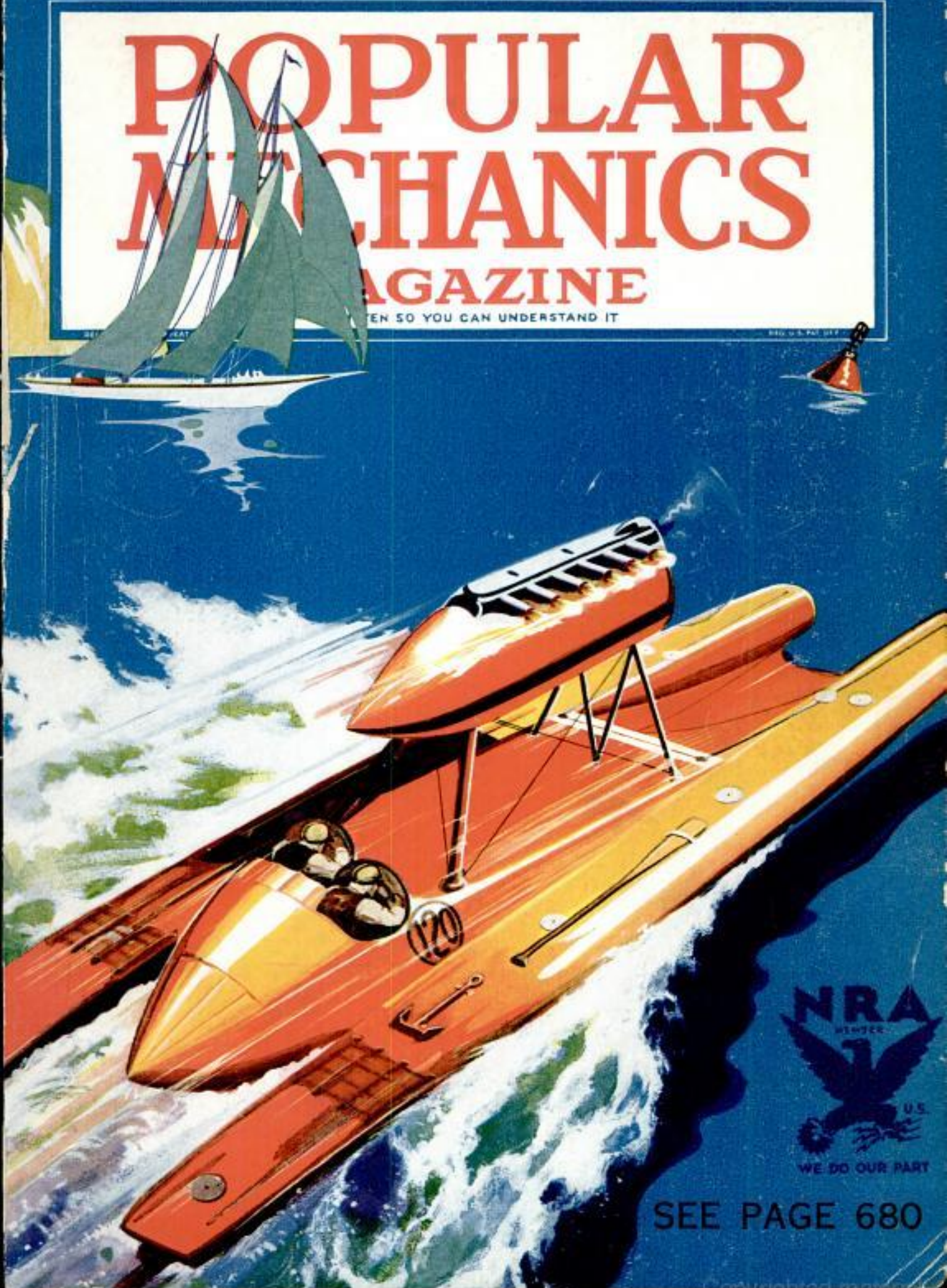


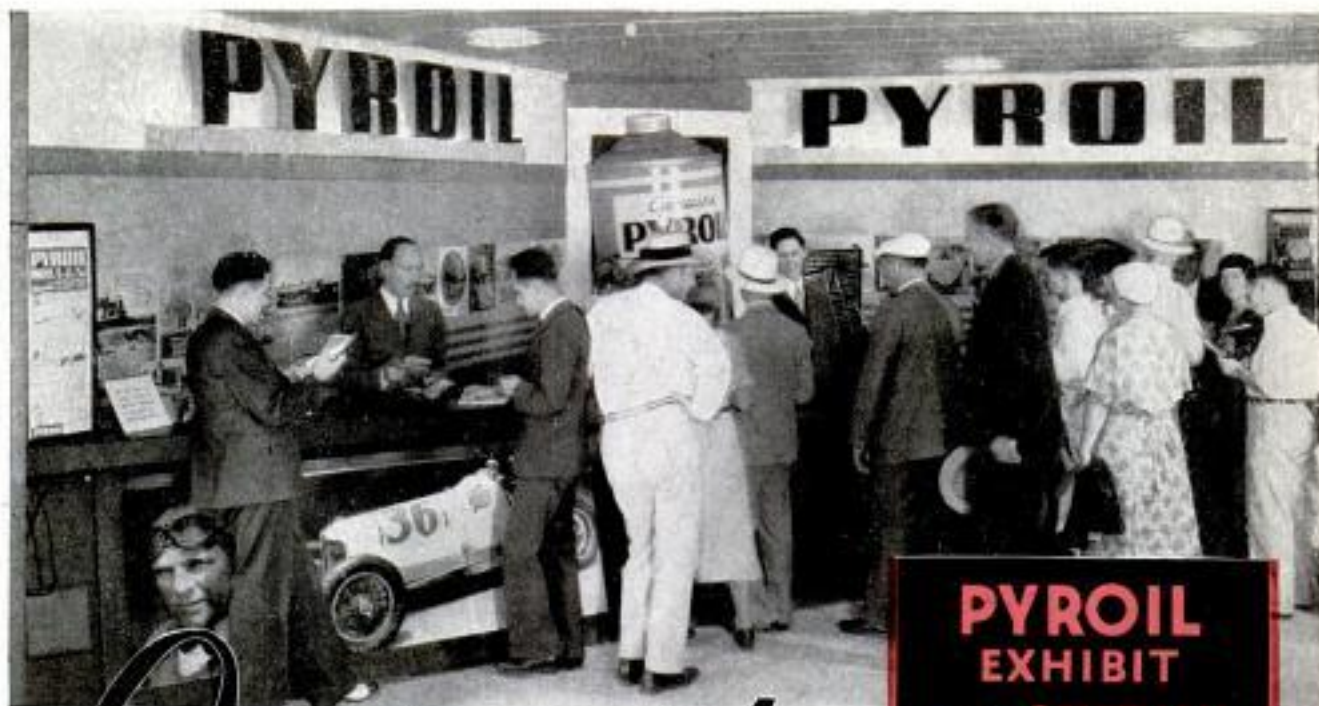
POPULAR MECHANICS MAGAZINE

...TEN SO YOU CAN UNDERSTAND IT

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SEE PAGE 680



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EXHIBIT**
at a CENTURY
OF PROGRESS
WORLD'S FAIR
CHICAGO 1933
General Exhibits Bldg.

The man who becomes a Pyroil Salesman or Distributor, starts off with a sales demand created universally for his Product. The picture above illustrates one instance of the extent to which Pyroil exploitation is continuously carried. Throughout the duration of the Chicago World's Fair, many thousands of people have visited the interesting Pyroil

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

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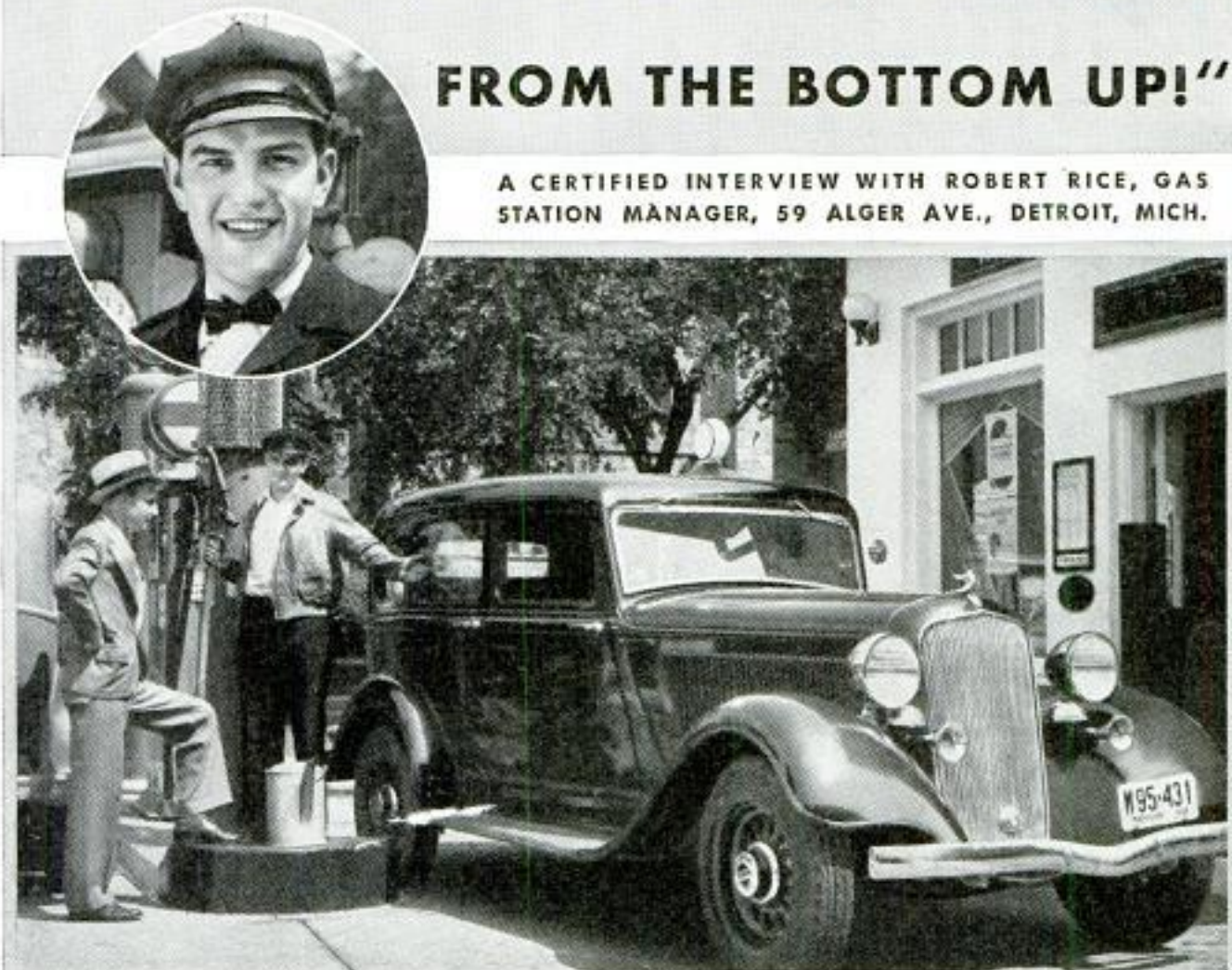
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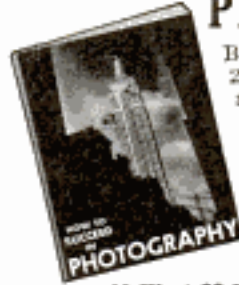
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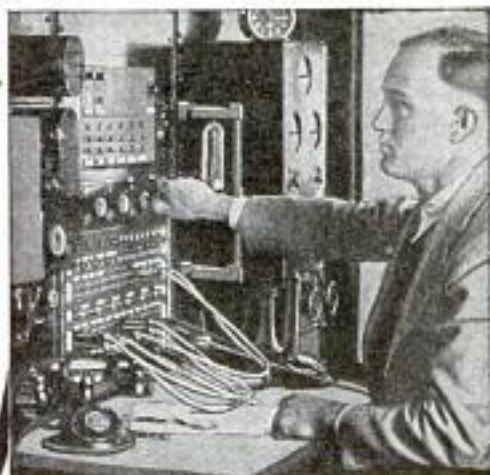
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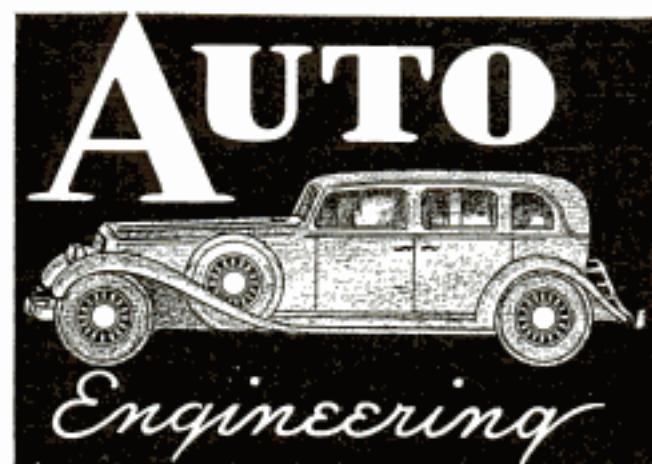
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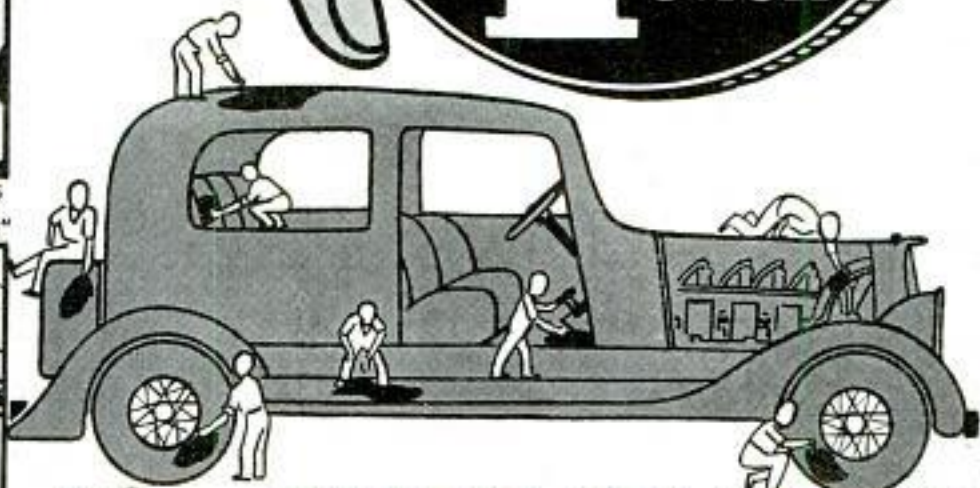


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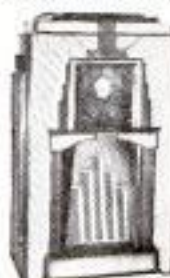
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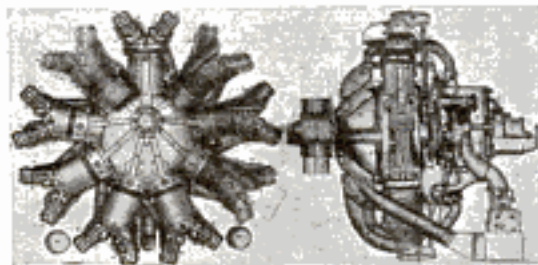
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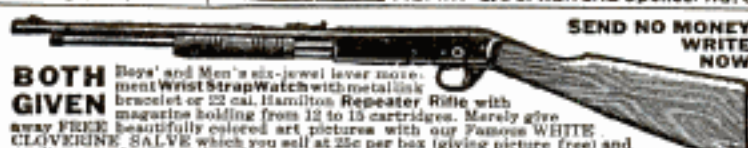
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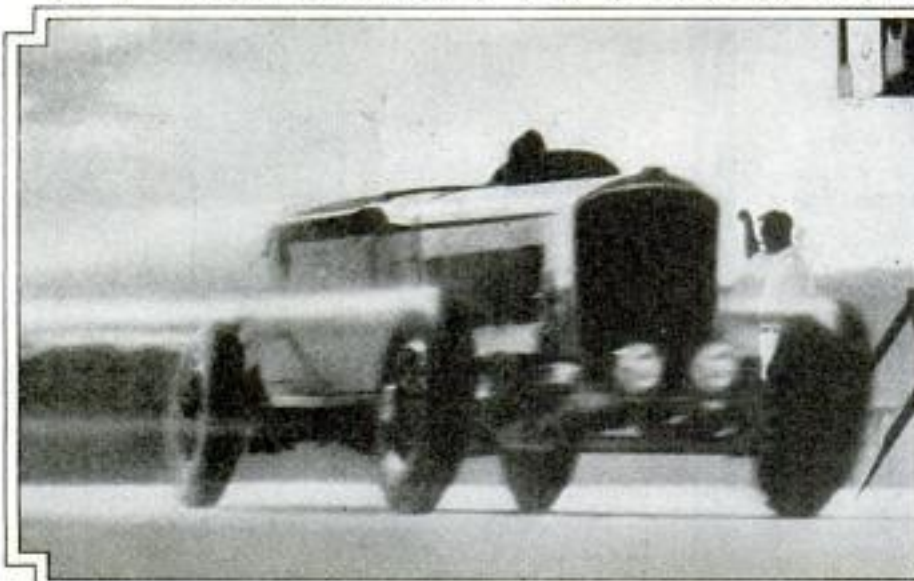
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PENNZOIL AMAZES EXPERTS AS 14 WORLD'S RECORDS FALL!



**NOT EVEN SPECIAL COSTLY RACING OIL HAS
ENABLED A CAR TO GO SO FAR SO FAST!**

Ab Jenkins uses regular Pennzoil—the same oil you can buy anywhere for *your* car—and averages a split second under 2 miles a minute for 3,000 miles. Breaks all official world's records from 200 miles and up!

PRACTICALLY every major world speed record has been made by using special racing oils—even for short races. So experts were amazed when Ab Jenkins . . . using regular *Passenger-car Pennzoil* . . . broke every official world's record from 200 to 3,000 miles.

"No passenger-car oil could possibly stand the pace" said experts.

But Jenkins replied that Pennzoil's Tough Film would do it, if *any* oil could. And what's more, Jenkins used a *light oil* (S.A.E. 20)—the same oil you can buy for *your* car!

The rest is history . . . no car . . . no oil . . . ever before . . . had gone so far so fast. World's records fell like rain, in this greatest speed test of all times. In all, 66 major and minor records were broken.

3 Times Concentrated

Think of it! Through the famous Pennzoil Double Refining process, Tough Film Pennzoil is 3 times *concentrated*. The non-lubricating elements, which form such a large percentage of ordinary oils, are drawn off—and discarded!

14 OFFICIAL AAA TIME WORLD'S RECORDS

Distance	Old Record m.p.h.	New Record m.p.h.
200 miles	118	123.88
500 kilo.	119.98	123.99
500 miles	119.24	124.04
1,000 kilo.	117.01	120.15
1,000 miles	116.36	123.01
2,000 kilo.	116.08	122.39
2,000 miles	112.87	117.04
3,000 kilo.	113.00	116.64
3,000 miles	113.13	117.98
4,000 kilo.	113.07	117.47
3 hours	120.64	124.08
6 hours	117.12	122.77
12 hours	112.82	120.5
24 hours	113.5	117.8

Pennzoil holds records for economy, too. And saves you up to 12% on gasoline alone.



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REFINERY-SEALED CANS now available in many territories. Both cans and bulk Pennzoil are sold under bond to guard you from substitutes. Member Pennsylvania Grade Crude Oil Ass'n. Permit No. 2.

BE SURE TO USE A PENNZOIL LUBRICANT FOR EVERY PART OF YOUR CAR

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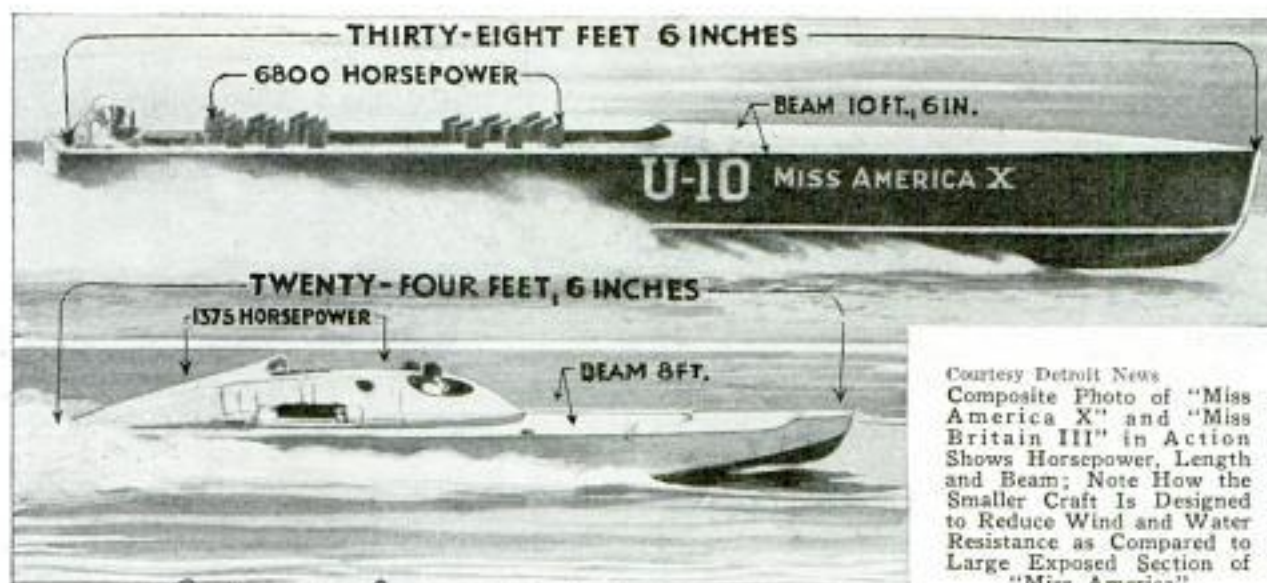
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 60

NOVEMBER, 1933

No. 5

C13 40 Horsepower Wins!



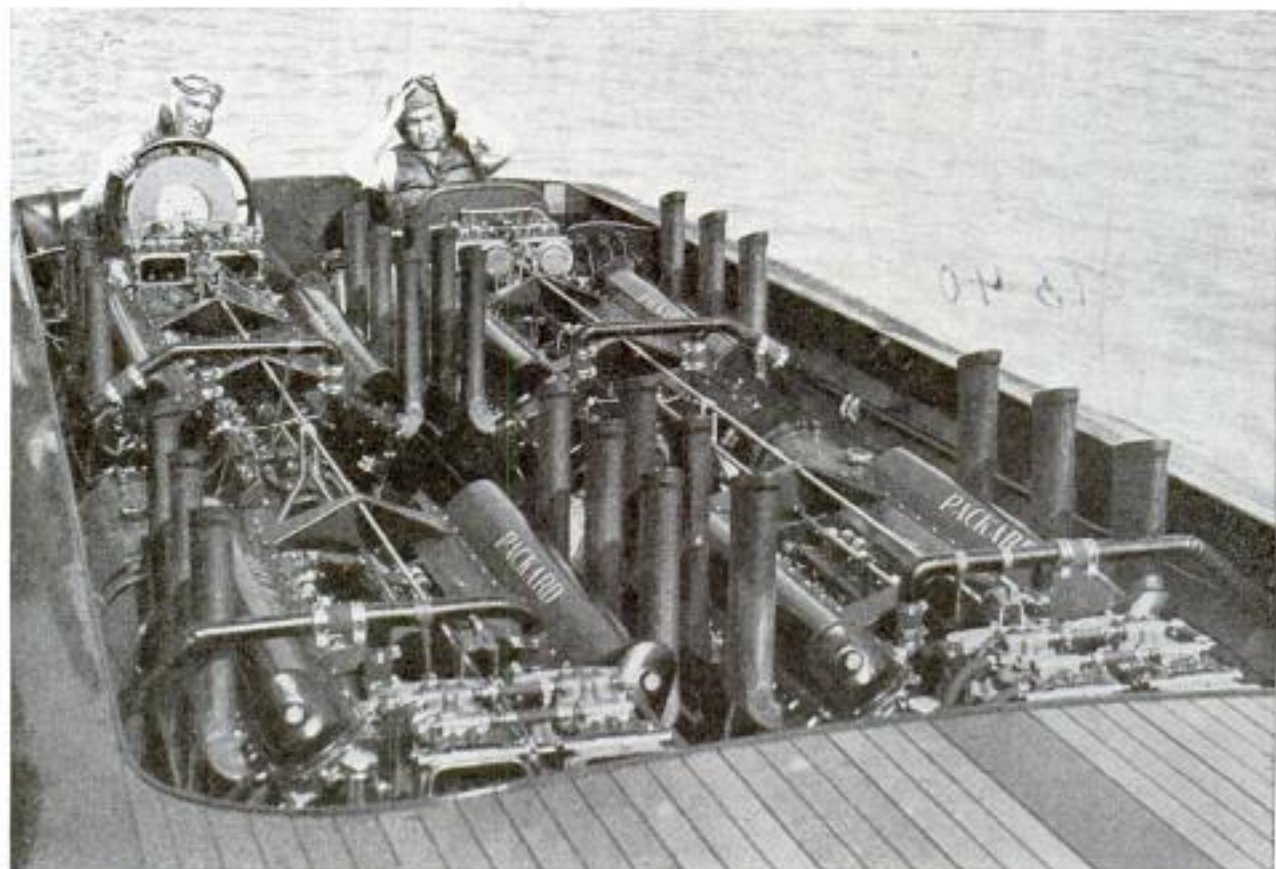
Acine News release
WHEN man first installed an engine in a boat and began striving for high speed on water, he started an argument. It all has to do with weight per horsepower and whether a good, little boat can compete with a good, big boat. Not until Gar Wood drove "Miss America X" to a victory over Hubert Scott-Paine of England in the 1933 Harmsworth Trophy race has there been an opportunity to compare the performance of two such craft.

On the one hand was Wood's boat, thirty-eight feet long and weighing 17,000 pounds. It was driven by four engines capable of 6,800 horsepower, plus extra power produced by improved superchargers. On the other, Scott-Paine's racer was only twenty-four and one-half feet long, weighed but 3,360 pounds and was driven by a single engine of 1,375 horsepower. Literally, the Harmsworth event resolved itself into a contest between a giant and a midget.

From the standpoint of weight per

horsepower, the Englishman's entry, "Miss Britain III," had the edge. In addition, her wetted surface was only sixty square feet, compared to "Miss America's" 130 square feet. The wetted surface is that part of the boat's bottom which remains in contact with the water at high speed. Thus, "Miss Britain" offered less than half the resistance to the water that "Miss America" did, so that the Scott-Paine engine had less work to do per horsepower than Wood's four engines.

Representing a radical departure from accepted speed-boat designs, "Miss Britain" was almost a pure hydroplane, built for the most part of metal. Every art of the streamlining expert had been used in the English craft so that air flowed over her as easily as the water slipped beneath her hull. Driver, mechanic, engine and all machinery were concealed behind streamlined cowling. Apparently, nothing had been overlooked in the attempt to make her the fastest craft in the world.



Giant Plant of "Miss America" Consists of Four Powerful Engines That Produce 6,800 Horsepower Plus an Additional Amount Obtained by Slight Changes Since 1932; Note How the Stacks Are Slanted

In comparison, "Miss America" had an open cockpit, exposing Wood, his mechanic, the four great engines and exhaust stacks to the drag of the air at high speeds. The resistance of the American craft must have been four to five times that of the British entry.

On paper, "Miss Britain" appeared to have a small advantage, but on the two thirty-five-mile laps necessary to win the Harmsworth Trophy, "Miss America" roared around the course to easy victory, her mighty engines never being called upon for all their power. Gar Wood took the lead at the start of the first race, leading the British challenger by more than three miles as he started the third lap. Then he slowed down his motors slightly, but never was in danger of being overtaken. His average speed for the thirty-five statute miles was 82.498 miles per hour and his fastest lap was 88.052 miles per hour.

But the second race was much closer, in fact, it was the closest

since Wood won the trophy for the first time in 1920. Scott-Paine crossed the finish line just twenty-two seconds behind Wood, after a spectacular drive in which he turned on all the power of his one engine. Several times "Miss Britain" leaped clear of the water as her speed reached better than 100 miles per hour on the



Driver and Mechanic of "Miss Britain" Shown in Streamlined Compartment as They Tested Racer near Detroit

C1317

straightaway, and it seemed that she would overturn on one or two occasions. Scott-Paine made his fastest lap on the last, averaging 87.215 statute miles per hour, while Wood's fastest run was on the third, driven at 89.339.

The weight-per-horsepower argument probably will go on indefinitely, but Scott-Paine seems to believe that horsepower is the deciding factor because he has announced that his boat will have two motors instead of one when he races Gar Wood in 1934.

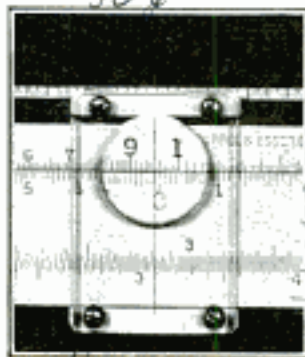
Chicago Tribune 9/11/33

SURFACED ROADS IN U. S. NEAR MILLIONTH MILE

At the present rate of construction, the United States will soon have 1,000,000 miles of surfaced highways. At the end of 1932, according to Owen B. Augspurger, president of the Automobile Club of New York, there were approximately 875,000 miles of surfaced roads suitable for motor travel. Of these about 275,000 were state highway systems. In the entire country there are a total of 3,040,000 miles of roads of which 360,000 are on state systems and the rest are county or local roads. The state systems include 200,000 miles of interstate roads covered by the federal aid provisions.

MAGNIFIER FOR THE SLIDE RULE PREVENTS EYE STRAIN

To prevent eye strain in using a slide rule, a magnifier which can be easily attached to the calculator is now available. It is in the form of a sliding lens with a magnifying power of about two diameters. It virtually doubles the size of the rule and slides easily from one scale to another. It is applied to the rule like a postage stamp merely by wetting the bottom and pressing it against the rule.



15 Charlton St. New York.

The Slip-Lens Co. 15 Charlton St.



Japanese Mother Using a Tub as Perambulator to Carry Her Four Children

TUB SERVES AS PERAMBULATOR FOR JAPANESE CHILDREN

Women natives of Oshima island, about 100 miles from Tokyo, learn when children to carry water on their heads because the island is volcanic and water must be borne for five miles or more. Some of the women become so skilled at this task that they can carry a big tub of water instead of the usual jug, and they use this skill in transporting other burdens, as shown by the accompanying photograph—a Japanese mother out for a walk with her four children riding in the tub.

RABBITS WORSE THAN DROUGHT

Rabbits in Australia cause damage estimated at between \$80,000,000 and \$150,000,000 annually, a sum comparable to the country's national debt. They not only destroy crops but eat the native herbage, and cause loss of water in dams by their burrowing. The damage is offset to some extent by exports of furs and carcasses.

Report of Vice Consul A. H. Hunt to Dept. of Commerce

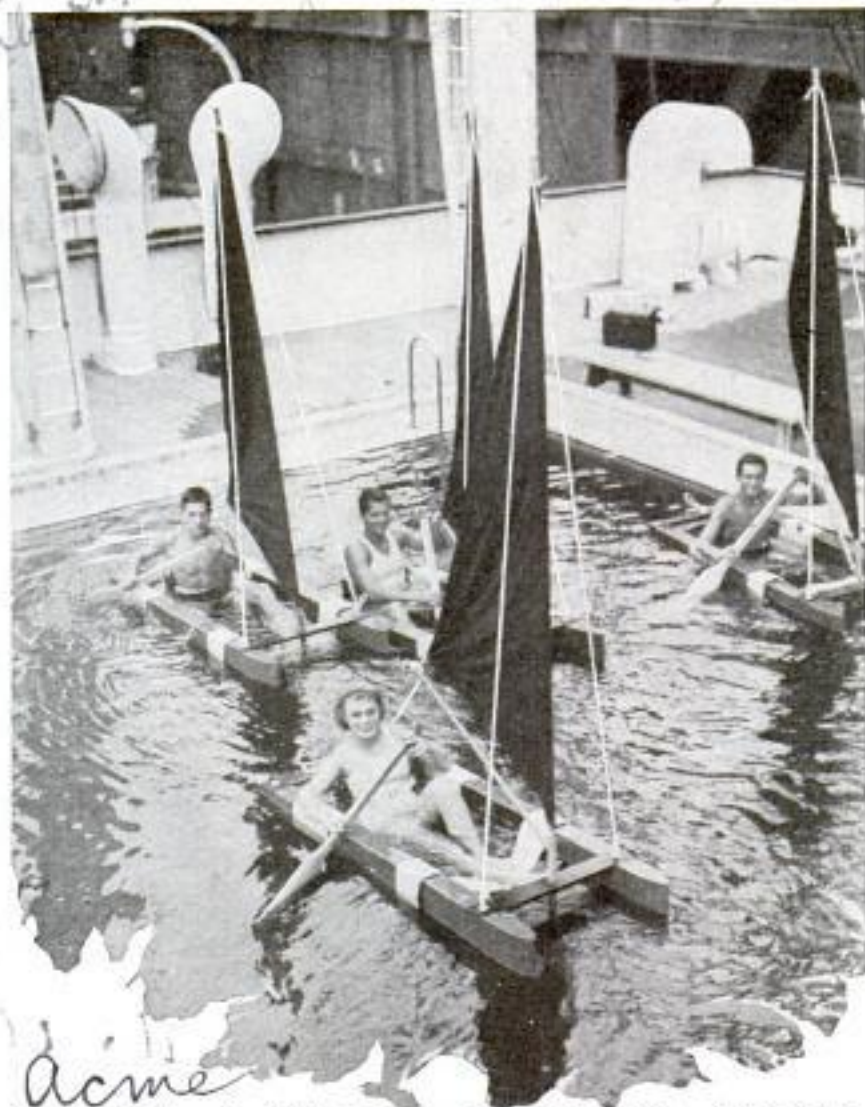
C1375

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47 Eric Berglund Bud
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Jr



Novel Craft Shown in Ship's Pool Near End of Race; When Wind Failed, the Contestants Were Forced to Use Oars; Winner Gets One of the Boats

ONE-MAN YACHT RACE IN POOL ABOARD OCEAN LINER

Something novel in aquatic contests was staged in the swimming pool of the liner "Santa Rosa" at New York when one-man yachts raced. The contestants were supplied with small boatlike craft fitted with a sail and an oar, the latter for use in the absence of a breeze.

SEVEN-YEAR ADDITION TO LIFE IS FOOD CHEMIST'S GOAL

Seven more years of life is the promise held out to mankind by the food chemist. In a report to the American Chemical Society, Prof. H. C. Sherman, of Columbia University, holds that the expectation of life will be extended from seventy to seventy-seven years, that man will be at the height of his powers in his chosen work at

health of the body. The "pillars" on which this improved health is expected to be based are: quantitative study of the energy relations, the protein chemistry of nutrition, the mineral elements, the vitamins, the inter-relationships between the different nutritional factors and the principle that in the chemistry of nutrition the ultimate concern is essentially the nutritional reactions of the living body as a whole. In experiments with rats, it has been found that, starting with conditions already normal, the quality of life processes may be improved and the average length of healthy life may be significantly extended by so adjusting the relative proportion of everyday foods as to enrich the dietary in certain of its chemical factors. Not only is life made longer, but it is made richer and more efficient throughout. In the chemistry of the nutrition process, Professor Sherman says, the rat in gen-

and Food Chem. Society
1325

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eral is very closely like the human, so that the application to mankind is well within the realm of probability.

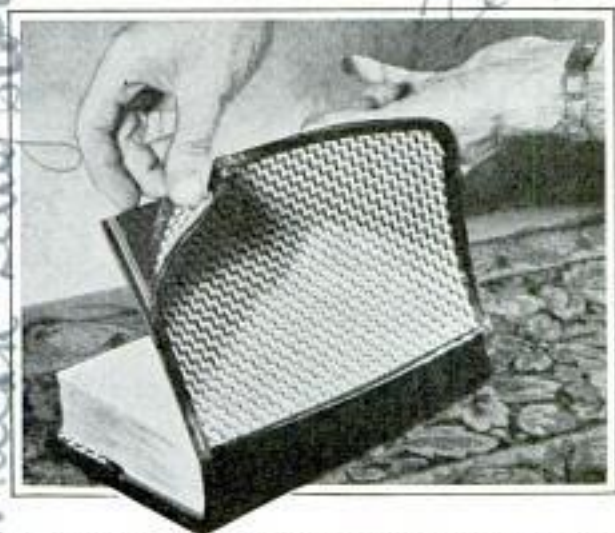
I H. Saylor

AUTOMATIC 'CHUTE FOR FLYERS SUCCESSFUL IN TESTS

Successful tests of an automatic parachute were conducted recently at the Vienna airport. Two flexible springs cause the 'chute to open automatically ten meters from the take-off point. This quick opening is made possible by rolling the parachute instead of folding it. On top of the 'chute are the springs, fixed cross-wise and rolled up with the cloth. Guide lines are inserted in the middle in a special manner to prevent tangling. By pulling a zipper, the wearer ejects the parachute, the springs forcing the 'chute to unroll. Packed in a two-part case, the parachute has an outer wrapper which is attached to the airplane by a string. When the wearer leaps, the outer wrapper is ripped off and the 'chute begins to open after leaving the danger zone where tangling with the plane would be possible.

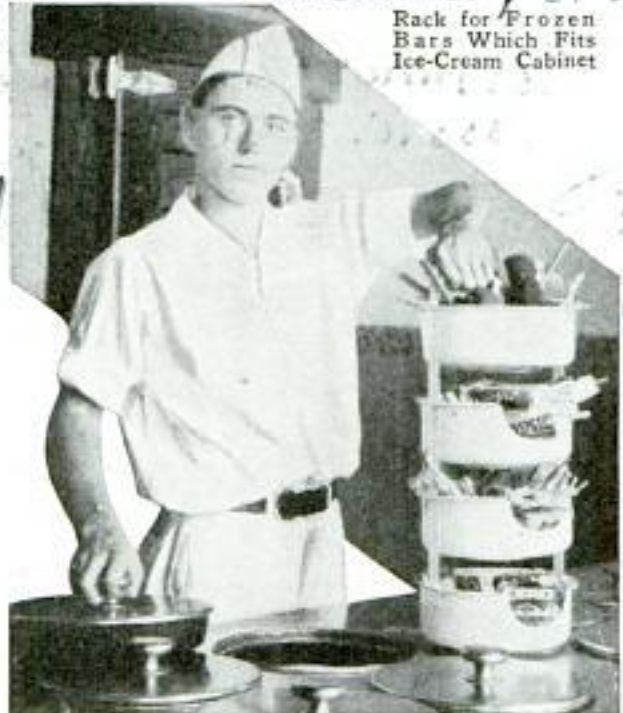
"STRAW HAT" FITTED ON BOOK PROTECTS THE COVER

Slip-on book covers made of a material similar to that used for some types of straw hats are not only durable, but attractive and inexpensive. The woven straw, of different colors, is arranged to form a pattern, and fabric binds the edges to make the connecting link between back and front covers.



Book Cover Made of Woven Straw in Contrasting Colors Is Not only Durable but Attractive

C1352 Ellwell
219...
Macomb, et al.



Rack for Frozen Bars Which Fits Ice-Cream Cabinet

RACK FOR FROZEN CONFECTIONS FITS ICE-CREAM CABINET

Fitting in the space in an ice-cream cabinet usually occupied by the ice-cream can, a four-tier circular rack keeps frozen bars and other confections cool and in order, and at the same time gives easy access to them. The rack consists of four deep trays held one above the other by metal strips joined at the top to form a handle. By lifting the rack, any tray is exposed to view. The holder is finished in white enamel.

STORM DIGS CHANNEL TO BAY AND SAVES CONGRESS MONEY

During a recent tropical storm on the eastern coast, water from the Atlantic ocean ripped a channel to Synepuxent bay. For more than twenty years, the citizens of Ocean City, Md., had petitioned congress to open such a channel and at the last session, an appropriation was voted for that purpose. Engineers had planned a waterway ten feet deep and 200 feet wide, but the storm did even better, breaking a channel fifteen feet deep and 200 yards wide and doing the work several weeks before the man-made channel was to have been started. While the storm did \$1,000,000 damage at that point, the immediate benefits which it brought are placed at double that amount.

copy by
Walter...
196

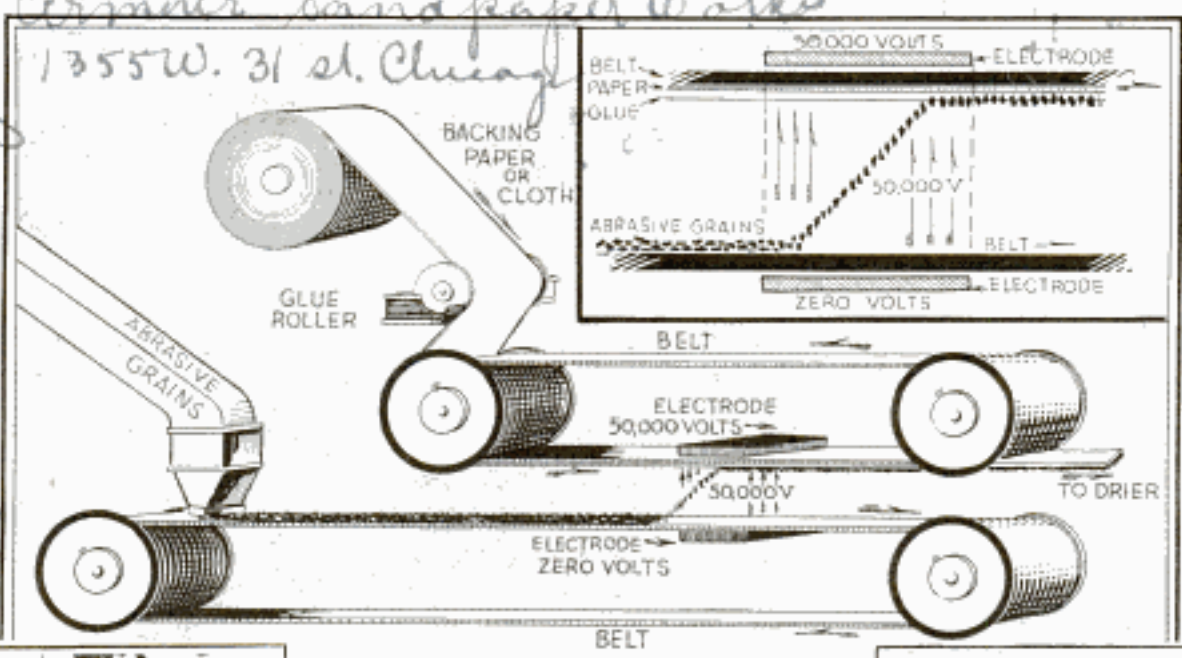
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Christian Science
Mon 9/10/33

C1304

Minnesota Mining & Mfg. Co. St. Paul, Minn.

Sharper Sandpaper Made by "Electrocoating"



Top, Right, How Abrasive Grains Are Drawn Up by Powerful Electrode to Glue-Surfaced Paper; Center, Arrangement Whereby Grains Jump from One Roll to Another; Bottom, Left, Microscopic View of Steel Filings Lying on Edge to Give Better Cutting Surface; Bottom, Right, How Grains Lay Flat When Abrasive Paper Was Prepared by Old Method



Cutting qualities of sandpaper and emery cloth prepared by a new method are said to be increased fifty per cent as a result of setting the abrasive grains on edge. Static electricity is used in the process, which is called "electrocoating." The abrasive particles are fed into the coating machine on a belt which runs parallel to another belt on whose under side is the backing paper moist with glue. When an

electrostatic field of 50,000 or more volts is applied, the abrasive grains are attracted so that they stand on end, then are drawn up to the upper belt where they stick in the glue. Thus, the particles embed themselves to produce a cutting surface of maximum sharpness, literally standing on edge. There is no piling up of grains at one spot, each particle standing alone and producing a layer only one grain thick.

FIVE-HUNDRED MILE RACE FUEL SET AT FORTY-FIVE GALLONS

When drivers in the 1934 Indianapolis Speedway classic roar away from the starting line, they will face the prospect of racing 500 miles on only forty-five gallons of gasoline. That limitation has been imposed on contestants by the rules committee in an effort to bring about the production of improved engines that will run fast with a curtailed use of fuel. Under the limitation, the car which finishes in

next year's race must average as good or better than eleven miles per gallon for the 500 miles. This will require not only the building of efficient power plants, but skillful maneuvering and careful driving if the winner expects to maintain his mileage average while trying to beat the speed of 104 miles per hour established in the last two events. In one five-car factory team entered in the 1933 classic, the best gasoline mileage was 11.7 miles per gallon. Most of the racing cars fall far below that mark, some getting only five or six miles.

Corps, Troy, N.Y.
Madava Falls, N.Y.
Bebr. Manning
Carborundum Co.

C1291
Indiana

**CLIMATE OF TREES
ATTRACTS INSECTS
TO FOLIAGE**

Whether or not insect pests will infest a certain species of tree depends not only on their liking for its foliage or fruit but also on the kind of climate it offers. For trees make little "climates" of their own within their leafy shells, different in humidity and temperature from the general atmosphere and from the climate of other trees. Dr. H. H. Darby, of the Bartol Research foundation, has observed a difference in the preferences of the Mexican fruit fly in Mexico during the hot season. The insects take shelter under the thick foliage of mango trees, and avoid the more open and airier crowns of the sweet limes.

Swarthmore, Pa
**MODEL OF COLLEGE BUILDING
SHOWS EACH STONE**

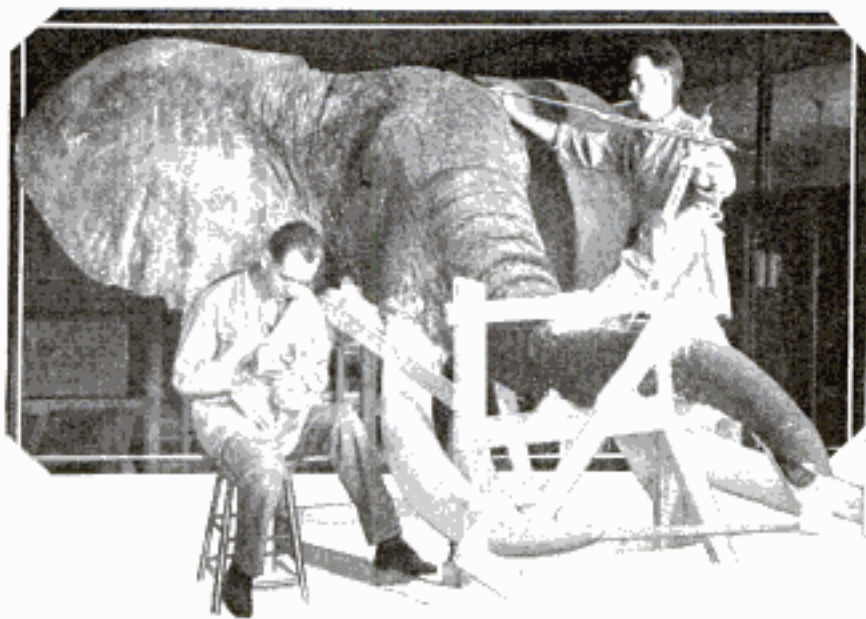
Each stone in a historic college building at Mount Morris, Ill., has been reproduced in model form by a resident of that town, who spent 260 hours constructing his cardboard reproduction of the structure. The original structure is of sandstone and each "stone" in the model is of cardboard.



Cardboard Model of an Old College Building with Each Stone in the Structure Reproduced

Nearly 1,300 panes of glass are also reproduced, using cellophane for the purpose.

Paul Keith



Mounting Giant Head of African Elephant as Compared to Mounting Head of Small Fox, on Which Artist at Left Is Shown Working

**BIG ELEPHANT HEAD MOUNTED
AS EASILY AS SMALL FOX**

Mounting the giant head of an elephant is accomplished as easily as preparing the head of the African fox, the smallest game animal, save for the length of time. Experts in a New York studio recently were able to compare these tasks as they mounted game brought back by N. E. Boomhauer, of Los Angeles, and Mr. and Mrs. W. A. Flinn, of Greenwich, Conn. The head of the elephant was many times the size of that of the tiny fox, but both were mounted in a lifelike manner.

**"CRAZIEST HIGHWAY IN WORLD"
TURNED INTO MOTOR ROAD**

Once known to international motorists as the "craziest highway in the world," the 365-mile stretch between Shanghai and Nanking, China, has been converted into an excellent motor route. On the first run over the new highway, two American automobiles established a new record for the stretch, being the first motor vehicles to travel from Shanghai to Nanking entirely under their own power. Even though the highway was opened formally soon afterward, it still was under construction at many points when the two Plymouths made their run. Consequently, the cars traveled the narrow streets of Chinese villages where an automobile never before had been seen.

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Contributor: Don Esler
55 W. 86 St. New York

KING "REX"



Capt. Francesco Tarabotto of the "Rex," Congratulating Comm. Luigi Rizzo, Chief Engineer and Author of This Article; Right, the "Rex" in Mid-Atlantic During Her Run

By **COMMANDER LUIGI RIZZO**
Chief Engineer the "Rex"

THE "Rex" today is king in fact and name. She has carried her passengers and crew across the Atlantic faster than any merchant ship in history, and has thereby won for herself the applause of the world. Four days, thirteen hours and fifty-eight minutes out of Gibraltar, the "Rex" dashed across the finishing line at Ambrose Light with three transatlantic records after her name.

All those tense hours I was the commander of her engines and the men who groomed them. Our epochal trip really began at Genoa, for there it was that the officers received the first intimation that we were to put the "Rex" to the speed test. Our orders were to "make the ship do her best without taking chances."

The "Rex" was ready. She is always ready. We had no special preparations to make, no additional crew to hire, no extra equipment to install. We had tended her well since she came down the ways, and she was waiting for her chance to win the

coveted prize. I shall never forget that Friday at dusk when the "Rex" stood off the Rock of Gibraltar, poised for the start. We had made the run from Villefranche at 28.72 knots, a good speed as ships go, but not fast enough for the "Rex." It was a practice trip to prepare her for the real trial.

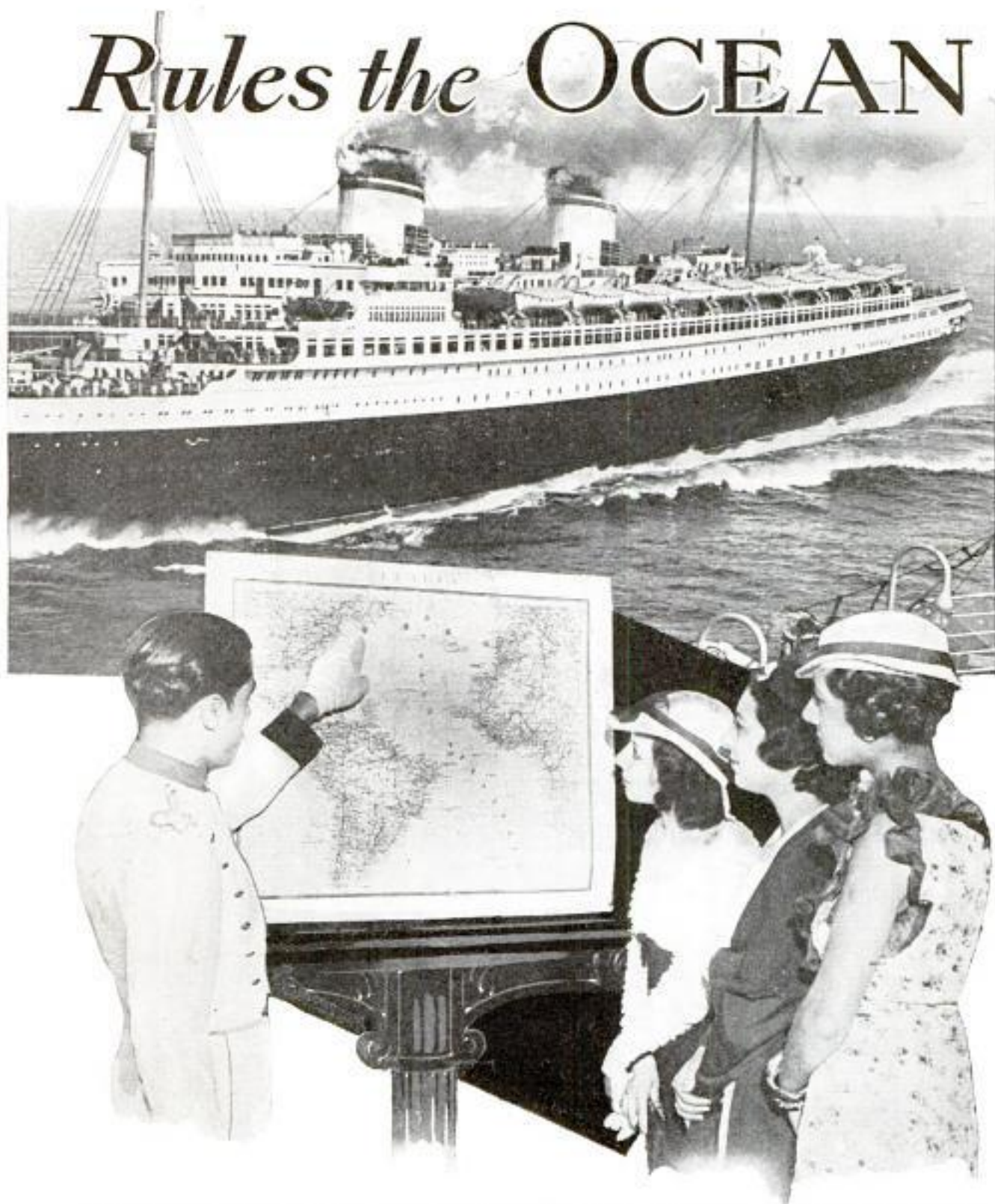
When Capt. Francesco Tarabotto gave the signal to go, the "Rex's" whistle thundered adieu, my men opened the valves, the steam rushed into the turbines, the propellers swished and the "Rex" began to slip through the gate of the Mediterranean with no indication to her passengers or to most of the crew that she was about to show her heels.

I was in constant communication with the bridge, and Captain Tarabotto was in radio communication with government officials in Italy. We watched her temperature as if she were a sick patient. Her take-off and arrival were necessarily slow. You cannot push a 51,000-ton ship too fast at the beginning. She has too many vital parts which might expand too quickly under the terrific heat and then crack to

Vertical handwritten text on the left margin: ...Italian Line...

1366

Rules the OCEAN

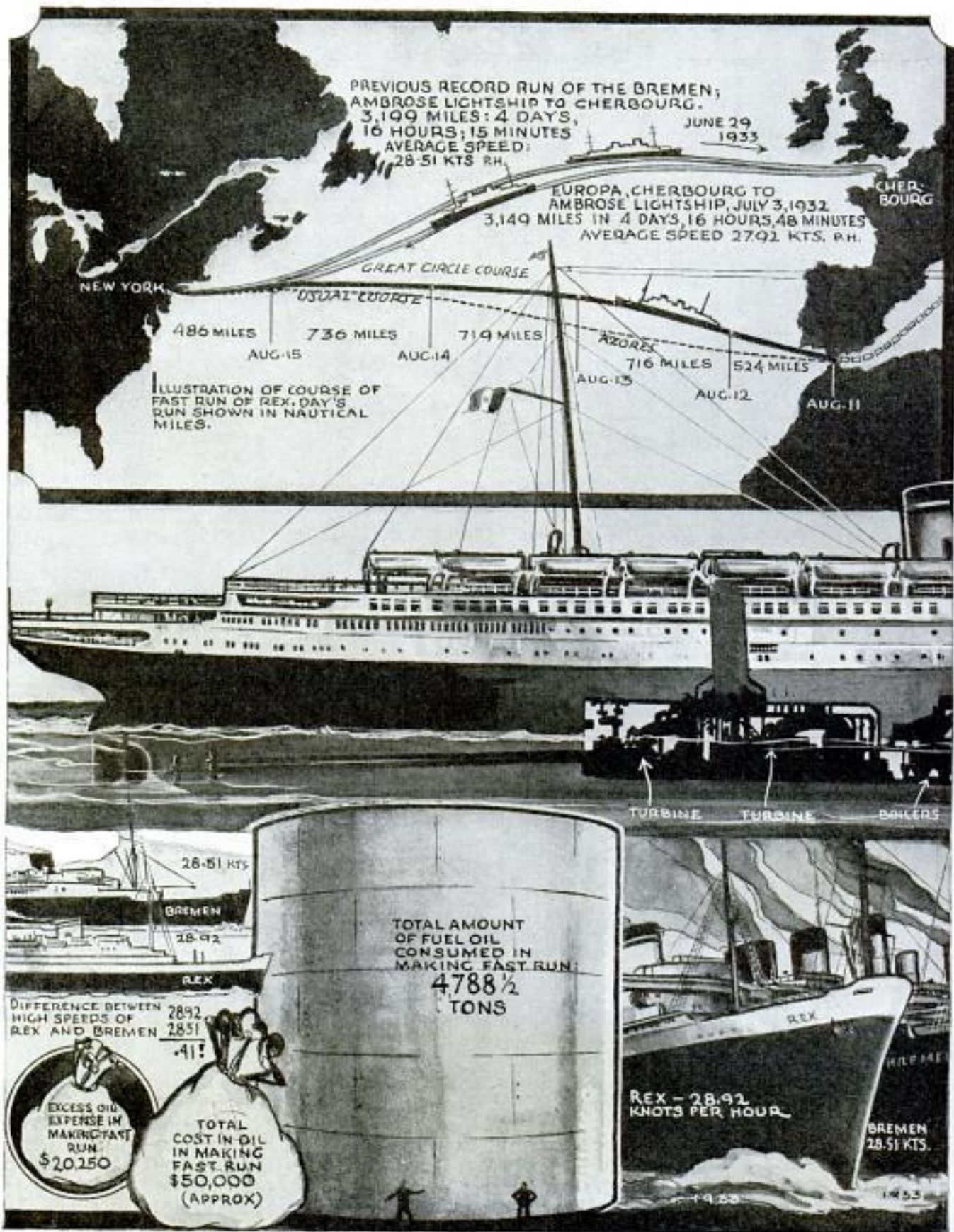


A Page Pointing Out to Passengers on the "Rex" Her Hour-by-Hour Position on the Record-Smashing Dash across the Atlantic; Small Flags Show Position According to Moon

bits like brittle glass. And likewise, at the end of the journey, you must let the engines cool off slowly. So we closely attended the many thermometers which indicate the temperature of her "lungs," her "heart," and the great furnaces which fire her with life. Slowly, slowly, slowly we

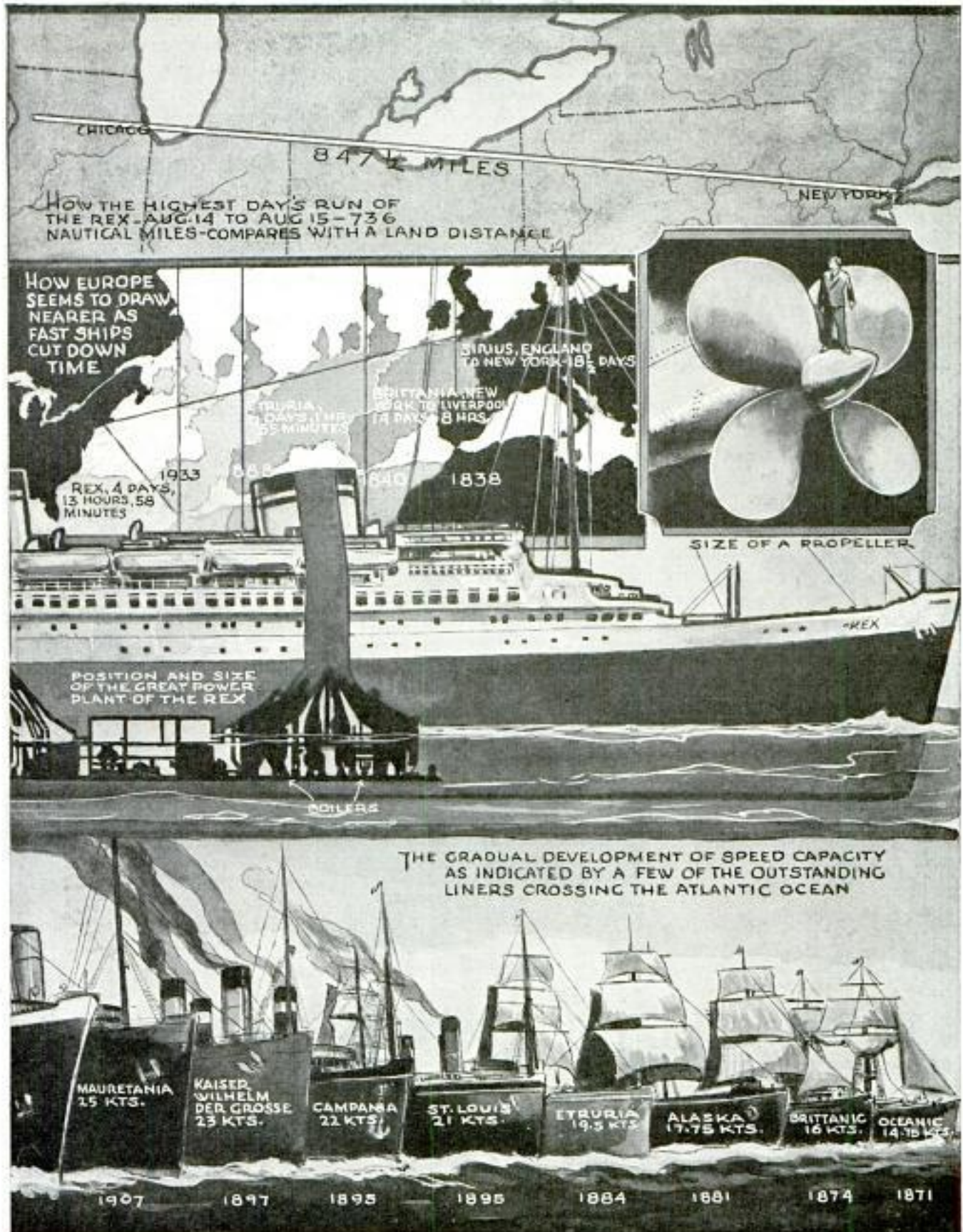
built up her speed, one knot at a time. And with her usual response, she bounded ahead on the ocean track. At twenty-five knots she was still lukewarm. At twenty-nine knots she was at a fine temperature and her whirring wheels settled down to a song that remained unbroken

Liner Burns \$50,000 in Oil on Record Run

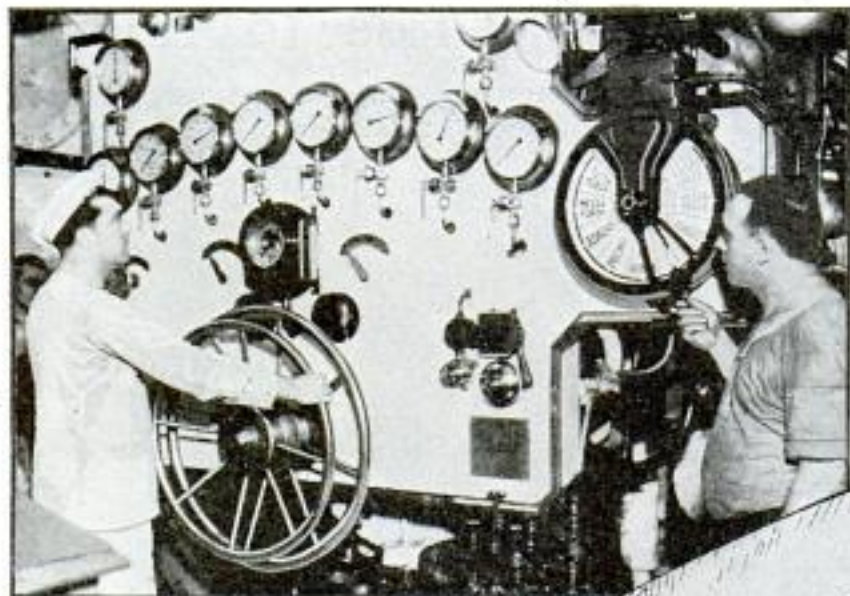


The "Rex" Burned Nearly 5,000 Tons of Oil in Making Her Record, and the Fuel Bill Was \$50,000; the Extra Speed Necessary to Break the Record Cost About \$20,000

Faster Ships Draw Europe Closer to America



In the Past Sixty Years Liners Have Doubled Their Average Speed and in Less Than a Century Ten Days Have Been Cut Off the Time for Crossing the Atlantic Ocean

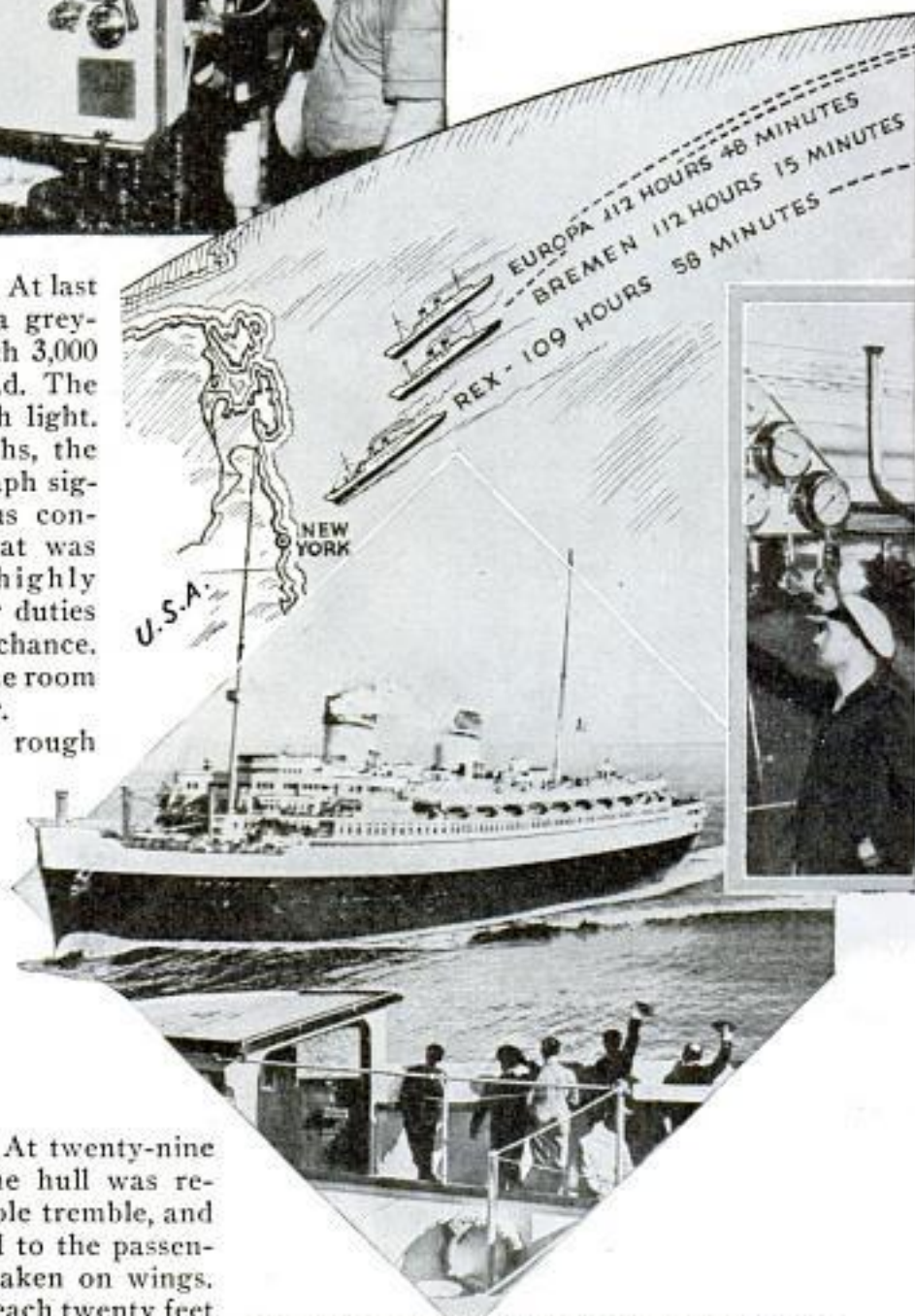


knots hour after hour, until she had made 736 miles in a twenty-four-hour stretch, the greatest distance ever covered in that time by an ocean liner. And not a whisper of protest from her! We did not push her any more. The old record

for four and one-half days. At last the "Rex" was off like a greyhound down the track with 3,000 miles of watery desert ahead. The engine room blazed with light. The brass faces, the graphs, the telephone lines, the telegraph signals, the bells—all kept us constantly in touch with what was going on. The men are highly disciplined and knew their duties well. Nothing was left to chance. The steel floor of the engine room was as steady as Gibraltar.

At times the sea grew rough and giant waves banged against the bulbous bow. The spray would fly over the rails, the "Rex" would dip, but she always rose again to plow through the next waves. Time after time she shook them off. The fog became soupy and the fog horn went at full blast, but we went on full speed ahead. At twenty-nine knots, the vibration of the hull was reduced to a barely perceptible tremble, and from the decks it appeared to the passengers that the "Rex" had taken on wings.

Four bronze propellers, each twenty feet in diameter, thrashed the water at 210 revolutions per minute, throwing off a wake that was white for more than a mile. Three days out we gave her full rein. She flashed her heels and spurted ahead to make 29.61



Top, Officers of "Rex" at Engine Controls; Below, the "Rex" Saluting a Sister Ship at Sea

was shattered. In three successive days, through rough seas and foggy weather, the "Rex" piled up daily records of 716,

719, and 736 miles respectively. No merchant ship had ever sailed so fast before.

On previous trips we had averaged twenty-six knots, which is considerably below the "Rex's" top speed. A ship's engines are essentially like those of automobiles. Your car may operate most efficiently at thirty-five miles per



Two Views of the Engine Room, and Some of the Dials and Controls



hour but you can, of course, drive up to seventy miles per hour. Likewise, the "Rex" operates most efficiently at twenty-six to twenty-seven knots.

One reason transatlantic racing is not a frequent indulgence of shipping interests is the high cost. The price of a few extra knots may seem to be an extravagance, but actually it is not. The "Rex" saved a full day in her record crossing. You must remember that we were driving a ship displacing 51,000 tons, and that her power plant alone weighs about 6,000 tons. In addition to propelling the ship, we must supply power for countless kitchen devices, pumps, motors, air-conditioning plants, refrigerators, elevators and telephones. We

have about 1,100 passengers to accommodate and besides, there are about 900 in the crew.

At her regular speed of twenty-six knots, the "Rex" burns about 650 tons of oil daily. But at twenty-nine knots, the oil gushes into the furnaces at the rate of 1,100 tons daily. Hence, the cost of three extra knots is 450 tons of oil per day, or \$4,500. For four

and one-half days the cost of three knots is \$20,250. The cost of oil to run the ship at twenty-nine knots for four and one-half days is about \$50,000. Of course, the cost of this fuel is distributed over a great many items of income.

It is difficult to imagine how fast an express ship burns oil. At twenty-nine knots, the "Rex" consumes 1,500 pounds of oil per minute, or forty-five tons per hour. The capacity of her tanks is 12,000 tons, which is enough to drive her back and forth across the ocean in about nine days without refueling.

The record of the "Rex" drives home the lesson that future ship designers must

(Continued to page 122A)

C1336
654

C. W. Irving, Newark
1622 Maple St. Racine, Wis.



Small Piano for Beginners Which "Plays" Electrically Lighted Notes When Keys Are Pressed

MINIATURE BABY GRAND PIANO PLAYS LIGHTED NOTES

Electrically lighted notes on a four-octave staff are played by a miniature baby grand piano made to aid children and beginners to co-ordinate a definite note on the instrument with its proper position on the musical staff. A small transformer operates where the piano harp would normally be, and lights a small bulb in the staff corresponding to the key pressed. It is plugged into an ordinary light socket and then is ready to "play."

PONY EXPRESS TOOK TEN DAYS FOR TWO THOUSAND MILES

When the pony express of pioneer days was operated on its first long trip, nearly 2,000 miles, the riders required ten days to transport the mail across the dangerous country west of the Missouri. In 1859, the last railroad station west was St. Joe, while only Salt Lake City lay between that point and San Francisco. The remainder was a wilderness filled with hostile Indians. The riders were carefully picked for great strength, bravery and light weight. Some sections of the route were so dangerous that the mail carriers had to

drive their horses at better than twenty miles an hour. Each rider covered a division of from 100 to 150 miles, working the horses in relays of about thirty miles. During the entire operation of the pony express, the riders covered 600,000 miles with the loss of only one letter. The mail bags held an average of twenty pounds and each rider carried two.

C1353 GRAIN DESIGNS APPLIED WITH TRANSFER PAPERS

Designs can now be applied to wood with an unattractive grain to give the piece the appearance of the natural grain of a more beautiful wood. This is accomplished by means of transfer papers imitating the designs of various kinds of wood and marble. The surface is first painted with an undercoat resembling in color the wood to be copied. After drying, the surface is dampened with water and the paper is laid face down on it. The back of the paper is soaked with water for about four minutes and then rubbed with a brush to eliminate wrinkles and press the design into the wood. In this manner the stains imitating the grain are transferred to the wood. Each paper can be used three times or more. After it has thoroughly dried, a coat of varnish is applied



Transfer Paper Used to Impart Artificial Grain Designs to Various Kinds of Wood or Marble

to the wood. The paper can be obtained in large sheets for covering wall surfaces, or in smaller ones for furniture.

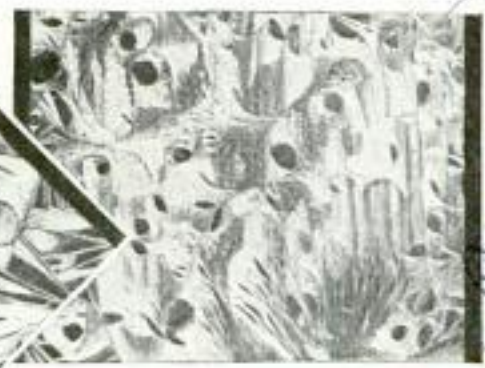
C1344
W. Elloughby
434

Mr Edward J. Wilkinson
434 W. Elloughby Ave.
Brooklyn, N.Y.

Oscar Leistner
321 Broadway
Chicago

Cr 216 Wonder Crust Laboratory pi
Box 513 Dickenbach

Self-Designing Paint Creates Odd Patterns



Examples of the Intricate Patterns Made by a Self-Designing Paint Which Is Applied with a Brush; It Can Be Used on Hard Surfaces Like Porcelain or on Wood

Patterns which an artist might have difficulty in reproducing by hand are created by the most inexperienced craftsman with a self-designing paint. When applied to a smooth surface, the paint, after about twenty minutes, gradually breaks up into attractive patterns resembling frost on a windowpane. The paint is applied with a brush, using a one-way stroke. The heav-

ier the application, the coarser the pattern. Only one coat is necessary and the paint is dry in four hours. Hard materials like porcelain, glass, bakelite or glazed tile require no preliminary preparation but porous materials like wood, leather, cloth and painted or varnished surfaces need special sealers which are allowed to dry for a few hours before painting.

EASY-STARTING DIESEL ENGINE REGULATES COMPRESSION

Hard starting, one of the difficulties usually associated with Diesel engines because of the exceedingly high compression, is reported to have been overcome in a Diesel motor invented in Australia. This engine employs a device to lower the compression by allowing a quantity of air to escape into a special container. Then, with the aid of a small amount of gasoline and the conventional spark from a detachable

magneto, the engine is started by cranking. Sufficient speed is developed to enable it to reach normal revolutions after which it functions as an ordinary Diesel engine. This engine is water-cooled, develops 650 revolutions per minute, and is rated at fifteen horsepower. The running cost for fuel and lubrication is eight cents per hour, based on Australian fuel costs.

☞ Fresh vegetables kept in warm temperatures lose more of their sweetness than those kept in a cool place.

Dept of Commerce
Press Memo 3/25/33

91
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iron

*Reader says
seller ret.*

... ..

Designed by Major General Hugh D. Isaacs, Chief of Artillery

Baby Guns Aid in Training Artillery Officers



Artillerymen Firing Miniature "Cannon" Which Simulate the Action of Big Guns; They Are Made by Attaching Tubes to Sawed-Off Rifles

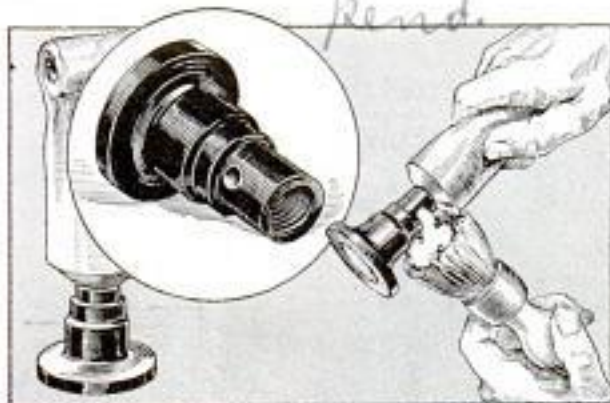
Big war problems are being solved in a miniature way by the United States army with the aid of baby guns. The guns are sawed-off target rifles to which one-inch tubes are attached. They fire a small steel ball bearing propelled by a blank cartridge and permit teaching the technique of firing without wasting the ammunition necessary for big guns, for with the baby guns an officer can not only "prove" his firing data and practice all the mental

gymnastics required to effect an adjustment on his target, but actually fire for effect as well. This last has never been possible heretofore except on the battlefield due to ammunition limitations. Firing procedure for the midgets is the same as for the French seventy-five millimeter guns. The explosion of the blank cartridge propels the projectile over a trajectory one-hundredth that of the big gun. Seating the projectile in the gun barrel for a particular shot is regulated by inserting a cylinder, or "spacer," in the barre extension. By using spacers of different length any desired density of loading and consequent muzzle velocity can be assured. This enables the projector to be quickly converted to fire over a trajectory one-hundredth that of any standard gun. Another simple arrangement enables four guns to be calibrated, an essential for accurate practice. Sweeps and barrages can be shot and the projectiles are visible in flight. It costs four-fifths of a cent to fire a baby battery as compared with seventy-two dollars for four shells for the real seventy-fives.

C1330

STAND FOR COLLAPSIBLE TUBE HOLDS IT UPRIGHT

Shaving cream, tooth paste and other materials contained in collapsible tubes are held upright where they are always handy to reach by using a supporting stand which screws to the top after the cap has been removed. The tube can then be set on the stand in an inverted position. When picked up, a sleeve valve in the stand slides back to expose an opening through which the paste can be squeezed. When set down, the valve closes, due to the weight of the tube and its contents.



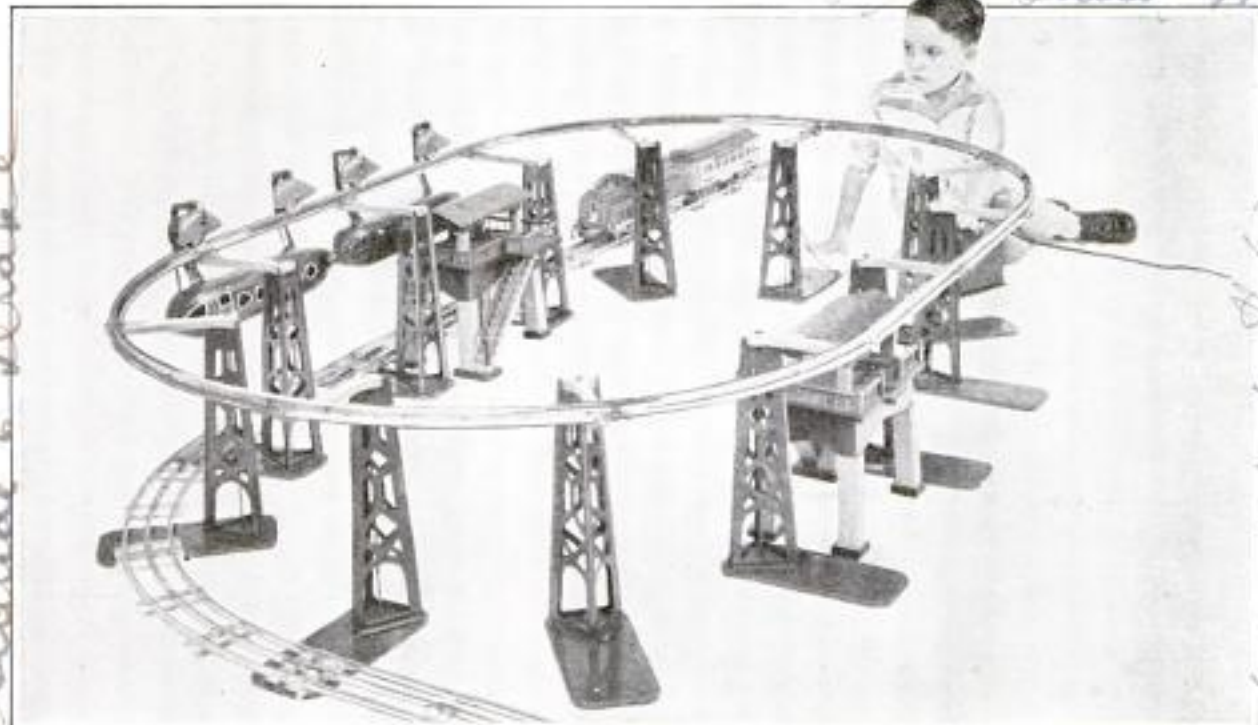
Stand and Cap for Collapsible Tube; Note Opening in Side, Which Closes When Not in Use

I. M. Miller Co. Hotel Esau man, Seattle Wash.

Designed by Major General Hugh D. Isaacs, Chief of Artillery

L. Comby, White Plains, Md. Ant. John

C125



Monorail Train Shows at Left Side of Elevated Track Leaving Toy Station; Another Station Is at Right; Electric Train on Floor at Upper Left Is Not a Part of the Monorail System

Two Grande & Derake

\$12.50 to \$60.00

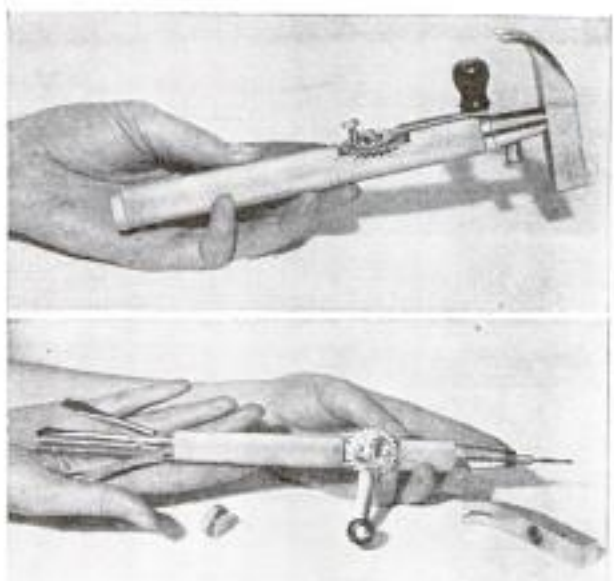
TOY ELECTRIC MONORAIL TRAIN HINTS OF FUTURE TRAVEL

Believed to be an indication of the form which future means of transportation will take, a toy monorail train is being offered to the American public. By elevating the single rail on which the streamlined cars are suspended by means of two wheels, the makers attempt to improve upon the present elevated-railway systems. The toy

monorail requires little space, which would result in relieving traffic congestion of today, if the system were adopted as the answer to metropolitan transportation problems. The rail is supported by standards. Made of cast aluminum, the toy cars are slightly more than fifteen inches long. The interior is illuminated and the motors operate on six or twelve volts, alternating or direct current. Toy stations are available for setting up beside the track.

HAMMER AND DRILL COMBINED IN COMPACT TOOL C1282

Several tools in one compact unit so small it can be carried in a pocket are contained in an instrument which at first glance resembles nothing but a hammer with a metal handle. By removing the hammer head and inserting a drill, the tool is quickly converted into a little drill which is turned by a handle on the side. Several other tools are contained in the hollow handle, including a screwdriver and scraper, each fitting into the end of the handle when the head is removed.



Hammer with Metal Handle Which Contains a Drill and a Number of Other Handy Tools

CA simple magnetic instrument developed by the General Electric company measures lightning currents.

Madison Ave and 35th St. New York

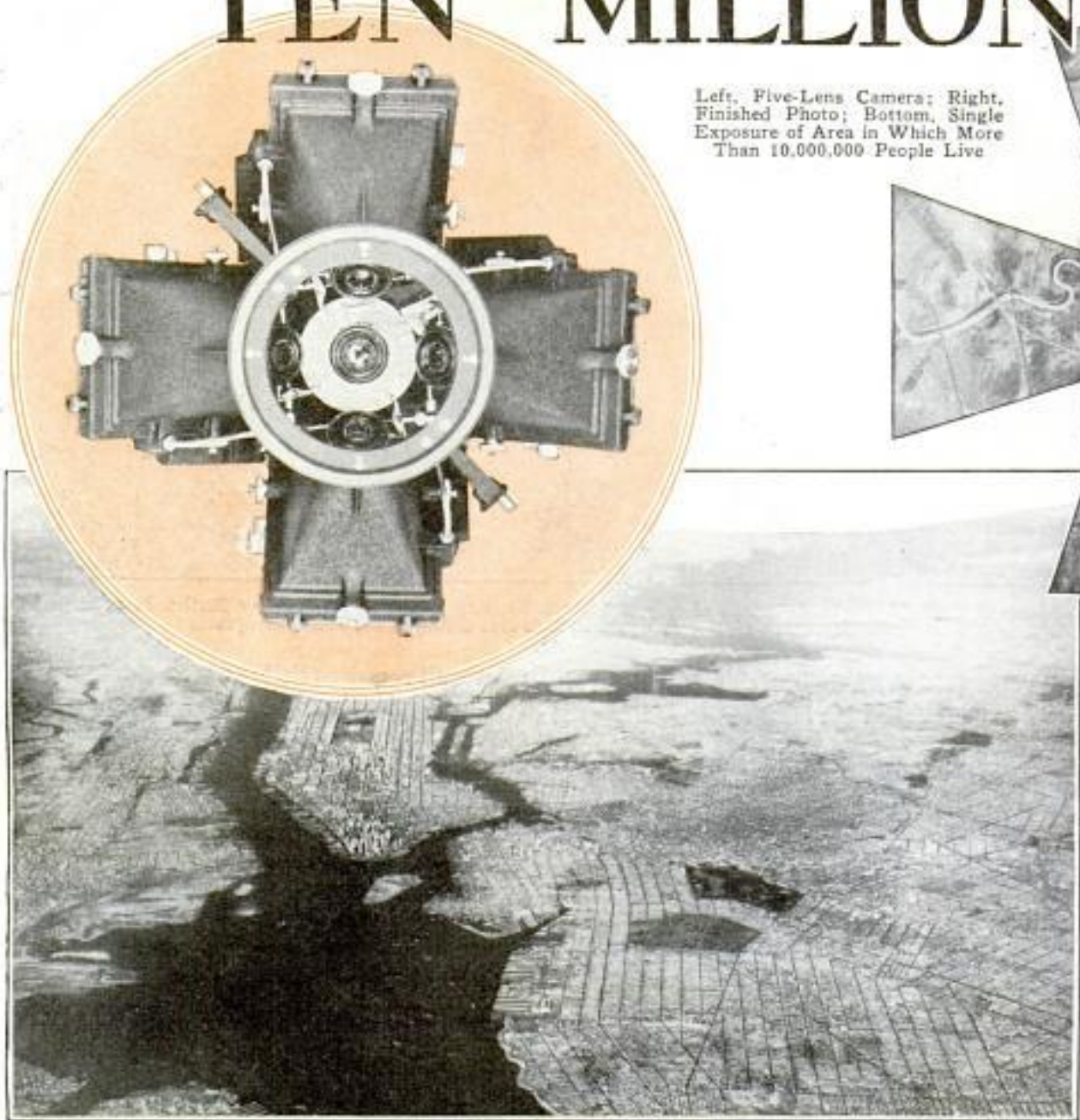
Conrad, N.Y.

Sold by Wescott Inc. Copyrighted material
Fitch

c915

TEN MILLION

Left, Five-Lens Camera; Right, Finished Photo; Bottom, Single Exposure of Area in Which More Than 10,000,000 People Live



Courtesy U. S. Army Air Corps

By JULIAN LEGGETT

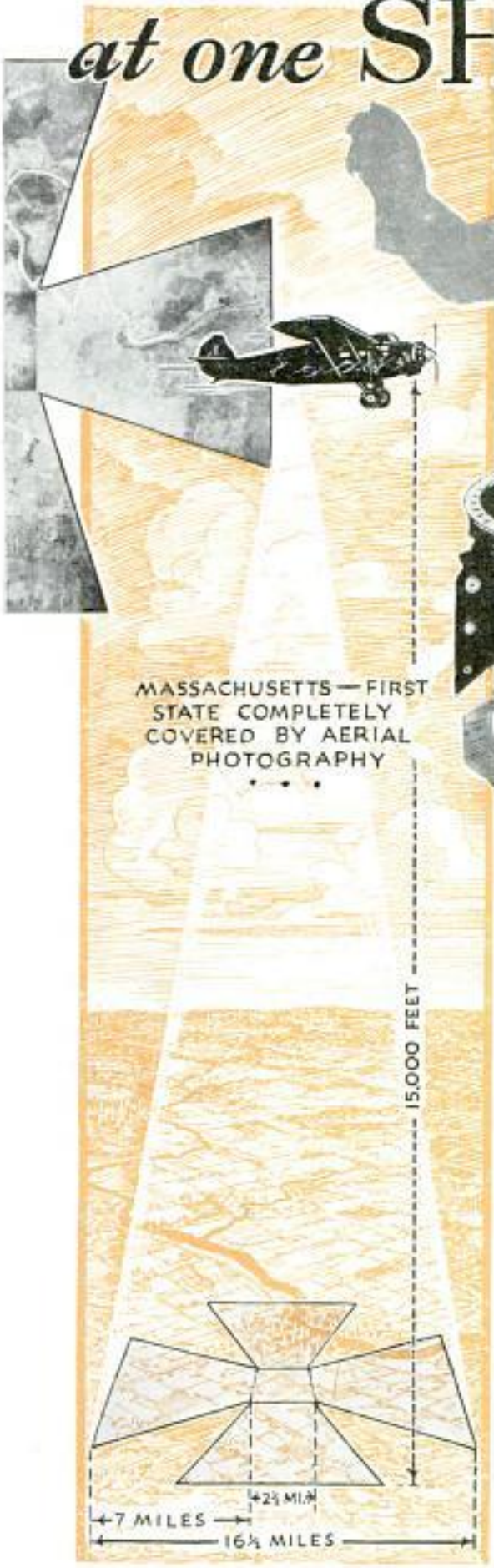
SHOOTING 10,000,000 people at one time is impossible for the most deadly engine of war but comparatively easy for a five-lens camera, actually five cameras in one, so constructed that highly accurate photographs can be made from an airplane flying thousands of feet high.

One example of its efficiency is a photograph of New York city and vicinity, in which some 10,000,000 people live. This snapshot was made from a United States army plane cruising 26,300 feet above the

city in a temperature of fifty-one degrees below zero.

Military experts point out that such a camera is of great importance because only one photograph may be sufficient to accomplish the same end that meant hours of dangerous flying and scores of snapshots in the day of the single-lens camera. Aerial photography, from the commercial angle, actually has been revolutionized by this new camera. For the first time in history, it is possible to photograph an entire

at one SHOT



MASSACHUSETTS — FIRST STATE COMPLETELY COVERED BY AERIAL PHOTOGRAPHY
 * * *

15,000 FEET



Left, Drawing of Photographic Plane in Action; Right, How Photographer Operates the Camera; Oxygen Masks Frequently Are Used on Account of High Altitudes

state in only a few hours. In the flying time of twenty-four hours and forty minutes, the state of Massachusetts was completely covered by cameramen of the Institute of Geographical Exploration, Harvard University, in planes at 15,000 feet altitude, nearly three miles up. Eight hundred composite photographs were taken, representing an area of 8,039 square miles, the largest ever photographed. This material is being used in the preparation of the most complete, accurate and up-to-date map of the earth's surface that has ever been drawn.

Twenty students of the institute accompanied Weld Arnold and Lieut. James F. Phillips on the mapping flights in groups of four on each flight. Lieutenant Phillips acted as pilot, laying his course by an ordinary commercial map on which he had charted north and south flight lines twelve miles apart. Starting the first day from Boston, the plane proceeded to the western edge of the state and flew from north to south, back and forth along the flight lines, taking photo-



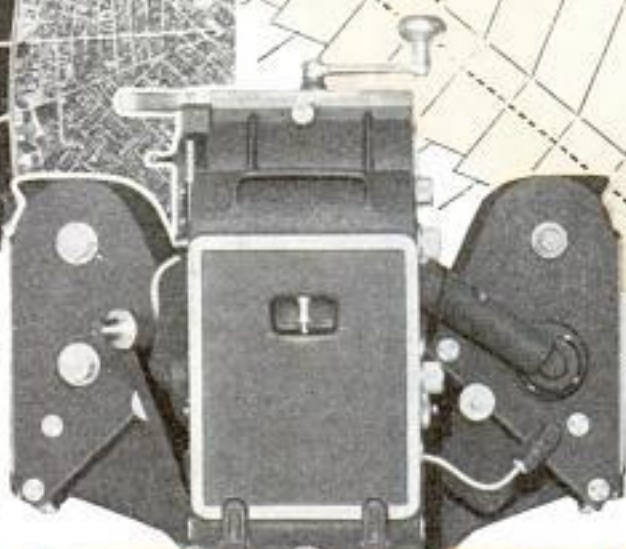
Top and Bottom Photos, Courtesy Institute of Geographical Exploration, Harvard University

Top, Photo of Boston and Cambridge; Note Harvard Stadium (the White Oval); Right, End View of Camera; Bottom, Photo Along Atlantic Coast

graphs at the rate of one each minute. Approximately fifteen miles of the state was recorded each time the camera snapped.

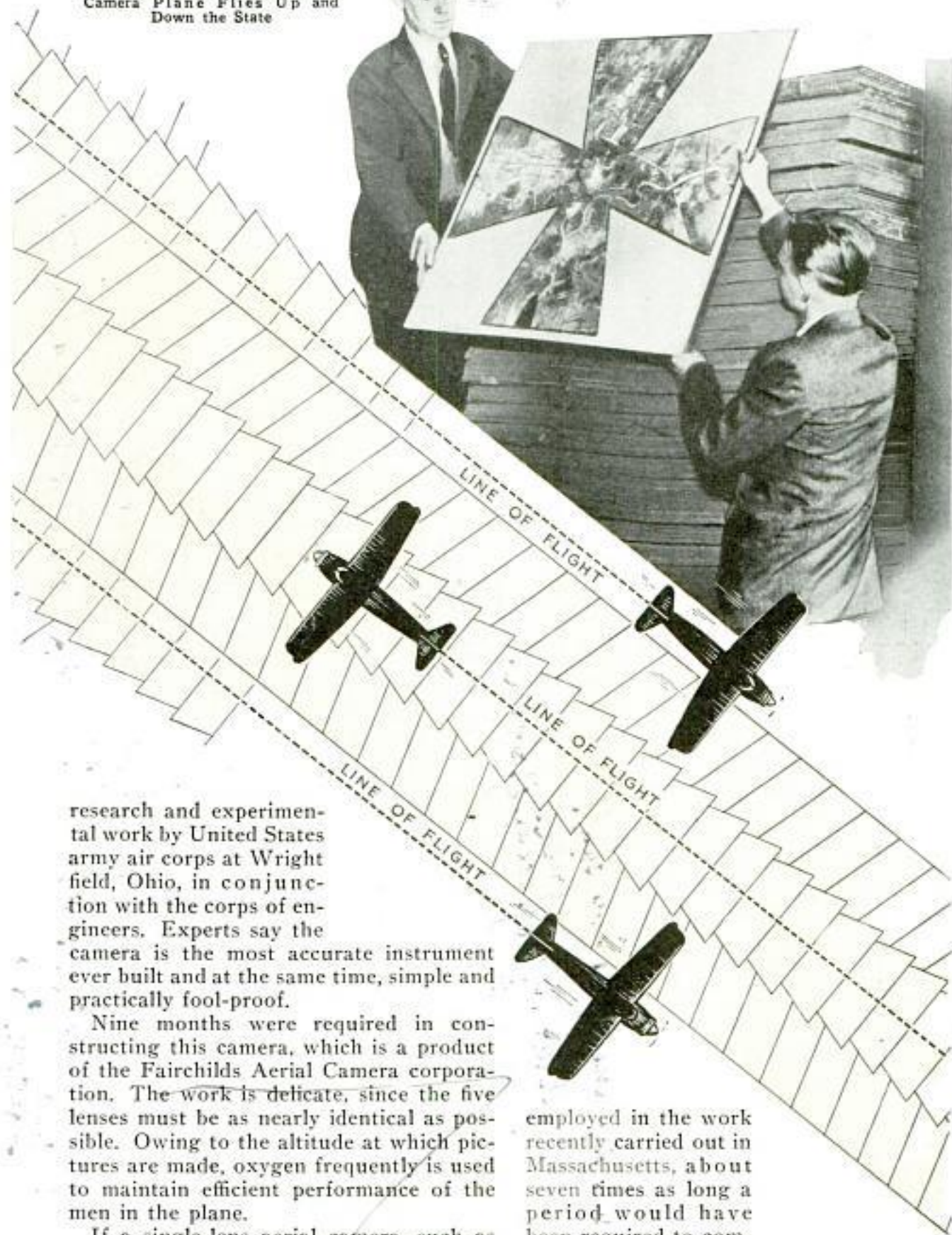
It was obvious to the men in charge of the work that there was need for an up-to-date map of many sections as new roads, town boundaries, reservoirs and ponds did not appear on existing maps. The photographs are suitable for forestry work, engineering projects, construction work of various sorts, city planning, as well as for map-making. The scale is about one to 30,000, which would present Massachusetts as a photograph thirty-three feet long by twenty-two feet wide. However, the photographs do not represent a continuous mosaic, due to the fact that at 15,000 feet the center lens of the camera takes direct perpendicular pictures of a strip two and one-half miles wide, while the side lenses take a diagonal strip about six miles wide on either side, like the wings of a Maltese cross. In map work, the direct photographs can be pieced together in strips two and one-half miles wide, separated by seven-mile strips, which can be filled in from the wing photographs.

The five-lens camera is the further de-



velopment of the tri-lens camera widely known by military authorities as the Bagley, invented by Maj. James W. Bagley some sixteen years ago. The latest camera is the result of fifteen years of guarded

Right, Stack of Photos Made to Aid in Mapping Massachusetts; Below, Drawing to Illustrate How Photographs Are Made as the Camera Plane Flies Up and Down the State



research and experimental work by United States army air corps at Wright field, Ohio, in conjunction with the corps of engineers. Experts say the camera is the most accurate instrument ever built and at the same time, simple and practically fool-proof.

Nine months were required in constructing this camera, which is a product of the Fairchild's Aerial Camera corporation. The work is delicate, since the five lenses must be as nearly identical as possible. Owing to the altitude at which pictures are made, oxygen frequently is used to maintain efficient performance of the men in the plane.

If a single-lens aerial camera, such as was used during the World War, had been

employed in the work recently carried out in Massachusetts, about seven times as long a period would have been required to complete the job.

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Deutsche Bautechnik,
 Populär-Mechanik,
 Sturvestrasse 1, Hannover
 Germany



Three Gas-Air Blower Plants Shown in Use, Drying Out Interior of New Building; This Method Reduces Delay Before Structure Is Occupied

NEW BUILDINGS DRIED FASTER BY GAS AND AIR BLOWER

Reduction of time between the completion of a new building and its occupancy is accomplished by means of an artificial drying machine. Natural drying is slow, resulting in the loss of many days while the moisture leaves the walls and the mortar sets, so that the practice of leaving a new building unoccupied for that period has been quite costly. The new process uses dry air for driving out the moisture and carbonic-acid gas for setting the mortar more rapidly. A single machine dries out a building in about three to four days. The heating station for the drying apparatus is located outside the building. Hot air, containing carbonic acid, is forced into the building by means of ventilator pipes. All rooms are closed tightly, of course, resulting in a rising pressure as the hot air enters. Heavy evaporation of water is effected by circulating the heated air. The process is said to kill off germs which might cause dry rot.

BETTER GOLD REFINING SOUGHT BY SCIENCE

Better methods of gold extraction from inferior deposits are being developed as scientists seek to offset reduced production of the precious metal. Dr. Frank D. Adams, of Canada, points out that

Transvaal now is the first gold producer of the world but that in five to ten years her rate of production will fall off. Scientists are making rapid progress in developing more refined methods of obtaining gold from sources which are relatively, but no one can predict the extent to which their efforts will counterbalance the natural, dwindling in yield in South Africa. In nature, gold is found almost everywhere, even in sea water. The geologist looks for gold primarily in igneous rocks. Gold generally occurs in connection with igneous rocks. When liquid rock material cools, gold comes up as vapor and condenses in the igneous upper layers, according to Doctor Adams.

MOTORCYCLE ON RAILWAY JOB RUNS ELECTRIC DRILL

As an aid in constructing an extension of the Piccadilly tube in England, a motorcycle drives the electric drill used in laying the rails. The cycle is equipped for operation on the track, moving along as the rails are put down. Its motor provides power for the drill.



Power for Electric Drill Used in Railroad Construction Is Supplied by This Motorcycle Equipped to Operate on Track

W. A. S. Agent Bremen

©1226
address unknown

for all shaft
drives of vertical
rock drills

Extension to Cockfosters
Piccadilly Tube
London, Eng

Francis Barnett Ltd
Coventry, England
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formerly president
Mc Gill University

*an lighting laboratories E. P. Wilkinson Sons Co
at Cleveland Ohio*
POPULAR MECHANICS
*Service Haute-cloud 663
 395.00 for factory*

**FLYERS CAN 'BLINK'
OR 'STARE' WITH
LATEST LIGHTS**

Pilots can now "blink" or "stare" at the ground by manipulating the latest signal lights for aircraft. The spotlights are of about 150,000 candlepower and were developed by the Westinghouse Electric and Manufacturing company for use particularly in seaplanes. When they stare, they are looking for objects along shore but when they blink they want to talk with someone. The narrow-beam, dual-purpose lights are rated at twelve volts and can be used for signaling at distances up to five miles and as a searchlight at distances up to 300 yards. The light can be mounted on a base in either side of the cockpit, but is kept stored in a compartment when not in use. The signaling shutter is mounted directly on the front of the unit and is operated by a hand trigger capable of blinking the light at high speed for code work.



Auto Trailer Which Expands into a Small Home Accommodating Four Persons; a Kitchenette and Ice Box Are Built into the Unit

**ONE-ROOM HOME FOR TOURISTS
IN AUTOMOBILE TRAILER**

Accommodations for four persons are contained in an auto trailer which actually is a one-room home on wheels. It has an all-steel body which can be unfolded in the rain without getting anything wet and the beds, which telescope each other when the trailer is on the road, are each full width for two people when the "home" is expanded. In the folded position, there is ample room for luggage underneath and in lockers built over the wheels. A kitchenette and ice box are part of the equipment and these are accessible from inside or outside.

☐The bureau of printing and engraving saves the tiny dots of paper resulting from perforating postage stamps and sells them to paper manufacturers.

**GOLD SOAKS UP WATER VAPOR
AND GIVES OFF HEAT**

When exposed to water, gold gradually produces heat. This fact has been determined by Prof. Frederick Barry and Elliott P. Barrett of Columbia University. A piece of massive gold exposed to water vapor at room temperatures gradually gave off heat for seven hours. The investigators said heat would be generated indefinitely by the gold but in gradually decreasing amounts. By weighing they found that the gold absorbed water, but they do not believe this fact alone explains the phenomenon. Using a mass of gold to generate power would not be very practical, however.

Science News Letter 8/26/33

New York

C-1290

"Baby" Truck Aids Army Scouts and Raiders

No further information



for use in scouting, reconnaissance work, patrols and quick raids in open country, on roads and often across the fields. It also may be used for carrying radio or field telephone equipment and for stringing wire. The cost per mile for fuel and tires is said to be less than one-half cent.

Weighing only 1,050 pounds, yet capable of going forty miles on a gallon of gasoline at a fast pace, a midget truck with a pick-up body is being tested for use of the United States army. The vehicle is built low to the ground, therefore is inconspicuous. It can be taken apart by its four-man crew and lifted around like portaging a canoe. The truck is intended



Top, Raiding Party Off in Midget Truck; Center, Light Gun or Other Army Equipment May Be Towed across Country; Bottom, Crew Shows Light Weight of Truck by Lifting It

AUTO WHEEL INDICATES DEPTH OF WATER OVER ROAD

C-1281

Some roads in Texas which are likely to be flooded by rising streams are now equipped with auto-wheel water gauges.



Auto-Wheel Water Gauge Which Shows Depth of Water over Road When Highway Is Flooded

The wheels are mounted beside the road and indicate to the motorist the depth of water to be forded. The markers are mounted on iron pipes so placed that the bottom of the tire comes on the level of the lowest portion of the road across a flat, thus indicating the submergence at the lowest point ahead although the highway adjacent to the marker may be still above water.

TREE FOOD IN CARTRIDGE FORM INCREASES FRUIT CROP

C-1290

Paper cartridges containing tree food are now being used to keep ornamental trees and plants healthy and to aid fruit trees when the crop is light. The cartridges, containing organic and inorganic materials, are placed in a circle around the base of the tree about three inches below the surface. A small amount of water poured over them immediately starts action. The cartridges hold intact all materials until dissolved, then the liquid tree food is passed to the roots through the

Cont. Elton Sterrett,
Box 524, Longview, Texas

The Van Yahres
Tree Service,
Westford, N.H.

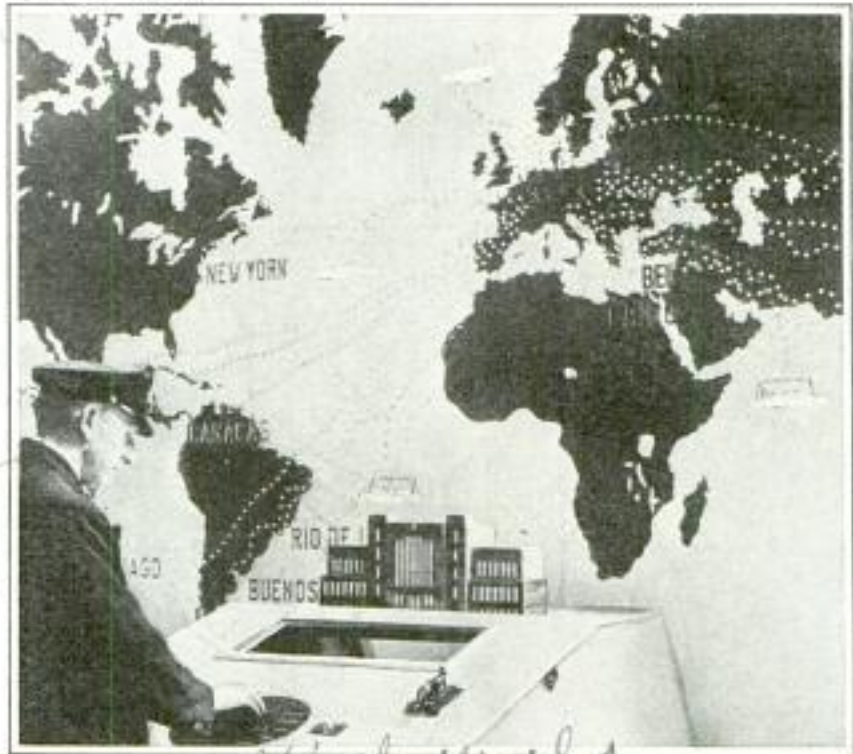
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perforated side walls, a small amount at a time so there is no forced growth. There is no root damage because the chemical action which takes place in fertilizers is gone through within the cartridge. The sealed containers also prevent leaching away of materials, which often occurs when loose fertilizers are used.

C1322

ELECTRIC SET FOR MANICURING SPEEDS WORK

Speeding up the process of cleaning, cutting, shaping and polishing fingernails, an electric revolving tool with several attachments has been produced in Germany as an aid to the manicurist. Cleaning, buffing or polishing brushes may be inserted in the device quickly and operated by an electric motor, eliminating much labor.



By Turning Switch, Operator Establishes Radio Connections between Germany and Cities or Steamships in Distant Parts of the World

RADIO STATION COVERS WORLD AT TURN OF SWITCH

How the German wireless station at Nauen reaches out to the ends of the earth was demonstrated at the recent exhibition at Berlin. At the turn of a switch, radio connections were established with the world's leading cities, with steamships and with a Zeppelin, flying miles away.

FIRST COAT OF PAINT ON WOOD GIVES LITTLE PROTECTION

In protecting wood against weathering, the first coat of paint is almost useless. The general assumption that second and third coats of paint were for appearance and durability only is shown to be incorrect from tests conducted at the Forest Products laboratory at Madison, Wis. From these experiments it was found that the major portion of protection offered by paint comes from second and further coats. There are two general types of primers on the market, aluminum and granular white-pigment paints. As a primer alone, aluminum appeared to be less effective than white paints, but it seemed to serve as a better base for further coats of paint to make a protective cover.

C1297

By J. P. Barrow



How the Fingernails May Be Manicured Easily with New Electric Tool and Attachments

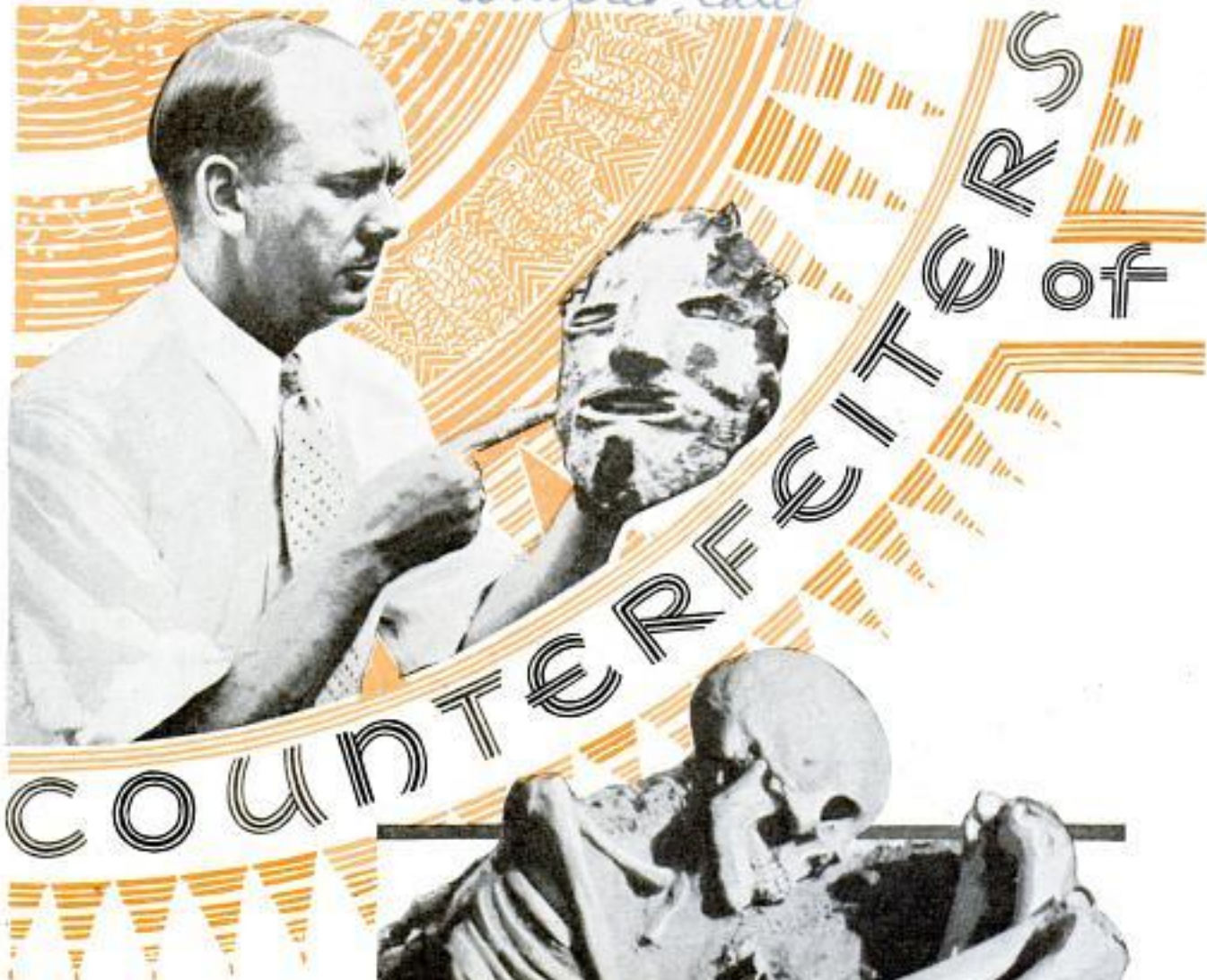
Barrow - Germany

124 Mrs. Islaty
Beisbergstrasse 25.26

Science News Letter
8/28/33

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420 S. San Pedro St.
Los Angeles, Calif.



Top, Pointing Out Genuine Pieces of Obsidian Used in Fake Aztec Mask; Below, Position of Body and Ornaments Tell Archæologists More Than Do the Bones Themselves

IN a large American museum is a display case that never fails to arouse interest. Crude stone instruments, strange metallic tools, and marvelously wrought Aztec images lie side by side. Here, apparently, is the cream of the entire collection. Yet the accompanying placard, instead of giving the history of the exhibit, contains the single word "Fakes." Not one item in the case is genuine.

Clever swindlers have been manufacturing worthless forgeries of antiques ever since they first learned that an object dating back to an early civilization may have a market value of hundreds or thousands of dollars. Museums are rarely fooled these days, but untrained private collectors pay a small fortune every year for fraudulent pieces. Everything that a collector

might buy, from the gold ornaments of the Incas to the carved stone bowls of early Indian tribes, receives the attention of the archæological fakers.

Not long ago Arthur Woodward, of the Los Angeles museum, was offered an ancient clay bowl of unique design, inlaid with a band of silver. Museums all over the world would have been eager to obtain such a bowl, if it were genuine. But the first glance showed the expert that the metal inlay, instead of being silver, had



Top, Aztec Pottery Classified as Fakes; Below, the Makers of These Fraudulent Relics Gave Themselves Away by Using Too Much Imagination

Top, Cannonball Believed to Be 300 Years Old; Below, Four Stone Implements Which Puzzle Scientists; Left, a Fraudulent Stone Statue

been cut from a tin can. That branded the whole piece as a fake. A rare Indian war shield, cut open, proved to consist of commercial beaver board covered with buffalo hide from an old bed. Close examination of an inscription cut on a grooved stone used by an early tribe to straighten arrow shafts showed that the inscription had been scratched on recently.

Scores of fraudulent Indian tomahawks of inferior metal, cast from molds, are on the market. Machine-made Navajo jewelry of silver and turquoise is hard to tell from the genuine hand-made article. Cheap blue turquoise, boiled in oil, takes on the green color of stones that have been worn for generations. Replicas of stone war clubs made for Hollywood motion-picture sets sometimes turn up in the hands of western curio dealers as genuine pieces of ancient workmanship.

Tourists and collectors should beware of some of the "genuine" Indian arrowheads that are for sale in Colorado and other western states, for with a little practice a man today can make flint and obsidian arrowheads and knives as expertly as could the Indians themselves. Many of the colored arrowheads on the market were chipped from automobile tail-light glass and from tinted medicine bottles. The microscope can usually separate the false from the genuine.

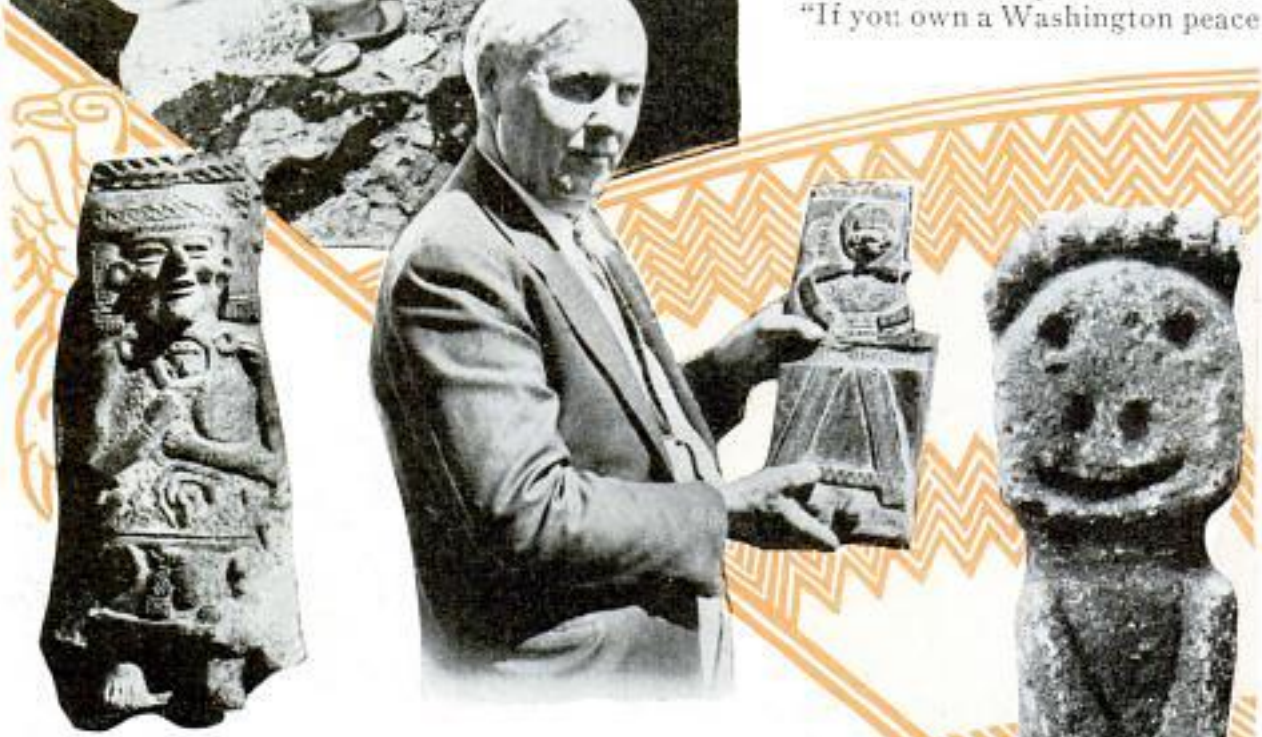
"Don't buy anything until you have thoroughly studied your field," is Mr. Woodward's advice to collectors. "In cases of doubt, consult an expert on your subject. A collector might welcome a chance to buy an ancient Aztec statue, but he would think twice after he learned that such pieces have been imitated almost more than anything else. Counterfeiting

C1236



pum. If they knew the history of wampum they would realize that the chance to buy genuine beads is rare. More than a dozen types of shells and beads were used by Indian tribes as money, but the true shell wampum was used only by east-coast tribes. Imitating true wampum in glass and wood began so early that the Dutch colonists passed a law prohibiting the counterfeiting of wampum in 1650.

"If you own a Washington peace



these pieces is such an old art that you might say some of the forgeries are truly antiquities themselves.

"Some time ago a few priceless specimens of a crude blackware pottery, supposed to have been dug from prehistoric graves in Colombia, were imported to the United States. Then more shipments were made, until nearly every museum and collector in the country was well supplied. Still the rare pottery arrived, finally being placed on sale by department stores at twenty-five cents an item. South American archaeologists eventually found that the blackware was being made by two brothers in a little factory. Now that archaeologists know their subject better they are not apt to be fooled so easily.

"Uninformed coin collectors are now paying as much as a dollar a bead for what is supposed to be true Indian wam-

Top, Inspecting Old Indian Skull; Below, Left to Right, Fake Aztec Relic and Fraudulent Tablet, and Authentic Indian Statue

and friendship medal issued in 1789 it may or may not be an original. Hundreds of medals were fraudulently struck off from the original die after it had passed out of the possession of the government. Approximately two million copies of the famous January 4, 1800, issue of the Ulster County, N. Y., Gazette, are in the hands of collectors, but not everyone is aware that the only copy that is known to be of the original issue is now in the Congressional library. The others were reprinted on the same press at subsequent anniversaries."

More dangerous than the fakes offered direct to museums are fraudulent antiques "planted" in the ground. One fake relic, buried, might lead archaeologists to wrong conclusions if they failed to detect it.

"Years ago the scientific world was temporarily set on its ear by the discovery of numerous inscribed baked-clay caskets in Michigan," says M. R. Harrington of the Southwest museum in Los Angeles. The inscriptions resembled ancient Assyrian symbols. Proof of a lingual connection



Ancient Flutes Made from Bones, and Fake Lava Figure; Right, Laying Bare an Ancient Indian Grave

between the old world and the new would have been tremendously important. Still, archaeologists were unable to discover any traces of the tribe that had left these wonderful caskets. Final proof that the whole thing was a hoax resulted when an assay was made of some strange copper instruments that were found with the caskets. The metal was exactly the same grade and purity as ordinary commercial copper."

To guard against such hoaxes, archaeologists prefer to conduct their own excavating instead of purchasing implements



and relics dug up by amateur "pot hunters" and others. Under the provisions of a federal law no one except members of an accredited institution are now allowed to carry on archaeological exploration on public lands. Inexperienced diggers are apt to destroy more than they save.

Even when scientists dig in virgin ground they must guard against the different "cultures" getting mixed up. In digging through the successive layers of an ancient camp site, archaeologists were puzzled to find an engraved bone flute in a layer of material that contained relics of a people too primitive to have performed such fine work. After a careful investigation it was found that the flute had been dislodged from its original position on the wall of the shaft near the surface and had fallen to the bottom of the hole.



Top, Knob on Gear-Shift Lever May Be Turned to Operate Direction Signal, at Bottom

AUTO-DIRECTION SIGNAL LIGHTS FROM GEAR-SHIFT KNOB

Indicating the direction in which the auto is to turn, a signal mounted at the rear of the car is operated by a twist of the thumb on the gear-shift knob. An electrical wire runs from the knob and connects in the lighting circuit. The direction indicator is a double lamp with one arrow pointing to the left and the other to the right. A pilot light on the knob shows the driver which way the arrow is pointing. The signal is visible in the day time as well as at night, and can be clearly seen for a distance of 100 yards to the rear.

Those wishing further information on anything described in our editorial pages can obtain it by addressing Bureau of Information; please inclose return postage.

LIGHTNING HAZARD IS AFFECTED BY NATURE OF GROUND

Not only the height of a building or of a tree, but also the nature of the ground on which it rests, is of prime importance in determining whether it will be struck by lightning. This is the contention of a Soviet scientist who points out that the resistance of the air is influenced by the radioactivity of the rocks below it, since radioactive materials give off radiation which increases the ionization and conductivity of the air. From the frequency with which the supports of an electrical power line were damaged by lightning, the geophysicist was able to present a graphic picture showing the parallelism between the number of lightning flashes striking the ground, the electrical conductivity of the air, and the distribution of radioactive rocks beneath the surface. These rocks lie sometimes at depths of 100 feet or more but their radiation seems to be effective.

C1275

WHEEL CHANGE AT HIGH SPEED STUNT OF MOTORCYCLISTS

Changing the wheel on the sidecar of their motorcycle at high speed is the stunt with which a German army exhibition team thrills spectators. The motorcycle rider tilts his machine until the sidecar is lifted clear of the ground, keeping the vehicle moving rapidly while the sidecar passenger quickly changes the wheel. The stunt was a feature of military maneuvers of the German army at Kassel.

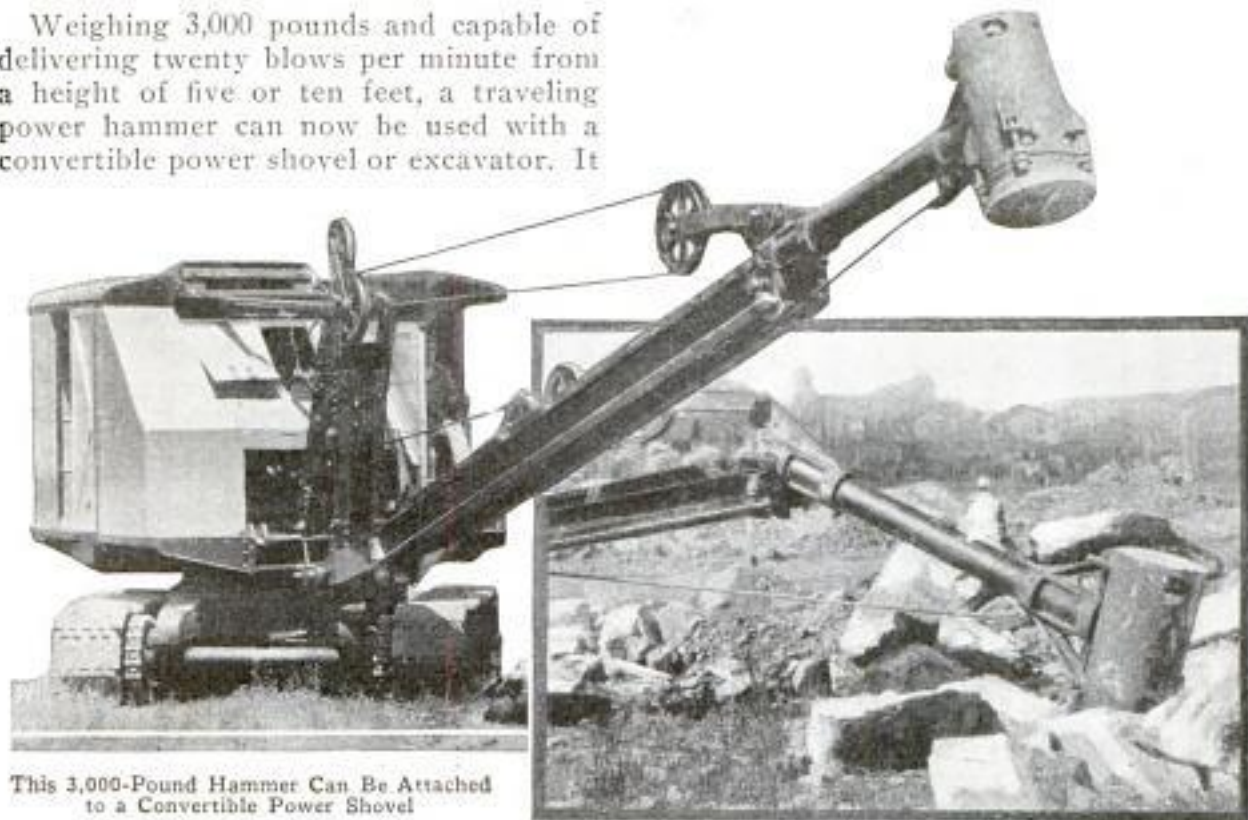


Changing Wheel on Sidecar as Motorcycle Moves at High Speed

Wade World

Big Power Hammer Can Wreck a Building

Weighing 3,000 pounds and capable of delivering twenty blows per minute from a height of five or ten feet, a traveling power hammer can now be used with a convertible power shovel or excavator. It



This 3,000-Pound Hammer Can Be Attached to a Convertible Power Shovel

can be used with almost as great freedom as a hand hammer and will even demolish a small building. It has also been applied to breaking up reinforced concrete paving, breaking ice or frozen earth crust, wrecking fences, walls and parapets, breaking castings in scrap yards and shale or sandstone which otherwise would have required blasting. The hammer can also be employed for tamping and driving short piles or fence posts and for pushing, pulling or turning large rocks to bring them into position for hammering. The hammer head has a removable face so that any desired shape can be inserted for the particular work required. It is operated on an excavator with a planetary clutch and the striking force can be augmented by a pull on the hauling line at the beginning of the drop, giving the tool greater effectiveness for its size than a simple gravity implement like a pile driver. The hammer head is rigidly attached to an eight-foot tubular handle hinged to the boom end. The joint is free and flexible so that blows may be struck in rapid succession without undue strain on this member which is caught before the hammer strikes the ground, with the stick or handle in approximate align-

ment with the boom. In this respect the operation is similar to that employed by a person wielding a hand hammer. It can be attached to the same boom accommodating other implements so that no boom changes are required in attaching it.

BUILDING LOT GROWS IN SIZE AS RESULT OF QUAKE

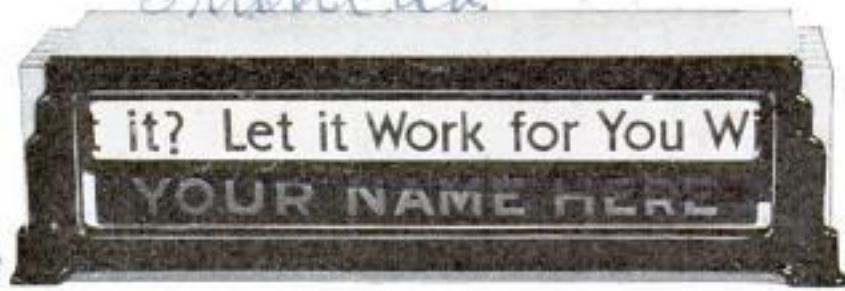
Even an earthquake does some good. A man living in the area affected by the California earthquake of last spring measured his building lot afterward and found to his pleasant surprise that it was one and one-half feet longer than before it was shaken. One principal street in Los Angeles had its width between curbs widened six to eight inches, while eleven-inch cracks were opened in side streets. These geological changes occurred in a sandy spit about one and one-half miles long and from 400 to 900 feet wide. It is estimated that the spit was widened four feet by the temblor in a number of places, for four extra feet of pipe were needed to repair the water system in some cross streets. In spite of the "stretching," little damage was done to houses in this area.

Between Alameda
Bay and Ocean

Miss Letter
8/2/33

e 1166
672

Travel Aid



Moving Electric Sign, Consisting of a Cabinet Containing a Light and Transparent Ribbon, Which Is Run on Spools by a Small Motor

CONTINUOUS MOVING SIGN RUN BY AN ELECTRIC MOTOR

Motion and illumination are combined in a small electric sign suitable for window or counter display. The message is printed on a satin ribbon, six feet long, which winds about several spools inside the case. Ribbons can be changed quickly and offer space for twenty ordinary words. The ribbon is moved past the open window of the sign by a small motor, and two electric lights inside the case illuminate the front and also the ribbon and its message. The entire unit is contained in a bakelite case and is inexpensive to operate.

QUARTER-HOUR UNDER WATER POSSIBLE IF YOU PREPARE

If you know how, it is possible to stay under water for ten to fifteen minutes. This assertion is made by Dr. Laurence Irving, associate professor of physiology at the University of Toronto. If respiration were temporarily arrested, the period over which any one could hold his breath would be about forty-five seconds. If forced deep breathing were indulged in before the attempt, that period might be extended to five or six

minutes. By adding the respiration of oxygen, the time might be extended to ten or fifteen minutes. This use of oxygen was employed by the Japanese spring swimmers in preparing for the last Olympic games. According to Doctor Irving, death comes quickly to submerged mammals because they struggle.

GUN ON TRUCK CAB GUARDS FLEET

Old-time cavalry men regard with amazement the new "flying squadron" of the seventh cavalry of the United States army. Horses have been almost replaced by horsepower in the latest motorized equipment. Pack animals have been supplemented by fast trucks, raiding parties by armed scout cars and messengers by short-wave radio outfits. Even a seventy-five millimeter field piece has been mounted on a truck. The twenty-one trucks in the squadron tow specially designed trailers, each carrying eight horses, with eight men, equipment and provisions for eight days in each truck. One feature is a triple machine gun mounted on the cabs of certain trucks in the line to protect the convoy from aerial attack.

Club



Convoy Truck Has Machine Gun Mounted on Cab for Protection against Attack on Motor Fleet

Crystal Mfg Co. 1725 Levee Blvd Chicago
Woods Hole Collecting Neb.

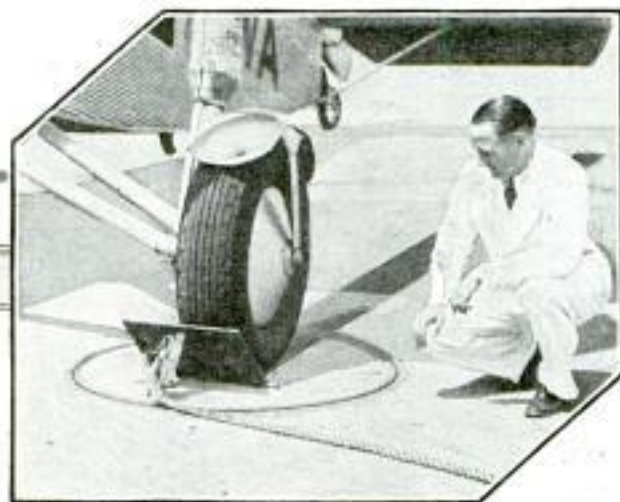
Tornator Club Canada

at Fort Bliss Texas

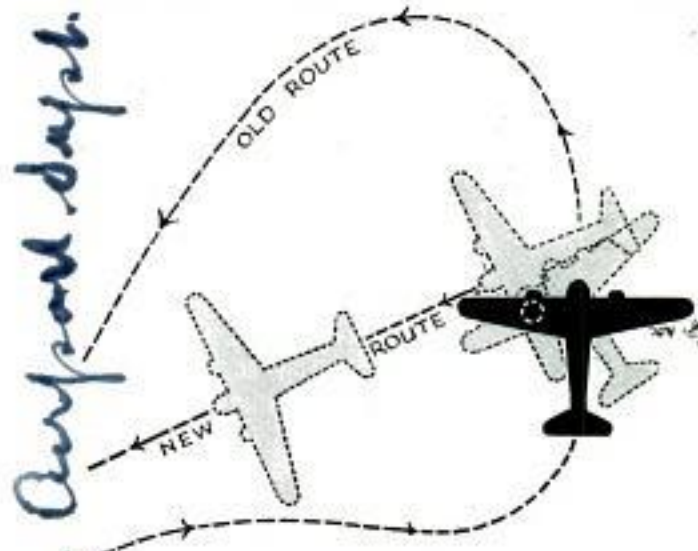
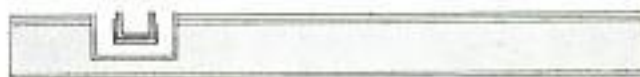
C1305 Cont. William H. Marks

Plane Turntable Rotates Ship on Own Axis

Aviation has taken a lesson from the railroad industry, and now uses a turntable to rotate ships on the loading apron at airports. One such table has been installed at the Columbus, Ohio, airport. It does not accommodate the entire plane,

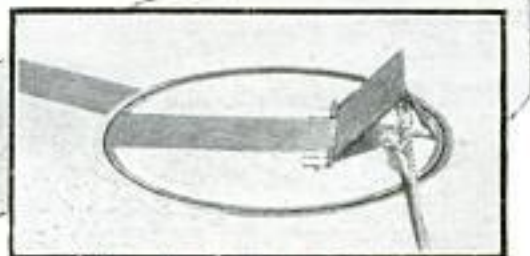


Turntable for Airplanes Which Rotates Ship on One Wheel; Diagram Shows Space Saved by Its Use



"gunning" the motor, the driving impulse swinging the table around, the wheel resting on it turning also while the other rolls around on the stationary concrete. Thus turns of any degree are practicable, and when the turn is finished, a rope attached to the jackknife

strut is jerked, causing the strut to break in the center and pull loose from its sockets. The stopping block falls of its own weight and the ship is then ready to move off the circular base.



patented.

but only one landing wheel, the other wheel moving about the table as an axis. Instead of requiring 200 feet or more for turning, a ship can now be moved about in a space limited to its own wingspread. The turntable is a circular metal plate, four feet in diameter, embedded on rollers in the concrete surface of the loading apron. Hinged on the circular plate is a rectangular slab, the stopping block, which can be raised or lowered. A jackknife strut fitting holes in the stopping block and the table base holds the block in an upright position when the turntable is in use. A ship taxis up a guide line until one wheel rests on the base and against the raised block. The turn is then made by

DEAD SEA YIELDING TREASURE OF BROMINE AND POTASH

Immense quantities of potash and bromine are to be recovered from the Dead sea by a company formed for that purpose which began operations more than two years ago. The waters of the Jordan river deposit about 40,000 tons of potash there each year, the source of both the potash and bromine being the hot springs of Galilee. It is estimated 50,000 years were required to produce the Dead sea salts in their present state of concentration in the brine. The consumption of bromine from this area is increasing and is being used not only in the preparation of chemical compounds and dyes, but also in the manufacture of antiknock motor fuel.

and Traja William Central Airport Dept.

Designed by W. Prindle, City Eng. Inc.

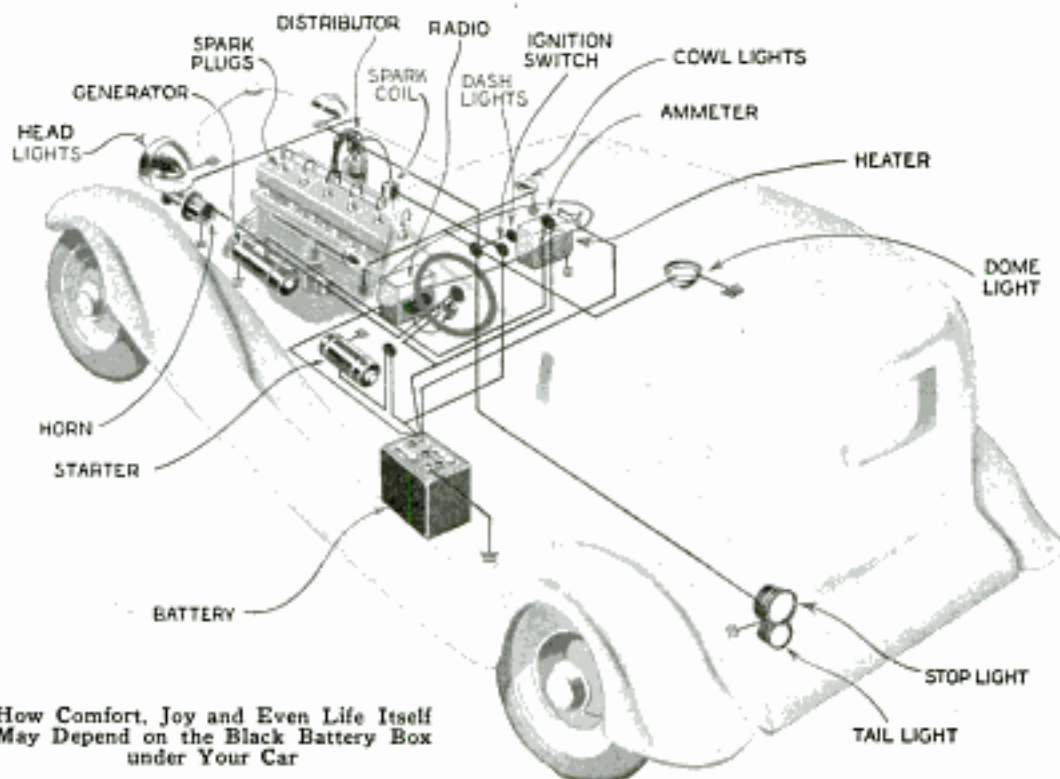
Palestine Potash Ltd. Jerusalem, Palestine

Christian Science Monitor 8/25/33

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Battery "Gyp"



How Comfort, Joy and Even Life Itself May Depend on the Black Battery Box under Your Car

very little active material inside. Many cheap batteries have silica or fine white sand mixed with the materials in the plates. Gyp manufacturers often cast the connecting links so they are hollowed out on the underside to save lead and still look full size.

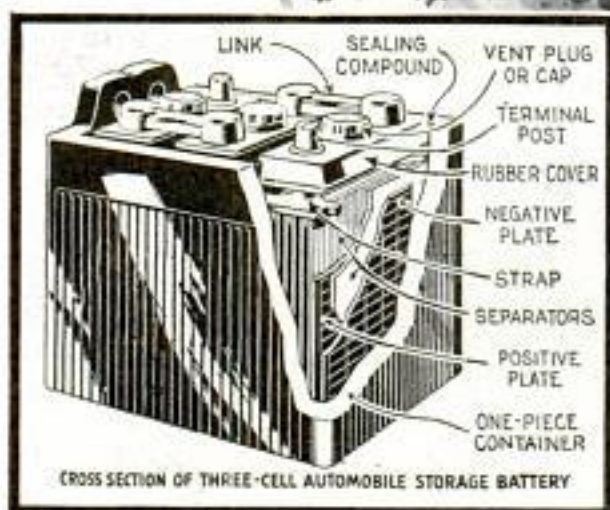
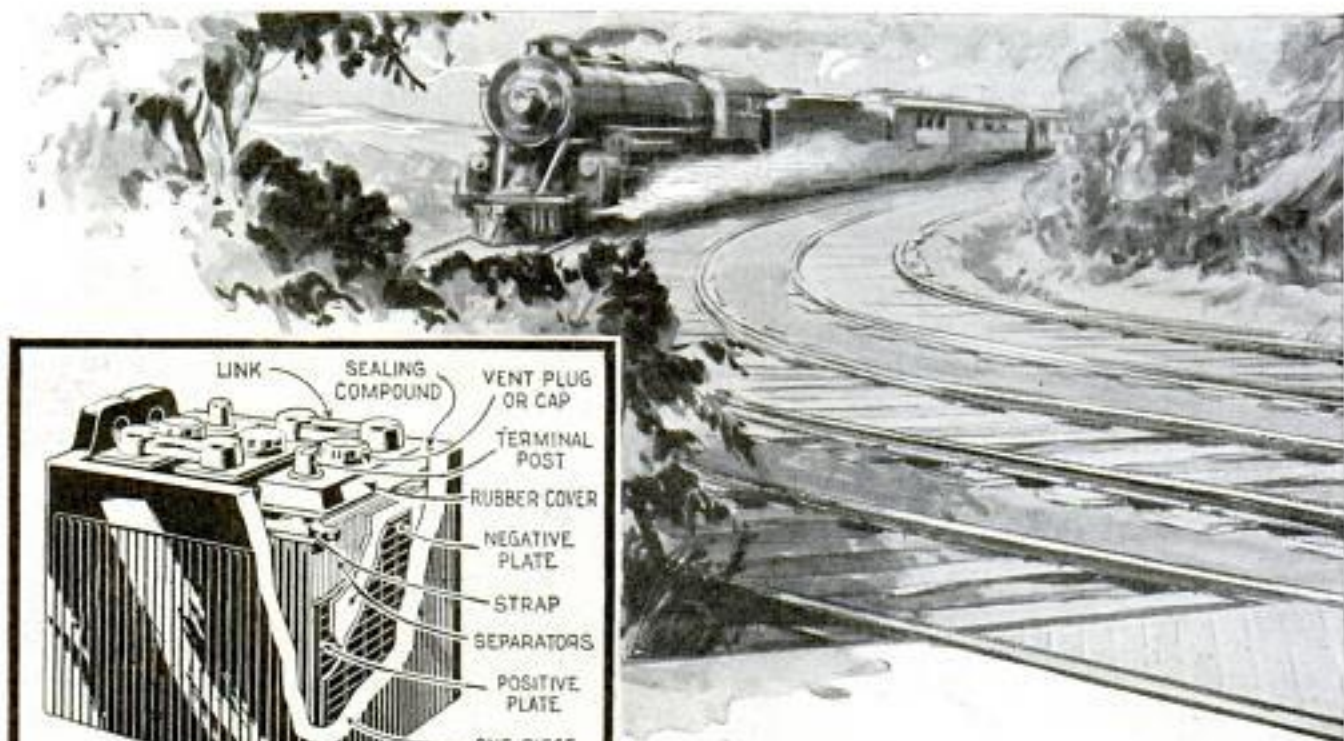
Rebuilt batteries are one of the worst detriments to the industry, and the better houses destroy their "trade-ins" so they cannot be rebuilt. The case of a "rebuilt" is usually sprayed with a rubberlike paint which makes it look like new. So serious is the "Rebuilt Battery Racket" that certain states have already made it unlawful to sell a rebuilt battery without labeling it as such.

One practice of some gyp service stations is to put the battery on charge with the connections reversed. The result is a ruined battery. When you return, you are informed that the battery would not take a full charge and is worn out. They will put it on the testing machine and prove

it to you. If this battery is opened you will find the chocolate-brown positive plates have taken on a lead-gray color, and the gray negatives a brown color on the outside, where they have changed due to the reverse charging.

Many an automobile owner has bought a new battery because he had confidence in a service-station man who was clever enough to be crooked without being caught. An unscrupulous service man can ruin your battery with you watching him and not be caught! Enough "iron filings" can be held under the finger nail and sprung into the cell, when removing the vent caps, to shorten its life. White vinegar can be added instead of water and your battery will be dead in a few days. A hydrometer with a hard-rubber tip can be forced down so as to split the separators when the battery is being tested or filled.

Good distilled water costs money and is quite an expense item with a good service station. Look around and see if there are



Where Life Itself May Hinge on the Care and Attention You Have Given Your Battery

any extra reserve bottles or empties to indicate they are really using distilled water. Be careful of the place with a faucet labeled "distilled water" piped through a partition. The water may come from a tank filled directly from the city mains. Water may be good drinking water but poison to a battery because the minerals are added each time the battery is filled and accumulate until they are strong enough to kill the battery. Distilled water has a flat taste.

When you keep your car in a public garage, mark it in some way for identification. Many an owner has bought a new battery which was again sold to someone else. The new one is removed at night and a used one that will last a while substituted. When it does fail, it is so dirty the owner never suspects it is not his battery and, after a little sputtering, he will buy a new one.

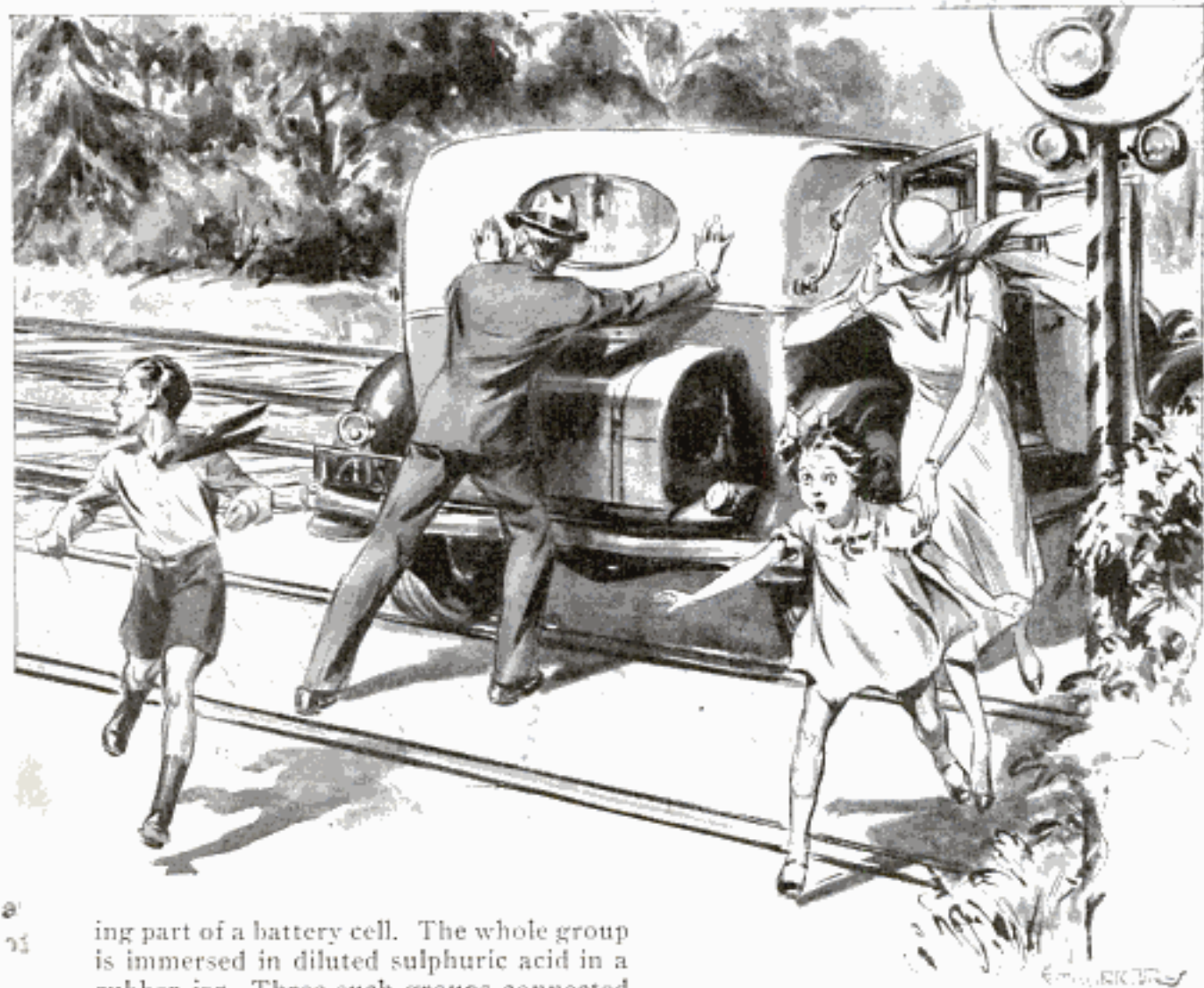
With millions of dollars being spent each year for batteries, it is no wonder that there are gyp dealers a-plenty to take money from the uninformed or careless motorist. And by their treacherous dealing they supply a product which is in many cases a menace to life itself. But it is fortunate that with a little care the bat-

tery crook can be detected and the honest battery supplier dealt with.

To protect yourself, some idea of what a battery is and why it is good or bad is necessary.

No automobile storage battery stores electricity. What it stores is chemical energy. So a battery merely undergoes a chemical change whenever it is charged or discharged. And the ability of any battery to render long and satisfactory service is determined by the quantity and purity of the active materials, the right balance or proportion of one chemical to another, and the care with which the battery is put together.

Of the many parts that make up a battery, it is not possible to say that one is more important than another. However, the plates are generally thought of as being the most vital parts. These are closely followed in importance by the separators—thin sheets of wood or rubber which keep the battery plates from touching. The plates are lead, welded to connecting straps to form what the trade calls "elements." Then these negative and positive elements are brought together—separators keeping the plates from touching—and this assembly forms the active work-



ing part of a battery cell. The whole group is immersed in diluted sulphuric acid in a rubber jar. Three such groups connected in series, make up the typical automobile storage battery.

When the gyp sets out to build a battery down to a price, he generally cuts down on the amount of material that he puts into the plates. Instead of using pure lead and antimony in the grid, any old scrap material will do. But in use a peculiar thing happens. Chemical reactions take place between the lead and antimony and the foreign matter that is present. In other words the battery wears itself out internally. Grids weaken and break down, active material falls from the grids, and in short order the battery is "shot."

Of course, the worse the battery the wilder will be the claims made for it. So when in the market for a battery it is well to keep in mind that "heavy duty" and similar terms mean little. In fact, even the number of plates mean little because the plates can be made of any desired size and filled with any kind of active material.

With these facts in mind, remember that a good battery built by a reputable manufacturer will give dependable service if it receives a little care. But all the care in the world will never make a gyp battery a dependable or economical source of electricity.

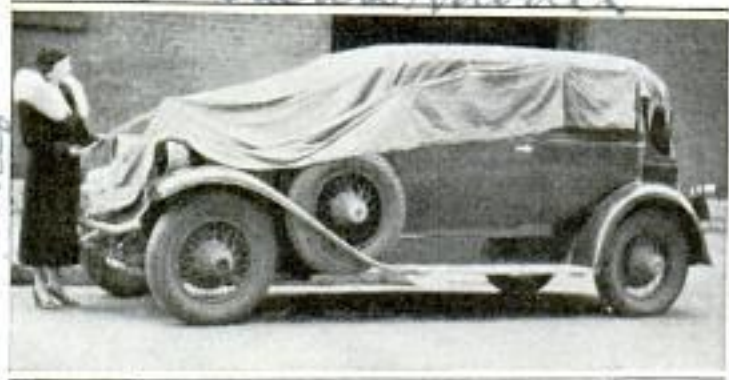
AMMONIA GAS PREVENTS RUST WHEN BOILER IS IDLE

Rusting of steam boilers during a period of shutdown may be prevented by the use of ammonia gas. When the boiler is emptied of water, it is blown dry with air as completely as possible and then filled with ammonia gas from a pressure container. The ammonia reacts with the remaining water in the boiler to form rust-proof surfaces. The mixture is easily removed by flushing the boiler with water. The process was discovered in Germany.

Mercburg Ammonia Works, H. S. Parkin, Industrie

C1324
 678 \$20.00 for bumper model
 \$17.00. break model
POPULAR MECHANICS

*Protex Auto Cover Co
 Cincinnati, Ohio*



Three Views Showing How Cover for Automobile Is Loosened, Pulled to Rear and Packed into a Small Trunk

AUTO COVER FOLDS INTO TRUNK AT REAR OF CAR

Complete protection for the automobile when a garage is not available is provided by a cover that folds into a trunk when not in use. The cover is mounted on a roller operated by a hand crank. To cover the car, a metal frame is raised and a rope attached to the cover is pulled toward the front of the auto, unwinding the cover. The sides of the cover then are pulled down and fastened at the bottom, front

and rear. To replace the cover in the trunk, the sides are loosened, the rope pulled to draw the sides up on top, and the crank turned, winding up the cover. Then the metal frame is lowered into the trunk at the rear of the car. Raising or lowering the cover may be done in one minute by even a child.

C1314
HURRICANE WATCH SAVES LIVES AND PROPERTY

Many lives have been saved by the hurricane watch maintained by the Pan American Airways in the area of the Caribbean sea during the past season. Combination meteorologists and radio operators at isolated stations in the West Indies, Central and South America have passed along to the United States weather bureau advance warnings of seven storms of hurricane force. There are thirty-five of these stations on twenty-four-hour watch, in addition to the twenty to thirty air liners which are equipped to receive and send the latest reports by radio. Established primarily as beacon stations and weather guides, these stations that make up the hurricane watch have taken on the added duty of protecting shipping and thousands of homes. From June to October, these stations file weather reports to the central station at Miami or to a plane every thirty minutes. At Miami, reports are fitted into the weather map and the result is

turned over to the United States weather bureau for re-transmission. Last year, a hurricane was watched for several days before it swung around to strike the southern coast of Cuba. So accurately were its movements and velocity tabulated that thirty-six hours before it struck, a message was broadcast: "The storm is going to hit Monday morning about ten o'clock." The inhabitants, warned, were able to move back to sheltered hills and take their belongings with them. Many lives and much property was saved as a result of the warning.

and Weather Bureau

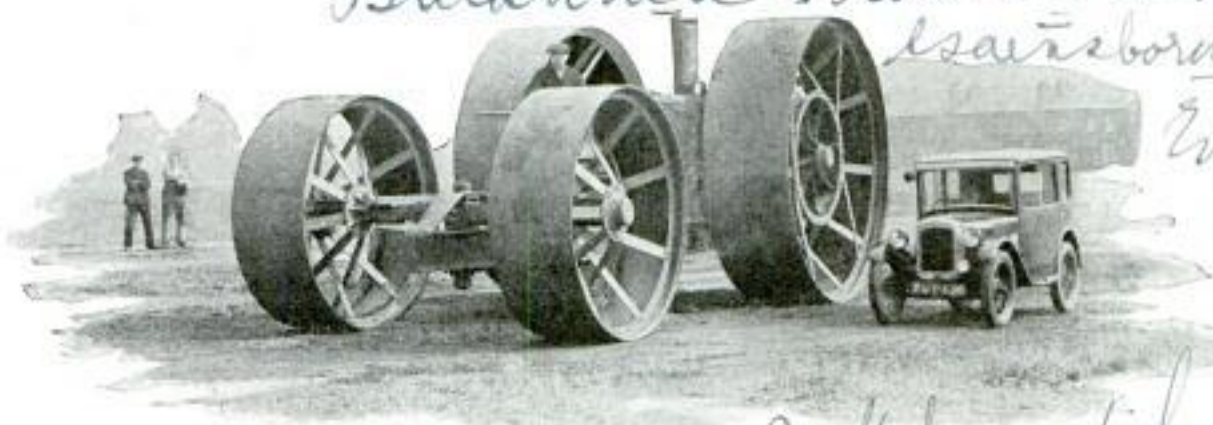
*NY Times
 8/27/33
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01271 Marshall Smith & Co.

POPULAR MECHANICS

Britannia Iron Works 679

Isarborough, England



Four-Wheeled Steam Roller with Vertical Boiler Designed for Pressing Down Steep Embankments; Each Wheel Presses Down Its Share of Ground Surface

FOUR-WHEELED STEAM ROLLER USED ON STEEP GRADES

Rolling the steep sides of a reservoir embankment in England presented a problem to workmen because the usual multi-tubular type of boiler could not be employed since the incline caused great fluctuations in the water level in the boiler. Finally a huge roller was designed with a vertical boiler which supplied steam at a working pressure of 275 pounds per square inch. The roller has four wide wheels, each of which presses down its share of ground surface. It has two speeds, two and four miles per hour, either forward or in reverse.

ATOMIC DIVINING ROD FINDS OIL FAR BENEATH SURFACE

By measuring minute quantities of gas near the surface, an atomic divining rod indicates the presence of oil. Marsh gas, or methane, as well as other hydrocarbon gases, are always found wherever there is oil. Since these gases are light, they penetrate through the rocks in very small amounts and rise fairly close to the surface. On applying the gas-detector to a depth of about three feet, traces of the gases are found, the inventors say, and further digging reveals oil. The rod does not make it possible to determine the amount of oil but allows the determination of the extent of the oil area. The new method represents a great economy over the boring method, as even the most efficient California companies average no more than one oil pocket for every ten borings. The oil divining rod was pro-

duced by two Soviet scientists, who sought to measure exceedingly small quantities of gas which, they believed, should escape when the nucleus of an atom was disintegrated. First tried in the regions of Grozny and Baku, the rod worked so satisfactorily that further researches were carried on to develop the instrument.

INDOOR BASEBALL GAME USES FULL-SIZE BALL AND BAT

Indoor baseball can now be played safely in the living room, using a rubber ball of regulation size and a standard bat. The ball is fastened to a metal rod which is attached through a spring to a baseboard containing the diamond. When the ball is struck, it bends over into the diamond to make a home run, foul or other play, according to the skill of the batter. Following each play, miniature wooden men are placed in their respective positions. From two to eighteen players can participate in the game.



Indoor Baseball Game Which Employs a Ball of Regulation Size and a Standard Bat

W.A. Sabdar aya M. Sabdar

145 S. Jefferson Ave. 3/4/35

NY Times 8/27/33 do not answer letter for further info.

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C1307

The Sphere
July 29, 1933

Racing Boats Are Streamlined Like Airplane



Streamlined Racing Boats of Italian Design Powered with Airplane Motors Which Drive Air Propellers

Italy is rapidly acquiring world speed records, both on the water and in the air. An Italian seaplane holds the air record for speed and an Italian liner, the "Rex," recently smashed the record for an Atlantic crossing. Now the country is turning its attention to the designing of faster speedboats, apparently with the intention of trying for more honors. The accompanying picture shows a race between two streamlined creations of Italian design, each modeled somewhat after a seaplane. An airplane motor drives an air propeller in each instance and the sleek bodies are supported on pontoons similar to those used on seaplanes, thus decreasing both wind and water resistance at full speed.

C1303

RIVER SENDS A WARNING OF FLOOD BY RADIO

Any sudden change in the level of the Pitt river is forecast for the residents of Bieber, Calif., two days before it occurs, the stream broadcasting its own level automatically by radio. The radio system of obtaining water-level reports was developed and installed by a California state engineer and through its use the time may come when distant residents of a river valley can be warned of impending floods in plenty of time to save life and property. One of the radio level recorders has been installed on the Pitt river, two days' flow from where the automatic transmitter is located. The transmitter consists of a battery-operated set of less than one-watt power, broadcasting on a frequency of 2,464 kilocycles. The transmitter is clock-controlled and, since the clock mechanism is run by weights, it will operate for weeks at a time without attention. A gauge float broadcasts the extent of its change in position. Thus

Div. of Water Resources
 California Engineer

Chas. F. ...

a listener, miles away, at known intervals hears a radio reading of the river level in units, tenths and hundredths of feet. If the level were 8.51 feet, for instance, the signal would be transmitted by eight buzzes, pause, five buzzes, pause, and one buzz. The apparatus has already proved its worth by telling farmers of sudden drops in the river level, enabling them to irrigate thousands of acres before the drop has time to reach them.

GAS PUMP RINGS UP SALE WHILE FUEL FLOWS

As it delivers fuel into the customer's automobile tank, a new gasoline pump registers the amount of the purchase. The price per gallon is shown on a card at the top of the pump, while two slots below show the amount of gasoline delivered and the amount due. Each customer may see at a glance how much he owes, the price of each gallon being added to the pump's register as the gasoline flows.



Motorist Watches While Gas Pump Records Sale of Five Gallons of Fuel and the Price



Skiing Has Now Become a Summer Sport in Michigan, with Straw Taking the Place of Snow on the Slide and Landing Place

STRAW TAKES PLACE OF SNOW FOR SKI JUMPERS

Michigan ski jumpers conceived the idea of holding a summer ski meet and then happened to think that the snow for the slide was lacking. That did not stop them, however, for they found that straw could be used as a substitute and covered the slide and landing place with it. Those who have tried the straw slide report that excellent results are possible.

ARMORED CAR HAS GUN TURRET AND BULLET-PROOF TIRES

Tested secretly for use by the Persian government, an eight-ton armored automobile mounts a one-pound, rapid-fire gun on a turret. It has a machine-gun battery on each side and is equipped with bullet-proof tires. From a military standpoint, the feature of the car is double steering, the conventional control at the front and a second mounted in the rear. Thus, the car can be driven backward in reverse gear at more than forty miles per hour or forward at more than seventy-five miles per hour. There are four forward speeds. Experts say the car is suitable not only for war but also to check insurrections.

The Wayne Co. Oil & Gas Co. Wayne, Mich.
Copyrighted material
Amirson, N.Y.



Coal Is Now Being Delivered in Paper Cartons to Eliminate Dirt and Shoveling in Handling

CUBE COAL IN PAPER PACKAGES ELIMINATES DIRT

Coal wrapped in paper packages of convenient size to toss into the furnace is now being sold to eliminate the dirt, dust and shoveling in handling the fuel. This coal is molded into cubes under pressure and it is claimed that in package form, the cubes do not fall apart like loose coal, thereby releasing the heat and gases gradually and giving more usable heat.

ANTIDOTE FOR DEADLY POISONS EFFECTIVE ON RABBITS

Believed to be more effective than any other means of counteracting the effects of carbon monoxide and cyanide poisoning, a new antidote has been tested successfully on rabbits. It will be used in further experiments to determine whether human beings respond in similar manner. The antidote is a solution of sodium tetrathionate. A dose of three to four milligrams of a hydrocyanic-acid solution per kilogram of body weight is fatal to a rab-

bit when administered through the mouth. But the intravenous injection of two or three milliliters of a two-per-cent solution of the new antidote per kilogram of body weight is effective in saving rabbits having received orally three times the lethal dose of hydrocyanic acid. Rabbits gassed to a point from which recovery was impossible without treatment were revived by the sodium tetrathionate solution.

TAKE-ABOUT ELECTRIC SANDER IS FAST AND EASY TO USE

Balanced to a point that assures easy operation at minimum effort, a new portable sanding machine produces excellent work, regardless of the operator's experience. The machine weighs only fifteen pounds, making it easy to carry about from one job to another. It gives a smooth, flat finish. A standard three by twenty-four-inch belt, an inexpensive size, is used by the sander. Air passages around the field and a turbine-type fan keep the device cool under almost any condition. Belt changes may be made quickly. The one-half horsepower universal motor operates from light sockets on direct or alternating current. Use of the sander is not limited to wood, because the tool merely puts the abrasive to work. By using the correct abrasive belt, almost any material can be surfaced. Felt and canvas belts can be supplied for special work.



Sanding Machine Shown in Use; It Is Easily Portable and Plugs into Wall Socket

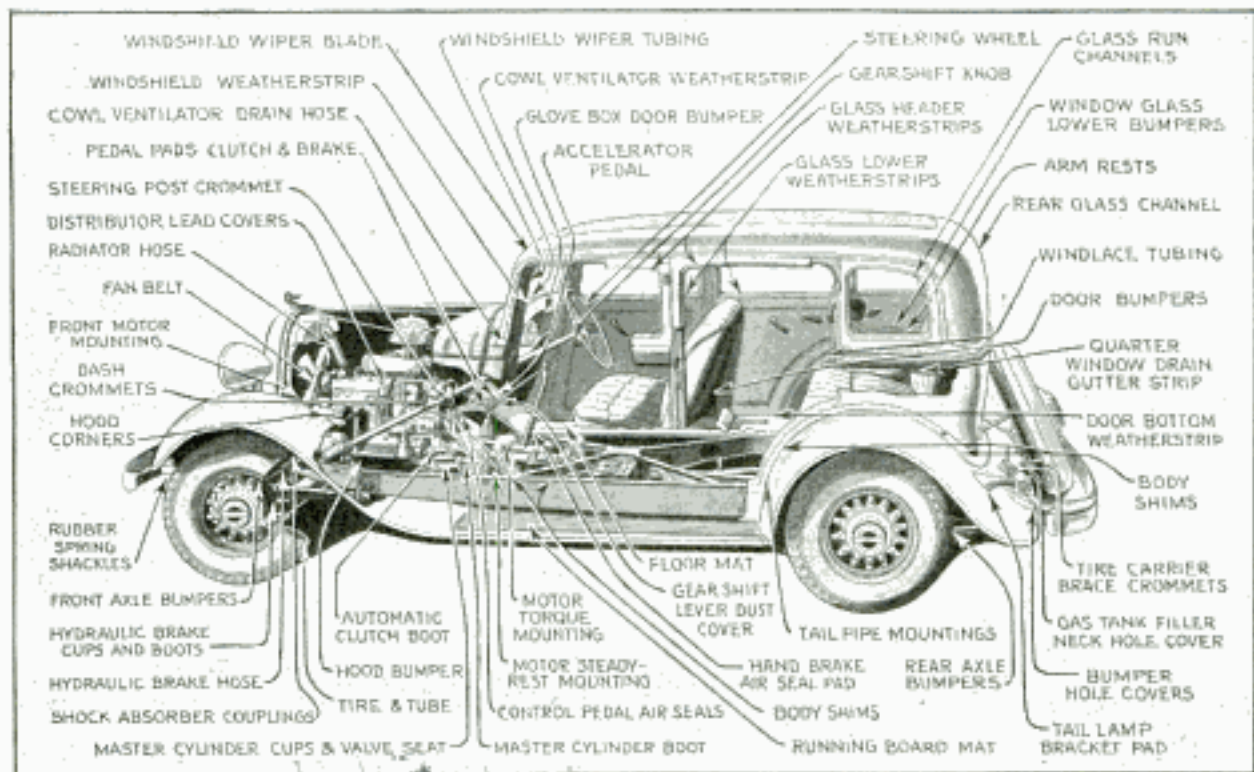
W. J. ... 8/26/23

Chicago & Western

The Porter-Cable Machine Co. The Sawacee, Wis.

Reported in Science by John H. Straige

Modern Auto Rides in "Cradle" of Rubber



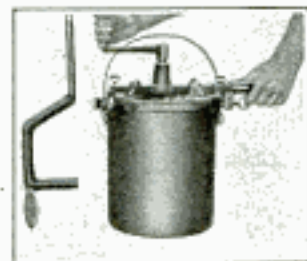
Artist Shows How the Automobile Manufacturer Is Producing Quieter Cars with the Aid of Rubber; Drawing Shows Most of the Spots at Which Rubber Is Used; Even Spring Shackles Are Rubber

Few drivers realize that the modern automobile is literally cradled in rubber, although they may notice the absence of engine vibration and road shocks and the silent operation of the whole car. The practice of mounting the engine on rubber has been gaining ground steadily in the automotive industry, so much so that it is no longer new. From time to time, manufacturers have found it possible to substitute rubber for some wooden or metal part, making the substitution so quietly that the public probably never knew it. In a recent checkup, the maker of one of the light autos, the Plymouth, found that rubber is being used at more than sixty spots in the latest models, exclusive of tire and tube. And the end is not yet in sight because the industry's research laboratories are always trying out rubber at a new point in the automobile. One unusual use of rubber is in the front axle-spring bumpers, replacing the metal type. Throughout the Plymouth, rubber serves as a buffer, eliminating all metal-to-metal contacts and reducing the number of "squeak" sources. When it was decided to "float" the engine on rubber,

engineers faced the problem of finding a substitute for the metal fuel lines, which would break under constant vibration. There again, rubber was called into service, as material for flexible lines. Some automobiles contain more than forty pounds of rubber, besides tires and tubes.

PAINT MIXER WITH HAND CRANK REPLACES STICK IN PAIL *C1294*

Replacing the inefficiency of the "stick-in-a-pail" method, a paint mixer with a hand crank can be attached quickly to any three and one-half gallon or five-gallon pail. One hand holds the "grip-handle" while the other turns the crank, causing the paddle to revolve as many as 100 times per minute without losing the technique of mixing



with a stick. The device is said to produce a perfect mix without the drudgery of the old method.

C. E. Farrington Co
Phoenixville, Pa.

21295

541 1/2 Islanddale Blvd

DEAD MEN



DRINKS POTASSIUM CYANIDE

TELLS FRIENDS AND DROPS DEAD

RUSHED TO HOSPITAL

Do you know that if you "die" of heart failure, you have better than an even chance of being brought back to life?



By MAXWELL REID GRANT

2210 64th St. Los Angeles

DO YOU know that if you meet sudden death from one of the many common causes of accident, you have six chances out of ten of being brought back to life?

Do you know that heart failure need not be fatal? That death from drowning may not necessarily be irrevocable? That electric shock may render you only temporarily lifeless, if proper restoratives are applied without delay?

Almost uncanny are the means by which emergency surgeons cheat death. A few cubic centimeters of a mysterious blue dye, injected into the veins, restores life to poisoned men. Minute electric currents thrill through heart tissues to reawaken vital processes. Tilting teeter-boards, run by electric motors, force the stopped pulse to resume its work. Mechanical lungs breathe for the drowned. Skillful mechanical fingers fish deadly objects from the lungs or stomach. The flickering flame of life is rekindled by quick injections of adrenalin, shot into the heart itself.

A man lay dying from a chronic heart disease. He asked his physician if only he could keep him alive until his son had time to reach him—he must tell him an important secret.

With a long, slender gold needle, the

Top to Bottom, Left, Three Stages in Artificial Respiration as Applied by Ambulance Driver in Emergency Case; This Treatment Is Intended to Force the Lungs and Heart to Perform Normally; Top, Right, Strip of Drawings Illustrates Revival of Patient Who Had Swallowed a Large Dose of Poison; Quick Treatment at the Hospital Saved His Life

made to LIVE



Top, Right, Applying Artificial Respiration and Oxygen to Victim of Asphyxiation; Bottom, Giving Oxygen to Gas Victim

doctor pierced the right auricle of the dying man's heart. Through this needle flowed almost imperceptible impulses from an electrical generator, causing the muscles to contract and set the heart beating again about seventy times per minute. Thus, the patient was kept alive until he had talked to his son. This case was the more remarkable because the heart was

wasted from disease. When the heart is sound, this electric "pace-maker" permanently restores the dead to life.

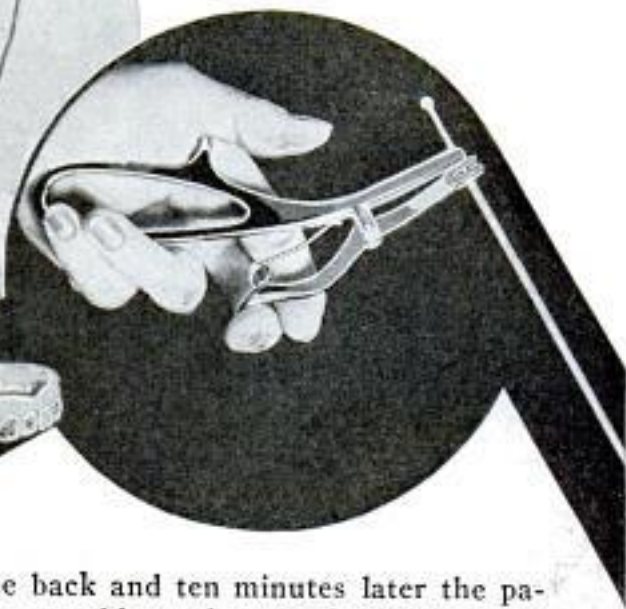
More than a hundred men today are living testimonials to the power of this instrument. Dr. Albert S. Hyman determined to make an apparatus that would supply regular impulses to the heart when it had stopped beating. Engineers built a small generator producing forty to 120 electrical impulses per minute. The current is led down through the needle, which is forced between the patient's ribs, into the stopped heart. Current passing from the needle's tip, through the heart and back through a metallic sheath, gives the twinge that starts heart muscles working again. Six out

of ten people dead from heart failure, revive, provided they are treated within a period of ten minutes.

Whole batteries of microscopes are being turned on the mysteries of sudden death. In test tube and retort are evolving new chemical compounds that have miraculous powers over living organisms. The work of emergency treatment is pro-



friends what he had done. They rushed him to the emergency hospital, where Dr. R. J. Millzner prepared fifty cubic centimeters of the blue dye and injected it into the young man's veins. Miraculously life began to



Top, Removing Electric Wire with Dry Cloth and Dry Stick; Right, Device Closes Pins in Body; Bottom, Objects Taken from Stomach and Lungs

gressing rapidly on many fronts. In a laboratory at the University of California, Dr. Matilda Brooks, research biologist, systematically poisoned rabbits and rats with cyanide. Others she asphyxiated with carbon monoxide. Then she injected small quantities of methylene blue, a substance long used as a commercial dyestuff, but little known in medical science. Immediately the apparently lifeless creatures became conscious and rapidly returned to normal condition. The results of these experiments led Doctor Brooks to recommend that the restorative be tried on human beings.

The opportunity came soon. Cuthbert Reiveley, twenty-four-year-old medical student, drank fifteen grains of potassium cyanide in half a glass of water. Just before he became unconscious, he told

come back and ten minutes later the patient was able to sit up and tell friends of his sensations.

Doctor Brooks explained that cyanide and carbon monoxide poison the body cells and prevent them from absorbing life-giving oxygen from the blood. Carbon monoxide joins with the red corpuscles, forming a compound that renders the blood cell inert. In some unknown manner, methylene blue drives out the poison and restores the corpuscles to life again.

Sodium thiosulphate, a drug previously used in treatment of ringworm and to reduce blood pressure, seems to have similar power. Last year, Dr. A. Buzzo, of Buenos Aires, saved four people from death by the use of this drug.

Another device for reviving the dead is a mechanical teeter-board to which the patient is strapped and slowly teetered up and down, heels over head, and back, restoring pulse action and forcing the lungs to work bellows-fashion

Strangely enough, many of the emergencies which endanger human life are the result of swallowing some foreign body. If the object punctures the delicate walls of lungs or stomach, death is almost

sure to follow. Treatment of such cases is made possible by instruments which enable the surgeon to look directly into the stomach or lungs, and manipulate tiny steel fingers to grasp the foreign body.

A seventeen-year-old girl recently swal-



Left, Demonstrating New Tourniquet for Checking Flow of Blood from Injured Arm; Right, Using "Fireman's Lift" in Carrying Drowned Person

lowed a tin whistle, which lodged in the right bronchial tube. Every time she drew a breath, the whistle blew—loudly enough to be heard in the next room. Her parents hurried her to the receiving hospital, where police surgeons placed her before an X-ray screen. On the glowing green surface of a fluoroscope, they saw the whistle in the bronchial. A doctor painted her throat and vocal chords with a local anæsthetic. Then he took his bronchoscope—a long, slender, nicked tube, at the top end of which tiny mirrors reflected an intensely powerful beam of light down the middle. Peering down this tiny tube, he saw the whistle gleaming. Down the tube went a wiry instrument, tipped with spring claws which opened up as the doctor pressed a handle. Spreading tightly against the inside of the whistle, the

claws held it firmly while the doctor cautiously withdrew it, ever so gently, so as not to injure delicate tissues.

In another case, an eleven-year-old boy swallowed a brass tack almost an inch long. X-rays showed it had reached the lower lobe of the lungs—a critical position. Again the bronchoscope crept down the throat. Tiny claws seized the point of the tack, turned it into the tube where it could do no harm, and removed it. So frequently are safety pins swallowed, that there are special instruments made to grasp an open pin, hook over its branches, and force it to close, when a pistol-grip is squeezed by the surgeon.

The doctor who performs this type of work at the Georgia Street Receiving Hospital in Los Angeles has an extensive collection of articles he has removed from the stomach and lungs. They include bones, false teeth, pins, needles, tacks, nails, coins, and even a knife two and one-half inches long, with opened blade. A five-year-old child had swallowed it.

Putting into practice the latest life-sav-

(Continued to page 130A)



Wide World
Model of Village Church Helps to Demonstrate How Conductors to Ground Protect the Structure against Artificial Bolt of Lightning

PROTECTION FROM FIRE TAUGHT WITH MINIATURE VILLAGE

Hundreds of working models were used in a Berlin, Germany, exhibition to help teach fire prevention to the public. A miniature village, struck by an artificial bolt of lightning, illustrated the value of adequate protection from lightning. Germany's huge fire losses each year were impressed upon visitors by large charts,

eliminated, the radiant-gas tubes doing the work of nine or ten bulbs. Instead of the white light colored by interposing a colored lens in front of it, the new signal has a set of originally colored neon tubes. Confusion is decreased in that the signal shows only one color at a time, instead of the red-amber-green combination. The signal is said to be as effective in daylight as at night.

TRANSOCEANIC ZEPPELIN BASE TO BE BUILT IN BRAZIL

Construction of a base for year-round Zeppelin service between Europe and South America has been authorized by the Brazilian government. Close to \$1,000,000 will be spent on hangars, gas tanks, a lighting system and roads to the base. The government also is building a large central airport for land and seaplanes in preparation for the transocean air-mail service of the German Lufthansa and the French Aeropostale company, which probably will be inaugurated in 1934. Upon completion



Neon-Tube Traffic Signal Has Only One Signal for Each Direction, Reducing Confusion

of the dirigible base, the Zeppelin company, with which Dr. Hugo Eckener is affiliated, will place in service two great airships. An eighty-hour schedule between Friedrichshafen, Germany, and Rio de Janeiro will be used on the westbound crossing, with a ninety-five-hour schedule going east.

C1392
NEON-TUBE LIGHTS DIRECT TRAFFIC

Reduced operating costs and increased visibility are two advantages claimed for a new neon traffic-control light. The signal device has four faces, one for each direction at the street intersection. Electric current costs are said to be reduced by more than seventy per cent, while lamp replacements are almost

C1256

*Under license from patentees 1696716
J. P. Battalis
Raymond
S. Easty
J. W. Walshung*

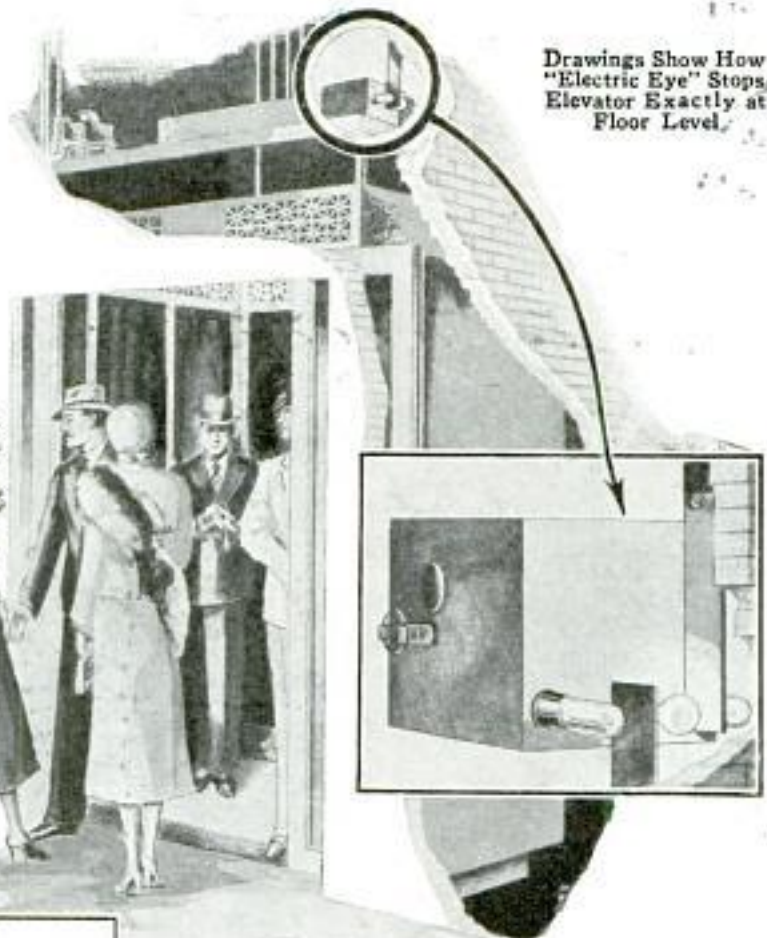
mono. lens

Denver Post 8/13/33

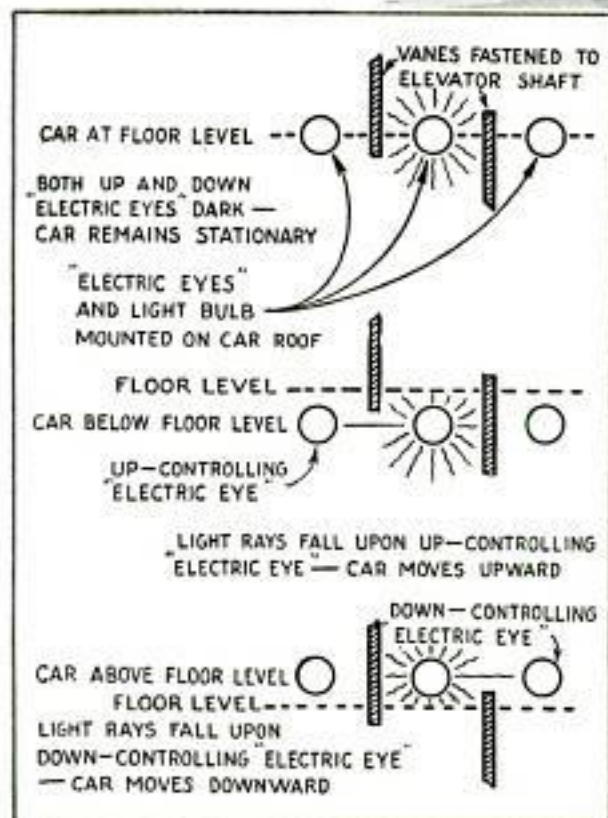
*Victory Methods Co.
94-98 5th St.
Washington W. Va.*

"Electric Eye" Stops Elevator at Floor Level

Photo-electric cells control the fastest passenger elevators in the world, those in the R.C.A. building of Rockefeller Center in New York City. In testing the cars, officials traveled at a rate of 1,400 feet per minute, going from the first floor to the sixty-fifth in thirty-seven and one-tenth seconds. Yet, the elevator stopped exactly level at any desired floor, due to the action of two little photo cells, or "electric eyes," that ride each car up and down the 850 feet of elevator shaft. The application of the apparatus, installed by the Westinghouse Electric and Manufacturing company, is simple. A small automobile headlight bulb is mounted on a control panel at the side of the car. An "up" controlling



Drawings Show How "Electric Eye" Stops Elevator Exactly at Floor Level.

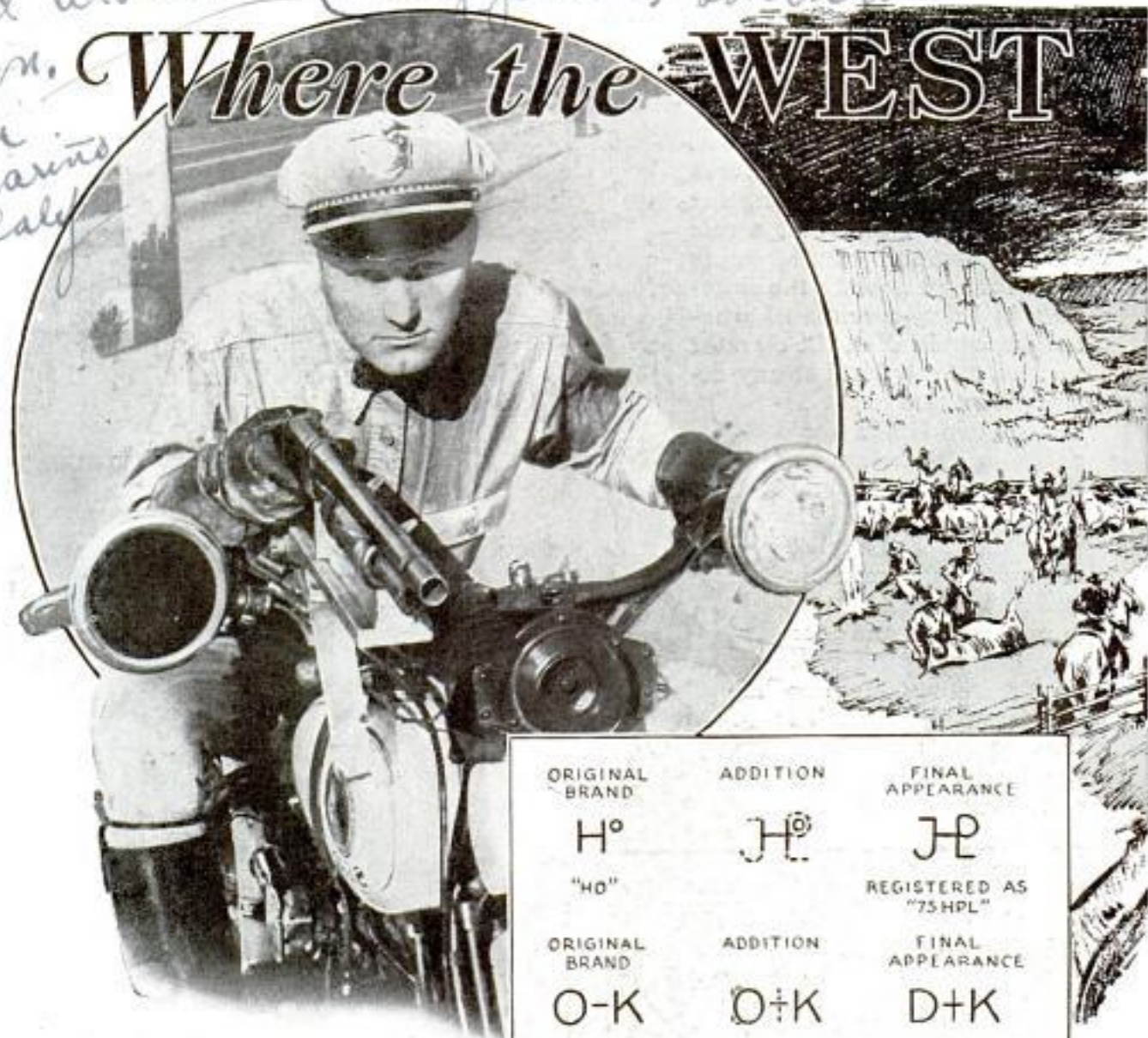


inches on the opposite side, the "down" photo cell is mounted. When the light's rays fall upon the up cell, the car moves upward, when they illuminate the down cell, the car descends. Metal vanes fastened to the wall of the shaft control the elevator in stopping by allowing, as the car slows down, the light's rays to fall upon only one of the photo tubes at a time and by intercepting the rays when the car reaches the correct floor level. This control also serves the purpose of keeping the elevator at floor level as the car is being loaded with passengers. In tall buildings, there is the problem of cable stretch, the elevator sometimes dropping from one to two inches under the weight of twelve persons. But the electric eye solves this problem by keeping the car creeping upward slightly as the passengers enter. Then as the passengers leave, the control counteracts the tendency of the car to rise as the elastic cable shortens.

cell is mounted three inches from, and on a horizontal line with, the light bulb. Three

C 1062 Reference Harry Wright
 and W. Parker Chief Deputy Sheriff
 Hall of Justice, Los Angeles
 San Marino Calif

Where the WEST



OUT on the western plains one night a group of mounted men cautiously rode up to a barbed-wire fence. After a whispered conversation one of them snipped the strands. Half an hour later a herd of cattle was being driven through the gap into the open country.

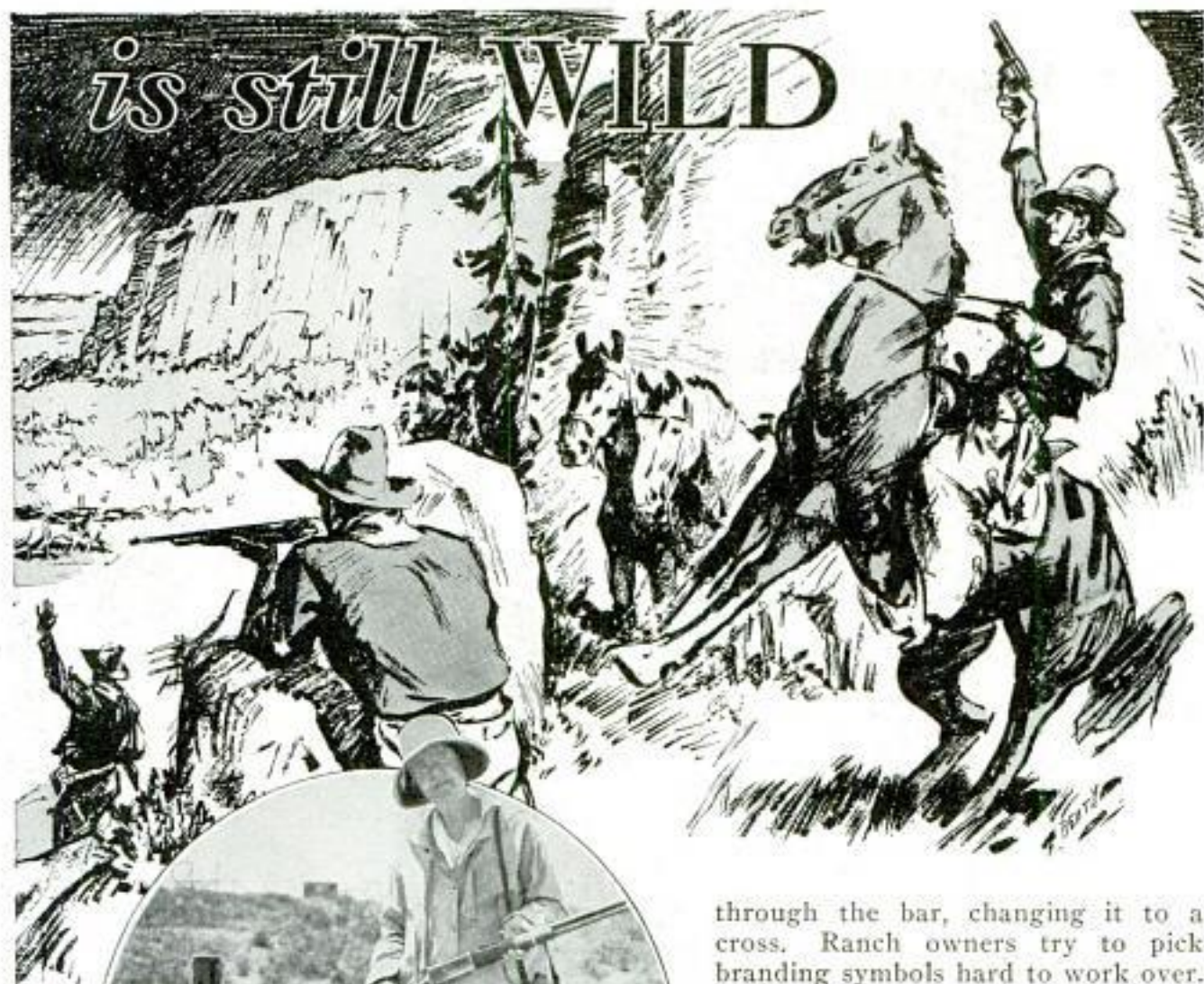
The same night, a few hundred miles away, three desperadoes pounced on the buildings of a mining company and blew open a strongbox packed with bullion. Shooting their way through the crowd of aroused miners, they fled into the hills. Instead of being parts of a wild-west novel or a motion-picture thriller, these events are taken from current police records. The fact is that parts of the west are just as wild as they

ORIGINAL BRAND	ADDITION	FINAL APPEARANCE
H ^o "HO"	JH ^o	JH REGISTERED AS "75HPL"
O-K "O BAR K"	O+K	D+K REGISTERED AS "D CROSS K"
W- "W BAR"	WH	WH REGISTERED AS "WH"
	#	THE "PIG PEN," A BRAND RUSTLERS HAVEN'T BEEN ABLE TO WORK OVER

Photo Courtesy Auto Club of Southern California

Above, Highway Policeman with Shotgun Attached to Motorcycle; Below, How Rustlers Change Brands

were in the days of the "Apache Kid" and "Wild Bill" Hickok. Men still go armed habitually. Cattle rustlers, "two-gun" men, and outlaw bands are still active. Only a few months ago peace officers caught a



One Woman Mine Owner Showing Exactly How She Protects Her Property from Claim Jumpers

group of rustlers who had raided several herds.

Rustlers look for cattle with a brand easy to change. For instance, rustlers moved into a territory where "O bar K" cattle ranged and registered "D cross K" as their own brand. They stole "O bar K" cattle, straightened one side of the "O" to make a "D," and ran a vertical line

through the bar, changing it to a cross. Ranch owners try to pick branding symbols hard to work over. In case of doubt an animal is slaughtered. The old brand shows up plainly on the under side of the hide and recent additions to the marks are easily detected.

Deputies in the cattle country are also coping with a new problem these days. Instead of working over brands, rustlers load cattle into trucks, transport them to a deserted area, and slaughter them for the meat, but officers can usually track the rustlers down. Range law requires that hides of slaughtered cattle be spread on a fence so that all comers may observe the brand. Instead, rustlers bury the hides. Deputies go straight to a cattle thieves' rendezvous by watching the buzzards and tracing truck-tire tracks.

Desert men keep track of their friends and mark the coming and going of strangers by watching trail signs. Little things in the road are read Indian fashion. Every one knows the different tire marks left by



Left, Officers on Patrol Duty in Desert; Below, Federal Officer on Border Watching for Smugglers, and a Liquor Still Found in the Desert Hills

their neighbors' cars. Deputies read footprints and recognize the tracks of different horses in the same way.

Justice in the desert often moves slower than it does in the cities. Because the country is sparsely settled, a murdered man may lie unfound for days. Neighbors may know little about him except his name. If no clues are found the deputies adopt a policy of watchful waiting. Months may go by. But eventually a letter may arrive for the man at the local post office or a stranger may inquire about him. Any lead into his back history is a starting point from which the deputies work forward until they reconstruct the action of the crime.

Mining holdups are not as common as in the past. Guards protect the mines and shipments. In the last century, in one community where the bad men almost outnumbered the good ones, the owners of a silver mine were robbed repeatedly. Finally the highwaymen were outwitted. Every night the output of the mill was melted and added to a ball of silver. From a few pounds it grew to weigh nearly half a ton. Eventually it was shipped in a heavy freighting wagon. The highwaymen, unable to carry the heavy ball up into the hills, let the shipment through.

Thirst is a terrible, constant threat on the desert. Newcomers hardly realize that to go without water for a day often means death. Because scores of people are lost in the arid regions every year, life-saving



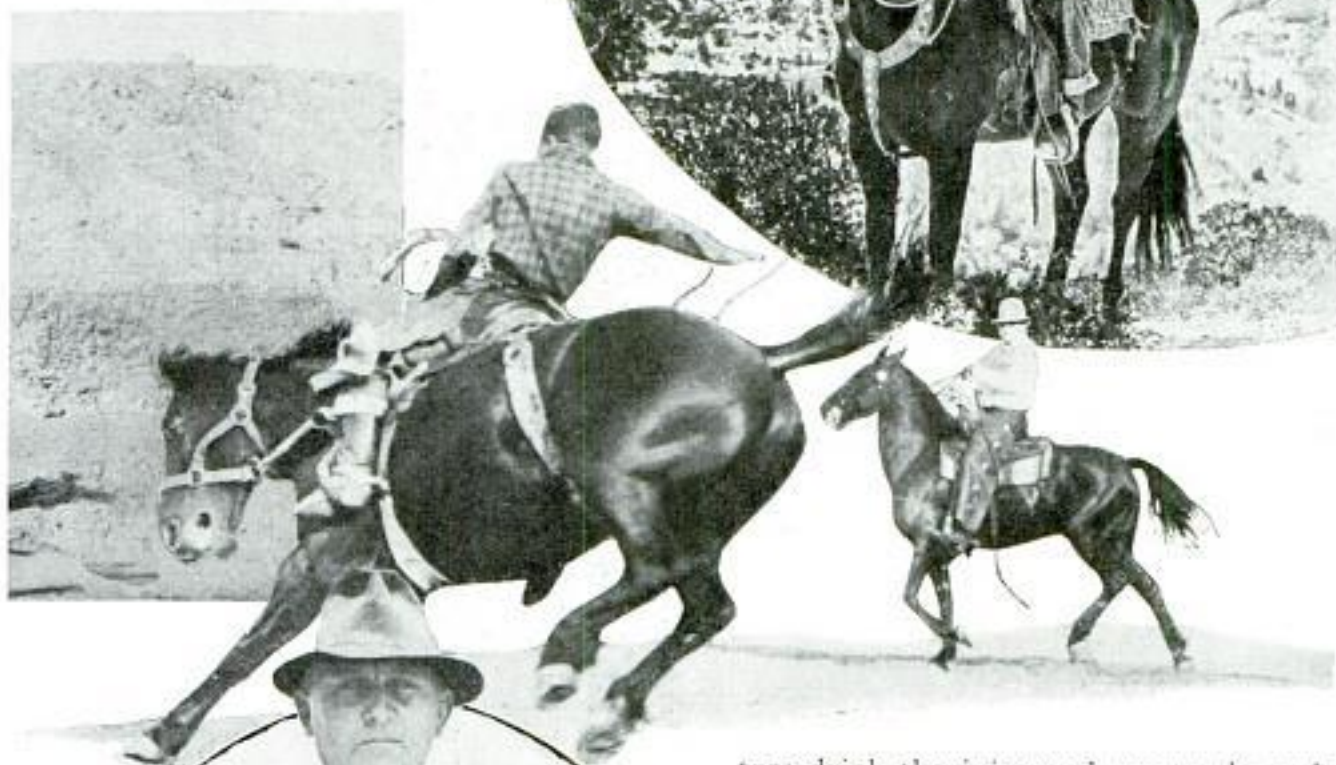
is part of every desert deputy's job. Tourists misjudge distances in clear air and start off on hikes from which

they fail to return. Automobile campers run out of gasoline or break down far from water. Even seasoned prospectors, trained in desert lore and accustomed to the heat, sometimes go astray.

"The hot dry air evaporates the moisture out of a person in a few hours," explains an officer at an outpost near Death Valley in California, "but an overdose of water in the desert is just as bad as none. When a call comes in to the station that a man is lost, I drive to the region where he was last seen and find a high spot. Then I carefully rake every acre in sight with

binoculars. You can cover everything inside a five or six-mile circle with glasses in less than an hour, saving as much as a day's search. If you are looking for an automobile you can sometimes see it ten miles away."

Besides an emergency canteen of water, most desert men carry a can of tomatoes. One sip of tomato juice seems to be as effective as a pint of water in fighting off thirst. Prospec-



Above, Deputies Still Use Horses to Patrol Hilly Country; Below, Tear Gas for Stopping Brawls

tors drink the juice and empty the pulp into a hat to feed their burros. Lacking such aids, desert-trained men roll a small pebble around in their mouths to keep their tongues from swelling.

Styles in firearms change slowly on the desert. The single-action frontier-model revolver that was first used in 1871 is still popular today. But the two-gun man of fiction who blazes away with both hands is rare. Nor do you often find killers who keep score of their victories by cutting notches on the butt of a "shooting iron."

In addition to two revolvers, deputies are rarely without a sawed-off shotgun or a rifle. Not long ago an officer furnished proof of the superiority of a rifle over a

(Continued to page 122A)

C1243

694

Goodyear Tire & Rubber Co

POPULAR MECHANICS

Abrams, Ohio

Sportsman's Boat Folds into Small Zipper Bag



Top, Left, Collapsible Boat Packed into Zipper Bag; Top, Right, Boat in Use; Bottom, Preparing to Inflate the Fabric Craft

Small enough to be stowed into a zipper bag no larger than a suitcase, inflatable boats are available to the sportsman. Only a few seconds are required to unpack the fabric boat and a minute or two to inflate it with a hand pump. One, two, four or seven persons may ride in the craft, which comes in the four sizes. Each boat has two compartments, each of which will support the maximum load if the other is punctured. In addition to the oars, which

are sectional, and the pump, a repair kit is carried in a pocket inside the boat and tears and punctures may be repaired quickly, even while the craft is in the water. The boats are shaped somewhat like conventional rowboats, the prow slightly raised to reduce resistance to the water. Because of their unusual width, it is difficult to capsize the boats. Fabric seats extend across the boat, in position for easy rowing. Three-ply waterproof fabric is used in constructing the craft, the pieces being joined with cemented, waterproof seams.

BRAKES FOR HIGH-SPEED TRAIN CHALLENGE TO EXPERTS

One of the most difficult problems which builders of the Union Pacific system's 110-mile-an-hour train had to solve was that of brakes. Without brakes to stop it rapidly and safely, there could be no train. The distance in which the engineer must stop cannot be changed without changing the spacing of signals at prohibitive ex-

pense and incurring costly delays. But if the rate of retardation is not modified to compensate for the increased speed, especially where slow and fast trains run on the same track, there is more danger of collisions at high speed. To maintain the old stopping distance made necessary the invention of a brake of extraordinary flexibility and responsiveness. The New York Air Brake company solved the problem, producing brakes weighing only one-third

New York Air Brake Co
420 Lexington Ave. New York

my dinner 8/10/23

as much as those now required on the standard railroad sleeping car. Stopping the speeding train without jarring the passengers is accomplished by automatic devices that apply gradual and successive air pressure. The engineer merely turns on the air. A "decelerometer" does this job efficiently, applying the heaviest pressure at high speed and then relieving it as the train slows down.

TIRE ON WHEEL REPAIRED WITHOUT DEFLATING

Cuts, blisters and sand pockets can be repaired in a tire without removing it from the wheel and without deflating. A new vulcanizer does the job. The heater plate containing an electric element is placed over the cut and held there by a strap. Pressure is applied with a large C-clamp. After the clamp has been tightened, a cord from the plate is plugged into the nearest electric socket and the current turned on. Depending upon the thickness of the tire, the current is left on as perhaps thirty minutes. Cooling requires ten minutes and then the vulcanizer is removed. An automatic thermostat in the heater keeps the temperature from rising above 265 degrees, leaving the repair man free to do other work. Raw gum rubber is used to fill the cut before the vulcanizer is applied.



Vulcanizer Shown Applied to Tire on Wheel; Note That Tire Has Not Been Deflated



Growing Flower Bulbs in Paper Cartons for Shipping and Selling; Note Protective Collar around Center One

CARTONS FOR GROWING BULBS MAKE HANDLING EASY

Lilies of the valley and other similar bulb flowers are now being shipped and sold in round paper cartons which protect the growing flowers in transit. The waxed containers are large enough for the extensive root system and the cover has three holes through which the bulbs protrude and six smaller ones for watering and aeration. The roots rest in moss instead of earth and there is a collar fitting about the top of each round carton to protect the plant in shipment. By shipping in this manner it is possible for the flower lover to obtain such blooms for the mid-winter months since they are grown like any other house plant.

FROGS GROWN IN DYE SOLUTION BECOME ALBINOS

Frogs grown in permanent dye baths do not become colored. Instead they turn out to be albinos, lacking color even in their eyes. This paradoxical result was obtained in a long series of experiments by an investigator for the Carnegie Institution who used very dilute solutions of certain dyes, placing frog eggs and tadpoles in the various baths. The frogs hatching from eggs were normally pigmented when they hatched, but soon lost all color. The tadpoles similarly lost color but did retain their eye pigments.

The J. Hoyle Co. W. A. ...
W. A. ...
W. A. ...
W. A. ...

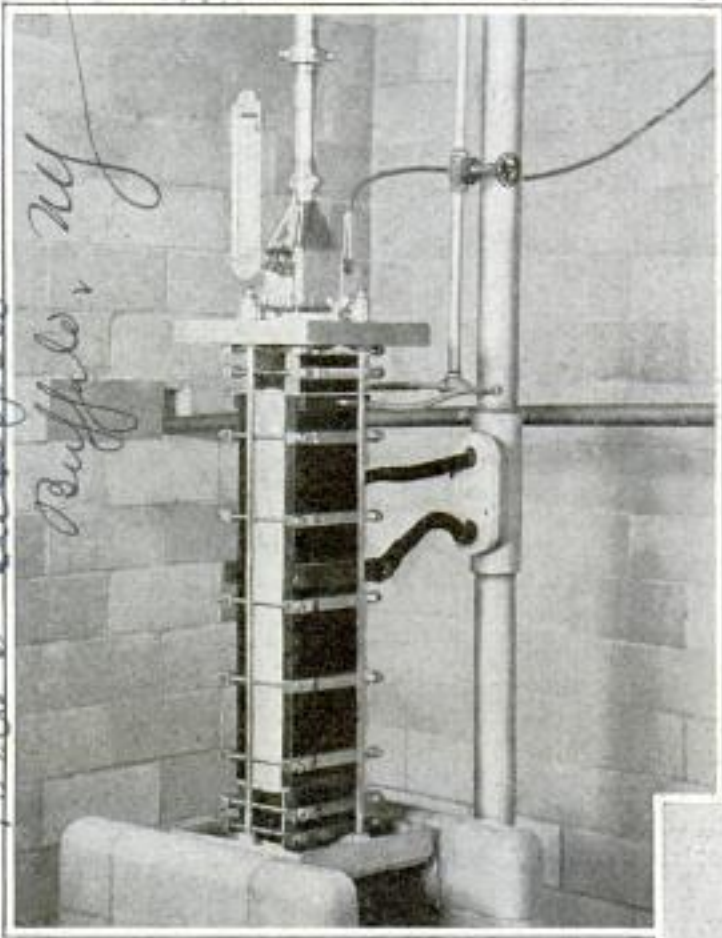
Lily. Bulb. Corp. 42 nd
C1233 122 42 nd
City

source new ... 8/19/33

W. A. ...

521-3 Penn Ave Wilkensburg Pa

Process used by Sterling Milk Co Buffalo, NY

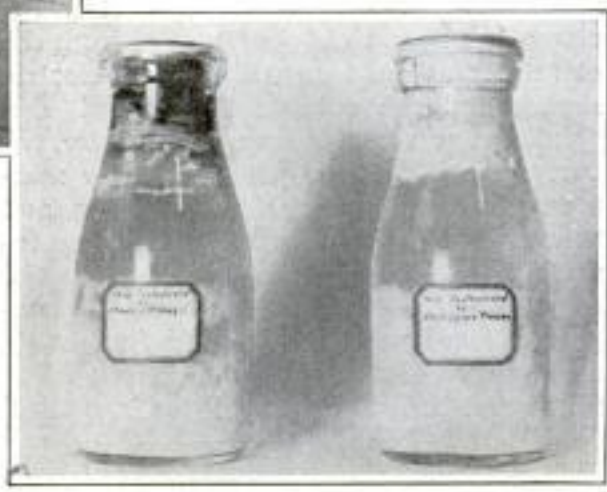


the bottle pasteurized by electricity, a deep, cheesy collar had formed, but in the steam-pasteurized bottle, the collar was black and giving off the odor of putrefaction. Electrically pasteurized milk is said to retain so fully the flavor of raw milk that experts cannot distinguish between the two. The process is entirely automatic, from the push of a button to the moment when the purified milk pours into bottles. A thermally actuated electric coil automatically changes the resistance in the field of the milk-pump's motor, while the heat of the milk in the pasteurizer ruins this electric coil. If the milk in the machine gets too hot, the coil lessens resistance, speeds the motor and the pump, passing the fluid through

"Electric Chair" for Pasteurizing Milk Is Shown Above; Right, Comparing Sixty-Day-Old Milk

MILK PURIFIED BY ELECTRICITY IN LATEST PASTEURIZER

Speeding up and improving pasteurization methods, an electric machine destroys bacteria in milk in nineteen seconds, compared to the thirty-minute steam process. Only the milk's natural lactic-acid bacteria are spared, since they thrive on heat, resulting in the fluid keeping sweet for phenomenal periods. Also, when the milk sours, it sours naturally, forming a fine, rich, creamy curd. Two bottles of milk, each two months' old, were compared. In



the pasteurizer at a faster rate. In the nineteen seconds that it takes the milk to climb up a column to the small "death chamber" where electricity is shot through it, the fluid is purified.

C 1260 DIVERS HUNT LOST JEWELRY AND PURSES AS SIDE LINE

As a change from raising wrecked ships from the bottom of the ocean, divers frequently are called upon to hunt jewelry and purses dropped into the sea by visitors at beach resorts. On one occasion, a diamond-mounted wrist watch was found by a diver three days after it had been

dropped from the end of a pier. In this case, the search was confined to a small area. It is when the diver has to hunt for a lost article over a comparatively wide area that the art of knowing how comes in. For instance, when articles are lost from a yacht, the swinging of the vessel at anchor probably will entail a search over an area of many square yards. Such a search is carried out in a methodical

Answers 8/12/33

way. First, a weighted rope is lowered at the spot where the article is believed to have been dropped. The diver goes down beside this rope. At the bottom of the rope, he attaches another rope which he holds in his hand. Then the diver hunts in a circle around the weighted rope, gradually paying out the "distance" rope until he has covered a wide area. If the article is not found, the weighted rope is moved and the search continued. In looking for large objects, the diver goes down on a weighted grating, a sort of cradle on which he lies face down. The grating is then towed slowly by the boat containing the diver's air pump. Often, artificial light is used.

PENDULUM LEVEL GIVES QUICK READING

Considerable time in taking readings on slope or grades may be saved by the use of a pendulum level. The instrument, which will do all that any carpenter's level will do, gives perpendicular and horizontal readings. On one side of the face, the graduations are in degrees of the circle. On the reverse side, the reading may be taken in slope or inches to the foot. The numerals are inches in slope to a given foot and any desired slope from one-fourth inch to the foot to twelve inches to the foot or forty-five-degree slope may be determined easily. It may be used with a tripod and cross head as a builder's level, giving either slope or grade instantly and accurately. In a machine shop, the instrument will provide an accurate cross head for a lathe, saving time of skilled workers. Con-



Simple Pendulum Level Enables Contractors and Workmen to Make Quick, Accurate Readings

tractors, airplane builders and pipe-line welders are others for whom the level has been designed.



Veteran Tuner of Organ Pipes Is Shown Preparing "Voice" for Instrument; He Has Been on the Job Sixty-Three Years

BUILDER OF PIPE-ORGAN "VOICE" HAS EXACTING TASK

In the intricate construction of a great pipe organ, the "voice" builder has one of the most exacting tasks in the industry, tuning the pipes by groups and then as a whole. One of London's voice builders, John Randle, has worked at the same bench for sixty-three years, during which time he has helped to produce some of the mightiest pipe organs in the world. Few people realize the enormous work entailed in the making of a pipe organ. These instruments vary in size, a large modern organ having from 4,000 to 6,000 pipes, more than 100 miles of cable and wire and costing from \$50,000 to \$300,000. Besides its hundreds of pipes, the modern theater organ has devices for reproducing every known effect, including thunder, fire bells, breaking glass, the ripple of surf, the whirl of airplane motors and scores of others.

Handwritten notes:
 © 1239
 Bell Organ, 107 St. James Hill
 N.Y.C. 372 York Road
 N.Y.C. 4 London.

Handwritten advertisement:
 Pacific Sales Equipment
 Co. Ltd. 1438 Beachwood
 Dept. 200 Angeles

502262 Cont. slot 3 Black
of United Air Lines
United Airports, Bay and
Calif

Between the HALVES



Left, the Southern California Chariot; Below, Stanford Indian Shaking Hands with Trojan Warrior

GRIDIRON battles on the Pacific coast are now supplemented by the mass teamwork of the thousands in the cheering sections to form huge living pictures moving in rhythm to inspiring college songs. Here's a typical afternoon of between-the-halves entertainment at the Los Angeles Olympic stadium.

University of Southern California is playing, let us say, St. Mary's. The gladiators have retired to quarters for arnica, aspirin, and the solemn admonitions of Head Man Jones and wily Slip Madigan. As one man, the vast audience rises to stretch, to burst into relieved chatter, to condemn or praise respective champions. That's the cue for the entre-act curtain.

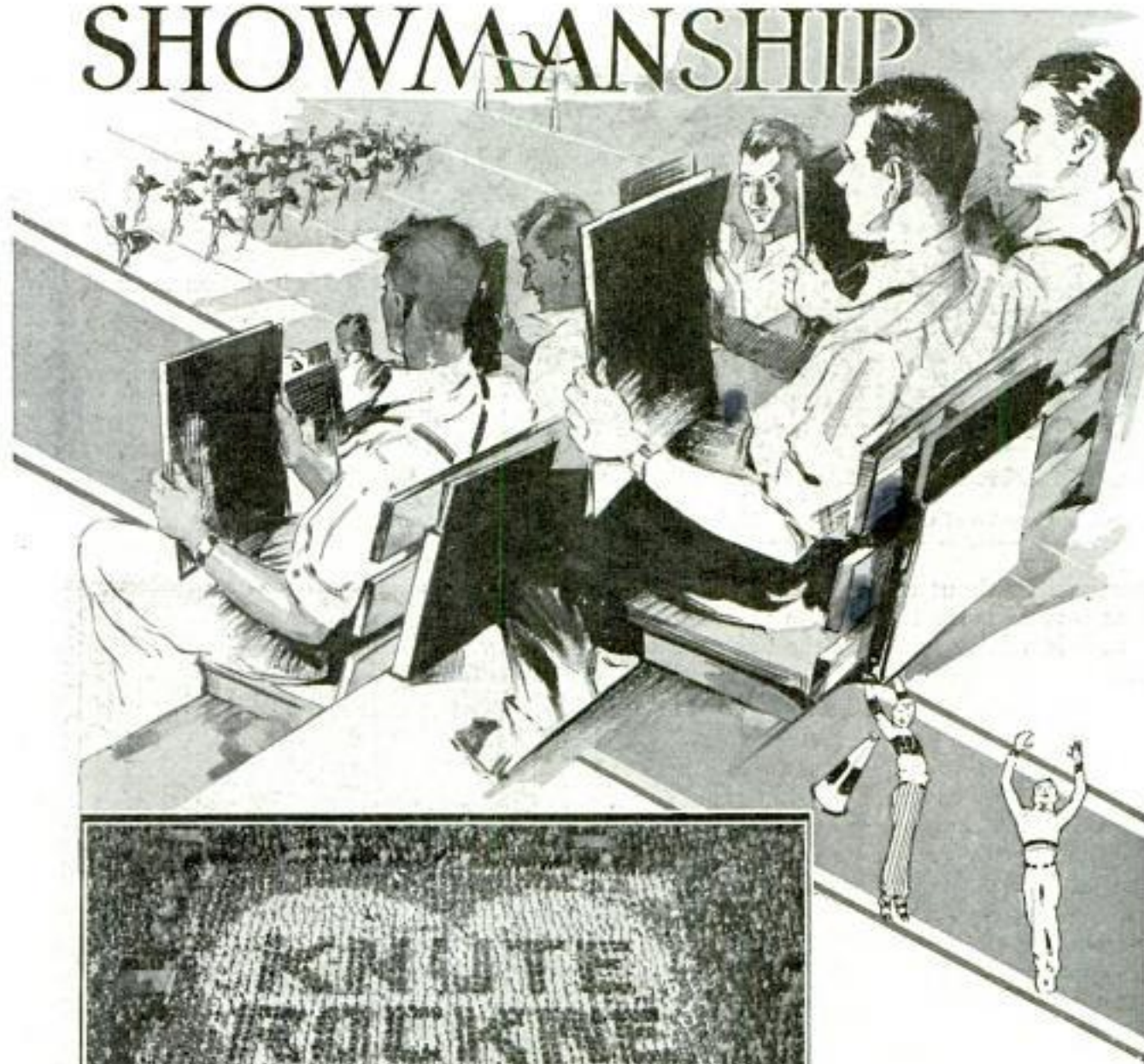
Down from the stand pours the Trojan band. Resplendent under the sun, it marches on the field with stirring rhythms, then circles, wheels, forms, re-forms. Then through the tunnel in which the athletes vanished but a moment before, a strange procession wends. At its head the wooden horse of Troy, invariable signal for a loyal outburst. Next a Roman chariot, mule-drawn, lashed by a clownish Ben Hur. Now, perhaps, a squad of militia, drag-



ging a grotesque field artillery piece that, wheeled into position, fires colored balloons at goal posts which amazingly collapse. The crowd is all attention now, waiting for the headline act. All eyes swing to the Trojan rooting section where, tier on tier, sit 2,400 youthful actors, white-shirted, hatless. Suddenly the band stills, the tumult dies away.

Down in one corner of the great white rectangle a tiny stab of flaming color appears, develops into a golden streak, climbing, twisting. An invisible artist, of Gargantuan proportions, is drawing a pic-

SHOWMANSHIP



Top, Students with Their Colored Cards Ready to Paint a Human Picture; Below, a Student Tribute to the Late Knute Rockne

ture on that human canvas. Solids appear as the moving finger writes and the giant crayon descends to a ripple of applause, then the murmur rises to rapid crescendo and sustained approval and dies away. But wait!

The band blares forth "The Bells of St. Mary's." Instantly, magically, the great

nificent burst of leather-lunged pandemonium. Timing this applause to an artistic nicety, the tolling bell halts, then vanishes like your shadow when the sun goes under a cloud. Presto change! The slate is wiped clean!

"How do they do it?" puzzle amazed visitors. Tell them the entire stunt was

bronze bell forms in the rooting section and begins to sway a measured arc. To every four beats of the music the swing is complete. Ding-dong, ding-dong!

Surprised, delighted by the novelty, the great crowd responds in a mag-



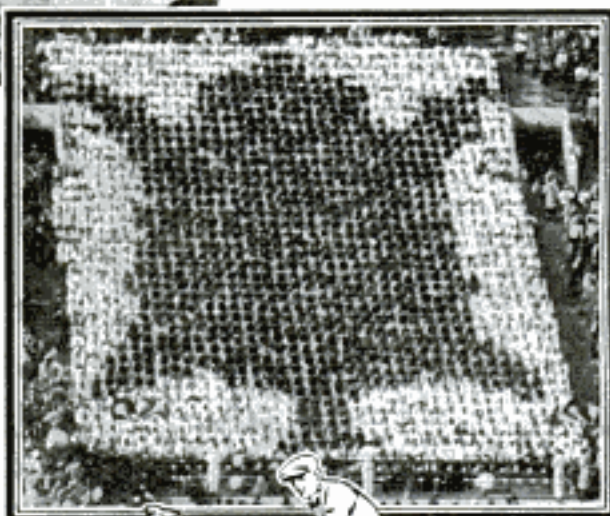
Above, a Close-Up of the Students with Their Colored Cards Ready to Present Design at Right

arranged without a single rehearsal and you invoke more than polite incredulity. But it is a fact and here's the behind-the-stage arrangement.

Three days before the game, the "Yell King," his gag-men, artist staff and technical advisers hold conference. They decide what stunts to stage, the designs and color details. On Thursday they meet again. Before them this time is a large rectangular board. It is forty inches one way, sixty inches the other, line-crossed and criss-crossed to mark 2,400 identical squares each numbered, from one to 2,400. It stands against the wall like a motion-picture screen. The artists submit their sketches on magic-lantern slides. These are projected and traced on the big board. Technicians carefully record the number of every square along which the outlines and solids fall. Friday these numbers emerge from the printers as "Instruction Cards." Saturday afternoon the rooting section files into its seats with the general crowd. There is no pre-arrangement. On the inside back of each seat is a little pocket containing a number of vari-colored cardboards, approximately one foot square. With them is the printer's instruction sheet. In a blank space thereon, the student carefully writes the number of the seat he occupies, then rapidly

scans "Stunt No. 1" to see if that numeral appears. If it does not, he has nothing to worry about for the first act.

Suppose, however, that Seat 727 is called for in the first stunt. The occupant then reads the detailed instructions. A red card is wanted initially, he notes; then a yellow, next a blue or gold, as



the case may be. The cards are arranged on the lap in order. As the cue for Stunt One is given, Seat No. 727 pays close attention to the "Yell King," who, over a loud-speaker microphone, audible only to members of the section, is giving the actors their first idea of the picture about to be presented.

"At the command," says the leader, "all up. And make it snappy! Be sure and wait for the 'down' signal. On second up the colors change, first blue, then the gold. All ready? Here we go! Action!"

In the animated drawings, heavy responsibility falls on the starting number designated. The man holding the second number is usually in the next row above,

032222

perhaps one man to the left or right. Listening for the microphone cue, his eyes are glued on the man just ahead. When this chap raises his card square from lap to chest, the second student must follow suit only a split second later. Thus a ripple of movement runs rhythmically up and down, across and around the huge board.

More and more, the



Above, Student Rooters Encouraging the Trojan Warriors; Left, University of California Students Pay Tribute to Coach Jones; Below, the Stanford Indian Formed by One of the Student Rooting Sections at a Football Game



trend is to animated cartoons. The Trojan is shown scalping the Stanford Indian. The wooden horse with strangely flying heels is a favorite. Railroad trains have been produced, with spinning wheels and clanging bell, and so has an ocean liner plowing through the waves.

The latest advances have been made through the synchronizing of music. All movement is controlled by the beat or periodical accentuations. Thus slow music is best adapted for the purpose. Because of mild climatic conditions, these animated entertainments have originated largely in Southern California where coats, umbrellas and other articles may be dispensed with. This form of between-halves entertainment, however, is practiced generally at all Pacific

coast gridiron encounters and by all school bodies. But it takes real showmanship to put over.

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

1176
702

Built by the Webb City
Cartersville Foundry
POPULAR MECHANICS
Machine Works

For Dairy Company
near Jefferson City
Mo.



Here is Probably the World's Largest Milk Bottle; Its Size is Demonstrated by Comparison with Height of the Workman

GIANT TANK LIKE MILK BOTTLE ADVERTISES DAIRY

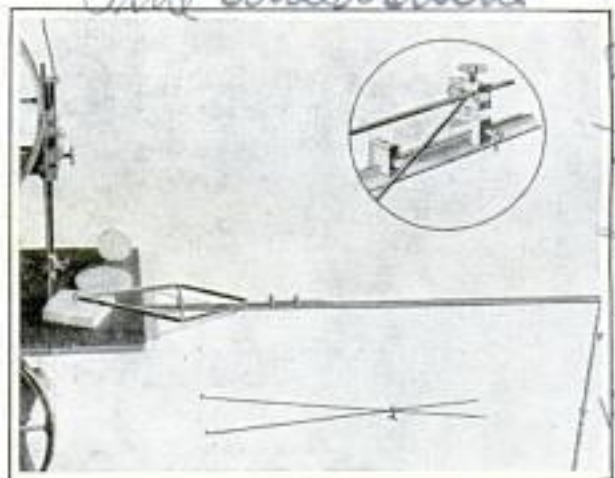
Shaped like a milk bottle, a 12,000-quart water tank has been constructed in Missouri for use in advertising a dairy. The giant steel "bottle" is electrically welded and stands sixteen feet seven inches high.

heights twice that attained by Professor Piccard, who ascended ten miles into the upper air. While some of the instruments supported by parachutes are lost, about ninety per cent reach the earth safely to aid science in its study of cyclones, exploration of the stratosphere and weather forecasting.

CIRCLE GUIDE ON JIGSAW ALSO FITS BANDSAW

With a new attachment for jig or bandsaw, it now is possible to cut true circles or segments of circles quickly. It consists of a bar made of T-iron extending to the right of the saw table and held horizontally by an upright bar from the floor. A metal frame resembling the framework of a kite is fastened to the T-bar by a clamping block and a sharp spur at the point of this frame nearest to the saw blade is pushed into the wood to be sawed. The frame is moved along the rod until the spur, which acts as the center point of the proposed circle, is as many inches from the saw blade as the radius of the circle is to be. Then the frame is tightened

against the T-bar at the block, and the circle is made by revolving the piece of wood on the spur pivot. Two to sixteen-inch diameter circles can be produced.



Attachment for Jig or Bandsaw Enables Operator to Produce Perfect Circles in Wood

COLDER HIGH OVER EQUATOR THAN AT NORTH POLE

That the air high over the equator is colder than that over the North Pole is the assertion of Dr. J. Bjerknes, Norwegian meteorologist, based on information obtained by sending small balloons far into the stratosphere. When the thin air at fifteen to twenty miles above the earth causes the balloons to explode, the recording instruments which they carry float down on parachutes. Temperature, humidity and pressure are registered at

C1283
Christian Science
Mon. Mar 11/7/33

in lecture at G. of Toronto
Toronto Club, Canada

Hermann
Machine Co. S.
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Chas H Water Bottle & Glass Co

6136 Santa Monica Blvd Hollywood Calif

Industry Built on New Uses for Old Bottles

...om you reg...
... with ...
...ature ...
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...ttle...



Photos Show Various Steps in New Art of Converting Plain Glass Bottles into Decorative Glasses and Vases

By finding new uses for old bottles, a mirror manufacturer of Hollywood, Calif., has built up a profitable business. At first, old ginger-ale bottles were turned into beverage sets, pickle jars were converted into bud vases and water bottles into fish bowls. Then a way was found to transform plain white glasses, which had been fashioned from bottles, into decorative containers of frosted glass with monograms. Now an engraver is employed to develop novel effects. For some pretentious beverage sets, gold and silver are liquidized and the solution baked on the glass. Colored designs are painted on and then fired for permanency, while signatures and portraits are affixed to the glasses. When the manufacturer started the new art, a steel instrument was used to file off the neck of the bottle to convert it into a glass. Now, a high-speed spinning wheel is used for quick work. One of the most popular methods is the water-and-oil process. The bottle is filled with cold water to the height where it is to be cut and a string saturated in oil is wrapped around the neck at this same point. The string is lighted and permitted to burn.



The expansion of the cold water coming in contact with the hot line of glass snaps the bottle in two pieces at the contact point. After the neck of the bottle comes off, the rough edges are ground, beveled on both sides and

put through a smoothing operation. Finally, the glass is finished off on a pumice-stone wheel for polishing and buffed on a felt wheel.

C1298 GAS HELPS KEEP APPLES FRESH FOR LENGTHY STORAGE

Placed in a gas storage room, apples are kept fresh over longer periods by being forced to breathe, or draw in moisture slowly. The length of time during which apples may be stored has been almost doubled by the new process. Advanced methods for freezing fish and meat also have been discovered, increasing the time that chilled meat will remain in good condition. Pork, chilled by this process, has been stored for seventeen weeks and then found as tender as veal or chicken.

*Chickman Science
Inventor 1/24/33*

*Report of Food
Investigation Board
London, Eng.*

c1218 Barber-Colman
Co. 229 Loomis
St. Rochford, Ill.

704

POPULAR MECHANICS

Dr. Hubert Levinstein
of London before Conference
of Society of Chemical Engineers
impulses and actuates the mechanism for
opening the door. The receiver also is af-
fected by the additional impulse trans-
mitted by the lights of the car, causing lights
in the garage and on the driveway to be
switched on.



Driver Touches Button on Radio Control to Set in Motion the Apparatus for Opening Doors

GARAGE DOOR OPENED BY RADIO OPERATING IN AUTO

Garage doors may be opened without the owner getting out of his automobile by means of a radio recently placed on the market. In addition, the radio is capable of selecting the proper door to open for a particular car in a double or even larger garage and of flooding the driveway and garage with light at night. All this is done on a secret signal code known to the auto owner. The unit consists of two main parts, a transmitter installed in the car and a receiver located in the garage. A timer clamped back of the instrument panel, a spark-plug unit bolted to the frame of the car and a transmitting antenna beneath the car make up the transmitter. Automatic sending of the coded signal, which is a combination of dots and dashes, is controlled by the timer. Power is derived from the auto storage battery. The receiver in the garage is connected to a receiving antenna consisting of a wire buried in the driveway. When the car owner pulls a button on the dash, the receiving set picks up the resulting signal

MATERIALS TO REPLACE WOOD SOUGHT TO SAVE FORESTS

Possibility of a world timber shortage is leading scientists to carry out intensive research into the best ways of cutting down wood consumption. In this manner, the experts hope to conserve the wood supply for its more important uses. The situation has stimulated the "plastic" industry, which produces teacups, electrical instruments, radio parts, automobile steering wheels, silent gears and many other articles from a number of chemical materials, treated with certain resins. Almost anything made out of wood can be imitated closely by using resins obtained from phenol with formaldehyde, mixed with an equal quantity of wood meal by special processes. Annually the United States uses about 25,000,000,000 cubic feet of timber, while the annual growth is only one-fourth that amount. At this rate, it is obvious that the world supply of timber will soon begin to fall short of the demand.

GUARD LOCKS OPEN WINDOW FOR SAFE VENTILATION

Easily attached without the use of nails, screws or tools, a new lock for open windows permits ventilation of the home in safety. The lock has nothing to get out of order and is fastened on a window in a few seconds. It consists of a single metal strap with means of attaching to upper and lower sashes so that the window cannot be opened wider than the length of the lock. The device is a means of preventing children from falling out of windows and also keeps burglars from entering.

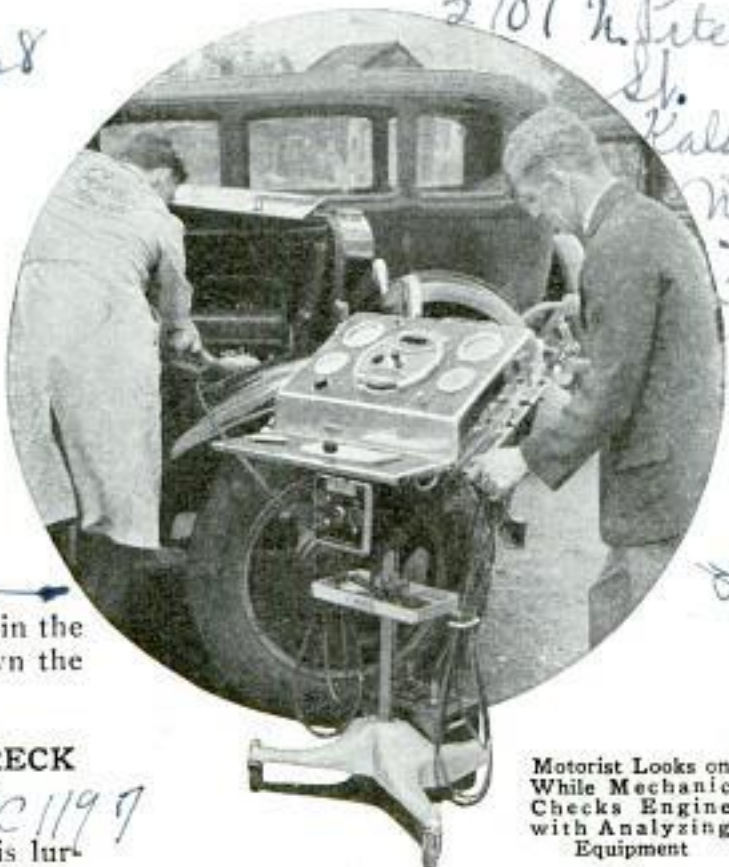


The Advance Products
Co. 372 Copeland
St. Harold Ave

San Diego News 8/6/33

ATTACK ON GERM THEORY OF ILLNESS SPREADS

1228
 Revolt against the theory that germs cause all disease is spreading as the result of a movement begun in England. More than 2,000 physicians in that country have formed a health league based on the new thought that germs are incidental to the later stages of the disease and that such scourges as cancer and consumption can be checked before the danger stage is reached. The leader of the research department is Prof. O. A. Bewall, London scientist, who has submitted himself to various operations and inoculations in the hunt for proof sufficient to tear down the old theory.



Motorist Looks on While Mechanic Checks Engine with Analyzing Equipment

GOLD IN CENTURY-OLD WRECK LURES SEA EXPLORERS

1197
 Gold cargo valued at \$10,000,000 is luring explorers of the ocean floor in a new salvage expedition in the North sea. The cargo is that of the English ship "Lutine," which was wrecked a century ago. Unusual equipment has been devised by a Dutch engineer, F. Beckers, to reach the vessel, which is believed to lie beneath fifteen feet of water and forty feet of sand. Salvage operations have been started near the Isle of Terschelling.



Strange-Looking Apparatus at Work on Salvage of Gold-Carrying Vessel Which Sank in the North Sea More than 100 Years Ago

MOTOR TEST AND TUNING UNITS CHECK AUTO ACCURATELY

Simplified so that the auto owner may see for himself, test units for quickly checking the condition of the engine and ignition system and for tuning up the motor are available to the service man. Since all test devices, such as meters and gauges, are plainly marked, the car owner can understand easily each move in the process of checking the motor. In addition to being made rapidly, the tests are accurate and positive, reproducing actual car-operating performance. Among the features of the tune-up unit are battery load test, starter load test, compression reading, ignition check-up, comparison method test of coil, condenser examination and tests of ignition cable, spark plugs, generator, ammeter, lights, wiring and vacuum.

Motor check \$375.00
475.00
Minor 1935-00

Wed World

YOU MUSTN'T



FRED JONES walked into a restaurant and a waitress appeared, pad and pencil ready.

"Bring me tomato juice, baked white fish, bran muffins, creamed carrots and mashed potatoes," he ordered.

"Anything to drink?"

"Yes. A glass of milk; and I'll have some ice cream later."

The waitress looked at him with mingled alarm and astonishment.

"Pardon me," she faltered, "but wouldn't you rather have coffee instead of milk, and pie or something else for dessert?"

"Why?"

"Well, you know, it's dangerous to eat fish and milk or ice cream together."

But science has found no evidence that fish or other sea food should not be eaten with milk or milk preparations. It's just one of those foolish food ideas that you encounter every day, a genuine "fish story." Perhaps the superstition arose from the discovery that both milk and sea foods spoil easily. Doubtless many cases of illness, following the eating of fish and milk, could be traced to the infected condition of one of them, the other food playing no part in the trouble.



Top, Government Inspectors Sampling Cocoa Beans; Below, Can Bulging at Ends—Always a Cause for Suspicion

Food experts at the department of agriculture, at hospitals and elsewhere, are busy exploding food myths of all kinds. Most of the false beliefs can be traced to some ancient superstition, or to some illness that was believed to have come from a food or a food combination when it really was caused by something else.

Bananas for a long time were handicapped by a rumor that they were difficult to digest, notwithstanding the fact that

*cm. Walter & Burton
% 82 Toledo, Ohio*

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EAT THAT!

monkeys of all ages thrive upon them. Food experts subjected the banana to thorough tests, and decided it really is a highly nourishing food. It now is recommended for children who are suffering from digestive troubles.

Food myths at one time kept people from eating potatoes and tomatoes, both members of the nightshade family of plants. The potato was regarded as a curiosity until whole-



sale failure of grain crops brought it to the front as a low-priced food. The tomato had a similar career. It served as an ornamental plant before it became an acceptable food. The potato and tomato are good examples of foods that have proved to be less dangerous than was generally thought. Physicians now recommend that infants be given tomato juice because of its healthful properties—a far cry from the time when the tomato plant was a garden ornament, regarded as poisonous.

Cheese has been condemned as difficult to digest and as a cause of constipation or dangerous if eaten in sizable quantities. Yet numerous experiments have proved that cheese, particularly the milder types, is almost wholly digestible, some ninety per cent of its nitrogenous material remaining in the body. This is a better record than most popular foods can claim. Mild cheese can be eaten in quantity over long periods of time without producing digestive or other trouble, it has been shown. Cooks and housewives are finding that it makes an excellent substitute for meats because it contains desirable fats and proteins. An ounce of Cheddar cheese

Top, Bananas, Once Victims of a Food Myth, Are Now Recommended as Nourishing Food for Children; Below, Sampling Olives



Above, Cheese, Once Condemned, Now Known as Wholesome Food; Right, Inspecting Fish Shipment

equals, approximately, a glass of milk, one egg or two ounces of meat. As for digestibility, no practical difference has been found between fresh or unripe cheese and that which has aged.

Another popular food myth concerns milk and fruits, particularly cherries, which have a high acid content. Many persons believe that, because the fruit juice curdles the milk, the combination is unfit to eat. Any false ideas about the digestibility of curdled milk can be dispelled at once by recalling that raw milk has to curdle in the stomach before it can be digested.

Moldy food has been the cause of much doubt in almost everyone's mind. To eat, or not to eat, seems to be the question when mold is present. Happily, what medical men call pathogenic fungi—those molds which cause such diseases as athlete's foot—do not occur on foods; and the food molds do not attack the human body, with a few possible exceptions. One of these exceptions is a type of red mold which grows on bread. Reports of re-

search work with lung diseases say that this mold will grow in lung tissue, where its progress is extremely difficult to stop; and will produce illness resembling tuberculosis. However, food authorities consider that most other food molds, such as those appearing on jellies or cheese, are not dangerous enough to cause worry. It is good practice to discard the moldy part of the food in question, and to use the rest.

Some people believe that "artificial" honey often is sold in jars, cans and glasses. Others think factories can turn out comb honey. But the busy



bee still holds exclusive manufacturing rights to honey and the comb. No scientist has learned how to convert the nectar from flowers into a food that is among the most easily digested, or to manufacture endless rows of six-sided beeswax cells as perfectly and cheaply as a bee can. The artificial honey is natural honey that has been removed from the beeswax comb by extracting machines.

Honey is the only common food that is absorbed directly into the blood without going through complicated digestive processes. It is predigested by the bee, so that it can be assimilated by the human body in a half hour or so. Honey producers tell of cases where severe digestive troubles have been reduced with the assistance of

a diet that included honey instead of sugar. But to some persons, honey is no better than a poison because some digestive systems cannot handle honey. Similarly, some persons cannot eat strawberries or other foods.

Food experts have devoted much effort to the study of fruit containers, and particularly to the problem of keeping fruit in metal cans after the cans have been opened. They have exploded the myth that food should be removed from metal cans as soon as opened. In nine



cases out of ten, the food would retain its purity longer if left in the can. The fastidious housewife who hurries to dump the remaining peaches, or corn, or beets, into a "clean" dish really is increasing the contamination of the food. For the typical metal can is far more germ-free than the average home-washed dish. This is because the sterilizing processes employed by canneries is more effective than everyday dishwashing.

As for metal poisoning, repeated experiments have failed to reveal even the suspicion of danger from metal or metal compounds that may have dissolved in canned food. Fish, corn and various other foods come in cans that have been lacquered on the inside. This precaution has been taken to prevent discoloration of the food, and not to offset possible metal poisoning. Some foods placed in unlacquered cans become discolored, but it is only their appearance and not their purity that has been affected.

Probably a great many foolish ideas

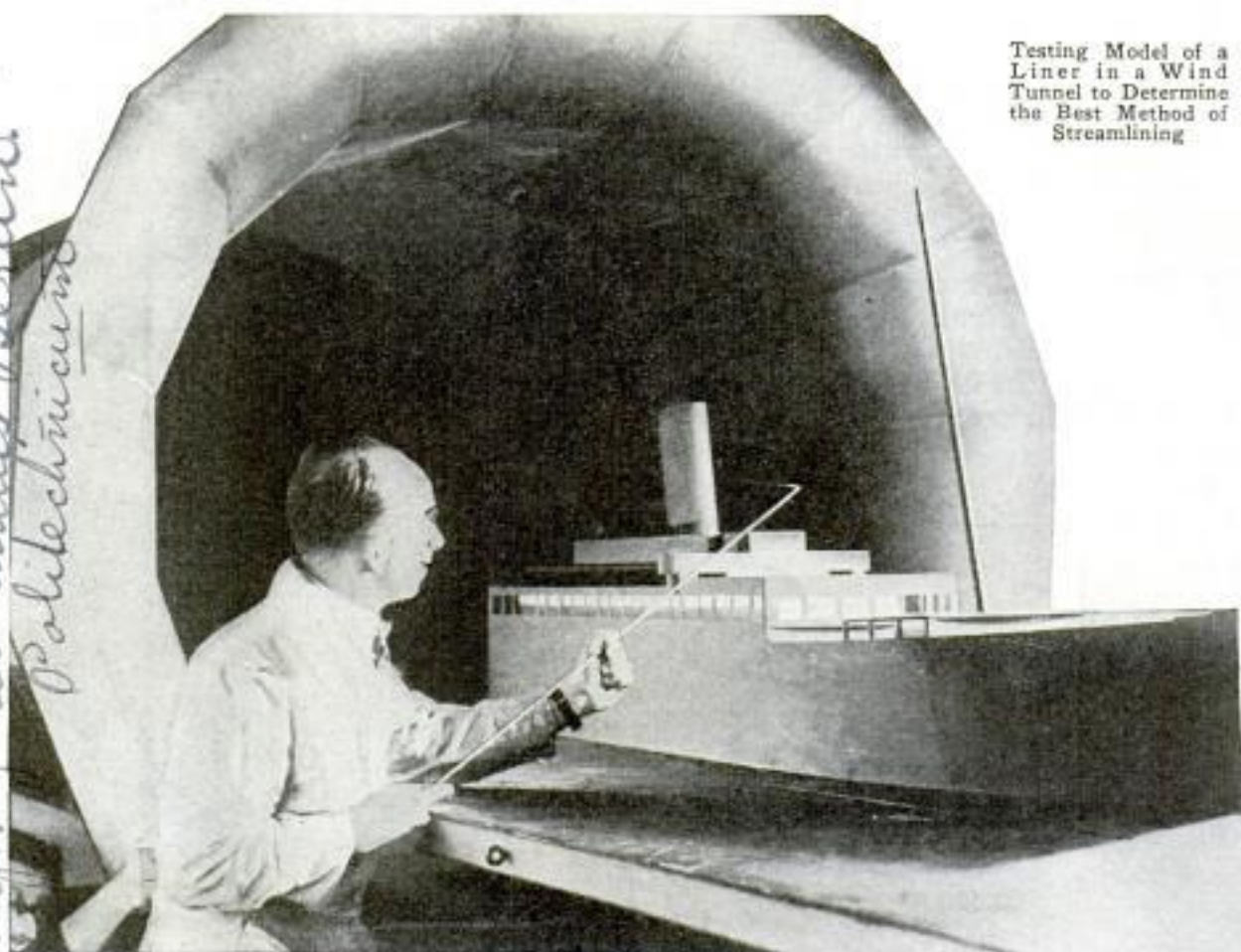
Above, Testing Food Samples in Government Laboratory; Below, Pouring Food from Metal Can into Dish Does Not Prevent Spoilage, as Once Thought

(Continued to page 124A)

Wind-Tunnel Tests Aid in Streamlining Boat

*Under direction of Prof. Pröhl, of the
Hochschule für Luftschiffahrt
Politechnicum*

Testing Model of a Liner in a Wind Tunnel to Determine the Best Method of Streamlining



Wide World

Wind-tunnel experiments with model boats are being conducted in Germany with a view to streamlining vessels in such a manner as to greatly decrease wind and water resistance, and thus increase speed. As a result of the tests, it is hoped the best method of streamlining will be found, particularly for decreasing air resistance which constitutes a large factor in a bulk as big as an ocean liner. In making the experiments, model liners are exposed to the action of the current in a wind tunnel and careful records are kept of the results for the various designs.

now is being used for lining tank cars in which are transported hydrochloric acid, fifty-per-cent sulphuric acid, phosphoric acid, nickel-plating solutions and others. The rubber lining resists the corrosive effects of these acids, increasing the life of the car. As it is now possible to vulcanize either hard or soft rubber around the boiling point of water, equipment of large size and irregular shape can be lined with rubber after it has been placed in permanent position. It is common knowledge that because of its great resistance to abrasion, the modern tire tread will resist wear on hard-surfaced roads better than the hardest steel. Taking advantage of this property, rubber coatings or linings are now being used extensively in machinery, such as screens, sand and gravel chutes, centrifugal pumps, fans and blowers, and mills designed for grinding or mixing abrasive materials such as sand, gravel or concrete. When wet with water, vulcanized rubber has a surprisingly low-frictional resistance against metal, therefore lending itself to

C 1202

RUBBER SERVES MANY NEEDS OF INDUSTRIAL WORLD

Offering great resistance to corrosion, abrasion and shock, rubber is solving many problems for the industrial world. Discovery of a process for vulcanizing rubber integrally with many common metals has almost revolutionized engineering practices. For instance, vulcanized rubber

*George A. Schlager
The B. F. Goodrich Co.
Akron, Ohio*

material

use as bearings for shafts operating with water lubrication. The "cutless" bearing is used extensively for propeller shafts in the marine industry. The automotive industry, of course, is constantly increasing its use of rubber to improve the modern automobile.

AIR-CONDITIONING UNIT FITS IN WINDOW

Serving a single room or office, a new air-conditioning unit fits into the window. Among its advantages over some room units is the fact that it starts with fresh, outside air, which is filtered, humidified, warmed and circulated. The equipment withdraws smoke from the room, helps to eliminate noise from the outside, prevents dust from entering and corrects the humidity. Included in the health window, as the unit is called, is a water tank with a capacity of one and one-half gallons of water. A red light warns when the water is low. A vaporizer is turned off automatically as the water level reaches the danger point. At the back of the unit is a glass wool filter that catches dust and pollen. This part may be cleaned by holding it under the faucet once a week. A reversible electric fan pulls air in from the outside or pulls smoke-laden air from the room. Screened louvers for direct ventilation may be opened on each side.



Apparatus in Window Keeps Air Conditioned in Office; Air Is Drawn from the Outside



© International News Photo
Two-Story House in California Built within a Natural Circle of Giant Redwood Trees

HOUSE CIRCLED BY REDWOODS IS TWO STORIES HIGH

One of several curious homes in the Redwoods Mill valley of California is a two-story house constructed within a circle of giant redwoods. It happened that the trees grew in such a fashion that there was just room to build the dwelling inside the circle and today the trees tower above the home on all sides.

HUGE WHITE SPOT ON SATURN HELD METEOR'S IMPACT

Believed to have resulted from a collision with a meteor, a huge white spot has been discovered on the planet Saturn. The spot appears to be about the size of the earth, nearly 8,000 miles across. As seen from the earth, the spot resembles a cloud of dust in the atmosphere surrounding Saturn. Such a cloud might have been produced by the fall of a huge meteor or by a volcanic eruption inside the planet.

The Burrows Corp
170 Free St. Portland

Naval Observatory
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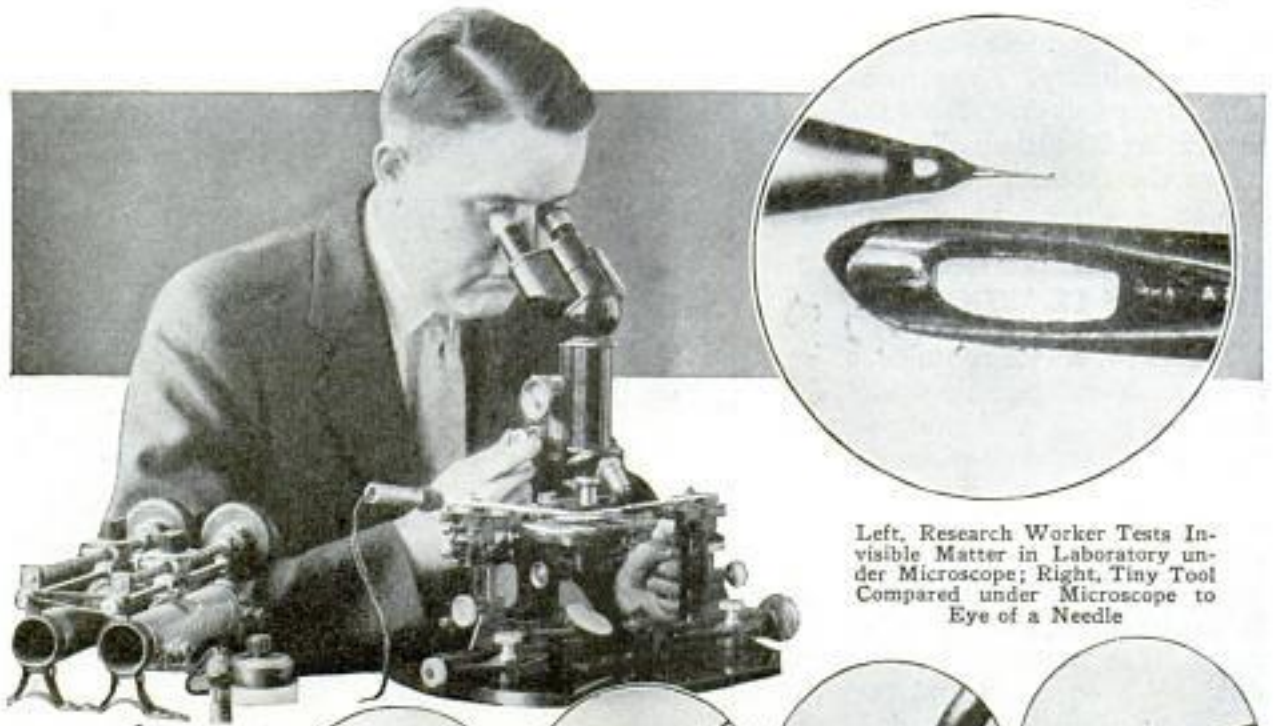
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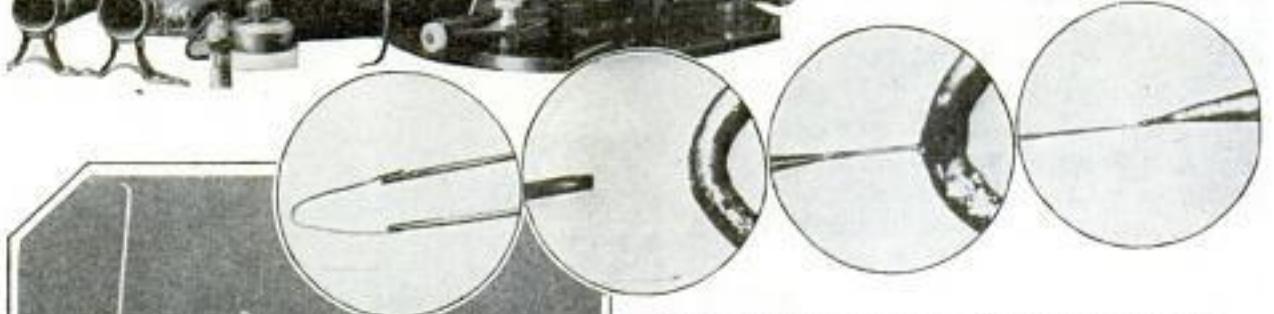
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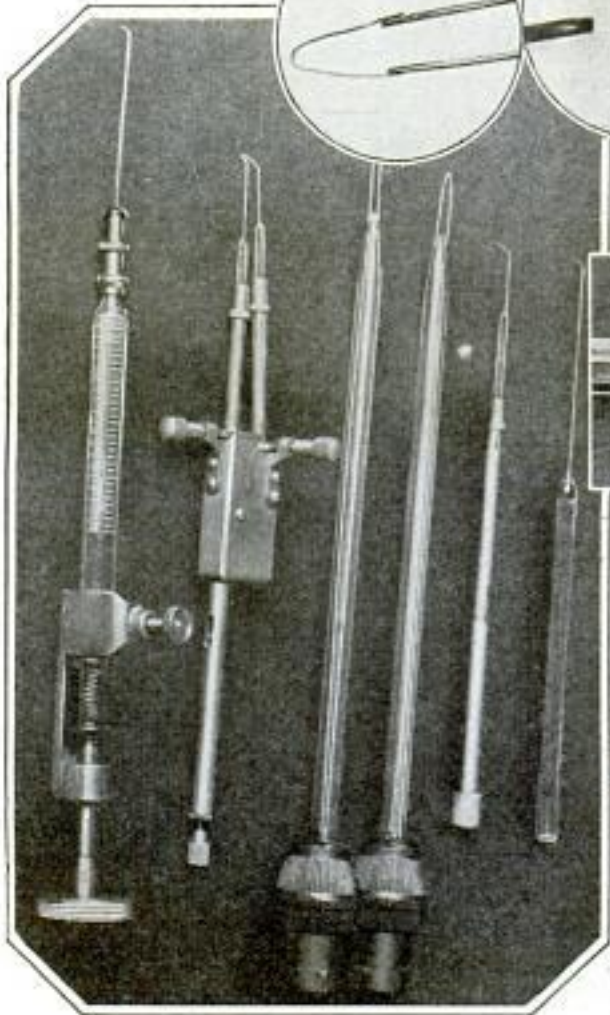
Tiny Laboratory Set Up under a Microscope



Left, Research Worker Tests Invisible Matter in Laboratory under Microscope; Right, Tiny Tool Compared under Microscope to Eye of a Needle



Above, Some of the Steps in Fashioning Minute Glass Tools for Work in Tiny Laboratory



Left, Small Instruments Aid Tests under Microscope; Top, Right, Distillation Apparatus; Bottom, How It Looks When Ready for Use in the Microscopic Laboratory

C1191

C1284. Mrs. H. W.

POPULAR MECHANICS

713

MICROSCOPIC TOOLS AID TEST OF INVISIBLE MATTER

Microscopic tools, so small that the eye of a needle appears large in comparison, are used in a tiny laboratory for testing single particles of matter too minute to be studied by any other method and which cannot be concentrated into larger quantities. The work is carried on by means of an instrument called the micro-manipulator, which, with a series of micrometer adjustments, makes it possible to operate under the microscope various tools of very minute size. The manipulator consists of two pillars at either side of the microscope in which the tools are clamped and on which the micrometer adjustments are mounted. The success or failure of such investigations depends in large measure upon the construction of suitable tools, which must be practically built anew for each test. The invisible particles are handled by small hooks similar in shape to a buttonhook. These hooks are made from glass and measure about one-thousandth of an inch across the opening. Small platinum heating elements aid in fashioning these hooks under the microscope in a manner similar to that which a glass blower would use on a larger scale. There is also a tiny distillation apparatus for distilling material too small for the eye to see. For high-temperature work, minute heating elements made from platinum and tungsten filaments are used, as well as a very small oxyhydrogen flame. With these instruments, investigations may be conducted on a micro scale at temperatures higher than can be handled ordinarily in the regular way. These tests constitute practically an entire laboratory set-up under the microscope and with certain limitations, almost any operation which can be conducted on the laboratory bench on a particle the size of a hickory nut can be duplicated on a particle too small for the eye to see in the microscopic laboratory. Colloidal materials may be studied in this manner, including rubber, milk, gels and suspensions of various kinds, to determine the nature of the individual components of the solution. Probably the greatest application is the study and identification of impurities in commercial products. The laboratory is being used by research workers of the Eastman Kodak company.



Burglar-Alarm Sign Which Tells Police Car Is Stolen; It Is Exposed When Starter Is Pressed

BURGLAR ALARM FOR THE AUTO TELLS POLICE IT IS STOLEN

Stolen cars broadcast their own messages for help to the police if equipped with an automatic burglar alarm which the thieves set off unwittingly. The alarm has the appearance of a license plate and is attached to both the front and rear of the car. It is connected to the starter and will flip the plate over if an attempt is made to start the car while the device is operating. When the plate is turned over, it displays a "Help, Police" sign. Another button near the steering wheel will do the same if the driver presses it in the midst of a holdup.

AUTO CRANKSHAFT MADE TRUE WITH SIMPLE TOOL



Only one man is required to operate a simple tool for truing automobile crankshafts which can be fitted to any make of car. By removing the oil pan and disconnecting the connecting rods, the device, circular in shape and with a hollow, adjustable center, fits directly on the crankshaft. By tightening the knife and revolving the tool, it is possible to true a shaft in a very short time.

C1286

John A. National Inventors League Cleveland

Kurtzner, Cleveland Ohio
1947 E. 55th Cleveland

Arquie, dlf

Rochester, Ny

Arquie Machine Works

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Leggett

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TRAFFIC COPS



WHEN the S.S. Titanic plowed into a giant iceberg and sank in 1912, carrying more than 1,500 persons to the bottom of the North Atlantic, a shocked world demanded protection against recurrence of such disasters. That not a single ship has been lost under similar circumstances since that day is proof enough that the governments of the world heard and heeded that demand.

Where the cold Labrador current meets the warm Gulf Stream, at the southeastern edge of the Grand Banks of Newfoundland, is one of the most perilous areas on earth. Fog overhangs the region forty per cent of the winter season and fully half the summer. Severe gales lash the waters. And until a few years ago, shipmasters always had the fear that across their bows might loom a huge iceberg, so close that a collision would be unavoidable.

Yet, through these dangerous waters runs the busiest trade route in the world, and on the Banks is one of the most famous fishing grounds. That passenger liners and fishing vessels needed protection had long been conceded, but nothing was done until the Titanic disaster.

Immediately, the United States navy

Not a single ship has been lost through collision with an iceberg since the patrol was inaugurated twenty years ago

"Specter" of Sea with U. S. Coast-Guard Cutter in the Distance to Protect Shipping

Washington sent two cruisers into the ice area for guard duty until the last icebergs disappeared from the ship lanes in late June of 1912. Next year, two United States coast-guard cutters patrolled the region, and that fall, the International Derelict Destruction, Ice Observation and Ice Patrol Service was organized, with the United States undertaking its management and with Belgium, Canada, Denmark, France, Germany, Great Britain, Italy, The Netherlands, Norway and Sweden sharing the expense.

To the United States coast guard was assigned the patrol duties. In February of each year, one vessel goes to Newfoundland to investigate ice conditions, in preparation for the regular patrol by two large cutters. A third vessel is designated as

C124/1

of the SEA



Each cutter is 250 feet long and forty-two feet in breadth, a small chip compared to the giant bergs on which it keeps an eye from the moment they enter the shipping lanes until they melt to the size of a large library desk. Small as they are, these cutters are capable of withstanding the heavy seas of the North Atlantic. They are driven by electricity at speeds around sixteen knots.

Top, Lookout Scanning the Horizon for Icebergs from Bridge of the "Modoc"; Left, Map Showing Clusters of Bergs and Their Position; Bottom, Officers and Crew Watching Iceberg as It Slowly Drifts South



Courtesy of U. S. Coast Guard

"stand-by" for use in emergency. The two large cutters on patrol after the icebergs start south from Greenland remain at sea for two weeks, alternating on the patrol.

Complete radio equipment is carried for communication with shore and with ships flying the flags of all nations. When two days out of Boston, headed for the ice



Courtesy of U. S. Coast Guard
Top, High Explosive Fails to Damage Big Berg; Left, Close-Up of Giant "Specter"; Right, the "General Greene" on Duty to Make Scientific Study of Northern Waters; Bottom, the "Mojave" on Patrol

fields, a "How do you do" message goes to the Canadian land stations at Cape Race and at Chebucto Head, near Halifax, to the French station near St. Pierre and to the United States naval stations at Bar Harbor, Me., and Chatham, Mass. These stations answer immediately, assuring co-operation.

At six o'clock each morning during the patrol, the first ice broadcast goes out: "Patrol vessel near two bergs; latitude 42 degrees, 30 minutes; longitude 48 degrees, 30 minutes; set and drift 180 degrees, five-tenths of a knot per hour; foggy, smooth sea." Added to that will be the position of perhaps twenty other icebergs. The set and drift data enable ship navigators to know that the two bergs, which are the two southernmost, are coming south at the speed given. Queries flood the cutter throughout the day.

"Where is the southernmost ice?" asks one passenger liner. "I am in a dense fog in latitude 47 degrees, 10 minutes, longitude 49 degrees, thirty-five minutes; what is my best course to clear the ice?" another ship radios.

These requests are answered promptly.

Actually, the patrol cutter is the traffic policeman of the North Atlantic. On the steamer lane between Europe and America, liners, cargo carriers and tramps pass constantly, just as traffic passes on a busy

city street. On what is known as the "westbound tracks" are ships coming from Europe, and on the "eastbound tracks," sixty miles south, are the vessels going to Europe. Ships off the tracks are reported for violations of the rules, because a vessel off the track is just as dangerous as an iceberg. Boulevard speeds are in effect so that fast liners "step on it" through all kinds of weather. The cutter stands as a traffic officer on the avenue of the sea. If the ice threatens blockade, the cutter sets the "stop" sign and turns the traf-



Top, Memorial Services for Victims of "Titanic" Disaster; Left, Taking Temperature of the Sea in Vicinity of Berg; Bottom, "Bridge" Type of Iceberg as Sighted from the "Modoc"



fic into a detour to the south. Like a good traffic officer, the cutter answers all questions about the condition of the "road" and will help a ship in trouble. On one day, the cutter may hear from as many as thirty-eight vessels, all within close range. This does not account for all the ships passing, for many do not reply to the ice broadcasts.

The cutter receives press dispatches ev-

ery morning at 1 a. m. from Arlington for rebroadcast at 6 a. m. to large vessels and at 7 a. m. to smaller ones.

From reports received from vessels regarding position, direction of course, speed, water temperature and ice reports, the cutter plots three charts to determine

location of the "cold wall," that line of demarcation between the Labrador current and the Gulf Stream. This line is the danger line because icebergs that are perils to shipping seldom cross it. A berg of large size usually will disappear within a week after crossing the line.

Upon sighting an iceberg, the cutter approaches close enough to make photographs and sketches from two sides. Length, breadth and height above the water are recorded. From these figures, the total mass can be roughly gauged because about one-eighth of an iceberg is exposed.

(Continued to page 128A)

C492
718

Made-Rite Mfg Co / Pres. Light Co Inc
Sandusky Ohio
north Sandusky
Chio

POPULAR MECHANICS

LAWN SPRINKLER IS TURNED INTO LIGHTED FOUNTAIN



Sprinkler Equipped with Electric Bulbs Becomes Illuminated Fountain for Night Use

For night use, an electric lawn sprinkler is equipped with a light. In addition to providing illumination for moving the hose, the light converts the sprinkler into a luminous fountain that adds a touch of beauty to the grounds. The device throws a spray twenty feet high and covers a thirty-foot area. It may be attached to any garden-hose connection. A three-way ground-plug base is supplied for the electric-light connection.

SEAL-SKIN TAKE SETS RECORD FOR FORTY-FOUR YEARS

Establishing a record, the largest take of fur seals from the Pribilof islands herd for forty-four years was reported for this season. The take totaled 54,550 skins, compared with 49,336 last year. When the United States bureau of fisheries took over supervision of the seal herd in 1910, it numbered only 135,000 animals. Since that time, the annual take has increased almost without interruption and at the same time the herd has increased to about 1,800,000 animals. More than 500,000 seals have been killed in the herd since 1910, but since only the surplus three-year-old

Charles E. Jackson
Acting Com.

U.S. Bureau of Fisheries, Washington

males are taken, the herd has grown in size. According to the treaty under which the United States government assumed control of the Pribilof herd, both Japan and Canada are entitled to fifteen per cent of the skins taken.

BRIGHT COATING ON INSULATION REFLECTS HEAT RAYS

Coated with a bright, aluminum surface for reflecting heat rays, a light-weight insulation material is declared to be forty per cent more efficient than other forms of insulation. The material is flexible and easy to fit around corners or pipes. It has a heavy seal of vapor-proof compound, preventing moisture from entering through walls. The insulation needs only to be nailed along the edge of studs or rafters, requiring no sawing, or notching. The material is said to reflect sixty to eighty per cent of the radiant heat rays, just as any bright surface reflects light rays. It is produced in rolls of convenient size for easy handling.

BALLOON-TIRED BOY'S COASTER HAS HAND BRAKE

Equipped with balloon tires for increased riding comfort, a boy's coaster wagon has a disk-type brake controlled by a hand lever. The frame or chassis is covered with a pressed-metal body. Pulling or pushing the handle propels the vehicle. Gears may be disengaged for coasting. The tires are single-tube pneumatics, carrying approximately a ten-pound pressure for the child of eight or nine years.

into them for enjoyment on paths.



Latest Coaster Wagon Gives Young Driver a Comfortable Ride; Note the Balloon Tires; It Is Easily Propelled

The Colson Co
Elyria, Ohio.

Copyrighted material

Game Mounted to Resemble Natural Life

Advanced Methods of Mounting Game Make the Bird or Animal More Life-like; Treatment of Book Ends Is Unusual



Advanced methods of mounting birds, animals and fish have been introduced to make them more lifelike, increasing their appeal to the nature lover and craftsman. In past years, taxidermy meant the mere "stuffing" of game. The skin was removed from the animal and filled with sawdust, straw or similar material. The taxidermist of today molds an artificial body for his specimen, carefully reproducing every muscle and contour. The skin, after being preserved properly, is then applied to this

body, resulting in a mounted specimen that is more natural than that produced by old methods. Too, whereas in previous years taxidermy was largely confined to the mounting of game specimens, it now offers the home shop worker an interesting hobby in the manufacture of decorative and useful articles for the den or hunting lodge. Attractive bookends, lamps, ash trays, clocks, mirrors, cigar lighters and other articles may be made by the skillful worker.

Scene from Letter 8/14/33

©1257
ENERGY IN SUN, WIND AND SEA AMPLE FOR FUTURE MAN

Ample energy for the future use of man is contained in the sunshine, wind, tides and ocean heat, says Dr. Arthur B. Lamb of Harvard University. Each year the world uses 17,800,000,000,000 kilogram-calories or as much energy as might be derived from 2,700,000,000 tons of coal. If natural resources were cut off, it would take the labor of 11,000,000,000 men to furnish the same energy. However, only seventeen per cent of the energy used each year is actual human energy. Coal fur-

nishes fifty per cent, with the remainder coming from oil, wood, gas and the labor of domestic animals. Should all natural resources be removed or exhausted, there are other sources of energy available. The annual solar energy to the earth totals almost forty-two times the energy of all the world's reserves in the form of coal, oil and gas. If all the light energy that falls on Boston's forty-three square miles could be converted into power, the output would surpass the total present output of power in the United States. Similarly, the heat of the earth would yield millions of times as much energy as all present sources.

The scene is from the book 'The Science of Taxidermy' by Dr. Arthur B. Lamb, Harvard University.

Professor of Chemistry, Director of Chemical Laboratory, Cambridge, Mass.

dnr. and maker - Wm. D. Isillee,
3258 N. Howard Ave

720

POPULAR MECHANICS

Milwaukee Wis

Pliable Veneer Makes Wood Inlaying Easier

Chicago. Craftsman Wood Service
2727 S. Mary



Illustrating Easy Wood Inlaying with Prepared Pieces of Pliable Wood

No one needs to be a trained craftsman to produce wood inlays of excellent grade if a new, pliable veneer is used. Called Intarsia wood, this veneer comes in slices one-eighty-fifth inch thick, mounted on glue-faced muslin to insure durability, strength and safety from damage in handling. It is so pliable that it can be rolled around a pencil without splitting. The sheets lend themselves to any design, cut with sharp scissors or razor without splintering or the edges becoming jagged. The veneer comes in all the familiar woods, walnut, mahogany, bird's-eye and curly maple, liquid amber, lacewood, aspen, oak and others. To apply the wood, the craftsman dampens the glue-coated muslin and presses the piece into place. After all the pieces are assembled into their places, the entire design is covered and pressed with a hot iron to soften the remaining glue so that it will soak into the pores. Upon cooling, the glue makes a hard, permanent

joint between the wood and the object decorated. Then the design is sanded lightly and coated with shellac or varnish. Complete instructions are supplied with the Intarsia wood.

COLD-DRIVEN RIVETS END NEED FOR HEATING AND CATCHING

Men who follow the picturesque profession of catching red-hot rivets on lofty perches may soon disappear from among steel workers. Cold-driven rivets instead of heated ones make the seals on a giant gas holder built for a Philadelphia company. The ordinary practice has been to heat the rivets and pound the point into a second head after it is placed in a hole through two pieces of steel. On cooling, such a rivet contracts, drawing the plates together. It is now found that cold rivets with small heads can be hammered into position tightly enough to make a seal.

Source News Letter
8/12/33
Copyrighted material

reported below scene
Dept. of Royal
Academy, Rome.

Chas. E. Miller Corp.
Merceda, 14th and
C/210. Main St.

**LONGER RANGE OF MICRO RADIO
UPSETS WAVE THEORY**

Chicago Tribune 8/16/33

Communication by micro-radio waves beyond the limits of sight tend to upset the theory that these waves would travel only as far as could be seen in a straight line. In tests between his yacht, "Electra," and an experimental station ninety-four miles inland, Guglielmo Marconi, of Italy, sent messages by radiophone and radio-telegraph. This distance is three times the range attained in previous tests. Over a distance of 161 miles, faint code messages were picked up on the yacht, despite two intervening mountains, indicating that the micro waves were not hindered by opaque obstacles. Marconi's tests were conducted on a wavelength of sixty centimeters with a new micro-wave transmitter and receiver using twenty-five watts of power. Engineers have believed that micro waves would travel only as far as the eye could see from the top of a high building or mountain, sixty miles at the most. On such a short wavelength, transmission is similar to that in which a searchlight or other form of light beam may be used, the tiny waves being close to the light spectrum and traveling in much the same manner, save that they are invisible.

C/255

Anderson and
Discontinued.

2/17/42.



Tower and Three-Blade Propeller of Wind-Power Plant; Blade Unit Has Speed Governor

**ROLL-UP KEY FOR PASTE TUBE
IS MONEY-SAVER**

10¢ by mail. C/175



Saving money by making it possible to extract all the contents, a key that fits any collapsible tube has been produced for the purpose of rolling the tube up from the end. As the paste or cream is used, the key is turned to roll the tube evenly. The key slides on the bottom edge from the side, giving a firm grip.

After the contents have been extracted, the key is removed and fitted on a new tube.

**WIND-DRIVEN ELECTRIC PLANT
RUNS FARM EQUIPMENT**

Electric current for operation of farm equipment may be generated by a wind-driven plant now on the market. A three-blade propeller, made of metal and having a diameter of sixteen feet, is used. Heavy-duty storage batteries supply current from five to eight days when the wind fails. Rate of charging the batteries may be regulated by means of a governor that causes the propeller to turn away from the wind when the windmill's speed becomes too great. In a storm, the blades turn so that only the edges are affected. The governor, generator, gear case and main bearings are inclosed in a weather-proof hood. Galvanized steel towers support the propeller at a height to catch the wind. The plant is available in thirty-two or 110-volt sizes.

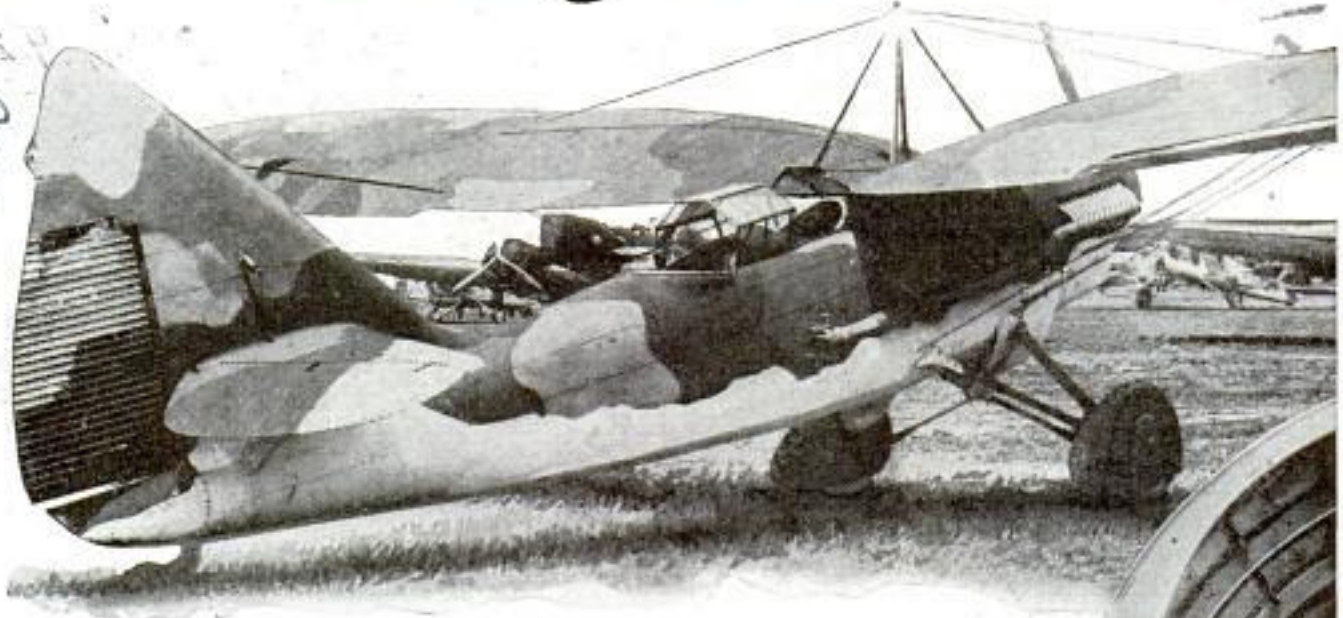
Send.
Chas. Joseph Rasginsch.
1700 S Morgan Chicago

CS. 4-17

Leggell

Making PLANES

and Curtis - Robertson Aircraft Co St Louis Mo



EAR-SPLITTING noise has been characteristic of heavier-than-air craft since the first crude ship took off on its amazing flight. It has dogged the footsteps of manufacturers and puzzled scientists, in addition to frightening away perhaps thousands of prospective passengers from established air lines.

Until recently, there was no answer to the objection, "airplanes are too noisy." Even the most air-minded admitted that roaring motors, screeching propellers and whistling wires were not conducive to comfortable travel, due to the fact that noise affects the ears in a way that produces, in many persons, sensations akin to sea-sickness.

Attempts to solve the noise problem have been made in many countries, both for military and commercial aircraft. Some progress has been made in the commercial field, which now boasts one type of transport ship that is only slightly noisier than the average train, so far as the passengers inside the cabin are concerned. In the military field, the United States army air corps has produced silencing methods and devices that permit a single-engined ship to fly at 8,000 feet without being heard on the ground. This altitude varies, of course, with the atmospheric conditions.

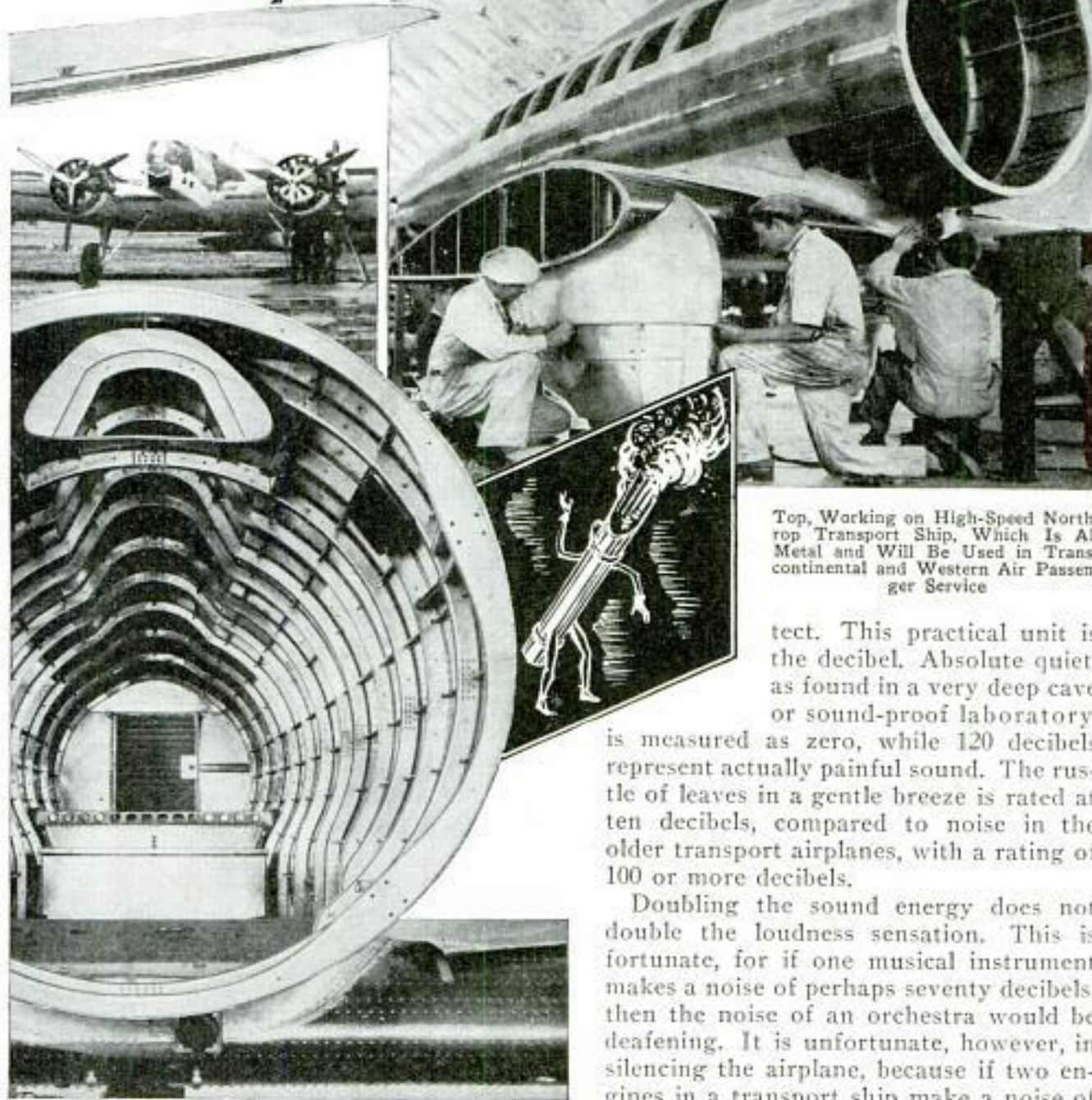
Top, a Close-Up View of the Single-Motored Ship Which the United States Army Air Corps Has Equipped with Silencing Devices; Note the Top and Bottom Camouflaging; Right, Looking through Northrop Passenger Cabin under Construction



The principal sources of noise, in order of importance, are the propeller, the exhausts, engine clatter and wires. The noise energy of any one is so great that even large reductions in that energy result in

Sperry Gyroscope Co. 1947.

Easy on the EARS



Top, Working on High-Speed Northrop Transport Ship, Which Is All Metal and Will Be Used in Transcontinental and Western Air Passenger Service

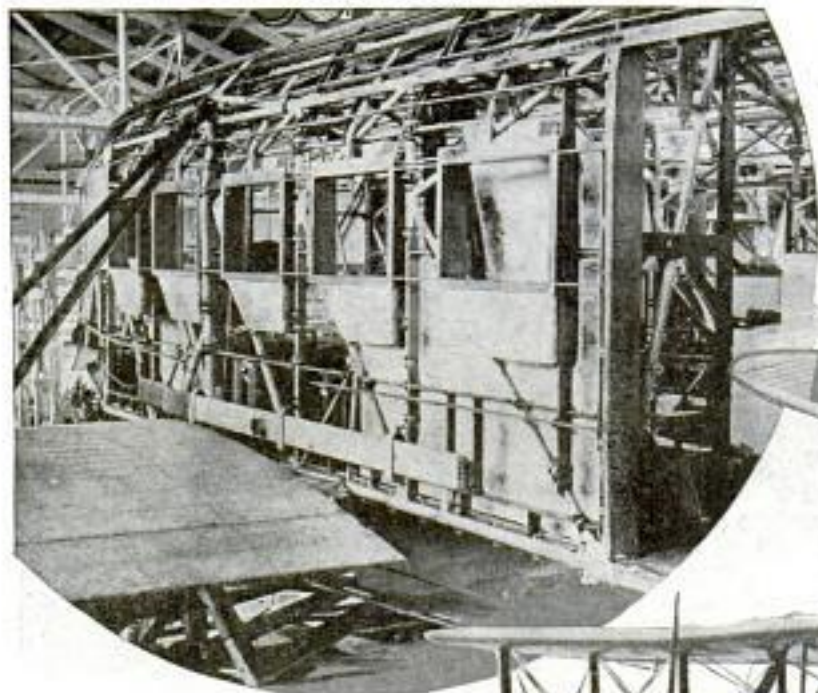
what appears to be only a small reduction in the noise heard.

The task has been far from easy. Sound intensity is measured by a unit called the "bel," which is based on noise-volume variations too large for practical use. Therefore, one-tenth of that unit is considered a proper means of measuring loudness, since it is the lowest increment of change in loudness that the average ear can de-

tect. This practical unit is the decibel. Absolute quiet, as found in a very deep cave or sound-proof laboratory, is measured as zero, while 120 decibels represent actually painful sound. The rustle of leaves in a gentle breeze is rated at ten decibels, compared to noise in the older transport airplanes, with a rating of 100 or more decibels.

Doubling the sound energy does not double the loudness sensation. This is fortunate, for if one musical instrument makes a noise of perhaps seventy decibels, then the noise of an orchestra would be deafening. It is unfortunate, however, in silencing the airplane, because if two engines in a transport ship make a noise of 103 decibels and one is shut off, the plane will roar at a noise level of 100 decibels. It can be seen, therefore, that a reduction of two or three decibels in the noise of a plane is really an accomplishment.

It might seem that reductions in decibels are so small compared to the reductions in noise energy required that results are not worth the effort, but they are of great value for military purposes. This is due to the fact that noise energy varies in-

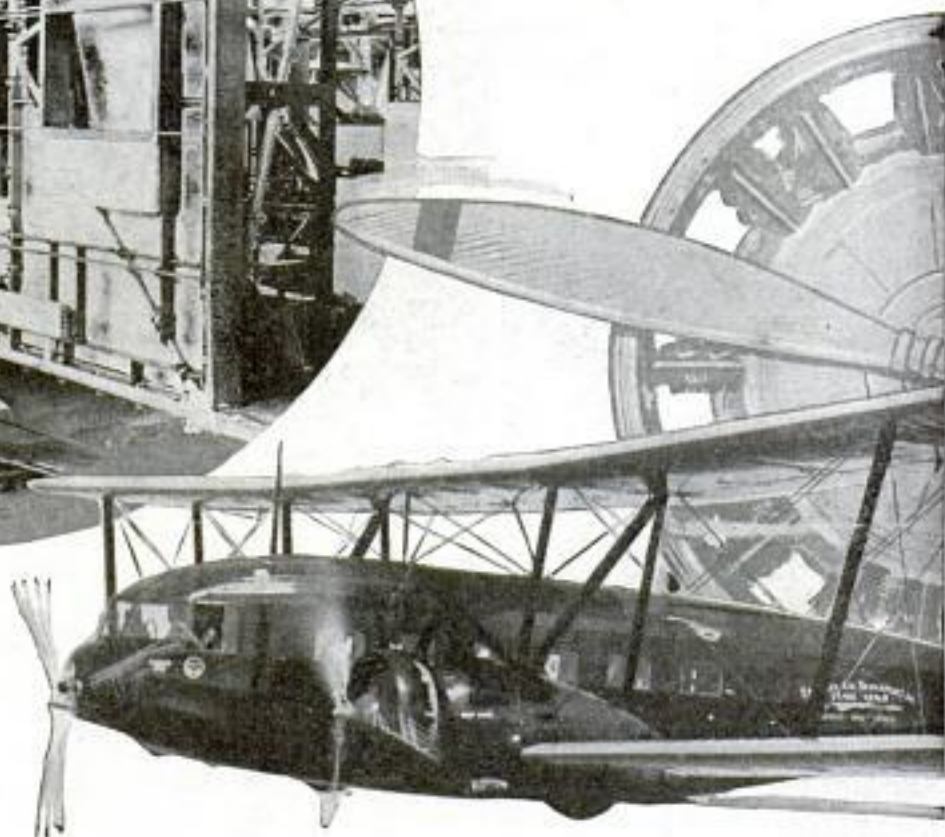


Left, Building a Transport Cabin Along Latest Sound-Proofing Lines; Note Liberal Use of Insulating Materials; Bottom, New Curtiss Condor, Quiet Air Liner

versely to the square of the distance from the noise source. That is, if an airplane could be heard ten miles away, a reduction of only six decibels would result in its noise being audible only five miles distant.

In seeking to reduce the noise of its planes, the air corps has directed its efforts at the propeller and exhausts as the worst offenders. It has been found that the tip speed of the propeller is the controlling noise factor, although the thickness, width and pitch are contributing elements. Therefore, the reduction at the propeller takes the form of gearing, so that the blade moves at the minimum practical tip speed, as well as in use of thin, wide blades.

Extensive tests have brought a muffler for the exhausts that is far from perfect, yet reduces the loudness considerably. With geared propeller and exhaust muffler, the air corps has been able to reduce the test plane's noise by twenty decibels, which means elimination of ninety-nine per cent of the total sound energy of the ship in operation. Thus, the "silent" fighting plane may skim through the clouds without revealing its location to the enemy on the ground. By camouflaging the bottom of this ship to match colors in the sky and the top to resemble colors on the



ground, its builders have come close to making the craft invisible, as well as unusually quiet.

In the commercial field, the Sperry Gyroscope company, in conjunction with several transport-ship and engine manufacturers, has conducted extensive research into sound-proofing in general, sound-deadening materials and methods of eliminating objectionable noises in airplanes. Experts have applied sensitive instruments to every part of the air transport and have suggested changes here and there. Most of these suggestions are incorporated into a rebuilt Curtiss Condor that is rated at eighty-five decibels in the cabin, or slightly more than in a subway train. This air liner was the first in which passengers could actually talk without raising their voices to any great extent.

Further improvements are found in the latest Curtiss-Wright Condor, which recently was placed in service on two major air routes. In this ship, which has a rating of seventy-five decibels, it is possible to carry on conversations in ordinary



Physical Intensity Scale	Decibel Scale	Threshold of Feeling
10,000,000,000	100	Noise in old-type airplanes
1,000,000,000	90	
100,000,000	80	Noise in N Y subway
	75	Curtiss Condor
10,000,000	70	Noise in train
1,000,000	60	Noise on average busy street
100,000	50	Soft radio music in apartment
10,000	40	
1,000	30	Average whisper 4' away
	20	
	10	Rustle of leaves in gentle breeze
	1	0
		Threshold of Audibility

Range of speech as usually heard in conversation: 10,000 to 1,000,000

Top, Applying Noise Detectors to Parts of Passenger Cabin; Bottom, Range of Sound in Terms of Decibels from Threshold of Audibility to Threshold of Feeling

tones. Its cabin is free from vibration and it is so quiet that riding in it causes no discomfort.

The Airplane Development corporation, a subsidiary of the Cord corporation, has

developed an ultra-fast passenger transport ship that is said to have a decibel count of seventy-three, even greater than a Pullman car. Conversation in ordinary tones is possible while the plane travels at cruising speed of 195 miles per hour or top speed of 225. This ship, which is the result of extensive research, was built under the direction of Gerard Vultee. Sound filters in the heater lines were introduced to eliminate the air-borne noise of engine explosion and propeller slap. A new type of engine mounting helped to reduce vibration in various parts of the passenger compartment. Everything for the complete comfort of the traveler is incorporated into this new craft.

Meanwhile, other transport companies are at work on the problem, trying new insulation materials in the passenger cabins, new geared propellers and improved mufflers. Each new passenger ship is a little

less noisy, yet the job is only half finished, manufacturers and sound experts assert as they continue their effort to produce a really "silent air liner," one that will offer the ultimate in travel comfort.

Not yet, but perhaps sometime, will come the transport ship in which you'll literally be able to hear a pin drop.

©1216. Rototiller Inc.

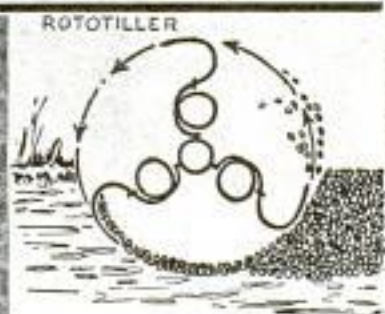
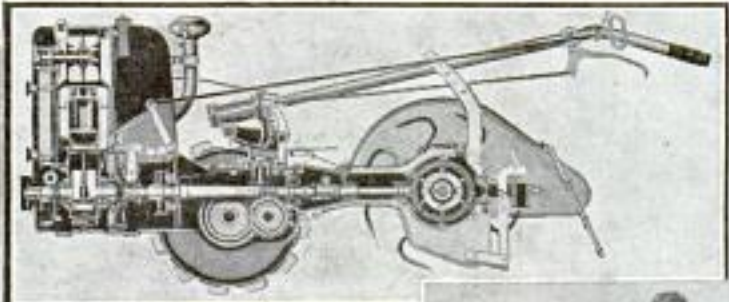
21-44th Ave.

726

POPULAR MECHANICS

Long Island City, N.Y.

Rotary Tiller Prepares Soil or Digs a Ditch



THIS ONE OPERATION INSTEAD OF



Left, Soil Tiller in Use as Ditch Digger; Top, Right, Cutaway View of Tiller; Center, Left and Bottom, How Tiller Does Work of Three Machines; Center, Right, Preparing the Soil

Revolutionary in that it may be substituted for a number of machines now used in farming, a rotary soil tiller now on the market pulverizes and aerates the earth to a depth of twelve inches, doing the work of the plow, disks and tooth harrow. Sharp-pointed, spring-mounted tines revolve through the soil like picks to break it into very small particles, each sharp point breaking away a small amount of ground instead of shearing it away in large pieces. The tiller may be adjusted to produce an extremely fine or a coarse condition. Only one trip over the farm prepares the soil for seeding. Attachments are available for weeding, cultivating, ridging, mowing, leveling, stationary engine work, cutting forest-fire lines and ditching. Equipped with forest-fire disks, the machine penetrates heavy underbrush, cutting a swath twenty-seven inches wide at a rate of two miles per hour. A high-pressure water pump can be attached for throwing four streams from one-quarter

inch nozzles. In ditching, the tiller is run over the ground with the tines set at the maximum depth of twelve inches. A shoveler follows to remove the loosened earth. The operation is repeated until the desired depth is reached. In one test, the machine completed a ditch forty-five feet long and two and one-half feet deep in forty minutes with only one shovel wielder scooping out the loose earth.

PHOTO CELL IN WATER TESTER CHECKS ON HARDNESS

Automatically testing the water issuing from a softening machine, a new instrument equipped with a photo-electric cell keeps watch on the hardness of the water. When the hardness exceeds a predetermined figure, the device sounds an alarm. Called the hardimeter, the instrument is connected to the soft-water supply line. At intervals, a sample of water passes into a glass cylinder. A small quantity of chem-

Elgin Softener Corp.
Elgin, Ill.
Copyrighted material

Call 70 W. B. Smith & Co
Utica, N.Y. 727

ical is mixed with the sample. If the water is zero hard, no changes occur in the color of turbidity of the sample. The slightest trace of hardness, however, causes a change. Then a beam of light is passed through the cylinder containing the sample to strike the photo-electric cell, which converts light into electricity. Thus, by measuring the amount of electric current generated by the light sensitive cell, there is a definite measurement of the transparency of the sample with its chemical reagent. If the water is hard, the transparency of the sample is lower and the resulting current is less, showing on a meter scale. The photo cell also regulates the water softener so that it delivers its full capacity without danger of over-running and losing large amounts of salt and regenerating water.



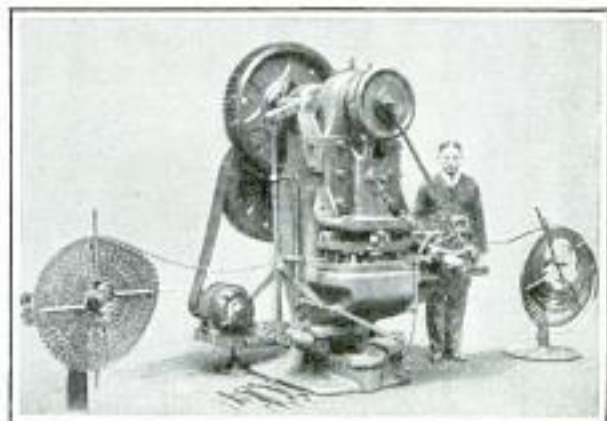
Individual Water Tanks for the Use of Rangers in Fighting Forest Fires Are Refilled by Carriers When the Supply Becomes Exhausted

RANGER CARRIES PUMP ON BACK TO FIGHT FOREST FIRES

Forest rangers in several states and in some national forests are equipped with a portable fire pump and water tank, worn on the back. The pump has a capacity of seven gallons of water and is hand-operated. An adjustable nozzle permits the operator to fight fires with a fifty to sixty-foot stream or a long, coarse spray. When the tank is empty, it is refilled by a line of water carriers.

C183
STEEL RIBBON MADE INTO CHAIN BY ECONOMICAL ROBOT

Steel ribbon is twisted into chain at the rate of forty links per minute by a robot that operates at low cost. Seven operations are performed by the press, which is entirely automatic. The machine replaces



At Right Is Steel Ribbon Which Passes into Machine and Emerges as Chain, Shown at Left

several presses and operators formerly required to do the same job.

Terracotta Machine Co. Science News
East Budgeton, N.J. Lutter. 8/2/33
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C1248
SKY-WRITING AT HIGH ALTITUDE DONE WITH FROZEN SMOKE

Sky-writing at 20,000 feet with "frozen" smoke is the latest advertising scheme in England. High-speed planes capable of climbing to this height can write at about twice the speed as at lower levels, and also virtually all the "bumps" and cross currents are lacking which caused the message to be smeared before it could be completed at lower altitudes. The pilots four miles up wear electrically heated suits, but the low temperatures improve their writing since the smoke is half-frozen. At night the advertising is continued by means of searchlights on tall buildings which project colored patterns against the clouds above.

c1185

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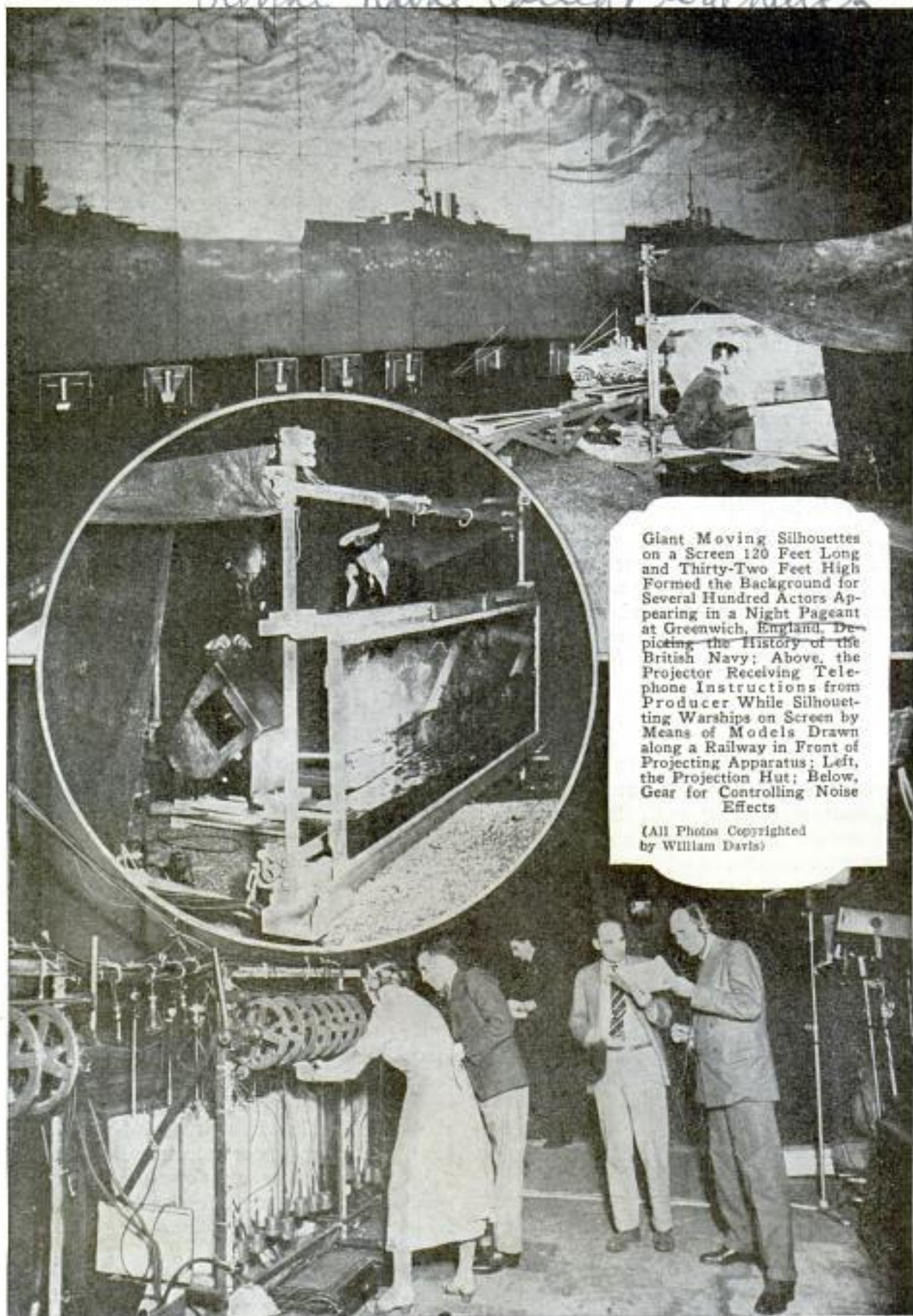
Worked out by Professor Haigh

POPULAR MECHANICS

Chief of Engineering Laboratory

Huge Shadows Enact History of British Navy

Royal Naval College, Greenwich

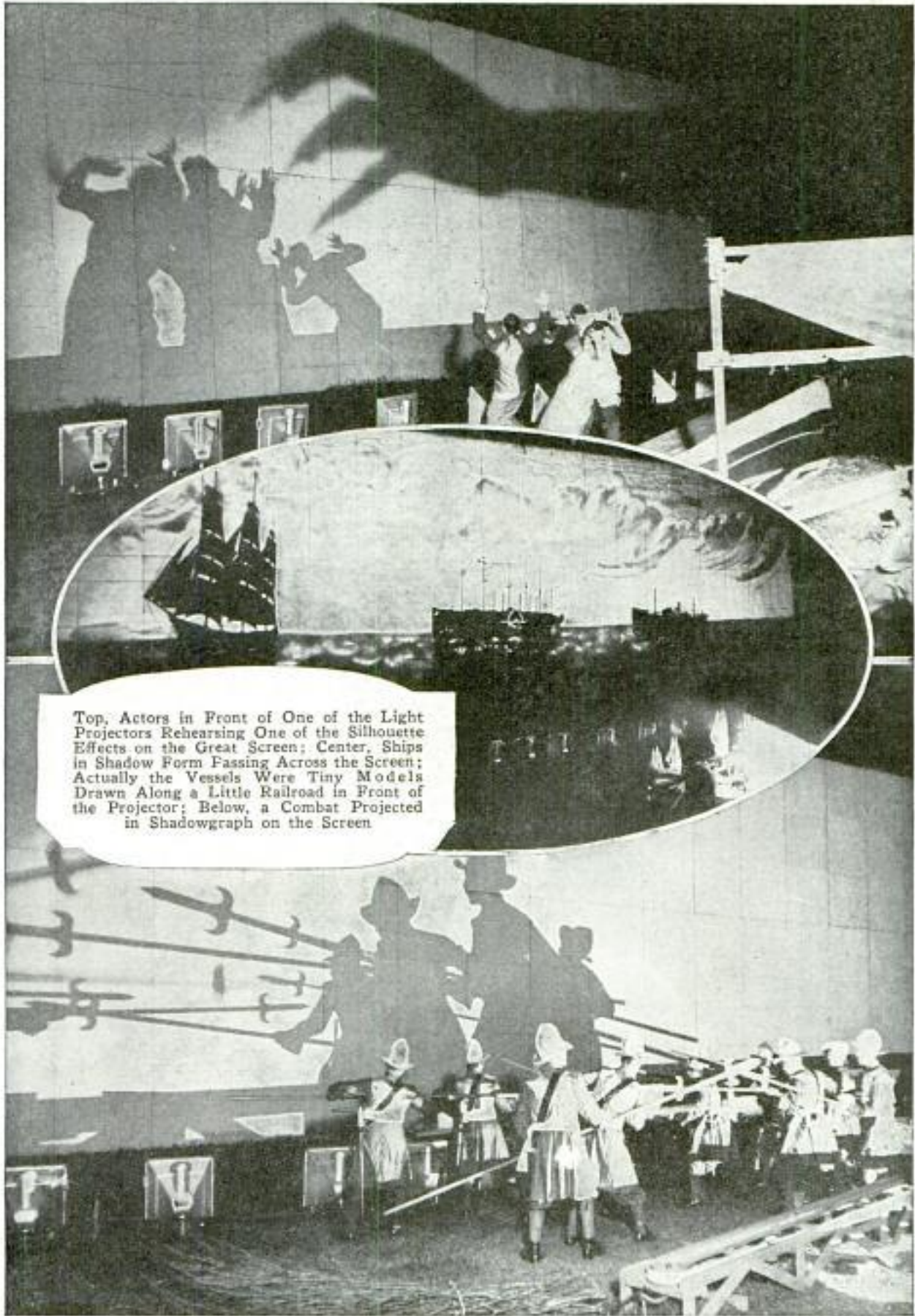


Giant Moving Silhouettes on a Screen 120 Feet Long and Thirty-Two Feet High Formed the Background for Several Hundred Actors Appearing in a Night Pageant at Greenwich, England. Depicting the History of the British Navy; Above, the Projector Receiving Telephone Instructions from Producer While Silhouetting Warships on Screen by Means of Models Drawn along a Railway in Front of Projecting Apparatus; Left, the Projection Hut; Below, Gear for Controlling Noise Effects

(All Photos Copyrighted by William Davis)

c185...

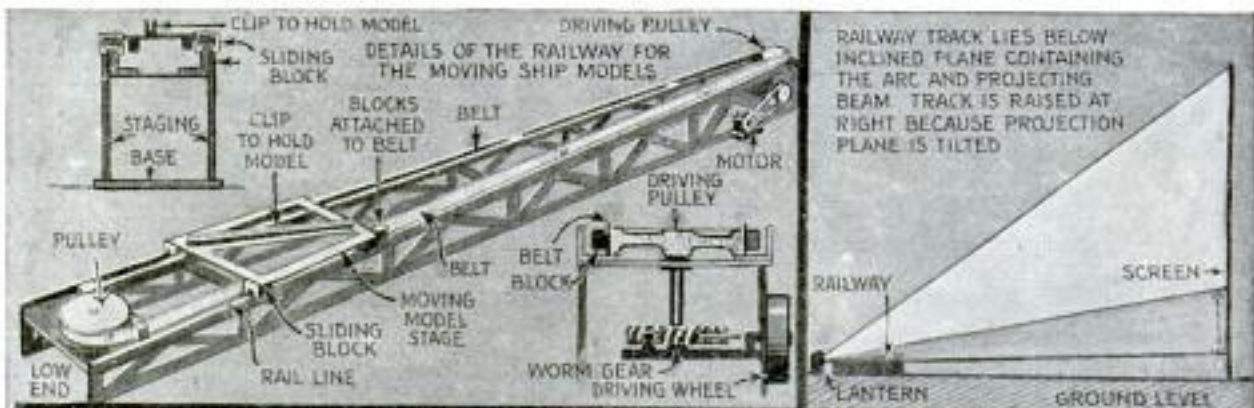
Moving Silhouettes Thrown on Giant Screen



Top, Actors in Front of One of the Light Projectors Rehearsing One of the Silhouette Effects on the Great Screen; Center, Ships in Shadow Form Passing Across the Screen; Actually the Vessels Were Tiny Models Drawn Along a Little Railroad in Front of the Projector; Below, a Combat Projected in Shadowgraph on the Screen.

C185

How Big Shadows Were Cast by Tiny Models

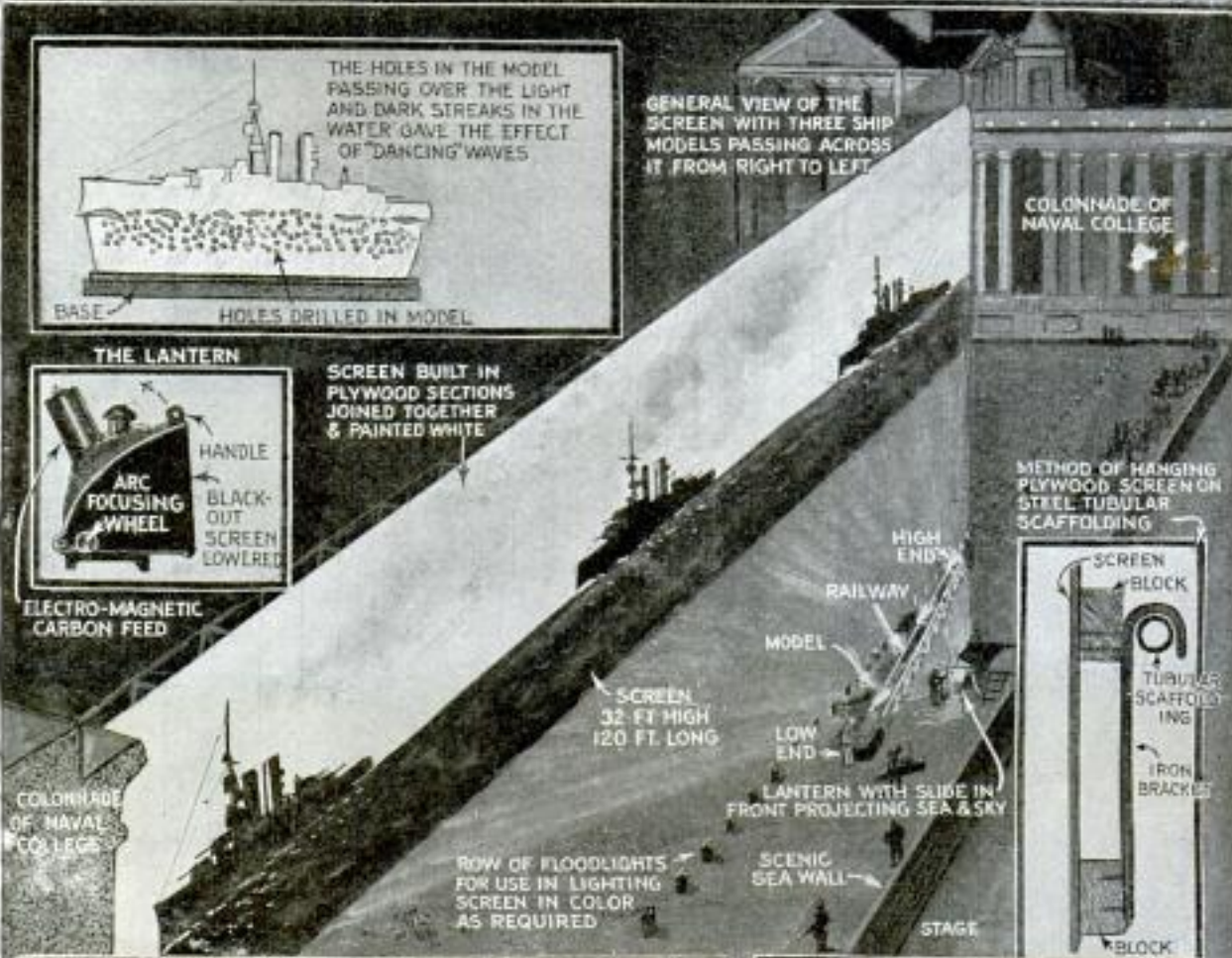


GENERAL VIEW OF THE SCREEN WITH THREE SHIP MODELS PASSING ACROSS IT FROM RIGHT TO LEFT

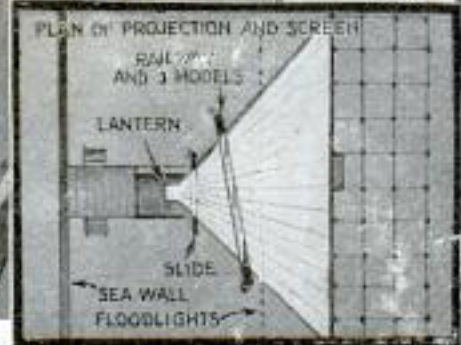
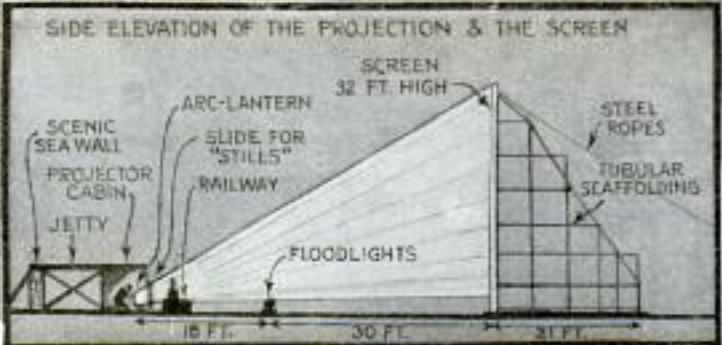


SCREEN BUILT IN PLYWOOD SECTIONS JOINED TOGETHER & PAINTED WHITE

COLONNADE OF NAVAL COLLEGE



METHOD OF HANGING PLYWOOD SCREEN ON STEEL TUBULAR SCAFFOLDING



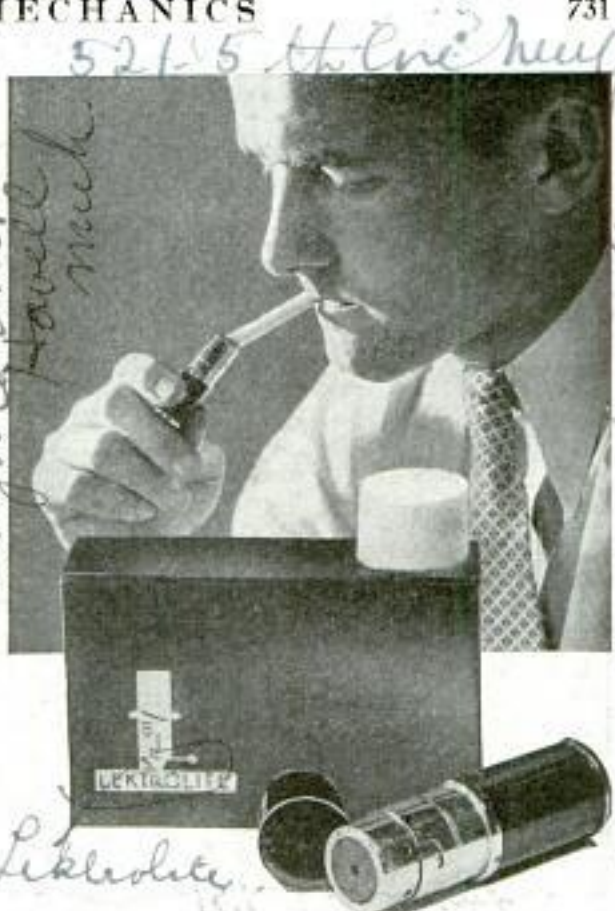
Diagrams Show How the Historic British Ships Were Projected from Models; Note the Electric Railway System Which Carried the Models Past the Projector Which in Turn Cast the Reflection on the Big Screen; See also How Holes Were Drilled in the Models to Give the Illusion of "Dancing" Waves

**GENTLE-RAIN IRRIGATION PLAN
 SUCCESSFUL ON FARM**

Having the effect of a gentle rain, an irrigation system has been tested successfully by many farmers in Michigan. The plan is that of O. E. Robey, agricultural engineer of Michigan State College. The system is simple, calling for a header of ordinary pipe hooked to the water supply and some lengths of old, leaky fire hose or some lines of canvas tubing. The hose does not permit spraying from thousands of punctures because this would erode the soil and injure tender plants. Instead, the water merely seeps through the fabric in small drops and gradually spreads over the area to be irrigated. Experiments have demonstrated that 27,154 gallons of water will cover an acre of ground with an inch of water in the manner of a gentle rain. Another advantage of the Robey system is that the hose can be moved easily from place to place on the farm, wherever water is available. The cost of canvas tubing is small and the whole layout is comparatively inexpensive. Hose lines may be placed between rows of plants in the fields, among trees in orchards and under bushes in small fruit patches. Water has been carried successfully through 660 feet of porous hose to thoroughly irrigate ten acres of land in some tests.

Rec'd in Time Press 8/6/33

Clayton C. Chm.



Chemical Cigarette Lighter Which Ignites Smoke When Cigarette Is Held against It and Puffed

**CHEMICAL IN CIGARET LIGHTER
 GIVES HEAT WITHOUT FLAME**

Chemical action produces the heat in a little cigarette lighter which has no flame, no flints, no batteries, no wheels, no buttons and no mechanism to get out of order. It contains only four parts, a case consisting of cover and base, and a lighting element and fuel cartridge. The lighting element is on the tip of the fuel cartridge and a chemical wick is inside it. The wick is saturated with a special fluid which acts to produce heat when a cigarette is held against the lighting element and puffed. The fluid is used once a week and recharging takes less than a minute.

VARNISH FOR WORN AUTO TIRES

Germany is experimenting with a varnish which is applied to worn auto tires to protect them against heat and wet weather. The varnish is prepared by heating fatty oils, such as castor oil, with three to eight per cent of sulphur and the sticky elastic substance is applied to the worn spots. The liquid coagulates into a rubberlike solid which is resistant to friction.

**KEY CONTAINER AND SELECTOR
 HAS SLIDE FASTENER**

Selecting the desired key among several is made easy with a pocket holder operated by a slide fastener. Pushing up on a tab slides all the keys out of the holder where they are exposed to view in a neat row. Pulling the tab in the opposite direction causes the keys to slide into the container and pressing the tab against the holder locks them in that position. One side of the holder has a space for cards or change.



*Ashon Bros
 223 W. Jackson
 Chicago*

*Ref. Deutsche Bergwerk. Technik. Blatter
 Suene Service 8/1/33*

C 12 19

Mc Williams Electric Co.

S. E. Washington

The Searcraft Co. 205 W. Wacker Drive, Chicago



Building Paper Coated with a Thin Layer of Copper to Make It More Durable and Weatherproof

METAL-COATED BUILDING PAPER USED LIKE SHEET COPPER

Some of the durability and protective qualities of copper are incorporated in a building paper coated with a thin sheet of this metal. The paper consists of a double layer of asphalt in which are imbedded crossed fibers of sisal. The surfaces of this sheet are covered with a heavy paper and the thin sheet of copper, made by the electro-deposit method, is then bonded to the paper. The product is flexible and can be substituted for sheet copper in many places. It is particularly suited for use as a flashing around doors and windows and can also be employed for gutters, eaves and around chimneys.

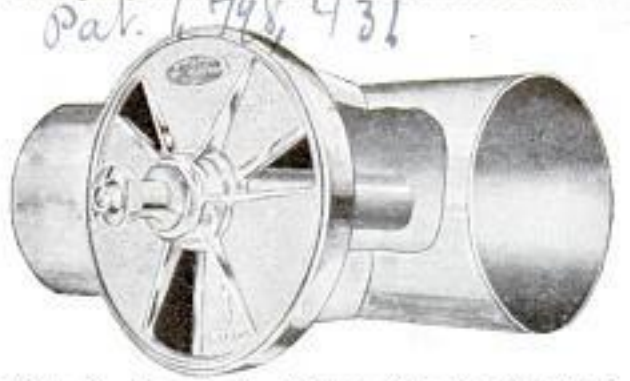
WORLD IS BECOMING WARMER AS THE ICE AGE ENDS

Polar conditions are causing the world to become warmer and drier. This is the opinion of Sir Douglas Mawson, polar explorer, and Dr. C. E. P. Brooks, meteorological expert. They explain the warming-up process is slow and results in a rise in average temperature of only two or three degrees in 1,000 years. This is due to the

fact that the end of the ice age is nearing. The ice has left most of Scandinavia and most of Iceland, but it still lingers around Greenland and covers the poles. In time it may all melt and there may be no ice even at the poles, as such conditions are believed to have occurred before. The present masses of ice at the poles have an area of 3,500,000 square miles and the average thickness is about 2,000 feet. If all this ice melted, the level of the oceans would rise forty or fifty feet. The smaller the amount of ice, the drier the world's climates will tend to become because ice is one of the chief causes of storms which bring rain. If the oceans ever do rise fifty feet, it is thought that many large and important areas of England and America would cease to exist.

DRAFT REGULATOR ON FURNACE OPERATED BY THERMOSTAT

Fuel is saved and an even fire is maintained by a draft regulator for the furnace which is operated automatically by a bimetal regulating coil, or thermostat. The regulator is placed in the flue pipe near the chimney and the heat from escaping hot gases affects the bimetal coil which in turn operates a rotating shutter. Opening the shutter permits cold air to enter the flue pipe and mix with the escaping hot gases, lowering their temperature and reducing draft. The regulator helps maintain coal and coke fires evenly and gives the proper draft for oil burners. It also



Draft Regulator for the Furnace Flue Pipe Which Is Opened or Closed by a Thermostat

reduces fire hazard since it prevents runaway fires and overheating of flue pipes and chimneys. Tension on the bimetal coil can be regulated by a set screw to fit the regulator to the particular furnace in which it is installed.

Mc Williams Electric Co. S. E. Washington

San Diego Union 8/6/33

01224

See Sept. 1934 - 358

Hydrofoils Double Boat Speed in Latest Test



Left, Showing How Hydrofoil Is Attached to Boat: Circle, Inventor at the Wheel; Bottom, Boat Riding High and Almost Dry on Hydrofoils



Tested under difficulties because of choppy water, a small boat equipped with hydrofoils traveled at twice the speed ordinarily obtained by its eight-horsepower outboard motor. Hydrofoils are steel planes, one bowed under the center of the craft and the other a T-shaped affair attached at the rear. The center lifting plane is about four inches wide and from seven to eight feet in length. As the test started, the hull gradually was lifted clear of the water by the hydrofoils until the boat glided along like a flying fish at about twenty-four miles per hour. The maximum speed without the planes is twelve miles per hour. Invented and tested by Dr. Oscar Tietjens of Westinghouse Electric and Manufacturing company, the planes are called hydrofoils because they act in water as an airfoil acts in air. When a certain speed is reached, the airfoil, or wing edge, lifts an airplane off the ground. Similarly, the hydrofoil lifts the boat clear of the water, freeing it from the drag of the water, giving the sensation of gliding or skimming through the air. In the choppy river where the tests were made, spectators believed there might be some difficulty in maneuvering the boat. Actually, there was less trouble in getting it up on the planes because the water slapped the craft up on the hydrofoils and the drive of the engine kept it there. Dr. Tiet-

jens believes that hydrofoils will increase the speed and comfort of other water craft.

HALF DISKS FOR RAKE'S TEETH MAKE IT EASY TO CLEAN

Leaves and trash do not clog the teeth of a rake fitted with half disks instead of the usual prongs. Owing to the broad construction of the disks, the leaves are not pushed to the upper part of the teeth, and such as do cling between the disks can be removed easily by giving the tool a short backward stroke. It is also an excellent implement for the garden as it pulverizes and loos-



ens the soil more thoroughly. It is made of aluminum alloy cast in one piece.

John H. Cramer

6. Pittsburg (Left) Can't Close Rake © 12/16/36. Mariasville, Ohio

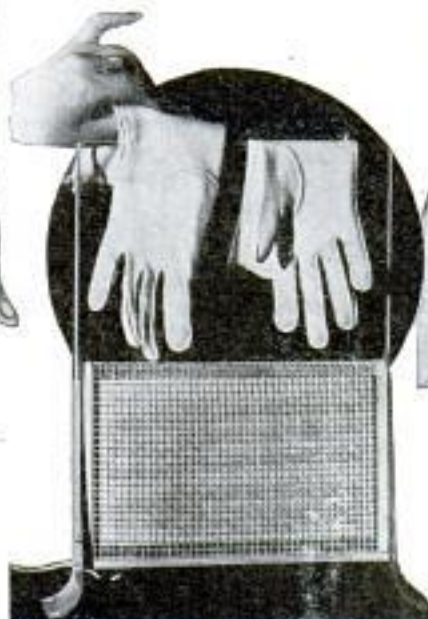
Easier Ways - - - - - of Doing It



Top, Cellophane Container for Silverware Prevents Tarnishing; Being Transparent, the Container Makes It Easy to Select Any Piece of Silver at a Glance; When Sealed, All Air Is Excluded



Above, a New Convenience for Home Reading; Electric Lights in Each Wing of the Chair Give Abundant Illumination for Reading, Sewing, etc.; There Is No Glare Because Lights Are Below Eye-Level



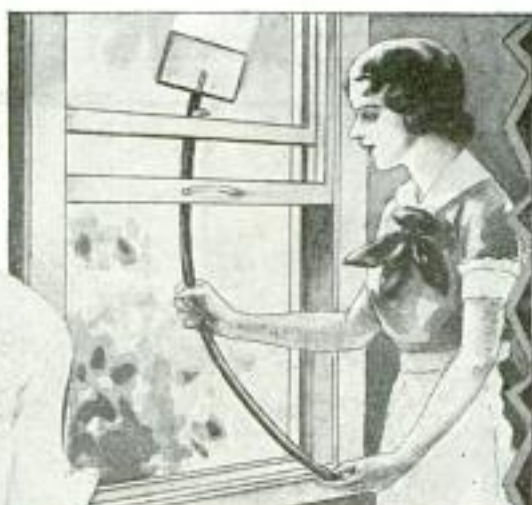
Above, Space Heater and, Inset, Dual Chamber Burner That Gives an Upper Fire and a Lower Fire; This Results in Variation of Fuel Consumption from One-Tenth to One-Half Gallon of Oil per Hour; the Heater Is Said to Be Highly Efficient and Unusually Quiet



Above, Comb Cleaner with Two Brushes That Rotate as Comb Is Drawn between Them; Left, Electric Drier for Gloves, Handkerchiefs, Hosiery and Other Small Articles; It Is a Westinghouse Product



Above, Porcelain Puppy Acts as Three-Way Socket for Connecting Electrical Appliances to Single-Wall Outlet; Cords Plug In at Sides or Backbone; Special Process Makes Pup Almost Unbreakable



Top, Window Cleaner with Flexible Metal Handle May Be Adjusted to Any Size Sliding Window; One Side of Cleaning Pad Is for Washing and Other for Drying; Left, Metal Ring Clamps around Edge of Pie Pan to Keep Juices from Escaping; It Also Seals the Crusts Together

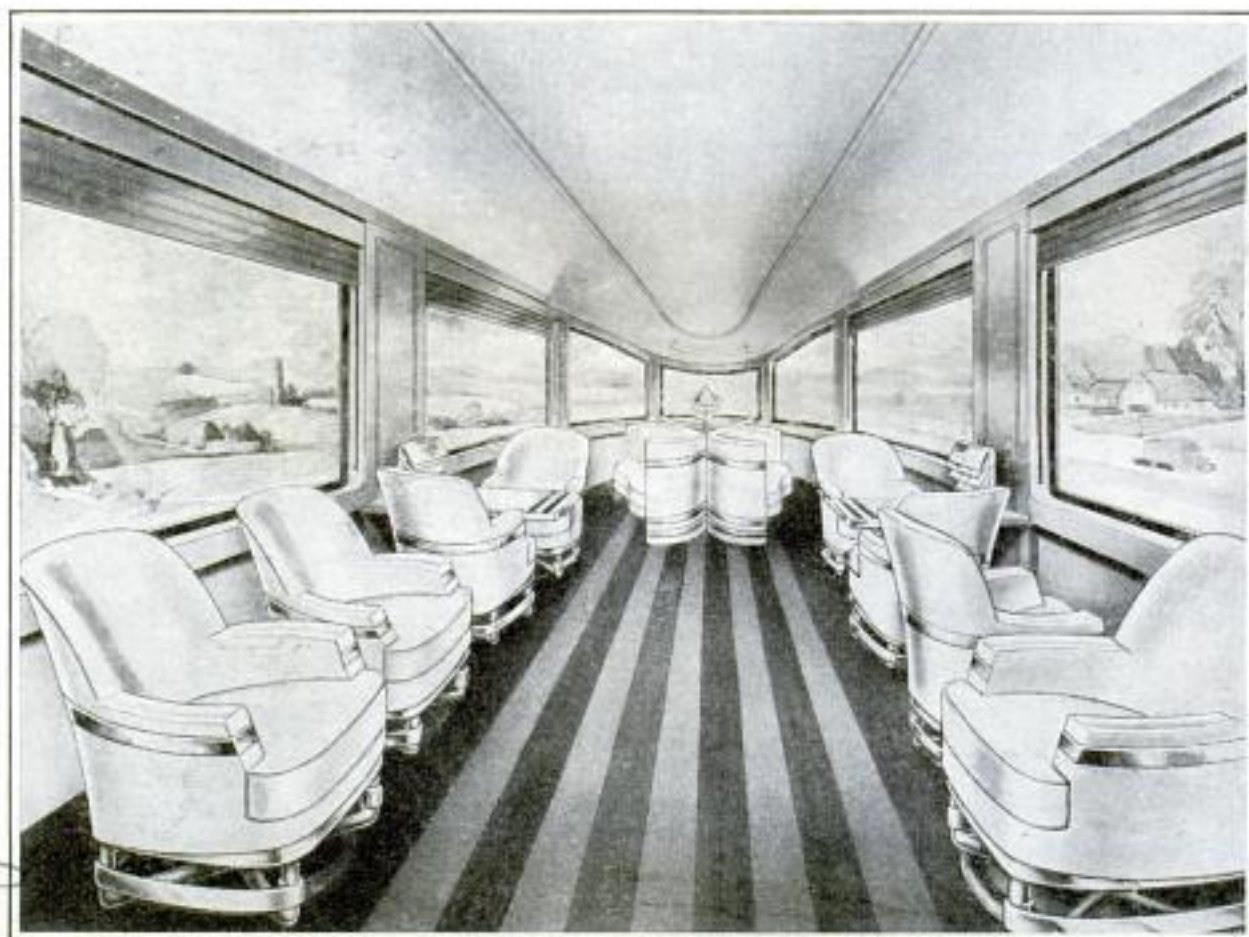


Right, Nine-Inch Washing Machine Operated by Turning Hand Crank; There is a Detachable Wringer with Rubber Rollers; Vacuum Cups Rotate Like Those in Full-Size Washers



Above, Model Kitchen as Arranged by Westinghouse Electric and Manufacturing Company Saves Time; Note Arrangement of Electric Stove, Sink, Refrigerator and Table Space

Solarium Built into Rear of Bulletlike Train



Furnished in Ultra-Modern Manner, Solarium Offers Unusual Comfort to Travelers; It Will Be a Feature of the Super-Train Going into Service Soon; Note Exceptional View Afforded by Wide Windows

Offering comfort and good visibility to passengers, a solarium, or sun compartment, will be a feature of the streamlined, bulletlike train which the Burlington railroad will place in service soon. The train will be light, built of aluminum alloys, and fast, driven at speeds above 100 miles per hour by a motor. In the solarium at the rear of the train, the passenger will find something entirely different from the conventional observation coach. Strips of stainless steel will hold in place a broad expanse of shatter-proof glass, each of the large windows an aid to visibility. Comfortable lounging chairs and soft, indirect lighting are other features.

CRAYONS MADE OF OAT HULLS

Artists' crayons can now be made from oat hulls, an agricultural waste. By treating furfural, an oily yellow liquid made from the hulls, with various simple chem-

icals, a black substance suitable for crayons has been produced. Tests show such crayons are satisfactory in use as compared with charcoal, and by varying the chemical treatment, crayons of varying hardness and blackness can be obtained.

OLD RAZOR BLADES ARE USED IN HANDY CUTTING TOOL



Old razor blades are used in a handy cutting tool which consists of a handle or adjustable holder to receive the blades and a guide for some types of cutting. The tool can

be used for opening cardboard cartons, or as a paper cutter, pencil sharpener or pattern cutter.

P. J. J. Badenburg Co.
Racine, Wis.
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The Zephyr
Science News Letter 8/12/33
C1245
elova State College
Armed. d. av.

Merham. Supplies. Seattle

Presented at 16th International Congress POPULAR MECHANICS 737
 1191 Ave. West 300 5th Ave New York

San Diego Union 8/6/33

GEOLOGIC MAP OF U. S. SHOWS NATION'S MINERAL WEALTH

After fifty years of labor, a new geologic map of the United States has been completed, forming a brilliantly colored picture of this continent's rock-buried treasures. The map, the work of the geologic survey, shows more than 160 units of rocks in twenty-three different color patterns. The work has been in progress since 1879. One map was published in 1911 but it was incomplete and has been out of print for several years. One of the clues obtained chiefly through this survey work is that there are promising deposits of beryllium in the Rockies, Black Hills and mountains on the Atlantic coast. This metal is rare and its discovery is difficult because it is often mistaken for aluminum. Similar clues about possible mineral deposits are indicated on the new map.

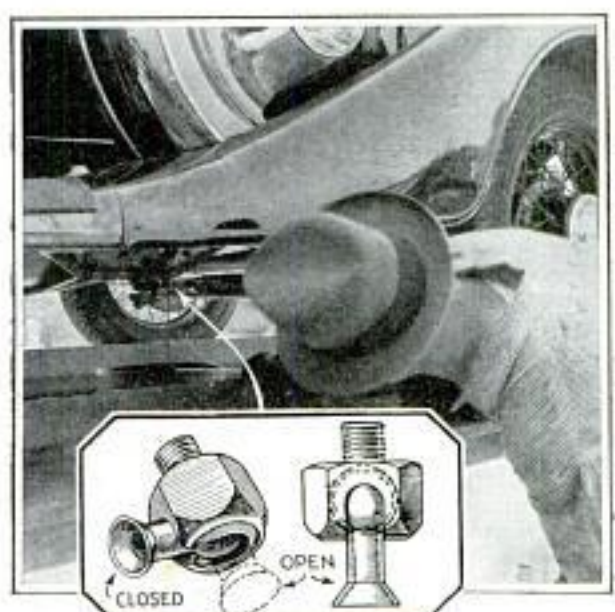
Alvin L. Larned



Hat, Suit, Shoes and Even Hose Shed This Improved Shower After Chemical Treatment

EASY-TO-OPEN OIL DRAIN PLUG HAS BALL-SOCKET VALVE

Motorists who prefer to change oil in their cars themselves, but have been deterred by thought of crawling under them to remove oil drain plugs, need no longer hesitate. A ball-socket valve which replaces the ordinary plug can be opened with a rod without even reaching a hand under the car itself. This plug is positive in action, cannot come open accidentally and is self-cleaning.



Oil Drain Plug Containing Ball-Socket Valve Which Can Be Opened without Crawling under Car

CLOTH IS MADE WATERPROOF IN CHEMICAL BATH

Treatment in a new chemical bath converts fabrics into waterproof material so that men's suits, women's dresses, hats and even sheer silk stockings may be made to shed water. So efficient is the process that a velvet dress or a man's suit can be immersed in a tub of water without getting wet. Not a drop of water is absorbed by the treated material. A flag with the chemical coating will not be affected by rain. In the aviation industry, the process will be useful in treating the wings of a plane so that they will shed moisture, thus preventing the formation of ice. Fabrics immersed in the chemical are said to be unchanged in physical appearance.

W. and Mrs. 945 Broadway
 D. H. Pieter, 945 Broadway
 Mrs. Pieter, 945 Broadway

TYPEWRITER WITH COIN SLOT OFFERED FOR PUBLIC USE

Equipped with a slot into which the user drops a coin, a typewriter for public convenience has been installed in a Los Angeles department store. The typewriter may be used thirty minutes by inserting a ten-cent coin in the slot.

Sears Roebuck & Co. Chicago

41 Broadway

C1225 Washington
738 Lamp Co
Blomfield, N.J.

A. J. Jager, Asst.
Director Bureau of
Navigation - Steamboat



Natural Poses Are Easier to Obtain When Photographer Uses the New "Flashless" Flash Lamp

PHOTOFLASH WITHOUT GLARE AIDS CAMERAMAN

Giving off only a soft glow, a new photographic flash bulb is an aid to the cameraman because his subject is not startled and the pose is better. The bulb is coated deep blue inside, reducing the brilliancy of the flash as seen by the subject but having little effect on the film, which is sensitive to the peculiar blue light. Photographic work inside churches, court rooms and other places where use of the brilliant white flash bulb is inadvisable is now possible with the new blue bulb, a product of the Westinghouse Electric and Manufacturing company.

While an animal can be revived and kept alive for a limited time, this does not mean that it can function normally because it must be kept under an anesthetic. The artificial heart consists of two rubber pockets which dilate and contract like the auricle and ventricle of a normal heart. It is attached to arteries and veins with glass tubes, and an electric current from a battery regulates the flow of blood into the apparatus.

C1231

OVER SEVEN HUNDRED VESSELS BUILT IN U. S. IN YEAR

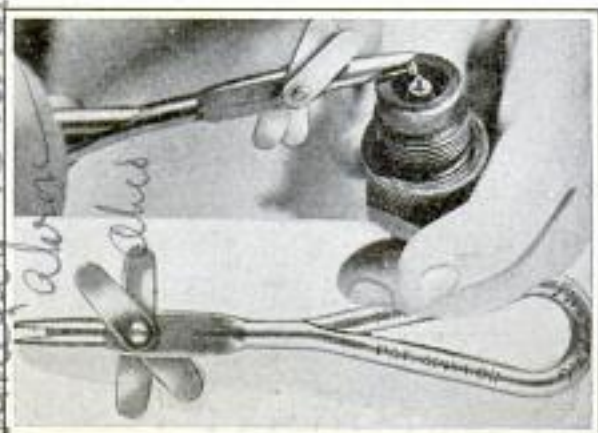
During the fiscal year ending June 30, there were 749 steam, motor, sail, unriggered and yachting vessels built in American shipyards and they aggregated 193,313 gross tons. Of these, sixty-three vessels of 167,586 gross tons were of metal and the others of wooden construction. All vessels of five net tons or over are included in the total. This compares with 898 vessels aggregating 221,907 gross tons built the preceding year.

GAP ADJUSTER FOR SPARK PLUG DOES JOB QUICKLY

Adjustment of spark-plug gaps is made easy by a tool with four gauges and a forked opening for bending the ground electrode in or out. The tool has a handle like a buttonhook, with the forked opening replacing the hook. The gauges are riveted to the tool and may be swung into position for measuring the gap.

"DEAD" ANIMALS ARE REVIVED WITH ARTIFICIAL HEART

Apparently lifeless animals have been revived and kept alive for as long as three and one-half hours by means of an artificial heart after their own hearts have been removed. This heart, which is being tested at Georgetown University medical school, maintains circulation of the blood by pumping it through the arteries and veins. It is being used to learn more about the effects of stimulating drugs on blood pressure of animals and it is hoped the experiments will be of practical value in opening up new knowledge of the cause of death following severe injury or shock.



Top. Tool for Easy Adjustment of Spark-Plug Gap; Close-Up of the Adjuster

Half a million square miles of Arabia remain to be explored by foreigners.

Washington, D.C.

H. S. Cushman Mfg Co

Lullabye Furniture

POPULAR MECHANICS Co.

739

North Bennington, Vt.

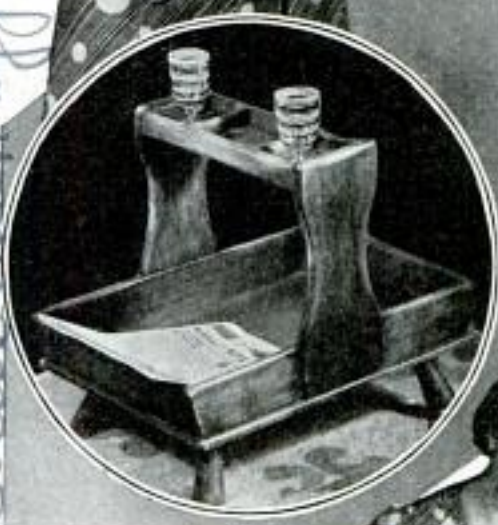
Stevens Parish Wis

Latest Furniture Copied from Early American

c1108

c1097

Left, Floor Lamp with Adjustable Arm Supported by Wooden Peg; Right, Cut-Out Wood Decorations Glued to Furniture Replace the Painted Designs



c1095

Above, Magazine Tray and End Table Like Blacksmith's Tool Box; Below, Magazine Rack and Stand with Cabinet for Storing Books

c1098



c1094

Below, Floor Lamp with Two Handy Trays; It is Modeled after the Old Candle Stands



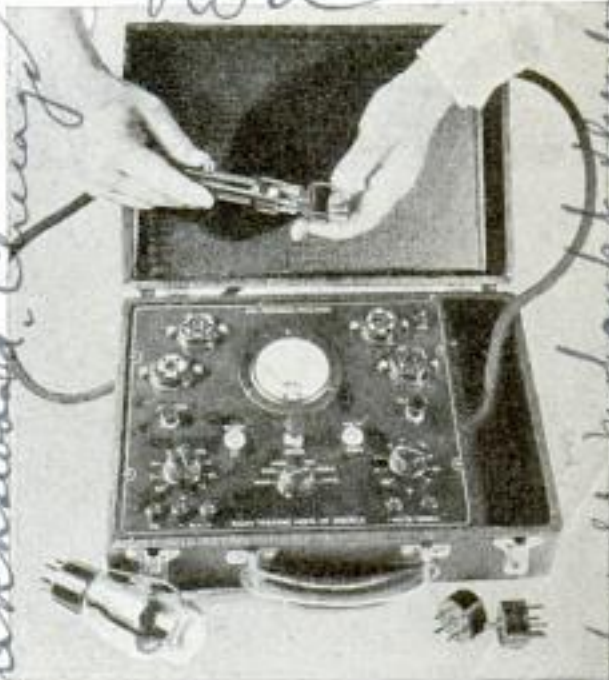
H. S. Cushman Mfg Co North Bennington Vt

Stevens Parish Wis

St. Johns Table Co
Cadillac, Mich

H. S. Cushman
Registered material
North Benning

ANALYZER FOR RADIO RECEIVER TESTS LATEST TUBES



Note Sockets for Testing the Latest Radio Tubes in This Analyzer for Receiving Set

Keeping pace with the rapid development of radio receivers and tubes, a new analyzer is ready for the service man. It analyzes the set and tests resistance and voltage. The device is simple in operation, flexible in application and designed for testing tubes of even more advanced construction than those now in use. Six and seven-pin tubes may be examined. While the tester is built for direct-current operation, it may be adapted to alternating current by the addition of a copper-oxide rectifier.

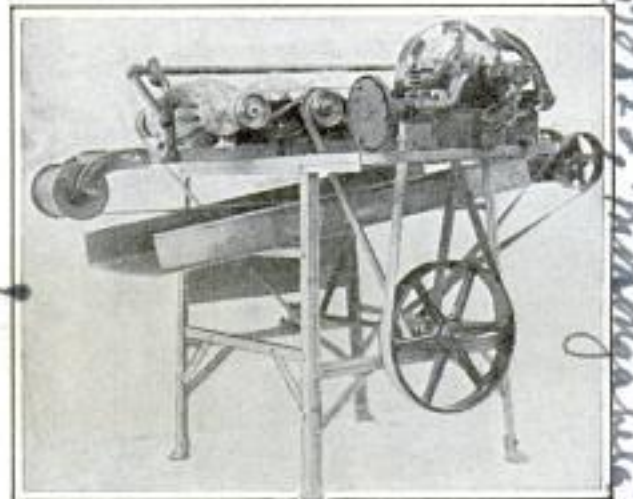
AFRICA IS SEEN AS BIRTHPLACE OF MODERN TYPE OF MAN

Africa, and not Asia, was the original center of humanity, the scientific "Garden of Eden." This is the conclusion of Sir Arthur Smith Woodward, British authority on ancient man, who points to recent skeletal evidence unearthed in Tanganyika territory, Africa, that a kind of man lived there very early in the Pleistocene or ice age who resembled modern man closely. This is taken as an indication that the modern type of man may have appeared much earlier in Africa than in Europe or Asia. There are four types of mankind

which disappeared before the rise of true men to domination of the earth. One is the Piltdown dawn man, discovered in England. Another is the famous ape-man of Java, and contemporary with these is the Heidelberg man, known only by one lower jaw found in Germany. Most recently discovered is China's fossil man. All of these are regarded as offshoots from the human stem, sort of unsuccessful experiments of nature as compared with modern man and his ancestors. Extinct also is the Neanderthal man who was widespread in Europe at a time that is geologically less remote than the opening chapters of Pleistocene time. So a million years ago, more or less, there were five kinds of men existing in different parts of the world. All arose from a common animal ancestor and one was destined to evolve into ourselves.

FRUIT AND VEGETABLE CLEANER DOES WORK OF SIX PERSONS

Bunch vegetables are washed at the rate of one bunch per second in a fruit and vegetable cleaner which the inventor claims will do such work as rapidly as six persons. It will also wash and polish tomatoes, and polish apples, peaches, peppers or cantaloupes. The cleaner has been used successfully to wash eggs and take the sprouts off potatoes. It will polish from twenty-five to forty bushels of tomatoes an hour and up to sixty bushels of apples. Onions can be cleaned at the rate of seventy-five bushels an hour.



Fruit and Vegetable Cleaner Which Washes Bunch Vegetables and Cleans and Polishes Fruit

Developed in Laboratories of the Radio Association by Agnes M. Mansworth, Chicago

Developed in Laboratory of the Radio Association by Agnes M. Mansworth, Chicago

Developed in Laboratory of the Radio Association by Agnes M. Mansworth, Chicago

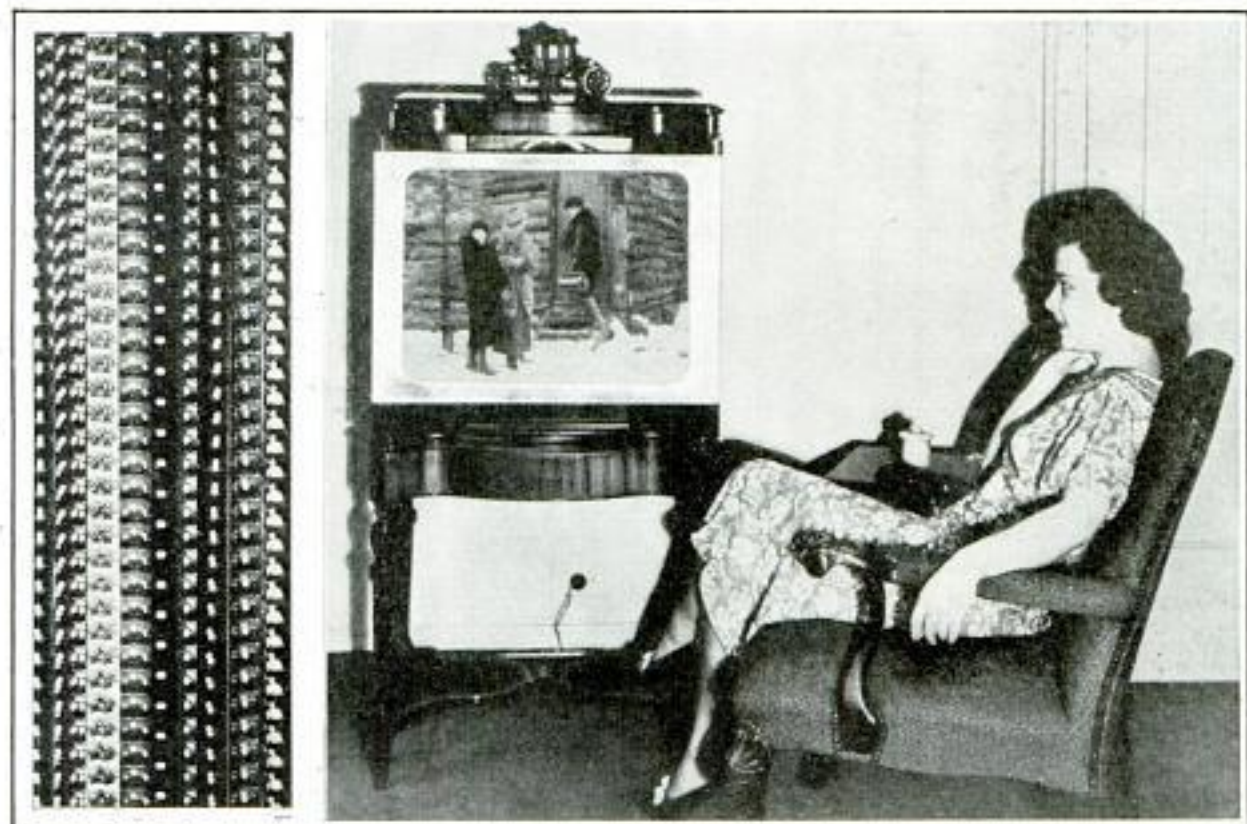
Arthur's notebook. The...

Arthur's notebook. The...

Arthur's notebook. The...



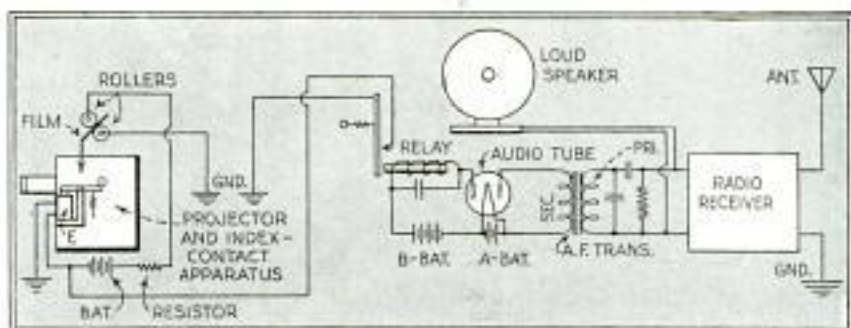
Programs *with* VISUAL EFFECTS



WHILE television is still "just around the corner," two young Chicago engineers claim to have ready a perfected system which combines the audible programs now broadcast by radio with visual effects produced in the home, through the medium of a new method of film projection and remote control. By means of this radio control through existing broadcasting equipment, and on the present broadcast wavelengths, the studio audible program and the home visual performances operate in perfect timed re-

lation to each other. The operator of the master projector at the station supplying the service to subscribers maintains complete control of their home projectors at all times. He can halt them when a printed

(Continued to page 118A)



Complete Receiving System for Synchronized Sound and Pictures

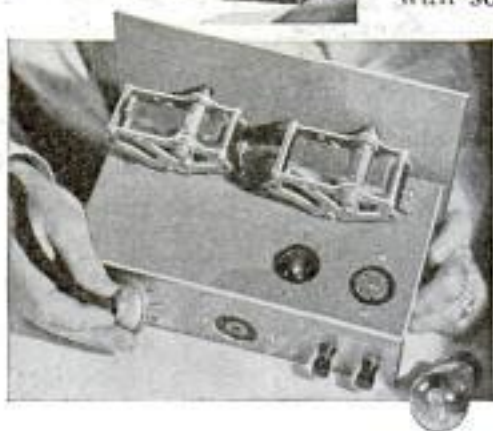
ONE-TUBE



BBROADCAST programs, police calls and amateurs are all within the range of this 25 to 500-meter beginners' set. The cost is very low and most of the parts can be salvaged from discarded receivers. Unlike most beginners' sets, that are usually assembled on a breadboard, this one employs a sheet-metal panel and base. The parts are not crowded and space has been reserved on the base for an additional tube, and an audio transformer, so

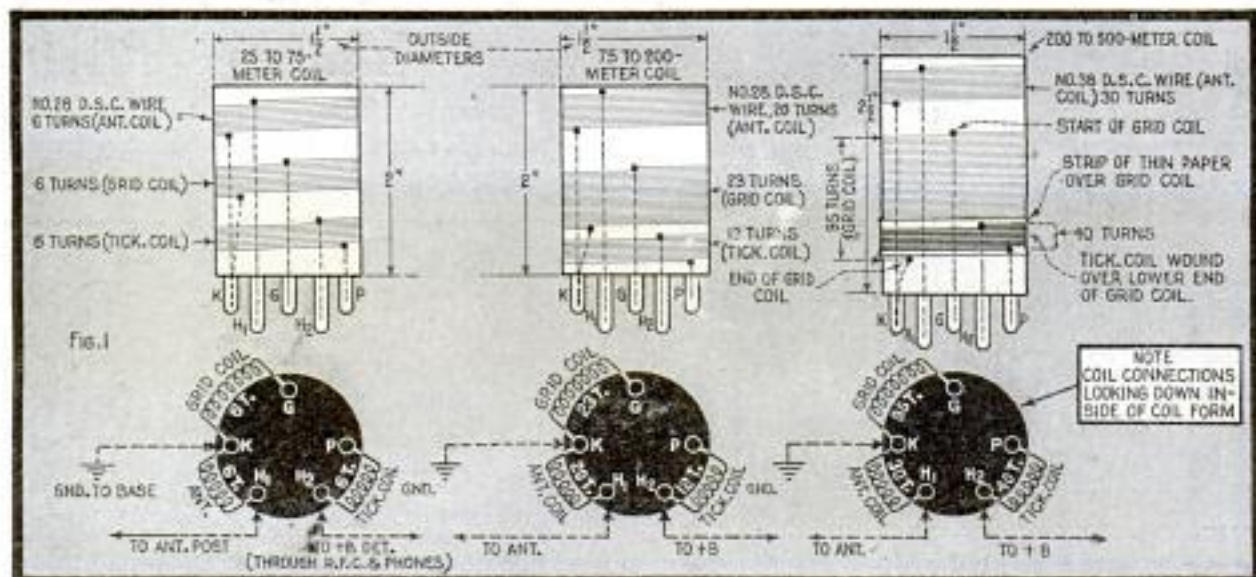
that a small magnetic speaker may be used at a later date.

As the tube is of the heater type it may be operated, without regard to polarity, with a 6-volt storage battery, or a 6-volt transformer can be used instead. Regardless of which method you choose, no changes are required in the wiring. However, if a 6-volt heater transformer is used it will be necessary to connect a switch in the 110-volt a.c. supply line, or the operator can plug the line in and out of a convenient wall socket as desired.



It is a good idea to wind the plug-in coils first; three of these coils are required to cover the range from 25 to 500 meters. Suitable coil forms, 1½ in. in diameter, are available. However, these forms may be made from old 5-prong tube bases and lengths of bakelite tubing having a ¼-in. wall.

The tubing fits down over the tube base where it is held in position with good strong glue. The wire sizes and turn data are given for each coil in Fig. 1. Owing to



ALL-WAVE RECEIVER

for beginners

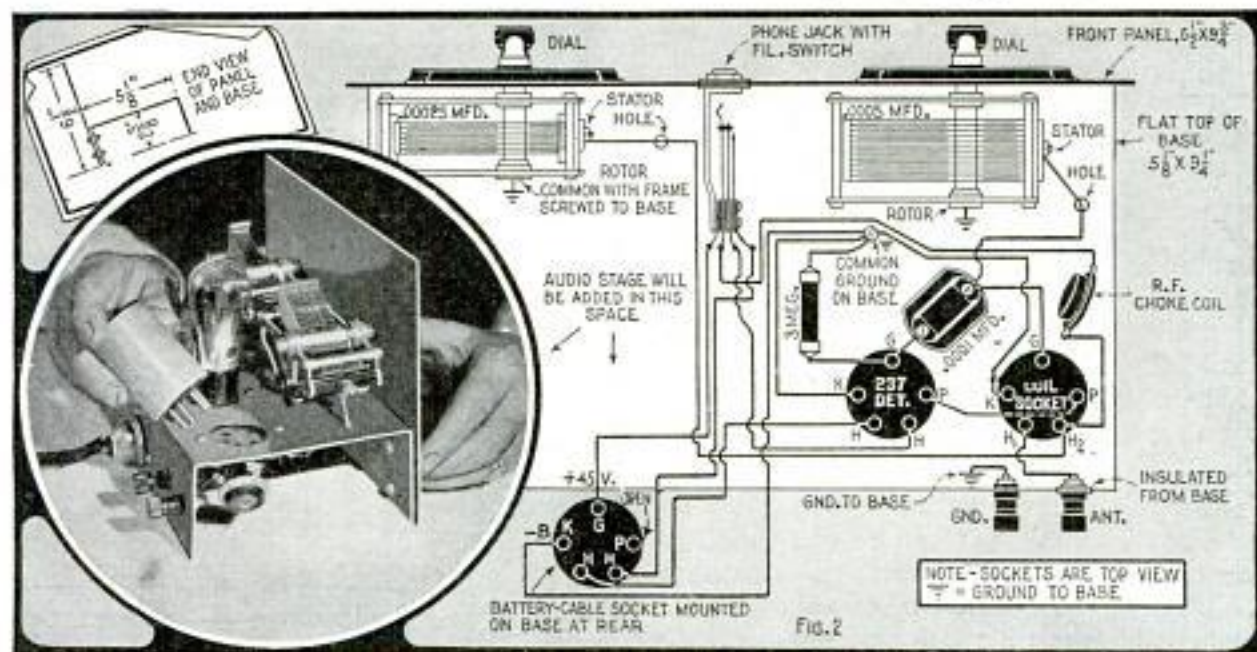


lack of space the actual number of turns are not shown on the coils; the lines merely indicate the position of each winding and the start and finishing ends that terminate in the base prongs.

Small holes are drilled at the start and finish of each winding. Starting at the top of the form, the wire is inserted from the outside and run down through the proper

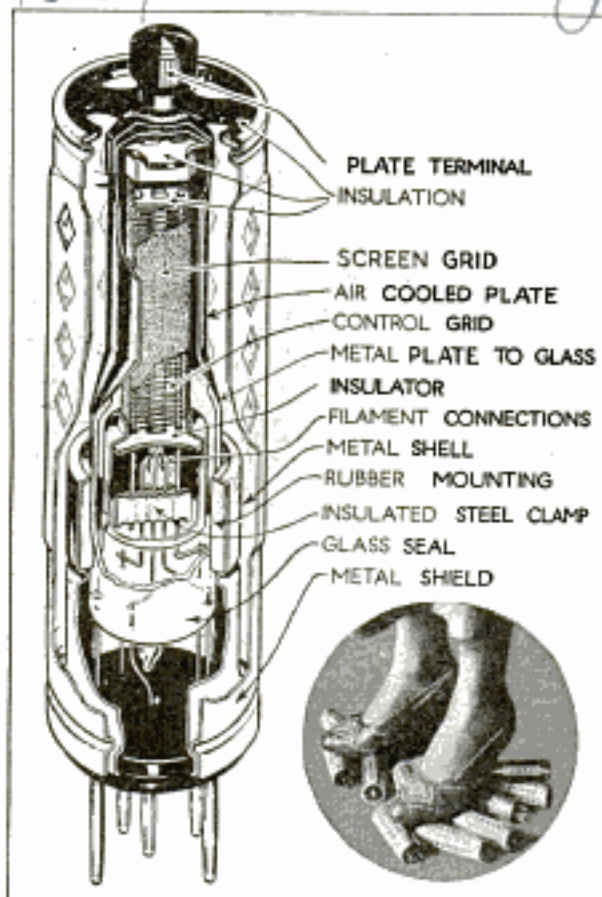
prong where it is clipped off even with the end. The insulation is then scraped from the end of the wire which is firmly soldered in the prong before beginning the winding. The various prongs are easily identified as shown in the sketches below each coil in Fig. 1. Some of the socket connections, contacted by the plug-in coil

(Continued to page 120A)



C 4579

No. 11 Sagent known



Sectional View of the "Metal" Screen-Grid Tube; Inset Photo Shows Tubes under Test

You Can Walk on These Tubes

Radio receiving tubes that may be dropped 6 ft. on a concrete floor, or walked on, with little risk of damage, have been recently introduced in England. A cylindrical copper container, which also serves as the plate, replaces the usual glass envelope. The tubes are smaller than those in common use and are claimed to be more uniform and freer from microphonic noises. The vacuum seal is made at the lower end with glass through which the grid and cathode leads are brought out for connection to the terminals. The plate terminal is connected directly to the copper cylinder which forms the greater part of the vacuum inclosure. This entire assembly is mounted inside a ventilated metal shell. These rugged tubes are now being made in standard English types.

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

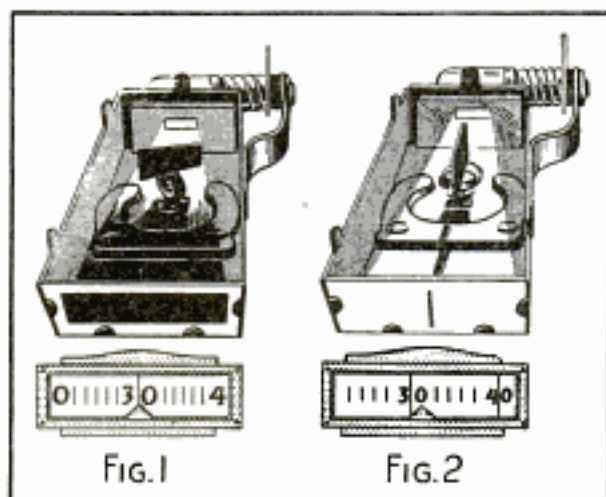
Thumbtacks Used for Terminal Markers

Celluloid-covered thumbtacks make good terminal markers for identifying battery leads, antenna, ground and phone posts. The tacks are made in various colors and may be marked on the top with india ink, after which, a coating of clear varnish can be applied. This method of marking has been found especially useful for experimental layouts of the breadboard type. These tacks may also be mounted on metal or bakelite panels by drilling small holes that will just admit the pin. The point may be dipped in shellac before inserting or it may be clinched at the back.

C 4590

Shadow Meter for Close Tuning

To accurately tune receivers equipped with automatic volume control, it is necessary to use some form of visual guide as the operator cannot depend upon a change in loudness to set the dial to the correct position. A slight error will cause distortion that is quickly noticed by a critical listener. The Westinghouse shadow meter, designed for receivers of this type, spreads a broad shadow across the meter's face when the set is not accurately tuned to the station, as shown in Fig. 1. As the station is tuned closer the shadow gradually narrows, on the scale, to a minimum width to indicate the sharpest tuning point. The meter consists of a light aluminum vane and shutter on a moving coil in a magnetic field. The shutter intercepts the light rays of a miniature lamp, casting a shadow on the translucent dial.

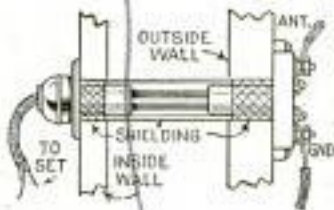


Left, Broad Shadow Indicates Poorly Tuned Station; Right, Same Station Properly Dialed

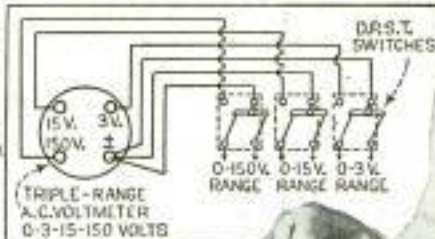
Westinghouse Elec
 Mfg. Co. E. Pittsburgh Pa

4572
Woodruff and Co.
Meriden, Miss.

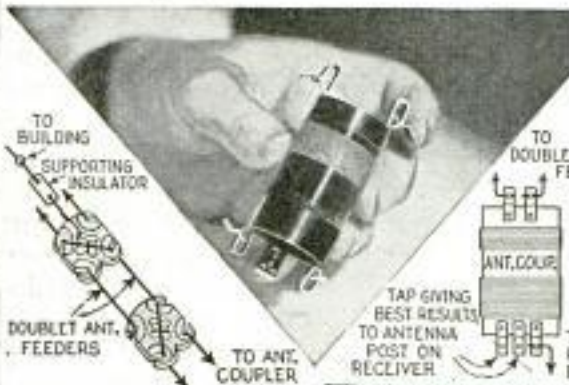
Practical RADIO Suggestions



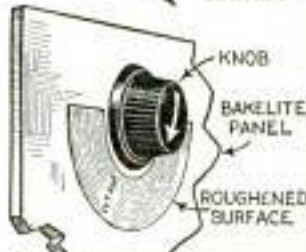
Through-the-Wall Lead-In Unit Is Shielded for Use with Noise-Reducing Antenna Systems



Above, Photo and Diagram Show a Simple Method for Switching a Triple-Range A.C. Voltmeter for Various Tube-Filament and Line-Voltage Readings; Left, a Universal Doublet-Antenna Coupler Which Permits the Use of an Ungrounded Feeder Line with Any Type of Receiver without Loss of Stability; Especially Useful with All-Wave Sets



Above, Logging Scale for Pointer Knob Made by Holding Strip of Sandpaper against the Knob and Panel; Turn Knob Back and Forth to Roughen the Polished Surface



Above, Small Wooden Wedge between Core and Winding Stops Power Transformer Hum; Left, Master Die Fits across Face of D.C. Milliammeter to Supply Extra Scales for Many Readings



Above, Homemade Extension Handle for Tuning Small Short-Wave Transmitters; the Brass Rod, Threaded at Both Ends, Replaces Set Screw in Knob Bushing; the Handle Screws on Opposite End



Left, Short Lengths of Soft-Rubber Tubing Make Good Vibration Cushions for Experimental Apparatus; Right, Hammarlund Low-Loss Plug-In Coil Form Has Label Window on Handle



Let's discuss your 324000000 at the City, N.Y.
 along I should know
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Cycle-Set Installation Showing Miss Ellis Tuning in One of Her Favorite Stations

Miniature Battery Set for Bicycles

Miss Patricia Ellis, of Hollywood, takes her radio receiver along when she goes for a spin on her bicycle. These tiny sets, that may be operated with dry cells and small B-batteries, are often seen on the beaches and in tourist camps. The bicycle installation is quite simple; the receiver is clamped to a board mounted on the handlebar and the batteries are fastened to the frame in the position usually occupied by the toolbox. Another suggestion would be to use a small, wire package carrier for both the batteries and the receiver.

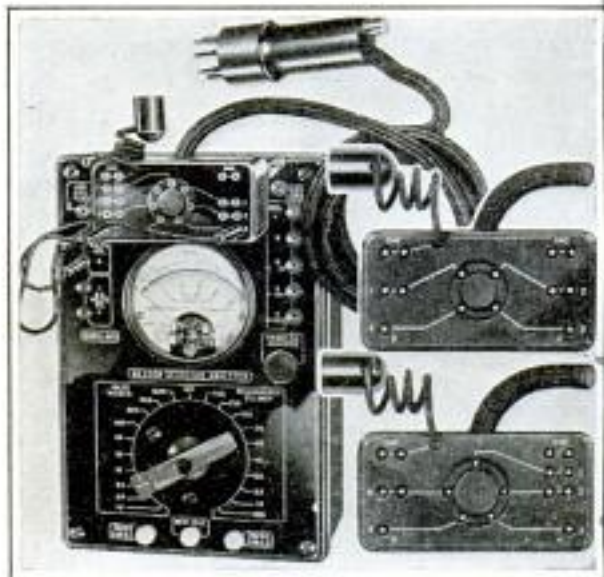
Receiving Television Signals

While the ear may be fooled into accepting poor audio amplification as perfect, the eye immediately detects uneven receiver output in television reception. For televised silhouettes, this lack of uniformity is not noticeable, but really good resistance-coupled amplification is required for the satisfactory reception of halftone pictures. Stations located in a number of the larger cities are now broadcasting regular television programs that can be received within a radius of about 100 miles. Experimenters are invited to tune in on the broadcasts and send in reports of reception. Signals can be picked up, from most of these stations, with a cathode-ray receiver or a receiver of the

scanning-disk type using a 60-hole single-spiral disk running at 1,200 revolutions per minute. In Chicago, Kansas City and Minneapolis, a three-spiral 45-line scanning disk is required, and the speed is 900 revolutions.

Set Tester Keeps Pace with New Tubes

Complicated switching systems are avoided and extreme flexibility is claimed for this Weston set tester, or trouble analyzer, now available for radio service men and experimenters. As more pins continue to appear on the new tube bases, and the tendency is to get more elements into a single tube, many set testers become obsolete almost over night. Voltage, current and resistance readings in a radio set are obtained with this tester by means of a standard analyzer plug which brings out all of the terminals. However, instead of bringing these terminals to the inside of a complex instrument, they are brought to a small rectangular box carrying a tube socket and a group of pin jacks. This tube-selector unit plugs in at the top of the instrument, as shown in the photo, and connections are made to the socket by means of small leads fitted with tips for the pin jacks. These separate plug and tube-selector units are inexpensive and available for all present types of tubes; others will be added as required. They



Selective Set Tester with Tube Selector Attached; the Four and Five-Prong Units Are at the Right

may also be used to bring any of the older testers up to date.

Weston Electrical Instrument Corp.

Try Allied Radio Co. 319 Jackson Blvd. Chicago
 makes sense now

24583

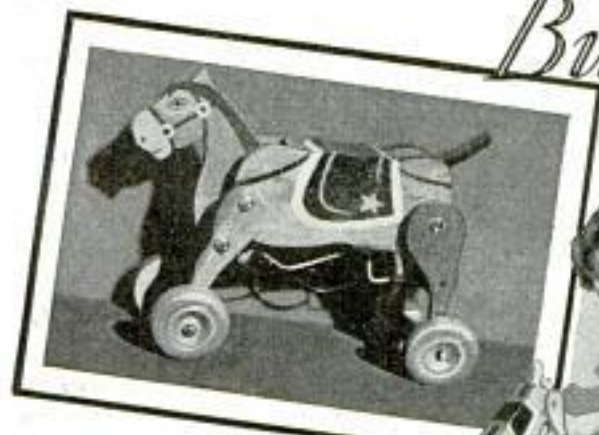
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319 Jackson Blvd. Chicago
 619 Jackson Blvd. Chicago

319 Jackson Blvd. Chicago
 319 Jackson Blvd. Chicago



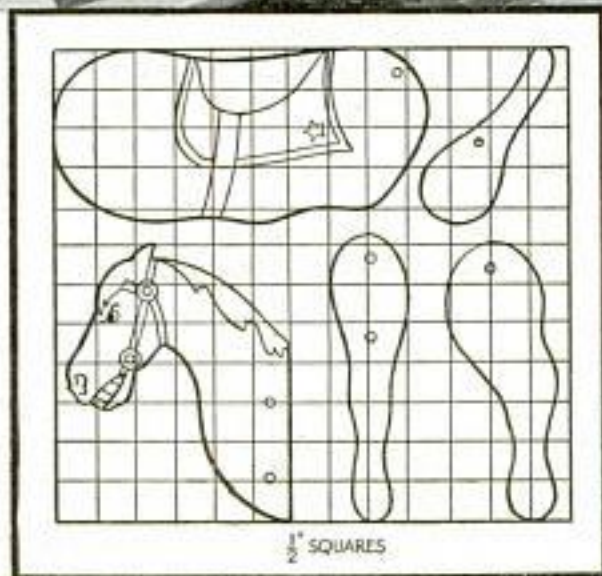
"RODEO REX" a spring-driven *Bucking Broncho*



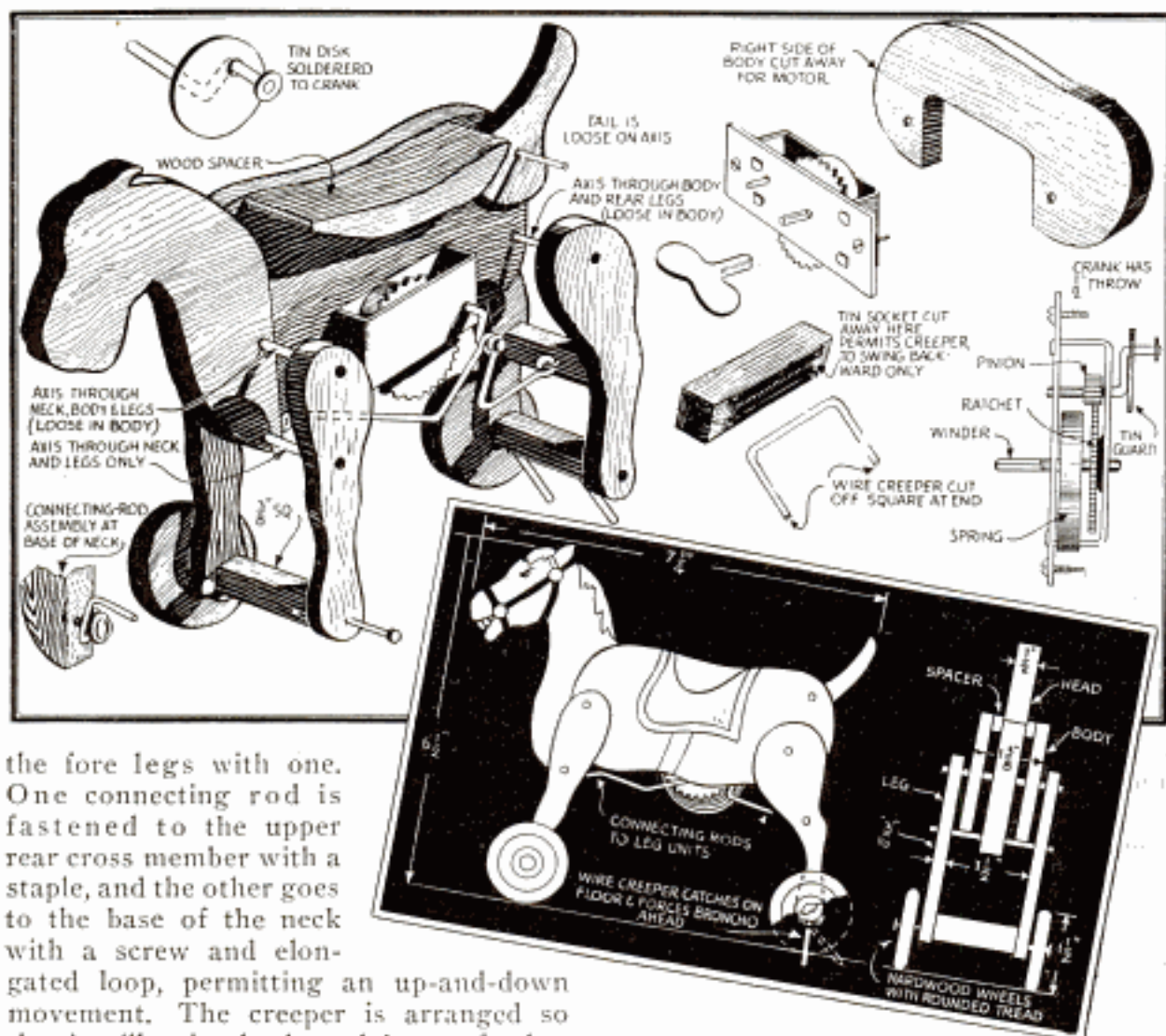
By
BOB HARTLEY

THIS little broncho, animated by a light spring motor, cuts the most amazing capers, bucking, galloping and leaping into the air. And sometimes, in sheer deviltry, he stands on his nose and just kicks. Having the motor, the rest of the job is extremely simple, being largely a matter for the jigsaw and soldering iron.

On a sheet of paper marked into $\frac{1}{2}$ -in. squares, lay off the outlines of the various members, then trace them on wood, preferably white pine, although a harder wood will make a more substantial job. The head and tail are cut from $\frac{1}{2}$ -in. material, and the legs and sides of body from $\frac{3}{16}$ -in. stock. Assembly of the various parts is illustrated in the drawings. A motor such as is required can be taken from toys such as are sold at the ten-cent stores. The pinion shaft of the motor should be provided with a crank having a $\frac{1}{2}$ -in. throw, or describing a circle 1 in. in diameter when making a complete revolution. To



this crank solder a tin disk to serve as a guard to prevent the connecting rods from slipping sideways. Note that the legs are assembled in unit pairs, the hind ones with two wood cross members and



the fore legs with one. One connecting rod is fastened to the upper rear cross member with a staple, and the other goes to the base of the neck with a screw and elongated loop, permitting an up-and-down movement. The creeper is arranged so that it will swing backward, but no farther forward than the vertical. This causes the horse to move forward. The hind legs swing on a $\frac{1}{8}$ -in. rod that fits tightly in the legs but turns freely in the body. The fore legs swing on another axis which turns freely in the body.

Hardwood wheels $1\frac{1}{2}$ in. in diameter turn on axles made from nails. The wheels

should have rounded treads to offer the minimum of resistance. The two sides of the body are glued to a spacer along the back, and the tail is counterbalanced and swings free on its axis, bobbing up and down when the broncho bucks. It is, of course, important that all parts work freely to get the maximum performance.

Methods of Obtaining Quick Prints from Negatives

When you are in a hurry to obtain a print from a negative without waiting for it to dry after developing, place it between two sheets of clear cellophane. Before doing this, however, the negative should be placed in a hardener, and care should be taken that it does not come in contact with a printing surface that is too warm or the emulsion may leave the backing. Another way of getting a print in a short time is to soak the negative in alcohol, as

it comes from the wash, for about 2 min., after which it is dried in circulating air. Prints may also be dried quickly by soaking them in alcohol for 2 min., and then burning the alcohol off. The print will be left dry, but it will not burn. If this method is used, a print can be made and dried in about 3 min. This is not advisable for average use because the print does not have time to be properly fixed or washed, but where quick proofs are needed this method will save much time.—Lloyd Thompson, Kansas City, Mo.

Ideas That Will Help to Improve the Home

Electric Clock Permanently Connected to Wall Outlet

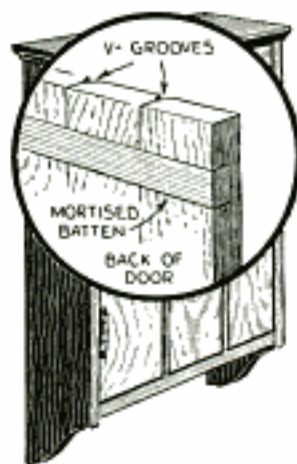
Your electric clock can be permanently connected to a wall outlet by running the cord through the plate of the conduit box.



After a hole has been drilled through the plate, the plug is removed from the cord, the latter is slipped through the plate and the bared ends of the two wires are then connected to the terminals of the receptacle inside the box. If the plate is metal, the hole should be drilled large enough to accommodate a small bakelite bushing.

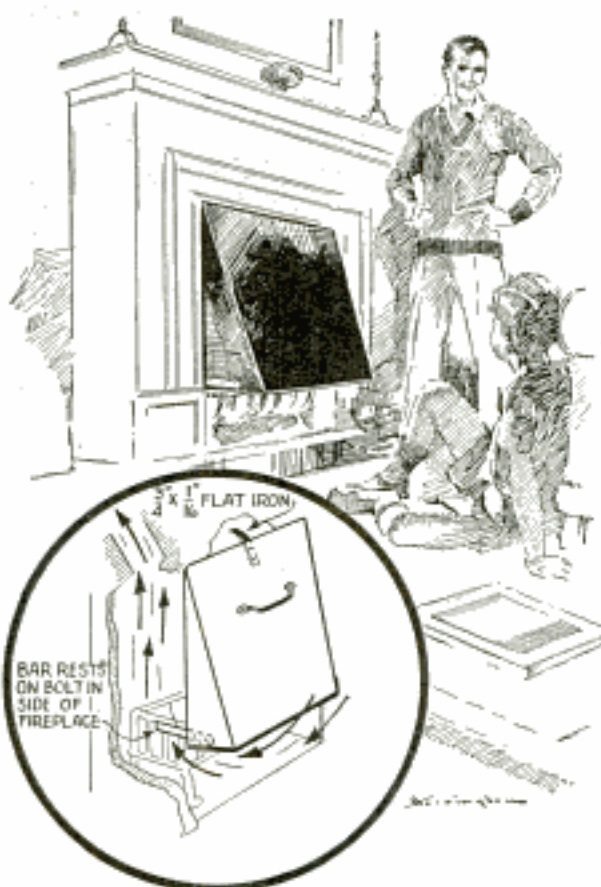
This Cupboard Door Has No Ridges to Collect Dirt

A simplified type of cupboard door, which is quite an improvement over the old-style door with its set-in panels that collect dirt on the lower stiles, is made of $\frac{1}{2}$ or $\frac{3}{4}$ -in. stock. The edges of the vertical pieces are beveled with a plane to form $\frac{3}{16}$ -in. V-grooves on the front side when butted together. Two cleats mortised flush with the rear side of the door provide the necessary rigidity.



Sheet-Metal Hood Helps Draft in Fireplace

For quickly starting a fire in a fireplace, you can cover the front with a sheet-metal hood, leaving an 8-in. opening at the bottom for draft. The hood is fitted at its lower edge with two iron bars that rest on bolts in the side of the fireplace or fire

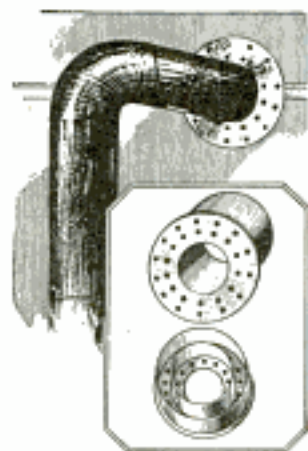


Draft under Fire Increased by Installing a Sheet-Metal Hood in Front of Fireplace

box, and at its upper edge with a curved piece of flat iron, or better, a piece of spring steel, which is pushed under the top. The hood is removed after the fire has been started.

Safety Wall Thimble for Stovepipe

Fires that are started in homes by an overheated stovepipe where it passes through the wall or ceiling, can be prevented by using a ventilated wall thimble of the type shown. It consists of two short sheet-metal tubes riveted or welded at the ends to a sheet-metal disk, with holes in it so that air can circulate between the tubes and carry away excess heat.





Setting the Iron Holder Flush with Top of Board Helps to Reduce Work on Ironing Day

Iron Holder Set Flush with Top of Board Saves Work

When doing a large ironing, the fatigue caused by constantly lifting the iron from the board to the holder can be eliminated if the latter is set flush with the top of the ironing board. Cut a hole near one end to take the holder and then screw a block to the underside with iron brackets as shown in the detail. The hole should be cut at an angle so that the iron can be pushed onto the holder without twisting the arm from its natural position.—Harold E. Benson, Denver, Colo.

Rubber Pouring Spout for Oilcans

Pouring oil and liquids from a can may be greatly facilitated by the attachment of a rubber pouring spout. It is made by cutting a rubber band from an inner tube so that it is wide at one side. When used, the band is snapped around the nozzle and handle of the can. —G. E. Hendrickson, Argyle, Wis.



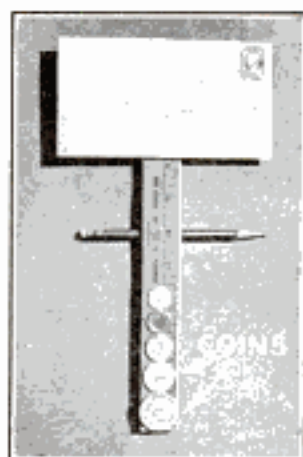
☐ Oxygen and acetylene tanks should never be dropped or handled roughly, and should not be stood on end, unless fastened to prevent them from falling over.

A Camouflaged Duck Blind

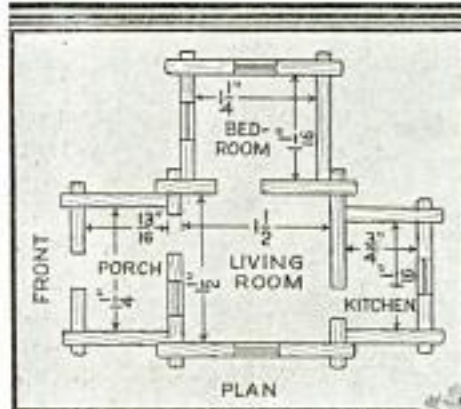
Many hours of hard work cutting weeds and brush with which to make a duck blind can be eliminated by using old squares of canvas camouflaged with paint. Practically all shades and colors of a shore in autumn can be simulated by smearing the canvas with different colors of paint. The duck boat should also receive its share of coloring. The sides may be painted to look like water or marsh-ground reflections, and over the cockpit, a covering may be spread and smeared with brown, green and yellow paint to resemble piles of marsh hay and driftwood. A blind can be built wherever it is convenient to set out decoys. If the shore is weedy, a few armfuls of cattails, rushes, or marsh hay, properly placed, will help the deception. At the end of a day's shooting, the blind can be rolled up and stowed away in the boat for use again the next day.—Ben C. Robinson, Newcomerstown, Ohio.

Weighing Letters with U. S. Coins

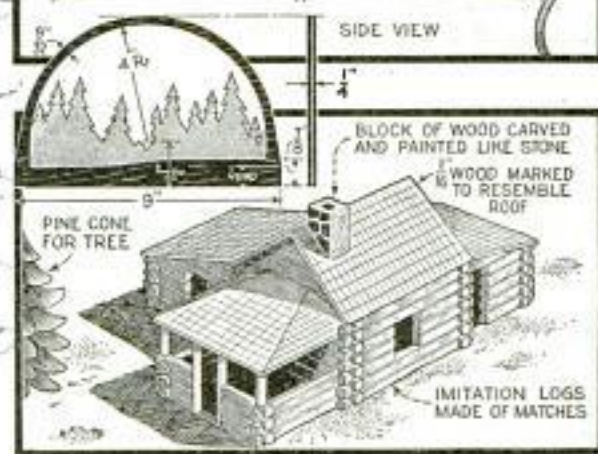
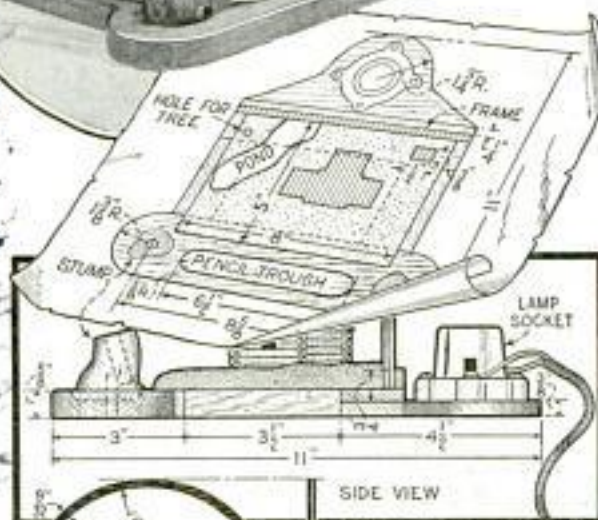
Have you ever been in doubt as to the number of stamps to put on a letter? A quickly-improvised scale can be made by using five new U. S. coins; a penny, nickel, dime, quarter and half dollar. Place the letter to be weighed on one end of a rule that has a round pencil under its center. Line up the coins as shown so that the largest one is even with the opposite end of the rule. Slightly rotate the pencil to balance the letter. If, at the exact points of balance, the pencil is slightly closer to the coins than it is to the letter, one stamp is sufficient, but if it is closer to the letter, two stamps are needed. As these five coins, when new, weigh exactly 1 oz., which is the maximum allowance for one stamp on a first-class letter, one of approximately 2 oz. can be weighed by placing a second set of coins directly over the first.—Ernest E. Smith, Los Angeles, Calif.



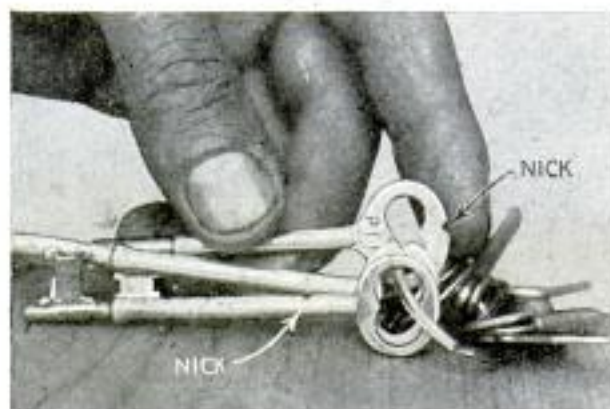
An Attractive Log-Cabin Desk Set and Lamp



Reminiscent of vacation days in your log-cabin camp, this desk set has a pencil trough, two fountain-pen holders, and a miniature log cabin in which stamps, pins and paper clips are kept. A small lamp illuminates a background of pine forest in silhouette, which adds considerably to its attractiveness. The top surface of the base is cut away to form a gradual slope, and the edges are rounded so that when covered with sand, the surface will be quite realistic in its resemblance to the grounds around the cabin. A semi-circular background, just behind the cabin, consists of a plywood frame that holds a parchment-paper scene of pine trees, painted with a dark opaque green. A removable roof of thin veneer, ruled to simulate shingles, makes the interior of the three-room cabin accessible. The sides are built up of matches, cut to resemble logs and glued together, after which an application of stain will give them the appearance of weathered wood. The chimney is a block of wood, carved and painted to resemble masonry. After gluing the cabin to the base, coat the latter with glue and sprinkle on white sand. A pine cone placed on the opposite side near the background will help to balance the scene and add to its novelty. The pencil trough is merely a shallow groove made with a round-edge gouge, while the pen holders are short sections of a tree branch, with the bark left intact. These are drilled to hold the pens and are fastened with screws or dowels.



Identifying Keys in the Dark



Selecting Your Keys in the Dark by Feeling the Nicks Filed in Different Locations

Small nicks filed at different places on a bunch of keys that are somewhat similar in shape will aid greatly in selecting the right one in the dark, the location of nicks being the means of identifying each key. Another way is to file one or more nicks at the same location on the key and use the number of nicks to identify each key. In either case, you can quickly select the right key by feeling them with the fingers.

Arrangement for Carrying an Extra Spare Tire

On long auto trips an extra spare tire can be carried as shown in the illustration. Two pieces of flat iron are pivoted at the center with a bolt and are bent at one end to hook over the regular spare and at the other to support the extra tire. Leather straps around the tires at the top and bottom hold them together.



Predicting Storms with Homemade Weather Glasses

Interesting chemical weather glasses, which change in appearance with changes in the weather, may be made by anyone. If a mixture consisting of potassium nitrate, $\frac{1}{2}$ dr., ammonium chloride, $\frac{1}{2}$ dr., camphor, 2 dr., and denatured alcohol, 2 oz., is placed in a long test tube and the mouth is covered loosely with a piece of

thin rubber, a heavy sediment in the bottom of the tube will indicate fair weather. When the precipitated matter rises to the top of the tube and the solution becomes very turbid it indicates the approach of a storm. Another weather glass, which acts differently but also changes with the weather, is made by pouring a solution consisting of potassium nitrate, 38 gr., camphor, $2\frac{1}{2}$ dr., ammonium chloride, 38 gr., distilled water, 9 dr., and 188-proof denatured alcohol, 6 dr., into a long glass test tube and covering it loosely.

Checking Loss of Compression in Auto Motor

Compression losses in an auto motor may be determined by removing all of the spark plugs except the one in the cylinder to be tested, and then cranking the engine slowly by hand in order to "feel" the compression of the suspected cylinder. If there is a loss of compression, the source of the leak may be found by inserting a short length of rubber tubing into the crankcase through the filler pipe, making certain that the lower end does not become closed with oil. Then, by holding one end of the tube to your ear while an assistant cranks the engine, any leakage past the piston can be clearly heard. If this cannot be heard, it is safe to assume that compression is being lost through one, or perhaps both, valves.

Grips Made on Your Gun or Casting Rod with Plastic Compound

A comfortable grip for the hand is easily made on your gunstock or casting rod with a plastic compound that adheres readily and dries hard. Press some of the plastic around the rod and then grasp it in the natural way, pressing the fingers firmly into the plastic to make deep impressions. Carefully remove the hand, and after the plastic has dried, sand lightly and stain to match the handle.

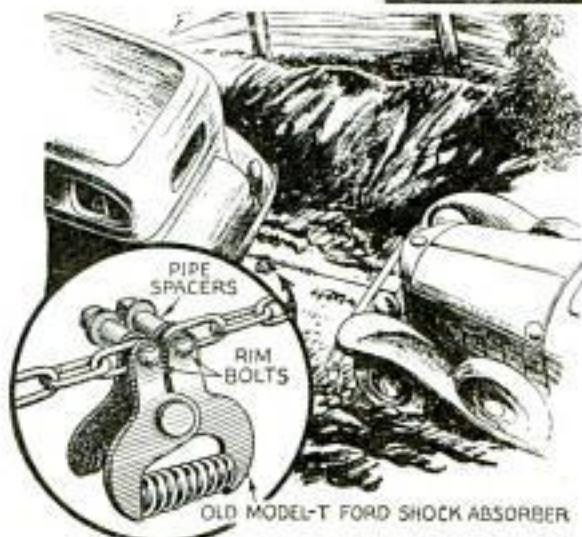


*Plastic wood
addition. L. L. Co.
428 B. B. Carter, maro*

Simple Ways of Solving Motoring Troubles

Have you ever had the gas siphoned from your tank while you were gone? Use of a bicycle padlock with a heavy shackle will usually avoid this trouble. First get the lock, measure the thickness of the shackle, and then select a drill just a trifle larger. Two holes, opposite each other, are drilled in the filler tube so that when the lock is attached, one side of the shackle will press firmly against the top of the cap, which prevents it from being unscrewed. Of course, the shackle can be bent up and over the edge of the cap with a pry bar if the thief is determined, but such methods are usually not resorted to by those engaged in petty thefts of this kind, and you may be reasonably certain that your tank will not be molested.

Sudden jerks that snap towing ropes will be absorbed and breakage reduced to a minimum if an old model-T shock absorber, of the type shown, is attached to one end of the rope. This is best done by bolting the jaws of the absorber to the end links of two chains, one of which

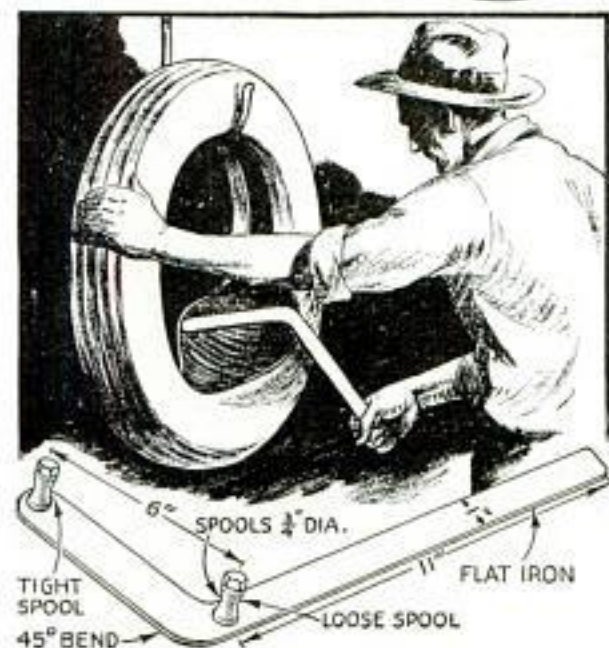


is tied to the end of the rope and the other is wrapped around the rear axle or bumper of the tow car. A bolt inserted through two of the links and fitted with a large nut holds the chain in place. A shock absorber will be found better for this purpose than single-coil springs, as the latter are like-

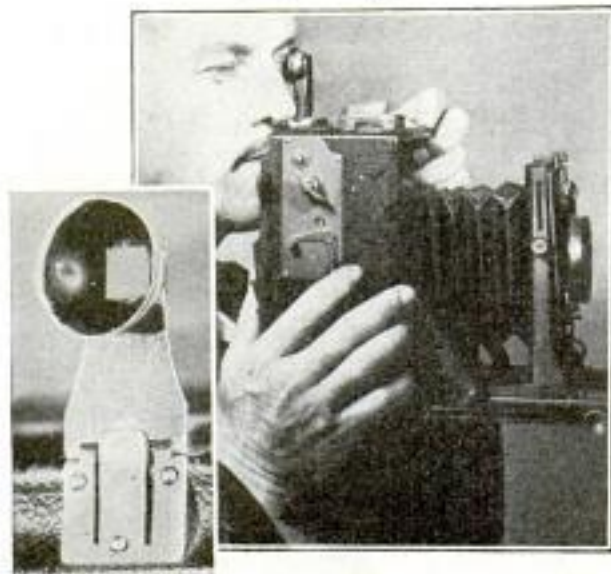
ly to be broken when a sudden strain is applied. However, three or four heavy coil springs attached to steel crosspieces at each end may be found practical.

In the lower drawing is shown a simple tool for spreading heavy tires so that they can be readily inspected inside. The tool is a piece of flat iron bent to the shape shown in the detail, and fitted with two metal spools, one of which rotates. Both are held on studs screwed into tapped holes in the positions shown.

When a shatter-proof windshield of the type having a sheet of nitro-cellulose between two pieces of glass becomes cracked, air getting inside often causes discoloration, which obstructs your view. To prevent this trouble, coat the crack with collodion as soon as possible after the break, which seals it.



Cup on Camera View Finder Helps Photograph Airplanes



Brass Cup Soldered to Camera View Finder Shades Eye When Photographing Moving Objects

Photographers who experience difficulty in shooting distant views of airplanes in flight, or other moving objects, by having the image lost when sighting through the view finder, can prevent this trouble by fitting the view finder with an eye shade. A small brass cup, about 1½ in. in diameter, is soldered to the rear side, a square hole being cut in the cup. The shade keeps sunlight from shining between the eye and the view finder.

Setting Traps to Catch Mink

Here is a method of setting a trap for mink that has been found highly effective in the middle and late autumn season. Take No. 1 size single-spring traps and start out along a creek or small river where muskrats have been feeding on corn shocked along the shores. Places where you find muskrats are also likely to be frequented by a colony of mink, as muskrat meat and rock bass are their favorite foods during this season. Inspect the shores of the stream carefully, and wherever you find a muskrat hole in the bank with water standing from 1 to 3 in. deep on the bottom of the entrance, set the trap. Do not do this, if possible, while standing on the shore, but wade along the edge to the entrance of the burrow and scoop out a level place for the trap to rest on. Be sure the pan of the trap is not

more than an inch or two under the water. If necessary, build up the bottom of the entrance with sand, or set the trap far back into the hole where the water is of the proper depth to just conceal the jaws and pan. Then stake the trap with an 8 or 10-ft. pole, first trimming off all branches except at the extreme end where the two main branches should be cut to form a wide Y. Sharpen the butt end of the pole, slip the trap-chain ring over it and push the sharpened end firmly into the mud just under the surface of the water to one side of the burrow. Cover the chain with mud and the set is complete.

Rubber Keeps End of Wood Stake from Splitting

Three or four thicknesses of old inner tube tacked to two blocks, will, when



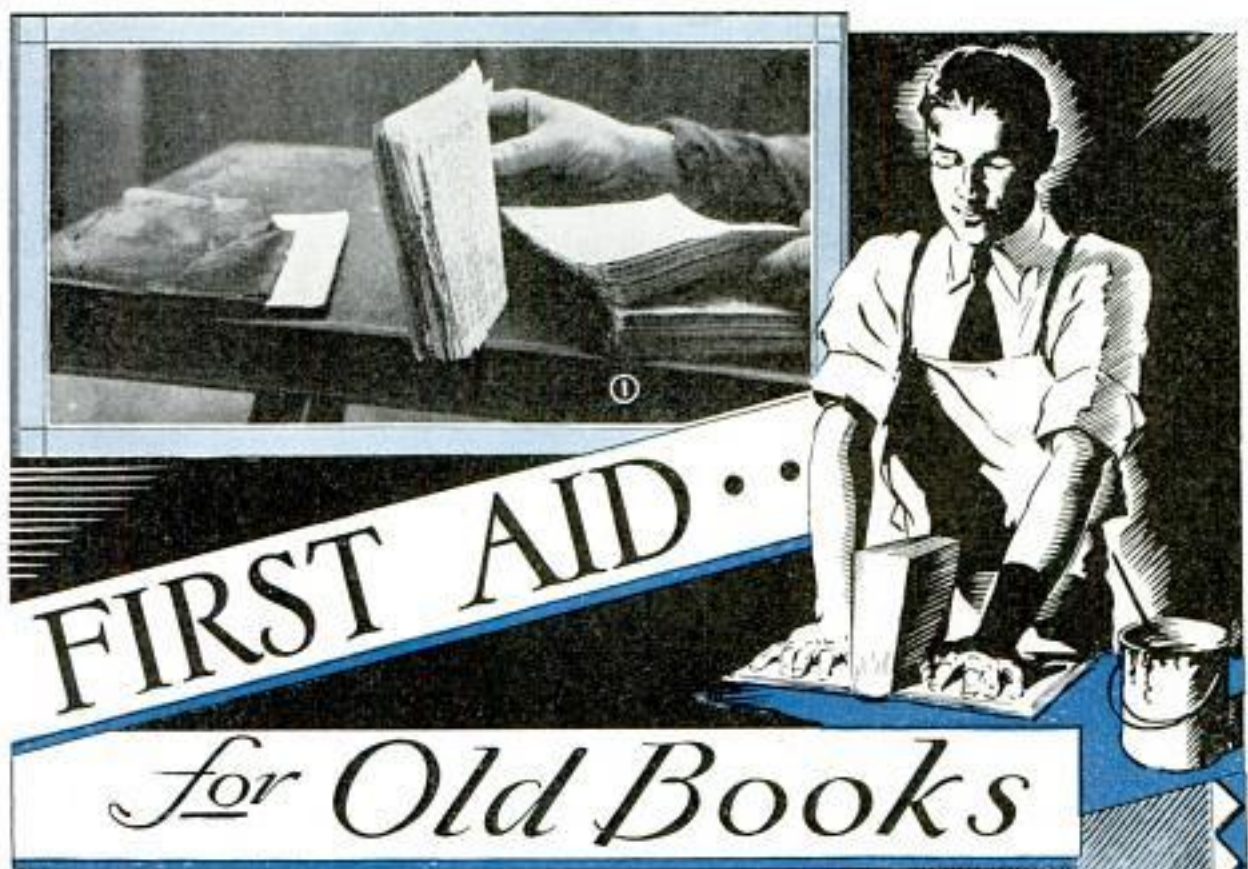
slipped over the top of a wood stake, absorb some of the shock from the hammer or sledge and help prevent the wood from splitting while it is being driven into the ground. The

length of the inner tube should be folded over double and the blocks tacked to the ends so that when the rubber is placed on the stake the weight of the blocks will keep it there.

Tightening Bristles in Paint Brush

Small paint brushes that lose their bristles can be temporarily repaired by wrapping fine wire around the bristles close to the ferrule. This little kink is especially handy if you have a rush job of painting and the bristles are loose in the only brush available.





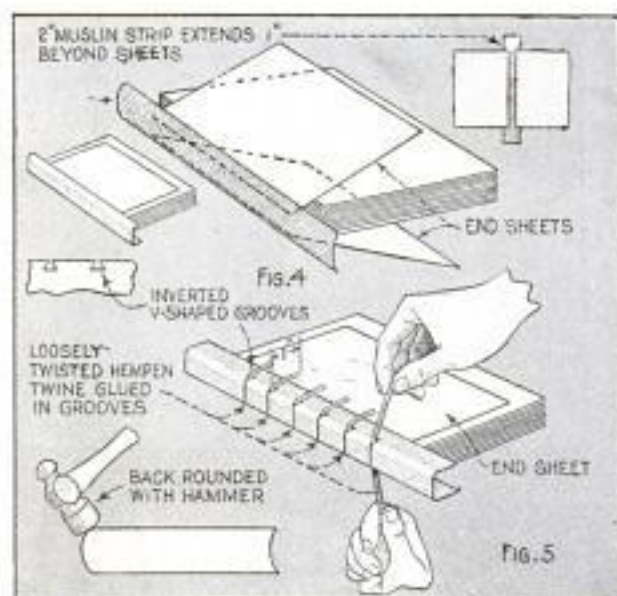
By LESLIE H. PHINNEY

AS I have worked for eight years as a bookbinder, I am supposed to know something about the trade, but when a friend asked me to repair the book shown in Fig. 1, at a time when I did not have a single tool of the craft at hand, I was rather doubtful about the outcome. Fortunately the job was completed with excellent results and as the crude method used was thoroughly practical, it may be helpful to others who have old books they wish to renew.

Take for example a book with numerous loose leaves, the sewing of the remaining sections broken and the covers removed. The first step is to mend all torn leaves with transparent tissue tape. Loose leaves that are torn at their back edges are reinforced and brought to full-page width with strips of light weight white paper, pasted over the margin. All pages are then put in order and are lined up at the back and top. The book is next placed between two wooden blocks, so that the back projects about $\frac{1}{4}$ in. Set the assembly on a table and weight it down with a flatiron or other heavy ob-

ject. Cover the projecting back with a thick flour paste to which liquid glue has been added, one teaspoonful of glue to $\frac{1}{2}$ pt. of paste. This is worked well in between the edges of the leaves and sections, and rubbed down with a round-edged piece of wood until all crevices have been filled. Then set the book away to dry for 24 hours.

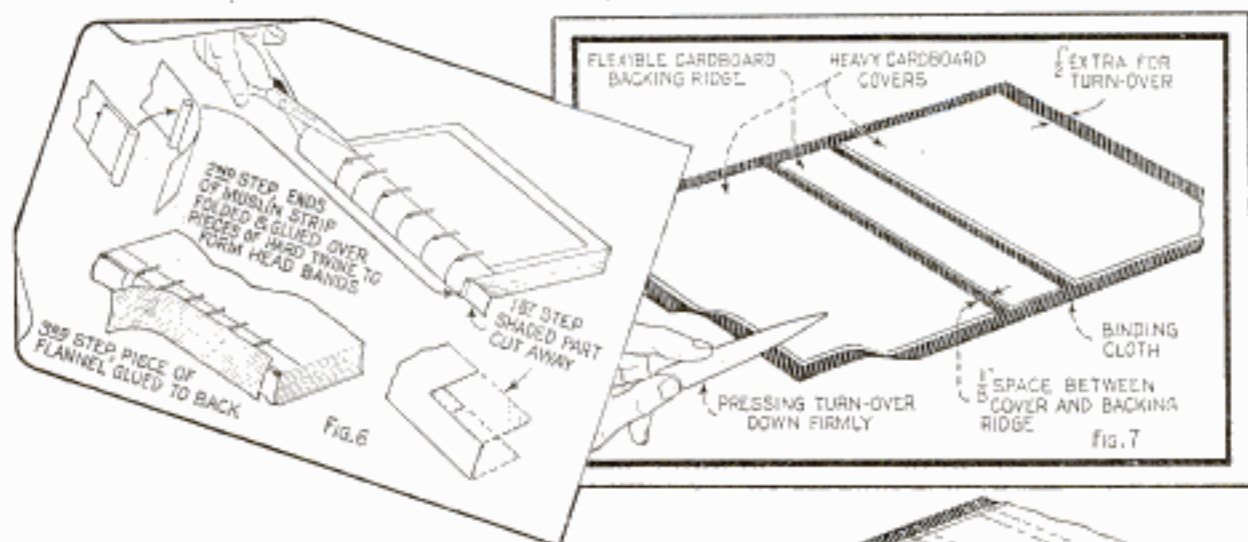
Resuming the work, cut two sheets of bond paper just a trifle smaller than the



size of the pages. A 2-in. strip of muslin is pasted to the edge of these "end sheets," Fig. 4, so that the space between them is about $\frac{1}{2}$ in. less than the thickness of the book. The muslin strip should project about an inch beyond the paper at each end. The assembly is then placed over the sides of the book and the muslin strip is pasted to the back. When dry, the book is clamped between the wooden blocks, Fig. 2, which are tightened by twisting a

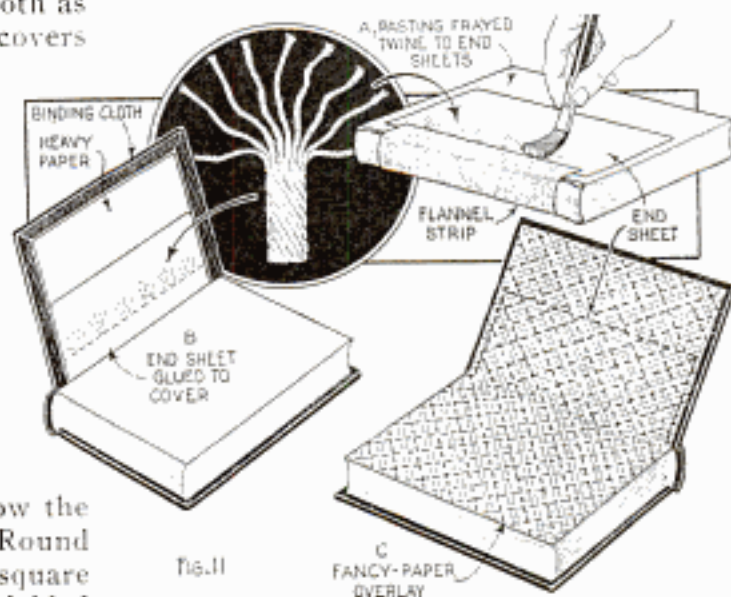
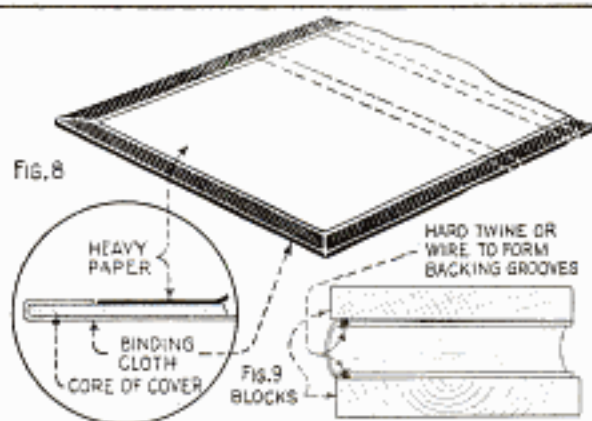
light rope around them, and the next step is to cut grooves for cords as in Fig. 3. A hacksaw will be found handy for this purpose and the grooves should be undercut so that they resemble an inverted V. Cut pieces of loosely twisted hempen twine 2 in. longer than the thickness of the book and glue them in the grooves. See Fig. 5. Let the pieces of twine project about an inch on each side of the book. When this glue is nearly dry, lay the book on the table and tap along the back edges to slightly round the back. Place it between the blocks again, so that the back is held in a rounded position, apply a coat of paste and rub down with a crumpled newspaper. When dry, the back will be permanently rounded.

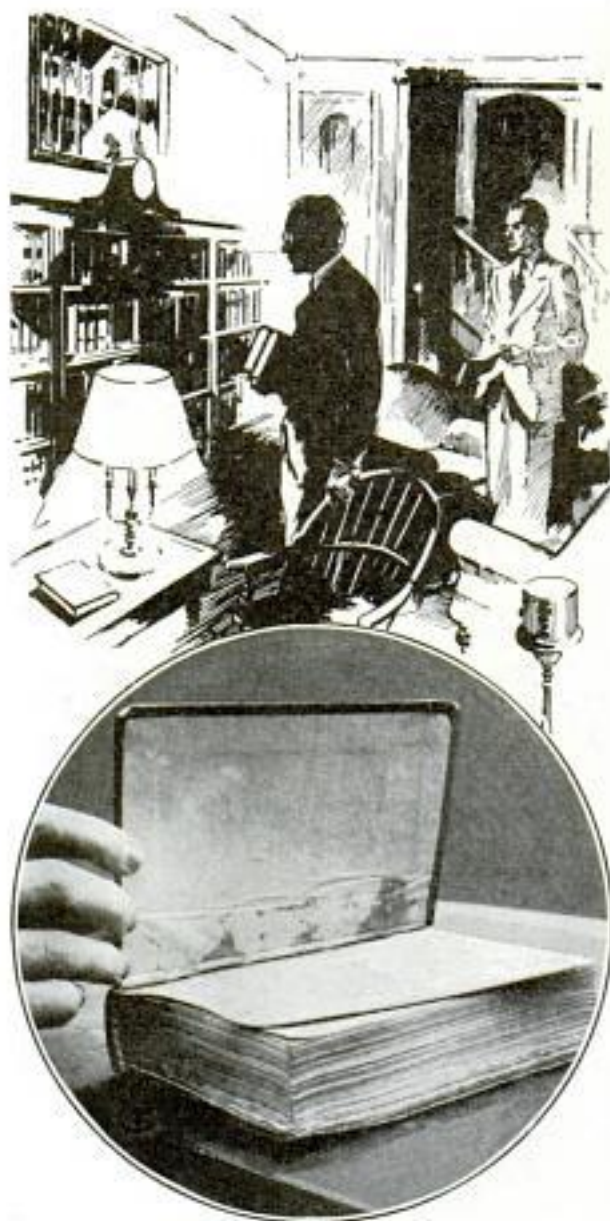
The extending ends of the muslin strip are then coated with glue and doubled over, a short piece of hard twine having been placed at the fold as in Fig. 6 to form the "head bands." The fold should be



close to the edge of the back. An extra strip of light cotton flannel or similar cloth, 2 in. wider than the thickness of the book is next glued to the back, after which a piece of strong brown manila paper is glued over the cloth, the paper being $\frac{1}{4}$ in. shorter than the length of, and just as wide as the thickness of the book.

Preparation of the two covers with a flexible cardboard "backing ridge" between them, is done while the book is drying. Covers are cut from heavy cardboard, unless the old covers are still in good condition. Their size should be a trifle larger than that of the pages so that they will project at the front, top and bottom, but allowance must be made for a $\frac{1}{8}$ -in. space between the covers and the backing ridge. The width of the latter must be equal to the thickness of the book. Now lay the covers down with the backing ridge between them on a piece of binding cloth as shown in Fig. 7. Binder's cloth for covers may be purchased from any book bindery. Buckram cloth is the most durable. Thin imitation leather may also be used. Cut the cloth, allowing $\frac{1}{2}$ in. on all sides for turn-over. Then coat the inner surface of the cloth with glue or paste and press down the covers and backing ridge, after which the edges of the cloth are carefully turned over and pressed down tightly on the inside. Be especially careful to avoid wrinkling at the corners. An old cover will show the proper method of folding here. Round corners are harder to turn than square ones. After the edges have been folded





over and pressed down, and before the glue on the cloth has dried, take two sheets of heavy paper about the same thickness as the binding cloth and cut them to fit inside the covers so that it will not overlap but will butt against the cloth as in Fig. 8. Cut these pieces a trifle undersize as they will enlarge when coated with paste, which is next done so that they can be fastened permanently in place. The purpose of these pieces is to offset the tendency of the covers to warp so that the cloth side will become concave. In fact, when the paper dries it will shrink and should cause a slight bow in the opposite direction, causing the covers to tightly hug the volume.

Next lay the book in place on the back cover as shown, and bring the front cov-

er over so that the backing ridge is in line against the back of the book. Tie a piece of smooth, hard twine loosely around the book letting it lie in the $\frac{1}{8}$ -in. space between the backing ridge and the covers, as in Figs. 9 and 10. Place the book between the blocks again, the edges of the latter coming just over the cord but not resting on the backing ridge. Then squeeze the assembly in a vise or put it under weights so that you can get at the back to rub it well down against the book. Pressure of the vise or weights will also press the twine down forming "backing grooves." Straight lengths of $\frac{1}{8}$ or $\frac{3}{16}$ -in. wire are even better than hard twine for this purpose. Keep the assembly under pressure until the covers are thoroughly dry. Then remove the book from the blocks, open the covers and fray out the ends of the cords that were first glued in grooves cut in the back, Fig. 11, detail A, and paste the frayed twine to the end sheets so that none of the strands cross each other. Then paste the flannel strip and the end sheets to the inside of the covers as shown in detail B of Fig. 11. If you desire, this operation can be done before the previous job of pressing in the backing grooves, which makes it possible for both gluing jobs to dry simultaneously. To prevent wrinkles, the end sheets must be stretched toward the front edge of the covers. Also a sheet of oiled paper should be placed between the end sheets and the book to prevent the end sheets from sticking to the pages.

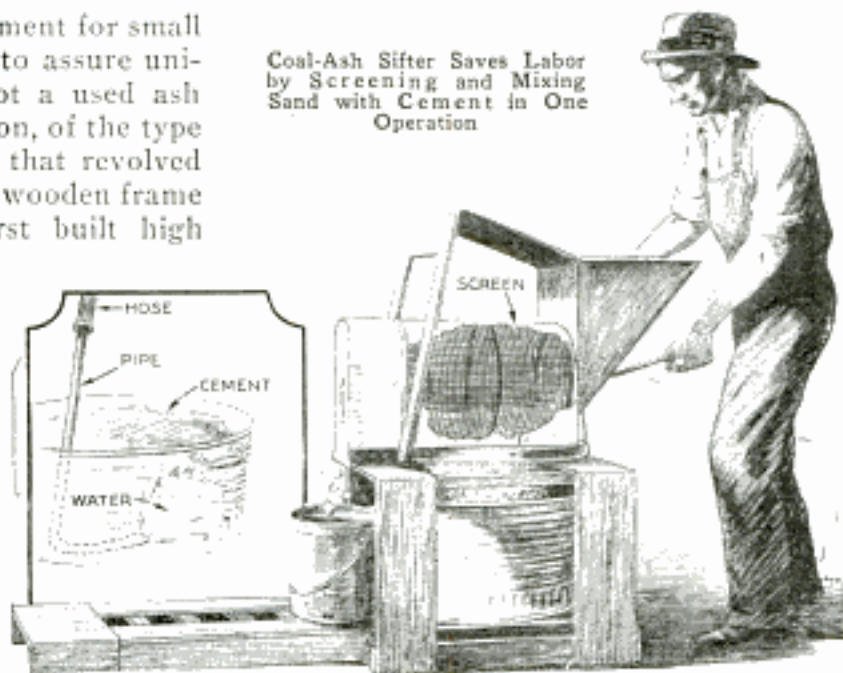
When dry, you can do the final job of pasting some fancy paper over the inside covers and fly leaves as shown in Fig. 11, detail C, bringing this over the edge of the binding cloth. When first opening a book after it has been rebound, or one that is new, lay the cover flat on a table and hold the book in a vertical position. Then open a few leaves from each side and bring them back gently. By continuing in this way until the center of the book is reached, it will be "broken in" properly and will never have a cracked back.

☞ Grease or vaseline, rubbed on the hands before starting on a dirty job, will keep dirt out of the skin pores, and enable the hands to be cleaned much more easily after the work is finished.

A Rotary Ash Sifter to Mix Sand and Cement

To save time in mixing cement for small jobs around the home and to assure uniformity of every mix, I got a used ash sifter, in fairly good condition, of the type having a cylindrical screen that revolved inside a sheet-metal case. A wooden frame to hold the sifter was first built high enough to permit a wash tub to be slipped under it as shown in the drawing. Although the base on which the tub is shown is not essential, it was found easier to slide a full tub of the mix from the base than to slide it over the ground. At the end of the sifter, you will find an opening to drop out clinkers. When used for cement mixing, stones and pebbles are thrown off at this point into a pail set directly underneath. In use, the correct proportions of sand and cement are dumped into the hopper and by turning the crank, are mixed in one operation, the mix falling into the tub. If running water is available, you can make a simple nozzle for wetting the mixture. It consists of a length of pipe bent at right angles at one end, which is

Coal-Ash Sifter Saves Labor by Screening and Mixing Sand with Cement in One Operation



then flattened to eject the water in a fan-shaped spray. To use the nozzle, it is pushed to the bottom of the mix as indicated. The water is allowed to run until it barely covers the mix, and shutting off the water as soon as it comes to the top of the mix, makes the consistency just right. A little stirring with a hoe completes it.—Dr. M. K. Jaques, Chicago.

Luminous Knob Makes Flashlight Easy to Find in Dark



By removing the luminous knob from the pendant of a light pull cord and placing it inside the reflector of your flashlight, it can be readily found in the dark. In this position

the luminous chemical inside the knob will be re-energized each time the flashlight is used.—F. W. Bentley, Jr., Missouri Valley, Iowa.

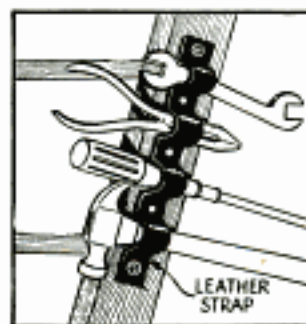
How to Make Furniture Polish

Good liquid furniture polish is made by melting together white ceresin wax, 1 lb., laundry soap, 3 oz., after which turpen-

tine, 2½ pt., is stirred into the solution. When this mixture has been completed, stir in warm water, 2 pt., to form a creamy paste, which is then rubbed into the furniture with a damp cloth. To finish polishing, rub the surface with a soft, dry cloth that is free of lint.

Tool Rack on Side of Ladder

Nailed to one side of a ladder rail, a strip of leather or inner tube provides a handy place to keep tools while working on a ladder. In this way, the tools are always at hand when wanted and are not so likely to be dropped as they would when laid on the work.





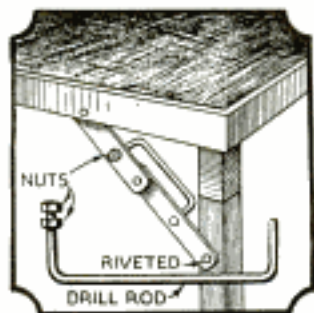
Rack Consisting of Wood Blocks and Hacksaw Blades Holds Freshly Painted Work While It Dries

Drying Rack for Painted Work

Made from wood blocks and two hacksaw blades, this support holds freshly painted work while it dries. The blocks are nailed together to form a tee, after which the hacksaw blades are screwed tightly to the ends of the horizontal block as shown in the circular detail. In use, the work is set on the blades and is supported by the vertical member. If the latter is cut short enough to slip down alongside the longitudinal piece, the support can be conveniently folded.

Strengthening Legs of a Card Table

Wobbly card tables that have jointed leg braces can be made rigid by strengthening each brace with a piece of drill rod. First thread one end of the rod for two nuts and bend it to the shape shown in the drawing. Then drill the brace on each side of the joint, pivot the threaded end of the rod in one of the holes and insert the free end in the other one. When the legs are to be folded, pull the free end of the rod out of the hole.—George Pica, Chicago.



☐ When the kitchen-sieve screen rusts through, cut it off, and fasten a double thickness of cheesecloth or muslin to the rim with strong thread.

Shovel Used to Check Brush Fire

Everyone going into the woods should understand how to combat a fire running in dry leaves and brush. An ordinary long-handle shovel is one of the best fire-fighting tools where the timber is of low scrubby second-growth in loamy or sandy soil. As soon as a fire is discovered, a fire line should be made. Have one man go ahead and scrape the leaves and loose brush into a windrow, followed by a second man who throws dirt in a flat ribbon along the side of the cleared line farthest from the fire. This is best done by digging holes every few yards and pitching the dirt along the line of the cleared furrow. All dead or leaning brush and old trees should either be chopped down or uprooted in the direction of the fire, running the fire line on the distant side of them. If possible, the windrowed leaves and brush should be back-fired as soon as the dirt fire line is completed.

Jig Locks Adjustment on Dividers

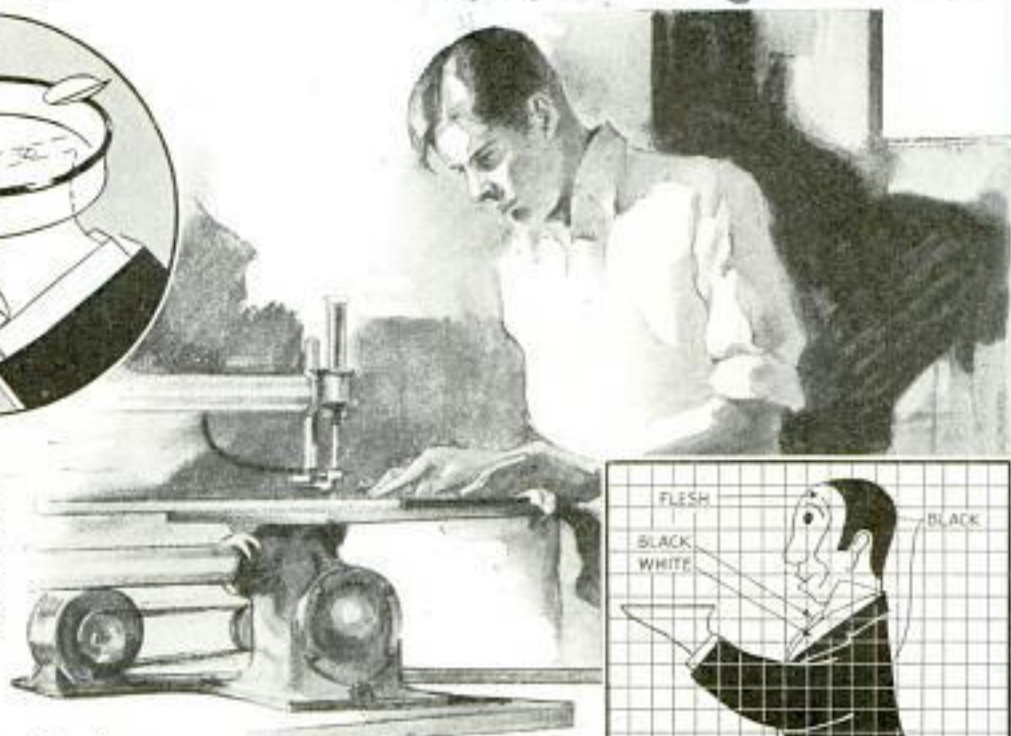
This little jig will keep your dividers from slipping out of adjustment when they are set for duplicating measurements. It is a V-shaped piece of flat iron with holes in the ends, to slip over the divider leg and the adjusting arm, and it is drilled and tapped in the center for a thumbscrew. When the dividers have been set, tightening the thumbscrew holds the adjustment firmly.



Wire Mesh Keeps Mice from Getting into Dressers

Old pieces of furniture, such as bureaus and dressers, may be made mouseproof by tacking wire mesh underneath the frame that supports the lower drawer. This does not add to the weight of the furniture, and any accumulation of dirt and lint can be brushed through the wire.—W. W. Kincaid, Pleasanton, Kans.

Comic-Figure Ash Tray Made of Plywood



Almost Any of Your Favorite Newspaper Cartoons, Slightly Altered in Pose to Suit the Purpose, Can Be Used to Make Serviceable Ash-Tray Holders

Supported vertically on a weighted base, this ash tray makes a novel addition to your den. Lay off a large sheet of paper in 1-in. squares and draw in the figure to make a pattern, which is then cut out and is traced on $\frac{3}{4}$ -in. plywood. If you prefer, any of your favorite newspaper cartoons can be substituted for the figure shown. After it has been cut out of $\frac{1}{2}$ -in. plywood with a jigsaw, drill a $\frac{1}{2}$ -in. hole through the leg just above the top of the shoe, and then drill a second hole lengthwise from the bottom of the shoe to meet the first one. These holes take a bolt and nut with which the base is attached. The latter consists of a 1-in. block with the center sawed out and filled with lead after which it is screwed between two $\frac{1}{2}$ -in.

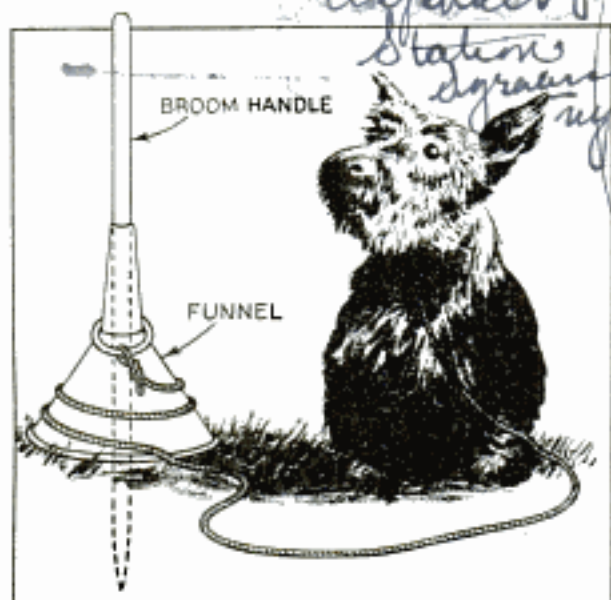


blocks as shown in the detail. An ash tray, having a removable glass dish, is screwed to the extended hand of the figure, which is then painted in the colors indicated.

Extra Tail Light on Car Helps in Emergencies

When driving across the country, I was stopped by a highway policeman because my tail light had burned out. An extra lamp was in my kit but it was a difficult job to replace the burned-out lamp in the dark. To avoid this trouble in the future,

I mounted another tail light on the bracket with the original light, and wired it so that a switch on the instrument panel controlled it independently of the other lights. The extra light now serves a dual purpose. I use it for parking where front lights are not required, and as an emergency tail light on the road.—Wm. B. Miller, Cincinnati, Ohio.



Your Dog Will Not Get Entangled in the Tether Rope if This Stake Is Used

Never-Tangle Dog Tether

This simple tether has the advantage over the kind commonly used in that it effectively prevents the rope from being wound around the stake. A length of broom handle is pointed at one end and is inserted through the spout of a tin funnel. When the stake is driven into the lawn so that the funnel rim rests on the ground, the ring of the tether is slipped over it.—C. E. Hendrickson, Argyle, Wis.

Hidden Hanger for Picture Frame

Made from thin brass or sheet metal, this picture hanger is hidden from view and always keeps the frame tilted at an angle. A slotted hole, to slip over a nail or screw in the wall, is made in the hanger which is then bent to the shape shown and screwed to the frame. The angle of the bend depends on the slant at which the picture is to hang.



Ⓒ Setscrews can be tightened without the usual risk of twisting them off, if the heads are lightly tapped with a hammer while drawing them tight with the wrench.

Repairing Cracked Concrete Floors

Cracks in concrete floors are easily repaired and waterproofed, unless there is considerable vibration on the floor. First chip down the sides of the cracks to form V-grooves at least 2 in. deep and sweep water through them to remove all loose particles of cement and sand. Then prepare a stiff, waterproof mortar consisting of a mixture of portland cement, 1 part, and clean, sharp sand, 2 parts, and wet it down with a solution made by mixing waterproofing, 1 part, and water, 8 parts. Immediately before filling the grooves, brush over them a bonding coat consisting of a solution of liquid waterproofing, 1 part, water, 3 parts, and enough portland cement to form a thick, creamy paint. While the bonding coat is still damp, apply the mortar and trowel it smooth. Holes in a concrete floor can be repaired in the same way, first digging them out to a depth of 1½ in. below the finished floor.

Notched Brush to Paint Pipes

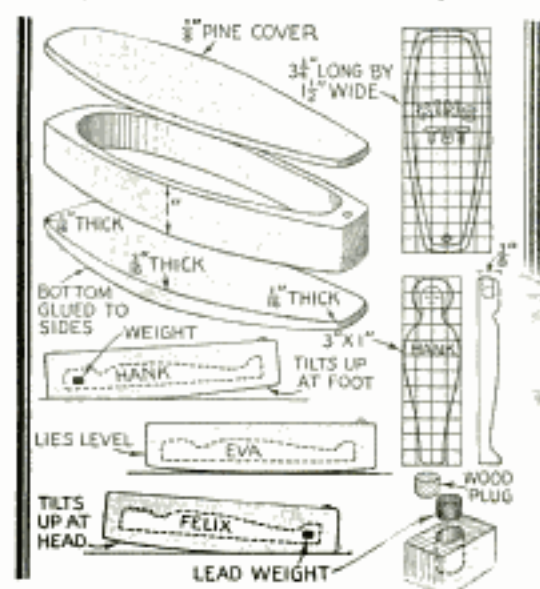
A brush having a V-notch cut in the bristles as shown will be found better for painting pipes and rods than the ordinary flat brush. The notch permits a greater area of the rounded surface to be covered with each stroke, which results in a quick painting job that need not be gone over a second time to cover bare spots.



Trailing Small Animals with a Dog

Many a young hunter has come back empty-handed from an evening's hunt with his dog for mink, coon, skunk or opossum because he didn't pick a good night. The best time for hunting of this kind is on a fairly warm misty evening when the skies are dark, or right after a rain when there is no wind. At this time the small animals are running and the damp leaves hold the scent of the animal for several hours.

Mystic Mummy Trick Keeps 'em Guessing

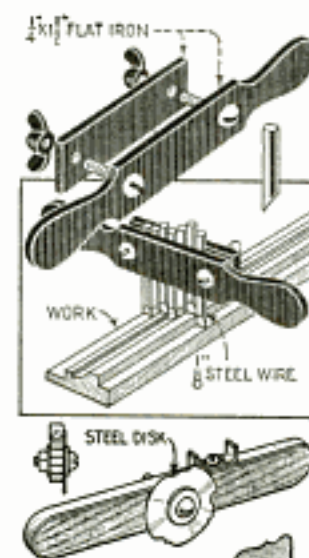


Here is a trick that will baffle the keenest observers. Three "mummies" and a casket are handed a spectator, who is instructed to place one of them in the box, close the lid and keep the other two out of sight. The mummies are distinguished by the names Hank, Felix and Eva. The spectator places the casket on the table and the "magician" apparently can see right through the closed casket, for he unerringly names the mummy inside of it. The simplicity of the trick is what fools the spectator. He does not notice that the casket is slightly rounded on the bottom, and does not set perfectly flat on the table, nor that Hank is heavier at the head than the feet, while Felix is just the reverse and Eva is balanced at the center. It is necessary to set the casket on a smooth surface, and the magician should endeavor to have his eyes as near the level of the surface as possible, without arousing suspicion, in order to make correct observations. The ends of the casket should be tapered as little as possible, as the less taper, the less likely the spectator will catch on. Whittle the mummies from white pine blocks. First drill a $\frac{1}{4}$ -in. or smaller hole in one end for a lead weight, which should be just enough to bring the corresponding end of the box down. The hole should then be filled with a wood plug and carefully sandpapered. Painting will make it unnoticeable. Whittle the mummies to shape after weights have

been inserted. The casket is made up of three pieces, the central block being cut out inside with a coping saw, and the bottom glued on. The lid swings on a small screw at the base.

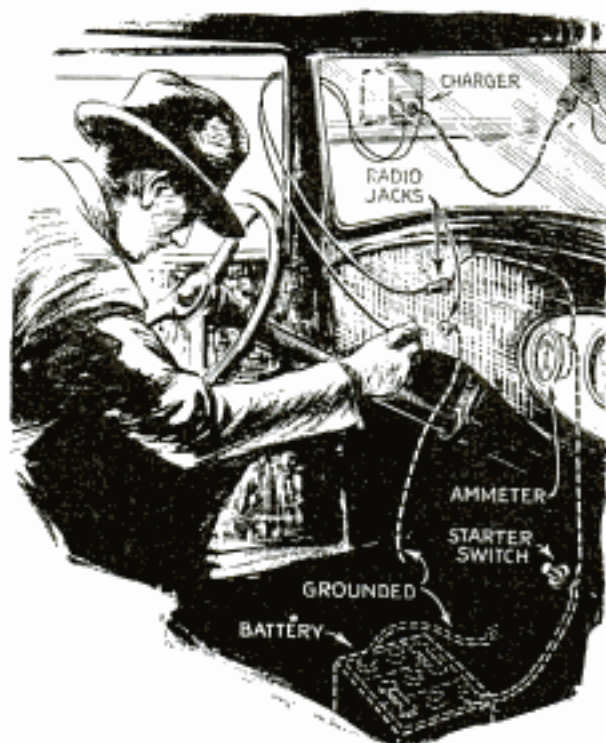
Homemade Beading Tools for Cutting Small Moldings

Here are two simple beading tools with which you can make small moldings. The one shown in the top detail consists of several short lengths of steel wire flattened at one end and clamped between two pieces of flat iron, one of which has handles formed at the ends.



The wires are raised or lowered to get the desired shape of the molding. The other tool, shown inverted in the lower detail, is made by pivoting a wood handle to a steel disk, which has the outlines of different moldings cut

in its edge. An adjustable flat-iron guide holds the tool true as it is pulled over the surface of the work.



Car Battery Charged Overnight with Trickle Charger Plugged into Radio Pin Jacks on Instrument Panel

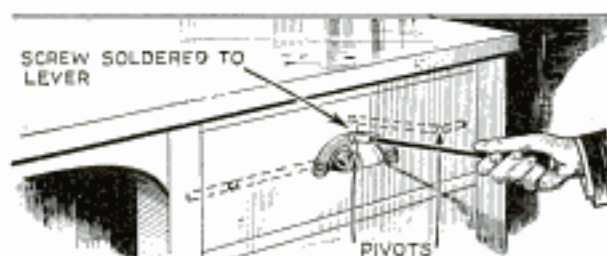
Storage Battery Charged Overnight in Your Car

Car owners who have trouble in keeping their batteries charged in winter will find this method of using a radio trickle charger to boost them during the night, highly effective. The charger is mounted on a shelf near the car and the two leads, usually hooked to a battery, are lengthened, or longer ones substituted so that they will reach to the instrument panel on the car. The ends of the charging leads are attached to plugs to fit radio pin jacks, which are installed on the instrument panel, the plugs being carefully insulated from the metal with hard-rubber or bakelite sleeves and bushings. One of the pin jacks is grounded to the car frame and the other goes to the ammeter so that this will show a reading when the charger is operating and its leads are connected. When the ammeter shows charge the leads are correctly hooked up. If it shows discharge, the connection is reversed, which would result in discharging the battery. It is a good idea to tag the ends of the charging leads so that you know which is positive and negative. Of course, if you don't care to make the installation on the instrument panel, the charging leads may be provided with spring battery clips so

that the leads can be connected directly to the battery terminals. In this case, you should be certain to run the positive lead to the positive battery post and the negative lead to the negative post. Doing this every night will keep your battery in fully charged condition, provided there is no short circuit in the car wiring.

Secret Drawer Lock for the Desk

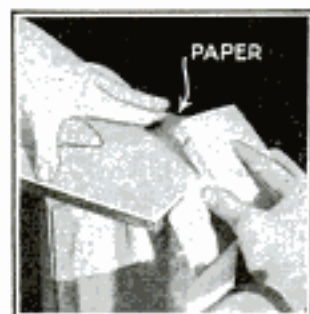
This desk-drawer lock is operated by means of a screwdriver and has no keyhole, hidden springs or push buttons. The locking device is a machine screw that extends through both the drawer and the top side of the drawer pull. The head of the screw should be identical in shape, size and finish, with those used to attach the drawer pull, as the effectiveness of the lock depends on the deception of this screw. It has a crossarm soldered to the end inside the drawer. Pivoted slides, loosely riveted to the crossarm, slip through holes in the sides of the drawer, when it is locked, and engage with holes that have been drilled in the legs of the desk.



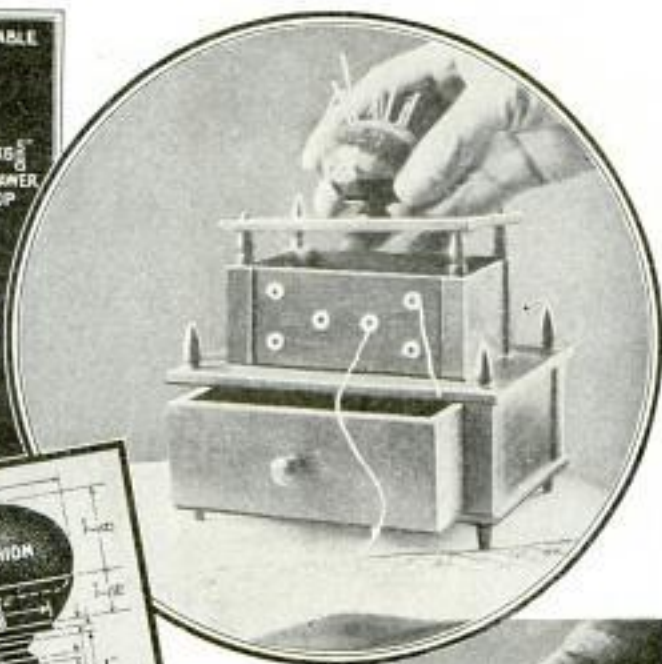
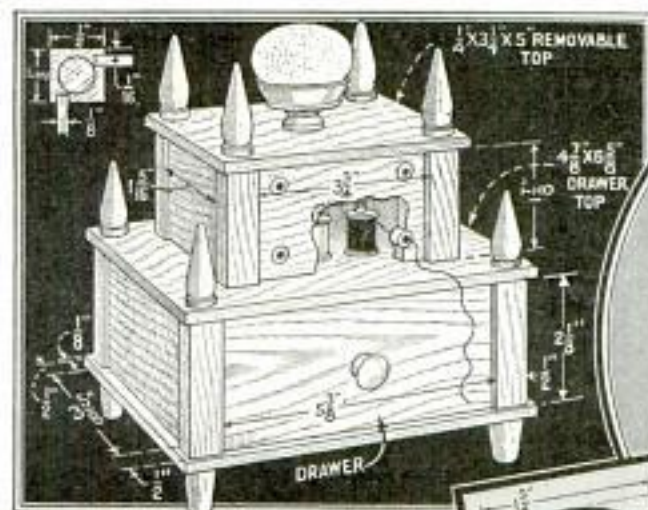
Turned with a Screwdriver, Machine Screw Operates Pivoted Slides and Locks Desk Drawer

Picture Frames Made Dustproof with Paper

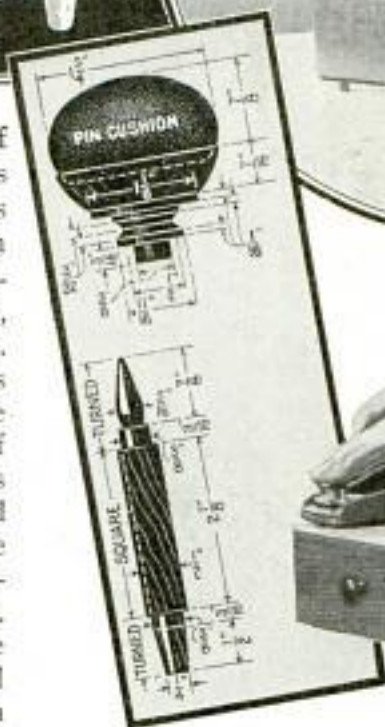
If you frame your own pictures, they can be made dustproof by using the following method, which is used by commercial photo finishers: After the picture has been fastened securely in the frame, spread a thin film of glue over the back of it and then stretch a strong piece of paper over this. When dry, rub a sandpaper block over the edge to trim off the surplus paper.



This Antique Sewing Box Easily Duplicated



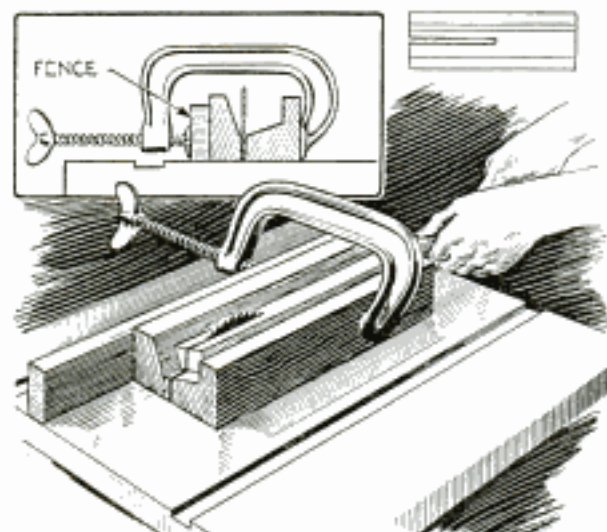
Rare indeed in the line of sewing boxes, this antique was used by great grandma and has been handed down through three generations. You can reproduce it in walnut, cherry, rosewood, or bird's-eye maple. The drawer holds such things as scissors and buttons, while the upper part holds spools of thread, which set on spindles in the top of the lower part and unwind through eyelets in the front. The lid lifts off and permits easy access to the spools. In building a duplicate of the box, first make the top and bottom of the lower part from $\frac{3}{16}$ -in. stock and drill $\frac{3}{8}$ -in. holes, centered $\frac{3}{8}$ in. from the edges, in each corner for four posts, taking care that the holes in the two pieces coincide. Next turn the posts from $\frac{1}{2}$ -in. sq. stock and saw kerf two of them on two sides and the other two, which are the front posts, on one side to take the ends of the side and rear panels. Now glue the assembly together and make the drawer. Small cleats should be glued to the bottom between the side posts to serve as guides and prevent the drawer from catching on the edges of the rear posts. The top part of the box is made in the same way as the lower part, except that the lower ends of the corner posts are glued into holes drilled through the top of the lower part and all four posts are saw



kerfed on two sides. The front is fitted with a panel in which six eyelets are located as shown. The base of the pin cushion is turned and then glued into a hole drilled in the center of the lid.

Stovepipe Cut with Can Opener

Stovepipe can be neatly cut with an ordinary can opener. First, scribe a line around the pipe where it is to be cut, and with a three-cornered file, make a small hole through the pipe to insert the blade of the opener. Cut around the pipe in the same manner as you do when opening a can. This produces a clean cut that is slightly flared at the edge so that it is easy to insert the joining pipe.



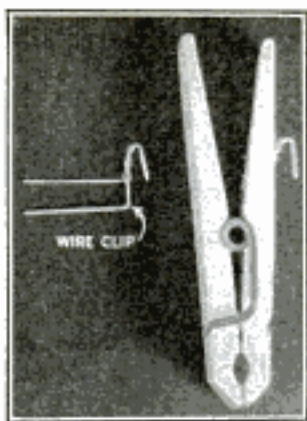
Guide Clamped to Saw Fence Helps in Cutting Wedge-Shaped Pieces on Circular Saw

Ripping Wedge-Shaped Pieces of Stock on Circular Saw

In trying to cut some thin, wedge-shaped pieces on a circular saw, I found that the fence could not be set at the proper angle without striking the teeth. To get around this, I made a guide and clamped it to the fence. The guide consisted of a heavy piece of stock squared up and then grooved in the center so that one side and the bottom had the pitch shown in the detail. In this way, it was no trick to cut wedge-shaped pieces of almost any length desired.—John E. Hyler, Peoria, Ill.

Photo Clips Made from Clothespins

Inexpensive clips for holding photographic films, prints and enlargements while washing and drying them, can be made from spring-type clothespins, which can be purchased for about five cents per dozen. First cut off the nose of the pin at an angle as shown, and then make a clip from small copper wire, inserting the ends of the wire into two holes drilled in one leg of the pin. In use the altered clothespin is clamped over the work, which can then be hung up to dry by means of the wire clip.



Noah's Ark and Animals Made on Your Jigsaw

Few toys have as much fascination for a child or remain as long in his memory as his first Noah's ark, and here is an edition de luxe which will be found very easily made by the jigsaw-puzzle craftsman. Like others of its family this ark is a dry-land craft running on small wheels, but surpasses other models in that the cabin is fitted with six individual menagerie cages as well as a comfortable stateroom for Noah and his lady, and Ham, Shem and Japheth. The capacious hold will accommodate several score animals below deck. Both sides of the roof lift up to permit removal of the animals.

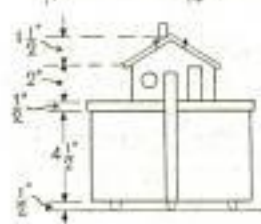
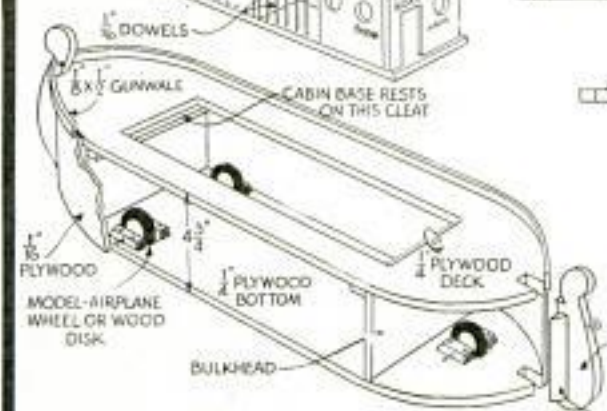
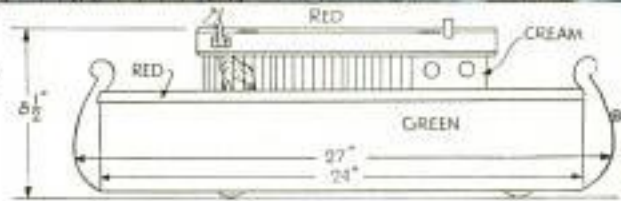
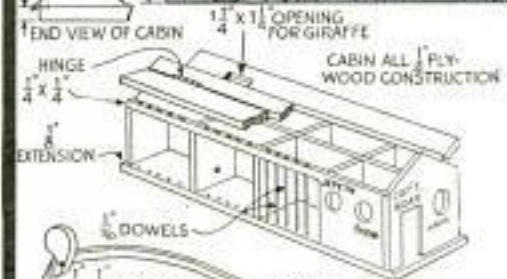
Throughout, $\frac{1}{4}$ -in. plywood is used except where otherwise specified. Note that the sides of the hull are of $\frac{1}{16}$ -in. plywood or veneer, nailed and glued to the edges of the deck, bottom piece and stem. Two bulkheads reinforce the hull, which is mounted on three small wheels. Model, rubber-tired airplane wheels are excellent for this purpose, but disks cut from $\frac{1}{4}$ -in. plywood will be satisfactory. The axles are mounted in small blocks screwed to the bottom piece. A strip of pine or spruce $\frac{1}{8}$ in. by $\frac{1}{2}$ in. serves as a gunwale. The curved portions can easily be bent after steaming over a teakettle. The base of the cabin is made to fit flush with the deck, and rests on two cleats at the ends, with a small tin latch or bar to hold it in place. For the cabin, $\frac{1}{4}$ -in. plywood is used throughout, and $\frac{1}{16}$ -in. dowels serve as cage bars. These dowels are the same as "applicator" sticks used for swabbing the throat, which can be had at any drug store.

Drill $\frac{1}{4}$ -in. portholes, as indicated, in Noah's stateroom, and cut a square opening in the roof over the giraffe's cage. Note that two narrow pieces are used at the peak of the roof, and the lid portion of the roof hinged to them. Glue all joints and secure them with brads. The cage bars should also be glued in place. About six of these to each cage will be sufficient. Partitions are made in the manner shown.

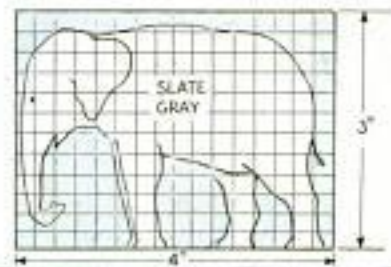
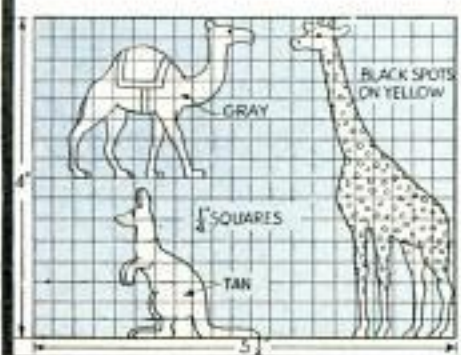
Cut Noah, his clan and all the animals from $\frac{1}{8}$ -in. plywood, and leave enough stock on the feet to be inserted in the wood bases as shown. The bases should be rabbeted and planed in a long piece and then cut into lengths as required.

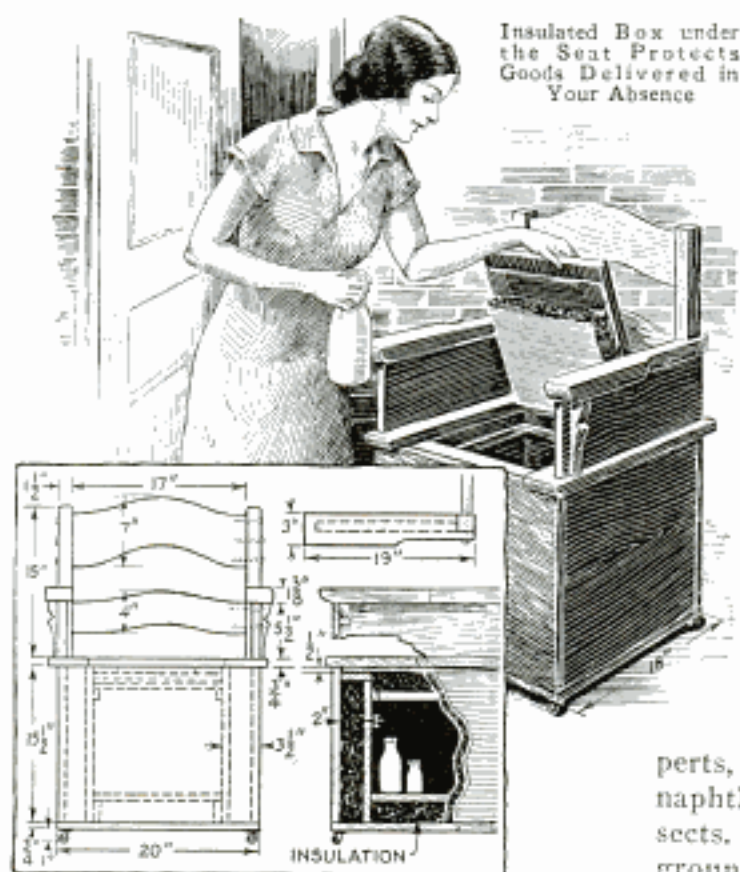
NOAH'S ARK *de Luxe*

runs on wheels
another job for the jigsaw



PLYWOOD SIDES NAILED & GLUED TO THESE PIECES





Combined Refrigerator and Porch Seat

Milk and perishable groceries delivered in your absence from home will be well protected against heat or cold if the deliveryman sets them in this insulated chair. The lower part of the chair is just a well-made box having double walls at the sides, ends and bottom, between which an insulating material, sawdust or crumpled paper, is tightly packed. The lid of the box is also doubled and insulated. The inside of the box should be sanded and given two or three coats of white enamel so that it is easily kept in a sanitary condition, while the outside is given two coats of paint to match your porch furniture. As the chair is rather heavy, it should be fitted with large casters.

Worn Timer Bearing Causes Auto Motor to Miss

Intermittent missing in an auto motor was traced to a worn timer-shaft bearing, which allowed the gap at the timer points to vary at irregular intervals. If this condition is suspected, a simple check-up can be made by cranking the motor and noting the width of the gap between the

timer points when they are fully opened by the action of the cam. The amount of bearing wear should be tested at each of these points by pressing the timer shaft sideways, first toward, and then away from the fiber block on the timer arm, noting any change that occurs in the gap between the points. If an appreciable change in this opening occurs, the points should be reset so that there will be an average opening of not less than .012 in. When a noticeable wear exists in the shaft bearing, it is best to install new parts.

Gladiolus Bulbs Fumigated with Naphthalene

According to information given out by government plant experts, fumigation of gladiolus bulbs with naphthalene will protect them against insects. After removing the bulbs from the ground, they should be stored in a cool place for at least a month before fumigating. When small lots are treated, the bulbs should be placed in tight paper bags, and the naphthalene flakes sprinkled over them in the proportion of 1 oz. for every 100 bulbs, after which the top of each bag is folded so that the fumes cannot escape. After three or four weeks, the excess flakes may be shaken from the bulbs.

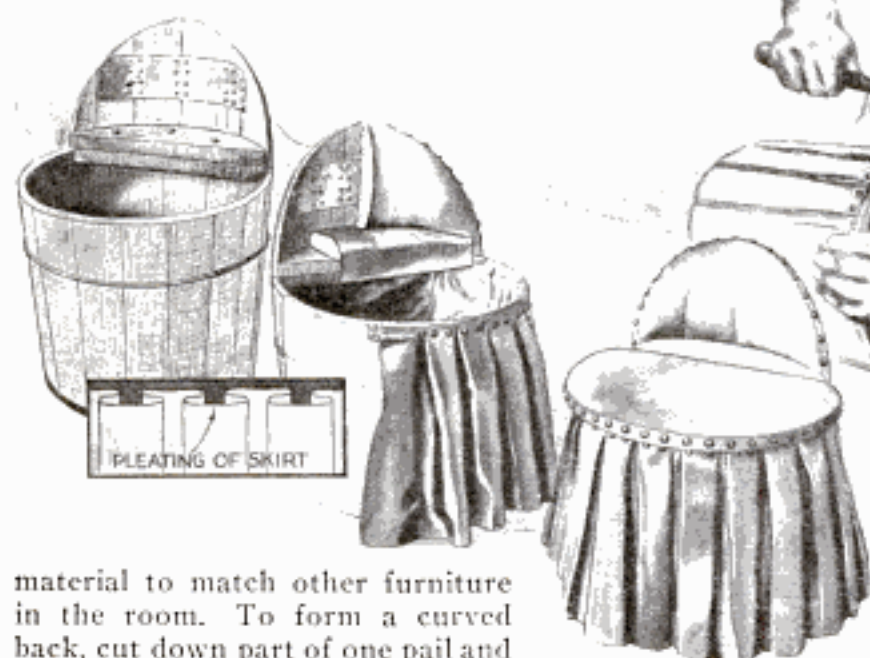
Desk Drawer Equipped to Hold File Folders

An office clerk who handled several different files, fixed up one of his desk drawers to hold the file folders so that they would not be piled on top of his desk. Two holes were drilled in the front end of the center drawer and dowel rods were inserted in them to support the folders as shown. When not in use, the dowels are removed and placed inside the drawer.—Lester P. Young, Culver, Ind.



Bedroom Chair Made from Two Candy Pails

Besides being a novel ornament for your bedroom or sun parlor, this small chair, which is made from a couple of ordinary candy pails, can also be used for storing darning, sewing or other material. It is substantial enough to be used as an occasional seat and can be covered with



material to match other furniture in the room. To form a curved back, cut down part of one pail and reinforce it with a strip of sheet metal. Nail this to a curved block, which is fastened to a similar block at the top edge of the other pail. The front part of the seat projects about $\frac{1}{4}$ in. over the side and is fitted with cleats on the underside to hold it in place, or it may be hinged. Upholstering the chair completes the job. This is done by padding the seat and back and covering it with cloth or imitation leather. Gimp is drawn over the edges and is tacked down with fancy upholsterers' tacks. The skirt is of the same material as the seat, and is pleated and tacked to the top edge of the pail as shown.—Herbert Bast, Sheboygan, Wis.

Detecting Counterfeit Silver Coins

Counterfeit silver coins may be easily detected by applying a silver solution made by dissolving silver nitrate, 24 grains in distilled water, 1 oz. To this is added nitric acid, 15 minims. The solution should be stored in a clean amber colored bottle and kept tightly corked. To make the test, first clean the coin by swabbing



it with a piece of cotton soaked in gasoline, alcohol or carbon tetrachloride. Then apply one drop of the solution on the cleaned surface. If the coin is silver, the so-

lution will cause no action but all other metals will be stained black, due to the action of the test solution.

Nail Holder for Your Hammer

For driving a nail in a place where it cannot be conveniently reached with the hand for starting, this holder can be slipped over the head of the hammer. The holder is made from a piece of sheet metal cut and bent to the shape shown. After the nail has been started, the holder is removed to prevent it from being battered as the nail is driven.—F. Hartl, Chicago.





380 Blueprints for Home Craftsmen

Iceboats, skis, snowshoes, all kinds of models, toys, simplified furniture, bric-a-brac shelves, garage, four-room bungalow and numerous other practical things to build, some of which are listed on a full-page advertisement in this issue. Complete list 3c postage. Price of prints are 25c each, or six for \$1.00 postpaid. Address Blueprint Department.



How to Silver Mirrors

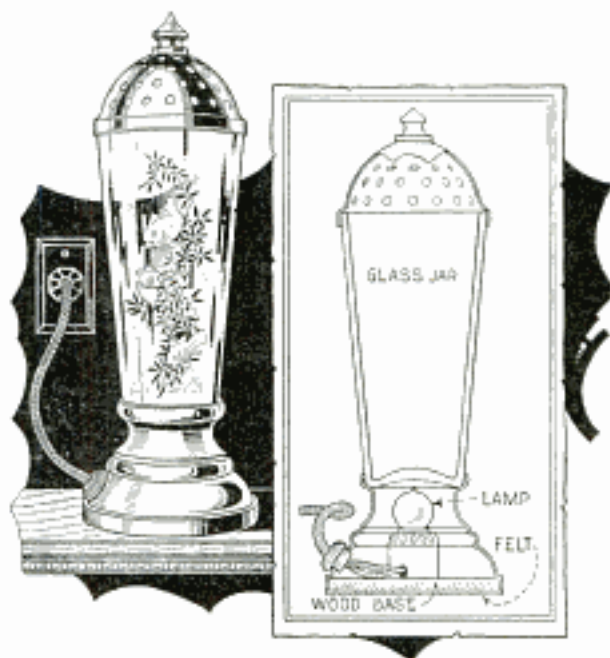
Before glass can be silvered for mirrors it must be thoroughly cleaned of oil and gum. This is readily done by washing it with a mixture of equal parts of gasoline or benzine, and carbon tetrachloride. After cleaning, the glass should be swabbed with a solution made by dissolving washing soda, 1 lb., and lye, 2 tablespoonfuls, in 1 gal. of water. This solution should be used as hot as possible, taking care not to break the glass. Next rinse the glass thoroughly with clean water without touching it with the hands. In order to remove all traces of the cleaner, swab the glass with an acid cleaner made by mixing equal quantities of water and nitric acid, and then rinse with clear water. When the rinsing water wets the glass completely without forming globules, the glass is clean and ready for silvering. If it does not, the cleaning process should be repeated. The cleaned glass must be kept under water to prevent it from collecting dirt from the air until it is silvered. The following solutions for silvering will last well if kept separate in three amber-colored bottles: The first solution is made by dissolving silver nitrate, 1 oz., in distilled water, 10oz.; solution No. 2, by dissolving pure potassium hydroxide, 1 oz., in distilled water, 10 oz., and solution No. 3 consists of glucose, $\frac{1}{2}$ oz., dissolved in distilled water, 10 oz. When ready to silver the glass, pour $\frac{1}{2}$ oz. of the first solution, for each 10 sq. in. of glass to be silvered, into a large glass jar, and add pure ammonia, drop by drop, until the precipitate which first forms has barely dissolved. To this, add an equal volume of the second solution, and again add ammonia until the white precipitate barely clears. To the combined solutions, add a volume of the third solution equal to the quantity of the first solution used. Stir and pour on the glass. After silvering, the excess solution is rinsed off and the mirror is allowed to dry. The silver should be protected with a thin coat of asphaltum paint, made by diluting one part of ordinary asphaltum paint with an equal volume of benzol. All residues and waste from mirror silvering should be washed away carefully to avoid any possibility of danger from explosive silver fulminate, which might form if they were allowed to stand.

Button Holds Wallet in Pocket

After losing a wallet by having it accidentally slip out of my hip pocket, I purchased a new one and sewed a button to the side so that it could be fastened in the buttonhole of the pocket. This held the wallet firmly, and made it more difficult for my pocket to be picked, as this method of fastening it would not be suspected.—F. Lettino, Astoria, L. I., N. Y.

Novel Aquarium Is Indirectly Lighted

Here is a small aquarium for tropical fish, which also serves as a lamp. The base consists of a brushed-brass ceiling canopy of a height to permit the installation of a small electric lamp and a porcelain sign receptacle within the shell as shown in the detail. A hardwood disk supports the receptacle and is fastened inside the base of the canopy with small escutcheon pins, a felt disk being cemented over the bottom to prevent marring furniture. The cover is also of brushed brass, the canopy of a small bedroom wall bracket being used for this purpose. It should be perforated to allow for aeration of the aquarium. The canopies may be used in their original brushed finish, or a verdigris finish may be had by brushing them with a solution consisting of French verdigris, 5 oz., and sal ammoniac (crystal), 2 oz., dissolved in acetic acid, 1 quart.



Glass Jar and Brass Ceiling Canopies Combined to Make an Attractive Lamp and Aquarium



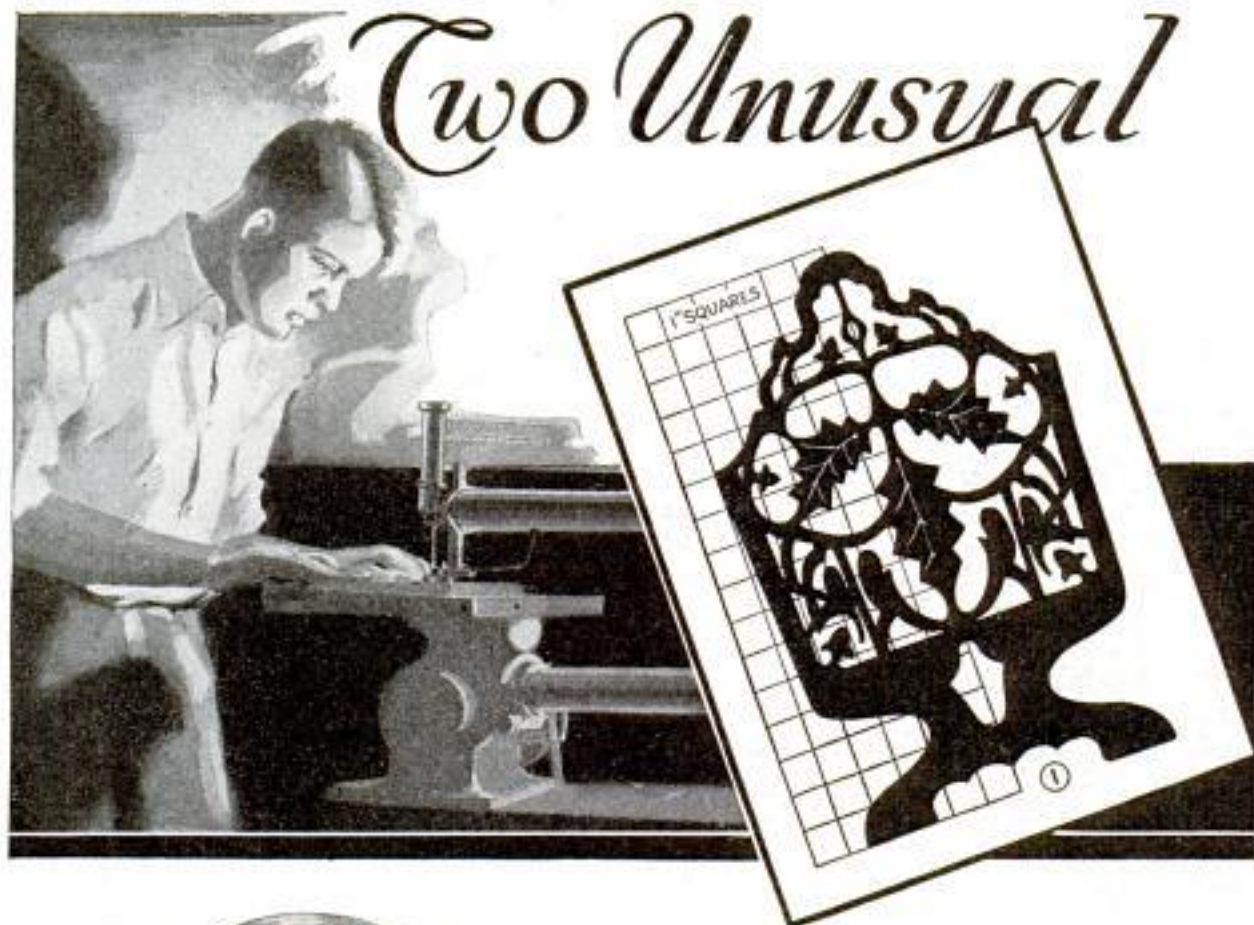
Ink Bottle Held Securely with a Strip of Heavy Paper Tacked to the Drawing Board

Strip of Paper Holds Ink Bottle on Drawing Board

It is often convenient to have a bottle of ink setting on the drawing board, but it is likely to be accidentally upset. To avoid this, a temporary holder can be had by cutting a hole in the center of a strip of heavy paper to fit over the neck of the bottle, and then fastening the paper to the board with thumbtacks as shown.—Harold E. Benson, Denver, Colo.

How to Obtain Brilliant Negatives

Amateur photographers often have trouble in getting brilliant negatives when developing roll film, which is usually due to the fact that they do not develop the roll long enough. A dependable way of getting brilliant negatives from a roll that has been properly exposed consists of two things; first develop the roll in the ordinary way for about 3 min., and then dilute the developer with clear water in the proportion of 2 oz. to every 8 oz. of developer. Keep the film in this bath until the detail of the negative is just visible on the reverse side of the film. Although the matte side of the film may look black and over-developed, this will not be the case, and only brilliant and sharp negatives will result.—Melvin Kennard, Gasport, N. Y.



ONE of these magazine baskets is entirely a jigsaw project, while the other is a product of your skill at woodturning, although in the absence of a lathe you can make a simplified type, of the same general design, from dowel rod. A motor-driven jigsaw is, of course, preferable, as it is a great time-saver over the method of using a fretsaw by hand.

Like most jigsaw articles of this type, the magazine basket, shown completed in Fig. 3, should be cut of plywood to avoid splitting, which would occur with single-thickness material when such intricate

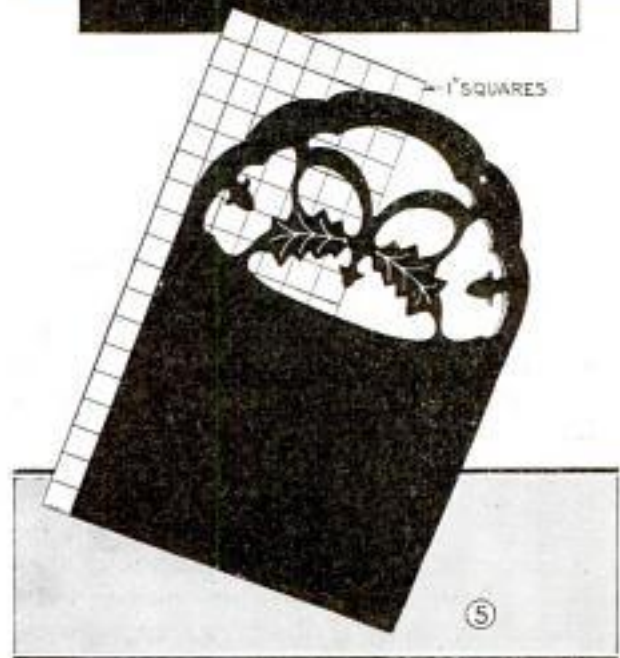
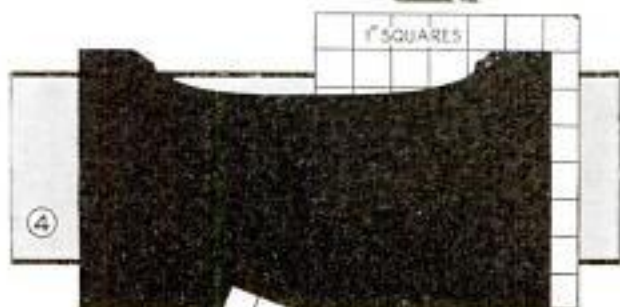
designs are cut out. Any good grade of plywood, about 6 sq. ft., will answer, and the thickness should be $\frac{1}{4}$ to $\frac{3}{8}$ in. The feet are made of $\frac{3}{4}$ -in. material, 4 in. wide and 9 in. long, and are fastened to the bottom of the basket with screws. Get a large sheet of paper or cardboard and line the sheet off with a soft pencil into 1-in. squares. Then sketch in the curves making the designs of the ends, sides and center member, Figs. 1, 4 and 5 respectively. These designs are then transferred to the wood with carbon paper, and sawing them out is next. When the different parts have been cut out and sanded they are assembled with small nails and glue, after which a finish to properly harmonize with existing or proposed surroundings is applied.

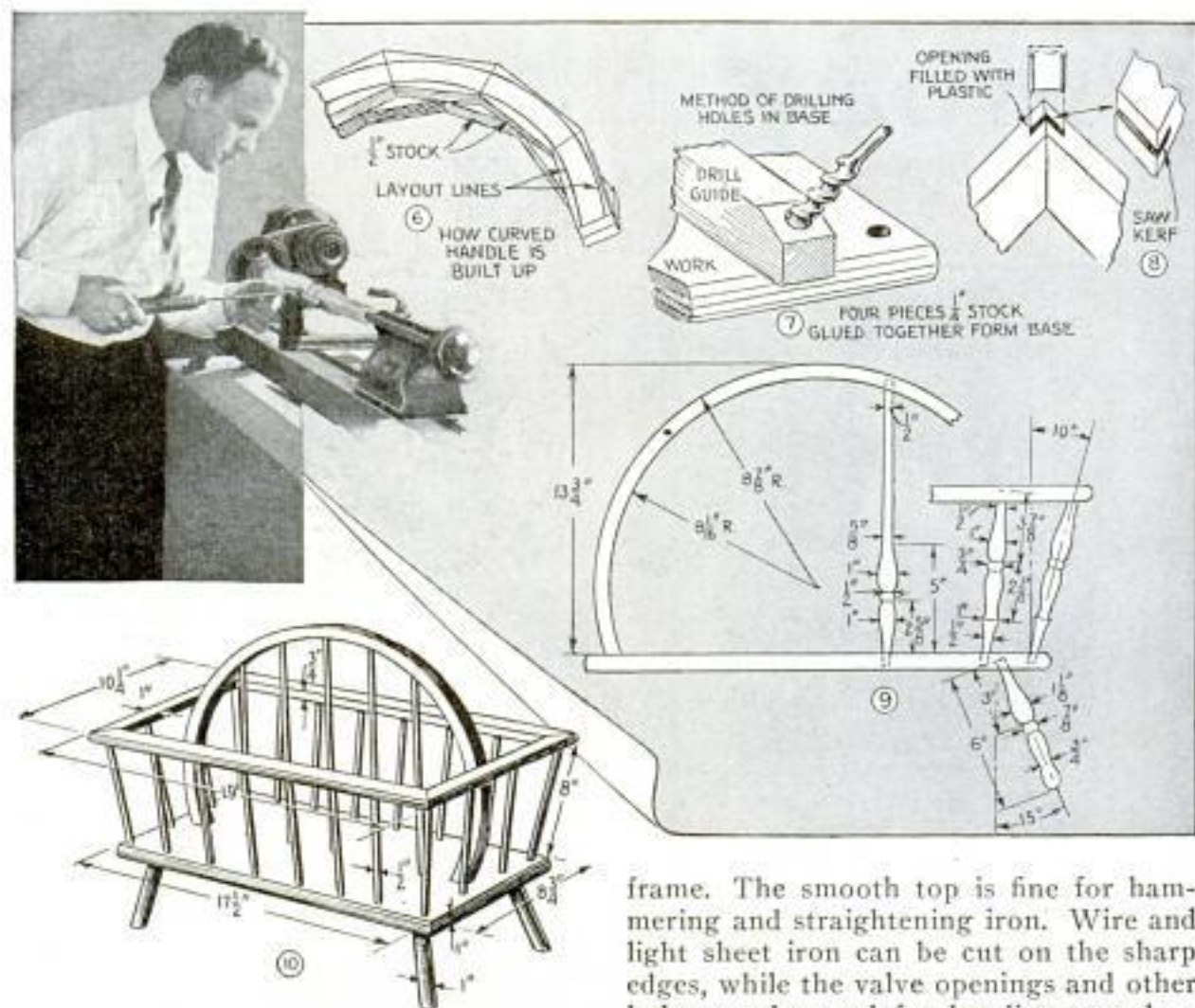
The second type of magazine basket, shown in Fig. 2, consists of a base of 1-in. plywood, or one built up to this thickness by gluing four pieces of $\frac{1}{4}$ -in. stock together. The base is sanded smooth and the edges carefully rounded. The center is then located with a pencil line, and five $\frac{1}{2}$ -in. holes for the center spindles are drilled, taking care that these holes do not break through. Next, the holes for the

MAGAZINE BASKETS



side and end spindles are laid out and drilled, centering $\frac{3}{4}$ in. from the edge all the way around the base. The corner spindles incline outward approximately 10° , measuring diagonally across the base. This position of the corners will incline the side spindles about 5° , and the holes should be drilled accordingly. An accurate guide for the bit is shown in Fig. 7. This may be made from a piece of hardwood. In use it is clamped to the base. The holes should not break through. Holes for the four legs which are set at a 15° angle may be drilled with a similar guide to assure uniformity. The top frame is made up to the dimensions shown in Fig. 10, and the necessary $\frac{1}{2}$ -in. holes are drilled to take the spindles. The mitered corners of the upper frame may be fastened with clamp nails and glue as in Fig. 8. At this stage the basket may be assembled on the base, using glue on all joining parts, assuming that you have already turned out the spindles, sizes of which are given in Fig. 9. The curved handle is built up of several





segments as in Fig. 6. After the glue has dried, the wood is sawed roughly to the curvature shown in Fig. 9 and is finished with a sharp spokeshave and fine sandpaper. Holes are drilled for the five center spindles and the whole is then glued and screwed in place.

Although any hardwood may be used, maple or birch is perhaps best as the piece belongs to the Colonial period. It may be given an appropriate finish with a light oak oil stain, rubbed off to highlight the various parts and followed with two coats of white shellac lightly sanded and waxed. Fig. 10 shows the same type of basket in which plain pieces of dowel rod are substituted for the turned spindles.

Auto Cylinder Block Serves as Anvil

An old auto-engine cylinder block makes a convenient anvil for the home workshop. Take off all the parts and either set it on the floor or fasten it on a heavy

frame. The smooth top is fine for hammering and straightening iron. Wire and light sheet iron can be cut on the sharp edges, while the valve openings and other holes can be used for bending round or flat iron, punching sheet metal, etc. Hardwood blocks fitted into the cylinders provide supports on which to cut leather.

Rubber-Head Tacks Hold Round Stock for Sawing

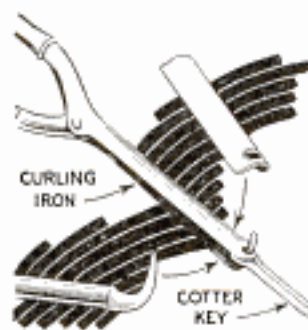
Small round stock, such as dowel rod, is rather difficult to saw unless it is held in a vise, which takes considerable time if it is done frequently. To save time, rubber-head tacks may be driven into the bench top near one edge where they will not interfere with other work, and used to hold the stock as shown in the photo. A thin strip of wood can be placed under the work, on one side of the tacks as an aid in keeping the work square with the saw.



Solutions for Coloring Electric Lamps

Electric lamps or any other items of glassware may be colored with a stain made by dissolving aniline dye in denatured alcohol and mixing the resulting solution with twice its volume of flexible collodion. In selecting the dye, be sure that you get one that is spirit soluble. Dip the lamp in the coloring solution until coated, then remove it and turn it over until the coating sets, after which it is put away to dry, taking care that the coated glass touches nothing. Rotating the lamp prevents the color from running toward one side, which would result in an uneven job. Another stain that may be used for this purpose consists of dry white shellac, 3 oz., powdered clear rosin, 1 oz., gum benzoin, 1 dr., and denatured alcohol, 10 oz. To this may be added any dye which is soluble in alcohol. After the ingredients have been dissolved, the solution should be filtered through finely woven cloth.

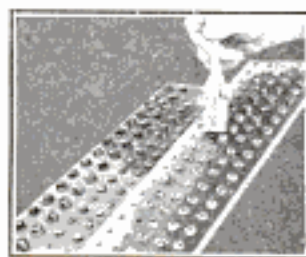
Cotter-Key Tool from Curling Iron



An old curling iron is easily made into a tool for pulling cotter keys. The round jaw of the iron is pointed and is bent at right angles to engage a hole in the end of the other jaw, which has been cut off to an equal length and drilled at the end. In use, the bent end of the curling iron is inserted through the eye of the cotter key and the jaws pressed together, thus making a grip that will not slip.

Painting Bolt Heads Quickly

When the heads of a number of bolts are to be painted, much time can be saved by drilling holes in a board and inserting the bolts so that their heads project above the surface. In this way, a few strokes with a brush will coat them.—J. C. Coyle, Los Angeles, Calif.



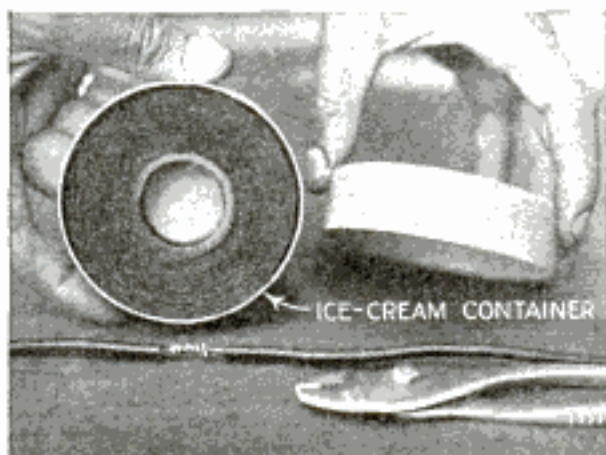
Annual Painting of Canvas-Covered Porch Decks Is the Best Preventive against Leakage

Repairing Leaky Canvas-Covered Porch Decks

Owners of homes that have canvas-covered decks over sun parlors or sleeping porches often have trouble in having water leak through, which ruins the plaster on the ceiling and walls below. This trouble can usually be prevented by giving the deck a coat of paint each year. To repair a leak, note where the water comes through the siding and you may be reasonably certain that the trouble will be found directly above this point. Remove the nails from the canvas, which is then turned over to inspect the floor underneath, where you will most likely find the spot where the water runs down. It is best to cover this first by nailing on a piece of tin as shown in the circular insert, daubing thick white lead on both sides of the patch liberally. Then the roofing is replaced and given a coat of paint. It is a good idea to coat all the seams of the deck with white lead, after which strips of canvas about 6 in. wide are applied. The strips are tramped down, and white lead is daubed along the edges, feathering it so that there is a gradual slope from the top of the canvas strip to the floor surface. After the lead has dried thoroughly, apply three coats of porch paint to the entire surface.

☛ Sleeves of old raincoats make good bags in which to carry rubbers.

Holder for Friction Tape Improvised from Ice-Cream Container



Cardboard Ice-Cream Container with Upper Part Cut Off Makes Good Holder for Friction Tape

Cut off to the proper depth, a half-pint ice-cream container, or any other cylindrical paper box, makes a good holder for a roll of friction tape. The containers can be had at drug stores or soft-drink parlors, and are made of a specially prepared cardboard that will withstand hard use.

Hose Clamp Aids in Straightening Grease-Cup Cap

Small grease-cup caps are often bent so that they cannot be screwed on to the cup without first straightening them. The best method of doing this is to put a hose clamp around the cap, and tap it lightly while the clamp is being tightened. In this way, the cap will soon come into shape.



To Renew Luster of Weathered Glass

After long exposure to the elements, window glass often becomes dull and opaque, and can not be polished by ordinary methods. To renew the original brilliance, the glass should first be washed with water and then with a solution made by slowly pouring hydrochloric acid, 2 oz., in water, 1 pt. It is a good idea to use rubber gloves while washing the glass with the acid solution. After washing away the acid with water, the glass should be

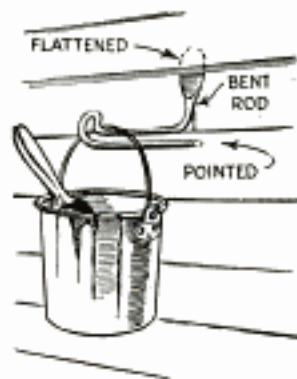
polished with a paste made by mixing precipitated chalk, 1 lb., with ammonia, 1 pt., and denatured alcohol, 1 pt. The paste is rubbed on the glass with a cloth and allowed to dry, after which it is removed with a soft, clean cloth.

Pictures That Vanish and Reappear

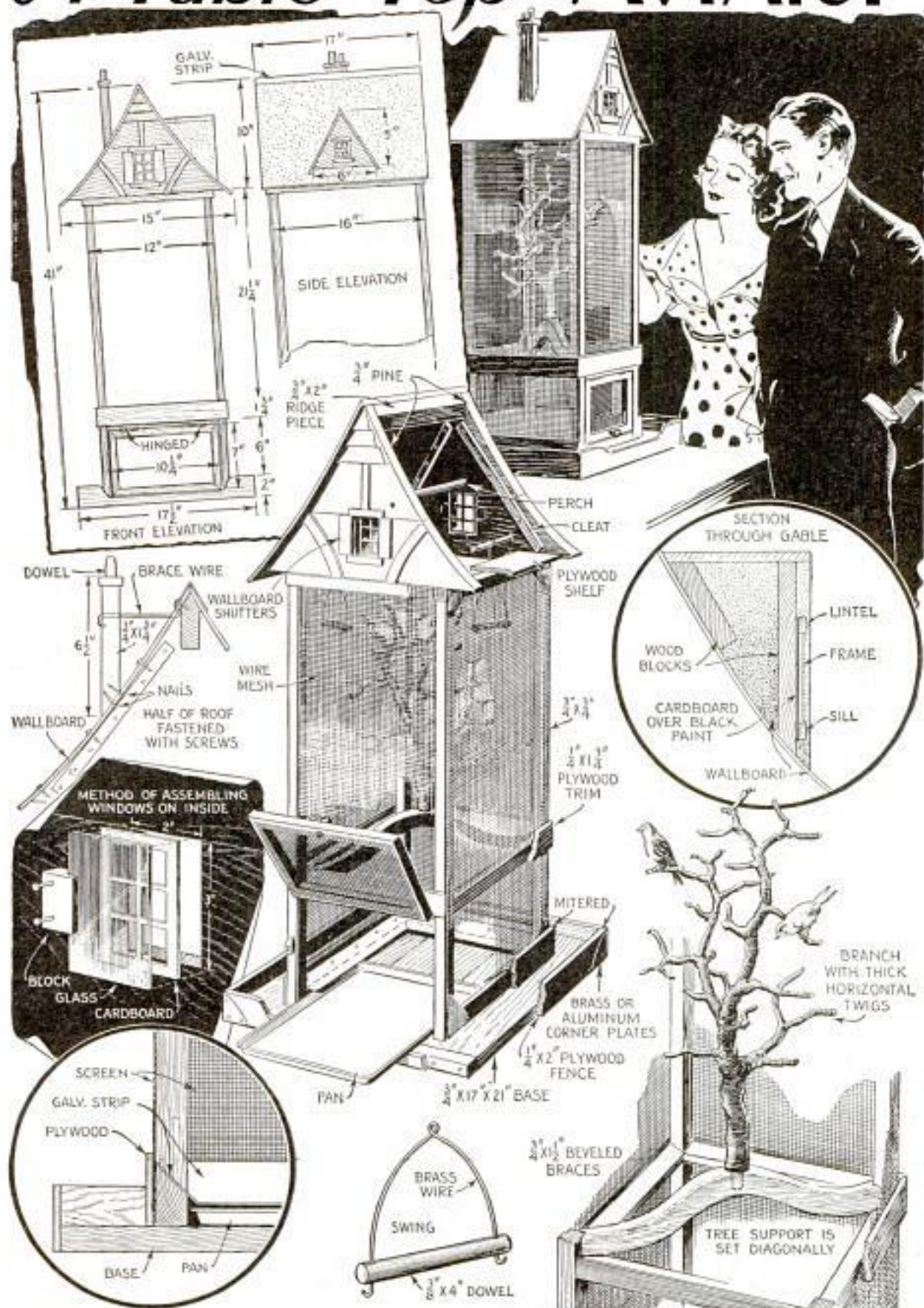
Pictures that will be invisible in dry weather, may be painted in three colors on paper, cloth or glass. In damp weather, or if moist air is blown over the glass, the picture will appear. The solution used for blue is made by dissolving gelatine, 1 part, in water, 100 parts. When the gelatine has soaked for 20 min., heat the solution and stir it. After the gelatine has been completely dissolved, add cobalt chloride, 1 part, and 10-per-cent carbolic acid, 3 drops. The yellow solution consists of gelatine, 10 parts, water 100 parts, copper chloride, 1 part, and 10-per-cent carbolic acid, 5 drops, while the green solution is made by dissolving cobalt chloride, 2 parts, copper chloride, 1½ parts, nickel oxide, 1½ parts, and 10-per-cent carbolic acid, 5 drops, in hot water, 100 parts. In a separate container, soak gelatine, 20 parts, in water, 200 parts, and dissolve by heat. When dissolved, mix the two solutions. The picture is painted preferably on blotting paper. The colors are not brilliant, but the change is definite and sufficiently pronounced to produce a beautiful effect in damp weather.

Hook to Hold Paint Bucket on Side of Building

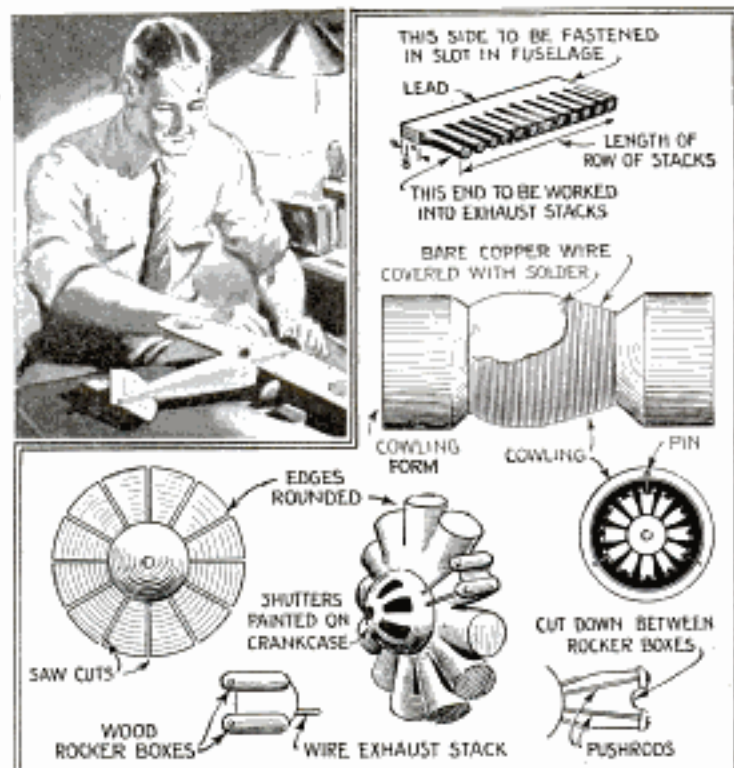
When painting the sides of a building, this hook will be found handy for holding the paint bucket. An iron rod, pointed at one end and flattened at the other, is bent as shown, and the flattened end is inserted between two of the siding boards. In this position, the weight of the bucket on the hook pushes the pointed end into the siding and keeps the flattened end from slipping out of place.



A Table-Top AVIARY



Shortcuts to Simplify Modelmaking Problems



These Three Kinks Will Help You in Imitating Water or Air-Cooled Motors for Model Airplanes

Imitation Motors for Model Airplanes

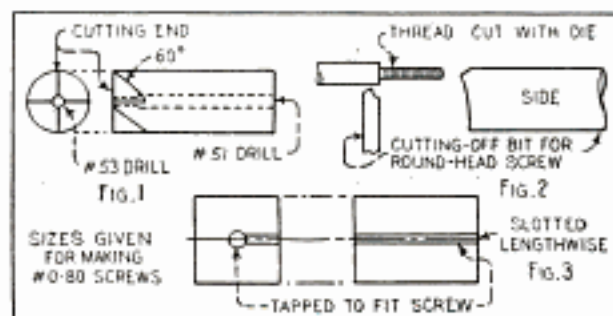
Here are three kinks that will be helpful in making imitation motors for model airplanes. To make a row of exhaust pipes on a water-cooled motor, take a piece of sheet lead as long as the row of pipes desired, and as wide as the distance the stacks are to project from the side of the fuselage plus about $\frac{1}{8}$ in. Lay off twelve equal divisions and shape the stacks with a knife and file. An air-cooled motor can be imitated by turning down a block of soft wood to the shape shown, marking off the cylinder divisions, sawing a slot between each and then rounding off the sides of the cylinders. Small blocks of wood are next glued onto the cylinders for rocker boxes which are drilled lengthwise to take pieces of fine wire to resemble pushrods. If desired, the rear of each cylinder may be drilled and another short piece of wire inserted to simulate an exhaust pipe. After painting shutters on the crankcase, the motor is complete. To make the cowling turn a block of wood to a diameter slightly less than that required, and wind it with bare copper wire. Then flow solder over the wire and smooth

it down. It will be necessary to drill and split the wood form out of the wire covering, after which the cowling is attached to the motor with pins pushed into small holes drilled in the tops of the cylinders.—J. L. Sprague, Spokane, Wash.

Hollow Mills for Making Small Machine Screws Used in Models

Modelmakers who have difficulty in getting small machine screws not generally available on the market, can make up a set of hollow mills and turn out the screws if they have access to a metal-turning lathe. The mill illustrated is for No. 0-80 screws. To make it, get a 1-in. length of $\frac{3}{8}$ -in. drill rod and face one end. Then drill a hole lengthwise through the center, $\frac{1}{16}$ in. deep from the faced end, with a No. 53

drill, and, with a No. 51 drill, make a second hole through the center from the other end to meet the first one as shown in Fig. 1. This is done so that the work will not bind. Now remove the rod and scribe two lines at right angles across the faced end to mark the cutting edges of the mill. File the flutes at about 60° almost to the lines, and then file the cutting edges to the lines. If the mill is to be used on brass, the edges should be almost flat, while if it is to be used on steel, they should have an angle of about 7° . Be sure the flutes are filed into the hole to provide a good cutting edge, and then harden and temper the mill. To make screws, place



Small Machine Screws for Models Made in Your Own Shop with Homemade Hollow Mills

the mill in a tailstock drill chuck and work it against a piece of stock held in the lathe chuck until the desired length is turned, after which the screw is threaded with a button die. If the screws are to have slotted round heads, you can cut them off with a formed cutting-off tool as shown in Fig. 2. To cut the slots, the screw is held in a vise by means of a jig made by drilling and tapping a scrap piece of square brass rod and then cutting a slot lengthwise through the tapped hole as in Fig. 3. If the screw heads are to be hexagon, it is best to purchase hexagon rod, which can be obtained in sizes as small as $\frac{1}{8}$ in.—James B. Webster, Knoxville, Tennessee.

Bending Thin Strips of Wood Over a Soldering Iron

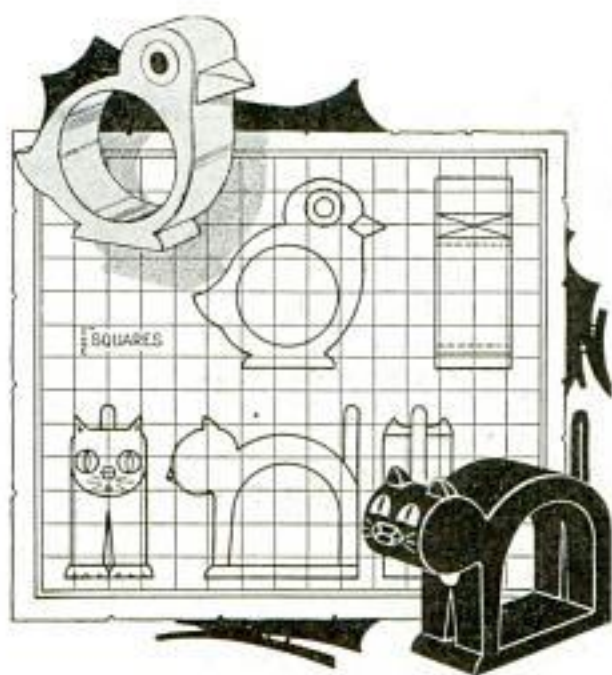
Heat from an electric soldering iron may be utilized effectively for bending thin strips of wood, and unlike an open flame, there is practically no danger of scorching or burning the material. The iron may be locked in a small vise in a



horizontal position or it can be supported on a block so that the heated end projects. The piece of wood to be bent is grasped in both hands and is held close to the surface of the iron as shown, moving it slowly back and forth and gradually forcing it to the shape desired. When bent, the work is removed from over the heat and is held a few moments until it has cooled, after which it will hold its shape.

Children's Napkin Rings That Resemble Birds and Animals

Made of hardwood, either of these napkin rings will serve as a reminder for the children to keep their napkin neatly folded when not in use. The chick ring is roughed out with a scrollsaw from a piece of $1\frac{1}{8}$ -in stock, after which the beak, tail and base are whittled down to shape with a sharp knife, and fine sandpaper is used to smooth the rough edges. For the finish, first apply a priming coat of shellac,



A Scrollsaw Is All You Need to Make These Attractive Napkin Rings for Your Children

and then a coat or two of bright-yellow lacquer or enamel. The eyes are white circles with a bright contrasting center. They are best imitated with small gummed reinforcements such as are used in loose-leaf note books. The kitten ring is made in the same way, except that it consists of two parts, the body and the base. Small V-grooves are cut in the body for legs.

Tool for Scraping Inside of Pipes

Dirt, grease and scale are quickly scraped from the inside of pipes and tubes with this improvised tool, which consists of a stick, fine wire and a number of wood screws. The latter are placed in pairs at frequent intervals on opposite sides of the stick and are wrapped with the wire to hold them in position. Each pair of screws is staggered so that the entire inside of the pipe will be scraped.



☐ Steam for running small toy engines may be obtained by connecting a rubber tube to the valve of a steam radiator.



This Little Homemade Truck Is Useful for Wheeling Heavy Garbage Cans to the Street Curb

Garbage Cans Moved to Street Curb with Small Hand Truck

If you live in a city where the garbage is collected from the street, this little hand truck will be a great help in moving the filled cans to the curb. It has three wood disks for wheels, one at the rear and two at the front, which turn on rod axles. These are threaded at the ends and are fastened by means of nuts and washers to two aprons nailed to the sides of the platform, short lengths of pipe being slipped over the axles to keep the wheels properly spaced. Bolting two wood handles to the aprons and bracing them to the platform completes the truck.—Jos. C. Coyle, Los Angeles, Calif.

Counterweight Keeps Bail of Bucket in Vertical Position

A gardener who carried water to his plants in buckets, counterweighted the bails to hold them in a vertical position so that he could pick them up easily. The eye at one end of the bail is straightened out, after which the bail is looped through the bucket ear so that the end extends 2 or 3 in. down the side for attachment of the weight.



extends 2 or 3 in. down the side for attachment of the weight.—A. H. Waychoff, Phoenix, Ariz.

Wire Slide Eliminates Suffering of Trapped Animals

An 8-ft. length of baling wire serves effectively as a trap slide to drown and prevent trapped animals, such as muskrat, raccoon or mink, from suffering when caught in a trap. Set the trap along the bank or edge of a stream in the usual way. Then tie a large rock to one end of the wire and throw it into deep water. Run the other end of the wire through the ring on the trap chain and tie it to a root or tree on the bank. If these are not close enough, a stake driven into the ground will serve the purpose. When the animal is caught, it immediately plunges into the deep water and the weight of the trap soon pulls it under. Pelts of animals caught in this way are usually more prime than those from animals allowed to struggle in a trap staked to the shore.

Resin-Covered Brick Aids in Soldering

A handy accessory for the soldering bench is a brick covered on one side with a thin layer of resin. When the soldering-copper tip becomes corroded, it is rubbed over the brick a few times to restore the tinned surface. The brick acts as an abrasive, and the resin as a flux for making the solder adhere to the work.



Cutting Clean Holes in Shim Stock

Clean holes to take bearing bolts can be cut in thin shim stock by using the bearing cap and a steel ball a trifle larger in diameter than the hole to be cut. The bearing cap is clamped in a vise or placed on some solid support, after which the shim material is laid over the hole and the steel ball held on the stock in line with the hole. A sharp blow with a hammer will drive the ball through the shim and make a smooth hole.

☛ A bundle of short strings, bound together, can be used as a brush or swab.



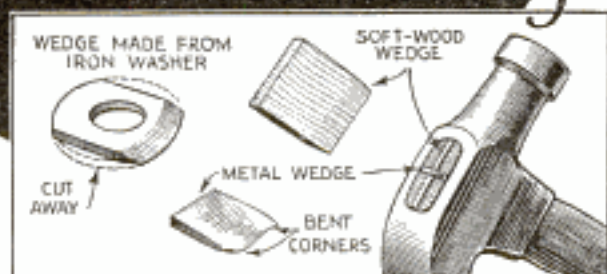
Personal Handles



By E. W. HALL

IF the handle of your hammer splits just behind the head without breaking in two, simply wrap it tightly with friction tape where it is split, and notice how much longer you can use it without becoming tired. Splitting makes a handle more flexible, so that it absorbs part of the shock that is otherwise transmitted to your arm. This is just one of the tricks of hammering, according to a man who has used all kinds of hammers for the past twenty-five years.

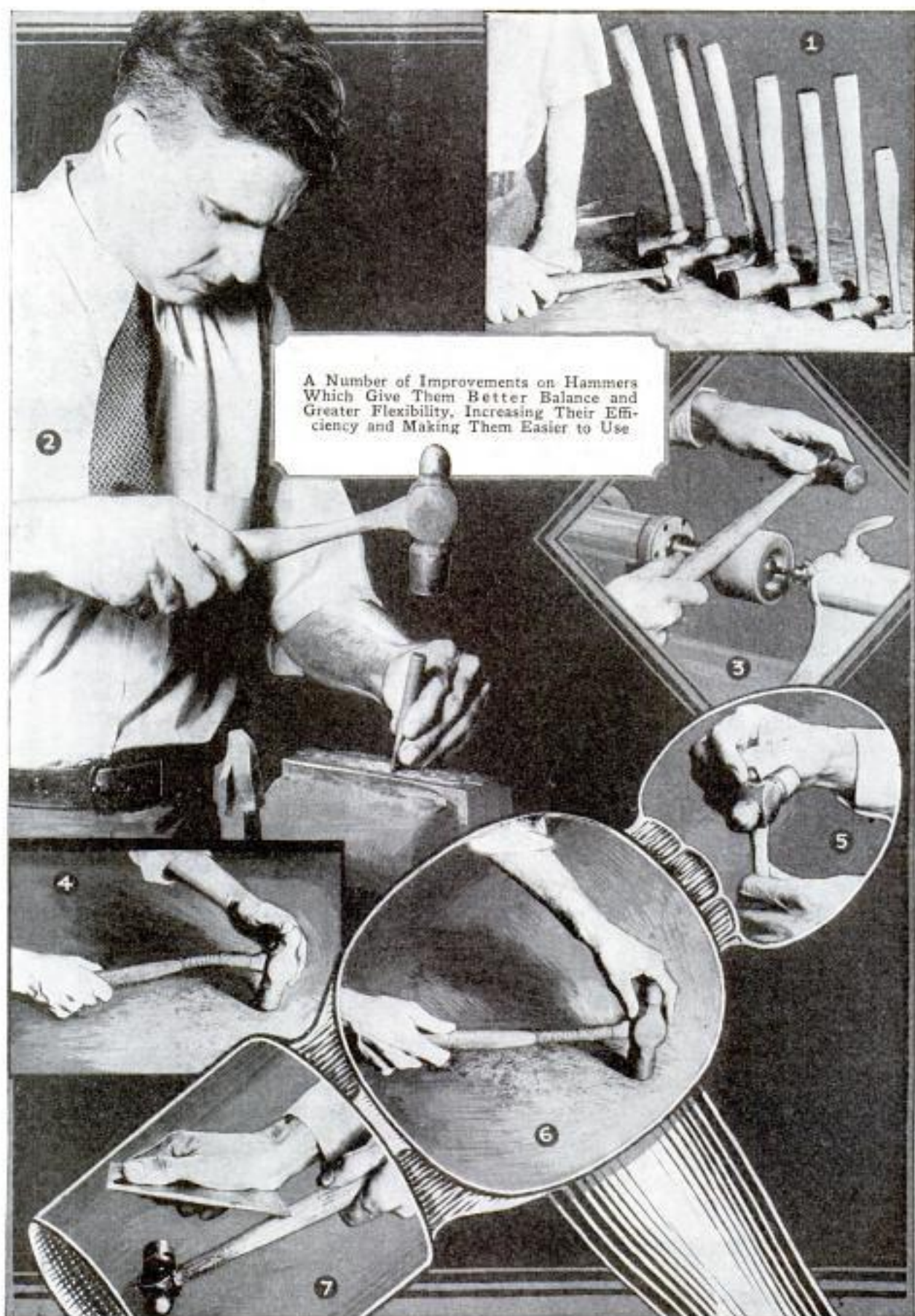
Your hammer should be a personal tool. It should have a handle shaped to fit your hand and a balance that suits the muscles of your hand and arm. The handle should be of hickory, straight-grained and well-seasoned. The angle of the head to the handle depends on the use of the hammer. If you are going to pound holes at shoulder level into a concrete wall, the head should be at right angles. If you are to use the hammer for chipping work held in



a bench vise as in Fig. 2, the head should be inclined somewhat sharply. A good rule to follow is to set the head so that, in normal use, the elbow need not be held uncomfortably in striking a square blow.

Fastening the head is an art. Veteran hammer users favor two wedges, one, of soft wood, running across the longest dimension of the handle end; the other, of steel, with the entering edge bent at the corners so that it looks somewhat like the letter S, running at right angles to the wood wedge. Always scrape the handle to a snug fit and then make saw cuts for the wedges. Each cut should extend about two-thirds through the eye, and the wedge

Balanced Hammers Suit Your Hand and Arm

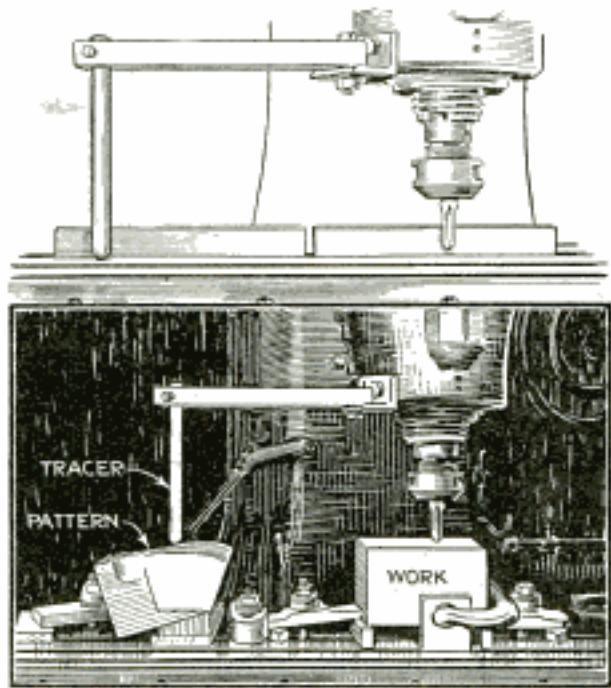


should be driven just to the bottom of the cut to prevent splitting. The next best arrangement is to use an iron washer having one edge hammered or filed flat, as illustrated in Fig. 5.

With a sanding drum or wood rasp, scrapers and fine sandpaper, work the handle to shape, Figs. 3 and 7. If the hammer is to be used wholly for striking blows and not for pulling nails, cut the handle down so that it is very slender for a distance of 2 or 3 in., just behind the head, and then wrap with tape, Figs. 4 and 6. This gives flexibility that reduces shock to your arm. Next, strike a number of hard blows to determine where the handle chafes your hands. Flatten this portion out with a rasp or sanding drum, and smooth it with a scraper and fine sandpaper to fit your hand. Then sandpaper off all rough and irregular spots and dip the handle into water. Let it dry for a half-hour, and sandpaper off all grain that has raised. Do this once or twice again. Finally, rub linseed or lubricating oil into the wood, and polish. The thing you do not want in a hammer is a handle that is painted, varnished, covered with tape, smeared with glue or wrapped with a trick rubber grip that will blister your hand with prolonged use. Handles of claw hammers used for both pounding and nail pulling should be thick rather than slender, and the grip should not be so form-fitting that it becomes uncomfortable when reversed. The same applies to the grips of pein hammers that are used both ways. For most work, the face of the hammer should be as smooth as glass, and it usually can be slightly rounding. Occasionally you can improve performance by driving the surface of a bastard file slightly into the face to roughen it a bit.

Duplicating Work from Pattern on Milling Machine

Machine shops not equipped with forming machines for duplicating work on steel from patterns can do the job on a vertical milling machine by using a tracer. This consists of a flat-iron arm pivoted, for side motion only, to a piece of angle iron, which is bolted rigidly to the head of the machine. The other end of the arm is drilled and is fitted with a setscrew to take



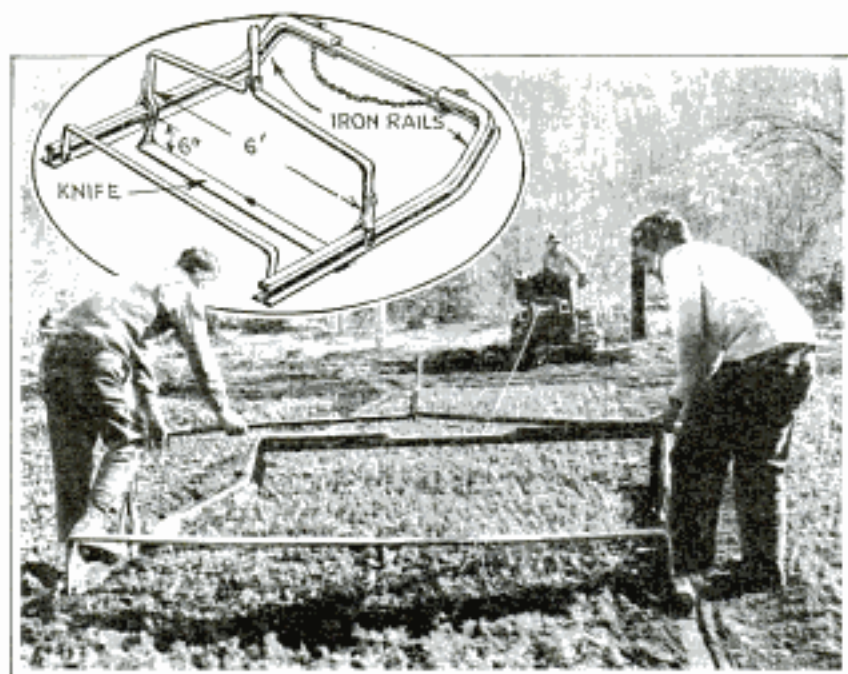
Tracer Used in Duplicating Work from Pattern on Steel Block with Vertical Milling Machine

the tracer point. It is important that the point be of the same size and shape as the cutter, and that the cutter and tracing point be as near in line as possible. Lining them up is best done by holding a flat piece in the bolt slot of the machine table and moving it over until it touches both the cutter and tracer as shown in the detail. The spindle head is then locked and the table is run up to within $\frac{1}{2}$ in. of the cutter point, after which the tracer is adjusted to touch the table and is set rigidly so that it cannot move. This allows $\frac{1}{2}$ in. for finishing after the work is formed. Now, after running the table down and clamping the work and pattern to it, you are ready to start cutting.

Small Emery Wheels Quickly Dressed with Hacksaw Blades

If your worn hacksaw blades are saved, they can be made into a tool for dressing small emery wheels. Four or five blades, bolted together in the manner shown, are pulled back and forth across the face of the wheel at an angle as it turns.





Pulled by a Tractor, This Knife Cuts Roots of Young Fir Trees 6 In. under Ground for Transplanting in Areas to Be Reforested

Large Knife Cuts Roots of Young Fir Trees to Be Transplanted

A large knife 6 ft. long, pulled by a tractor, is used by a government nursery at Wind River, Wash., for cutting the roots of 2-yr. old fir trees 6 in. underneath the ground so that they can be easily pulled up for transplanting in areas being reforested. The knife is welded to an iron frame, which is pivoted between two braced railroad rails, the front ends of which are bent upward so that they slide over the ground.—H. Miller, Portland, Oregon.

Keeping Small Animals from Entering End of Drain Pipe

In a creamery where trouble was experienced by toads and rats getting into the end of a drain pipe, the foreman fitted a sheet-metal flap, or disk, over the open end to keep them out. The flap was hinged to a wood block, which was wired to the drain pipe as shown. This arrangement permitted liquids to run out of the pipe but proved effective in keeping out animals.

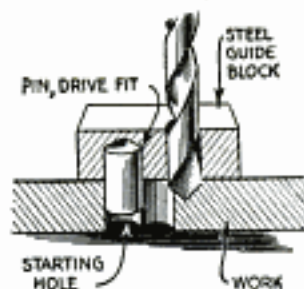


Satin Finish on Aluminum

Aluminum may be given a beautiful satin finish by dipping it into a hot solution made by dissolving lye, $\frac{1}{2}$ lb., in water, 1 gal. The cleaned metal should remain in this solution about 3 min. If left longer, it is likely to be made too rough by the lye. Upon removal from the dip, the work should be rinsed in water, and if it is coated with a black film, this may be removed by immersion for a few seconds in a solution made by slowly pouring nitric acid, 1 lb., into water, 1 gal. The work should now be first rinsed in cold and then in hot water. This will produce a fine-grained satin finish that may be preserved with a thin coat of clear metal lacquer.

Jig Helps in Drilling Overlapping Holes in Stock

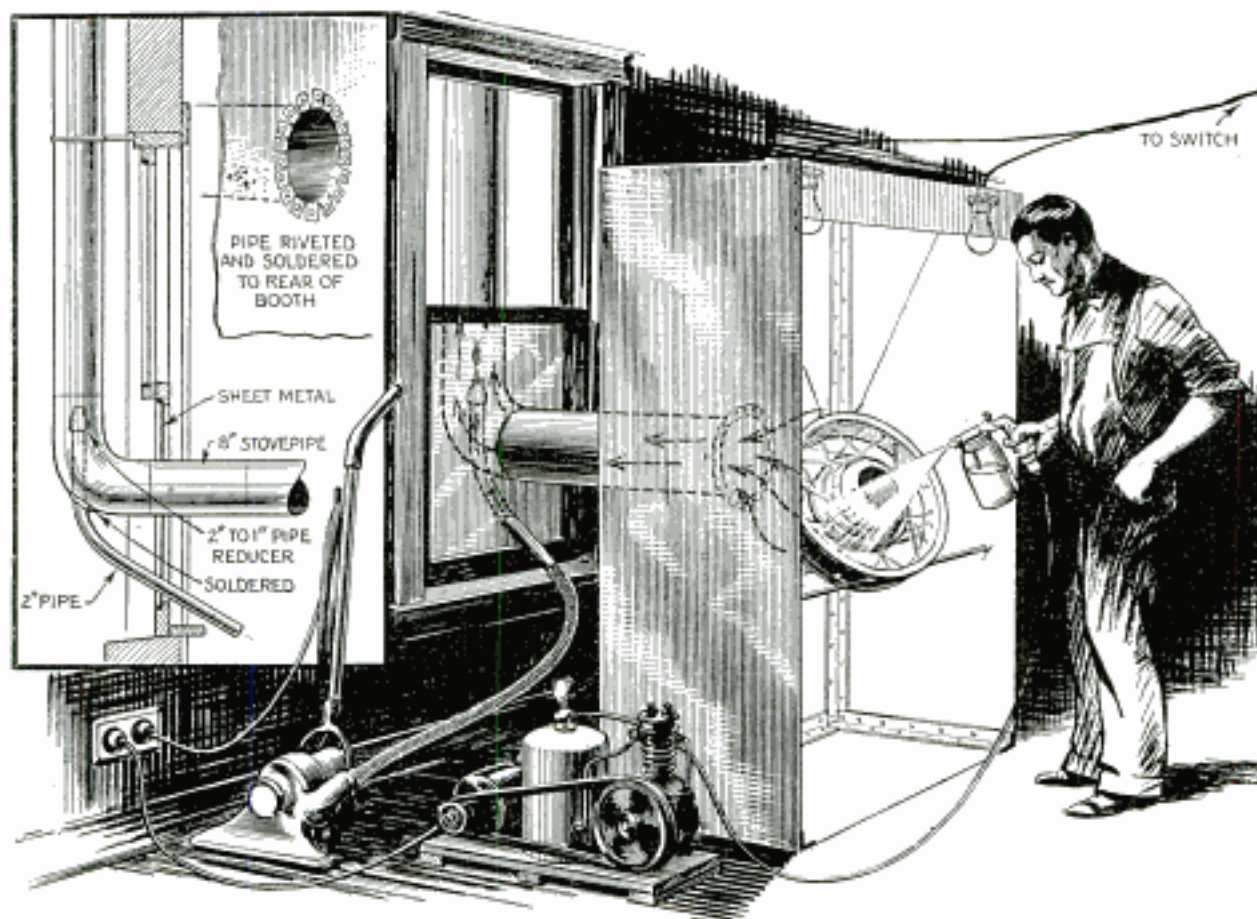
The next time you are making cut-outs in wood or metal and want to drill a number of small overlapping holes around the outline of the section to be removed, try this little jig. It consists of a small steel block, which is fitted with a short pin at one end and has a guide hole for the drill spaced the proper distance from the pin, made near the other end. In use, first drill two holes as close together as possible on the outline to be cut out, set the pin in one of these, and with the drill inserted through the guide hole, make the next hole in the work. If the pin and guide hole have been correctly spaced, the drill will just break through the side of the last hole drilled.



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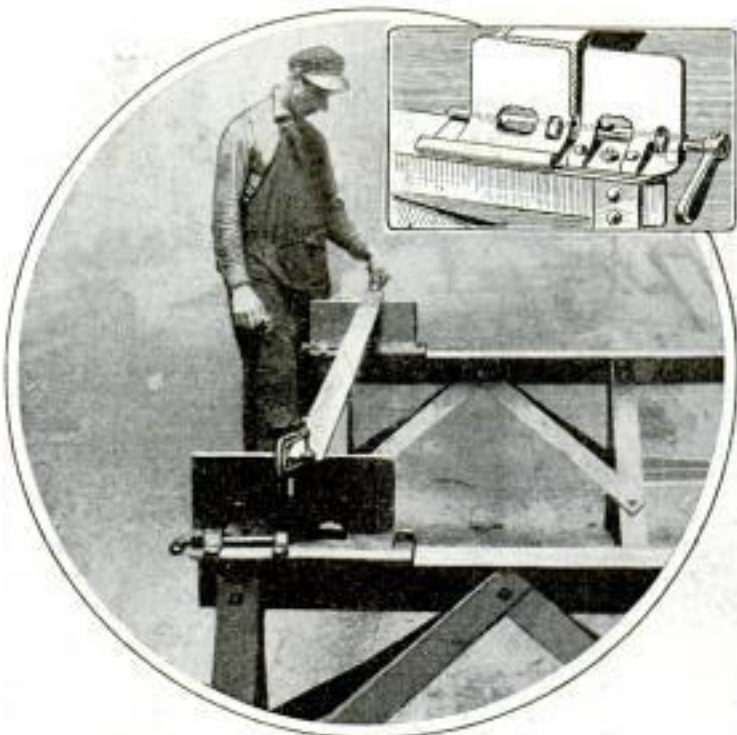
☐ The transverse pressure on a boiler is double the longitudinal pressure.

A Spray-Painting Booth with a Forced Draft



Fire hazard of spray painting, and also the harmful effects of breathing air contaminated with lacquer fumes, are eliminated by using this paint-spraying booth, which is built up of galvanized sheet iron on an angle-iron frame. The booth is provided with a forced draft furnished by a vacuum cleaner. Using the cleaner for this purpose will not damage it, as it is temporarily connected to the exhaust pipe by the hose when spraying is to be done. The booth may be made to any convenient size. The 8-in. stovepipe, which carries away the inflammable fumes, is riveted and soldered to the back of the booth and extends through a window. It is important that the end of this pipe be above the surrounding building. A piece of 2-in. pipe, inserted and soldered into a hole cut in the stovepipe elbow, should be equipped with a reducer as shown. This reduces the size of the air outlet and thus increases the suction in the booth. If a permanent installation is made, the lower window pane should be replaced with plywood or sheet metal. As solvents used in

lacquer are very inflammable, a few precautions should be remembered. The vacuum cleaner, the brushes of which usually spark, should be placed well out of range of the fumes. As sparks from key sockets have been known to start fires, the sockets used for illuminating the booth should be of the keyless type and the circuit should be controlled by a switch located some distance from the booth. Before starting to spray see that the lamps are screwed tightly into the sockets and that they are supported in such a way that they cannot fall and break. About the only other cause of fire in paint-spray booths is from spontaneous combustion caused by alternately spraying lacquer, and varnish or oil enamels. If the booth is kept clean and the highly inflammable coats of lacquer and enamel are removed frequently, there is little danger of fire from this source. Scrapings from the paint booth should be either burned in the open in a safe place, or buried if more convenient, so that they will not lie around and be the means of causing a fire.



Vise Improvised from Sections of T-Stock Holds Angles While Measuring and Laying Them Out

Improvised Vise Holds Angle Stock

Mounted on a sawhorse, this vise will be found handy for holding tees and angles. The horse is constructed in the regular way, using a length of T-stock for the horizontal member, while the vise consists of two sections of the same material. The lower flange of one section is cut away and is notched at one end for a collar as shown. This holds a screw bar inserted into a hole drilled lengthwise through the base of the tee, which is then bolted to the horse. The other section is drilled lengthwise and a small part of the flange is removed for the insertion of a large nut, which screws onto the threaded end of the screw bar. The edges of the flange of this section are then bent over the edges of the horizontal member of the horse to form a sliding jaw for the vise.

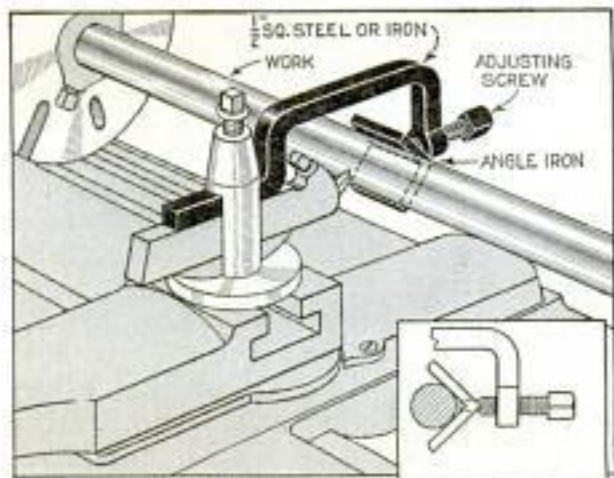
Identifying Obliterated Numbers on Machinery

Methods that have been developed by the United States bureau of standards for identifying obliterated numbers on guns and stolen property in criminal cases are also valuable for identifying obliterated numbers on shop and farm machinery for the purpose of ordering new parts. First smooth down the surface around the num-

bers with emery, taking care to remove as little of the metal as possible, and then apply the following solution: Copper ammonium chloride, 4 parts by weight, hydrochloric acid, 48 parts by volume, and distilled water, 48 parts by volume. There are two methods of applying the solution, one being to simply apply it to the metal, while the other, which is probably the best, is to moisten a cotton swab with the hydrochloric acid, rub it in the ammonium chloride, and finally to the metal, doing this repeatedly. In either case, the solution should be rubbed well into the surface of the metal. This sometimes takes several hours to make the numbers visible. If the solution fails, carefully heat the metal until the numbers appear. If the numbers do not appear by the time the metal reaches a color below cherry red, the test should be discontinued, as heating a metal beyond this point will likely cause it to warp.

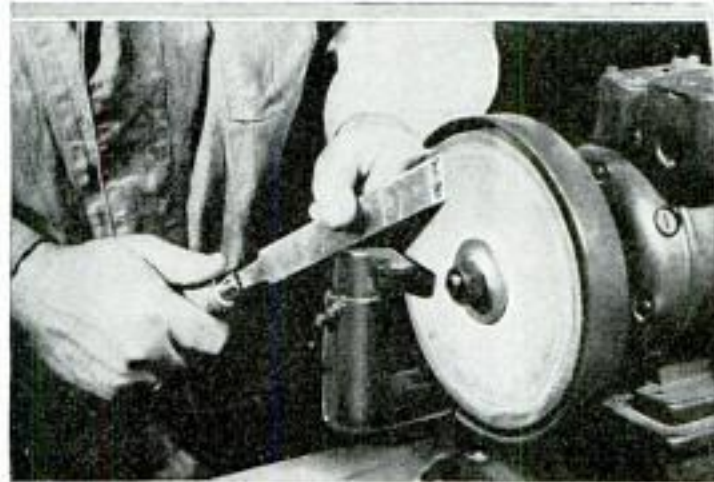
Follow Rest Supports Lathe Work

Mounted in the tool holder, this follow rest is effective for supporting slender work in a lathe. The rest consists of a $\frac{1}{2}$ -in. square steel arm bent to the shape shown and tapped at the outer end for an adjusting screw. The latter is turned down at the end to fit a hole drilled in the center of a short section of angle iron, which supports the work.



This Rest Moves Along with the Turning Tool on the Opposite Side of the Work

SHARPENING

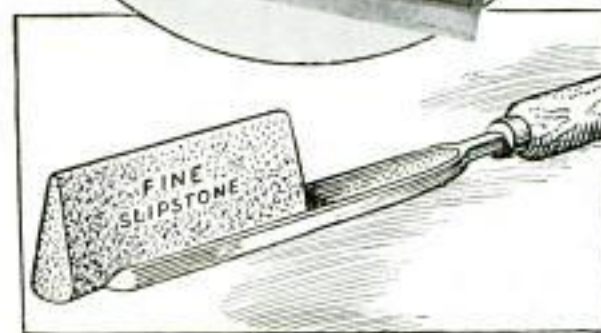


Your Lathe Tools

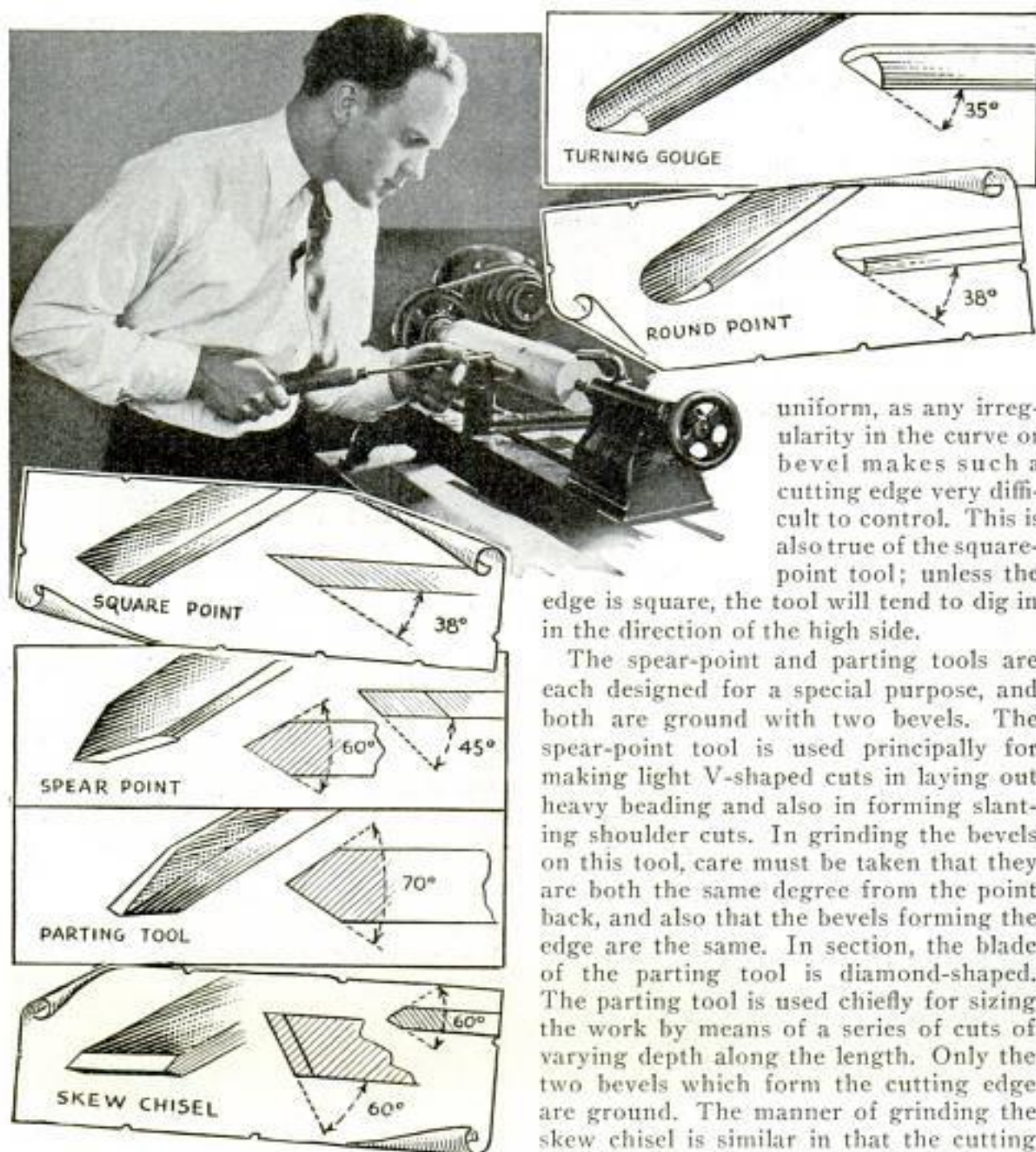
By W. Clyde Lammey

LIKE all other edge tools, chisels used for wood turning must be properly sharpened. When grinding them, keep them as near the original shape as you can. It is advisable to do as little grinding as possible and to depend mostly on honing as the tools are highly tempered. A fine oilstone is most effective and produces a cutting edge that cannot be acquired in any other way. The procedure in sharpening a set of lathe tools depends on their condition. If the cutting edges are nicked or are otherwise out of true, the tools should be carefully ground on an emery wheel. When grinding, the edge should be dipped in water every few seconds to prevent overheating. The edge should never be held on the wheel until the metal turns blue as the temper will then be drawn and the tool will not hold its edge.

In grinding a gouge, the handle is grasped in the right hand with the left hand supporting the edge against the face of the wheel and the index finger of the left hand resting on the tool support. The handle is lowered until the bevel of the edge rests against the face of the wheel. In this position the handle is swung to the right and at the same time the tool is turned until the right side of the bevel is presented to the wheel. At this point the



grinding stroke is started and at the same time the handle is swung to the left, rolling the tool across the face of the wheel in the same direction until the opposite side of the bevel is reached. The operation is then repeated in the reverse direction. If this is done with care the bevel will be true throughout its width and the curve of the edge will be uniform. It is important that the gouge be ground and honed



uniform, as any irregularity in the curve or bevel makes such a cutting edge very difficult to control. This is also true of the square-point tool; unless the

edge is square, the tool will tend to dig in in the direction of the high side.

The spear-point and parting tools are each designed for a special purpose, and both are ground with two bevels. The spear-point tool is used principally for making light V-shaped cuts in laying out heavy beading and also in forming slanting shoulder cuts. In grinding the bevels on this tool, care must be taken that they are both the same degree from the point back, and also that the bevels forming the edge are the same. In section, the blade of the parting tool is diamond-shaped. The parting tool is used chiefly for sizing the work by means of a series of cuts of varying depth along the length. Only the two bevels which form the cutting edge are ground. The manner of grinding the skew chisel is similar in that the cutting edge is formed at an angle with the length of the blade, and by two bevels ground back on the flat sides.

If no power-driven emery wheel is at hand, rough grinding of lathe tools may be done on the fine side of a combination stone. The grinding stroke should be straight along the length of the stone without a rotary motion. Plenty of light oil should be used to clear the stone and to prevent glazing. After the tool has been brought to a sharp edge, the round, square-point and spear-point tools should be given a few light strokes with the blade flat on the stone. This tends to remove

properly as it is used almost exclusively in roughing the stock from the square into round. The grinding operation should stop when the edge is sharp, as beyond this point the edge will feather and portions of it will break off, making it very difficult to hone properly.

The round-point tool is sharpened in the same way as the gouge except that the bevel is slightly shorter due to the cutting edge being flush with the top face of the blade. Care must be taken to keep the bevel at the same angle throughout its width, and the curve of the edge must be

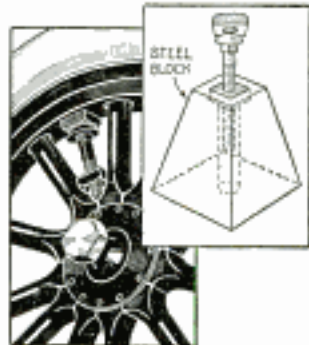
the wire edge formed by the rough grinding on the bevel. The gouge is rolled from side to side on the stone and the strokes are made straight in the same manner as with the other tools.

Honing of lathe tools is done on a very fine oilstone, with exception of the gouge which is finished with a tapered slipstone. Some wood turners even finish the tools on a leather slip to attain a very fine edge, but in ordinary work this is not necessary. In honing, the pressure should be uniform and somewhat lighter than that used in grinding. After several honing stropps, the edge should be smooth to the touch. If it is still rough, the honing should continue until this is removed.

Car-Wheel Fellys Expanded with Bolt

In order to tighten the spokes on my car wheels which had loosened at the fellys, it was necessary to expand the latter. This was done with a carriage bolt of a length to just fit between the felly and the base of the spokes at the hub, as shown. A nut was first run down on the bolt the length of the threads, after which it was placed between the spokes

with the head resting against another nut held on the inside of the felly. In this position, the bolt was turned out of the nut by means of a wrench on the shoulder under the head, and the felly was expanded so that molten babbitt metal could be poured into the spoke hole to take up the play. This idea can also be applied to make small jacks for use around the shop, if a steel or wood block is drilled through the center and countersunk on top to take the bolt and nut as shown in the detail.—James F. Goodman, Stockbridge, Mich.



Molding Large Quarter Rounds

Running large quarter rounds on a molding machine can be greatly simplified by following the method used by an eastern concern where orders were often received for quarter round as large as $3\frac{1}{2}$



Simplified Method of Cutting Large Quarter Rounds, Using a Form and Only the Top Head of the Molder

by $3\frac{1}{2}$ in. For making this size, pieces of finished stock, $3\frac{1}{2}$ by $6\frac{1}{2}$ in. full, were first ripped at a bevel as shown in the lower detail, allowing very little waste stock to be rounded, which is important. The ripped pieces, which are perfectly square on their finished sides, are then held in a form having an accurate 45° V-groove, and are run through the molder, using only the top head. To form a cutter having the right radius, very little grinding is necessary. The results of this method were found entirely satisfactory.

Sheet-Metal Covers for Fire Barrels

In order to keep workmen from piling junk on top of fire barrels so that they would then not be readily accessible in case of an emergency, one factory foreman provided each barrel with a cone-shaped cover of sheet metal. These were painted red to match the barrels and make them easily found.



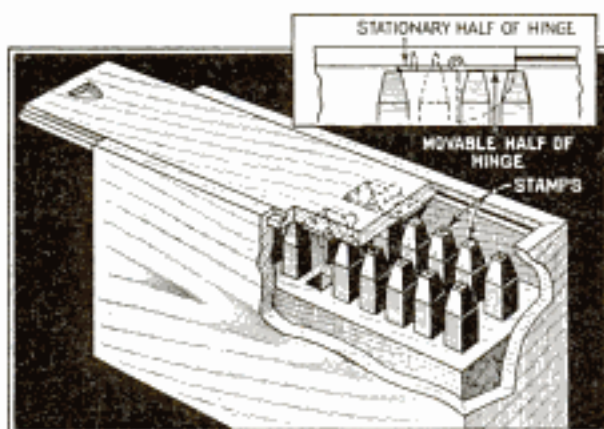
Underslung Cart Moves Heavy Loads



Cart for Handling Heavy Articles, the Load Being Raised Only a Short Distance from the Floor

Moving heavy articles around a shop is made easy with this underslung cart. The wheels were taken from an old buggy and attached to a dropped axle, which supports a 3 by 4-ft. platform of $\frac{1}{4}$ -in. steel. The handles are made of $\frac{1}{4}$ by 2-in. flat iron and extend about 1 ft. in front of the wheels where they are bolted to the platform, which is supported at the rear end by vertical flat-iron pieces extending down from the handles.

Box Cover Prevents Accidental Loss of Steel Stamps



Sliding Cover of This Stamp Box Cannot Be Closed Until the Entire Set Is in Place

Machinists will find this steel-stamp container effective in reminding them to return all the stamps before putting the set away, as the cover cannot be closed

until the entire set is in place. The container is a box fitted with a sliding cover, which has two small hinges screwed to the underside. One side of each hinge hangs free and slides over the tops of the stamps if they are all in place. If a stamp is missing, the free end of the hinge drops down into the opening and prevents the cover from being closed until the missing stamp is replaced.

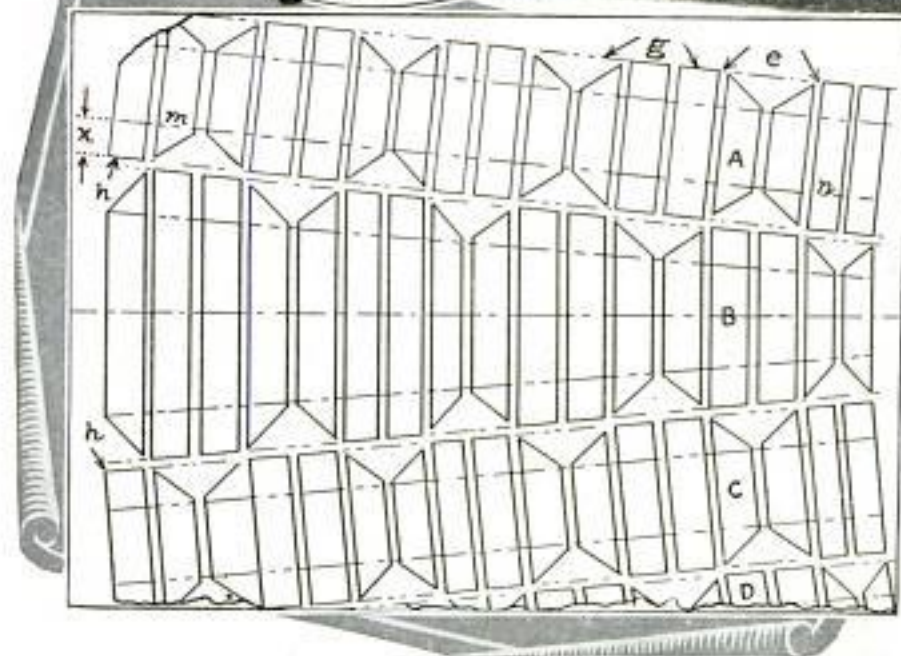
How to Make Camera Bellows

Stiff cardboard about $\frac{1}{8}$ in. thick, some black sateen cloth, and a little glue is all you need to make a bellows for your enlarging camera. On the cardboard, lay out the extended bellows slightly longer than their length when finished. Then divide the patterns into segments as wide as the depth of each fold. Separate each segment by a space equal in width to three times the thickness of the cardboard. Care should be taken in laying out the patterns to get the segments lined up, or the bellows will not fold properly. After the patterns are completely laid out on the cardboard, they are cut apart to separate the pieces A, B, C and D. The space between each segment is cut down to the center line, a strip of gummed tape is fastened over the cutout section, the entire length of the pattern, which will hold the segments in their correct relation while the other side is similarly cut out, leaving a $\frac{1}{2}$ -in. neck of cardboard at the center connecting each segment to its neighbor. When finished, you will have four assemblies of cut-out segments held together with tape, which facilitates handling them and still keeps them spaced apart perfectly parallel. The assemblies are next coated with glue and pressed down on the cloth, allowing several inches of the cloth to lap over at one edge so that the bellows may be spliced. After the glue has dried, the pieces of tape are removed and the other side of the assembly is glued to a second piece of cloth. This piece is worked down into the spaces between the segments so that the two pieces of cloth will be glued together wherever possible. The outer edges are now placed together and the bellows are spliced, after which they are ready to fold. The bellows may be covered with imitation leather.

Bellows for Homemade Enlarging Cameras

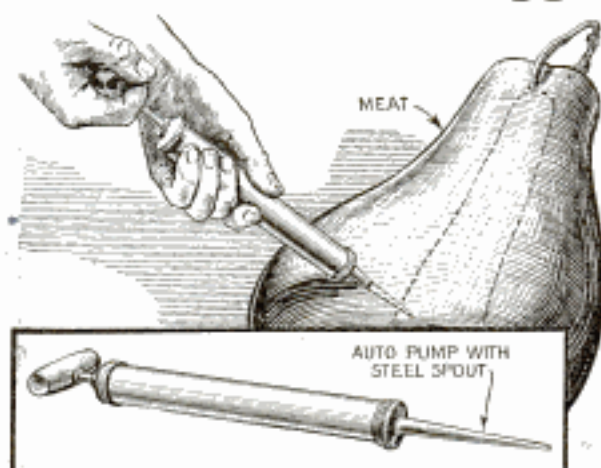


Sides of the Bellows Consist of Numerous Segments Glued between Two Pieces of Heavy Black Satteen



After Laying Out the Segments on Cardboard, Sections A, B, C and D Are Cut Out and Then the Paper between the Segments Is Removed, First on One Side and Then on the Other Side. Strips of Tape Hold the First Half, Already Cut, So That the Segments Will Be Kept Parallel, While the Second Half Is Cut Out. Then This Side Is Taped and the Assemblies of Segments Are Glued between Two Pieces of Cloth, Which Have an Overlap at One Edge for Splicing

Five Practical Suggestions from the Farm



"Bone Sour" in Home-Cured Meat Prevented by Injecting Preserving Solution around the Bone

Method of Preventing "Bone Sour" in Home-Cured Meat

Souring of home-cured meats around the bone, which is usually caused by the preservative not penetrating deep enough into the meat, can be prevented by injecting some of the fluid around the bone with a syringe having a pointed spout. If a syringe of this type is not available, one can be improvised from an old tire pump by cutting off the end and soldering onto it a long spout taken from an oilcan. An ice pick, or other pointed instrument, can be used to make a small hole in the meat to the bone, after which the spout is inserted and the fluid is squeezed out under considerable pressure.

Handles for Earthen Jars from Wire and Short Sticks

Large earthen jars in which meat, kraut or other produce is preserved are difficult to carry, and frequently slip from the hands and break unless they are fitted with handles. These may be quickly provided by using a



hoop of wire and a couple of short pieces of broom handle. Place the hoop around the top of the jar, with the handles in the position indicated, twisting them to draw the hoop snugly around the

jar beneath the roll rim. The handles will be held firmly by the wire and the jar may easily be carried.

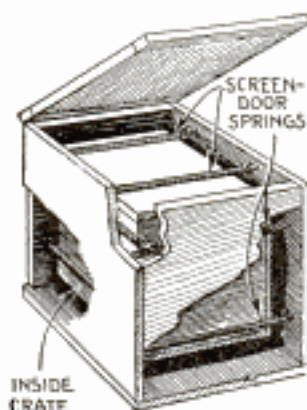
Quickly Formed Spouts Improve Your Buckets

A pouring spout on a bucket can be quickly made with a sharp cold chisel and a ball-peen hammer. With the chisel, cut a short horizontal slit in the side of the bucket and hammer out the metal just below the slit to form the spout. If the slot is cut close to the rim of the bucket, the alteration will not appreciably change its carrying capacity.



Shock-Absorbing Case Reduces Egg Breakage

Poultrymen will find this shock-absorbing egg case a great help in reducing breakage of eggs when hauling them over rough roads. The case can be made any size desired, and consists of two lightweight boxes, one of which fits inside the other with a clearance of 3 in. on all sides. Screen-door springs are attached, by means of screweyes, to the inside of the outer box, as shown, so that the inner box, which contains the eggs, is floated between them. This idea may also be applied to cases used for transporting eggs by rail or truck.



Clamps on a small home meat grinder will not work loose when using the machine if a piece of sandpaper is placed between the clamps and the underside of the table; the abrasive side of the sandpaper should be placed next to the wood.

Fitting Bronze-Backed Auto Bearings

Automobile-engine bearings of the shell type, such as main and connecting-rod bearings, sometimes cause trouble by working loose in their retainers. This allows a part of the normal bearing wear to be transferred to the bronze backing and to the housing. Wear of the heavy shims commonly used with this type of bearing also occurs, soon followed by a separation of the babbitt lining from the shell, which results in complete destruction of the entire bearing or of some major engine part. However, this bearing trouble may be entirely eliminated by the proper fitting of these bearing shells in their retainers, the general rule being to file away more metal from the steel retainer than from the shell, when refitting. This is best done by filing both these parts together until they are flush and true with each other, then removing the bronze shell and filing an additional .002 in. from the steel, which may easily be determined by means of a feeler gauge or a micrometer. This procedure allows the shell to extend a little above the retainer, permitting the heavy steel shims to bear directly on the shell, holding it tightly in place in the retainer. If these shims are worn, they should be replaced with new ones, but if they are not readily obtainable the old ones may be filed true.—A. H. Vance, Harshaw, Wis.

Sanitary Carrying Cover for Cuspidors



The janitor of a large office building, disliking the unsanitary method of picking up cuspidors with his hands, made this carrying cover for handling them. It is a piece of sheet metal with the edges rolled over to form flanges on the underside in which the sloping tops of the cuspidors fit. A flat-iron grip riveted to the top of the cover provides a handle.

☐ To keep milling cutters from slipping on the arbor, put writing-paper washers between the steel washers and the cutters; thin copper or brass washers can be used.



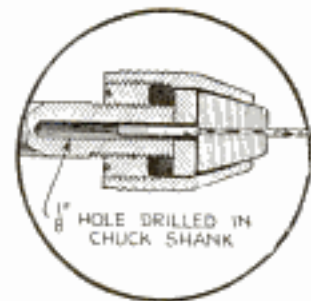
Sheet-Metal Scoop Attached to Hand Truck for Gathering Sweepings around Shop Machines

Sweepers' Portable Scoop for Shops

To aid the janitor in gathering sweepings from beneath lathes and other machines, one shop foreman made the scoop shown, and attached it to a hand truck. The scoop is made of heavy sheet metal and has two flat-iron hangers with which it is attached to the truck. Wheeled to position beside the machines, the sweepings are quickly brushed into the scoop.

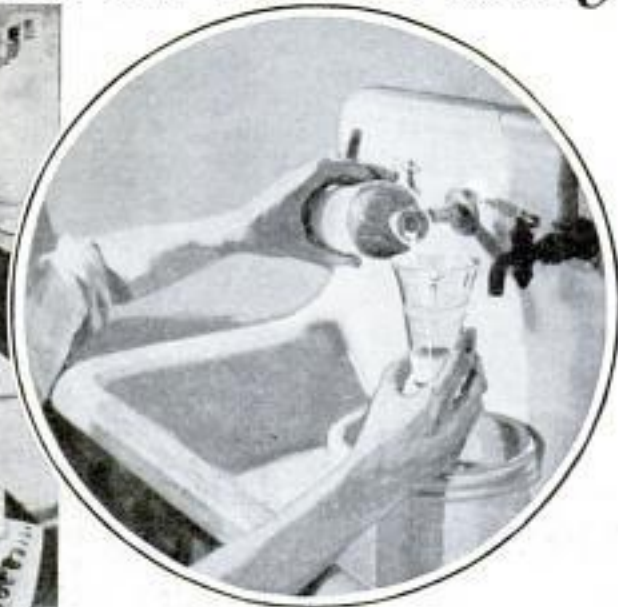
Altering Chuck to Prevent Breakage of Small Pin Drills

Instructors in a manual-training class had considerable trouble in keeping students from applying too much pressure to long, slender drills when starting them into work, which, of course, resulted in excessive breakage. One of the instructors hit upon the idea of drilling a $\frac{1}{8}$ -in. hole lengthwise in the center of the chuck shank so that a drill could be pushed farther up into it, leaving just enough of the drill projecting to pierce the piece of stock at hand.



E. H. Sargent, 155 2 Superior
Chicago

ELECTROPLATING *with*



do not mention use.

TOOLS, household appliances, metal models and hundreds of other articles may be improved in appearance and protected against rust and corrosion by electroplating them with cadmium, zinc, or lead. Cadmium produces the most beautiful finish. This metal is used for plating hardware, screws, and articles assembled from a number of different kinds of metal to produce a uniform, bright finish. Cadmium plating is much simpler than chromium and for many purposes it is decidedly superior. It is also more resistant to corrosion. Its white color and great durability, and the simplicity with which it is plated to any metal, make it practical for hundreds of purposes. Zinc plating is equally simple and provides efficient protection against rust. Although zinc plate is not as beautiful in color as cadmium, it is used extensively, and often preferred. The durability of galvanized iron is due to its thin coating of zinc. Electroplated zinc is just as durable as galvanizing and for many practical purposes this method is superior and less expensive. Lead plating is used to protect other metals against the action of sulphuric acid and chemicals. For laboratory and shop jobs where a plate that will not be attacked by ordinary acids and chemicals is required, lead plating is about the

only simple means available. Lead plating should never be used where it is likely to come in contact with food.

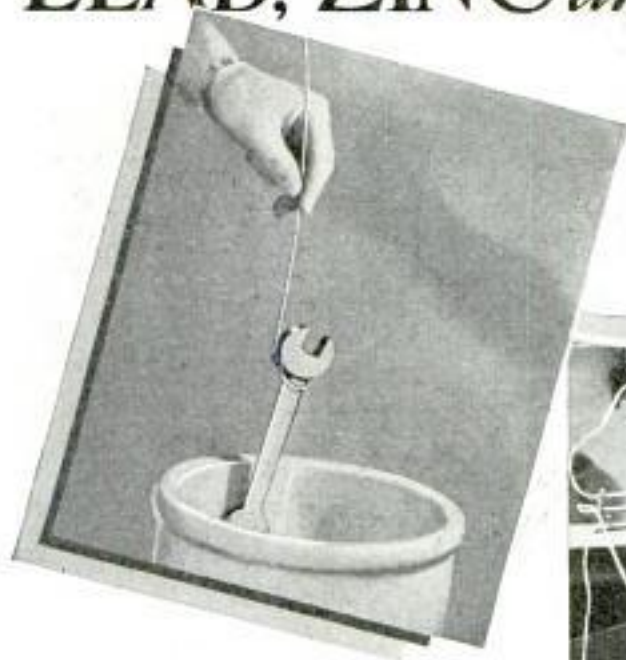
Electroplating will not correct defects in the surface of the work. Therefore, all roughness should be removed with a grinder, files, and emery paper. The surface should then be buffed with a good grade of compound. A scratch brush will be found handy for finishing irregular objects. When the surface of the work is as smooth as is desired, the article to be plated should be strung on a piece of copper wire which will serve to support it in the cleaning and plating solutions. The next step, or cleaning, is the most important part of the work. If the cleaning is not thorough, a good job cannot be produced. To insure perfect cleaning, three operations are required. The polished work is first suspended by a wire in a boiling solution consisting of scrubbing soda, 1½ lb., lye, 2 oz., and soap chips, 4 oz., dissolved in a gallon of water. The solution should be kept in a stone jar. It will remove all grease from immersed objects in about 5 min. If the work to be plated has been soldered, the time in the bath should be reduced to about 2 min. In this case the article should be previously washed in gasoline to remove most of the grease. The short boiling will be sufficient if this caution is followed, and the solder will not be damaged.

Cadmium Electro-Plating Co. 159 W. Kinzie Chicago

W. W. Welch, 715 N. Sedgwick Chicago

LEAD, ZINC *and* CADMIUM

By
C. A. Crowley

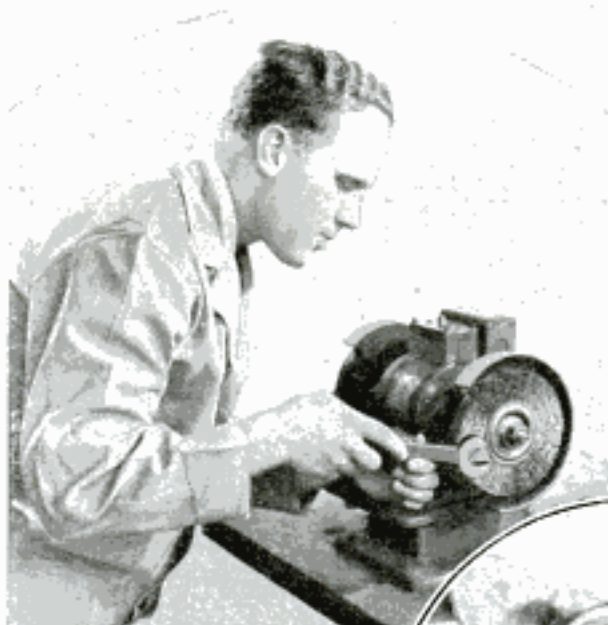


The work is now removed from the cleaning solution with the wire and after this it should not be touched with the hands. When thoroughly rinsed with clean water, the article is dipped for about a minute in a pickling solution made by slowly pouring sulphuric acid, $\frac{1}{2}$ lb., into one gallon of water contained in a stoneware jar. (Caution—do not pour the water into the acid.) This solution should be kept in the sink or in a location where the acid will do no damage if the crock should break. After preparing this solution, it should be allowed to cool before using.

Immersion of objects in this solution will remove scale, rust, oxide and brazing flux. The work should not be left in the pickle longer than is necessary to produce a scale-free surface. After pickling, the work is transferred to another stone jar containing a bright dip, which is made by slowly pouring sulphuric acid, $\frac{1}{2}$ lb., into water, 5 pts. (Caution—do not pour the water into the acid.) Add to this mixture nitric acid, 8 oz., and hydrochloric acid, $\frac{1}{4}$ oz. This solution should be allowed to cool before using. If the solution is used continuously, the crock containing it should be kept in a pan of cold water to keep it cool. The work should be left in this solution only long enough to be brightened. It should then be rinsed in

clean water and kept under clean water until you are ready to start plating.

Electroplating with all of the metals described in this article is carried out in exactly the same manner. A plating tank, which may be a tar-lined storage-battery box, and a large glass or stone jar, or any rubber, glass or stoneware receptacle large enough to hold the work and solution, will be needed. Three brass or copper rods long enough to span the box will also be needed. The electric current for plating may be had from a storage battery or an old A-battery charger of the tungar type. A radio rheostat of the heavy-duty type may be used to control the current. If a rheostat is not available, two strips of sheet iron immersed in a jar of salt water will make a water rheostat that will serve the same purpose. Moving the strips farther apart reduces the current and voltage and vice versa. Excellent control can be had by this method. Although a voltmeter is useful it is not absolutely necessary when plating with these metals. If you wish to use a voltmeter for accurate control one of the battery-testing type is satisfactory.



A good reliable solution for plating cadmium is made by dissolving 10 oz. of sodium cyanide (deadly poison) in one gallon of water. In handling cyanides use great care to avoid getting them on the hands, in the eyes, or in contact with any part of the body. They may be absorbed through membranes or skin abrasions with fatal results. Ordinary care will reduce the hazards of these poisonous chemicals to a minimum. They are used every day in large quantities in schools and in industry with almost no accidents. There is one other thing to remember in handling cyanides. Under no circumstances must they be mixed with or allowed to come in contact with acids. If this should happen deadly hydrocyanic acid fumes will be generated. After the cyanide has dissolved in the water make a paste with cadmium oxide, $4\frac{1}{4}$ oz., and a small amount of water. This smooth paste is now added to the cyanide solution and stirred with a wooden paddle until dissolved. When dissolved add liquid glue, 1 oz., and stir to mix. This solution is poured into the plating tank and is ready to use. The work to be plated is suspended from the center rod in the solution by the copper wire. The work should be completely covered by the solution. Sticks of metallic cadmium obtainable from any



chemical supply house are suspended from the two outside bars. The cadmium sticks may be bent over on the ends so that they hook over the rods, or they may be suspended with pieces of copper wire. If wires are used for suspending the sticks, care should be taken to prevent the wires from getting under the surface of the solution. With the tank set up in front of a window so that a draft will carry any fumes generated away from you and out of doors, adjust the rheostat so that as small a current as possible flows. A plate will start to form on the work very quickly. The current may be increased as long as the plate is bright in color. A dark plate means that the current is too high, which is corrected by adjusting the rheostat. If a voltmeter is used, the rheostat should be adjusted until the reading is about 3 volts.

A good plate will be produced in about 5 min. At the end of this time the work should be lifted from the tank by the wire and rinsed thoroughly in running hot water to remove the last trace of poison cyanide. When the work is dry the plate should be white and very bright. For most purposes no further treatment will be required; however, if a brighter surface is wanted it may be produced by polishing or buffing with a dry cloth buff.

If you wish to plate with zinc, the solution is made by dissolving 10 oz. of sodium cyanide (deadly poison) and 2 oz. of sodium hydroxide in one gallon of water. When these chemicals have dissolved, add a paste made by rubbing zinc oxide, 6 oz., with water while stirring with a wooden paddle. After the paste has dissolved add corn sugar, $1\frac{1}{2}$ oz., to the solution and stir until dissolved. In preparing and using this solution, follow the cautions already mentioned for handling poisonous cyanides.

To plate with zinc, clean the work exactly as for cadmium plating, and suspend sheets of pure zinc from the two outside rods in the plating bath. With the zinc

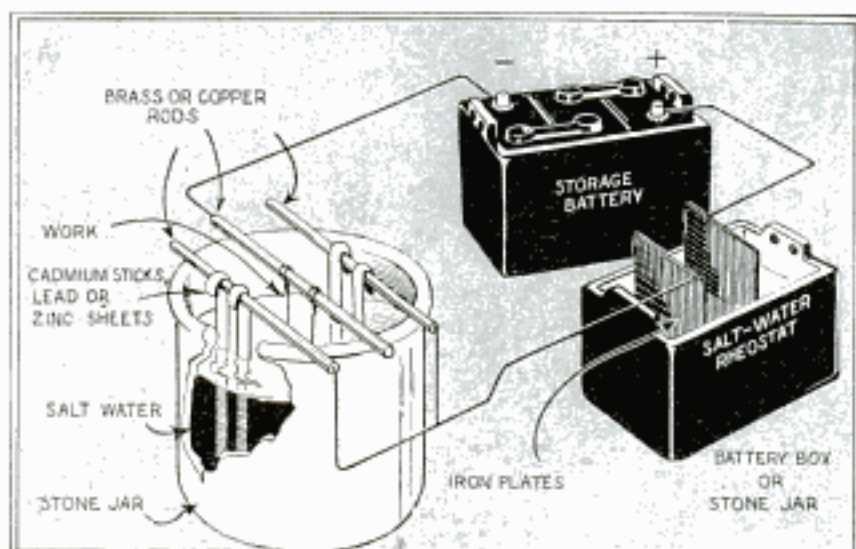


solution in the tank, suspend the work from the center rod as before, and adjust the rheostat until the strongest current is flowing, which will produce a bright plate. If a voltmeter is used, the rheostat should be adjusted so that it reads about $3\frac{1}{2}$ volts. Zinc plating is not as bright or as white as cadmium, but it is very durable and resistant against corrosion. The time required for producing a good plate will be between 5 and 10 min. A longer time will produce a thicker plate. If the work to be plated is cast iron add cadmium oxide, about $\frac{1}{2}$ oz., to the above solution after it has been rubbed to a paste with water. The addition of cadmium oxide will not hurt the solution for plating on other metals.

Both of these plating solutions may be used over and over again until they cease to produce good results if they are stored in glass bottles, which should be labeled poison and carefully protected from breakage and accidental use for other purposes. If the solutions are to be destroyed after use, they may be washed down the sink with large volumes of water if scrubbing soda, $\frac{1}{2}$ lb., is first poured in the sink to neutralize any acid which might be in the trap. If a sink is not at hand, the solutions may be poured in a hole dug in the ground in a location where they can not cause trouble.

Lead plating is best done with a bath

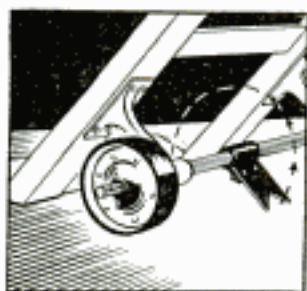
made from hydrofluoric acid. In using this acid to prepare plating solutions care should be taken to keep it from getting on the hands, as it produces painful burns which are hard to heal. The acid comes in wax bottles which must be handled carefully. This acid dissolves glass and large quantities of it are used for etching. The completed lead-plating solution is not very corrosive and can be handled without any serious danger. The solution is made by first pouring 32 oz. of about 50-per-cent strength hydrofluoric acid into a lead-lined vessel. Glass cannot be used and care should be taken to prevent the acid from spattering. Next add boric-acid crystals, 14 oz., in small quantities slowly, while stirring with a wooden paddle. As the boric acid is added the solution will get hot. While the acid mixture is cooling, make a paste by rubbing lead carbonate, 20 oz., into a few ounces of water. When the acid mixture is cool, add the paste in small quantities while stirring. The solution will froth and boil as the paste is added. The paste should be added slowly and in small quantities to keep the frothing to a minimum. When all of the paste has been added and the solution has cooled, carefully pour off the clear liquid, leaving the sediment behind. This solution may be placed in the well-cleaned plating tank ready for use. A glass tank may be used for plating after the solution



has been prepared as described. In plating with lead follow exactly the same procedure as before. Sheets of lead are suspended from the outside rods and the rheostat is adjusted until the plate is bright and fine-grained. A coarse deposit of any metal usually means that the current is too high. If a voltmeter is used, the rheostat should be adjusted until it reads about 2 or 3 volts. Good results may be had with any of these plating solutions without a rheostat if only one or two cells of the storage battery are used, whichever produces the best plate. Plating with any of these metals is simple, and no skill, tedious work, or delicate instruments are required.

Safety Brake on Hand Truck

Following an accident in which a workman was injured by having a heavily loaded truck roll back on him while pushing it up a gangplank, a Wisconsin wholesaler equipped all his hand trucks with safety brakes as shown in the drawing.



The brake is merely a piece of flat iron sawed at one end to form two points and is clamped loosely around the axle so that it will drag along when pushing the truck. As soon as there is any backward movement of the truck the pointed ends of the brake will dig into the

floor and hold the load. When not in use, the brake is swung forward to rest on a crossmember of the truck.

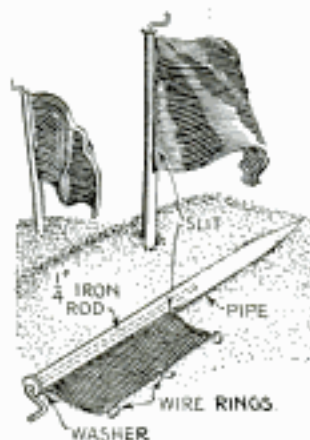
Painting Insulated Steam Pipes

Asbestos-covered steam or hot-water pipes passing through a finished basement are unsightly unless they are painted to harmonize with the surroundings. Size the covering before finishing

or the amount of paint required will be excessive, and therefore expensive. A good size to which any kind of paint will adhere, is made by soaking sizing glue, $\frac{1}{2}$ lb., in water, 1 gal., overnight, and then melting it over a fire. When the glue has melted, stir in about two cupfuls of flour for each gallon of glue to form a paste, and apply it with a brush. After about 48 hours the pipes can be painted.

Gas Pipe Protects Warning Flag

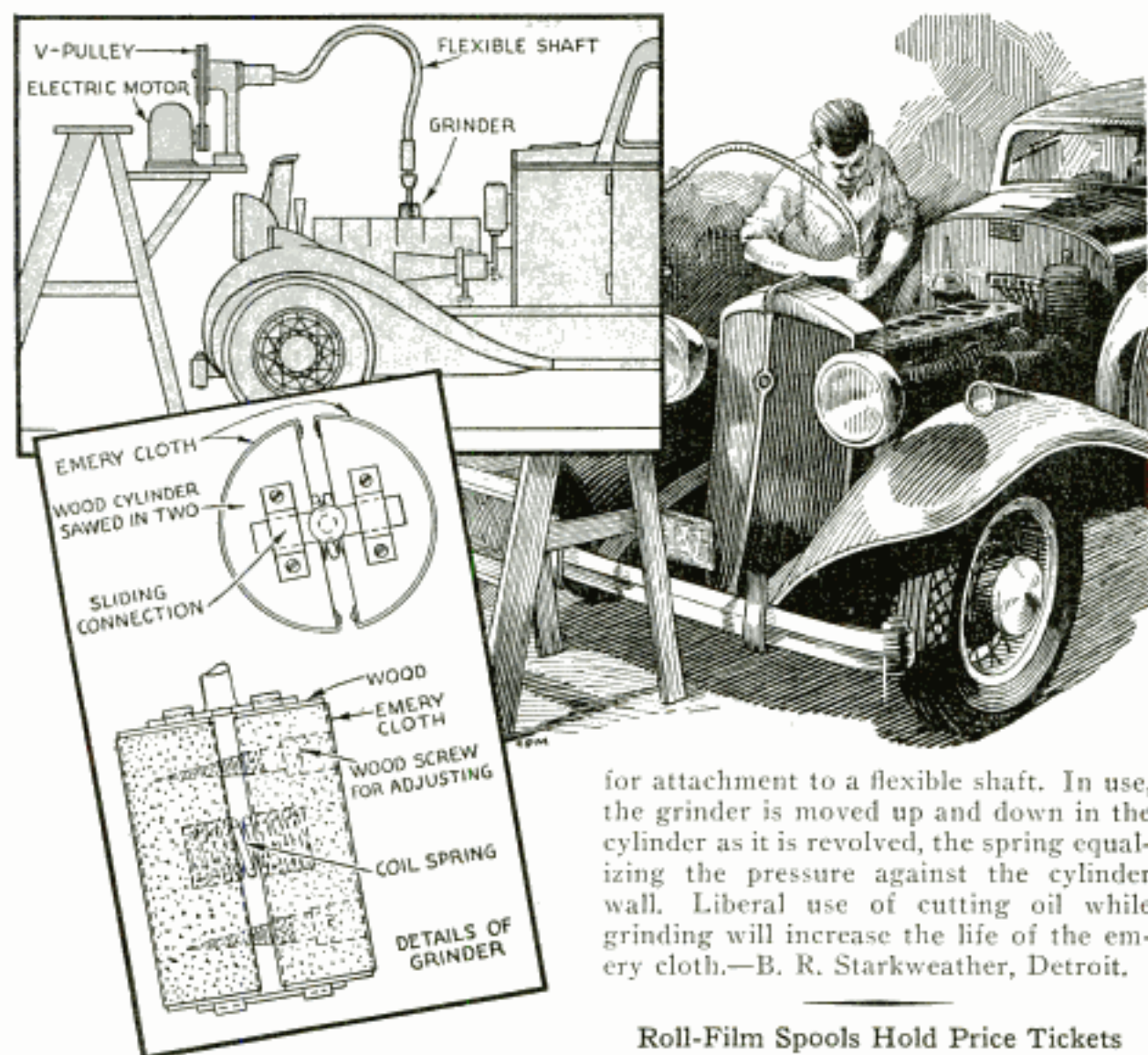
An Arizona contractor uses a signal or warning flag that winds inside a gas-pipe stake when not needed on the job. The stake is about 3 ft. long, is pointed on one end, and has a slot, a little longer than the width of the flag, in one side. The



flag is fastened to a piece of $\frac{1}{4}$ -in. rod, one end of which has been bent to the shape of a crank. Two or three small rings, sewed to the outer edge of the flag, prevent it from rolling inside, and a washer, screwed to the top of the pipe and drilled for the rod, keeps the crank from dropping into the slit in the pipe.

☛ You should get in the habit of resetting the tailstock on a lathe immediately on completing a taper job.

Tool for Truing Up Worn Auto Cylinders



for attachment to a flexible shaft. In use, the grinder is moved up and down in the cylinder as it is revolved, the spring equalizing the pressure against the cylinder wall. Liberal use of cutting oil while grinding will increase the life of the emery cloth.—B. R. Starkweather, Detroit.

Roll-Film Spools Hold Price Tickets

After my car had been driven 40,000 miles, the piston rings had worn the cylinder walls, leaving slight shoulders of several thousandths of an inch above the top of piston travel. Having no reboring and lapping machine, I made the illustrated grinding and honing tool with which the shoulders were removed. It consists of a split wood cylinder, slightly smaller in diameter than the motor cylinders, which is covered with a medium grade of emery cloth. A small coil spring is placed between the two parts, which are held together by means of two adjusting screws that work freely in one piece as shown. Sliding connections at the top and bottom of the cylinder keep the two parts from twisting and provide the necessary rigidity. The top connection has a shank welded to it

for attachment to a flexible shaft. In use, the grinder is moved up and down in the cylinder as it is revolved, the spring equalizing the pressure against the cylinder wall. Liberal use of cutting oil while grinding will increase the life of the emery cloth.—B. R. Starkweather, Detroit.

Retailers and operators of bazaar and rummage sales will find the spools on which roll film is wound handy for holding price tickets. These spools can be obtained at almost any drug store or photo finisher. Simply file or cut off part of each disk so that the spool will not roll, and then slip the ticket into the slot, the lower corners being cut at an angle to permit insertion.





Heavy Canvas Fastened to Roller and Pulled over Truck Bottom Quickly Dumps Light Loads

Sliding Floor Cover on Truck Dumps Light Loads

The owner of a small truck who sometimes hauled light loads of sand, dirt and rocks rigged up a movable cover on the truck floor so that the contents could be dumped without using a shovel. One end of a piece of heavy canvas, large enough

to cover the entire bottom, was doubled over at one edge, which was then securely fastened with roofing nails to a hardwood roller on the rear end of the body. The roller was fitted between two $\frac{1}{4}$ -in. steel plates bolted to the truck body, the plates being drilled to serve as bearings. At one end of the roller a large crank is fitted, for winding up the canvas when unloading.

Spray-Gun Holder Made from Tin Can

To overcome trouble experienced by having his spray gun fall over and spill paint when he set it down, one painter made a holder from a tin can large enough to accommodate the paint jar of the gun. The bottom of the can was nailed to a wood base 4 in. square, the weight of which was sufficient to hold the gun upright when set in the holder. —N. Kline, Parksville, N. Y.



TIN CAN SCREWED TO BLOCK

In Our Next Issue

DRY-ICE EXPERIMENTS ANYONE CAN DO—Some amazing tricks to perform for your friends, without the need of any expensive equipment.

LINOLEUM BLOCK PRINTING AT HOME—How to make your own Christmas, birthday and greeting cards.

WHAT TO DO WHEN YOUR CAR QUILTS—Wasted hours of waiting on the road for a mechanic avoided by knowing a few simple things to do.

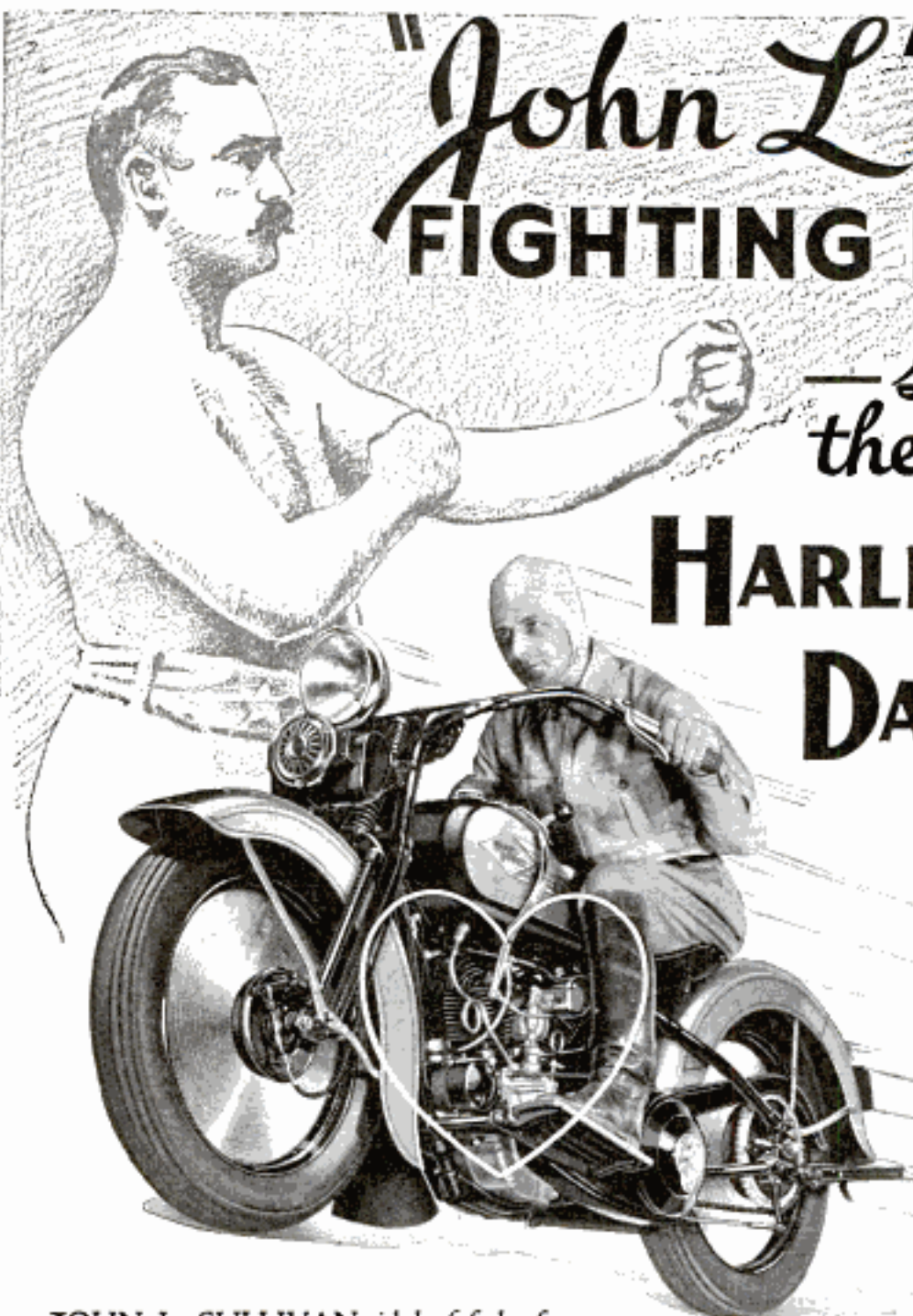
REMOTE CONTROL FOR TOY TRAINS—Train seemingly operates under control of a Tom Thumb engineer.

HOMEMADE AIR COMPRESSOR—An easily constructed item for spray-painting with a small gun, and other uses.

NEW TABLE-TOP GAME—Fascinates young and old for hours on long winter evenings.

MONTEREY DESK—For the home workshop or the manual-training class; makes an attractive piece of home furniture.

SAW FILING—Simplified technique on sharpening your saws.



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FIGHTING HEART**

*—so has
the 1934*

**HARLEY-
DAVIDSON**

New TNT motor
delivers 36 horse-
power—a marvel
in air-cooled mo-
tor engineering!

JOHAN L. SULLIVAN, idol of fight fans the world over, was famed for his punch and fighting heart.

For the same reasons the 1934 Harley-Davidson is the marvel of the motorcycle world.

Just test the "punch" of this 74 Twin. Its marvelous TNT motor is so powerful that hills just flatten out, and miles are but parts of minutes! Like John L. it never knows what

"quit" means—a true FIGHTING HEART, the heart of a Champion!

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PANATOMIC FILM Gives Tiny



KODAK PUPILLE—An aristocrat among miniature cameras, the master of almost every situation under which pictures can be made. It has an ultra-fast $f.2$ anastigmat lens, 30 times as fast as those on ordinary cameras, fitted in a Compur shutter with speeds of 1 to $1/300$ second, carried on a precision spiral mount. Has depth-of-focus scale, and eye-level finder (shown in use above). Focuses from $2\frac{1}{2}$ feet to infinity. Makes 16 pictures, $1\frac{1}{8} \times 1\frac{1}{8}$, on vest-pocket Kodak Panatomic Film, capable of great enlargement. Complete, as shown below, with range finder, 2 filters, and leather carrying case, \$75.



THE miniature type of Kodak has gained greatly in importance through the introduction of Kodak Panatomic Film, a film of such fine grain that tiny negatives produce enlargements of striking size.

The miniature camera, in fact, now has picture-making abilities which are hard to match.

Its powers are of such practical importance that everyone interested in photography should know what they are.

1. By reason of its small size, it can be equipped with an ultra-fast lens without excessive weight or cost, and thus can get pictures with the minimum amount of light and at the fastest shutter speeds.

2. The optical law which gives its short-focus lens extreme depth of field,



PANATOMIC—A New Fine-Grain, Panchromatic Film for Small Cameras

Panatomic pictures of "half-vest-pocket" size can be stepped up to the largest exhibition print size without noticeable granular effect at normal viewing distances. In ordinary picture sizes, enlargements from Panatomic Film are practically indistinguishable in quality from contact prints.

This new Eastman film is not only exceedingly fine-grained—it is also fully color sensitive, offering miniature camera owners the full range of tone effects obtainable only with panchromatic film and color filters.

Kodak Panatomic is as fast as Kodak N. C. Film in daylight and twice as fast in artificial light. It comes in F127 (Vest Pocket), F117 ($2\frac{1}{4} \times 2\frac{1}{4}$), and 35 mm. daylight loading rolls. Try it today.

If it isn't an Eastman, it isn't a Kodak

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Camera Big Picture-Making Powers

increases its focusing latitude and enables it to make pictures which are exceptionally sharp.

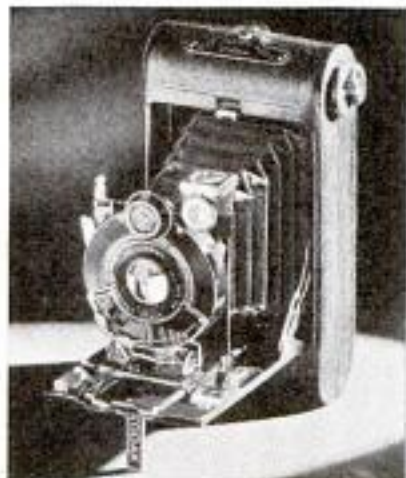
3. It can make very close closeups, and work in the most confined spaces, where only its short-focus, wide-angle lens can take in the scene.

4. It is inexpensive to use in the way that insures the best pictures, which is to make a number of shots of each subject.

And now these unique advantages of the miniature camera are not offset by loss of picture quality through enlargement. In fact, the new fine-grain Kodak Panatomic Film, by removing restrictions as to final picture size, has made super-cameras of the little Kodaks described on these pages.

VEST POCKET KODAKS

Small cameras of great picture-making scope, with lenses and shutters to fit your needs! Vest Pocket Kodaks are available with a wide range of equipment—from the Model B to the *f*.4.5 Special (shown below). May be used with the new fine-grain Kodak Panatomic Film. The small negatives ($1\frac{3}{4} \times 2\frac{1}{2}$ inches) make brilliant prints and excellent enlargements. Supplied in five models. Prices from \$5 to \$25. Let your Kodak dealer show you these fine photographic instruments.



***f*.4.5 V. P. Kodak Special, \$25.**
Other models as low as \$5



IN THE FRONT RANK of miniature cameras are the two Kodak Vollendas. Shown above is the *f*.4.5 model. Its fast lens and eye-level finder make action shots easy. Has 3-speed Pronto shutter and built-in self timer. Makes 16 nega-

tives ($1\frac{3}{4} \times 1\frac{1}{8}$ in.) capable of great enlargement on one roll of F127 Panatomic Film. Price, \$19.50.



***f*.3.5 VOLLEND**

The Kodak Vollenda shown at the left has almost twice the speed of the *f*.4.5 model. An eight-speed Compur shutter gives full play to its fine *f*.3.5 lens. Accurate focusing and framing are simplified by the depth-of-focus scale and eye-level finder. Makes 16 exposures ($1\frac{1}{4} \times 1\frac{1}{8}$ inches) on a vest-pocket size roll of Panatomic Film. Price, \$27.50. Send coupon for full details.

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P.M. 11-33

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Eastman Kodak Company, Rochester, N. Y.

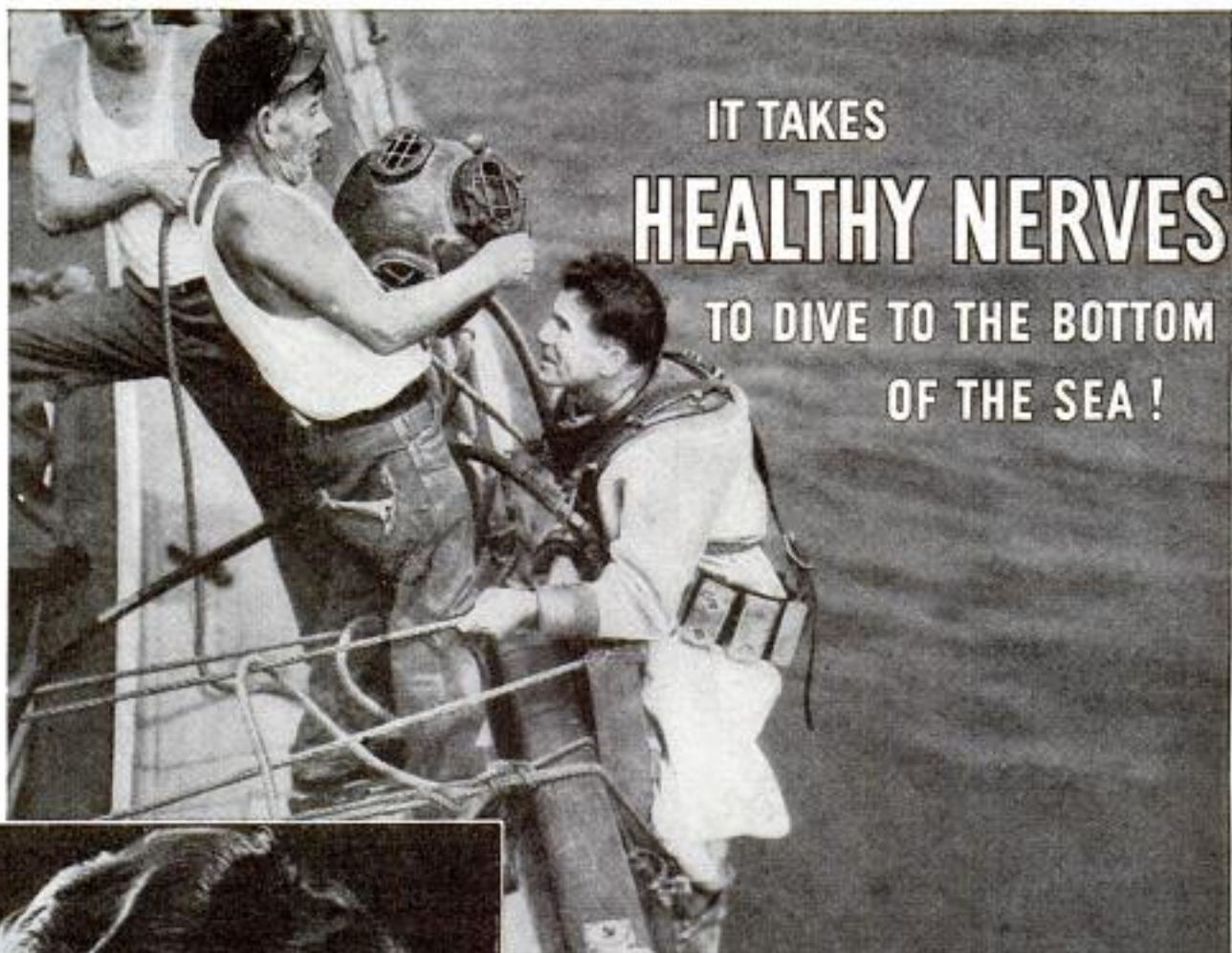
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 TO DIVE TO THE BOTTOM
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● LEFT—FRANK CRILLEY, champion deep-sea diver of the world, retired naval diver, holder of the Congressional Medal of Honor, the Navy Cross and other decorations, about to go over the side in a nerve-wracking, deep-sea descent. His rescue work includes diving at such disasters as that of the ill-fated submarine F-4 off Honolulu, the S-4 at Provincetown, the Messina earthquake, and many others.



● LEFT—HEALTHY NERVES are essential to a deep-sea diver. Frank Crilley, who has been an enthusiastic Camel smoker for many years, says, "Camels never upset my nervous system."



turn to Camels

—they never upset my nervous system."

* * *

Camel's costlier tobaccos *are* milder, do taste better. They never get on the nerves. Men and women whose very lives depend on healthy nerves have discovered this. *Your* nerves will confirm it. Start smoking Camels today and learn the difference.

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Camels are made from finer, MORE EXPENSIVE tobaccos than any other popular brand. You will find Camels rich in flavor and delightfully mild.

Costlier Tobaccos

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NEVER TIRE YOUR TASTE**

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**PROGRAMS WITH VISUAL
EFFECTS**

(Continued from page 741)

message, chart, cartoon or advertisement is to be shown.

The cost of the visual attachment for the home receiver and the special film is quite low. The entire mechanism of the small projector is housed in a container about the size of a cigar box. The reel holding a week's supply of this special film, a section of which is shown, is hardly larger than the ordinary typewriter-ribbon spool. Owing to a new method of film transferring, one small reel will hold enough exposures for an hour's entertainment each night for a week. The cost to the subscriber will be very little for this "ultra-concentrated canned vision" as the inventors termed it. Once used, the film may be thrown away, it is that inexpensive.

The projector works directly in conjunction with the output of any modern radio receiver already in the home as shown in the photo and hook-up diagram. The dial that tunes your receiver automatically starts the projector. A wrong station, or the right station at the wrong time, will not actuate the film. It is fool-proof and furthermore, should one tune in late on a given broadcast, his film will automatically and rapidly find its proper place with respect to the audible portion of the program. This is accomplished through a series of special re-synchronizing perforations on the subscriber's film.

To the layman, the inventors describe the system as follows: The broadcasting station is about to start a program from the studio. The artists are seated before the microphone, which is placed in front of a motion-picture screen. Opposite the studio screen is the master projector. As the studio program starts, the film in the projector, prepared in advance, begins to unreel in step with the words or music of the performers. Instantaneously, in the homes equipped with these radio visual attachments, there is thrown upon the screen exact duplicates of the program being projected in the studio. The home and studio visual performances operate in perfect time without the use of special wavelengths or short-wave sets. Instead of only the head or bust of the artist, this new method makes possible the portrayal of an entire stage or outdoor production.

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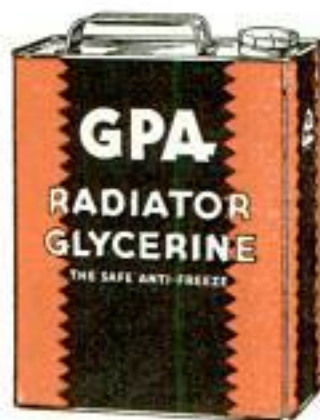
With G. P. A. you get real peace-of-mind. And at lowest prices in history. Prices were re-

duced last year; then reduced *again* this year.

Look at the advantages listed below. Then you'll see why car manufacturers endorse the new G. P. A. . . . why sales increased last year . . . why YOU should get G. P. A.—enough for adequate protection NOW! Glycerine Producers' Association, 386 Fourth Ave., New York.

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This plate is a microphotograph of the abrasive solids found in the sludgy mass collected by a Purolator Oil Filter. They are typical examples of the destructive particles that settle in the crankcase and are carried by the oil stream to every part of the engine.

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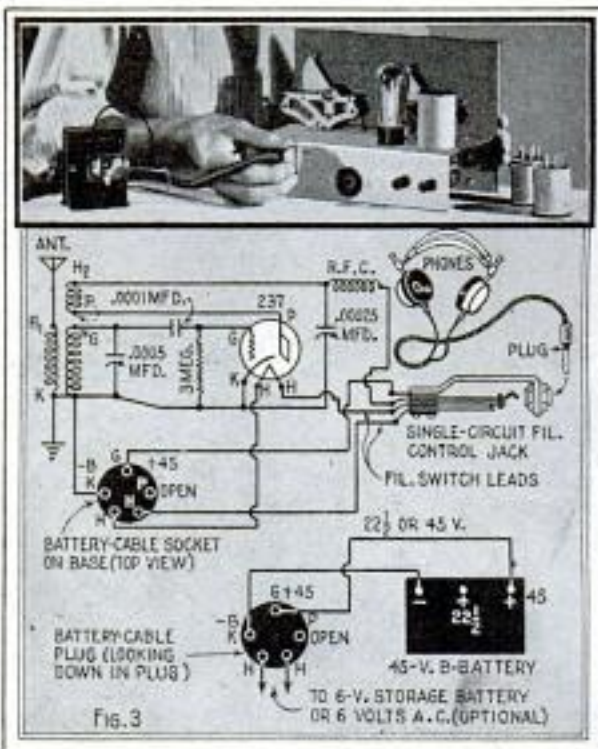
PUROLATOR

THE OIL FILTER ON YOUR MOTORCAR
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ONE-TUBE ALL-WAVE RECEIVER FOR BEGINNERS

(Continued from page 743)

prongs, are also indicated. All coils are wound in the same direction; it will be noted that the tickler-coil winding on the 200 to 500-meter coil is wound on paper placed over the lower end of the grid winding. Care should be taken, while drilling the holes for this coil, not to damage the grid coil winding underneath. When completed, the coils may be covered with

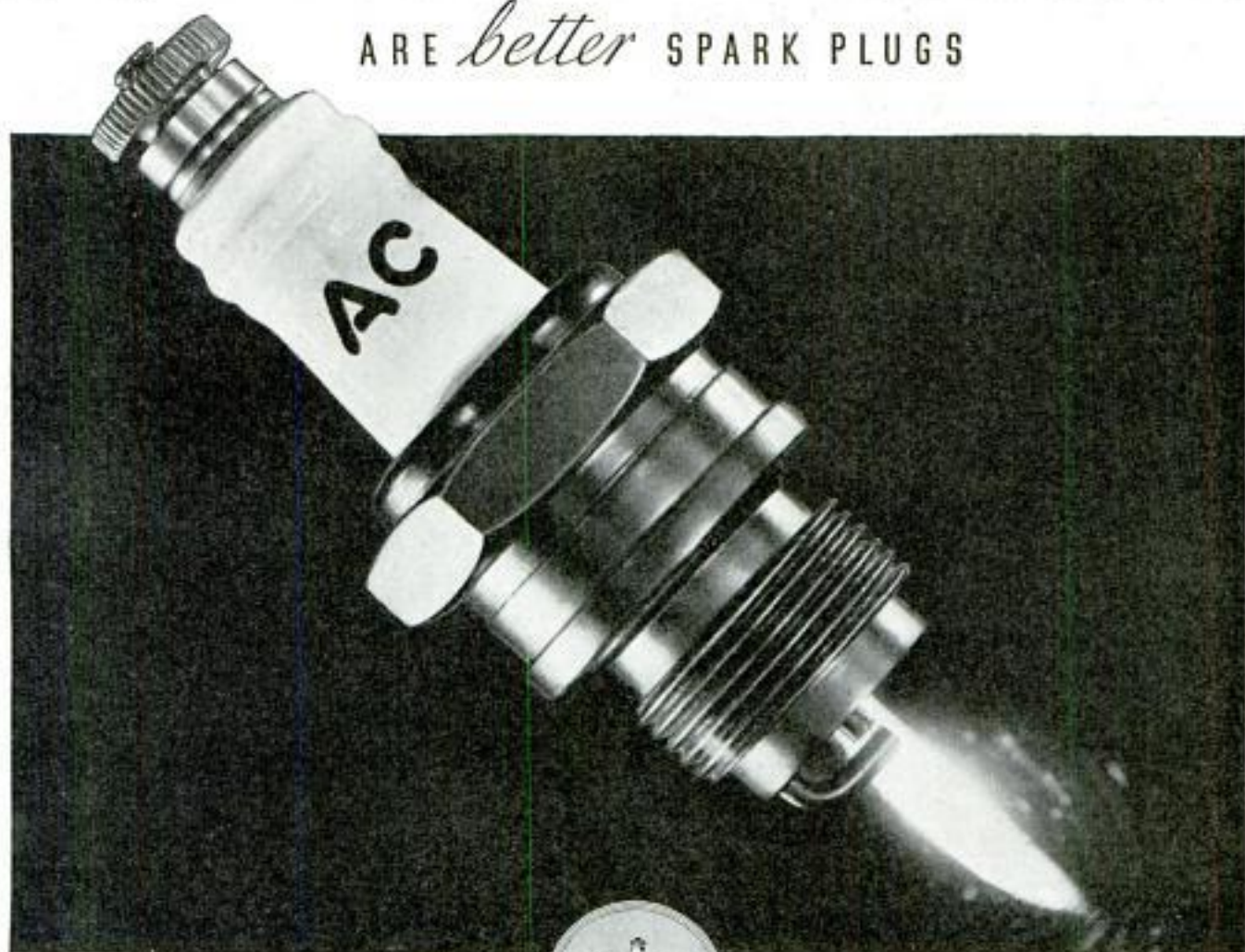


a strip of paper, as shown in the insert photo in Fig. 2. Collodion or shellac is used to hold the protective paper covering in position.

A complete material list can be obtained upon application. The arrangement of the parts, and wiring, is clearly shown in Fig. 2 which is an X-ray view looking down on the completed receiver. The metal base is easily bent to shape in a vise by clamping it between two boards. A small hand drill and tapered reamer are used for cutting the three socket holes. A large blueprint of the layout and wiring diagrams is available; those who wish it should specify blueprint No. 191. The schematic diagram and battery-cable plug connections are shown in Fig. 3.

A 5-conductor cable and plug should be provided as the extra lead will be necessary if an additional tube is added later.

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KING "REX" RULES THE OCEAN

(Continued from page 653)

reckon more with resistances, since the cost of the last three knots almost equals the cost of the first twenty knots. At present, if we want to increase our speed ten per cent, we must almost double our power. When you remember that the "Rex" develops 144,000 shaft horsepower, that is no slight undertaking.

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We need only look at a fish to discover that a blunt face can travel through the water swifter than a sharp face. But it took men thousands of years to conceive and invent the bulbous bow for ships. Is the curvature of the rest of the hull correct? Landsmen are prone to believe that if a ship causes a commotion in the water, it indicates that the hull is well designed. But the best hull is the one which causes the least disturbance.

All over the world, great marine laboratories are now trying to discover the correct curvature for sea-going hulls. When they do find them, faster ships than the "Rex" will undoubtedly be built. Meanwhile, we are well satisfied with the showing she made. She fulfilled every hope we had for her.

WHERE THE WEST IS STILL WILD

(Continued from page 693)

revolver. Driving along a deserted highway, he noticed two cars drawn up in a manner that suggested a holdup. He drove on beyond revolver range, stopped, and walked back. As he approached, a man stepped away from the cars and covered him with a revolver. At the bandit's command he turned and walked back to his car. But instead of driving off as he had been bidden he reached in the rear and pulled out a rifle. The deputy was beyond pistol range and on seeing the larger weapon the bandits jumped into their own car and drove off. The deputy calmly fired three shots into the outlaw car, puncturing a tire and wounding the driver.

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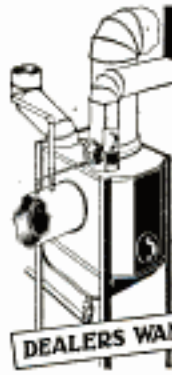
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DEALERS WANTED

YOU MUSTN'T EAT THAT!

C/211 (Continued from page 709)

about foods are traceable to peculiar characteristics of the persons holding such beliefs. The saying that "one man's meat is another man's poison" has a substantial foundation of truth. One man may break out in a violent rash after eating a dish of strawberries. Another may become ill from drinking pure milk. You have to learn by experience what you can eat and what you must leave alone.

There are, however, certain foods that are poisonous to all consumers at certain times of the year, and perfectly edible at others. An example is afforded by certain sea mussels caught in California. In some seasons these produce a poison that causes paralysis in persons eating them.

The ptomaine-poison myth is firmly rooted in the popular imagination. When someone eats something that makes him sick, the immediate thought frequently is that he has ptomaine poison.

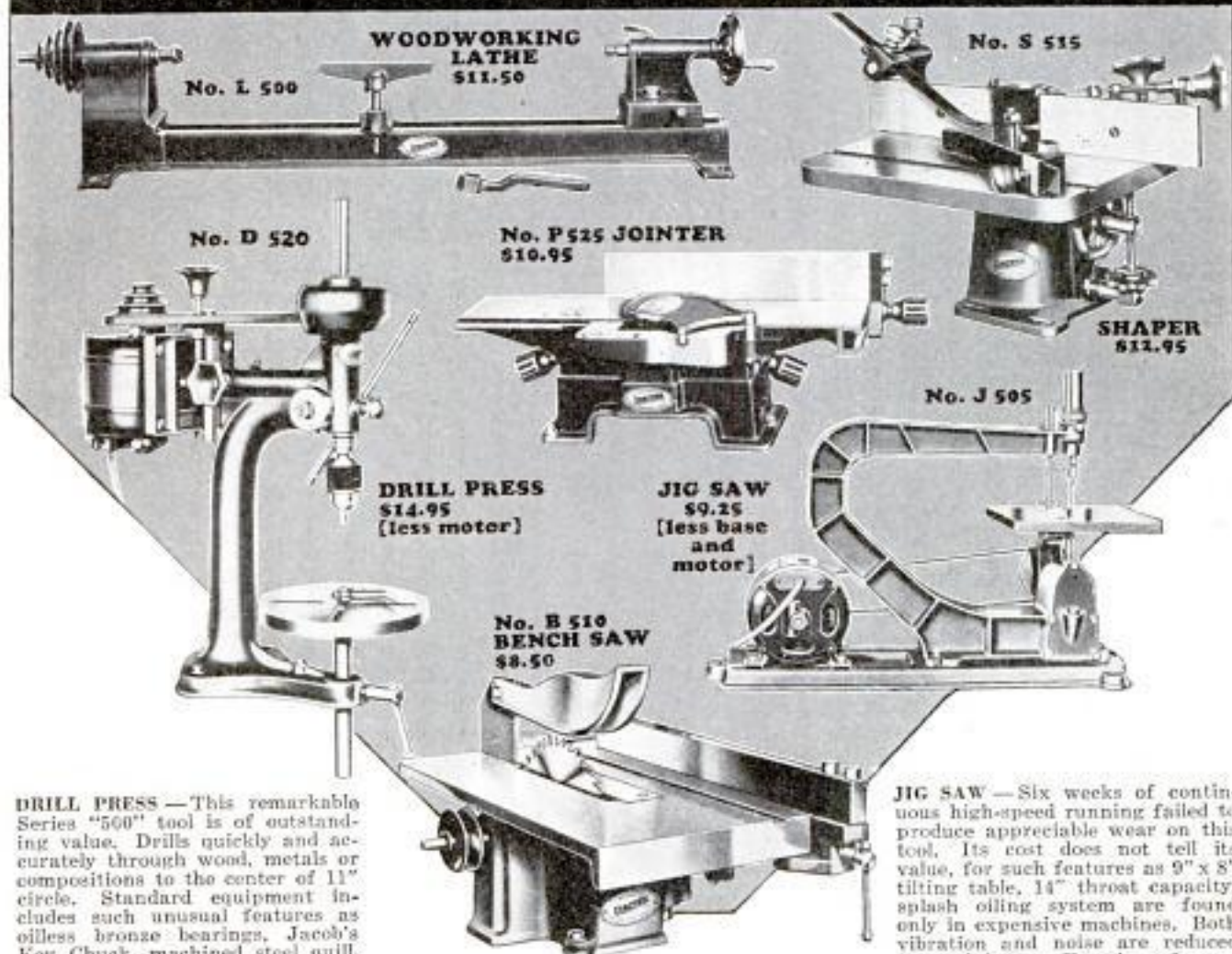
And this brings out another misconception, although one that will be of greater benefit to everybody if it is permitted to continue as a myth. Recent investigations have shown that decayed food is not necessarily dangerous food. However, it happens that food which contains ptomaine poison always is decayed. It is believed that the poison is produced by specific bacteria, and that these always associate with other harmless bacteria which cause decay.

One of the most powerful poisonous substances known is generated by certain bacteria which sometimes grow in decaying food. It is so potent that persons who merely tasted food containing it have died. Botulism, as this type of poisoning is known, happily has not visited this country very often in recent years. Home-canned foods such as string beans, asparagus, fish, corn and peas sometimes cause trouble. The germ that causes botulism can withstand ordinary boiling, and must be processed under steam pressure to make destruction certain. The canning industry has improved its methods so that today there is little likelihood of botulism from commercial cannery products.

Another form of food poisoning that is troublesome but not frequently fatal is gastro-enteritis. It likewise is produced by

(Continued to page 126A)

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YOU MUSTN'T EAT THAT!

(Continued from page 124A)

bacteria which generate a poison, and is most common in such foods as custards, cream fillings, meat pies and hash made from left-overs and not thoroughly heated.

Dr. Albert C. Hunter, who studies food poisons for the department of agriculture, recommends that all foods which give the least indication of being spoiled be discarded. Although you may be able to eat partly spoiled food and get away with it, some day you may run into a nest of the wrong kind of germs. Canned goods particularly should be watched. If the can is of metal, decay usually produces a swelling or bulging of the ends or lids. If there is a pressure inside, noticeable when the can is punctured, the contents should not be used. As for glass containers, they should be inspected for leaks, presence of bubbles in the food, pressure, discoloration, or mushy or stringy appearance of the contents.

All foods which do not give off a normal odor should be rejected. Bacteria causing gastro-enteritis may be present without perceptible changes in odor, but in the majority of cases growth of the botulinus organism is accompanied by some spoilage of the food. If you merely taste a food that is infected with a powerful poison—that causing botulism, for example—you may be poisoned as thoroughly as if you had eaten a considerable amount.

In selecting your food, you will have to rely largely upon experience to determine what to avoid. Food studies indicate that a healthy person's taste is a reliable guide to the things that can be eaten with success. If you like baked beans, the chances are that you can digest them.

About the only thing which the average eater cannot leave entirely to his native judgment seems to be the matter of quantity. The girl who weighs 210 pounds and likes chocolate creams, very often cannot rely on her gastronomic yardstick. But, on the whole, your chances of going into an early grave that you dug with your teeth will be lessened if you rely on common sense and the advices of your appetite, snap your fingers at popular but unscientific food myths, insist on food adequately cooked in sanitary surroundings, and, above all, avoid anything that appears to be the least bit spoiled.

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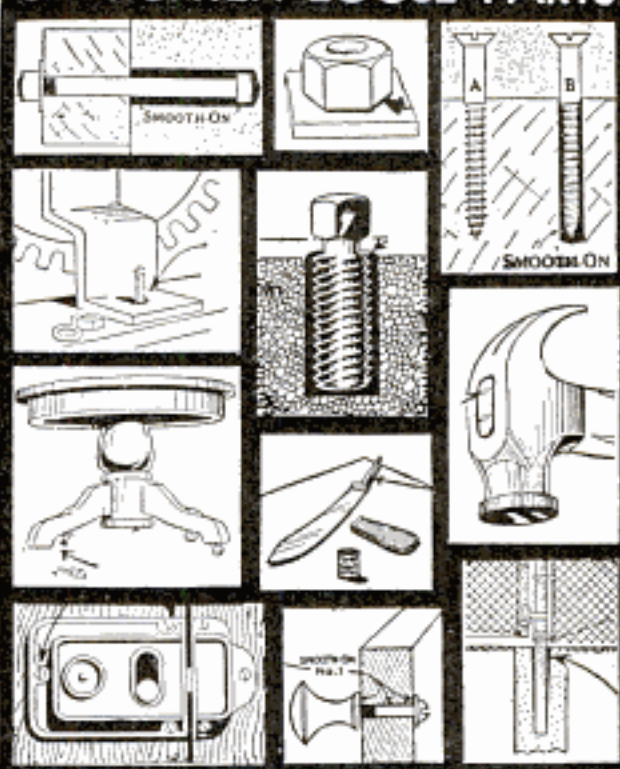


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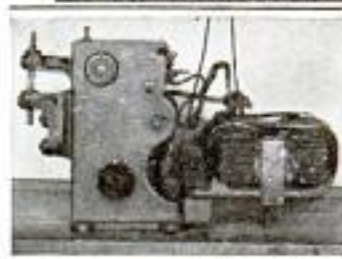
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Axes, hunting knives, tools—one wipe with Esso Handy Oil and they are protected for weeks against rust and corrosion. Carry a can in your pack—leak-proof cap keeps it out of the bacon. Of course there's a can in the car, too—it earns its keep in no time. On sale at dealers everywhere.

Esso, Inc., 26 Broadway, New York City

Esso HANDY OIL

TRAFFIC COPS OF THE SEA

(Continued from page 717)

Then the temperature at surface and at five different depths is taken and water samples are drawn up for salinity determination. From this information may be predicted the direction in which the berg will move.

Upon the oceanographer, a scientifically trained officer or civilian in the employ of the United States coast guard, falls the job of watching the icebergs. He remains at sea during the entire period that the bergs are present, transferring by small boat from one cutter to the other. The oceanographer must know his vessel's position any moment of the day or night. He is the Ice-Patrol aide to the commanding officers of the cutter and keeps a changing record of the movements of all ships within 400 miles. In addition, he keeps tab on all ice floating in the steamer lanes and sends radio warnings of weather, derelicts and ice, prepares weather charts and receives and answers requests from ships by radio.

The season of 1933 was unusual in that no icebergs appeared far enough south to menace the ship lanes. This condition made it unnecessary for the regular patrol cutters to go north, but the "General Greene" was engaged in ice observation from the first of March to the end of June and the "Champlain" made one cruise the latter part of June. Following its observation duties, the "General Greene" proceeded on a northern oceanographic cruise under command of Lieut. R. M. Hoyle, United States coast guard. F. M. Soule, senior physical oceanographer, was aboard to survey the waters between Greenland and Labrador in search of further knowledge of conditions bearing upon the ice menace in the North Atlantic.

Attempts to destroy icebergs with high explosives have not been very successful, one giant berg resisting two heavy charges of TNT.

As a reminder of the importance of its "traffic cop" duties, memorial services for those who lost their lives in the Titanic disaster are held aboard the coast-guard patrol cutter on April 14 of each year, usually at the actual spot where the big liner sank. Thus, the United States coast guard pledges itself anew to protect shipping against the "white specters" of the sea.

NEW LOW PRICES ON
GOODRICH-Firestone
GOOD YEAR \$2.15
U.S., FISK and OTHERS 19 K. 4. 40 - 21

And we **YOU**
 defy anyone to equal our quality. Every standard brand tire reconstructed by our superior, modern method is positively guaranteed to give full 12 months' service under severest road conditions. This guarantee is backed by the entire financial resources of an outstanding company, Member N.R.A. Today's lowest prices.

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BALLOON TIRES		REG. CORD TIRES	
Size	Price	Size	Price
29x4.40-21	\$2.15	30x3	\$2.25
29x4.50-20	2.35	20x3 1/2	2.35
29x4.50-21	2.40	21x4	2.95
29x4.75-19	2.45	22x4	2.95
29x4.75-20	2.50	22x4	2.95
29x5.00-19	2.55	24x4	3.25
29x5.00-20	2.65	22x4 1/2	3.25
29x5.25-18	2.90	22x4 1/2	3.45
29x5.25-19	2.95	24x4 1/2	3.45
30x5.25-20	2.95	30x5	3.65
31x5.25-21	3.25	30x5	3.75
29x5.50-18	3.35	32x5	3.95
29x5.50-19	3.35		
29x5.00-18	3.40		
31x5.00-19	3.40		
32x6.00-20	3.45		
32x6.00-21	3.65		
32x6.00-20	3.75		

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 SEND ONLY \$1 DEPOSIT on each tire ordered. We ship balance C. O. D. \$ per cent discount for full cash with order. Any tire failing to give 12 months' service replaced at half price.

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 1840 S. MICHIGAN AVE., CHICAGO, ILL.

FREE "RAY-O-VAC" Flashlight Lantern With Order for 2 Tires
 Complete with batteries and bulb, ready to use. Holds and automobile necessity. Gives 600 foot light beam. Adjustable handle.

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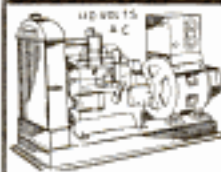
12 and 15 in.
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MONOCOQUE POLISH FIGHTER BOEING FIGHTER HEATH PARASOL **SPARROW HAWK FOKKER D-8 SOPWITH CAMEL** **PUSS MOTH FOKKER TRIPLANE** **60¢** **POSTPAID**

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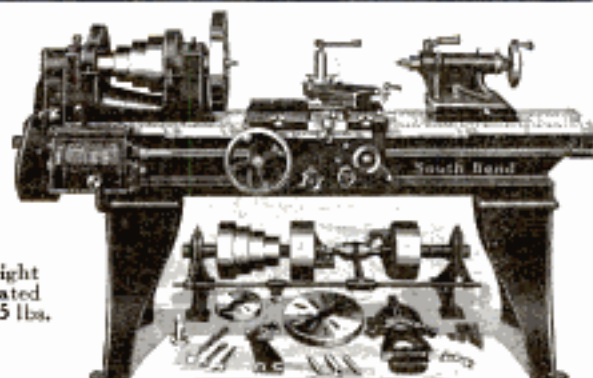
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Heaters \$14.50 up

A Kalamazoo Direct to You!

South Bend Lathes

Back-Geared, Screw Cutting Precision Lathes



Weight Crated 1875 lbs.

16" x 6" Quick Change Gear Lathe, Countershaft Drive, \$540. Terms \$105 down, \$38 a month

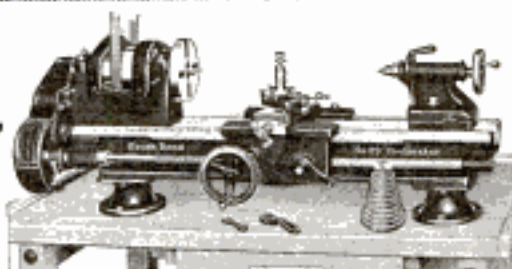
The 16" Lathe is recommended for the manufacturing plant, tool room, machine shop, repair shop, and automotive service shop. Has the precision for the finest tool and die work, also the power and rigidity for heavy jobs. Is available in Quick Change Gear and Standard Change Gear types—in bed lengths from 6' to 12"—in countershaft drive and individual motor drive models—\$540 to \$980. Easy Terms.

Used by U. S. Government, Radio-Victor Corporation, Carborundum Company, Western Electric Company, and in hundreds of America's finest industries.

Prices of Other Popular Sizes

SIZE OF LATHE	Weight Crated	Quick Change	Standard Change
9" x 3' Junior.....	375 lbs.		\$169.00
9" x 3'.....	430 lbs.	\$265.00	225.00
11" x 4'.....	725 lbs.	340.00	300.00
13" x 5'.....	1110 lbs.	402.00	352.00
16" x 8'.....	2035 lbs.	580.00	520.00
18" x 10'.....	2840 lbs.	759.00	689.00

New 9" Swing "Toolmaker" Bench Lathe \$100.00 and up



9" x 3" "Toolmaker" Bench Lathe Complete as shown, \$110.00
 Terms \$28.00 down, \$7.00 a month

The 9" Swing "Toolmaker" is a back-geared screw cutting precision Lathe for light manufacturing, laboratory and tool work, also for the repair shop, auto shop, electrical shop and home workshop. Available in bed lengths from 2 1/2' to 4'—bench or floor legs—countershaft and motor drive.

Send for Complete Catalog

Write for General Catalog No. 93 describing all sizes and types of lathes except the 9" "Toolmaker". Also Circular 9-G showing 9" South Bend Toolmaker Lathes in various types and drives. Sent free postpaid, on request. Use coupon below.

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 Gentlemen: Kindly send General Catalog No. 93 9-G "Toolmaker" Circular size of lathe class of work
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FITS ALL
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FITS ANY
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Do away forever with the drudgery of wood or coal. The most simple and economical invention on the market is now giving perfect satisfaction to enthusiastic users everywhere. This new invention is a new type of oil burner that takes the place of wood or coal and automatically and silently changes cheap oil into one of the quickest and hottest fires known.

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Try this wonderful burner right in your own home at our risk. Act quickly and get our special low introductory price. Sold under absolute money-back guarantee. Write at once for FREE booklet on home heating and how to get a burner without cost.

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Big money to be made. The demand is enormous. Claude Wints sold \$4,301.00 in one month. We want spare or full time workers immediately. Real money-making opportunity. Write or wire for our protected territory offer.

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Send your free booklet with details on home heating for
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 Check if interested in making money as an international representative with protected territory.

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Don't Throw Away
That Coat and Vest!

Let us match your coat and vest with new trousers tailored to your measure. Save the price of a new suit. Over 100,000 patterns. Mail sample of suit, or your vest which will be returned with FREE sample for your approval.

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ACCURATE
NOISELESS

No Cleaning Required. Recoil and
Bullet Splatter Absolutely Eliminated.
Low Cost Ammunition.

The Crosman Silent .22 Single Shot and the Crosman Silent .22 Repeater pneumatic rifles are a decided improvement over the noisy old-fashioned powder guns because of their absolute and unflinching accuracy.

FREE

We will mail to you, absolutely free, our booklet containing full information about target and game shooting . . . also Crosman catalog, or ask your dealer.

CROSMAN ARMS COMPANY

407 St. Paul St.

Rochester, N. Y.

DEAD MEN MADE TO LIVE

(Continued from page 687)

ing methods as fast as they are perfected is the job of the modern ambulance crew. Traveling auto-hospitals, complete with the finest medical equipment, speed to your rescue, with a surgeon in charge.

Inside are improved instruments for first-aid treatment—head bandages all made up; hinged leg and arm splints, upholstered with lamb's wool and covered with rubber, that may be slipped in place and laced tight with only two motions; "iron lung" oxygen respirators, and a complete kit of necessary medicines. Collapsible tubes filled with opiates, heart stimulants, sedatives, and other medicines are ready for instant use. No need to wait for sterilizing a hypodermic needle; it forms part of the tube, which is sealed, germ-proof, ready for immediate injection.

Rapid telephone connections, radio broadcasting systems, swift, smooth-riding cars, and highly-organized efficiency on the part of ambulance crews, today have drastically slashed the time required to respond to a call. In Los Angeles, where a fleet of ambulances has a territory of hundreds of square miles to cover, the average time is seven to eight minutes.

Precious, life-giving moments, these; for whether or not you may be snatched from death depends upon whether your heart can be made to resume its task of pumping blood through the system. After circulation has stopped for half an hour or so, the blood begins to clot and congeal. Then it is too late. But until then, you still have a chance.

Organized science gives you two or three minutes to summon aid. Don't waste them!

"Many lives have been lost unnecessarily through panic," says Dr. Charles F. Sebastian, assistant chief surgeon at the Georgia Street Receiving Hospital. "When a crowd collects at the scene of an accident, some time often elapses before it is discovered that no one has taken the responsibility of calling for aid.

"When an accident occurs, don't lose your head. Be sure some one actually goes at once and calls a doctor.

"Don't get hysterical. Make a little examination to be sure the victim is actually injured, and if possible, in what way he is

(Continued to page 132A)



EASY to Play

WITH an easy-playing Conn band instrument, you can be ready for band or orchestra in 4 to 6 weeks. A sure road to popularity if you start on a Conn. Choice of the world's greatest artists. Magnificent tone. Many exclusive features—yet they cost no more.

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World's Largest
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Canned Wood Makes Home Repairs Easy



Newly discovered wood that comes in cans makes it easy for anyone to keep home in first-class condition. Handles like putty, just as soft. Quickly hardens into wood, like natural wood. You can paint, carve it. Drive nails or screws into it. It's PLASTIC WOOD. If you have a broken chair...loose caster, ugly nick...crack in floor, hole in wood, plaster or tile, loose drawer pull . . . rotten spot in wood to replace . . . do a quick, expert, permanent job of repairing with PLASTIC WOOD. Results will surprise you. Paint, hardware stores sell for 25¢ a tube, 35¢ a can.

PLASTIC WOOD

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METLMACH THE MODERN MACH

FIRE PROOF—WATER PROOF—100% SAFE

The only thing of its kind. A remarkable match, made of metal, that can be thrown in fire and water yet is unharmed, lights 1000 times, or more. SAFE. Ends fear of fires and danger to children. Needed in every home and by all campers or smokers. Cheaper, more convenient than old fashioned matches. Sells on sight.

Try Metlmach for yourself and see why it has sold around the world in 90 days. Send 10c and a 3c stamp for sample METLMACH with full salesman's terms, or better still send \$1 for 15 METLMACHES with all particulars, sell them for 10c each and make 50% profit.

Metalmach Corp., 115 Water St., Warsaw, Ill.

Salesmen

One man sold 100 gross in three days, earning \$227. We want more men in every locality to do the same.

COPY-STAMP THE STAMP OF A THOUSAND USES



Prints postcards, letters, menus, school-work, notices, drawings, tags, etc. Used by hundreds of business concerns, schools, clubs, churches, and others. Quick, clean, automatic, instantly changeable. Ask your stationer or write us direct.

THE STENCIL-STAMP CO., INC.
53 Park Row New York, N. Y.

A BIG NEW WOOD LATHE AT A SENSATIONAL LOW PRICE

Turns 8" Diameter
36" Between Centers

**SPECIAL
OFFER**



Imagine it. This extra heavy wood lathe, all steel bed, 48 inches long, at lowest price ever quoted. Heavy duty headstock with 3 step cone pulley for V-belt. Extra long nosecone roller bearings. Spur center and 4 inch face plate screw onto spindle. Tailstock spindle has screw movement of 1 1/2 inches. Tool rest 5 in. long. Priced amazingly low. Accessories include 3 step cone motor pulley, V-belt, and set of 4 turning chisels. Net weight 27 lbs. Shipping weight 30 lbs. Send now for FREE information. Amazing low prices. Not sold through agents or chain stores. **BLUE STAR LATHE, 200 Main St., FAIRFIELD, IOWA.**

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TAKE UP THEIR OWN WEAR

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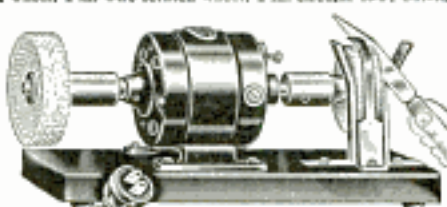
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High-grade polishing stand with adjustable split bearings; 3 jaw drill; 3 in.-3 row bristle brush set of 9 wheels; 5 ft. leather belt and book; saw table; mitre gauge; 2-speed pulley; polishing compound; tapering spindle. All for \$3.95. \$1.00 with order, balance C. O. D. Money refunded if not satisfied.

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A wonderful spare-time or full-time money maker. Sharpens knives in your home or carry it with you. Easy to use. No experience needed. Put on a keen lasting edge in a jiffy. A sure repeat business. Will pay for itself quickly. 9 in. long, 4 in. high, weighs only 2 pounds. **\$6.45**
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Fits-kit FOLDING HACKSAW



MECHANICS • MOTORISTS • FARMERS

Here is the all-purpose tool that you have been waiting for! Something brand new! The famous Fits-Kit Hack Saw is just the tool you've always wanted to do a thousand and one jobs around the house, shop, camp, and car. Does the work of a saw, knife or hatchet. Cuts wood, steel, or bone.

FOLDS FOR KIT OR POCKET

Fits-Kit Hack Saw folds up for convenient carrying in kit, tool chest or pocket. Built on an entirely new principle that insures perfect tension of blade at all times. Made of cold rolled steel throughout and positively cannot get out of order. Has magazine in back for spare blades. Will last a lifetime. The handiest tool you ever owned! Send \$2 for one today. Money back if not satisfied.

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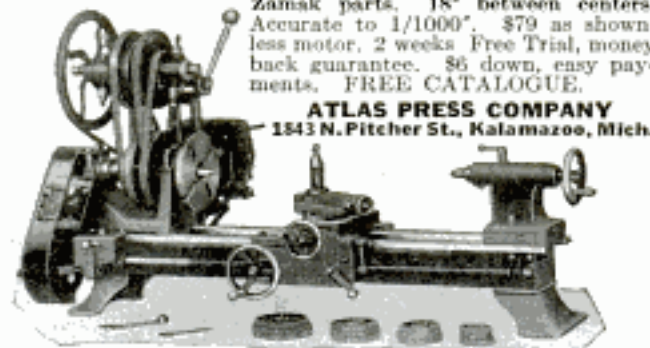


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No increase in price yet. Real 1933 modern design. V-belt drive. Built-in countershaft. Runs from light socket. 45 Zamsk parts. 18" between centers. Accurate to 1/1000". \$79 as shown, less motor. 2 weeks Free Trial, money back guarantee. \$6 down, easy payments. FREE CATALOGUE.

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**Allied Radio
CORPORATION**
833 W. JACKSON BLVD., CHICAGO, ILL.

DEAD MEN MADE TO LIVE

(Continued from page 130A)

hurt. Describe his symptoms as clearly as possible over the phone. This is a great aid to the ambulance surgeon, as he can be preparing the means of treatment while the ambulance is on its way.

"Don't move the victim unnecessarily. Many times, attempts to move the victim has brought him to a critical condition and shortened his chances for life.

"Be sure to give the address of the accident, describing it accurately. Too often the emergency-hospital phone rings and an excited voice calls, 'there's been a terrible accident over here. Send an ambulance quick!'—and hangs up."

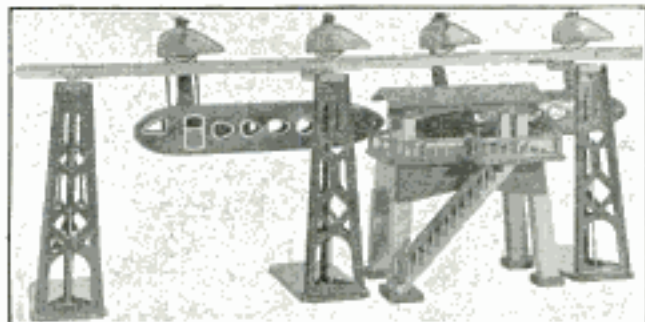
The aerial ambulance is fast becoming an important factor where distances are great and doctors few. At Kelly field, the United States army air corps has an ambulance plane which last year transported one hundred stretcher patients by air. The United States coast guard, too, operates a complete sea-going ambulance service from its bases along the coast.

Just recently, twenty-eight miles out to sea, two men lay at the point of death, terribly scalded by an exploding steam pipe aboard the oil tanker "Samuel Q. Brown." The ship's doctor shook his head gravely. Only special hospital treatment could save their lives.

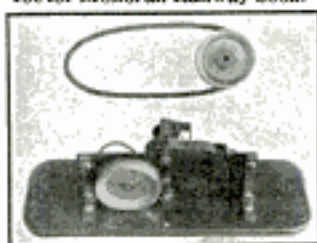
Radio waves leapt from the ship's antenna. At Cape May, N. J., United States coast guard base No. 9, a radio operator was listening. He reported to his commanding officer. Crisp orders were given. A huge amphibian plane skimmed across the water and took to the air. Twenty-five minutes later, it swooped down alongside the tanker. The injured men were strapped to stretchers and transferred to the plane. The amphibian sped back to Cape May, where a doctor and ambulance waited. Quickly examining the patients, the doctor frowned.

"I can do nothing for them. Their only hope is to rush them to the St. Agnes hospital at Philadelphia, where they can be given special treatment that is not available here."

The plane sped off again. Soon it landed at Philadelphia navy yard, where another ambulance was waiting. Within a few moments the sufferers were being given the finest hospital care.



MINIATURE MONORAIL RAILWAYS BRING YOUR RAILWAY UP TO DATE. Complete sets priced from \$8.85 up. Send 10c for Monorail Railway book.



The finest toy power motor on earth, 6-8 volt, AC or DC, geared reduction (cut tooth gears) to 2" grooved pulley. 8 to 1 or 16 to 1 reduction, as you wish. Reverse control switch. Size 9" x 3" x 2 3/4" high. \$1.98
Extra pulley with 1/4" hole.15
Endless 1/4" cord, rubber belt .15

Aero Monorail Company
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1000 Rooms
Three restaurants including popular-price Coffee Shop. Rates from \$2.50 single, \$4 double.

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HEATING, TEMPERING, ETC.

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We can supply construction sets and all sorts of parts, blue prints, books, etc., for building real life scale models of the Destroyer Preston, Flying Cloud, Constitution, Spanish Galleon, Sovereign of the Seas, Blossom, Mayflower and many others. Our large 84-page photographically illustrated booklet contains valuable information and hints for building ship models in addition to prices and full description of the above articles. A copy will be sent postpaid upon receipt of 15 cts. (coins preferred).

Model Ship Supply Co., Dept. A, Mineola, N. Y.

Cash Daily Making Do-Nuts!

BIG PROFITS
in Your Own
Business at Home



Greaseless!

HERE'S a steady, fine-paying business that earns big profits—you get two to three times your production cost. You get *cash every day*. Start right in your own home, in spare time, or have a shop of your own. Men and women in many parts of the country earning good steady incomes—making a product that everybody likes, that sells on sight—delicious, greaseless do-nuts baked by electricity with the Ringer Electric Do-Nut Baker.

"My Ringer Do-Nut outfit has ended my worries," says Arthur Rabenort, of Illinois. "I do wholesale business only and am selling 80 dozen a day!"

Year 'Round Business

—Steady demand from stores, cafes, homes—and a fast seller at Fairs, Parks, Benches, Highway Stands, Rinks, etc.

"The only business I know of that pays a profit the first day. I now have two Ringer machines," writes H. H. Liesenfelder, Wis. C. H. Barr of Ky. writes, "After searching the city for work, I bought a Ringer Do-Nut Machine. Now I supply steady customers that buy every week. It is a paying business." Mrs. T. A. Lay, Fla., writes, "Have all the business I care to handle. The machine makes a beautiful, tasty do-nut."

No Canvassing These delicious Do-Nuts speak for themselves. Grocers, restaurants, drug stores, lunch counters buy all you can make. Or, as others are doing, you can sell your entire output profitably by men, women or boys on commission basis. Ringer Do-Nut Baker operators who started in spare time at home now have attractive, profitable shops of their own.

Start Now! It takes only a \$25 investment to start you. Get into the business that brings freedom from financial worries—that will make you independent, happy and prosperous. NOW is the time to start!

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—show you how easy it is to start making money at once. Send coupon or a penny post card for full information. No obligation. No salesman will call. Write today. Ringer Do-Nut Co., 159 Main St. N. E., Minneapolis, Minn.



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Please send me Free Plans and full information about the Ringer Do-Nut Baker.

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22x5.00-19	2.55	32x4.75	2.75
22x5.00-20	2.55	32x4.75	2.75
22x5.00-18	2.90	32x4.75	2.75
22x5.00-19	2.95	32x5	2.75
22x5.00-20	2.95	32x5	2.75
22x5.00-21	2.95	32x5	2.75
22x5.00-18	3.30	32x5	2.75
22x5.00-19	3.30	32x5	2.75
22x5.00-20	3.30	32x5	2.75
22x5.00-21	3.30	32x5	2.75
22x5.00-18	3.40	32x5	2.75
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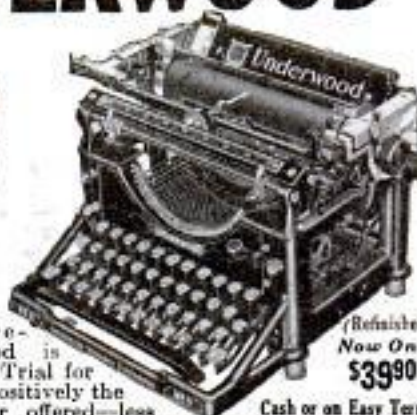
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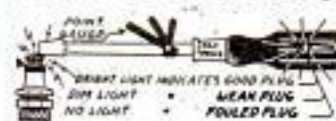
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