles has made noise as objectionable a product of high-speed tire action as heat. Hammering of the tread on the road sets up vibrations that are audible. Broken tread designs, that is, patterns involving buttons, were found to be the biggest cause of trouble. Each time a button strikes the road surface, a vibration is set up. If the buttons are evenly spaced, each vibration boosts the one produced by the preceding button, so that the total noise may be great. Staggering buttons and making them of assorted sizes gives some relief, but not complete freedom from noise.

Another action that produces tire noise is the rush of air around the wheel and tire. When the tread is irregular, the air is churned and broken up, a process that sets up audible vibrations.

And so the ribbed tire, with its smoother surface presented to the air, and its lack of buttons to rattle against the pavement, came back to life. Whether it will be adopted generally in preference to the rough-tread tire is something that time will tell. From the standpoint of noise, it certainly is an improvement on new cars, but as a car ages, mechanical noises gradually grow to proportions where the driver is not conscious of noise from any kind of tire tread.

"How about non-skid properties?" you ask.

This is a natural question, and one that automobile and tire engineers do not regard as wholly settled for the simple reason that they know very little about any kind of skidding. In spite of spending thousands of dollars for all kinds of research, the actions that take place when a tire rolls or skids over a pavement still are almost entirely a mystery. Tread action can be studied perfectly in the laboratory, but only with great difficulty under actual operating conditions. Consequently, anything said about skidding may have to be revised in the light of discoveries that most certainly will be made in the future. On the whole, the smooth,

ribbed tire that was brought out to combat noise removes little from car safety, and in some respects may add a little.

It is only the side skid that need cause the paved-road driver worry, and, according to careful research, the ribbed tire actually has better non-skid properties on wet pavements than any other type, in such action. When a ribbed tire slides sidewise over a wet pavement, the first rib wipes the pavement dry so that those following it can get a grip. This action, of course, takes place with button-tread tires that have grooves running around the tire circumference, but it is neutralized to some extent, engineers believe, because the numerous spaces between buttons hold enough water to lubricate the pavement as rapidly as it is wiped dry by the rubber.

As for icy pavements, studies of skidding action have shown that it makes no difference what kind of tread a tire has, or whether it has any tread pattern at all. The important thing is the amount of rubber in contact with the ice. Frequently a motorist can drive more safely over ice, or free himself from a slippery spot, by letting some air out of his tires. Tread design seems to have no effect on skidding caused by car tracks. It is mainly when driving in snow or over dirt roads that rough-tread tires have the opportunity of demonstrating their abilities best.

The 1934 touring season finds the inflation-pressure question still not definitely settled, but with the tendency still in the direction of low-pressure tires. A great number of cars in the popular class are being sold with low-pressure equipment, that is, with tires sixteen inches in diameter. However, some leading lines still have seventeen-inch tires or larger, in the balloon class.

LIQUID AIDS PHOTO COPYING

Copies of photographs, drawings, letters and the like may be obtained easily without a camera by means of a liquid which makes translucent the paper on which they are printed. A photographic print swabbed with the solution becomes translucent, permitting the light to pass through and facilitating the production of a paper copy. This copy would be a "negative," from which one or many positive copies may be made. The liquid acts instantly.

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DON'T LET A BLOW-OUT THROW YOUR CAR OUT OF CONTROL

Get the Life-Saving Protection of the Amazing Golden Ply Invention . . . Get Months of Extra Mileage, too

If motorists could only see a blow-out in the making—thousands of terrible accidents would be prevented every year. But that's the mysterious thing about a blow-out. It works in the dark . . . *inside* the tire, where you can't see it.

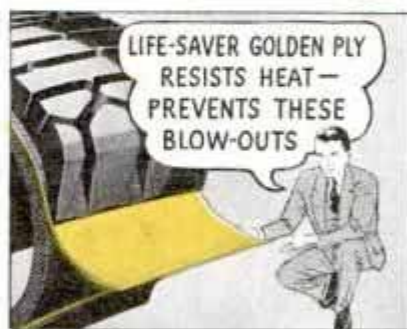
With today's high speeds and smaller wheels the danger from blow-outs is greater than ever. Terrific heat is generated *inside* the tire. Rubber and fabric separate. A blister forms—and grows—until BANG! A blow-out.

To protect motorists from blow-outs every new Goodrich Silvertown has the amazing Life-Saver Golden Ply which *resists heat*. Rubber and fabric don't separate. Blis-

ters don't form. The great, unseen cause of blow-outs is prevented before it even begins.

Make sure you get the New Goodrich Silvertown. Remember it's the *only* tire that has the Life-Saver Golden Ply invention—and it costs no more than other standard tires.

FREE! Handsome emblem with red crystal reflector to protect you if your tail light goes out. Go to your Goodrich Dealer, join Silvertown Safety League, and receive one FREE. Or send 10¢ (to cover packing and mailing) to Dept. 366, The B. F. Goodrich Rubber Co., Akron, O.



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COWBOYS OF THE DEEP

(Continued from page 841)

ample, the story of William Foley, mate of the "Dalzellita," who while steering with the Lamport and Holt liner, "Bruyere," in tow, saw a woman jump off a ferryboat.

"Performing one of the most intricate steering maneuvers on record, he managed to bring his tug alongside of the woman without losing his tow. Diving into the water from the wheelhouse he brought the woman aboard and then, seeing that she needed help immediately, he cut his tow adrift, raced to pier 71, where he put the woman ashore to await an ambulance and then darted back into midstream to pick up his tow.

"Then there is the story of the tug "Dalzellea" which, piloted by Capt. Howell, was towing the U.S.S. "Wyoming" to sea when the freighter "City of Elwood" rammed the tug "Howard" near by. Casting loose from the "Wyoming," the "Dalzellea" sped to the "Howard," which was in a sinking condition, her captain lying helpless on the bridge with a crushed ankle. Taking charge, Capt. Howell rescued all hands."

The offices of the tugboat companies are never closed and among the tugboat fleets there are always one or more of each company's tugs standing in readiness at their piers in the watches of the night. There is no telling when a wireless message from a stranded ship, a tanker on fire, or a telephoned report of a derelict barge, or an emergency call from the newsreel crew will galvanize one or more of the cowboys of the deep into instant action.

Science has developed powerful tugs with derricks, pontoons and other modern devices for rescuing ships from the clutches of the sea. One of the most famous tugs is the "Peacock." Beginning its career as a mine sweeper, it was taken over by the Merritt Chapman Scott company and equipped with scientific devices for aiding in rescue work. The "Peacock" has never lost a ship which she started out to save. In four years she saved thirty-five ships, 400 lives and salvaged property and shipping amounting to over \$15,000,000. Making the longest salvage trip in the annals of tugboating, a distance of over 15,000 miles, she steamed from her home port of Los Angeles two years ago to bring back the S.S. "Steelmaker," which was disabled in the South Seas.

CENTURY OF PROGRESS

(Continued from Roto Section)

away, Shakespeare's sweetheart, the church where Gray wrote his "Elegy in a Country Churchyard" and the gateway of the Tower of London are other reproductions.

America is represented in this galaxy of nations by a Colonial village with reproductions of Washington's birthplace, Franklin's print shop, Paul Revere's house, Pilgrim cottages and a village smithy. Old North church dominates one vista of this community and Mount Vernon the other.

The Chinese village portrays a gay and colorful section of the streets of Shanghai. Pagoda towers eight stories high and painted in brilliant hues mark the entrance to a colony of typical Chinese buildings of brilliant mandarin red, jade green, Chinese yellow, blue and gold. Chinese shops, theaters and restaurants contain native merchants and craftsmen and the narrow streets are illuminated by thousands of Chinese lanterns.

Nestling in the deep green moss, ferns and shrubbery of its native heath and flanked by a setting of blue-flowered flax, peat bogs, thatched cottages and ancient gray castles, the Irish village typifies the life and activities of all the counties of Ireland. There is a reproduction of Tara's hall, famed in literature as the meeting place of Irish kings, clergy, princesses and bards. A Creole village, a Mexican colony and a section of old Vienna also nestle in the international section.

The largest new structure erected for the 1934 fair is the Ford exposition building, 900 feet long, 110 feet high and situated in an eleven acre tract. The main section of the structure is cylindrical with a sawtooth wall on the outside and three similar sawtooth walls set back at intervals as the structure rises. This gives the impression of a set of four gears and the idea of motion is supplied to the gears by lights, thus presenting a gigantic optical illusion.

The structure is to house a drama of transportation, depicting the development of passenger vehicles from the early chariots of the Egyptian kings to the automobile of today with a moving spectacle of all the industries which contribute to the automobile today, including the parts played by farms, mines and factories.



Keep Clean Shaven if you want to hold your job!

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"You can't fire me for that—not for a little stubble on my face!" . . . But he *is* fired for that. Neglect of personal appearance has cost him his job. Do you think this situation is overdrawn? We'll leave it to Wm. L. Fletcher of Boston, one of America's greatest employment specialists.

WM. L. FLETCHER Mr. Fletcher has serviced 1500 employers—placed thousands of men in new positions. He knows how men get jobs—why men lose jobs. Says Mr. Fletcher, "I know of many cases where failure to shave often and well has led to a man's dismissal. Most

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employers judge by appearance and will not tolerate stubble. In my experience, a fresh, clean shave is vital."

* * *

Today, thanks to the Gillette "Blue Blade," no man need neglect shaving. This blade is especially made to shave tender skin without irritation. **No razor can be entirely satisfactory unless adjustable for the requirements of your beard.** The Gillette Razor with its *flexible* blade provides this essential feature. Automatic honing and stropping produce edges whose sharpness will amaze you. With this blade you can shave every day and twice a day when necessary in perfect comfort. Prove this. Get Gillette "Blue Blades" today.

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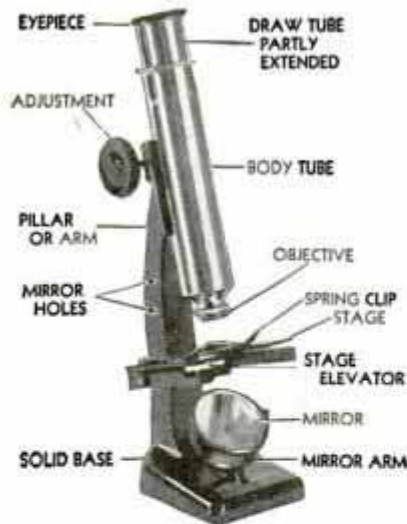
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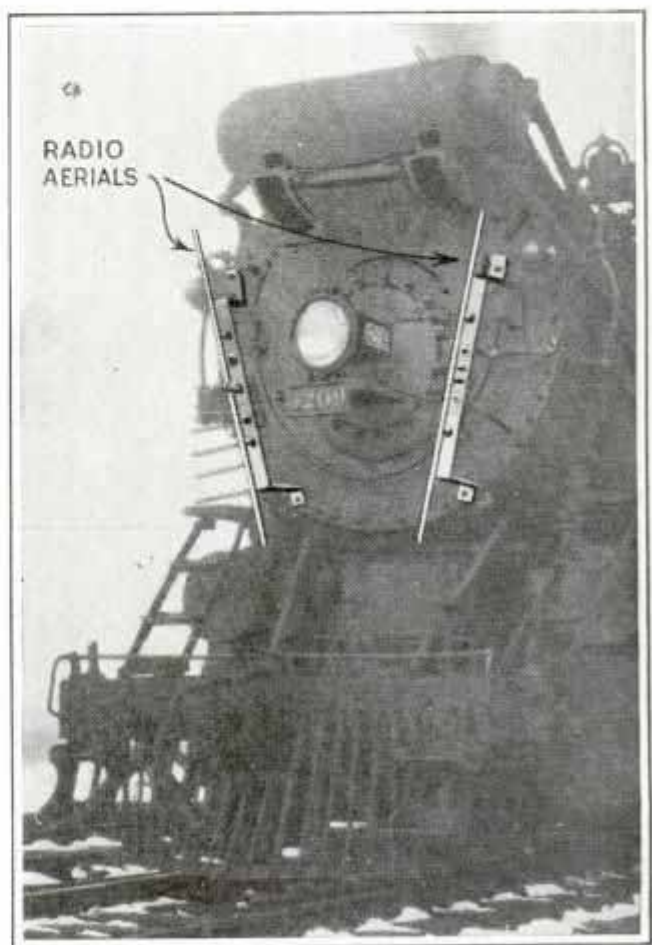
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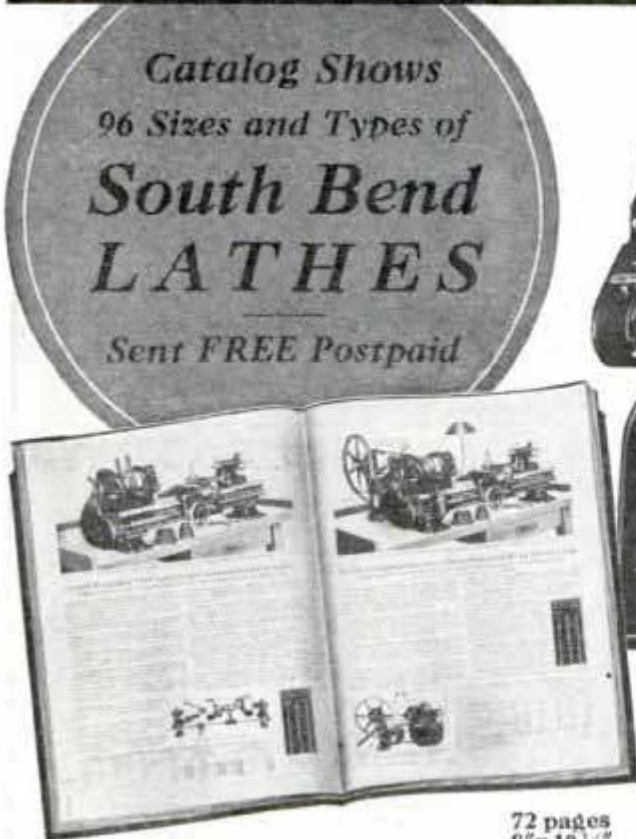
Aerials on Locomotive Are Used for Two-Way Radio Communication between Trainmen

service is available for the engineer and the brakeman to communicate at all times between the engine and the caboose. The system consists of an ultra high-frequency transmitter and receiver with microphone and loud speaker located in the engine cab and duplicate equipment in the caboose. Separate antennas are used for transmitting and receiving, two being located at the front of the locomotive and two others serving equipment at the rear of the train. A six-volt storage battery, capable of thirty hours of operation without recharging, is the power supply of the equipment, which was installed by engineers of the Westinghouse company.

It is estimated that if a road is shortened by one mile, and if it is used by 500 cars a day, the saving to these motorists is \$12,500 a year.

Science Letter 3/3/34

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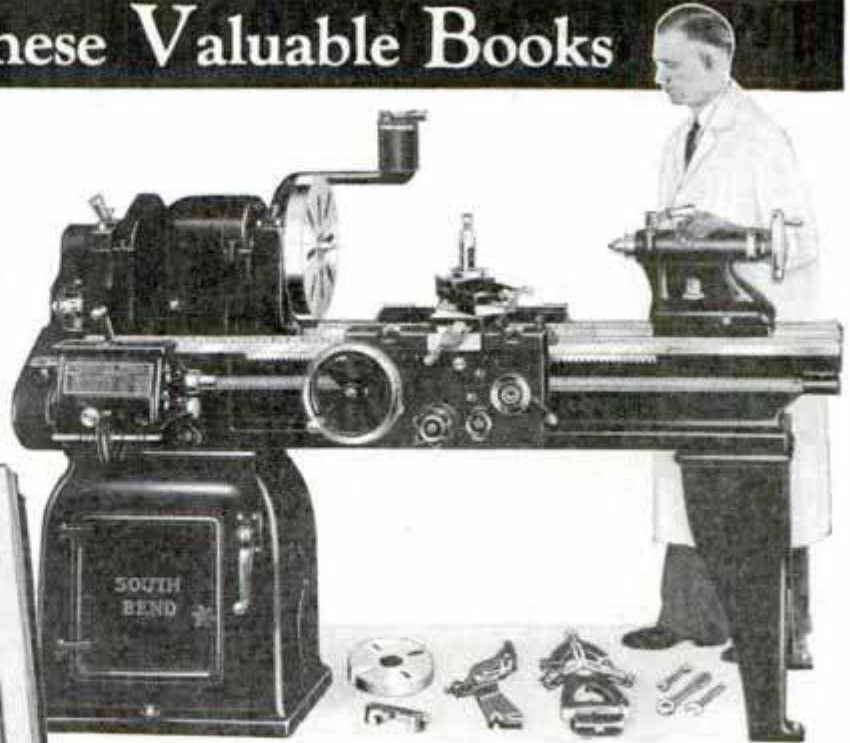


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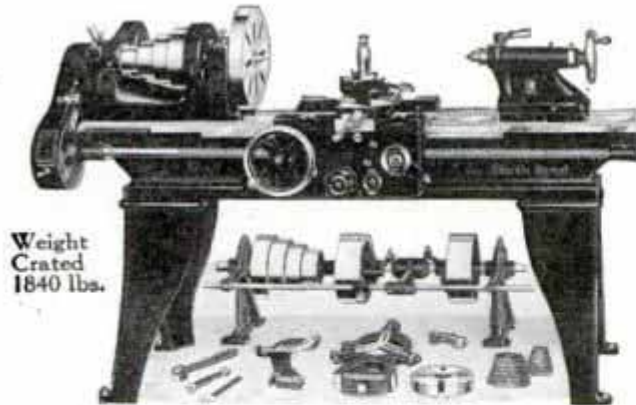
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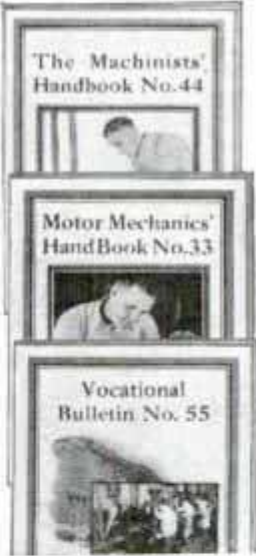
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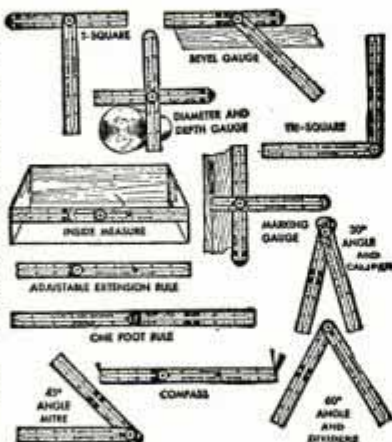


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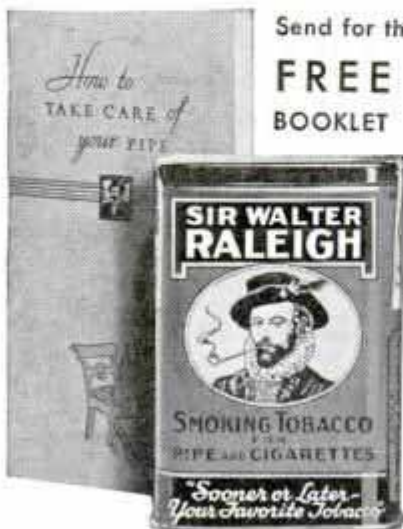
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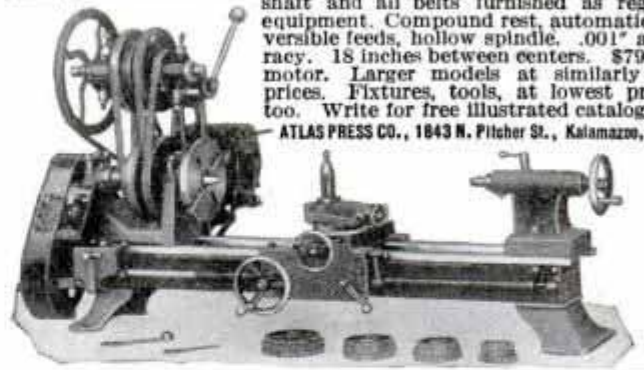
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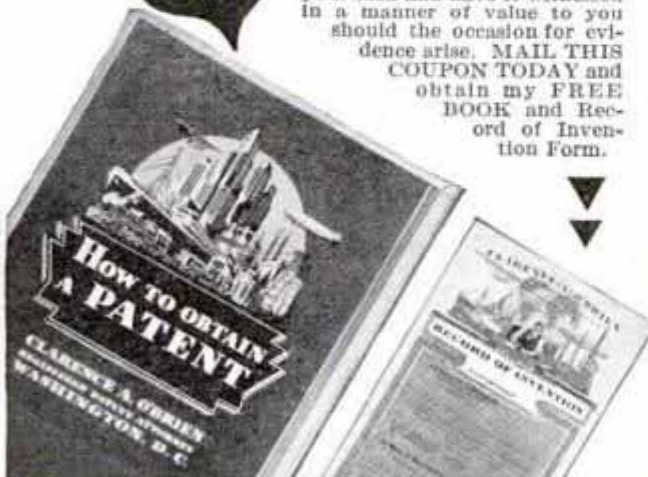
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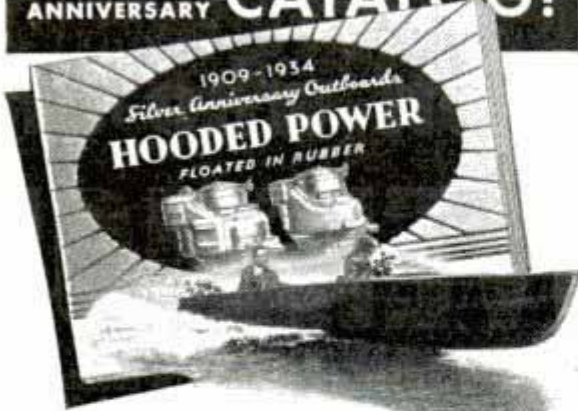
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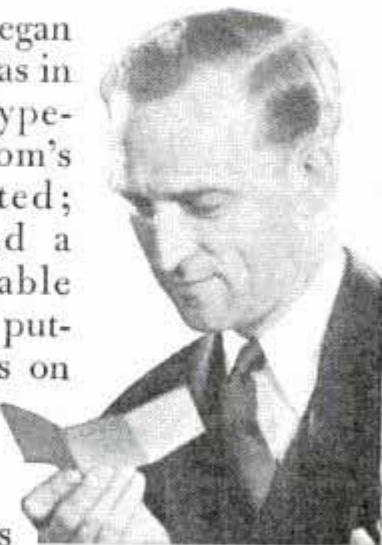
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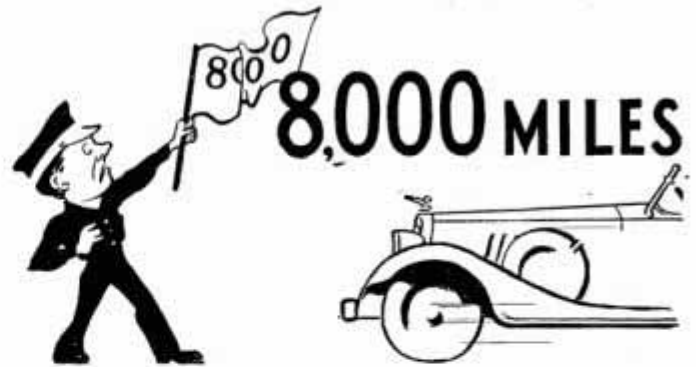
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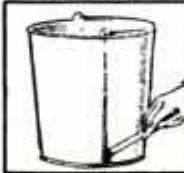
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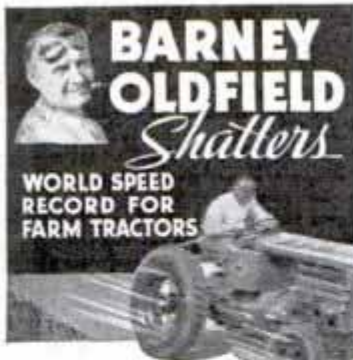
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OF COURSE YOU TOLD HIM "B.O."



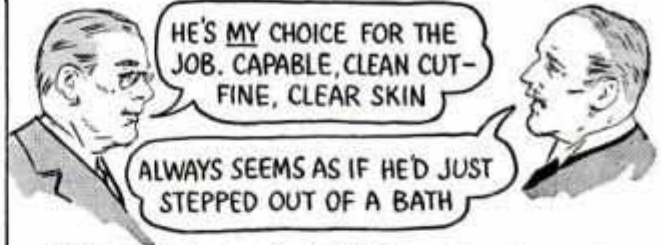
THEY DIDN'T MEAN ME TO HEAR THEM, BUT I'M GLAD I DID. "B.O." _ THAT EXPLAINS A LOT! I'LL GET LIFEBOUY TODAY AND USE IT EVERY DAY.



NO "B.O." NOW to spoil his good times... advancement coming, too

HOW ABOUT GOING BOWLING WITH THE GANG TONIGHT?

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Such quantities of lather

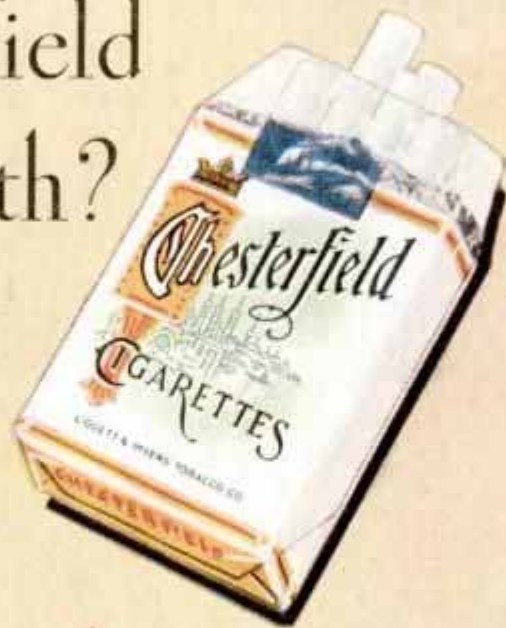
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