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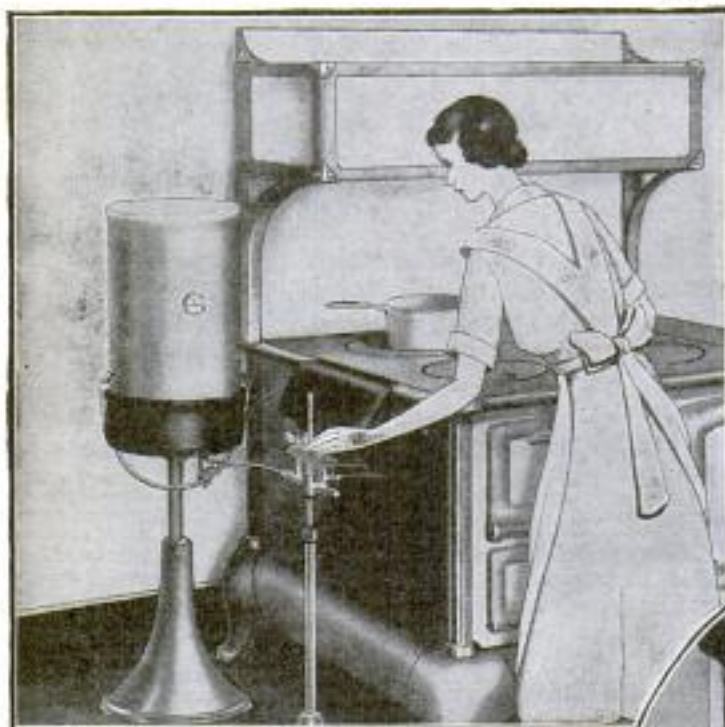


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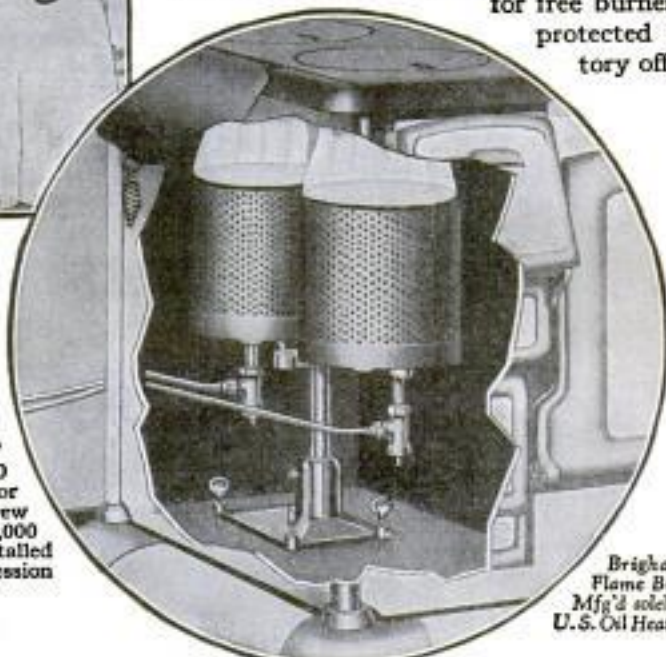


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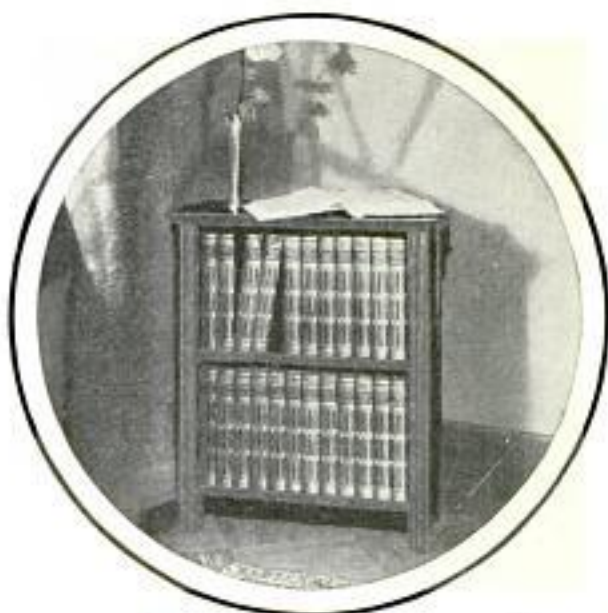
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PRIZE AWARDS in Woodcarving Contest

WE take pleasure in presenting the names and addresses of the cash-prize winners, selected from the thousands of entries in Popular Mechanics International Woodcarving Contest, which closed July 1, 1932. Checks were mailed on Aug. 15.

POPULAR MECHANICS MAGAZINE

1st Prize—\$250.00.....	Carl Hallsthammar, 5456 Glenwood, Chicago, Ill.
2nd Prize— 100.00.....	William Ryan, 417 N. 7th, Newark, N. J.
3rd Prize— 75.00.....	Albert O. Stenwick, Red Wing, Minn.
4th Prize— 50.00.....	Henry Butsch, Mt. Angel, Ore.
5th Prize— 25.00.....	Charles Swan, Galva, Ill.

(Owing to excellence of work four additional \$25.00 prizes were awarded.....)

H. W. Raney, Milsted, Ala.
E. A. Griffin, 1411 Highland, Joliet, Ill.
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\$10.00 Prize Winners

Rollin D. Ackley, 1218 Willard St., Ann Arbor, Mich.	Michael Matejovic, 337 W. 41st St., Shadyside, Ohio.
Charles T. Bailey, 203 Miller St., Cairo, Ga.	U. S. Moore, Lomax, Ill.
Delbert Brown, 411 3rd St., West Palm Beach, Fla.	William H. Nill, Greenville, Ohio.
Clarence S. Browning, R. R. 1, Box 64, Boring, Ore.	Russell Ofstad, Box 682, Burns, Ore.
S. R. Collier, West Liberty, Ky.	B. T. Orear, Moccasin, Ill.
Frank Crauwels, 12762 Hamburg Ave., Detroit, Mich.	C. E. Payne, Letterman Gen'l Hospital, San Francisco, Calif.
L. G. Engedal, 1821 N. 18th St., Milwaukee, Wis.	Robert Peters, 116 Delaware, Peoria, Ill.
Joe M. Golonka, 246 Adams St., Youngstown, Ohio.	Joseph Rundquist, 1923 Oakes Ave., Superior, Wis.
James Harris, Newcastle, Ky.	Fred J. Stalker, 5010 Broad St., Pittsburgh, Pa.
G. S. Hunter, 368 Mortimer Ave., Toronto, Ont., Canada.	S. Strudwick, Hillsboro, N. C.
R. N. Hutto, Hackberry, Tex.	Elbridge A. Thompson, 391 Center St., Old Town, Me.
R. W. Lyon, Newton, N. H.	R. T. Vincent, 326 Warrington Drive, Rochester, N. Y.
Harry Maslow, 753 East 103rd St., Cleveland, Ohio.	

\$5.00 Prize Winners

Ernest Albertson, Coteau, N. Dak.	B. C. McCracken, Denton, Mont.
M. A. Anderson, Graham, Wash.	Z. V. Matthews, Ocean Park, Wash.
Donald V. Beek, 15424 Lexington Ave., Harvey, Ill.	Ralph Michael, Box 117, Fremont, Ind.
Herman Bee, Box 281, Webster Springs, W. Va.	Bruce Miller, Ft. Perry, Ont., Canada.
Cecil Bowman, 123—15th St., Richmond, Calif.	Peter Miller, Box 91, Junction City, Ore.
R. A. Boyer, 155 Thulpehoeken, W. Reading, Pa.	Leonard Nightwine, Falmouth, Mass.
Gilbert M. Burk, 3622 K St., Tacoma, Wash.	William Olinger, Keshqun, Pa.
Elwin M. Burmaster, Box 91, Ellsworth, Kans.	C. W. Parke, 1790 Kendale, Memphis, Tenn.
Frank J. Carney, 12 Fourth Ave., Carbondale, Pa.	T. Rae, 285 Taylor Ave., Astoria, Ore.
Carlisle Carroll, 616 E. Woodward St., Denison, Tex.	Richard Rozier, St. Pauls, N. C.
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W. H. Looker, Clarence, Mo.	Marjorie Wilson, 1027 West 48th St., Los Angeles, Calif.
T. P. McCann, Healdton, Okla.	Charles E. Wood, 348 Clinton Ave., Newark, N. J.

Certificates of honor were issued to those whose work was distinguished in being especially skillful, while 1000 jackknives were sent to others who submitted notable work.

According to rules of the contest to which all contestants voluntarily agreed, models submitted cannot be returned but become the property of Popular Mechanics Magazine, and have therefore been consigned to our museum to become part of the permanent exhibit of skill and craftsmanship.

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I'VE only been selling about a year. When I broke in, though I realized that trained salesmen are the highest paid men in the world I expected the going to be hard at first. It was—a lot harder than I'd expected, even. At the end of six months I was commencing to get discouraged. I certainly hadn't made a flop of it—but I wasn't getting the results I should have had.

Naturally, seeing other fellows who started right with me go right ahead, I realized something was wrong. A particularly disheartening thing was the fact that at times I'd be right on the point of closing a good-sized order—and all of a sudden, it would go "flop." In fact, it kept happening all the time. I was doing something, I knew, that was killing those sales.

Finally I decided that I had to do something. I had been hearing a lot about National Salesmen's Training Association. But I'd never investigated them. Then, one day, I read one of their announcements. I was amazed to find how comprehensively they covered the training of salesmen. Furthermore, they announced that they were sending a most unusual volume, "The Key to Master Salesmanship," to ambitious men who asked for it—not only experienced salesmen, but men who had never sold, but wanted a chance in this highly paid field.

Naturally, I wrote for it—it seemed to me that here was the certain solution to the errors I had been making. Imagine my surprise—and interest—when there arrived, not only one book but two. To this day I can't decide which of those books helped me most. The little book which I had not been expecting was just what I needed at the time. It was written for men just like me—men who had been plugging along in salesmanship—never successful, never so hopeless that they quit selling. And while "The Key to Master Salesmanship" gave me an insight into the real secrets of salesmanship, the other book, "Mistakes Com-



monly Made in Selling," was the one I could first get practical use from.

Right in the first few pages, I saw some examples quoted. They were things I had been doing every day. I'd never dreamed they were dangerous errors. The more I thought about them, the more clear it became, though, why I was having such difficulty with my closes. I thought to myself: "By golly, that's why Barnes decided to put off buying, this very afternoon!" I kept on thinking of men whose orders I had lost, through just that very mistake. There were six of them.

The next morning I sallied out, bright and early to see if I couldn't save those sales, using the tips given me. Before noon, I had put the practical suggestions of that little book to work—and sure enough, in every case, I made the sale which I had thought was gone glimmering. Six sales saved—at \$15 commission apiece, that was \$90 made, by one morning's work, plus the advice of a little book that cost me nothing!

Of course, that set me to thinking. If that one piece of knowledge could make me \$90, how much would I make out of having all the knowledge which the National Salesmen's Training Association could give me? It didn't take long to figure that one out, either! I was enrolled for the full training that same

night; and the next two weeks saw my sales records soar. Not a minute of time lost—I studied just in spare hours but I learned things in those spare hours that I'd never have picked up, just by my own experience.

Today, I find amazing increase in the volume of my sales now over what they were a year ago. Then I was selling only about 40% of my quota—this month, with a quota twice as high as it used to be, I'm 50% over! And you know what quantity production means when the bonus checks roll around!

Today any man who wants to see how to end some of his biggest sales weaknesses can learn from this book some of the most frequent mistakes which spoil sales, and get practical suggestions how to end them. Not a penny of obligation—"Mistakes Commonly Made in Selling" is now FREE to any ambitious man. At the same time we

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My book, "Rich Rewards in Radio," gives you information on the opportunities in Radio and explains how I train you quickly to become a Radio Expert through my practical Home Study training. It is free. Clip and mail the coupon NOW. Radio's amazing growth has made hundreds of fine jobs which pay \$50, \$60, \$75, and \$100 a week. Many of these jobs may quickly lead to salaries as high as \$125, \$150, and \$200 a week.

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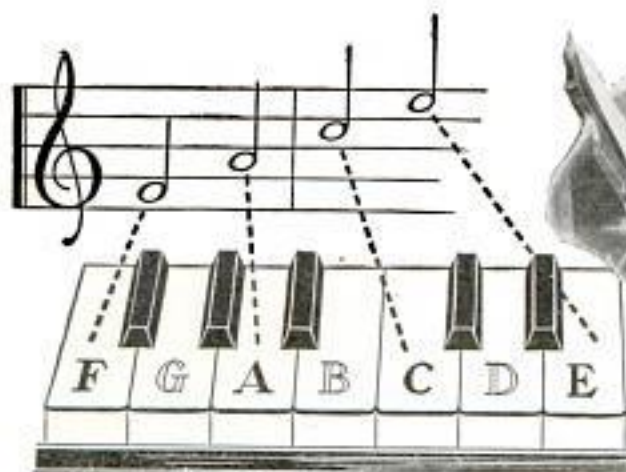
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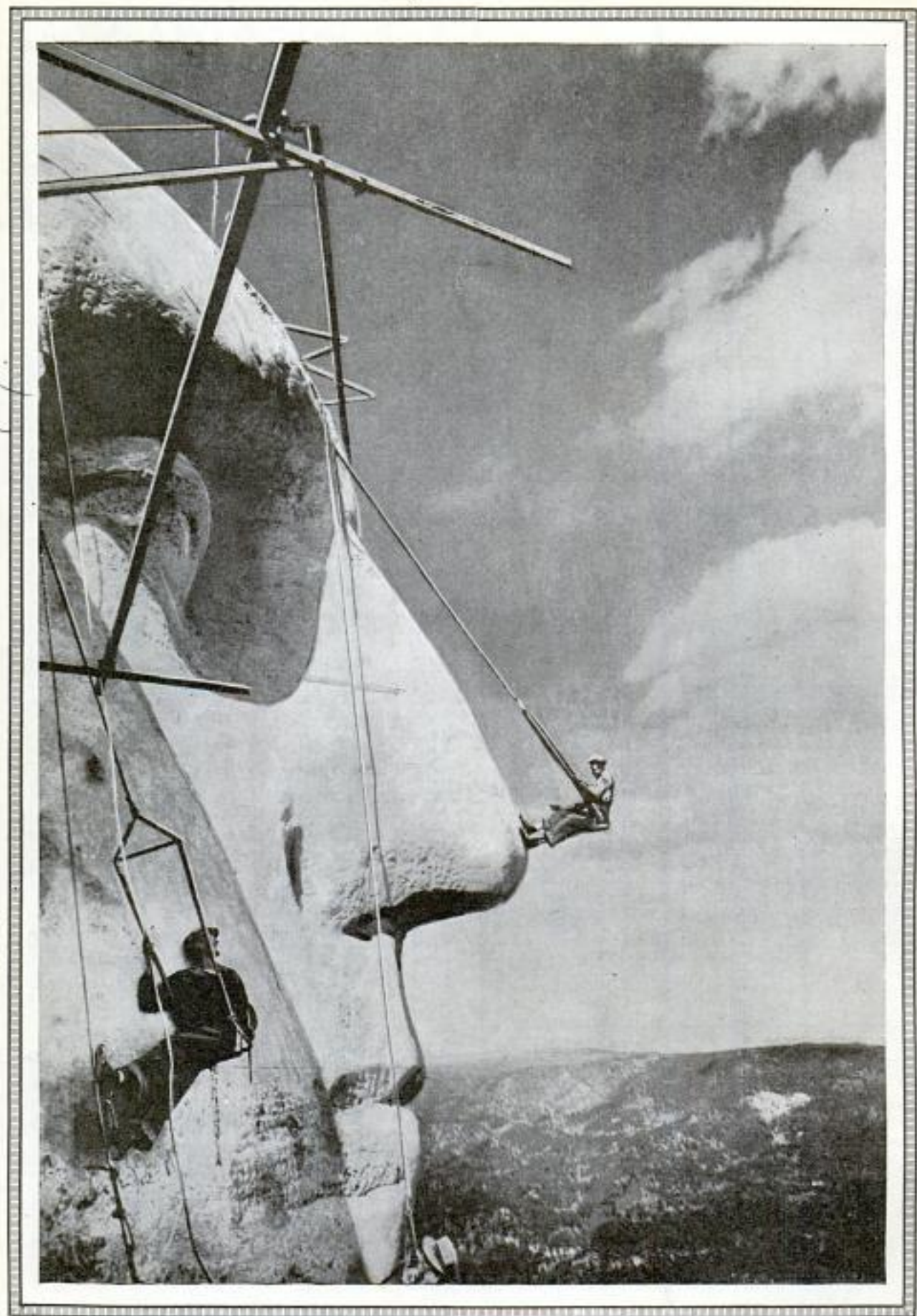
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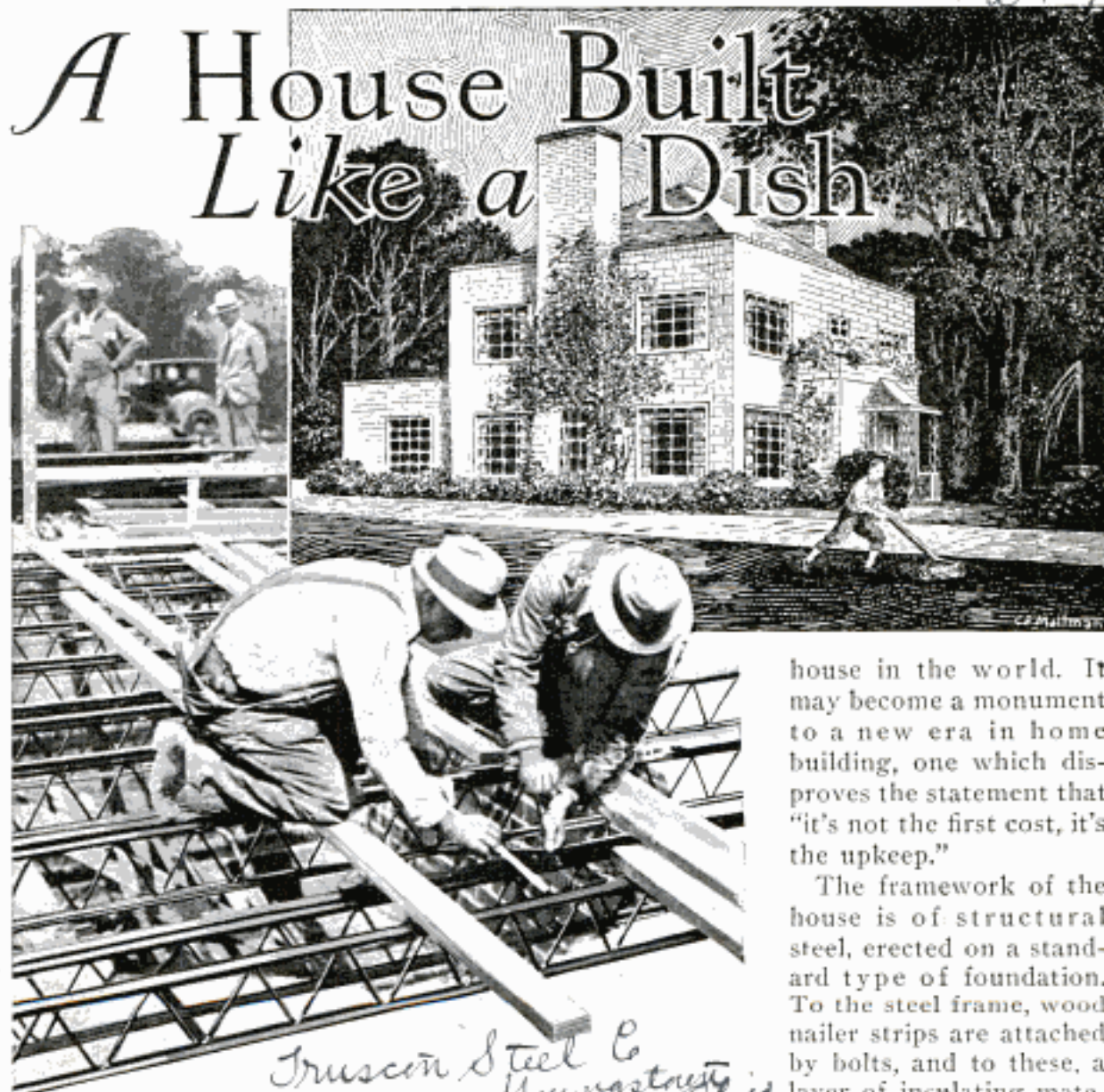
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 58

NOVEMBER, 1932

No. 5

B 1495



Erecting the Framework of the Porcelain-Steel House; the Workmen Are Installing Struts to Brace the Steel Joists

PEOPLE who live in glass houses might worry about stones, but the owner of a porcelain house has no such fear, nor most of the other things that bother the average home owner. To prove this, there has been erected in Cleveland, Ohio, the first porcelain-steel

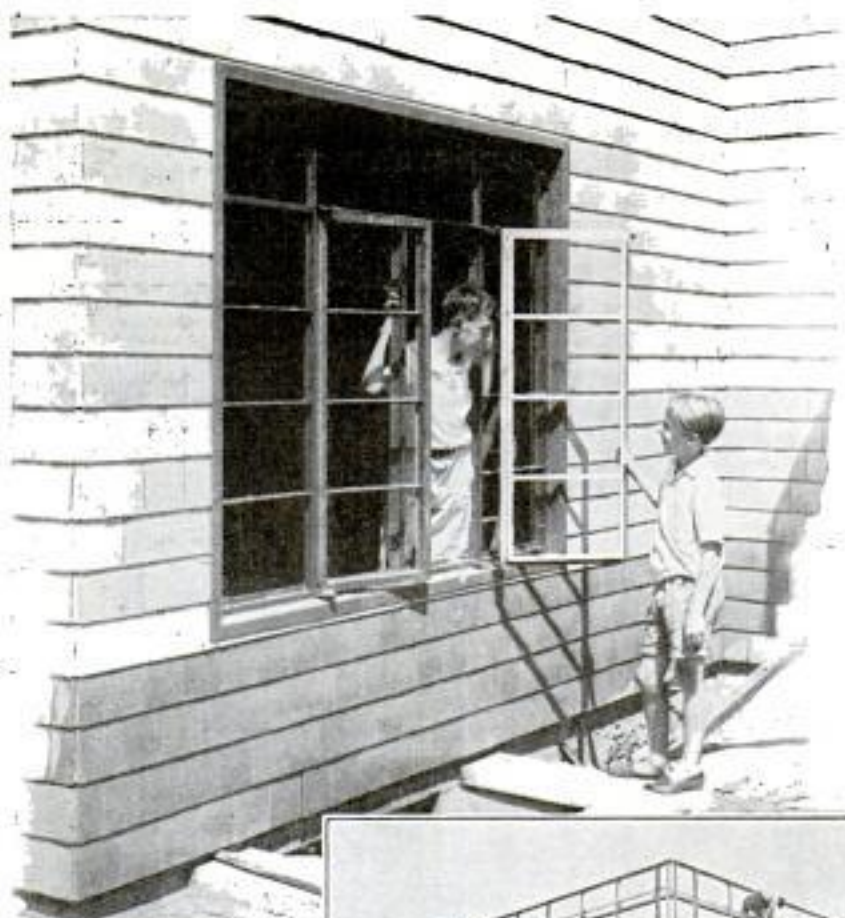
house in the world. It may become a monument to a new era in home building, one which disproves the statement that "it's not the first cost, it's the upkeep." The framework of the house is of structural steel, erected on a standard type of foundation. To the steel frame, wood nailer strips are attached by bolts, and to these, a layer of insulating material is nailed. This layer consists of an inch-thick sheet of sugarcane fiber sandwiched between steel plates. Floors are laid on steel joists, supported by steel beams and incorporating a wood nailer strip along the top edges. Windows are of the steel-casement type set in sheet-metal frames which are fastened directly to the structural-

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six by six inches of exposed porcelain surface. They are backed by a layer of asphalt-felt roofing, which extends upward for about nine inches. The shingles, which come in thirty-six-inch units, are attached directly to the steel-sheathed insulation layer by means of ordinary nails passing through the asphalt felt and through holes in the metal. The asphalt felt forms an additional insulating and waterproofing layer beneath the outer wall covering. Sidewall shingles have barbs bent so that they hook beneath the asphalt strip of the layer below. This holds the lower edges snugly against the wall. The roof shingles have no barbs.

steel studs. So far, the house is much like others. But from that point on, new ideas appear. The outside walls and roof are covered with porcelain-steel shingles recently developed. The porcelain layer, baked to the steel base, is practically everlasting. It is easily kept clean, and requires no periodical refinishing. The coating covers both surfaces and edges of the shingles. Any color within the range of porcelain making can be produced. The pioneer house at Cleveland has walls of a shade of buff sandstone, with a three-foot green strip about the base, and green at the top beneath the coping. The roof is in three shades of brown. The shingles each have about



Tests have indicated that the porcelain-steel material will withstand any degree of heat or cold that may be encountered, and that the porcelain surface is not easily dam-



Top, the Window Casements Are Made of Steel; Center, the Structural-Steel Framework; Below, the Porcelain-Steel House Almost Completed

B1559

aged. A .22-caliber rifle bullet, fired into a shingle from a distance of ten feet, broke the enamel from a circle less than an inch in diameter, and this only where the steel base was bent inward by the force of the impact.

The porcelain idea has been carried inside the house, porcelain-enamel tile being used on the bathroom and kitchen walls and in the first-floor lavatory. On other walls, a conventional plaster finish has been employed. It is applied to plasterboard nailed to wood strips attached to the steel frame, on the walls, and to metal lath on the ceiling. Asbestos-wool insulation is used between wall surfaces.

In addition to the novel uses of porcelain, the house has several other distinctive features. It is of Georgian architecture, with a large chimney at each end. One of these is pierced by a window. In addition to its structural-steel frame, the downspouts are carried inside the walls.

By employing porcelain on all exterior surfaces, the builders believe that they have created a residence that has unusual durability. It may prove to be the pioneer "hundred-year house" of tomorrow. Already, porcelain-steel shingles have been used to a considerable extent for gasolinestation roofs, with promising results.

Because it will be possible to erect a porcelain house at a considerably lower cost than one of brick or other material of comparative durability, the new type of construction promises to become popular with the small-home owner. Although the pioneer house at Cleveland cost about \$15,000, refinement of the methods of construction will lower this amount considerably. Shingles and other parts, being made in the factory, can be turned out by mass-production methods, with resulting savings.

Originators of the porcelain shingles believe that one of the biggest fields for them is in the reconditioning of old structures. A house that shows its age and yesterday's style can have its appearance changed completely and permanently by the application of porcelain shingles directly to the weatherboarding and old roof base. A layer of insulating material can be added before application of the shingles, if desired. The cost of such a transformation will not be great.

IRON ELEPHANT RUN BY MOTOR IMITATES REAL ANIMAL



Robot Elephant Run by Five-Horsepower Motor; It Imitates Motions of a Real Pachyderm

Paris is being amused by the lifelike antics of a robot elephant, the invention of a Frenchman. The dummy animal is almost as large as its living counterpart and its motions are controlled by a five-horsepower motor. It is able to imitate faithfully the lumbering movements of a real pachyderm, to the huge amusement of both children and grown-ups.

Keystone
M. Marcel Durvich
algeria d'acclimatation
Paris, France

RUSTING OF STEEL PREVENTED BY PRODUCT OF WOOL

For keeping steel surfaces bright, a less expensive substitute for petroleum grease has been found in lanoline, a waste product of the woolen industry. Tests have shown that pieces of steel, coated with crude lanoline and turned once a month in a dry unheated room, showed no signs of rusting. Pieces similarly treated and stored in an ammonium-nitrate shed withstood corrosion for three years. In contrast to this, other pieces, cleaned and dried and covered with mineral oil, rusted completely in from one to six months.

Emb. Dr. MacBeyne
J. Brunson
Sirave, Pennell, Eng
Tested by National Physical Laboratory, London, Eng.
Copyrighted Material



Small Dirigible of Semirigid Type Which Is Able to Land under Its Own Power without the Assistance of a Ground Crew

DIRIGIBLE THAT LANDS ITSELF WITHOUT AID OF GROUND MEN

Without the aid of a ground crew, a new dirigible of the semirigid type will be able to land under its own power by means of an unusual method of control. To prove his claims, the inventor built a thirty-three-foot model, weighing about 100 pounds, and after putting it through a series of difficult maneuvers, brought the ship down with no outside assistance, and without the discharge of gasoline or water from the ballast tanks. Steel wires and braces are used in the interior construction instead of structural metal, and a circular tunnel running from the nose to the tail of the craft is said to lessen wind resistance. Two 1.36-horsepower motors propelled the balloon during the tests.

*Shad Rose,
Tested at Van Nuys,
Calif.*

White House

Stone Service 9/9/32

TREE RINGS HELP TRACE AGE OF INDIAN RUINS

Tree rings, whose form and size have been influenced by the varying weather of New Mexico hundreds of years ago, are helping trace the history of the ancient Indians by setting the dates of Pueblo ruins. Since the weather was different in the two states, the tree-ring calendar worked out by Dr. A. E. Douglass, of Arizona, could not serve for New Mexico, so a new calendar was built by W. S. Stallings, Jr., dating back to 1200 A.D. This is far enough to date the ruins in the golden age of the Rio Grande Pueblo Indians.

Laboratory of Anthropology Santa Fe, N.M.

**B154
SOFT-DRINK STAND LIKE BIG LEMON**

Shaped and colored to look like a lemon, a roadside stand in California advertises the soft drink dispensed by its youthful operators. To approaching motorists, the stand resembles a giant lemon and no sign is necessary to inform them what beverage is being served.



Yes, Lemonade Is Drink Sold at This Odd Shaped Stand

Owned by Jackie and Eddie McMerney

Copyrighted material

B71558

The London Electrotype Agency, Ltd

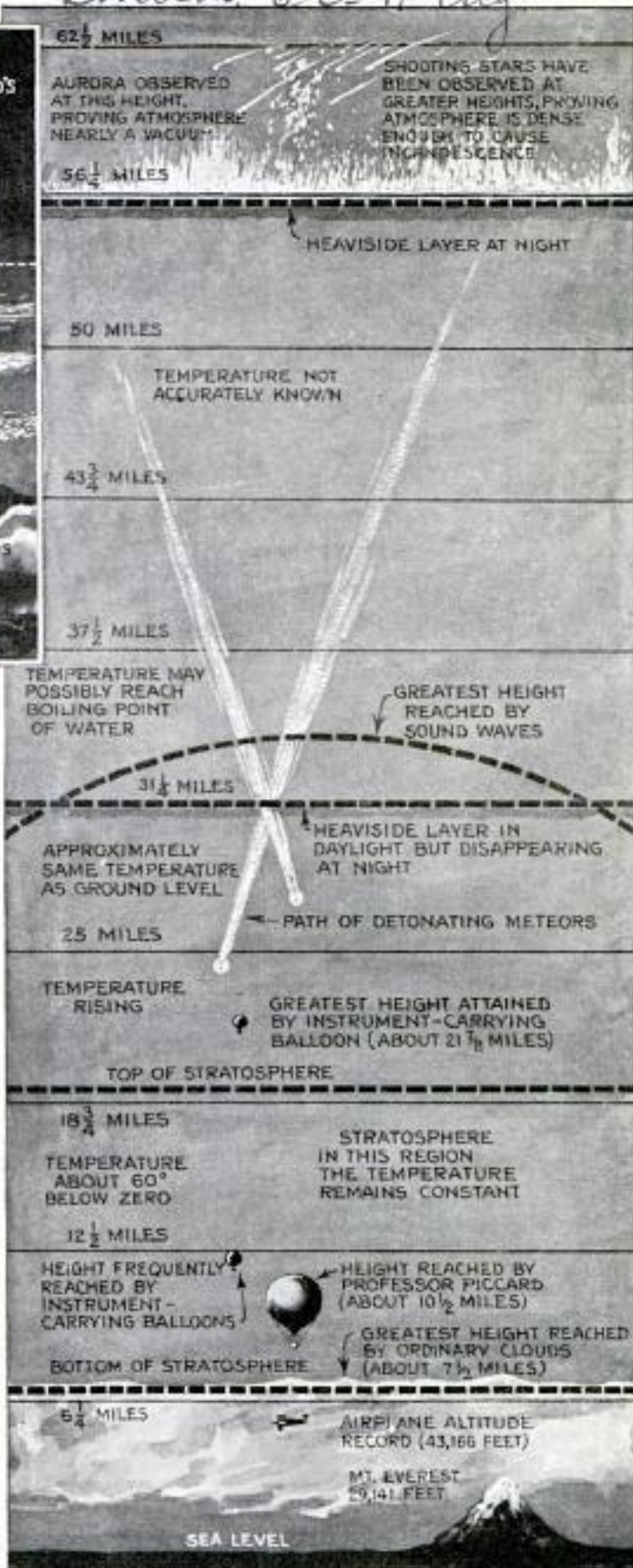
POPULAR MECHANICS

693

10, St. Brude's Av. Fleet St

What Exploration of the Upper Air Means

London, E.C. 4, Eng



When Prof. Auguste Piccard, of Brussels University, made his second balloon ascent into the stratosphere from Switzerland, last August, to study the cosmic rays, he reached the greatest height ever attained by man, but he did not approach the heights to which instrument-carrying balloons have gone. Nor did Professor Piccard much more than penetrate the layers of upper air about which man knows many facts and surmises others. The accompanying illustrations compare the height attained by the scientist with those of clouds, mountains, the greatest altitude attained by an airplane and the distance to which free balloons have ascended. Some facts are known about the atmosphere up to sixty miles, where it is dense enough to cause incandescence, as proved by shooting stars. The temperature of the atmosphere about twenty-one miles up rises rapidly until at twenty-five miles, it is believed to be about the same as on the ground.

Brussels, Belgium

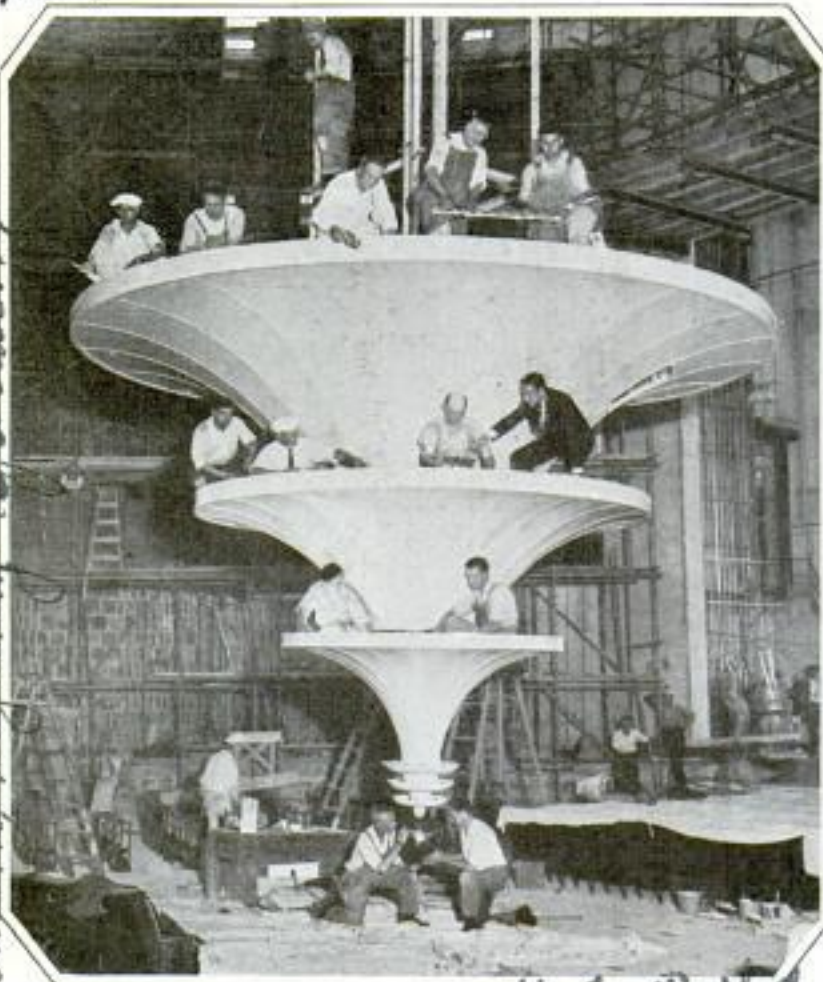
see Oct. 1932-528

Aug-1931 177

Report to American Psychological Association

69/561

installed under direction of Foster Lunnness lighting specialist



Workmen Assembling Six-Ton Chandelier Which Will Adorn International Music Hall in Rockefeller Center in New York

TWENTY-FIVE FOOT LUSTER WEIGHS OVER SIX TONS

When the ~~international music hall on the Radio City side of the Rockefeller Center in New York~~ is completed, it will boast the largest chandelier in the world. This colossal lighting fixture is twenty-five feet in diameter and weighs over six tons. One hundred men spent three months in making it and fifteen men spent a week in assembling the parts.

ELECTRICAL CURRENTS IN SKIN MEASURED BY METER

Electrical currents generated in the skin by emotion and disease are being measured by a new meter that was designed to aid in diagnosing human ills. The device registers the currents in different parts of the body at the same time, showing them to be different, as though the body were a house with the light in one room turned

Wide World
constructed to stand high pressure. The chamber is made up of a cylindrical body and a firing cap. To reload the chamber, a bullet is securely inserted into its front end, and a blank cartridge is then placed inside through the rear. The firing cap is next screwed into place back of the chamber. When so assembled, the chamber is loaded into the rifle and fired as any other cartridge. This ammunition solves the problem of medium-range target shooting and is accurate up to 200 yards.



Reload Chamber to Give Reduced Power to High-Power Rifles; Note the Method of Assembly

B1509 RIFLES REDUCED IN POWER BY RELOADS

High-power rifles can be used, where reduced loads are desired, by employing reload chambers

B1603

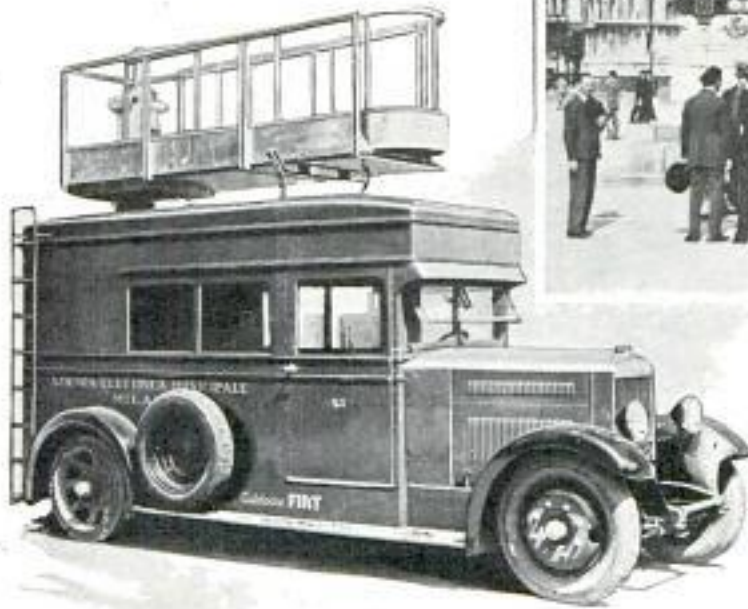
Chicago
Ernest W. Harrow Institute for Juvenile Research, 907 A Lincoln Chicago

Up Chambers
National Arms Co. 1683 Tolson N. W. San Francisco, Calif.

B1554

TELESCOPING TOWER ON AUTO AIDS POWER LINE REPAIRS

For speeding up repairs to electric trolley and power lines, a telescoping tower mounted on an automobile is being used successfully in Milan, Italy. The mobile unit enables linemen to work without disrupting traffic or cutting off the power supply. The tower is raised to a height of thirty feet by a hydraulic jack. Oil is pumped into concentric steel cylinders, the pump being operated by a motor driven by storage batteries carried in the body of the car. An automatic clutch disengages the oil-pump drive, and, from the gallery, the lineman op-



Telescoping Tower Mounted on Truck for Repairing Overhead Cables; It Is Raised Thirty Feet into the Air by a Hydraulic Jack

erates the controls to raise or lower the platform. The tower is insulated and is made of light aluminum alloy.

WORKERS GIVEN COD-LIVER OIL LOSE LESS TIME FROM JOB

Reduction in time lost from work on account of illness has been made possible by daily doses of cod-liver oil for employes of one large industrial plant. In a test, 115 women and seventy men were given one tablespoonful of the oil daily, while another group of eighty-eight women and

forty men had no oil for a four-month period. The number of hours of absence per person during the experiment was about thirteen for the cod-liver-oil group and twenty-five for the other. Ninety-six members of the oil group and fifty-two of the other group lost no time during the test. It was found 102 oil-taking employes and forty-two

of the others had no colds during the experimental period from December through March. The subjects were chosen from personnel engaged in three types of work, office, light machine and heavy machine. Cod-liver oil contains vitamin D, which prevents rickets, and vitamin A, which promotes growth and is thought by some authorities to strengthen resistance to infection.

A man at the North Pole is about thirteen miles nearer the center of the earth than one at the equator.

Lawrence and Lawrence
Constat
Co. Rochester
10/32

Pat. G. Boston
Mass. (eng)

B1596

Reported by American
Chemical Society by Arthur
W. Holmes and Madeline
R. P. K.

Science News Letter

2/20/32

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Wide World
 Workmen on Tower of the Potsdam Military Church Engaged in Repairing the Famous Chimes to Restore Tones of the Bells

E. J. Emerson
CHIMES OF POTSDAM REPAIRED TO RESTORE TONES

For the first time in many years, the famous chimes of the Potsdam military church were overhauled recently. Workmen ascended to the tower and cleaned the bells to restore their purity of tones.

B1577
THREE SUNSETS SEEN IN HOUR

Passengers flying to the Pacific coast often see three sunsets within an hour as they cross the mountain ranges of Nevada in late afternoon. The plane hurdles three lofty ridges. As it drops over each, the illusion of a sunset is provided, and climbing for the next, the sun seems to be rising again.

United Air Lines Chicago

BILLIONS YEARLY COST OF WEEDS TO FARMERS

Weeds are costing farmers of the world billions of dollars annually. The Canadian national research council found that certain types of weeds reduce grain crops by as much as seventy-five per cent, and during a three-year period, 173,302 tons of weed seed were shipped annually out of the prairie provinces with grain, this amount being equal to ninety-six trainloads of sixty cars each. In addition to the cost of shipping weed seed, it is estimated Canadian farmers lose \$40,000,000 a year due to weeds. In the United States, the loss from weeds is placed at \$3,000,000,000 a year. The principal cause of weeds is believed to be dirty seed and feed, and as a result there is today a trail of weeds right to the Arctic ocean. It has been found weeds can be controlled with various types of cultivating machinery, by planting smothering crops and employing chemical weed killers.

B1612
MEDICINE COSTS EACH PERSON SIX DOLLARS A YEAR

America's annual bill for medicines approximates \$715,000,000, or about \$6 per person. These figures are estimates made by C. C. Concannon, chief of the chemical division of the department of commerce, who believes that scientific advances in the treatment of diseases are as much responsible for the increased total of medicines purchased as is the increase in population for the rise in standards of living. Production of druggists' preparations and patent and proprietary medicines grew from \$206,000,000 in 1921 to \$277,000,000 in 1931.

Annual Convention of United Medicine

Harbour Com. Montreal 2 Aug 1931

Washington, D.C.

U. S. Coast and
Geodetic Survey.

POPULAR MECHANICS

031567
Cmt. Ray Blair
Rm. 3407, Munition
Bldg Washington
D.C.

"WILD WEST" CANYONS FOUND OFF NEW ENGLAND COAST

031613

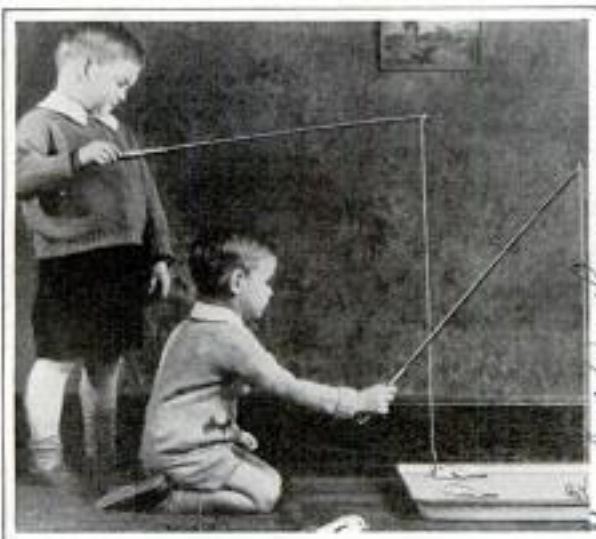
Scene Service 9/12/32

Vast canyons, rivaling anything the west has to offer, have been found in the bottom of the ocean off the New England coast by the geodetic survey. Following the discovery of an immense fissure, known as Corsair Gorge, two years ago, a survey was made which has revealed an area with such irregularity that it dwarfs by comparison anything above water in eastern North America and rivals even the grandest topographic features of the west. A preliminary contour map of the region shows a series of steep-walled canyons cut thousands of feet deep. The least of these is deeper than Yellowstone canyon and the greatest must be comparable with the Grand canyon of the Colorado. The valleys have the typical sinuous shape of river valleys as well as the branching tributaries and other characteristics of canyons cut by streams. Since these valley floors are traceable to depths of at least 7,000 feet, it is evident that at one time New England must have been a plateau at least a mile and a half above sea level.

CHILDREN CAN FISH ANYWHERE WITH LATEST GAME

031582

Children can go fishing anywhere, in lake, river, bathtub or a pail of water, with a new game. It consists of rods with red handles and hand-painted fish with rings in their mouths. The hooks catch in the rings and out comes a big one.



Here's a New Game for the Children: They Catch Fish in Any Pond with This Outfit

Holgate Bros Co
Kane, Pa



Insect Trap with Electric Light to Attract the Pests and a Fan to Draw Them Inside

FAN PULLS INSECTS INTO TRAP AS LIGHT ATTRACTS THEM

Electricity now is being used to catch mosquitoes in a tubular trap employing both an electric fan and an electric light. The tubular section is about eight inches in diameter, and has a rudder which holds it into the wind. An electric-light bulb and reflector inside a screened opening serve as bait. Behind the reflector is a suction fan. The light attracts the insects and the fan sucks them into the trap. A slanting mesh screen allows the air to escape but deflects the mosquitoes downward and into a jar of poison. A screen over the outer opening prevents larger insects from entering the trap.

STRONG RIBS IN PLANE WINGS

031575

Although weighing only a few ounces, the spruce and mahogany-plywood ribs in the wings of one type of pursuit plane can withstand a pressure of 100 pounds for each ounce of their own weight. Careful attention to stress analysis in engineering produced this great strength, which enables the planes to pull out of power dives at 350 miles per hour without damage.

Boeing Airplane Co
3300 Front St
Seattle, Wash

Zoo at Washington, D.C.

01153

Electrical Research Products, Inc.
Port Washington, L. I. N.Y.
subsidiary, Western Electric Co.

The BATTLE of



Wide World
Photos. Inc.
229 W. 43rd
New York

By MORGAN W. GIBNEY

WHEN some car of the same make and model as your own, runs away from you at the "Go" light; passes you on the open road when you're wide open, or zooms in high up the hill when you are laboriously scaling in second, you're quite apt to ask questions. And the answer is probably contained in two words: higher compression—the modern motoring magic which makes less gasoline yield more power and performance.

High compression is here. Higher compression is coming. On the drafting boards and in the research laboratories of automobile manufacturers are motors which will yield more power and more performance than any now in service—yet at lower operating cost.

All of which prompts a question: What is this high compression of which all motordom is talking? The engineer will explain it to you in terms of increased thermal efficiency and higher brake mean effective pressures. A more easily understandable picture is a comparison with a common coil spring. The tighter you squeeze that spring, the greater its potential energy. Similarly, the more you squeeze (compress) the mixture of gas in the cylinder of a motor, the greater its



Dr. J. Hartman.
Acoustic Engineer
might be General Electric
of Washington

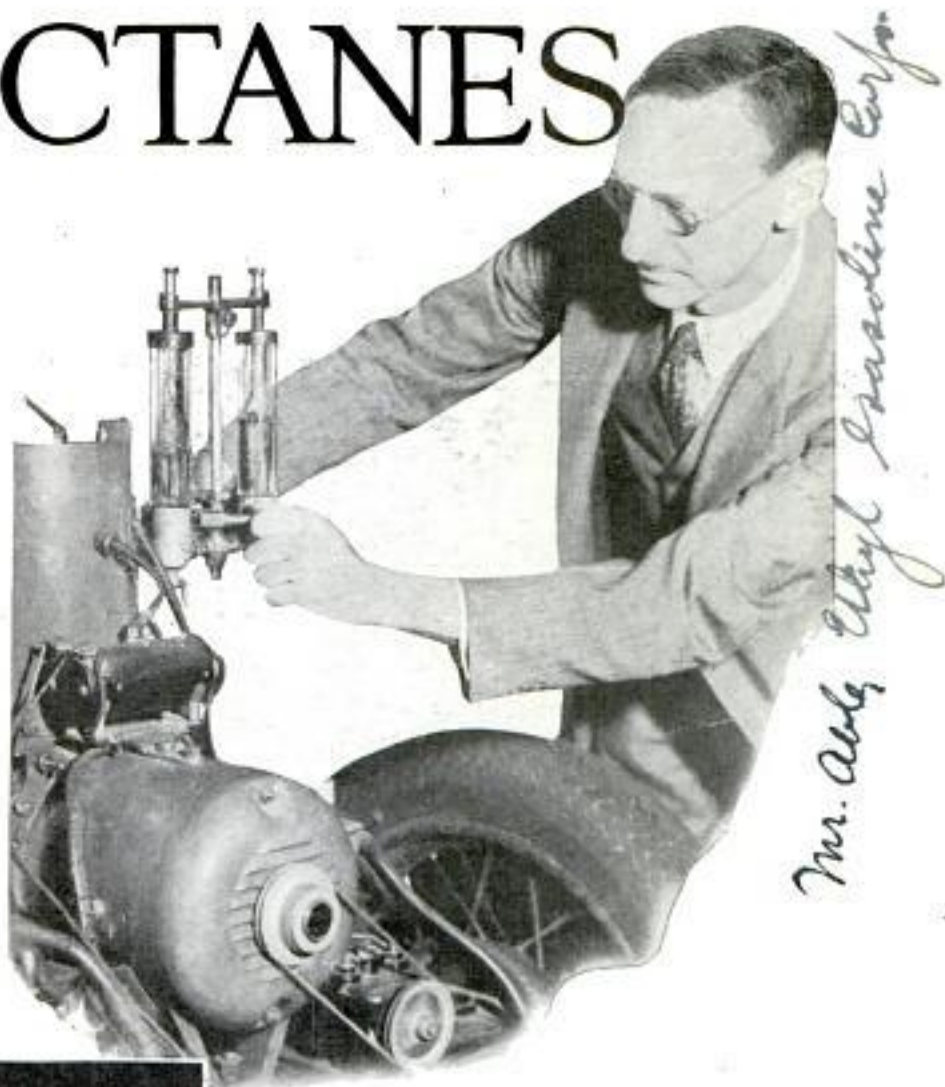
Measuring Intensity of Detonation in Engine in Hill Climb by Means of Sound Meter; Below, the Electric Ear Mounted beside the Motor

Beacon Hill
Port Washington
L.I. N.Y.

the OCTANES

effective power when ignited.

Since 1925, the horsepower of motor cars has increased, on the average, more than seventy-five per cent. Cubic displacement of motors, on the other hand, has increased an average of only fourteen per cent. Thus, it may be seen that automotive engineers have been striving to squeeze more power out of their motors without increasing their size. From an average of less than four to one a few years ago, compression ratio has increased to more than five to one for virtually all cars—and around six to one for many. Several manufacturers offer optional high-



Mr. Aubrey Ethyl Isaacson Corp.



Photographs of Combustion in Engine; Above, the Knock, Below, Even, Complete Burning of Fuel

Comparing Fuels in Test Engine to Determine Knock Characteristics

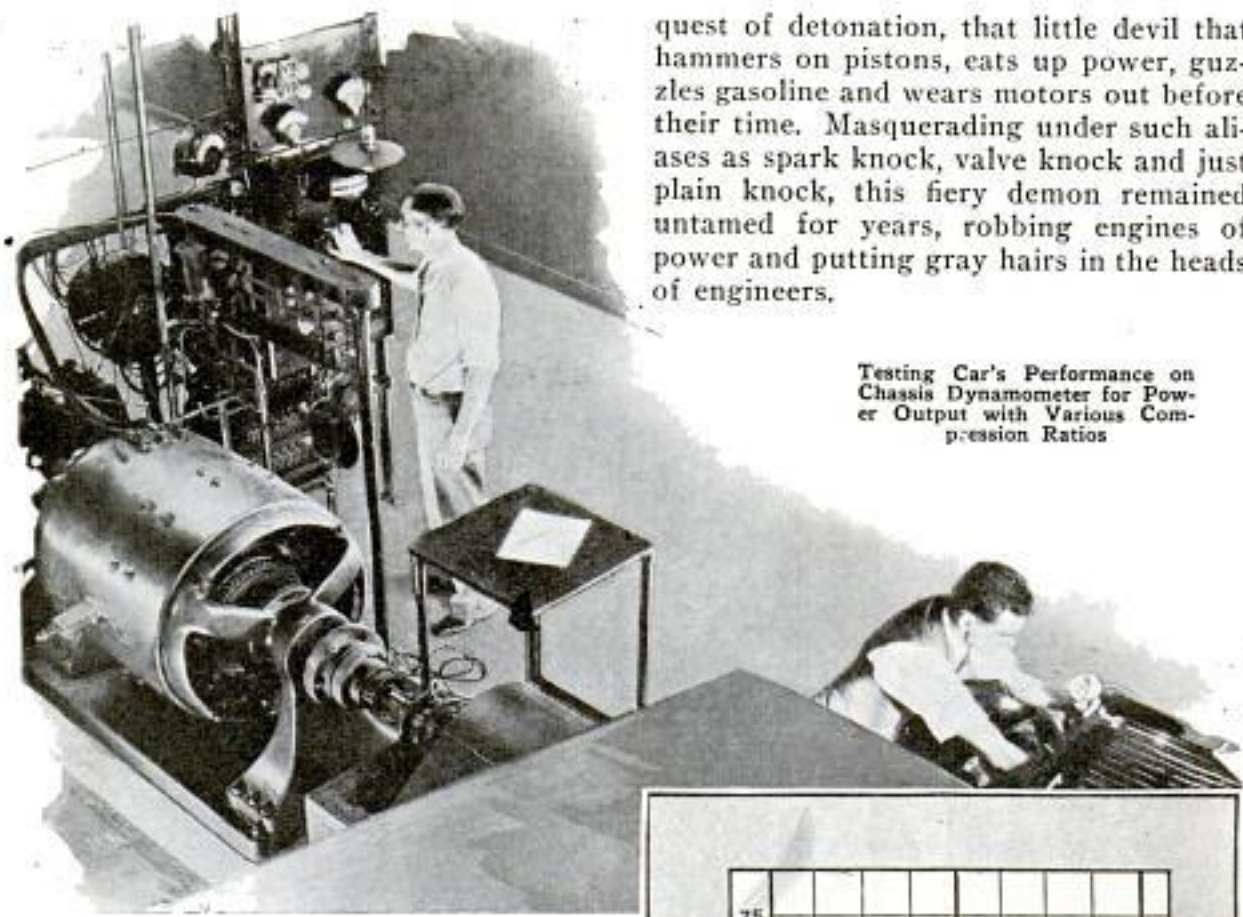
compression cylinder heads, some of them as high as seven-to-one ratio.

With these facts on high compression known, the question arises: Why haven't all manufacturers jumped to super-compression motors long ago? For the simple reason that high compression has had its problems along with its virtues. Engine roughness, detonation and the need for frequent carbon removal have been the outstanding bugbears.

Race cars have long utilized compression pressures far beyond the range of passenger cars—in some instances, ratios as high as ten to one. But race drivers are not annoyed by rough motors, they clean out carbon after every race, and they are willing to pay any amount for fuel. They are out for one purpose—to win.

You, on the other hand, would have been distinctly annoyed by motor perform-

06 11 53
700



Testing Car's Performance on Chassis Dynamometer for Power Output with Various Compression Ratios

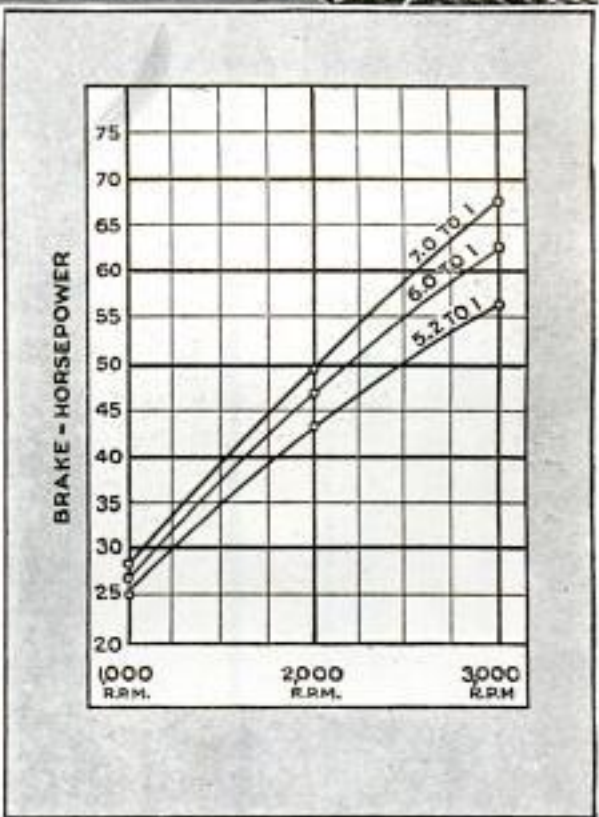
ance characteristically rough. You soon would have tired of laying up your car every 1,000 miles or so for carbon cleaning. And you would scarcely have been interested in carrying your own private supply of specially blended gasoline. So, you have had to sacrifice efficiency for better all-around motoring manners.

Now, real high compression is coming into its own. Most of the bugs have been whipped. Concentrating of engineering attention on the problems of engine design has conquered roughness, just as it conquered problems in connection with four-wheel brakes, balloon tires, silent transmissions and other seemingly formidable barriers to progress.

The need for frequent cleaning of carbon has been overcome by the development of chemical removers which, when injected into the cylinders, every 1,000 miles or so, dissolve the gum and oil deposits which act as a binder and allow the carbon itself to blow harmlessly out of the exhaust pipe.

One of the most important—and most interesting—chapters in the history of motoring progress, is the story of the con-

quest of detonation, that little devil that hammers on pistons, eats up power, guzzles gasoline and wears motors out before their time. Masquerading under such aliases as spark knock, valve knock and just plain knock, this fiery demon remained untamed for years, robbing engines of power and putting gray hairs in the heads of engineers.



Graph Illustrating Increased Horsepower through Increase in Compression Ratio

Chrysler Gasoline Corp.
Nobody knows just exactly why detonation occurs. But all engineers know how it occurs. When ordinary gasoline is subjected to high compression and a spark introduced, the gas, instead of burning

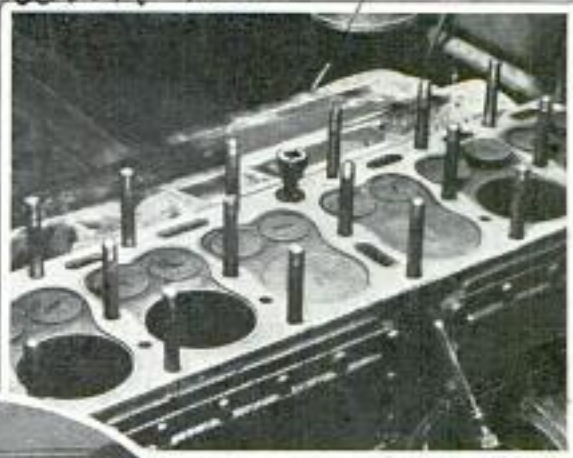
2. best. mech.

*701
St. Catherine
Ont.
Canada*

evenly and exerting a push on the piston, explodes. In detonating, a part of the potential power is delivered in a sharp rap, the rest is wasted in heat.

Some years ago, engineers began a search for something to add to gasoline which would stop this knock. In all, more than 30,000 different compounds received consideration. Finally, they evolved tetraethyl lead, popularly known as ethyl.

Imagine 100,000 molecules of gas mixture in a combustion chamber together with one tiny molecule of ethyl. That infinitesimal amount of tetraethyl lead is all that is needed to control combustion and chain the demon detonation. How does it do it? Nobody knows—not even the master minds who conceived it—but the

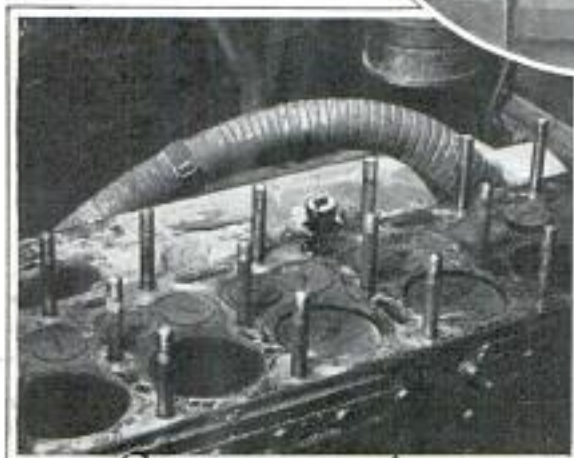


Octanes bear the same significance in rating the anti-knock qualities of gasoline as temperature degrees in measuring the heat of a summer day. The higher the octane rating, the higher the anti-knock qualities.

Octane number is not the only characteristic of gasoline which refiners

are spending thousands of dollars to improve. One refinery has spent more than \$150,000 in developing a process for removing minute traces of undesirable impurities. Before this process was developed, gasoline had to be treated with sulphuric acid, then neutralized with caustic soda, and finally washed with water, in order to remove tiny traces of sulphur, gum and other impurities.

Although the sulphur is present in only extremely small quantities, unless it is removed it will form corrosive compounds which in burning will damage the engine parts. Gums present in the gasoline are certain to result in sticky valves. The old sulphuric-acid method was unsatisfactory for the new high-octane gasoline because it removed the particular hydrocarbons which gave the gasoline such high anti-knock quality. In the new process, the gasoline, while in a vapor state, is passed through a solution of zinc chloride, familiar to most of us as the solution used as a flux for soldering. This method, although

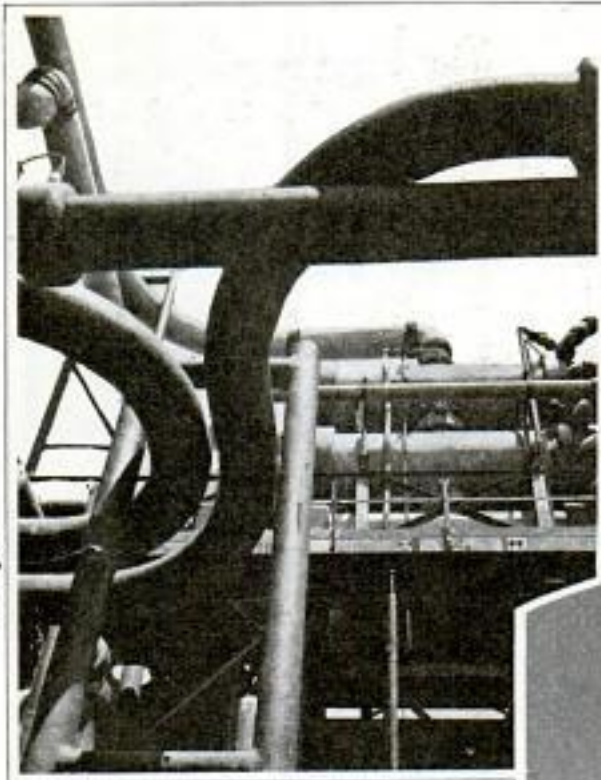


Remo. see above
Center, Chemical Decarbonizer Which Removes Carbon by Dissolving Binder; Top and Bottom, Motor before and after Treatment

fact remains that it does the job. Gasoline refiners also have increased the inherent anti-knock qualities of fuel through improved refining methods, notably cracking. Thus, automotive engineers have been enabled to design engines of higher and higher compression. With supercompression coming, ethyl and the finest of cracked gasolines are relied upon to wage the "battle of the octanes."

But what is an octane?

B1153
702



Reaction Chambers and Stabilizing Towers of Gasoline-Cracking Plant

taking out the impurities, leaves the anti-knock quality undiminished.

Various agents have been introduced to prevent oxidizing of gasoline. One literally gobbles up any oxygen which may be assimilated by the molecules of gas. Volatility, vapor pressure, distillation range and stability are other characteristics of gasoline which have received their share of attention in the campaign of research to fit old fuels to the new engines. High volatility is required for quick vaporization when the engine is cold, to give quick starting. But this volatility must not be accompanied by a high vapor pressure which will starve the carburetor by causing vapor lock in the fuel lines when the engine is heated up.

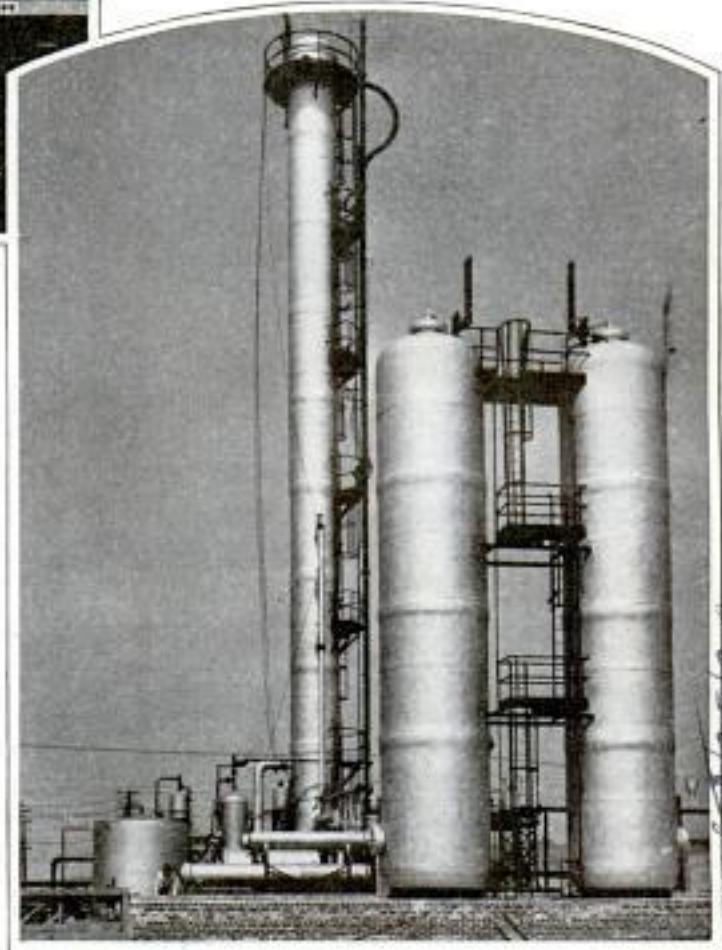
How high may compression pressures go? That is impossible to predict. At the present time, pressures vary from around seventy-five pounds to 150 pounds, according to the manufacturers. And the end is by no means in sight. Laboratory experiments indicate that it is possible to carry

compression pressures considerably higher. So the battle goes on and on, conquering today the problems which yesterday seemed insurmountable. And you, the motorist, "get the break."

B1548

HOWL SIGNAL FOR TELEPHONE WARNS IF RECEIVER IS OFF

If the receiver is left off the hook of telephones of the South African railway company, an intense, high-pitched howl gives warning. The system recently was installed to prevent a tie-up at peak-traffic hours. Another feature of the system



is a method of grouping by which several telephones in a section are arranged in consecutive order. By this arrangement, if any number in the group is busy when dialed, the call automatically is switched to the next consecutive number, the selecting switch stepping over all engaged phones in the group and establishing connection with the first idle instrument. The entire system is automatic.

Reported to Commerce Dept.
by Asst. Trade Commissioner
Wm. Wayne Es. Clark

Dept. of Commerce 72570

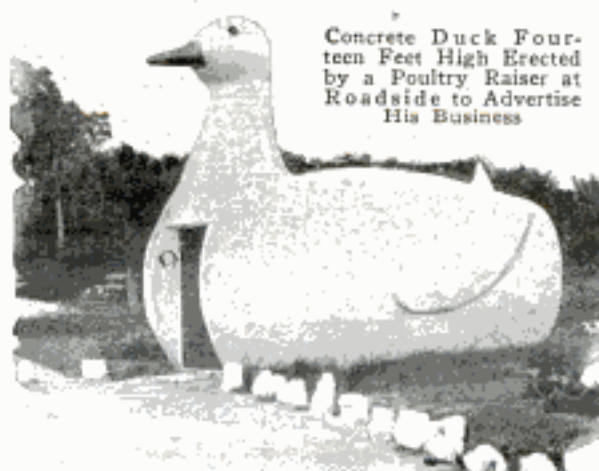
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PLANT THAT PUNCTURES TIRES IS LATEST AUTO MENACE

Appropriately called the "puncture vine," a creeping plant with sharp burs that penetrate automobile tire casings and cause punctures is spreading rapidly in the United States. From the western part of the country, it has moved east into Indiana, although it thrives best in dry regions. California is spending \$150,000 a year in efforts to exterminate the vine. The new menace to motorists is a small creeping plant, innocent-looking, but underneath its leaves are small burs that have several projecting spines almost as long and hard as tacks. One of these spines always points upward, in whatever position the bur lies, and is stiff enough to go through tire casings.

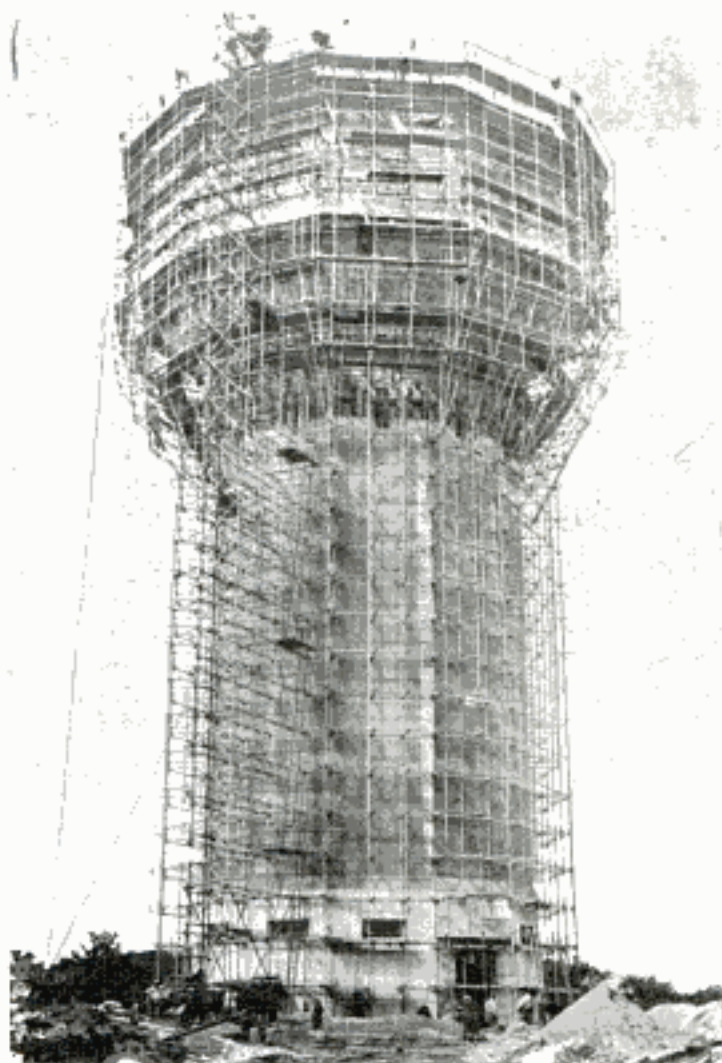
CONCRETE BIRD DRAWS ATTENTION TO DUCK FARM

Beside a road on Long Island, a huge concrete duck attracts the attention of passing motorists to a farm where these fowl are raised, and has been the means of increasing the business of the owner. The duck is fourteen feet high and contains a salesroom and office. The foundation is of concrete blocks. A framework of lath forms the outline of the bird.



Concrete Duck Fourteen Feet High Erected by a Poultry Raiser at Roadside to Advertise His Business

Maurer's Duck
Farm,
Riverhead, L.I.
N.Y.



Partly Completed British Water Tower Which Has Capacity of 784,000 Gallons and Is 162 Feet High

GIANT OF MODERN RESERVOIRS SUPPLIES ENGLISH COAST

Considered one of the largest of its type in England, Great Yarmouth's new water tower has a capacity of 784,000 gallons and rises to a height of 162 feet. When completed, it will supply water over an area along the North Sea coast from Caister to Gorleston.

RAINBOW IS CIRCLE TO FLYERS

Seen from an airplane, a rainbow appears in the form of a complete circle with the shadow of the ship in the heart of the "rain ring." Under certain unusual atmospheric conditions, it is also possible to see a "moonbow" at night from a plane. This phenomenon, which is a rather uncommon occurrence, appears in the form of a ghostly white circle.

United Air Lines
Chicago

B 1530

704

Revs. Illinois Idas 6
Toledo Ohio

B 1545

American Airways. Inc
122 54th no St New York



Passenger Getting Shave and Manicure in Aerial Barber Shop; the Service Was Tried Recently on One of the Large Airlines

FILTER RIDS AIR OF RAGWEED POLLEN

Ragweed and other plant pollen to which hay fever is attributed are removed from the air with great efficiency by an inexpensive filter made of glass wool coated with a viscous material. The filter is in the form of a loosely compressed mat in a cardboard frame and can be used in any fan system of air conditioning. The mats are twenty inches square and can be employed in a warm-air furnace as well as for force-fan room installations. Laboratory tests

tested by E. Vermin 12/1
H. Clark Chicago

Sheetop

BUSY PASSENGERS ARE SHAVED IN FLYING BARBER SHOP

Aerial passengers of the future who want to have a polished appearance upon landing need only to climb into the flying barber's chair and order a shave and manicure. Recent experiments on an airline in the United States may lead to permanent establishment of such service.

PLEASANT ODORS AID EYESIGHT AND SO DOES A PINCH

Late research has shown that a sniff of a pleasant odor improves eyesight temporarily, but an unpleasant smell or the pain of a pinch on the hand is equally effective. Back of the experiments, conducted by George W. Hartmann, of Pennsylvania State College, is the fact that the senses do not function independently of each other. In other words, there is a unity of the senses and a person crippled in one sense can replace part of his loss by greater development of the remaining ones. It has also been discovered by another investigator that human eyes are subject to unfelt jars which, like the shutter of a movie camera, cause them to see intermittently. Usually a person does not realize that his sight is being thus interrupted, and the effect is called stroboscopic seeing.

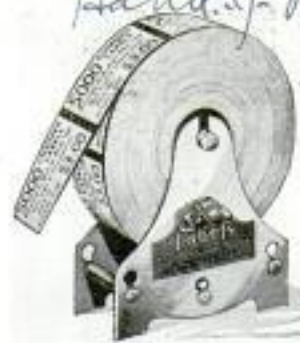
St. Louis College

Chicago Evening Post
9/8/32

showed the filter removes about ninety-nine per cent of the pollen in the air, as well as soot, dirt and other impurities. For some time, doctors have experimented with air filtration for asthma and hay fever sufferers in the belief that comparative freedom from pollen irritation for a portion of the day would give reasonable personal efficiency for sufferers for the rest of the twenty-four hours. Some tests have indicated that hay-fever victims who sleep in pollenfree rooms are able to go about their work in the daytime in comparative comfort.

B 1553

LABELS IN PERFORATED ROLLS TORN OFF AS NEEDED



Stickers and labels now can be obtained in perforated rolls from which individual slips are torn as needed. The roll fits in a convenient holder which permits it to unwind as the labels are

used. For the stickers, a moistener and holder in one unit speed up the work of attaching the gummed paper to bottles or other containers.

at meeting of American Psychological Assn.
Cornell Univ. Ithaca N.Y.

Ever Ready Label Corp
257 W 17th St
New York City.

Fred Pearson
Imp. Day

TIDES FELT SIX MILES INLAND
BY DELICATE INSTRUMENTS

Evidence that ocean tides affect the earth's crust at least six miles inland has been found by scientists measuring the speed of light in California. When delicate instruments in a mile-long experimental tube were found out of place, the scientists discovered the cause of a mysterious error in measuring light. The test tube was located six miles from the ocean. While the movement is small and could cause a mistake of only a few miles per second, the experimenters regard the discovery as significant. Arrangements have been made to study the cause and effect of the ocean's pressure against the earth's crust.

Cleveland Plain Dealer
8/20/32

MAIL KEGS TOSSED FROM SHIP
PICKED UP BY FISHERMEN

Transatlantic liners passing near the Azores use floating kegs to post the mail of passengers. Those aboard ship are invited to send postcards of scenes in the Azores to friends with the assurance that the cards will bear Azores cancellation marks. The head is removed from a small cask, and the mail is inserted, after which the head is replaced. A pole is attached to the keg with a flag at each end, so that no matter which of the keg's heads is upward, the flag marks its position in the water. The cask is retrieved by Azores fishing boats which race for the keg to win a small amount of money that is always included with the mail.



Keg Containing Mail Is Tossed into Sea near Azores to Be Picked Up by Fishermen

Cont. Felix J. Koch,
Cary and Elston,
College Hill, Cincinnati, O



Rocket Propelled by Liquid Gas and Intended for a Trip to the Stratosphere; the Missile Carries an Altimeter and a Parachute to Be Used in Descending

Mid World

LIQUID GAS TO PROPEL ROCKET
ON STRATOSPHERE FLIGHT

Liquid gas, instead of powder, is to be used to propel a large rocket made by Herr Winkler, noted German engineer, and intended for a flight to the stratosphere. It is estimated the explosion of the liquid fuel will last for forty seconds and will send the rocket upward at a speed of 265 miles per minute. At the head of the missile is an altimeter with a parachute attached which opens as the rocket descends.

MOVIE "DICTIONARY" TO DEFINE
"WOW," "ZOOM" AND "PAN"

Strange terms used only in the motion-picture industry will be given definite meanings in a guidebook proposed as one step toward standardization of the film trade. Some of the words are "blimp," "zoom," "wow," "tilt," "pan" and "flutter," and when used by the movie makers, their meaning is entirely different from that known to the person uninitiated into the mysteries of the films. In addition, this guidebook will include specifications for film, studio illumination, acoustic treatment, cameras, laboratory processes, and the like, as an aid to standardizing technical equipment and methods. A considerable saving in the making of talkies is expected to be one result.

1451

Science Service
8/16/32

Society of Motion Picture Engineers; recommend
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HUNTING

By **BOYDEN**

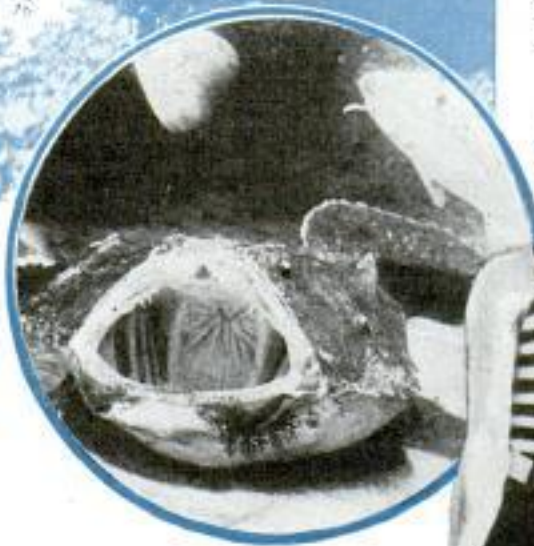


instant was doomed. Its enemy in a lunge swifter than sight seized it at the throat with jaws armed with teeth sharper than razors. Thereafter the victor swam about clutching fast until the writhing body of the vanquished eel had become limp and dead.

This fight and numerous others that have occurred in recent times at the aquarium are evi-

BEHIND the plate glass of one of the display tanks at the New York Aquarium a duel was in progress. Two killers were stalking one another. They were ferocious moray eels, each as long as a man and thick as pythons. When the sun went down, and the interested and reluctant swarms of human visitors were sent from the building, the sinuous velvety green shapes could be seen swimming with deadly deliberation, yellowish eyes afire with something that on land would be called hate. Each morning the same terrible purpose would be revealed to the first human who would hasten there to see if the fight had come to a conclusion. Hour after hour, day after day for three weeks it was the same. Then in a flash it was over.

Knowles, whose job it is to feed many of the salt-water members of the collection, told how it ended. He has seen the conclusion of many eel fights. One moray for an instant relaxed its vigilance and in that



Top, Eelpouts; Center, Fifty-Pound Angler, Mostly Mouth; Below, Vincent Astor with Two Iguanas

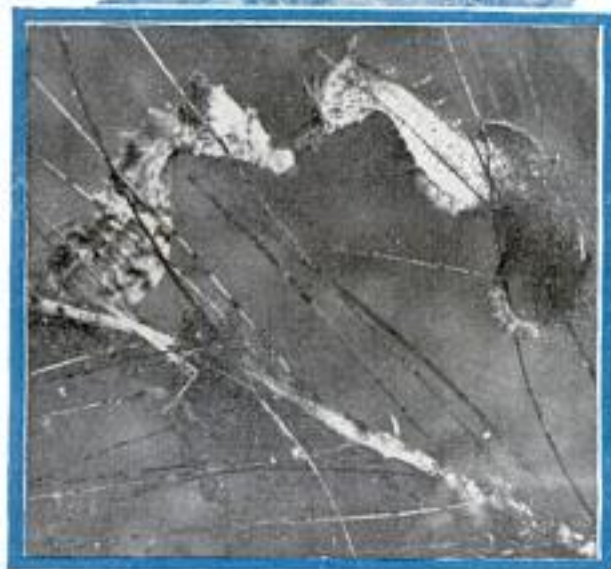
199. Puritan Ave
Forest Hills Garden,
L.I. New York

B/1055

SEA MONSTERS

SPARKES

dence of the effectiveness of the institution's control of the chemistry of the sea water in which the specimens live. Because of it the green morays fight more violently and more frequently than ever before. The squirrel fish, once regarded as among the most peaceful inhabitants of the tanks, pay tribute to the virility of the tank water by fighting as they

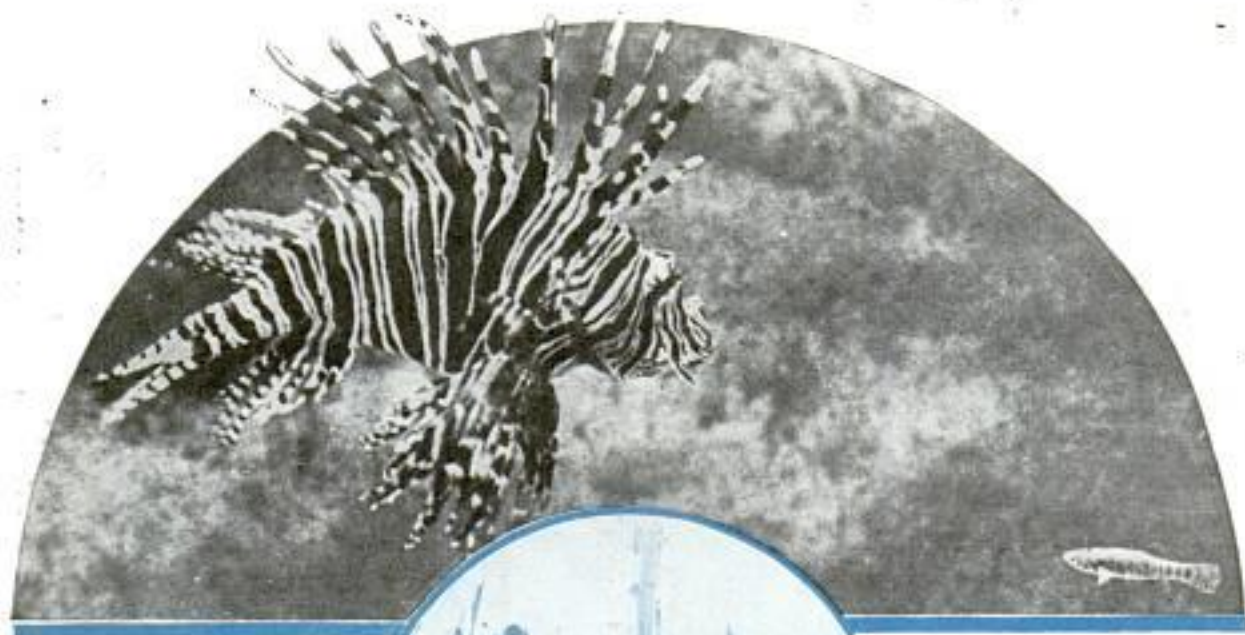


would normally in the sea. Shark suckers, once regarded as innocuous fish, abandon their dreadful hosts to attack the nightmarish, flapping shapes of sting rays. Sand sharks and surgeon fishes, in particular, have been awakened to pitches of ferocity that make it apparent that at last in these aquarium tanks they feel entirely at home. Even the big 300-pound giant grouper, sometimes called a jewfish, has been rejuvenated into the swift-striking, devouring animal he would be in the sea.

The New York Aquarium is on the edge of the harbor, but the harbor water is diluted by the fresh water of the Hudson and fouled by sewage. It is necessary to bring sea water from a point at least fifty miles from shore, and sea water by the shipload costs more than new

Top, an Octopus in Repose; Center, Hunting Food for the Tiny Sea Horses, Shown Below

Ye Alde Curiously Shops
Colman Clock, Seattle, Wash.



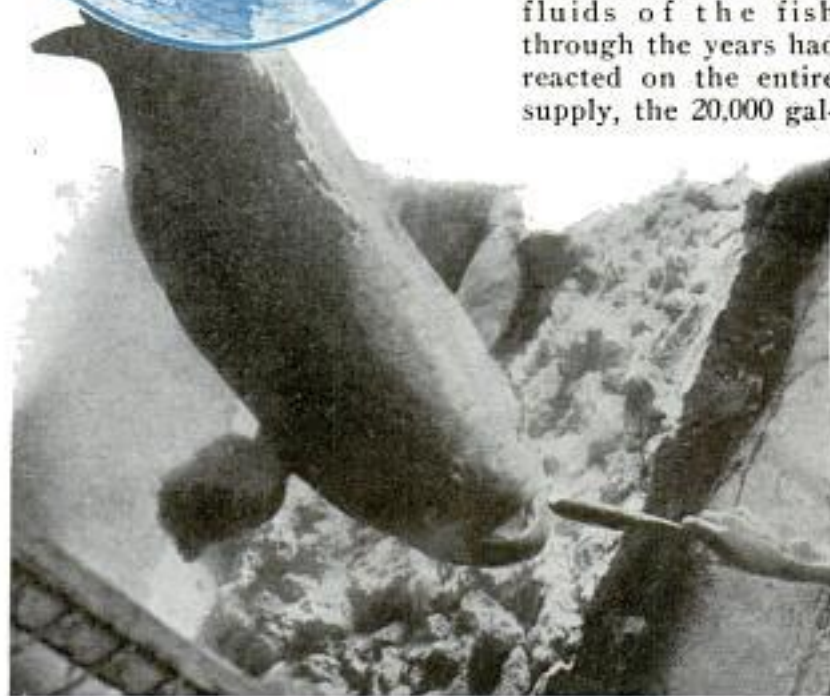
specimens. For years Dr. Charles Haskins Townsend, the director of the aquarium, has struggled to keep the valuable collection alive in a system of stored water from which only the solid wastes of its inhabitants could be filtered. Finally he determined to attack the problem with science. He assigned a young aquarist, Charles M. Breder, Jr., to abandon all other tasks and deal with this one.

Breder produced a cure. We all of us have in our veins, Breder said recently, a salt solution like that of the sea. Without its freight of corpuscles, blood is, chemically, very similar to sea water. The philosophy of many scientists includes a belief that before any life forms could abandon the sea for the land they had to develop not only lungs but a circulatory system which is in effect a miniature ocean. So Breder began by comparing the qualities of the aquarium's stale sea water and of



"fresh" sea water.

What he discovered was that the fish specimens were dwelling in a fluid that made their lives as precarious as that of human beings whose kidneys function badly. The waste fluids of the fish through the years had reacted on the entire supply, the 20,000 gal-



Top, Zebra Fish Hypnotizing Its Prey; Center, Taking Catch from Net; Below, 300-Pound Jewfish Which Ate Its Seventy-Five Pound Mate

lons in circulation and the 100,000 gallons in the reservoir beneath Battery park. All

(Continued to page 118A)

B 1438

Vraegerwerke, Lübeck, Germany

POPULAR MECHANICS

709

no U.S. agent known

"Counter Lung" to Save Submarine Crews

Miniature diving equipment intended to insure the escape of the crew of a sunken submarine has been tested successfully in Germany where the apparatus was invented. For the tests a U-boat was placed at the disposal of the inventor by the government. The device is known as a "counter lung" and fits over the face like a gas mask, while about the shoulders is a section that serves as a life belt, once the wearer has reached the surface. It is claimed that a crew can escape from a depth of sixty feet.



© New York Times

Interior of Submarine with Members of Crew Wearing "Counter Lung"; Top, Man Rising through Water after Release from Sub

Wide World
silk fabrics used in dresses and neckties so that they will not crease or wrinkle. A synthetic condensation product is introduced inside of the cotton or artificial silk strands, thus giving them elasticity and life similar to the properties of wool. The process, applied after the goods have been bleached, dyed and printed, can be used with a large number of materials, since it is inexpensive. Artificial silk of the viscose type is strengthened not only in its dry state, but also when wet, so it can be washed without damage.

Cont. Wilkins

TIES WITHOUT WRINKLES

After fourteen years of research, a British textile concern has succeeded in developing a method of treating cotton and

01513
The latest electric range roasts meat without the housewife's attention, that is, it first sears the meat at a high browning temperature and then lowers the heat to complete the cooking.

Total Broadhurst Lee & Co., Ltd. Manchester England

Wesborough Elec. Mfg. Co. Domestic Engineering Co. Pittsburgh Pa

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Double-Deck Trains Carry More Passengers



coach of equal size with the usual seating arrangement and body design. Despite the comparatively lightness, the new coach carries about one-third more passengers than the ordinary car and can also be operated more efficiently. The two-deck coach is sixty-two feet long, about two feet higher than ordinary cars, and has seats for 120 persons. Both upper and lower rows of seats are entered from one center aisle which is a trifle higher than such an aisle in an ordinary coach. Passengers step down one step to enter the lower seats, and go up one step to enter the top level. Seats are arranged in pairs facing each other, and the upper tiers are staggered with relation to the lower sections in such a way that there is a clear space above each lower pair of seats ex-



Double-Deck Railway Coach Which Seats 120 Passengers; It Contains One Center Aisle from Which Passengers Step Up or Down to Reach the Top or Lower Tiers of Seats

Double-deck day coaches are being tried out by the Long Island railroad on its short runs as a means of reducing the weight of material per passenger carried. The proportion is about one-half that of a

tending to the top of the car. Both upper and lower seats have two windows to each pair. The car is heated and lighted electrically and there is a special ventilating system.

SPEED DETECTOR TIMES AUTO ON HIGHWAY

For accurately determining the speed of automobiles traveling on highways, a detector has been devised and is in use in Connecticut. The instrument consists of an L-shaped box in which a mirror is placed at an angle of forty-five degrees to each opening, one of which points directly across the road and the other is directed toward an observer stationed at a distance. An approaching automobile, as it passes the box, makes a distinct flash in the mirror that is readily seen by the observer.

At the instant of the flash, the observer presses the starting button on a stop watch and, as the car passes the observation station, the watch is stopped. Elapsed time over the marked distance reveals the auto's speed. A base line of 176 feet has been found the best distance for judging the speed. About 100 readings can be made in thirty minutes. The device is being used to determine the average reasonable rate at which automobiles are driven at a certain point. This information, considered in relation to safety factors, enables state authorities to fix a consistent and fair speed limit.

*Statement from
Engineering of Robins
by Eno Foundation*

*Used by Connecticut
Dept. of Motor Vehicles*

B1469 Prof. Lemay H. Andrews, Johns Hopkins University
MODEL OF MOVING MOLECULES HAS STEEL-BALL "ATOMS"

Science Service 8/18/32

Steel balls, representing the nuclei of atoms, are held together by springs in models that help scientists understand the workings of molecules when a problem becomes too complex for modern mathematics. The springs represent the chemical attraction or bond between the steel-ball atoms. Shaken at various speeds by a vibrating machine, these giant molecules move practically as rigid units, indicating a state of no chemical or physical activity within them. But at certain speeds, the attached steel balls dance violently on their springs. When these speeds are reduced to their equivalents in "exciting" wavelengths of light, they are found to correspond closely to the stimuli necessary to cause the atoms of molecules to produce light rays photographed in the so-called Raman spectra, by which molecules "sign their names."

B1397
ANIMALS MOUNTED ON WOOD HELP DECORATE HOME

Combining the arts of taxidermy and woodworking, stuffed animals mounted on useful wood articles help to decorate the home. Specimens of many kinds can be combined with lamps, mirrors, book ends, clocks and the like. Branches and stumps of small trees, with the natural bark, provide a lifelike base for the mounted subjects. Rabbits, squirrels, owls and frogs are suitable for this work. Frogs are easily mounted in human attitudes are particularly adaptable to the caricature type of mounting.



Am. of Wood

Comic Decoration for Home or Office; Made by Mounting Stuffed Frog on Match Holder

The Northwestern School of Taxidermy
 Omaha, Neb.

B1426 Chicago Lighting Institute
 20 N. Wacker Drive
 Chicago



Pointer for Identifying Skyscrapers, the Names of Which Appear on the Semicircular Base

POINTER IN TOWER IDENTIFIES CITY'S TALL BUILDINGS

Visitors looking over Chicago's skyline from offices of the Chicago Lighting institute, near the top of the Civic Opera building, avail themselves of a silent guide that almost automatically points out the various skyscrapers for them. The device consists of a semicircular base with radiating lines on its surface, each marked with the name of a building and a number. Corresponding numbers appear on a vertical fin to which a pointer is attached. To locate any building, it is only necessary to place pointer and fin at the line and number on the base representing it, then elevate the pointer to a corresponding number on the fin and sight over the arrow which is aimed directly at the building it is desired to observe.

MUSIC SHORTENS PHONE WAIT FOR LONDONERS B1457

Persons telephoning a London phonograph company are provided with entertainment if there is a delay in connecting them with the party called. The company has arranged phonographs so that the caller listens to music while he waits and is thus kept from growing restless.

Cont. H. P. Getzke
 7547 Stockton Ave
 Detroit, Mich

Miracles of Precision in Formation Flying



Sketches Illustrating Various Formations Used by Army Planes in Exhibition Flying; Those Watching Such Maneuvers Marvel at the Close Formations, but a Study of the Drawing Will Show That the Safety Factor Has Been Carefully Considered in the Placement of the Planes in Each Instance

Display Prowess of Uncle Sam's War Eagles



Note How the Pursuit, Observation and Attack Planes Are Grouped in Units of Three; Eighteen Such Ships Constitute a Squadron and Fifty-Four Make a Group; Thirty-Nine of the Bombers Compose a Group, and the Close Formation of These Big Ships Make Them Appear Like a Cloud as They Pass Overhead

B/476
714

Inventor and manufacturer
H. L. Essee
15 Hancock St.
Everett, Mass. B/290



Using Wall-Paper Remover That Operates with Low-Pressure Steam

STEAM REMOVES WALL PAPER AND LOWERS COST

Operating on fuel costing eight cents a day, a portable wall-paper remover has been found practical. The machine is mounted on rubber-tired wheels so it may be pulled about easily. Low-pressure steam, to soften the adhesive, is supplied from a boiler that requires no pumping or priming. The walls are left dry and clean, ready for refinishing, and in addition, the machine may be used for house heating, drying out a room for painting, plastering and ceiling work, by replacing the boiler with a heat reflector.

SUPER-POWER MAGNET STEEL RESISTS SUPREME HEAT

Resisting temperatures to several hundred degrees Centigrade, a new magnet steel more powerful than tungsten and cobalt products has been developed in Japan. Made of iron, nickel and aluminum, the new steel is said to have nine times the coercive force of tungsten and two and one-half times that of the best cobalt magnet steels. Its magnetic strength can be varied. Magnetic stability is retained under mechanical shocks. The steel is not readily forged and must be cast to shape.

MACHINE WITH TOO MUCH "IT" PENALIZED BY THE LAW

PICTURE, if you can, a great railroad company being haled before a court of law and there being required to pay a large penalty—all because of the attractiveness of one of its turntables! Fantastic? No, some of the greatest railroads in the country are, unhappily, able to testify that it's all too true—so much so that the rule of law involved has come to be known as the "turntable doctrine." It's like this: If you maintain on your own ground a machine or other instrumentality that is attractive to young children and dangerous to them if they meddle with it, you're accountable under the law for any injury sustained by a child while playing with the machine. It's your duty to warn the children away or otherwise keep them out of the danger. Railroads seem to have a particularly hard road to hoe with respect to responsibility for their machinery. When a passenger on a train is injured by some accident resulting from the breakdown of the machinery or appliances of transportation, the laws says that "the thing speaks for itself," and takes it for granted that the accident was caused by the railroad's negligence unless the railroad can absolutely prove the contrary. While this rule of law is applied most frequently in railroad cases, it extends to any case where a machine which causes injury is under the exclusive control of its owner or operator and the accident is of a kind that does not ordinarily happen if the owner or operator uses proper care in the running of the machine. Sometimes owners of land, troubled by trespassers, set up mechanical devices to trap the unwelcome visitors. This is dangerous business, for if the trespassers should be injured by the operation of the devices, the law would hold the landowner liable. Nowhere has the jealousy of the law in the protection of human life become more manifest than in its severity in cases of so-called machine murders. Often the victim is caused to kill himself, unwittingly, by the opening of a door or the ringing of a bell. The very planning of such a killing is evidence of the premeditation that characterizes the crime as first degree murder in almost all states. Night watchmen and guards in industrial plants are sometimes confronted

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Osaka, Tokyo, Japan
B/499
The International Nickel Co
of Canada, Ltd.
Dr. T. Mishima, Asst
Professor, Tokyo Imperial University
Tokyo Japan
We start after July 1932. P. 3

Com. Chas R. Rosecrans, Jr
205 County Bldg

Com. Welkins

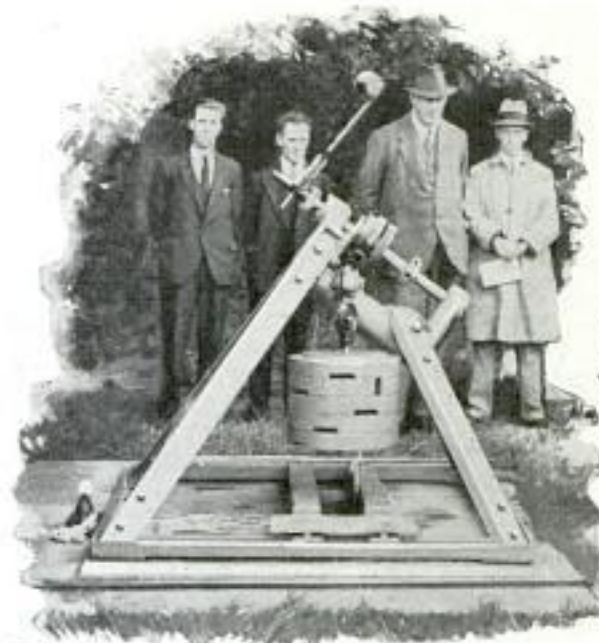
POPULAR MECHANICS

715
B1464

Media, Pa.

question of whether or not it is permissible to kill to protect costly machinery and equipment from damage or destruction. It is well-settled law that a person may use all reasonable and necessary force in defense of his property, but in no case is it permissible to take life merely for the protection of property rights. Murder by a mechanical device designed to protect personal property became a vital legal question in a case in which a man placed a spring gun in his trunk in such a position as to kill anyone who opened the trunk. He warned his landlady of what he had done, but she, out of curiosity, tried to open the trunk and was killed. The man was indicted for murder, and the court decided that he could not take life indirectly, by a mechanical contrivance, under circumstances that would not justify him in taking life directly had he been personally present. Machinery that makes life miserable for the neighbors also is likely to bring its owner to grief in the courts. You must use what is yours in a way that will not injure others.

ROBOT DEFEATS GOLF PLAYERS IN DRIVING CONTEST



This Golf-Ball Driver Hits Each "Pill" with Equal Power and Has Won against Several Champions

To test the distance various kinds of golf balls can be driven, a machine is used in England which imparts exactly the same force to each ball hit. Champion golfers have pitted themselves against the automatic driver, but they invariably lose, since the robot drives much farther than its best human opponent.

near London

TILE FOR NEW OR OLD HOMES EASILY APPLIED TO WALL

Giving color to the kitchen and bathroom of old homes, a new steel wall tile is easily clipped into place on a specially prepared board. Clips that grip the tile are arranged vertically on the board, which is placed directly over the old wall, and the joints are sealed with metal strips. Spacing of the tiles is done by a sliding motion.



New Colored Steel Tile Is Clipped on a Backboard, Applied Directly to Wall

IDOL OF "GOD OF THE FLAYED" FOUND IN MEXICAN CACHE

A cache of rare idols has been found twenty-five miles northeast of Mexico City. The most curious object is a hollow clay idol of Xipe of half human size. Xipe is a gruesome god, thought to have originated in Oaxaca, who is always represented as wearing the skin of a human victim. He was associated with various ancient agricultural rites, and during the yearly festival in his honor, men who had taken captives in war, sacrificed them, flayed the bodies and wore their skins during the ensuing month. There were six cylindrical three-footed pots with lids, nine inches high, beautifully decorated with incised and colored designs representing plumed-serpent motifs typical of Teotihuacan. The find also included smaller idols, pottery, beads, and other objects.

near Toltec city of San Juan Teotihuacan

Aswald Line, Royal Ethnological Museum, Stockholm Sweden

Chicago. W. L. Van Lane Co. 48 S. Dearborn St. Chicago, Ill.

Columbia Enameling & Stamping Co. 1111 N. Dearborn St. Chicago, Ill.

Int. un. Ni

Chicago. W. L. Van Lane Co. 48 S. Dearborn St. Chicago, Ill.

OB1258

Com. Joseph H. Mountain
2739 Glenwood Ave
Los Angeles, Calif

Sales Dept. Union Oil Company of California
Union Oil Bldg Los Angeles Calif

Taming the INVISIBLE



your hand, then notice how rapidly it evaporates. As long as it is imprisoned in the liquid form, gasoline is powerless to commit any crime, but at ordinary temperatures, it is impossible to keep the giant in his box.

Gasoline vapor must be combined with many times its weight of air in order to be explosive. A mixture containing from one to six per cent gasoline vapor in ninety-nine to ninety-four per

Left, Basket and Pail with Tight Cover, a Safe Device for Home Dry Cleaning; Below, Dipping Cigaret in Gasoline without Starting a Blaze



GASOLINE will not burn! A cigaret plunged into a dish of gasoline will be extinguished. A white-hot piece of metal may be quenched in a tank of kerosene

without danger of fire. A flaming match may be extinguished in liquid oil with perfect impunity. Yet, during 1930, damages amounting to \$14,300,712 were caused by fire from petroleum and its products in the United States.

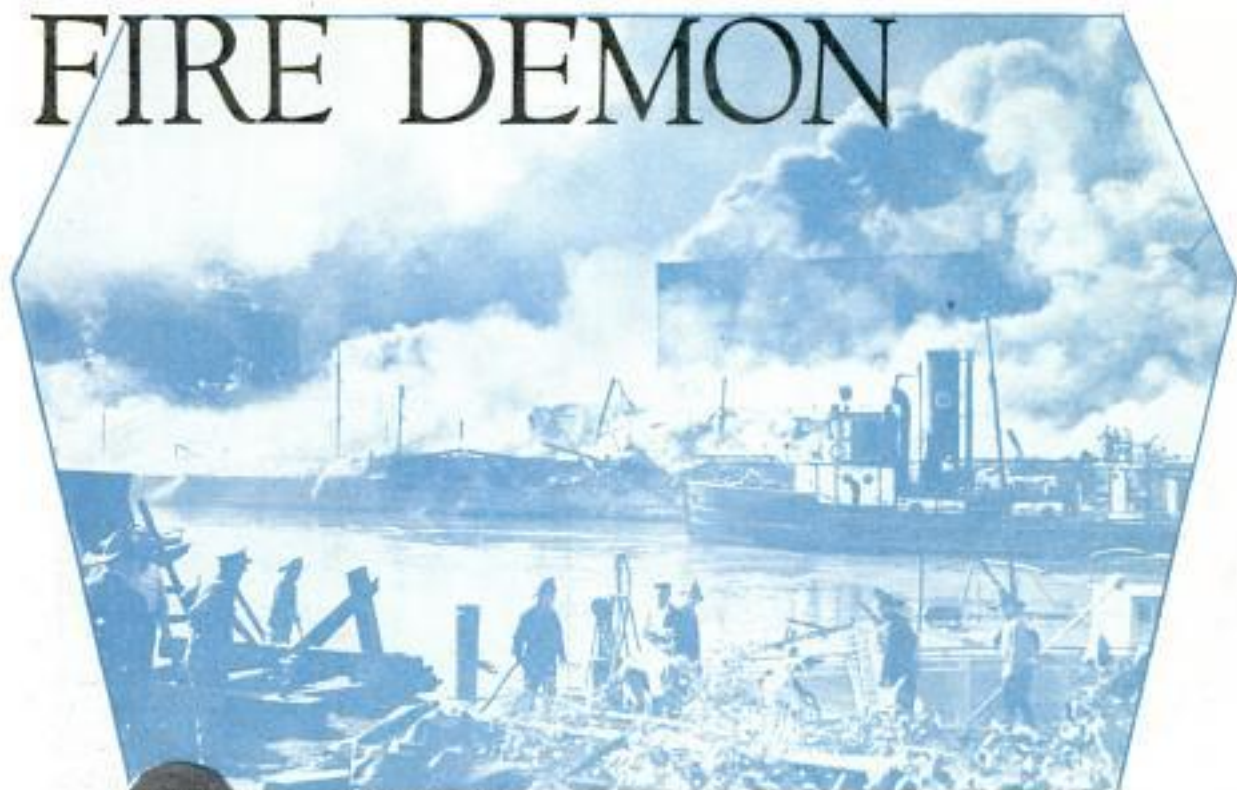
Gasoline has been called "a giant in a box." While he is in his box—the liquid state—he is comparatively harmless. But he is always trying to get out. Like the famous Jack-in-the-Box, he pops his head out as soon as the lid is lifted. The gasoline giant is the vapor it gives off. Pour a few drops of gasoline into the palm of



cent of air becomes a giant with a tremendous wallop. Although invisible, this mixture, when confined in a tight vessel, has the destructive power of dynamite.

Because gasoline vapor is ignited by any open flame, spark, or other high-temperature source, every effort must be taken to

FIRE DEMON



Disastrous Fires Like This May Be Started by a Spark Igniting Gasoline Vapor



Center, Handling Kerosene Out of Doors; Below, Gasoline Vapors Ignite at Ordinary Temperatures

get rid of this vapor. Gasoline containers, such as tanks for stoves and lamps, should be filled out of doors where vapors will be carried away before they can collect to form an explosive mixture. Motorboats, automobiles and airplanes should not be serviced in boathouses, garages or hangars, unless precautions are taken to keep a through-draft which will blow out the vapors rapidly. Home clothes cleaning with gasoline or cleaning fluid should be done out of doors.

Small tanks and drums should be filled with water as soon as they have been emptied, in order to force out the gasoline or oil vapors. Failure to do this caused a ship's carpenter several weeks in the hospital.

"The carpenter wanted a tub to wash his clothes in," said Captain Grano, master of the ship in which this accident happened. "He took an empty gasoline drum and started to cut it in two with a cold chisel. Well, the chisel on the steel side of the drum made a little spark which exploded the gas inside the drum. He didn't need any tub to wash in for a while!" But the skipper told of another more serious explosion from the same sort of cause.

"We used to wash down the insides of

B1258



Placing a Lid over a Flaming Skillet Quickly Smothers the Blaze; Below, Right and Wrong Ways to Prevent Gasoline Fumes from Collecting in Motorboats

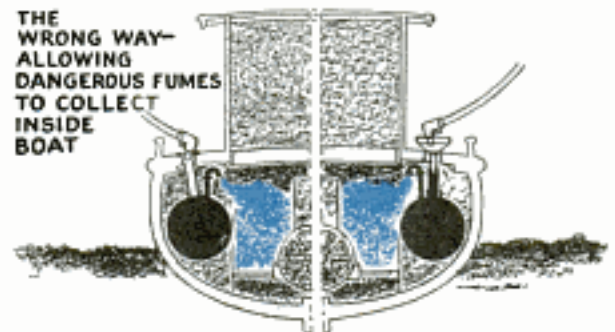
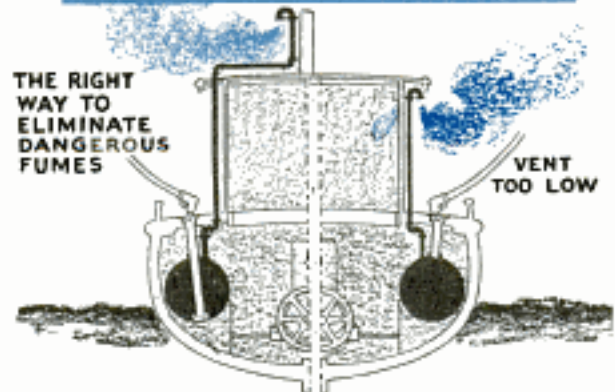
below its flash point, the temperature at which it gives off enough vapor to form an inflammable mixture with air. If ordinary gasoline is cooled below zero Fahrenheit, a burning match may be plunged into the liquid without igniting it. Fuel oil and kerosene have flash points somewhat above ordinary room temperatures so



the tanks with a hose, to reduce the danger of the vapors when we emptied the tanks," he said. "Once a green sailor was sent into the tanks to wash them down. He was warned to use a brass nozzle on his hose because one of steel might cause a spark which would ignite the highly explosive gases in the empty tank. Instead, he took a steel nozzle, and no sooner had he gotten into the tank than he dropped it on the bottom. A spark resulted and the ship trembled and shook with the force of the explosion which wrecked her."

Like the "empty" gun, the "empty" tank is the most dangerous. Several boys were playing near some empty gasoline drums in a dump near a city in Oregon. They built a fire near the drums. It was not long until a spark found its way to the vapor from the drums, or perhaps the breeze drifted some of the gases into their fire. The drums exploded, one after another. Two of the boys were seriously injured.

But what of the stories of quenching lighted cigars in gasoline and burning matches in fuel oil? These experiments may be performed, but should never be attempted except under laboratory conditions where all temperatures are under careful control. They depend on keeping the material



must be heated before they can be ignited. No fire can burn without oxygen. If you can find a way to deprive a fire of its oxygen, the most persistent flame will be

B 1481

extinguished. The giant, even though out of his box, will be smothered. Never use water on an oil or gasoline fire. The oil or gasoline will float on top of the water, and the result will be a spreading of the fire. Unless you have a suitable foam extinguisher, use sand, a wet blanket or some other means of smothering the blaze.

Make certain that fuel tanks in motorboats, and such craft, are installed in accordance with the recommendations of the National Fire Protection association. Although the tanks must have vent pipes to discharge the vapor when filling, and to allow for breathing, these pipes must be in positions which will allow them to carry the vapors out of danger of ignition. Filling pipes should be tightly connected to the tanks so no vapors can escape into the interior of the boat. Funnels should be grounded to the tanks so that danger of a static spark is eliminated.

In general, when handling gasoline, kerosene, fuel oil or any other petroleum products or inflammable or volatile liquids, take every precaution to keep fumes and vapors dissipated or under control, and keep all open lights, flames, sparks and fire of all kinds away.

B880

HOLDER FASTENS KEY IN LOCK TO PREVENT BURGLARIES

Gripping the key in the lock so that it cannot be turned or pushed out of the keyhole from the outside, a safety holder has been devised to prevent burglaries. When the door is locked, the holder is placed in the lower part of the keyhole with a hooked end slipped over the open end of the key. A spring holds the key in the hook so that it is impossible to change the position of the key except from the inside. In addition, the holder can be used as a bottle opener.



Names and addresses of manufacturers of articles described in this magazine will be furnished free by our Bureau of Information.

J. W. Baldridge, Box 1063, Cedar Rapids, Ia.

ICE BOXES KEEP INSECTS COOL WHILE TRAVELING



Insect Enemies of Oriental Fruit Moth Are Shipped in Iced Boxes to Keep Them Healthy

Refrigerated containers are being employed to keep insects comfortable and healthy while traveling. The ice boxes are used in shipping parasites reared in laboratories to orchards where they attack the oriental fruit moth and other pests. The containers consist of wooden cages with a capacity of 300 cubic inches and holding about 500 parasites. The cages are packed with dry moss in a metal cylinder which is then placed in an ice-cream shipping tub filled with sawdust and cracked ice.

ANTI-KNOCK GASOLINE TREATED TO TAKE OUT GUMMINESS

To prevent gumminess, anti-knock gasoline is being treated with parabenzenylaminophenol, a substance that checks the tendency of cracked gasoline to combine with the oxygen in the air. This substance does not affect the anti-knock properties of the fuel. Successful experiments with the chemical have ended a long search by scientists for something that would stop automotive fuels from varnishing the inside of feed lines and causing trouble.

Mr. J. H. Rogers and Mr. Vanover, Rogers and Standard Oil Co.

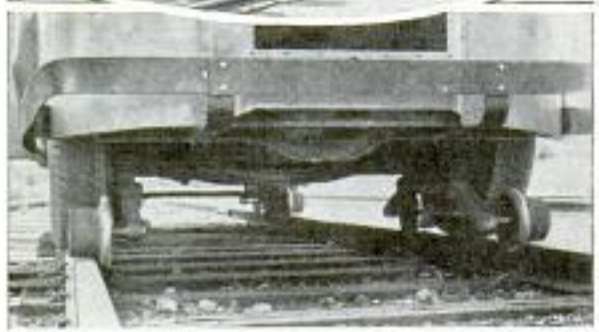
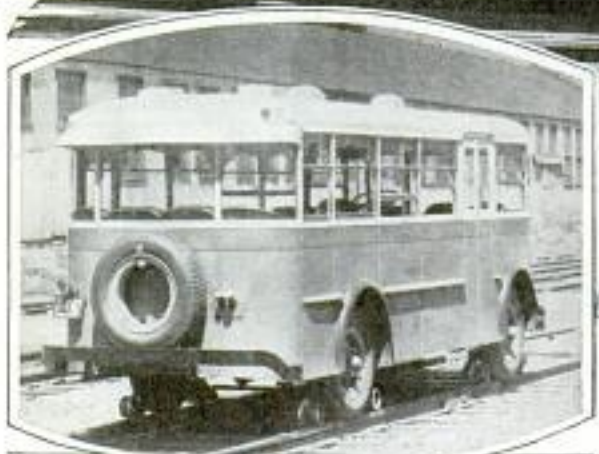
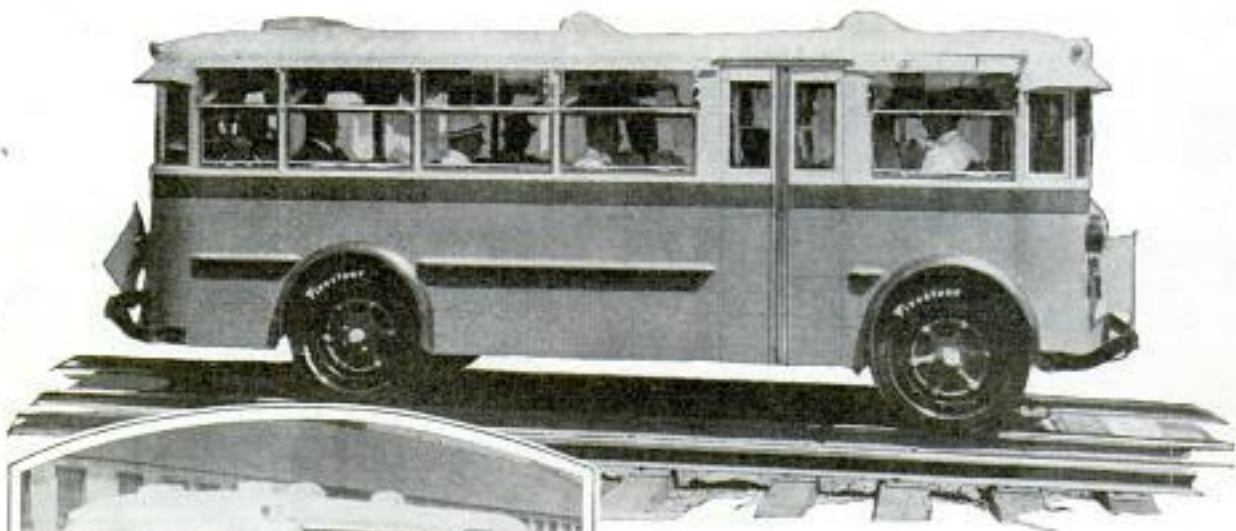
Cont. Mrs. Katherine Smith, Arlington Hall, Pennsylvania Ave. Station, Washington, D.C.

Wilmington, Del. E. du Pont de Nemours & Co. 7% Standard Oil Co. Wilmington, Del. at meeting of members of Chemical Society

B1472
720

Twin Coach Corp
105 W. Adams, Chicago
POPULAR MECHANICS

Coach Runs on Road or Rails at Pull of Lever



This Rubber-Tired Car Runs Equally Well on Rails or Roads without Change of Tires

change-over mechanism makes it unnecessary to remove the pneumatic tires used on the highway to operate on rails.

B 1479

WIPER AT WINDSHIELD'S BASE HAS DOWNWARD SWEEP

Pushing rain or snow downward so it will not run back into the cleared area, a mechanical wiper located at the base of the automobile windshield has been introduced. It is installed below the field of vision, the blades being invisible until set in motion. Tests show the wiper is especially valuable in keeping the windshield clear of snow, pushing it down instead of up as do the conventional cleaners. The action is positive and in proportion to the auto's speed. Fifty-percent increase in the space cleared on the windshield is claimed.

By pulling a lever, the driver of a new automobile bus can operate his vehicle on the highway or on railroad tracks. Transferring from road to rails, the lever action releases eight small steel-flanged guide wheels that prevent the coach's rubber-tired wheels from running off the track. One small guide wheel is provided for the front and rear of each large wheel. Another pull of the lever causes the flanged guides to disappear, freeing the coach to travel on the highway. Cost of operation on rails is estimated at fifteen cents per mile, with a speed of eighty-five miles per hour, if necessary. The coach has a capacity of forty passengers. The simple



New Windshield Wiper, Fastened at the Bottom, Keeps Rain from Running into Cleaned Area

Stewart Warner
Speedometer Corp
4828 Levee, Chicago

Cont. W. E. Stewart. Box 630, Stewart, Mo.

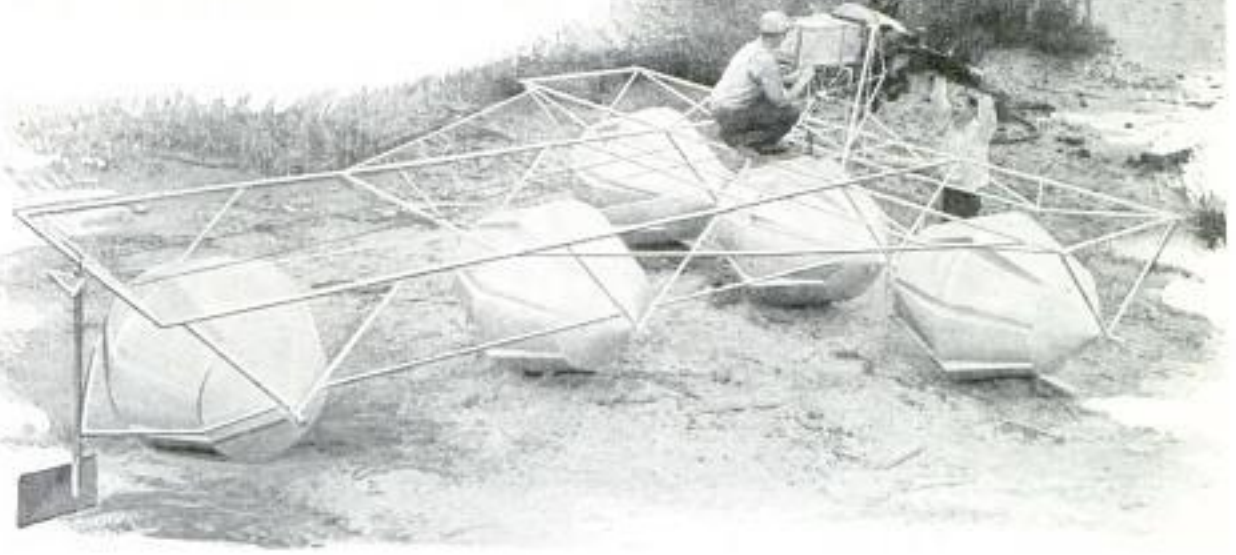
Dr. Edward S. Harris, 750 Hamilton St. POPULAR MECHANICS

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SPEED BOAT FLOATS ON DRUMS THAT ROLL OVER WATER

To attain greater speed by reducing resistance of the water, five large steel drums that are free to revolve as the craft skims



Speed Boat Equipped with Revolving Steel Drums on Which the Craft Floats; as the Boat Moves, the Drums Rotate, Thus Diminishing Water Resistance and Increasing Speed

over the surface were used for the hull in designing a new speed boat. Stability of the drums was increased by making them double-cone shaped, and indentations on their surfaces cause them to roll along the water in much the same manner as an automobile wheel does on the highway. The boat is pulled through the water by a sixty-horsepower airplane engine and propeller.

stead of relying on a big assortment of this kind, people would be healthier if they would permit the physiological regulatory mechanism within the body to protect them and to accustom themselves to the stimulating influence of cold air and winds.

EXTREMES IN WEATHER HELP TO IMPROVE HEALTH

Where marked changes in weather occur daily and yearly, the best health is found. Dr. William T. Johnson of the University of Pennsylvania says that people are healthier in such climates, but that they must become accustomed to the stimulating changes. To derive full benefit from the varying weather, people should not rely too much upon the protection of clothing, but on the protection which comes from within the body. People are temperature-conscious, Doctor Johnson points out, and they provide themselves with fur coats, overcoats, topcoats, clothing of varying weights, sandals, overshoes, galoshes, boots, sweaters with and without sleeves, and other special clothing. In

DOOR CHIME WITH TWO TONES SERVES FRONT AND BACK

Giving different signals for the front and back doors, chimes that are operated by the lighting current have two distinct tones that are easily distinguished. The caller is prevented from annoying the owner by continuously ringing the chime, because only one signal is given each time the button is pressed.



by the lighting current have two distinct tones that are easily distinguished. The caller is prevented from annoying the owner by continuously ringing the chime, because only one signal is given each time the button is pressed.

Army pilots have reached altitudes of 30,000 feet above sea level where exhaust gases freeze and form a network of streamers in the air.

flying Boeing Wash. pursued planes

National Signal Systems, 300 Vincent - 9th St. Bldg. Cleveland, Ohio

at American Congress of Physical Therapy

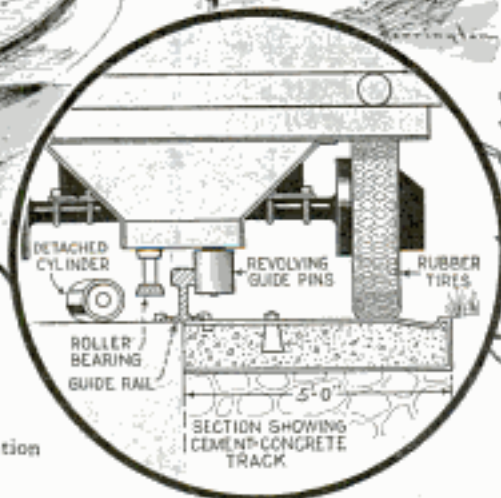
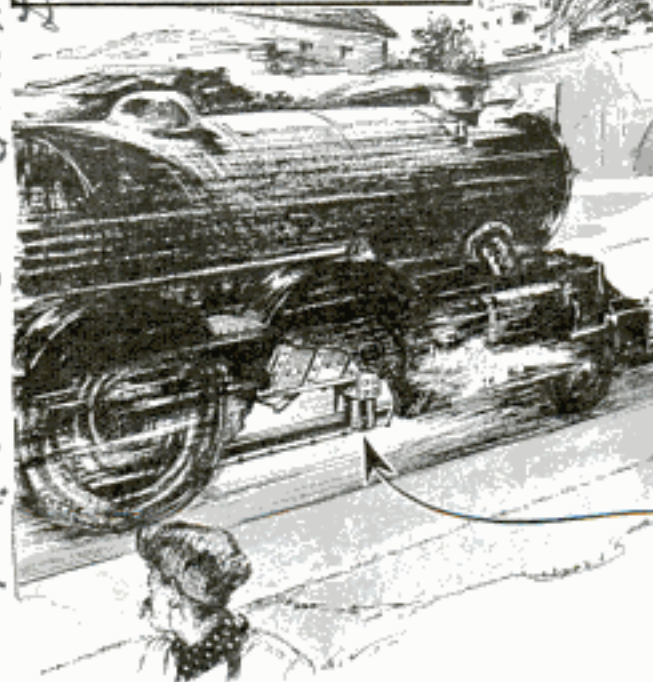
Graduate School of Medicine, Phila

B1471
722

dr. W. C. Shetton
59. Millbank
London, S.W.1, Eng.

Train Guided by Single Rail Runs on Rubber

train's motion, since the guide pins revolve on roller bearings, eliminating friction. In forest areas, the guide rail could be made of wood. A considerable saving



Top, Left, Model of One-Rail Train; Center, Artist's Conception of Locomotive; Bottom, Right, How Train Is Guided

Eliminating double railroad tracks, cross-ties and flanged wheels on locomotive and cars, a new system of operating trains introduces a single guide rail, a concrete roadbed and rubber-tired wheels. The system is designed especially for small lines, where heavy traffic is not encountered, such as feeders to main lines, and as a means of transportation for farms, mines, quarries and sparsely populated areas that are in the process of development. The roadbed is paved with concrete or macadam. Fixed to the surface in the center is a continuous single rail, which guides the train by means of pins attached to each set of wheels. These pins prevent the train from leaving the track. Flangeless wheels, to which are attached wide rubber tires, are used. The single rail carries no weight and does not retard the

is claimed for this system, in addition to the advantages of quiet operation. A large scale model of the system has been set up and operated by the inventor.

RADIO WAVES BUILD VITAMINS IN FOOD SUBSTANCES

By subjecting food substances to radio waves of the proper length, two British scientists have found it possible to cause vitamins to increase rapidly. The result is food of concentrated vitamin content. The scientists have discovered the wavelengths of vitamins A, B and D and are experimenting with C. Ultra-short rays of the same wavelength build up a particular vitamin in substances under treatment. The work is similar to treatment of milk with ultraviolet rays to enrich its food value.

dr. W. C. Shetton
59. Millbank London
S.W.1, England

Dr. C. P. Snow and
Dr. L. B. Bowden at

Cambridge
Laboratory of Physical Chemistry, Eng.

Colombie, 29. Bear Road, Berkeley, Calif. 42

and H. J. Withers, Esq.

EYEBROWS REVEAL YOUR AGE BY CHANGING POSITION

As a person grows older, his or her eyebrows change their position, sinking below the upper margin of the orbital cavity or eye socket of the skull. Prof. V. Suk, British scientist, has found that eyebrows grow closer to the eye with advancing age. He also has discovered that seventy per cent of women's brows are even, while seventy-one per cent of men's eyebrows are of the "double" or heavy, uneven type. The color of the brows has no connection with their form and is hereditary. The scientist says that long and curly eyelashes occur naturally only among children and that they are soon replaced by the shorter, stubbier adult growth.

RUBBER BOAT FOR FISHERMEN USES OUTBOARD MOTOR

To meet the needs of fishermen and duck hunters, a rubber boat that may be equipped with an outboard motor has been made in sizes large enough to hold two, four or six men. The side pontoons, which take a pressure of two or three pounds of air, may be inflated by a foot pump or even by blowing. Rubber seats, also inflated, have sufficient buoyancy to support the weight of the boat and its occupants, it is said. Easily controlled because of its raised bow and stern, the boat can be landed safely in rough and choppy water.



Rubber Boat Equipped with an Outboard Motor; It Is Easy to Control and Exceptionally Buoyant

New York Rubber Corp
Season, N.Y.



Trained Horse Tilting at an Angle to Aid Rider in Snatching a Sack from the Ground

HOW FAR CAN A HORSE TILT WITHOUT FALLING?

Unusual skill and daring are demanded of the riders in a sack race, wherein the horseman mounts his steed, races to pick up a sack from the ground some distance away and dashes back to the starting point, all within a time limit. In order to grasp the sack, the rider tilts his horse at a dangerous angle and swings himself sharply toward the ground. It has been observed that while its body may be inclined at an angle of forty-five degrees, the horse's eyes remain parallel to the ground.

OYSTERS KEEP FRESH LONGER IF TREATED IN SHELL

If oysters are subjected to a mild chemical treatment, they can be shucked more easily and will keep fresh longer, the United States department of commerce has found. The oysters are placed in sea water containing a reagent that relaxes their adductor muscle so that the shell is easily opened for removal of the meat. In addition, oysters so treated are more sanitary and keep better. The chemical also prevents growth of bacteria and spoilage organisms.

Bureau of Fisheries
Experiments conducted by Dr. O. Koehnig and Dr. H. H. Prytherch at Beaufort, N.C.

Chicago Tribune 9/6/32

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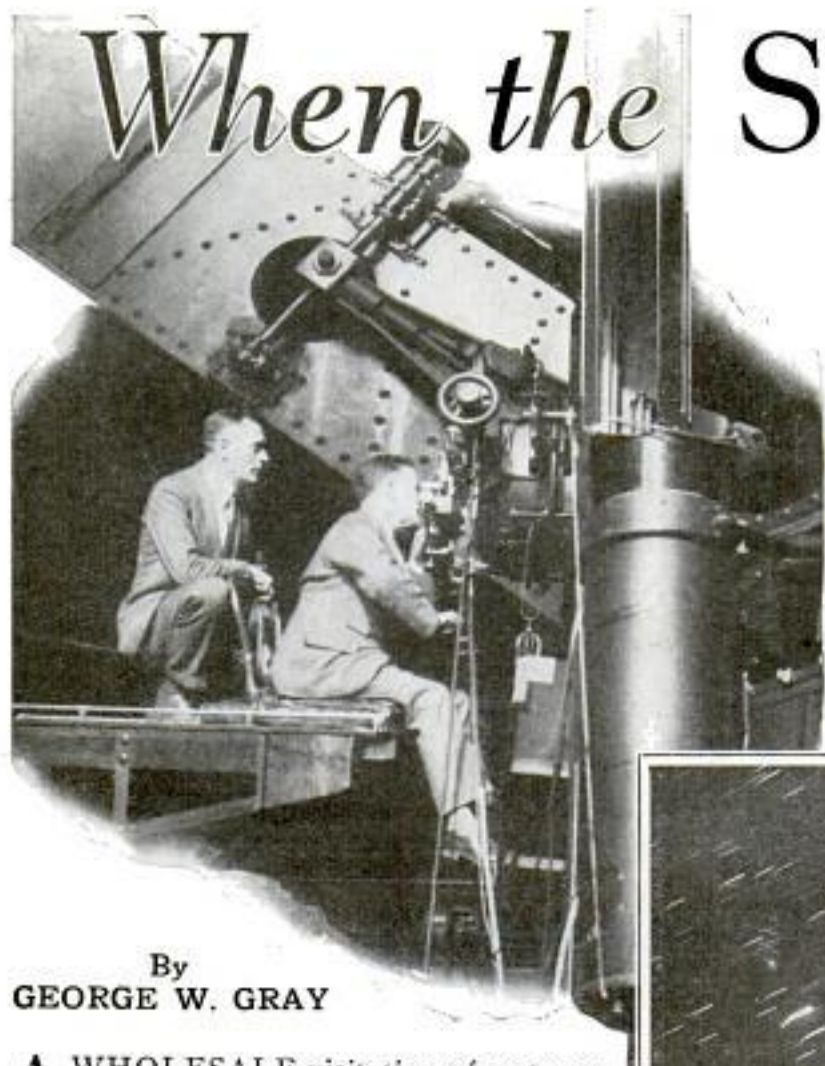
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Wald. & Co. Chicago
March 29, 1932

Bartlett 1572 W. Paris Blvd. Los Angeles, Calif.

Wald. & Co. Chicago
March 29, 1932

When the STARS



By
GEORGE W. GRAY

A WHOLESALE visitation of meteors, which promises to be the most spectacular since 1866, when "the stars fell like snow" and many superstitious folk were terrified by the sight which seemed to betoken the end of the world, is scheduled for this November.

Why does science expect a meteoric shower in November? The answer goes back to 1799. The famous explorer, Von Humboldt, was traveling in the tropics that year, and he tells in his journal how he was waked up in the early morning of November 12 to see the falling stars. For more than four hours he watched thousands of darting meteors, some as big as the moon in appearance, some the size of Jupiter, all with blazing tails, some showering sparks and many bursting like great rockets.

Thirty-four years later, the night of Nov. 12, 1833, there was another meteoric shower, just as dazzling. It was seen with especial brilliance in the United States, and two American scientists, D. Olmsted

of Yale and A. C. Twinning of West Point, noticed a fact which Humboldt had not mentioned. They saw that the tracks of most of the shooting stars came from the direction of the constellation Leo.

This hint of orderliness in the paths of meteors was a stimulus to scientific study. Astronomers searched history for records of past displays, and Prof. H. A. Newton worked out a tabulation reaching



Above, Astronomers Making Observations Through Mt. Wilson Telescope; Right, a Typical Meteor

back to the year 902 A. D., which showed that the showers from Leo occurred on the average every thirty-three years. He predicted that there would be another brilliant visitation on a night in November, 1866. And he was right.

Of course, shooting stars are not stars. Actually, they are fragments of rocklike

FALL



Top, Resilvering Reflector of Mt. Wilson Observatory Telescope; Below, a Small Meteorite

stuff, most of them mere motes, which are continually colliding with the earth. Dr. Harlow Shapley estimates that about a thousand million a day is the average fall, the majority burning up instantly as they speed from interplanetary space into our atmosphere. The larger particles last long-

er and burn more brightly, and these are the fireballs. Still more massive chunks hit the earth or plunge into the sea before they are consumed, and these are the meteorites. Only a few hundred meteorites are known, less than 400 have been found in the United States, and most of them are on display in museums.

The space through which the earth travels is, therefore, not empty. It is peppered with innumerable fragments that are continually falling. Every clear moonless night some meteors may be seen, but in November they are like a hailstorm of fire. This quickened activity is explained by the presence of a vast belt of meteoric stuff which circles around the sun in a path so situated that the earth's revolution brings us near the meteoric belt every fall. In consequence, we see some Leonids every November—those on the fringe of the belt which respond to the earth's attraction and plunge into our atmosphere at many miles per second. But the meteoric belt is not uniform; it is so made up that every thirty-three years the earth's orbit crosses its densest section, and then we pass di-

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726



Top, the Famous Meteor Crater in Arizona, Made When a Meteorite Hit the Earth; Below, a Comet and Its Trail

was expected in November, 1899, but it proved to be a rather tame performance. Astronomers believe that the attraction of other planets displaced the belt of meteors somewhat from its accustomed orbit, and thus the earth missed its usual encounter with the swarm. This year, however, planetary positions are favorable.

Not all meteors are fragments of comets. We know this because of their speeds. Comets are cousins of the earth, members of the solar system, and their speeds are strictly controlled by the gravitational influence of the sun. Twenty-six miles a second is the best the sun can do at our distance; therefore, whenever a meteor enters our atmosphere at a higher velocity, we know that it must be from the region of the stars. And meteors traveling 100 miles a second have recently been clocked! Indeed, of 6,500 meteors observed by the Cornell-Harvard Meteor

rectly through the thick of the swarm. And it is comet stuff that pelts us. Years ago the brilliant Tempel's comet traveled approximately the same path that is now occupied by the swarm of meteors. Since 1866 this comet has not been seen, and many astronomers believe it collapsed shortly after that year. Thus, it is really a cloud of debris left by it that we will enter in November, if the schedule holds.

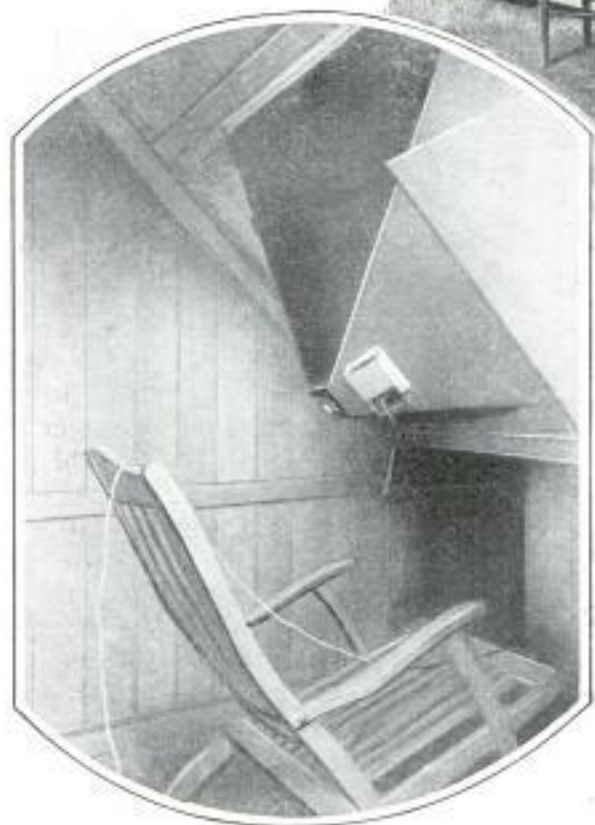
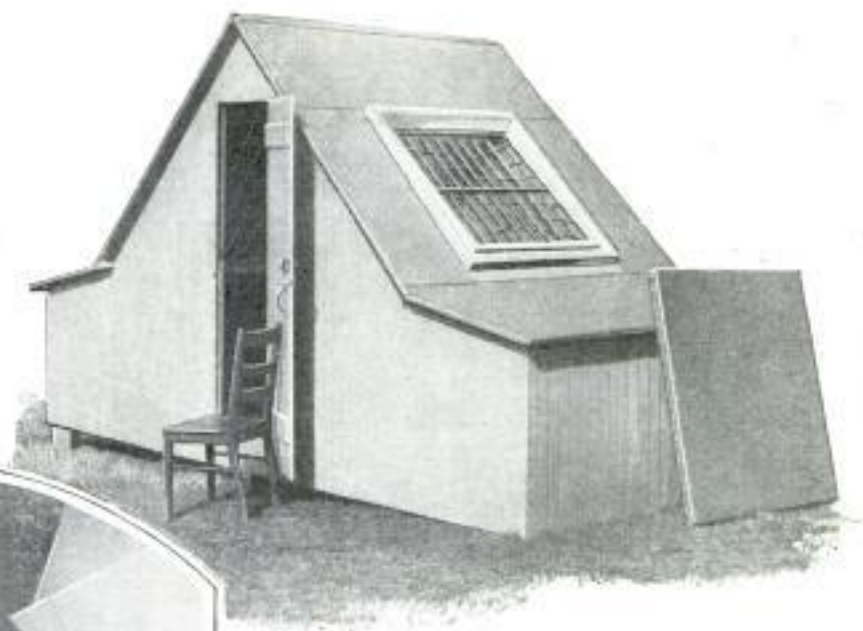
I say "if" because there is always a bit of uncertainty about meteors. A shower

expedition in Arizona last winter, more than one-fifth were traveling faster than twenty-six miles a second. On this basis, we may estimate that four out of five meteors are comet stuff, while the fifth is a sample from the Milky Way.

This Cornell-Harvard expedition sought to learn the seasonal distribution of meteors, whether there are any differences from one month to the next, and Arizona was chosen because of its steady atmosphere and high average of clear nights.

POPULAR MECHANICS

Meteors are rarely visible higher than 150 miles, presumably because the air above that altitude is so thin as to offer little resistance. Most of them burn up before they get within forty or fifty miles of the earth's surface. It has been computed that a typical meteor of the first magnitude which is visi-



Interior and Exterior of Meteor Observer's Hut; Rati-culated Window Indicates Latitude and Longitude

shortening the year. The changes are so minute, however, that in 10,000 centuries the shortening of the year will amount to only one-thousandth of a second.

In spite of this continual pelting of the earth with high-speed missiles, remarkably little damage has been done. Fortunately, the big meteors seem to steer clear of thickly populated areas and all the largest meteorites known have been found in out-of-the-way places. The largest fall of which we have any eyewitness record occurred in Siberia in a region so remote that, though the crash occurred in June, 1908, scientific details of it were not known until recently.

ble for one and one-half seconds has the energy of 4,400 horsepower.

A point in connection with meteors, quite apart from astronomical interest, is the question of their influence on the earth. Even those that burn up contribute gases to our atmosphere and drop particles of ash which settle to the soil. But our globe is so large that it would take a thousand million years for the deposits to make a layer one inch thick over its surface.

It is true, though, that the earth's continual encounter with meteors is slowing down its rotation, increasing its size and mass, and its attraction for the sun, shortening its orbit, lengthening the day and

It was found that the devastated area was a circular region about seventy-two miles in diameter. The ground was pitted with hundreds of deep funnels where fragments of the meteorite buried themselves after its explosion. The meteorite is estimated to have weighed half a million tons, and at its fall towns 250 miles away heard great detonations and saw vast pillars of smoke. Fortunately, no human being was in the path of this destruction, but a herd of 1,500 reindeer were, and only a few scorched carcasses were found.

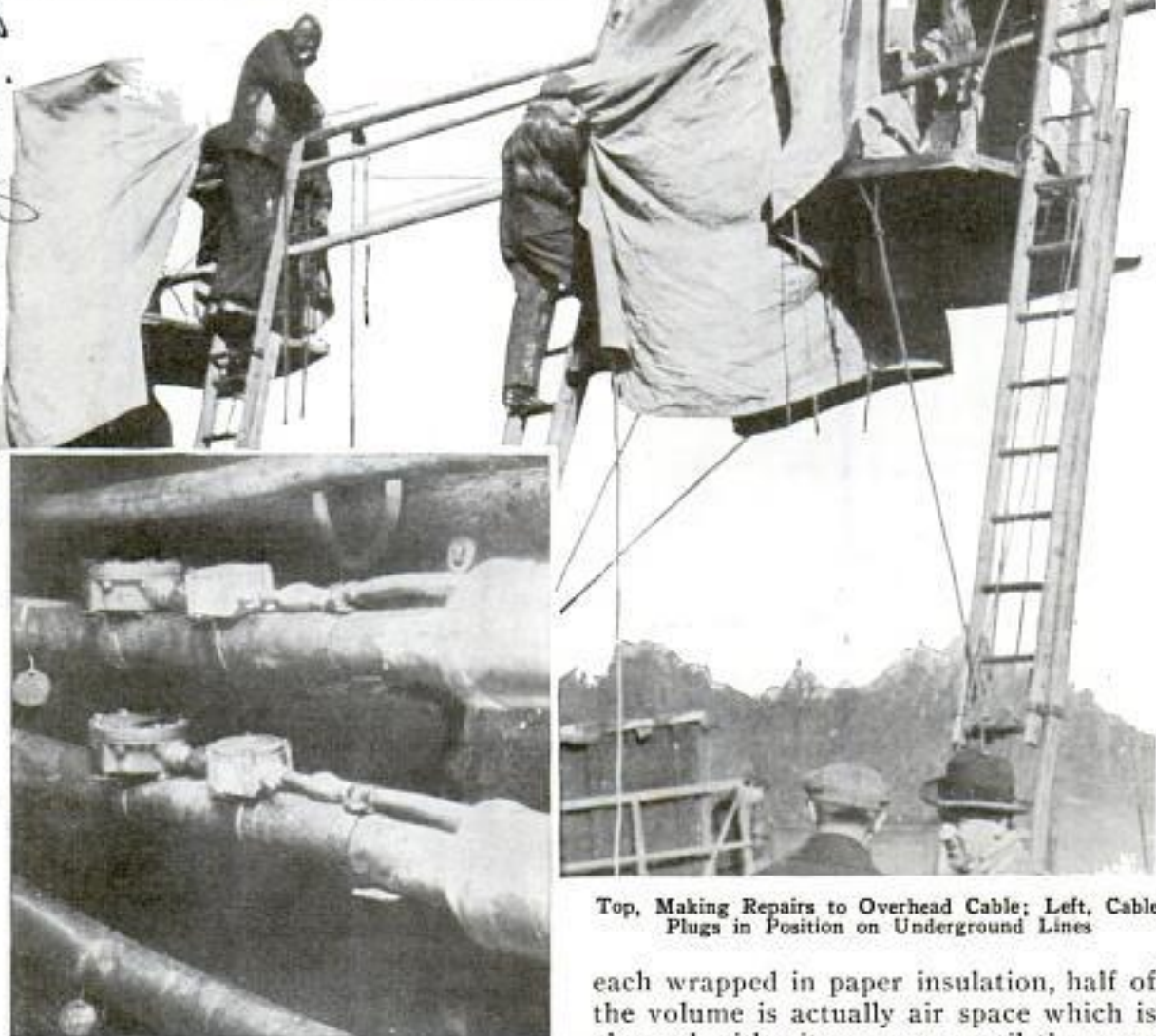
Doubtless this Siberian visitor was a larger chunk of comet stuff than that which hit the Arizona countryside some centuries ago and cut the great scar known as Meteor Crater. This crater measures

(Continued to page 140A)

Guarding Long-Distance Telephone Cables

Among the latest tasks performed by robots is that of guarding the nation's cross-country telephone network. This robot is an electrical device which warns its human masters that a puncture has occurred in the protective lead sheath surrounding the copper wires which are the speech carriers of a telephone cable. These punctures would admit moisture and destroy the insulation. In addition to its

Cmt. Hamilton Ballard, 109
Forest Ave. Cranford, N.J.



Top, Making Repairs to Overhead Cable; Left, Cable Plugs in Position on Underground Lines

services as a signalman of trouble, the robot temporarily checks the encroachments of moisture by forcing a gas out through any small hole in the cable sheath so fast that fog or water has no chance to enter. And finally the obedient servant tells its human associates where to look for the dangerous hole. Although the cable appears to be filled solidly with copper wires,

each wrapped in paper insulation, half of the volume is actually air space which is charged with nitrogen gas until the pressure is about twelve pounds per square inch. During the months or years which may intervene between accidents to the cable sheath, this pressure is maintained, gas being added as necessary to replace that lost by slight leakages. But when a sheath failure occurs, gas rushes out through the hole. When the pressure has dropped to nine pounds, the robot rings a bell or lights a lamp in the central office.

*Ans. Scrings and
Morsey, Syracuse
729 N.Y.*

When a toll cable is being made ready for its protective system, "cable plugs" are installed to divide it up into ten-mile lengths which are individually gas-tight. Such a plug is made by removing a small part of the sheath and then spreading the paper-covered wire to a ballooned shape. These wires are first impregnated with a special wax. Then a lead sleeve is installed over the impregnated conductors and is filled with a carefully selected asphalt so that no gas can pass along the cable from one side of the plug to the other. This sectionalizing of the cable reduces the loss of gas when a puncture occurs and facilitates the location of leaks. Robot contactors are mounted about three miles apart in each ten-mile gas-tight section, and are wired to the central office so that the one first giving a sheath-failure alarm may be instantly recognized by the attendant many miles away. This partly locates the leak, which is naturally the point of lowest gas pressure so long as any gas remains in the cable. The total cable volume being relatively large, gas continues to flow from a puncture of ordinary size for many hours. The trouble-hunting crew arrives in the vicinity of the leak, guided by the location of the signaling contactor. They tap the cable sheath at various points with temporary valves, and read the pressures, thus locating the leak. High accuracy gauges or manometers permit a close determination of these pressures at varying distances from the approximately located leak. These pressure readings are graphically plotted to form a "picture" of the pressure gradients to the point of gas escape, which is thus tracked down.



Rowboat Equipped with Electric Oar Operated from Storage Battery; the Outfit Is Silent, Thus Being Suitable for Fishermen

price - \$92.00 without battery

miles per hour, the craft can be slowed down to about two miles for trolling or casting. A cheap storage battery will run the motor for ten hours, while batteries of higher amperage give correspondingly longer service. A friction joint in the clamp keeps the oar and propeller, which take the place of a rudder, in fixed position, and the absence of grease and oil, as well as its simplicity of control, make it particularly suitable for women and children.

B 14 P 5

**ELECTRIC SCISSORS FOR HOME
CUT ANY KIND OF CLOTH**

Scissors operated by a small electric motor are now being offered for the home. They cut any kind of cloth from the sheerest of silks to the heaviest woolens, and it is claimed they also eliminate fraying or pulling the threads of delicate fabrics.

Sunbeam \$5.00



Scissors Operated by Small Electric Motor; Note the Grip Shaped to Fit the Hand

**ROWBOAT WITH ELECTRIC OAR
DOES NOT SCARE FISH**

B 1521

An outboard electric oar, that can be clamped on the stern of any rowboat or canoe, is especially adapted for the use of fishermen because of its silent and smooth action. With a top speed of five or six

Also, they follow the lines of a printed pattern almost automatically. The handle is shaped to fit the hand, and the blades are in a position where there is little danger of the operator injuring himself.

*Irvin's Brake Service
617 Erie Blvd, East
Syracuse, N.Y.*

*Chicago Flexible
Shaft Co., Roswell
Road and Central Ave*

*Abercrombie & Fitch
Wanamaker
New York
N.Y.*

B1191

Monroe A. Smith, Acoustics Engineer
 United States Lysfessum &
 300 W. Adams, Chicago



Photographing and Measuring Traffic Noises with a View to Decreasing Annoying Sounds

By H. W. MAGEE

THE Sermon on the Mount, the voice of Washington delivering his farewell address or any other sound ever created could be heard today—if your ears were keen enough.

The reason is simple. Sound is only dissipated by absorption, and there is no perfect absorbent for sound waves. Thus every word ever uttered by man and every sound ever produced still exists, the waves traveling on, diminishing as more and more of the energy is absorbed, but never disappearing entirely.

Sound has many curious properties. It is a vibration in an elastic medium, created virtually out of nothing and living forever. For instance, 200,000 people talking constantly for two hours would use up about enough energy in the form of heat to brew one cup of tea. Yet their words would vibrate to the end of time.

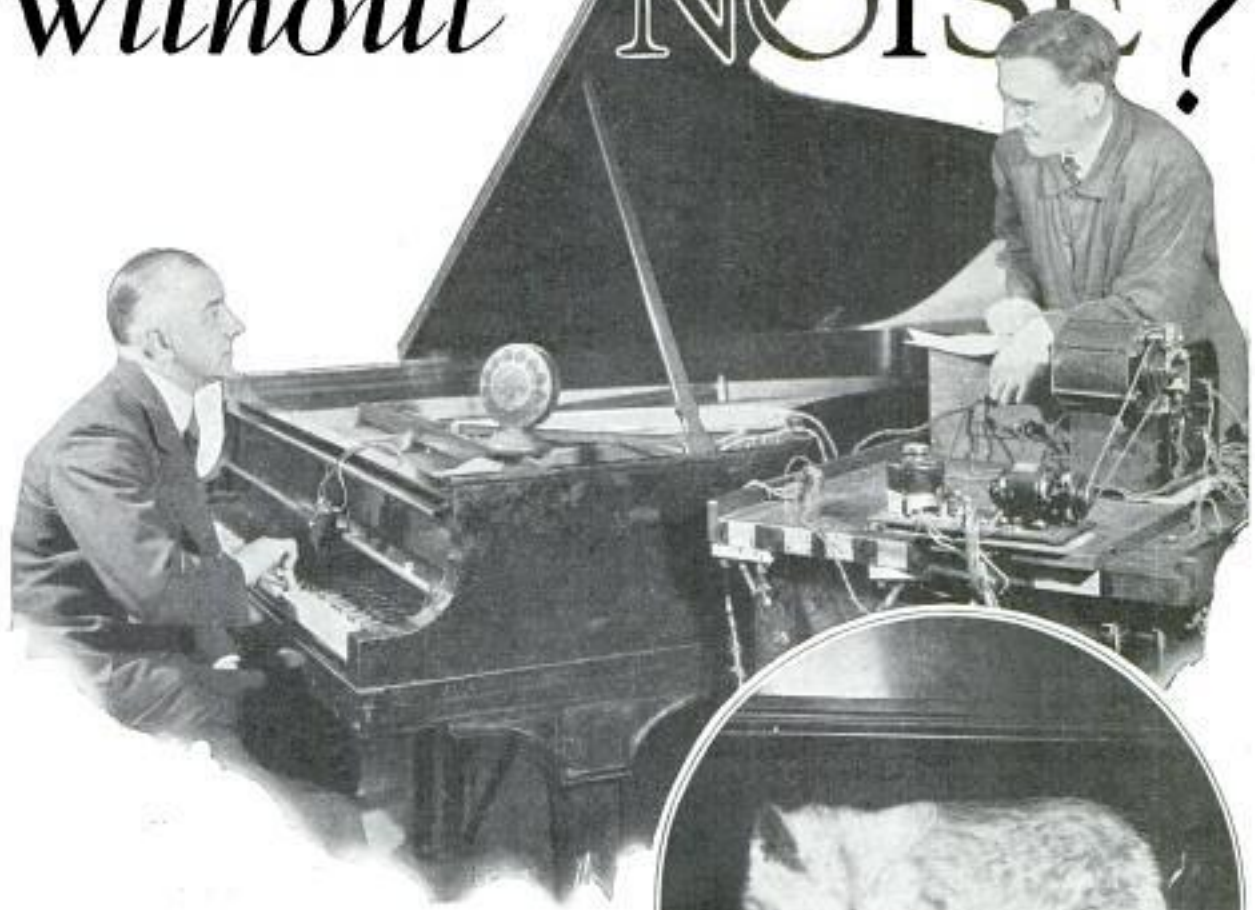
Fortunately for the sound engineer, our ears are not sensitive enough to be annoyed by sounds created in the past and

by comparatively few of the noises of everyday life. It is his job to hunt the unwanted sounds and silence them as speedily as possible, by providing insulation to "swallow" them. Monroe A. Smith, acoustics engineer, explains some of the things the sound man has accomplished.

So proficient has he become at this business of knocking out noise that he could today, if called upon, so thoroughly insulate a home beside an elevated railway that the occupants would not notice the noise of trains thundering overhead. So spectacular a feat as this would hardly be practicable, however, since it would be too costly. Instead, he has devoted himself for years to improving the sound properties of theaters, auditoriums and churches, to quieting the machinery in factories and to taking the din out of business offices by silencing telephone bells, typewriters and stock tickers.

More recently he has extended this noise-abatement job to the home, and in

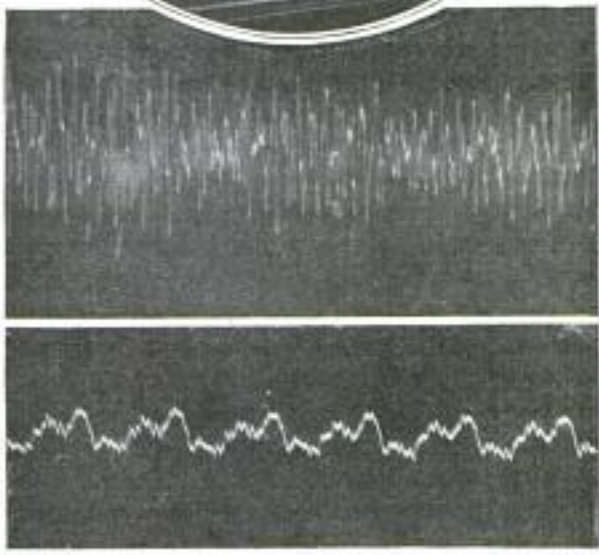
without NOISE?



this field he has achieved surprising results. Today the sound engineer is not only able to confine any ordinary noise to the room in which it is created, but he is also able to smother the sound in this room so it will not be annoying. Likewise he can soundproof a dwelling or apartment house so thoroughly that the music from a radio or piano in one room will not penetrate to a bedroom adjoining.

This control of sound has been accomplished at comparatively small cost to the home builder, and without changing the general appearance of the structure thus treated. On the surface a soundproofed wall looks exactly like any other wall. Actually its cost is often less than a wall that allows sound waves to pass through it.

The average home requires little sound protection, such as is accorded the theater or church, because household furnishings, overstuffed furniture, rugs and draperies absorb sound so rapidly that reverberation is not noticed. Also, sounds in the home usually are under control, and any annoying din in any single room can be



Noise and Music Illustrated; the Strip of Irregular Lines Above Represents Kitten on the Keys, and That Below, the Pianist



Above, Ceiling Suspended on Springs to Deaden Sound; Right, Close-Up of Spring Construction

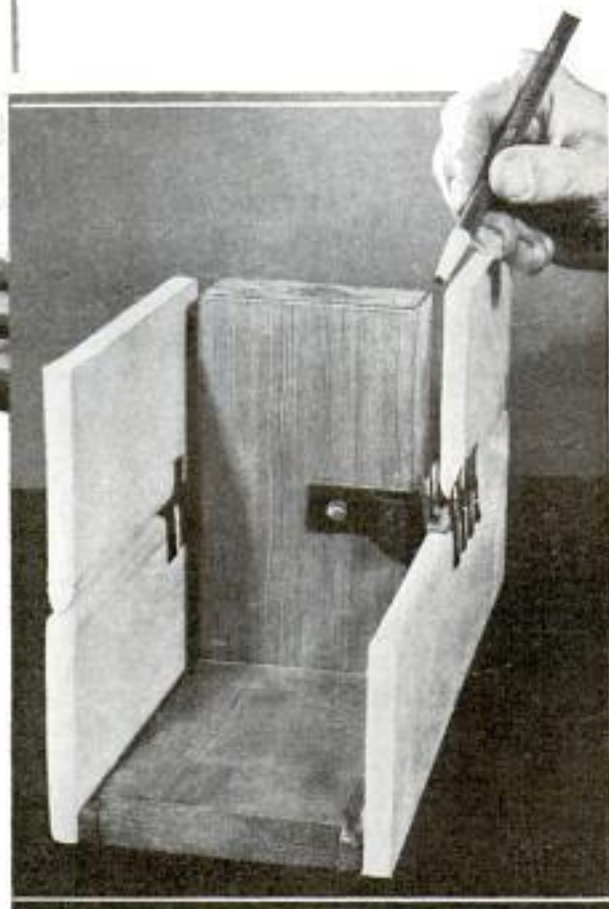
quieted without sound treatment. The source of trouble in homes is the penetration of sound from one room to another or from the outside into the house. The problem is one of sound insulation to keep unpleasant noises from passing through walls. It is in this field that the noise engineer is doing effective work for the home owner.

When a sound is created in a room, the waves proceed toward the boundaries at a rate of 1,130 feet a second. It strikes the walls, floor and ceiling and is either absorbed or reflected, according to the nature of the material it strikes. If the boundaries are simple plaster walls, for instance, ninety-seven per cent of the sound bounces off them to be reflected again and again.

This phenomenon may explain why men with mediocre voices sing in the bathroom but not elsewhere. This room is usually small with surfaces that reflect sound well and with no furnishings to absorb the

noise. In such circumstances, a weak voice assumes volume and it is not very difficult for the singer to convince himself he possesses a grand-opera voice as he listens to the notes bouncing back and forth across the walls.

When sound strikes an un-insulated wall, it vibrates the wall and in turn the air of the adjacent room. Such penetration of sound waves through these walls can, of course, be stopped by making the walls so thick and heavy that the weak energy of sound cannot move them, or by making parti-

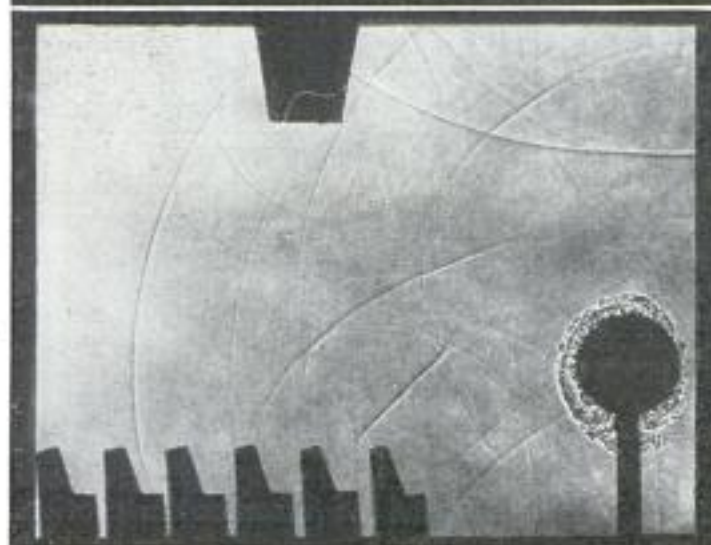
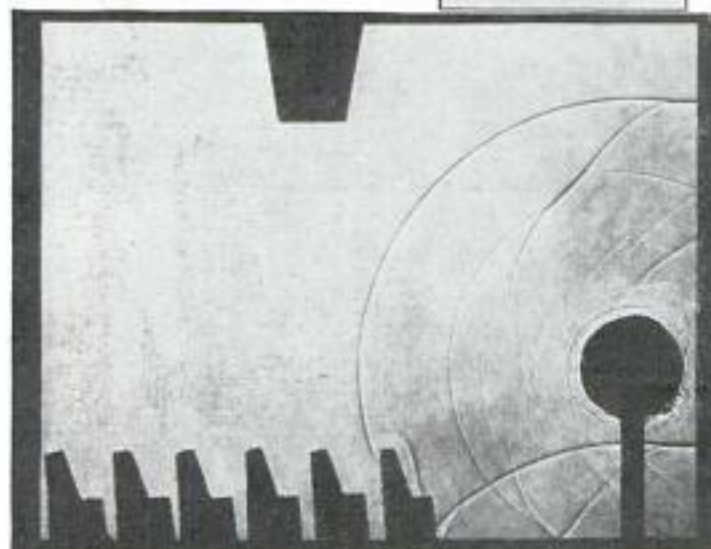
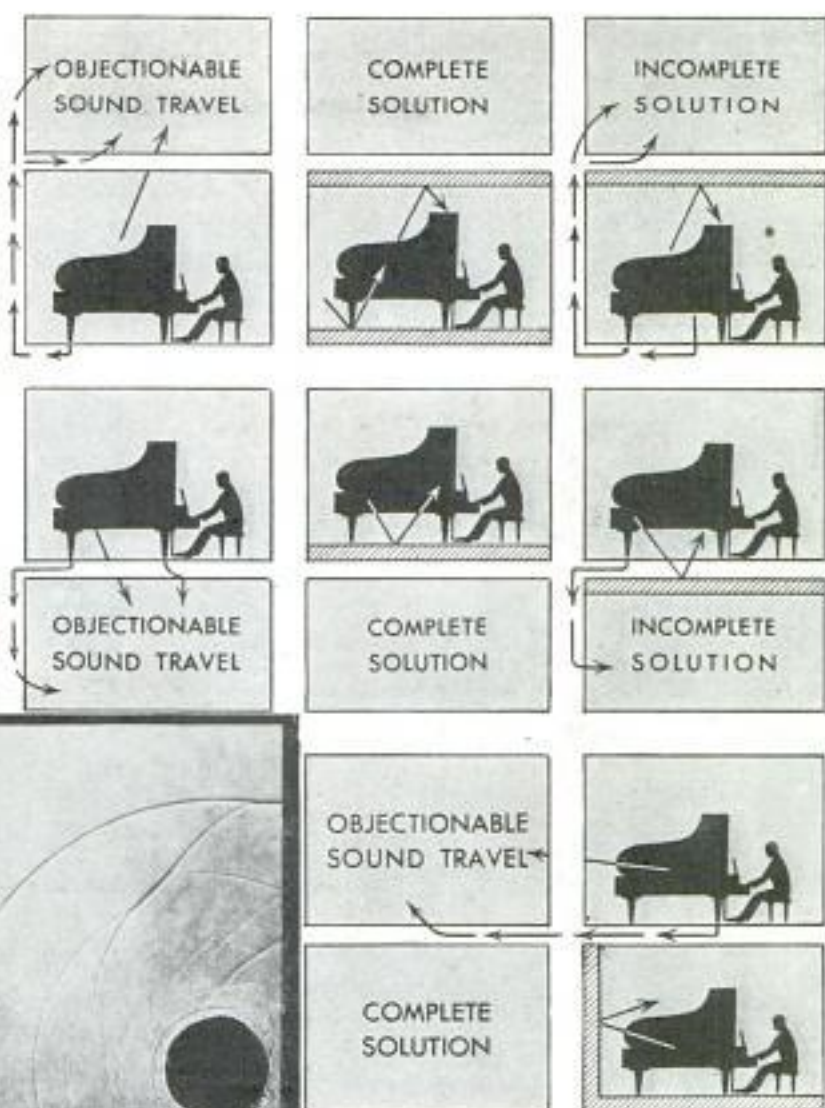


tions so rigid they cannot transmit sound. In building construction either method usually means waste, and expense that is prohibitive.

Instead, the sound engineer attains the same result by erecting walls that absorb the sound, such as plasterboard or various types of wallboard, or by attaching these or other wall materials in such a manner that they cannot pass the vibrations onward. The latter effect has been achieved

by fastening the walls to springs and allowing the tiny springs to "swallow" the sound vibrations.

In the home, office or factory, the sound engineer works to achieve relative quiet rather than complete silence. In a metropolitan office, for instance, the roar of the city may not cause annoyance because the many sounds neutralize. All that may be necessary is to absorb the noise of near-by typewriters, telephone bells and stock tickers. In a quiet residential district, on the other hand, the engineer may be faced



Courtesy Riverbank Laboratories

Above, Right and Wrong Methods of Sound Insulation; Below, Photograph of Progress of Sound Waves Made in a Church

with the problem of keeping out the relatively subdued noise of passing autos.

The sound engineer today is ready to provide a noiseless existence indoors, for he can remove annoying sounds in buildings.

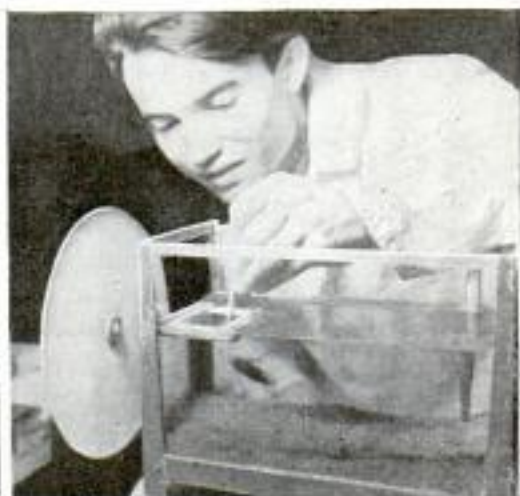
Out of doors he still faces a big problem. Automobiles have been quieted greatly in recent years by applying sound insulation, and it has been demonstrated that street cars, elevated railways, and other traffic, can be quieted.

The work has progressed to a point, however, where the engineer visions a future city easy on the ears—one in which traffic hums quietly past sound-insulated offices, homes and factories. For he has proved he can take the noise away.

Another World Seen Through Animals' Eyes

Below, Studying the Reactions of a Mole to Music by Watching It as Various Notes Are Produced; Right, Proving Fish Can Distinguish Colors; They Were Trained to Eat Only When a Gray Disk Was Used

can fighting fish have been trained in such a way that they will not take food when a colored disk is placed upon the aquarium, but will begin to eat as soon as the disk is replaced by a gray one. The same fish will take the food only when it is placed in the water for the second time, which is considered proof of



© New York Times

Fish that can count and distinguish colors, and a mole that reacts in the presence of various musical sounds, have been under watchful eyes of natural scientists at the Hamburg university. Recognizing that we can know the world only as it appears to us, these men are peering into the environments of the animal world, which to the animal is either large or small, bright or dull, according to its organs of perception and their development. Discovery of the secrets of that new world is the objective of the research. Small South Ameri-

their ability to count up to two. Repeated experiments with the mole have proved that a definite relation exists in its reactions to musical sounds produced by a phonograph.

"FACTORY" OF STONE AGE FOUND IN FRANCE

Men of the Old Stone Age had their Pittsburghs and Detroits—places where they gathered to make tools because of unusual abundance of workable stone or

other favorable circumstances. A "factory" has been found in southern France. The site was located by J. Townsend Russell, of the Smithsonian Institution. Tramping through a forest in the foothills of the French Pyrenees, he noticed man-worked flakes of flint along a rain-washed

*Science Service mail
report 8/30/02*

Washington, D. C.

B1522

cart track. Subsequent exploratory digging, or "soundings," revealed a very extensive surface quarry under two or three feet of soil that has piled up through the ages since the old-time hunters squatted here to chip flint tools and weapons. The workmanship of the pieces found indicates that the tool makers in this ancient workshop belonged to the cultural division of the Cro-Magnon race, known as the "Solutrean," from the name of the place where tools of this type were first discovered. The Solutrean workmen flaked beautifully even laurel-leaf-shaped tools out of flint, but had not yet learned how to grind and polish their blades. Only toward the end of the era did these artisans in stone achieve this skill.

B1512

BOXES ARE WEIGHED AND COUNTED IN MOTION ON CONVEYOR

As packages are moved over a conveyor, which has been recently installed in a London warehouse, they are automatically counted and their weight recorded. The scale, which is portable and can be placed at any desired section of the conveyor, indicates the weight on a large dial and makes a permanent record.



Howey Rocks, Fla.
 Working Models of Lighthouses Which Serve as Landmarks for Visitors to Department of Commerce Building

*George A. Putnam
 Curator of Lighthouses
 Fenwick Lodge
 Boston
 Mass.*

LIGHTHOUSES SERVE AS GUIDES IN GOVERNMENT BUILDING

Working models of two famous lighthouses were found to perform an unexpected service when placed on display in the commerce building at Washington. Visitors who become confused or lost in its maze of corridors and hallways often turn to these beacons for guidance to safety, like ships in a storm.

VERTICAL LINE SEEMS TIPPED BY OPTICAL ILLUSION

If you look for three minutes at a diagonal line, another which is perfectly straight up and down will not appear vertical, but slanted in the opposite direction. Dr. James J. Gibson, of Smith College, has discovered that this is the same illusion that makes the landscape seem to slide away from you when the train on which you have been traveling suddenly stops. The greatest after effect in tipping the vertical lines comes when the diagonal line is slanted at about ten degrees, Doctor Gibson says.

Science Service 9/2/32

Northampton, Mass



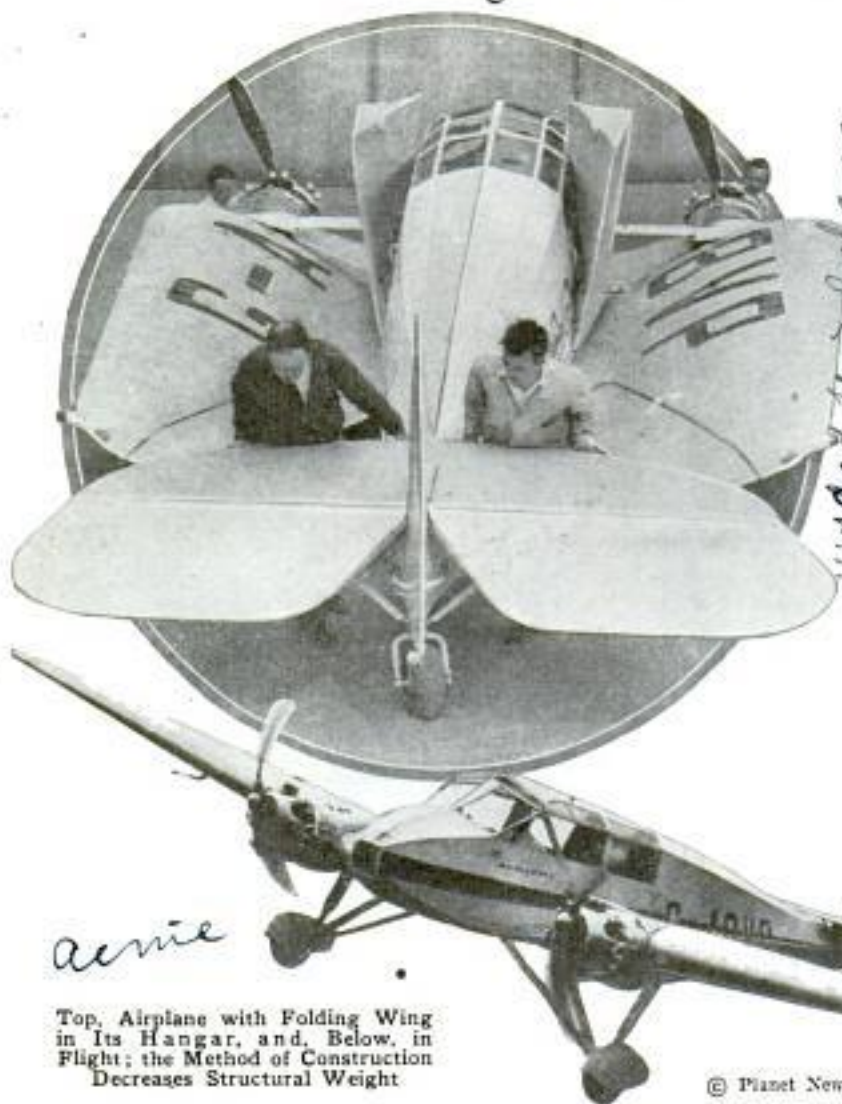
Courtesy Merris Loughboro
 Boxes Being Weighed and Counted Automatically as They Move along a Conveyor System

*Herbert Morris & Co.
 Loughboro, Leicestershire
 England.*

*American Psychological Assn.
 Copyrighted material*

1483
736

Designed by H. J. Stieger
tested at *Croydon Aerodrome*
POPULAR MECHANICS



Top, Airplane with Folding Wing in Its Hangar, and, Below, in Flight; the Method of Construction Decreases Structural Weight.

© Planet News

AIRPLANE WITH FOLDING WING CUTS STRUCTURAL WEIGHT

Structural weight is decreased without sacrificing safety, it is claimed, in an airplane with a folding wing recently tested in England. The single wing is strong enough to bear the strain imposed on the ordinary biplane, thus allowing a larger load to be carried. The airplane is constructed on what is known as the monospar system.

SELF-LIGHTING SIGNS OF GLASS REQUIRE NO POWER SUPPLY

Illuminated display signs that require no electricity or other power to operate are being made of reflecting glass, a flat, rolled, solid-color product with a diamond pattern molded into the surface and an enameled backing. Artificial light is bright through the glass

from a distance of 1,000 feet, making possible novel and striking effects at little cost. It is used for window or wall signs and also for the sides of auto trucks. The glass does not deteriorate in reflecting power, since there are no metallic or mirrored reflectors to tarnish or break. It is made in several colors which are impervious to sun and weather and comes in sheets thirty-nine by sixty inches. Letters or designs are painted on the reverse side of plain double-strength glass, and this is placed over the reflecting glass, permitting the reflected light to shine through

Words of Pure Colors

the unpainted portions. This method makes it easy to change the message of a sign quickly. Brilliant illumination is obtained even on dark, cloudy days, and at night the street or shop lamps are often sufficient to cause the sign to light up.

ELECTRIC FLASHING MACHINE FOR TREATING DISEASE

Muscles and nerves damaged by infantile paralysis and other disorders now are being limbered up with an electrical machine similar in principle to the devices that flash advertising signs. The reaction of the muscles is under perfect control and is usually secured without pain or discomfort to the patient. Another device measures the strength of parts of the body as they are gradually restored.

After certain speed is attained in power air dives, the propeller acts as a brake.

United Air Lines

Copyrighted material

Words of Pure Colors
Hospital for Joint Diseases & Engineers of Physical Therapy
Demonstrated by Dr. J. W. New York
1919 Modern Art

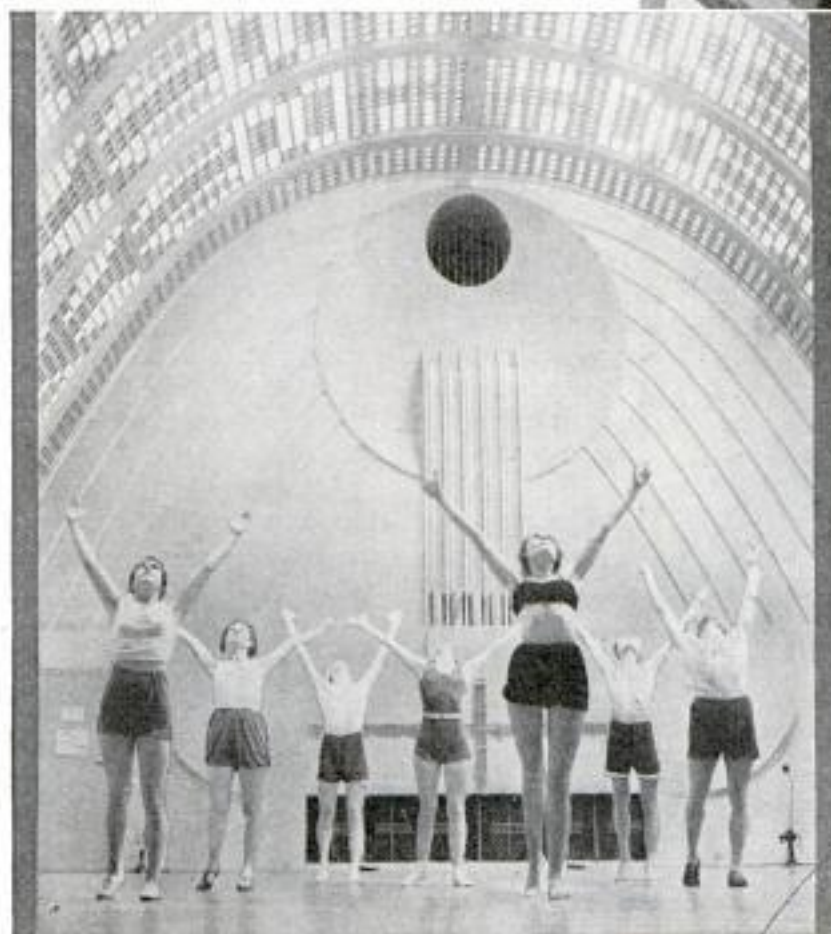
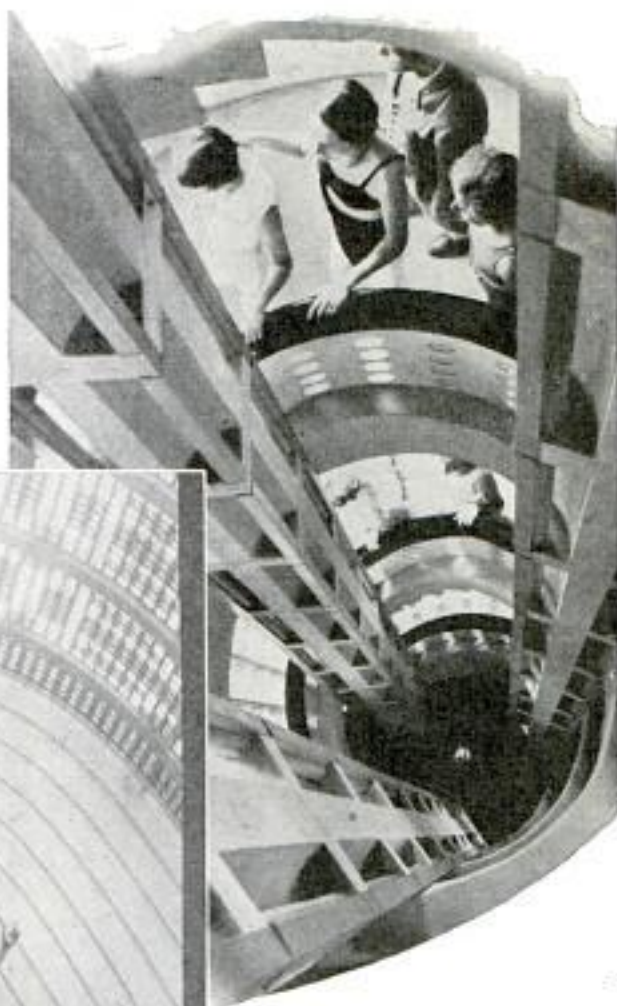
Trans. A
Sh

B 1501

Founded by Dr. H. C. Ludwig
Roselius, Bottcherstr. 737
Bremen, Germany

"Hall of Heaven" for Curing of Frayed Nerves

Sometimes called the "Hall of Heaven," a physical-training school has been designed and built for working people of Bremen, Germany, where they can obtain bodily exercise and perfect relaxation from the day's labor. The gymnasium, completely equipped with apparatus, is illuminated with a soft blue light projected through the windows, which is said to quiet the nerves and promote good health. A notable feature is the ventilating system that keeps the air pure and invigorating at all times, equivalent to that found



© New York Times
Interior of the "Hall of Heaven" at Bremen, Germany, and, at Top, a View of the Staircase

over the North Sea. The recreation hall is visited by an average of about 2,000 people each day.

MAN TAUGHT BY ANIMALS

Inventive man runs his boats by three principal types of propulsion: jet propeller, paddle (or oar) and screw propeller.

like otter and beaver. Although no animal has a screw propeller that turns clear over, the screw-propeller principle is used by a great many. This depends on presenting a surface at an oblique angle to the water and pushing it at right angles to the direction of intended travel. This is done by fishes in the water and by wings of birds and insects in the air.

In every one of these, his invention was anticipated by swimming animals and by some flying animals as well, Dr. J. Gray of King's College, London, declares. The jet propeller is used by relatively few animals, the common squid being perhaps the best known. Paddles are used by many, especially by swimming birds like ducks and by mammals

*Quena Serone mail report
8/20/32*

*at meeting, British Association
for Advancement of Science
9/1/32*

B 333

QUEER THINGS

wire haired forlamer



By ALBERT

have seen dozens of mongrels with black mouth roofs, and dozens of flawlessly pure bred dogs with pinkish roofs to their mouths. There is no more truth in the idea than in the dictum that a pure bred dog won't eat fish.

Perhaps the same person invented it who said that puppies always open their eyes when they are nine days old. Many a fine pup has been drowned by his ignorant

HERE are a few canine fallacies which are in sore need of debunking:

You have been told always that a dog with a cold and moist nose is in good health and that a warm and dry nose is a sign of illness.

The healthiest dog I have owned—old Sunnybank Lad—had a warm and dry nose throughout all his sixteen years of vigorous life. On the other hand, I have found cold and moist noses on dogs that were dying. There is no set rule for determining the state of a dog's health from the temperature of his nose.

If you really want to find whether or not your dog is ill, one of the best ways to do it—though even this is not wholly infallible—is to look at his gums. If they are pale and sallow, the chances are that he is in bad condition. Most healthy dogs have brightly pink gums.

You have been told that a thoroughbred dog has a black roof to his mouth. I



Borzoi.

Courtesy of Fall

about your DOG

A. S. S. Setter



ded March 1942

PAYSON TERHUNE

*Sunnybrook Farm
Pamilton Lakes
N.J.*

owner because at ten or even twelve days his eyes had not yet opened, and because this was supposed to imply he was blind. Comparatively few puppies open their eyes on precisely the ninth day. Much oftener the eyes don't open until the pup is from eleven to fourteen days old.

But of all the insanely idiotic theories the most absurd is that a dog knows good people from bad, and that you should trust or distrust a fellow-human because your dog likes or dislikes him.

I wonder how many good men have been branded as bad because dogs didn't like them, and how many unworthy men have been trusted because they had the knack of making themselves liked by dogs. A single instance will prove to you the folly of the idea:

A few years ago, a governor of Maine sent a beautiful white collie to the state penitentiary, as a chum for the convicts and with the hope that the dog might be a humanizing influence in that grim abode.

The prisoners welcomed their new four-footed pal eagerly. The dog enjoyed his long stay there, and he made friends with hundreds of the convicts. Many of them were his loved and constant comrades.

Now, out of those hundreds of confined lawbreakers there surely must have been some who were not saints, who were not

even trustworthy. Yet the dog eagerly made friends with them. If the old theory were true, he would have spent his time in shuddering solitude, shrinking in horror from these malefactors.

No, your dog has no mysterious and heaven-sent instinct which tells him who is good and who is bad. You, yourself, have no such instinct. Like yourself, your dog is attracted to some people he meets, and is repelled by some others. This with no regard to their sanctity or their sins.

Bill Sykes's dog loved his master quite as much as did George Washington's or Bishop Doane's. One of the holiest men of my acquaintance cannot induce a dog to come near him except in anger. A crook who had robbed an orphans' fund came to me for help to keep him out of jail. My usually conservative Sunnybank collies were effusive in their liking for him.

Personally, I believe it is all a matter of scent—of a subtle human odor which is pleasant or distasteful to dogs. But I cannot prove this.

B 333 Sigurdson



Nor can I prove that dogs have a language of their own. Yet no dog man can doubt that they have some means of communicating their wishes to one another. I have seen this done by the touching of noses and in other

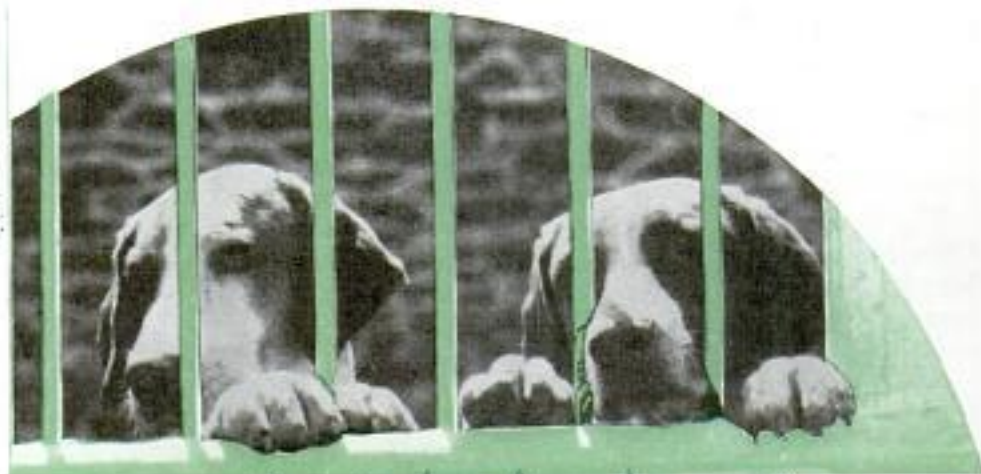
ways. One dog will get up from his rug and go around the room touching noses with such fellow-dogs as chance to be there. Whereupon, all of them will follow him outdoors for a run or for a romp. I have seen this innumerable times. Perhaps they communicate by sense of touch, perhaps by sounds too high for the human ear to grasp.

I cannot explain this, any more than I can explain why our fiery little red-gold collie, Wolf—ordinarily the most silent of our dogs—waked us at 1:30 a.m. on June 3, 1922, with a series of unearthly long-drawn howls, and refused to be quieted. I had heard that queer timbre in a dog howl twice before, in other years. So I made note of the exact time.

Next morning I learned that my mother had died at exactly 1:30 a.m. on June 3, 1922—more than thirty miles away from Sunnybank. My whole household heard that awesome death howl of Wolf's, and can attest to it, as well as to the fact that never before nor after, during his ten years of life, did he give vent to such eerie sounds.

One winter night in 1894, I heard a multiple repetition of that unmistakable death howl from every dog within two miles of our lake—a lake wherein a woman drowned herself that night. The spot where she was drowned was far out of sight, or of scent or of hearing, of any of these howling dogs.

Yet I refuse to attribute any of these things to the supernatural, even as I refuse to regard as supernatural the fact that three of our dogs, at different times, have known we were coming back to Sunnybank before even our superintendent here



English fox hounds

Airedale

was notified of our impending return. They went wild with excitement, and tore down from the lodge to Sunnybank house and galloped frantically around the veranda, keeping up an ungodly din which lasted until our arrival.

I say I refuse to regard any of these things as supernatural. Somewhere, could I find it, there must be a logical cause for it all, a cause based on some natural instinct of dogs which we humans have not bothered to figure out.

It must seem supernatural to dogs—if indeed they think of such things, which I don't believe they do—when a human receives a flat piece of paper with pen-



scratches on it, and translates those scratches into words. It must seem supernatural to them when we humans put our hands on a knob which makes part of a blank wall open, and when we shut it behind us. Yet the reading of a note and the opening and shutting of a door are among the simplest commonplaces of our lives.

But there is one canine mystery I never have been able to solve. It is the amazing knowledge of dogs on some matters, and

Top Photo, Courtesy of Fall

their duncelike stupidity on others.

My dogs—some of them—know when I am coming home, before I have sent word of it to the humans at Sunnybank. I have had dogs which could work out some problem by human or even supernatural deductions. I have had dogs which taught themselves to do things which were all but impossible.

But, much as my dogs love the hearth fire in winter and often as they have seen me make that fire blaze up by putting new fuel on it, I never knew nor heard of a dog with sense enough to pick up a stick from the woodbox and lay it on a dying fire. If I tie a dog to a stake or a tree by a long rope, he will almost always trot around that stake or tree until the rope is wound tight, holding him a prisoner without an inch to move in. Never have I had a dog with the rudimentary brains to reverse that motion and to unwind the rope again.

In brief, I marvel at the mingled cleverness and senselessness of the canine race. It is a blend I cannot grasp.

Films to Teach Mutes Work of Vocal Organs



As a Guidance in Teaching Mutes to Speak, German Scientists Are Using Moving Pictures Showing the Pupils the Oscillations of the Vocal Organs, Which the Mutes Then Try to Imitate © New York Times

Motion pictures of the human language are being used in attempts to teach mutes how to speak. At the phonetical laboratory of Hamburg university, Germany, film without sound is employed to show the sequence of oscillations of the vocal chords of normal persons. This serves as guidance for the patients, as the linguistic engineers attempt to obtain the same oscillations in respect to their organs of speech. The scientists at the laboratory, directed by Professor Panconcelli-Galzia, regard the human language as nothing but technique, and all their research work is aimed at solutions of technical problems of speech. When the patients reach the point where their oscillations match those of the normal person in the film, their vocal organs are in readiness for the finishing touches that will result in speech.

LUMBER PRESSED INTO LAYERS RESISTS FIRE AND WATER

Intended particularly for the airplane and automotive industries, a form of com-

Phenoloid
pound lumber made by pressing layers of wood together is being used as construction material. It comes in sheets or panels which are processed with a resin that renders it waterproof, fire-resistant and anti-septic. Successive layers of wood are placed on trucks with the resin spread between adjacent layers. In addition, a series of electrically heated, polished plates are introduced between the panels. The entire truckload is run into a press and pressure is applied by hydraulic rams. A temperature of more than 300 degrees is maintained for fifteen minutes, during which the heat and resin penetrate the wood, destroy all fungus growth and fuse the layers together. The combination of high pressure and high temperature is said to produce a flat, smooth panel of uniform thickness, and as a rule no sanding of the surface is required. This compound lumber is suitable for various other uses, as floors, instrument panels, etc.

Our Bureau of Information is for your benefit. Use it as often as you please.

no further data
Haskelite Lumber Co.
120 S. La Salle, Chicago.

WILD ANCESTOR OF CATTLE SOUGHT IN VAIN

Roast beef, England's stand-by, has smoked on English tables for thousands of years, but nobody knows whence came the sturdy cattle that make the roast beef possible. Domestic cattle have been in Europe since the middle of the New Stone Age, yet no one has discovered what their wild ancestors looked like or where they lived. So says Bryner Jones, minister of agriculture in Wales. Neolithic settlements in England, as well as elsewhere in Europe, contain bones of a short-horned species of wild cattle, Mr. Jones stated. These bones have never been found apart from human settlements, hence the cattle must have been domesticated when the race who owned them migrated into Europe, presumably from Asia. From these earliest domestic cattle, he said, all the varied breeds of Britain have descended.

Mr. Jones expressed the opinion that in themselves these Stone Age cattle possessed sufficient potentialities of variation to account for the rise of modern breeds.

IODINE COMPOUNDS CONTROL SLEEP AND HIBERNATION

Experiments showing that iodine-containing compounds probably control sleep in man and hibernation in other creatures are reported by Dr. G. S. Carter. He experimented with hearts taken from frogs in winter and in summer. He found that thyroxin, which is the iodine-containing secretion of the thyroid gland, produced in the heart of the winter frog a curve of temperature and pulse rate typical of the heart of the summer frog.

TWIN RELEASE FOR LIFEBOATS PREVENTS ACCIDENTS

"Snaking" and possible capsizing of lifeboats as they are being launched is prevented by a releasing gear which detaches both ends of a craft simultaneously from the falls. The hooks from which the lifeboat hangs from its davit cables are controlled by a lever. To the lever is attached a concealed connecting rod which runs along the bottom of the boat. When the lever is pulled, the rod actuates the hooks at either end of the boat, releasing them so quickly that the work is done in a split second of time.

Ⓜ A single ton of structural steel represents the work done in one day by three men employed in building construction.

American Institute of Steel Construction
200 Madison Ave. N.Y.C.



This New Davit and Release Detaches Both Ends of the Lifeboat at the Same Time, Preventing "Snaking" or Capsizing

Science Service 8/30/32
Science Service 8/28/32

to British Assn for
Advancement of Science
9/11/32

B1224



Secrets of the

By THOMAS M. JOHNSON
 420 W. 116 St., New York

AN evening on Long Island. Along the shore road, automobiles stand parked. But suddenly, the peaceful scene is shattered. Out on the water, shots flash and crash. At the same instant, a boat grounds on the beach, and scrambling figures throw themselves upon the driver of one of the cars.

"Get outa that!" a voice commands. "And take yer foot off that switch!"

The coast guard have captured, red-handed, the secret signaler of a gang of bootleggers. With him, they have caught the liquor-loaded boat to which he has been signaling with automobile headlights, whose special shutter enables him to flash out messages in Morse or any code.

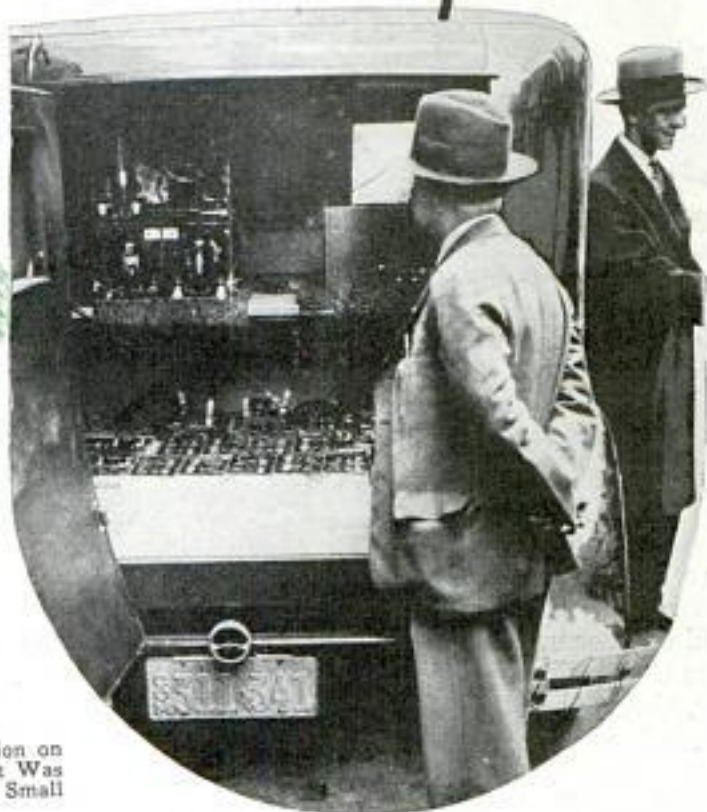
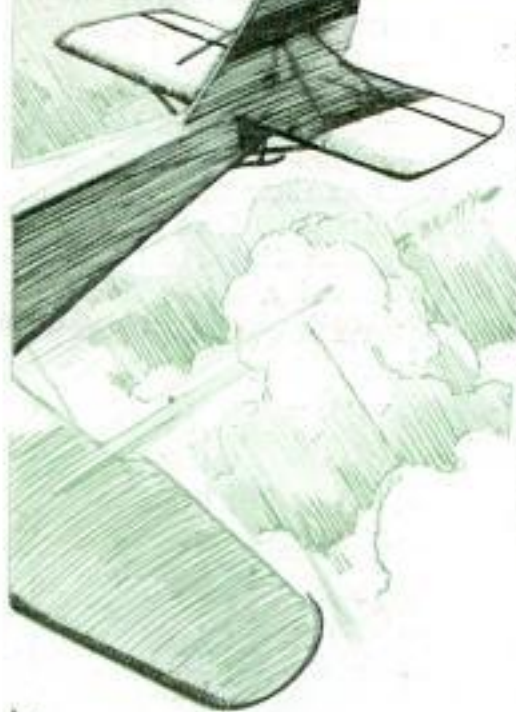
That scene has been enacted so many times on the Long Island shore, where so much imported bootleg liquor is landed, that peace-loving people are blind now to lights flashing. Curiosity may draw a bullet. There was an arsenal of weapons in a mansion looking out to sea from Atlantic Highlands, N. J., when federal agents raided that bootleggers' castle. Within was a secret radio station; without, mounted on



Top, Bootleggers' Radio Station Hidden in Trunk; Below, a Rum Runner's Code Book

a tennis court with an unobstructed view of the sea, was a powerful automobile headlight. It was fitted with a shutter and, at night, could flash twelve words a minute, telling rumboats when the coast was

BOOTLEGGER'S Grapevine



A Bootlegger's Radio Station on Wheels; All the Equipment Was Concealed in the Rear of a Small "Panel" Car



clear. In a myriad tricky ways, the rum smugglers strive to keep secret the messages to one another that are so vital a part of their trade. Just beyond the twelve-mile limit off our coast, their small tramp steamers await word when to be ready to transfer their cargo of liquor from the French islands St. Pierre and Miquelon or British West Indies to the fleet of speedboats that will rush out from shore to get a quick load of 150 to 4,000 cases, then dart back again to some lonely haven where the trucks wait to carry it to warehouses. However skilled the desperate men handling this daring operation, they must get word from shore to ship, and back. So the hidden radio, the lights flashing, the signaling with red and green lanterns from headlands—once even, from atop the tall flagstaff of the Sea Gate Yacht club!

"All clear here," says the green lantern. "Can speedboats come out?"

Out on the dark sea, a masthead light twinkles.

"Okay," it says, "Cutter has gone."

Or instead of a colored lantern, it may

B/1224



one was found with a hidden radio station out on Long Island. It filled many neatly typed pages in a fat loose-leaf ledger, showing separate letter groups for every message that might conceivably have to be sent in so exacting and highly developed a business.

Bootleggers are turning more to radio as their best means of communication. One instance was the fake distress messages that reported a ship sinking in

be a skyrocket. Bootleggers have used them, too. And, fearing they had been seen by coast guard cutters under Capt. Randolph Ridgely, they have placed in the water a tub bearing a lighted lamp, one side covered, to make a ducking, bobbing will-o'-the-wisp for cutters to chase. Meantime, shrouded in darkness, the real speedboats would quickly empty the so-called mothership.

Where birds of prey are few, bootleggers have used pigeons to carry messages notifying waiting accomplices when and where to expect a delivery, sometimes in clear, sometimes in code or cipher. Bootleggers use both. Usually the code covers simply the few most usual messages, as for instance:

"Father is sick," means, "sea too rough. Don't send speedboats."

"Mother is sick," means, "cutters hanging around. Don't send speedboats."

"Father is well," means, "sea smooth. Send speedboats," and so forth.

Messages have been captured referring to the number of cases of liquor to be transshipped as bales of cotton, crates of oranges and even stacks of Bibles.

Not all rumrunners' codes are so simple. A remarkably complete



At the Top Is Shown Radio Sending Set Concealed in Auto Trunk, Lately Adopted by the Bootleggers, and, Below, Secret Doorway to Subterranean Storehouse of a "Speakeasy"

B1224

the Atlantic thirty miles off Barnegat, N. J. The message came weakly, hesitantly, as if the operator was exhausted or inexperienced.

Twenty boats rushed for the spot; among them, three coast-guard cutters, two destroyers and a seaplane. They found no ship in distress. Meantime, the Munson liner, "Pan American," and the radio station at Manasquan, N. J., had kept the mysterious operator in conversation, which revealed him to be more expert than he had seemed. They took bearings on his position—and the bearings intersected, not thirty miles at sea, but at Hoboken, N. J. But by that time, the rum had come ashore unmolested.

Another intercepted radio message revealed an amazing rumrunner's trick, derived from the refueling-in-air stunt recently so popular. Flying across the border from Canada, came an airplane with an extra tank of 100-gallon capacity. It met an American plane, to which, by the usual hose, it transferred the contents of the tank. Then it flew back to Canada. Detection was facilitated when the tank slopped over, spattering people beneath with liquid "manna" that tasted like Scotch whisky.

There are estimated to be from twenty-five to fifty illegal radio stations in New York and vicinity alone, hidden in suitcases and in trunks. These have made trouble enough for the government forces, but recently, there have come new developments, that fill them with dismay.

The very newest thing in their struggle to communicate secretly, is the automobile radio set. In all the thirteen years of prohibition, until three months ago, only one such had fallen into the net. That one was captured three years ago, a crude affair, with only a five-mile radius. But within the last three months, the agents have caught two.

The first of the two led a merry chase to the federal agents patrolling Long Island in cars equipped with radio-direction finders, always searching the air for strange voices that may be tracked down to their source, usually some lonesome house by the sea. The two cars take bearings on the same spot, the source of the sound, from two different angles. Where the bearings intersect, there is the station.

B1446
"ISLAND STORES" BOOST SALES AT FILLING STATIONS



Gasoline-Supply Stations Are Meeting Depression by Installing Sales Booths for Accessories

Weatherproof display cases with interior lighting are being installed on gasoline pump islands at filling stations to increase the business of such places. Automobile accessories are attractively displayed in the cases and the location attracts the motorist's attention. Such items as razor blades and shaving cream are also dispensed from these outdoor shops, some of which do a business of from \$250 to \$500 a month.

HOMES PROTECTED FROM FIRE BY ELECTRIC CARTRIDGE B1453

Protection against fire is provided by an inexpensive electric-alarm cartridge that is connected to the house doorbell circuit. When flames send the temperature above a predetermined danger point, the cartridge automatically closes the circuit and rings the bell or buzzer continuously until shut off. The device can be used to set off a siren or other form of alarm. Only one inch long, the cartridge can be hidden behind picture molding, if desired. The cost is so low that a number may be installed in various parts of the home or other building. The cartridge is sealed by a metal plug, which, when the heat reaches the device, melts and closes the circuit, sounding the alarm.

Metal Works Co
Madison Av. Cleveland O

Artisan
11400

50 cents per year

2 by 10 electric
per alarm

L. S. Beffa, 110
William St. New York

"Home in the Sky" Is Built Inside Skyscraper



son can create when he builds a home. It is kept furnished in an up-to-date manner and supplied with all modern conveniences. Radio broadcasts, dealing with some building or furnishing subject, are sent from the house thrice a week. Since it was completed, it has been inspected by some half million visitors, averaging 600 to 700 a day. The two-room log cabin was



Top, Brick, Stone and Weatherboarding Are Combined into a Pleasing Exterior; Center, Interior of the Home in the Sky, the Basement Being on the Sixteenth Floor; Right, the House as Seen from the Eighteenth Story of the Builders' Exchange

A modern six-room residence and a two-room log cabin have been erected inside the Cleveland Builders' Exchange building. The house, thirty-one by thirty-nine feet, represents the prize-winning design of an Ohio architects' competition. Its basement is on the sixteenth floor of the skyscraper and the roof extends through the eighteenth floor. The court in which the home stands is fifty-six by fifty-one feet and thirty-one feet high. Living vines and shrubs decorate the house walls and lawn area, but the "home in the sky" is not inhabited. Instead, it is maintained as a permanent example of what the average per-



added to show an ideal vacation retreat and stands amid artificial surroundings of a rustic nature.

Cont. Walker & Courtois 1032 Florida Ave. Akron Ohio

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031299

Further information about the culture may be obtained from A. T. Root Co. Medina Ohio

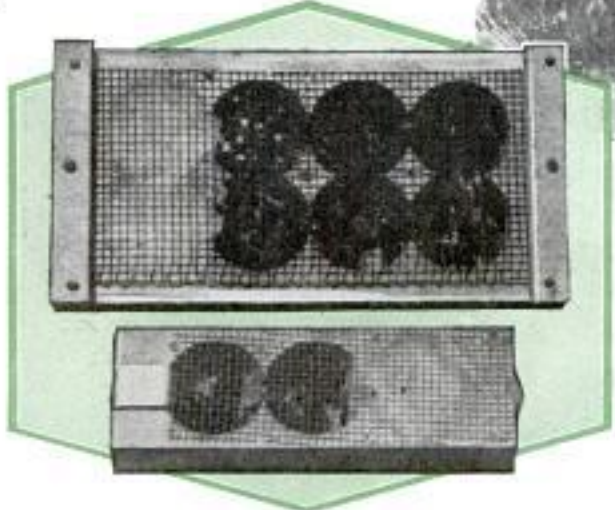
Book catalog - beekeeping. Government publications in insects.

MONEY from HONEY

COLLEGE expenses are being paid, automobiles, gasoline, clothing, food are being bought, and bank accounts are being increased with profits from the only legalized robbing business in the world—beekeeping.

The fact that the bee works away from home makes it possible for almost anyone to keep one or more colonies, no matter whether he has flowering fields or not.

Not every case of beekeeping will give good returns, however, because the bee business is subject to off-periods. Dry seasons with resulting small honey yield, bee diseases, freezing of swarms—all these things must be expected, although some can be avoided by careful management. But the price of honey has remained relatively higher than almost any other food product. Then there



Top, Shaking Bees from Frame of Honey into Funnel Leading to Shipping Container; Below, Boxes for Shipping Queen Bees

is a market for beeswax, and extra bees can be sold.

The beginner at bee raising can obtain, for about \$8, a colony layout that includes, besides the ten-frame hive, a two-pound package of bees and a queen, some 10,000 individuals; a bee veil, a feeder, bee smoker, embossed beeswax foundations for the frames, a frame-wiring outfit (it is necessary to use wires in large frames for supporting the foundations) and full instructions.

Usually the first season's honey yield can be expected to be zero. The bees must

Com. Walter E. Burton
1032 Florida Ave
ahrm Ohio

B1299
750



Top, Using Smoke to Quiet the Bees; Right, a Queen Bee Surrounded by Her Many Attendants

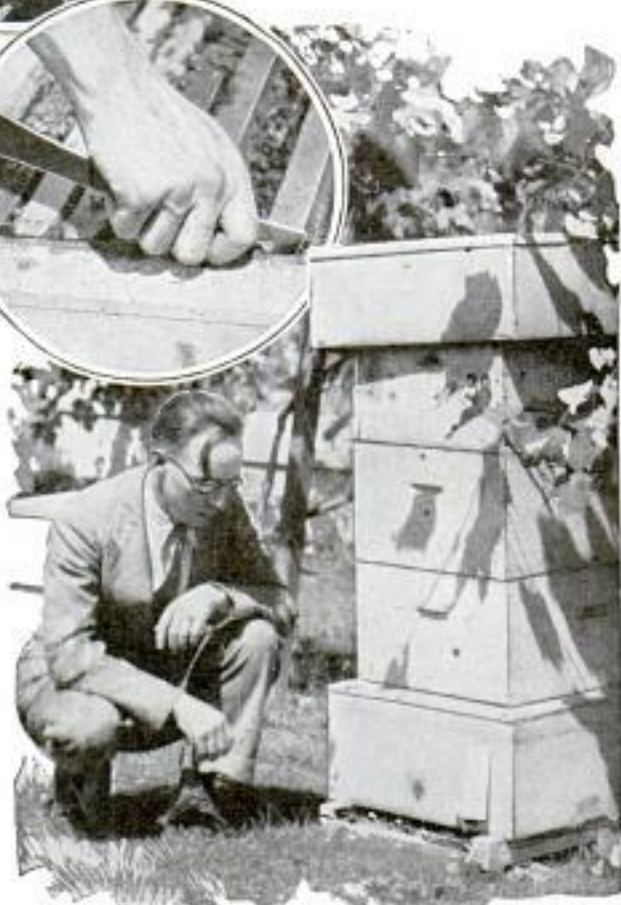


duce machine-made starters. He built equipment for embossing flat sheets of beeswax into a crinkled form whose pattern consisted of a series of three-sided depressions. The angle between one side and the opposite valley of each depression was about 140 degrees. After a time it was discovered that the bees, in making such foundations used an angle that invariably was 120 degrees; furthermore, when the 140-degree material was provided for them, they proceeded to rebuild it to their own standard.

It used to be a practice of beekeepers to brag about the number of swarms they could raise from a beginning colony. But in recent years it has been proved that one big healthy colony is more profitable than several small weak ones. In addition to requiring relatively less equipment, the output of honey is great-

first become well established and multiply into a colony of perhaps 50,000 to 100,000 individuals. This growth of the swarm usually will consume all the honey produced. New frames and foundation sheets, and new queen bees will be needed from time to time. But, after a colony is established, these are paid for from profits. Incidentally, the foundations, or starters, are the sheets of beeswax that run through the centers of combs. From these, the bees build wax cells in both directions outward, and fill them with honey "distilled" from flower nectar. The owner can let his bees build this wax partition themselves, but he does so unwisely. Bees have no particular sense of direction, so run the rows of cells diagonally as often as not. But the most important fact is that a bee, to produce one pound of wax, consumes eight to ten pounds of honey. Therefore, it is economy to spend a few cents for wax starters that, if made by the bees, would represent honey worth dollars.

Incidentally, there is a story about the beeswax foundations that illustrates the uncanny intelligence of bees. A manufacturer of bee supplies decided to pro-



In Circle, Tool for Lifting Frame from Hive; Below, "Skyscraper" Hive Formed by Adding Stories

er. So, instead of buying new hives, the wise keeper simply increases the space in the ones he has.

If he fails to provide enough space, the bees will swarm, that is, a part of the colony, led by the old queen, will leave for parts unknown. The remaining bees are in charge of a younger queen in most cases. In beeland, one queen is enough. If there are two or more, the extra ones are "taken for a ride," or the old one leaves with her followers.

The beginning beekeeper who desires to invest as little money as possible will sell his honey in the form of combs. He may get a higher price for it, but in addition he sells the beeswax and the frame itself. By investing \$7.50 or more in a honey-extracting machine, he can produce strained honey, and use his frames and beeswax cells over and over. In addition, he obtains a quantity of wax that can be sold.

In almost any locality there exists a good honey market. It can be sold to motorists, stores, and by house-

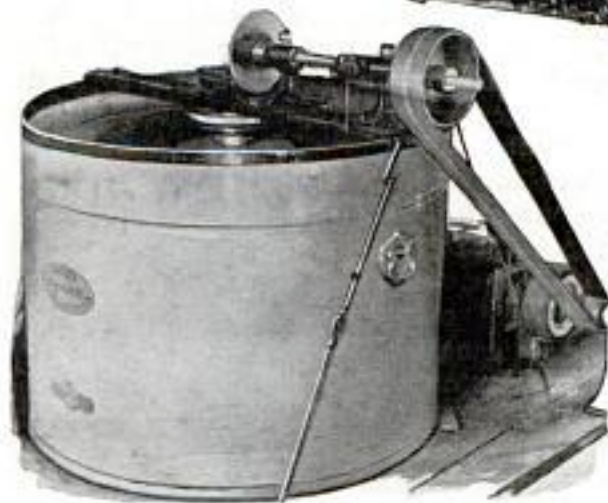


to-house canvas, without shipping to distant points. Another market centers about small, individual quarter-pound combs that can be sold for a dime or more. Confectioneries, lunch rooms, hotels and home tables constitute the main markets.

Besides getting honey and money from bees, the apiarist derives considerable pleasure from studying his busy workers. He likes to explain that there are from 30,000 to 75,000 bees in

a colony, and only one queen, and that the workers often die in six weeks from intensive honey gathering.

Then the beekeeper will tell you that it takes 20,000 bees, each flying perhaps two miles, to bring in a pound of nectar that is worked into one-fourth as much honey. Thus, 80,000 bees are needed to gather four pounds of nectar, and another 80,000 to evaporate and modify it into a pound of honey. But that is not all. It takes eight to ten pounds of honey to make one of wax, so that a quarter-pound candle may represent the combined efforts of nearly a half million bees!



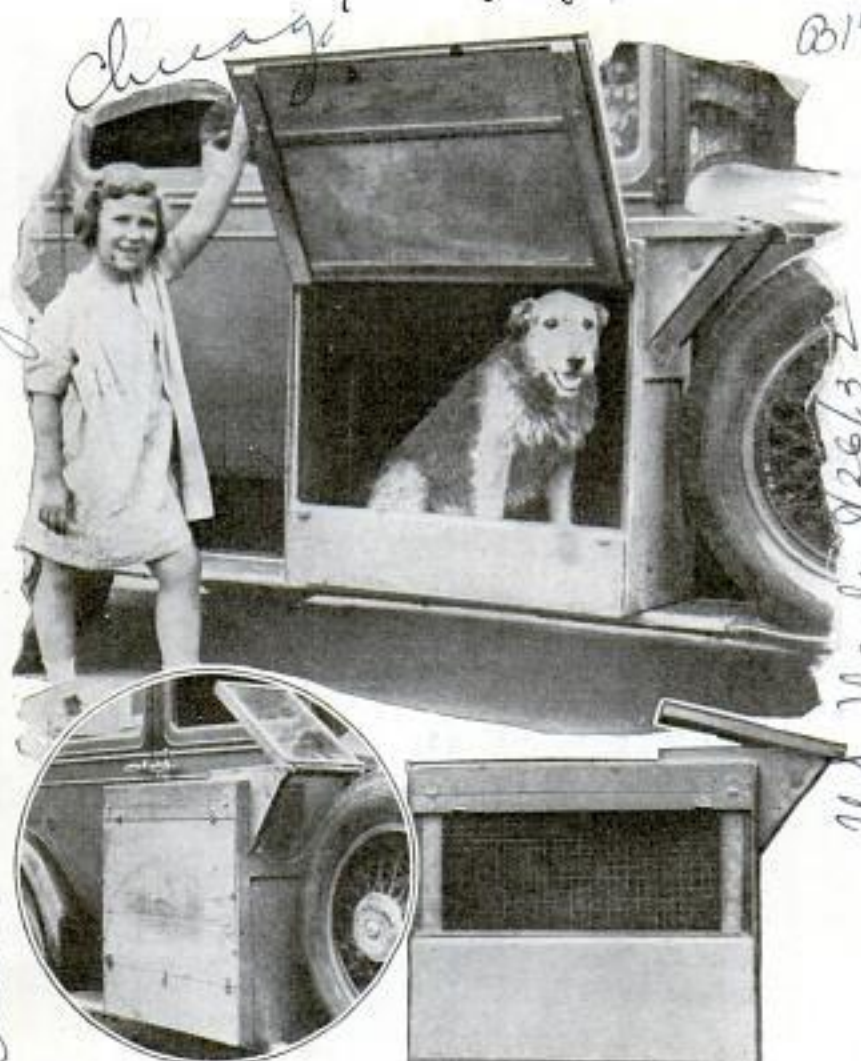
Top, Typical Single Hive; Center, Bee Veil and Wood Honey Frame; Below, Centrifugal Honey Extractor

B144/752

Cont. Weston-Barnett
Chas. 534 Wrigley Bldg
POPULAR MECHANICS

Dept. of Agriculture
Bureau of Agriculture
B1498 Engineering
Washington
YELLOW FREIGHT
CAR COOLER
THAN RED

Howard L. Messert, Pres. Humboldt
Redwood Co. Eureka, Calif.



Dog Kennel on Auto Running Board Is Shown Open and Closed; the Screened Vent at the Front Keeps "Doggie" Comfortable

DOG KENNEL FOR AUTO CLAMPS TO RUNNING BOARD

One man solved the problem of how to carry his dog on an automobile trip from California to Wisconsin by building a kennel on the running board. The compartment was made of redwood, combining light weight with durability and stanchness, and was fastened with clamps to the right running board, hence no drilling or marring of the automobile was necessary. A vent in the top and a screen in the side provided ventilation even in the hottest weather, and the screen also protected the dog from flying pebbles. The floor of the carrier was carpeted and the "annex" was painted to harmonize with the car.

— vessels
The number of motor vehicles in this country has increased fifteen per cent in the past ten years, while steam vessels decreased about twenty-nine per cent.

Bureau of Navigation and Steamboat Inspection
Dept. of Commerce.

In a study made of surface temperatures of refrigerator cars to find how heat-insulating material should be distributed for greatest efficiency and economy, government experimenters found that the color with which a car is painted has much to do with the degree of penetration of solar heat into the car. There was less penetration of heat through light-colored paints than through others. Red cars were hotter than yellow ones, but cooler than black. The difference between air and surface temperatures for stationary cars was about twice as great as for moving cars.

FLUID TO RESEAT VALVES WHILE MOTOR RUNS

Automobile valves can be resealed with the motor running, and without the time and expense of regrinding, by applying a liquid now available for the purpose, a treatment so simple that any car owner can do the work himself in a few minutes. The actual reseating takes place while the engine is operating, as shown by tests with a compressograph on motors before and after treatment. The fluid tends both to balance the motor and increase the compression, which results in increased power, more smoothness and a faster pick-up. Cars using the treatment have shown very satisfactory results from it.

Warnerizer



Warner. Patterson Co
920 S Michigan Ave
Chicago

Copyrighted material

B 1420

31456 Cont. Paul Ramsey, Pittsburgh
Pal Esagette, Pittsburgh

FULL-SIZE MODEL HOUSE BUILT OF SCAFFOLDING

To determine how exterior decorating effects of the new Franklin Institute building in Philadelphia would appear on the finished structure, a full-size model of the building was erected of scaffolding, and plaster casts of the trimming were applied to the model. The wooden framework was put up on the building site, and casts of cornices, outside decorations and trim were applied separately at the proper height, and the effect studied by a civic-art jury. Such models are often built in a studio where the casts are made so the architect may appraise and correct his work, but in this case the institute decided in favor of a full-size model on the site. After approval, the casts were used for the usual full-size designs from which stonecutters work.

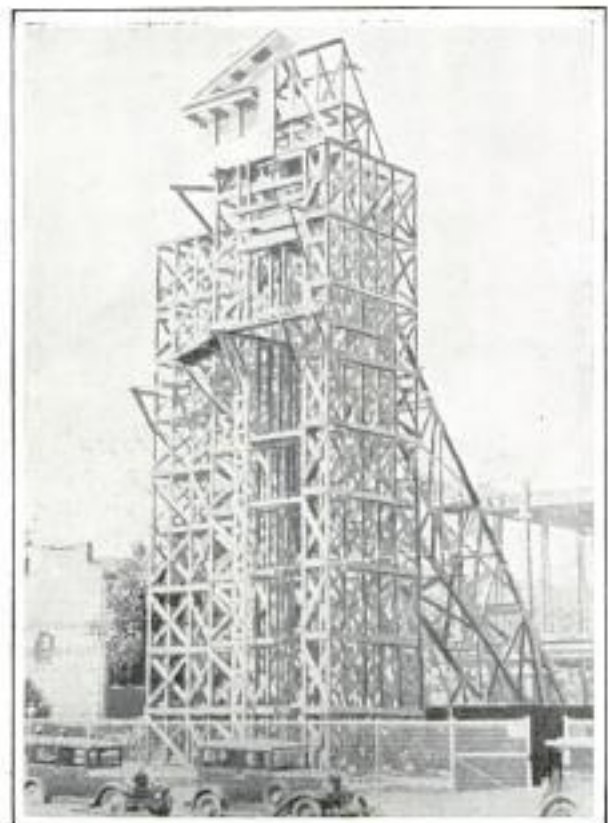


Solar Furnace Capable of Producing a Temperature of 5,000 Degrees; Heat from the Sun Is Focused Seven Feet above the Furnace

SOLAR FURNACE TO GIVE HEAT OF FIVE THOUSAND DEGREES

Two Pennsylvania pottery makers have constructed a solar furnace ten feet in diameter which they claim will produce a temperature of 5,000 degrees Fahrenheit at the focal point. When augmented by a magnifying glass between the furnace and its focal point, it is believed an even more intense heat can be produced. It was designed for experiments in fusing zirconia, with a melting point of 5,200 degrees, in making laboratory crucibles. Concentric wooden cants provide the framework on which are fastened polished chromium-plated metal slabs.

Paul Morrison and George Aderhold, Saranburg, Pa.



Model of a Building Constructed of Scaffolding to Test Appearance of Decorative Effects

ALUMINUM DOME IS WELDED AT TWO THOUSAND JOINTS

Regarded as one of the largest aluminum welding jobs ever attempted, the dome of the new Marine hospital at New Orleans has been completed, with welding at more than 2,000 joints. A torch using hydrogen instead of oxygen and acetylene was used to get a temperature of 2,300 Fahrenheit, about half that of the ordinary torch. The lower temperature prevents excessive oxidation and carbonization of the sheets of aluminum, enabling welders to make a strong and clean joint. Five thousand square feet of aluminum were used in the dome, which is eighteen feet at the base. Six men worked six months on it.

Cont. J. J. McLaughlin
119 S. 38th St. Phila

Cont. George H. Coad
c/o Tribune, New Orleans, La.

Cont. Alvin Blotz and Steel Metal Co. 713 Mangum St. New Orleans, La.

B1167 Colomberg, 29 Beau Road,
Berley Heath, n.w. London

The TRUTH about

By HAROLD T. WILKINS *Esq.*

"CIVILIZATION is waiting for the discovery of new gold mines," said Lord Leverhulme, recently, in London. That challenge, in spirit, has been taken up on the sea and land by salvors and treasure hunters who are trying to fish up some of the fabulous amounts of valuable metals shut up in Davy Jones' locker.

Engineer-inventors have reinforced their efforts with diving outfits which enable men to walk fairly easily on the seabed at the great depth of 300 feet and more, lamps to light the pathway to



treasure wrecks, warmed air from storage tanks regulated by small hand valves on the diver's suit, and ear protectors in the shape of tightly fitting telephone disks inside woolen skull caps.

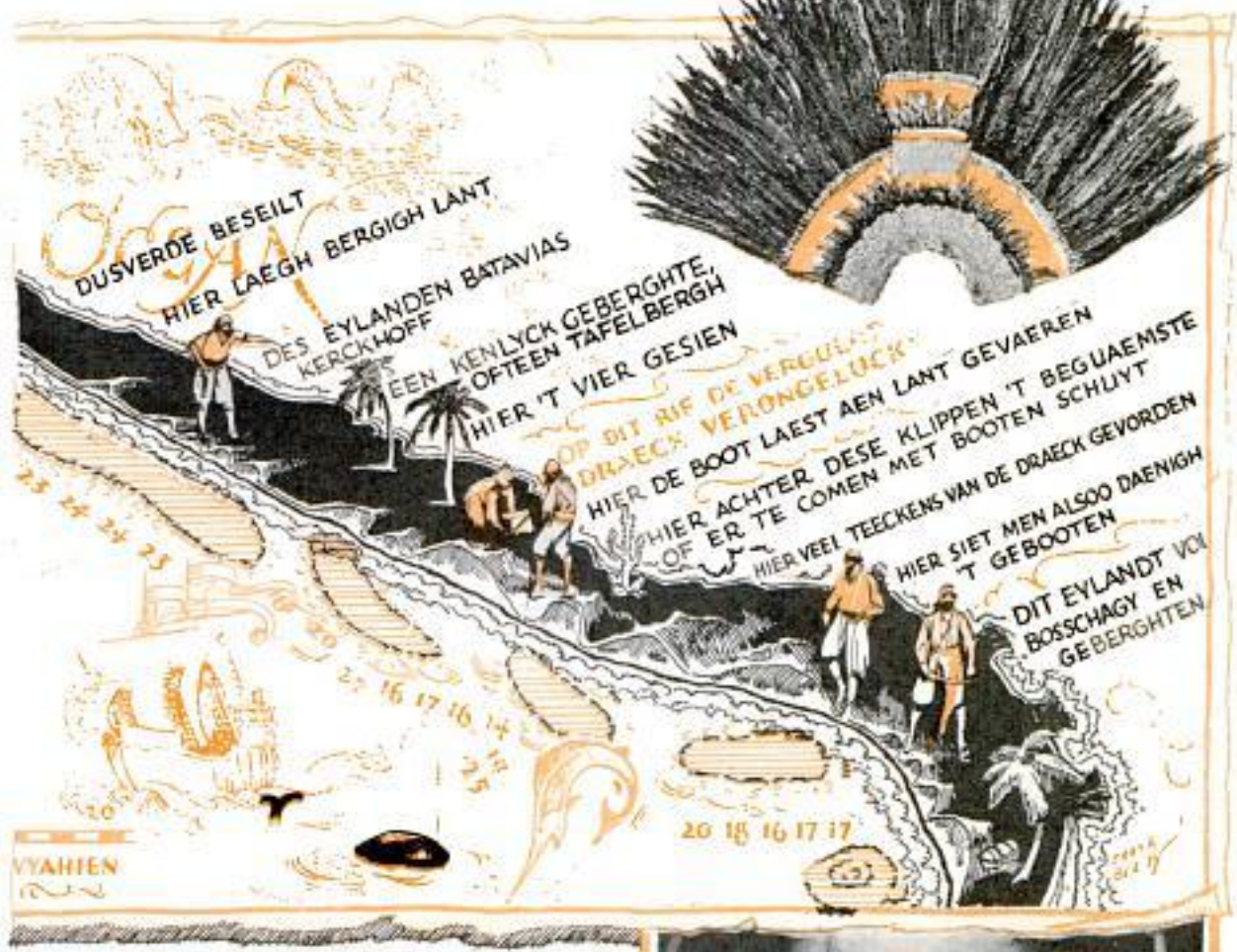
Before many years have passed, we may also have underwater television to tell the men on the surface steamers what is taking place within the range of the diver's vision as he gropes in the murky ooze. Steel stairways, leading to submarine chambers, opening like magic casements, with lights to guide the "iron men" toward the rotting wrecks

Courtesy of the Graphic

Gold Breastplate Found in a Grave in Colombia; Top, Chart of Dutch Expedition Which in 1658 Made a Trip to the West Coast of Australia to Search for a Treasure Wreck

B 1167

TREASURE HUNTS



have been built. A salvage syndicate started work, in May this year, beneath the waters of Table bay, South Africa, where there are fifteen ships whose location and cargoes are approximately known. Divers already have gone down to the sea floor and located the rusted hulks. These salvors will also hunt for the wreck of the old "Jonge Thomas," a Dutch East Indiaman which drove ashore in a storm on June 2, 1773, and broke in two at the mouth of the Zout river. She had a valuable cargo, and so far as is known, it was not all salvaged. In the same waters, lies the old wreck of the Portuguese East Indiaman, the "St. James," which went to the bottom in 1586, loaded with much gold.

In Irish waters, an adventurous attempt to reach the "Lusitania's" cargo is planned by Captain Railey, an American who is using an ingenious underwater stairway invented by Simon Lake. This tube is about 240 feet long and has an observation cham-



© The London Mail
Upper Right, Crown of Feathers and Gold Given by Montezuma to Cortez; Below, Underwater Lung Used in Treasure Hunting

ber with powerful electric lights for illuminating the seabed around the wreck of the liner.

*Attempt made.
7/05.*

03/167
756



© The London Times

"This is not a treasure hunt," says Captain Railey. "We hope to take a film of the hull, and to send up three small safes of little value, but nothing will be disturbed. There is no treasure in her—that has been verified. What we mean to do is to try out a new system of submarine lighting and our novel submarine access tube."

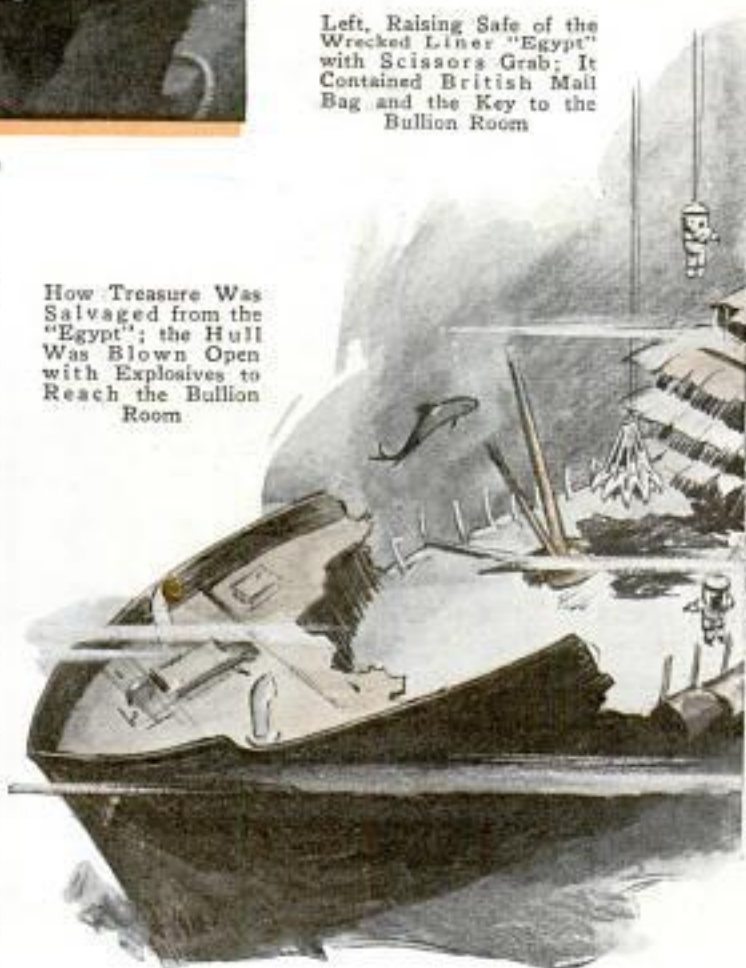
Another war-time wreck in the Irish seas is that of the White Star liner "Laurentic," torpedoed off the coast of Donegal. There are still about \$5,000,000 worth of gold and specie in this wreck. A British admiralty salvage ship, the "Racer," fished up about \$25,000,000 in gold coin from the ship in 1924. A salvage syndicate of London was recently granted a concession to work on this treasure wreck for a limited period, in 1931-1932, and their time is almost

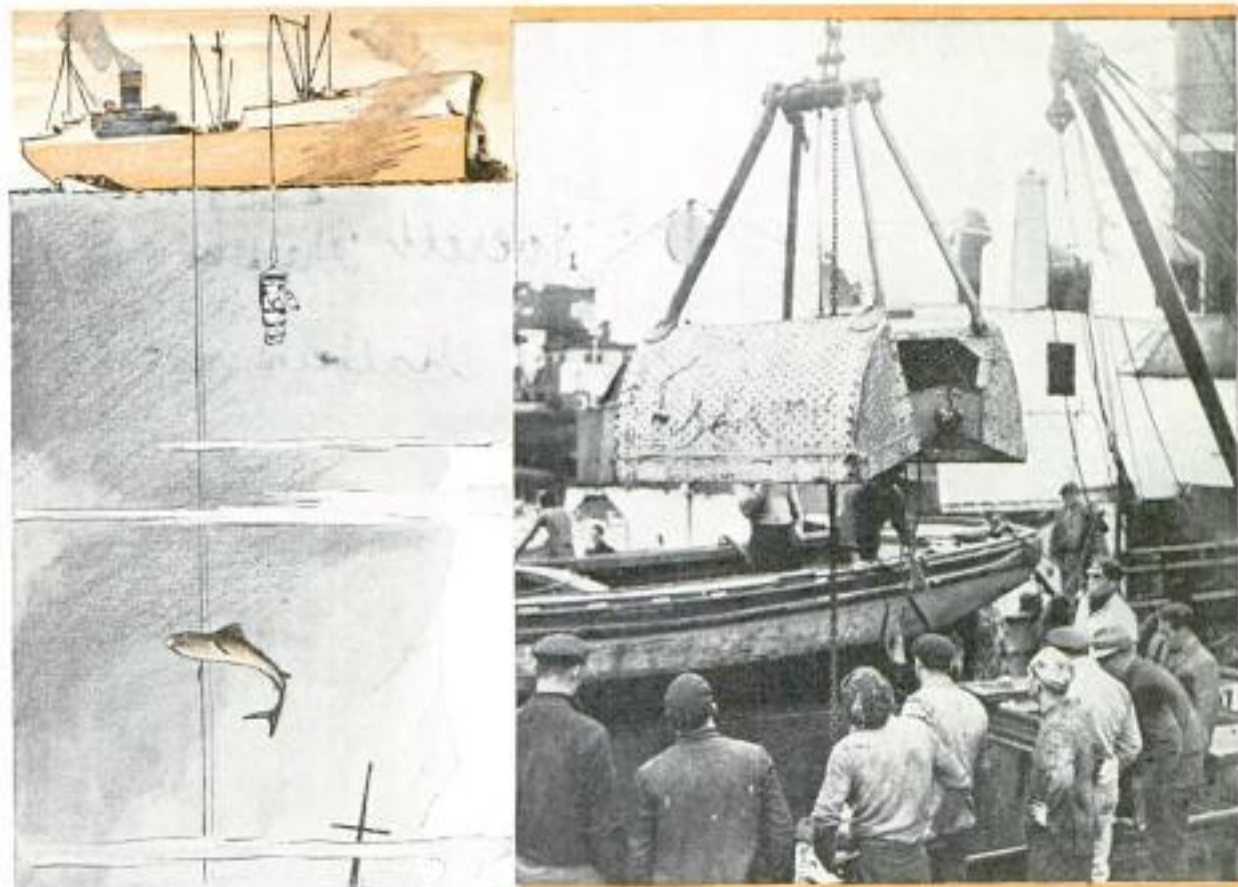
up. They have been using a salvage steamer "Estoy," and the divers have had to wage a battle with the sands in a region in which violent storms make the job very risky. Sand has buried every section of the "Laurentic's" hull, and especially the part in which the gold lies, where the action of the waves has pounded the silt into a hard concretelike mass. One way of clearing the wreck is to play upon the sand with water forced at pressure through a hose from the salvage steamer.

Another rich prize for salvors lies almost in the hands of an Italian salvage crew who already have recovered some of the treasure from the wreck of the sunken liner "Egypt," which went to the bottom in a fog collision off Brest with five and a half tons of gold and silver,

Left, Raising Safe of the Wrecked Liner "Egypt" with Scissors Grab; It Contained British Mail Bag and the Key to the Bullion Room

How Treasure Was Salvaged from the "Egypt"; the Hull Was Blown Open with Explosives to Reach the Bullion Room





© The Daily Mirror

Above, Grapple Used in Salvaging the "Egypt"; It Closes Automatically About Its Burden



\$400,000 in gold coins and forty-three tons of silver.

Ashore, too, the treasure hunters have

been active. Excavators in London have found an old Roman pill jar, a bronze spoon from a Roman woman's boudoir, a medieval spade, Venetian glass and a Roman oculist's cup, with the inscription, "Use Julius Senex' salve for sore eyelids." All over the British Isles, great hoards of gold and silver, dating back for centuries, are known to be lying underground or hidden under the ruins of old castles, halls, and abbeys. The hidden gold is found more often by chance than by following up traditional clues.

Despite the curse against those who search for the great treasure supposed to have been hidden by the old-time monks of Cysoing, on the Franco-Belgian border, an army of men have recently wandered over a beet field trying to locate the site of a hoard of jars filled to the brim with gold pieces, said to be worth at least \$10,000,000. The treasure, which has been missing for hundreds of years, is said to be hidden somewhere in a labyrinth of underground

(Continued to page 126A)

PICTURE OF TELEPHONE METER ASSURES TRUE READING

B1425
Factograph
Cm. June 8 captured 3497
Road 1/2
height
stand



Making Pictures of Telephone-Meter Readings; the Camera Prevents Errors and Speeds Up the Work

Telephone meters at exchanges, which record the number of calls over the lines of subscribers, now are being read photographically to provide a permanent record and also to prevent errors. Instead of having a recorder read each meter separately, a boxlike camera, known as a factograph, is employed. This camera contains a roll of film on which 1,000 meter readings can be printed. After all the meters in an exchange have been photographed, the film is developed and the prints are sent to the accounting department.

IT IS ALWAYS HARVEST TIME SOMEWHERE ON EARTH

B1486

Harvesting the world's crops never ceases. In January, Australia, Uruguay, Chile and Argentina are at work in the fields. February finds Egypt and southern India busy, while March continues with work for Egypt, northern Africa and India. By April, the cycle has swung farther north to include countries surrounding Palestine, Persia and Mexico. The first month of harvest in the United States is May, when Louisiana, South Carolina, Georgia and Alabama get busy, while abroad, Algeria, Tunis and central and southern Asia are taking crops to market. June, July, August and September are busy months for the United States, Canada, Russia, the Scandinavian countries,

Siberia and most sections of Europe. October sees the last of the harvest in Sweden, Finland, Norway, Alaska, northern Russia and northern Canada. In November, the farmers of Peru and South Africa reap the fruits of their toil, while Burma and Argentina have a busy December.

Everett, Wash

METALS IMPROVED BY ALLOY WITH VANADIUM

B1442

By being mixed with vanadium, almost any metal is improved. An alloy of ordinary soft cast steel and vanadium is closely similar to tool steel, being tougher and more easily worked and less apt to chip, but not as hard as tool steel. Aluminum, after vanadium treatment, becomes a tough workable metal and can be welded, a process once considered impossible. Copper and lead will mix thoroughly in almost equal proportions when treated with vanadium and will not separate on a remelt. By adding three per cent vanadium to pure copper, a metal with two and one-half the tensile strength and six times the hardness of pure copper is produced. Experiments with the alloy material indicates that vanadium is a natural purifier of any metal. It flows freely with most metals, apparently effecting a recrystallization of the metal to which it is applied.

ICE CREAM IN THREE MINUTES WHILE CUSTOMER WAITS

B1462

Producing one quart of ice cream in three minutes while the customer watches the entire process of manufacture, a new freezer is attracting attention on the west coast. Ice-cream mix is poured into a glass-faced drum which contains an axle carrying an eight-bladed rotating gear. Brine circulates around the cylinder, causing the freezing. The customer can watch the operation through the glass facing of the drum. A small electric motor provides the power.



Will mark patent

443 E Broadway
Portland, Ore.
Carbonating Co.

James Montagnes 608
Harbour Commercial Bldg
Vancouver B.C. Canada

Drum
Zugier, 11
Oregon
Lewis, Columbia

Carrier Engineering Corp
12 S. W. St. St. Phila

B 1429

Beardslee Chandelier

POPULAR MECHANICS

Co 216 S Jefferson 759

Steam furnished by Phila Electric Co

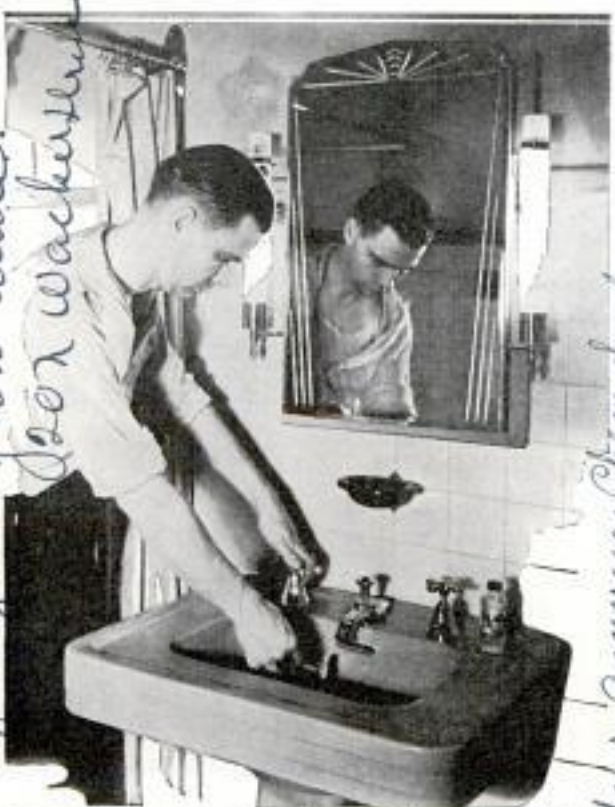
**STUDIOS COOLED WITH STEAM
"BOILING" IN A VACUUM**

Cold steam is being used successfully to cool broadcasting studios and talking-picture sound stages, both of which present difficult problems, since the sound of rushing air, involved in ordinary methods of cooling, would be picked up by the sensitive microphones and greatly magnified. The steam-cooling method depends upon the fact that water in a vacuum boils at a very low temperature. Steam is blown into a tank through an injector which creates a very high vacuum above the water. The water then "boils" at a temperature of about 34 degrees Fahrenheit, and this water takes the excess heat from the air.

WCAU. 1622 Chestnut, Phila

**MIRROR WITH TUBULAR LIGHTS
FOR THE BATHROOM**

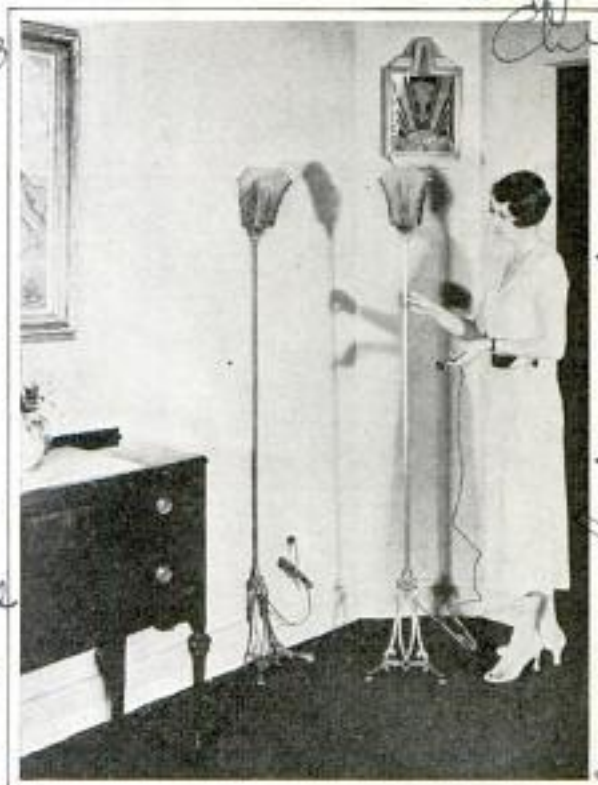
Better illumination for the bathroom is furnished with a cabinet and mirror equipped with tubular side lights instead of ordinary bulbs. The tubular bulbs and shades, extending the full length of the mirror, eliminate shadows and light the face and neck without glare, hence are particularly suited for shaving.



Tubular Lights for the Bathroom Mirror Provide Better Illumination for Shaving

Chicago Lighting Distributors
207 Wackerline

Before American Chem. Society



Portable Wall Lamps Which Can Be Moved from One Room to Another Like Ordinary Floor Lamps

Chicago Lighting Distributors
207 Wackerline

**PORTABLE LAMPS FOR WALLS
CAN BE USED ANYWHERE**

Wall lamps that are as easily portable as floor lamps can be moved anywhere about the house to enhance decorative effects. The lamp is attached to a tall support which rests flat against the wall, giving the appearance of being a permanent fixture since the bottom stands almost flush with the baseboard.

**CRACKED SEAL OIL IS GOOD
FOR MANY USES**

By cracking oil extracted from seals, a high-grade anti-knock gasoline is produced, suitable for operating an automobile. Sixty per cent of the oil is converted into gasoline, twelve per cent into asphalt, seven in Diesel oil, sixteen into illuminating gas and five into water. The process is now used for the production of a large part of the gasoline used in the United States, crude oil or petroleum being subjected to this method of refining. A rendering plant has been established on the Pribiloff island to turn the carcasses of seals killed for their fur into useful by-products.

U.S. Michigan
Universal Oil Products Co

Capital City Electric Co
Des Moines, Iowa

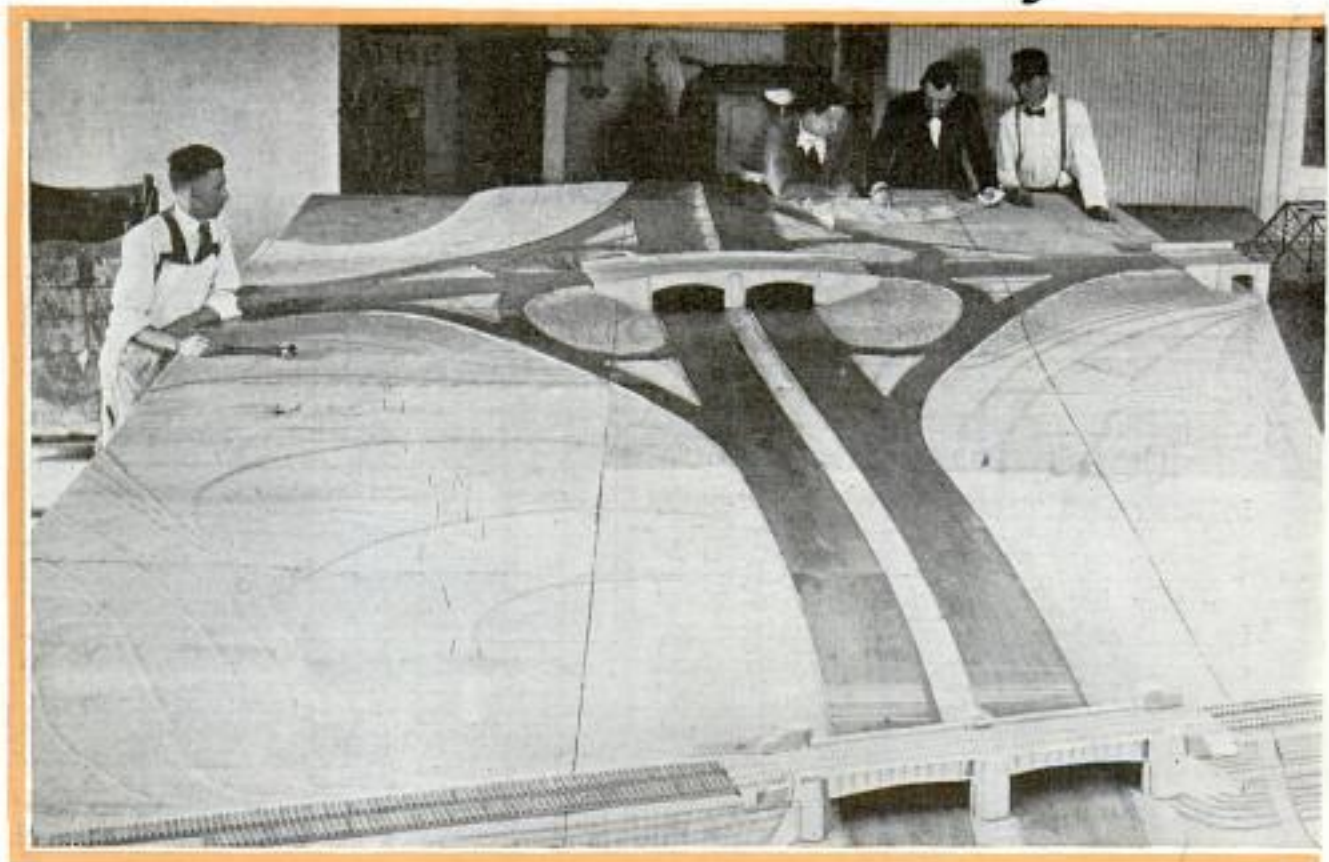
Authored by Dr. Isustar
Egloff and Edwin P. Nelson
Chicago industrial chemists

B1336

James B. Crane,

3720 Northampton St

"Ghosts" of the



Government Experts Studying Night-Driving Hazards with the Aid of a Model Highway

How to Avoid the Many Dangers of Night Driving

By JAMES B. CRANE

ROARING down a macadam road at night, a big automobile screams around a curve. Two brilliant lights from an approaching car glare against the windshield. Too late the driver sees that the macadam ends abruptly in soft dirt. He slams on his brakes, slithers through the dirt and hurtles off the road into a ditch.

Such is one of the "ghosts of the open road"—those totally unexpected situations that arise with dramatic suddenness to terrorize the average motorist at night, shaking his confidence in his driving ability

and robbing him of the pleasure of handling a smooth-running car.

Fortunately, most of these phantoms need haunt him no longer if he takes careful note of some important information just obtained by government experts in the biggest research program of its kind ever attempted. With novel instruments and thousands of feet of movie film, scientists have studied every conceivable way whereby the driver in the dark gambles with death.

Driving speed has increased, the experts found, by an average of as much as ten to twenty miles an hour during the last couple of years, due to improved engines, brakes, and other details. The thirty-mile-an-hour speed common on most city streets today represents not only a fifty-per-cent increase over yesterday, but an increase of 125 per cent in the energy and destructive power of the moving vehicle. When a moving car crashes into a parked

Open Road



Top, Left, Part of Model Highway; Right, a Victim of Glaring Lights; Below, This Girl Stepped before a Car to Rescue a Kitten

car, it does more than twice as much damage going thirty miles an hour as going only twenty.

Movies of all sorts of headlight conditions revealed some surprising facts heretofore unknown. For instance, glare isn't caused mainly from the supposed fact that certain cars have lights that are excessively bright, but from the great inequalities of brightness of different headlights. Lamps which have been in use for a year, or even less, may give only from one-fourth to one-tenth as much light as when new. All of which leads to this striking new discovery, that, if the driver with weak headlights meets the driver with strong ones, nothing can protect the former from a certain amount of

glare. On the other hand, a motorist can face the fullest intensity of the brightest lights and still see the road clearly if his own are adjusted so as to illuminate the foreground. His lights counteract the strength of the other fellow's.

Here's an urgent warning to all motorists—by all means have your headlights checked at least once a month. A sad fact revealed by the experts' research is that about sixty-six per cent of the headlights now used are out of adjustment.

Is it possible to eliminate glare entirely? May be so, but hardly with present-day equipment, it was found. When your car is in motion along an average road, the lamp beams are not standing still, but are continually in motion, flashing up and

B1 396

down along the roadway ahead so that, at distances of 200 feet or less, the direct rays of your lights frequently hit an approaching driver full in the eyes—not always to blind him, but sufficiently to destroy his full vision for a second or so. And it takes only a second to crash.

Friction and tension effects of different types of road material on tires at various speeds were studied. The night driver may



front or rear wheel, is worse than having the entire wheel fall off. When driving along strange roads at night, watch out for sharp edges and rocks along the road's shoulder—one of them may pierce your tire and send you crashing through a fence or into another car. Many serious accidents occur from this cause, including a great number of those listed in accident statistics as "ran off road-



avoid much danger, they found, if he is careful to notice the material on a road surface, especially on the shoulders, where soft dirt or gravel makes it impossible for the tires to "grab" and hold.

It is of vital importance that air pressure in all tires be checked regularly and made to conform to tire manufacturers' recommendations. When your tires scream going around a curve, it means they are insufficiently inflated—have them checked at once.

Insufficient inflation results in bad wear and deterioration of the tire's side walls—and, far more importantly, causes you to go into a dangerous slide.

A blowout



Top, Testing Wearing Quality of Tire; Center, Flights of Approaching Auto Do Not Expose Parked Car; Below, Testing Efficiency of Brakes

way." To minimize the hazard of a blowout, no tire should ever be used after the rubber tread has been so worn that the fabric is exposed. Moreover, the alignment of the front wheels should be checked whenever tires show evidence of excessive wear.

At least forty per cent of the brakes used in automobiles today are out of adjustment or faulty in some respect. A stopping distance of thirty-five feet from twenty

miles an hour may be required reasonably of passenger cars with four-wheel brakes. Additional tests for proper equalization are also desirable, officials emphasize, if you wish absolute brake safety.

Bureau of Standards
Washington, D.C.

B1334

B1297

Of particular interest to manufacturers are the new discoveries about how strong a car should be in order to be reasonably death-proof in case of a serious accident. First of all, the experts found shatter-proof glass absolutely essential. Then, the car body should offer passengers a maximum of protection. The top undoubtedly is the most vulnerable part of the body. In many cases it simply will not stand the strain of having the car turn over.

If you don't want to gamble with death, always exercise extra caution while driving at night, the government experts advise. Here are some "don'ts" that may save your life some time when you're speeding along the open road in pitch darkness: Don't go over thirty miles an hour when attempting to pass a motionless car while facing its headlights—you can't possibly know what the driver may suddenly decide to do.

Don't try to pass on a hill or a curve—even at night when you can't see any headlights coming; their beams may be intercepted by some object.

Don't go fast over a wooden bridge—you never know until it's too late whether a couple of its boards may be loose.

Don't ever speed over the top of a hill—the other fellow's lights may not be visible, and you can't tell which side of the road he's on; he may be trying to pass another car.

Don't park on a dark road without plainly visible lights on your car.

Don't let your windshield stay dirty—one of the most dangerous interferences to vision is the refraction of light on a smeared windshield glass.

And last, don't forget to have your car checked regularly, nor to do your share in making things safe for the other fellow.

B1508

BOREDOM FOUND TO BE CAUSE OF INDUSTRIAL DISABILITY

Boredom causes industrial workers in England to lose more time from their jobs than all the recognized industrial diseases put together, according to a government report. This is attributed to the mechanization of industry. The vague nervous disabilities which have increased greatly in recent years are really due to ennui on the part of the machine hand, it is thought.

Chief Inspector Factories and Workshops for 1931

CAMERAMAN ON TOP OF PLANE SNAPS THRILL PICTURES



Top, Taking Off; Center, Photographer Looks Down on City; Bottom, Grinding Out Thrills

Century, 29 La Salle, Chicago

Strapped on top of an airplane, the cameraman goes for a ride that results in some unusual pictures. Novel photos that give observers the feeling of being in the air themselves are taken, while it is easy to follow the leaps of parachute jumpers. He usually returns with something worth while from these death-defying ventures.

*Source Service 8/26/37
Emphasized on page 2*

Chicago Lighting & Radiator
20 N. Wacker Drive

B 1430 The Miller Co
101 Center St.
764

POPULAR MECHANICS
Meriden, Conn. Milwaukee Wis



Floor Lamp That Is Easily Converted to Table Light by Removing One or More of Its Sections

JOINTED FLOOR LAMP CHANGES INTO A TABLE LAMP

Three lights in one are contained in a jointed electric floor lamp combined with an ash tray. When the entire light is assembled, it constitutes a reading lamp for the floor with a handy ash tray or glass container. By removing one section and the tray, the fixture is transformed into a table lamp, and by taking out three sections and attaching the top to the base, it is converted into a dressing-table light.

LATEST HOME MOVIE COMBINES SAFETY AND LOW COST



Practical and so safe that a child can operate it, a home movie projector has been produced to sell below \$5. The entire mechanism is attached to a

Myers Mfg Corporation
2915 Detroit Ave
Cleveland Ohio

Workrite Specialty Co
3129 N. 28th St

frame stamped from sheet steel. One feature is the omission of teeth from the crank, eliminating the principal cause of film tearing. The light housing of steel is shaped to the contours of a sixty-watt lamp and is covered with a light wire screen to dissipate heat from the light. This prevents burns in handling the machine. Standard inside frosted lamps are used and the projector throws its own screen. Shutter troubles are eliminated by simplified timing. A two-piece lens focuses for "big-audience" films, or pictures a few inches square.

HOME HUMIDIFIER LIKE A VASE OPERATES AT LOW COST

Resembling a beautiful vase that will fit in with luxurious furnishings, a portable electric humidifier has been produced for the home, office or apartment. The body has a black crystallized finish, and the base and grill are chromiumplated. The apparatus, which is thirteen and one-half inches high by eleven and one-half inches in diameter, has a motorized fan for circulating the vaporized air. It operates at unusually low cost, being rated at 660 watts with an efficiency of close to 100 per cent. The capacity of nine quarts is sufficient for nine hours. A floating chamber permits only a small amount of water to be boiled at a time. When the device is emptied, the current is automatically cut off. A snap of the switch puts the humidifier back into operation after it has been filled with water. The operation is almost instantaneous, since there is no waiting for a large body of water to heat.



Workrite Electric

SIX-THOUSANDTHS-INCH "MIST" KEEPS VEGETABLES FRESH

Sprayed from a metal ball, jets of water only six-thousandths of an inch in diameter are thrown on vegetables in a mist to preserve their freshness. The "mist" sprayer is for the especial use of grocers and vegetable and fruit markets.

B 1395
Senge Watson Mfg Co
4903 W. Jackson St.
Milwaukee Wis

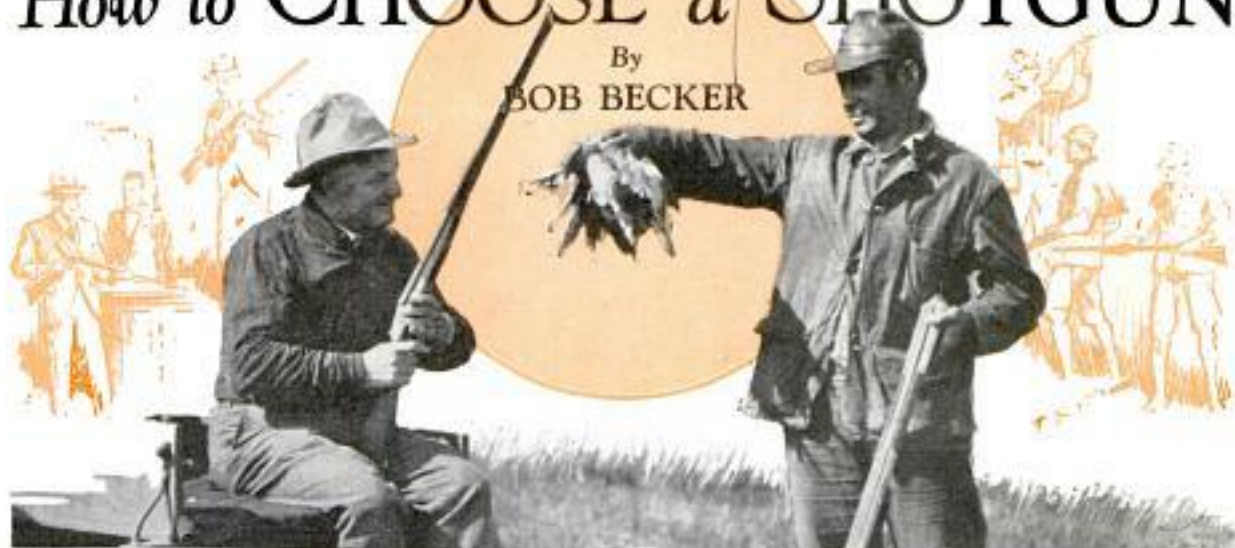
4903 W. Jackson St.

001269

Chicago Tribune
Tribune Square
Chicago

How to CHOOSE a SHOTGUN

By
BOB BECKER



WILL a twenty-gauge shotgun be all right for ducks, rabbits and pheasants? Which would you buy, a double-barrel or a pumpgun for general hunting? I want a gun for all around hunting. Shall I buy a twelve-gauge repeater, full choke?

These are just a few of the questions hunters face when they buy a gun. Many times a sportsman, one of the army of 7,000,000 hunters in the United States, is anxious to find the answer to that everlasting question: what is the all-around shotgun that will take care of all kinds of upland-game and waterfowl hunting? If, generally speaking, he knows that the twenty-gauge will do the same work at thirty-five yards as the twelve-gauge at forty-five, and the ten at fifty-five, he has something on which to build a decision.

Remembering that we are trying to find the nearest thing to a general-purpose gun, let us see how the twenty-gauge and the twelve compare. Checking on the average killing circle at twenty-five yards, it is found that a twelve-gauge full-choke,



Above, Two Good Double-Barrel Guns for Doves; One Is a Twenty-Gauge Lightweight Weapon with Twenty-Eight Inch Barrels of Different Choke, the Other Is an Open-Bored Twelve-Gauge; Left, the Repeating Magazine Shotgun, One of the Most Popular Types of Guns Used by Hunters for All Kinds of Shooting; This Gun Is Particularly Liked by Those Seeking Water Fowl When Fitted with Thirty-Inch Barrels, Full Choke

with three drams of powder and $1\frac{1}{8}$ ounces of shot, gives a seventeen-inch killing circle. The twenty-gauge full-choke with $\frac{7}{8}$ ounce of shot gives us a twenty-inch circle. Score one for the twenty, because it gives a slightly larger spread due to higher velocity. However, the twelve-gauge, if loaded in correct proportions, will throw more shot, put more pellets in a thirty-inch circle at forty yards and there-

B1269
766



fore kill game more effectively than the twenty-gauge. After all is said and done, it's the number of shot pellets that reach the target which tells the story.

This little table tells the gun buyer the whole story at a glance.

Gauge	Full Choke	Load	Pellets in Load	No. in 30-In. Circle at 40 Yd
12	75%	1½ oz. No. 7	336	252
16	75%	1 oz. No. 7	299	224
20	75%	¾ oz. No. 7	262	183

It must be apparent that as the shooter begins to reach out with his shots the twelve-gauge continues to give him a splendid killing pattern, whereas the twenty-gauge and the sixteen, too, with their lighter loads, are unreliable. Moreover, the smaller gauges will not handle large-size shot like the twelve-gauge. And the larger shot will carry farther and kill at greater range.

The gun buyer should keep in mind that the twelve-gauge will give him reliability, good patterns and killing spreads at fifty yards, where the twenty-gauge will not do it beyond forty. Both guns will kill beyond those ranges of course. But the point is, they are not certain at greater distances.

Therefore the twelve-gauge should be chosen for what sportsmen call "general purposes." For upland field shooting requiring

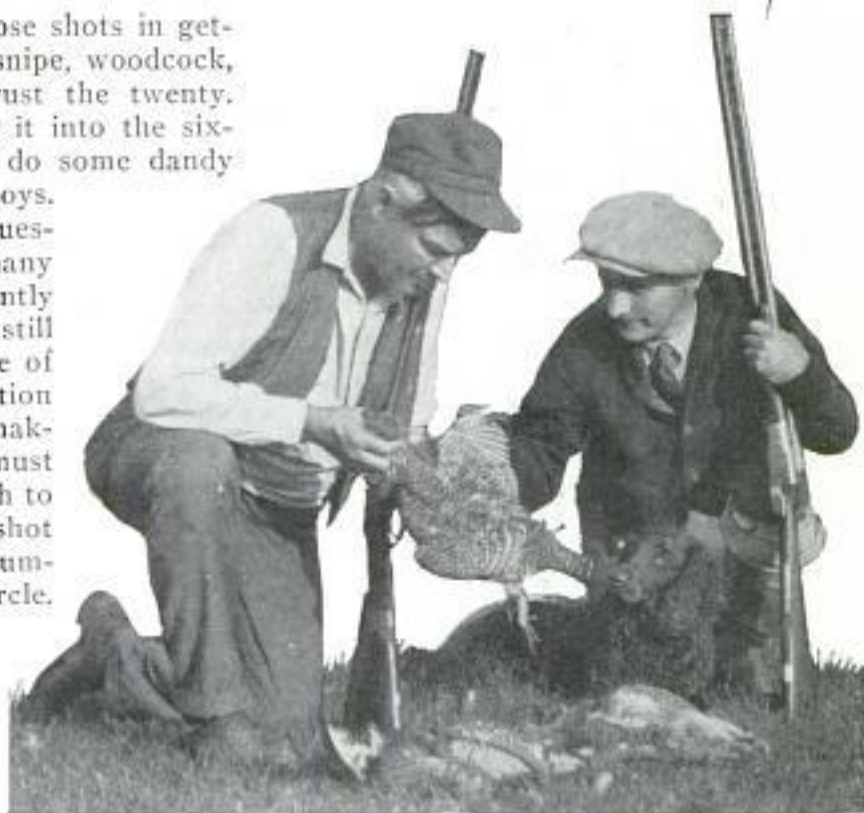
Above, the Nearest Thing to an All-Purpose Gun—a Double-Barrel Twelve-Gauge with Twenty-Eight or Thirty-Inch Barrels and Two Chokes



Double-Barrel Open-Bored Twelve, Single-Barrel Five-Shot Automatic, and Twelve-Gauge Repeater with Open Choke—All Good Guns for Upland Game Shooting

quick work and fairly close shots in getting at game like quail, snipe, woodcock, grouse, etc., one can trust the twenty. With heavy loads lifting it into the sixteen-gauge class, it will do some dandy work on ducks over decoys.

Now comes the other questions of chokes and how many shots to the gun. Apparently thousands of hunters are still unfamiliar with the choke of a gun barrel and its relation to patterns. Briefly, gunmakers have found that they must taper a barrel from breech to muzzle to compress the shot charge and get a certain number of shot in a killing circle. In other words the muzzle of a gun is constricted or choked to jam the shot together when they leave the barrel. Generally speaking



Above, Prairie-Chicken Hunters Choose the Double Guns for Upland Game Shooting; at Left, the Twenty-Gauge, and at Right, the Twelve-Gauge, Both Well Adapted to the Purpose



How Far to Lead a Bird Is Something That Each Hunter Has to Learn from Experience

a so-called "full choke" is about seventy or seventy-five per cent choke, a modified is about sixty per cent and an improved cylinder to get a spread pattern is around fifty per cent. These percentages mean that this part of the charge goes in a thirty-inch circle at forty yards.

It follows that the tighter the choke, the better the pattern at long range. Also the more open the choke the wider the pattern on both close and long shots. If a sportsman buys a full-choke gun that puts ninety-five per cent of 279 pellets in a thirty-inch circle at twenty-five yards and goes out to shoot rabbits, he need not blame the gun if he misses a close shot or else blows a rabbit to pieces due to the fact that the shot charge is traveling in a small congested mass.

With facts about the superiority of the twelve-gauge in mind, and how the choke of a gun affects its pattern at close and long-range shots, the hunter is ready to step up to the gun counter and pick the nearest thing to an all-around gun for rabbit hunting on the farm or a long-range shot at a chicken hawk.

This all around gun should be a double-barrel, twelve-gauge weapon weighing around seven and one-half pounds with

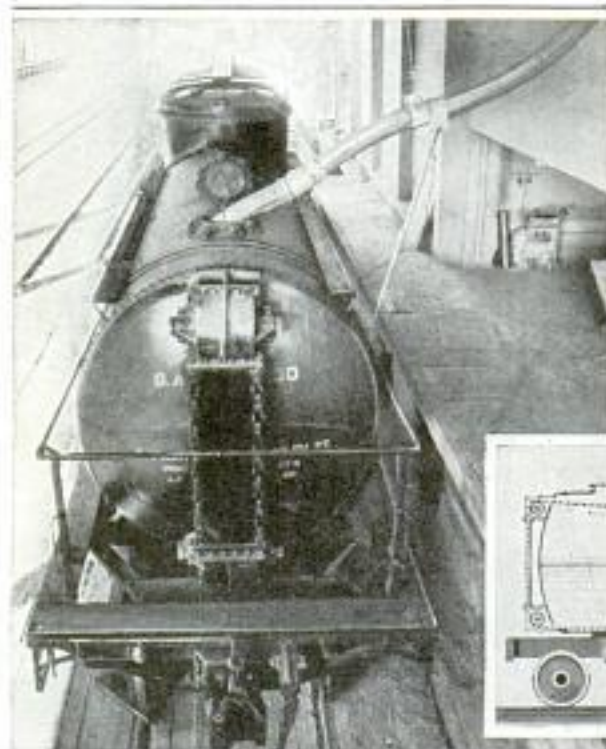
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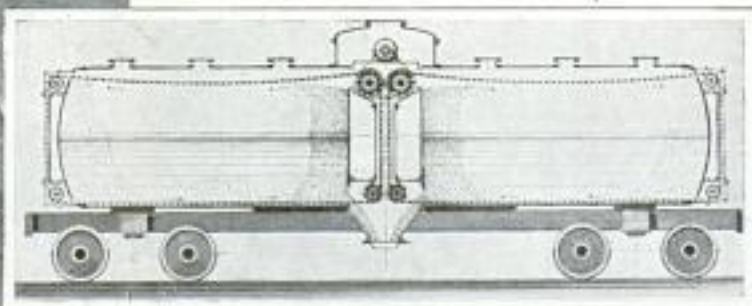
768

General American Tank Car Corp
Continental Illinois Bank Bldg
POPULAR MECHANICS

This "Dry-Flo" Tank Car Quickly Loads Itself



handled in tank cars. The new car looks like the conventional tank and both are unloaded from the bottom. In the dry-flow car, however, are three compartments through which pass an electric-driven drag-chain conveyor. The motor that operates the conveyor is located in the dome of the car. Loading and unloading is accomplished by turning on the motor, the material being carried to or from the compartments by the conveyor without the aid of labor. Time and cost of placing the



Dry Materials Are Loaded and Unloaded Just Like Liquids by This Tank Car; Left, Loading by Means of Flexible Pipe; Drawing Shows Motor in Dome and Arrangement of Gears and Endless Chains

Granular commodities, like dry cement, sulphur, soda ash, and the like, can be handled in a new type freight car in the same way as gasoline and other fluids are

dry materials in sacks, barrels and boxes are eliminated, resulting in an approximate saving of \$200 on a sixty-five-ton load. Unloading is done in two hours.

"GOOD MIXER" WRITES BETTER THAN OPPOSITE TYPE

Comparison of handwriting reveals that the "good mixer" is apt to be a better penman than the solitary individual. Prof. June Downey contrasted the handwriting of twenty-five "extraverts," corresponding to the good-mixer type, with that of as many "introverts," the opposite type. Graded by impartial judges, the good mixer scored higher than the introvert. The judges pointed out that the writing of the good mixer generally is symmetrical, bold and flowing, while the introvert's is cramped and perhaps back-slanted.

gers on ocean liners have been protected by this lighthouse as their ships entered or left New York harbor, and it has become a landmark for thousands of regular travelers. The model is carved entirely from plastic wood. Four pounds of material were used in producing the model, which is nine by ten inches by six high.

MODEL OF FAMED LIGHTHOUSE MADE OF PLASTIC WOOD

Fashioned of plastic wood, the famous Fire Island lighthouse has been reproduced in model form. Millions of passen-



Fashioned from Plastic Wood, This Model Resembles in Every Detail the Fire Island Lighthouse

John A. B. Huntz
Ocean Beach, L. I.
New York

meeting of 3rd International Congress of Eugenics

B1450

Science Service 8/6/32

B1436

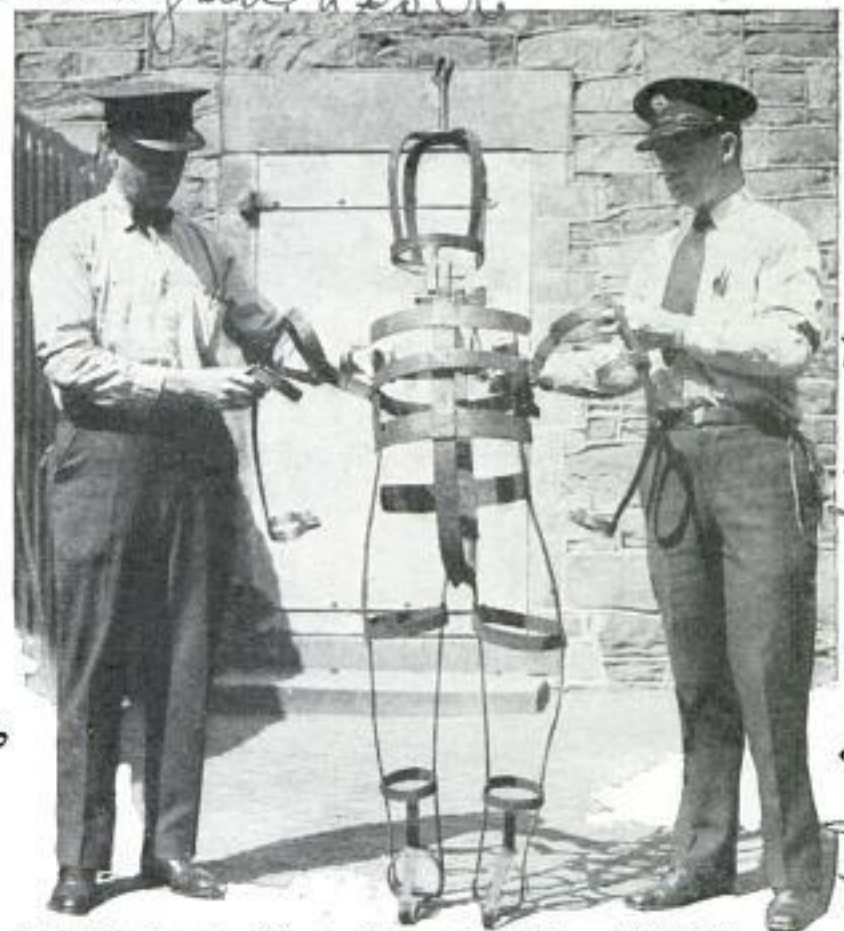
Science News Letter 9/13/32
Uryls, U Karchepeuko
Leningrad Botanical
Institute, Leningrad, U.S.S.R.

B1515

RADISH-CABBAGE STRANGE CROSS NOW GROWN

Fertile crosses between distinct species, and even between separate genera—something declared impossible by many opponents of evolution—are growing in a special garden at Cornell University. The most outstanding example is a hybrid between radish and cabbage. The plants, although botanically related, are separate genera and are as far apart as plants as are domestic cattle and the American buffalo.

B1544



Ancient Instrument of Torture Preserved as Relic at Philadelphia Prison; the Victim Was Incased in the Iron Framework

Emb. J. Morris Stanton
5258 Parkside Ave
Phila

REVOLVING SIGN IS ATTRACTION TO MOTORISTS

Eight feet in diameter, a circular sign on the highway between Ward and Estes Park, Colorado, mystifies the motorist as it slowly revolves, presenting four messages on as many segments. The sign operates by water power, which is brought down in a fifty-foot hose from a spring on the hillside above. There is a fall of ten feet, and one-half inch of water is used. From the hose, the water enters a pipe which feeds it on the reverse side of the sign. An old wagon wheel, about three feet six inches in diameter, with a three-inch tire, is the basis of the sign. Twenty-three large tomato cans are attached to the wheel behind the sign at regular intervals close to the outer edge. The pipe is so placed that the stream falls on a can at the exact center, causing the sign to revolve slowly.

B1506



COLONIAL "IRON MAIDEN" KEPT IN PRISON CELLAR

The "Iron Maiden," an ancient instrument of torture, although still among the relics of Moyamensing prison in Philadelphia, rests in the cellar and has not been used, according to the records, since early in the nineteenth century. The grim figure, with its knotted iron thongs, capable of inflicting horrible torture, tightly incased its victim and, in old days, hung suspended high on the prison wall where the public came to jeer. Prisoners referred to the Iron Maiden as "the Old Crow."

ALCOHOL SEEN AS AUTO FUEL

In order to dispose of the surplus crops of figs and potatoes, Turkey is considering mixing twenty to thirty per cent of alcohol with the gasoline sold in that country. About ninety-nine-proof alcohol is said to be necessary for successful mixture with gasoline, and the government hopes to convert the excess into motor fuel.

Barwick Service, Boulder, Colo

Commerce Dept

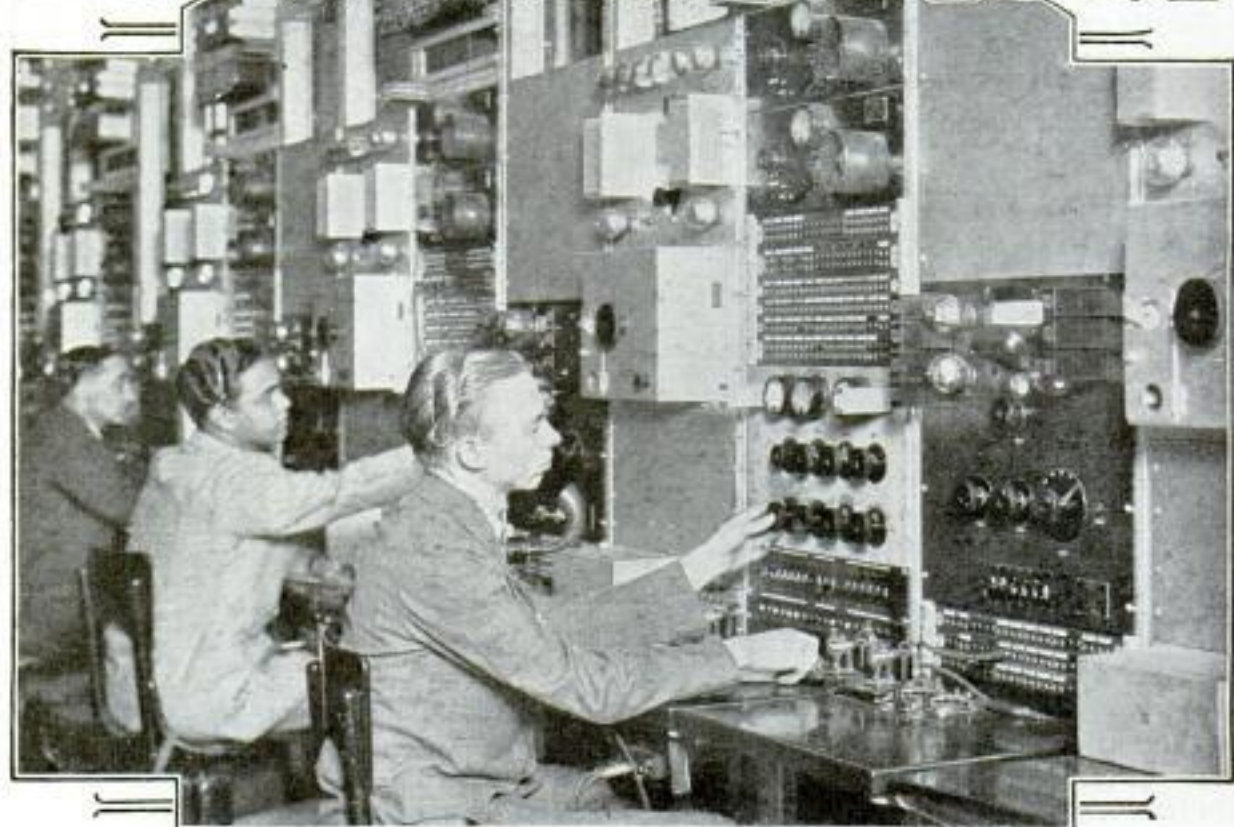
Istanbul Turkey

L. F. McAllister
Proprietor, Willow Creek
Store cafe

Reported to Dept of Commerce
by Asst. Commercial
Attache John J. Harding

B 1225 Charles Morrow Wilson
to Mrs. Harriette Joseph (Literary Agent)
55 W. 42nd, New York

The World at Your



Control Boards at Which Technical Operators Make Adjustments That Affect the Differences in Speech Volume, Due to Various Types of Voices, Thus Insuring Better Reception

IT was a futuristic telephone conversation. Grace P. Kelly, chief operator of the transatlantic switchboard at New York, was speaking from yesterday into tomorrow—talking with Sydney, Australia. The voice from the other side of the world was coming through by way of two systems of land telephones and two trans-ocean broadcasts, yet as clearly as if phoned from the next block.

"Maybe you would like to have a try at the long lines?"

There was no maybe about it. I was delighted. Five minutes later I was in the thick of a chat with W. F. Dobson of the British post office telephone system. It was 3:30 p.m. in New York and 8:30 in London. Mr. Dobson explained that he had just finished supper and was then basking before his fireplace. Honolulu next told of the vagaries of tropical weather, of the experience of resting in the shade while watching a snowstorm rage on a far distant mountaintop.

Next was a far-eastern city. The voice

that greeted me said, "Good morning, how are you this afternoon?" explaining that it was just coming worktime in that metropolis, where the clock is twelve hours ahead of New York. And so I had talked from nine in the morning until 8:30 at night on 19,277 miles of telephone channel. It was a new chapter from "Alice in Wonderland."

Compared with radio, overseas telephoning is a swaddling infant. The first commercial transatlantic telephone channel was opened on January 7, 1927, between the metropolitan districts of New York and London on a one-way circuit. By March, standard two-way service was available between the world's two greatest cities. Today the overseas hookup includes eleven co-operating systems with a total of 32,829,000 telephones or about ninety-two per cent of the total in service throughout the world.

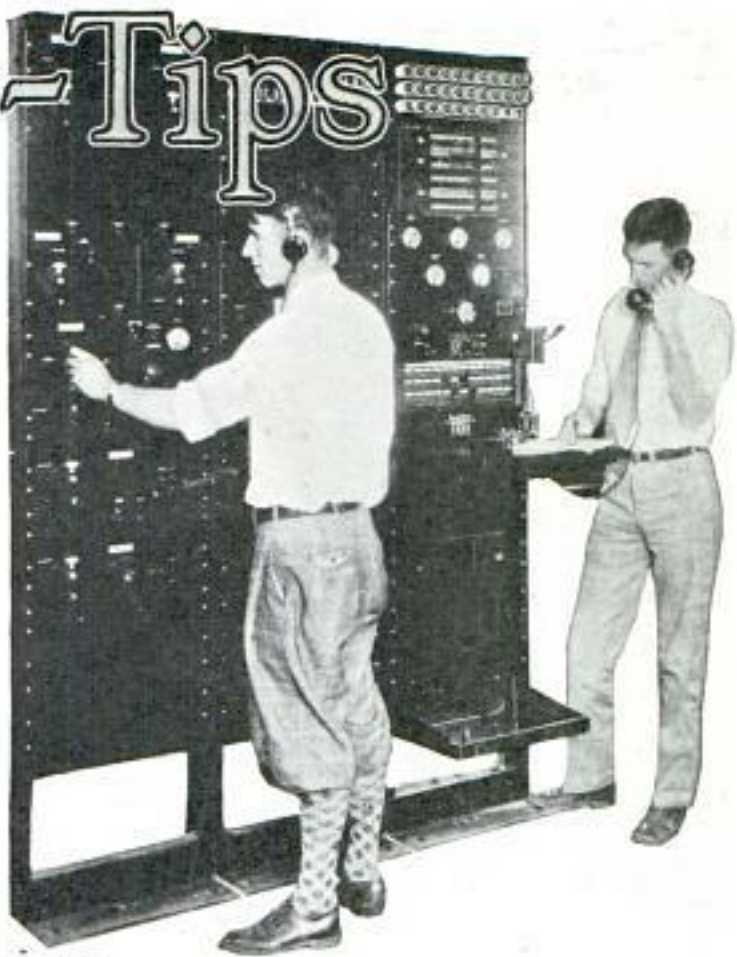
The United States' patronage of the overseas service has also increased about twelfefold during the five-year tryout—

Finger-Tips

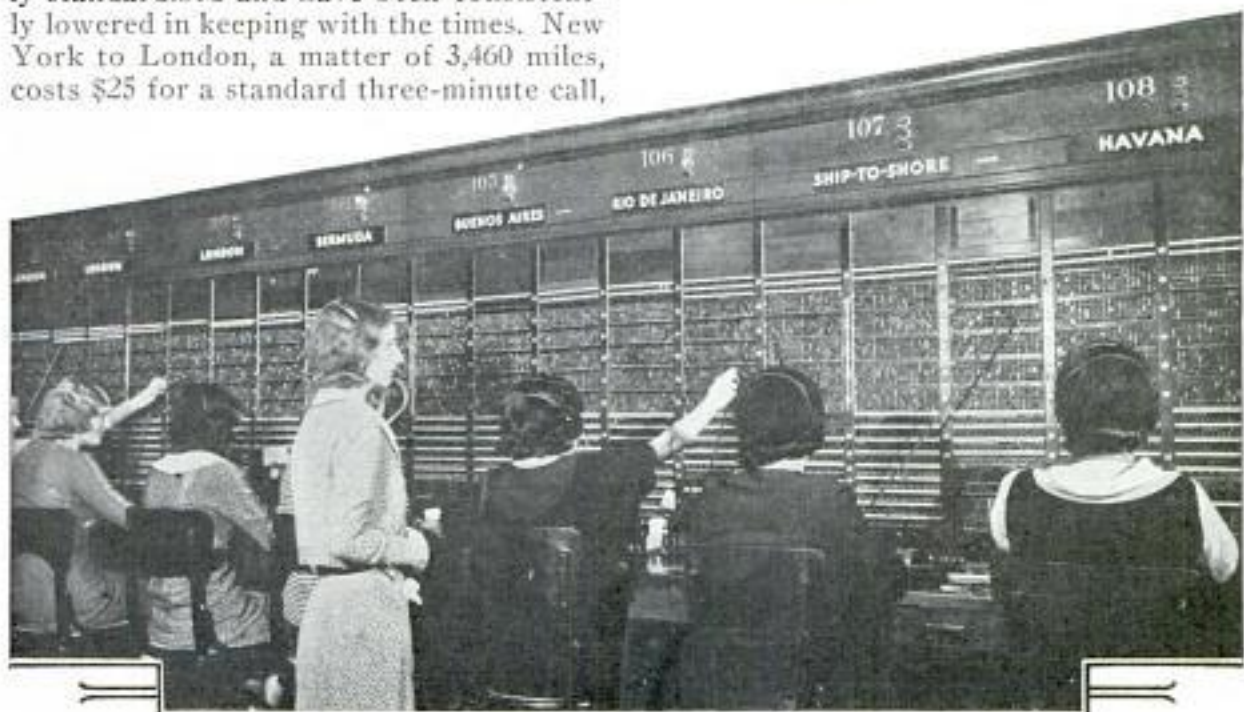
By
CHARLES MORROW WILSON

from a year-around average of seven calls a day in 1927 to about eighty-eight a day during 1931 and the first quarter of 1932. The volume of transatlantic messages for the year 1931 showed an increase of twenty-one per cent over that of 1930.

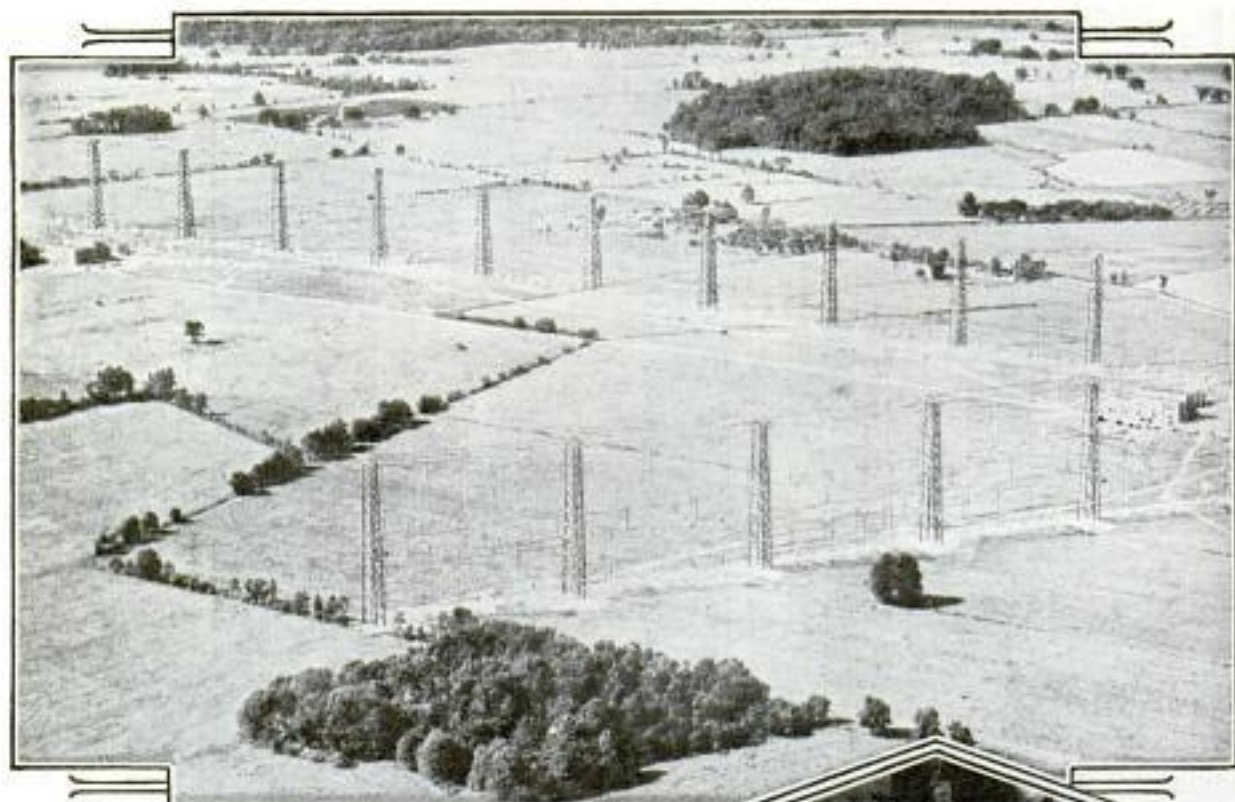
What about the actual uses, the present and probable importance, of trans-ocean telephony? Record files provide some interesting sidelights on long-line utility. Address tabs indicate that the America-Europe calls are divided about fifty-fifty between business and personal messages; whereas the South American, Hawaiian and Far East calls run about seventy per cent business and thirty per cent personal. Normally the United States sends out about fifty-two per cent of her transatlantic calls and takes in forty-eight. Rates on all systems are closely standardized and have been consistently lowered in keeping with the times. New York to London, a matter of 3,460 miles, costs \$25 for a standard three-minute call,



Receiving Set Arranged to Operate over Wide Range of Wavelengths; It Is Provided with Switching Devices to Permit Connection to Various Antennae



At This Switchboard a Specially Trained Group of Operators Handle All Calls Between Points in North America and Europe, South America, Bermuda and the Far East



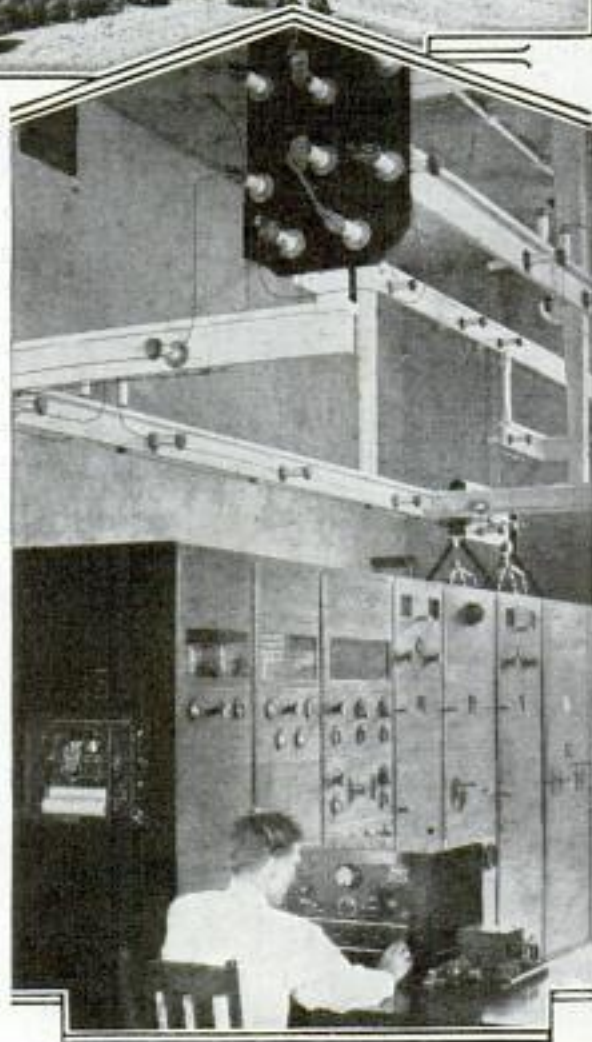
Aerial View Showing South American Antennae in Foreground and European in Background

whereas New York to Sydney or Adelaide, 18,000 miles, costs \$35. The service is about equally good. If anything, distance is apt to add clarity.

Overseas patronage follows the trails of high finance. Any ripple or lead that touches the purse strings of the world is apt to throw the transoceanic wires into a pell-mell rush of business. Any quick rise in transatlantic telephoning is recognized as a sure harbinger of world news in finance.

President Hoover is a particularly enthusiastic patron of the overseas telephone. In January of 1929 he greeted the king and queen of Belgium by telephone to Brussels. "The White House is calling," has become familiar parlance at long-line terminals the world over. During the Far East war, Secretary Stimson had a complete set of overseas extensions put in the state department offices so that various members of his staff could listen in and enter notes on telephone diplomacies.

The standard length of a trans-oceanic telephone call is three minutes with extra charge for each additional minute. The longest on record was a business call from New York to Paris which lasted 110 min-



Transmitting Set and Part of System of Conductors Connecting It to the Antenna

B1374

at Marine Barracks in Washington

utes in length but the personal calls stay closely within the three-minute limit.

Linguistically speaking, the long lines give unchallengeable proof that English is becoming the one commercial language of the world. All overseas terminals are now equipped with English-speaking staffs and English is the undisputed key language of all long lines. Added to this, American telephony terms are coming to hold sway in virtually every language. A 'hello girl,' for example, is a hello girl anywhere in the world. But most of the foreign staffs know English after the Oxford catechism.

B1404

PLOW WITH ROTARY CUTTERS RUN BY DIESEL ENGINE

Rotary cutters and a Diesel engine are features of a power tiller that is easily operated by one man. The twelve plow bodies are of cast steel with removable forged-steel shares attached by soft iron bolts which shear under excessive strain. The cast-steel rings to which the shares are attached rotate in opposite directions at variable rates of speed but constant in ratio with the forward speed. The speed of the plowshares is always greater than forward speed, thus permitting thorough pulverization. Behind the rotary plow, a furrower, disk harrow, ditcher or grader can be drawn. The Diesel motor is intended to give a full load output without strain and develops 150 horsepower. The fuel is pumped directly into the cylinder under pressure sufficient to atomize it at once.



Officer Drilling Marines 1,000 Miles Away by Commands Spoken into Radio Mike

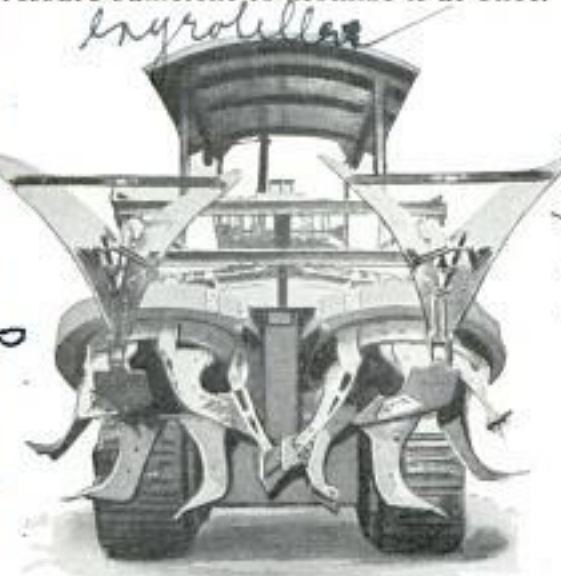
RADIO ORDERS DRILL MARINES THOUSAND MILES AWAY

Marines 1,000 miles away executed difficult maneuvers ordered by Capt. L. L. Gover as he sat before a microphone in the first military drill by remote control. Captain Gover delivered his commands from his desk in Washington and a regiment of marines at the Great Lakes training station obeyed.

HOME COOLED BY CITY WATER AND ICING SYSTEM

Operated in connection with an icing system, circulating city water helps to cool a Michigan home, reducing the amount of necessary ice by fifty per cent. The water is circulated in automobile radiators through which air is blown. A 500-gallon tank, used for ice melting, holds 2,000 pounds of ice partly submerged in water. The equipment consists of two cooling coils, one for city water and the other for ice water, a cold-water pump, an air filter and a fan for blowing the cooled air through the ducts to the rooms. Awnings and blinds shield windows from the sun, resulting in a saving of 148 pounds of ice per hour. Cooling for thirty hot days requires about 156 pounds of ice per hour.

How is agent known



Power Plow with Rotary Cutters to Pulverize Soil; the Tiller Is Operated by a Diesel Engine

John F. Goler & Co. Leeds, Ltd. 113 Cannon St. London, E.C. 4, England

Electrical World 8/10/32

described in Synchronoscope and Edison Organ

By using hard

B3148 7 dm. Theodore Bedell, Secur-O-Seal Corp
 109 Church St. 23 E Jackson
 Chicago

774

POPULAR MECHANICS

FOLDING ANCHOR HAS FIRM AND QUICK GRIP

paid 6/28/32

Bedell Folding Anchor



Cross Rod at Top Hangs at an Angle, Helping to Force Anchor into the Bottom

Instead of the stock or crosspiece at the top, a new ship's anchor has a metal rod that can be removed. This feature gives it the advantage of folding. In addition, the metal rod, which fits into a slotted key at the head of the anchor when in use, hangs at an angle so that it serves to throw the anchor claws over and into the sand or mud. This results in a quicker and firmer grip. A ten-pound folding anchor will serve the same purpose as a thirty-pound anchor of the conventional type, according to the inventor.

STONES ATTACKED BY GERMS

Stones, no less than men, animals and plants, are attacked by germs. And these bacterial onsets can cause serious damage to building materials. So states Prof. S. G. Paine, of the Imperial College, London. Reviewing the work of other botanists as well as his own researches, Professor Paine pointed out that primarily this bacterial

disintegration of stone is beneficial, for it is one of the things that breaks down solid rock into soil fit for farms and forests. But on the works of man the bacteria, some of them the identical ones that are helpful in the soil, often make havoc. A new type of bacterium has been discovered during the researches under the direction of Professor Paine. This species is able to live on certain sulphur compounds that naturally occur in some kinds of stone, leaving sulphur deposits on the surface. It is considered probable that many of the deposits hitherto blamed on sulphur-dioxide gas in the air are traceable to these bacteria.

B31505

GUARD LETS AIR INTO AUTO BUT KEEPS OUT THIEF

A strong metal guard that slips over the glass in any coupe or sedan and locks in place, but cannot be removed from the outside, made its appearance on the market recently. The guard is made of a strong material, finished in dark bronze. It slips on the edge of the window, needs no tools to install, but can be taken off any time and stored in the side pocket of the car. It keeps the car cool by allowing a current of air, will not rattle when in place and cannot get out of order. The guard expands or folds as soon as the window is raised or lowered.

glass up to 26" \$1.50
 in " 34" 1.75



Mix-ins Metal Guard like Latticework Keeps Thieves Out If Auto Window Is Opened

Dial telephones have reduced the number of telephone operators by more than sixty-nine thousand.

U. S. Bureau of Labor Statistics

Science Service
 mail report B-153
 6/22/32

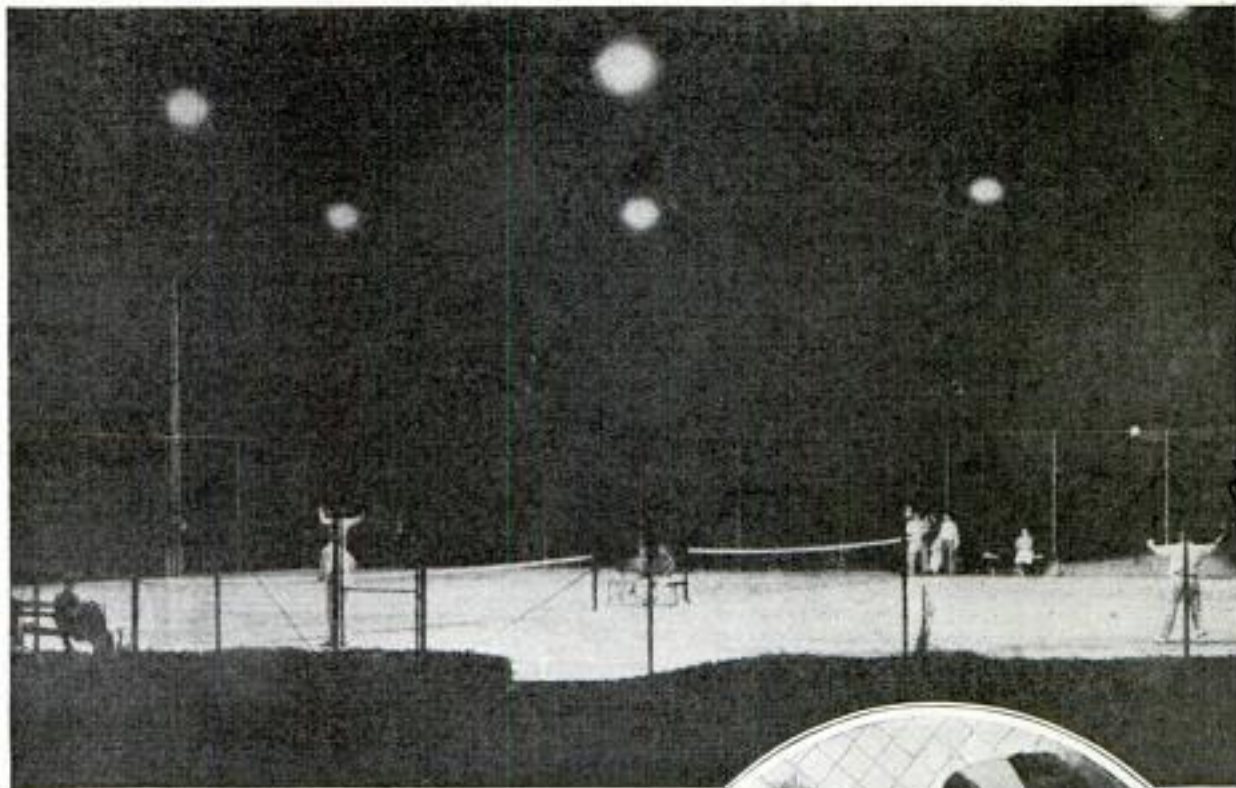
Secur-O-Seal Corp 23 E Jackson Chicago

B 1514 Chemical Processes Ltd

614 Roosevelt Bldg
POPULAR MECHANICS
Los Angeles, Calif

775

"Pay-As-You-Play" Lights for Outdoor Sports



Top, Illuminated Tennis Courts; Right, Box Which Turns on the Lights When Coin Is Inserted

A device for regulating the lighting of public recreational centers, and especially for putting the use of lights for illuminating such places at night on a pay-as-you-play basis, has been invented in Los Angeles. It consists of an automatic time switch designed to turn the lights on upon the insertion of a coin and to turn them off after a predetermined period. The coin closes the electrical circuit, and there is, of course, a motor which controls the timing. Included is also an automatic red light which gives advance warning of the shutting off of the illumination. The invention is intended for use on municipal playgrounds, for lighting tennis courts, baseball diamonds and bowling greens.



B 1550
**PAINTE LIKE "MOTHER OF PEARL"
 MADE FROM FISH SCALES**

Fish silver, a paint pigment made from fish scales, which is said to produce an opalescent finish when used in the manufacture of lacquers and decorative paints, has been developed in Germany. The product gives an effect comparable to the

glimmer of pearls, and when mixed with two colors, produces a finish similar to mother of pearl. The scales are removed by a chemical treatment and the opalescent substance is brought into colloidal solution which may be incorporated in various lacquers. Fish silver consists of fine transparent crystals which have a high power of reflection, and does not produce a metallic luster or hide the undercoat, but covers it with a shimmering haze. It has been used effectively on everything from straw hats to automobiles.

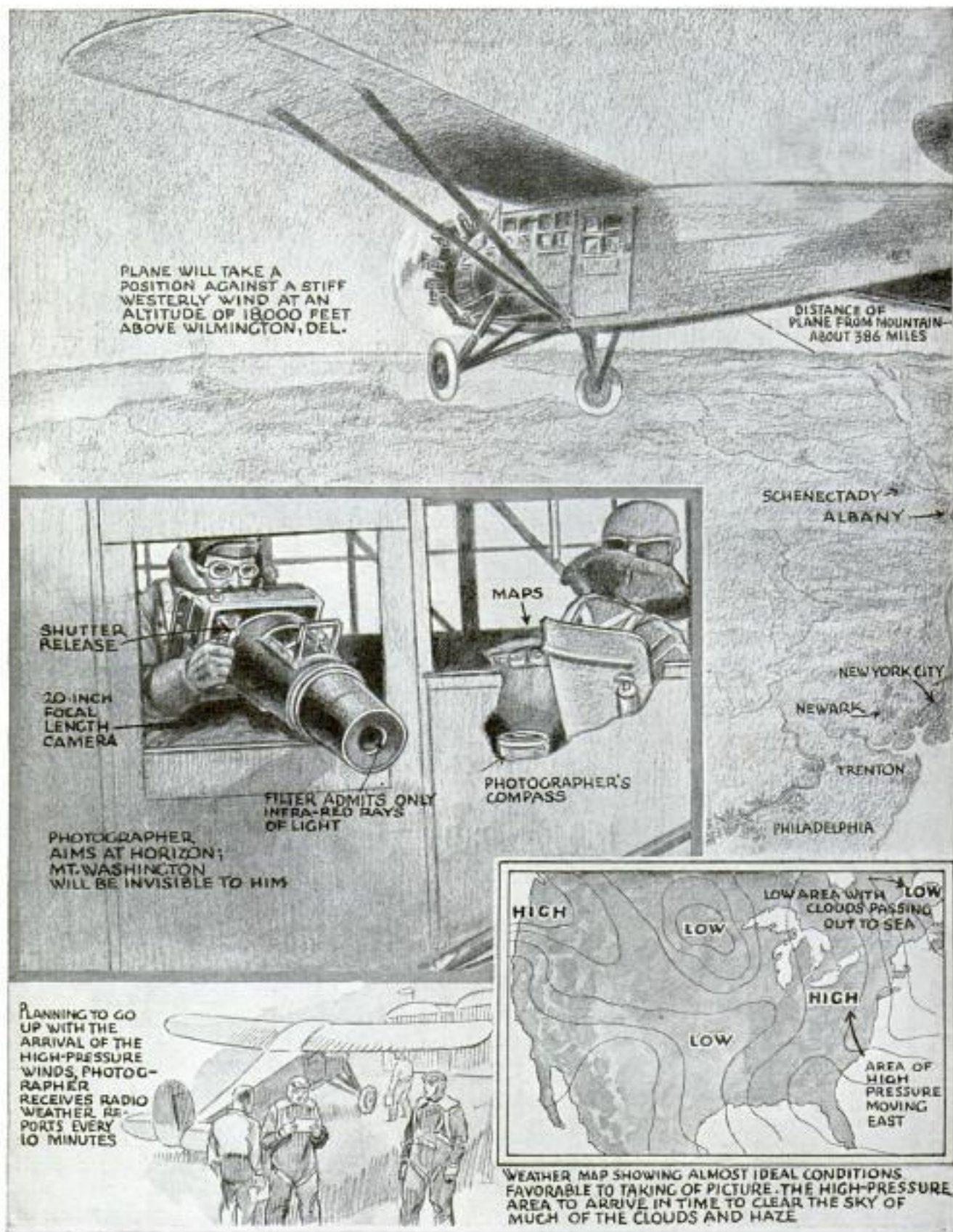
Report from Consul General W. L. Lowrie
 Frankfurt a. Main, Germany

Comd. Chas. R. Byers, Genl
 2333 - 4th St
 Los Angeles, Cal

Dept. of Commerce
 8/20/21

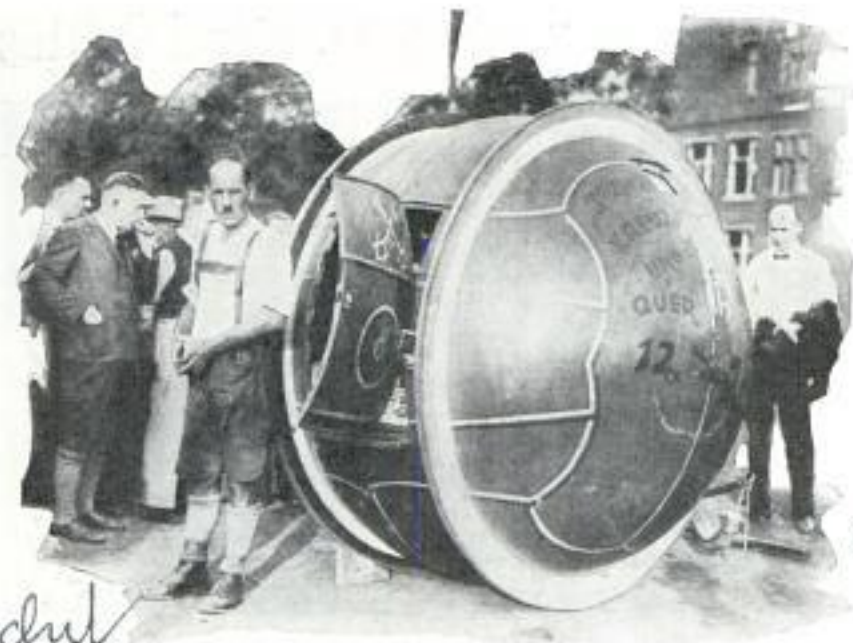
Copyrighted material

Aerial Camera to Snap Invisible Mountain



Aerial Photographers Are Able to Take Pictures of Mountains They Cannot Even See, with a Camera Which Uses a Filter to Admit Only the Invisible Infra-Red Rays of Light

B1490
778



Courses of great rivers are followed by overland migrants. In thick weather the birds often go astray, and, arriving at unaccustomed haunts, are classified as rare and accidental vagrants. When the gloom deepens, the voyagers become sorely handicapped, while a dense and prolonged fog will put an effective brake on continuation of the migration."

B1480
**CONCRETE PUMPED
IN PIPE DIRECT
TO THE FORMS**

Concrete can now be conveyed in pipelines direct

Rolling House Which Is Pulled over Highways by a Donkey; It Contains a Bed on Ball Bearings Which Always Remains Upright

**REVOLVING HOUSE IN CYLINDER
ROLLS OVER HIGHWAYS**

Two German athletes are making their home in a rolling house that is transported with them as they travel about the country. The dwelling is in the form of a cylinder with closed ends and a door in the middle section. It is fitted with a bed resting on ball bearings so it always remains in an upright position. The residence is drawn by a horse or donkey.

rect from the mixer to the forms by utilizing a special pump which moves the material 500 feet horizontally or seventy two feet vertically at a rate of fifteen to twenty cubic yards per hour. The pump is of the piston type, is portable and is driven by a gasoline or electric motor. Five-inch pipe is used, and it is claimed the mixture can be moved through such a line all day long without clogging. In tests, the pump has been stopped for more than half an hour, after which the mixture in the line was moved as freely as before, and has handled 125 cubic yards of mixed concrete in one and a half hours.

**DIRECTION SENSE OF BIRDS
IS REALLY VISION**

The mystery of how migrating birds find their way unerringly to their destination will probably be dispelled by further field observations, it is predicted by Prof. C. J. Patten, of the University of Sheffield. Repeated observations have convinced Professor Patten that birds are not guided by any special sense, but that they find their way by watching their surroundings and by profiting from experience. "Birds possess an 'eye brain'," he said. "Their sense of vision is extraordinarily acute and by no means indiscriminating. It seems unreasonable to brush aside the idea that migrants may obtain guidance by taking stock of landmarks. Furthermore, the sense of hearing can play a part. The wash of the waves is a reminder to hug the coast—the guide line of prime importance.



Pumping Concrete through Pipeline Direct to the Forms from Mixer 500 Feet Distant

B1528

England

Science 8/30/32

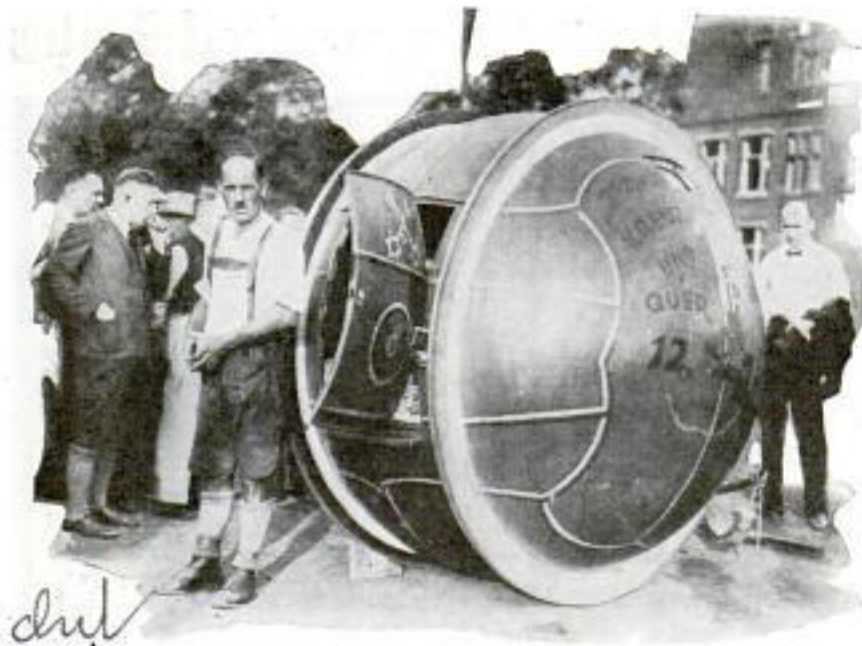
Pumpcrete

Chain Belt Co 1644 W. Bruce St. Milwaukee Wis

before British Assn. for Advancement of Science

Chain Belt Co 1644 W. Bruce St. Milwaukee Wis

Material



Rolling House Which Is Pulled over Highways by a Donkey; It Contains a Bed on Ball Bearings Which Always Remains Upright

REVOLVING HOUSE IN CYLINDER ROLLS OVER HIGHWAYS

Two German athletes are making their home in a rolling house that is transported with them as they travel about the country. The dwelling is in the form of a cylinder with closed ends and a door in the middle section. It is fitted with a bed resting on ball bearings so it always remains in an upright position. The residence is drawn by a horse or donkey.

DIRECTION SENSE OF BIRDS IS REALLY VISION

The mystery of how migrating birds find their way unerringly to their destination will probably be dispelled by further field observations, it is predicted by Prof. C. J. Patten, of the University of Sheffield. Repeated observations have convinced Professor Patten that birds are not guided by any special sense, but that they find their way by watching their surroundings and by profiting from experience. "Birds possess an 'eye brain,'" he said. "Their sense of vision is extraordinarily acute and by no means indiscriminating. It seems unreasonable to brush aside the idea that migrants may obtain guidance by taking stock of landmarks. Furthermore, the sense of hearing can play a part. The wash of the waves is a reminder to hug the coast—the guide line of prime importance.

B1528

England

Science 8/30/32

before British Assn. for Advancement of Science

Courses of great rivers are followed by overland migrants. In thick weather the birds often go astray, and, arriving at unaccustomed haunts, are classified as rare and accidental vagrants. When the gloom deepens, the voyagers become sorely handicapped, while a dense and prolonged fog will put an effective brake on continuation of the migration."

B1480

CONCRETE PUMPED IN PIPE DIRECT TO THE FORMS

Concrete can now be conveyed in pipelines direct from the mixer to the forms by utilizing a special pump which moves the material 500 feet horizontally or seventy-two feet vertically at a rate of fifteen to twenty cubic yards per hour. The pump is of the piston type, is portable and is driven by a gasoline or electric motor. Five-inch pipe is used, and it is claimed the mixture can be moved through such a line all day long without clogging. In tests, the pump has been stopped for more than half an hour, after which the mixture in the line was moved as freely as before, and has handled 125 cubic yards of mixed concrete in one and a half hours.

Milwaukee

Pumpcrete

Chain Belt Co. 1644 W. Bruce St.



Pumping Concrete through Pipeline Direct to the Forms from Mixer 500 Feet Distant

Chain Belt Co. 1644 W. Bruce St. Milwaukee, Wis.

B1502

Mr. Sablating

Tested at Tempelhof Airfield, Berlin 779

POPULAR MECHANICS

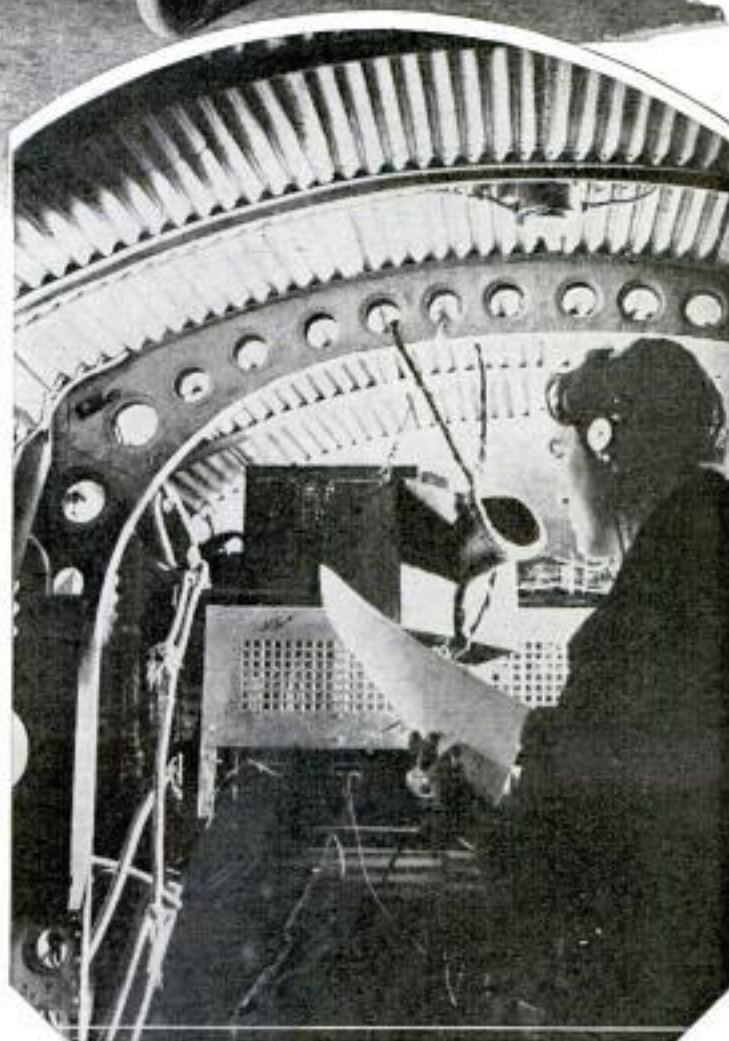
Voice from Sky Has Loud Speakers in Wing



© New York Times

Top, Airplane with Two Loud Speakers Mounted on Wing; Right, Broadcasting from Ship to the Ground

By mounting two loud speakers on the airplane wing in front of the propeller, where sounds will not be distorted, a German inventor has succeeded in developing a method of talking from a height of from 600 to 2,000 feet. The voice is distinctly heard by people below within a radius of more than a quarter of a mile. The speakers are operated separately, one being used for long-range transmission, while the other is for broadening the range.



B1546
DRY AIR ABSORBS MORE SOUND THAN MOIST

Sound is absorbed more readily by dry air than by moist and more sound is taken up by warm than by cold air. These facts have been ascertained by the bureau of standards. They

are of great interest in radio broadcasting because it is important that the absorption be kept constant.

Research Paper
 Journal of Research

No. 465, Aug. number

Copyrighted material

Dept. of Commerce 8/23/32

B 346

Harold J. Shepstone, Esq
139, Bromwood Road
Clapham Common, London, S.W.
England

Startling Facts about

By
H. J. SHEPSTONE

THOUGH the fur trade is, perhaps, the oldest in the world, it is as versatile and as full of life and romance today as ever it was. Indeed, never in its history was the demand for all kinds of pelts, both in the raw state and made up, so great.

Moreover, scores of animals whose pelts were regarded a few years ago as of little or no value are now being ruthlessly hunted. Even the humble

rabbit has been pressed into service as a dress fur. Experts declare that the world's output of fur today must reach an annual value of not less than half a billion dollars.

The best skins still come from Canada, and the supply would appear to be inexhaustible. It was the existence there of the prized ermine and sable that led to the formation of the Hudson's Bay company. It was in Canada, too, that the idea of breeding the rarer and more prized animals for their pelts, such as the silver fox, had its birth, and today all kinds of animals—foxes of many species, the skunk, mink, marten, raccoon, and other creatures—are being reared like pedigreed stock solely for their pelts.

The greater majority of the skins, however, are still obtained from the wilds by the lonely trapper, who every winter faces extreme cold, terrible snowstorms and innumerable dangers in his quest for the more prized fur.

The modern furrier can take the better-class hare and rabbit pelts and convert them into a really beautiful imitation of the seal, ermine, fox or lynx.



New York
Zoo

Jasper National Park
Alberta, Canada

Top © Eastman Kodak Co.

The Little Squirrel and the Big Polar Bear Both Own Fur Coats That Are Valuable

93 346



Above, an Alaskan Trapper and Part of His Season's Catch; Right, Fur Wrap with Silver-Fox Collar

When rabbit skins first appeared upon the market, it was thought that they would remain as the poor man's fur, but the imitation is now so excellent that it has become the fur of the well-to-do. Rabbit and hare pelts simply swamp all other skins. They are being used by the furriers of America and Europe in ever-increasing quantities. America uses nearly 100,000,000 of them a year and England 80,000,000.

After passing through the dye works they come out, not as rabbit skins, but as cony seal or some other fanciful name. Not one woman in a hundred purchasing a garment made of these skins believes she is buying rabbit skins. It requires an expert almost to detect the difference. Rabbit should have a deep fur; but that means nothing, for the dresser's evening machine can cut it to a stub. The dye can be told, as a rule, from the color of the underskin, and the true nature of the fur is indicated by the "catty lick" of the sheen. Although rabbit skins, so dyed and treated, possess fair wearing qualities, their luster does not



white caramel with
silver fox collar 781
Copyrighted material

in Zoo at Bear Mountain

Nature Trails and

782

Trade Museum.

Palisades State Park

see Dec. 1937
826

POPULAR MECHANICS

lives on the slopes of the Andes, in Chile, at an elevation of 12,000 to 19,000 feet.

Mr. Chapman determined to visit the native home of the chinchilla, secure a number of living specimens, transport them to California and rear them. Everyone assured him the feat was impossible. All previous attempts to bring the creatures alive out of South America, or to rear them in captivity, had failed. Mr. Chapman overcame the difficulty by bringing the valuable creatures very slowly down the mountains, thus acclimatizing them gradually. He kept them two years at 11,000 feet, giving them the utmost care and providing every requisite. The next stage was 9,000 feet, where a year's stop was made; then other long halts, successively lower, until, after nearly six years,

he was ready to sail with the original dozen for a land of far different clime and a reversed season.

This was the supreme test. Throughout the 8,000-mile voyage from Iquique, Chile, to Los Angeles, a matter of forty days, the animals were kept on deck in a screened cage. It boasted of eight separate compartments, in the center of which was a container filled with 100

last. Nevertheless the rabbit skin as a dress fur has come to stay.

More and more, however, the trade is looking to the fur farmer for the more prized pelts. Of the many kinds of animals which are being artificially reared, the fox, because of the high value of its pelt, is the most favored. Fox farms are found not only in Canada, and the United States but in Norway, Sweden, Japan, and a start has also been made in England. One of the first animals to be farmed for the sake of its fur was the skunk. It yields a beautiful, thick, black and white fur coat that is very durable and capable of standing much hard wear. Though a popular fur today, for years the public would not buy a skunk as skunk. It had to be given some fake name such as black sable to get it across to the trade.

No fur farm probably has incited more interest among naturalists than M. F. Chapman's chinchilla farm on the outskirts of Los Angeles. How this creature was saved from threatened extinction and successfully reared in captivity is one of the latest romances of the animal world. The chinchilla is a burrowing animal and



These Three Animals Supply Much of the World's Fur; Top, a Tame Raccoon; Center, a Champion Rabbit; Below, Product of a Fox Farm

B346
American checked giant rabbit
owned by Frank Eckert
Gray City, N.C.

U.S. Department of Commerce

Prime Edward Island
Canada's Natural Resources

Copyrighted material

B31510

pounds of ice. The cage was curtained all around with canvas and this was kept moist by a liberal sprinkling with water. While passing through the tropics, however, the chinchillas, from frigid heights, had literally to be packed in ice.

The valuable creatures which had demanded the expenditure of so much time and money, were housed in a large screened building, well ventilated, divided into pens which ran partly underground. They soon settled down to their new quarters, and, to the delight of their owner, their offspring waxed quite sturdy, so that Mr. Chapman now has between 2,000 and 3,000 chinchillas on his farm. One pair of babies will normally produce 126 pairs in six years. Their food bill is not a great item, three chinchillas consuming less than a chicken. A genuine chinchilla coat or wrap is quite a rare garment, and one sold in New York recently realized \$30,000.

Sheep serve to provide the following furs: Afghan lamb, American broadtail, American wombat, Astrachan, Bagdad lamb, Caracul, China lamb, etc.

Goats: blue Japanese wolf, China bear, kid, leopard kid, etc.

Dogs: Belgian lynx, black Poiret fox, Chinese dogskin, Manchurian black fox, Manchurian wolf, Manchurian dogskin.

Cats: Black cat, cat, domestic cat, Genet, house cat.

The horse gives us the Russian pony.

Here is a list of some of the trade names for furs made from domesticated animals:

Rabbit, or Belgian hare, American seal, Australian cony, Australian seal, Chinchilla rabbit, all the cony furs, French sable, French seal, several kinds of imitation seal, Nu nutria, twin beaver, etc.

**BELL HEARD FOR THIRTY MILES
INAUDIBLE TO RINGER**

The largest bell of its kind in the world, hung over 400 feet above the street and audible over a radius of thirty miles, has been installed in Philadelphia. The control apparatus for this gigantic bell, by which it automatically strikes the hours and half hours, as well as the apparatus for regulating its tolling, lies eighty feet below street level, and the operator at this depth and isolation cannot hear the bell. This difficulty has been overcome by in-

memorial to John Wanamaker

Lincoln Liberty Bldg.
Wanamaker Store



Tower of a Philadelphia Building Which Houses a Swinging Bell Weighing Nearly Twenty Tons

stalling a microphone in the bell tower which is connected with an amplifier in the control room. The continuous striking of this huge bell presented unusual problems in vibration set up in the building itself, which might be disastrous and annoying. The bell itself weighs 38,640 pounds, but the total weight carried by the four steel columns that support it and the yoke and motors is 165,000 pounds. Between these columns and the steel frame of the building on which they rest is a seven-eighth-inch pad of insulation consisting of alternate layers of lead, asbestos and steel, incased in copper sheathing. As the vibrations pass from one layer to the other, they are steadily deadened, with the result that the bell is completely cut off from the building so far as vibration is concerned. The tower is equipped with a specially built lightning protector.

Edwards, 2047 N. Park Ave. Phila
Com. George H.

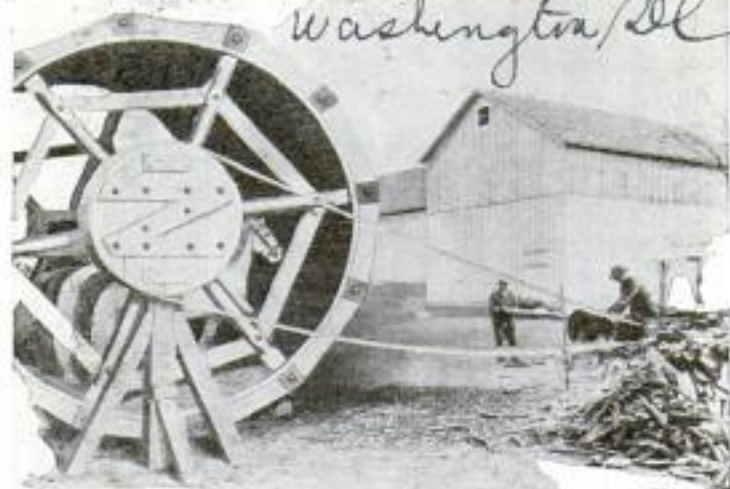
B 1493 Cont. H. L. Manning
apt. 503 Fl. 3900

784

POPULAR MECHANICS

Connecticut Ave. N.W.

Washington, D.C.



This Huge Wheel, Propelled by Horses Walking on the Inside, Will Provide Power on Farm

HORSES IN BIG "SQUIRREL CAGE" RUN FARM MACHINERY

Power for all farm purposes can be supplied by the horse or mule if a machine that can be built by the farmer, is used. This machine consists of a large wheel, resembling a squirrel cage, into which from one to six horses are placed. As the horses walk, they turn the wheel, supplying power by belt to farm machinery. Only one moving part and two bearings result in saving much power lost by the tread and sweep, with their complicated gears. Threshing, grinding, baling, corn shelling, pumping and turning a buzz saw are but a few things that can be done by means of this new application of horsepower.

PACIFIC OCEAN NOT BIG ENOUGH TO HOLD THE MOON

There is no foundation for the widely accepted theory that the Pacific ocean basin was the birthplace of the moon. This is the conclusion of D. Arthur Neuberg, a German professor who has spent much time calculating the total volume of the Pacific ocean basin as compared with the moon, to determine whether the earth could have "calved" the moon out of the Pacific in some remote geological period. He estimates the Pacific basin at 167,000,000 cubic miles and the moon at 5,240,000,000 cubic miles. Thus the basin is more than thirty times too small to have supplied all the material needed to make the moon, and even if the Pacific, Atlantic and

Indian oceans, and all the seas had been scooped out to make the moon, there still would not have been enough material. Herr Neuberg believes that the earth and moon were shot off together from the sun as a single egg-shaped mass, which subsequently separated into a larger body, the earth, and a smaller, the moon.

B1492

ELECTRIC MAP FLASHES LIGHTS TO SHOW RADIO STATIONS

Delays in waiting for station announcements, to discover the location of a station to which your radio is tuned, are avoided by using an electric map which shows the geographical position of a station as soon as the dial is turned to its wavelength. The map is fitted with tiny electric lights representing cities, and these flash whenever the radio receiver is tuned to broadcasting stations located there, thus enabling the listener to determine at a glance the place from which a program is coming.



When Dial Is Turned to Wavelength of Radio Station, Map Shows Its Location

Names and addresses of manufacturers of articles described in this magazine will be furnished free by our Bureau of Information.

Wm. William Codel
Milwaukee Wis
no street address

B1542

Science Digest
9/3/32

Meissen, Germany.

237

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B1424 further information from Mr. Silbermann, 419 Haas Bldg 785
 POPULAR MECHANICS
 Los Angeles, Calif.

Old Ship Mined for Gold Dust Lost in Cracks



Left, the Old Ship "Humboldt" Which Brought Thousands of Miners Out of the Alaskan Gold Fields in Its Fifty Years of Passenger Service; Right, Prying Up Deck in Hunt for Gold Dust

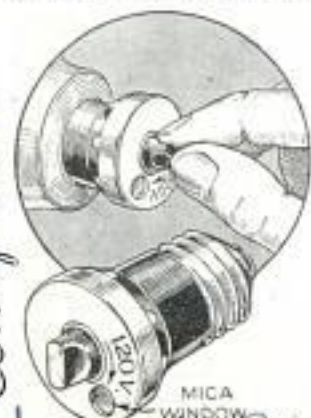
Gold dust that filtered into cracks for a half-century is being removed by shipyard workers who are "mining" the old wooden steamer "Humboldt." For fifty years, the vessel was operated between Alaska and Seattle, Wash. In that time, careless passengers returning from the gold fields lost flakes of gold dust that were dropped or swept into deck crevices.

The timbers are expected to yield ten times the commercial value of the hull, since it is estimated that more than 100 pounds of gold dust awaits the treasure hunters. One hiding place in particular is sought as the workers rip apart the ship's timbers. An absconding purser is known to have deposited part of the gold dust from the safe in some part of the vessel.

Cmd. Thos. E. Stinson Jr.
 145 S Spring St Los Angeles, Calif.

B1405
**PLUG WITH HALF DOZEN FUSES
 CONTAINS MICA WINDOW**

Six fuses are contained in one plug that greatly simplifies replacement if a fuse blows out. When this happens, it is only necessary to turn a control in the center of the plug to bring another fuse into action. At the edge of the plug is a mica window which reveals the smudge when a fuse blows, so there is always visible proof that this fuse, and not



WCAU

some other part of the wiring system is defective, thus eliminating trouble and saving the time of the householder.

B1470
**SIGN LIGHTED BY SPARK PLUGS
 FLASHES AS MOTOR RUNS**

Connected to the spark plugs, neon signs on the sides of a motor truck flash on and off as the engine runs, the gas being lighted by the same spark with which each cylinder is fired. Each plug is connected to one letter in the sign so that these flash on in perfect sequence. Small condensers are used to make the connection between plugs and letters. The neon tubes are unaffected by the jolting of the truck, and the operating cost is practically none.

1321 Arch St
 Phila

Aut of business 4/16/36

Six sets plug @ 255.
 259 8 1936, Chicago

R. W. Hall Amplification
 Engineer, State U Cal
 Universal Broadcasting Co
 Columbia System

The Penniless IMMIGRANT

South Isate, Alger Court, Bronville, NY

By FRAZIER HUNT

IT was a March day fifty-six years ago. The "Westphalia" pulled in to New York and disembarked its motley load of steerage immigrants who, thanks to a rate war, had paid only \$11.50 for their passage from Hamburg to New York.

Down the gangplank walked a wide-eyed, broad-shouldered Serbian lad of fifteen. He wore a red Turkish fez; he knew of no single person in this great land of opportunity except of Benjamin Franklin and Abraham Lincoln. And his total capital was five cents. His name was Michael Pupin.

Immigrant officials questioned him. It was ridiculous to think he could land. He



had neither friends, money, nor prospects; he would have to be sent back.

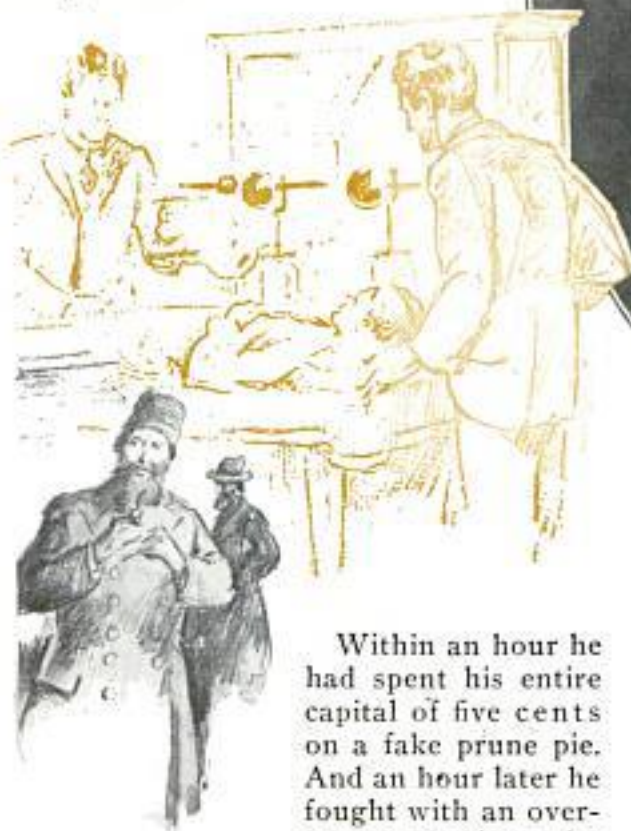
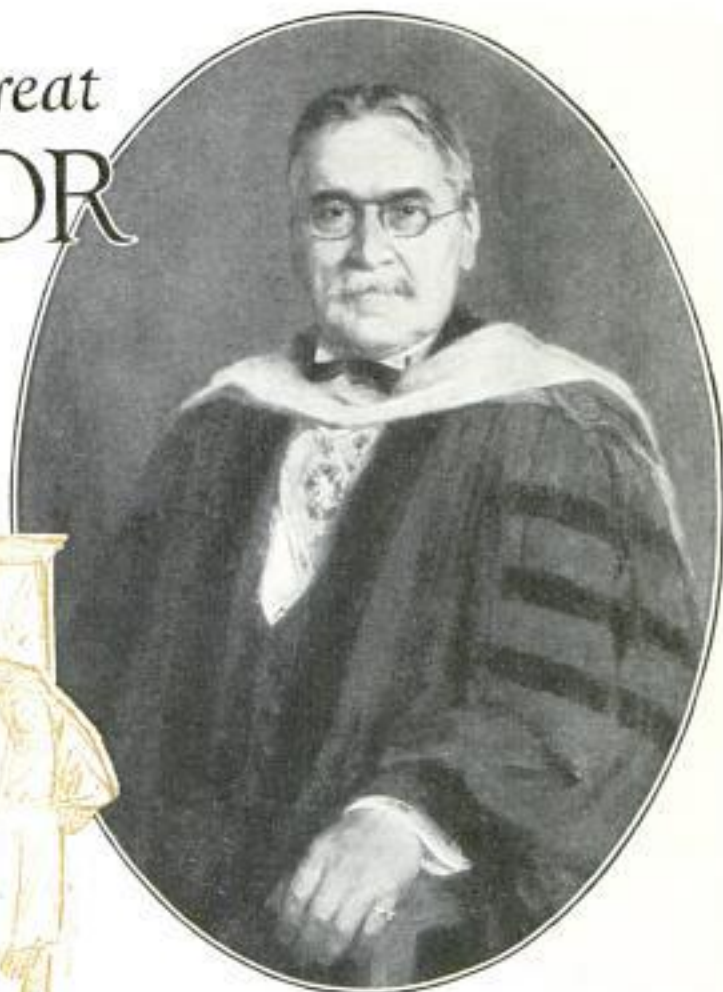
"Why did you come to America?" a kindly official asked through an interpreter.

"Because I wanted to grow up in the land of Franklin and Lincoln," the boy answered. And then he told his new-found friend how these two great Ameri-

who became a great INVENTOR

cans had been the magnet of inspiration that had drawn him here.

The wise and fatherly official slipped him through; with such men for heroes, maybe this immigrant boy would amount to something after all.



Within an hour he had spent his entire capital of five cents on a fake prune pie. And an hour later he fought with an overgrown newsboy who

made fun of his red fez; and when a policeman went to arrest the boy who could speak no word of English, the other newsboys interceded and he was let off. There was fair play in this land of Franklin and Lincoln.

By noon the following day he had found a job on a Delaware farm through the immigration bureau. What an incredible, unbelievable twenty-four hours it had been; but everything about this boy had been—and was to be—incredible and unbelievable!

He had been born in a little Serbian village of Idvor on the plains of the Banat,

in what at that time was a part of the Austro-Hungarian empire. His father was a farmer, but the most important person in this little peasant village. And his mother was one of those rare and beautiful souls who so often are the mainspring that send men into high places in the great world.

When he was thirteen, he was sent away to Prague to school, and here, a year later, he received word that his father was dead. He wanted to hurry home and help, but his mother insisted that he stay in school. But there was very little money now. And one day he saw on a magazine cover the announcement of a bargain steerage rate to America.

Immediately he sold his books and watch and extra clothes, and with a little bundle of linen, and the red fez, he hurried to Hamburg and boarded the "Westphalia." He had no money for a blanket or a mattress, and on these cold, raw spring nights he would huddle on the lee of the smokestack to keep warm.

Swiftly the years swung by after he

(Continued to page 122A)

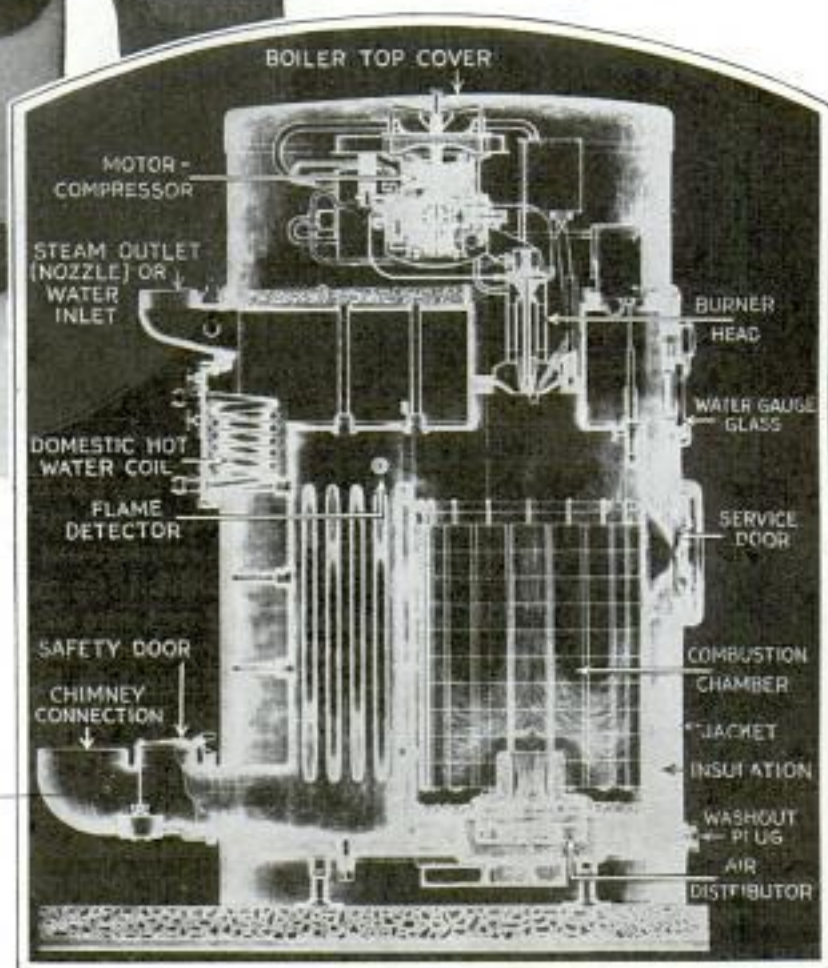
Oil Furnace Built Like Electric Refrigerator



ward in a fine spray, ignited by electric-arc electrodes, and kept burning some distance below the burner nozzle by air from above which also cools the nozzle and electrodes. The main air stream from below meets the burning oil vapor from above, and swirls into a diffused flame which "mushrooms," sweeping the gases up along the hot refractory-lined walls of the combustion chamber, over the top, down again through

Schenectady, N.Y.

Down-draft combustion, such as is employed in large power plants, has been adapted to the heating of private homes in an oil furnace as unusual in appearance as it is in principle. This furnace, produced by the General Electric company, somewhat resembles the refrigerator built by the same company since the burner and controls are housed in a compartment in the top. This plan permits the down-draft, counterflow combustion widely used in power boilers. The heating plant is contained in one compact unit, thus simplifying installation, since it can be carried through any basement door. Beneath the black and chromium exterior are the boiler, burner and controls, all designed for operation as a co-ordinated unit. Oil enters at the top, is projected down-



Oil Furnace Built in Compact Unit; All Controls and the Burner Are in a Compartment in the Top, Thus Making Down-Draft Combustion Possible

the boiler tubes, and out to the chimney at the bottom, having given up most of the heat. In this manner, the length of the combustion path is nearly twice the length of the combustion chamber, insuring complete burning of the oil where it will do the most good. The furnace is heavily insulated as is also the control

B148

compartment from the combustion chamber. The cover and air duct of the control section take care of the smell, and acoustical corrections in the cover effectively silence the noise of operation. The unit may be applied directly to steam-heating plants, to hot-water system by adding a water circulator to provide prompt response to the thermal control, and to warm-air systems through addition of a special air conditioner. Incorporated in the design is a water coil to furnish year round hot water without attention.



Free Balloon, Carrying Radio Equipment, Which Transmits a Record of Temperatures and Atmospheric Pressures Encountered

Keystone

B1411
ELECTRIC EYE MEASURES LIGHT FOR CAMERA

Helping to make better pictures by quickly determining the correct exposure, a new meter embodying the photo-electric cell, or electric eye, measures the light for photographers. The brightness of any scene is translated into proper apertures and shutter timings by a mechanical calculator after the intensity has been measured. Then the camera is set to correspond to markings on the calculator. The exposure meter is useful for both still and motion-picture work.

\$39.75



Top, Determining the Correct Exposure for Camera by Means of Handy Meter, Shown at Bottom

FREE BALLOON SENDS REPORTS OF WEATHER BY RADIO

In exploring the upper atmosphere, the weather bureau is now using free balloons carrying radio equipment which automatically transmits reports of temperatures and atmospheric pressures encountered as the balloon ascends. A photo-electric cell, or electric eye, translates thermometer and barometer readings into radio signals which are received on the ground.

B1410

SHEETS OF ZINC STOP INSECTS

In Argentina sheets of zinc are used to fight grasshoppers. Trenches are dug and the sheets are placed as high curbs, forming a trap. Before grasshoppers develop wings and as they cross the fields, they find it difficult to traverse the trenches. Here they are caught and burned.

U.S. Daily 8/11/32

Weston Electrical Instrument Co., 619, Franklin St., Newark, N.J.

report from Dept. of Commerce attached A. V. Dye, Buenos Aires

B1428 Luminator C
 846 W. Wood St
 POPULAR MECHANICS
 790
 851 W. Washington
 Chicago

Report from Consul
 W. H. Slaty, Newcastle
 on Tyne, Eng.
 B1435

Chicago Lighting Institute
 20 N. Wacker Drive



Shaving Mirror Containing Its Own Electric Light behind a Section of Opaque Glass

SHAVING MIRROR WITH A LIGHT ON ADJUSTABLE SUPPORT

Shaving is made easier with a large mirror designed particularly for this purpose and equipped with its own electric light. The light is set behind a section of opaque glass at the bottom of the circular mirror so the face is clearly illuminated without shadows. The mirror and light are mounted on a standard adjustable in height.

CHEMISTS CHANGE COAL TO OIL AND OTHER SOLUBLES

Two University of Washington chemists, working on the classification of coals, have found that as much as eighty or ninety per cent of coal can be converted into oil and other soluble products, thus offering a possible source of gasoline and oil. Fourteen kinds of coal were tested, the best grades giving the highest oil yields, but even with inferior lignites one-third of the product was converted to oil. In Germany, where coal is more plentiful than petroleum, gasoline is already made from the solid fuel by the hydrogenation process, but the present low cost of petroleum in this country makes the application of such a process here seem remote.

B1439

Seuble

never seen 8/5/35

FREE-WHEELING LOCOMOTIVE RUNS AT HALF COST

Fuel consumption is reduced fifty per cent in a British locomotive equipped with devices for coasting, or free wheeling. Wear and tear on the engine also are considerably less. Total fuel and lubricating costs are said to be about three cents per mile for a new electric railcar operating on one of the most difficult routes of the London and Northeastern railway. Of the eight-hour running time each day, the engine free-wheels four. During the coasting periods, the engine is stopped. Unlike the ordinary steam engine, this locomotive does not require daily cleaning, but only undergoes an inspection once a fortnight. On the level, the engine makes sixty miles per hour, and on a gradient, twenty.

Commerce memo 8/12/35

TESTER FINDS MOTOR TROUBLE AND HELPS TUNE UP

Trouble in an automobile engine can be found quickly and accurately by using a new testing instrument. In addition, it is possible to tune the motor to factory standards, to accurately adjust dual carburetors and to synchronize dual and twin-ignition distributor points. The check up can be done in fifteen minutes, the instrument indicating the condition of distributor points, distributor, coil, condenser, spark plugs, cables, spark timing, valve timing, magneto, carburetor adjustment, intake leaks, cylinder-head gaskets, valve tappets, valve springs, piston rings, fuel pumps and vacuum pumps. The instrument consists of tubes which are applied to various parts of the motor and dials that indicate the condition of each part.



Applied to Vital Parts of a Motor, This Instrument Makes a Quick Diagnosis of Troubles

315 x reel th.

Prof. W. L. Beuschlein
 and Mr. E. C. Wright

The Testscope Co.
 Champaign, Ill.

B31364 Thomas M. Johnson, 420 W
116th St New York

Acme newspapers

IN DISGUISE

Secrets of the Master Spies

NAPOLEON received an Alsatian smuggler who had been recommended for his service as "all brain and no heart." The emperor saw a stoop-shouldered middle-aged man, whose uninspiring face beneath iron-gray hair, bore an apathetic expression. In a flat, toneless voice, he announced:

"Your Majesty, I am Schulmeister."

"You won't do!" Napoleon exclaimed and, turning his back, he left the room. Returning presently, he found in the same room, another man; erect, hawk-eyed, a determined face topped with flaming red hair.

"Who are you?" the emperor snapped.

"Your Majesty, I am still Schulmeister."



The Art of Disguise, as Practiced in the Movies, Is of Little Help to Spies; Below, Scene from the Life of Famous Spy Who Was a Female Impersonator

Thus began the amazing career of Napoleon's great spy, who won battles and crowns for the "Man of Destiny," often by his consummate ability to disguise himself. Schulmeister could, at will, so alter the expression of his face, his bearing, his voice, his entire appearance, that he virtually became another person.

The art of disguise has been, and still is, important to those daring souls—spies and criminals and detectives—who live double



Detective in False Whiskers and Another Disguised as Scrubwoman, Who Captured Anarchists in St. Patrick's Cathedral Several Years Ago

French negotiator of the peace treaty with Bismarck.

Probably the most remarkable success in disguise that has been recorded, is that of the Chevalier d'Eon. Complexion, eyes, voice and figure all suggested a woman, and this peculiarity he utilized, becoming probably history's best female impersonator. Louis XV of France sent him to St. Petersburg to pose as the niece of a French merchant. He wore silks and satins, ear-rings, a back ribbon about his white throat, and powdered his long, soft hair. He not only passed as a woman but men raved over him. He became a belle. He was so successful, that enemies tried to kill him. To their amazement, the delicate young woman revealed herself a strong swordsman.

Lafayette Baker, who became chief of Lincoln's secret service in the Civil War, worked a daring trick when he took with him on a spying expedition to Richmond, a big camera. He counted on the Confederates believing that no spy would carry a thing that was notoriously forbidden, so he must be as he claimed, an itinerant photographer and a harmless fool in the bargain.

But for him, and for all spies, the risk was terrific. The very disguise that, if it worked, would save his life, would, if it failed, hand him over to a firing squad. When the American army officer, Nathan Hale, dressed as a schoolmaster to enter the British lines, he signed his own death

Boer, and German Secret Agent Disguised as Australian Army Captain

lives, always fearing to be recognized. After Schulmeister, probably the most efficient spy in recent times, came Stieber, the "bloodhound," whose secret agents honeycombed France before the Prussian invasion in 1870. To account for his travels over France, he adopted the disguise of a peddler. Later he disguised himself as a butler, and waited upon Jules Favre,

*Frutz
disguised as
daughter of*

Hats
McCarthy

B1314

warrant. So did the British Major Andre when he threw over the shoulders of his British uniform coat, an American army overcoat. The reason why the famous world-war woman spy, Mata Hari, was caught, was that she could not disguise herself. Her appearance was too distinctive.

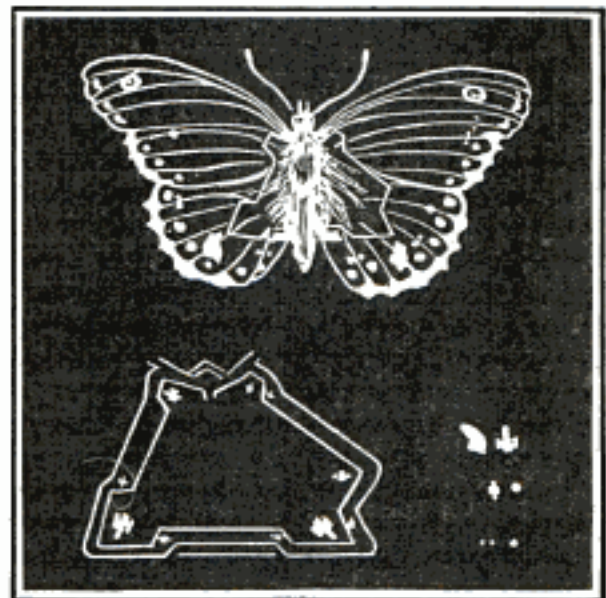
One would think that by now the underworld would be on guard against peddlers and rag-pickers—both favorite disguises of secret agents. But that old trick cost a famous gangster his life early this summer. Hearing where he was hiding in Albany, two New York detec-

tives reconnoitered carefully, for the man was known as a killer. One got himself up as a peddler, going from house to house, climbing steps, ringing bells, sizing up whoever answered.

On the porch of the suspected house, sat several people, including one who resembled the criminal. The peddler mounted the steps, offering his wares. He looked closely, signaled imperceptibly. A passing house painter, in overalls, carrying pot and brushes, turned in at the walk. The gangster sprung to his feet and reached back. Flame spurted from his pistol. He leaped from the porch. One detective fell, wounded, but as he fell, from his painter's overalls he drew his pistol, and fired once killing the gangster.

Baden-Powell, founder of the Boy Scouts, when spying in Germany, reddened his face, and carried a bottle of brandy, whose contents he sprinkled over his ragged clothes, when he saw a policeman approaching. Then he waved the bottle, staggered drunkenly, and offered the policeman a drink. Great forethought and presence of mind the spy needs to keep from betraying himself by some little thing. For instance, the French spy in Germany, disguised as a German, who

thanked the waitress for everything she brought him. He spoke perfect German, but, he was too polite. She had him arrested. A firing squad ended his politeness.



Drawing of Fort Made by a Spy Disguised as a Butterfly Hunter

While it lasted, perhaps the cleverest disguise of pre-war espionage was that of the butterfly hunter. An innocent old chap, he flitted about with his net, his specimen case and his sketching outfit; catching new species with naive delight, sticking them upon cards, then drawing them, with every marking complete. Sometimes he flitted near fortifications, gun positions, camps—of which every detail

was recorded, according to a secret code, in the scalloped, dotted markings of the butterflies he sketched. Baden-Powell was one of many who used that trick.

Having found some identity that will not arouse suspicion, the spy's next problem is to change his appearance to prevent what he always dreads—recognition. He must disguise himself, but not as the actor disguises himself. Most of Lon Chaney's tricks would be useless to a spy. The spy's make-up must pass for nature in glaring daylight, must not melt or rub off, must even stick through violent exercise—and last for days, even for weeks. Little chance for wigs and false whiskers, none for the high lights and shadows in grease paint on which actors rely.

One of the most characteristic human features is, of course, the mouth. It can be changed by using a set of false teeth such as any dentist can make, to fit over the real teeth; also by putting pads inside cheeks or lips. The spy can change the shape of his nose, too, though not by the nose putty or injected wax of the stage. Nose putty shows and wax melts. The spy must stuff up his nostrils wads of cotton, in such manner that he can still breathe. He can also stain his face, neck and hands,

1364

and an American agent, covering former President Calles of Mexico, is said to have used iodine and dirt. Hands are important, and a spy about to impersonate a laborer or peasant, has been known to do weeks of hard labor to acquire callouses and dirty, broken finger nails.

An artist at disguise was Inspector Calchas of the Paris Surete. Intentionally he stuffed himself, became fat and puffy. He cultivated a dull, stupid look. "No one fears a fat man," he would say, laughing. Assigned to a case, he would disappear into the underworld of Paris, leaving no trace. A month or two later, he would reappear, with his man. Somehow, he had wormed himself into the criminal's confidence, posing as a crook among crooks. He used to scrape acquaintance with crooks on trains, get them into card games, win their money, then offer to take their loot instead. One of his favorite ruses was to run a little shop as receiver of stolen goods.

Probably the most striking use of disguise in the history of detective work in New York, was in the St. Patrick's Cathedral bomb plot. Anarchists, I. W. W.'s and German spies were causing almost a reign of terror with explosions in public buildings, factories and ships. At twilight, March 2, 1915, people passed in and out of the great place of worship. Sightseers

drifted along the aisles, worshippers knelt reverently.

Of a sudden, they were thrown into confusion by a swift movement of figures in the half light, a scuffle, blows. They saw a scrubwoman fling herself onto two dark men, and seize a package one was about to set down. A tall bearded man in a frockcoat forsook his devotions to aid the scrubwoman. From all sides came running men in varied garb. They surrounded the two dark men and hurried them through the frightened crowd to the street.

The tall man had been Detective Sergeant George Barnitz, wearing false beard and frockcoat. The scrubwoman had been Detective Walsh. They, and the rest were members of the bomb squad, headed by Inspector Thomas J. Tunney. They had nipped in the bud a plot of anarchists to explode a bomb in the cathedral—then the largest religious edifice in the States.

One of the squad, Detective Polignani, had disguised himself as an Italian immigrant of radical leanings, and ingratiated himself with the anarchists. He had accompanied them to the cathedral, where the others waited, disguised, so as not to arouse suspicion until they were ready to pounce. And that was not until the exact moment when the anarchists had ignited the bomb—just before it exploded. That "scrubwoman" leaped just in time.

PICTURES RISE UP FROM PAGES OF CHILDREN'S BOOK

1455



Pictures in This Children's Book Rise or Fold Automatically When It Is Opened or Closed

Illustrations that rise out of the pages are contained in one children's book, the pictures coming automatically in position. When the book is opened to a certain page, the illustration moves to an erect position to provide height, width and depth, thus giving the child a better perspective. This movement is accomplished by the clever use of folded pictures, such as have been used in folding valentines with their paper figures.

1497

PLANTING OF FORESTS GROWS

Artificially reforested lands in this country now total 1,900,000 acres, and of this area 155,000 acres were planted last year. The forest service reports this is an increase of about 16,000 acres over reforestation for 1930. Industrial organizations, including water-power, railroad, lumber and mining interests, planted 21,000 acres.

Made by Lane Publications 11, St. Jude Dr. London, E.C.4, Eng

Mad. Lady 8/26/32

Kroch's Book Store 206 N. Michigan Ave Chicago

Dept. of Agriculture 8/25/32

B1419

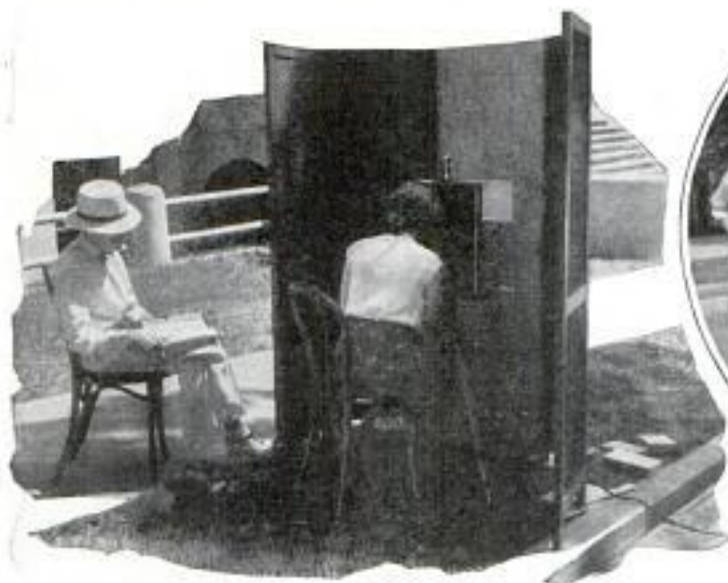
Cont. A.W. Small

POPULAR MECHANICS

Burlington Hotel Washington

795

Yellow and Black Best Colors for Road Signs



Left, Viewing Highway Sign through a Shutter Momentarily Opened to Determine Type with Best Visibility; Right, Some of the Signs Tested; Note the Scrambled Letters

In an effort to determine what color, shape and size of highway signs offer best visibility, the federal bureau of standards and the bureau of public roads have finished a series of tests. In them, an instrument known as a tachistoscope was used, the persons tested viewing signs of various colors and shapes through a shutter momentarily opened, then describing what had been seen. The signs were presented to view in the noonday sun and in evening shadows at distance of from fifty to 200 feet, and the shutter was opened during intervals of from two-tenths of a second to a full second. Signs read in the

shortest intervals by the most people will be considered the best, but since every person viewed every sign under varying conditions, it will be a long time before all the results can be tabulated. It was found, however, that many types of signs believed most readable often fail completely. Black and white signs, for instance, show well on dull days but are useless against glaring lights. Other signs could not be read by color-blind persons, thus eliminating combinations of red and green. In general, tests indicated the best combination is a diamond or octagonal yellow background with black letters.

FAMOUS BLUE OF OLD EGYPT IS REPRODUCED

Ancient Egypt's famous blue no longer is a secret of the dead, for modern chemists have analyzed and reproduced it. An exhaustive study resulted in discovery of its constituents and in its artificial production. Other studies of pigments showed they were almost exclusively of mineral origin and were laid on a prepared surface from a water suspension containing some sticky substance, probably glue. In work in old Egypt, chemists have given invaluable aid, spraying frail objects with

a celluloid solution to stiffen them for handling, separating corroded objects, soaking wooden articles in hot paraffin to prevent splitting or warping, and doing other services that have resulted in the permanent preservation of many priceless antiquities. In much of his work, the chemist used simple apparatus and simple methods to get amazing results, frequently revealing the secrets of arts once considered lost in the tombs of the Egyptians.

Our Bureau of Information will answer all questions regarding articles appearing in this magazine.

Prof. Lyman J. Reuell
Boston University
Boston, Mass

Science Service 8/19/32

EASIER WAYS



Right, Four-Egg Cooker with Sand-Glass Timer; the Handle Is Detachable and Cooker Is Made of Aluminum



Portable Electric Air Conditioner That Washes, Cools and Humidifies 1,000 Cubic Feet of Air Every Ten Minutes; Right, Transparent Cellophane Mending Tissue for Papers and Documents



Above, Pedestal Gas Range with Pipes Concealed in Base, Making It Easy to Clean Floor under Stove; It Is Finished in a Variety of Colors; Right, Chest of Drawers of Triangular Shape, Designed to Fit in Corners, Thus Saving Space in Small Apartment



OF DOING IT



Left, Electric Mixer with Motor Concealed in Cover; It Whips Contents to Creamy Consistency in Short Time; Below, Light and Compact Kitchen Outfit for Campers; It Is of Aluminum and Has Removable Handle



Above, Handy Desk for Children That Contains a Blackboard Which Can Be Lifted from the Front and Placed in a Rack in the Rear When Not in Use; Simple in Arrangement, It Enables Juveniles Always to Have a Blackboard Close at Hand with All the Advantages of a Desk



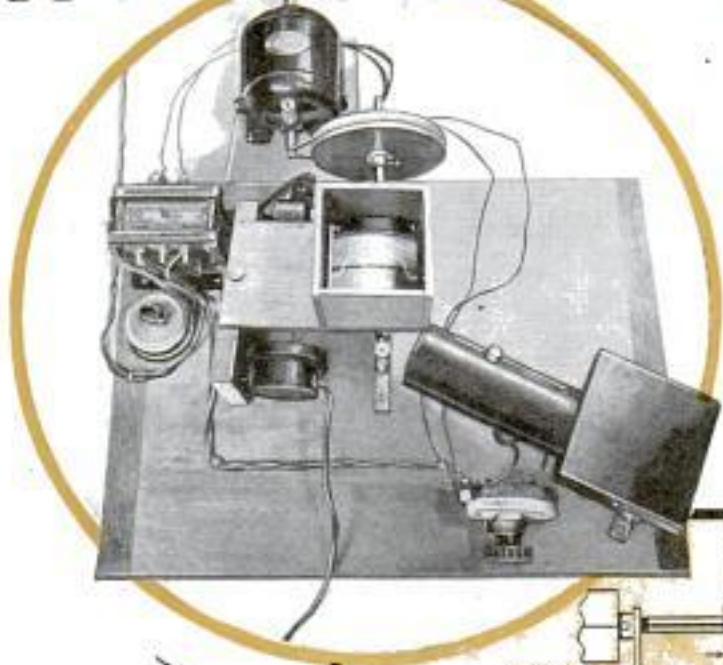
Rubber-Cushioned Kneeling Pad on a Wooden Frame Mounted on Rollers Which Makes the Task of Scrubbing of Floors Easier



Washable Envelopes for the Preservation of Food in Refrigerators; They Are Made of Cellophane and Are Moisture, Grease and Odor-Proof



HUM *and* A.C. TROUBLES

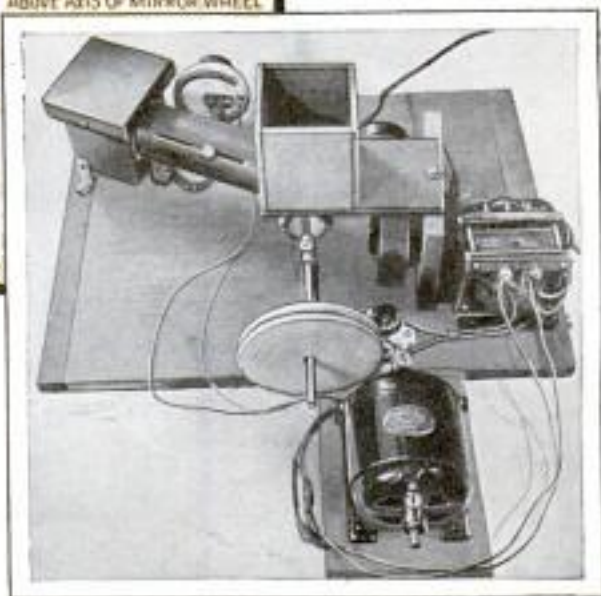
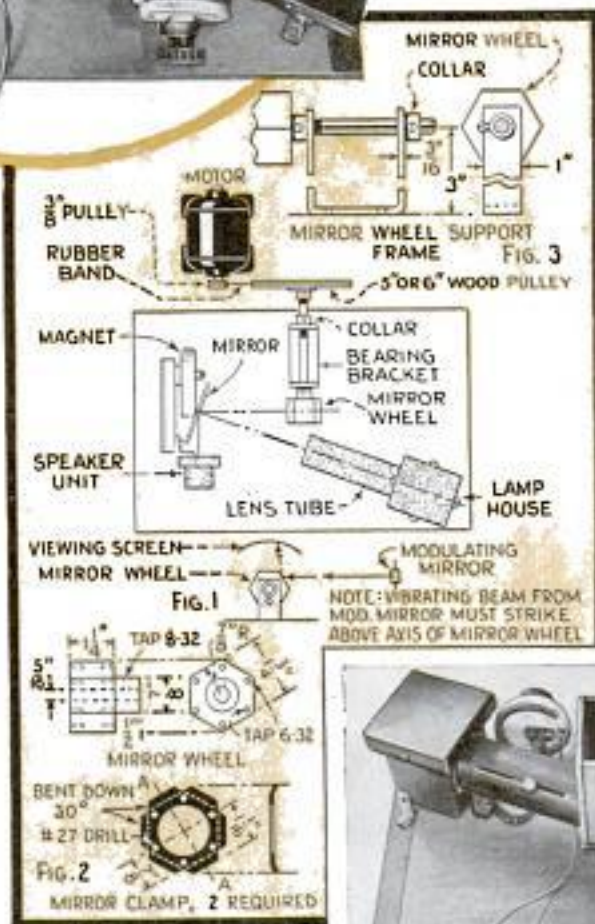


THIS easily constructed tester, or oscillograph, makes receiver hum, a.c. noise and power-pack troubles visible on a screen and may be built by any experimenter or radio-service man at the low cost of less than \$10.

The completed tester consists of an automobile light bulb, two standard lenses, an old magnetic speaker unit, a small motor and a simply constructed six-sided mirror. The auto lamp is housed in a metal box to which a tube is fastened to provide a mounting for an adjustable lens holder. This simple assembly, when properly connected, will show the wave form of an alternating current with sufficient accuracy for most practical purposes. The visible wave, or oscillogram, will help the radio experimenter to quickly diagnose trouble

in either a receiving or transmitting power-supply unit.

The complete assembly is shown in the photos and diagram, Fig. 1. The rotating mirror, detailed in Fig. 2, is made from a piece of standard 1/4-in. hexagonal brass rod 1 1/4 in. long. Two copper end pieces hold the mirrors in place. The mirrors may be cut from a piece of silvered glass, and a thin piece of blotting paper should be placed between the mirrors and the wheel to allow for expansion. If preferred, the six-sided wheel may be made from polished stainless steel. By using a larger lamp, good results are possible with polished stainless steel surfaces as mirrors. If square stock is easier to obtain it will serve equally well for the rotating element if run at higher speed. The supporting bracket and collar for hold-



Made Visible

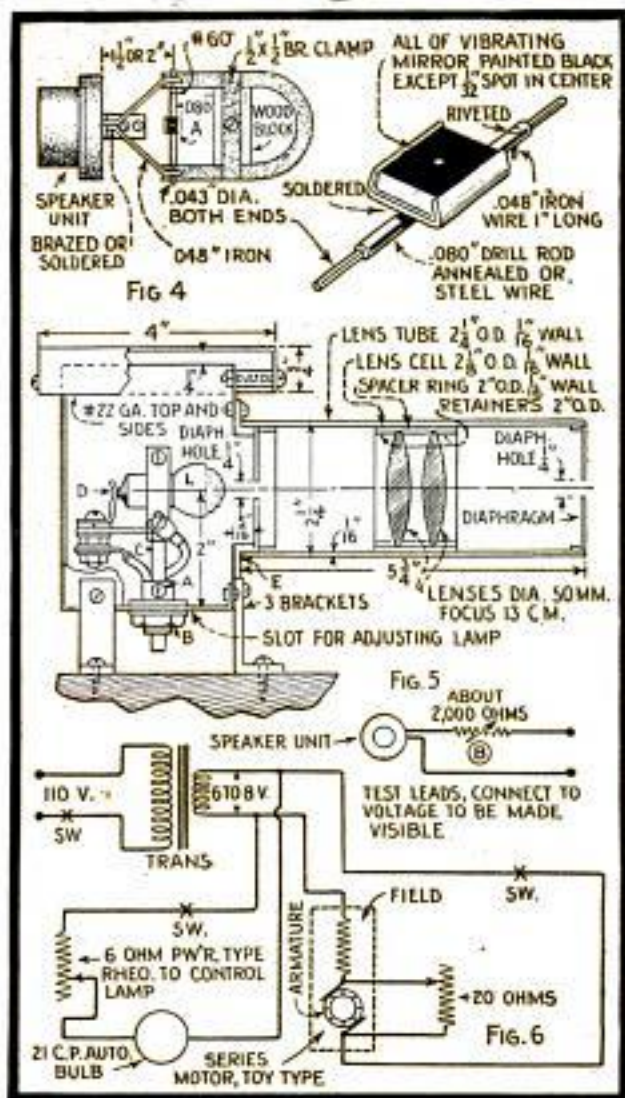
By R. E. CRAIG

ing the mirror shaft in position are detailed in Fig. 3. The collar may be cut from steel or brass tubing.

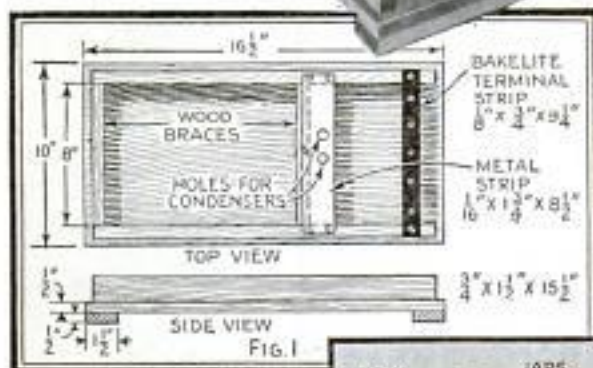
The vibrating mirror movement is shown in Fig. 4. A magnetic speaker unit, or headphone, together with a permanent magnet, can be assembled at low cost. A Baldwin unit was used in the model illustrated. However, almost any type of unit will answer. The forked iron, or steel wire, assembly which rests on the vibrating mirror axle and transmits vibrations from the speaker unit to the round vibrating shaft, is fastened to the speaker diaphragm with a drop of solder. Solder was also used to hold the vibrating mirror frame to its axle shaft. The 1-in. piece of iron wire which is shown riveted at one end to the mirror roller forms a counterbalance. It may be soldered instead of riveted if preferred and the length should be adjusted to balance the unit. The entire surface of the mirror except for a tiny center spot, not over $\frac{1}{32}$ in. in diameter, is lacquered dead black. Another method that may be more convenient, would be to solder a small silver rivet to the mirror roller. The face of the silver rivet would be polished so as to reflect the light to the rotating mirrors, or it may be made concave to act as a focusing mirror, thus increasing the light intensity on the rotating mirrors.

The sheet-metal housing for the light bulb is detailed in Fig. 5; by loosening screw lock A the bulb may be freely moved up and down until the best position is found. The nut B secures the entire light-supporting member rigidly in the housing. By loosening it, the position of the lamp may be changed as required. The movable supporting screw which carries locknut B was made from a piece of $\frac{1}{2}$ -in. outside diameter brass tubing with $\frac{1}{8}$ -in. wall. The lamp-supporting rod C is $\frac{1}{4}$ in. in diameter. All other parts of the assembly, including the spring con-

(Continued to page 128A)



Electrolytic B-Eliminator Is Easy to Build



This inexpensive B-eliminator requires no high-voltage transformer or rectifier tube and has sufficient output to operate a three or four-tube receiver. The total cost is less than \$5 and most any experimenter will have practically all of the materials on hand. The beginner will find this hook-up interesting and instructive as it involves the principles of an electrolytic rectifier, a filter and a voltage divider.

The wood base, Fig. 1, may be made of ordinary box wood, which can be given a mahogany or walnut stain if desired. The metal strip which forms the grounded, or negative, side of the filter unit is drilled to mount the two inverted 10-mfd. elec-

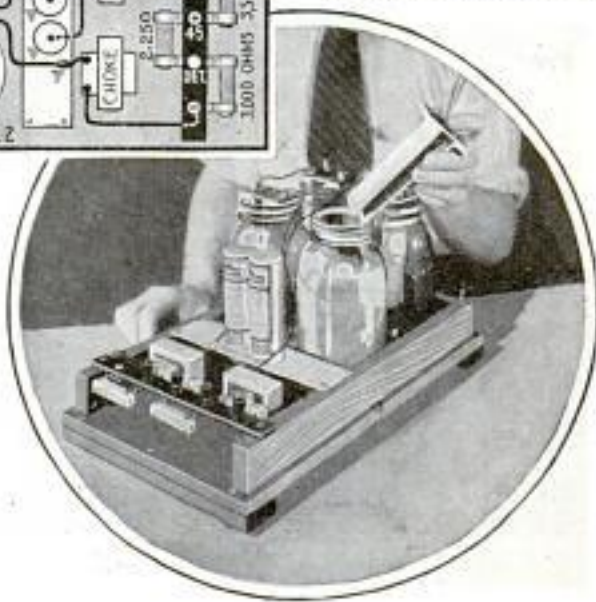
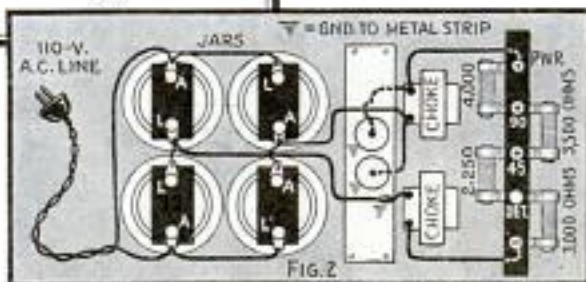
trolytic condensers. These condensers are of the dry electrolytic type; the holes in the metal strip are made just large enough to pass the mounting screw and a large nut on the under side holds the condenser in position. The metal containers form the negative side and are in direct contact with the metal strip. The insulated terminals of the condensers extend below the strip.

The binding posts and resistor units, that make up the voltage divider, are mounted on a strip of bakelite.

Four of mother's one-quart fruit jars are required for the electrolytic rectifier. Aluminum and lead sheet for the electrodes may be obtained from any hardware store. The aluminum should be the purest obtainable and at least $\frac{1}{8}$ in. thick. Lead sheet of the same thickness is used, and four strips of each metal, $1\frac{1}{2}$ in. wide and 6 in. long, are required. A 1-in. right-angle bend is made at the end of each strip and terminal mounting holes drilled. Four bakelite mounting strips, $\frac{1}{8}$ by $1\frac{1}{2}$ by $2\frac{1}{2}$ in., are now cut and drilled to space the electrodes about $\frac{1}{2}$ in. apart. Brass machine screws may be used for the terminals. The terminal mounting strips are narrow enough to provide plenty of vent space at the top of each jar, which is very necessary.

The electrolyte solution is made by dissolving 1 lb. of

(Continued to page 134A)

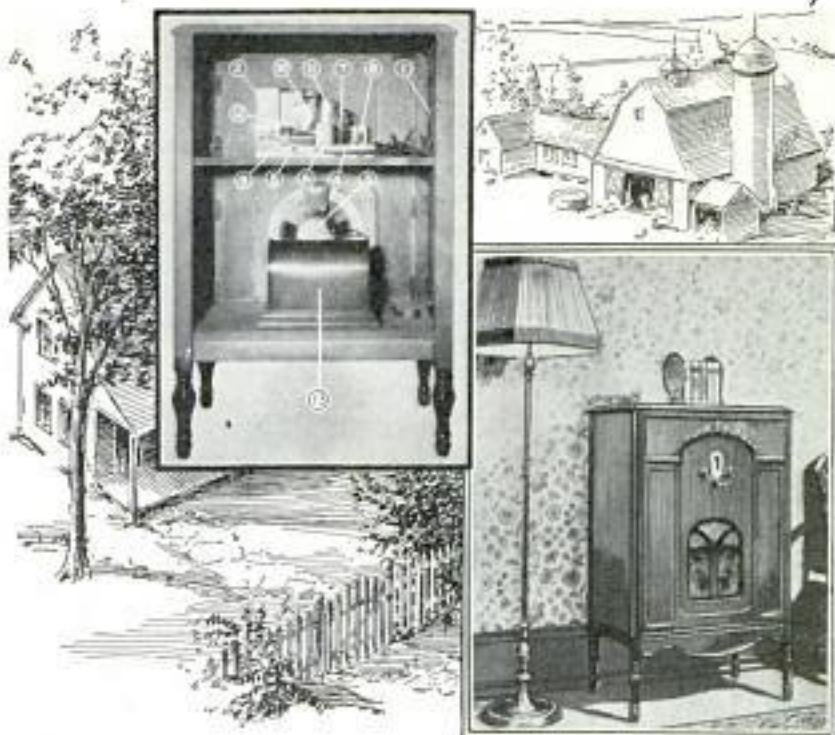


Bell Transformer for Filament Supply

Those who have tried to use a bell-ringing transformer for heating the filaments of type-227 tubes, for small one or two-tube a.c. receivers, have usually given up the idea because of the transformer heating. This may be overcome by placing the transformer in thin motor oil.—Darrell Ward, Montgomery, Ala.

Operating A.C. Midget in Automobile

The small unit mounted under the cowl of the auto enables the owner to operate his home midget a.c. receiver in the car. No B-batteries or ignition-system suppressors are required. The same idea may be applied to boats or airplanes, as this power converter supplies 110-volt 60-cycle a.c. from any 6-volt storage battery. It is said to furnish sufficient current to operate a.c. midget sets employing up to eight tubes. It will also operate any a.c. electrical appliance rated from 40 to 80 watts. A portable public-address system may be plugged in at the car battery for advertising purposes, picnics, etc.



All-Electric Receiver for Farm Homes, Showing Front and Rear Views of the Assembly

An All-Electric Set for Farm Plants

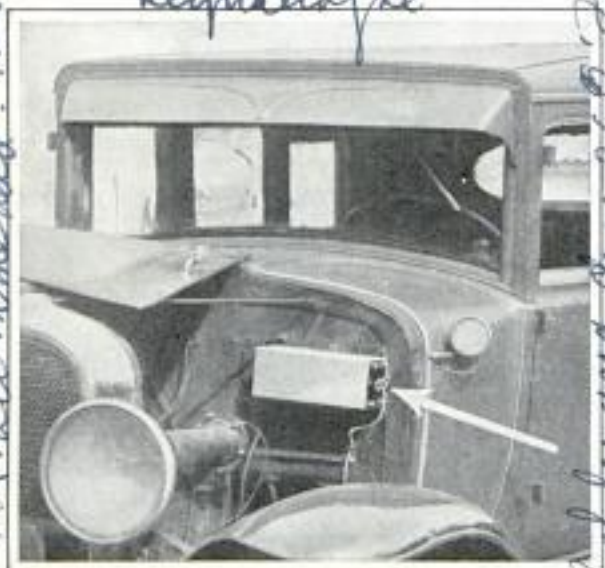
It is no longer necessary to make trips to town and miss favorite programs, owing to battery troubles, if a 32-volt farm-plant supply is available. This 32-volt all-electric receiver is especially designed for use with such plants. It is connected to the usual antenna and ground and plugged into any 32-volt d.c. light or power socket. Of advanced design, it employs two pentode and four screen-grid tubes. A large dynamic speaker provides good tone and plenty of volume. The various parts indicated in the rear-view photo are as follows: 1, local and distance switch; 2, 9, 10 and 11 are tube, coil and condenser shields; 3, speaker; 4, supply lead; 5 and 6, antenna and ground; 7, pentode output tubes; 8, audio coupling coil; 12, condenser bank and 13 is the B-battery eliminator.

Saving Odd Lengths of Wire

Odd lengths of wire of all sorts should be coiled neatly and placed in a box. Screws, nuts and washers should also be sorted and kept in labeled jars.

For further information on any radio construction article write to the radio department; this service is free.

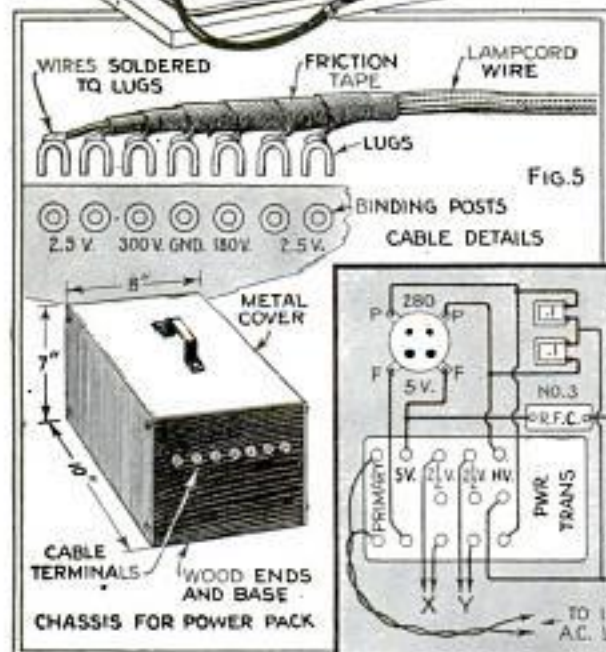
not recommended. see 1935-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100
 Helco Appliance Corp
 1043 Broadway Bldg
 San Francisco, Calif



Small Power Converter Installed in Car for Operating A.C. Midget Receiver

~~Helco Appliance Corp~~
~~1043 Broadway Bldg~~
~~San Francisco, Calif~~
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Five-Tube All-Wave Receiver at Low Cost

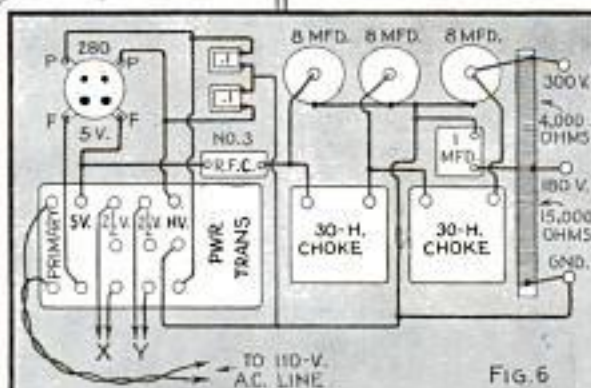


be found useful in some cases for eliminating r.f. noises from the line. It consists of 300 turns of No. 30 d.c.c. wire wound on a 1/2-in. spool. The electrolytic condenser may be a 3-section 24-mfd. unit or three separate 8-mfd. units. The two 30-henry chokes are inexpensive 75-mil. types connected in series. The voltage divider can be a standard 20,000-ohm wire-wound unit with a variable tap for the 180 volts; this is by-passed with a 1-mfd. condenser. The 180-volt tap should be adjusted after the set is in operation.

The power unit is assembled on a wooden base and the back and front panels are also made of wood as shown in Fig. 5. The metal cover may be made of sheet metal and should have a number of ventilating holes drilled in each side. Binding posts are brought out at front for the home-made cable connector detailed above.

The writer has obtained highly satisfactory

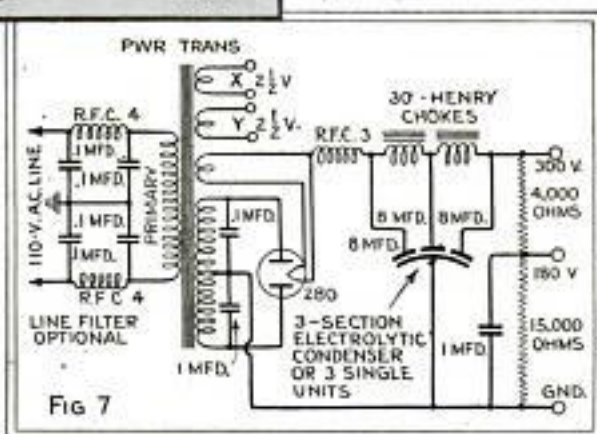
results with this all-wave receiver; maximum results, however, depend on location, the skill of the operator and close attention to details. A complete material list and enlarged diagrams are available for those who



PART II

The power pack for the receiver described in the October issue is quite simple and most of the parts will be found in the average radio experimenter's junk box. If the builder has a good B-eliminator on hand it may be possible to alter it slightly so as to conform to the specifications given in Figs. 6 and 7. The power transformer used should have about 350 volts each side of the high-voltage center tap, a 5-volt winding for the filament of the 280 rectifier tube and two 2 1/2-volt windings to supply the tube filaments in the receiver as indicated at Y and X.

The No. 3 r.f. choke is optional but will



wish them. The line filter shown in Fig. 7 is not absolutely necessary but is advised where line interference is encountered. The r.f. chokes No. 4 consist of 100 turns of No. 24 d.c.c. wire wound on 1-in. forms.

*Any. Acces + King dne
11 W. 42nd St
New York*

*Hammarlund
Mfg. Co. 424 W
38th St*

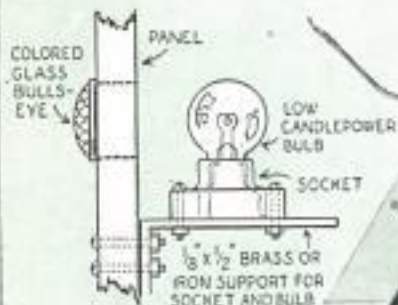
*Hammarlund Mfg. Co.
424 W. 33rd St New York*

Practical RADIO SUGGESTIONS

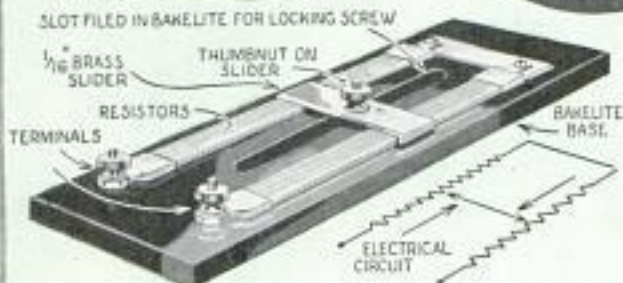
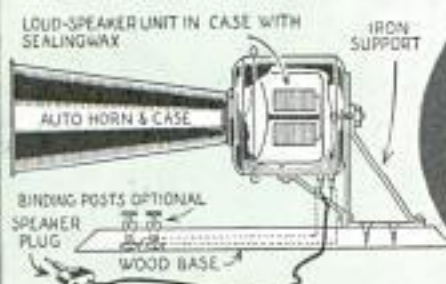


STRIP OF CROCUS CLOTH

Above, Polishing Speaker or Microphone Plug to Prevent Noises Caused by Faulty Electrical Contact; This May Also Be Applied to Tube Prongs; Below, Signal Light for Experimental Apparatus; a 2½-Volt Lamp May Be Supplied from One of the Tube Filament Transformers

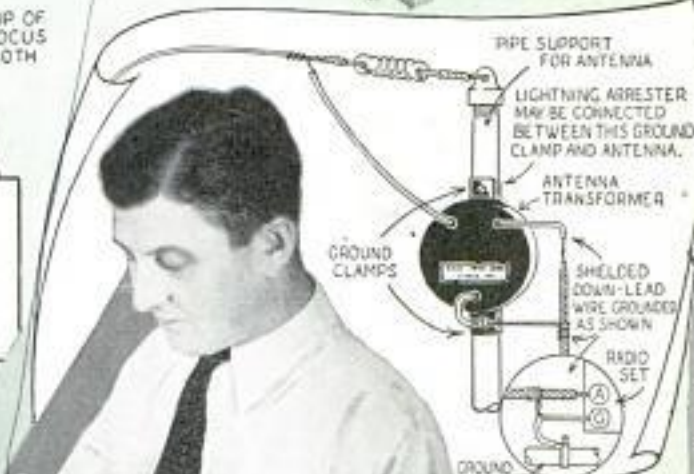


Below, Portable Speaker Made by Mounting an Old Diaphragm-Type Loud-Speaker Unit in an Auto-Horn Case



Left, Utility Variable Resistor Made from Small Straight Wire-Wound Resistors, Handy for Meter Shunt or any Accurate Resistance Adjustment; Right, Toggle Switches Ganged for Simultaneous Operation by Means of Metal Strip

Right, Two-Section Condenser for Short-Wave Receivers; Large Section Tunes to Center of Band and Small Section Spreads Amateur Bands over Dial



Antenna-Coupling Transformer for Reducing Man-Made Static; the Shielded Down Lead May Be Grounded Either at the Roof or Near the Receiver

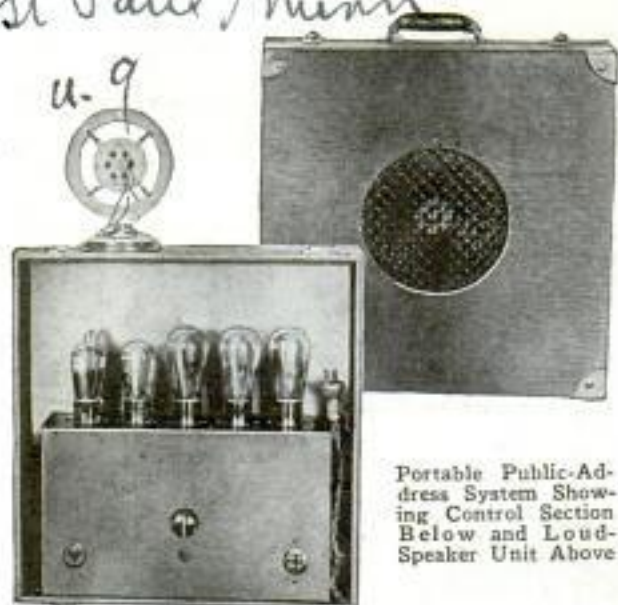


Low-Loss Socket for Short-Wave Circuits; Left, Aluminum Salt Shakers as Coil Shields



United Sound Engineering
2233 University Ave
St Paul, Minn

POPULAR MECHANICS



Portable Public-Address System Showing Control Section Below and Loud-Speaker Unit Above

Compact Portable Public-Address System

Although weighing only 29 lb., and complete in a single case, this portable amplifier will serve from 500 to 1,000 people. It is also adaptable for larger crowds with the addition of auxiliary speakers. The microphone will pick up either voice or dance music and a special input connection is provided for plugging in radio or phonograph. The carrying case is divided into two equal sections which are connected with polarized plugs.

Glass Vials for Choke Coils

Small glass vials make excellent forms for winding r.f. choke coils. The cork or metal screw cap may be fastened to the chassis to serve as a mounting. The end turns can be held in place with friction tape or narrow metal bands. Larger coils may be wound on test tubes.

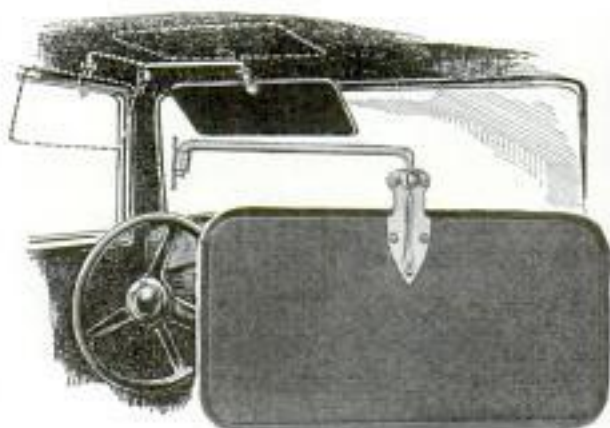
Making Old Sets Tune Sharper

Older receivers of the tuned r.f. type tune broadly for two main reasons. First, they usually have large inductance coils, or r.f. transformers, which serve as loops or wave pick-up in these days of powerful broadcast signals. Therefore, the signal energy reaching the receiver circuit is not limited to that picked up by the antenna and ground system. The second reason for broad tuning lies in the fact that the older r.f. circuits employed a potentiometer for controlling oscillation. This method of shifting the grid return between the nega-

tive and positive filament leads not only broadens tuning but also calls for heavy plate current. The simplest means for avoiding the first cause is shielding to reduce the inductive pick-up. The receiver cabinet may be lined with tin foil, shel-lacked in place and connected by a wire to ground. Care should be taken that the foil does not touch the set parts or bare wiring. Copper or aluminum partitions between the r.f. transformers and tuning condensers will also help. The second consideration is to eliminate the potentiometer. This is disconnected and the grid return, that went to the movable contact arm, is connected to negative filament instead. By regulating the r.f. plate voltage it is easy to control oscillation, a 200 to 500,000-ohm volume-control clarostat in the r.f. plate supply giving good volume control aside from the advantage gained by the removal of the potentiometer.

Antenna Built in Sun Visor

This combination auto-aerial and sun visor not only simplifies the car-antenna problem but also provides a means of protecting the passengers' eyes from glare. A ball-and-socket joint enables the operator to adjust the visor to the various positions shown. Usually sold in pairs, these units may be connected to double



Visor Antenna Protects Eyes from Sun and Picks Up Radio Signals

the antenna pick-up and are said to give maximum efficiency.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; material lists are always available without charge.

Vigor-Tena Corp
Baltimore, Md.
Kansas City, Mo



AERO-TROLLEY

*develops
amazing
speed*

by BOB HARDY

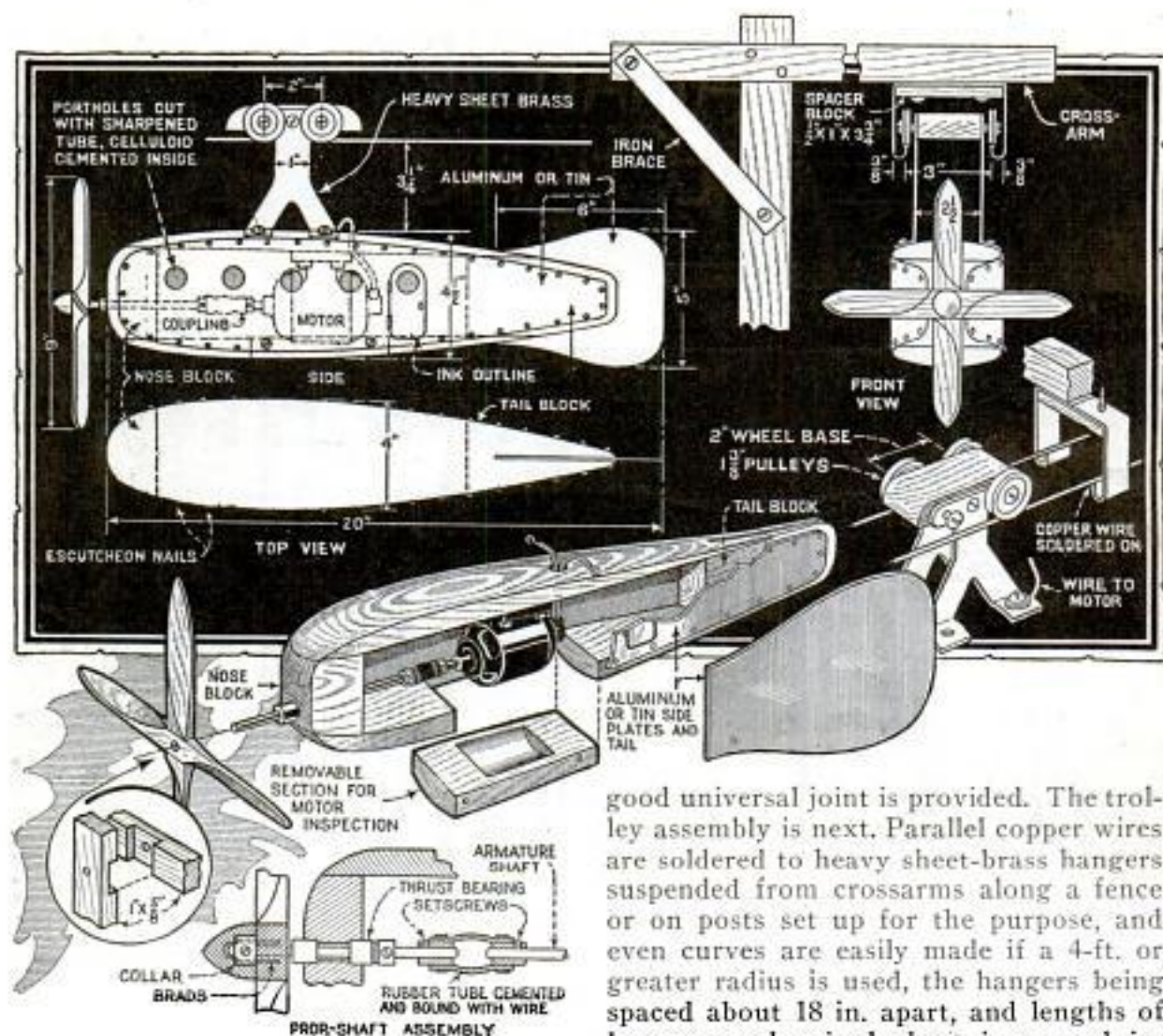
LIKE a passenger carrier of the future, this little aero-trolley speeds along the wires at a breath-taking rate, for it is amply powered, and the graceful streamlining reduces air resistance to a minimum.

Its construction is comparatively simple, the only special equipment being a toy motor of low voltage, a transformer for use with the house-lighting current, some sheet brass, copper wire and pulleys and couplings from a standard toy building set. It is suspended from the trolley to obtain perfect balance, and ample clearance is allowed for the 9-in. four-bladed propeller, between trolley wires and supporting posts. The top and bottom pieces of the car are made of white pine, fastened at the ends to the nose and tail blocks, and are carefully streamlined. Sheet aluminum is used for the sides. Before the



plates are installed, however, cut away a section from the bottom, as indicated, for inspection of motor.

Before cutting the sides, make paper patterns to get a neat fit. The portholes are made with an improvised punch. The motor hangs from the ceiling. A slot is cut in the rear of the body to receive the



sheet-metal tail. To assure getting this slot in alignment, cut it before the wood is streamlined. Likewise, the pilot hole for the propeller-shaft bearing should be located and drilled in the nose block before it is streamlined. A simple universal joint between the shaft and motor can be made from a piece of rubber tubing, slipped over two collars, cemented with ambroid or model-airplane cement and bound with wire. Before doing this, file a few grooves lengthwise on the collars. Two short or one long bearing of brass tubing can be used in the nose block, and a thrust washer, or better, a model airplane ball-thrust bearing, should be used where indicated. The propeller is fastened to the shaft by means of a set collar with two small holes drilled for wire brads to be thrust into the wood hub, the whole assembly being well cemented. It is important to have the propeller shaft aligned as carefully as possible with the armature shaft, even though a

good universal joint is provided. The trolley assembly is next. Parallel copper wires are soldered to heavy sheet-brass hangers suspended from crossarms along a fence or on posts set up for the purpose, and even curves are easily made if a 4-ft. or greater radius is used, the hangers being spaced about 18 in. apart, and lengths of brass or galvanized sheet iron used instead of wire to hold the curve. On the straight lengths, the trolley wires should be supported about every 24 or 30 in. and fairly heavy copper wire used. The wheels are located to have a 2-in. wheelbase on a wooden block. Ordinary grooved pulleys from a toy construction set will serve the purpose. The couplings and propeller shaft, as well as collars and bearings, can also be found in a construction set. Be sure that the ends of the round-head screws used for trolley-wheel axles do not touch in the wood chassis, causing a short circuit. The brass brackets supporting the car will have to be cut with a chisel or a hacksaw, for a much heavier stock should be used than can be cut with a pair of shears.

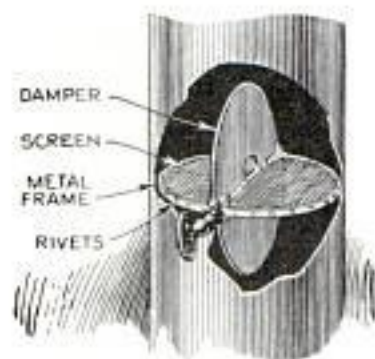
For a finish, leave the aluminum side plates untouched except for polishing, but the wood portions of the car should be painted a French gray; the propeller is finished in mahogany stain, and given two

coats of shellac. Do not use any motor of the same voltage as the city light current, because the uninsulated trolley wires are easily shorted through carelessness and would likely blow out fuses in the house or garage, not to mention the danger of a severe shock. By using a transformer, the power circuit will be perfectly safe at small voltages.

Hose on Oil-Drum Faucet Aids in Filling Auto Tank

Automobile owners, who keep their gasoline in large cans from which the fluid is drained into another and then is poured into the car tank, will find it more convenient to attach an old water hose of the right length to reach the car, on the faucet of the storage tank. This makes it easy to fill the car tank without spilling the gasoline. The storage tank, of course, should be elevated above the level of the car.—Claude E. Johnson, Romance, Ark.

Screen on Stovepipe Damper Keeps Sparks from Flying



Attached to an ordinary stovepipe damper as illustrated, a screen-wire disk will keep sparks from passing up the chimney. The wire is riveted to a strap-iron

hoop and then fastened to the shaft at right angles to the damper so that, when the latter is opened, the screen closes the pipe. The screen will not interfere with the draft if kept free of soot.

Wetting Coal in the Cellar

A depression, 3 in. deep and 3 ft. square, in the floor of your coal bin, provides a good place for wetting coal without having the water run over the floor. The sides and bottom of the depression are made water-tight with concrete. Water is saved in this way by using it until it has all been absorbed by the coal.

Roller Skating with a Bicycle Motor



Twenty Miles an Hour Attained on Roller Skates by Using Front-Wheel of Motor Bike

Here's a new sport in roller skating with a motorized bicycle wheel. The outfit consists of the front wheel, fork and handlebars of a bicycle, with a motor attached as shown. A speed of 20 miles an hour certainly is thrilling on roller skates.—E. Paul du Pont, Monchanin, Del.

Barrel-Hoop Signal for Fishing through Ice

Tied to the end of your line, a light barrel hoop will serve as an emergency signal when fishing through the ice. The hoop is placed across the center of the hole and will rise as indicated by the dotted lines when a fish pulls on the line.



Signal Made from Barrel Hoop Gives Warning of Catch When Fishing through Ice

Burning Displays

with Chemical Experiments



OXYGEN SETS FIRE TO HEATED WOOD CHARCOAL & IS SIMILARLY USED TO REMOVE CARBON FROM AUTO MOTORS



HEATED STEEL WOOL BURNS



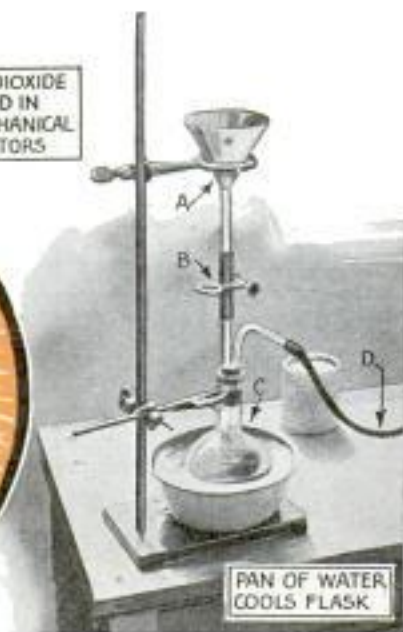
Water in Funnel A Drops on Sodium Peroxide in Flask C; the Drip Is Controlled by Clamp B; Oxygen Is Conducted through Tube D to Inverted Bottle E



SULPHUR-DIOXIDE GAS IN WATER TURNS BLUE LITMUS RED



BURNING SULPHUR PRODUCES SULPHUR-DIOXIDE GAS




PAN OF WATER COOLS FLASK

and Dazzling Lights


By CLYDE A. CROWLEY

be used to hold the glass tubes in the flask. An ordinary cork may be used if it is bored with two holes. A piece of brass tube filed sharp on one end makes a first-class cork drill. A funnel is connected to a short length of glass tubing inserted into the stopper with a piece of soft-rubber tubing. A hose clamp controls the flow of water from the funnel into the flask. Two short pieces of glass tubing should be bent to an L-shape for these experiments. The bending of glass is easy if care is taken to heat the entire length of the portion to be bent. This may be done by attaching a "fishtail" to an ordinary Bunsen burner. If an alcohol burner is used, the glass must be moved back and forth in the flame to heat about 3 in. of the tubing. While the glass is being heated preparatory to bending, it should be rotated so that it is heated evenly all around. If this is not done, the glass may collapse when it is bent. The ends of all glass tubing should be heated in a flame until they start to melt and the sharp edges become rounded. Unless this is done, tubing and stoppers will be cut when the tubes are inserted. Moisten the glass and the stopper with water and insert the tubing with a rotating motion.


Wide-mouthed bottles or milk bottles may be used to col-




BURNING MAGNESIUM RIBBON GIVES BRILLIANT WHITE LIGHT IN OXYGEN



GLOWING SPLINTER BURSTS INTO FLAME IN OXYGEN



SHARP BRASS TUBE USED TO DRILL HOLES THROUGH CORK

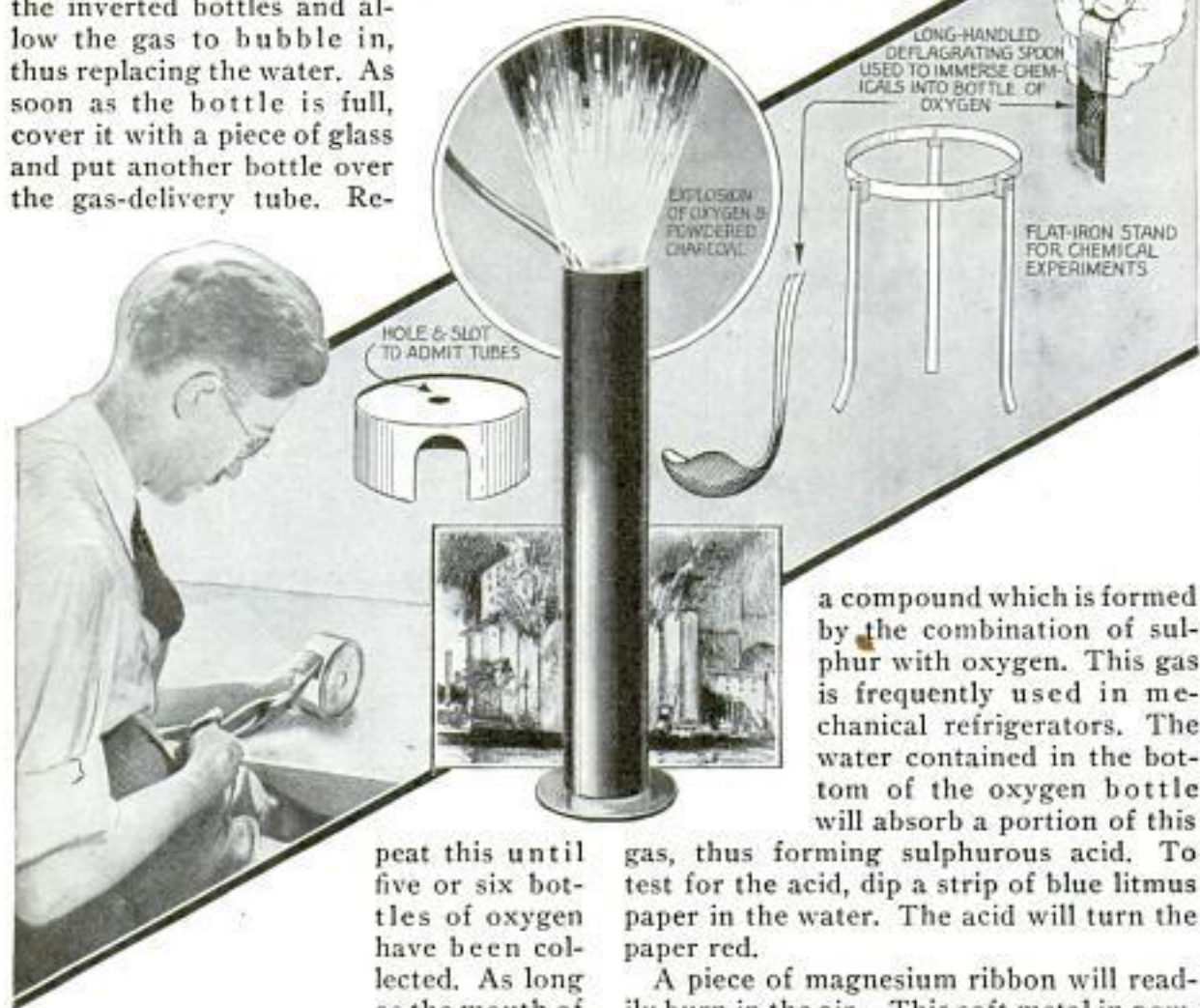


HEATING ALUMINUM POWDER



lect the oxygen. Fill the bottles with water and cover each with a piece of glass, then quickly invert and plunge the covered mouth of the bottle under the surface of the water. The cover glass may then be removed. Open the hose clamp and allow a few drops of water to pass into the flask. Only a very small amount of water should be allowed to enter at one time. Insert the delivery tube into one of the inverted bottles and allow the gas to bubble in, thus replacing the water. As soon as the bottle is full, cover it with a piece of glass and put another bottle over the gas-delivery tube. Re-

safely set on fire with a burner and then inserted in a bottle of oxygen. The sulphur will burn with great intensity and a beautiful colored flame. Do this part of the experiment at a window so that the disagreeable and irritating gases will be carried away. The odors which come off are sulphur dioxide,



peat this until five or six bottles of oxygen have been collected. As long as the mouth of the bottle and the cover glass are wet, the gas will not escape.

The simplest test for oxygen is to ignite a splinter over a burner, and after it has taken fire, blow out the flame and quickly insert the glowing splinter into a bottle of oxygen. The splinter will be relit and will burn vigorously. A piece of steel wool held with a pair of pliers and heated in a burner until it glows will burn with dazzling brilliance when inserted into the oxygen. A small piece of sulphur, held in a long-handled spoon whose bowl has been bent at right angles to the handle, may be

a compound which is formed by the combination of sulphur with oxygen. This gas is frequently used in mechanical refrigerators. The water contained in the bottom of the oxygen bottle will absorb a portion of this

gas, thus forming sulphurous acid. To test for the acid, dip a strip of blue litmus paper in the water. The acid will turn the paper red.

A piece of magnesium ribbon will readily burn in the air. This soft metal in powdered form is used to make photographic flashlights. If a piece of magnesium ribbon is set on fire in the flame of a burner while held with a pair of long-handled pliers, it will burst into a dazzling brilliant white flame when immersed in a bottle of oxygen. Do this experiment in a dark room and note the intensity of the illumination. Aluminum powder may be burned in oxygen with great brilliance if it is first heated in a spoon over a burner until it becomes quite hot. Iron powder and finely divided zinc dust will also burn just as easily and effectively in oxygen as paper,

wood and other inflammable substances burn in air.

An interesting way to show the efficiency of oxygen in causing combustion is to powder a small amount of wood charcoal, place it in a metal-can lid and heat it over a burner until a few of the particles start to glow red. Turn out the burner and point the delivery tube from the oxygen generator at the hot charcoal in the pan. Squeeze the hose clamp and allow some water to flow onto the sodium peroxide. The charcoal will burn vigorously with a great shower of sparks. This is the principle used in removing carbon from the cylinders of automobile motors, a stream of oxygen from a tank being directed into the cylinder of the car through the spark-plug hole and the carbon is then burned away in exactly the same manner as it was in this experiment. The lye solution left in the oxygen generator may be bottled and labeled "Poison Sodium Hydroxide." It will come in handy for other experiments in chemistry. If a stream of oxygen from the generator is directed into a tall open-mouthed can which has a $\frac{1}{4}$ -in. layer of finely powdered wood charcoal on the bottom, the oxygen and carbon will mix to form a dust-laden gas which is explosive. If one end of a long-wood splinter is set on fire and cautiously brought to the mouth of the can, a small explosion will result. Of course, in doing this, keep your face away from the top of the can. Many flourmill and other industrial-plant explosions have resulted when a spark from a belt or an electrical switch set off an explosive mixture of fine dust and air.

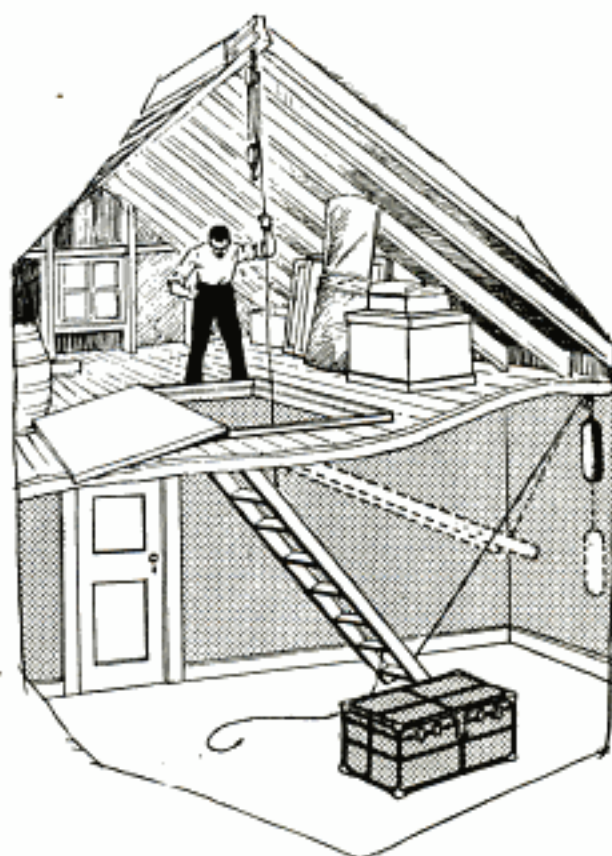
Hose Improves Bucket Handles

A short section of an old garden hose slipped over the bail of a bucket makes a comfortable grip that will not cut into the hands. It also prevents the annoying clank.



Several layers of friction tape first are wrapped around the handle in order to keep the hose from slipping about on the bail.

Utilizing Idle Space of Garage



Counterbalanced Ladder Permits Use of Garage Attic without Sacrificing Space for Stairway

By covering the joists of your garage with flooring and providing a trapdoor equipped with a counterbalanced ladder as shown, considerable storage space can be obtained. The counterbalance should be heavy enough to keep the ladder against the ceiling when not in use.

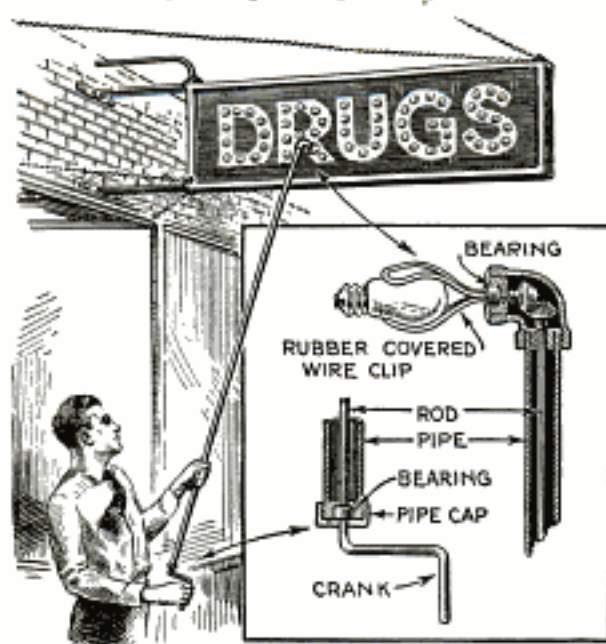
Magnets Used to Hold Small Tools

Several magnets, taken from an old model-T Ford magneto and hung on a wall or the back of a workbench, will be found useful for holding small tools. Nails driven underneath and above the top, and on both sides of the magnets, will keep them securely in place.—Martin G. Winterton, Ferndale, Wash.

Making Temporary Tracing Paper

Paper can be made temporarily transparent for tracing purposes by wetting it with benzine. The tracing is done while the paper is wet. After the benzine evaporates, the paper returns to its original opaqueness.

Device for Replacing Lamps in Sign



Improvised from an Iron Rod, Pipe and Fittings, This Device Helps Replace Lamps in Electric Signs

Here is a device that will be found handy for replacing lamps in an electric sign. It consists of a length of $\frac{1}{2}$ -in. pipe, with hardwood plugs driven into each end and drilled to take bearings for a $\frac{1}{4}$ -in. iron rod. The lower end of the pipe is fitted with a cap, also drilled for the rod, while the upper end is fitted with an elbow. Two bevel gears, taken from an old speedometer shaft, are contained inside of the elbow, one end of which is plugged and fitted with a bearing for a short rod, which holds a spring-wire clip, bent and covered with rubber tubing to grip the lamps. A crank formed on the lower end of the rod completes the job.

Old-Iron Finish on Wood

An imitation old-iron finish can easily be applied to small chests and picture frames by stippling on a paste made of 1 part flake graphite and 4 parts orange shellac. Put the graphite into a small jar and slowly stir in the shellac until a thick paste is formed. This will stay moist for several weeks if tightly covered to exclude the air. It is better to construct the article from rough lumber, paying no attention to sanding, as the roughness of the material makes a suitable key for the paste. If wallboard is used, do not prepare the surface, but apply the paste as you would

over wood. Stipple a $\frac{1}{8}$ -in. coat of paste on the object with a stiff brush, covering all joints and cracks. When this is done allow the paste to dry for at least three days and then sand the surface lightly with medium sandpaper to remove all the small, sharp projections. When completed, polish with a soft cloth or crumpled newspapers to bring out the graphite and give the article a polished metallic finish. To give the pieces an antique effect, use a thin mix of rust-colored oil paint, such as Baden brown, being careful to get the color into all the small indentations. When this is finished, lightly wipe off the paint from the high spots and allow to dry, after which another polishing with a cloth or newspaper and a thin coat of white shellac will give the article an appearance that cannot be distinguished from real rusted iron that has been roughly polished.—W. M. Anderson, Jr., Oakland, Calif.

Goggle Case Attached to Instrument Board of Car

Screwed to the instrument board of your car, a spectacle case provides a safe place for carrying goggles and assures them being at hand when needed. The case can be attached by means of one of the screws that hold the board in place, or, if this is not possible, it is a simple matter to drill a hole and fasten the case with a small stovebolt.—Frank W. Harman, Los Angeles, Calif.

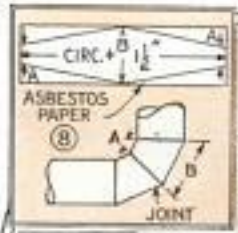
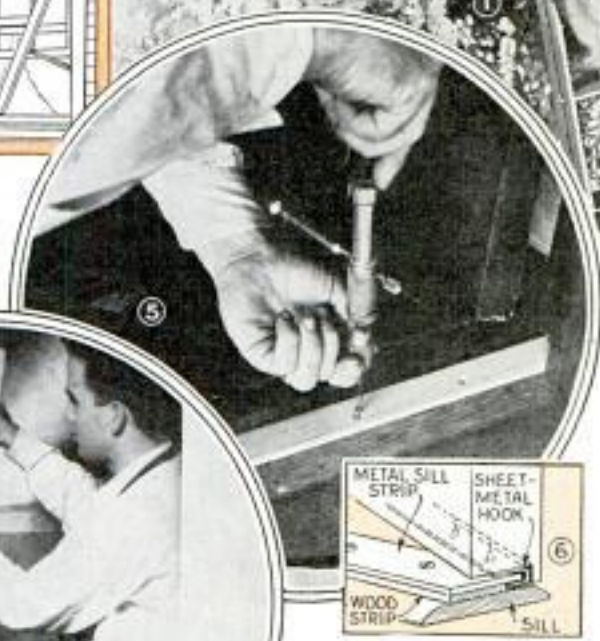
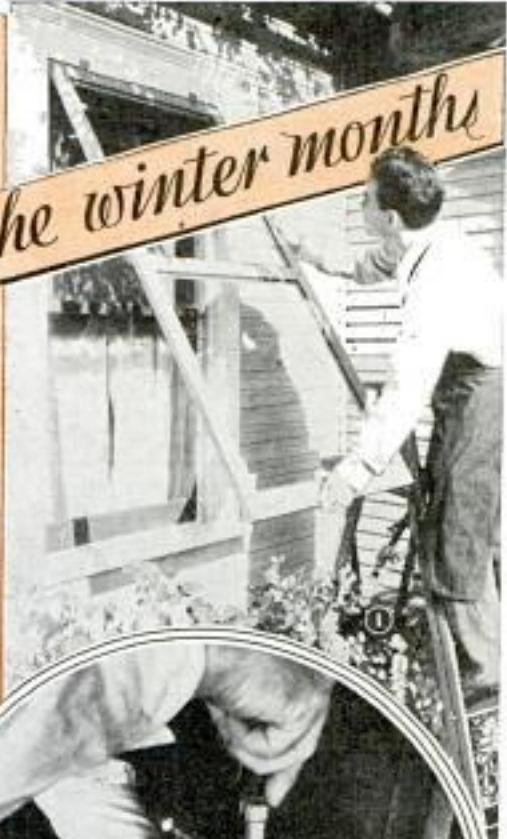


Driving Goggles May Be Kept in a Case Screwed to the Instrument Board of the Car

A WARM HOME

during the winter months

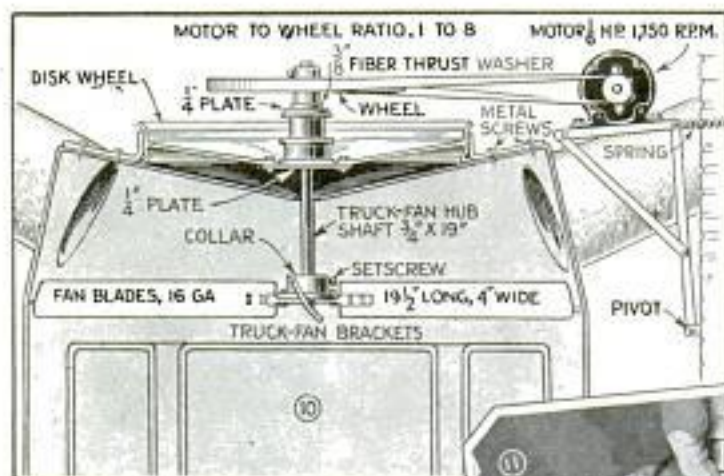
ACTUAL demonstrations have shown that a 33 per cent saving can be made on fuel bills through proper insulation and protection. One of the biggest items in winter protection is the use of storm sash. The dead-air space thus created is a perfect non-conductor of heat or cold. The construction of the sash itself is a fairly simple matter, the frames being made from straight lengths of 1½-in. stock joined with suitable mortise-and-tenon joints, and rabbeted all around for single or double-strength glass. Care must be taken to get a perfectly fitting sash.



The bevel on the lower crosspiece can be made after the whole frame is assembled, as shown in Fig. 3. The usual manner of installation is shown in the

photographs, the regulation sash hinge being fitted at the top, with hooks and eyes at the bottom. Small metal ventilators can be easily fitted from galvanized stock, as shown in Fig. 2, or the sash can be worked with casement rods, as in Fig. 4.

Figs. 5 and 6 show an effective method of weather-stripping doors. Brass or galvanized stock, 1/8 by 1 1/4 in. in size, is used



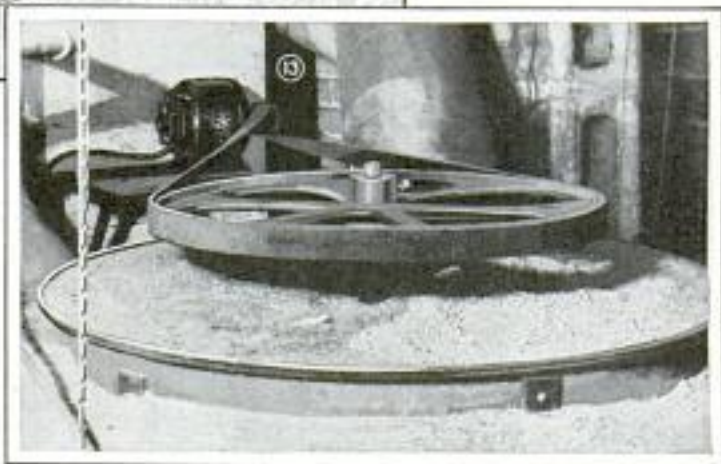
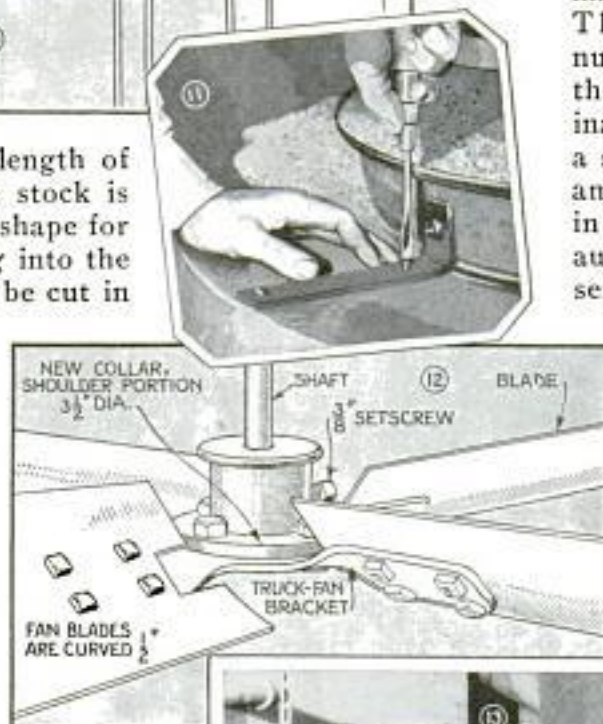
for the sill strip. A length of copper or galvanized stock is bent to the proper U-shape for the door hook, fitting into the rabbet, which should be cut in neatly to the exact depth required.

If your basement is cold and damp, it is advisable to completely cover the furnace and hot-air pipes with corrugated asbestos paper, as shown in Fig. 7. A three-layer covering of this material should be applied for best results, staggering the joints. The paper may be pasted on with asbestos cement or simply held in place with wire loops. Bends in the piping can be accurately fitted by taking the dimensions as shown in Fig. 8 and cutting the paper accordingly. The 1 1/2 in. of extra stock will just allow the paper to make a neat butt joint.

Storm sash and weather striping are often ineffective for their purpose when the window frames have been poorly constructed. Where the outside casing is nailed directly over the siding instead of to the blind casing, the triangular openings made by the back of the casing and the sidewall often furnish a direct air passage to the inside of the house. Such air passages should be plugged with oakum, topping off with a final layer of putty colored to match the painted trim,

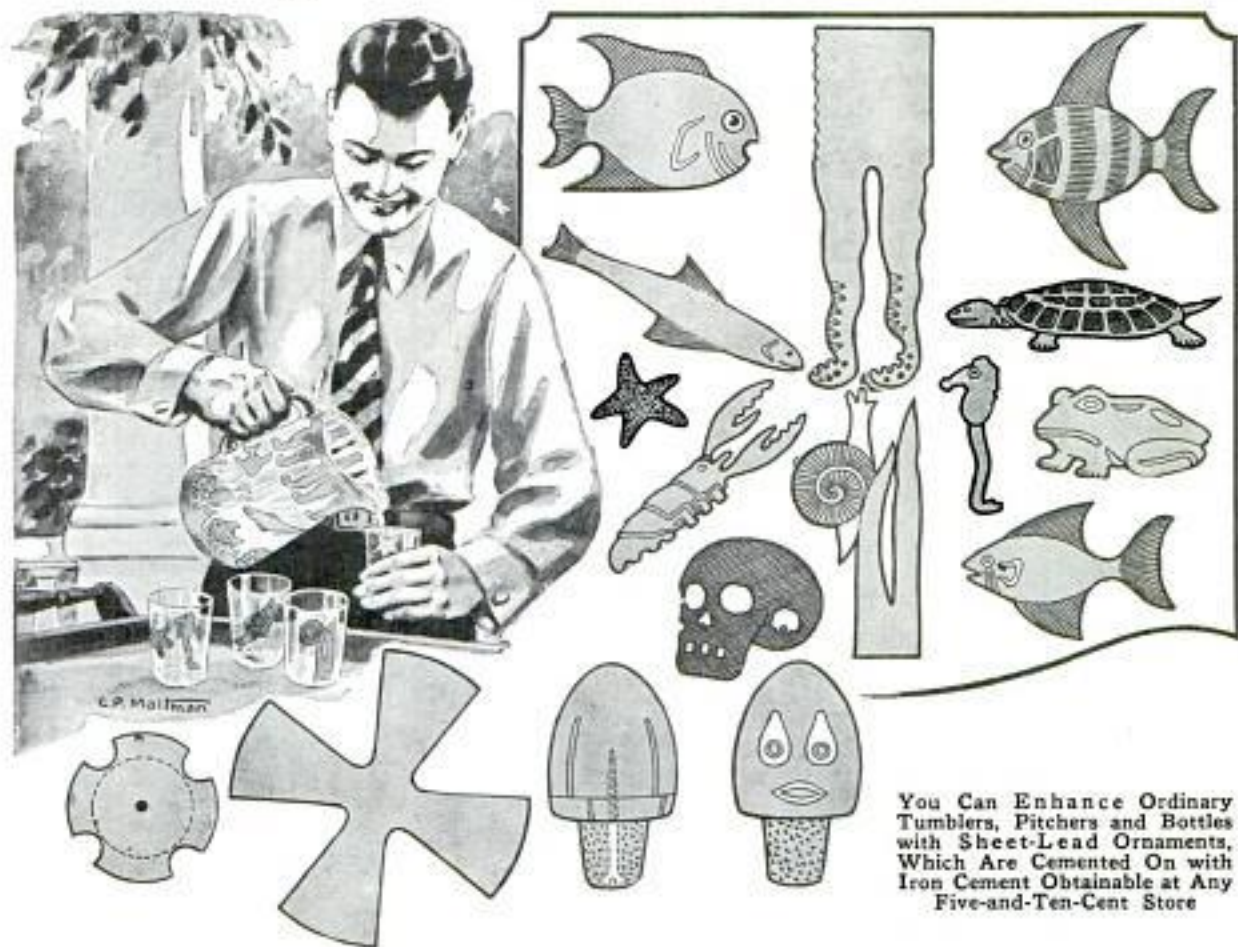
as shown in Fig. 9. Forced air circulation in warm-air furnaces is by no means a new idea, but is worthy of consideration again because of its effectiveness. A good example of a typical installation is shown in Fig. 10. This utilizes a truck-fan hub, the hub proper being used above the furnace while the fan brackets take specially made blades, as shown. These blades, four in number, are mounted at the same angle as the original fan blades, and have a slightly convex surface amounting to about 1/2 in. in the 4-in. width. The automobile disk wheel serves as a bearing hanger for the whole unit and is held in place with metal straps, as shown in Fig. 11.

Fig. 12 gives a detailed view of the fan hub and shows a new collar which must be made and drilled to fit the



original fan bracket. The driving wheel atop the furnace can be almost anything so long as it approximates a 1 to 8 ratio with the motor. In case you find that a flat belt slips off this wheel, get a wheel to accommodate a V-belt. Notice how a spring tensioner has been used to take up the belt slack and eliminate vibration. One or more fan blades should be filed down to prevent undue strain on the shaft.

Decorating Your Glassware with Sheet Lead



You Can Enhance Ordinary Tumblers, Pitchers and Bottles with Sheet-Lead Ornaments, Which Are Cemented On with Iron Cement Obtainable at Any Five-and-Ten-Cent Store

Glass beverage sets can be made highly attractive by means of sheet-lead ornaments glued on with iron cement. The lead used should be $\frac{1}{16}$ in. thick and after it is cut out, both sides are polished with a small brass-wire brush. When the figures have been cemented in place, shading lines can readily be scribed in with a sharp tool, made from a phonograph needle securely inserted in a wooden handle. If the container is a bottle, cut off a cork to fit and screw it to a wood block rounded off and covered with lead, as shown in the lower part of the drawing. When pressed around the wood, the resulting seams in the lead may be filled with solder and smoothed.

Fountain Brush for Coloring Photos

The following method will be found useful for water-coloring photos: Place a short piece of a cigaret-lighter wick in the small opening at the end of an ordinary eye dropper. Fill it with the color

and use it as a fountain brush. The frequent dipping of a brush is thus eliminated and the work is done more quickly.

License Plate Causes Overheating

The front license plate on most cars is bolted to the tie-rod between the fenders, and stops some of the air circulation through the radiator. By bending the plate out about 3 in., as shown, air for cooling the engine will have freer access, yet the plate will be plainly visible.



☐ A rubber bath sponge is effective for removing dust and lint from a felt hat.



Circulation of Air in Clothes Closet Assured by Installing a Register in the Ceiling

Register in Closet Ceiling Assures Air Circulation

Installed in the ceiling of a closet, an old heat register permits a circulation of fresh air from the attic into the closet, and prevents it from becoming musty. A register fitted with shutters is best for this purpose as the air can then be controlled by opening or closing them.—Bert Schumann, Denver, Colo.

Pipe Lever on Hammer Head Saves the Handle



To avoid breaking or splitting a hammer handle, when pulling nails, slip a length of pipe over the head, so it can be used as a lever. After a

wedge is placed under the lever, both hands are used, one on the lever and the other on the handle, to pull the nail. This method is especially useful in the case of rusty spikes which require considerable force to remove them.

Electric Lamp Filled with Chemical Makes Fire Extinguisher

Fire extinguishers can be made by filling burned-out electric lamps with carbon tetrachloride. To do this, immerse the lamp in hot water to soften the wax that holds the metal cap in place, and remove it to expose the tip of the lamp. After the cap has been removed, submerge the tip in the carbon tetrachloride and break it off with a pair of pliers. The vacuum in the lamp will partly fill it with the chemical, after which a drop of hot sealing wax will close the tip. The lamp should be wrapped in a cloth to prevent possible breakage of glass from injuring the hands. Several lamps treated in this way and kept in conveniently located racks, can be thrown into a fire, and when broken, the carbon tetrachloride fumes will smother it. Another method is to mix sodium carbonate, 5 lb., with fine sand or dry earth, $\frac{1}{2}$ bu., and keep it handy for fire emergencies. When thrown on a fire this mixture will smother flames quicker than sand alone.

Breaking In New Shoes with Aid of Golf Ball

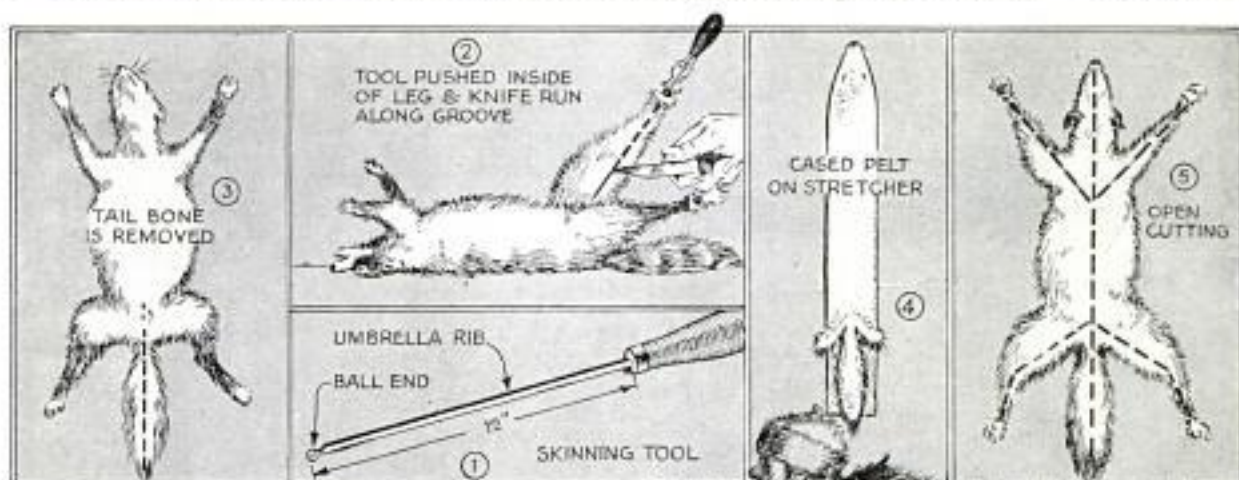
When the top of a new shoe presses on the foot, it can be easily stretched by forcing a golf ball, or any similar ball,



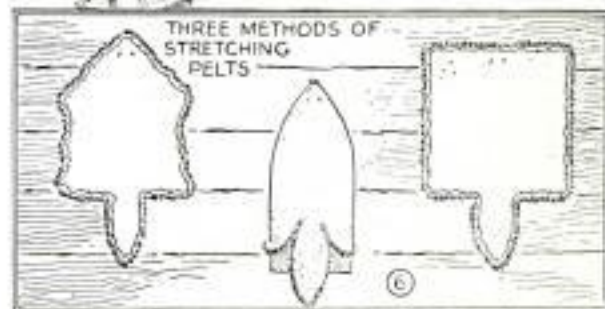
down into the shoe. If this is done at night, the shoe will usually be found to fit more comfortably the next morning.—G. C. Douglas, Charlotte, N. C.

Ⓞ Clogged fuel lines on cars can be cleaned by holding the nozzle of a tire pump against the open end of the pipe and pumping vigorously.

Correct Method of Skinning Small Game



With this tool, made from an umbrella rib as in Fig. 1, an amateur can remove pelts as expertly as the "old timer." A cut is made just below the paws on the hind legs as in Fig. 2. Loosen the skin slightly, insert the tool where the cut is to be made, as shown by the dotted line. Insert the knife point in the slot, and cut. Then work the hide loose from the flesh, around the tail bone, and remove the latter. This is essential for mink, raccoon, skunk, weasel, fox, wolf, etc., but not for muskrat or opossum. Then insert the tool at the root of the tail and cut as in Fig. 3. Work around the bone and put a small round stick between the bone and the skin. By pushing the stick, the hide can be pulled loose. Next pull the fur down over the belly to the front legs. Reach under the bones and peel them to the paws and cut completely around these. Then work the pelt down to the ears. Use your knife again and sever both as close to the skull as possible. Another pull and the skin is to the eyes. Cut the membranes, after which the fur can be pulled off. When this has been done it is slipped on a stretcher as in Fig. 4. With the exception of the raccoon, fur of small animals should be removed this way. Bear, beaver and raccoon skins are the only ones that should be handled open. Put the pelts, flesh side out, on stretchers, being sure that the belly is on one side and the back on the other, and hang in a cool, dry place to cure. Do not put any tanner, salt, etc., on the skins for this lessens their value. Suspend each fur with the tail down. The



open method of skinning differs from the cased method, in that a slit is made down the belly to the tip of the jaw as in Fig. 5. The fur is then peeled off and stretched, flesh side out, upon some smooth, flat surface as in Fig. 6.—Geo. J. Thiessen, Fremont, Ohio.

☛ Before writing on a glossy-finish photograph with ink, sprinkle talcum powder on the picture and shake it off. The ink will then adhere and will not have the tendency to draw up in spots.



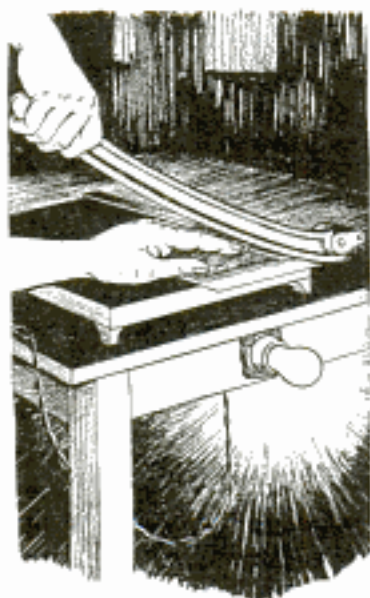
Tongue-and-Groove Boards Pressed into Place to Make Tight Porch Floor

A Helpful Hint in Applying Tongue-and-Groove Stock

When flooring a porch, nail the first board in place, then measure off the width of five more boards and nail the sixth board in about $\frac{1}{2}$ in. Then fit the boards together as shown in the drawing and press them down into place, which assures a tight floor. Tongue-and-groove siding may be put on in the same way—Joseph Minarovich, Berwyn, Ill.

Trimming Borders of Photos

When trimming the borders of photos, an electric lamp, mounted on the side of a table under the trimmer, will illuminate the portion of the paper that projects over



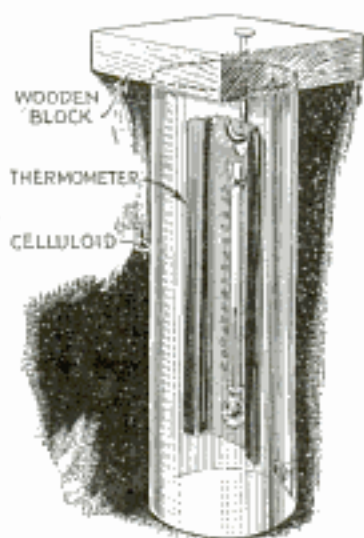
the edge of the cutter, making it easier to get the edges parallel with those of the picture. An ordinary porcelain socket is screwed to the apron of the table to hold the lamp.—Leonard Mitchell, San Francisco, California.

Making Etchings on Celluloid

Here is a simple method of etching on celluloid. The material is placed in a wooden frame resembling an ordinary picture frame. The subject, from which the etching is to be made, is next put in the frame and then backed with a wooden block, which holds the picture tightly in place. The outline of the picture is scratched in the celluloid with a sharp blade or scribe, after which it is removed and fastened to a piece of sheet aluminum to facilitate handling during the printing process. Melted soap makes a good adhesive for this purpose. When printing, celluloid is inked and wiped clean, leaving ink only in the etched portions. The paper on which the prints are to be made is first soaked in water and then laid over the celluloid. An old hand wringer serves as a good press for this purpose. Power presses or wringers should not be used, as they feed too rapidly.

Keeping Outdoor Thermometer Free from Ice and Snow

Outdoor thermometers that are likely to become covered with sleet and snow, which tend to make them inaccurate, can be protected with a celluloid shield. Roll it to form a cylinder and tack it to the wall. Then suspend the thermometer inside from a small block through which a nail has been driven and bent to form a hook.



Then suspend the thermometer inside from a small block through which a nail has been driven and bent to form a hook.

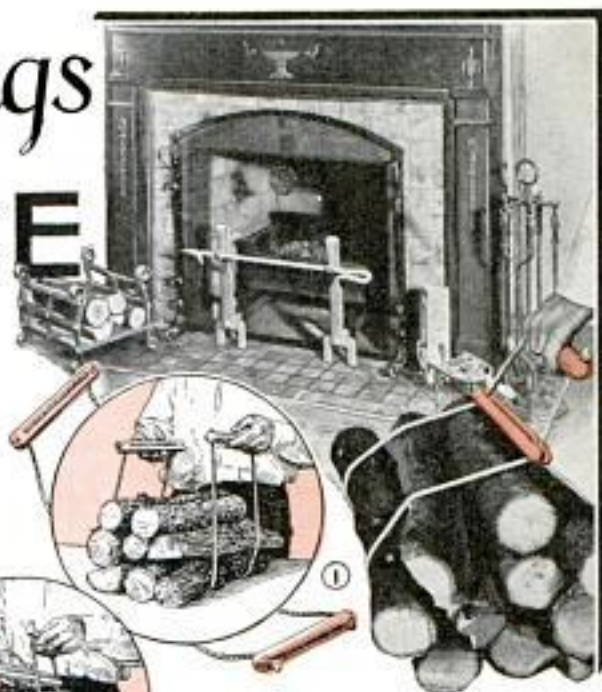
Hot Water Removes Tar from Fenders

Accumulations of tar under auto fenders can easily be removed with hot water. Pour it slowly on the top of the fender, and as the heat softens the encrusted accumulation, it can be scraped off with a putty knife.

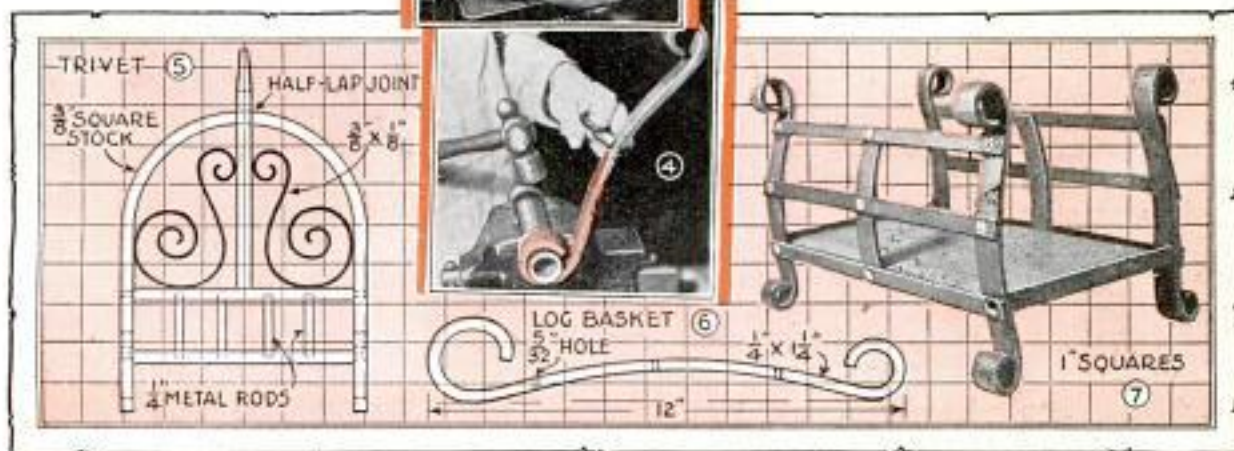
Practical Fittings for the FIREPLACE

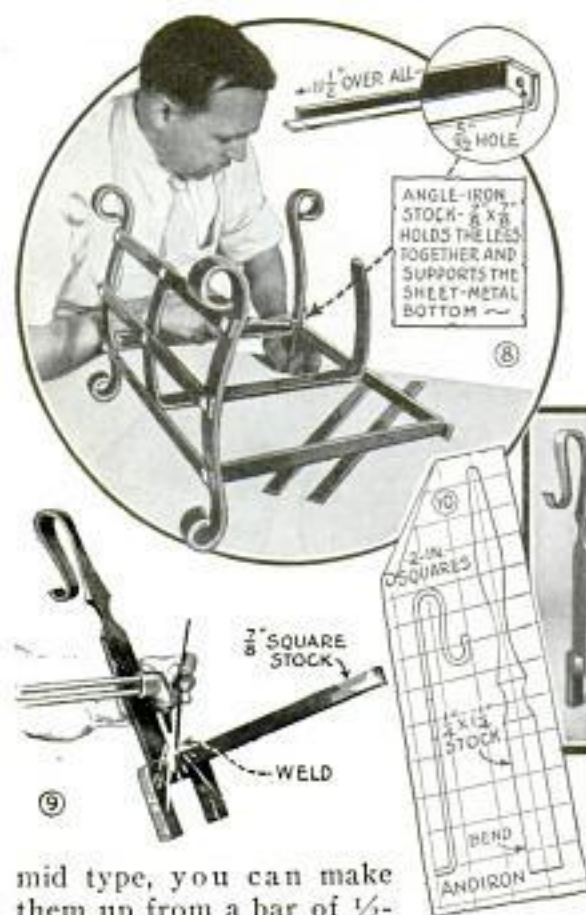
IF you have to go outside to bring in the fireplace wood, you will appreciate the simple log carrier shown in the photograph and in Fig. 1. How it is used is quite apparent from the sketches. If you like to keep a pot of tea or coffee warm beside the open hearth, the handy trivet shown in Fig. 2 is made from $\frac{3}{8}$ -in. square brass or iron stock. Notice, in Fig. 3, that the major portion of the joints are pinned together, the ends of the pins being riveted flush, although welding is simpler if you have the facilities. Quick work can be made of the one-lap joint by using four or five blades in the hacksaw frame instead of one. The inner scrolls are from $\frac{1}{8}$ -in. flat stock and can be fastened by welding or riveting. Vary the dimensions as given in Fig. 5 for the turned-down points in front, if you contemplate using these to hook the trivet over the edge of a fire basket.

An attractive holder for logs is shown in Fig. 7. In fashioning this, you



will first make the four legs from $\frac{1}{4}$ by $1\frac{1}{4}$ -in. flat iron, enlarging the pattern shown in Fig. 6 to get the proper shape. Use a $\frac{9}{32}$ -in. drill where indicated to accommodate $\frac{1}{8}$ -in. rivets or machine screws. In the assembly, a strip of angle iron is fitted at each end, as shown in Fig. 8, with one edge turned over at right angles to take the machine screw or rivet fastening. The side strips are of $\frac{3}{4}$ by $\frac{7}{16}$ -in. stock, about 18 in. long; the center support is of the same stock as the legs. Fit a bottom of sheet metal or light wood to complete the assembly. Plain round-head rivets are the easiest to fit on this job, but if you like the more attractive pyra-





mid type, you can make them up from a bar of $\frac{1}{2}$ -in. square stock. The stock should first be tapped for the $\frac{1}{8}$ -in. machine screws; then the pyramid can be formed and the required section of metal cut off. In fitting, the screw is drawn up tightly, cut off flush with the pyramid head and then tapped lightly with a hammer to bring it to a neat peak.

The making of andirons, Figs. 9, 10 and 11, demands somewhat heavier equipment since these are invariably true forging jobs from heavy stock. The simple pattern shown can be easily made up if you have the proper facilities; otherwise it is best left alone. For the U-legs and the log extension, $\frac{3}{8}$ -in. square stock is used, the free end of the last-named piece being welded to the front upright, as shown in Fig. 9. This set looks especially attractive if done in Swedish iron, hammered, burned and then briskly polished with steel wool to a high luster. The pyramid head at the base of the upright can be burned into place quite readily while the iron is hot.

Price, as applied to the colorful giant matches, is largely a matter of a fancy box,

You can easily make your own container, Figs. 12 and 13, buy the matches in bulk, and be far ahead, both as regards the attractiveness of the match box and the cost of your fire sticks. The box itself is readily made from composition board, holding the sections together with cloth tape and covering with colorful wallpaper, cloth or paint. Silhouettes and cut-out pictures lend additional snap. The legs may be simply round wooden pegs, brightly lacquered, or the more ornate metal scrolls held in place with small screws, as shown in Fig. 12. Naturally, the same general construction can be applied to square or rectangular boxes and in smaller sizes to accommodate the average match-stick length.

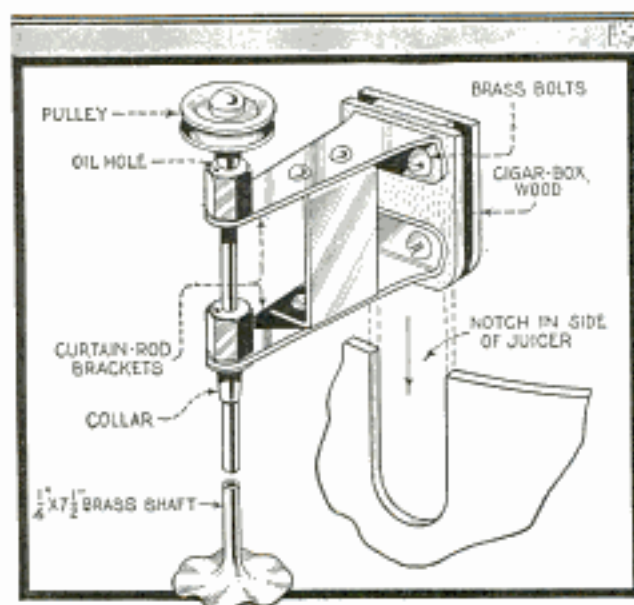


How to Locate Leak in Hidden Pipe

Here is a good method for locating leaks in air, steam or water pipes that are concealed. Fill the pipe with water until it overflows. Then close all of the valves and allow it to stand long enough for the water to leak out down to the break, after which the pipe is again filled with water as rapidly as possible. It is important that the exact capacity of the container used for this purpose be known, in order to determine the number of gallons of water used to fill the pipe flush with the top. Square the inside diameter of the pipe in inches and multiply by .7854, dividing this result into the number of cubic inches of water poured into the pipe, which is found by multiplying the

number of gallons by 231, the number of cubic inches in a gallon. The quotient is the distance to the leak in inches.—W. F. Schaphorst, Newark, N. J.

Attachment Converts Fruit Juicer into Mixer



This Homemade Attachment for Your Electric Fruit Juicer Will Save Time When Mixing Beverages or Beating Light Batters

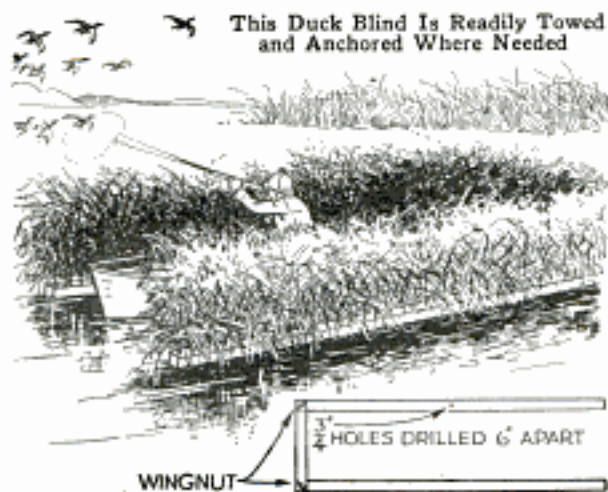


If you have one of the well-known types of fruit juicers, it is an easy matter to convert it into a mixer. A clamp made from cigar-box wood holds the mixer in place, the center piece being cut to fit in the slot in the side of the juicer. The supporting arms are two curtain-rod brackets, braced in the center and bolted to the clamp. Babbitted nuts, soldered to the

ends of the brackets, provide bearings for the mixer shaft, which may be either brass rod or tubing. Two pulleys are used, one on the end of the mixer shaft and the other slotted to fit over the pin in the end of the juicer shaft. A small collar, soldered to the shaft under the lower bearing, takes care of the end thrust in the mixer. The pulleys are connected with a round belt.

A Portable Duck Blind

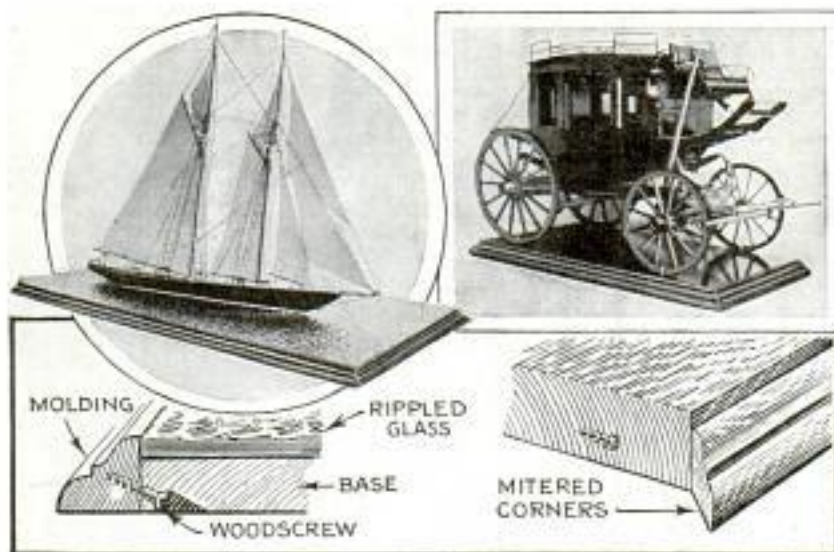
Here is a portable duck blind that can be towed out and anchored in the center of a body of water. It consists of two 15-ft. lengths of 2 by 4-in. stock and one end-



piece long enough to make a frame to straddle your boat. The frame is drilled at 6-in. intervals for the insertion of willow branches, or weeds and reeds to imitate the surrounding vegetation. The boat can be pushed out at the open end of the frame to retrieve the ducks.—James Marek, Oconto, Wis.

Barrel Hoops Are Useful in Transport of Christmas Trees

When moving young fir or spruce trees for the purpose of using them for Christmas trees, the branches should not be tied as this often damages them. If barrel hoops are slipped from the bottom up over the branches they will be held firmly and consequently there will be less danger of breaking them off.—Joseph Minarovich, Berwyn, Ill.



Attractive Built-Up Bases for Model Work Are Neatly Finished with Molding Carefully Mitered at the Corners

Inexpensive Bases for Your Models

Modelmakers will find the following method handy for making attractive bases for their models. First, a suitable piece of wood is squared and then molding is screwed to the edges, carefully mitering and gluing the corners. The screws are driven into the molding at an angle from the bottom of the work, as shown in the lower left-hand detail. After the base has been sanded and finished, it has the appearance of one that was carved from one solid piece. The drawing also shows how a piece of rippled glass can be used to resemble water, part of it being cut out to enable the ship to be attached.

Sheet-Metal Guard on Ax Handle

To prevent excessive wear on the handle near the eye of the ax, bend a piece of sheet metal over it as shown, and fasten it with wood screws. The holes for the screws should be staggered on each side to prevent splitting of the handle.



☐ Clogged files can be cleaned by scrubbing them with washing soda, and rinsing in a solution of nitric acid, 1 part, and water, 6 parts.

Non-Focusing Movie Lens for Portraits

Non-focusing type lenses on movie cameras may be used for taking portraits or titling by inserting a spacer washer between the lens and the camera. A plain washer should be used on the type of lens which screws in, while the type held by two screws requires a washer on each screw between the camera and the lens mounting. The thickness of the spacers on a 1-in. focus lens should be as follows: At 5 ft., .017 in.; at 3 ft., .028 in., and at 18 in., .056 in. Thicknesses of spacers for other distances may be calculated by dividing the focus of the lens in inches by the distance to the object in inches. This method can be used on focusing models for distances closer than those marked on the scale by setting the lens at 100 ft. and proceeding as before.

Rubber Band Helps to Hold Crock Cover Snugly

The usual method of tying a cord around a cloth cover on a crock, is unhandy if the cover is to be removed frequently. A rubber band tied to the ends of the cord eliminates the necessity of tying and untying it, and also makes the cover fit more snugly.



Refrigerator Keeps Cereals Crisp

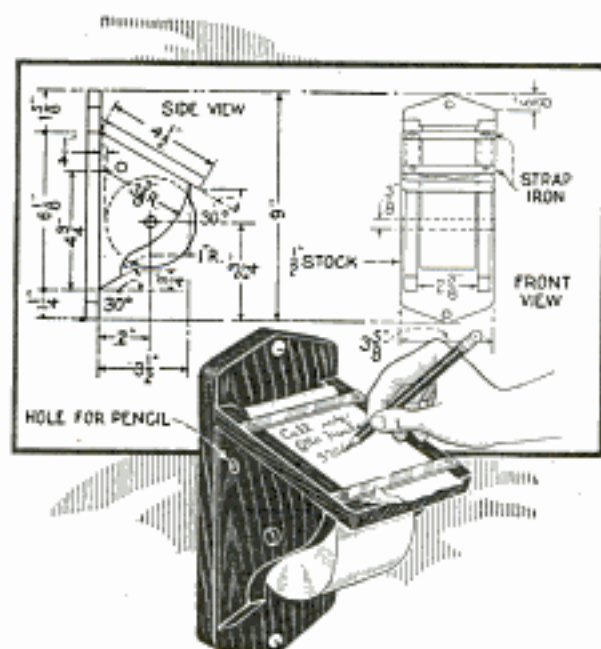
Placed between the wall and the condensing coils on top of a refrigerator, packages of cereals and crackers can be kept crisp indefinitely. The temperature of 120° to 175° radiated by these coils keeps the contents dry and prevents moisture from being absorbed.—C. C. Douglas, Charlotte, N. C.

Steel for Springs and Tools

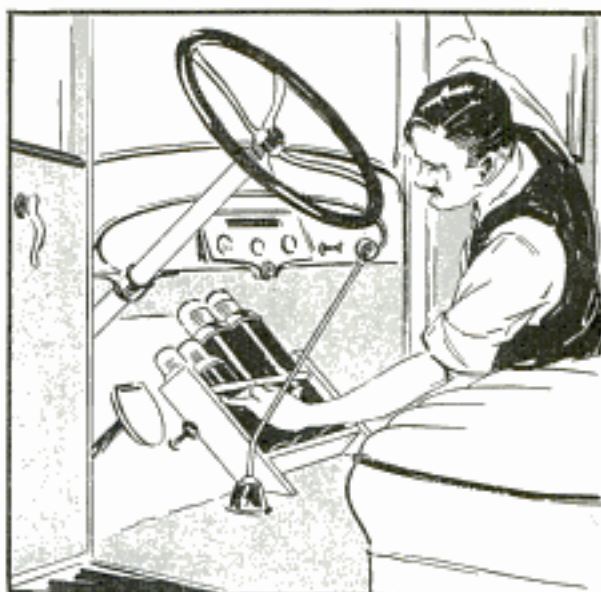
Old hacksaw blades, clock and watch springs and safety-razor blades offer material for making various flat springs. The material is first annealed and then bent to the desired shape, after which it is again tempered. This may be done by heating the spring to a bright cherry-red and then plunging it into a vessel of cold water, in which it is moved about vigorously. In order to make the spring tough, the temper is drawn, which is done by covering the piece with lubricating oil, and then igniting it. The character of the resulting spring will depend upon how long it takes the oil to burn off. If a spring turns out to be too soft or too hard, it can be annealed again and the tempering process repeated. Fine tempered tools may be made from old files. Unless the pieces are small, however, they should be made up with an anvil and forge.

Bracket Holding Memorandum Paper Is Screwed to Wall

Here's a simple holder for keeping a roll of memorandum paper in a convenient position on the wall. It is made of $\frac{1}{2}$ -in. wood and the top is fitted with two pieces of strap iron under which the paper is placed, while holes are drilled through the supporting brackets to take a pencil and a pin that is slipped through the roll.



Holder, Screwed to Wall, Accommodates Roll of Paper Which Serves for Jotting Down Memoranda



Portable Rack Provides Safe Method of Transporting Vacuum Bottles in Car

Rack Prevents Breakage of Vacuum Bottles in Car

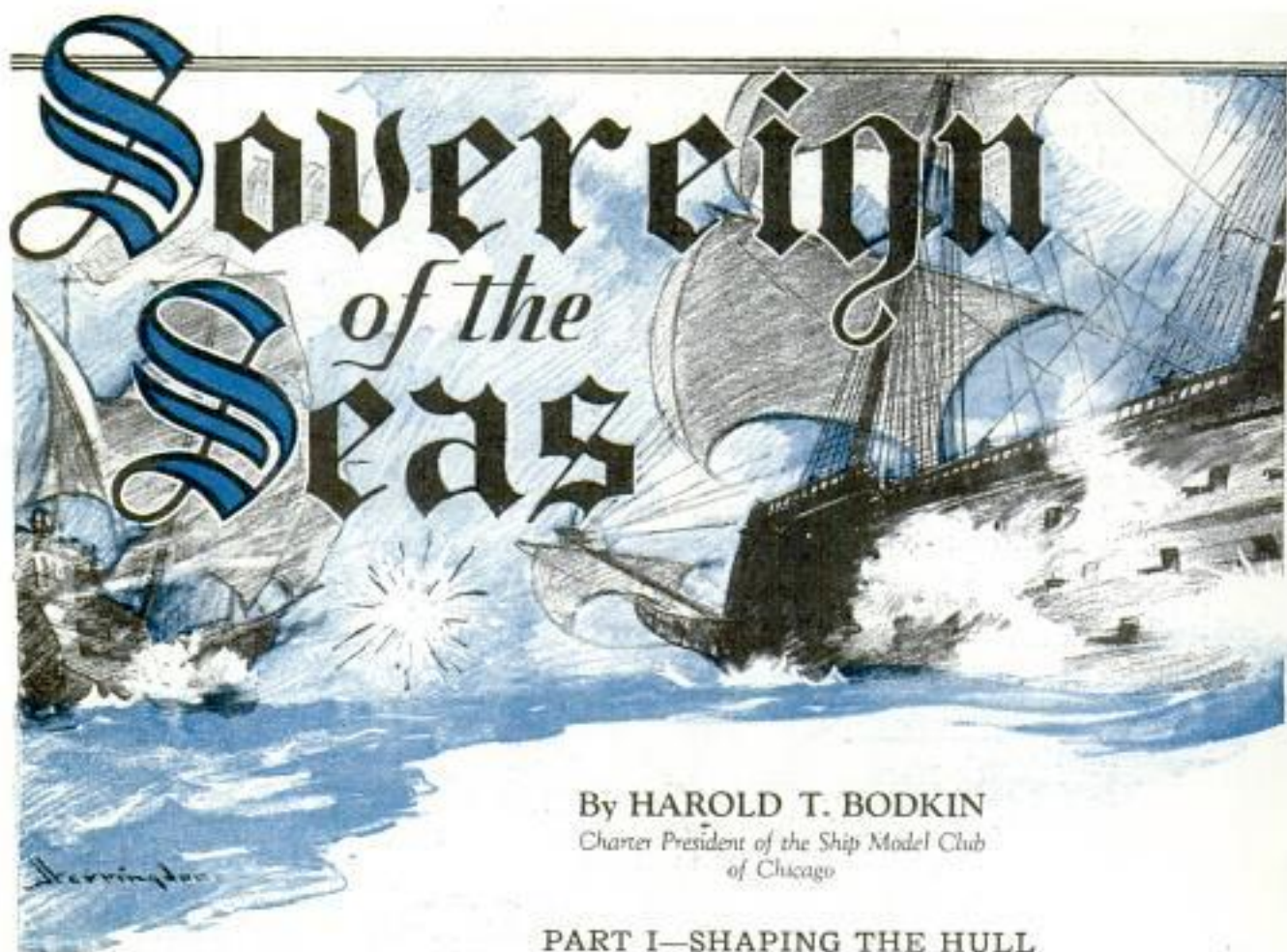
In order to provide a convenient method for carrying vacuum bottles in my car without danger of breaking them, I built a portable rack and placed it in the car as shown. The ends and sides are made from 1 by 4-in. wood, while the back is of $\frac{1}{2}$ -in. material. A strip of inner tube, stretched across the open front, holds the bottles, and allows their removal. A small cleat is nailed to the floorboards of the car at the bottom of the rack, to keep it from slipping. When not in use, the rack may be lifted out.—Adolph Ruhland, Philadelphia.

Firing Order of Motor Determined with Corks

The firing order of an auto engine can be determined by removing the spark plugs and inserting corks in the holes and then cranking the engine slowly. The corks will pop out as each piston comes up on the compression stroke, at the end of which the cylinder fires.

Wood V-Blocks Hold Polished Pipe in Vise

Wood V-blocks, faced with leather, will be found handy for clamping polished pipe and other round objects in a vise without marring them. The leather will last a long time and is easily cleaned with a moderate application of gasoline.



By HAROLD T. BODKIN

*Charter President of the Ship Model Club
of Chicago*

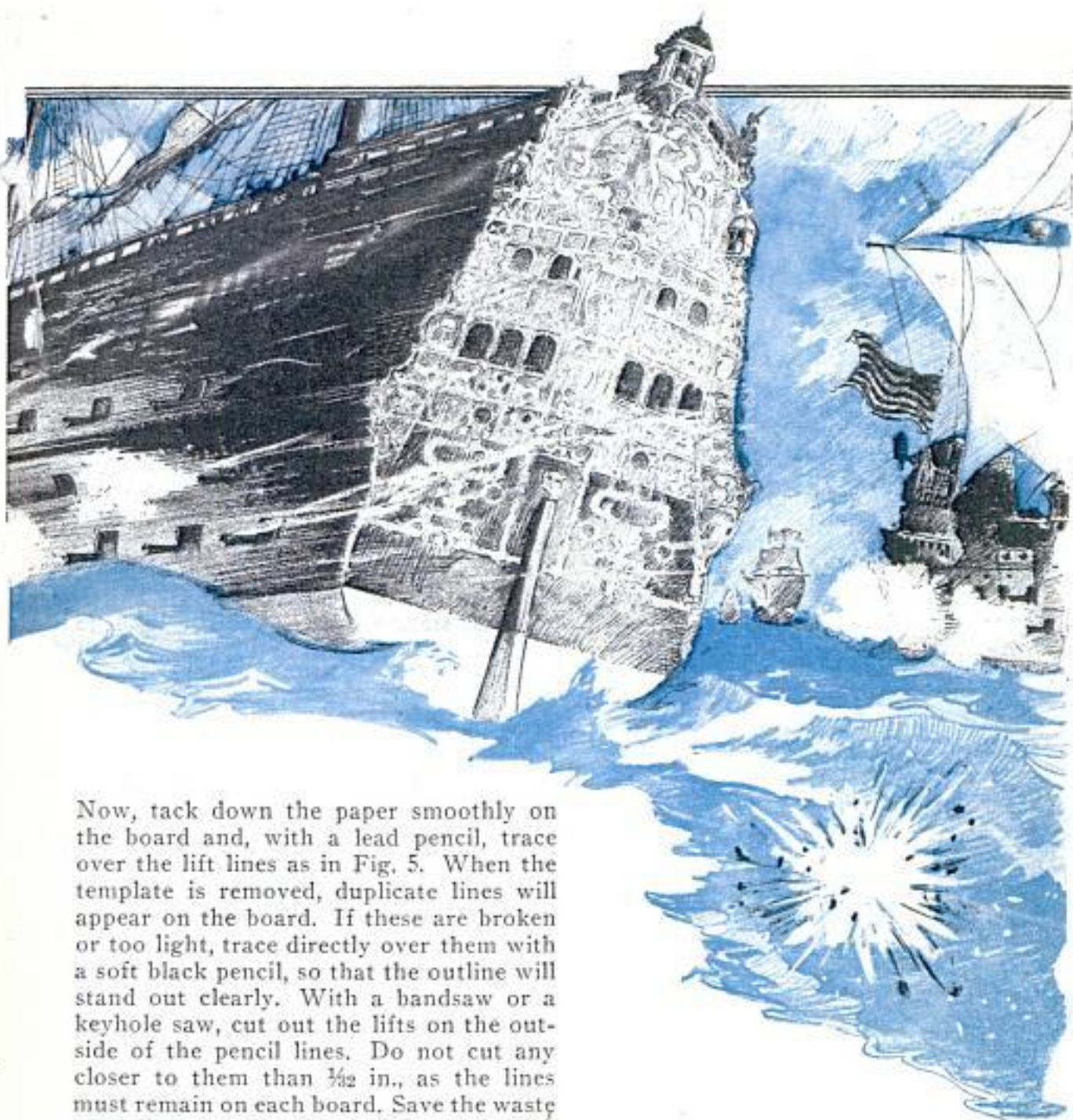
PART I—SHAPING THE HULL

WITH just a few common tools, materials that cost little, and average patience, you can construct this accurate reproduction of the famous old "Sovereign of the Seas," the most beautiful warship that the world has ever known.

For the hull you will first need six boards, or lifts, of clear white pine, each 36 by 6 by $\frac{3}{4}$ in. in size. Boards that are not exactly $\frac{3}{4}$ in. thick are unsuitable. Make sure also, that the boards are thoroughly dry and free from gum and knots, which later might cause warping and splitting. Smooth each of the board sides with No. 00 sandpaper and then bevel off one end of each at a 57° angle to the horizontal surface, as in Figs. 1 and 2. The next step is to make patterns for cutting the lifts to shape. Figs. 6 and 7 give the lift lines. In making up the lift plan, rule off the paper in $1\frac{1}{4}$ -in. squares and draw in the lift lines carefully; or, better still, get a set of blueprints that carry the lift lines in full size, enabling you to trace them as in Fig. 1. Cut six strips of tracing paper

or tough tissue paper, each 30 in. long and 6 in. wide. Fold the strips down their lengths so that, when thus doubled, each becomes 3 in. wide. One at a time, line up the fold of each sheet with the center line on the plan of lifts, but unfold the paper so that only one-half of it covers the lift lines. Beginning with lift line No. 1, trace each one on the paper, one line to a sheet. This done, fold each paper again as in Fig. 4, and trace a duplicate line on the second half, to get a complete symmetrical pattern. The result provides you with six full-width drawings of the lifts. On the underside of each sheet, cover the lines with soft-crayon shading to enable easy transfer of these lines to the lifts, which method is preferable to the use of carbon paper.

Then, one at a time, line up the aft end of each template squarely with the beveled ends of the respective lifts. The shaded side of the paper should make contact with the longest side of the board's surface, the bevel being on the underside.



Now, tack down the paper smoothly on the board and, with a lead pencil, trace over the lift lines as in Fig. 5. When the template is removed, duplicate lines will appear on the board. If these are broken or too light, trace directly over them with a soft black pencil, so that the outline will stand out clearly. With a bandsaw or a keyhole saw, cut out the lifts on the outside of the pencil lines. Do not cut any closer to them than $\frac{1}{2}$ in., as the lines must remain on each board. Save the waste stock from the boards; it can be used for the upper works. Next, draw a pencil center line down the long top side of each lift, and an adjoining center line on each beveled end. On each center line, locate the point at which station line No. 11 will cross.

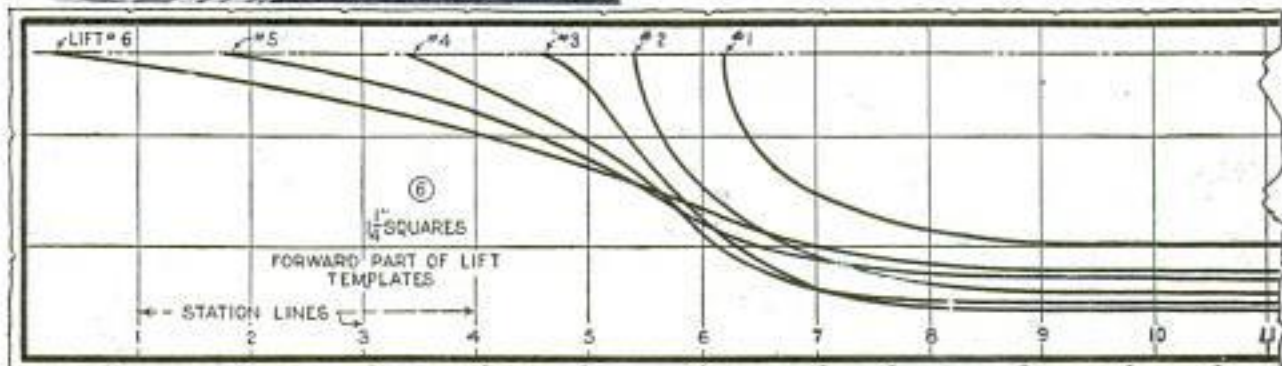
Draw this station line across the tops of all the lifts, continuing it down the edges of each board. This is the midship point of the hull, the marks enabling you to properly line up the lifts when gluing. Now, take lifts Nos. 3, 4 and 5; on the center line of each, measure $4\frac{1}{2}$ in. forward and 8 in. aft of station line No. 11. On the latter line, measure $1\frac{1}{4}$ in. out

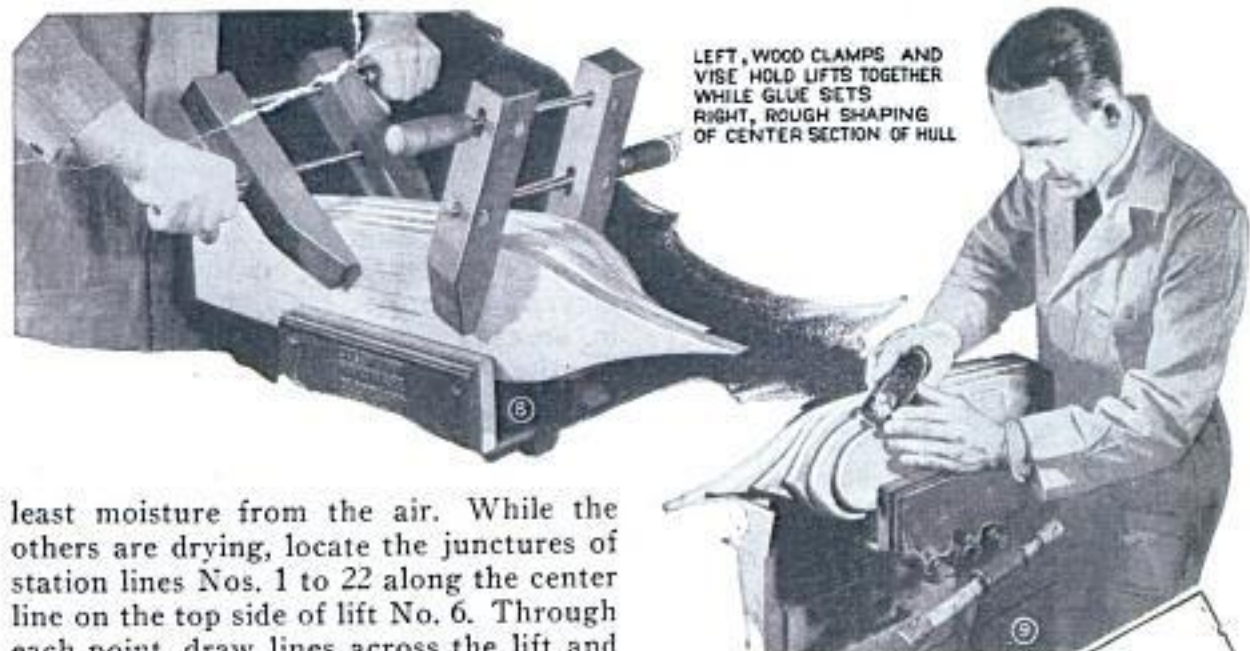
from the center line toward each side. Connect these points to form a penciled rectangle as shown in Fig. 10, and saw this part out in order to lighten the hull block.

Gluing the lifts together is next. You will need waterproof casein glue for this job, to assure strength and permanency. It is obtainable in package form as a dry powder, being sold at nearly all hardware stores. Full directions for mixing this glue are printed on each package. Follow these instructions carefully so that the mixture will have a smooth, creamy consistency, after which it is ready to apply.



Cover the entire top surface of lift No. 3, and the bottom of lift No. 4, with a thin, smooth coating of the glue, applying it with a brush, as in Fig. 12. Line up the square aft ends so that the bevels become one, and press lift No. 4 down on top of lift No. 3, glued sides together. Make sure that you align the fore and aft center lines, and that station line No. 11 on each edge of both pieces also lines up. With wooden clamps, or in a vise as shown in Fig. 8, squeeze out the excess glue between the lifts and let them stand clamped together for about 10 minutes, so that the glue will partly set. After this, remove the clamps and glue lift No. 5 on top of lift No. 4, aligning the lengthwise center line and station line No. 11. The beveled end projects beyond the aft end of lift No. 4, to provide for the curve cut in the stern later. If done as directed, the cut-out rectangles through each piece will also be lined up. Very carefully, so that none of the lifts will slide out of position, clamp the three together as tightly as you can and set aside to dry for at least 24 hours before removing the clamps. Follow the same method and glue lift No. 1, the lowest in the hull, to the underside of lift No. 2. After clamping, put the lifts in a warm, dry room, where the wood will absorb the





LEFT, WOOD CLAMPS AND VISE HOLD LIFTS TOGETHER WHILE GLUE SETS
RIGHT, ROUGH SHAPING OF CENTER SECTION OF HULL

least moisture from the air. While the others are drying, locate the junctures of station lines Nos. 1 to 22 along the center line on the top side of lift No. 6. Through each point, draw lines across the lift and down each side. After the two sets of lifts have dried, mix fresh casein glue and glue the top of lift No. 2 to the bottom of lift No. 3. Aline these as you did the separate lifts, clamp until the glue partly sets, and then glue the bottom of lift No. 6 down upon lift No. 5. This completes the rough hull block, which you should let dry 24 hours or longer. The beveled aft end of lift No. 5 should be sawed and filed in a smooth curve that joins the bevels of lifts Nos. 4 and 6.

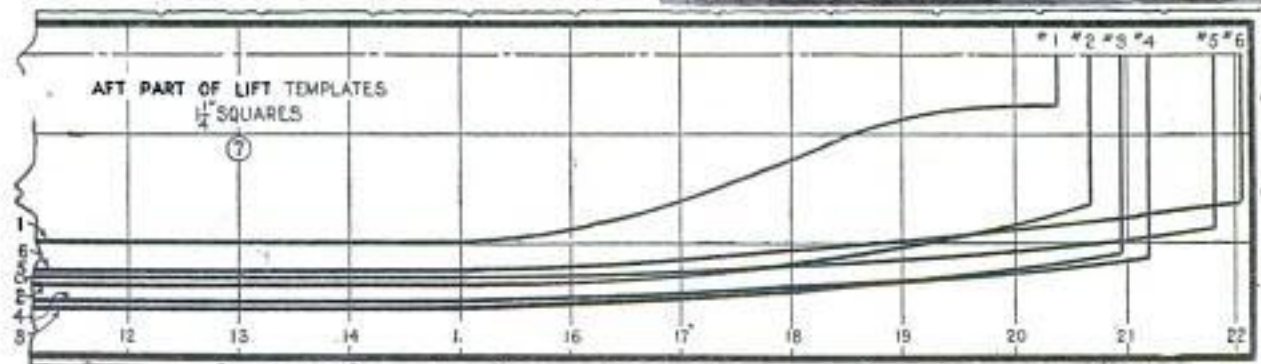
Now we will make the body templates as in Figs. 13 and 14. Cut 17 squares of $\frac{1}{4}$ -in. plywood, $4\frac{1}{2}$ in. long and $3\frac{1}{2}$ in. wide. The files, numbered 1 to 22, represent the finished cross sections of the hull at each of the station lines of corresponding numbers. One by one, line up a long edge of each wooden square with the center line and, with a carbon paper between the drawing and wood, trace a single curved station line on each piece. Saw reasonably close to the line on the left-hand side of templates 1 to 12, and to the

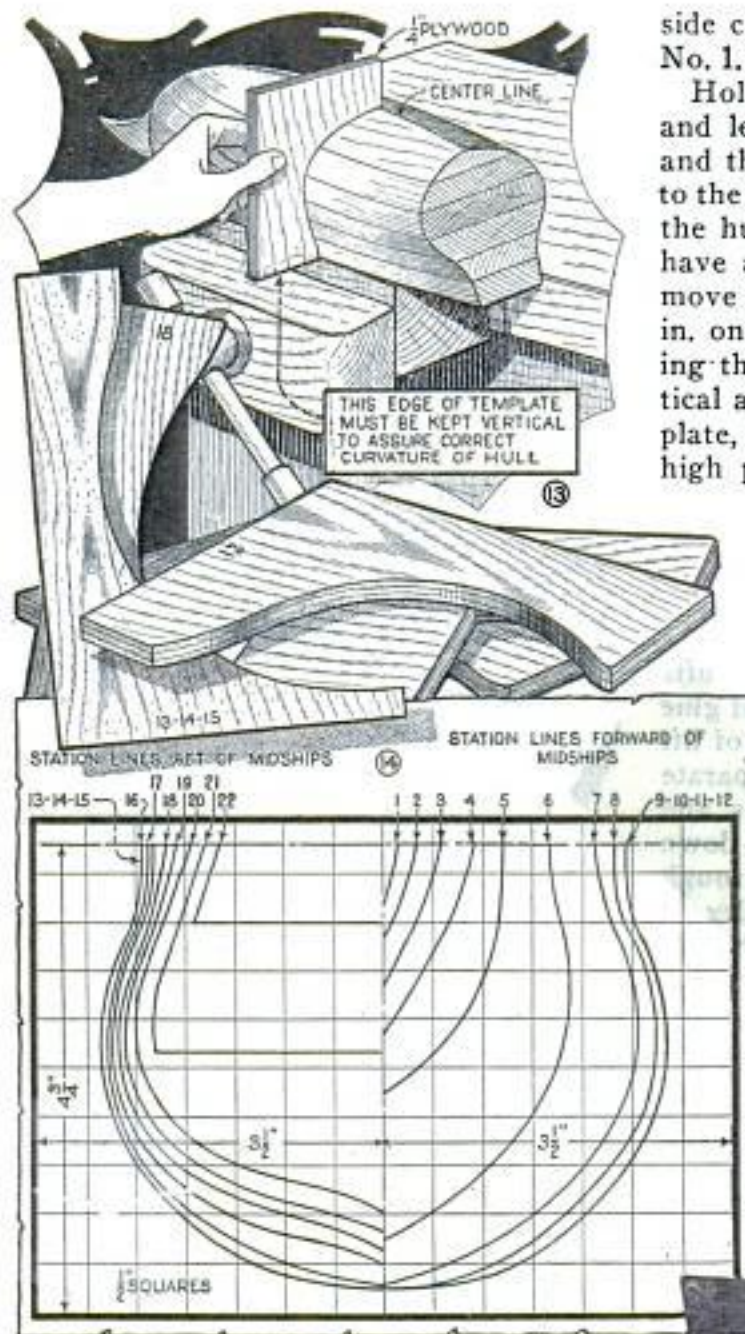


STATION LINE NO. 11

RECTANGULAR CUT-OUT IN LIFTS
S. 4 & 5 TO LIGHTEN HULL

WATERPROOF GLUE USED ON LIFTS





right-hand side of the lines on templates 13 to 22. Carefully finish down to the lines with coarse and fine sandpaper. You will now note that only one template is required for station lines 9, 10, 11 and 12, and one for station lines 13, 14 and 15. After these templates have been cut, you may begin carving. You will need a sharp spokeshave, a small block plane and possibly a 1-in. carpenters' chisel; also, a soft red or black wax crayon. A block is screwed to the top of lift No. 6 to hold the hull in a vise, enabling you to do the carving with ease. Draw a pencil center line over the bottom side of the hull and then rub a thick coating of the crayon on the in-

side curved edge of station-line template No. 1.

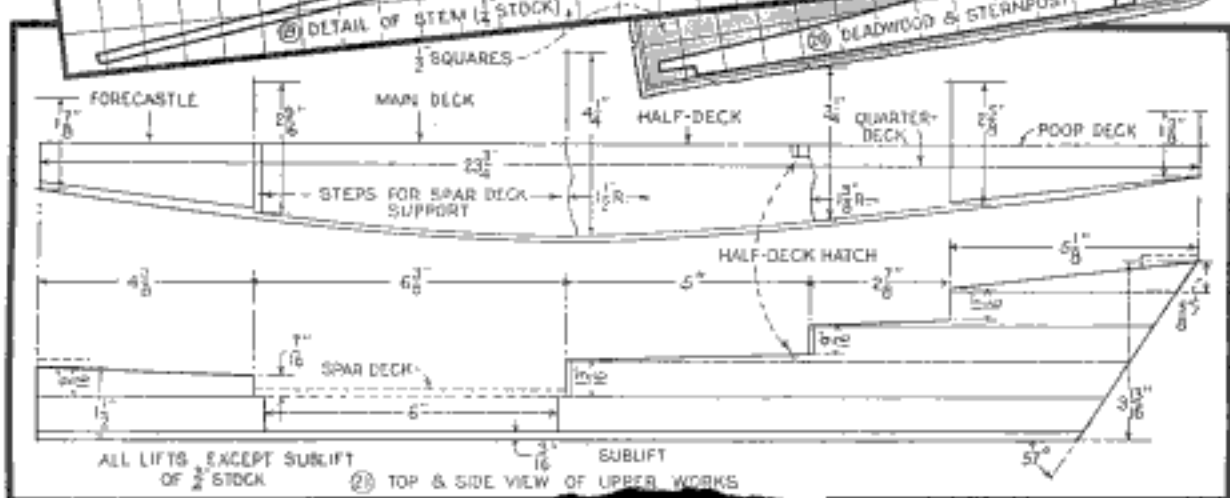
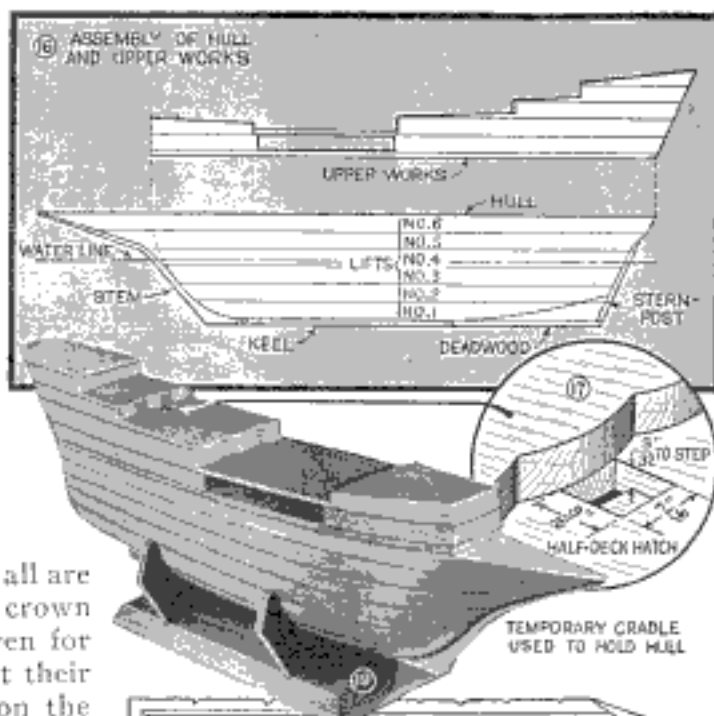
Holding the top edge of the latter flush and level with the top of the lift No. 6, and the long edge exactly at right angles to the same surface, press the piece against the hull at station line No. 1, which you have already marked on the lift. Now, move the template each way for about $\frac{1}{2}$ in. on each side of the station line, keeping the square edge of the template vertical at all times. When you lift the template, a crayon smear will show at each high point on the hull block. With the spokeshave, remove the crayon smears only. Then again press the templates against the hull, moving it fore and aft as before to produce more crayon smears and shave these off. Repeat these alternative steps until this section of the hull is near its finished shape. The inside point of the template curve should almost touch the bottom center line of the hull. The same method is followed in carving all the hull sections, which should be done in consecutive order, bow to stern. When working on the broad midship sections, you can use the block plane, as in Fig. 9, or a chisel to help cut away the stock. Be sure to take it easy. Don't make unsightly gouges that you will have to fill in later. After roughing down one side with the tools,



turn the hull and rough down the opposite side in the same way. Finish all sections to the exact template curves with Nos. 1, 0 and 00 sandpaper.

The upper works are next. Using the paper pattern of lift No. 6, cut a sublift from $\frac{3}{16}$ -in. thick board or plywood. Cut off the point square across, about 5 in. aft of the bow end. Two $\frac{3}{4}$ -in. lifts are needed for the forecastle and five more of the same thickness for the after decks. Waste stock from the hull lifts may be used. Follow the dimensions for the upper works as given in Fig. 21, cutting each lift to shape before all are glued together. For better effect, crown each deck, from the dimensions given for the edges, to about $\frac{3}{16}$ in. higher at their centers. The crown is not given on the drawing. Across the decks, from the center to the sides, step off points about $\frac{3}{4}$ in. apart. Then, mark pencil lines through the points, straight fore and aft. Lay a flexible straightedge along each deck line and, with an old hacksaw blade or putty knife, score V-shaped cuts along the full length of each deck line, as in Fig. 18. Cut the half-deck hatch steps as shown in Fig. 17. The spar deck is made of $\frac{3}{16}$ -in. wood, fitted and lined. It should also be crowned. Do not glue this deck in place now; only make it to fit in place as in Fig. 19. Then, glue the completed upper works down on top of the hull. When dry, go over the

(Continued to page 140A)





Spring-Wire Attachment on Vacuum Cleaner Loosens Dirt Accumulations in Cracks of Old Floors

Wire on Vacuum Cleaner Removes Dirt from Floor Cracks

Cracks in an old floor can be scraped clean with a length of 12-gauge spring wire, attached to a vacuum-cleaner handle by means of two metal guides, and extending through another guide on the suction nozzle. The end of the wire is split, as indicated in the detail, so that it will clean the dirt from the cracks when either pushing or pulling the cleaner. Coil springs hold the wire above the floor when not pressed down by the operator.

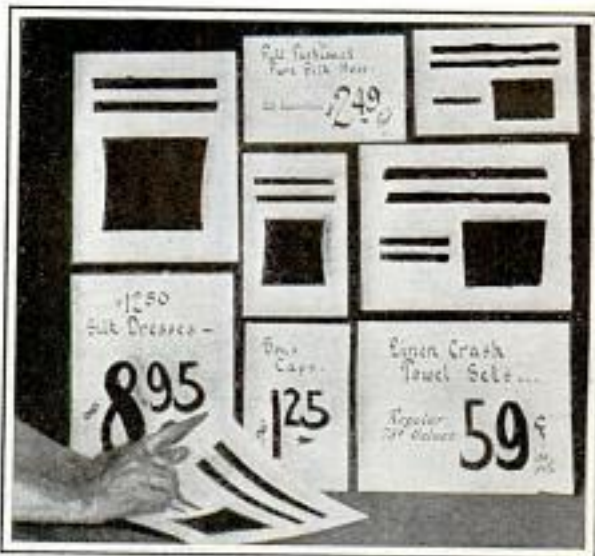
Causes and Remedies for Sparking of Electric Motors

When a brush in an electric motor is away from its dead-center position a snappy blue-white spark and a variation of the speed are noticeable. The remedy for this is to shift the position of the brush holder to the right or left until the sparking is eliminated. If the brushes have been replaced with a grade other than that originally provided by the manufacturer, it may cause serious sparking and may result in short-circuiting the coils. When only one brush gives off vicious blue-white sparks, there are two causes, the most common being an overload, and the other, in case the machine has just been repaired, is a reversed interpole winding.

Under such conditions, shut the motor down immediately and have a competent repair man check it up. Sparking of reddish color is caused by dirt on the commutator. A film of oil or grease combined with dust from the air and from the brushes is a conductor of such high resistance that the heat produced is sufficient to ignite the particles. In such cases, the commutator will be a dirty muddy color and should be cleaned with a piece of very fine sandpaper held against the commutator while running the motor. Never use emery cloth as the metal contained in it is likely to short the commutator. Uneven spacing of the brushes around the commutator will cause sparking at the brush that is out of line. When brushes of the copper-carbon type have worn down so that the copper top is the only part that is contacting, they should be replaced. Always replace a brush, if the copper connector on it is the least bit loose, as this condition will cause jumpy operation of the motor.

Guide-Line Stencils for Showcards

Where a number of showcards of similar sizes have about the same amount of lettering, a simple stencil will help in obtaining uniformity, eliminating the need of measuring each individual card. A set of stencils for cards used vertically or horizontally makes quite a variation possible, and it is evident that considerable time can be saved in this way.



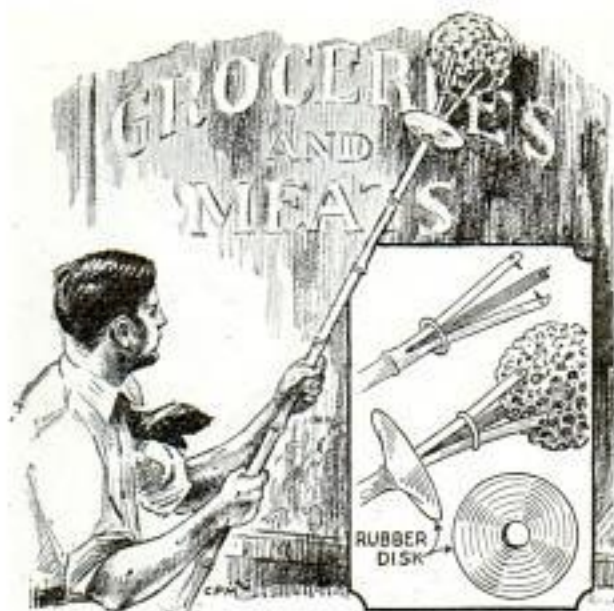
Set of Paper Stencils for Spacing Letters on Showcards Saves Worker's Time

A Few Simple Repairs on Home Plumbing



Test for Flush Tank Leaks by Raising the Float Rod. If Sound Continues, the Intake Valve Needs Repairing. Remove Screws, SS, and Take Out Valve as in Lower Sketch. Replace Washers A and B and Reassemble. If the Raising of Float Rod Causes Valve to Shut Off, Bend the Rod Downward as in Center Sketch. If Water Still Escapes, Examine Flush Ball Which May Have to Be Replaced as Shown in Upper Sketch

Water in Individual Lines Can Be Shut Off by Freezing the Pipe with Chipped Ice and Salt. Main Sewer Opened by Means of Cable Twisted with a Crank.



Bamboo Pole Split at One End Holds Sponge for Washing Windows

Window Washer Improvised from Bamboo Pole and Sponge

A practical window washer can be quickly improvised from a bamboo pole, a wire ring and a sponge. Split the smaller end of the pole into three parts and drive a short brad or screw through the end of each. Slip the ring over the pole and place the sponge between the forks. The diameter of the ring should be a little larger than that of the pole so that when the ring is pushed toward the end of the pole, the sponge will be held securely. To keep water from running down the handle, a rubber disk may be slipped over the pole below the sponge.—G. E. Hendrickson, Argyle, Wis.

Piece of Rubber under Hood Clip Silences Rattle



Sponge rubber placed between an auto hood and the fastener that holds it down, is effective for stopping rattles that come from this source. By applying two coats of rubber cement to

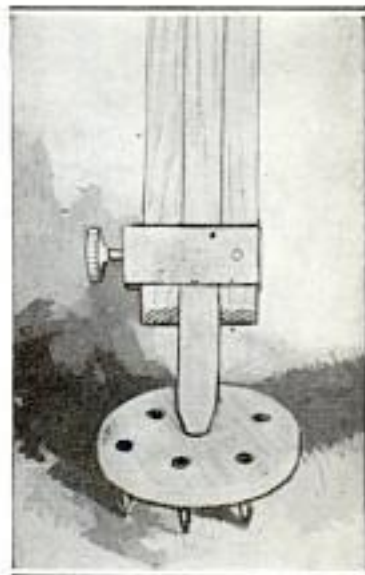
the hood, just under the fastener, and also to the rubber, it can be held permanently in place as shown.

Soldering with a Lead Pencil

For small soldering jobs, you can effectively use an automatic lead pencil. Wire the metallic part of the pencil to the negative pole of a 6-volt storage battery, and connect the positive pole to the work to be soldered. Then, touching the point of the lead to the spot you wish to solder and then drawing it away slowly, will create a tiny arc. Use hard lead in the pencil, which should have a handle of bakelite or other heat-proof material.—Charles A. Younger, Somerville, N. J.

Non-Slip Feet for Camera Tripod

When a camera tripod cannot be securely set on sandy soil, the illustrated anchoring disks will be found handy. They are cut from plywood and several nails are driven in each, while a small hole drilled in the center takes the tripod leg. Pushed into the ground, they prevent the tripod from slipping in any direction. The nails should project 2 or 3 inches.



Paint Makes Putty Adhere

Before putting windows, coat the edge of the glass and the frame with a good grade of outdoor paint and apply the putty while the paint is tacky. It acts as a base to which the putty will adhere more firmly so that it is less likely to crack and come off.

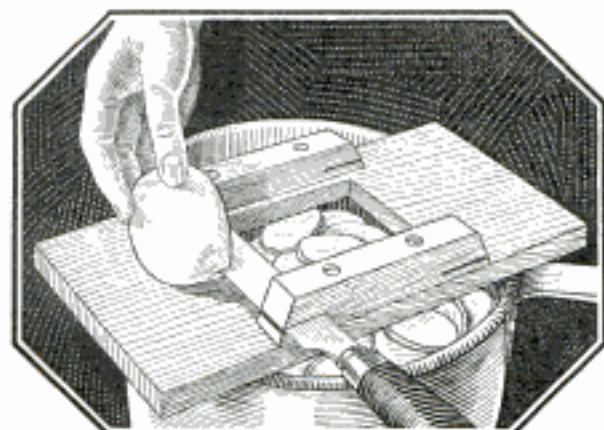
☞ Cellophane from a cigaret package, tied over the opening in a gasoline tank, will prevent loss of fuel if the cap is lost.

Slow-Speed Pulleys Made from Plywood

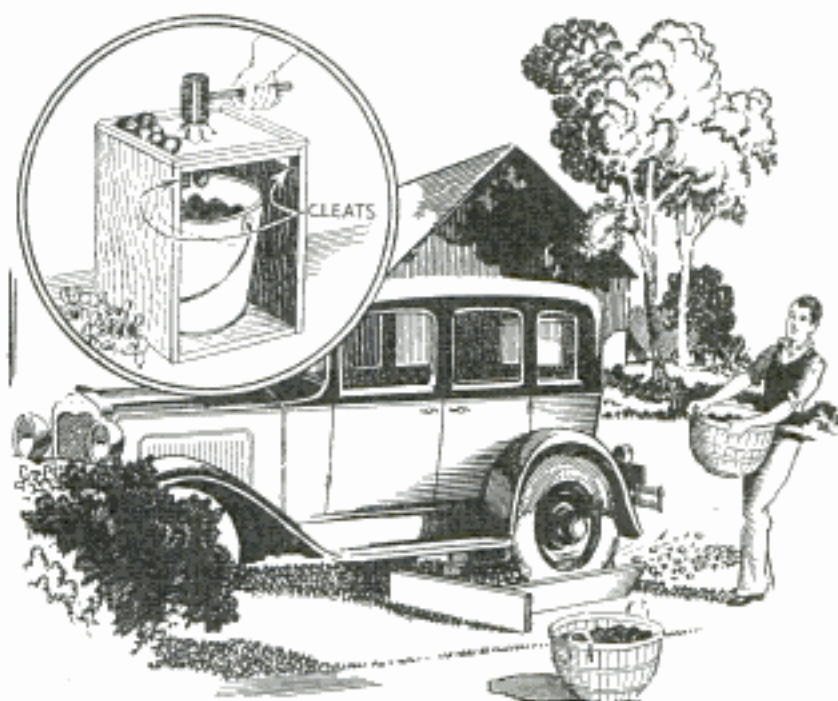
Utilizing scrap pieces of plywood, pulleys of almost any size or thickness are easily made. First determine the diameter of the pulley needed and cut out a number of disks to make up the desired thickness. Coat the sides of the disks with waterproof glue and bolt or nail them together, then drill the center of the pulley to fit its shaft. Such a pulley is satisfactory for slow speeds, but it may be necessary to true it up for high speeds. This can be done by drawing the edge of a sharp chisel or wood rasp across the sides while the pulley is being turned at a good speed. The chisel must, of course, be steadied on a rest. Pulleys of this kind are not likely to burst at high speeds.—I. W. Dickerson, Charles City, Ia.

Slicer Improvised from Ordinary Kitchen Knife

Working on the principle of a saw cutter, this fruit and vegetable slicer is easily improvised from a knife and a small board. Two cleats, slotted at both ends to take the knife blade, are screwed on opposite sides of a square hole cut in the center of the board. The slicer is especially handy for making potato chips.—A. E. Swab, Los Angeles, Calif.



Knife Held in Slotted Cleats Nailed to Board Makes Good Potato Slicer



Black Walnuts Hulled with Car Wheel Rotating in V-Shaped Trough, or by Driving Them through Hole in a Box

Auto Wheel Hulls Walnuts

Hulling black walnuts is easily accomplished without staining the hands by using one rear wheel of your car. Jack up the wheel and place a V-shaped trough, about 8 in. high, under it so that there will be a clearance of about 1 in. Put the car in high and pour the walnuts in the trough in front of the wheel, which will pull them through and tear off the hulls. A hand method of hulling is shown in the circular detail. In the end of a box, drill a hole just large enough for the hulled nuts to pass through. Lay an unhulled nut over the hole and hit it with a hammer. This forces the nut through the hole and leaves the hulls on the outside, the meats being gathered in a receptacle placed in the box, as shown.

An Emergency Pipe Wrench

An ordinary monkey wrench may be used successfully for pipe fitting, or for handling other round work, by simply placing a coarse file between the jaws of the wrench and the object to be turned. It is necessary, however, to place the file in the wrench in such a position that the pull will have a tendency to wedge it tightly between the jaws and the object.—A. H. Vance Harshaw, Wis.

What You Can Do

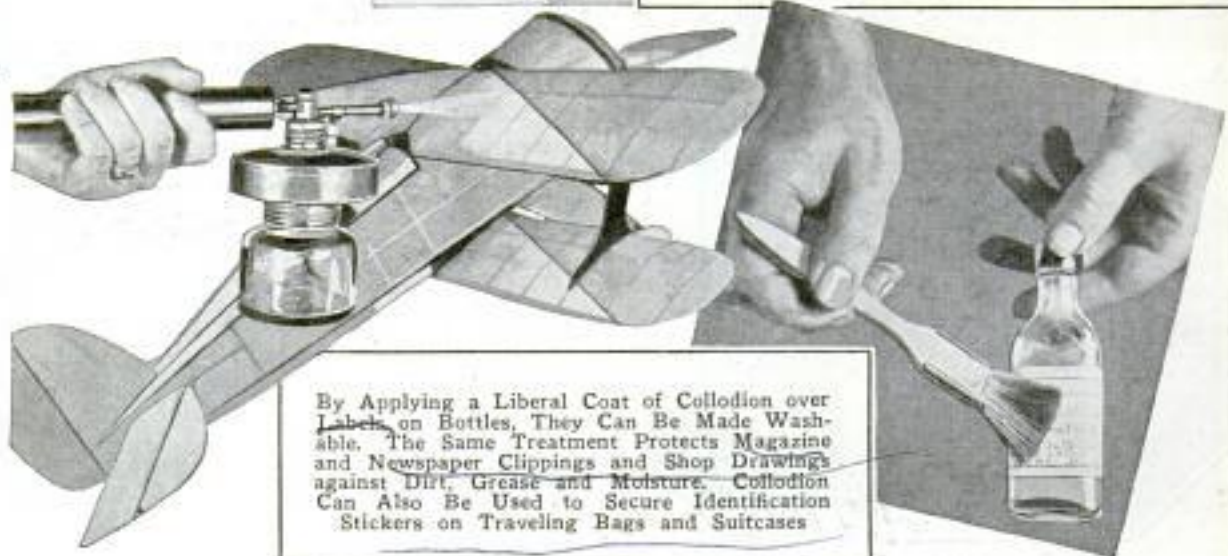


For Protecting Leather-Bound Books, a Flexible, Waterproof Varnish Can Be Made of Castor Oil, 1 Part, and Collodion, 10 Parts. If the Varnish Becomes Too Thick It Can Be Thinned with Acetone and It May Be Colored with Any Dye That Dissolves in Acetone. Right, a Clear Waterproof Brushing or Spraying Lacquer to Prevent Rust and Tarnish on Metal Consists of Acetone, 3 Parts, and Collodion, 1 Part. Below, the Same Lacquer May Be Used to Spray Paper-Covered Model Airplanes. To Stiffen Sails on Model Ships, the Mixture Should Consist of Equal Parts



"Cold Solder" May Be Made by Mixing Fine Aluminum Powder with Collodion, Enough of the Powder Being Added to Form a Viscous but Free-Flowing Paste. Mix by Shaking Vigorously. Bronze-Colored Cement Consists of Equal Parts of Fine Bronze Powder and Collodion. Aluminum Cement That Will Stick to Glass, Metal, Cloth or Wood Consists of Aluminum Powder and Collodion Mixed Together and Later Thinned with Acetone. Any Suitable Pigment Added to This Makes a Waterproof, Colored Stain That Will Adhere to Glass and Metal, and Is Attractive When Stippled. Bottles Can Be Made Air-Tight by Painting over the Neck and Cork with Collodion, a Heavy Coat Being Obtained by Several Successive Applications, Each of Which Is Allowed to Dry Thoroughly. Ordinary Corks Impregnated with Collodion Are Useful for Stoppers on Bottles Containing Corrosive Chemicals

*Bismarck
Brown.
Limer +
Amend,
3rd Ave
118th
New York*



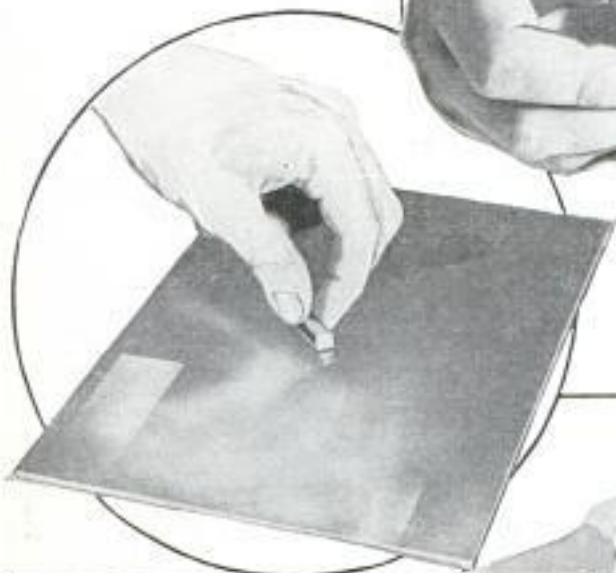
By Applying a Liberal Coat of Collodion over Labels on Bottles, They Can Be Made Washable. The Same Treatment Protects Magazine and Newspaper Clippings and Shop Drawings against Dirt, Grease and Moisture. Collodion Can Also Be Used to Secure Identification Stickers on Traveling Bags and Suitcases

with COLLODION

Zinc White and Collodion Mixed Together to Form a Viscous Paste, Makes an Effective White Cement for Use on Glass, Metal or Wood. After the Adhesive Has Been Allowed to Dry Thoroughly, the Joint Will Have Considerable Strength as in the Circular Detail Below



Unnoticeable Repairs on Scuffed Shoes Are Made by Applying Collodion to the Scuffed Leather and Pressing It Back in Place. Other Leather Goods, as Razor Straps, May Be Mended in the Same Way

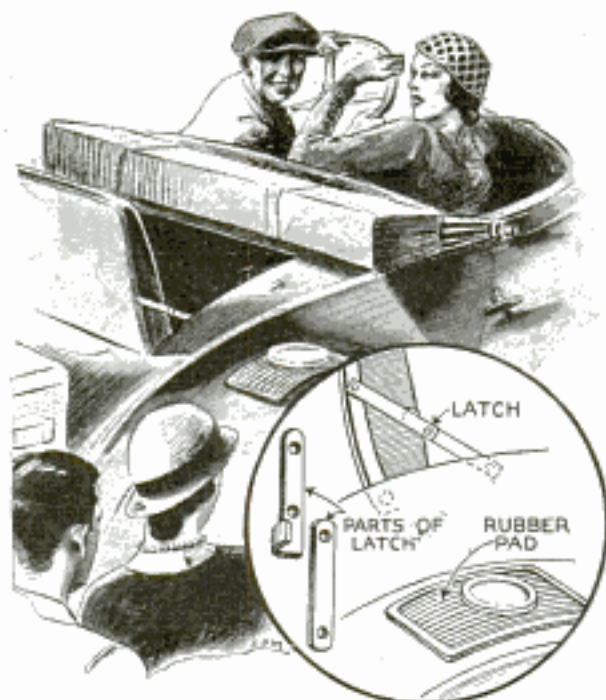


Besides the Various Uses of Collodion Shown on These Two Pages, It Will Be Found Convenient for Many Other Purposes. Plaster Casts May Be Finished Smooth and Waterproofed with a Solution of Collodion and Acetone. Several Thin Coats Are Better Than One Heavy Coat. Fishing Bobbers, Corks, Balsa Wood and Other Similar Material Can Be Protected against Becoming Waterlogged by Soaking Overnight in a Closed Jar Containing a Solution of Acetone, 2 Parts, and Collodion, 1 Part. The Turns of Radio Coils and Other Coils Used in Electrical Experiments May Be Held Securely in Place with Collodion. Paper Flowers May Be Waterproofed and Will Last Longer When Dipped in a Solution of Collodion, 1 Part, and Acetone, 3 Parts. Water-Color Paintings May Be Preserved without Changing Their Color by Spraying Them with a Solution of Collodion and Acetone or Ether



Liquid Finger-Nail Polish Can Be Made at Home by Diluting Some Collodion with Acetone. Keeping the Solution in a Tightly Corked Bottle Prevents It from Thickening Due to Evaporation. When the Celluloid Rim of Your Glasses Breaks, a Repair Can Be Made by Using Acetone, Which Softens the Broken Ends so That They Will Stick Together. An Inexpensive Collodion for Home or Shop Use Consists of Celluloid Scraps Dissolved in Acetone. A Fruit Jar with a Tight-Fitting Lid Is a Handy Container





Rubber Mat on Step and Strap Hinge on Back Increase Safety of Rumble Seat

Two Safety Kinks for Rumble Seats

Placed under the fender step, a small rubber mat helps to keep the foot from slipping when entering a rumble seat and also protects the paint against scratching. If a strap hinge is screwed to the back of the seat and to the rear deck, it will prevent the seat from closing when using the back as a rest for entering or leaving. The hinge can be purchased or made from flat iron, the construction being detailed in the inset.

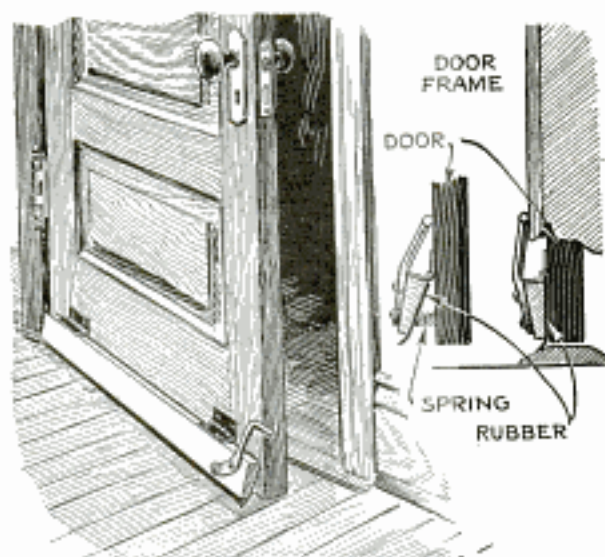
An Easy Way to Letter Models

Lettering on a small model, usually a job for an artist, can be mechanically executed by making impressions in the painted surface of the model with printers' type. The depressions are then filled with a contrasting color which is sanded down when dry. Obtain from your neighborhood printer capital letters and a few spacers in the size of type required and in the face most suitable for the model. Bind the individual type tightly together so that the face of each will bear equally on the surface to be lettered. Moisten the surface and press the type firmly into the soft paint so that it leaves a clear and uniform impression. After the body coat of paint has dried, carefully fill in the depressions with a paint of a contrasting

color with a toothpick, preferably in two applications, the last one being above the level of the surface. When the lettering is dry, the excess paint is smoothed down with fine sandpaper held on the end of a stick so that the paint on the body of the model will not be injured. Rub the lettering with a flat piece of felt and a paste made of rottenstone and oil until it is perfectly smooth and flush with the surface. Though primarily adapted for flat surfaces, a gently curved surface can be lettered in the same way if due care is taken when binding the type together. It is a good idea to work out the steps of this process before lettering the model, as a little practice is necessary to get a uniform impression.—Albert W. Eidman, Cleveland, Ohio.

Hinged Weather Strip on Door Keeps Out Cold Air

Automatic in action, this weather strip seals the space between the bottom of the door and the threshold. One side of the strip is lined with rubber, which extends below its edge to make contact with the threshold when the door is closed. A compression spring, placed between the door and the weather strip, throws the latter out and holds it above the floor when the door is open. An arm, at the end of the strip, comes in contact with the casing



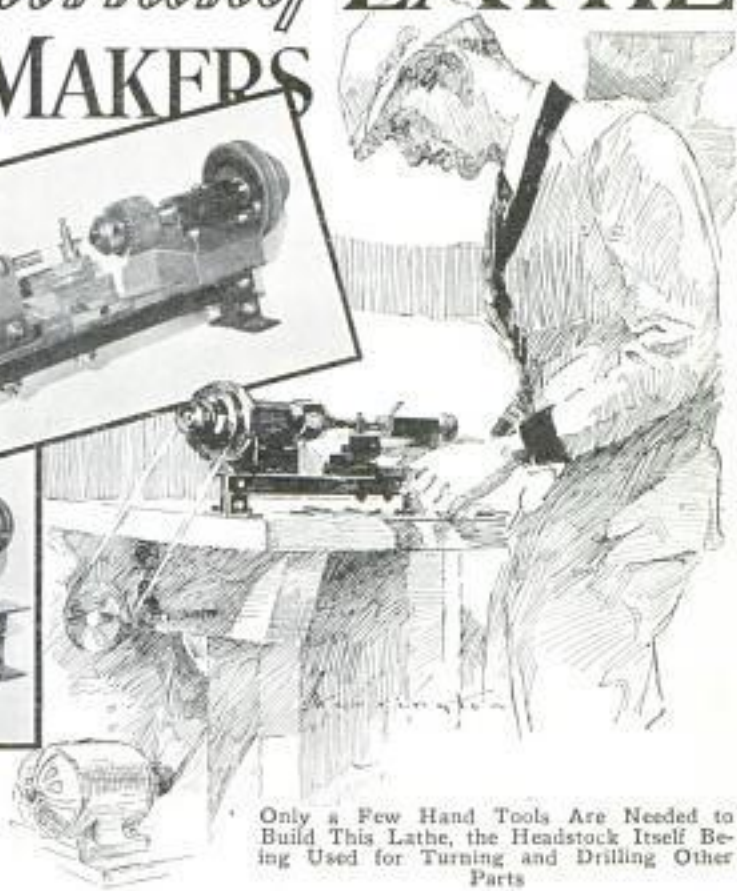
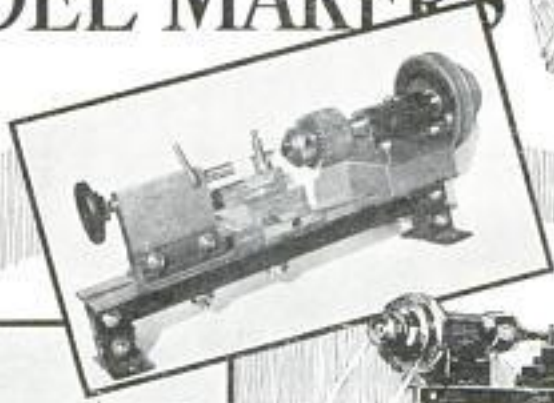
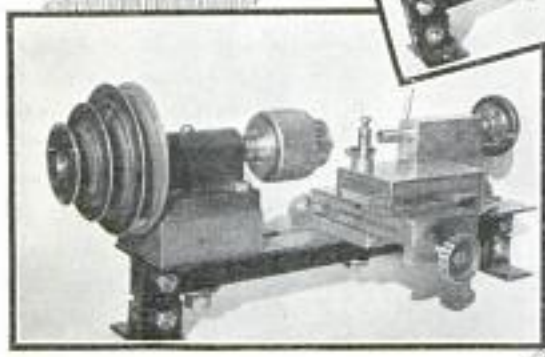
Hinged Weather Strip Automatically Seals Space Between Door and Threshold

and pushes the strip down when the door is closed.—B. B. Rogers, Choteau; Mont.



A Metal-Turning LATHE for MODEL MAKERS

by
W.R. BELL



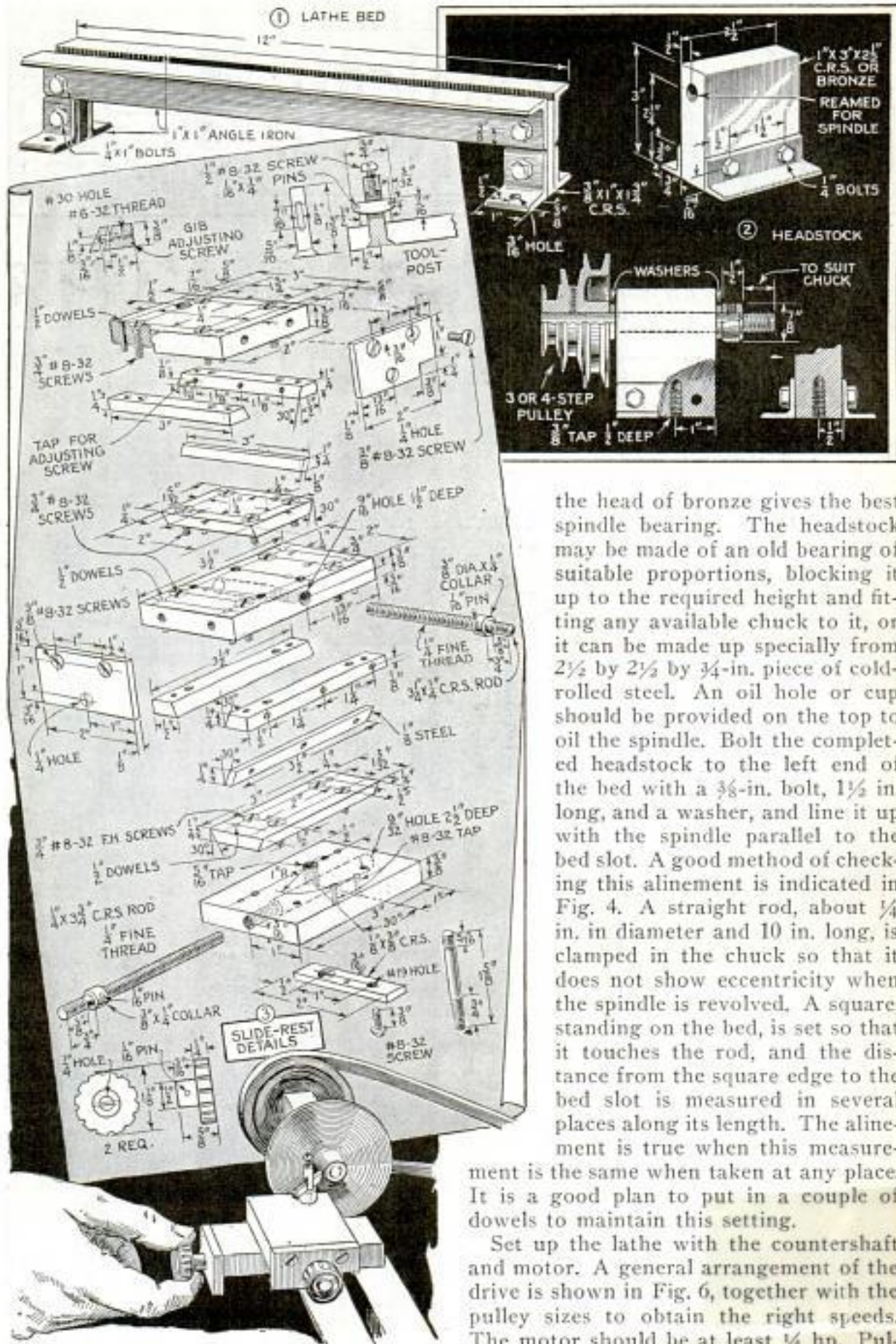
PART I

THIS metal-turning lathe, the front and rear views of which are shown in the photos above, has a capacity of diameters up to $4\frac{1}{2}$ in. and a maximum distance between centers of about $5\frac{1}{2}$ in. The tools required to build it are a hacksaw, breastdrill, files, clamps and a few drills, taps and dies.

Assemble the legs and feet of the bed, shown in Fig. 1, and then assemble these to the top angles, with the whole in an inverted position on a good flat surface. Clamp together and drill the bolt holes through the three pieces at one time, bolting before removing the clamps. Have the holes a snug fit for the bolts. This procedure will insure the bed top being true and flat. The cone pulley and a chuck, of

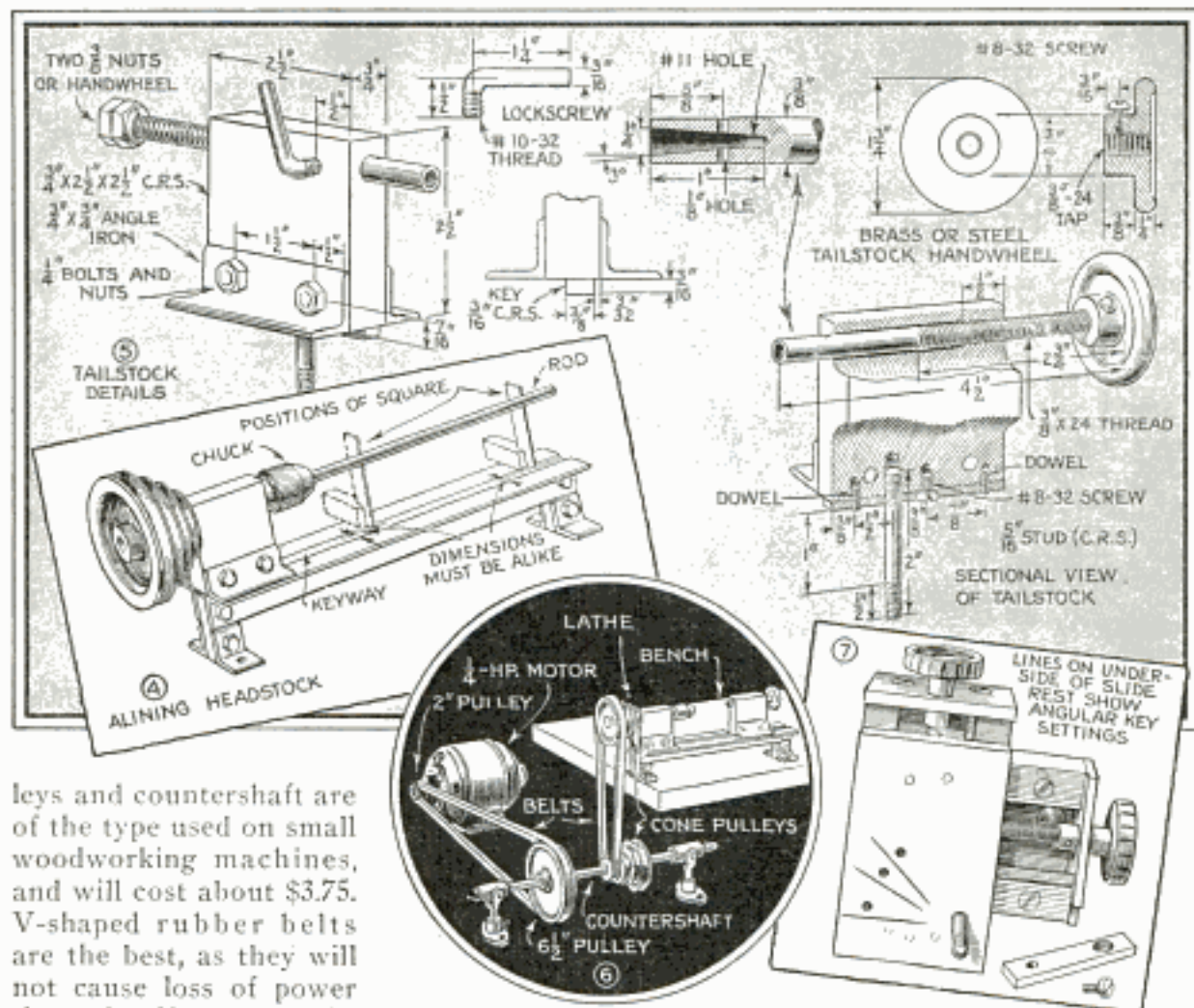
Only a Few Hand Tools Are Needed to Build This Lathe, the Headstock Itself Being Used for Turning and Drilling Other Parts

about $\frac{1}{2}$ -in. capacity, can be purchased from the stores selling the small popular woodworking machines and accessories. If you build the headstock shown in Fig. 2, it will be well to buy one of the small polishing-head spindles that are already threaded with the special thread to fit the chuck, together with a collar to fit. The spindle is cut off to the required length. Be sure that the spindle hole is parallel to the bottom surface, and ream it to fit the spindle without shake. The washers shown should be of brass if the head is steel, and steel if the head is bronze. They may be left off until you can turn them up yourself after completing the machine. Making



the head of bronze gives the best spindle bearing. The headstock may be made of an old bearing of suitable proportions, blocking it up to the required height and fitting any available chuck to it, or it can be made up specially from $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{3}{4}$ -in. piece of cold-rolled steel. An oil hole or cup should be provided on the top to oil the spindle. Bolt the completed headstock to the left end of the bed with a $\frac{3}{8}$ -in. bolt, $1\frac{1}{2}$ in. long, and a washer, and line it up with the spindle parallel to the bed slot. A good method of checking this alignment is indicated in Fig. 4. A straight rod, about $\frac{1}{4}$ in. in diameter and 10 in. long, is clamped in the chuck so that it does not show eccentricity when the spindle is revolved. A square, standing on the bed, is set so that it touches the rod, and the distance from the square edge to the bed slot is measured in several places along its length. The alignment is true when this measurement is the same when taken at any place. It is a good plan to put in a couple of dowels to maintain this setting.

Set up the lathe with the countershaft and motor. A general arrangement of the drive is shown in Fig. 6, together with the pulley sizes to obtain the right speeds. The motor should be at least $\frac{1}{4}$ hp. Pul-



leys and countershaft are of the type used on small woodworking machines, and will cost about \$3.75. V-shaped rubber belts are the best, as they will not cause loss of power through slippage. The tailstock, in Fig. 5, is first built up complete, but the spindle hole is not drilled until later. The dowel sizes are not given in any of the drawings, as these can be made to suit materials at hand. To bore the tailstock, place it on the machine, with the stud nut just tight enough to prevent shake and still permit sliding forward onto the drill. A temporary screw feed is rigged up to slide the tailstock forward by clamping a piece, with a long screw in it, to the bed end with the screw end pushing against the tailstock. Thread the spindle hole from the front, using the larger bore as a guide for the tap to keep the threads in line. After the spindle is fitted, lock two nuts on the back as a temporary handle, or fit on a handwheel, and bore the hole in the front end of the spindle. The taper is reamed with a $\frac{1}{4}$ -in. drill or reamer ground to the required angle.

The slide rest is shown in Fig. 3. The angular faces of the parts composing the dovetail slides are beveled with a file and

should be smooth and flat. All the slide-rest screw and dowel holes can be drilled, using the lathe and tailstock as a drill-press. The outside beveled pieces are attached to the undersides of the respective plates, and these, with the gibs and adjusting screws in place, are used as gauges for the mating inner parts. The sides of the inner dovetail parts are filed parallel, which is determined when these pieces will slide through the gauge with the same feel all the way. Blue paint will aid, used in the manner of fitting bearings. The assembly of the lower slide is completed first, and the inner dovetail part of the upper, or cross, slide is fastened on at 90° , using a square to set it and omitting the dowels at this time. Complete the upper-slide assembly, and, as in the case of the tailstock, the handwheels can be temporarily omitted by locking two nuts as a substitute, until the wheels can be turned up on the completed lathe.

(Continued to page 142A)



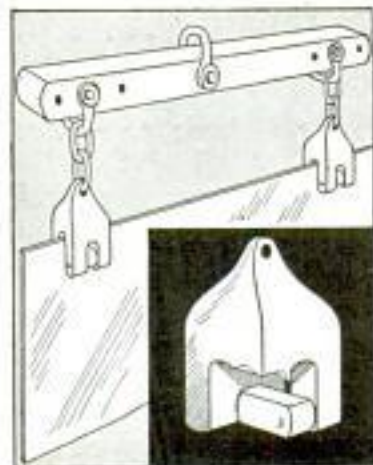
Rubber Washers Spaced Evenly on Gasoline-Pump Hose Protect It against Wear

Gasoline-Pump Hose Protected with Rubber Washers

Tight-fitting rubber washers placed over the gasoline-pump hose are used by a chain of western filling stations to keep it from wearing or becoming soiled from contact with oily concrete around the pumps. The washers are spaced on the hose so they keep it off the concrete, no matter in what position the hose is held.—Joseph D. Mountain, Los Angeles, Calif.

Self-Gripping Sling for Carrying Heavy Plates

Handling of heavy plates in the shop is simplified by using this self-gripping sling. It consists of a bar supporting two lengths of chain on the end of which specially



made grippers are attached. Each gripper has a serrated, tapered steel tongue, which allows the plate to be readily inserted, but grips it securely when the plate is pulled down. The weight of the plate is

usually sufficient to keep it in place so that the holder can be carried on a sling, or by hand. To make this holder adaptable to various sizes of work, several holes are drilled at each end of the bar. This permits adjustment of the chains, each one of which is attached to the bar by means of a clevis. Another clevis, centered between these holes, enables one to slip the holder on a sling hook.

Boring Bars from Tool Bits

Good boring bars for a lathe can be cheaply made from the unused ends of high-speed tool bits. Select the piece you wish to use for the bar and drill a hole near the end at the angle required to receive the bit. Drill the hole just large enough so that the four sharp edges of the bit will bite tightly when driven the desired distance. The spaces between the bit and the hole are filled with solder. This boring bar will be found superior to a forged tool steel or drill-rod bar, and is an asset to any mechanic's tool kit.

C-Clamps Speed Tire Mounting

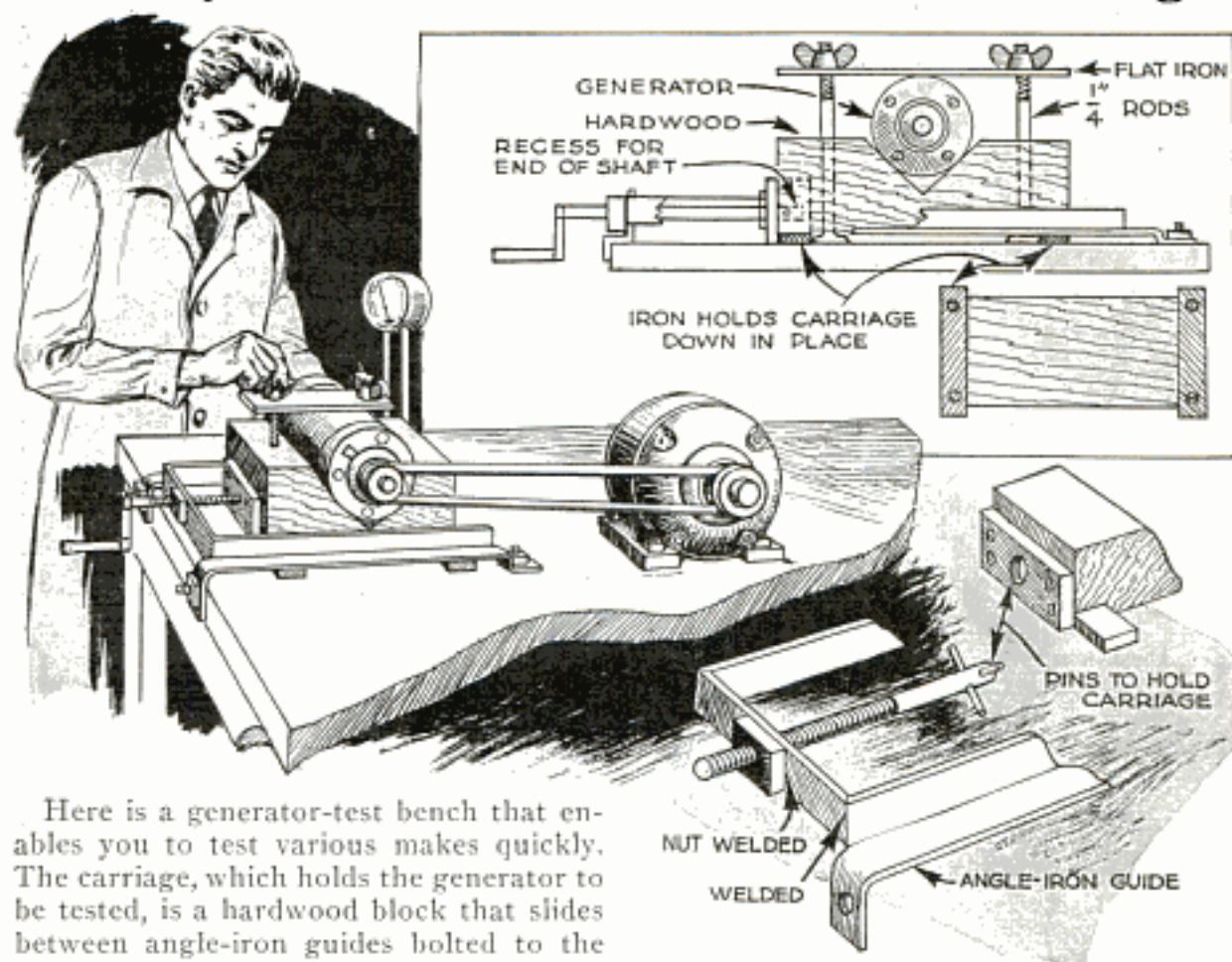
When mounting a tire on a drop-center rim, a C-clamp will be found useful for squeezing one side of the tire so that it slips freely into the center of the rim. This method of mounting is especially helpful with new tires, or with tires of the larger sizes.



Fitting Connecting-Rod Bearings

If connecting-rod bearings are adjusted before taking an engine down for the installation of new pistons, rings or piston pins, well-fitting bearings are assured. After being fitted, they are taken off, with shims attached, and laid away until the job is completed. In this way, there is no chance of the new parts binding and throwing off the fitting of the bearings.

An Adjustable Generator Tester for Garages



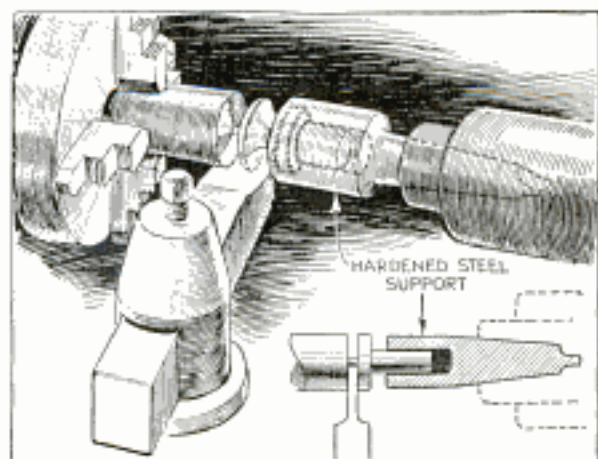
Here is a generator-test bench that enables you to test various makes quickly. The carriage, which holds the generator to be tested, is a hardwood block that slides between angle-iron guides bolted to the bench. The generator is fastened to the block by means of a clamp consisting of a flat-iron bar and two rods, which are threaded for wingnuts. Two pieces of bar iron are screwed across the bottom of the block and extend under the guides to hold the carriage down. A length of flat iron, with a nut welded in its center, is welded

across the guides at the back of the carriage, as indicated, to accommodate a screw rod, which allows adjustment of the carriage, one end of the rod being bent to form a crank. Pins driven through holes drilled in the rod on both sides of the plate hold the assembly together.

Support Holds Work While Parting It in Lathe

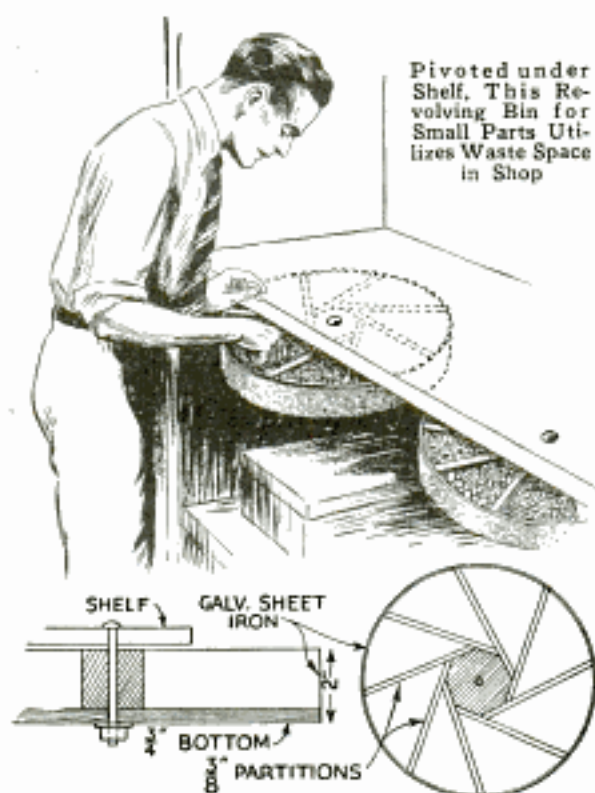
A jig for supporting work while parting it in a lathe, can be made from a piece of steel drilled at one end to receive the end of the work, while the other is tapered for insertion into the tailstock. When using the support, the parting tool can be fed into the work faster without gouging it or breaking the tool.

Large holes can be drilled in metal faster and easier by first using a small drill and then reaming the hole with a larger one.



Jig for Supporting End of Work While It Is Being Parted in Lathe

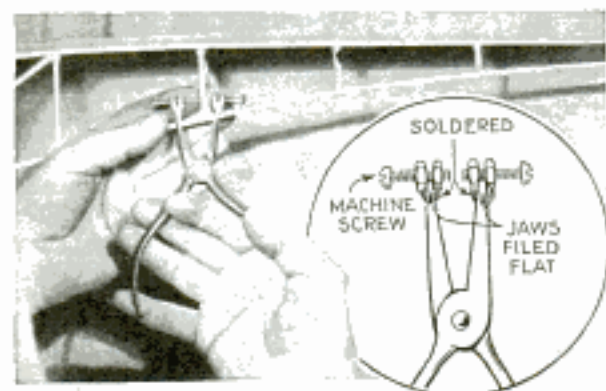
Revolving Bins Hold Small Parts



Small parts kept in a revolving bin, pivoted under the bench top or a shelf as shown, are quickly accessible and take up little space. The bin consists of a wooden disk with a sheet-metal rim nailed around the edge. A wooden hub is provided in the center, and the bin partitioned as desired. The hub and bottom are drilled for a bolt with which the bin is held in place.

Pliers Converted into Tool for Driving Small Brads in Model Work

An ordinary pair of pliers can be converted into a tool for driving small brads on model work where hammering is like-



Machine Screws Fitted with Nuts and Soldered to Jaws of Pliers Provide Tool for Driving Brads

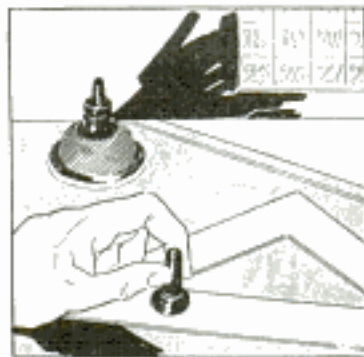
ly to damage it. File the ends of the plier jaws flat, then run nuts on two machine screws to grip the jaws as shown, after which they are soldered in place. If brazing facilities are available, only one nut need be brazed to each jaw. In use, the brad is placed in position, the screws adjusted to straddle the work and brad, and the handles squeezed together.

Pistons Expanded to Fit Snugly

Auto-engine pistons of the invar-strut type may be expanded to fit the cylinder snugly, when they become worn, in a simple manner. Place a strong support under each of the exposed parts of the struts in turn, and then center-punch them rather heavily at each of these points. The pointed end of the punch expands the metal in the strut and forces the sides of the piston outward, thus increasing its diameter.

Rubber Suction Cup Picks Up Draftsman's Triangles

When inking a drawing, a suction cup can be used for lifting the triangle without danger of smearing the ink. A short handle is attached to the cup. Besides regular triangles, the French curve can also be handled in the same way.



Easy Method of Changing Water in Goldfish Bowls

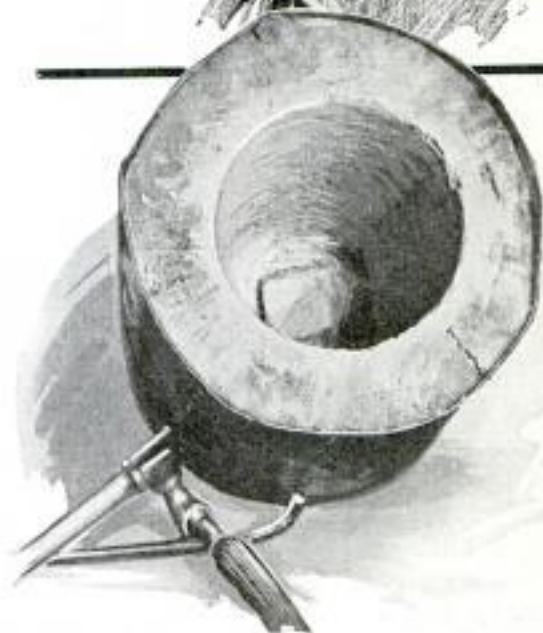
Dealers who display goldfish in bowls will find the following method of keeping them supplied with fresh water handy. The bowls are arranged on a rack designed something like a stairs, with one bowl on each step. The arrangement is such that the water is run into the top bowl in a small stream from a faucet extending over its edge. A system of siphons of small size carries the water from one bowl to the other. The last, or lowest siphon leads into a drain.

Small Gas-fired Blast Furnace

MELTS BRASS
& ALUMINUM.



THIS double-burner blast furnace, which will quickly melt 10 to 15-lb. charges of aluminum, brass or any alloy of which the melting point is under 2,000° Fahr., can be built at very low cost. It can also be used for making alloys, for heat-treating, annealing, casehardening and many other metallurgical operations. The refractory lining is built to dimensions inside of a sheet-metal can, which serves to protect the lining and gives added strength to the completed furnace. A 5-gal. oilcan, with its top cut away and two holes drilled and reamed to admit $\frac{3}{8}$ -in. pipe nipples, was used. The burner holes were drilled in opposite sides of the can at points $3\frac{7}{8}$ in. from the bottom. Heat-resisting lining is built up from ganister, which is a mixture consisting of equal parts of fire clay and pulverized fire brick moistened with water and worked to the consistency of heavy plaster. Scraps of fire brick are used as filler, which furnishes added strength and saves considerable time. The bottom of the can should be covered to a depth of 1 in. with ganister packed down firmly by ramming with a stick. Four pieces of fire brick, each $4\frac{1}{2}$ in. long and $3\frac{1}{2}$ in. wide, are next pressed firmly into the bottom layer of ganister as shown. Another piece of brick is set in the center to support the

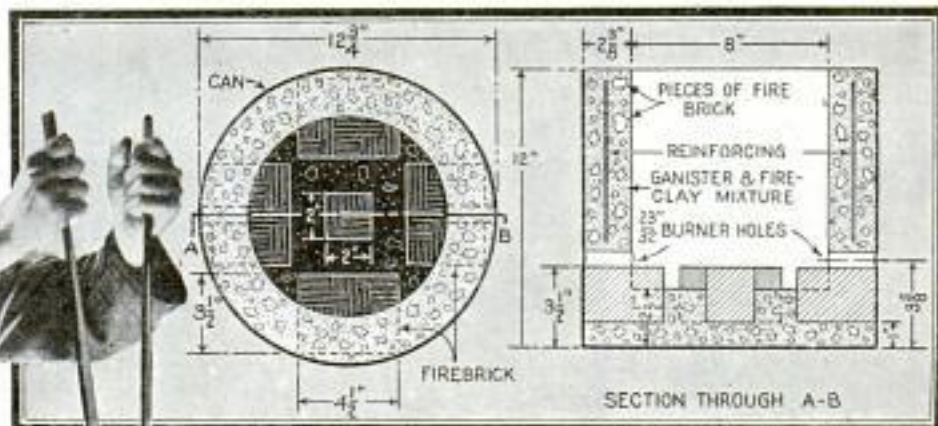


bottom of a crucible. The space between the supporting bricks is packed with ganister until its level is within 1 in. of the top of the bricks.

Two lengths of $\frac{3}{8}$ -in. gas pipe are inserted through the burner holes to extend to the center of the furnace, forming burner inlet holes. The pipe is removed after the ganister wall has partly dried, leaving two openings for the burners. A sheet-metal form 8 in. in diameter is now set in the can and centered. Small chips of fire

graphite crucible. Denver Fire Clay Co. 1746 Champa St. Denver Colo

or graphite crucible Co. Wayne and Monmouth Jersey City, N.J.

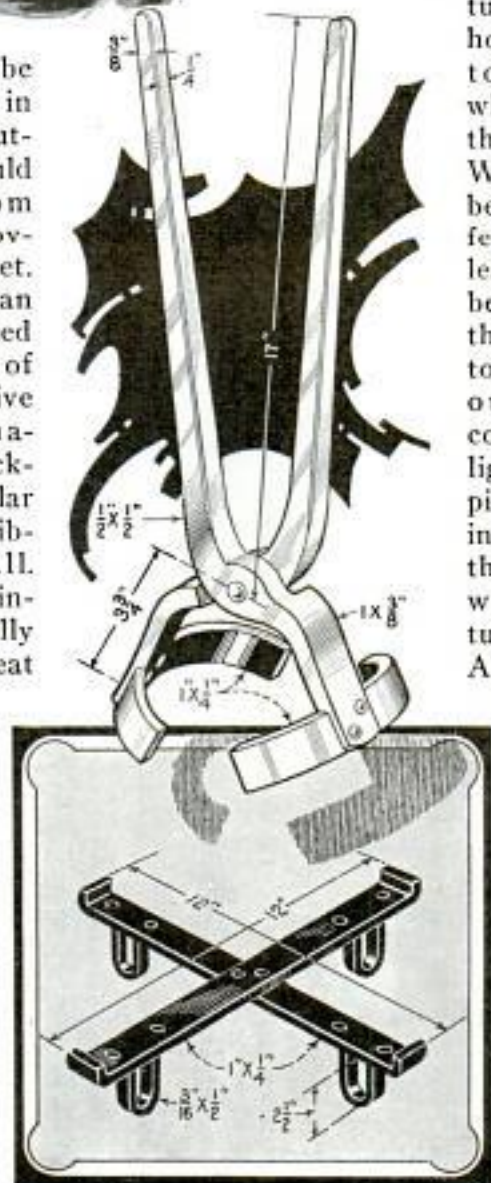


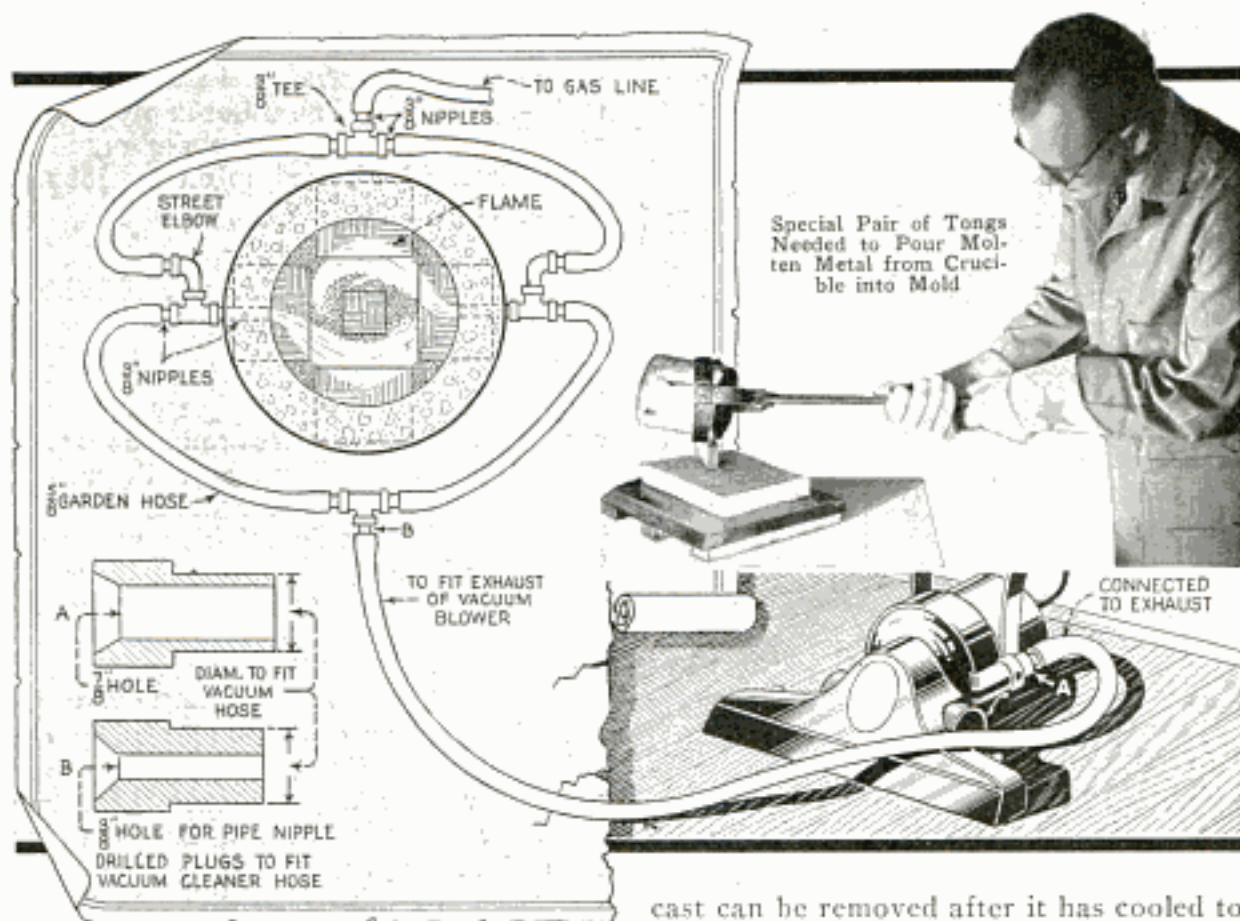
brick and ganister may be used to support the can in the exact center of the outside shell. This can should be smooth and free from dents to facilitate its removal after the fire wall has set. The space between the can and the shell is now packed with ganister and pieces of fire brick. In order to give added rigidity and permanence to the lining, old hacksaw blades or other similar material may be used as ribbing to reinforce the wall. Eight or ten such stays, inserted upright and centrally in the lining, will give great strength without being detrimental to the refractory value of the lining. When the wall has set sufficiently to support its weight, in about 12 hrs., remove the inner shell and the $\frac{3}{8}$ -in. pipes, and allow the assembly to dry in the air for two or three days.

The burners are built from $\frac{3}{8}$ -in. pipe and fittings. The air blast may

be furnished by a vacuum cleaner. Connections from the burners to the air and gas supplies are made with $\frac{5}{8}$ -in. garden hose, which fits snugly over $\frac{3}{8}$ -in. gas pipe. The wooden adapters for connecting the vacuum cleaner to the air line are turned from hardwood. The hose of the cleaner is used to connect the exhaust, which normally opens into the bag, with the air line. When the connections have been completed and the gas feeds have been tested for leaks, a final drying should be carried out by lighting the furnace and allowing it to operate at low heat without a crucible, charge or cover for 15 or 20 min. To light the furnace, ignite a piece of paper and drop it inside of the furnace. While the paper is still burning and with the vacuum cleaner turned off, open the gas jet. Allow the gas to burn for

half an hour or longer without a blast in order to dry out the fire wall. The vacuum cleaner may then be started and the hot blast used to complete the drying. At this point it will be necessary to regulate the gas until a whirl of intense flame is established inside of the furnace. Turn the gas as low as is possible to maintain good combustion. The





ends of the burners should not extend inside of the lining as the intense heat would melt them. Change their position slightly and watch for the long tongues of almost colorless blue flame which will be seen when combustion is best. To shut off the furnace, always discontinue the blast before shutting off the gas in order to prevent a "pop-back." Some cracks are certain to be found after the wall has been dried out, which are filled with a putty made of fire clay and water.

A pair of tongs of the kind illustrated should be constructed for inserting and removing crucibles. They should be constructed so that it will be possible to pour from the crucible into molds while it is held in the tongs to avoid spilling molten metal. As a precaution, it is a good idea to wear thick-soled shoes when metal is poured. The work should be done on dry sand and the elevation of the ground in the room used for pouring should be so adjusted that any spilled metal will not flow against wood or other inflammable furnishings. A small shallow hole in the ground is convenient for dumping excess quantities of molten metal. The pig thus

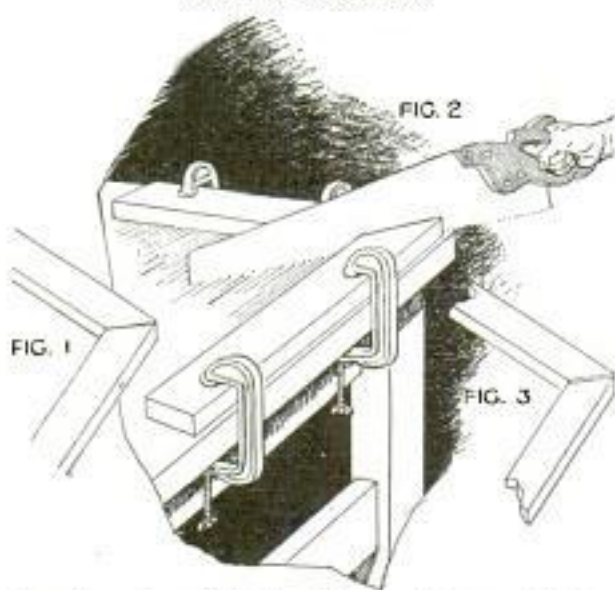
cast can be removed after it has cooled to be remelted when needed. Metal should never be allowed to freeze in the crucible.

To melt metal in the furnace light the gas and start the blast; insert the charged crucible with the tongs, cover the furnace with an asbestos board or other fireproof lid and allow the charge to melt. Inspection of the charge may be made by lifting the lid with a pair of tongs and observing the contents of the crucible through colored glasses. In melting metals a small handful of borax should be poured on the molten metal as a flux to dissolve any oxides which are formed. The scum or dross, which will come to the top, may then be skimmed off before the molds are poured.

The strap-iron stand shown may be constructed to elevate the furnace to any desired level. Crucibles made from graphite are ideal for most work although their cost and the difficulty of obtaining them sometimes make their use prohibitive for most experimenters and home-shop workers. A crucible may be constructed by fitting a malleable-iron pipe cap to a pipe nipple of suitable size. It is important that the pipe cap used in the construction of these crucibles be of malleable iron, otherwise

(Continued to page 132A)

Miter Joints Can Be Cut Accurately with a Handsaw



Running a Smooth-Cutting Handsaw Between Butting Ends of Joints Eliminates Slight Error

Here's a little trick for making a perfect butt or mitered joint with a handsaw. Simply clamp the parts to the workbench, after the approximate miter has been cut, butting the ends tightly together. Running the saw blade between the ends will cut the edges exactly parallel correcting any slight error made when the joint was first cut.

Holding Odd-Shaped Forms of Type in Place for Printing

Small print shops that are not equipped to reproduce a job that has type in circles or diagonally, can make the reproduction

as follows: Set the letters or design in the desired arrangement in an ordinary make-up galley and pour hot linotype metal around the base of the design, after which it can be locked up on the jobber. —Floyd Sutton, Versailles, Mo.

How to Determine Diameter of Wire without Calipers

The diameter of small wire can readily be determined without calipers or a micrometer. Wind the wire around a piece of rod of any size, keeping the windings close together, and count the number of turns in 1 in. of the winding. This number divided into 1 will give you the thickness of the wire in decimal form.

An Improved Cotter Key

To improve an ordinary cotter key, cut off one end a little more than flush with the nut or shaft in which it is used. Then bend the other leg over to almost touch the shorter one as shown, and spring it out a little. When the key is pushed through the hole, the looped end springs out, securely locking the key so it will not come out until the loop is pressed together. This also permits easier insertion of the key if it is used repeatedly.



350 BLUEPRINTS

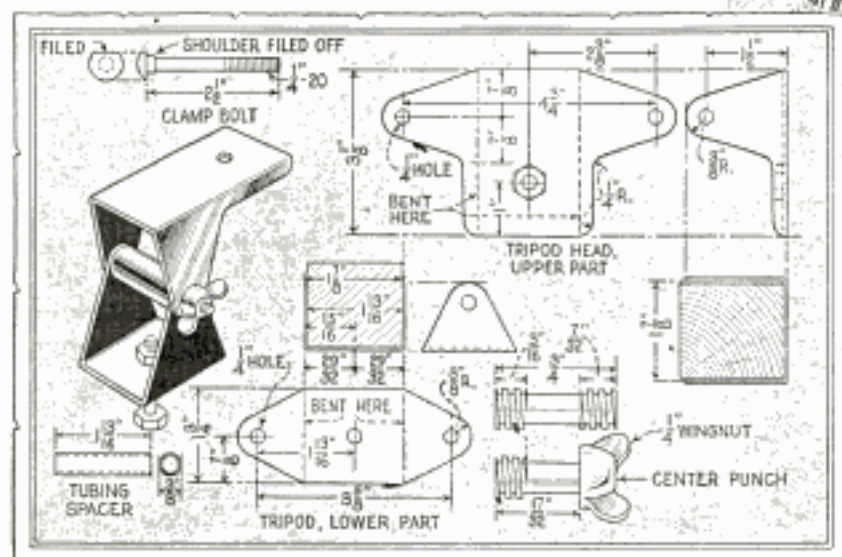
for Home Craftsmen

Model ships and airplanes, toys, smoking sets, tables and many pieces of household furniture besides numerous other practical projects. A sample and complete list of prints will be sent to anyone upon receipt of 6c to cover mailing costs. Prices of prints are 25c each, six for \$1, or a collection of thirty-five for \$5 postpaid.

Address Blueprint Dept.

Camera Tripod Improved with Tilting Head

This tilting head for an ordinary camera tripod is easily made and is adjustable to almost any angle. Two pieces of No. 20 or 24-gauge sheet metal are cut to the shape shown, and the edges are bent over at right angles as indicated by the dotted lines. To do this, take a block of wood, $1\frac{1}{16}$ by $1\frac{1}{8}$ by $3\frac{1}{2}$ in., and place it squarely across the smaller piece, so that the bending lines are just visible at either edge. Clamp the assembly in a vise, being



careful that the center line of the metal remains at right angles to the longer axis of the block. With a hammer bend down both wings of the piece squarely on the sides of the block. Then cut out two rectangular pieces of the sheet metal and tack one to each side of the block, and bend the other piece over it in the same manner as the first. When bent in this way, the edges of the lower part will fit neatly between the edges of the upper part without binding. The two pieces composing the head are pivoted together by means of a carriage bolt and wingnut, a tubing spacer being used to prevent the sides from pulling together when clamped. The shoulder of the bolt is filed off, and a flat is also filed on the head to take a drop of solder, which keeps the bolt from turning. The camera is attached to the head by means of a thumbscrew, which can be made by filing off the center threads of a No. $\frac{1}{4}$ -20 bolt, leaving a few threads at each end. A wingnut is screwed on one

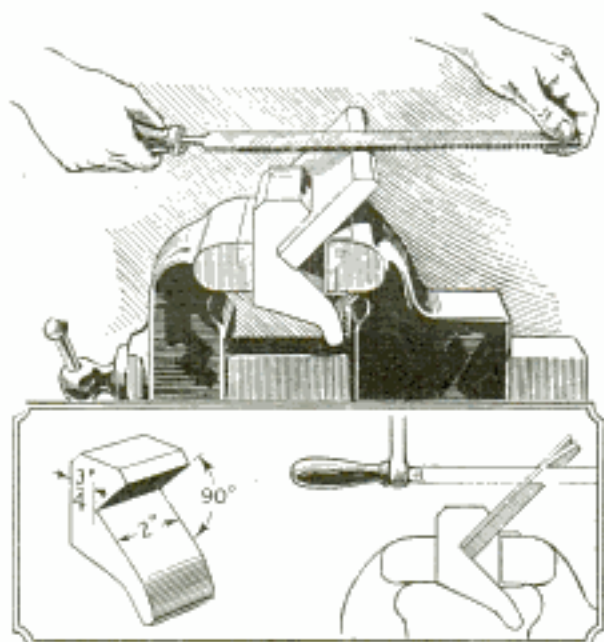
end and center-punched to hold it securely, while the other end screws into the bottom of the camera. A nut, soldered over the hole on the underside of the top of the head, keeps the screw from falling out when the camera is removed. A piece of felt or chamois is glued to the top of the head to prevent it from marring

the camera, while a hole drilled in the bottom of the head enables attachment to the tripod.—L. C. Peltier, Delphos, Ohio.

Ball Keeps Studs from Loosening

To keep studs and machine screws from working loose on machinery that is subjected to considerable vibration, recess the bottom end of the stud or screw with a center drill. Then, with a hacksaw, cut two $\frac{3}{8}$ -in. slots crosswise of the same end. Before driving the stud, drop a steel ball, slightly smaller than the diameter of the stud, into the hole. When the stud is driven in, the ball will expand the recessed end tightly against the sides of the hole, which will hold the stud securely. On screws of less than $\frac{3}{8}$ in. diameter, the saw slots can be omitted.—Robert S. Alexander, Providence, R. I.

☛ Soapstone pencils can be sharpened on a rasp attached to the bench.



Vise Jig Holds Flat Work at Convenient Angle for Removing Burrs or Filing Bevels

Holding Work at an Angle in Vise

A jig made from a piece of steel, cut to the shape and dimensions shown in the lower left-hand detail, will be useful for holding flat work at an angle in a vise. One leg is made long enough to just clear the horizontal slide of the vise, which prevents the jig from falling out when it is loosened. A piece of iron, of triangular shape, placed between the work and the sliding jaw of the vise, clamps the work against the jig when the vise is tightened. —Walter Wells, Newark, N. J.

Spring Head Cushion Adds Comfort to Garage Creeper

By mounting a narrow, padded headrest on two coil springs taken from a discarded automobile cushion, and fastening



Springs under the Head Cushion Improve Garage Creeper

them to the ends of a creeper, a greater degree of comfort is assured, as it holds the head at a more natural angle and prevents cramping the neck. Such a headrest has been found especially advantageous when the worker is compelled to recline upon the creeper for a considerable length of time.

How to Assemble Ball Bearings

Before pressing a ball bearing on a shaft, clean both parts thoroughly and measure the shaft diameter for the proper clearance for a force fit of the bearing. If the shaft is more than .0015 in. over the bearing-hole size, it should be reduced to the proper diameter, otherwise the extra force required to assemble it will expand the inner bushing and cramp the balls in the races. It is good practice, when reducing a shaft in a lathe, to file a short "lead," or start, on the front end of the bearing portion so that the diameter will be sufficiently under the hole size to allow the shaft to enter. The lead assures that the bearing face will be at right angles to the shaft on assembly and should not exceed one-eighth of the bearing surface. —Robert Alexander, Providence, R. I.

Copper Coil Preheats Gas Mixture in Blowtorch

To overcome the tendency of a blowtorch to cool on a cold, windy day, coil an 18-in. length of copper tubing as shown in the detail. Re-



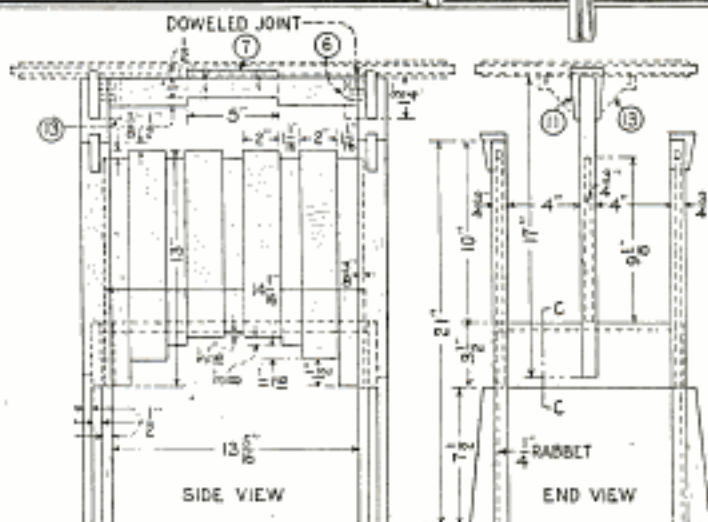
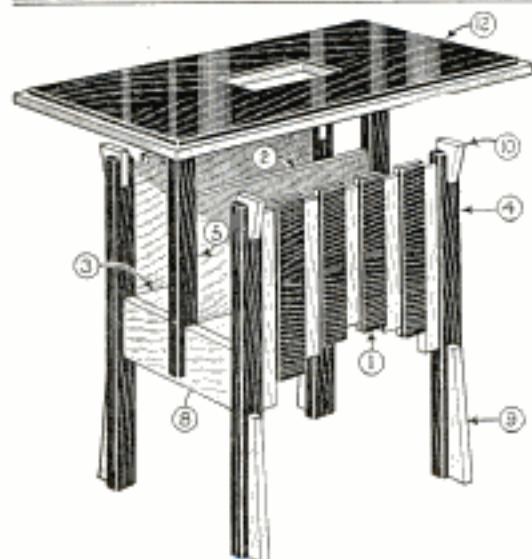
move the burner from the torch and attach the tubing to the tank so that the coil is directly in front of the burner to encircle the flame. In this way, the flame preheats the mixture of gas in the coil, insuring a hot torch at all times. —Lud. Larson, Moline, Ill.

Hard spots and corners on iron castings will quickly dull a new file; so it is advisable to go over them a few times with an old file before using the new one.

You can build this MAGAZINE RACK and TABLE . . .

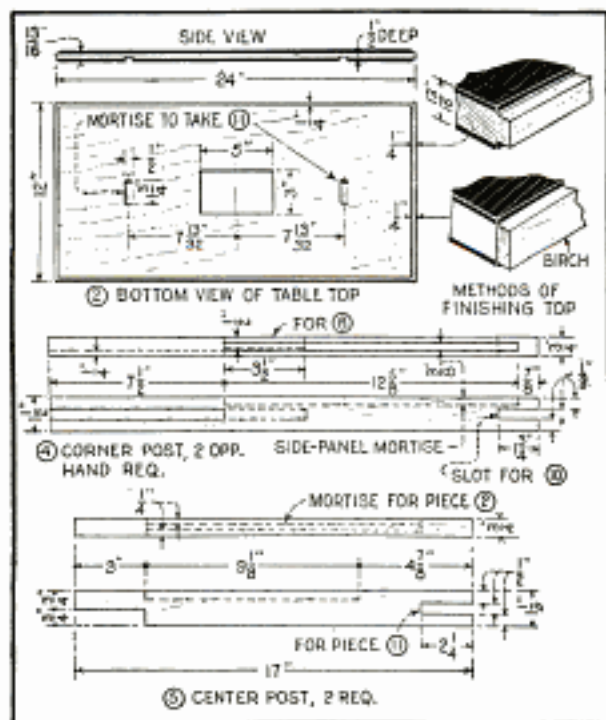
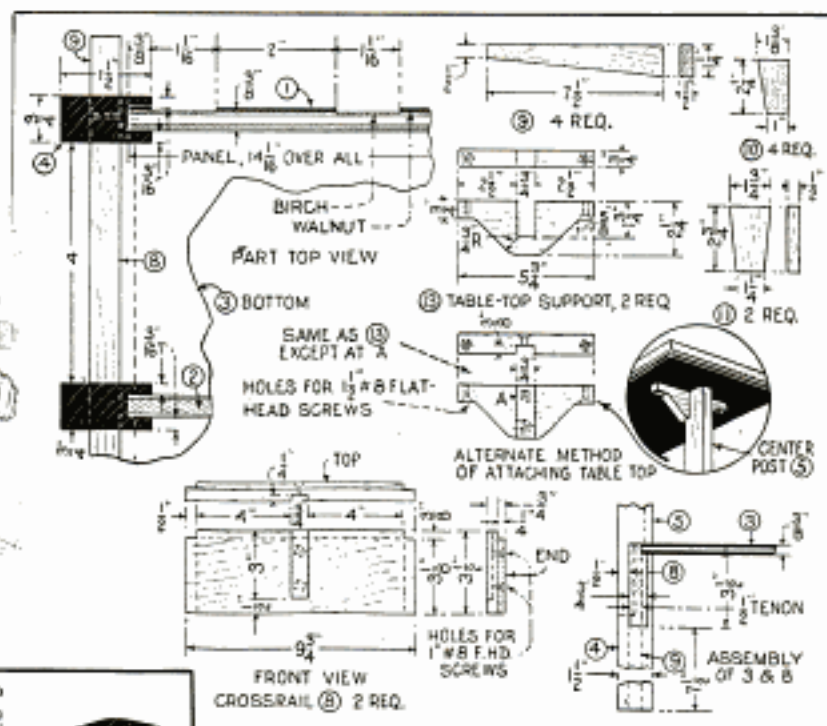
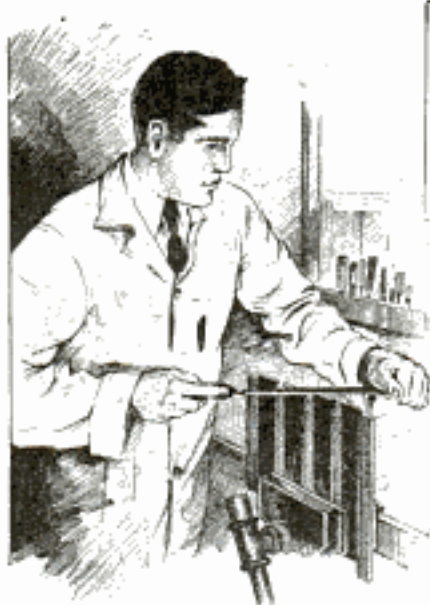
by Donald A. Price

THIS magazine rack and table represents an attempt to utilize the decorative possibilities of contrasting woods finished in their natural colors. Walnut and white birch are the two woods selected. Walnut should be used for the dark portions of the design. The rack was built and finished first. The height of the table is about 26 in., which is higher than the usual end table. However, this gives a better elevation to a reading lamp placed on it and also allows better access to reading matter placed in the rack when seated in



a chair. If work is started with a table as the only objective, the construction might be simplified by omitting the handle, No. 6, and attaching the center posts, No. 5, directly to the top with a cross bracket. While the construction may be carried through by hand methods, it will be greatly facilitated by using a motorized circular saw and router attachment. If a special routing machine is not available, this work can easily be done on the lathe with the aid of the sanding table to support the

work and the tailstock to feed it. The side panels, No. 1, may be made up first. When purchasing material for this be sure to select a five-ply panel, $\frac{3}{8}$ in. thick, with walnut veneer on one side and with a second layer of birch. The walnut veneer is to be cut away in bands $1\frac{1}{16}$ in. wide, exposing the lighter birch underneath. Sawcuts are made at each side of these bands, with the saw projecting above the table just enough to cut through the walnut veneer. The sides are best handled by cutting and



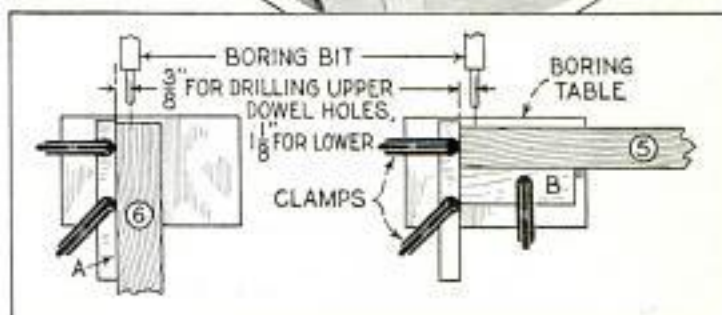
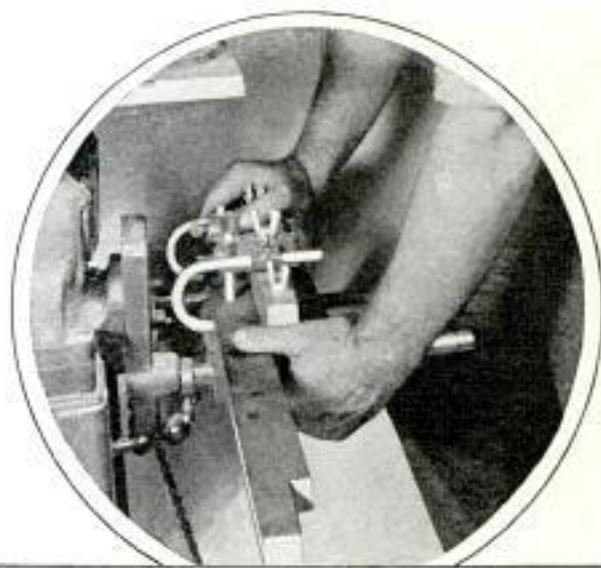
carefully squaring up two pieces, 13 by $14\frac{1}{16}$ in. in size, with the grain running lengthwise. Slide the ends against the rip fence to locate the cuts, working both panels at the same time. As the cuts are symmetrical about the center line, it will be seen that four cuts can be made with each setting of the fence. If a molding attachment for use on the saw is available, the flat-end cutters may then be used to clean up the bottom of the slot. In the absence of a molding attachment, sawcuts can be made to cut out the veneer in this slot, and the bottom trued up with a hand

routing plane. A dado head could also be used to do the slotting, following up with the hand router and sandpaper. After the slots have been cut, the step pattern on the edges may be cut out on a jigsaw and smoothed up with a file.

The corner and center posts should now be made up as shown in the detail of pieces Nos. 4 and 5. The $\frac{3}{8}$ -in. mortises for the side panels are cut in piece No. 4 with a router bit. It should be carefully noted that these mortises should be cut in opposite edges of the pieces for two of the four posts, making two rights and two lefts. A $\frac{1}{2}$ -in. groove is cut in the lower end of the legs for the ornaments, No. 9. The handle, piece No. 6, is not detailed, being merely a piece of $\frac{3}{4}$ by $1\frac{1}{2}$ by $13\frac{1}{16}$ -in. stock with a $\frac{1}{2}$ by 5-in. cutout in the center. The holes for the upper dowels should be drilled first in the ends as in the last detail. The piece is laid alongside a guide fence, A, clamped on the boring table to locate the hole and square it up. Then the corresponding hole in the centerpost is bored, butting its end against the fence to locate the hole. An additional block, B, is clamped to the table square with the boring bit to back up the work. The boring operations just described are repeated with the fence moved to the left to change the $\frac{3}{8}$ -in. dimension to $1\frac{1}{8}$ -in. in order to bore the holes for the lower dowels. By care-

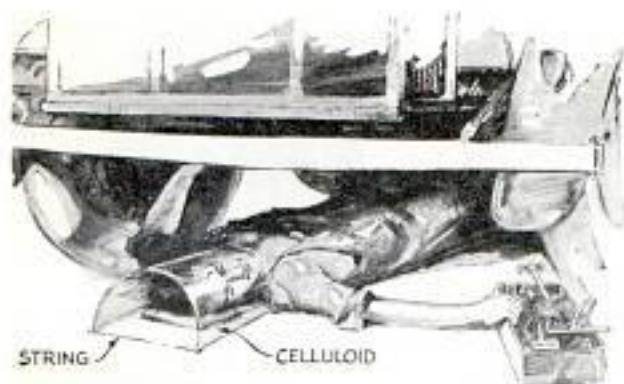
fully following this system of working, all marking out is obviated and the dowels will register perfectly when the parts are assembled. When the dowel holes are bored, a $\frac{1}{2}$ by $\frac{3}{4}$ by 5-in. piece, No. 7, is glued on the top edge of the handle, exactly in the center.

After the remaining parts have been made up according to the details, the assembly may be started by gluing in the ornaments, Nos. 9, 10, and 11. Then the side panels, Nos. 1 and 4, are assembled with glue and allowed to set. The two sides are connected with the crossrails, No. 8, and the bottom, No. 3, is glued and bradded in place. Then the center panel, Nos. 5, 6, and 2 is glued up, being careful to fit it so that the posts, No. 5, will just slip into their slots in the crossrail, No. 8. The finished center panel is fastened to the rest of the assembly with $1\frac{1}{2}$ -in. No. 8 wood screws from the inside of the crossrail. The edge of the table top may be treated in alternate ways to carry out the effect of contrasting woods, about which idea the whole piece of furniture is designed. If the center core of the panel is sound and of a light color, you can trim off the outer layers of veneer $\frac{1}{4}$ in. from the edge to expose the corewood. A better method is to run a $\frac{1}{4}$ by $1\frac{1}{8}$ -in. birch strip around the edge of the paneling, mitering it at the corners. To lay out the mortises and handhole in the top, lay it face down on the bench and set the rack upside down and properly centered. Then scribe around pieces Nos. 11 and 7 to locate these holes. The clamps, No. 13, should be a snug fit over the han-



Setup for Boring Operation to Have Dowel Holes Registered Perfectly When Parts Are Assembled

dle so that the top will be held on securely without any shake. The piece should be finished without staining by first applying a coat of filler-in oil, carefully rubbing this off after drying a few minutes until it appears dull. The oil in this will darken the birch or lighter parts to a pleasing straw color, just enough to take away the raw appearance of the unfinished wood. After the filler has dried thoroughly, several coats of white shellac, rubbed to a dull finish, will complete the job.



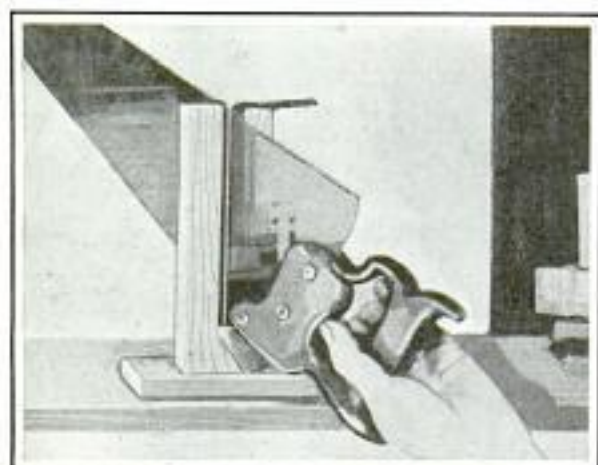
Celluloid Hood Protects Mechanic's Face from Dirt and Grease

Dirt Kept Out of Mechanic's Eyes with Celluloid

In order to keep dirt and grease from dropping into his eyes and face while lying on his back under a car, a mechanic made a celluloid hood to fit over his head. The celluloid is rolled into a half cylinder as shown, and is tied with a string at each end to hold it in shape.

☛ White lead, thinned to suitable consistency with lard oil, makes a good lubricant for dies.

A Handy Bench Oiler for Saws



With This Device One Can Quickly Oil Both Sides of a Saw to Protect It from Rust

Pulling your saw through this oiler coats both sides of the blade. The oiler consists of two pieces, a base and an upright, the former being bolted in a convenient place on the workbench, and the latter slotted and lined with felt, which is glued on. The top of the slot is cut at an angle to enable quick insertion of the saw.

Clip Prevents Loss of Wrench



Riveted to a wrench, a spring clip insures against its loss when carried in the pocket. This is especially handy for

mechanics who have to carry several small wrenches, such as those used on tappets and distributors.

Zinc-Plating without Electricity

An efficient zinc dip-plating solution is made by dissolving ordinary lye, 1 lb., in water, 1 qt. While this solution is boiling, add a quantity of zinc dust and continue the heating until no more zinc will dissolve. The excess zinc may then be removed by allowing the mixture to settle, and pouring off the clear solution. Well cleaned articles made from copper or brass acquire a uniform gray plate of zinc when dipped in this solution while hot. Articles made from iron or steel may be zinc-plated if they are first copperplated by im-

mersing them in a solution made by dissolving copper sulphate, $1\frac{1}{2}$ oz., in water, 1 gal., to which has been added 1 oz. of sulphuric acid. Without touching the copperplated work, rinse it in clear water and immerse it in the hot-zinc bath. Iron and steel must be freed from grease by washing in gasoline or by immersing in a strong, hot lye solution before plating is attempted. If the work is scaly or rusty, it should be pickled for 5 minutes in a bath made by cautiously adding sulphuric acid, $\frac{1}{2}$ lb., to water, 1 gal. All solutions must be used in containers which are not attacked by the chemicals. Enameled pans are satisfactory for this purpose. Zinc-plated articles made from copper can be given an imitation bronze finish by heating them in an oil bath to about 275° F. The work should be watched for the development of a suitable color. In heating oil, great care should be taken to avoid fire. An electric hotplate is suitable.

An Adjustable Hook to Support Long Work

Suspended from the rafters or ceiling, this adjustable hook, which consists of a heavy compression spring and an iron rod, will be found handy by blacksmiths and shopmen for supporting one end of long work while heating or drilling it. An eye is bent on one end of the spring for attachment to a chain or rod suspended overhead. A large hook is bent on the end of a rod to hold the work, while a smaller hook is bent on the other end so that it can be pushed inside of the spring and hooked over a coil of the spring in order to obtain adjustment for holding the work at the most convenient height.



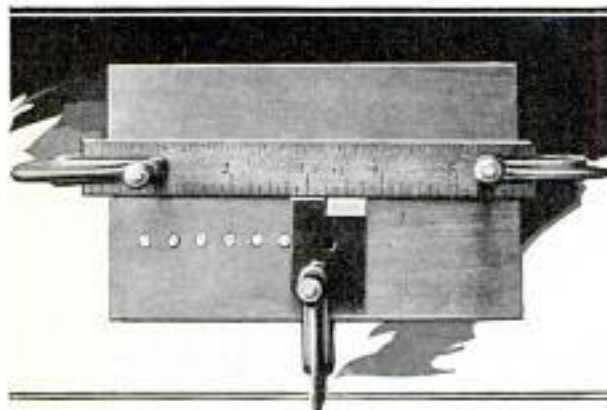
End of Long Work Conveniently Held for Drilling or Heating by Means of an Adjustable Hook

Guides for Centering of Keyway Cutters Save Time

Considerable time can be saved in setting up small shafting in a milling machine for cutting Woodruff-key slots, by making up a number of guides for centering of the cutter. To make the guides, mill a $\frac{1}{8}$ -in. flat on one side of several short pieces of stock of the various diameters required. Then mount the piece in the vise, with the flat bearing against the sliding jaw, and sink a keyway deep enough to serve as a guide for the cutter, it being assumed, of course, that the latter has been previously centered. By keeping these short pieces on hand, it is a simple matter to insert one of the required diameter in the machine and center the cutter for the regular work.

Jig Simplifies Accurate Drilling

When a number of holes are to be drilled in line, where their distance apart is equal to the graduations of a scale, the illustrated jig will be useful. Two C-clamps hold the scale on the work above the place



Scale and Metal Plate Aid in Drilling Straight Line of Holes Equidistantly

where the line of holes is to be drilled, while a third clamp holds a metal plate, which has one half of the upper edge beveled, and a guide hole drilled in its center directly under the position where the bevel ends. In use, the plate is moved an equal distance along the scale each time a hole is drilled.

☛ Screwdriver blades dampened and dipped in powdered rosin or emery powder will not readily slip out of the slot in the head of a screw.



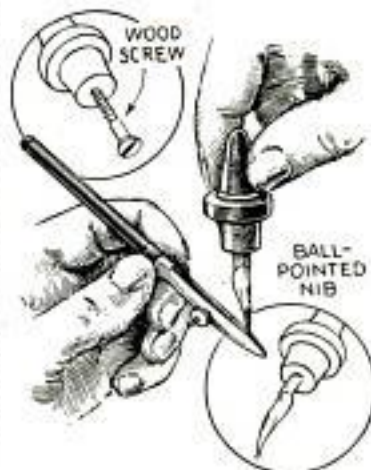
Piece of Inner Tube Nailed between Two Boards and Fitted with Handle Makes Floor Squeegee

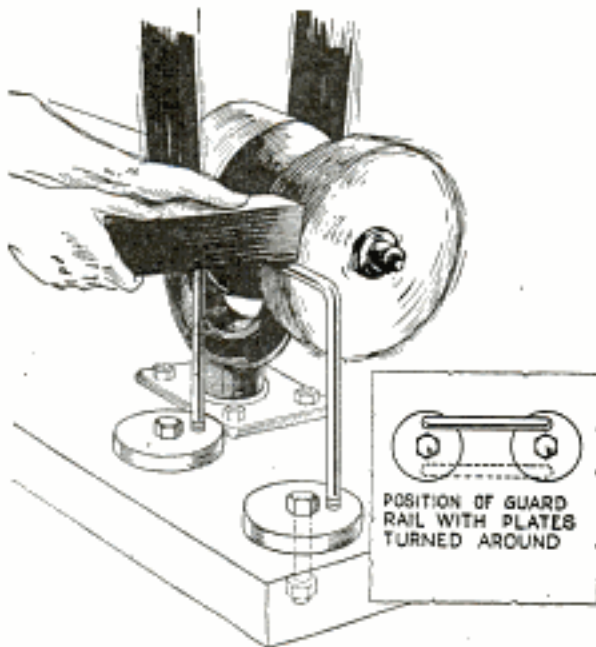
Garage Floors Cleaned with Squeegee

A 24-in. section of a large inner tube, folded in half and nailed between two pieces of 1 by 6-in. stock, makes a good squeegee for cleaning concrete floors in garages and basements. The rubber should project about $1\frac{1}{2}$ in. beyond the lower edges of the boards. A scraper or steel-bristled brush, attached to the top of the squeegee, helps to remove caked spots.

Substitutes for Quill in Ink Bottles

A wood screw, or a ball-pointed nib, substituted for the quills furnished in the cork of drafting-ink bottles, will be found handy for filling ruling pens when the quill becomes inefficient. By shaking the bottle before removing the cork, enough ink will adhere either to the screw or to the nib for one filling of the pen.





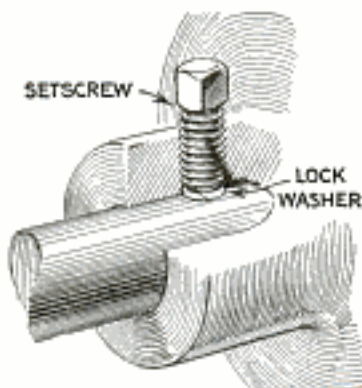
This Rest Prevents Sharp-Edged Work from Being Jerked from Operator's Hands While Buffing

Rest for Sharp-Edged Work on Buffing Wheel

Bolted to the bench in front of a buffing wheel, and extending up even with the center of it, the illustrated rest prevents sharp-edged work from being jerked out of the operator's hands. It consists of two round metal plates drilled in the center to receive the bench bolts, while holes drilled and tapped near the outer edge receive the ends of a suitable length of iron rod, bent as shown. As can be seen in the lower detail, the rest is adjustable.

Lock Washer Holds Setscrew Tight

Here is a new use for the common lock washer. Instead of being used under the head of a bolt, it is placed in the bottom



of a setscrew hole to hold the screw tight and prevent it from being loosened by vibration. If the hole in the shaft is not of sufficient depth to permit the insertion of the

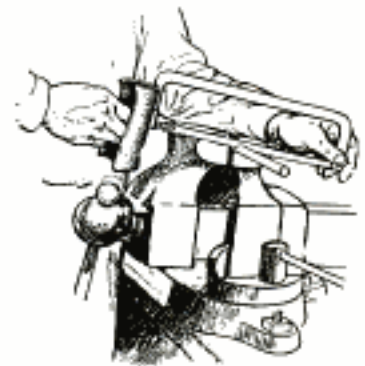
washer, it is a simple matter to drill it a little deeper.

Siphoning Water from Flooded Street Excavations

While working on a plumbing job where it was necessary to excavate a section of the street and the sidewalk to reach a leak in the service main from the city water main to the building, the water ran into the excavation so fast that the workmen could not complete the job. There was no pump available, and as it was impractical to bail the water out, a long hose, with a faucet at one end, was obtained and the free end inserted into the sewer-trap opening in the cellar. The hose was then filled with water, and the end with the faucet submerged into the flooded ditch. When the faucet was opened, the water was siphoned into the sewer. The faucet was adjusted so that the water was siphoned out as fast as it entered the ditch. In cities where there is a vent for the sewer at the edge of the sidewalk, the lower end of the siphon can be placed into it instead of running the hose to the cellar trap. When possible, this method is preferable to a pump, especially in residential districts where engine noise is objectionable.

Shield on Hacksaw Protects Hand

To keep your knuckles from being injured by having a hacksaw suddenly break through the work, slip a rectangular piece of old auto casing over the saw handle as



shown. The piece should be of sufficient size to cover the knuckles completely.

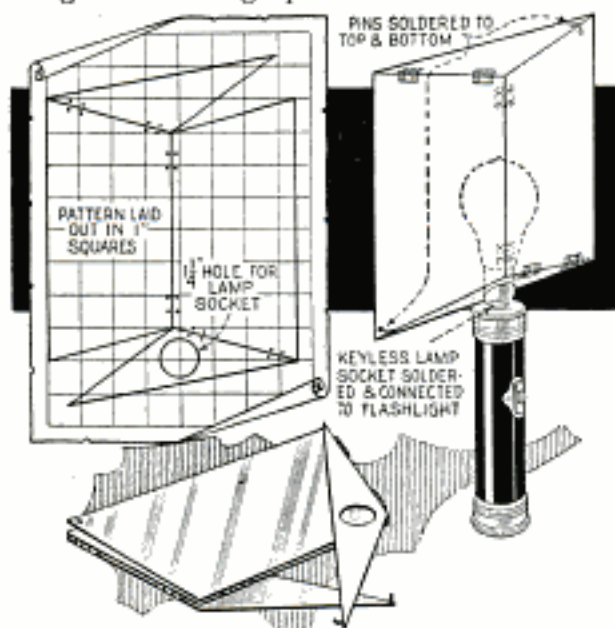
Brass Plating by Dipping

Small iron or steel articles may be given a thin, durable plate of brass by immersing them in a solution of copper sulphate, $1\frac{1}{2}$ oz., and stannous chloride, $1\frac{1}{2}$ oz., in 1 gal. of water. When these chemicals have dissolved, cautiously add sulphuric acid, $1\frac{1}{2}$ oz. Work to be plated must be thoroughly cleaned. Remove grease from the object with gasoline or by immersing

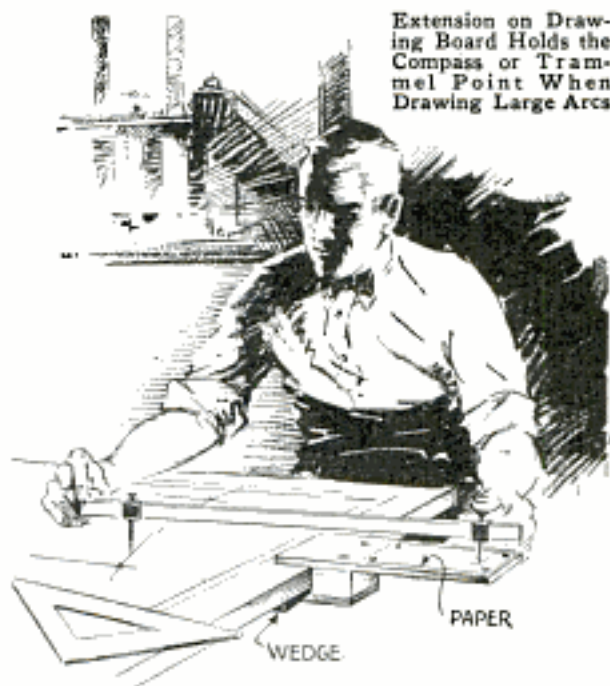
it in a boiling-hot solution consisting of 1 lb. of lye in $\frac{1}{2}$ gal. of water. Scale and corrosion are removed by immersing it for 5 minutes in a pickling bath made by carefully pouring commercial sulphuric acid, $\frac{1}{2}$ lb., into a gallon of water. Do not pour the water into the acid. Both pickling and plating operations should be carried out in a stoneware or enameled container. The color of the brass plate may be varied by increasing or decreasing the amount of stannous chloride. The less used the redder will be the plate.

Flash-Lamp Reflector Folds Flat for Packing

Folding to a thickness of $\frac{3}{8}$ in., this flash-lamp reflector is easily slipped inside of a case or coat pocket, and is readily set up. Sheet metal is cut into pieces of the sizes indicated by the cross-hatched section of the drawing, after which they are hinged together as shown. Pins are soldered to the top and bottom near the outside edges to slip into holes drilled through the sides to hold the reflector rigid when unfolded. If aluminum is used, the pins will have to be riveted, as ordinary solder will not adhere to this metal. A hole is cut in the bottom of the reflector to take a flashlight, which has a keyless socket soldered in place of the lens and reflector. The socket fits by friction in the holder and may be held in any position without danger of coming apart.



Made of Sheet Metal. This Flash-Lamp Reflector Can Be Folded into Compact Bundle to Facilitate Packing



Drawing-Board Extension to Scribe Large Arcs

For scribing large arcs, the illustrated extension board conveniently holds the compass or trammel points. The extension is merely two thin boards with a block nailed between them so they will straddle the drawing board. The top piece extends several inches beyond the edge of the board and may be covered with cardboard. A small wedge inserted between the drawing board and the lower piece of the extension holds it in place.

Cutting Grooves Inside of Cylinder with Power Hacksaw

On a job where it was necessary to cut several small grooves inside of a cylinder, and no tool was available for the work, a power hacksaw was used successfully. The vise on the saw was turned so that the blade would run between the jaws instead of alongside of them as in the usual setup. The cylinder was then clamped in the vise and trued up with the blade, which was loosened and placed inside. A piece of steel, slotted and casehardened and then clamped temporarily to the bed of the machine, guided the back of the blade.

☛ An acid-proof coating for tanks can be made by mixing pitch, 75 parts by weight; plaster of paris, 9 parts; ocher, 9 parts; beeswax, 15 parts, and litharge, 3 parts.

Can You Solve *these* Puzzles?



By SAM LOYD

*153 Halsey St
Brooklyn NY*

THREE miners decided on a merger of their adjacent claims. Then came an argument as to their individual holdings in the consolidated properties, for they were calculating their proportionate rights on the basis of how much fencing each claim required. The surveyor arbitrated by pointing out that the three claims, which were in the form of dissimilar right-angled triangles, were of exactly the same area, and thus the owners were entitled to like shares in the new company. Now, the area of each triangle was 3,360 square feet, and it makes an interesting problem to discover their respective dimensions, further information being that all sides of each (base, perpendicular and hypotenuse)

were whole numbers. The sketch provides the comparative proportions. What were their dimensions?

CONSTRUCTION estimates of my friend's contemplated bungalow provide a puzzle, as follows: Estimates of paperhanger and painter added together total \$1,190; painter and plumber, \$2,150; plumber and electrician, \$2,060; electrician and carpenter, \$3,985; carpenter and mason, \$4,600; mason and paperhanger, \$1,715. The total represents twice what the cottage will cost, since each workman's estimate appears twice. The paperhanger's estimate is two-thirds the electrician's. What is the cost for each kind of work?

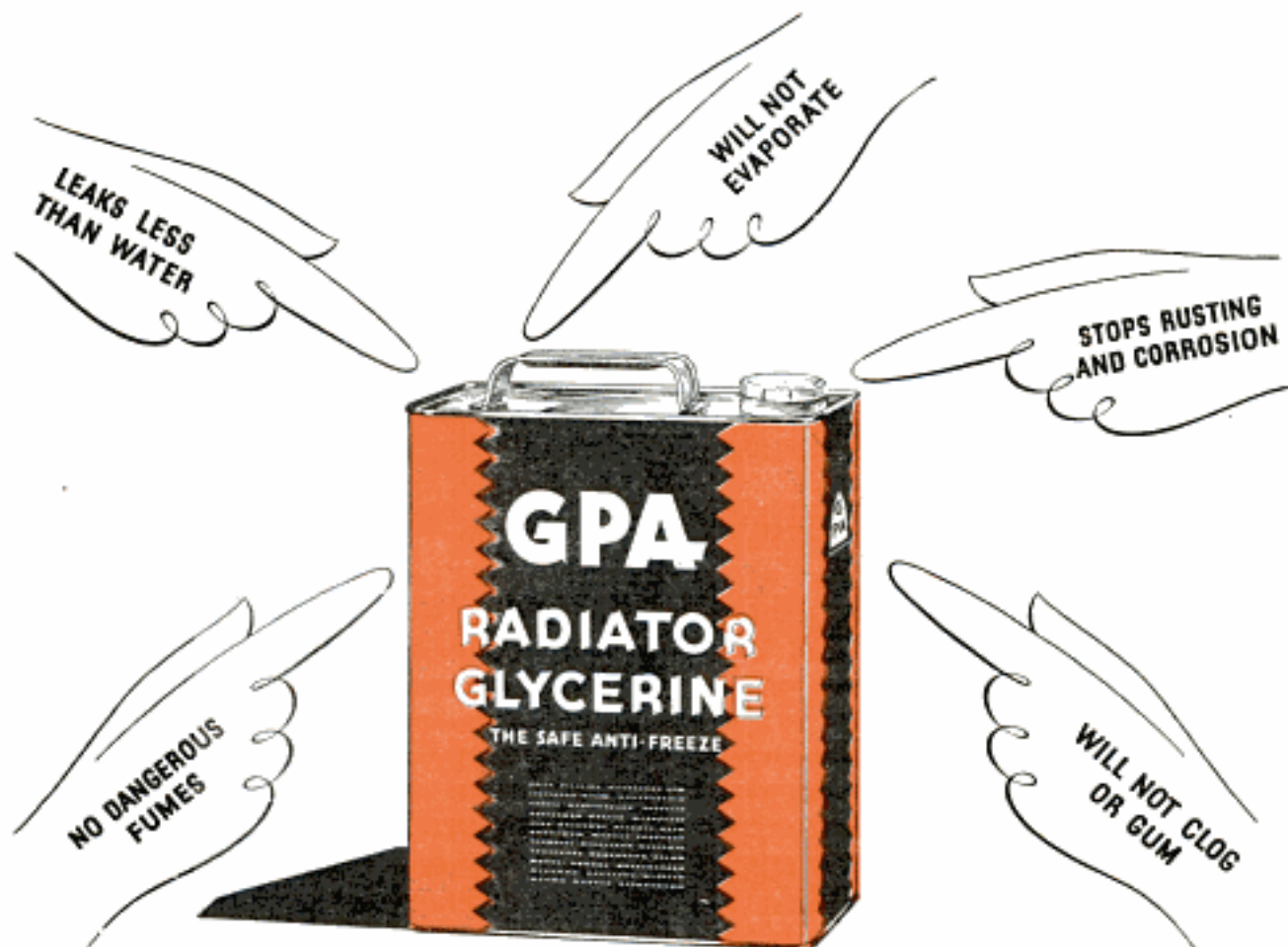
Answers to Last Month's Puzzles

In counting the guests from pew No. 60 to the opposite pew No. 82 there were 22 pews, or one entire column. No. 60 was the tenth pew, from which we deduce it was the thirty-second pew of the center columns. Therefore, there must have been 28 pews in the left wing—14 pews to the column. Altogether there were 88 pews in the four center columns, and 56 pews in

the four columns of the two wings, 144 pews in all, making a total of 864 guests.

Solving the court puzzle, the witness must have been born February 29, 1884, because it is the only February 29 falling on Friday between the years 1856 and 1924. Being of adult age, and her mother having been born in 1857, no other day will check with her testimony.

NEW! SAFER! COSTS LESS!



THE new G.P.A. is the anti-freeze *bargain* of 1932!

Not only is G. P. A. considerably lower in price but it is definitely better than ever for your car.

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5. Retards disintegration of rubber hose.

6. Positively will not clog or gum.
7. Mixes quickly and permanently with water.
8. Never overheats motor.
9. Does not injure Duco.
10. No dangerous fumes.
11. Safe—won't burn or explode.
12. Permits better operating temperatures.
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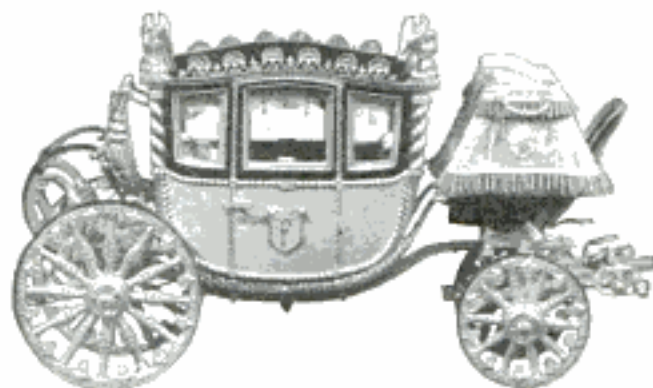


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A royal time at the Guild convention in Chicago, where that long-heralded "Century of Progress" Exposition will be in full swing! Such is the award awaiting 112 boys who earn first Senior and Junior honors.

And there are 1120 Gold Awards, 20 for each State, and 20 for each Guild District in Canada. In all, Guild members will receive awards valued at \$75,000!

Conditions of the 1933 Guild competition are the same as those which governed the two previous competitions. The judges are men of highest standing in the knowledge of craftsmanship. At their head as Honorary President is Daniel Carter Beard, National Boy Scout Commissioner. Honorary President of the Canadian Section is John A. Stiles, Dominion Commissioner for Scouting.

Join the Guild. Enter the competition. It may be your big chance to get started on a successful career! Read the simple instructions below—and enroll today!

How to Enroll in the Guild

It's easy to become a Guild member. Just go to any dealer in General Motors cars (Cadillac-LaSalle, Buick, Oldsmobile, Pontiac, Chevrolet) and say you want to join. He will do the rest. Your Manual Training teacher also can take your application—or the local Boy Scout Leader. Or you can simply fill out the coupon at the right and mail it to Guild Headquarters. Shortly after enrolling you will receive your membership card, an official Guild button and complete information about the Guild craftsmanship competition for 1933.

Fisher Body Craftsman's Guild Enrollment Coupon

(Please print plainly in all spaces below)

Boy's Name _____	Name of your School _____
Enrolled before <input type="checkbox"/> Yes <input type="checkbox"/> No	Grade _____
Born _____ day of _____	Manual Training Teacher _____
MONTH YEAR	Principal _____
Address _____	
City _____ State _____	

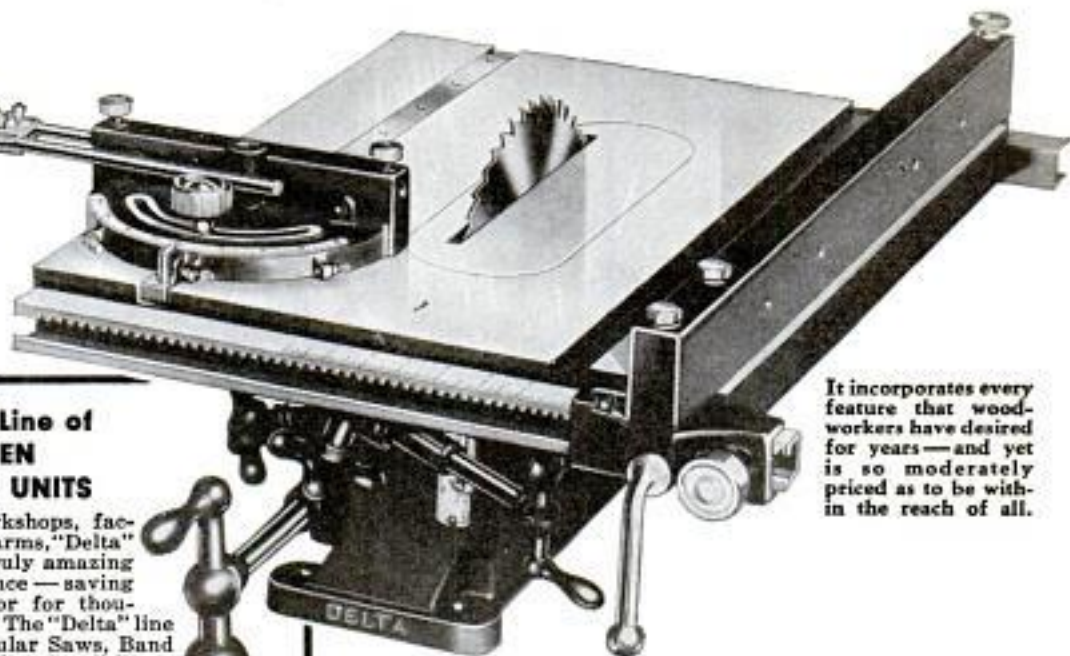
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Designed completely new from the ground up, this 1933 "Delta" Circular Saw is a revolution in performance, convenience and accuracy.



It incorporates every feature that woodworkers have desired for years—and yet is so moderately priced as to be within the reach of all.

New 1933 "Delta" Line of MOTOR-DRIVEN WOODWORKING UNITS

IN thousands of workshops, factories, schools and farms, "Delta" Tools are making truly amazing records of performance—saving time, money, and labor for thousands of woodworkers. The "Delta" line includes Jointers, Circular Saws, Band Saws, Woodturning Lathes, Scroll Saws, Drill Presses, Boring, Routing, Sanding and Mortising Attachments and a complete line of accessories.

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Radically different from any Scroll Saw on the market. Runs at full motor speed—1800 strokes per minute—with all springing and twisting eliminated—with perfect balance and absence of vibration! As a result, this remarkable tool produces fine, smooth and accurate work hitherto only possible on a band saw. Has 24-inch throat capacity and it will saw wood 2 inches thick! Works on metal and fibre as well as wood. Can be used for filing, sanding, and honing.



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Built with enormously strong, extra-heavy lathe bed. Has scores of new features that make it years ahead in design and performance.

New "Delta" Combination Units

"Delta" Combination Units are convenient, portable, and compact. All are mounted on benches or stands—and are available in large variety of combinations and at prices to fit all needs. These various combinations of "Delta" Tools are described in complete detail in the new 1933 "Delta" Catalog of Quality Tools.



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It would take almost a book to completely describe the features, advantages and range of operations of this sensational new addition to the Delta line. Briefly, the new "Delta" Drill Press measuring 68 inches high and provided with a heavy floor base, is a precision tool—built to meet the most exacting demands of production work and yet priced unbelievably low. It incorporates numerous new features... including Ball Bearing Spindle, Accurate Chuck, Tilting Table, Enormous Capacity, and many more. It is really two machines in one—as the head can be reversed and used efficiently as a Shaper. Hollow Chisel Mortising Attachments are available. For full details see the new "Delta" 1933 Catalog.

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LOW \$9 READY TO ATTACH AS ANY SMALL MOTOR
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Western price slightly higher.

HUNTING SEA MONSTERS

B/1055 (Continued from page 708)

of it was acidulous. Quickly then he found a means of restoring and maintaining the natural chemistry of the stored sea water.

The means was not only astoundingly effective; it was amazingly simple. Each week nowadays about twenty cents worth of a substance to be found on most pantry shelves does the trick. What Breder prescribed was ordinary baking soda. Actually the major portion of the salts of the sea consists of this familiar white powder in solution. Those who are aware that when the fluid of sea water vanishes through evaporation that which remains is sodium chloride—table salt—may be puzzled as to why table salt should not be added instead of bicarbonate of soda. The explanation is that in solution the sodium exists as bicarbonate but on evaporation recombines to form sodium chloride.

During a period of six months after the application of this treatment, fewer specimens died. The fish not only ceased to die as quickly as before, they began to thrive. A blue fish nearly doubled its weight. Injuries due to fighting were observed to heal with remarkable speed, yet previously fish sustaining any but the most trifling wounds were as good as dead. The fighting increased but a new arrangement of the 7,500 specimens of some 350 forms of life brought that problem under fair control.

By some native chemistry the fish distilled from that baking soda in solution all the rainbow colors that originally made their patterns brilliant suggestions to human designers. The ghostly shadows of faded tropical reef fishes became again vivid with red and green, black and silver, yellow and purple, iridescent and gold. Once more it was worth while to send expeditions afar off to bring back rarely seen specimens from the deep.

There are no dealers in monsters of the deep to correspond with the speculators who provide a market for wild land animals. If, as happened recently, the Bronx zoo has need of a black Indian rhinoceros it can buy one for \$8,000. The price of a giraffe, c.o.d. New York, is from \$5,000 to \$8,000. A good lion can be bought on the Bowery for \$1,500; a Siberian tiger costs from \$2,500 to \$3,000; a twenty-five-foot

(Continued to page 120A)



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What A Bargain!

We make this liberal offer to win your friendship, to show you how WOOSTER Foss-Set BRUSHES increase your painting skill—how BRUSH CLEANER by WOOSTER makes it easy to keep your brushes clean for good work.

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THE BRUSH—Wooster Shastette, 1 1/4" width, with pure Chinese bristle—great for painting small objects, sash or trim, touch-up jobs, etc. Foss-Set—Guaranteed use in anything—bristles can't come out!

THE CLEANER—Full 3 oz. package. Enough to clean out two or three used brushes. BRUSH CLEANER by WOOSTER is quick acting yet kind to bristles.

THE MANUAL—Contains valuable information on how to get better finishing and decorating results. Edited by F. N. Vanderwalker, famous practical authority. Actually worth dollars to you.

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We offer you the chance to invest 25¢ that will make dollars for you! Use the coupon to get a De Luxe Home Set, containing a real bristle dauber, a genuine lamb's wool polisher and a big tin of high-grade paste polish. Paste polish is best for most shoes. For kid shoes, we recommend Bixby's Liquid Polish. So if you want to earn extra money, don't turn this page until you've clipped and mailed the coupon below.

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88 Lexington Ave., New York City. Enclosed find 25¢. Please send me the De Luxe Home Set.

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2 IN 1 * SHINOLA BIXBY'S SHOE POLISHES



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HUNTING SEA MONSTERS

(Continued from page 118A)

python comes to market from some Malay jungle only rarely but the price runs around \$1,500, and a growing elephant from India can be had for the price of a good automobile, \$2,500. Even that rarest of menagerie exhibits, an okapi from Africa, is possible. There are two in the Antwerp zoo, but New York dealers say that a pair in the New York market would fetch \$20,000.

In recent times a number of multimillionaires have become interested in the game of using their costly yachts as vehicles for expeditions after specimens for the aquarium. William K. Vanderbilt with his yacht "Ara" has brought many fine specimens back from his cruises. Twice Vincent Astor has taken expeditions to the Pacific in his yacht "Nourmahal."

The first Astor expedition went to the Galapagos islands, 800 miles southwest of Panama. The chief concern of the scientific party aboard was the capture of some giant tortoises. For more than a century these cactus and grass-eating animals, which sometimes attain a weight of 600 pounds, provided the great whaling fleet of more than 700 vessels with their only fresh meat on Pacific voyages. Doctor Townsend is eager to save them from extinction. He believes that some day their flesh may be sold in butcher shops. The Astor expedition brought back 180 tortoises and these have been established in colonies in California, Louisiana, Texas, Florida, Honolulu and Bermuda.

But the "Nourmahal" on her return voyage from the Galapagos islands had other living creatures in her cargo, 265 fishes. Never before have living tropical fishes been transported so far—3,000 miles.

Size does not govern the value of an aquatic specimen. The 2,500,000 annual visitors from all over the United States prove it. They all want to observe sea horses, and their marvel grows when they discover that this fabled steed of Neptune's shell chariot is not so big as a man's little finger, with a market price of twenty-five cents each.

One horrible monster of the sea rarely to be seen in any aquarium is the octopus. In captivity the eight flailing sucker-lined arms of these grotesque animals soon be-

(Continued to page 130A)

CHOOSING A SHOTGUN

(Continued from page 767)

either thirty-inch or twenty-eight-inch barrels. It should be a double-barrel for several reasons. First of all, it gives him two chokes, whereas the single-barrel guns give him only one.

When you go after rabbits with this twelve-gauge double, and a cottontail jumps up just a few feet ahead of you to afford a close shot, this gun will spread the shot coming from the right barrel and not blow the cottontail to pieces. It will perform the same way on other upland game, as for example, on pheasants, which many times lie so close that you almost have to step on them. It will do for jack-snipe shooting and give you an excellent barrel for a close-in snap shot at grouse. By having more choke in the left barrel it should be used for the second shot, which often means reaching for the flying target at a fairly long range.

Choosing a gun for waterfowl hunting means the selection of a gun that delivers a good charge of shot in a close pattern at a long range. Most duck guns (doubles) are bored either full choke in both barrels or one full and the other modified. It is important that the wild-fowl gun be constructed to shoot large shot. Ordinarily number six shot is the favorite size in most duck hunting. But there are times, as for example in long-range pass shooting on canvasbacks in a high wind, when number fours are desirable. A suggestion on the weight of a duck gun in relation to loads and patterns is as follows:

A twelve-gauge gun (double) with twenty-eight or thirty-inch barrels should weigh seven and one-fourth to seven and one-half pounds if you plan on shooting three to three and one-fourth drams of powder and one and one-eighth ounces of shot. Now for choosing a gun for upland game. If the sportsman can afford to purchase a separate gun for just upland game-bird shooting, he is going to have some fun with the smaller gauges because it is in this field that the twenty and sixteen gauges provide so much sport. An upland-game gun should meet these requirements: It should be light in weight so that you do not get round-shouldered carrying it around, or so fatigued that you are slow on shots and do not enjoy the

(Continued to page 124A)

\$200. a month for life

*Would you be interested in this
guaranteed life-long income?*

Don't you often wish you could look forward to retiring some day on a Guaranteed Life Income? Many men and women who felt the same way a few years ago are now receiving Equitable checks for \$100, \$150, \$200 or more every month.

And they will continue to receive those checks every month as long as they live. There are no "ifs" or "ands" or "maybes." They KNOW that they will be completely free of financial worries even if they pass the century mark.

* * *

A few years ago they had no definite financial plans for the future. Then they learned of The Equitable Monthly Income Plan for Retirement. Many of them began by clipping a coupon similar to the one at the bottom of this advertisement. That is a way for you to begin, too. The coupon below will bring you a copy of The Equitable's booklet about guaranteed incomes. It tells you why and how a Life Annuity can provide a much larger income than any other equally safe plan affords.

The Retirement Annuity is but one of the many forms of Self-Income and Life Insurance service available through The Equitable.

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Please send your booklet, "The Fountain of Perpetual Youth."

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Two new BRIGHT SPOTS in the budget!

● IF ECONOMY is your watchword, here is cheering news for you. Think of buying genuine Eveready *Wireless-Electric* Lights for less than 50 cents apiece!

The new Eveready Spotlight Lantern, No. 10, is one of the most convenient little lights that was ever built. No bigger than the palm of your hand, and an inch and a quarter in thickness, it fits easily into a coat pocket. But don't think because of its size that it's a toy! Press the switch and it shoots out a straight, sharp beam of light of surprising brilliance. The new type solid glass spotlight lamp acts as a lens, intensifying the light-beam and increasing its range. And because of the thick glass construction it is practically unbreakable.

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THE PENNILESS IMMIGRANT

(Continued from page 787)

reached America. At night school and at Cooper Union he went on with his studies, and five years after he landed in New York, he entered Columbia college.

Greek and the classics thrilled him and all but captured him. But one day in his senior year he witnessed a lecture-room experiment of Faraday's discovery of electromagnetic induction, and a latent longing for science was awakened.

America was immature in the teaching of science in those days and so this brilliant immigrant boy turned his eyes toward Europe. From a Columbia trustee who had taken an interest in him, he borrowed money for two years of study.

For a year or two he was in Cambridge, and here for the first time he caught the vision of a life of science—of the true meaning of the eternal search for truth. Here he took the vows of a priest of science. His mother had told him as a boy that "education and knowledge is the golden ladder up which we climb to heaven," and to this he added that only through searching for the eternal truth could happiness be attained.

Berlin it was that furnished him his next great advance. Here under the inspiration of the great physicist Helmholtz he delved deeper and deeper into the unknown. New worlds opened almost daily for him.

Then Columbia college called him back to America, and he returned to work in the new department of electrical engineering of the school of mines. It was hardly more than a small building—which the boys called the "cowshed"—and contained the meagerest of equipment, but under the tutelage of this once Serbian immigrant boy were to pass some of the finest scientists America has ever developed—the great Robert Andrews Millikan, and Langmuir and Dunn and Armstrong. And here, too, were to be conceived some of the most important contributions to scientific development ever made in America.

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CHOOSING A SHOTGUN

(Continued from page 121A)

walking; more open boring and shorter barrels than the waterfowl guns.

In summing up suggestions to a hunter about how to buy a gun, the novice should keep these items in mind: (1) If you aren't a good shot stay away from the smaller gauges like the twenty and sixteen and buy a twelve-gauge. (2) Avoid a full-choke gun until you are a fairly good shot. The wider the spread, the better your chance to get your bird. (3) If you can afford one gun, make it a double-barrel twelve-gauge. (4) If you want a repeater or a self-loader mainly for long-range hunting, select a modified-choke gun. (The repeating guns made in America have no equal anywhere in the world for hard shooting, durability and accuracy.)

After the gun has been chosen, the novice is up against one of the world's greatest mathematical problems: how to judge the speed of a bird and place a shot charge so that it will strike the target. Briefly, here are some of the basic commandments for the beginner to keep in mind:

(1.) Get acquainted with the gun (empty) by throwing it to your shoulder and pointing it at small objects, always holding the gun firmly against your shoulder, not your arm, the left hand well out on the fore end of the barrel.

(2.) Stand with your left foot forward (this for right-handed shooters), your right foot ready to act as a pivot and supporting most of the weight of your body.

(3.) Don't jerk at the trigger when you fire the gun. Squeeze it—which means pressing down firmly.

(4.) Shoot with both eyes open. The reason is obvious. Two eyes are better than one; you can judge speed of birds more quickly and shoot more accurately.

(5.) If possible try the gun first on clay pigeons thrown slowly from a trap. Also, if possible, have an experienced shooter behind you. Get used to holding above targets going straight away and up (like quail fly in the field) and hold ahead of targets traveling at angles to you.

(6.) Remember that it is better to hold what you may think is too far ahead of a bird than to not lead enough at first. More birds are lost by the second method than by the first to the beginner.

(Continued to page 130A)

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TREASURE HUNTS

(Continued from page 757)

passages. Napoleon Bonaparte is believed to have hid treasure when he fled from France after the battle of Waterloo. His will, made in exile on the island of St. Helena, mentions gold and jewels hidden near his old palace of the Tuileries.

Asia too has its stories of treasure hoards, many of them located in India's jungle cities of the dead. A few months ago, Sir Sadig Attasi, the nawab of Bawalpur, a native state in the Punjab, of northern India, engaged a corps of 700 men to dig in a village called Derawar, where an Indian named Dewan Laxmichand assured the potentate he knew the site of a cache of treasure valued at the amazing figure of \$625,000,000! Legend says it is buried ten feet down. Often these native hoards were hidden in forts and walls, the clues being shadows thrown by certain buildings or trees at noon.

But the most promising field for modern treasure hunters lies in Central and South America and off the coasts and on shore of certain islands in the old Spanish Main, of the West Indies.

The writer has examined numbers of old Spanish charts, made by Jesuit mission fathers in the seventeenth century, and believes that there are in existence today, at least five caches, made by the Incas in various unknown or unexplored recesses of the great Cordillera of the Andes. Among these are the great gold cache of Lake Titicaca, the treasure of the valley of the Orcos, the lost treasure vault of old Cuzco, the gold hoard of the lake on Mount Soratu and the strange cache of the "hidden mountains" of Azangaro.

Modern Brazil and Argentina have many treasure caches, made in the old days of the Portuguese dominion, when many slaves, who were white malefactors condemned to life-long labor in the gold mines, hid big nuggets in the hope of digging them up at some future time—which never came.

Around Iquique, in Chile, large amounts of gold are locally said to have been hidden when the Peruvians retreated from the Chilean army, in the war of 1879. It is said today, that the Peruvians had to retreat so quickly from Iquique that they had not time to carry away their treasures,

(Continued to page 138A)

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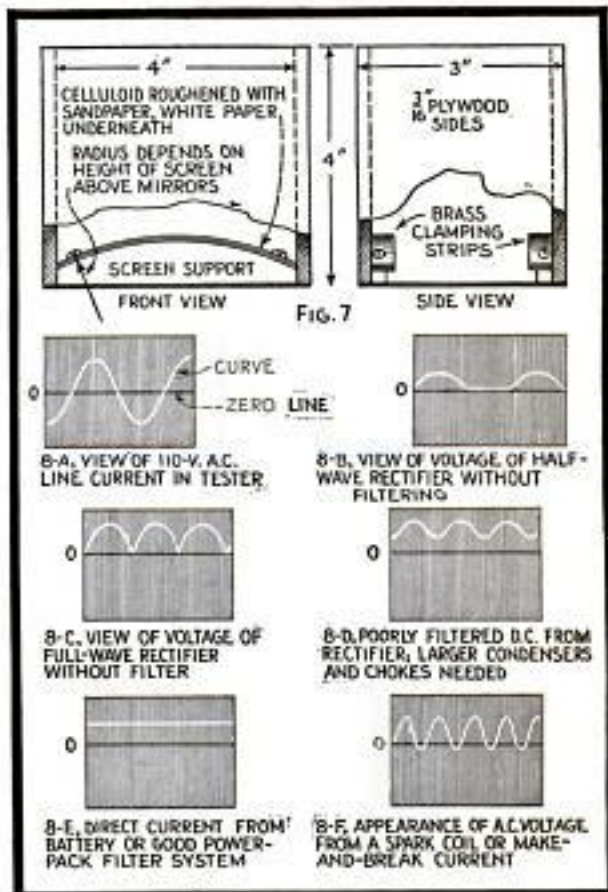
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A. C. TROUBLES MADE VISIBLE

(Continued from page 799)

tact D, may be made from sheet brass or steel. The adjustable lens holder and tube were assembled from the sizes of telescopic brass tubing indicated above the diagram. The collar which holds the lens tube to the lamp house may be made from 2 1/8-in. outside diameter brass tubing 1 1/4 in. long. The tubing is marked all around 1/2 in. from one end and slotted from this end to the mark at intervals of 1/4 in. The ears thus formed are bent out on the line at



right angles with the tube. Either solder or small machine screws may be used to fasten this collar to the lamp house.

The parts are now assembled on a small drawing board as shown in the photos. The baseboard should be mounted on rubber feet and the motor is mounted on a separate base and placed on a sponge-rubber pad to prevent vibration. The lamp and motor are supplied with 6 to 8 volts as shown in Fig. 6, from a small step-down transformer which may be a toy type. A storage battery may be substituted for the transformer if preferred. A 20-ohm rheo-

(Continued to page 131A)

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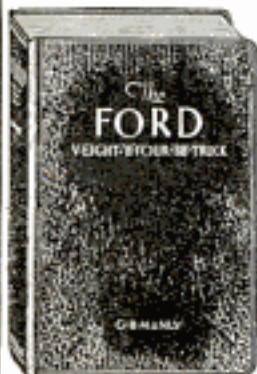
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61055 HUNTING SEA MONSTERS

(Continued from page 120A)

come slimy dead things, but in the ocean they live to attain huge size until only the largest whales dare prey on them. Time and again Doctor Townsend has brought specimens to the aquarium only to have them die.

One creature of the ocean depths has thus far eluded not only Doctor Townsend but all other marine zoologists. This one is an eel-like fish of giant proportions called Regalecus. No live one has ever been seen by a trustworthy witness but the biggest of which there is any record was cast out of the sea at Bermuda. It was thirty feet long and had a crested snout; a real sea serpent.

"Will you ever get one?" I asked Doctor Townsend.

"Well," he said, "he can't elude us forever. Carcasses of his kind testify that he exists and probably not in profound depths. I'd trade the rhinos, giraffes, okapis and elephants of all the menageries on earth for one live Regalecus. If you can catch one alive you can name your own price!"

CHOOSING A SHOTGUN

(Continued from page 124A)

(7.) Do not fire too hastily at game birds. The average beginner bangs away when the first feather of a quail shows, and on ducks he shoots so quickly that frequently no aim is taken. It is the cause of many misses, but—more important—the start of a bad habit. Let a bird get into its flight and then take time to shoot.

(8.) Remember there is no short cut to judging the speed of birds and where to hold on them. No one can tell you how far ahead of a bird to hold your gun. Not even veteran hunters can tell that accurately. It is something that is felt after much shooting. It comes by experience. Only practice and study bring it.

(9.) At first try to get a little practice on low-flying birds over water. These show where your charge goes and whether you are leading enough or too much.

(10.) Don't overload your gun and take a pounding from shooting big shells in order to reach extreme long-range shots. "Skyscraper" shots very often mean many wounded lost birds.

A. C. TROUBLES MADE VISIBLE

(Continued from page 128A)

stat of the radio type will provide speed control over a toy motor. If a 110-volt motor is used, a high-resistance heavy-duty rheostat is substituted. The wooden pulley wheel is about 5 in. in diameter.

The speaker unit should be connected to the voltage that is to be studied through a high-resistance adjustable rheostat to prevent its being burned out. The celluloid window in the viewing box, detailed in Fig. 7, is bent to a curve so that the wave picture will not be distorted. A center line should be inked on the tissue paper which is placed under the celluloid.

If the assembly is made in a partly darkened room, the light pencil from the illuminator will be clearly visible if a puff of smoke is blown into its path. The light beam should be focused upon the silvered spot of the vibrating mirror. To try out the instrument, turn on the lamp and start the motor, without connecting the speaker unit to a source of current. A fine straight line of light should be produced across the entire length of the viewing screen. Adjust the apparatus until this light streak is as bright as possible and lines up with the inked zero line. When these lines coincide, connect the test leads to the 110-volt a.c. supply with all of the rheostat resistance in the current. Now adjust the rheostat until enough current flows to produce a good curve. The motor control can now be adjusted until the curve stands still and resembles the curve shown in Fig. 8-A. The height, or amplitude, of the curve may be controlled with a 2,000-ohm rheostat.

It is a good plan to try the instrument on the output of a half-wave tungar rectifier, and on other types of rectified current to become familiar with its working. The motor-control system makes it possible to stop, or synchronize, waves throughout a wide frequency range. The effect of condensers and chokes of different sizes in power packs may be easily determined by a few experiments. The instrument may be used to show the effectiveness of filter systems, condensers, chokes and rectifiers in radio sets by connecting the test leads to the speaker terminals of the receiving set. The receiver should be tuned to a dead spot for this test. The ripple in the wave is a measure of the effectiveness of the filter system.

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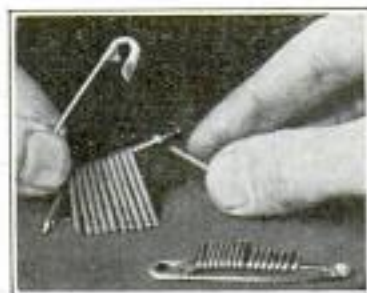
GAS-FIRED BLAST FURNACE

(Continued from page 845)

cracks may develop resulting in a loss of metal and other inconveniences. Soft steel may be casehardened; that is, given an outer case of very hard, high, carbon steel, in this furnace. Work to be casehardened is put in a crucible and surrounded with finely powdered bone charcoal, potassium carbonate or even powdered hardwood charcoal. The crucible and its charge are then put in the furnace and heated. The higher the temperature the more rapid will be the absorption of carbon. The thickness of the case depends upon the length of time the work is kept heated. It is impossible to state the exact time required to produce a satisfactory depth, due to the difference in qualities of steel and iron; however, a few experiments will show the best procedure. When you think the work has heated long enough, turn off the heat and allow the pack to cool. When cool, remove the work from the pipe crucible and brush off any adhering carbonaceous matter. The carbonized work is now ready to be hardened. This is done by heating to a cherry-red temperature and quickly immersing in a tank of cold water. While the work is in the cold water, it must be kept in constant motion to increase the rapidity of cooling.

Articles made from soft iron and ordinary steel may be given a very hard and durable surface by this treatment. Another application of casehardening involves the iron electroplating of articles made from softer metal at points where wear is likely to be encountered. These iron-plated pipes may then be casehardened as described above.

Safety-Pin Holder for Cotter Keys



Different sizes of cotter keys can be separated according to size, placed and held on safety pins as shown in the photo. The

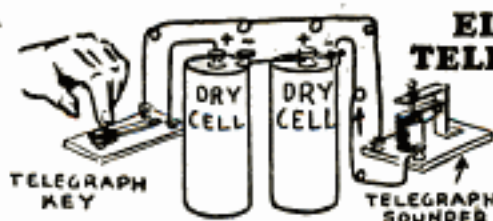
pins can be hung from a nail over the workbench or carried loose in the toolkit.

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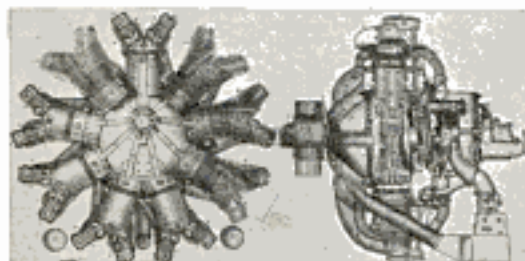
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(Continued from page 800)

mono-basic ammonium phosphate in 1 gal. of distilled water; be sure to use distilled water only. Each jar is filled with this solution so that the electrodes extend down into it for about 3¼ in. The plates in each cell are then ready for forming. This forming process is for the purpose of

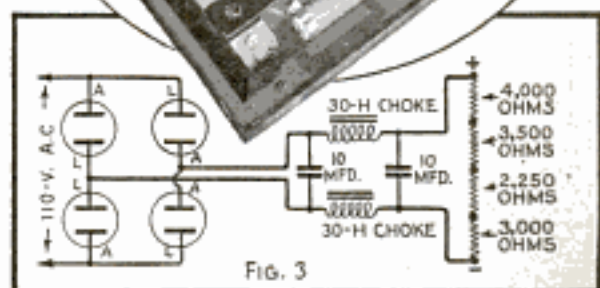
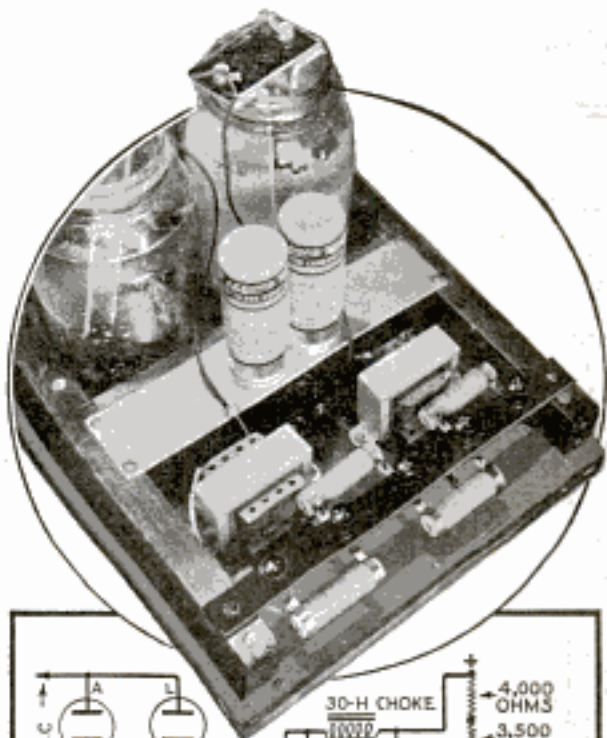


FIG. 3

creating an insulating film on the surface of the aluminum electrode. Connect each cell separately, in series with a 100 or 150-watt lamp in the 110-volt a.c. house line. The lamp will light up brightly and then after an hour or so it will dim and finally go out. When this occurs the cell is formed and ready for use. When the formed cells are in position, care should be taken that the aluminum and lead electrodes are wired in the circuit exactly as shown in Figs. 2 and 3. Also note that the connection taken from between the rear lead electrodes is soldered to the metal strip just before it goes to the choke.

Without the voltage divider, the output voltage will be from 110 to 120 volts d.c.

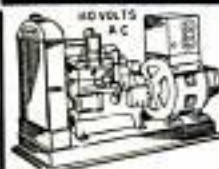
(Continued to page 136A)

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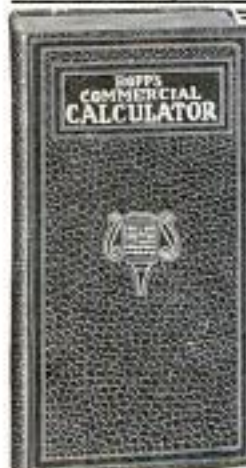
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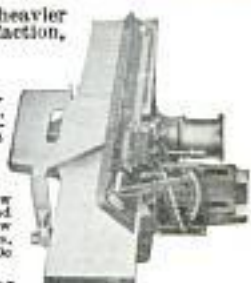
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(Continued from page 134A)

Enlarged diagrams, also a material list with further information and hook-up data are available if desired. The series resistors enable the builder to divide the output voltage to supply the plate requirements for the various tubes. These resistors cause a drop in the total output voltage but there is sufficient high voltage still available for the audio tubes. This voltage may be slightly increased by using a 2-mfd. paper-type filter condenser, instead of the first 10-mfd. condenser shown in Fig. 3, between the cells and the chokes.

Additional Data for Builders of Five-Tube All-Wave Receiver

The values of the various parts indicated by key letters and numbers in the schematic diagram Fig. 2 of Part I, that appeared in the October issue, refer to the material list which is available to all upon application. A .01-mfd. fixed coupling condenser C₁₀ should follow RFC₁ in the schematic diagram Fig. 2, and the a.f. transformer posts P and G are, of course, not intended to be connected to each other.

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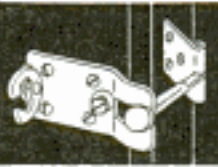
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TREASURE HUNTS

(Continued from page 126A)

and places are pointed out where the gold was hidden. Treasure hunters are operating in this region at the present time.

In the Spanish Main, Haiti, Tortuga and the Virgin islands still have undiscovered caches of gold and pieces of eight, dating back to the days of pirate Blackbeard. The writer recently heard of a negro fisherman in one of the Bahamas who has kept secret the location of an old treasure wreck he found when diving. These stories are by no means legendary, as is shown in the remarkable adventure of a poor fisherman, Edward Fitzgerald, who, on the shores of New Providence island, in the Bahamas, found, in February 1932, five gold bars valued at \$70,000. The cache was under a wild plum tree and some old-time pirates had carved a mystic sign on a rock near by.

The jewels and gold of Montezuma, the last Mexican king, have not been found, despite the feverish searches, by gringos and Mexicans alike, in the bed of the lava of the Lake of Mexico. This hoard is mentioned in the title deeds of the estate on which it is buried.

Salvors in United States waters will do well to verify the facts about the modern liner "Merida," and the old-time vessels, the British frigate "Hussar," the "Lexington" and the privateer "De Braak." A great deal of money has been wasted in looking for the treasure of these ships. The "Merida," a Ward liner which sank in a collision off Cape Charles, Va., in 1911, is wrongly reputed to have had aboard the Austrian crown jewels of the emperor Maximilian, of Mexico, as well as eight keys of gold coin and twenty-two tons of silver.

It is authoritatively reported that, when the "Merida" sank, her strong rooms contained about \$200,000 in silver and 1,000 gold dollars of a woman passenger.

There is nothing in the documents in either the British admiralty archives or those of the London public record office to corroborate the legend that the Revolutionary War frigate "Hussar" had a pay chest containing several hundred thousand dollars when she went to the bottom at Hell Gate, N. Y., in 1779. Near the "Hussar" is said to lie the old wreck of the "Lexington" with a half ton of gold, 8,800 pounds of silver plate and 500,000 Mexican dollars.



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SOVEREIGN OF THE SEAS

(Continued from page 829)

entire ship again with sandpaper, so that the hull curves will flow easily, without irregularities, into the contour of the upper works. The keel, stem, deadwood and sternpost are four separate pieces of ¼-in. board or plywood, cut to the shapes shown in Figs. 19 and 20. Some fitting may be required to make these conform to the exact shape of your hull. Join the assembly to the hull with glue and small wooden dowels. The stem should taper to ¼ in. thickness at the extreme bow. Where the assembled pieces meet the hull, the effect is improved by filling in the square joint with plastic wood to produce a slightly rounded joint. After this has been done, sandpaper the keel parts to equal smoothness with the hull. Brush the entire job with thin shellac to raise the grain and, when this has dried, sandpaper carefully to remove any trace of roughness. The fully assembled ship will now appear as in Fig. 15. Make a temporary cradle similar to that shown to hold the hull in a convenient position while proceeding with the work.

WHEN THE STARS FALL

(Continued from page 727)

about 4,000 feet across and is 600 deep. Hundreds of feet deeper the meteorite itself is believed to lie. Attempts have been made to sink a shaft to this buried treasure, for the nickel and iron in a meteorite of this size would give it considerable commercial value in addition to its high scientific interest. Had such an object struck Manhattan island or the Chicago lake front, it would have set a new standard of destructiveness.

Until recent years, meteors have received only slight attention from professional astronomers, and the task of observing them has been left pretty much to the amateur, who, by the way, has rendered valuable service. But lately astronomers have begun to realize that in meteors they have a clue to the physical universe. All their other studies must be made through the indirect medium of starlight, but in meteorites we have actual samples of the stars' stuff, specimens, it may be, from some far-off nebula or dead planet, which we may analyze.

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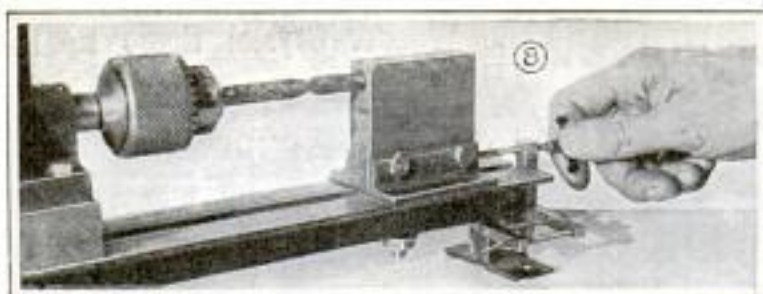
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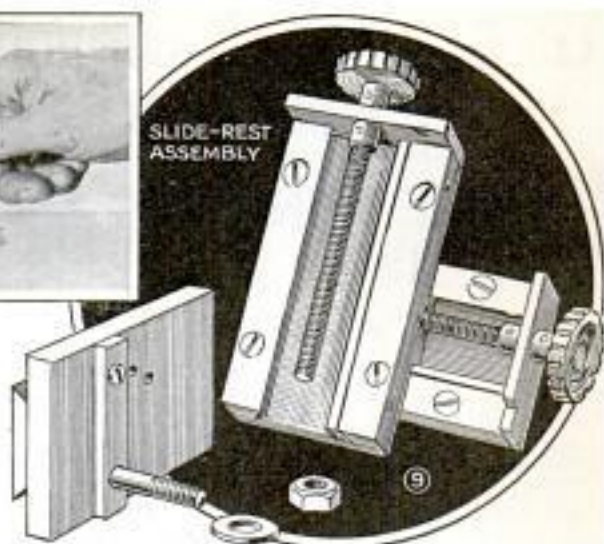
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LATHE FOR MODEL MAKERS

(Continued from page 839)

The final setting of the slides at 90° is done with the slide rest on the lathe, by feeding the cross slide across under a scribe, set up and clamped solidly to either headstock or tailstock, so that it scratches a line on the top surface of the cross-slide plate. A line is then scribed by hand on the same surface accurately at right angles to the first. Next, with the scribe set up as an indicator on the second line, feed in the lower slide so the second line follows under the point. If the setting is correct, the point should follow the line. Play in the screw holes should permit the slides to be moved by light taps of a hammer, until lined up properly, after which they are doweled. The key should be filed from a piece wider than $\frac{3}{8}$ in. so that it will fit snugly in the bed slot, and drilled for a snug fit on the stud. Angles are obtained by rotating the key around the stud, and the screw holes for holding the key at different locations can be laid out close enough. The indicator lines must be carefully located by adjusting the slide around until it will turn a piece of rod the same diameter for the whole travel of the cross slide. At this setting, lock the key with the screw and scribe the line along the side of the key for the zero angle. From this line, set the key at whatever other angles you may expect to use, and scribe the other lines. For clearness of illustration, only two angle settings are shown, but these may be as many as one for each degree, by putting two arcs of staggered screw holes in the base to obtain half-hole spacing, and slotting the holes in key. The toolpost is easily made from a flat-head machine screw of $\frac{5}{16}$ -in. diameter, long enough so that the threads are removed when cut to the $1\frac{3}{8}$ -in. length. Make the slot in this by drilling a series of holes and complete by filing out the metal between. File the head of the post



so it is slightly below the surface of the metal around the countersunk hole. The small segment can be cut from a large washer of $1\frac{3}{4}$ -in. diameter, $\frac{1}{8}$ in. thick, and should move freely in the post slot. Make a tool bit by grinding up a piece broken from a $\frac{1}{8}$ -in. square file and clamp it temporarily in the post to turn up the small round concave spacer. Assemble the post complete and drive in the pins at each end of the segment to act as retainers.

The turning of the three handwheels makes the final step in completing the machine. File the grooves in the rims of the slide-rest handles, and pin them in place, allowing free turning without play. Any shake at this point will cause chattering on heavy cuts. The tailstock wheel is held with a setscrew, and a slight depression is drilled on the spindle for this screw to enter. Tools and fittings for this lathe will be described in Part II.

Locating Trouble in Automobile Lighting Systems

By connecting the two caps from a blown auto fuse to the terminals of an ordinary buzzer with soldered lead wires, a good audible trouble tester can be made. Insert the fuse thus connected into the fuse receptacle, which persists in blowing out, and trace the wiring. When the short is removed, the buzzer will become silent. If the fuse blows only when the lights are on, the intensity of the buzzer will be reduced when the faulty wire is found. An alternate method consists of using an auto light bulb in place of the buzzer.

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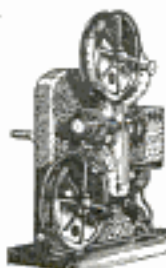
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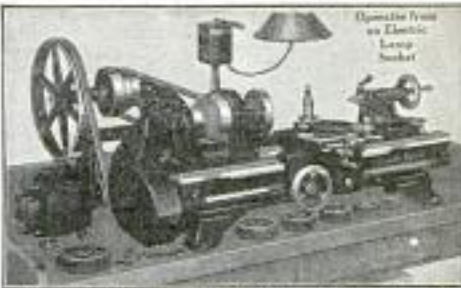
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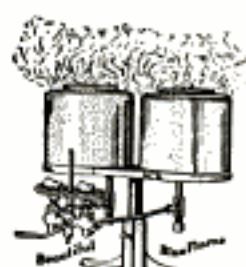
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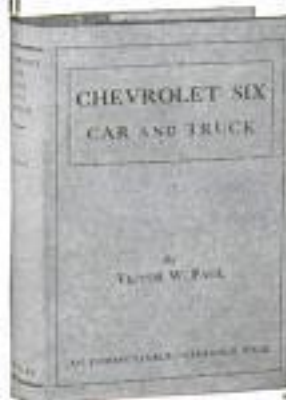
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