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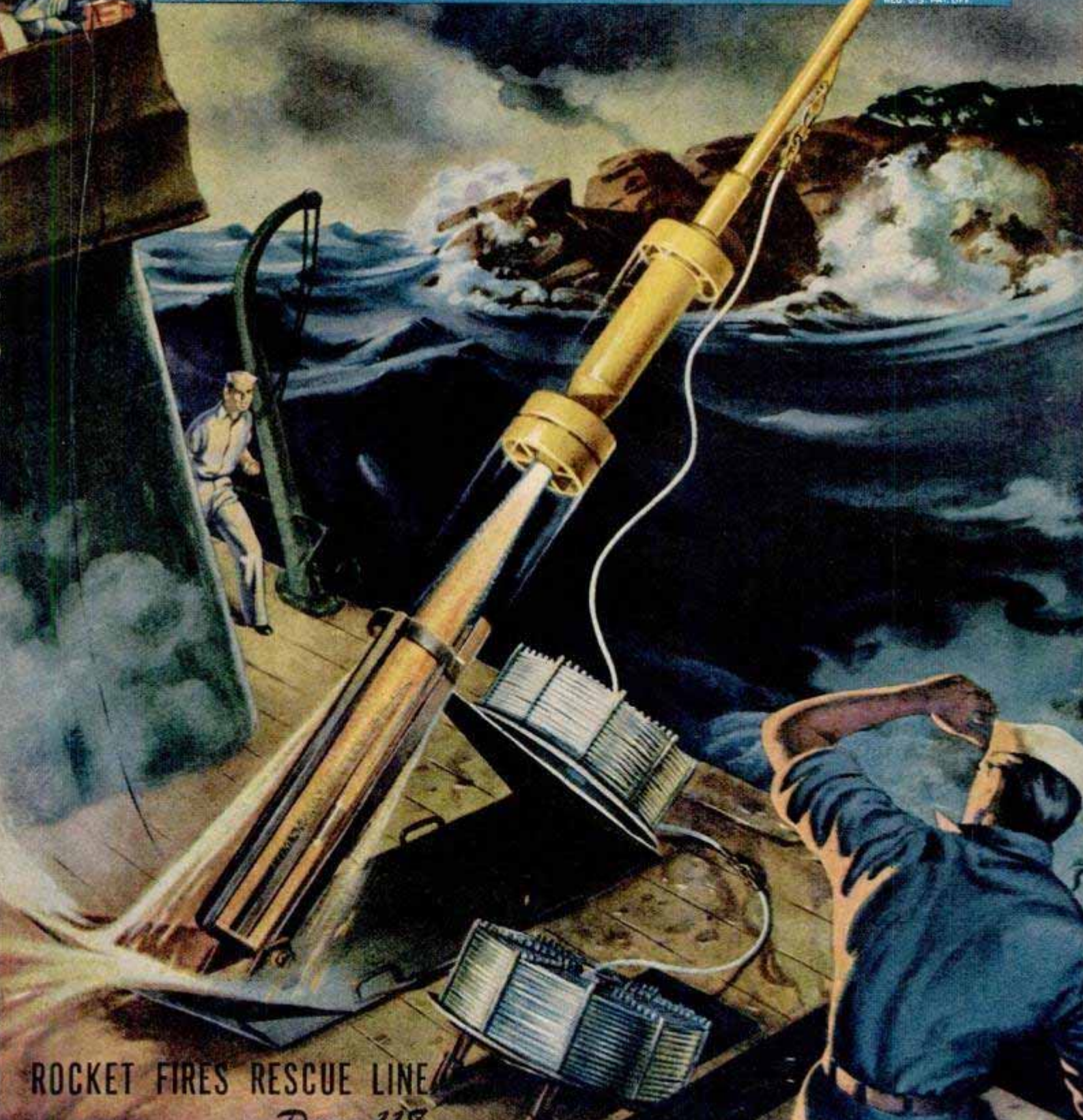
POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG. GREAT BRITAIN, No. 410426

REG. U.S. PAT. OFF.



ROCKET FIRES RESCUE LINE

2 118



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WHEN YOU NEED IT!

Ray-O-Vac leak-proof batteries
stay fresh for years!

(because they're sealed in steel!)

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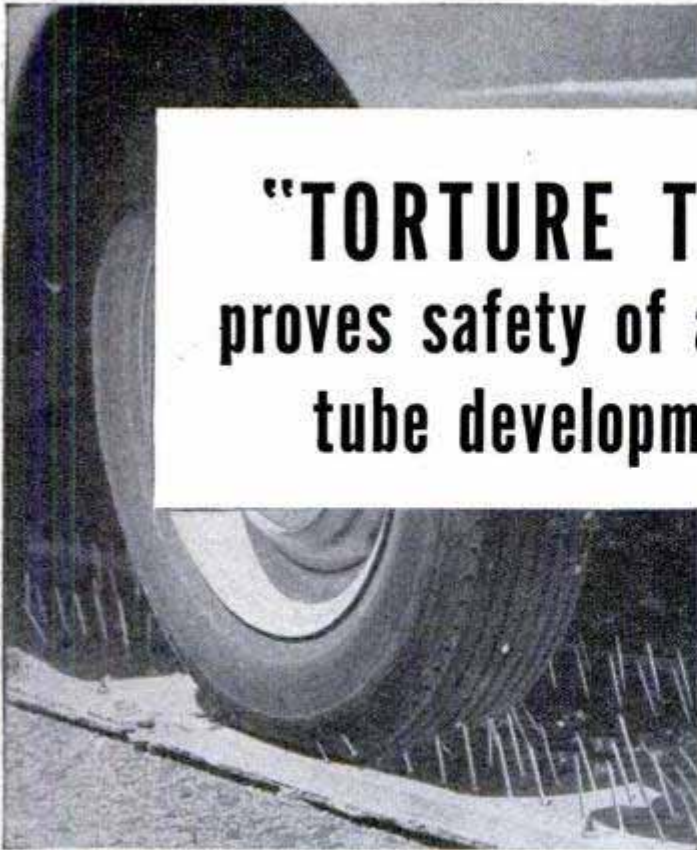
1. Steel bottom is added.
2. And a steel top.
3. Next—multiple insulation. Nine layers of protection against corrosion.
4. Last—a steel jacket. This completes an air-tight seal, to stop corrosion and keep the battery fresh and powerful. Only Ray-O-Vac builds batteries with all four of these safeguards.

GUARANTEE on every Ray-O-Vac Leak Proof: "If your flashlight is damaged by corrosion, leakage or swelling of this battery, send it to us with the batteries and we will give you **FREE** a new, comparable flashlight with batteries."

Ask for Ray-O-Vac Leak Proofs

Buy Spares... they stay fresh

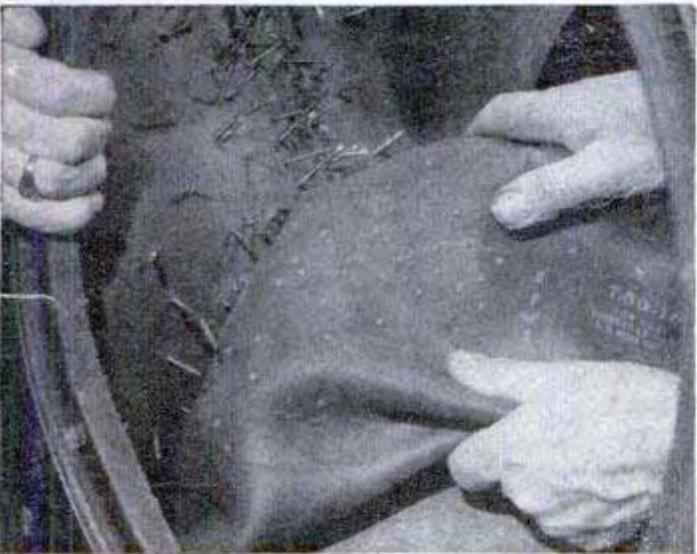
"TORTURE TEST" proves safety of amazing tube development!



1. In severe "Torture Test", cars equipped with Seiberling Sealed-Air Tubes roll down "torture road", pick up hundreds of nails that pierce deeply through tires and tubes. But the tubes do *not* go flat, need no repairs!



2. Here, big torture knives cut deep two-inch gashes. Even such drastic punishment can't stop this Seiberling Sealed-Air Tube with patented Bulkheads. It seals these 2-inch gashes as the car rolls on!



3. Seiberling Sealed-Air Tube being removed from tire for inspection after being pierced with more nails than you'll ever pick up. Each raised "rubber rivet" marks a spot where tube has *permanently* repaired itself! It's safe for many more thousands of miles of driving.

How can this tube take 1000 punctures WITHOUT GOING FLAT?

What is Bulkheading—the amazing principle perfected and patented by Seiberling—that makes this tube different from any other tube in the world? How can it outlast four tires, run more than 300,000 miles, be punctured many hundreds of times, *and not go flat*? How can it reduce your tire and tube costs, end the nuisance of flats, and protect you from the danger of blow-outs? The complete story is told in a new book which we'll be glad to send you. Just fill in and mail the coupon below.



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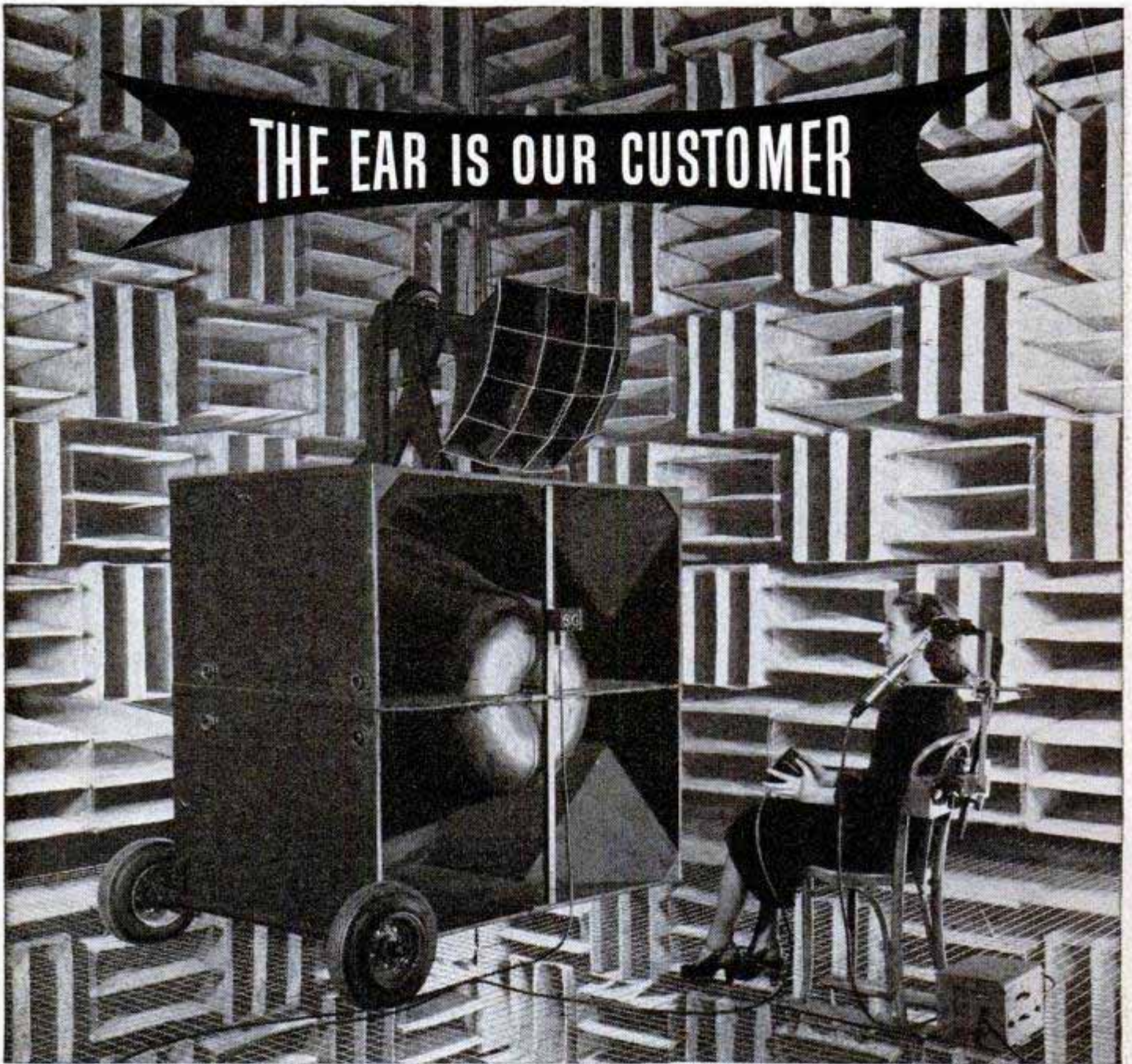
SEIBERLING

Sealed-Air TUBES

WITH PATENTED BULKHEADS



THE EAR IS OUR CUSTOMER



What happens when you hear? What happens *inside* your ear when sound waves come in from a telephone conversation?

Bell Telephone Laboratories scientists have developed special apparatus to help answer these questions, for the telephone system is designed to meet the ear's requirements for good listening.

In the test pictured above, the young lady sits before loudspeakers in a soundproofed room with a small hollow tube, reaching just inside the ear canal. Sounds differing slightly in frequency and intensity come from a loudspeaker. The subject seeks to tell one from another, recording her judgment electrically by pressing a switch.

Meanwhile, the same sound waves pass down the hollow tube to a condenser microphone, and a record is made of the exact sound intensities she identified. Results help reveal the sound levels you can hear clearly and without strain — the sounds your telephone must be designed to carry.

Scientists at Bell Telephone Laboratories make hundreds of tests in this manner. It's just one part of the work which goes on year after year at the Laboratories to help keep Bell System telephone service the finest on earth.

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Exploring and inventing, devising and perfecting, for continued improvements and economies in telephone service.



Popular Mechanics Magazine

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H. H. WINDSOR, *Founder*

H. H. WINDSOR, JR., *Editor and Publisher*



this month's cover

DESPERATE SAILORS are pinning high hopes on that shipboard rocket they are firing in the scene shown on this month's cover. It's an imaginative view of what may very well make headlines before long. The ship is breaking up near shore and the rocket is about to zoom through the air carrying a lifesaving cable. When the rocket lands, its stakelike nose will anchor itself in the ground. With the cable taut, a sailor will ride a breeches buoy ashore to secure the cable permanently for his mates to follow. The rocket equipment has been tested by the Coast Guard with promising results. Modern ships still carry the Lyle gun, used since 1870 for throwing a light line, but proponents of the rocket say the missile will carry a heavier cable much farther. In situations where life may hang by a thread, the best equipment must be found. For a detailed report, turn to page 118.

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MAY 1949

Number 5

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"Madame X" was the code name, during research and development, for an entirely new system of recorded music . . . perfected by RCA.

The remarkable background of "Madame X"

Now the identity of "Madame X," the *unknown* in a long search for tone perfection, has been revealed. From this quest emerges a completely integrated record-playing system—records and automatic player—the first system to be entirely free of distortion.

The research began 11 years ago at RCA Laboratories. First, basic factors were determined—minimum diameters, at different speeds, of the groove spiral in the record—beyond which distortion would occur; size of stylus to be

used; length of playing time. From these came the mathematical answer to the record's speed—45 turns a minute—and to the record's size, only $6\frac{7}{8}$ inches in diameter.

The record is of non-breakable vinyl plastic, wafer-thin. Yet it plays as long as a conventional 12-inch record. The new RCA Victor automatic record changer holds up to 10 of the new records—1 hour and 40 minutes of playing time—and can be attached to almost any radio, phono-

graph, or television combination.

Not only records are free of surface noise and distortion—the record player eliminates faulty operation, noise, and cumbersome size, common to many. Records are changed quickly, quietly . . . RCA Victor will continue to supply 78 rpm instruments and records.

This far-reaching advance is one of hundreds which have grown from RCA research. Such leadership adds value beyond price to any product or service of RCA and RCA Victor.



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Model 88C is a 14-shot tubular magazine semi-automatic rifle. Shoots .22 cal. long rifle ammunition, greased or waxed, regular and high velocity, with lightning speed and remarkable dependability.

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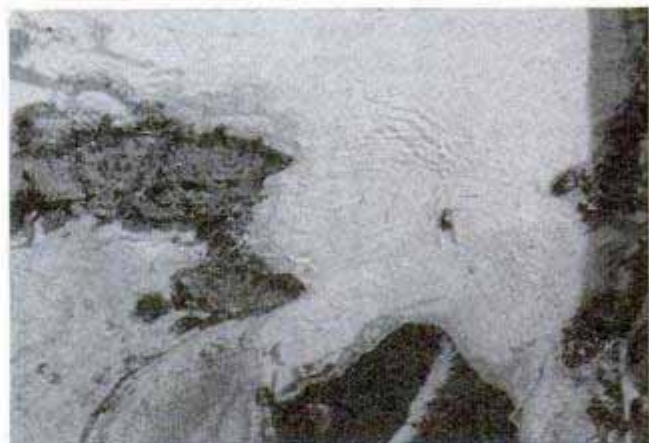
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in this corner..... THE EDITORS



McGrady's boat locked tight in ice-clad Snake River

AS SEQUELS to our story in February of the "Hell's Canyon Mailman," come these letters from George Shreve of the KRLC radio station newsroom at Lewiston, Idaho:

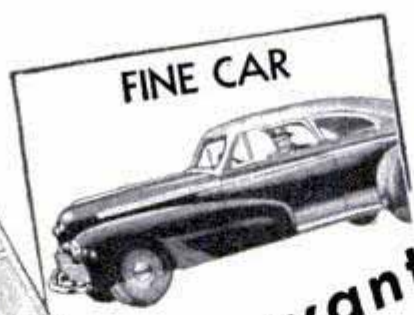
"To the Editor: We read your recent item about Kyle McGrady, the Snake River mailman from Lewiston, and enjoyed it very much. Here are pictures that might make a good follow-up story. McGrady's



Zimmerly's plane drops supplies to isolated farmers

boat got stuck in Snake River ice at Buffalo Eddy, 17 miles south of Lewiston, on December 29 . . . he hopes to free it soon without trouble, now that a thaw has set in. One picture is an aerial view of McGrady's icebound boat, the Florence. The other shows the Zimmerly Air Transport plane dropping food, freight and sheep feed to residents up the Snake River normally served by McGrady. The river and air are the only transportation to people living in the wilds of north central Idaho

(Continued to page 8)



To the man who wants to enjoy
an ACCOUNTANT'S CAREER



IF you're that man, here's something that will interest you.

Not a magic formula—not a get-rich-quick scheme—but something more substantial, more practical.

Of course, you need something more than just the desire to be an accountant. You've got to pay the price—be willing to study earnestly, thoroughly.

Still, wouldn't it be worth your while to sacrifice some of your leisure in favor of interesting home study—over a comparatively brief period? Always provided that the rewards were good—a salary of \$3,000 to \$10,000?

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Your progress is as speedy as you care to make it—depending on your own eagerness to learn and the time you spend in study.

Will recognition come? The only answer, as you know, is that success *does* come to the man who is really *trained*. It's possible your employers will notice your improvement in a very few weeks or months. Indeed, many LaSalle graduates have paid for their training—with increased earnings—before they have completed it! For accountants, who are trained in organization and management, are the executives of the future.

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and up the Snake River to Hell's Canyon."

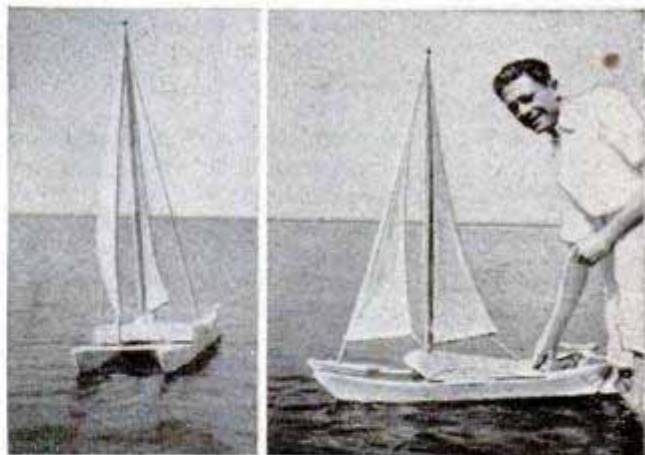
Ten days later Shreve wrote us of the tragic sequel:

"Kyle McGrady's riverboat Florence has broken out of the ice. McGrady gave the warming weather a booster with dynamite Saturday, February 19, to break the ice fairly close to his boat. The rest of the nearby ice began sinking and the water rising until the boat was freed about midnight. McGrady brought the undamaged boat home.

"Bert Zimmerly, the mercy flyer who had carried freight to McGrady's customers during the latter's freeze-up, was flying to Lewiston from Spokane the evening of February 17. He was found dead beside his badly wrecked plane five miles south of Pullman, Wash., the next afternoon. So far the CAA hasn't reported the cause of the accident. The night was damp but visibility fair. The terrain was rolling but not rugged. The plane's motor dug four feet into the snow and dirt. This was a tragic climax for a 41-year-old enterprising aviator who had organized Zimmerly Air Transport in 1934. He had trained thousands of pilots, for the Navy during the war and under the GI Bill since. He was first to go out on a search for missing flyers, hunters or people in trouble. Bert Zimmerly had been giving free service to snow-isolated people on the open prairie and up the river valleys this past winter, when they needed medical or hospital attention . . ."

We salute a neighborly and heroic flyer.

* * *



OUR JULY 1948 "cover girl," the Hawaiian catamaran, now has a miniature sister in Egypt. Flight Purser T. Patterson of TWA at Farouk Field, Cairo, built this one-inch to one-foot model from the article describing the Hawaiian Seabird, and writes: "You did not exaggerate the phenomenal performance of the Seabird, as in a light breeze I had to run to catch Marie. She was constructed and ran her trials in Bombay."

BETTERIN' the VETERAN

—a story about



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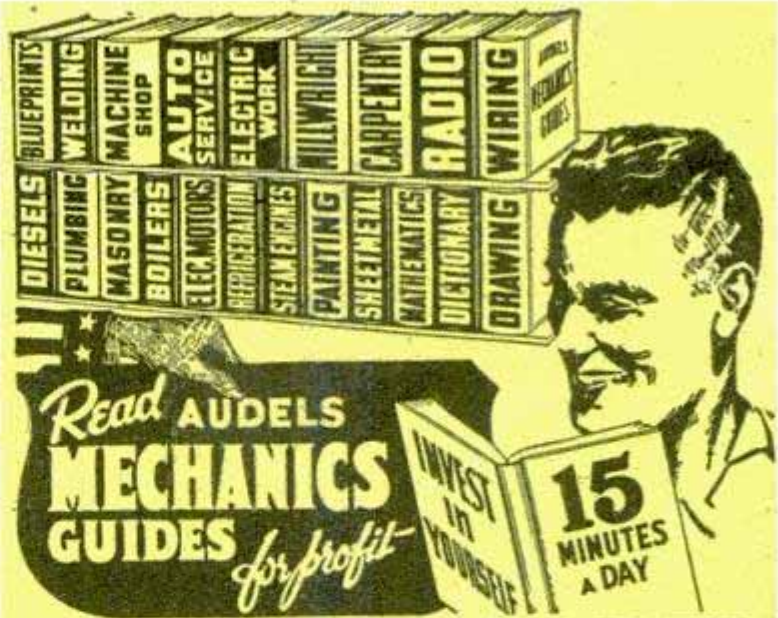
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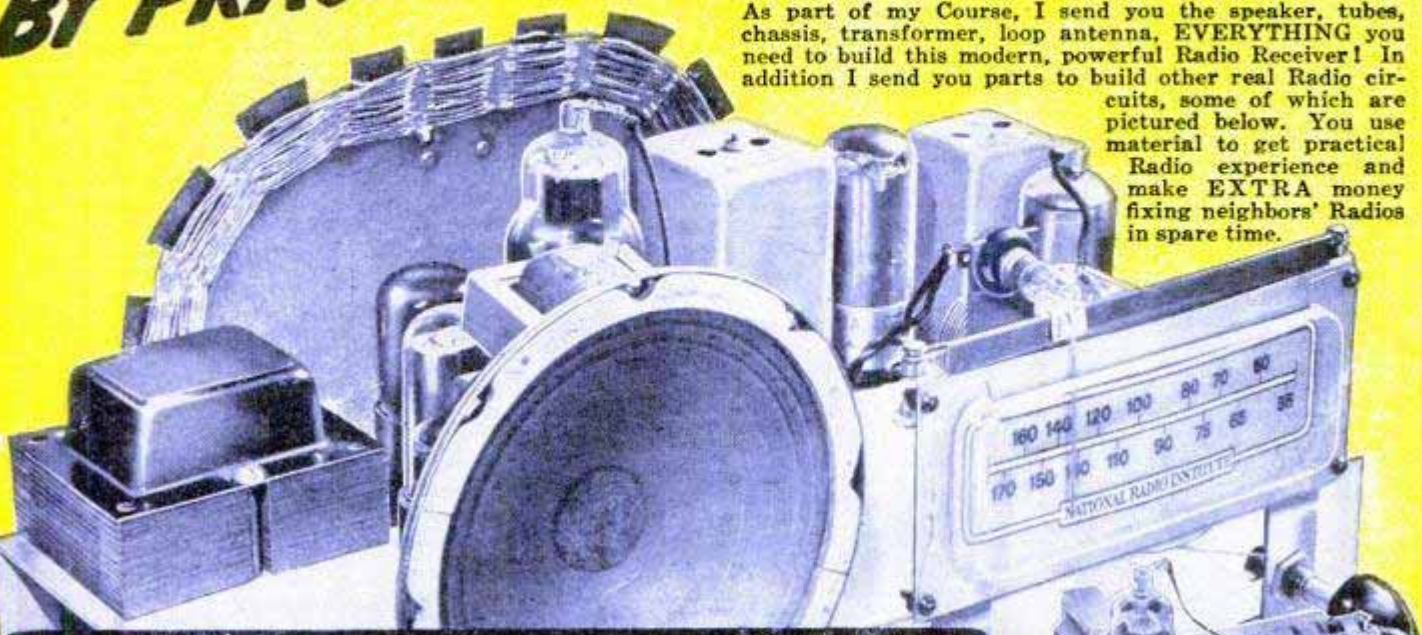
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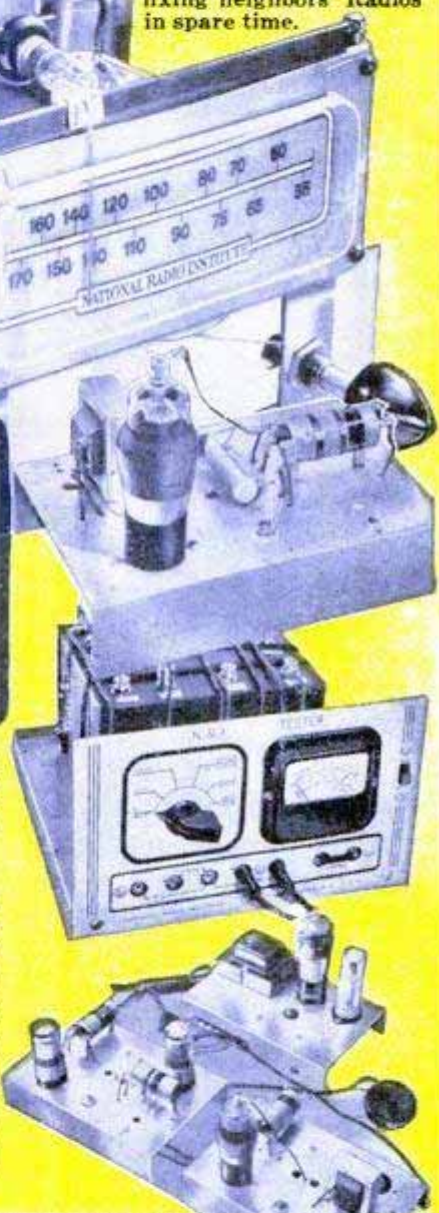
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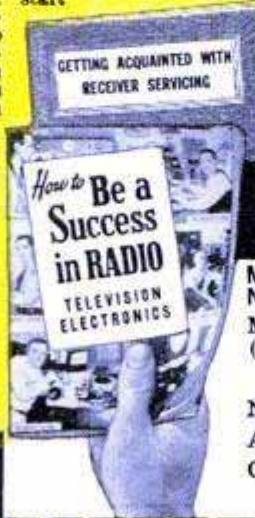
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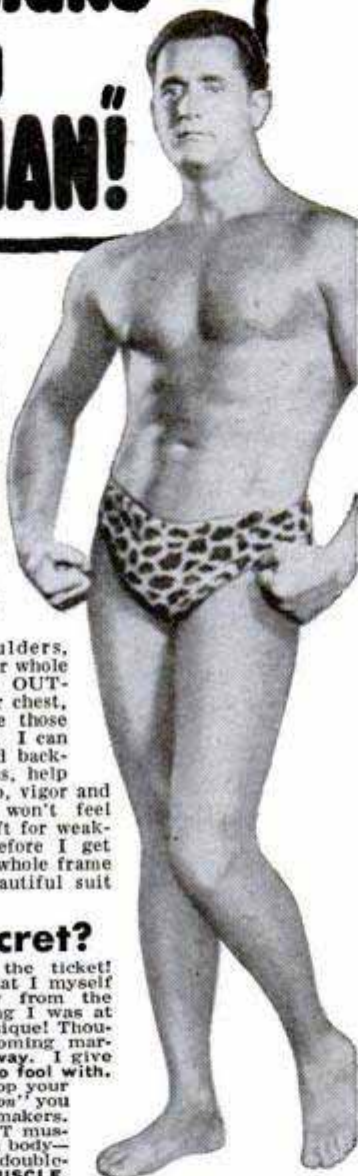
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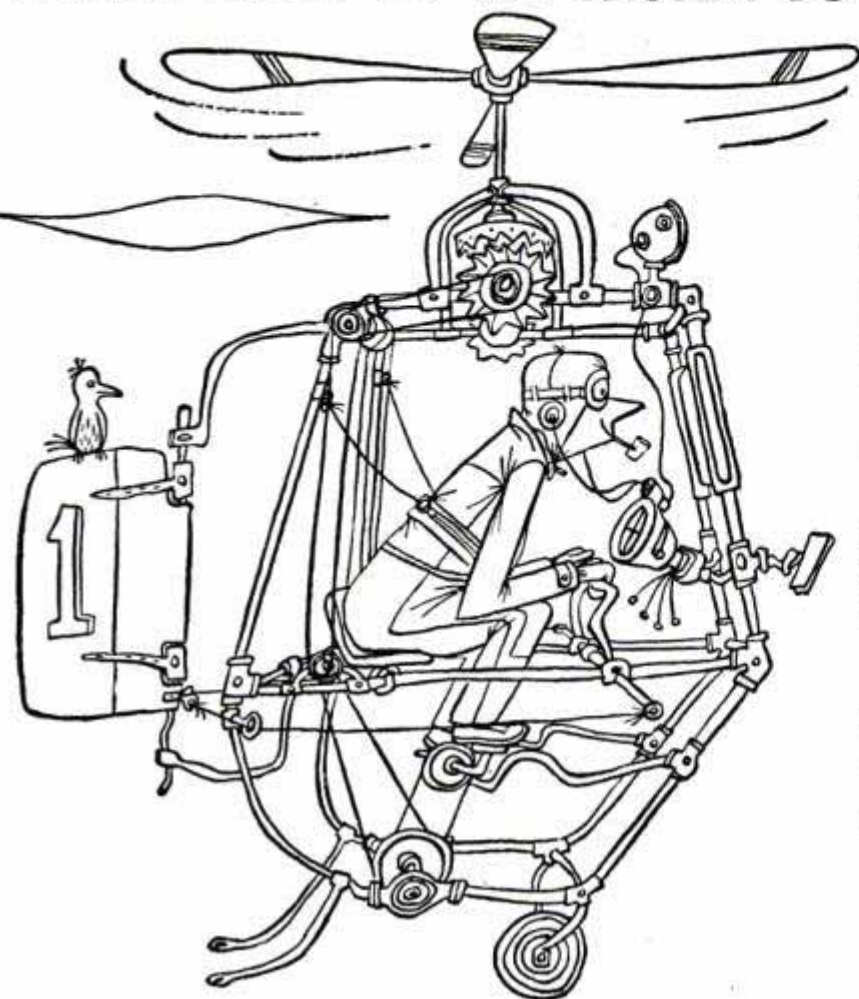
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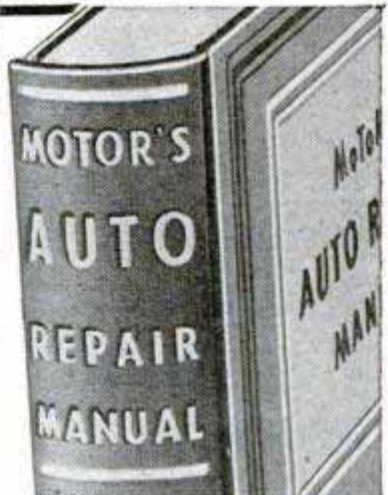
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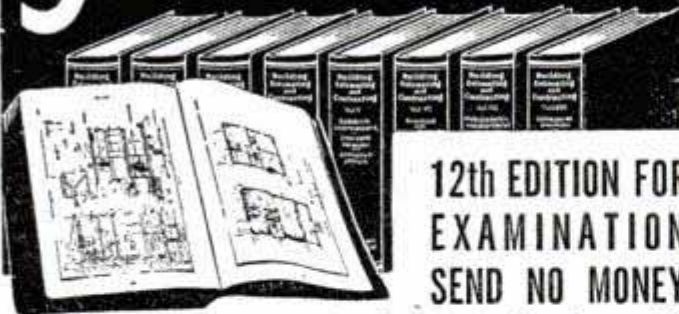
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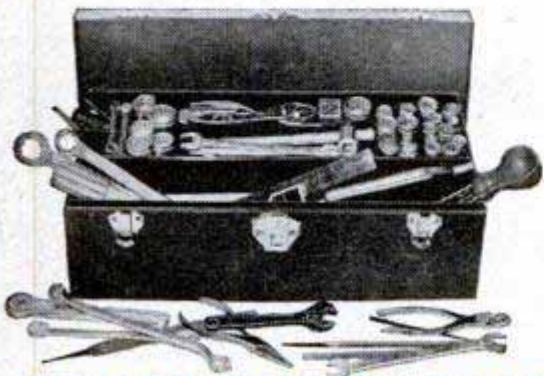
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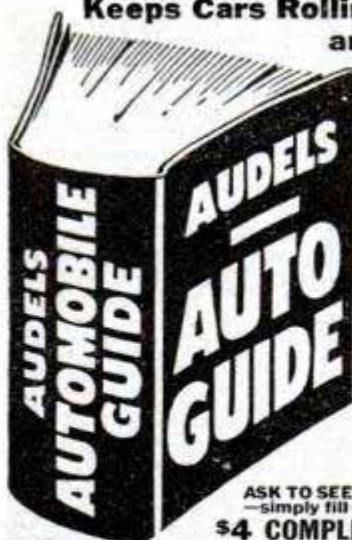


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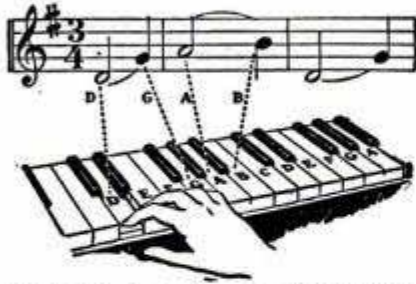
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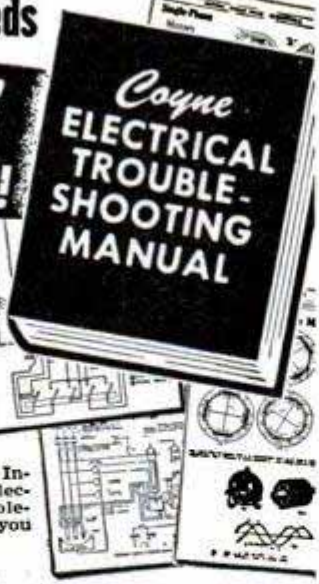
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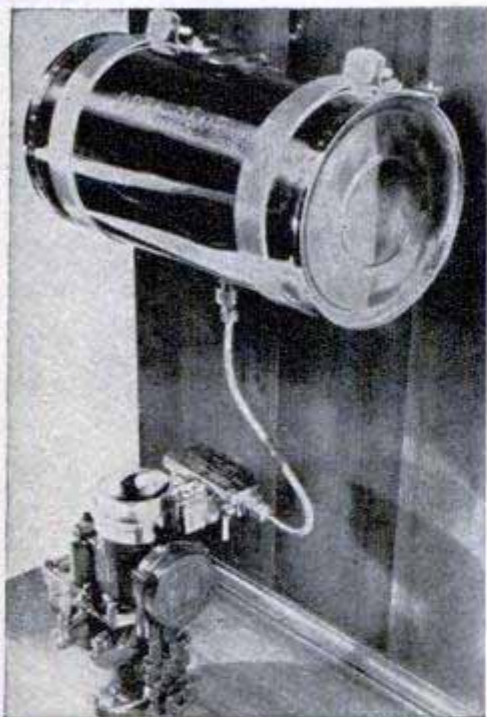
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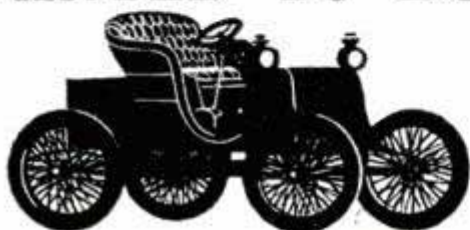


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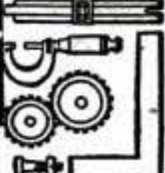


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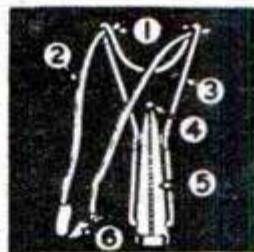
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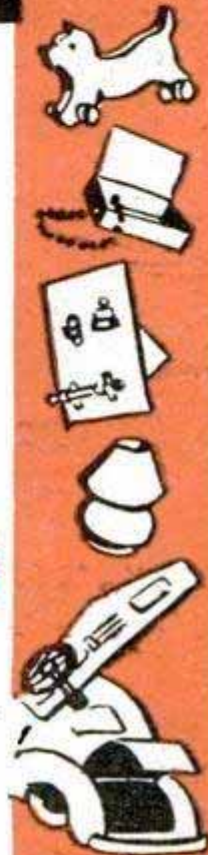
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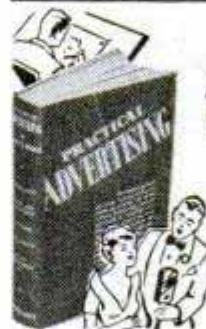
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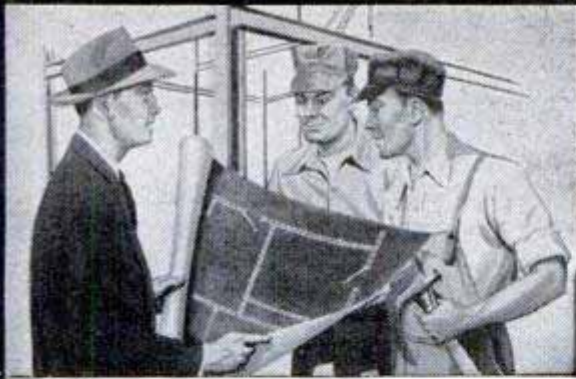
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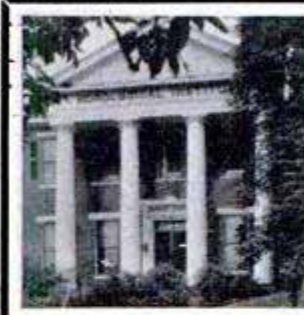
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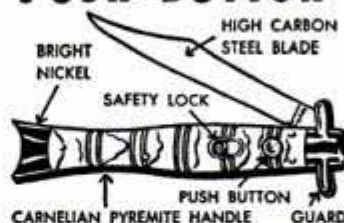


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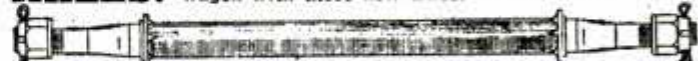
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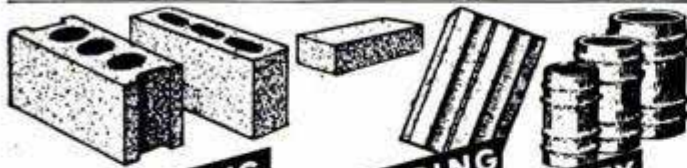
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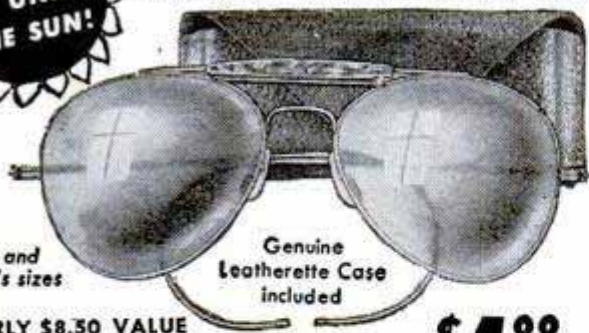
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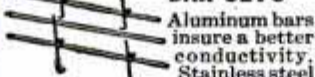
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\$5,000 YEARLY In advertising. Top-flight course. Mathews, 4501 Oakmont, Philadelphia 36, Penna.

MAKE Rubber stamps. Supply sources, complete instructions \$1.00. Free information! Th. Law, 54 East 99th, New York 29.

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WIN Contests: Free information. Contest Advisory Service, 60 E. Scott Street, Chicago 10, Ill.

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NEW Laboratory supply catalog of chemicals and apparatus. Contains many thousands of items with illustrations. Send 25c. Standard Science Supply Company, 1232 N. Paulina St., Chicago 22, Ill.

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BOYS Wanted. Over \$2.00 hour! Sell name plates for front doors. Free sample. Write Dept. 48, National Engravers, 214 Summer, Boston, Mass.

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AUTO seat covers. Strong fabrics with leatherette trim. Plastic piping. Tailorized to fit any car. Direct from our factory; up to 50% saving. Write for free circular. Agents wanted. National Process, Hempstead, Long Island.

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SELLS On sight. New reversible plastic table cloth. Patented. Write Beta-Plastic Products Co., 350 West 25th Street, New York 1, N. Y.

INSTANT Acting Fireball fog type automatic fire extinguisher smotherers fires. Beautifully designed. Volume seller at only \$4.50. 3505 Hope, Los Angeles 7.

HOME Agents. Power mower; only \$79.50. Terms. Sells on sight. Sales kit free. Smith Agency, 450-C, Excelsior Springs, Mo.

AMAZING Seller; "home mechanics paint kit." No competition. Not sold in stores. Splendid profit. Anderson, Box 3381, Merchandise Mart, Chicago 54.

MAKE More money! Sell 1949 everyday assortments. Plastic cards. Personalized napkins and stationery. Free portfolios. Commission. Richar's, 16A East 18, New York 3.

NYLON Uniforms, immediate delivery, immediate profits. Sell to doctors, dentists, nurses, waitresses, beauticians, housewives. Free sales kit. Superior Fabrics, Dept. P5, 3936 Market, Philadelphia 4, Penna.

\$100 WEEKLY—New complete, modern plastic line. Tablecloths, etc.—over 25 items. Every home prospect. 100% profit. Free samples. Carwell, 330-C So. Wells, Chicago 6.

\$6.00 HOURLY Showing Firestone Velon handbag; opens into large shopping bag. Fastest seller in America. Women buy several for gifts. Commissions advanced daily. Sample furnished. LeNard, 179-C West Washington, Chicago 2.

BIG Cash quick! Best in field! 4 rapid-fire money makers—Modern Wonder Book of Knowledge; only complete war history; new Home Medical Book; special illuminated Bible. No personal delivery. Get full facts. Universal House, 1020-I Arch St., Philadelphia, Penna.

AGENTS, Distributors: Huge profits! Sensational, new "combination, shopping bag-purse." Lightning-fast seller! Other merchandise; novelties! Royalty, Box I-748, Passaic, N. J.

SENSATIONAL Non-electrical burglar alarm for doors or windows. Sells on sight or sound. Retail \$2.95. Attractive, sturdy. Millions of prospects. 100% profit. Untouched market. Write Robertson Company, 228 N. LaSalle, Chicago 1, Illinois.

LEARN Mailorder. Dollar maker tips. Free information. Diehl's, Buffalo 4, New York.

LOOK! Make money all year round selling personal initialed individualized belts, buckles, cap badges, western buckles, tie holders, name plates. 2000 emblems to choose. Big profits, whole or part time. Please write today special outfit offer. Hook-Fast Specialties, Box 1425, Dept. 6, Providence, R. I. Established 1926.

NEW! Hardware, Plumbers' item. Particulars free. Lincoln, 10-A South 18th, Philadelphia 3.

CASH In on brand new idea. Personalized keepsake notes. Samples free. Lincolncraft, Dept. PM, Whitestone, N. Y.

AGENTS, Distributors, Jobbers, stop! Never buy plastic aprons, tablecloths, etc. until you get our new low prices. They're amazing. Riddell Sales Company, 1133A East 63rd Street, Chicago 37, Illinois.

BUY Thousands of nationally advertised products direct from manufacturers. Write for "Buy Direct and Save." Consumers Assn., 218-F Investment Bldg., Pittsburgh 22, Penna.

AGENTS Make big money selling "Ear-Buds" the perfume earring sensation. New designs. Particulars free. Minot Inc., 22 Minot, Dorchester 22, Mass.

QUALITY Plastics at lower prices! Proven hits in tablecloths, aprons, garment bags, utility covers. Free catalogue M95. Acclaim Products, 25 Hillside Ave., New York 34, N. Y.

MIDGET Bible, Lord's prayer; gold finish. Details, sample 25c postpaid. Mark, 153-D Fuller Building, Philadelphia 3, Penna.

AMAZING Seller! Fast profits! Hottest automobile accessory. No competition. Details free. Simon Brothers, 1908 South Broadway, St. Louis 4.

BIG Profits. Retractable ball point pen. \$3.60 per dozen. Metal Products Mfg., 2067 Broadway, New York, N. Y.

BOYS, Girls. Earn money in your spare time. No investment. Metal Stamps, Box 6325, Los Angeles 55, Calif.

OWN Your own business. Sell men's neckwear, spare or full time. Small investment; big profits. Free catalogue. Radio City Neckwear, Dept. M, 112 W. 50th, New York 19, N. Y.

FREE Nylons given if Kendex hosiery runs or snags! World's only women's hosiery sold with written guarantee amazing everybody. Mere words could not express unbelievable money-making opportunity. Fantastic earnings become reality. Armstrong earned \$202 in 9 days. Watkins sent 92 orders in one day. Imagine replacing hosiery free regardless of cause—whether use or abuse! Truly sales dynamite for terrific profits. Even if you never sold before, three magic words: "Guaranteed Against Everything" will open doors for you—make women listen and pour money in your pocket. Complete line from sheerest to service (15-20-30-40-60 denier) all lengths 28 to 35 inches—latest colors—seamed full fashioned and seamless. No competition because Kendex guaranteed nylons not sold in stores. Also complete line men's hosiery actually guaranteed for one full year! Nothing like this anywhere. Includes rayon, nylon, lisle, wool, cotton, mixtures, etc. All styles, patterns, colors, prices to please everybody. Thousands shipped daily. 100,000 pairs constantly in stock for fast delivery. Over 30 years in business. You need no money or experience. Nothing to pay now or later. Show free outfits. Write orders. We deliver and collect. Big advance cash plus huge bonus. Earn money spare or full time—exclusively or side line. No restrictions. Become manager—appoint others to sell for you—earn steady income on their sales. Complete money-making outfits including salesbooks in color, samples of hosiery materials, etc. furnished free and prepaid. Simply mail name and address to: Kendex Company, Babylon 53, N. Y.

SENSATIONAL New, plastic purse-secretary sweeping the country. Big cash profit on quick \$1.25 and \$1.75 sales. Amazing beauty, welded construction, self-seal pockets. Free sample offer. Boulevard Art, 75 West Van Buren, Dept. P-5, Chicago.

MEN—Women. New sensational floor mop. So clean to use woman can wash floors in evening gown. No drip or splash. Magic Mop Co., Dept. 143, Chicago 17, Illinois.

FASTEST, Easiest selling item ever offered man-market! Amazing new plastic Lic-Trol; placed in neck of liquor bottle automatically, accurately, quickly measures and pours drink; instantly adjustable to any size drink up to ounce; no jigger needed, no bother, no spillage. Nothing like it; to show it, is to sell it, at \$1.39; your profit half. Sensational demonstrator; sell scores daily, office to office; sell hundreds on noon-hour at plants employing men. Big added earnings selling wholesale to dealers. Free details. Marney's, Dept. M-1, Box 581, Ogden, Utah.

SURPLUS Household 10c. Retailer 3 doz. \$1.00. Sample 16c postpaid. No correspondence. Des Sales, Diamond Ave., Hicksville, N. Y.

FREE Samples. Big profits showing amazing glow-in-the-dark specialties. House numbers, pictures, plastic novelties, religious and nursery objects, etc. Large manufacturer. Madison Mills, 303 Fourth Ave., New York 10, N. Y.

SEWING Machine electrification kit. Nationally advertised. Has Good Housekeeping Guaranty Seal. Can be demonstrated and sold in 5 minutes. Make at least \$5 per sale. For complete details write today to Brownell Distributors, Inc., Dept. PM, 308 Canal St., New York 13, N. Y.

FREE Water and our concentrates, make flavors, lotions, shampoos, 125 products, labels, bottles supplied. Qualco, E20030 Russell, Detroit.

BIG Money—Fast! Sell quality plastic tablecloths (from \$4.00 dozen), curtains, aprons, etc. Factory prices. Free samples! Durever, 282-C Albany Ave., Brooklyn 13, N. Y.

MEXICAN Feather pictures. Unusual novelty. \$1.00 (stamps) brings \$2.00 worth samples, details. Refunded if unsatisfied. Aztec Art-P, Apartado 762, Mexico City.

SELL By mail books, novelties, bargains! Ready made circular service! Large profits! Catalog free! Elfco, 432 North Wells, Chicago 10.

BIG Money selling cast iron and aluminum cooking utensils direct to consumer, exclusive designs. Free illustrations. Jones Machine & Foundry Co., Chattanooga 2, Tenn.

MAGIC Cleaner—Laundry soap deal. Hotter than a firecracker. Big profits. Sample free. Bestco, 4642 No. Central, Chicago.

AGENTS; Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

PHOTO-Salesmen-agents. Sell beautiful hand-colored plastic enlargements. Collect deposit, we deliver. Profitable sideline. Send card, for free sample kit. Novel Portrait Co., 3343 North Ave., Chicago, Ill.

GOLD Lacquered window sign letters. Large sizes penny each. New foils. Absolutely beautiful. Free samples. Atlas, 544 W. 79th, Chicago 20.

EXCELLENT Sideline for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also, make money with our line of automobile initials and sign letters. Free samples. "Raico" XL-Roxbury, Boston 19, Mass.

AGENTS—300% Profit selling genuine gold window letters; stores and offices. Free samples. Metallic Letter Co., 438-B North Clark, Chicago.

AGENTS, Make more money. Write today for free package of colorful gift cards; and receive our fast selling assortment of everyday cards on approval. Big profits selling our line of shopping and vanity bags. Mother Goose pop-ups and record, children's books, napkins, coasters, greeting cards, gift wraps, stationery. Act now! Get acquainted with our fast selling line. Fanmour Corporation, Department P5, 200 Fifth Avenue, New York 10, N. Y.

REPRESENTATIVE Wanted by seat cover manufacturer. Mono, 6545 Santa Monica Blvd., Hollywood, Calif.

HIGH-GRADE SALESMEN

\$20 To \$30 A day easy; sensational new Raised Letter Nameplate, beautifully framed in mahogany; amazing seller to homes, stores, offices, etc. Get our tested plan. Write Raised Letter Metal Company, Dept. 13, Fox Bldg., Philadelphia 3, Penna.

AMAZING Liquid auto wax and cleaner. Simply wipe it off—so easy you can use cleansing tissue. Distributors, jobbers, salesmen. Samples \$1.00. Master Products, 125 S.E. 30th Place, Portland 15, Oregon.

ADVERTISING Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. M-49, 7530 Greenwood, Chicago.

SELL Calendars now. Be the first in your district. Good sideline or full time. Every business wants them. Few calendar salesmen are on the road now which means more sales for you. Fleming Calendar Co., 6539 Cottage Grove, Chicago 37.

MANUFACTURER'S Agents. Dry wash, waterless hand cleaner. Sell to industry, dealers, jobbers. Ridgefield Chemical Products Company, Inc., Ridgefield, New Jersey.

SELL Ultra-blue stock signs to stores. 1000 slogans, comedy, general, religious. "7x11" cost 6c, sells 35c. Make money. 15 samples ultra-blue signs "7x11" \$1.00 postpaid. Lowy, 8 West Broadway, Dept. 464, New York City 70.

SELL Sewing machine motor kits. Wholesale suppliers. Mixons Specialty, PM Box 394, Williamsport, Penna.

SOAP Saver, stainless steel, re-usable. Send 20c for two and dealers prices. Lang, 633 Fifth, Louisville, Ky.

UP To \$50.00 in a week and tailored suit for yourself without paying one cent. Write for plan. Progress Tailoring Co., Dept. S-217, Congress & Throop, Chicago 7, Ill.

SCISSORS Sharpeners. Fast 25c seller. Mar. 74 Park, Webster, New York.

SALESMEN—Sideline. Earn \$3,000 next 5 months selling calendars, advertising specialties. Buyers everywhere. Big comm. advanced. Samples free. Continental Calendar, 542-A South Dearborn, Chicago.

FANS—Fans. Salesmen making \$50.00 to \$100.00 per day selling our electric fans, sump pumps and printed self-sticking advertising tape. Write to Universal Fan Co., Inc., Peru, Indiana.

SPRAY-WAY: Sensational new compound. 1 pint makes 1/2 gallon; retails \$1.25. Cleans rugs, car upholstery. Demonstration does the selling. \$1.00 brings sample instructions sales plan. Spray-Way Co., Dept. 28, 4101 No. Vincent Ave., Minneapolis 12, Minnesota.

SALESMAN Sell automobile specialty "Dandy" back-cooler and back-rest. Every automobile owner wants one. Can make reasonable salary. Write P.O. Box 5, Columbus, Ind.

STOP! Want to make money all year round selling a complete line. wool uniforms, shirts, caps, ties, badges, 2000 emblems, personal initialed buckles, belts, and hundreds of other easy-to-sell items? Sales kit furnished. Please write today. Hook-Fast Company, Box 480PM, Roanoke, Va.

SELL Chemicals to taverns thru jobbers. Override. All you sell is free, less jobber commission, or be jobber. Sample 50c. Riesen Chemical, 419 Villet, Milwaukee.

MAKE \$200 Weekly and over taking orders outstanding quality metallized baby shoes. Free starting outfit. Marson's Bronze Art, 1059A Lewis, Long Beach 13, Calif.

SALESMAN! Make over \$30.00 a day. Sell nationally advertised adding machine for only \$12.95 complete. A desk model portable, precision built, fully guaranteed, every inch a business machine. Easy to operate, easy to sell, easy for you to make big money at 49% profit! For life-size color photo and full details, write today to Lightning Adding Machine Co., Inc., Dept. ZD-7, 543 So. Spring Street, Los Angeles.

SALESMEN Earn \$100 per week up calling on stores and individuals. Selling ventilating equipment. Everyone a prospect. Write for free 30 page catalog and plans. No investment required. Appliance Distributing Company, 163 Walton St., Atlanta, Ga. Dept. M8.

POPCORN Machines, all electric units, peanut roasters, caramelpop, heating appliances. Northside Sales, Indianola, Iowa.

NEW Jobs open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 28 E. Jackson, Dept. 17, Chicago 4, Ill.

BIG Money taking orders. Shirts, ties, socks, pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-AN Lincoln, Chicago.

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GET U. S. Gov't job! Security, big starting pay. Prepare at home now for local exams. Free 40-page book, sample tests. Write: Franklin Institute, Dept. P24, Rochester, N. Y.

INTERNATIONAL And other used correspondence courses bought, sold, rented. Free literature. Baker, 5509-B Winthrop, Chicago 40.

GOOD Jobs and a sound substantial future await you in hotel and institutional field. Men and women—all ages—needed for well-paid positions that offer color, excitement, ever-new and fascinating duties. Record breaking travel means even greater opportunity for trained men and women in hotels, clubs and institutions. Lewis School receiving calls for managers, assistant managers, stewards, hostesses, purchasing agents and 55 other types of important positions! From coast to coast, there are important positions that offer splendid opportunities for advancement in a business where you are not dropped because you are over 40. Previous experience proved unnecessary! No need to leave your job to qualify. A good grade school education, plus Lewis Training qualifies you at home, in spare time. Our National Placement Bureau helps to place you—and our amazing Certified Job Plan—actually certifies you will "make good" when placed. Write today for Free book! Veterans: Course approved for Veteran's Training. Lewis Hotel Training School, Room PE-368, Washington 7, D. C. (First and only School of its kind—now in its 33rd year.)

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EARN Extra money, working with figures. Write Jimmy Sherrod, Pavo 1, Ga.

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SPANISH Quickly, with Speed-O-Way phonograph records. Complete course \$7.95. Free folder. Speed-O-Way, Dept. 113, Box 2301, Houston 1, Texas.

PRACTICAL Course—Automobile radiators, repairing, recoring, cleaning. Ralph Hendry, Galt, Canada.

INVESTIGATOR Training. Phillips Secret Service System, 1917B North Kenneth, Chicago 39, Illinois.

MEDICAL Laboratory technicians in great demand. We train you in your own home. Catalogue free. Imperial Technical Institute, Box 973-J, Austin, Texas.

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HOME Bible course. Simple, helpful, instructive. Total cost \$4.00 includes textbooks, stationery, examinations, certificate. \$1.00 starts you, or simply request prospectus. The Bible Study School, 378 Van Houten Street, Paterson 1, N. J.

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CALIFORNIA Opportunities, working conditions, housing, etc. \$1.00. G. E. Middagh, 2378 Sutter St., San Francisco, California.

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"HOW To Make Money With Simple Cartoons"—a book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists' Exchange, Dept. 95-C, Pleasant Hill, Ohio.

EARN Money evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1-B, Wisconsin.

SIGNS Made easily. Instructions and ten sets modern alphabets, numerals, patterns. Sizes up to eight inches. All for \$1.00. Co-operative Business, 7 West Madison, Chicago 2.

LEARN Professional lettering in one week. Amazing new mechanical process. Complete instruction manual. 300 designs \$1.25. Major-Art System, 3510-F Palmer, Chicago 47.

SIGN Painting taught at home. Test lesson free. Ben Kerns, Box 812-T, Greenville, S. C.

9 ALPHABET 3 Numeral pattern sets and catalog, \$1.00. Sign Letter Distributors, P.O. Box 101, Mineola, N. Y.

BE A showcard writer. Learn at home in three weeks. Uncrowded. Big money field. Makes sales very first week. Write. R. J. Meisner, 1539 Wisconsin Ave., Dept. 12, Flint 6, Michigan.

DRAFTING And artists' material catalog, thousands of items, 25c (deductible first \$2 order). Draftsmen's, 187 Madison, Chicago.

CHALK Talks. Laugh producing program, \$1.00. Catalog 10c. Balda The Cartoonist, Oshkosh, Wisconsin.

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ADVERTISING: Placed in any publication, anywhere. Write for mail-order rate sheet "M." LeGrand Advertising Agency (established 1923), Floral Park, N. Y.

SOUTHWEST—24 Words in 40 weeklies, \$3.50. Pennebaker Service, Box 141, San Marcos, Texas.

MAIL-ORDER—Sales letters, literature, advertising prepared to produce business! Muchnick Co., 150 Nassau St., New York 7.

CHOICE Names \$5.00 thousand. State classification. W. Northern, Lake City, Arkansas.

DOUBLE The results from your advertising after reading Successful Advertising. Only \$2.00, postpaid. Satisfaction guaranteed. William Bennett, 114-35A 116th Street, Ozone Park 16, New York.

ADVERTISE: 24 Words, 40 newspapers \$3.50. Lists free. Advertising Bureau, 10511-C Springfield, Chicago 43.

INCREASE Your mail order sales. Sell to the farm market. Let us show you what others are doing. Free information. Farm Journal, 201 Farm Journal Building, Philadelphia 5, Penna.

ADVERTISERS! Reach nearly 18,000,000 readers. 25 Sunday national key newspapers, 18 words, \$51.50. "Terrific pullers." 20 popular newspapers, \$10.00. "Free booklet." Special—One inch display 2,-821,198 circulation, \$48.30. Newmark's Advertising Agency, (Established 1893), 217-7th Ave., New York 11.

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ADS Placed in out of town newspapers and magazines. Low rates. Catalogue free. Ideas that pay. Baker Advertising Agency, Successors Ankrum Agency, 189 W. Madison, Chicago 2.

MAILING Lists, certified, productive, inexpensive, \$5.00 1000. Homeworkers, agents, buyers, etc. Write Dixie Service, King, N. C.

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BOOM Your business with postcard stencil duplicator, \$4.75. Guaranteed performance. Postagraph, Box 181, Cincinnati 1, Ohio.

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PRINT-O-MATIC Selffeeding post card stencil printing duplicator \$13.50. All office machines. Supplies. Bargains. Typewriter for free literature. Pittsburgh Typewriter Supply, 336-7 Fourth Avenue, Pittsburgh 22, Penna.

RECONDITIONED Typewriters, mimeograph, multigraph printing devices, appliances, supplies. Catalog. Dixigraph Service, King, N. Carolina.

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BLACK-ON-WHITE Photostat prints from drawings, tracings, etc. 25c per copy up to 8 1/2"x11", 50c per copy up to 14"x17", plus postage. United Industries, Dept. A, Box 449, Madison 1, Wisconsin.

TACOGRAVURE, "photo-electric" printing. Picture of your product and up to 250 words, attractively presented, on 8 1/2"x11" sheet. \$27.75 per thousand. Samples 5c. Tacogravure, Box 389, Warsaw, Indiana.

BETTER Printing—Reasonable prices. Send requirements for free samples and new 1949 catalogue. Mills Burnham, No. Abington, Massachusetts.

100 8 1/2 x 11 MELBURN Letterheads with envelopes \$2.00. Box 140, Jersey City 3, New Jersey.

1000, 3/4x2 1/2 labels \$1.00. Free list. Box PM-135, Spiro, Okla.

SAVE Money on printing. Tell us what you need. Journal Printing Co., Newark, Ark.

100 ENVELOPES, 100 Letterheads, Monarch cabinet—\$2.75. Gillam Print Shop, 130 Sunset Ave., N.W., Atlanta, Ga.

5,000 LABELS \$4.50; Size 1 1/4" x 2". Free illustrated price list. M.P.S. Fine Labels, 336 Lawton Street, Fall River 3, Mass.

100 BOND Letterheads 8 1/2 x 11, 100 envelopes, \$1.65 postpaid (4 lines). Moyer Press, Windsor, Vermont.

USED Type, printing presses, type cabinets, etc. cheap. Visit our store. Edward Van Dillen, Inc., 74 Beekman St., New York 7, N. Y.

SAVE Money on your printing. Write for low price list and chart. We photograph and reproduce your copy on white or colored paper. Our art dept. will help with your advertising folders, catalogs, forms, etc. Direct mail sales our specialty. Winchester Printing Co., Grand Rapids, Michigan.

MIMEOGRAPHING—Excellent quality, reasonable prices. Free samples. Price list. Russell Mimeographing, Homewood, Alabama.

BUSINESS, Personal stationery, state requirements. Samples. Herbert Hudson, Centredale, R. I.

500 SHIPPING Labels 2 1/4 x 2 3/4, \$1.25, 2 x 3 two color \$2.25. Myers Company, 1228 Adams, Owosso 1, Michigan.

LOW Cost business stationery. Samples. Crow, 533 18th St., Huntington 3, W. Va.

MIMEOGRAPHING Experts. Samples free. Martin Mimeographing, 3212 Harper, Saint Louis, Missouri.

1000 BUSINESS Cards \$2.50 prepaid, samples free. Reliable Print Shop, 905 East Jefferson, Louisville 6, Ky.

400 8 1/2 x 5 1/2 LETTERHEADS \$1.35. Mango, 555-A South 20th, Newark 3, N.J.

MIMEOGRAPHING 100 8 1/2 x 11 \$1.10. Additional hundreds 50c. Mimeographing, Madison, Tenn.

SEND 10c Now, for our 48 page 1949 price list—refunded first order. McCall Press, 1326 South 27th, Omaha, Nebraska.

500 3/4x2 1/4 FOUR Line gummed stickers 35c; red border 50c. Moritz Printery, Saginaw, Mich.

QUALITY Printing—Reasonable prices. Fast service on catalogs, folders, publications. Write for prices. Bagby Printing Co., Georgetown, Ohio.

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PRINT Your own cards, stationery, circulars, advertising. Save money. Simple rules. Print for others, nice profit. Raised printing like engraving too. Have home shop. Details free. Kelsey Presses, L-11, Meriden, Conn.

MAKE Your own plastic printing cuts. New plexiplate process. Plexiservice, Argyle 1, Wisconsin.

HEMOCRAFT Presses, supplies. Catalog 10c. refundable. Riegel, 1111 Harrison, Philadelphia 24, Penna.

PRINTING Presses, type, supplies. Lists 3c. Turnbaugh Service, Loysville, Penna.

INEXPENSIVE Home-made printing press. Details free. Novelty Shop, Downs-ville, Louisiana.

RUBBER STAMPS AND OFFICE SUPPLIES

AGENTS, Quantity users! Big 48 page catalog of rubber stamps and marking devices sent for dime. (Refunded first order.) Miles Specialties, Kokomo 1, Indiana.

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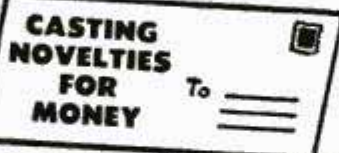
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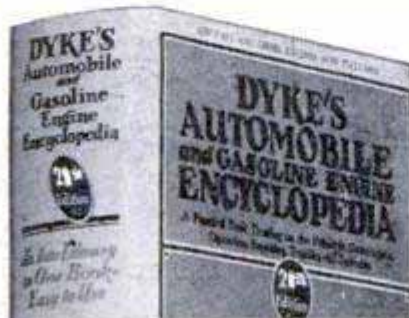
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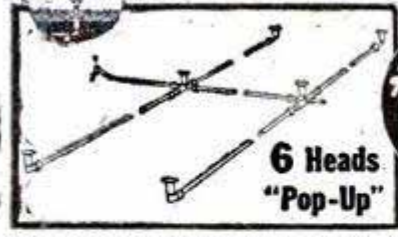


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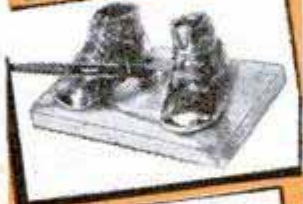
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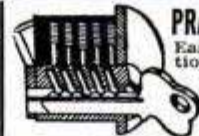
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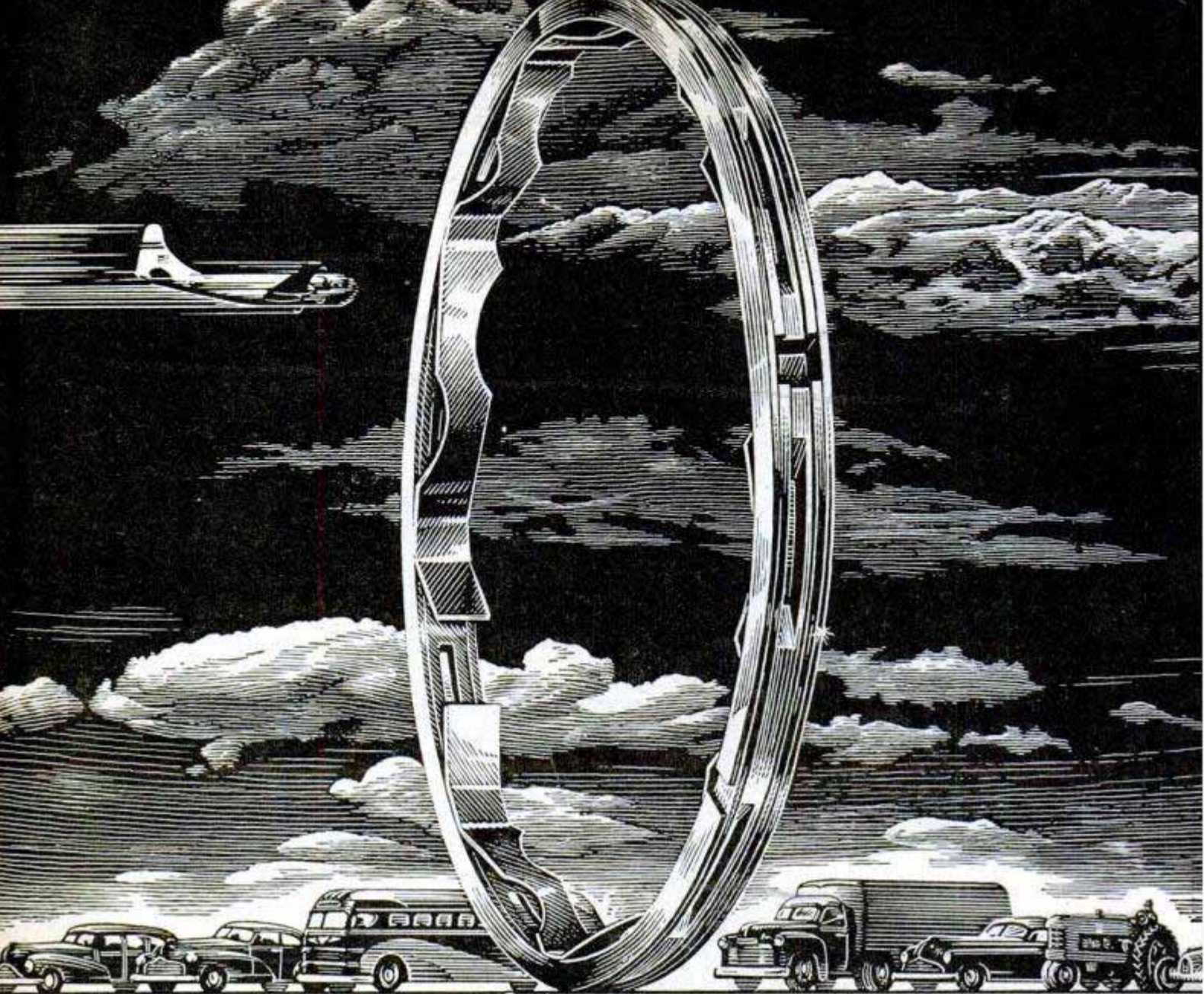
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Honored by motor-wise car owners all over America, who in survey after survey have invariably named Perfect Circle their first choice by a wide margin.

Honored by Racing Drivers. Long the favorite of drivers in the Indianapolis 500-Mile Classic, Perfect Circle is the leading choice with men who race and win on speedways and waterways throughout America.

* *In a recent independent survey among automotive engineers—maintenance men, fleet operators and designers of new equipment—Perfect Circle was first choice as the best engineered piston ring—first by more than 4 to 1—and received more votes than ALL other brands combined!*

Perfect Circle Corp., Offices: Hagerstown, Ind., and Toronto, Can. Plants: Hagerstown, Richmond, New Castle and Tipton, Ind., and Toronto, Can.

(Illustrated—Sectional Steel Oil Ring—one of 61 types of Perfect Circle Piston Rings.)

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STEAM LINE TO CONDENSER

STEAM-SEPARATION CHAMBER

CONDENSER COOLS STEAM AND CONVERTS IT INTO WATER

WATER AT 212 F. FROM ENGINE COOLING SYSTEM

ENGINE

WATER IS PUMPED BACK TO ENGINE

VAPOR PHASE COOLING CYCLE

POPULAR MECHANICS

MAY 1949

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 91 NO. 5

In "vapor phase" cooling system, water follows clockwise route. After engine heats it to the boiling point, steam is converted back to water

BY COOLING your automobile engine with boiling water you can drive it for a quarter of a million miles or more without need of a major overhaul. At the same time you'll get more power and better fuel mileage and will use much less oil.

Other advantages include faster warm-ups on cold mornings and better cooling of the engine on hot days.

This sounds absurd, of course. Common sense tells you that a good way to ruin your motor is to allow the radiator water to remain at a boil. Many engineers have preached that water temperature should never be allowed to rise above 180 degrees, if that high.

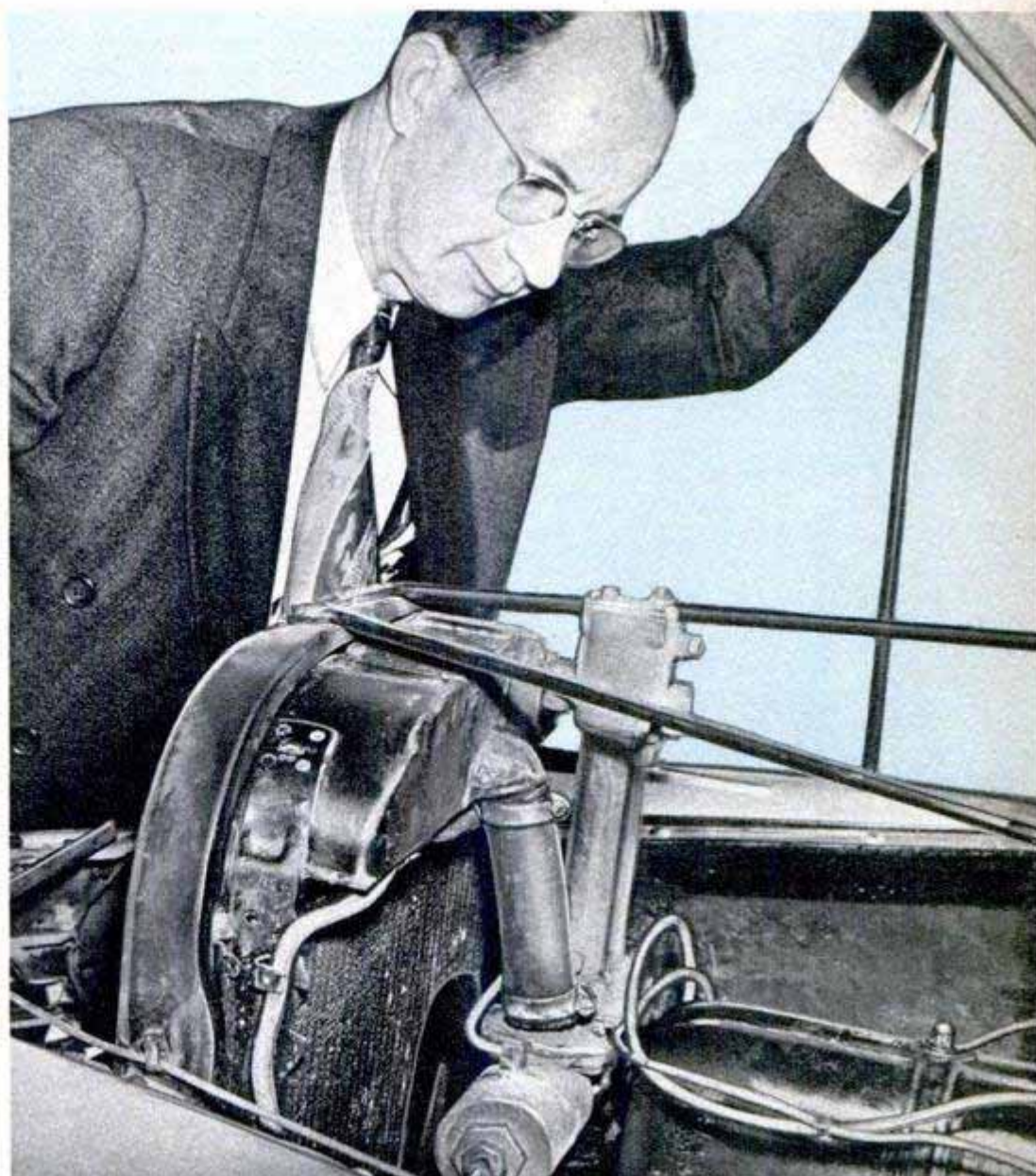
Yet a Chevrolet with an experimental high-temperature cooling system is still going strong after 165,000 miles. Mechanically the engine is as sound as if it had run no more than 30,000 miles. Valves, rings and cylinders are in excellent condition. The motor uses virtually no oil and delivers up to 19 miles per gallon of fuel in traffic.

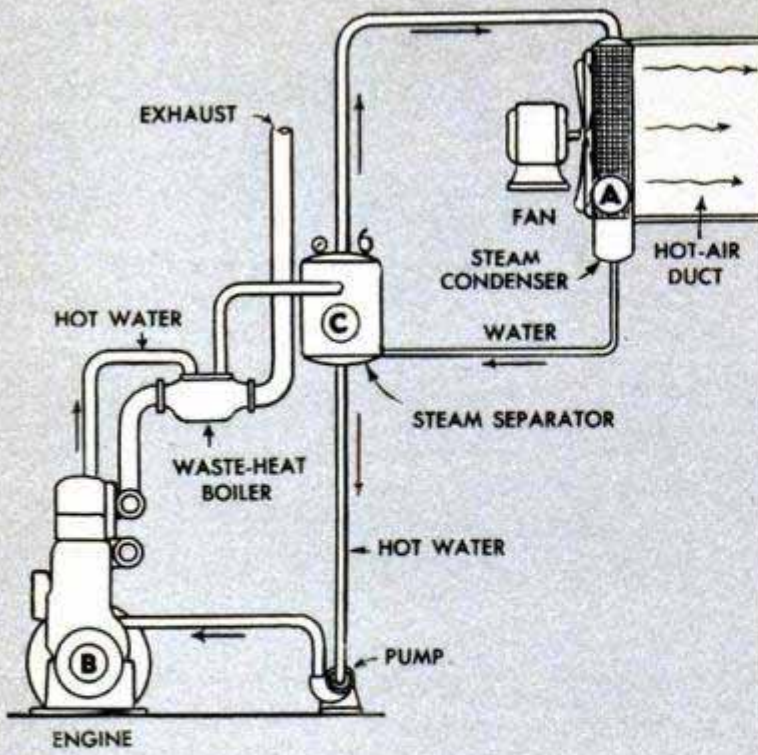
High-temperature

In automobile experiments, the radiator was strengthened and made to function as condenser to change steam back to water

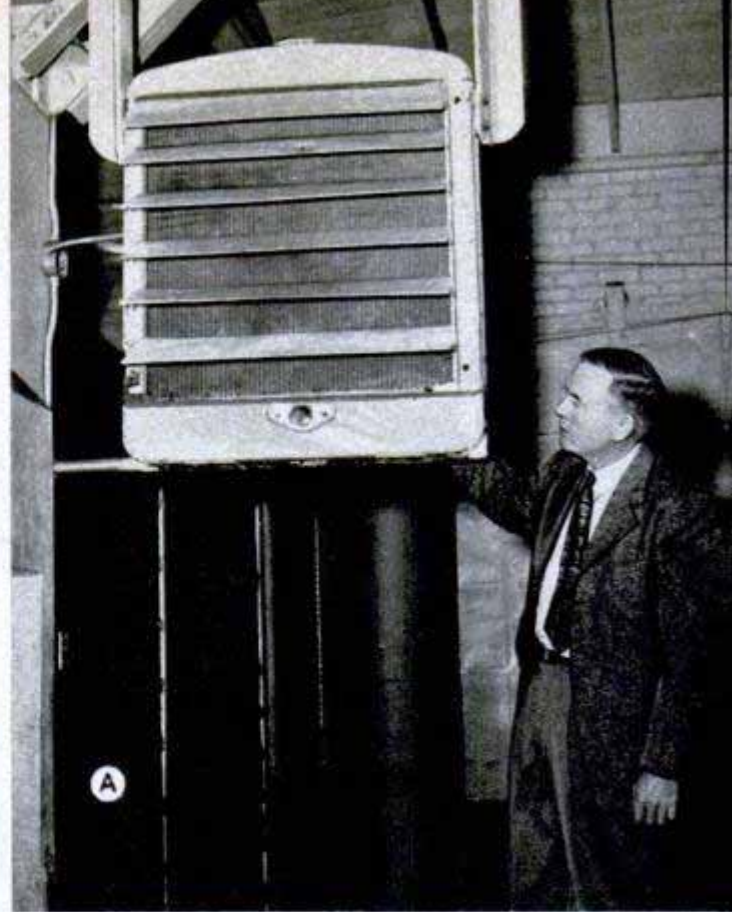
LET THE ENGINE BOIL

By Thomas E. Stimson, Jr.





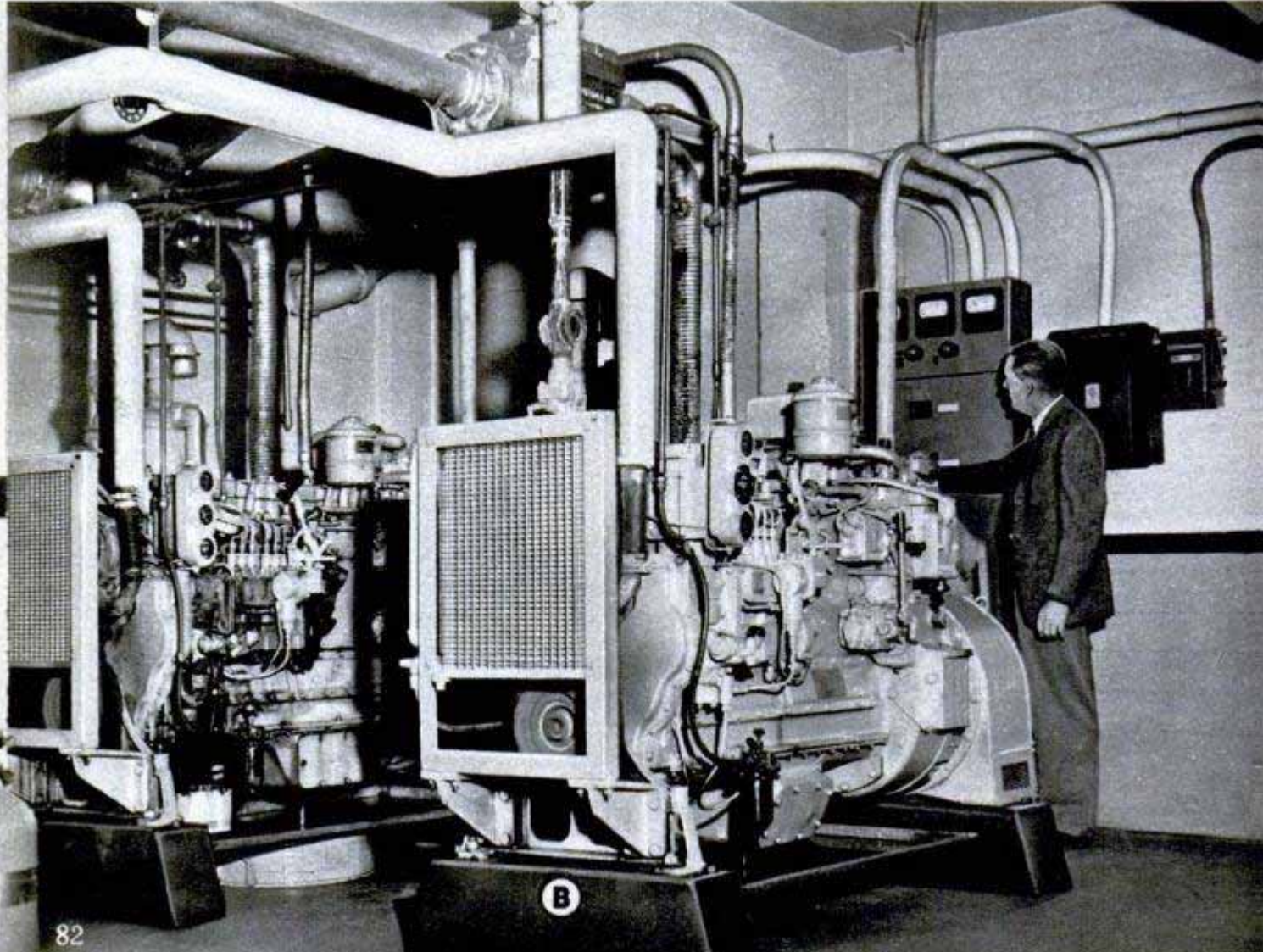
VAPOR PHASE WASTE HEAT RECOVERY SYSTEM



Instead of being wasted, engine heat not converted to mechanical energy can be used to warm building

Overhead radiator, with fan invisible behind it, acts as the condenser for system shown at bottom of page

Diesel-electric power plant employs vapor cooling, plus exhaust boilers, to capture B.T.U.s formerly wasted for space heating. Radiators cool lubricating oil and water lines are insulated to prevent heat losses



cooling, in fact, is causing a behind-the-scenes revolution in the internal-combustion-engine industry. The new principle is known as "vapor phase" cooling because the coolant liquid is deliberately allowed to produce steam. For some types of installations in which the waste heat is put to work instead of being allowed to dissipate, vapor-phase cooling actually doubles the thermal efficiency of an engine.

Unfortunately for automobile owners, it will be several years at least before the new system is available for them. Engineering a vapor-phase cooling system for stock cars that everyone can use is going to take time. Besides, the originators of the idea have their hands full already, making installations on large stationary plants.

Simply stated, vapor-phase cooling works this way: the water in the cooling system is allowed to heat up to 212 degrees and circulated to a steam separation chamber. There the steam is removed and the water is pumped back into the car's cooling system. The steam passes through a radiator or condenser, where it loses its latent vaporization heat and condenses back into water again, after which this water is returned to the cooling system.

Being a closed system, no water or steam escapes and the engine cannot boil dry. Neither can the water temperature rise above 212 degrees, the point at which it boils, unless the system is purposely designed to produce more than a minimum amount of steam.

Any good grade of commercial antifreeze may be used with the vapor-phase system. Since the system is closed, the antifreeze lasts much longer than it does in a low-temperature system which is open to air.

The new cooling system has been installed on about 5000 engines to date, ranging from small engine-generators for Army mobile radio equipment to heavy-duty stationary engines used for pumping or for generating electric power. Without exception, the substitution of high-temperature cooling for low-temperature cooling has materially increased the life and efficiency of the power plants.

Stationary engines that use sewage gases as fuel, for instance, are good for years of operation when equipped

with vapor-phase cooling. Sewage gases are so highly corrosive that in the past this type of fuel has virtually junked a new engine after about six months' use.

Similarly, marine diesels cooled with boiling water are 10 to 20 percent more efficient mechanically, can use cheaper grades of fuel without harm, and for considerably longer periods between overhauls.

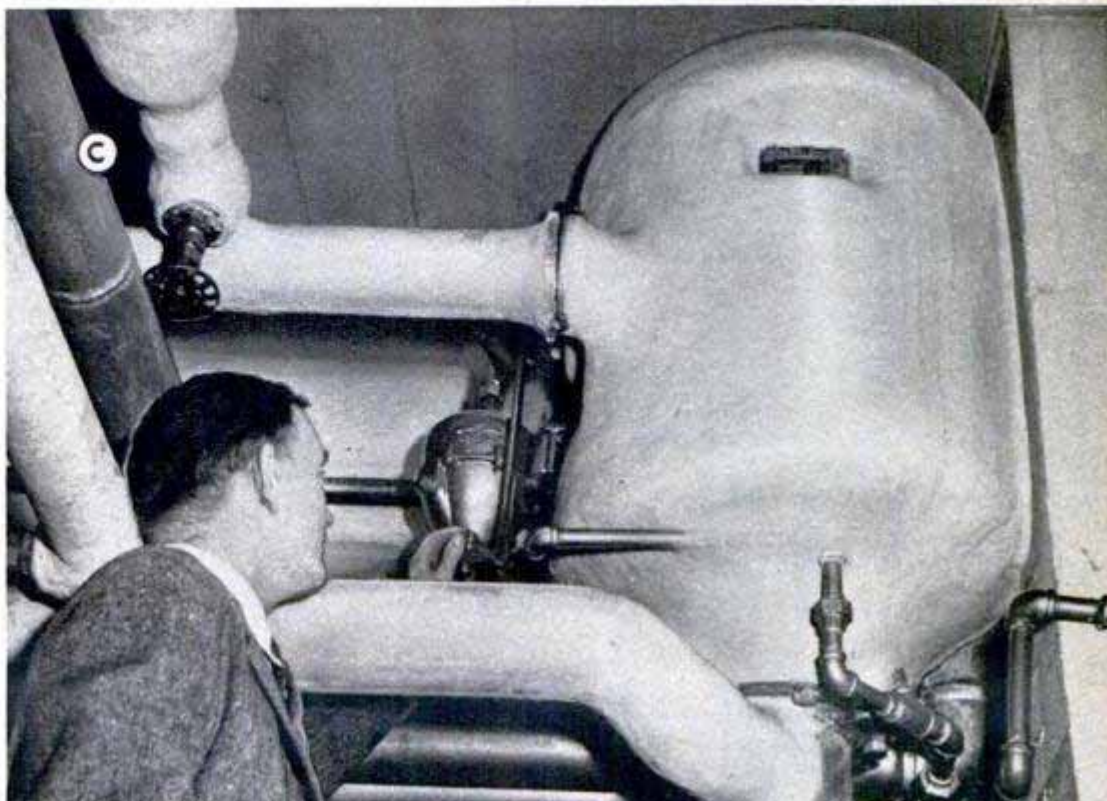
The main reason why vapor-phase cooling does all these things is because it maintains the engine block above the critical 194-degree temperature. This is the dew point at which water condenses in engines.

The combustion process produces about a gallon of water in vapor or steam form for every gallon of fuel burned. Most of this and other products of combustion are removed in the form of exhaust vapors. However, when part of the engine such as the lower cylinder walls is colder than the dew point, some water vapor condenses on the cold metal surfaces. Other products of combustion, including sulphur dioxide, combine with the water and corrode the metal. Too, some of the liquid is blown down into the crankcase where it sludges the oil, further hastening engine wear.

When engine temperatures are kept above the dew point, no condensation of the combustion vapors and gases takes place. All corrosive materials are removed by the exhaust and wear is kept at a minimum.

Another benefit of vapor-phase cooling is that the whole engine block acquires an even temperature. Piston-cylinder clearances are uniform throughout the full stroke, insuring better lubrication of the walls and rings. Heat transfer from the combustion chambers is improved, so there is no increased tendency for a fuel to

Insulated chamber where steam and water are separated is at upper right



detonate. Being a closed system to which liquid is added only to make up for mechanical leaks, scale and rust in the cooling system are almost completely avoided.

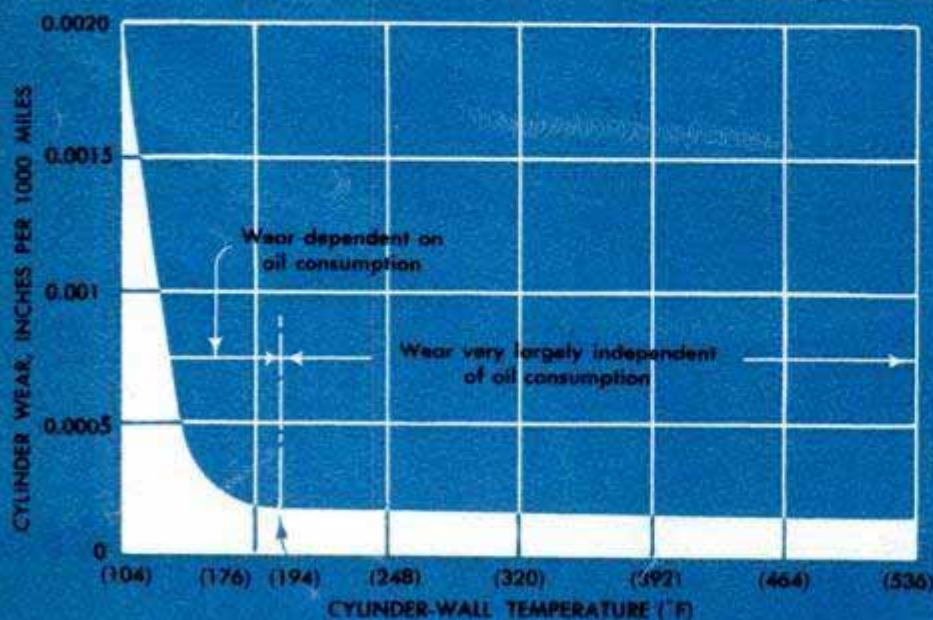
The ambient temperature on even the hottest day is "cold" compared to the temperature of the steam in the condenser, and so the cooling system continues to operate at peak efficiency even when the outside temperature climbs to 110 or 120 degrees. Similarly, the water temperature remains constant regardless of load.

Vapor-phase cooling got its start about 10 years ago when L. C. Harbert, J. H. Wallace, William G. Corey and R. A. Newton of Los Angeles sought a way of reducing the excessive wear that was occurring to engines that used raw sewage gas or "sour" oil-field gases as fuels. These gases are heavy in sulphur and other corrosive elements. The only existing remedy was to install expensive equipment that "scrubbed" some of the corrosive materials from the fuels.

Harbert and his companions knew that some research, especially in England, had indicated that corrosion was almost completely eliminated when engine temperatures were kept above 194 degrees. Starting from there, they designed a high-temperature cooling system that used the boiling point of water as a natural control. The idea worked and they applied for patents, then formed Engineering Controls, Inc., to manufacture and market the system.

At that time Visalia, Calif., was having typical difficulties with a 50-horsepower engine in its sewerage works. Sewage gas was used as fuel, and a new engine installed in February was so badly worn by July that it was beyond repair. A new engine, equipped with vapor-phase cooling, was installed and carefully watched. That was back in 1939.

By keeping engine-block temperature above 194 degrees, vapor cooling avoids condensation that leads to corrosion of metal surfaces



Today the same engine is still in use, still using the same corrosive fuel. The engine gets a routine overhaul about every 18 months and in 10 years some \$300 has been spent on replacement parts. If the engine had been powering a truck it would have traveled about 2½ million miles by now.

An example of how vapor-phase cooling helps double the thermal efficiency of an engine is found in the power plant of the Shepherd Tractor Company, Los Angeles. They have two diesel-type motor-generators that manufacture power for operating arc welders, air compressors, power tools and other equipment. About 31 percent of the B.T.U.s per pound of fuel are converted into mechanical energy. Most of the balance would be thrown away as waste heat if the plant followed conventional lines.

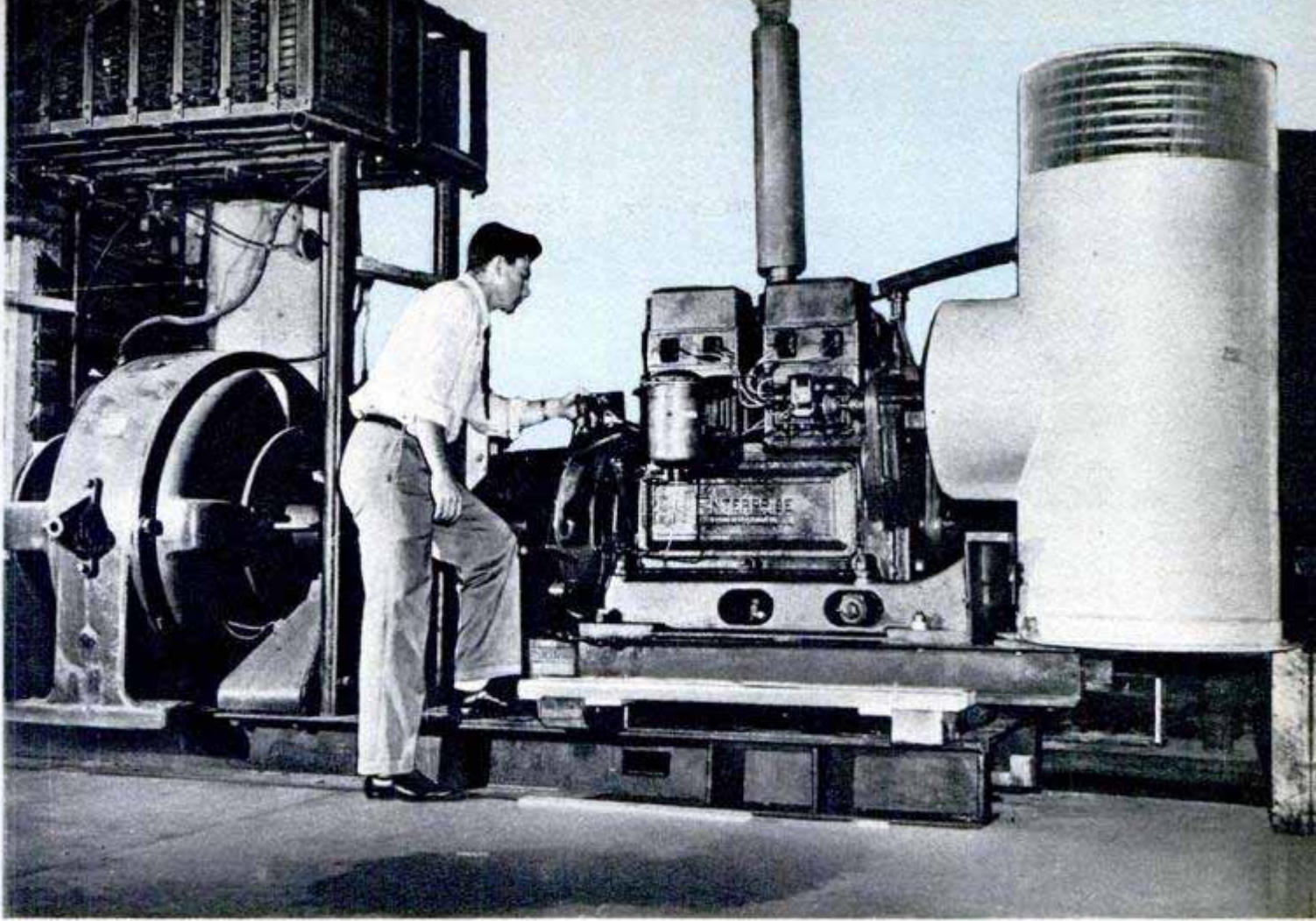
Instead, a pressure-type vapor-phase system, operating at a water temperature of 240 degrees, is used to cool the engines. Exhaust boilers that recover much of the heat that is usually dissipated by the engine exhausts are also used. The result is that enough steam is produced to keep part of the tractor plant warm during cold weather. The net over-all thermal efficiency of the power plant is in the neighborhood of 70 percent. G. G. Thomas, Sr., plant engineer, is now thinking about using the waste heat to operate a refrigeration system for keeping part of the factory cool during summer.

Recently a prospective client of Engineering Controls wondered whether the low-pressure steam of vapor phase could be used to distill fresh water from the ocean. The client's plant is about 100 yards from the Pacific on a lonely part of the coast. Wells in the vicinity produce only salt water and the company hauls in fresh water at considerable expense for domestic use and for its high-pressure boilers.

The engineers examined the company's power plant, four 600-horsepower natural-gas engines each driving a 400-kilowatt generator, and concluded that at average load the waste heat from these engines could operate a simple evaporator that would distill 458 barrels of fresh water from the ocean every day. Not only would the water be produced at no cost but the engines themselves would operate more efficiently on high-temperature cooling.

For oil-field clients, Engineering Controls provides an "engine attendant" by which a gas or diesel engine can operate automatically for weeks, without human supervision.

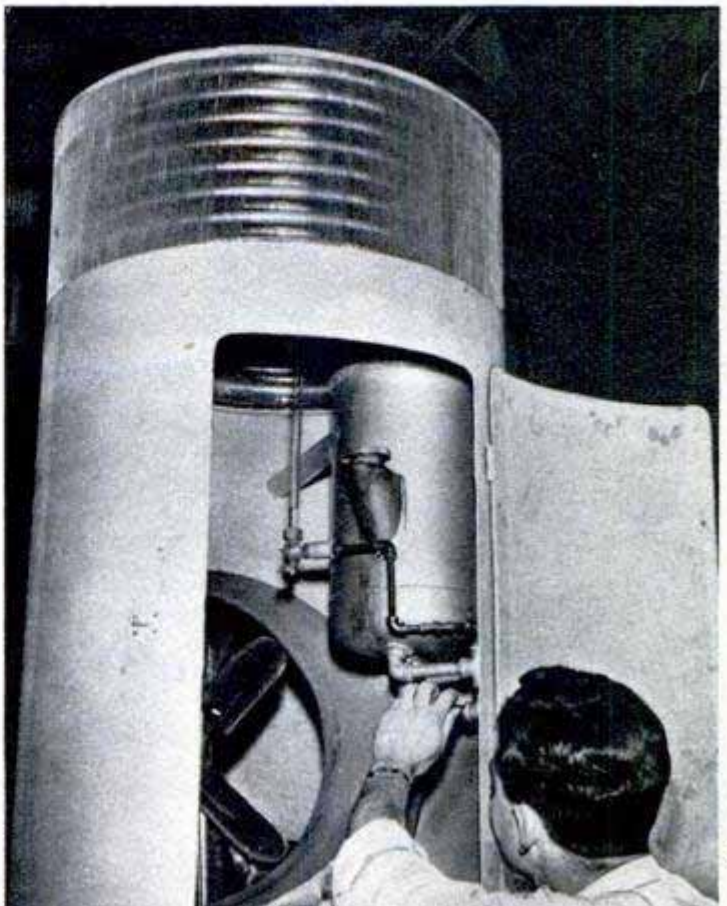
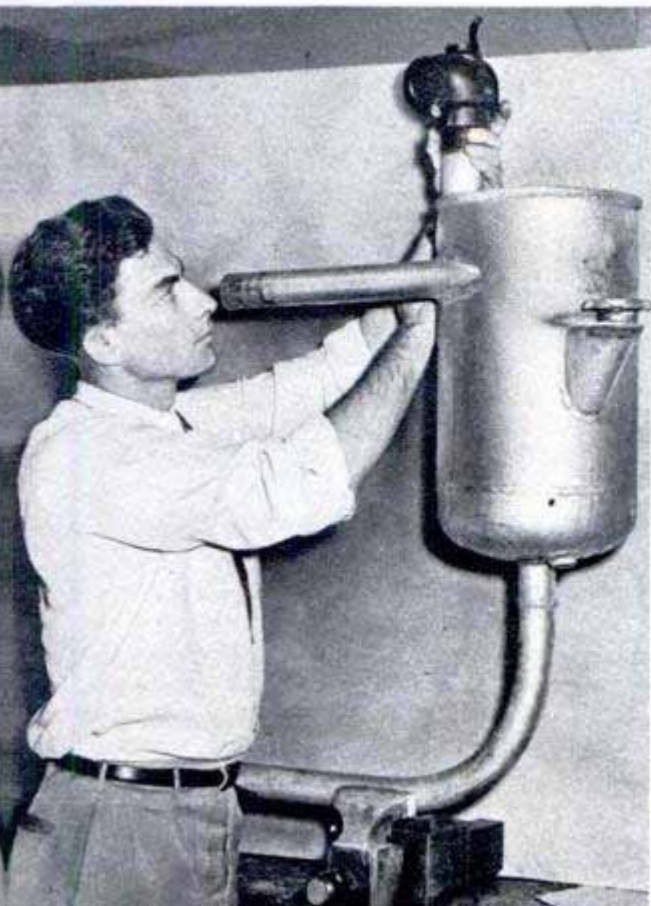
(Continued to page 258)



"Engine attendant" at the right is being built for operation in oil fields. It can operate diesel or gas engines automatically for weeks and weeks, without human supervision. The apparatus feeds oil to them as needed

Putting together a steam separation chamber for a 50-horsepower engine. Equipment used in auto experiments is considerably smaller

Cooling condenser coils form top section of the "attendant" and oil-storage tank is located below. Engine fan, visible in picture, draws air through condenser to insure cooling



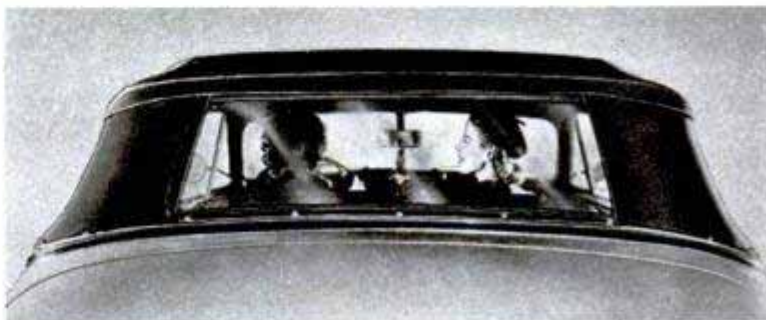


Self-Propelled Power Saw Clears Brush or Cuts Logs

One man can clear two to three acres of brush and scrub trees a day with a mobile power saw that propels itself. The clearing is done without disturbing the topsoil. The saw has a 30-inch circular blade, adjustable at various heights and angles from the ground. The outfit has two speeds and a neutral position, working through heavy brush and saplings at 1¼ miles an hour and in thin growth at 3 miles an hour. The saw is mounted on a swivel axle that can be swung free while the wheels stand still and a safety clutch stops the blade instantly if it pinches in a tree or log.

Convertible 'Picture' Window Folds Down With Top

Any convertible owner who has tried to back out of a parking space and keep an eye on approaching traffic will welcome a rear "picture" window. It is made of "flexible glass" and folds down with the top like a regular panel. The big window offers 500 percent greater rear visibility than is provided in most convertibles. The window can be installed in a few minutes with ordinary



tools, cleans easily with water and is available for 12 different makes and 56 models of convertibles.



Skating Factory Workers

Girl workers zip from job to job on roller skates in a Japanese spinning factory. The spinners must move rapidly between the machines. According to the plant superintendent, the roller skates have substantially increased the efficiency and boosted the workers' speed in the factory.

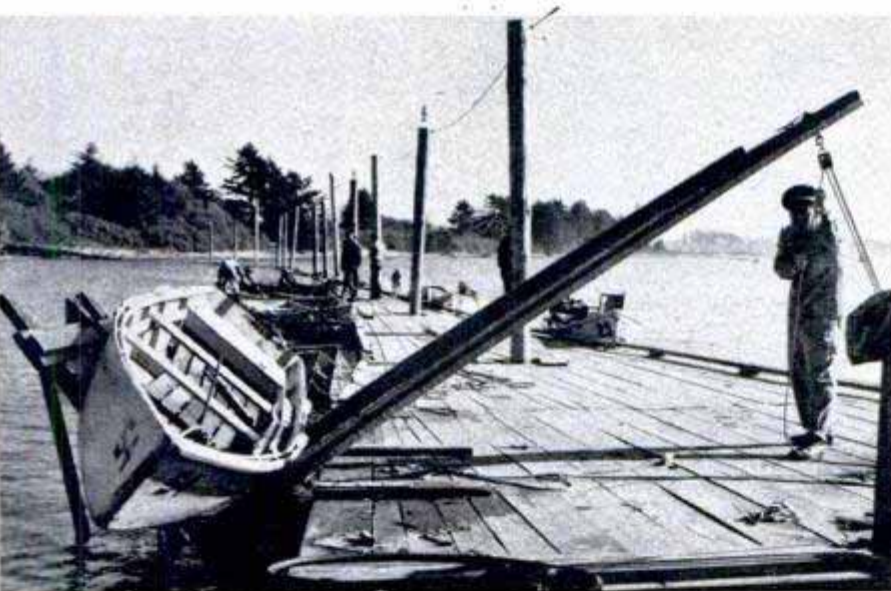
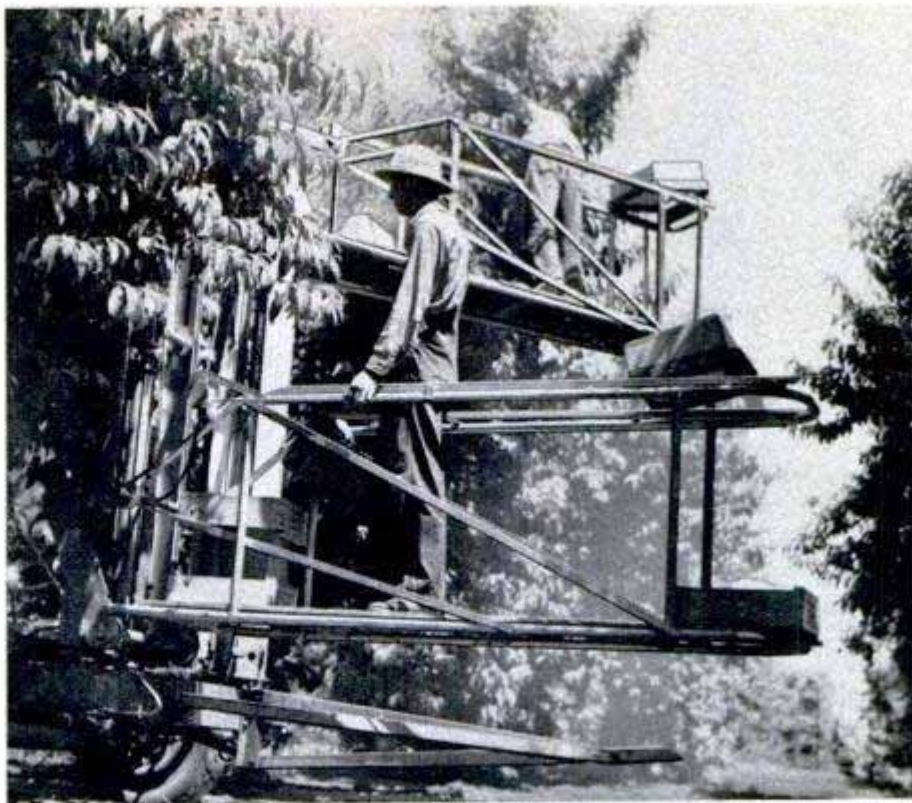
Jet Plane Photographs Ducks Before They Hear It Coming

Jet planes flying 400 miles an hour at an altitude of 300 feet "sneak up" on flocks of ducks feeding in marshland so fast that they can be photographed before they are frightened into flight. Ordinary planes cannot be used for an accurate photo census of wildfowl because the noise of their engines scares the birds away before the plane gets overhead. The Fish and Wildlife Service is now using an RF-80 jet-propelled plane equipped with a strip camera to assist in the annual census of ducks in the San Joaquin Valley of California.

University of Maine athletes who wear glasses have been fitted with contact lenses of nonshatterable plastic to eliminate the danger that is present when ordinary spectacles are worn in strenuous sports.

Fruit-Picking 'Walks' Swing Into Trees

Catwalks swing out from the four corners of a mobile orchard machine to provide platforms for picking, thinning and pruning fruit trees. The four catwalks are raised and lowered hydraulically and can be swung right and left to permit each worker to cover his side of the tree. The machine is in use on the Merrill Orchards in California. The owner estimates he will use the machine about 160 days this year and cut his costs by 50 percent. He plans to make the machine self-propelled before the end of the season.



Tipping Cradle Drains Rowboats

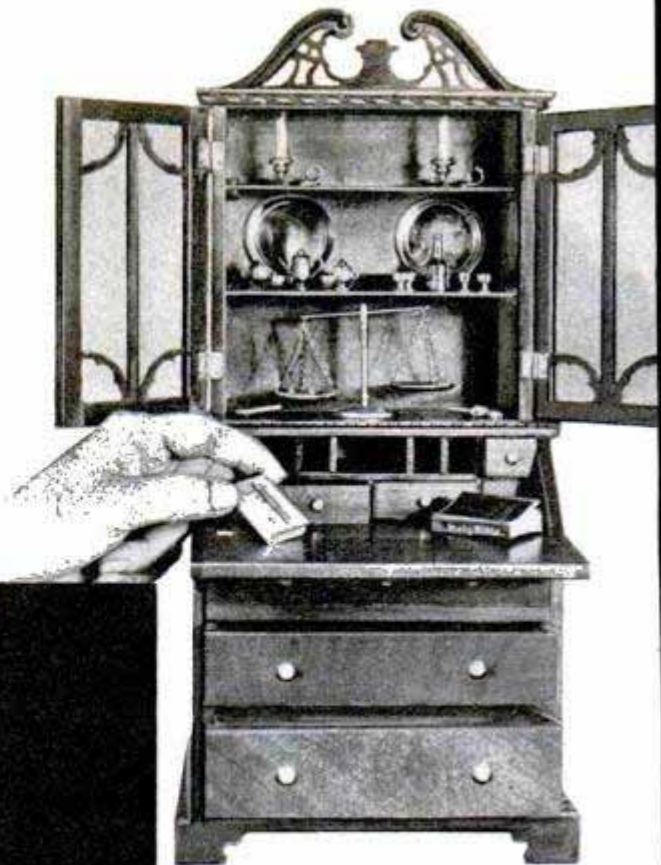
Instead of laboriously pumping bilge water from rowboats after every rain, the operator of a boat landing in California lifts each boat on a special hinged cradle and tips it until all rainwater and seepage runs out. The cradle, hinged to the pier, consists of an underwater platform over which the boat is floated. An upright arm attached to the cradle is pulled down by a tackle, raising the boat out of the water and turning it on its side.

Brush Cutter

Three whirling saw blades on a new brush cutter mow a seven-foot path through weeds and small trees. The cutter can be installed on a jeep, bulldozer or small tractor. The blades will slice through timber up to six inches in diameter. From 20 to 50 acres of brush per day can be mowed with the machine. A triangular guard pushes the brush to each side and an overhead framework protects the driver from trees that might fall toward him.



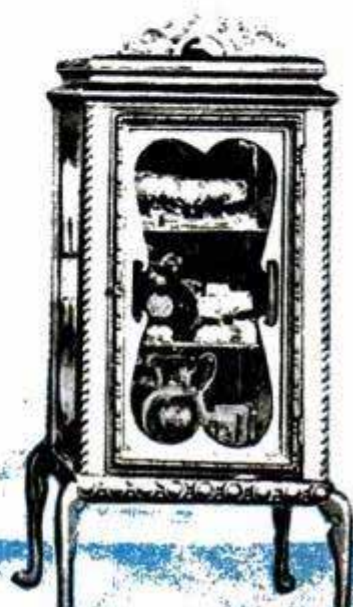
Heirlooms in Miniature



↑ Governor Winthrop secretary holds miniature scales, Bible, candlesticks and tiny goblets. Made of mahogany, it is 14 inches high, plays a tune when the drawer is out



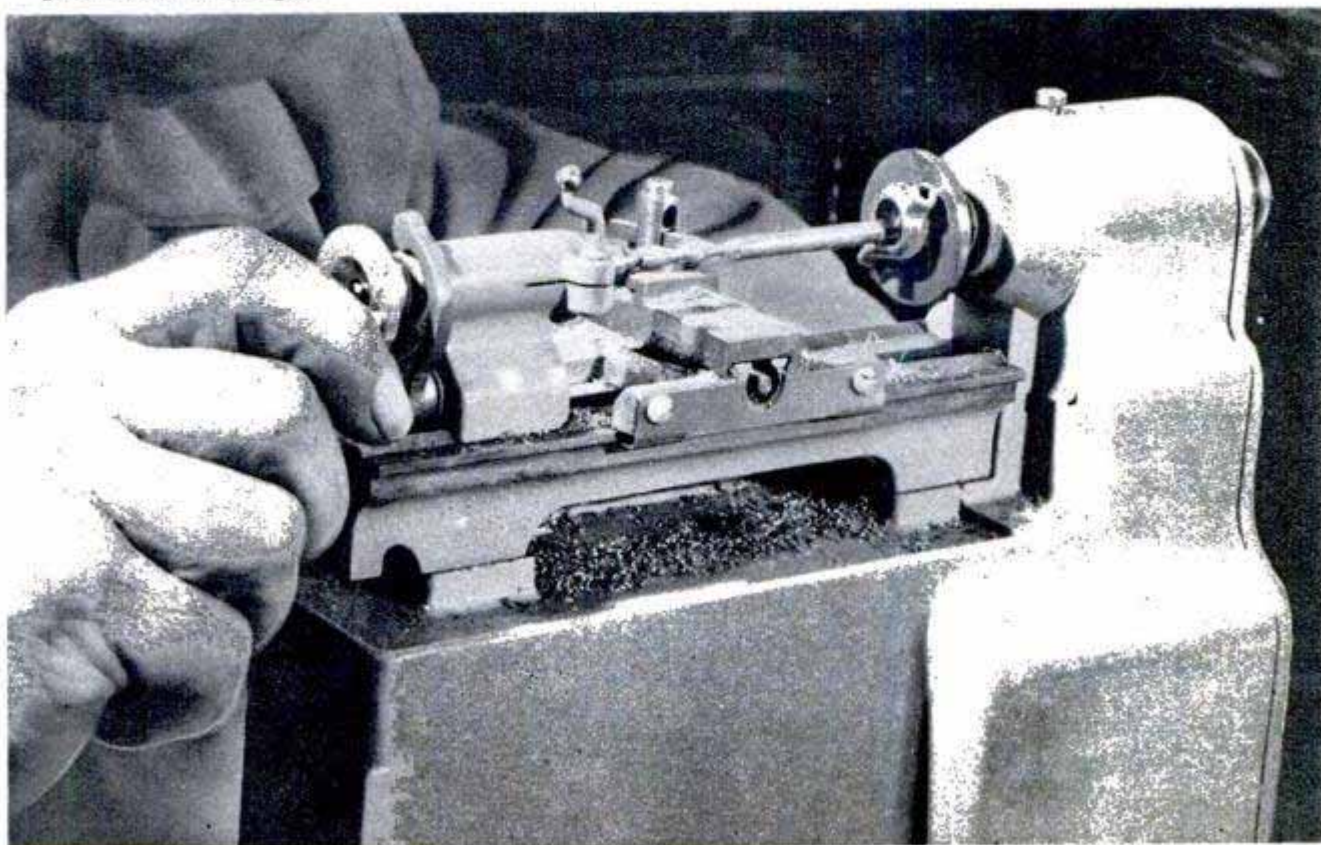
← Elaborately carved organ is nine inches long and has red-velvet pedals. Knee lever controls volume. Below, spinet desk is made of walnut. The gold-leaf cabinet holds tiny crystal glassware



IN A WORKSHOP fitted with lilliputian tools, Helen Armitage of Altadena, Calif., turns out exquisite family heirlooms only a few inches high. Her miniature pianos and melodeons play appropriate tunes and her grandfather clocks keep accurate time. Miss Armitage copies only the treasured heirlooms of her own family and the articles of furniture she particularly admires in the homes of friends. Each of her pieces has been copyrighted, there are no duplicates and she refuses to sell any of her miniature masterpieces. She started her hobby several years ago when the family's grandfather clock, which she admired, was given to someone else. To take its place, Miss Armitage made an exact copy 27 inches high. Today, her tiny heirlooms include melodeons, pianos, desks, perfume cabinets, organs and clocks. She uses a jewelers' lathe and other tiny precision instruments in her work. The heirlooms, made of rosewood, walnut and other fine woods, are authentic in period and design.



Miss Armitage holds miniature clock, a perfect copy of the original. Below, the tiny metal clock parts are turned on a jewelers' lathe





Community Mailbox

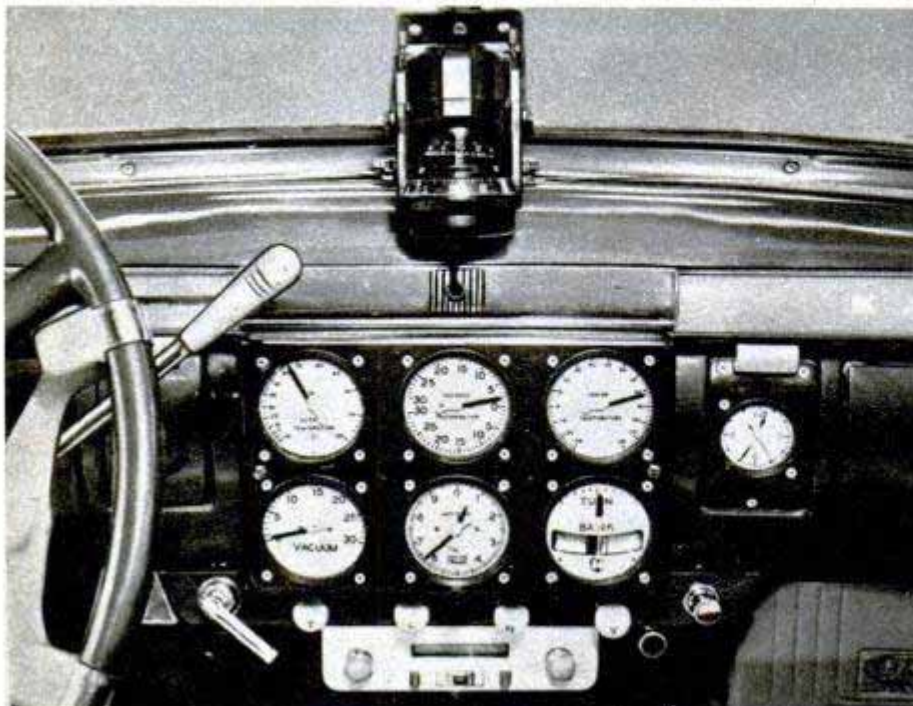
Rural mailboxes are often anything but beautiful, but there's one crossroads near Grangeville, Idaho, where the community mailbox is not only attractive but also practical. Seven mailboxes are mounted in gables of a small houselike shelter at the correct height for easy accessibility. The lower part of the shelter is a weatherproof parcel room. Also included is a neat sign showing direction and mileage to each farm.

Music Lessons Are Fun Now

Music lessons are as much fun as a game of marbles when the teacher has a training table that uses real marbles to teach everything from key names to harmony. Marbles representing each note of the scale are placed on a large staff printed on the table top and the student tries to hit as many as possible by shooting another marble into the group. If he can identify the struck marbles, he places them on a simulated keyboard in front of him. As many as eight students take part in the game at one time and competition enlivens the lesson. Not limited



to elementary training, the table has many varieties of games for instruction in all stages of pianoforte.

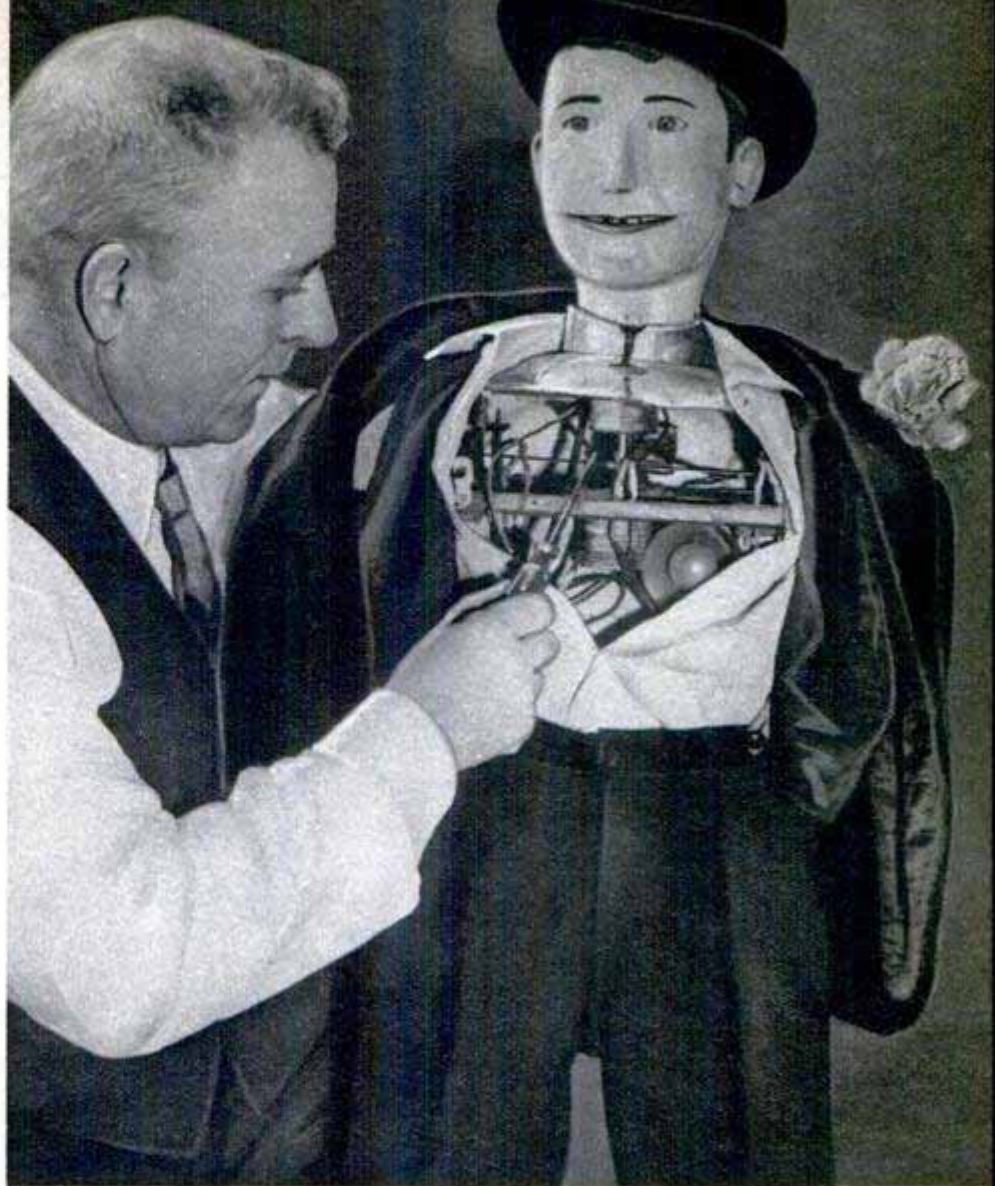


Airplane Instruments On Auto Dashboard

When W. H. Dietzel of Detroit, Mich., drives his new car he has almost as many dials on his instrument panel as the pilot of a trans-Atlantic airplane. Not satisfied with the standard dashboard, he installed a group of instruments that tells him everything from the outside temperature to the height above sea level. The airplane-type instruments include outside and inside temperature gauges, vacuum gauge, inclinometer, turn-and-bank indicator (which he admits is merely a novelty), clock and compass.

WILLIE the ROBOT

WILLIE is a dapper little citizen of Hammond, Ind., with a leer in his eye and a stomach chock full of wires and gears. He's a robot, the mechanical child of Andy Bober. If you ever meet Willie, there's any number of things he may do. He introduces himself politely, puffs a cigarette, answers your questions, walks, dances, turns in any direction, sings, plays a horn or harmonica and even aims and fires a pistol. Bober has worked 15 years on Willie. He won't reveal all his secrets, but explains that electrical impulses from the control box travel along a cable, up one of Willie's legs and into coils in his body. Willie hears through microphones in his ears and answers questions through a loudspeaker installed in his stomach.



Above, Willie smiles bravely with his shirt peeled back so his creator can make some minor adjustments. Below, the robot pauses for a light during a stroll around the room. Below, left, Bober operates dapper mechanical man by remote control from switch box



Budget-Size Yachting



Light enough to pick up and carry, as the girl at the left proves, the Sabot is a sailboat that will fit your budget

small and maneuverable that it can be sailed on small lakes and fair-sized rivers. And if the wind is too light for sailing, you can strip off the sailing equipment and the versatile boat becomes a handy, light-weight rowboat.

It is the Naples Sabot, an eight-foot leeboard dinghy of the pram type, the official plan of which was presented in the fall of 1946 when the Naples Sabot One-Design Association was formed.

A distinctive feature of the Sabot is the leeboard which provides the keel effect necessary for any sailing craft to keep it from sliding away with the wind. This leeboard is a paddle-shaped piece of wood on the starboard side that can be raised or lowered when necessary. With the leeboard up, the boat can be dragged along the beach like a light rowboat. The leeboard, as well as the rudder and mast, can be removed quickly to convert the Sabot into an easy-to-handle rowboat for hunting and fishing.

Boats of this type had been sailed previously, but it was only when they became an official class of yacht design that they came into their own and started the burst of popularity in racing circles.

There are several other boat designs similar to the Sabot. These include the El Toro, the Balboa Dinghy and the Seashell. But, at present, the Sabot seems to be a leading contender for the number-one spot on the hit parade of the budget-size yachtsman.

Merely sailing over the bounding main, with nothing but the fresh breeze for motive power, is an exciting and enjoyable

By Eugene M. Hanson

Photos by the Author

YACHT RACING is no longer the exclusive hobby of millionaires, nor is it limited to those who live near the ocean or large lakes. A new kind of yacht club, which brings sailboat racing within the financial reach of almost everyone, is having a mushroom growth around California's lakes, bays and coastline.

Making possible the popularity of these sailing organizations is a new type of small sailing boat. Recently developed and accepted as a standard by the North American Yacht Racing Union, this new class fits neatly into the workingman's budget.

Besides being so inexpensive that almost anyone can afford it, the new boat is so

sport, but the real thrill of sailing comes in yacht racing. It is the competition among rival boatmen that makes sailing enthusiasts such fanatics among sportsmen.

The original fleet of Naples Sabots is in Long Beach, Calif., where the design originated. But new clubs are springing up all over California and Sabot fans freely predict that this versatile little craft will bring about the formation of yacht clubs everywhere, even on the smaller inland lakes and rivers.

It is easy to form a yacht club and the cost is virtually nothing, aside from the actual cost of the boat. And when the club members stick to the Sabot, that cost is very low.

There are many reasons why sailing enthusiasts band together into yacht clubs. The primary reason, of course, is to provide racing. Without a race, no sailor can know for sure that he is getting the proper speed out of his boat and speed is the test of sailing skill.

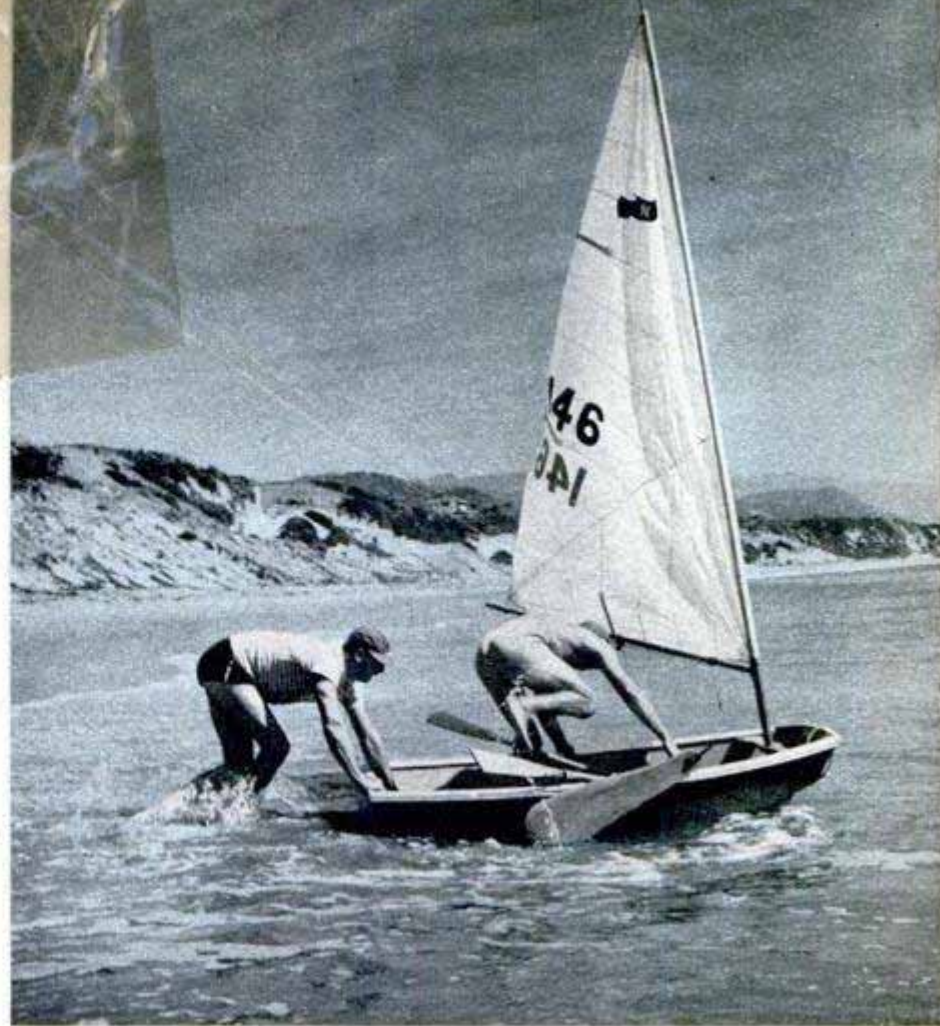
Unless he is racing other boats of the same design as his, the sailor has no true test of his skill, either. Other things being equal, the longer boat will always have an edge in speed over a shorter boat. For this reason, the budget-size yacht clubs nearly all favor restricting their membership to a single design, such as the inexpensive Sabot.

Since competition is so important, the clubs make it their first order of business to set up racing facilities, marking off a course with buoys and handling such details as setting race dates and interpreting the rules for beginners.

If there is one experienced sailor in the club, he can soon bring the newcomers up to the mark. Even without such help from a club member, many clubs have been able to prosper, thanks to the help they get from other clubs in the vicinity. Affiliating your club with one of the yachting associations is a sure way to get the benefits of this advice.

There's a lot more to sailing than simply letting the wind blow the boat over the water. You'll learn skill and judgment, so essential to good yachting, much more quickly if you can get some help from an "old salt."

The lack of harbor or docking facilities should not discourage sailing enthusiasts from going ahead with plans for a yacht club. The



Launching the Sabot is easy. You just push it out into the water. That's Jimmy Wallington, the radio announcer, at the stern. The 10-year-old California girl, below, is already a veteran behind the mast of the safe and easy-to-handle boat





Rigged and ready to sail, the Sabot can be dragged across the beach, eliminating the expense of a dolly

members of Malibu Yacht Club, who sail the Sabot exclusively, launch their boats right through the surf into the open sea. They pull out beyond the breaker line with the oars and then let the wind take over.

Members of the Malibu club swear by the Sabot, as do others who sail this tiny craft. Foremost among the desirable qualities of the Sabot is its economy, both in first cost and in upkeep. Equipped, all ready to sail, the Sabot costs only \$275. You can cut more than \$100 from this price by buying an unfinished boat from one of several manufacturers and finishing it yourself.

A screwdriver, a paintbrush and some sandpaper are about the only tools you need to finish one of these boats in your workshop or back yard. Nor do you have to be a skilled craftsman to turn out a shipshape job.

Finishing consists of puttying the screw holes in the hull, applying two coats of marine flat paint and a coat of enamel, installing floor boards and fittings. These fittings include the rudder gudgeons and pintles, tiller fittings, oarlocks, towing-ring bolt in the bow, traveler in the stern, leeboard fitting and bracket.

The mast and boom come from the manufacturer already roughed out. All you do is the sanding and varnishing and then add the fittings supplied with the boat.

Or, if you're handy with tools and want to start from scratch, you can build your

own Sabot. Plans for the boat can be obtained from the association. Working only on week ends, boatowners have built the Sabot in about six weeks.

Upkeep cost of the Sabot is virtually zero. Just a little time and effort in sanding and painting are all that is needed to keep your boat in good shape.

Next to the economy of the Sabot, its most appealing characteristic is its fine response to sailing skill. Jimmy Wallington, the well-known radio master of ceremonies who is the vice commodore of the Malibu Yacht Club, gave up a 39-foot yawl when he found out how much more fun it is to handle a tiny Sabot.

Wallington, who weighs 215 pounds, and Howard Splane, commodore of the club and another 200-pounder, often sail together in their boat, *The Grunion*. Their combined 415 pounds give an indication of the Sabot's amazing weight-carrying ability.

Weight of the boat itself is only 65 pounds, ready to sail. The lightness of the Sabot is another reason for its popularity and the low cost of upkeep.

It's so light and compact that you don't need a dolly to get it from your car into the water. You just drag it along the beach and launch it, just as you would a canoe or rowboat.

Two persons can pick it up and carry it easily. With the mast, rudder and leeboard removed, it will ride on the roof of your

car safely. When you are ready for a day's sailing, you merely haul the Sabot out of the basement or garage, tie it on your car and drive to the nearest water. It's as simple as that. No rental fees for moorings or dock space are necessary.

Anyone within driving distance of lake, sea or large river can thus enjoy sailing. The Sabot is so easily maneuvered that it doesn't require great expanses of water even for racing. Races are held by the Malibu club over a triangular course in the ocean where space is unlimited, but the longest distance between buoys is only about 300 yards.

The reason for using such a small course is that it requires more skill to round the buoys several times to cover a given distance than to sail over a longer course only once or twice. The small course also makes it easy for spectators to watch the progress of the race from starting gun to finish line.

The safety features of the Sabot are particularly appealing qualities for parents who want to teach their children the thrill of sailing. In case of a hard blow coming up when the boat is at sea, it is easy to take down the sail and row to a landing. With the sail and leeboard removed, the boat is as safe as a rowboat.

If a Sabot is capsized, which is possible if the boat is pushed too hard in a stiff wind when racing, it floats well and the crew can use it as a raft while awaiting help. Nor does the boat have to be towed ashore if it does capsize. It is easy to right because there are no stays to unbuckle before removing the mast. The mast simply slips into a tube-shaped well near the bow. Because the mast is round, it can turn in any direction during sailing.

Other qualities which Sabot owners like to point out are that it can be rigged in a matter of seconds, that it tows beautifully without any tendency to yaw, that it has a high resale value because it is a standard design and that it is one of the sturdiest of craft despite its small size and lightness.

Specifications for the Sabot are stipulated by the yacht-racing union and the manufacturers are not permitted to vary from them by more than a quarter of an inch.

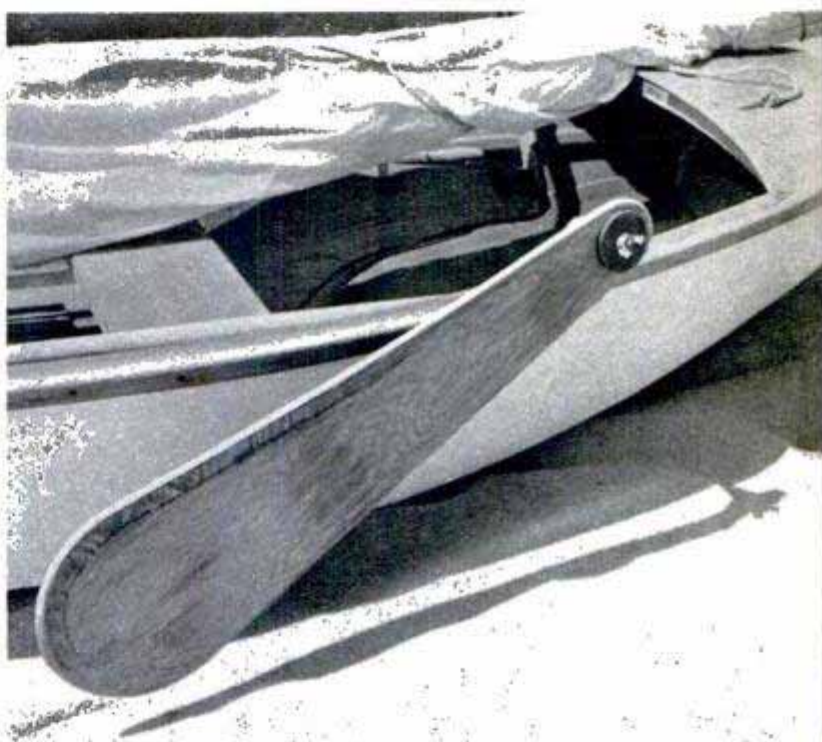
Roughly, the Sabot is 8 feet long, 46 inches wide, weighs 65 pounds, has a 13-foot mast and a 7-foot boom. It carries 36 square feet of sail. The oars are 66 inches long and stow easily.

Besides being a sailboat and a rowboat, the Sabot takes an outboard motor nicely and its shallow draft makes it ideal for hunting and fishing.

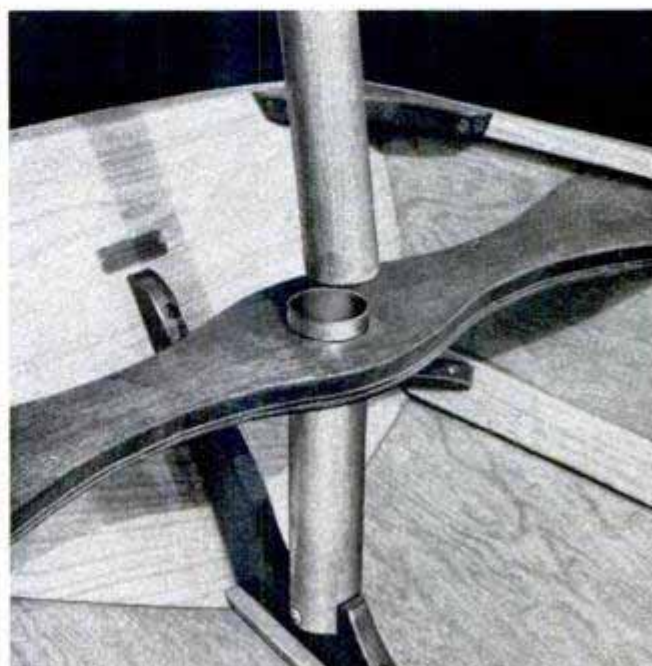
With all its versatility, however, the Sabot is really best suited for one specialized job—the job of introducing beginners, at low cost, to the joys of sailing.



Working from official plans, this young enthusiast built his own Sabot. It takes about six week ends to complete the boat. The photo below shows the leeboard which provides the keel effect for the craft. When the boat is sailing, the leeboard is vertical



Stepping the round mast of the Sabot is simple. You merely slip it into the tube-shaped well at the bow



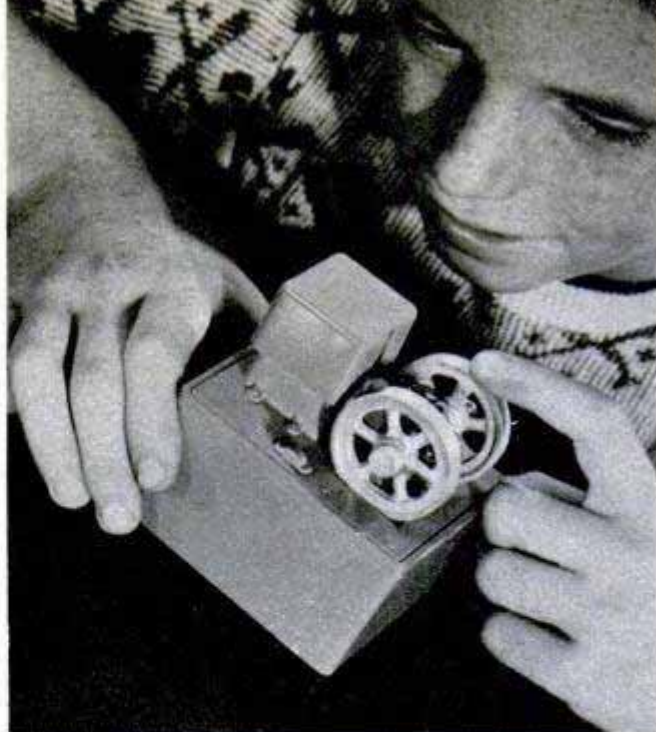


Jungle Voices on Wire

When he needed the chatter of monkeys as sound effects for one of his movies, Capt. Hassoldt Davis, an explorer, sat down in a cage full of chimpanzees and persuaded them to speak into the microphone. Captain Davis recently returned from an expedition into French Guiana sponsored by France and the United Nations. He wanted to reproduce the monkey voices accurately for his movies, and a cage full of monkeys plus the recorder provided the answer.

Pedal Violinist

Even though he has only one arm, Luther Caldwell, a farmer of Columbia, Mo., still plays his violin. Caldwell uses a pedal-operated rig of tubular steel that rests on the floor in front of his chair. When he pumps the pedal with his foot, a steel arm draws the bow across the strings.



Toy Motor Is Battery-Operated

Powered by two flashlight batteries, a toy electric motor eliminates the need for a transformer and power line. With its base and battery container made of Tenite plastic, the motor is designed so that its base becomes a cover for the unit when it is not in use. A push-button switch on the base starts the motor running. Speed can be regulated and power is transmitted to other toys by a belt wrapped around a hub cap.

Car-Washing Mitt Makes Own Suds

Detergent pellets slide into a lamb's-wool mitten to make car washing easier. You hose the car thoroughly, then wet the mitten and wipe it over the car. The water dissolves the pellets forming suds that remove dirt and grime. The suds are then rinsed from the surface and the car dries clean. It is not necessary to chamois or wipe the surface.





How to Tempt a Fish

PART II BAIT CASTING

By Joe Godfrey, Jr. [64 W. RANDOLPH, Chicago]

IT WAS THE PLACE and time a bass fisherman finds only in his dreams. Only this wasn't a dream. It was the real thing. It was the glory of a summer sunset coloring the water, the dimple of feeding bass, the little rings spreading over the golden red surface of the bay.

It was the roll of dorsal fins, the lusty slap of a forked tail, the sudden leap of a heavy fish at a minnow skipping across the surface of the water.

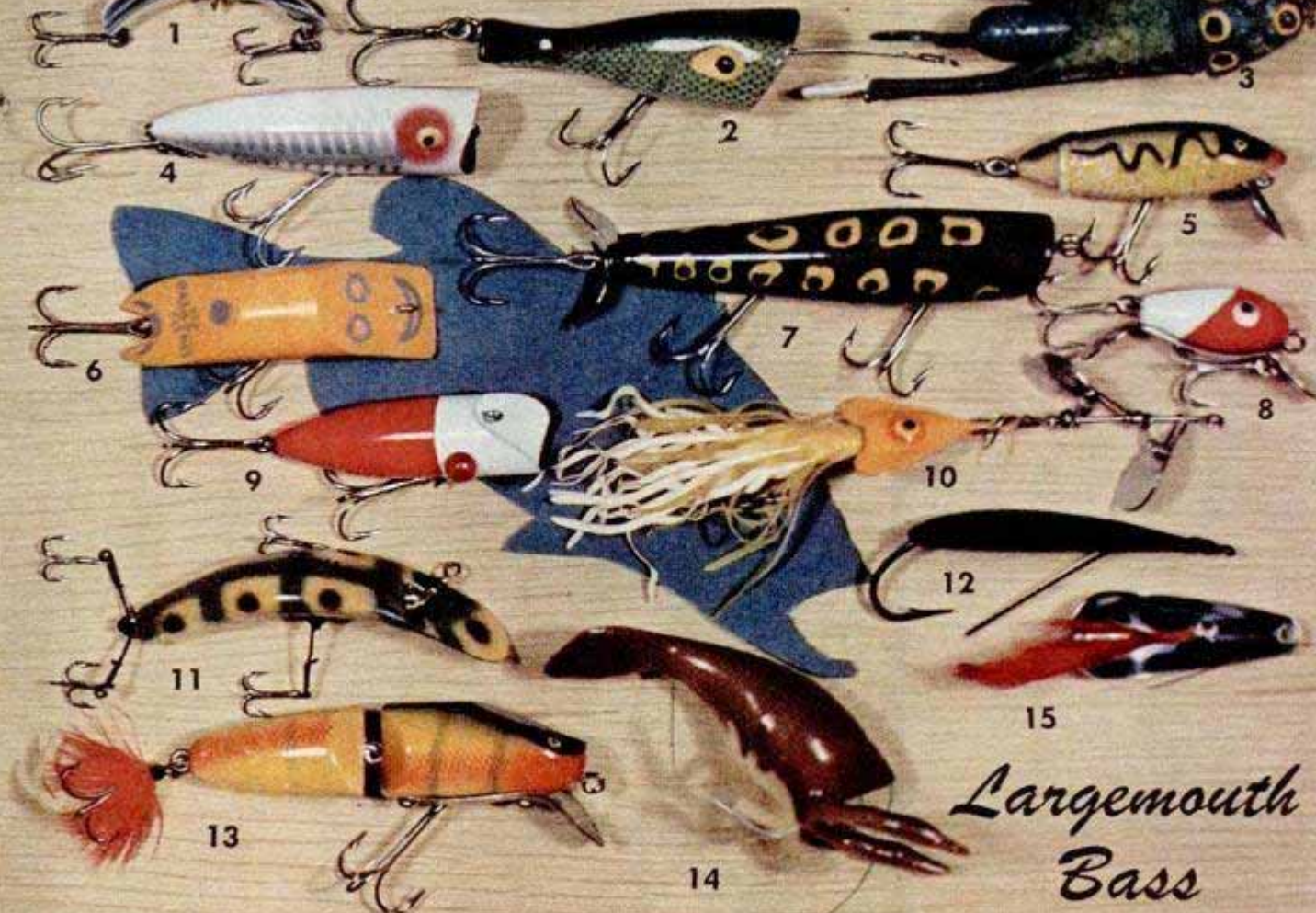
Now was the time to snap on a small wiggly plug and cast it into those rings. It was bass feeding time.

Not so many years ago bait casting was just another way to catch muskellunge, northern pike, pickerel, walleyes, lake trout, white bass, panfish, largemouth bass, smallmouth bass and spotted bass, but in recent years our fishermen have made it the most popular form of fishing. Now with a bait-casting outfit you can catch dozens of the salt-water game fishes including tar-

pon, snook, bonefish, ladyfish, barracuda, weakfish, snappers and others, if you fish in Florida.

It is an easy sport to learn, and millions of fishermen are luring the fish with plugs, spoons, spinners, feathers, bucktails and pork strips. Usually one quick lesson will do it—then practice makes for perfection. You must remember to keep a slight thumb pressure on the spool of the reel to prevent a backlash (overspin), often referred to as a "bird's nest." Bait casting is easy to master; but just in case you happen to be the impatient type and you fail to become an expert after three casts, the manufacturers now have an answer—level-wind reels that won't backlash.

It is not only the art of bait casting that attracts the lads and the lasses to this popular sport, but also the environment. It offers a panorama of beauty from the glacial lakes of Alaska, the mountain lakes in the Rockies, the 10,000 jewels and gems of



Largemouth Bass

BAITS FOR LARGEMOUTH BASS: 1—Russelure. 2—Walkie Talkie. 3—Gee Wiz Frog. 4—Chugger Spook. 5—Fish-Obite. 6—Flat-Head. 7—Dalton Special. 8—Dopey. 9—Wiggle-Plug. 10—Hawaiian Wiggler. 11—Flatfish. 12—Black Silver Minnow. 13—Lucky Tail Jointed Wobbler. 14—St. Croix Crab. 15—Rex Spoon

Minnesota, to the colorful flats of Florida.

If you want action in fishing, none of that sitting all day soaking live bait, give bait casting your best efforts. If you want action from a fish that leaps, rears, flips and bucks, try your luck at bass fishing. Any kind of bass fishing will do, whether it be for white bass, spotted bass, largemouth bass or smallmouth bass. If you have a bait-casting rod that you prize highly, don't

use it when going after big bass because sometimes the smallmouth (bronzeback) or even the largemouth (lunker) just ain't no gentleman. If you have never been in the ring with a black bass, put on your fishing togs, go to a lake where there are bass, and climb into your corner. If you tie into one, you will find him a real battler.

So important has bait casting become in fishing circles that the Metropolitan Miami Fishing Tournament, an annual \$15,000 prize event attracting more than 300,000 participating anglers, has added many prizes for the biggest fish taken on plug-casting equipment. These sport anglers have turned in such outstanding fish as a 99-pound tarpon, a 27-pound channel bass, a 40-pound cobia and a 29-pound barracuda. It is possible to take at least 30 different kinds of salt-water game fish using plugs, spoons and spinners.

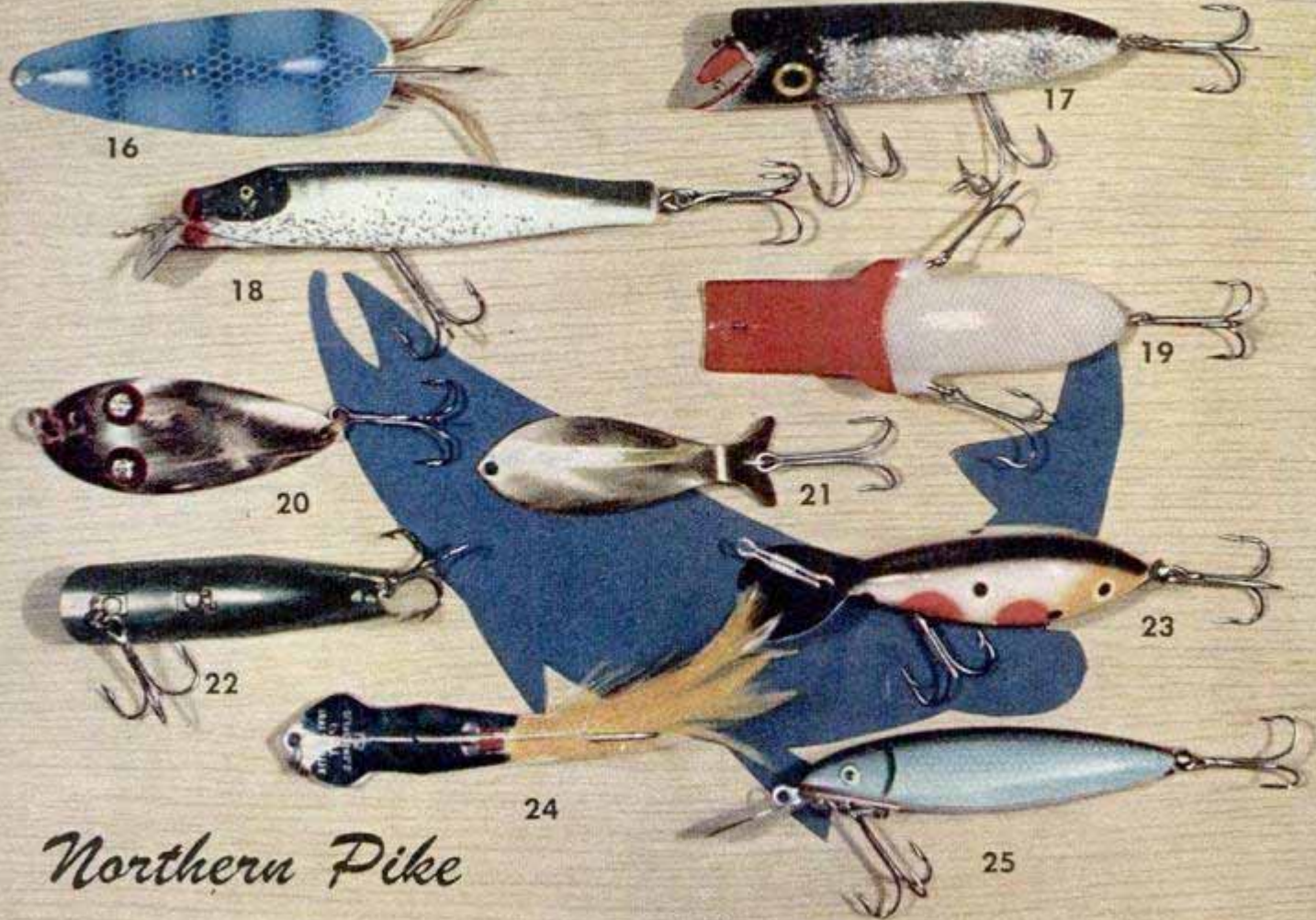
The International Game Fish Association, official organization that recognizes world-record salt-water fish, has announced the establishment of a new subdivision for world records—plug casting. This is because casting for marine fish on light rods and artificial baits has been a major sport of anglers in recent years. No

Crystal-clear tackle box made of Plexiglas permits angler to see through the trays to find the desired bait

POPULAR MECHANICS

*Richmond Walker
Practical Plastics, Inc*





BAITS FOR NORTHERN PIKE: 16—Dardevle Spoon. 17—Two-Timer Bassie. 18—Pike-Oreno. 19—Mercury Minnow. 20—Flash Eye Spoon. 21—Wig-a-Roo. 22—Russelure. 23—Whopper Stopper. 24—Pet Spoon. 25—Cisco Kid.

distinction is made in bait casting between the catches of men and women as it is felt that no handicap is involved in the use of such very light tackle.

Let's run over the history of fishing to see how bait casting fits in. The hooks that we often see in museums, made from the bones of animals and the beaks of birds, are proof enough that fishing first began in prehistoric times. We have also seen picture stories of fishing dating back to the days of the Egyptians, about 3000 B.C., and these pictures on rocks show fishing rods and lines as well as fish. The first book on fishing to be printed in English was "A Treatyse of Fysshynge Wyth An Angle" by Dame Juliana Berners in 1496.

The first fishing rod of split bamboo was made in the United States by Samuel Philippi of Easton, Pa., in 1848. The first split-bamboo bass rod was made by Charles F. Murphy of Newark, N. J., in 1866 and consisted of four glued strips of bamboo. Hiram Leonard of Bangor, Me., made the

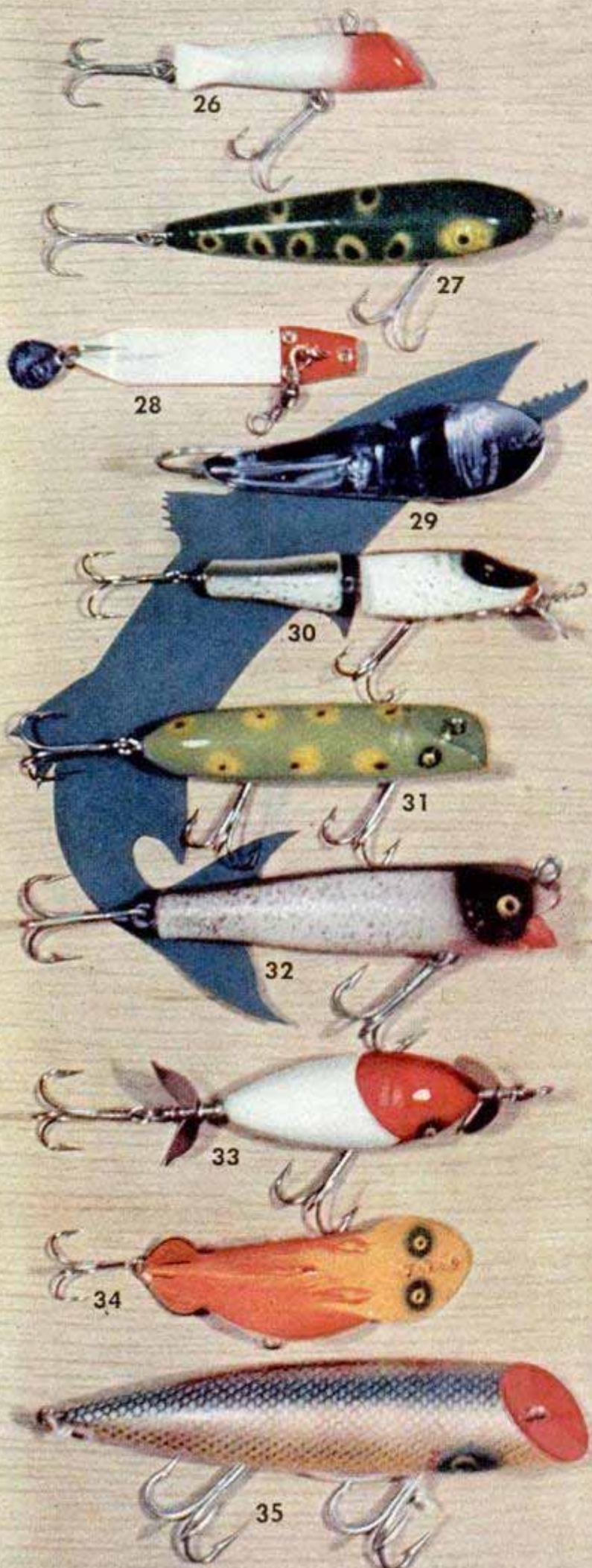
Above, right, telescoping beryllium copper rod a foot long fits in pocket. Below, it extends 4 feet 10 inches



MAY 1949

*The Handle Rod
Champion Products
Co.*

Barracuda



BAITS FOR BARRACUDA: 26—May Wes. 27—Runt Johnson Frog. 28—Trix-Oreno. 29—Reflecto Spoon. 30—Jointed Pike-Oreno. 31—Bass-Oreno. 32—Silver Flash. 33—Surf-Oreno. 34—Spoonplug. 35—Rose-gard Salmon Plug.

first six-strip split-bamboo rod.

Dr. James Alexander Henshall, father of black-bass fishing in this country, made the first six-strip bait-casting rod in 1875. It was about seven feet long. Charles F. Orvis made the first of these that sold in the stores.

Although split-bamboo bait-casting rods are still considered among the best for bait-casting purposes, the most popular casting rods today are made of tubular or solid steel because most of them are stronger and they duplicate the sporty action of split bamboo. They also cost less.

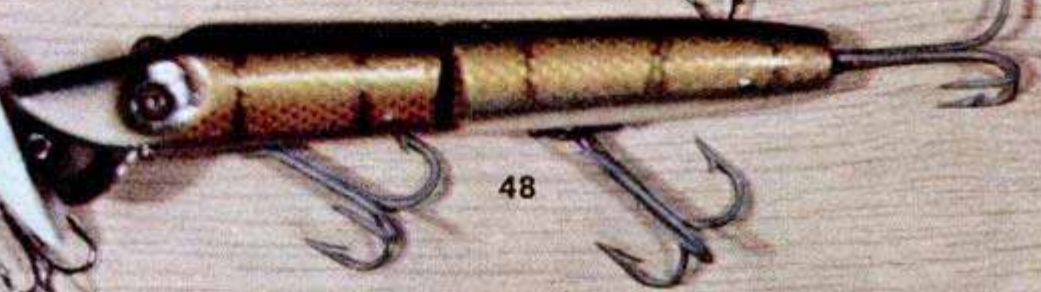
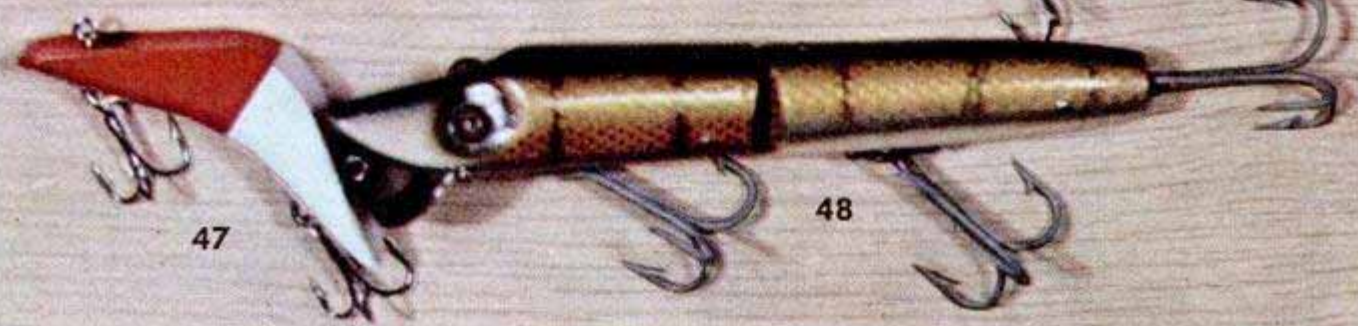
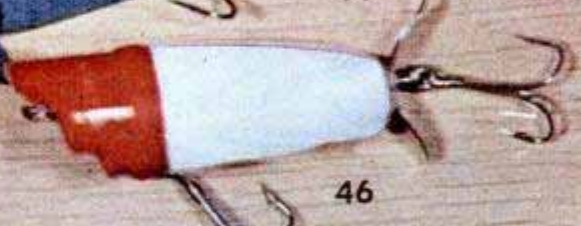
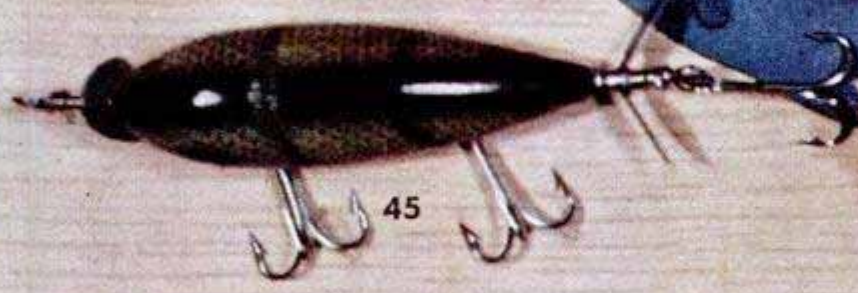
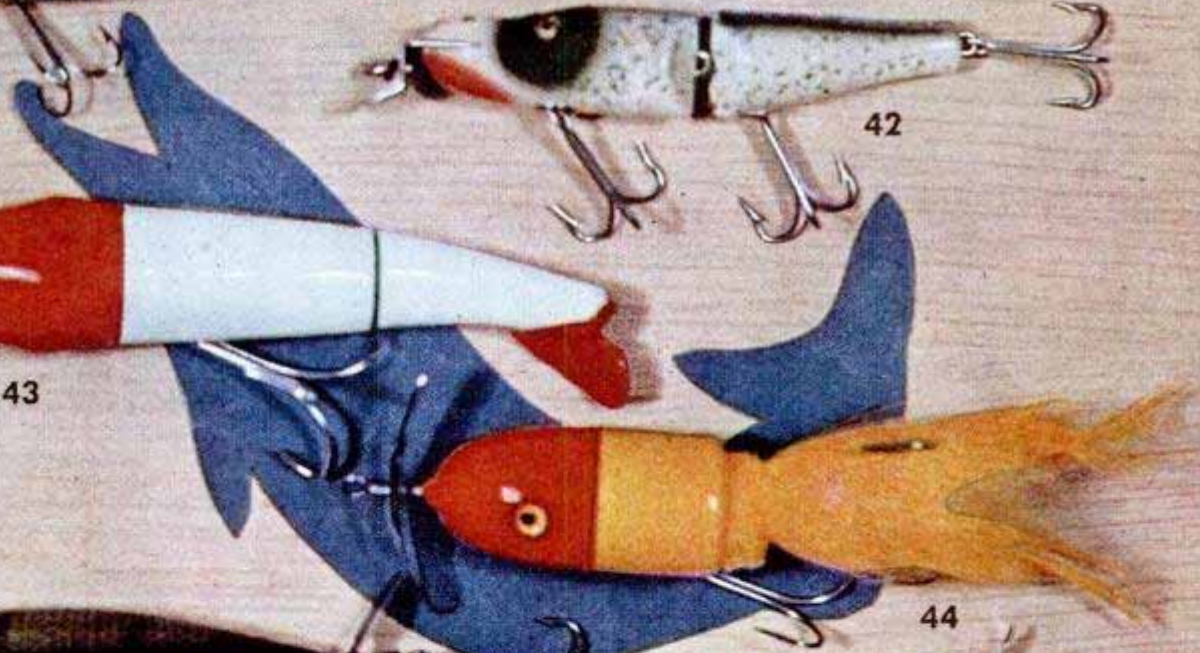
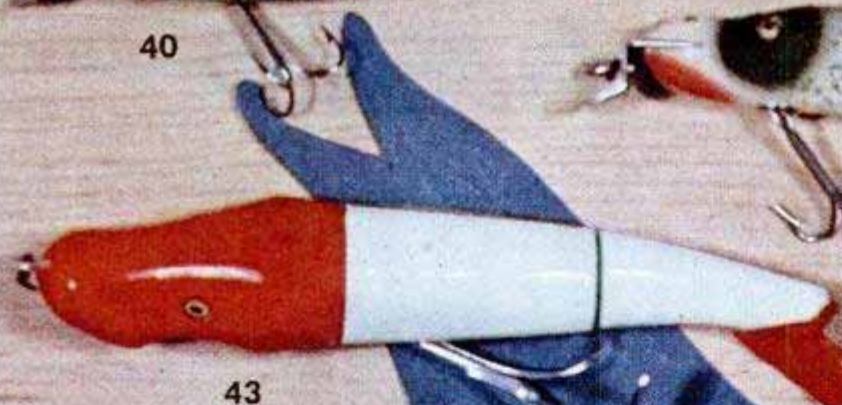
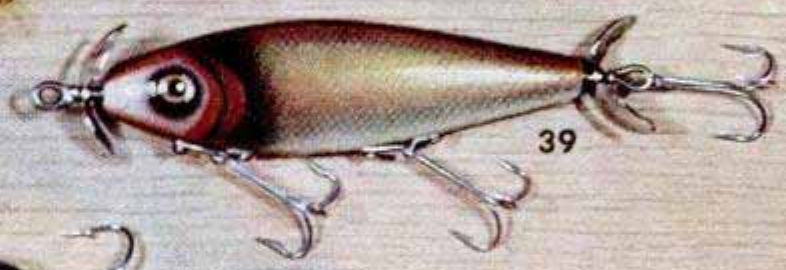
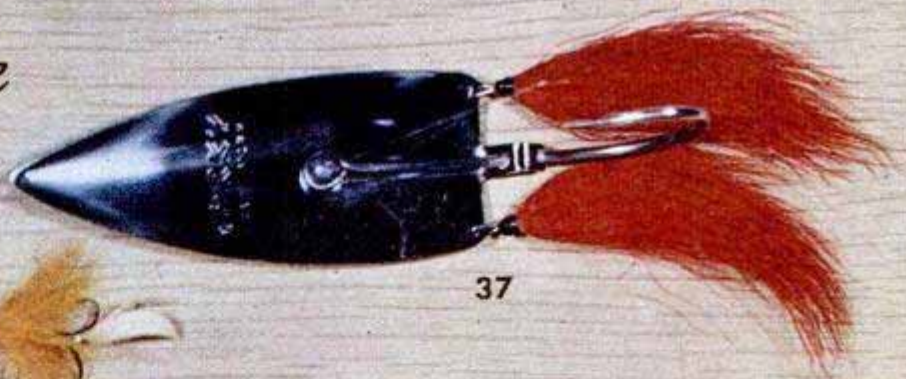
The newest rod, and a major departure, is an underslung rod with a larger but still comfortable handle that carries the line beneath the rod—no drag on the wet line—permitting longer casts.

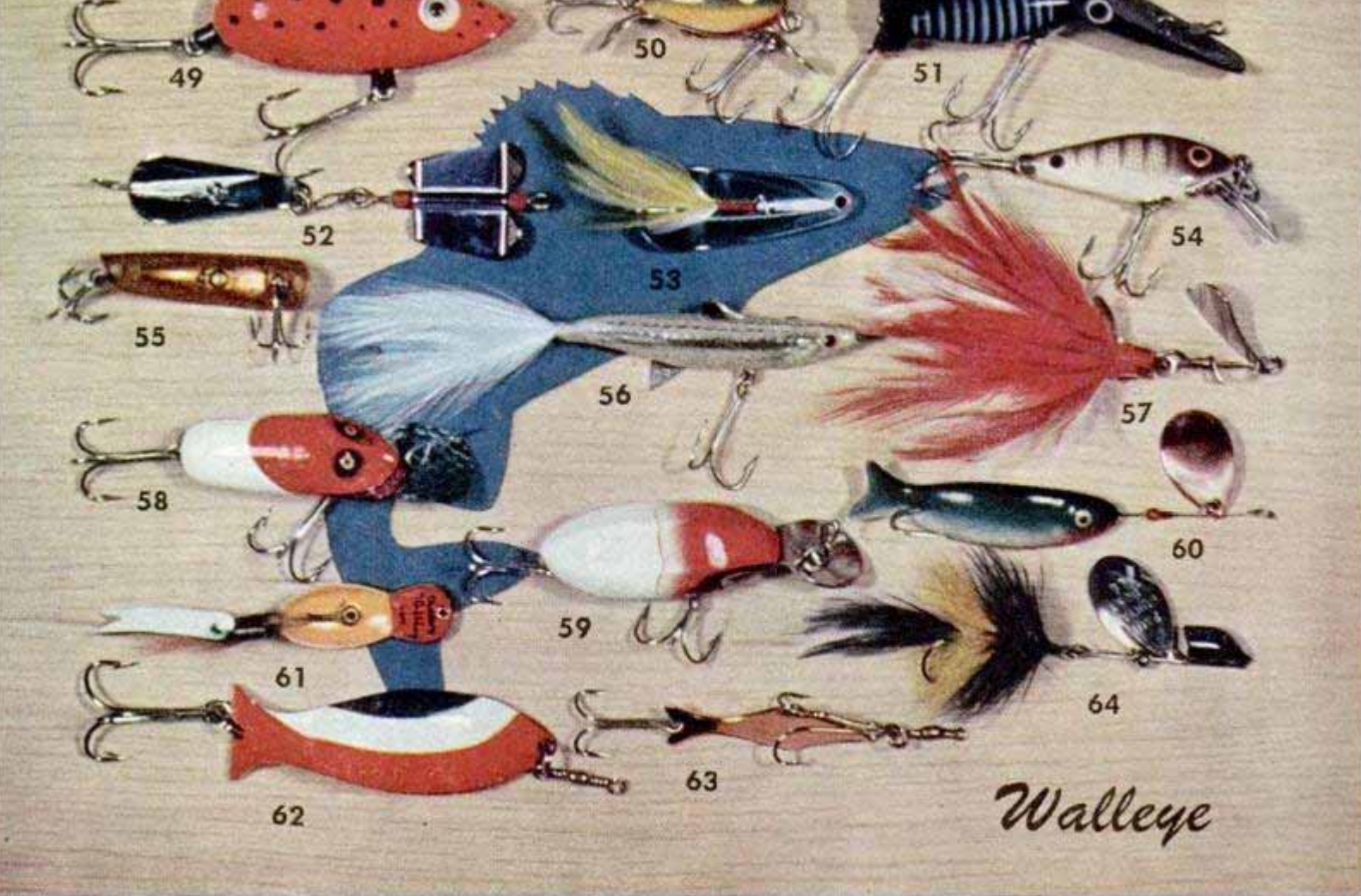
Another new one is the beryllium copper rod that telescopes into the handle. Collapsed to only a foot long, it fits in your pocket or your tackle box. Extended, it measures 4 feet 10 inches long and casts beautifully. There are some two-piece tubular rods of beryllium copper that are excellent.

Now, too, there are many rods made of glass. These rods have the casting action of the finest split bamboo or tubular steel, and they will not take a "set" (acquire a bend). They have the power needed for catching muskies or tarpon and they cast easily. Whenever I go fishing I now take the following favorite rods: a bait-casting rod of split bamboo, a solid-steel rod, a tubular-steel rod, a laminated rod, the beryllium telescope rod and a glass rod. Bait-casting rods should be six feet long or less. Short, stubby rods are good for muskies or salt-water use. The 5½ and 6-foot rods are for bass

BAITS FOR MUSKELLUNGE: (opposite page): 36—Lucky Tail Wobbler. 37—Porky Weedless Minnow. 38—Musky Jitterbug. 39—Musky Shiner. 40—Doodler. 41—Zara-Spook. 42—Jointed Pike-Minnow. 43—Mud Puppy. 44—Musk-E-Munk. 45—Two-Timer Minnow. 46—Weazel Sparrow. 47—Daily Double. 48—Jointed Vamp-Spook.

Muskellunge





Walleye



BAITS FOR WALLEYE: 49—Aqua-Bat. 50—Dopey. 51—Hot Shot Bait. 52—Twirling Wobbl-E. 53—Rex Spoon. 54—Spot Tail. 55—Russelure. 56—Weighted Finned Shiner. 57—River Devil. 58—Dive-Oreno. 59—Bottom Scratcher. 60—Minnie the Swimmer. 61—Wobbling Bait. 62—Worth Wobbler. 63—Lur-All Wobbler. 64—Lucky "66."

fishing. The five-foot rod is most popular.

The first reel ever made was carved out of a block of wood and had a handle for turning the block. The first multiplying reel used for bait casting was made by George Snyder in 1810. He was a watchmaker of Paris, Ky., and his reel was so geared that the spool revolved four times to every turn of the handle. Jonathan Meek, B. F. Meek and W. H. Talbot came along with multiplying reels which are still in use here and there by the old-timers who enjoy the ever-increasing sport of tournament casting.

The no-backlash feature on many of the reels made today has proved to be of great help to the millions of fishermen who enjoy casting a spoon or a plug into the lily pads for their smallmouth bass. This reel makes a novice look like a professional in 10 minutes. I have a personal preference for the smaller-size reels with the level-

Gaff made in England telescopes into handle with hook protected, extends full length for a long reach



Smallmouth Bass

BAITS FOR SMALLMOUTH BASS: 65—Gizmo Bait. 66—Wonderlure. 67—Tweedler. 68—Bright Eyes. 69—The Pupette. 70—Gehf-Lure. 71—Brook's Bait No. 7. 72—Weedless Reflecto Bass Spoon. 73—Slim Eli Zebra Spinner. 74—Miracle Minnow. 75—Dipsy Doodle. 76—Lucky Tail Wobbler. 77—Babe-Oreno. 78—Jitterbug

wind feature for muskie fishing. Before you go fishing, oil your reel. Keep it in a cloth bag and then drop it in a leather container. It will last longer.

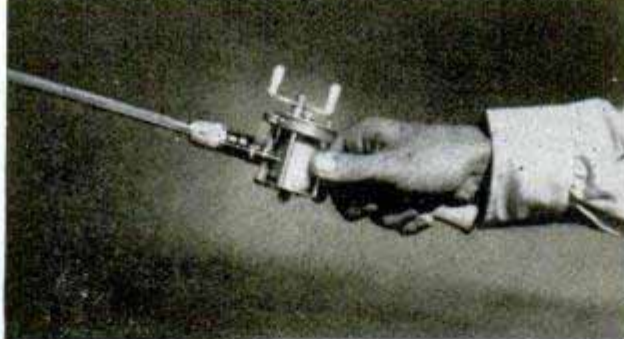
Fishing lines for bait casting once were made of twisted horsehair and braided silk, cotton and linen. Today, however, we see a great improvement in the braided fishing lines. Now they are braided of silk and nylon, and the silk lines are treated in a way that makes them more water resistant than ever before. We use the nylon line in salt and in fresh water. It's good.

The first plug was called the "200" and was carved out of wood by Jim Heddon of Dowagiac, Mich. Why he named it that no one seems to know. The story goes that he invented it while he was squirrel hunting. Resting his weary feet along the bank of a lake, he whittled a plug out of a piece of wood and tossed it into the water. A bass struck at it, so he carved another, put some hooks on it and found that it was a real bass-getter.

Later, he carved a bait similar in appearance, put spinners on it and called it the Dowagiac. This was the first underwater bait ever put on the market. Today, there are hundreds of bait makers who have imitated everything that swims and then some. There are designs resembling a swimming frog, mouse, chipmunk, duck,

Well-equipped angler carries a lightweight rod, a large net with aluminum frame, a transparent tackle box, a gaff and his own high hopes for a lucky day





When preparing for a cast, hold the rod with the reel handles up and carry through the cast with the reel in the same position. This will give the reel its best action, as it will ride smoothly on its bearings. Note that thumb presses lightly against the spool

sucker, crab, minnow, crippled minnow and many others. The first plugs were made of white cedar but today most of them are of plastic. Never before have anglers and fish had such a choice of lures.

No part of the fisherman's equipment is more colorful than the lures he uses; in fact, since all fish are color-blind it is well known that the hues of modern baits have reached the peak of artistic perfection just to sell the fishermen, not the fish. It is presumed, of course, that fish can see shades of lightness or darkness. It is the action of the bait rather than the color that attracts the fish. All baits will catch fish under favorable conditions. Those lures which are shown in this article are only a few of the many wiggling spoons and wobbling plugs that will help you bring home the fish.

There are three definite types of lures: surface lures, near-surface lures and deep-running or deep-diving lures. The depth reached during the retrieve will vary from six inches to around four feet or more. Surface lures wiggle in. Some glide from side to side, others throw a spray of water and there are a few that require the angler to pop them in. Poppers work best when the water is calm.

Catching a largemouth bass requires a rather slow retrieve of the lure; a little faster retrieve for smallmouth bass; and much faster for white bass, walleyes, pickerel, northern pike and muskies. A bait caster gets his full reward on earth when a big game fish hits his surface lure. There is an explosion on the surface of the water and the fight is on.

Be sure your tackle box has a few weedless plugs and spoons for fishing in lily pads and weeds. And be sure your box has some lures of all sizes from those for panfish up to the muskie and tarpon size.

To be properly equipped a bait caster should have two complete outfits—one for casting lures that weigh from a half ounce up to an ounce, and the second for casting heavier lures for muskies, northern pike, tarpon, barracuda and snook. The trend today is toward smaller lures which require less effort to cast. The exception

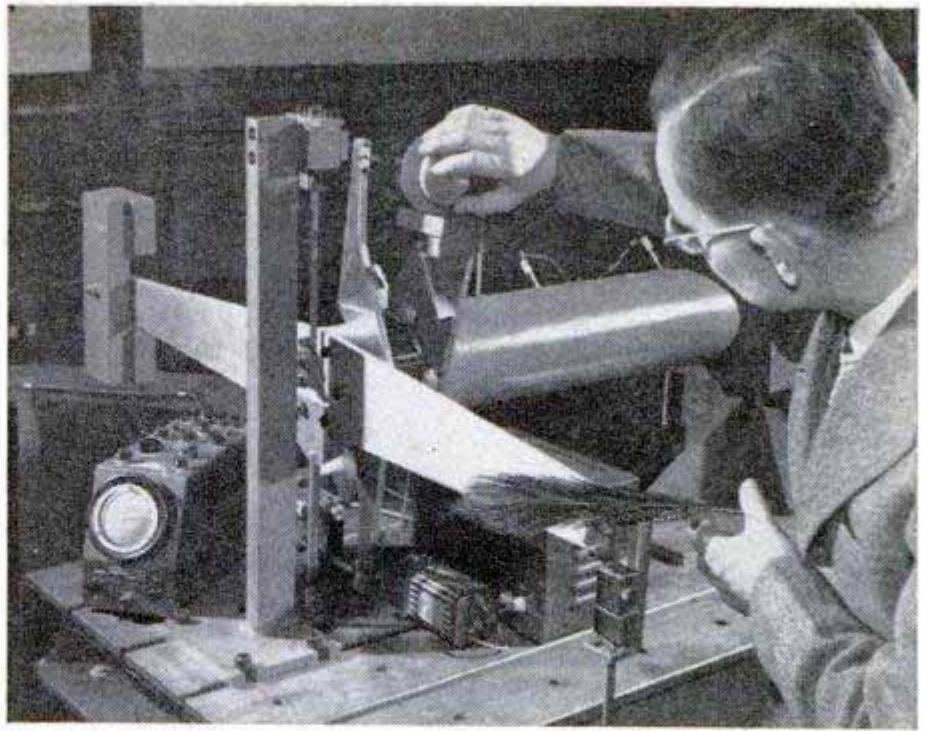
(Continued to page 242)

HOW TO CAST A BAIT

Overhead cast is the most important and should be mastered first. Panel at left, from top to bottom, shows proper arm and rod movement to execute a good cast. At the beginning, the arm should be close to the side with forearm parallel with the ground. Then bring the rod up briskly with the wrist acting as a hinge. The movement is straight over the right shoulder. Stop the rod when the handle is straight up and immediately begin the forward cast, starting slowly but increasing the speed. Apply the thumb lightly to the spool while the lure is in flight to prevent a backlash. Keep your eyes constantly on the target and hold the rod in alignment with the outgoing line. Good average cast travels about 75 feet

Weight of Feather Twists Steel Shaft

How much force does it take to twist a steel shaft one inch thick? A supersensitive machine developed by Westinghouse has proved that the weight of a feather will do it. The twist is incredibly small and the machine measured it as less than one millionth of an inch. The twist detector consists of a steel shaft 25 inches long and one inch thick, bolted to the center of a crossarm at one end and held immobile at the other. When a weight is placed on one end of the crossarm, the shaft is twisted by an amount proportional to the weight. Sensitive electrical contacts measure the movement at the sur-



face of the shaft. The machine is used for measuring the torque of jet engines and other powerful machines.

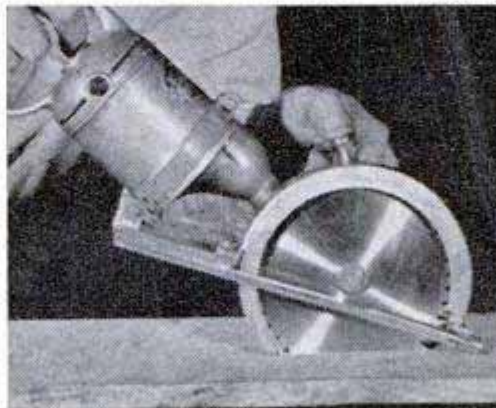


Gates for Irrigation Ditches Control Flow of Water

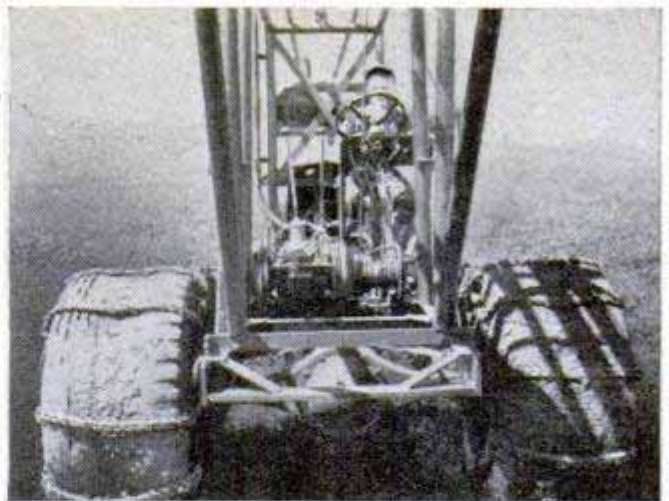
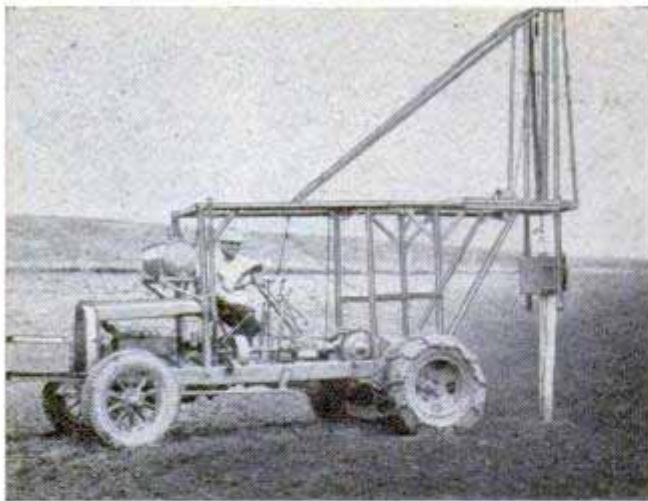
Metal gates with adjustable doors control the flow of water down irrigation ditches and can be used without building dams. The doors can be locked at various openings to provide the desired flow down the irrigation ditch. Semicircular in shape and made of aluminum alloy, the gates can be moved from one location to another. They are rust and corrosion resistant and are available in various sizes to fit all lateral and head ditches. The gates eliminate the need for earth, sacks and canvas in building dams.

Saw Attachment For Electric Drill

With an attachment that fits any standard $\frac{1}{4}$ -inch drill motor, you can convert your electric drill into a portable power saw. Easily mounted on the drill, the saw attachment has a six-inch blade and an adjustable shoe that can be set to cut any angle up to 45 degrees. The lightweight attachment rips, cuts and bevels light panels and thin stock speedily. Heavier wood, up to two inches thick, can



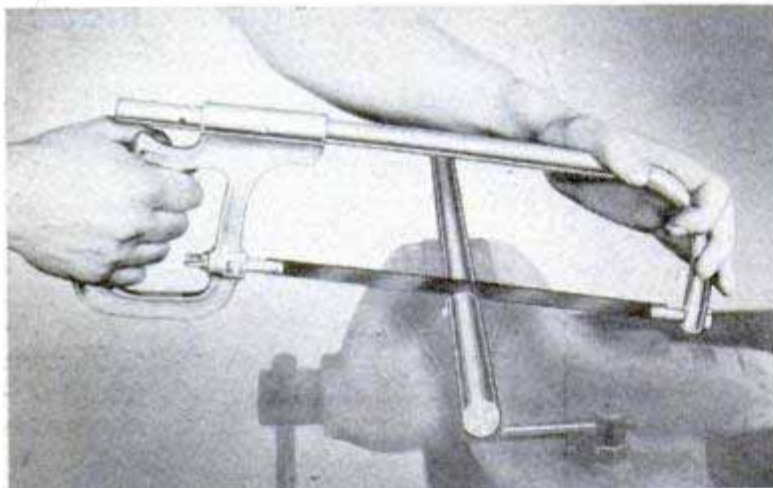
be cut, but more slowly. A control lever opens and closes the lower guard to permit the saw to enter the work at any point.



Rig Built From Scrap Drives 55 Posts Per Hour

Five blows from the 250-pound block of a homemade post driver sink a post deep into the ground. The rig, built by George Brenner of Genesee, Idaho, can drive 55 posts in an hour. Parts of a dozen different automobiles, some framing pipe and scrap metal went into the handy machine. At haying time, Brenner can replace the post-

driver attachment with a buck rake. Other simple attachments make the odd vehicle into a manure loader, dirt shovel, bulldozer or machinery hoist. The heart of the machine is the rear end of a car, cut down and installed upside down. The driving tracks can be tilted on hillsides so the heavy weight will fall straight down.



Tubular Frame on Hacksaw Ends Blade Twisting

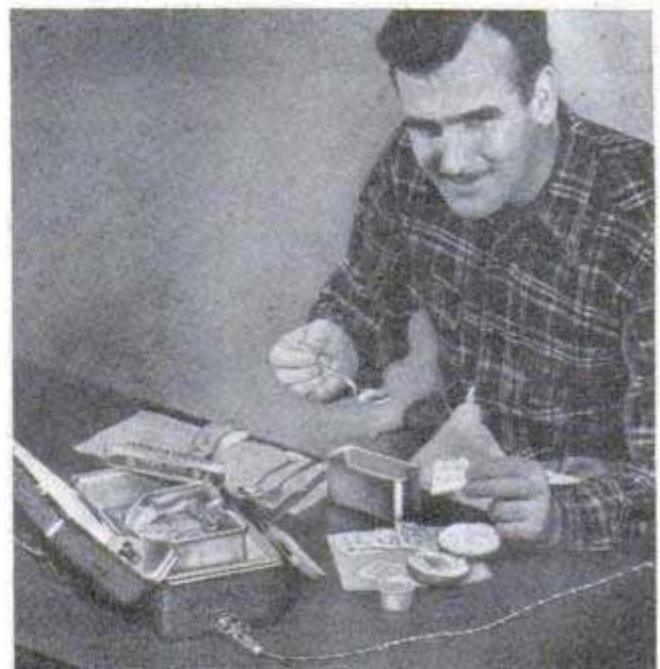
Hacksaw blades last longer and cut more accurately in a precision-made frame that eliminates blade twisting. A curved steel tube forms the back, sliding smoothly into the cast-aluminum handle. The design prevents distortion or twist when the blade is tightened to a high tension. The frame is adjustable to take 10 and 12-inch blades and it does not collapse when blades are changed.

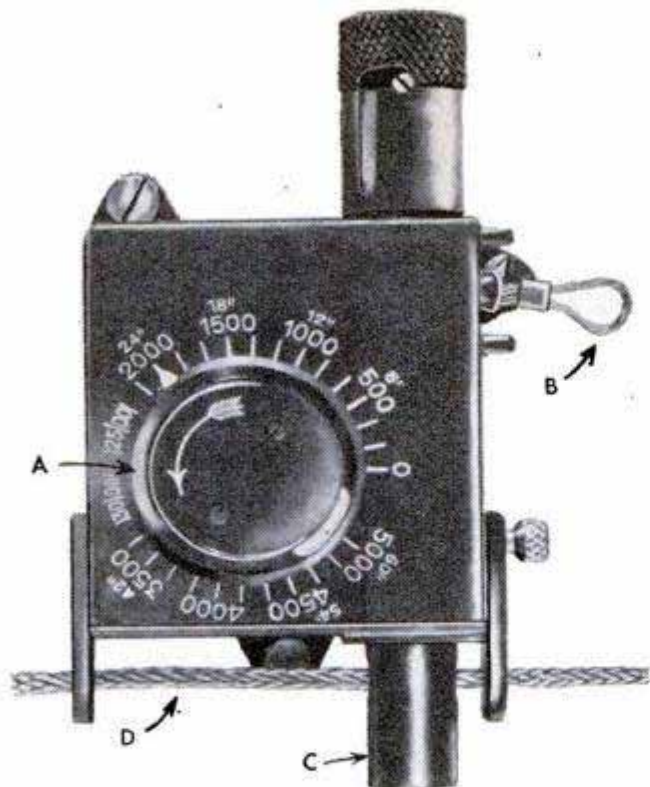
Electric Lunch Box Heats Food

Stews, soups and meats with gravies and sauces are quickly heated in a lunch box that plugs into an electric outlet. There is a separate compartment for cold foods. A rack in the top holds eating utensils.

Paint Has Baked-Enamel Luster

One coat of a new paint with a baked-enamel luster is all that is needed to cover old surfaces. Especially designed to provide a scrubbable finish for kitchens and bathrooms, it requires no thinning and dries in three to four hours. When used on new wood or bare plaster, it can be painted over in four to five hours. Hot cooking spatters, beverage stains and boiling water will not mar the finish. It is made in nine pastel colors and a nonyellowing white.





How the timepiece works: Dial A is set for the proper altitude. When parachutist jumps, loop B is pulled, starting timepiece. Rip cord D passes through tube C and a knife cuts cord at proper time to open chute

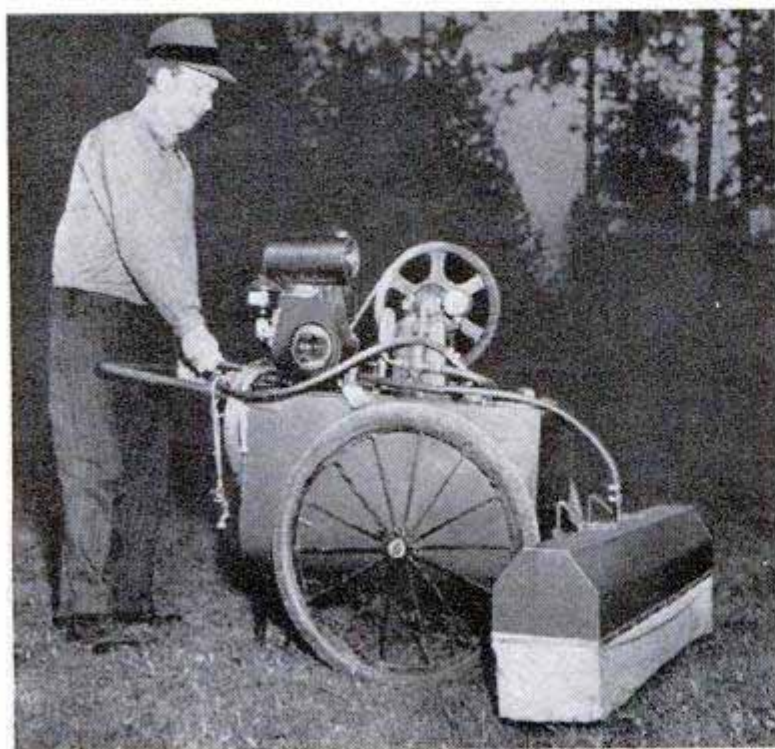
Timepiece Opens Parachute

Famed for their accurate watches, the Swiss now are making a timepiece that opens a parachute at any desired altitude, thereby eliminating the human element in pulling a rip cord. Many standard watch parts go into the instrument. When the parachutist leaps from the plane, a watch starts ticking and the rip cord passes through a metal tube. When the proper altitude is reached a small knife cuts the cord and the parachute opens.



Semipermanent Plastic Starch Makes Cottons Wear Longer

Clothes stay crisp through as many as 10 launderings with only one application of a plastic starch that requires no heating. Tests also show that the new starch makes cottons wear twice as long as they do when starched with the usual preparations. One test consisted of using the new starch on one half of a curtain and ordinary starch on the other. After eight launderings, the new-starched half was still in good condition while the other half was badly torn.



Skirted Spray Boom Protects Flower Beds

With a spray boom that is skirted to prevent dispersion of the weed killer, a Washington gardener is able to kill dandelions in his lawn with 2,4-D without damaging the adjacent flower beds. A five-foot boom containing six nozzles, spaced to give complete coverage over the strip, was mounted in front of the 25-gallon, bicycle-wheel sprayer and enclosed with a metal hood and canvas skirt that just clears the grass. The skirt keeps the spray localized, preventing it from drifting or being blown over delicate flowers nearby. A quick-action shutoff valve was installed between the handles for instant control over the spraying action.



“APPLE PIE” SOUND MOVIES

You don't have to thread or rewind film when you see and hear these movies on records

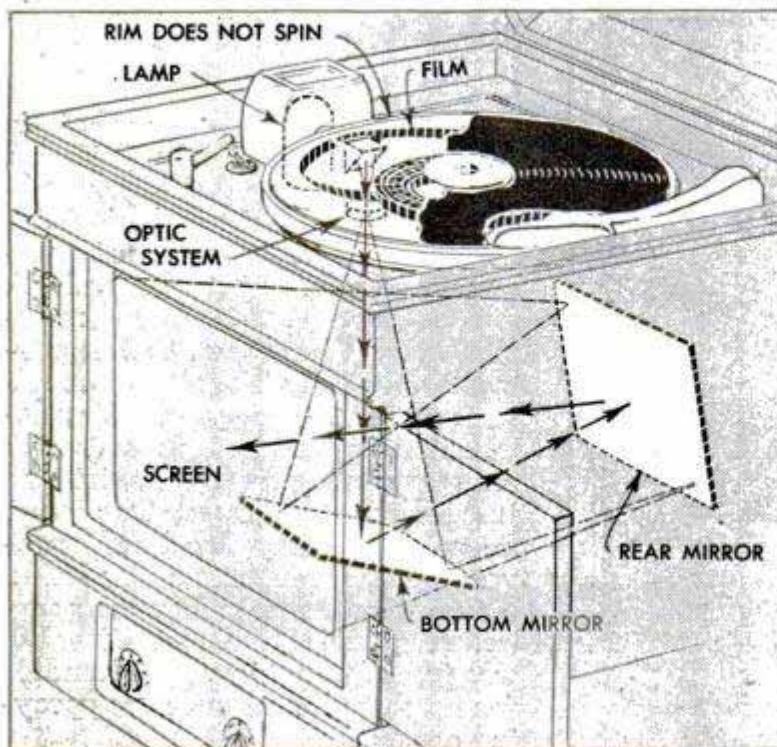
The sight-and-sound recordings are easy to play. You put on a record, press the button and the show begins



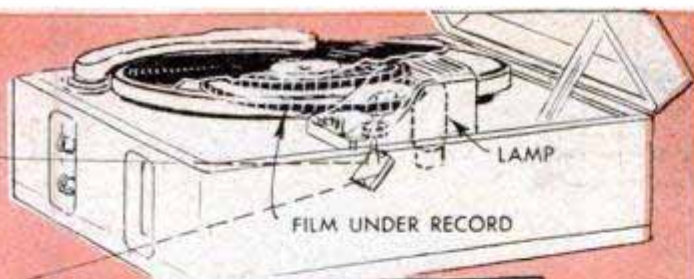
YOU SEE as well as hear recordings on a phonograph that reproduces both pictures and sounds. Developed by two Hollywood film makers, the Visatone record player brings sound movies into the home without the bother of film-threading or rewinding. Merely by placing a special record on the turntable, you can see and hear Mickey Mouse, Donald Duck, your favorite musical comedy stars and even operatic productions. Phonovision, Inc., the manufacturer, has a contract to release Walt Disney shorts in recorded form.

The secret of the sight-and-sound phonograph is a thick record that can be compared to an apple pie. The top crust of the pie is a conventional phonograph record. Beneath the top crust, where the filling would be in the pie, is an 8-mm. movie film that carries the visual half of the recording. The side and bottom, to continue the pie analogy, are aluminum.

As the record spins, the film unwinds on a horizontal plane, passing in front of an aperture in the

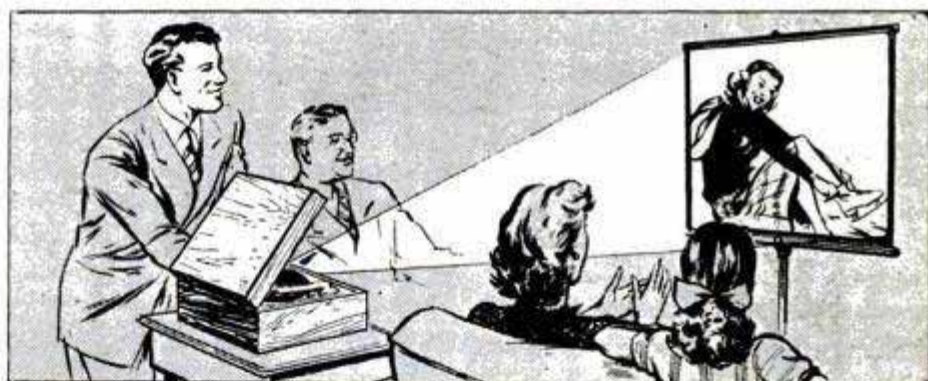


The model with the built-in screen is a complete movie theater. Arrows in sketch show how images are projected on screen



Portable model projects movies through opening in cabinet. Right, new record, top, compared with regular type

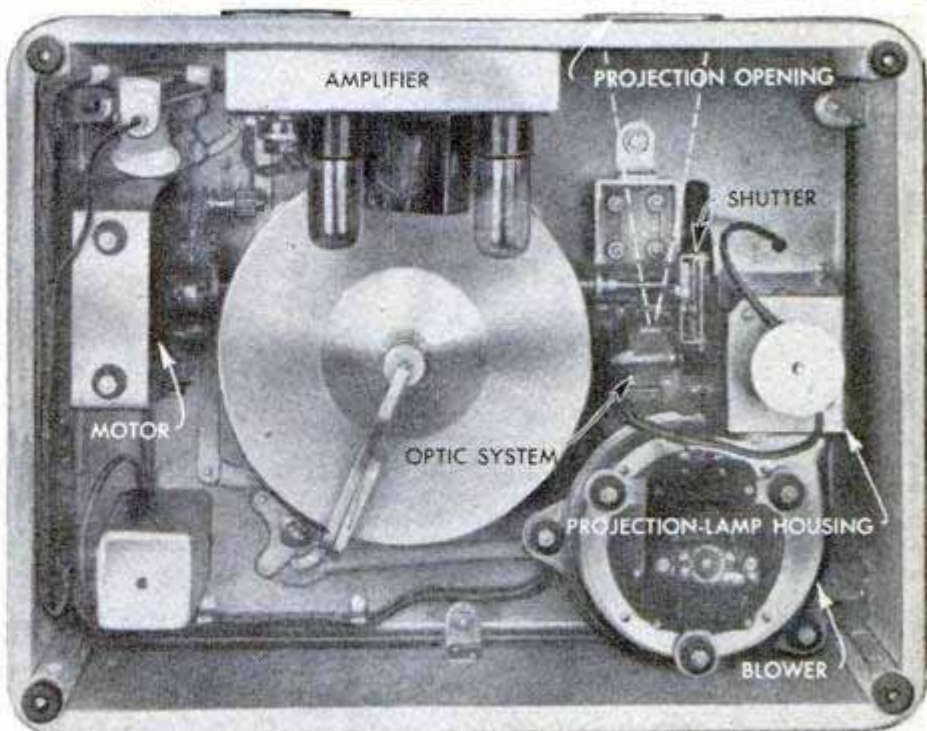
side crust, which does not spin with the record. A projection lamp shines through the side-crust aperture and then through the film, picking up the images that are projected on the translucent screen by a lens and prism arrangement. Mirrors reflect the light rays onto the screen.



Two models are being produced. One, a completely self-contained unit, has a large screen in the front. The other, a portable model, has no screen, the images being projected against a wall or screen through an opening in the case.

You never touch the film. It is enclosed in the record away from dust and fingerprints. When the record has been played, the film is ready for another showing without rewinding.

An underside view of the portable player. The top drawing shows how this model is used





Television Verifies Checks at Bank

Signatures on checks are verified by television at the Franklin Square National Bank, Long Island, N. Y. The bank teller places the check in question over a television tube and closes the panel which activates the machine. A picture of the check

then appears on a television screen in the bookkeeping department on another floor. The bookkeeper can tell at a glance whether the signature matches with the sample signature in the bank's files. The teller and the bookkeeper talk over the phone to verify the signature, while another instrument records their conversation.



Tokyo Police Bus Acts As Mobile Lab

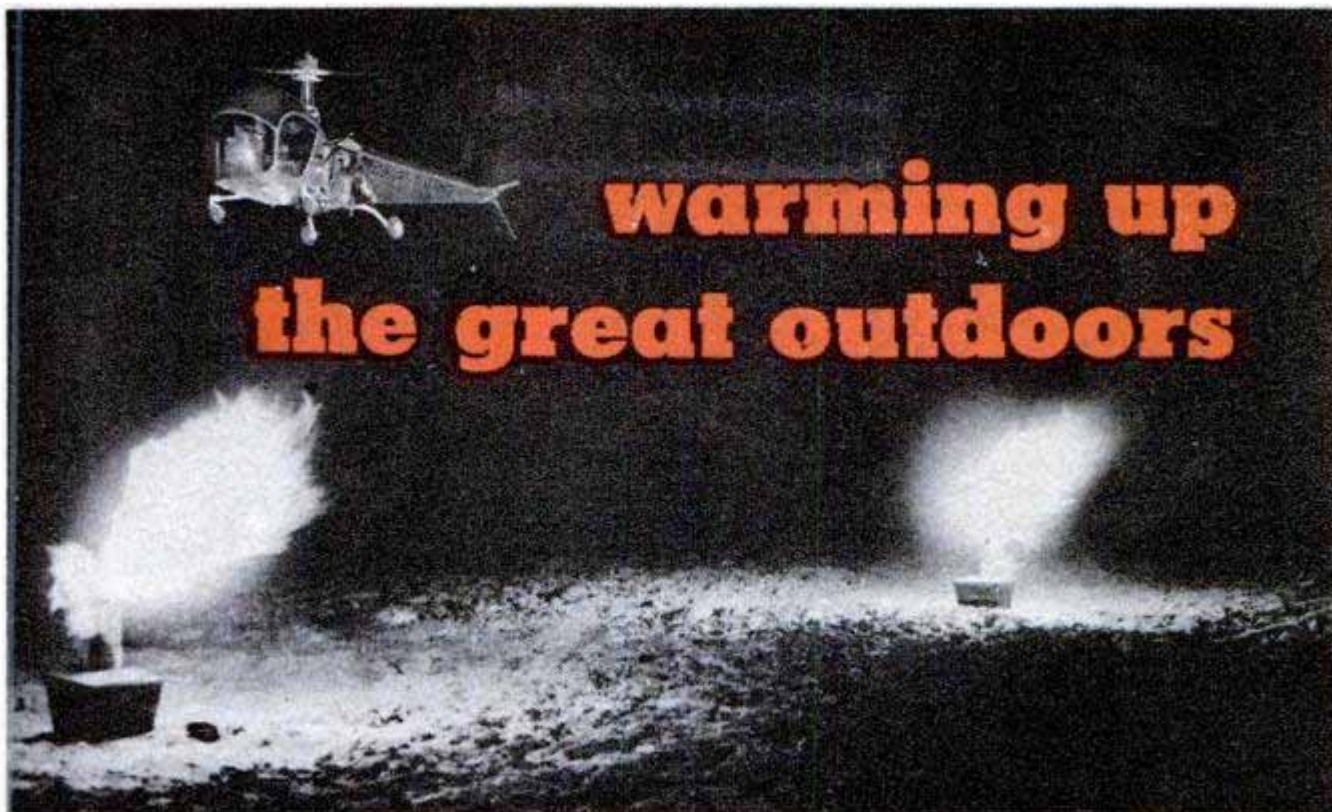
To make the force more mobile, Japan has put into use its first police-operations bus. It is equipped with a photo laboratory, lookout tower, public-address system, short-wave receiver and searchlights. The 9-ton vehicle is 24 feet long and accommodates 20 persons. It has been turned over to the Tokyo headquarters of the recently established National Rural Police.

Paint-Can Holder

Paint cans are clamped securely in a holder that protects all surfaces upon which it is placed. The base plate is indented to seat either pint or quart cans. A handle and clamp fasten down the can, protecting the hands from overflowing paint. The clamp also acts as a brush rest and a stripper for wiping excess paint off the brush.

Portland cement is ground so fine that about 90 percent of it will pass through a sieve with 40,000 openings per square inch—a sieve so fine that it will hold water.





warming up the great outdoors

Its landing area lit by orchard heaters, a helicopter descends for fuel during an all-night frost battle

By Ewart Thomas

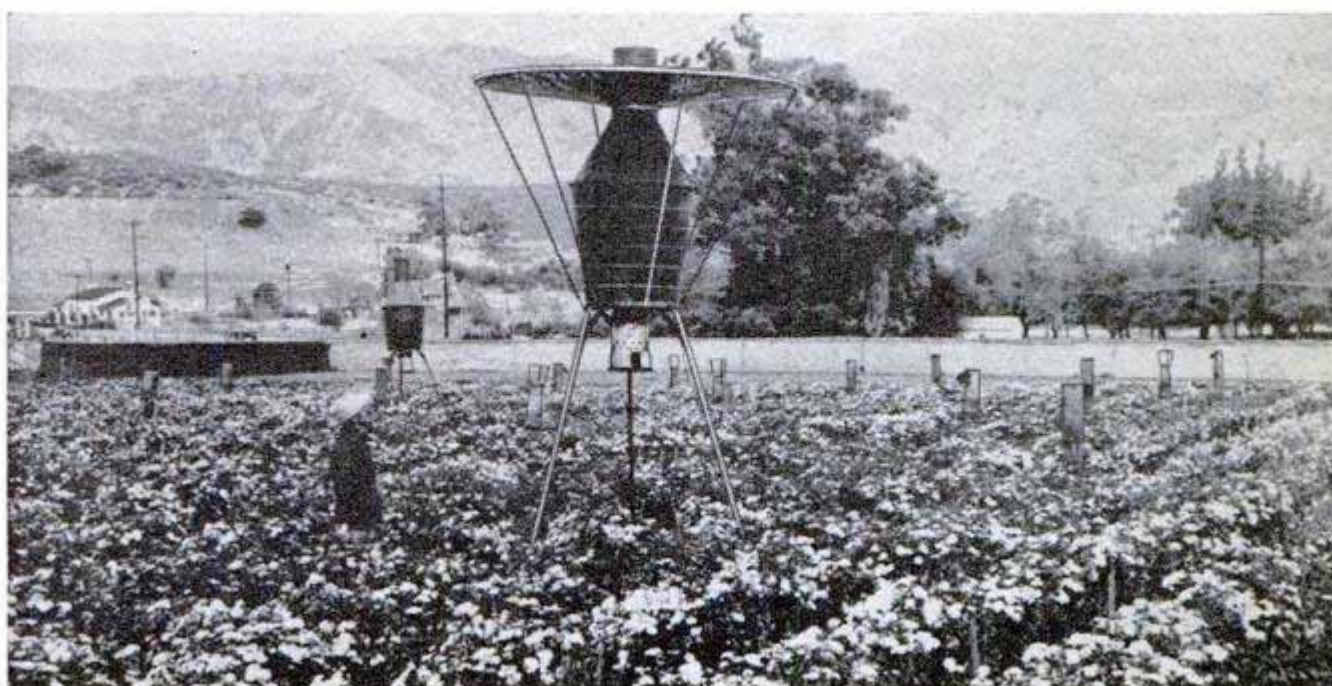
GROTESQUE infrared heaters, huge wind machines and even helicopters are helping save millions of dollars worth of fruits, vegetables and flowers that otherwise would be destroyed during unseasonal freezes or unusual cold spells.

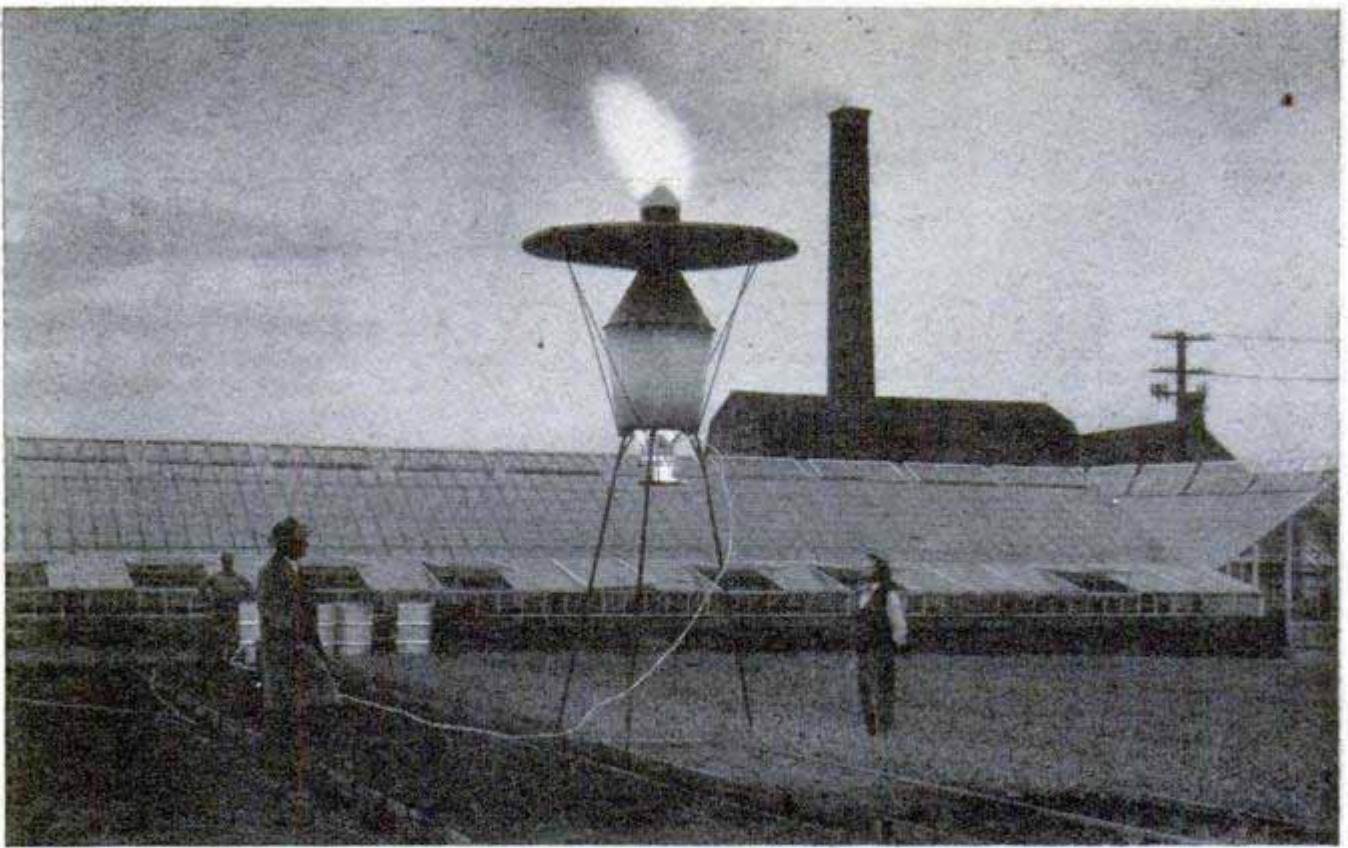
In the North, a late spring freeze is apt to kill the tender buds of plants that are just starting to grow, while an early autumn freeze can ruin a mature crop that is about ready for harvest. In the South, es-

pecially in Florida and California, "unusual" cold weather in midwinter can damage or destroy vast acreages of citrus fruits and other semitropical plantings.

Farmers can't change the weather, but they have learned how to modify it when a difference of only a few degrees can mean losing or saving a valuable crop. One of the new protective devices is the Frostguard heat machine, also known as the Michigan heater because it was developed at the

Infrared heater looms over field of winter-blooming flowers. The small stacks in rear are orchard heaters





Glowing cherry red in the dawn, this infrared heater protects young plants from damage by late spring frost

Michigan State College. This apparatus keeps a crop warm on cold nights by infrared radiation.

Essentially, the heater is a round sheet-metal stove or chamber, mounted on tall tripod legs, and topped by a wide polished reflector that slants the heat rays downward. Fuel oil, pumped up to the heat chamber from a tank, is vaporized under pressure and the chamber glows cherry red in the dark. Placed out in the field, it

protects vegetation within a radius of 30 to 100 feet, depending on the type of crop and severity of the freeze.

One nurseryman who put 30,000 carnation plants out in the field a month ahead of the usual time saved them all when the temperature slumped to 28 degrees by using infrared heaters. Inside his protected plot the temperature ranged from 36 degrees to as high as 40 degrees. In West Virginia two infrared machines saved an

On cold mornings, any orchard heaters that are not needed to protect the crops are set up in nursery workshops where they provide smokeless heat



acre of currants that were coming into bloom when the temperature dropped to 25 degrees.

In the Imperial Valley in California last winter infrared heaters saved a large portion of a crop of green peppers even though the temperature went down to 12 degrees above zero. In this severe freeze the machines protected every plant within a radius of 30 feet.

Infrared heaters produce their effect by direct radiation. For best results, four or more machines are placed so that their radii overlap, strengthening the effect on plants at a distance. Beside protecting vegetables and flowers, the



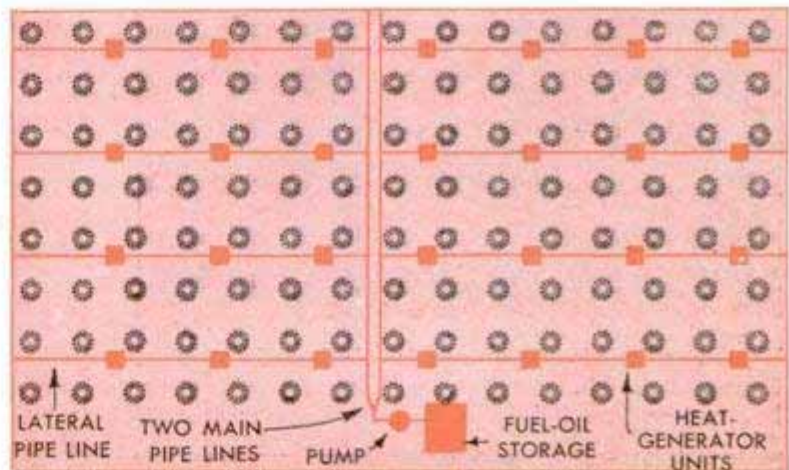
In the early morning hours, orange-grove workers light smudge pots as the mercury skids below 27 degrees

heaters are used to guard against spring frost damage in orchards that are just coming into bud. They are not considered adequate for orchards that are in full leaf unless allowance is made for absorption of heat by the foliage.

The Frostguard is the most recent of a long line of outdoor heating appliances. Oldest and still widely used is the crude smudge pot that burns low-grade oil and is used principally for orchard heating, particularly in the citrus groves of southern California. The pot consists of a large oil reservoir, plus a stack or chimney, and it heats mainly by convection. It produces objectionable clouds of dense smoke but when used in numbers of up to 40 units per acre it can protect large, closely spaced orange trees in full foliage against temperatures as low as 22 degrees.

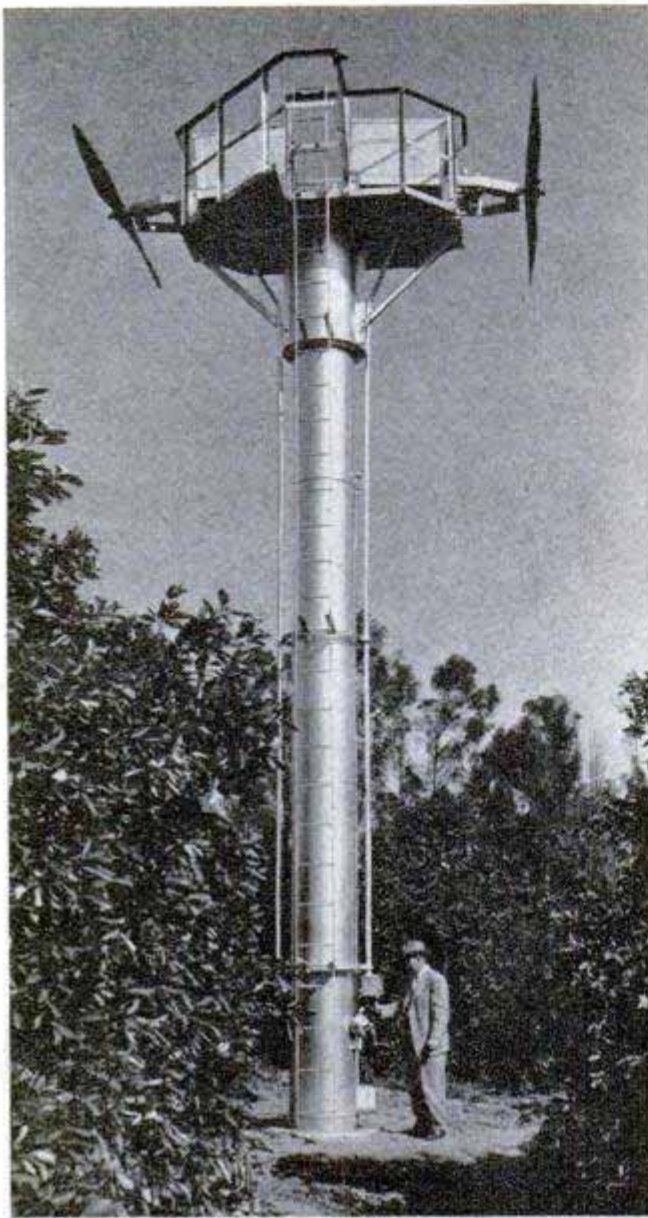
Improved orchard heaters are equipped with a return stack or with a stack ventilated by a number of openings that give the flame a spiral motion, making for more complete combustion. The improved heaters create virtually no smoke, especially when better grades of fuel are used.

Many orchards now are protected by smokeless pipe-line heating systems which consist of



Sketch shows layout of pipe-line heating system. Below, testing a heat-generator unit such as used in pipe-line heating systems





Wind machine blows warm upper air down into grove. Below, snow blanket protects fruit from mild frost, but heaters are lighted if a hard freeze threatens



many heat generators placed almost flush with the ground and connected by copper tubing to a central fuel tank. The generators operate under pressure and produce a hot, white flame of about 2000 degrees. Heating is accomplished both by convection and radiation. The pipe lines may be buried to permit between-the-trees cultivation. In noncultivation groves, the lines are merely laid along the ground.

Some orchardists and other growers have installed overhead networks of infrared electric lamps to protect against frost damage but the consensus so far seems to be that other methods are less expensive or more positive.

Fighting frost with the wind created by large overhead propellers seems silly at first thought and yet the wind machine is now an accepted and valued frost-prevention device. In fact, some lemon growers claim that because of their wind machines they now get two crops a year instead of one! The delicate blossoms that appear in the winter are saved from the frost, enabling the tree to produce a summer crop as well as the usual winter harvest.

Wind machines are valuable chiefly on still, cloudy nights when a temperature inversion exists. Under these conditions the air 30 or 40 feet above the surface may be a number of degrees warmer than the temperature at ground level. When the ground temperature drops to freezing, the wind machine blows drafts of warm upper air down into the grove or field.

One popular wind machine consists of two 100-horsepower gasoline engines mounted on top of a 30-foot steel column. Each engine drives a 12-foot steel propeller at 900 revolutions per minute. Both propellers are tipped down seven degrees from horizontal and the whole engine platform rotates, making one revolution every nine minutes. Fuel is stored inside the support column and engine starters and controls are at ground level. One machine for each 18 acres of oranges, on the average, can raise ground temperatures from two to four degrees under the right conditions.

Similarly, electrically driven wind machines are mounted about 30 feet above ground. They use motors ranging from 10 to 100 horsepower, depending on the propeller size and the speed at which it is driven. Most electric machines turn themselves on automatically.

About 1500 wind machines are in use, mostly in southern California citrus areas. Other machines on the West Coast furnish protection against spring frosts to almonds, avocados, grapes and pears. In New Jersey they are used to protect holly and other specialty crops.

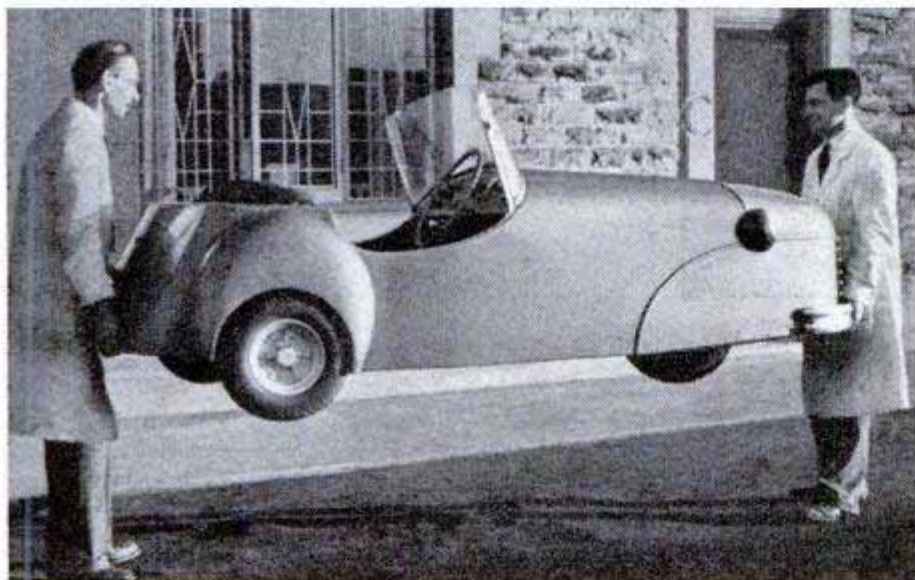
(Continued to page 266)

First "Aussie" Car Built in One Model

Australians will soon be riding in their first "home built" car as mass production of the Holden gets under way in General Motors-Holden's Ltd. plants. The car is being built only in one model, a four-door five-passenger sedan, and it is said to travel 30 miles on an American gallon of gasoline. The Holden has an overhead-valve, six-cylinder engine with a rating of 21.6 horsepower and a development of 60 brake horsepower. Curb weight is only 2200 pounds, a low figure for a sedan of 103-inch wheelbase, 172-inch over-all



length and a height of 61 $\frac{11}{16}$ inches. The transmission is conventional and the brakes hydraulic.



Midget British Auto Weighs 195 Pounds

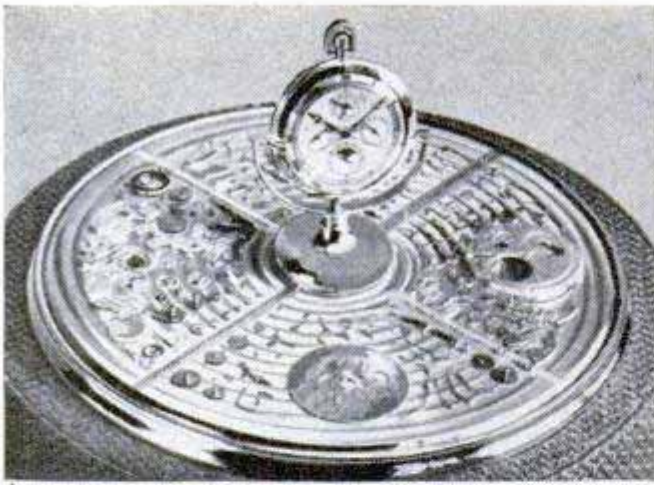
Parking a new British automobile is simple—you can pick it up and place it in the tightest space because it weighs only 195 pounds. A three-wheeler, the Mini-car travels 100 miles to the gallon and costs less than \$800. Its single-cylinder engine gives it a maximum speed of 40 miles an hour. It will hold two adults and one child without crowding.

Suitcases for Car Built Into Trunk

Two suitcases are built into the rear compartment of the new English Bristol car. The suitcases provide maximum space while keeping the contents neat and clean. They are held in place with straps. The car was exhibited at the International Motor Show in London recently.

☞ Climbing 7 $\frac{1}{2}$ miles in 7 $\frac{1}{2}$ minutes, a British Beryl-Meteor twin-jet fighter set what is believed to be a record for both piston and jet planes.





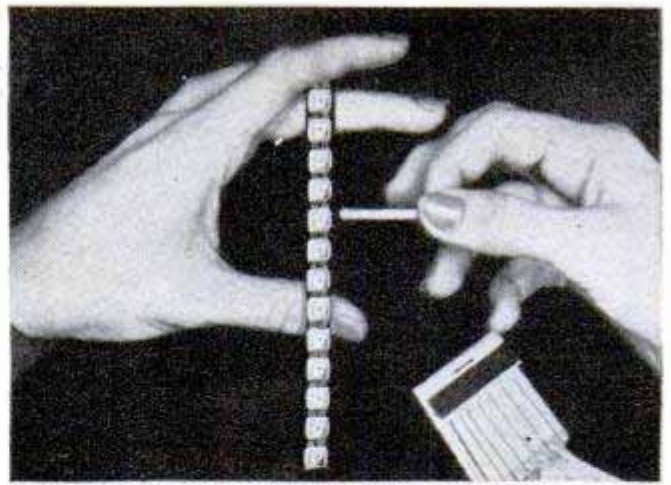
With 900 parts, this watch, shown assembled and disassembled above, is called the world's most complex

Another unusual timepiece, the slender Swiss watch below is thin enough to fit between teeth of comb



Rare Watches

So thin that it will fit between the teeth of a comb, a man's pocket watch has been produced by Swiss craftsmen. Another Swiss watch, called the most complex in the world, contains 900 parts. It has two faces and tells you the hour, minute, second, day, month, year and moon phase.

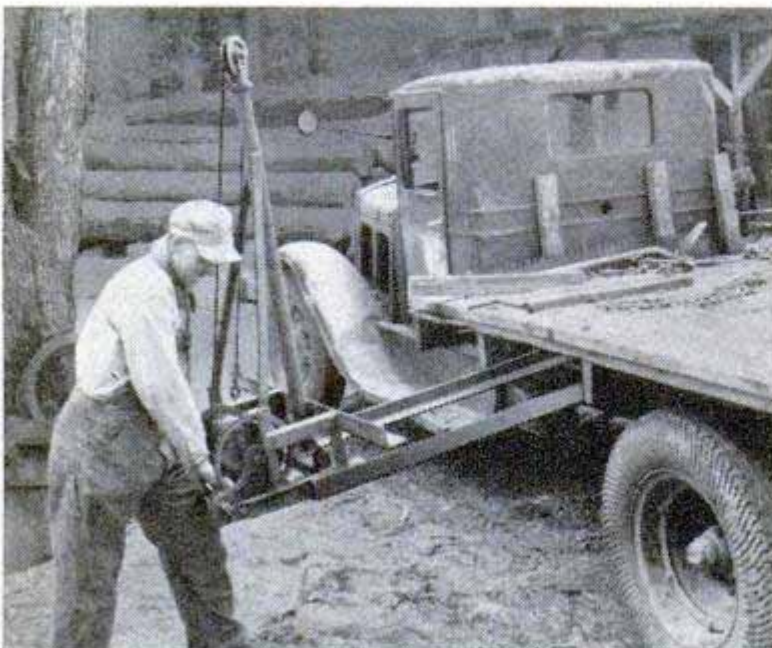


You need good eyes to tell the time on this midget watch, the face of which is as tiny as a match head

Below, accountants and engineers will like this two-purpose watch that has a slide rule around its dial



There is a stop watch built into the movement and the calendar mechanism automatically adjusts for leap years. A third unusual model is a tiny watch scarcely larger than a match head. One novelty-minded Swiss made a wrist watch that has a precision slide rule built around its dial. It is designed for architects, accountants, engineers and scientists.



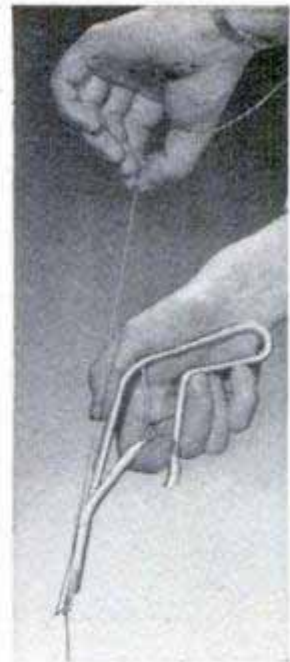
Log Loader

Loading huge logs on a truck is a one-man operation when he's using a loading device built by an Indiana sawmill operator. The loader is supported by two horizontal angle irons that fit under the truck bed between the cross-pieces. A hand winch, which can be cranked from either side, winds up the cable dragging the attached log onto the floor of the truck from the opposite side.

Many of the products described in this issue are already commercially available. For information concerning manufacturers' names and addresses, turn to the WHERE-TO-BUY-IT INDEX, page 10

Fishhook Extractor

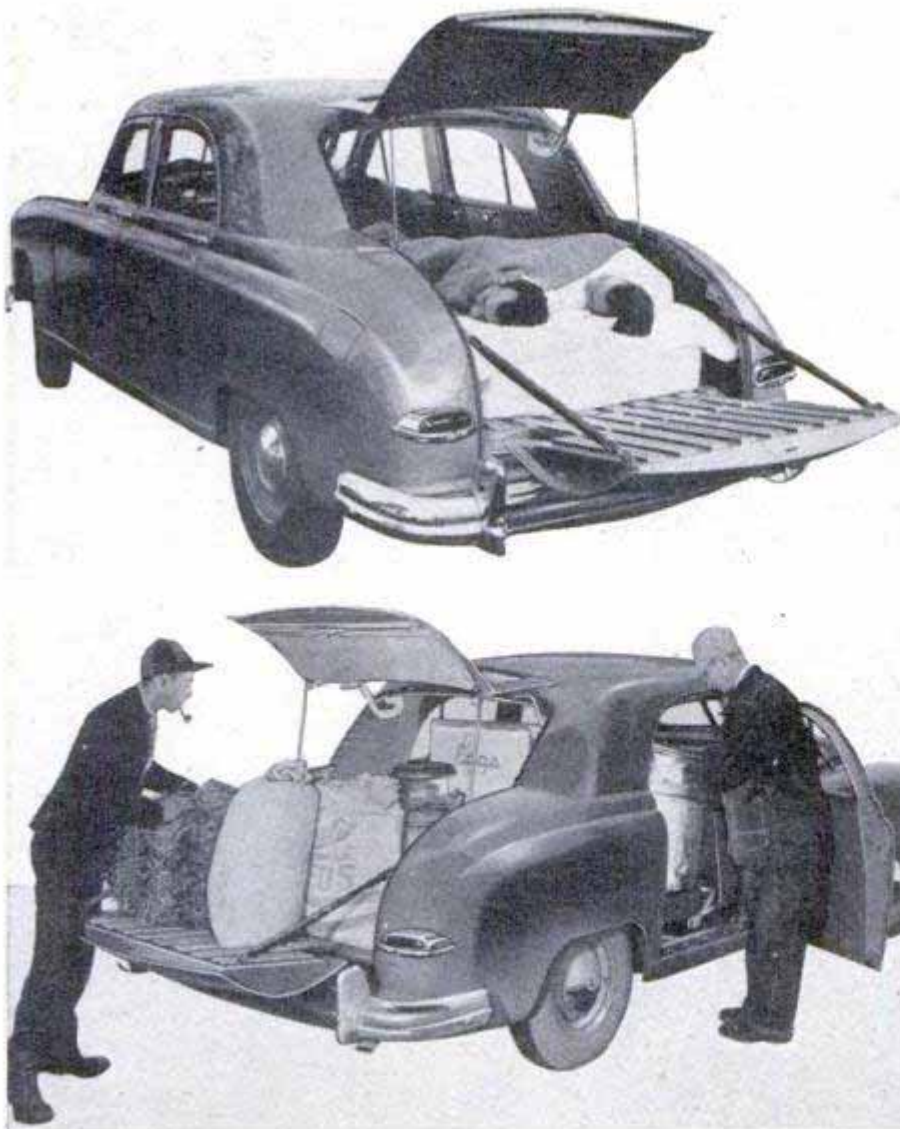
Anglers now can remove their fishhooks without even touching the catch. An extractor releases the hook when a trigger is pulled. Holding the line about a foot from the fish, the fisherman inserts it in a guide on the extractor. He then pushes the extractor down the line until it reaches the hook. When the trigger is pulled, a pointed rod holds the fish while the hook is forced in the opposite direction.



Electronic "Traffic Cop" For Building Elevators

Control of elevator movements in a busy office building can now be handled by an electronic "traffic cop" that adjusts to compensate for periods of heavy loads. Normal waiting time is reduced to 30 seconds or less under normal conditions. During rush hours, electronic circuits time each call and if, after 60 seconds, the caller has not been picked up, the control unit dispatches a car di-

rectly to that floor. This is especially important during noon and night rush hours when most movement is downward and customers waiting on lower floors are passed up by filled cars. The control can be set to any one of six patterns, depending upon the traffic conditions of the moment.



Rear Seat Lifts Out Of "Cargo" Sedan

In 10 seconds the new Kaiser Traveler can be changed from a six-passenger sedan to a station wagon. Key to the conversion is a collapsible rear seat which can be removed to accommodate up to 94.5 cubic feet of cargo. The floor space provided is 92 inches long and 46 inches wide between the wheel housings. Two hinged body panels, one lowering to become a tailgate, make it possible to open the entire back end of the car for easy loading. Even with the back seat in place, there is still nearly three times more usable space at the rear than there is in conventional four-door sedans. It comes equipped with heavy-duty springs.

Motorcycles use special four-foot parking stalls, complete with meters, in San Diego, Calif.

Rocket



Stake fastened to the rocket motor plunges deep into the ground, providing a strong anchor that could be used with breeches buoy

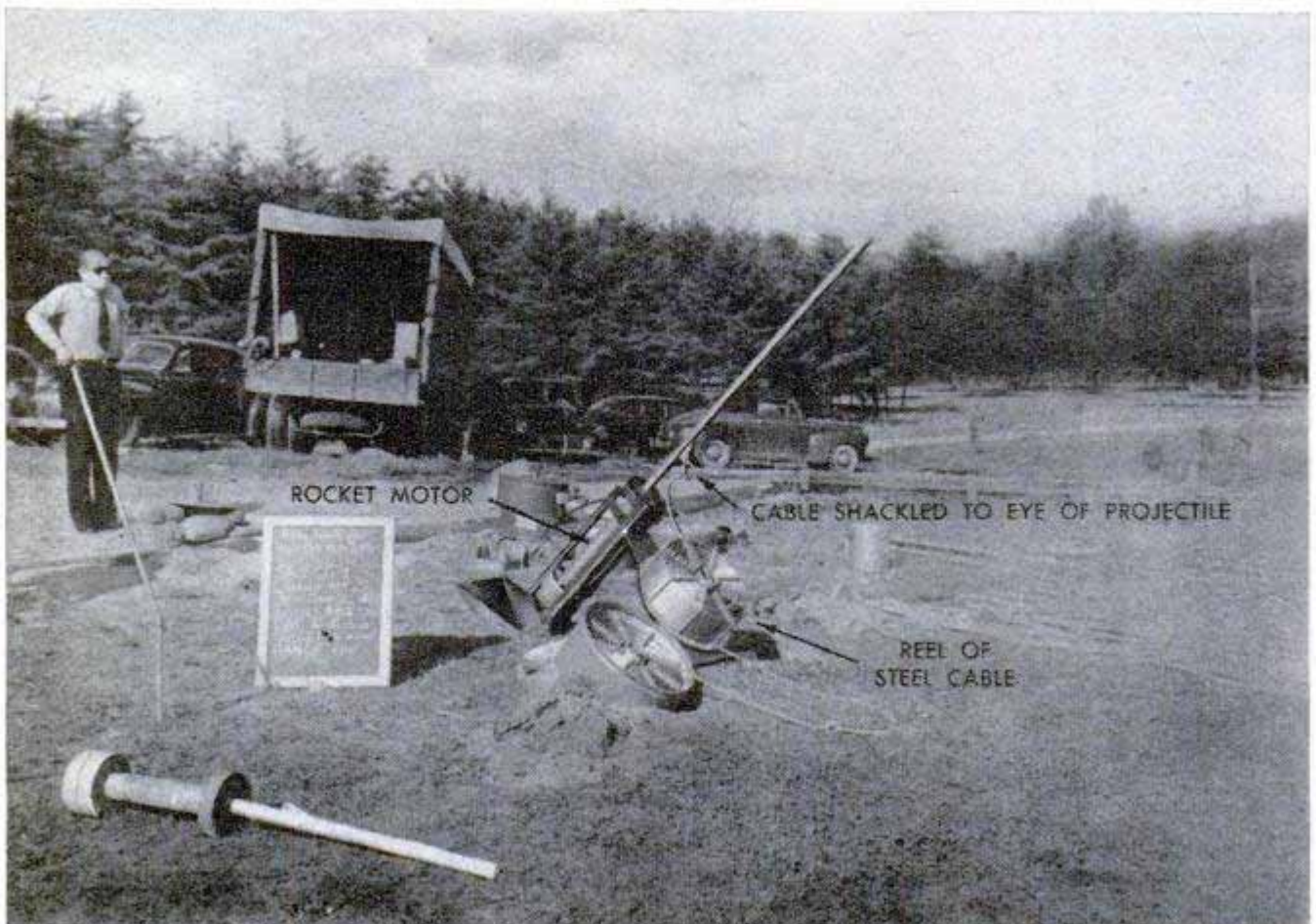
EXPERIMENTS are under way that may lead to the use of small rocket motors for firing steel cable ashore from ships in distress. One method of firing rescue lines by rocket has already been tested by the Coast Guard, which must approve all life-saving equipment used on Uncle Sam's merchant vessels.

In one experiment, a 3.25-inch Navy rocket zoomed out 1171 feet, carrying along a

self in the earth or takes hold in bushes or trees, providing a strong anchor for the line. After the stake is secure, the cable could be rigged for a breeches buoy to take ashore a crew member who would then make the line permanently secure for his mates to follow.

In the case of a ship in distress on the open sea, the rocket could be fired either from the helpless ship or from a rescue

Setup for firing the cable-carrying rocket is simple. Note the way the steel cable is coiled in the reels



Fires a Rescue Line

craft. Then a towing hawser could be hauled into place.

The preliminary tests showed that rockets can carry the line successfully with reasonable accuracy. Its proponents hope that some form of rocket propulsion will replace the traditional Lyle guns used since 1870 for shooting light lines. These guns can handle only a 500-pound-test line, which requires that successively heavier lines must be pulled over until the giant hawser can be transferred. A major drawback of this method is that ships, often in a heavy sea, must remain in dangerous proximity for a considerable time. The shoulder gun, used on smaller ships, throws a very light line, lengthening this period.

The tests indicate that rockets, too, have their drawbacks, some of which will have to be overcome if rocket projectors are to be accepted by the Coast Guard. The cost of a rocket is about 20 times that of operating a Lyle gun, a factor that could be disregarded if only rescue operations were involved, but must be considered because of the large number of practice shots required and the amount of equipment needed for refitting each ship and shore station. Another objection is that personnel

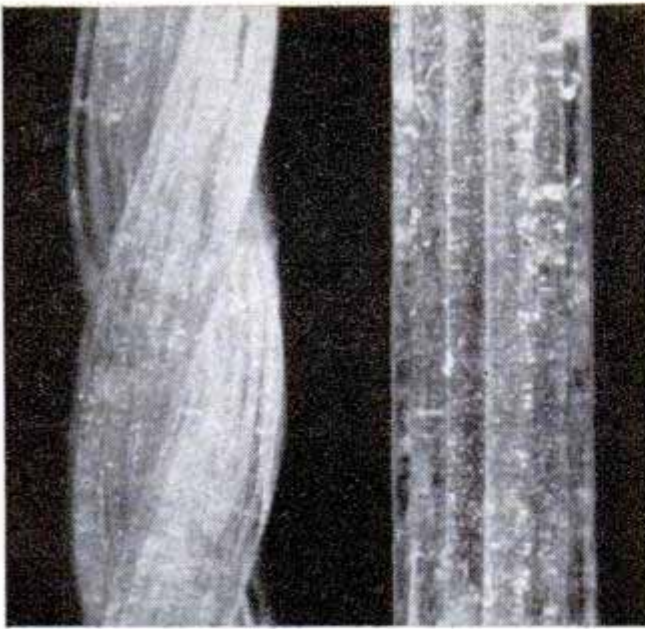
must stay at some distance from the launcher when the rocket is being fired because of the blast of hot gases. However, the rocket can be fired electrically from a remote point as simply as setting off a photographer's flash bulb.

The Testing and Developing Division of the Coast Guard has been conducting studies of many different line-throwing techniques. Rifles, mortars, rockets and pulse-jets all are possibilities. Each has its good points and its limitations. According to Commander R. T. Alexander, Chief of the Division, "The present thought is that a combination missile brought to high speed by a propellant explosive such as smokeless powder or cordite with a rocket or jet booster that cuts in after the projectile has attained speed may be most practicable."

Cable-carrying rockets also have been proposed as anti-aircraft weapons. They could protect key points from low-level strafing, as did the cables hung from barrage balloons during the war. The rocket installations can be concealed easily and the rockets fired at a moment's notice to a height of 500 feet for a total duration of 10 seconds. The cables might bring down aircraft or at least divert bombing runs.

Rocket zooms away from the launcher, this time carrying two 1/8-inch cables with their ends fastened together



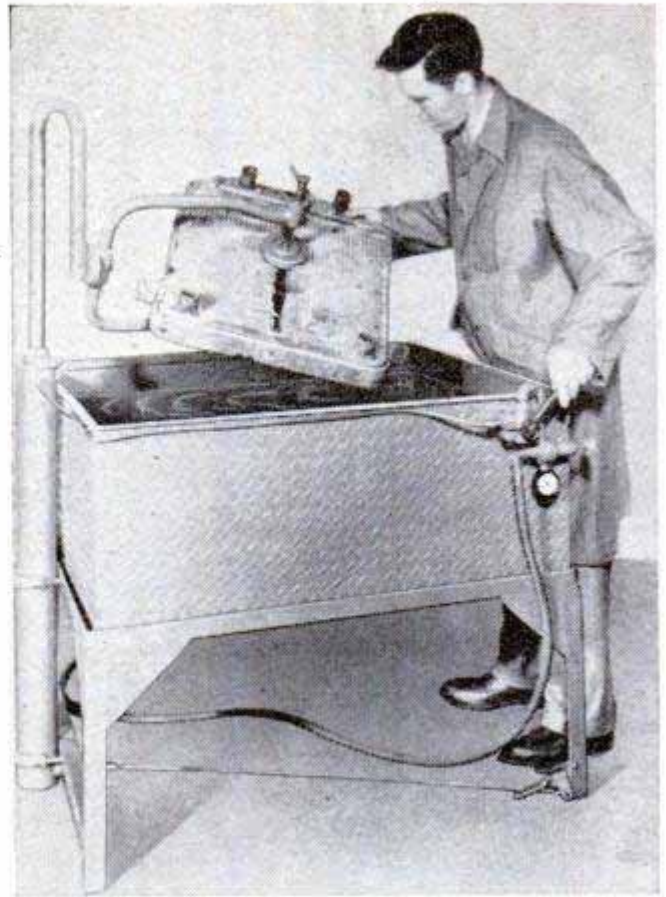


Thread at right is made of fibers welded together without a twist. At left is a conventional thread

Nontwist Thread

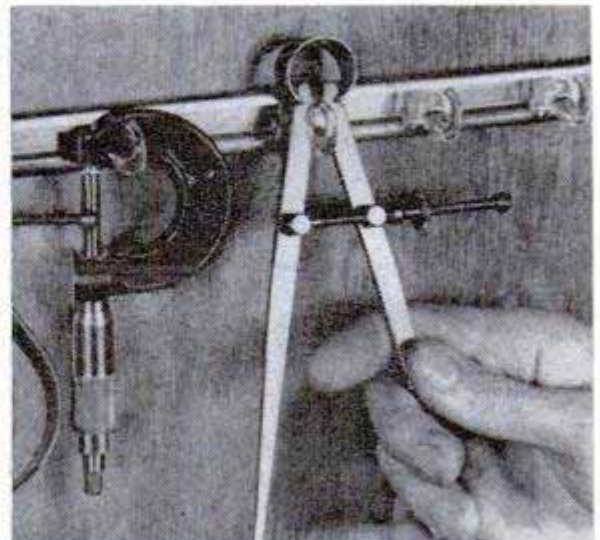
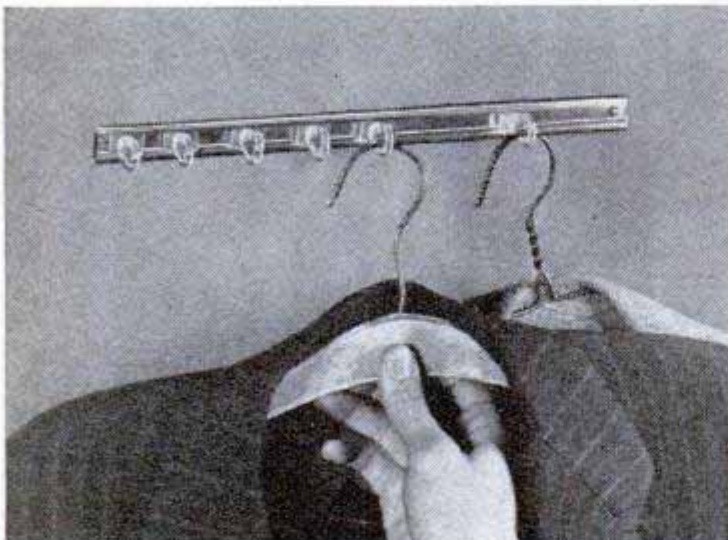
Thread made of several nontwisted filaments won't kink, snarl, split or ravel. The new thread eliminates the spirals and ridges of conventional threads and may be made of almost any kind of fiber, either synthetic or natural. Although no details of the manufacturing process have been released, the manufacturer states that the thread is neither coated nor resin-treated, but consists of fibers welded together without a twist. The first commercial thread produced by the process is made of nylon and is called "nymo."

☐ Traffic lights in Hayes, England, have been synchronized with a talking device to repeat at intervals: "Now, children, mind how you cross."

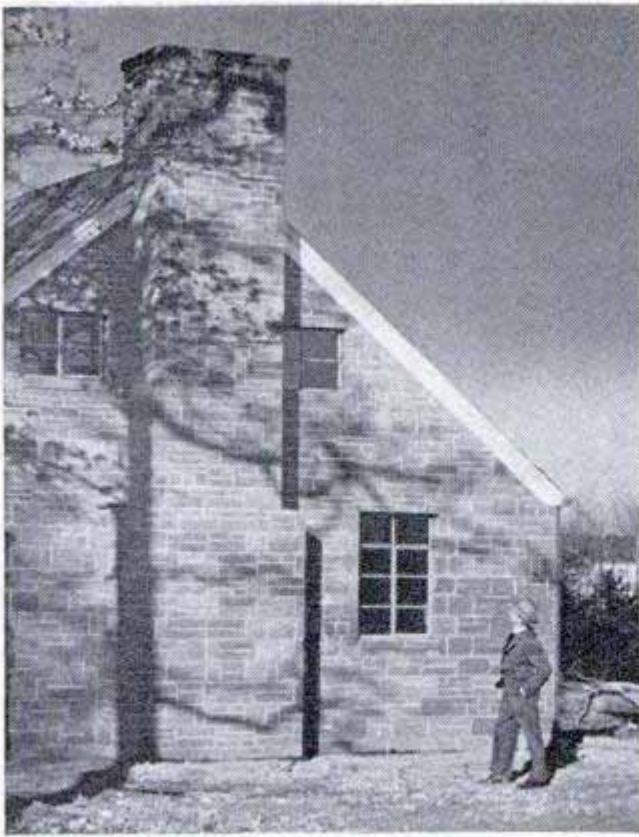


Combination Hoist and Tank Speeds Radiator Repairs

Automobile radiator repair work is speeded and made less tiring by an adjustable stand that holds the radiator firmly and moves it in and out of the test tank by an air-operated lift. Rubber pads on the clamps protect the radiator fins from damage. Movement is controlled by either a hand or foot lever. The radiator can be rotated 360 degrees either above the tank or in it. The limit vertical movement is 24 inches.

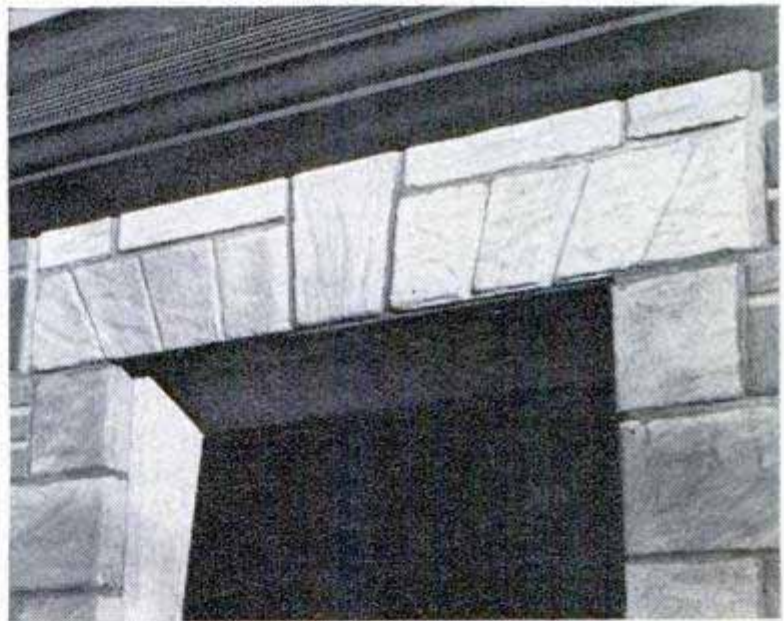


PLASTIC HOOKS THAT SLIDE IN A METAL TRACK provide an adjustable arrangement for hanging anything from tools to clothing. The hooks have a capacity of 15 pounds each. The stainless-steel track can be mounted vertically on a wall or horizontally on the underside of a shelf as it would be for hanging cups in a china closet. Several foot-long sections of track can be butted together if a longer track is desired

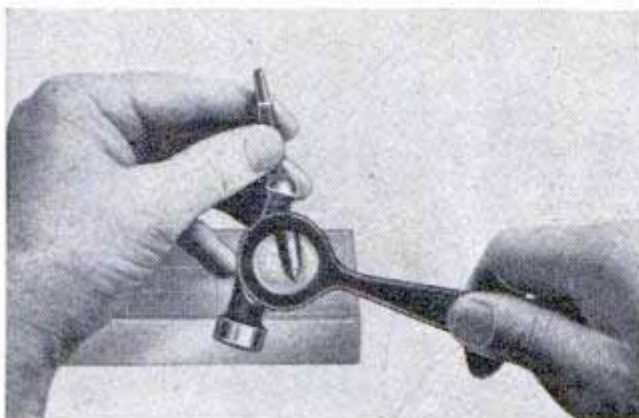


"Stone" Blocks of Concrete Cast in Shaped Molds

Walls that appear to be made of cut stone can be erected with concrete blocks that are tamped in a standard block machine with a special die. The blocks give the effect of stone at much less cost than real stone. The molds produce a variety of textures on the outer surfaces. The blocks then are tinted with several metallic colors, which have proved permanent. Some blocks are grooved to simulate several small pieces of stone, and the grooves are covered with light mortar. Others are grooved for steel sash, or are cast as keystone blocks for doorways and in other shapes. The blocks come in three sizes, 8 by 8 by 8, 4 by 8 by 16 and 8 by 8 by 16 inches.

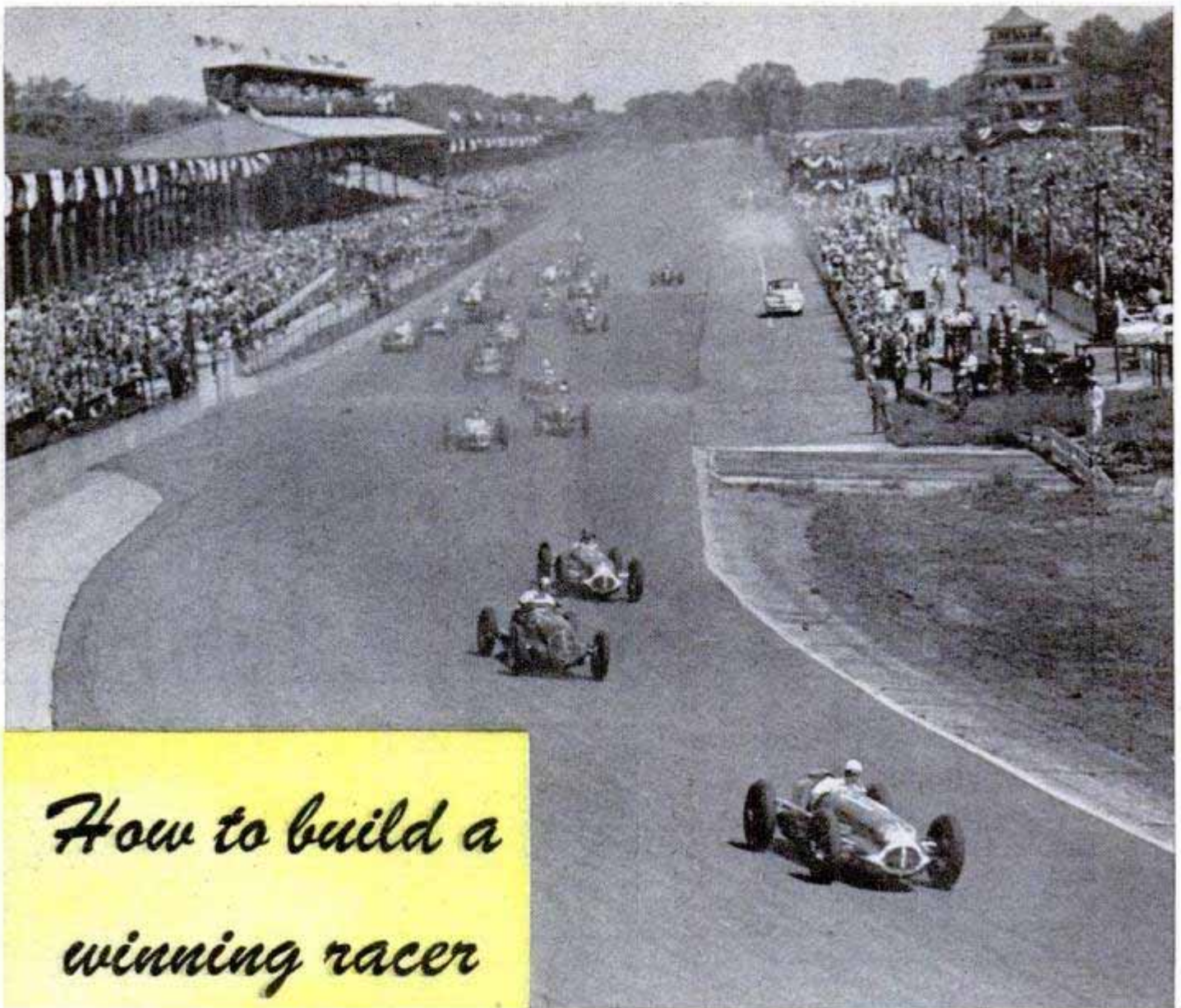


Top, left, when tinted with metallic colors and used in a building, the concrete blocks appear to be cut stone. Top, some of the irregular-textured blocks have grooves to simulate mortar lines. Above, special keystone blocks are cast for doorways



Hammer Has Magnifier Built Into Head

Precise spotting of punch marks is speeded by a hammer that has a built-in magnifier. The seven-power lens is mounted in the head of the hammer and eliminates the usual looking away that results when separate glass and hammer are used. With the new hammer, which weighs only four ounces, the punch can be spotted exactly and then struck without the worker having to look away from his work.



How to build a winning racer

By Lou Moore

As told to Thomas E. Stimson, Jr.

IN THE 16 TIMES that I've competed at Indianapolis, either as driver or owner, my cars have won the 500-mile race four times, have placed second three times, and have finished in third place on three other occasions.

That's something of a record and in this article I'll tell you how an Indianapolis winner is put together.

In the first place, what kind of car has the best chance of winning the race? Remember that it will have to average something like 118 or 120 miles per hour for 500 miles.

Some designers have put their faith in supercharged engines, some have used two small engines in the same car, some experiment with new types of springs for better roadability, some favor a four-wheel drive.

Green flag waves and the nation's fastest racers zoom down the speedway as the 1948 classic begins

My own experience has been that you can't beat a front-drive car at that track as long as the motor is running well. The value of the front drive is that 65 percent of the car's weight is on the driving wheels and thus provides good traction in the turns.

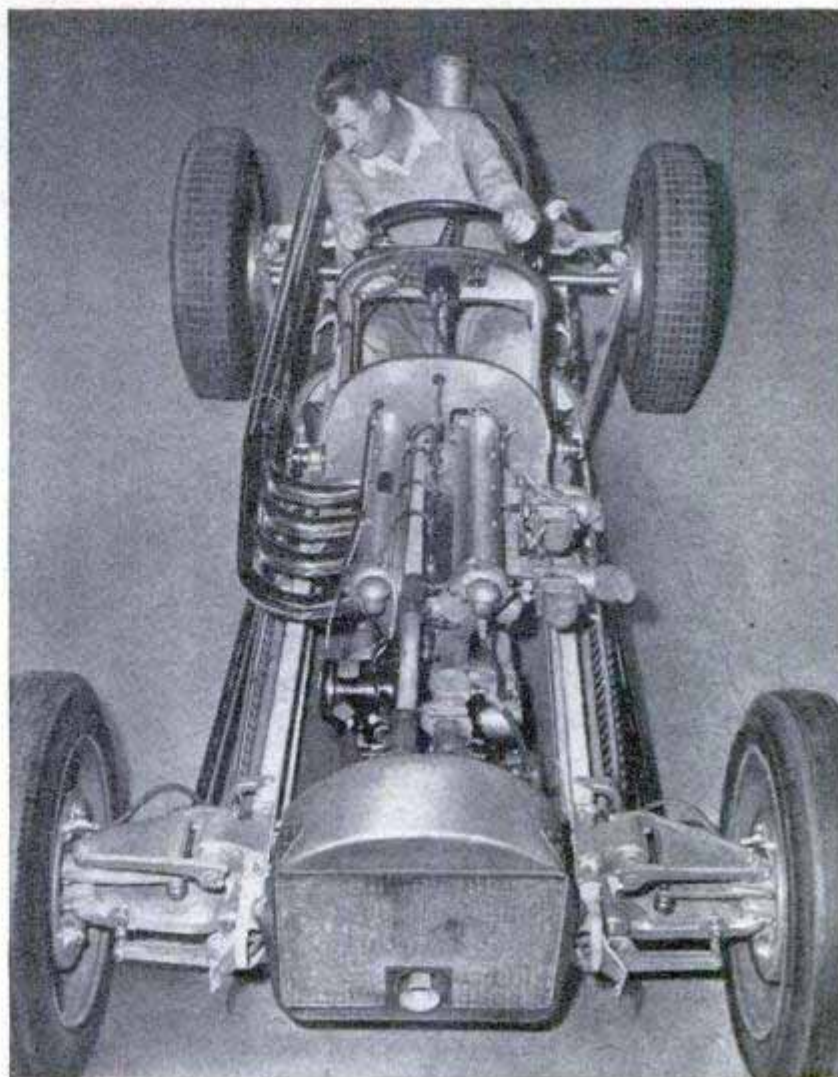
My favorite engine, for power and endurance, is the 270-cubic-inch, four-cylinder, nonsupercharged Meyer-Drake, formerly known as the Offenhauser. It's a simple engine and hence reliable. Its 350 horsepower allow a driver to average as high as 130 miles per hour on the 2½-mile track in time trials.

When I built two brand-new cars for the 1947 race, I designed them around that combination, a front-end drive and a Meyer-Drake engine. Both were known as Blue Crown Spark Plug Specials. Mauri Rose drove one of them and won the race. Bill Holland drove the other and placed second. Last year Mauri won the race again in the same car and Bill once more took

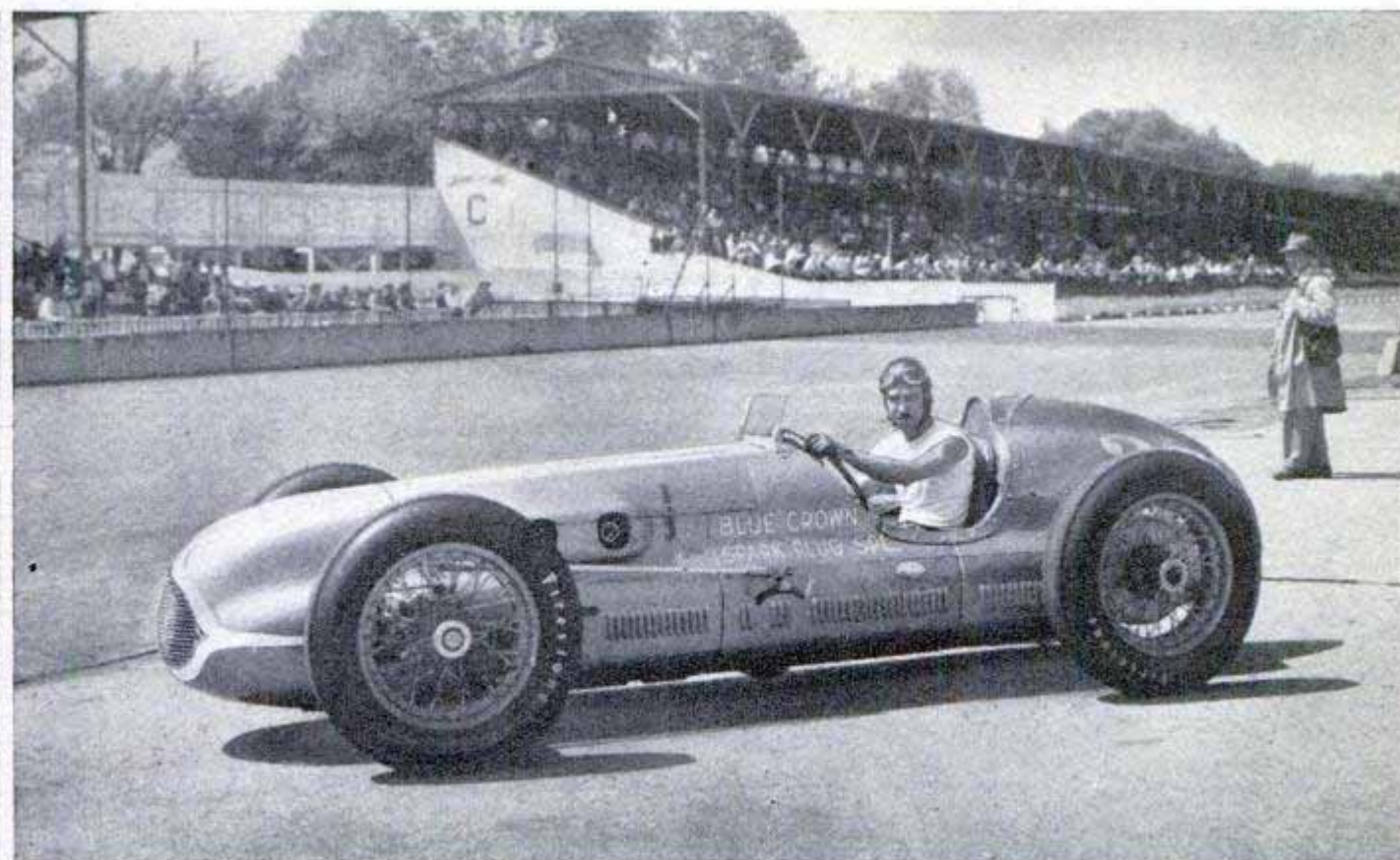
second. This year there's a chance that one of the two drivers will win the race again. There's even an outside chance that we'll take first, second and third, for there will be three cars in my team this year.

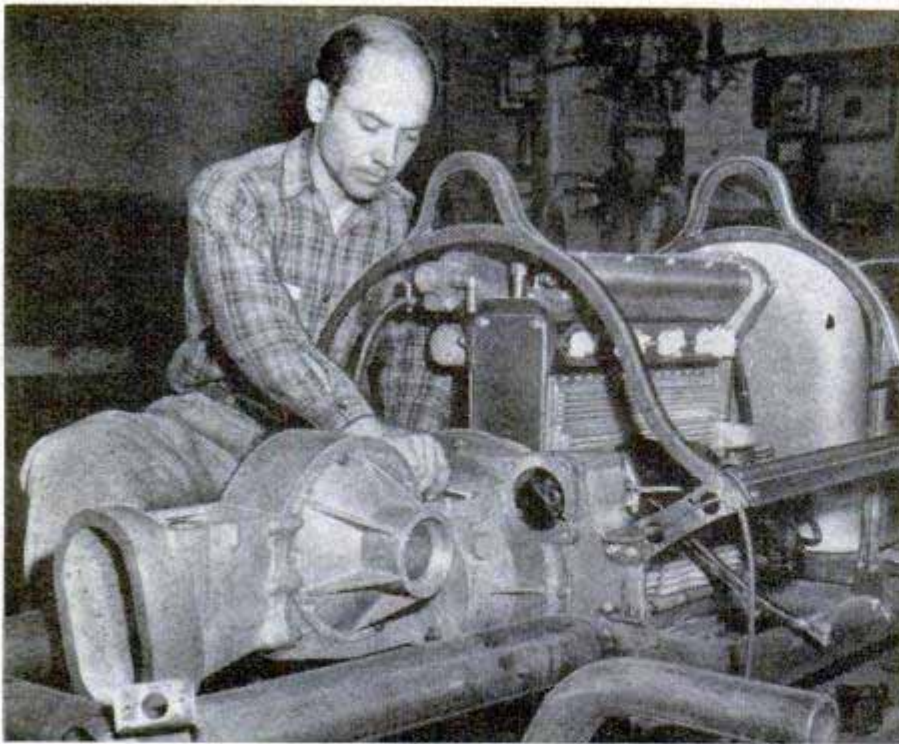
The new car that I've just finished building is also powered with a Meyer-Drake but has a rear drive instead of a front drive. I designed it especially for the dirt tracks and yet it is fast enough and handles well enough to place among the leaders on Memorial Day. George Connors will drive it on the brick-and-asphalt Indianapolis track and we'll enter it in a dozen dirt-track events this summer.

I began to get ready for this year's race last July in my shop in North Hollywood, Calif., and I've been at it ever since, except for three weeks off in December. Besides building the new car, I've torn down and rebuilt the two cars that I built for the 1947 race. Every part that showed wear or fatigue was replaced, including timing gears, crankshafts, rods, pistons and valves. I put in new clutch



Moore checks the cockpit design of one of three cars he has built for this year's race. Below, this car built by Moore and driven by Mauri Rose won the Indianapolis classic both in 1947 and in 1948



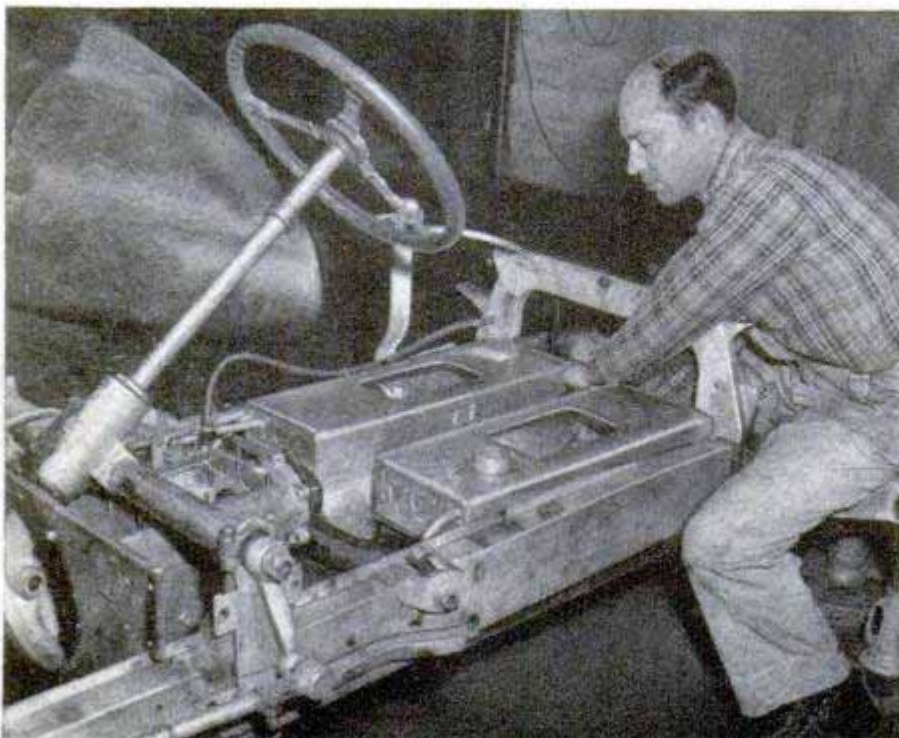


Builder of champions installs gearbox and transmission in a new car

parts and replaced the radiators of both cars. No doubt most of the parts have thousands of miles of life left in them but it's safest to replace them after two races.

My schedule called for having all three cars ready to go by the 15th of April. Then they were towed on trailers across country to Indianapolis. That left about five weeks for settling down in the garages at the track, getting the cars officially inspected, tuned up and qualified. That's more time than most owners like to spend at the track but it's good insurance. If any bugs show up, we'll have time to correct the trouble.

"Belly" tanks under the driver's seat will provide more fuel capacity



troubles develop we put the car back in the garage. It will sit there until the time comes for the qualifying run. The only attention it will need on qualifying day and on the day of the race will be carburetor adjustments. These will depend on the fuel mixture and on the humidity of the day.

Many of the owners use straight alcohol as fuel for their qualifying runs. It would be a good fuel for the big race itself, for it produces the most power and keeps the engine cool. The trouble is that it delivers no more than three miles per gallon at high speeds. For the Memorial Day "500" we blend some alcohol with gasoline in a ratio that yields about 10 miles per gallon. With that mixture only one pit stop for refueling will be needed.

I'll signal one of the cars into the pit somewhere between 250 and 300 miles, after which the other cars will follow at 10-lap intervals. Usually a couple of tires need to be changed and meanwhile fuel will be poured, under pressure, into the car's 35-gallon tank. Water and oil are checked and the car is ready to go again, well within 90 seconds of the time it stops.

Of the 33 cars that start the race I figure that no more than five or six will give us real competition.

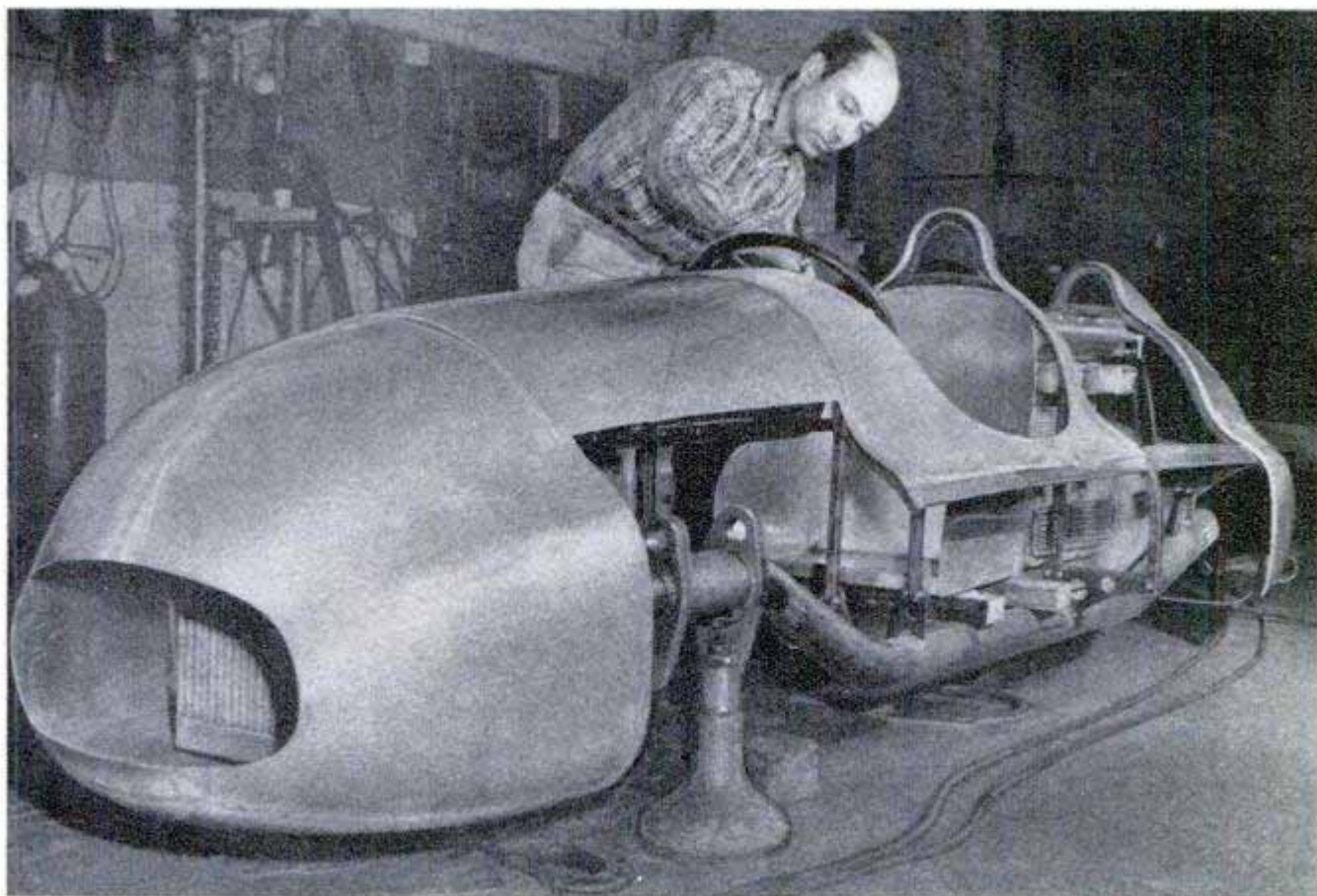
You can scratch a number of the drivers because they haven't the skill and endurance for hurtling around the track for 200 laps. You can eliminate a number of the other entries because the cars are compromise jobs that can't do their best at Indianapolis. You can cross off a few more of the cars because they won't be tuned up properly. The head mechanics and the pit crews just won't have found the right combinations of fuel, gear ratio and carburetor adjustment by the time of the race. Barring accidents and unlikely mechanical failures, that leaves seven or eight cars, counting my own, as the most dangerous contenders.

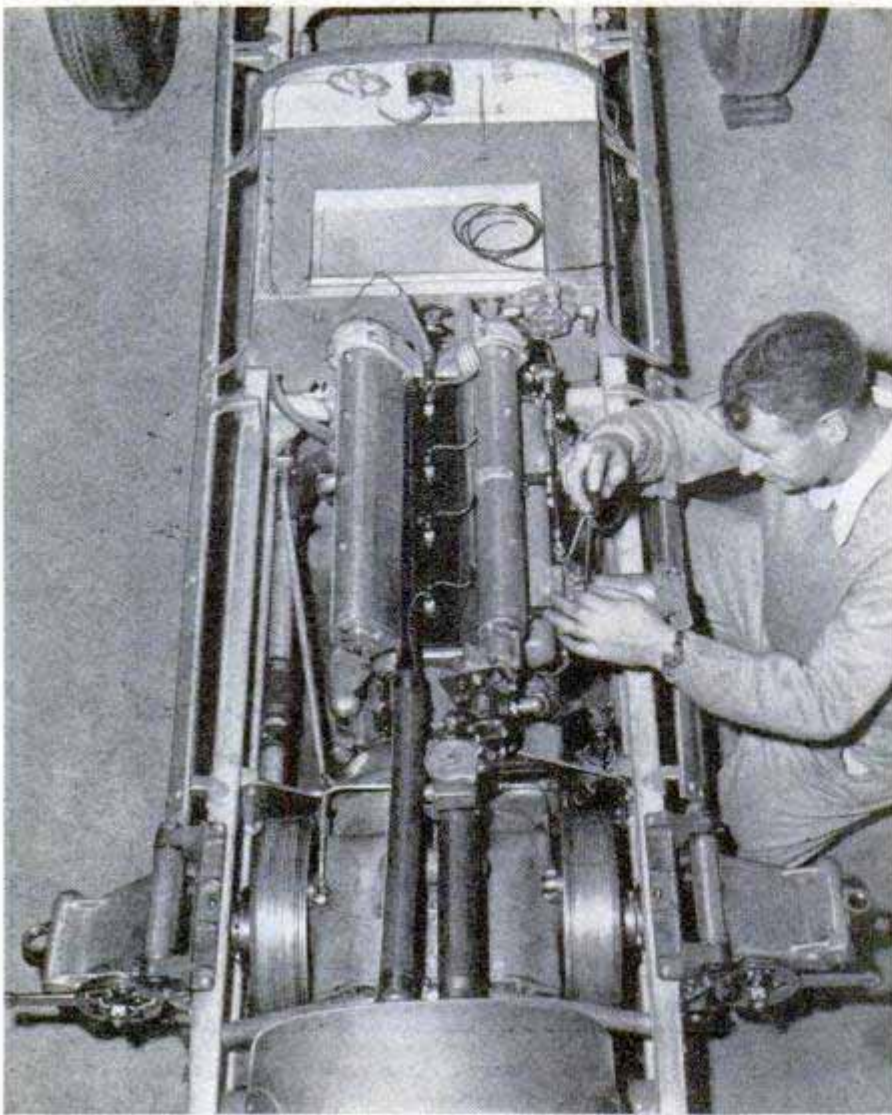
My drivers and I go over our strategy the day before the race, after the qualifying runs are finished. By then we have a pretty good idea about whether the race will be "hot" or whether everyone is going to hit the speed that they think will win and then try to outlast the competition.

That, in fact, is the best plan. The trick is to estimate the average speed that will be necessary to win the race and

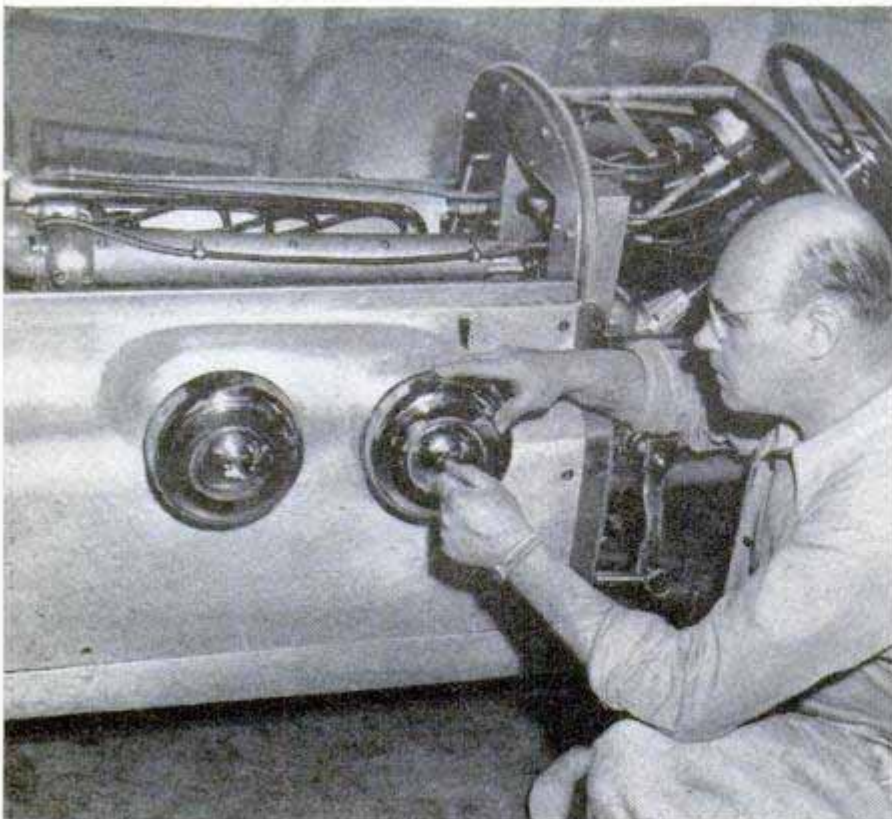


Steering wheel of one of Moore's three new racers is geared to drag-link arms that in turn are connected with the front wheels. Below, Moore's new rear-engine, rear-drive car has a 3½-inch tubular frame. It will have only five inches of clearance with the wheels installed





Moore tunes up the engine of the car that won second place both in 1947 and 1948. All the parts that show wear or fatigue are replaced. Below, the polished chrome caps projecting from the side of a new racer pick up air from outside car and pass it into the twin carburetors



then drive just fast enough to maintain that average. If some "hot shot" wants to burn up the track and get a long lead early in the race, none of the smart drivers chase him. The chances are that he'll wind up in the pits with serious motor trouble or will require extra stops for fuel and rubber.

As the race runs on, however, the top drivers in the best cars try to close in on whoever happens to be in the lead. They want to drive as slowly as they dare to conserve tires and fuel and yet they must stay close enough to the leader to have a chance of overtaking him when the time comes. Meanwhile the leader wants to stay in front and he begins to work at it if there happen to be better drivers in faster cars creeping up on him.

It's hard to say what will happen in the race this year because, for the first time since the war, there will be a good number of new, postwar cars. Frank Kurtis, for instance, has built a bulletlike front-drive car, powered with a Meyer-Drake, for one owner, and a pair of rear-drive cars with the same power plants for other enthusiasts. One of these has a variable wheelbase that will be set at 100 inches for the Indianapolis race and reduced to 94 inches for dirt-track competition.

Diedt & Lesovsky, race-car builders, have turned out a novel rear-engine rear-drive car for N. J. Rounds of Beverly Hills. The design is intended to provide a steady ride and to maintain the same balance all through the race. In most cars the fuel supply is carried in the tail and the car's handling characteristics change as the fuel load lightens. Round's car will carry

(Continued to page 264)



Piasecki Helicopter Corp. photos

Loop-the-Loop Helicopter To Be Carrier "Lifeguard"

Speed runs of 131 miles an hour, an unofficial world's record for helicopters, have been made by the Navy's new all-metal XHJP-1. It is also the first helicopter known to have performed a successful loop. The craft carries seven and will serve with aircraft carriers as a "lifeguard." It can follow planes taking off and landing and be ready to make quick rescues when pilots are forced to ditch. A hydraulically operated hoist, mounted near the pilot's seat, will bring rescued personnel directly up into the cabin.

Hydraulically operated hoist, left, will bring rescued flyers up through wide hatch next to pilot. Above, helicopter moving litter patient and, below, blades folded for parking on carrier



Tire Playpen

With one side wall cut away, a tractor tire serves as a playpen for a child. It is high enough to prevent a small child from crawling out. The lower rim serves as a shelf.

Once dependent on waste vegetable and animal material, the fertilizer industry today is chiefly chemical with sales totaling \$600,000,000 in the U. S. and consumption of about 17 million tons a year.



Republic Aviation photos

Swept-back wing of the XF-91, left and above, reverses usual design and appears widest at tip. The Delta wing of XF-92, below, is expected to be most effective in supersonic realm

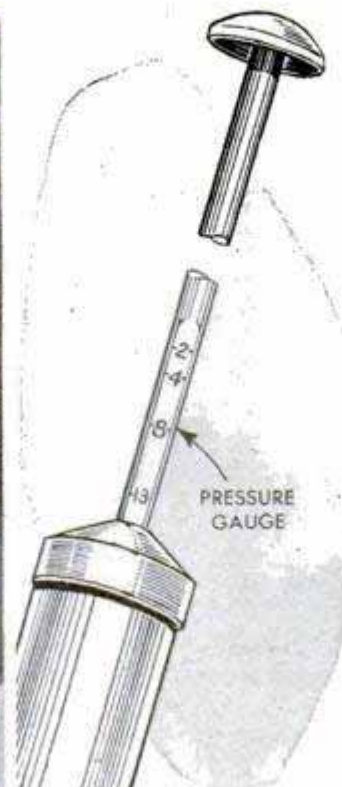


Consolidated-Vultee Aircraft photo

Wings for Jets Have Odd Shapes

Unusual wings distinguish the U. S. Air Force's two newest jet-rocket interceptors. Both are sharply swept-back. In the Republic XF-91 it appears to be wider at the tip than at the junction with the fuselage. The Convair XF-92 has a triangular-shaped wing, with movable portions at the trailing edge for aileron and elevator action, eliminating the need for tail sections. A vertical stabilizer and rudder provide directional control and

stability. Test models of both planes have been flown numerous times but their performance figures have not been revealed.



Hand Pump for Football Has Gauge on Shaft

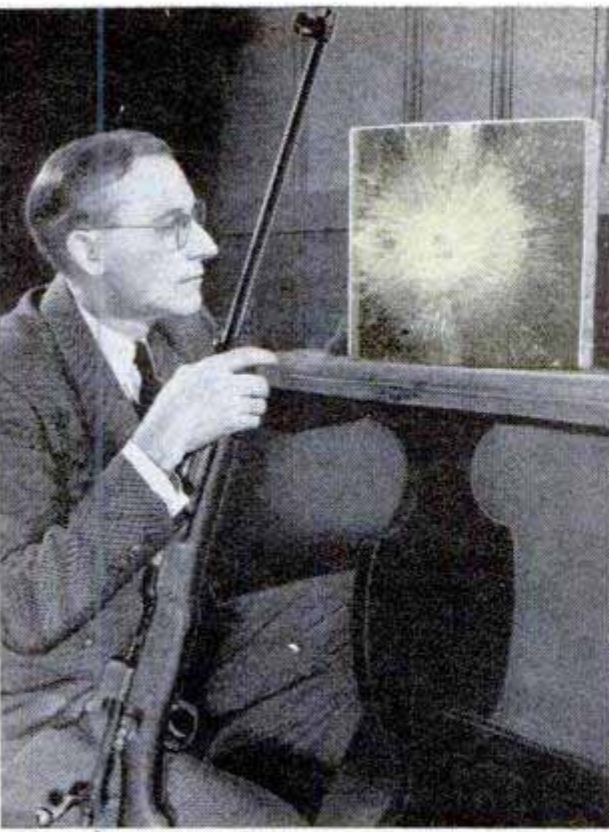
You don't need a separate gauge to know how much air you've pumped into a football when you're using a hand pump with a built-in gauge. The gauge, etched in the rod of the pump, registers pressures from 2 to 13 pounds. When the handle is released, the pressure forces the piston against a spring, pushing the scale out where it is easily read.

Cement Paint From Powder

Dissolving a new enamel powder in turpentine makes an acid and alkali-resistant paint especially adapted to cement and masonry. It can also be used on wood and metal. The powder is composed of three resins and pigment.

the man who stops bullets

By *Bernard W. Crandell*



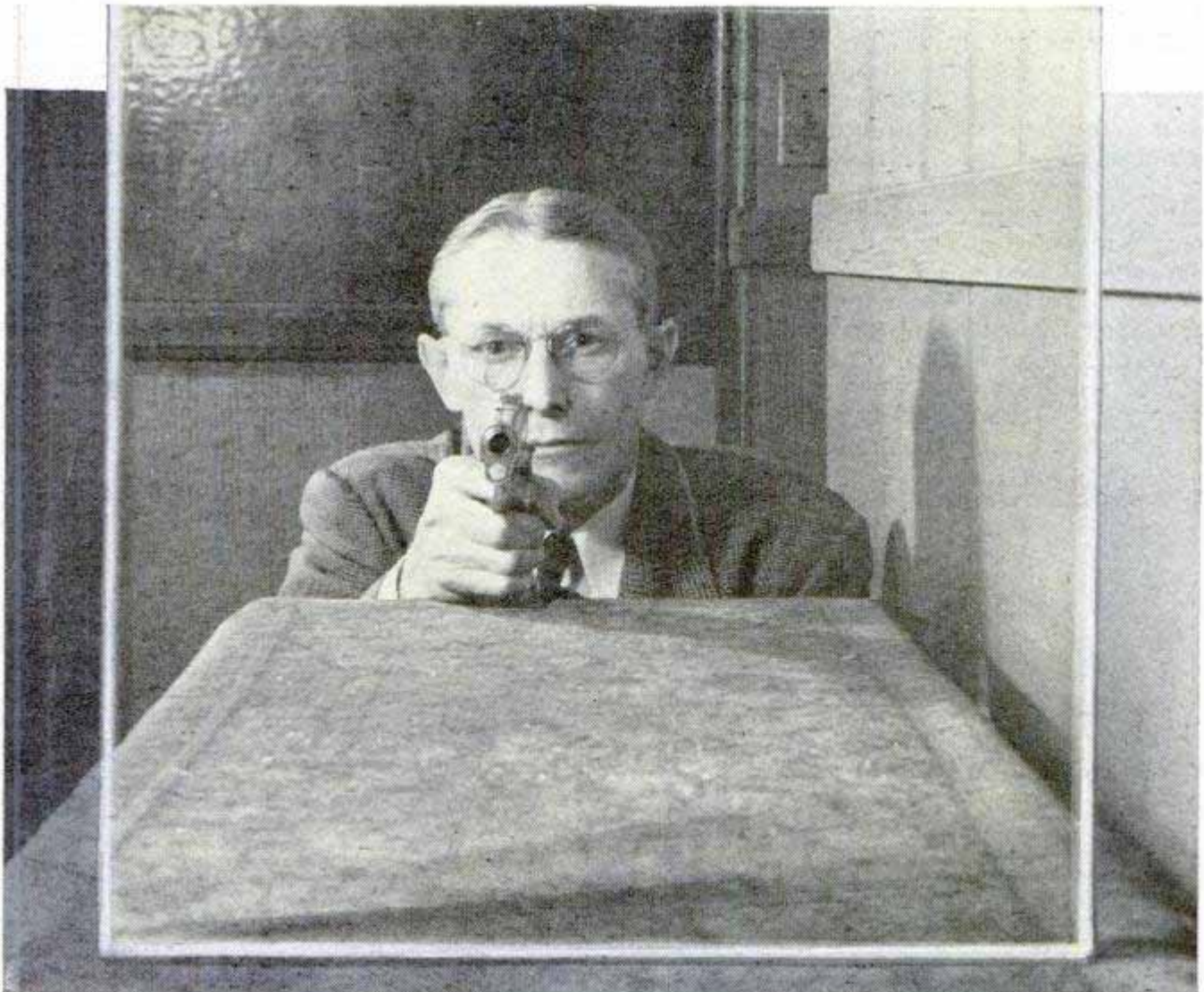
STANDING at the end of a quiet residential street in Highland Park, Mich., is a mysterious brick factory building without a name. It is guarded across the front door by bulletproof steel mesh and at the rear by a red, armor-plated jeep.

The idea of an armor-plated jeep in suburban Detroit is enough to provoke mild amusement. The husky war wagon, hung in armor $\frac{1}{2}$ inch thick, is the pickup truck of the Smart Safety Engineering Company, which makes a business of armoring limousines.

Carroll M. Smart, an inventor-engineer, armor-clad the jeep early in World War II to act as a fast reconnaissance car but it was turned down by the Army in favor of something larger. What happens

Carroll M. Smart, builder of bulletproof cars for presidents and kings, studies effect of bullet fired at nine-ply armor glass used in his big limousines

Below, Smart takes aim with an Army .45 at a heavy piece of armor glass. He carefully tests all glass of laminated type for degree of protection needed





Scotland Yard inspectors liked the gun ports on windows of Smart car. This car was used by royal family

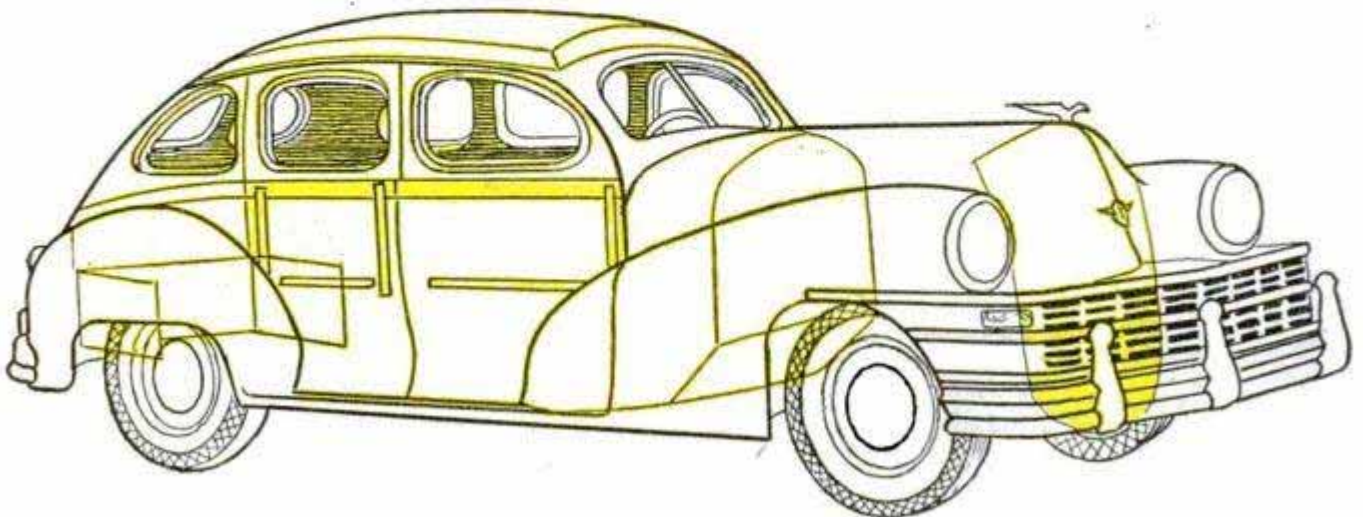
in Smart's factory is for the particular benefit of presidents, kings, high government officials or millionaires who want to ride in bulletproof automobiles. This instinct of self-preservation has kept alive a specialized type of engineering that ordinary car manufacturers have ignored. Smart and one or two others, notably the Federal Laboratories, Inc., of Pittsburgh, are alone in this field, which is called engineering "safety" and is worth a modest gross of around \$100,000 annually.

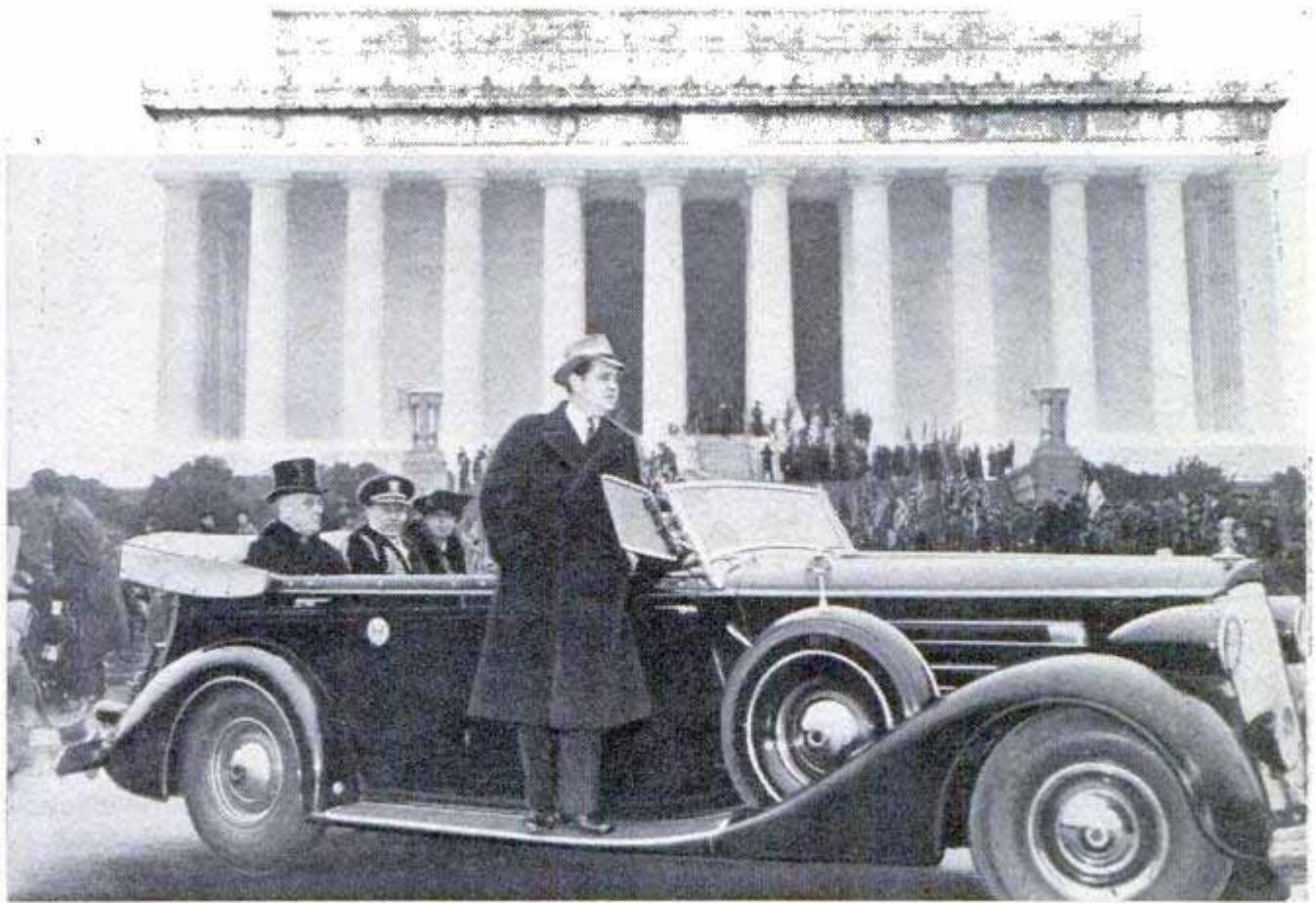
Stopped during the war except for a few special jobs, the Smart business is beginning to pick up and the neighbors again are

seeing four by eight-foot sheets of armor steel moving into the building, and limousines, apparently normal except for a slight greenish tinge to their windows, rolling out.

The science of converting automobiles into pillboxes impervious to small-arms fire is far from being a cut-and-dried operation. As orders arrive from all parts of the world, Smart deciphers the postmarks as a tip-off on foreign politics. After 13 years' experience, it is his theory that requests for armored limousines are indicative of forthcoming attempts to overthrow a government. Just for the record, Smart recently armored a seven-passenger sedan

Chrome-nickel armor plate (shown in yellow) is placed beneath shell of modern car to make it bulletproof





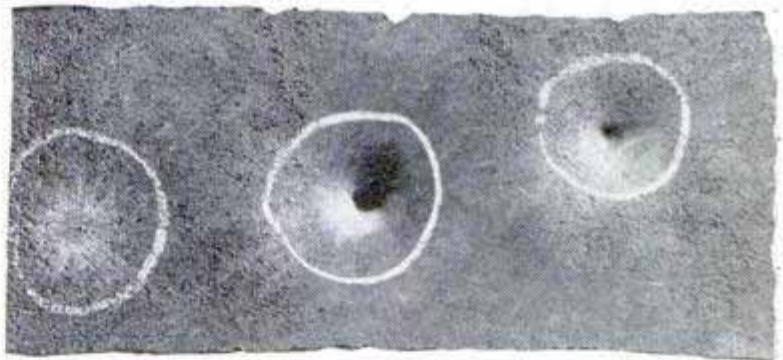
This is one of White House cars armored by Smart. Bulletproof spring-release windows can pop up in jiffy

ordered by a South American republic, presumably for use by the President.

Orders from within the United States, however, are just thorough precautions against assassination, generally taken only by the highest of our government officials. During the war Smart fixed two automobiles for the late President Roosevelt.

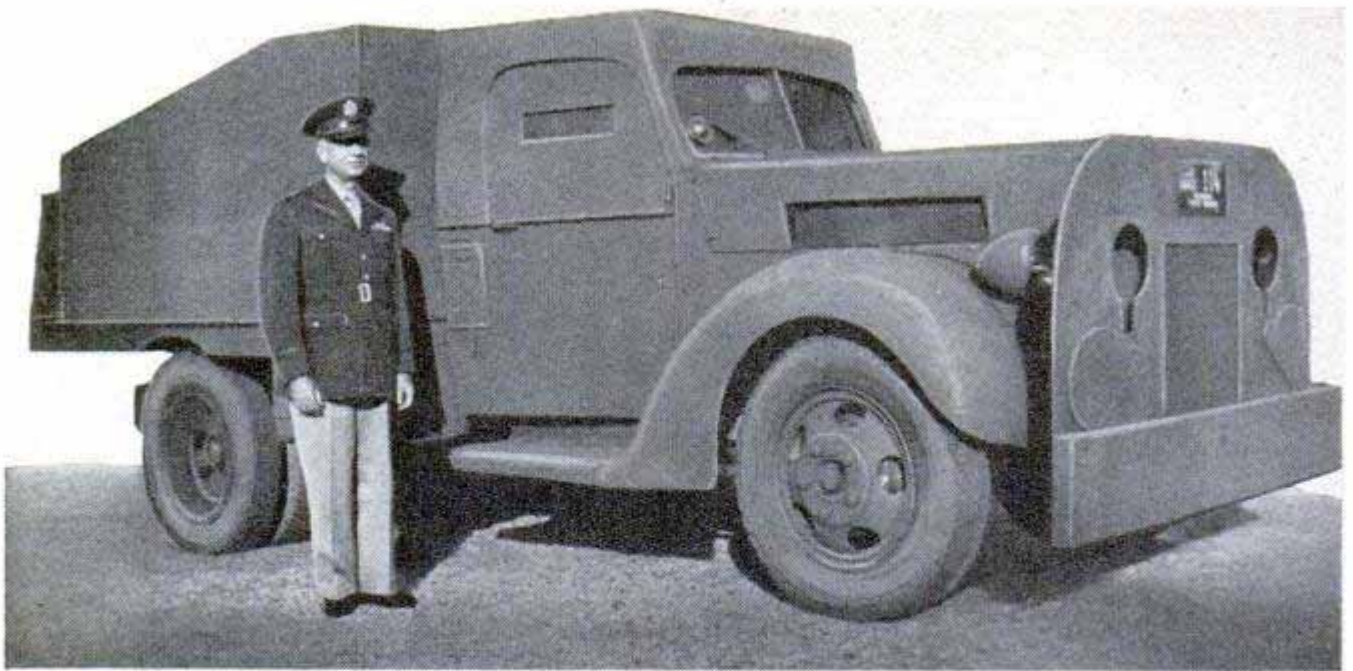
One of the Roosevelt jobs, a Packard touring car, probably was the toughest job Smart ever handled. The Secret Service, entrusted with the President's safety, specified in addition to the usual armoring, that the windows had to be of bullet-resistant glass two inches thick; that they had to jump automatically from the "down" to "up" position; that the rear seat had to conceal a plate of armor that, like the windows, would jump head-high in a split second; and, finally, that the canvas top be fixed to withstand a 6½-pound object—the weight of a hand grenade—dropped from a height of 32 feet.

To solve the window problem, Smart installed high-tension springs in the doors which would lock when the windows were



Dents in armor plate, left to right, were made by a .38-caliber police special, a .30-caliber Army ball with steel jacket, and a .30-caliber lead-nose bullet. Below, this jeep was armored by Smart during the war and tested at Aberdeen Proving Ground





This is a riot squad car built in Smart's armoring shop for the Michigan State Troops to use in Detroit

cranked down, and release upon the touch of a switch. There were three such switches, one on either side of the rear trunk where Secret Service agents rode during parades, and one on the dash within reach of a third Secret Service man in the front seat. If danger threatened from any direction, the President could instantly be made secure from any assassin's weapon up to a .50-caliber machine gun. The grenadeproof roof presented a bigger headache. Clarence Bruce from the Bureau of Standards in Washington flew to Detroit with two live hand grenades in his pocket to help make the tests.

"We drove the President's car out to the Detroit race track and parked it beside one of the stables," Smart relates. "I wired a grenade to the center cross bow of the roof, attached a long wire to the pin, and with the other end of the wire in my hand took shelter in the stable. Then I pulled the pin."

The resulting explosion not only blew the top off the car but nearly got Smart and Bruce in the bargain. Fragments flew through two sections of stable wall, missing them only because they were squatting.

"The canvas top was in shreds and the top of the front seat panel was badly damaged, making it obvious to us that if a man were sitting in the back seat he would have been killed," Smart said.

After getting the seat repaired, Smart installed a tough cloth webbing just beneath a new canvas top and made another test. This time, however, they dropped a grenade without pulling the pin from a barn window 32 feet above the car roof, and found that the reinforced roof easily withstood the impact. President Truman now is using this combination grenade-bulletproof car.

Despite a limited volume of business, safety engineers have made their trade more exacting than automobile manufacture itself. The tiniest crack in the armor, they know, might be the crack that would kill the customer. They have run tests on armor plate and bullet-resistant glass with guns varying from pea-shooting .22s on up to .50 caliber. The company has had to meet scores of different specifications for cars—all according to what the customer thought was going to be shot at him. Also, the armor had to be placed so it wouldn't show, and it isn't easy to make a window inconspicuous.

There are reasons why a person riding in a rolling fortress, like a man wearing a bulletproof vest, would just as soon keep the news about it quiet. However, Smart loves to tell of a general in a South American country who, thinking that the idea of an armored limousine reflected upon his courage, specified that the car have protection only in front. It turned out that the general, who must have been bucking for president, wanted to give his constituents the impression that he would always meet an attacker head-on, never offering an ignominious potshot at his posterior.

Smart started his business in 1933 when, as an engineer with the Highland Park Fire Department, he got upset over the killing of policemen while chasing gangsters' cars. In his spare time, he armor-plated a scout car for the Dearborn Chief of Police, which drew so much attention that the Detroit Police Department handed him a fleet order for 52.

Since then, Smart has handled jobs for many police departments here, for Scotland Yard, Chiang Kai-shek, the Rajah of

(Continued to page 254)



Handle Forms Sheath for Knife

With a handle that folds completely around the blade, a new sports knife combines the advantages of a sheath knife with the safety and compactness of a pocket-knife. The knife comes in two models, one for fishermen and one for hunters. The hunting model has a single-edge blade. On the fishing knife, the blade is saw-toothed and hooked on one side with a cutting edge on the other. Shaped to fit the palm, the handle is made of Tenite plastic trimmed with aluminum.



Baby Buggy "Walks" Upstairs

Getting a heavy baby carriage up and down stairs is made easy by a British inventor. He mounted three wheels on each end of the rear axle in a triangular fashion, permitting the buggy to "walk" up and down stairs as the three wheels rotate around the common axle. When pushed on the level, the buggy rolls on two of the three wheels.



"Jet" Print Washer

Any large tray or dish-pan becomes an efficient print-washing tank when a print washer with a jet-pump action is used. The plastic water distributor, attached to the side of the tray by suction cup, directs the flow of water so that one jet washes and agitates the prints while another forms a pumping action that sucks the "dirty" water out a discharge tube, keeping the water level constant. The tray can be placed below the sink level, since the jet-pump will elevate the discharge water several feet. The hose connector fits any standard household faucet.

Swamp Crop

Digging around in the black bogs of Minnesota, a chemist came up with a jackpot idea—peat pellets

By Agnes Harrigan Mueller

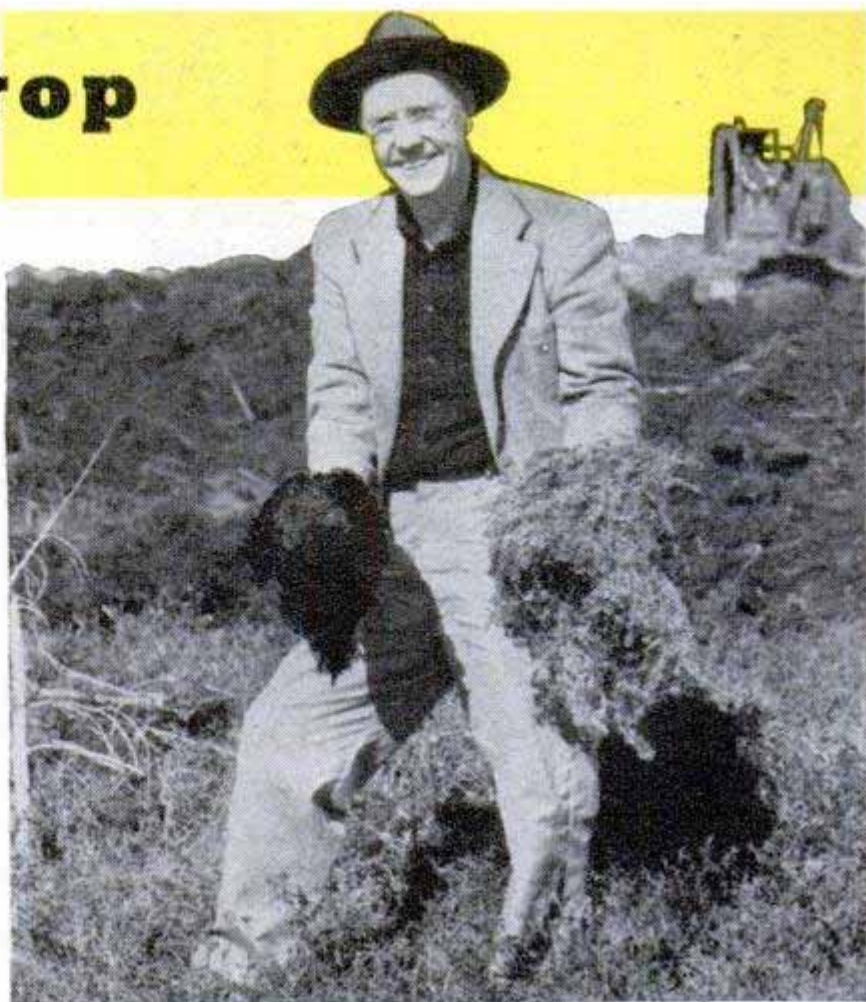
FOR YEARS timbermen, farmers and miners wrote off the muskeg swamps of northern Minnesota as wasteland. Today, their minds are being changed by a crude pilot plant that turns out peat pellets which point toward a prosperous future for the bogs.

Clayton Plummer, a former Manhattan Project chemist, was commissioned by the state of Minnesota to discover the potential of the vast peat deposits. Since Minnesota has more peat than all the other states combined, an estimated 50 billion tons, the economic value of the deposits would be tremendous if practical processes and economic uses could be found.

As a result of Plummer's study, peat pellets are being produced in small quantities at a cost of about \$4 a ton, much cheaper than the methods used in Europe where peat is commonly used as fuel.

When dug from the ground by power shovels, peat contains about 90 percent water. It is piled in huge mounds to drain. Still saturated, the peat is taken to a large meat grinder that serves as a macerater. The grinding process breaks down the cells and releases more water, producing a jellylike material. This material is then fed into a large revolving cylinder, open at both ends, mounted on a slight angle so the peat rolls through the cylinder. Continuously rotated by an old Ford engine, the cylinder rolls the peat into hundreds of pellets about an inch in diameter. As they fall out the lower end of the cylinder, the pellets are gathered and placed on racks where the sun and air dry out the remaining water. When dry, the pellets are hard and look like large black marbles. Plummer has used the pellets as furnace fuel with good results.

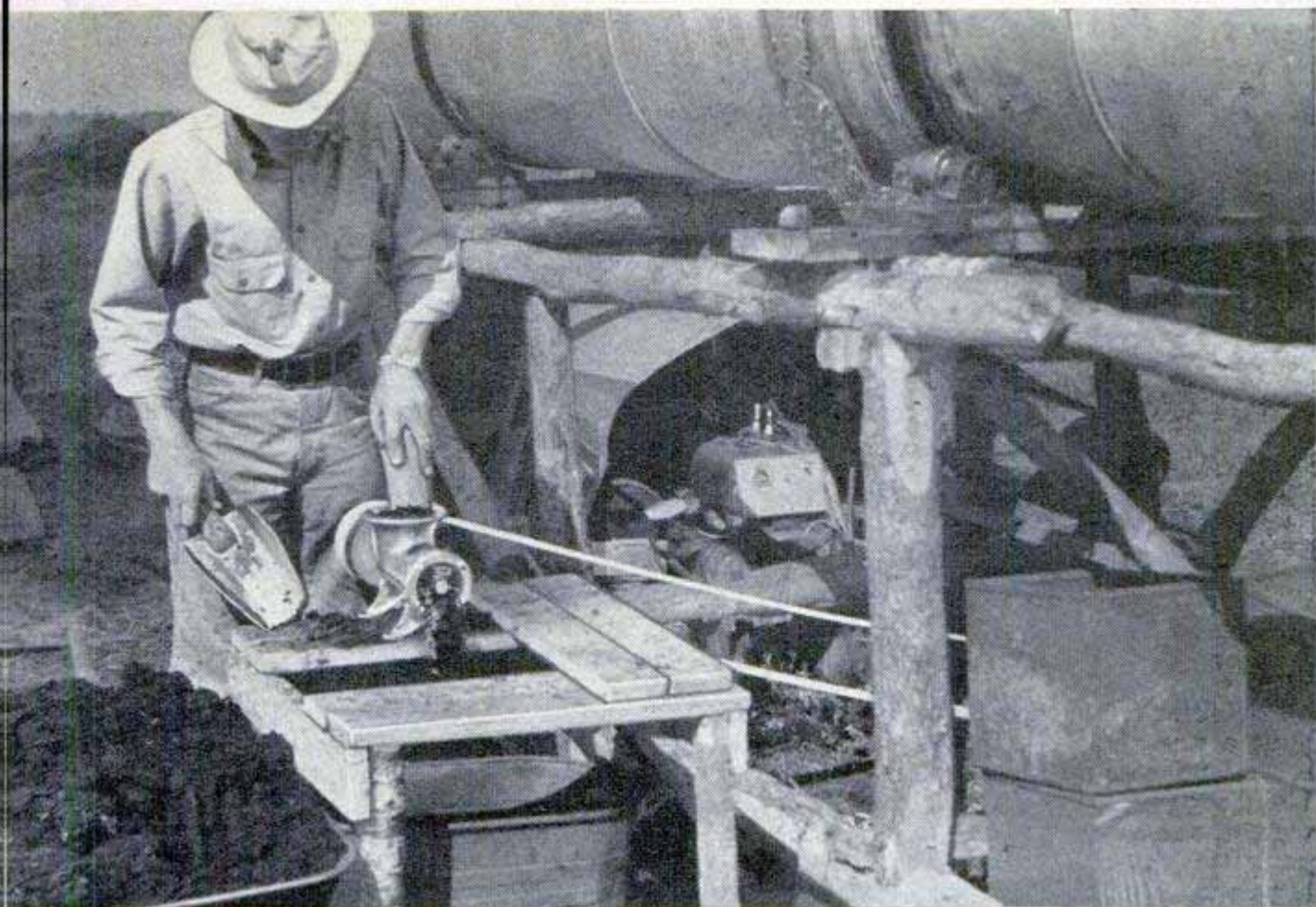
"I'm convinced, however," he says, "that fuel is not necessarily the best use for peat.



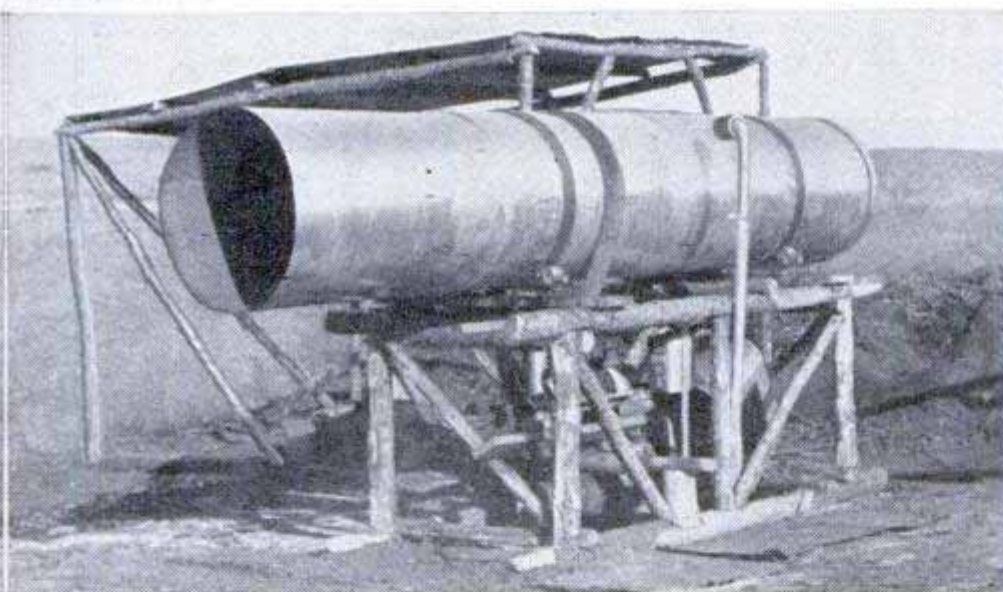
Top, Plummer holds clumps of peat. The one in his right hand is 10,000 years old. Above, the peat is dug by a power shovel

My experiments show that it can be used for waxes, diesel oil, fertilizer, sweeping compound and many other products. It has almost endless possibilities."

But even if used solely as fuel, the Minnesota bogs have a tremendous economic value. According to Plummer, the one bog he is working has enough peat to heat the homes of Chisholm and Buhl for 25 to 40 years. With thousands of acres of bogs, Minnesota expects to turn this wasteland into a valuable resource.



After it has drained, the peat is ground into a jellylike mass by this large meat grinder to break down the cells, releasing much of its high water content



This crude-looking machine, at left, rolls the jellylike mass of peat into pellets about one inch in diameter. The pellets drop from the end of the tube

After they leave the large revolving cylinder, the pellets are placed in the screen racks at right where they are dried by the action of the sun and air. In four or five days, pellets are dry enough to use as fuel





Army Signal Corps photos

Army Has Parachutist-Size Teletypewriter

Portable teletypewriter equipment so light a parachutist can jump with it has been developed by the Army Signal Corps. Weighing only 45 pounds, it is one fifth the weight, one fourth the size and operates 66 percent faster than existing types. It is waterproof and could be floated onto a beach in amphibious landings. Either wire or radio circuits can be used and the new equipment has 300 fewer parts than the old. Be-

cause of the reduced weight and bulk, it could be used much closer to the front lines than was possible during World War II, when teletyped messages could move only as far forward as division headquarters. Previous field equipment totaled more than 400 pounds and required either a vehicle or seven men to carry it. Two parachutists can jump with the new teletypewriter, its power unit and accessories.



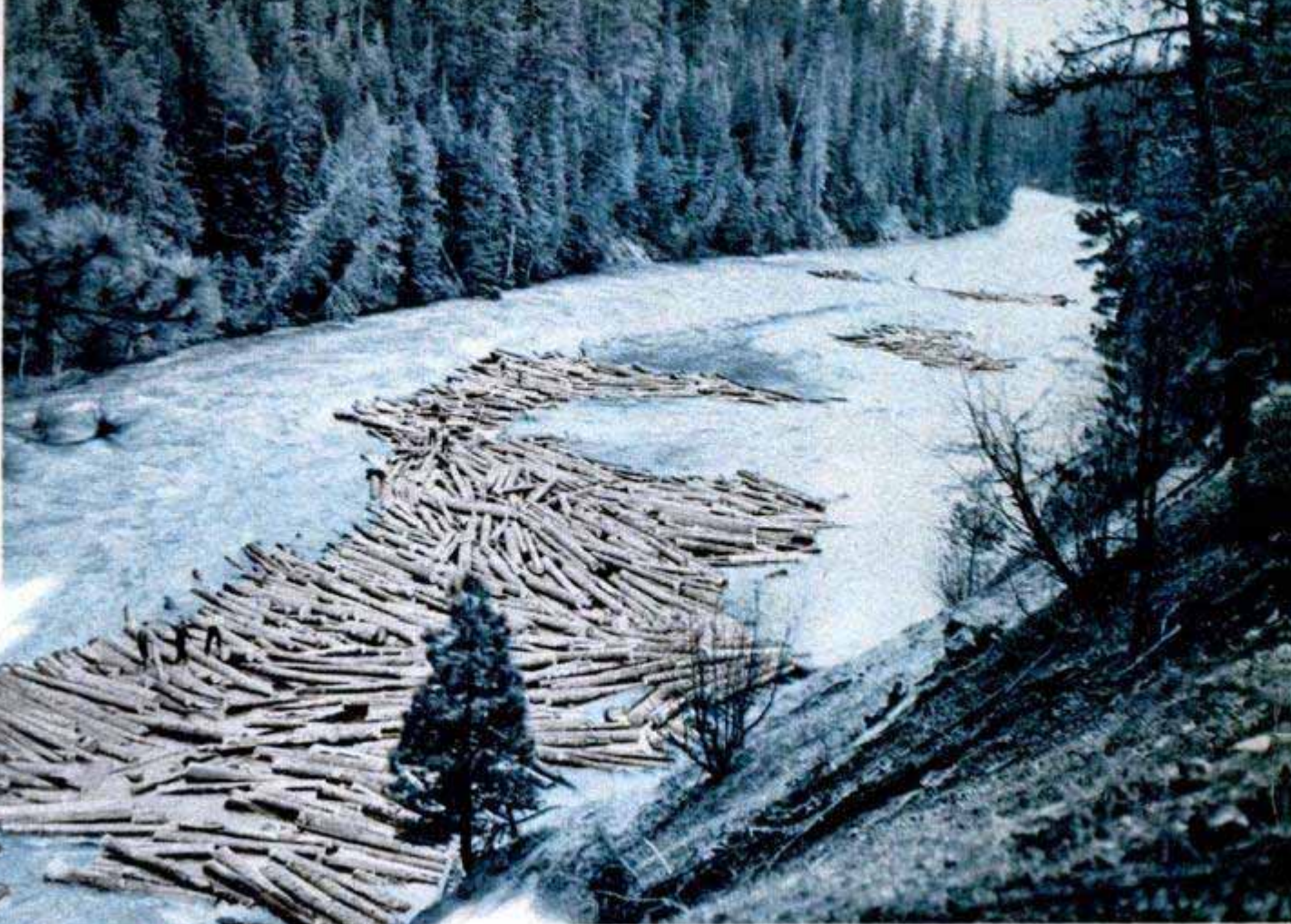
Players Get Practice Cuts At Baseball on "Golf Tee"

Made of rubber piping, an unusual "golf tee" helped San Francisco Seals' baseball players sharpen their batting eyes for this season. The ball is a stationary target at the top of a tee that can be adjusted for both height and horizontal location.

Glazing Stays Elastic

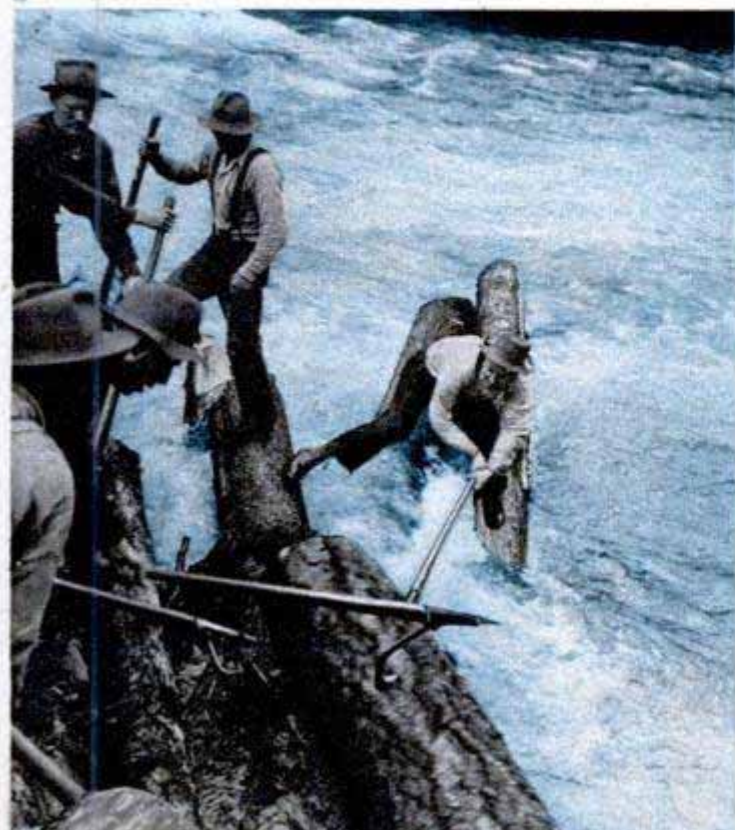
Neither time nor weather causes a new glazing compound to contract and harden like ordinary window putty. A special processing to retain natural oils prevents it from drying out in the container between widely spaced uses. The material remains elastic and can be used to patch cracks immediately before painting.

☐ First commercial use of the turbo-supercharger that enabled warplanes to fly higher and faster is in the new 75-passenger Boeing Stratocruiser.



Rough Riders of the River

That water is icy cold and one misstep means you're in up to your neck. Agile footwork is essential here



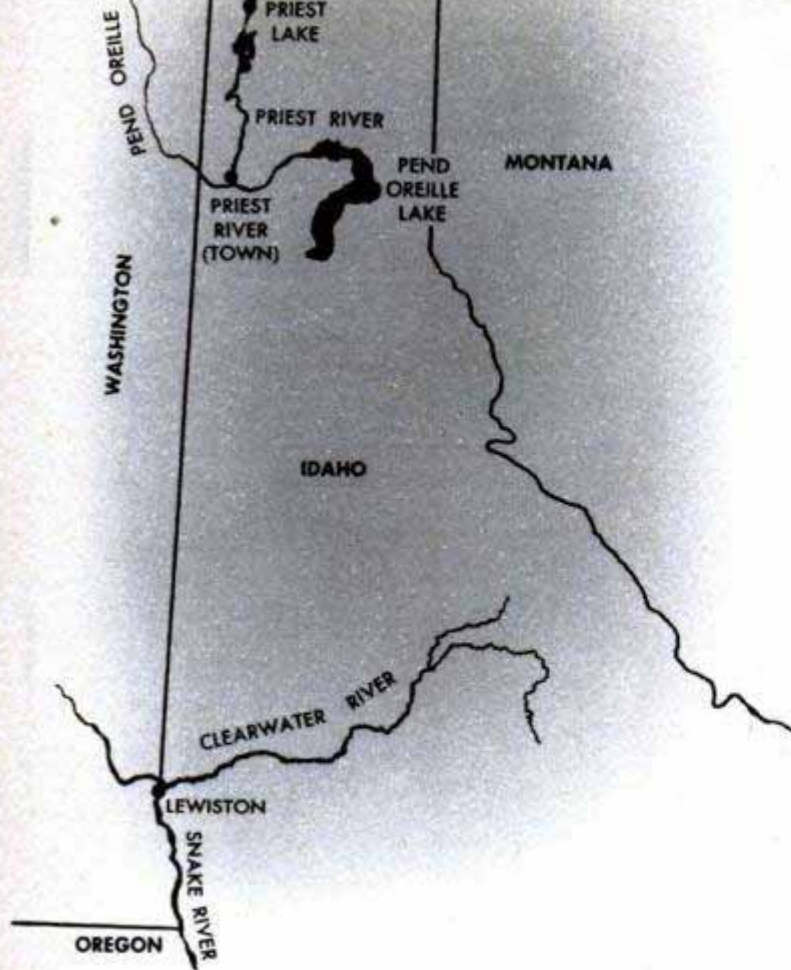
IT WAS a center jam—a potential man-killer. Huge 16-foot saw logs, weighing up to 2000 pounds, crunched against one another like shoestring potatoes in a crazy man's skillet. The wooden carpet that had been slithering, jostling and churning toward the sawmill stopped dead. Logs were jammed up for half a mile back.

The river boss was all over the place, trying to find the key log. When he spotted it, a dozen men set their peavey hooks into it and strained. No go. Then the river boss ordered a charge of dynamite. "Whoomp!" went the explosion and a white plume of water shot skyward. That did it.

"She's a-pullin'!" went up the cry.

As the grumbling logs began to move downstream like half-submerged alligators, the men scrambled to safety. One of them miscalculated and plunged into the icy water. A pal gave him a helping hand. Another, unable to reach dry land, dug his spiked boots into a slippery timber and birlled down-river.

That's a log drive—one of the most



Map shows the Priest and Clearwater Rivers away up in northern Idaho. Below, a lumber crew rolls logs into a wooden flume in which they will float down to the river. Some of these flumes are five miles long

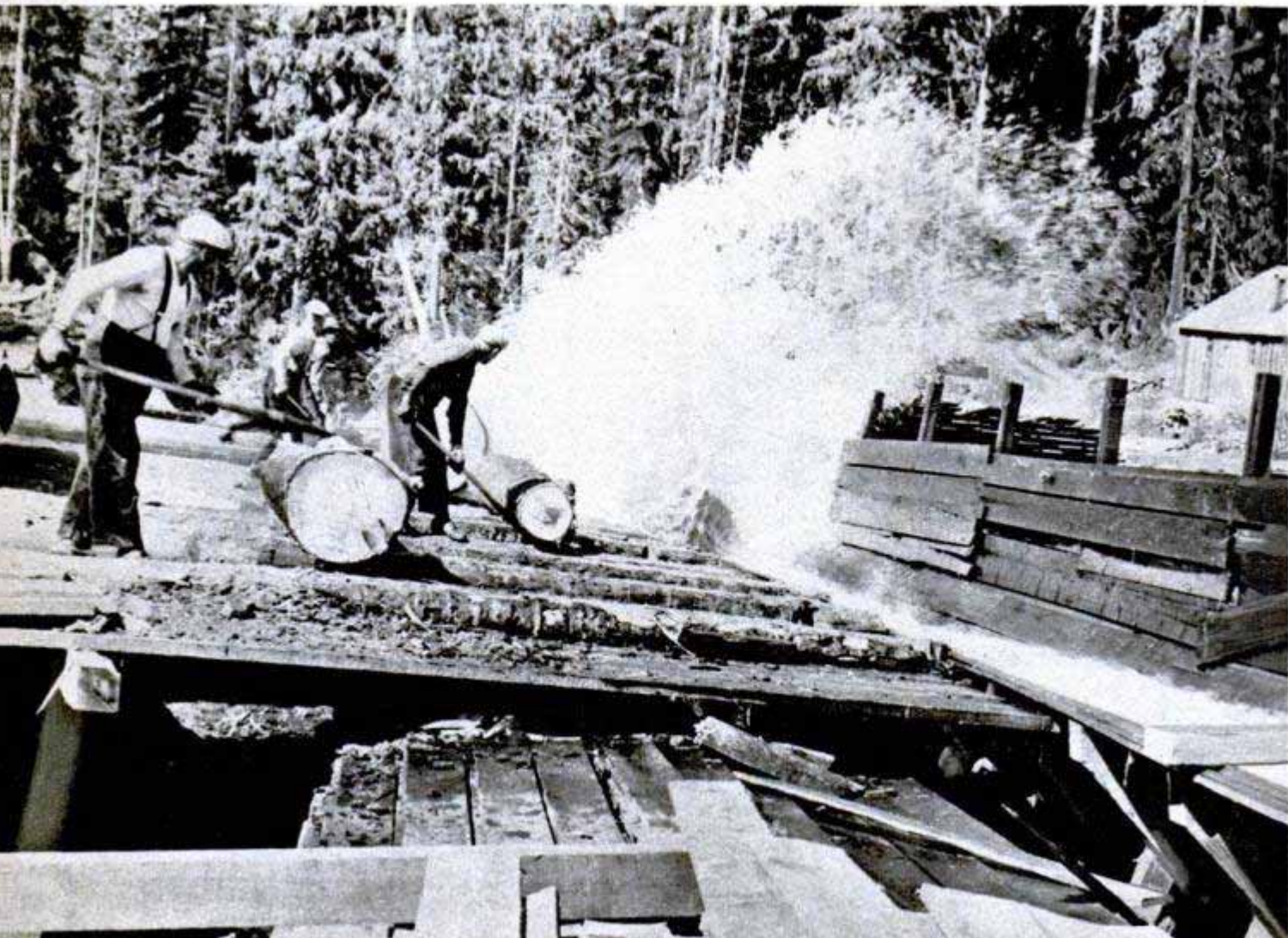
spectacular and action-packed features of America's annual timber harvest that reaches a total of 35 billion feet a year.

It's true that railroads and trucks have relegated most American and Canadian log drives to the history books. But this spring, two of the biggest drives in history are being conducted in the wilderness of Idaho's panhandle. Both will be at their height this month.

One drive is down the north fork of the Clearwater River and is bossed by "Boots" Edelblute for Potlatch Forests, Inc., who operate a 300,000-acre tree farm, one of the largest in America. This drive was temporarily abandoned during World War II, but is being resumed this spring on a larger scale than ever. Some 50 million feet of timber are herded down 120 miles of the Clearwater River from Beaver Creek to the sawmill at Lewiston.

The other is the Priest River drive, under the direction of veteran Bill Whetsler who runs logs for the Diamond Match Company. Since 1901 this drive has sent logs swirling down the 65-mile stretch of white water between Priest Lake and the Pend Oreille River.

Men who work the log drives are called "riverjacks" or "riverhogs." Like whooping cranes, sea otter and passenger pigeons, they are an extinct species in most parts of the United States. But today in rough and





There are 12 million board-feet of lumber piled up in this giant log jam at Big Riffle on Clearwater River

rugged northern Idaho you'll find them as numerous as ever.

What lures a man into this arduous, dangerous life?

It's certain not merely the wages. Riverjacks average about \$90 a week and board. It's something more than money. Perhaps it's that thrilling brush with death that airplane test pilots experience. Or the struggle with nature that a deep-sea diver knows. Maybe it's the challenge of physical skill required of a tightrope walker.

Whatever the lure, it's something that gets into a riverjack's blood and stays there for life. Men who leave the river for safer jobs in cities and on farms, often drift back. After the war, riverjacks who had been drafted promptly returned and asked for their old jobs.

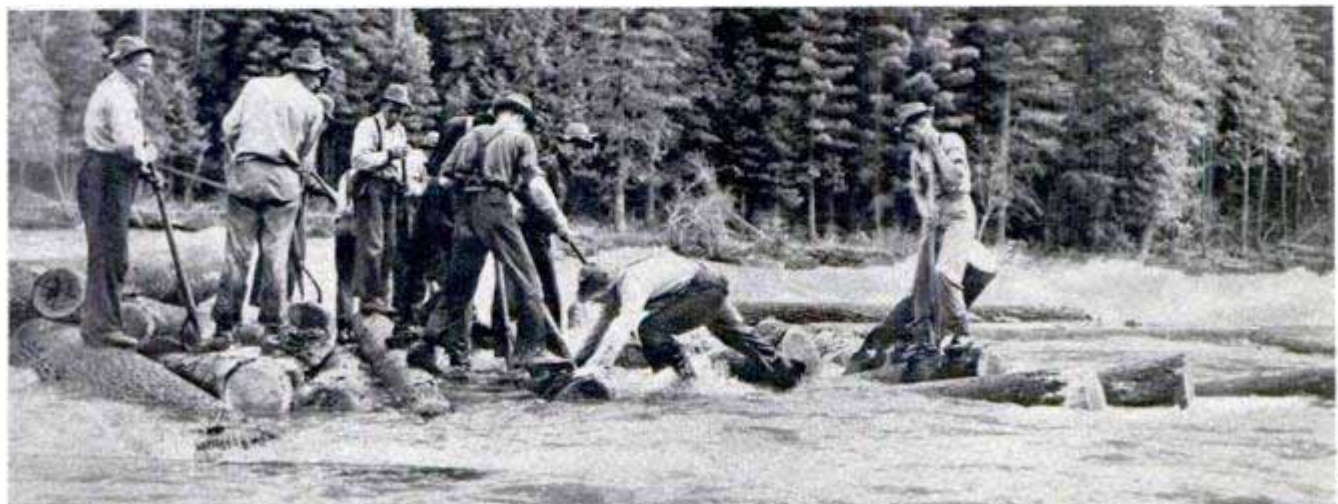
During the sawmill days of summer and the backbreaking task of winter logging,

lumberjacks may find their work a chore and a bore. But when spring comes and ice begins to break up on the river, they suddenly become the aristocrats of the lumbering industry—riverjacks. And for four months—March, April, May and June—the riverjack is king of the North Woods.

Because the 65-mile Priest River is flanked by a good highway, Bill Whetsler's Diamond Match crew drives out from the town of Priest River each morning in trucks, drives back again at night. That's luxury unheard of in the old days. On the other hand, the Potlatch riverjacks enjoy no such conveniences. They run a log drive like their forefathers 100 years ago.

During the summer and winter preceding the drive, logs are cut in the woods and flumed to Clearwater River. Some logs are floated as much as five miles in the flumes. Other logs are trucked to the river and

Riverjacks usually work in groups for protection. If one man falls in, the others help him out of the water





When the riverjacks can't break up the jam with their peavey hooks, a dynamite charge blasts the logs loose. Below, two of the crew are in the icy water as they start the logs moving on the down-river end of the jam





Downstream where the riverbanks are not steep, a bulldozer is used to break up the log jams near the shore

dumped in. The logs float downstream until they hit an obstruction forming a jam.

Then when spring comes, the Potlatch crew goes to work — freeing logs which have lodged on the riverbanks and in jams at the center.

Working with pike, peavey, brawn and sure-footed skill, the riverjacks follow the tree trunks downstream like cowboys driving a herd of cattle over the old Chisholm Trail. Most logs float downstream without any trouble; it's a small 10 to 15 percent that makes riverjacks necessary. Logs get stuck in the mud or entangled in low-hanging branches, jam on submerged rocks, against islands or in the elbows of curves.

Annoying pile-ups that latch on one bank or another are wing jams. Logs jammed against a sand bar in the middle of a river are center jams. They're the trickiest and most dangerous.

Center jams are unraveled from the down-river end of the pile-up. There are two very good reasons for this

point of attack: (1) The key log, the one that holds up all the others, is probably at the lower end of the jam and when it is freed the others can move. (2) Should a riverjack lose his footing and fall into the water, he can be rescued at the down-river end.

One of the biggest jams on the Clearwater occurs each year at Big Riffle, about

When a man falls into the deep water, this boat comes to his rescue





Steering the clumsy wannigan in swift water is hard work. It takes three men to handle the 50-foot rudder

halfway down, where the river narrows between rocky banks. A solid phalanx of from 12 to 15 million feet of timber blocks the river at this spot until rising water frees it.

When working on jams, riverjacks always have nearby a bateau—a double-prow, flat-bottom boat 32 feet long, 6 feet wide, manned by two men with oars and two others with long poles. When a man goes overboard, the bateau can be quickly maneuvered into position so that he can be pulled out.

Much of the time, riverjacks work in ankle-deep icy water and frequently up to their chests in water. A man who plunges in up to his neck is said to have "washed his clothes"; if he goes in over his head, he's said to have "closed the door." But no matter how wet they get in the icy

water, riverjacks keep on working. Woolen clothes and exercise keep them fairly warm if not dry.

Principal tools of a riverjack are his pike pole and peavey. The pike is an eight-foot staff with a hickory handle and a steel point at the end. It's used mainly for pushing and guiding logs. The peavey is a five-foot tool with a hook at the end—used principally for turning logs over. These two tools, plus the old reliable, dynamite, have a long history among American loggers.

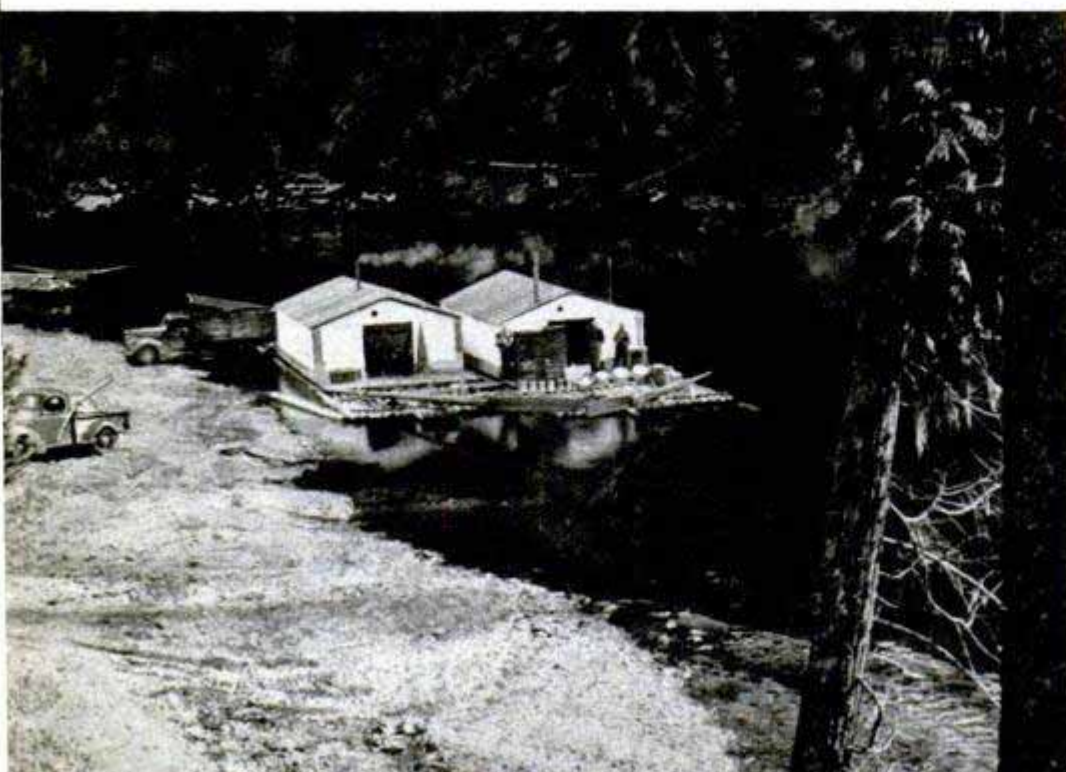
No riverjack would get near a log without a pair of well-calked boots. He calks his own—as often as once a week, depending upon how soon the needle-sharp points are dulled by granite rocks. A slippery shod pair of feet is an invitation to disaster. Worn-out calks are removed promptly with chisel and hammer. This leaves gap-

ing holes in the outer sole of the boot. These holes are filled with square pegs of white pine and new calks driven into the wood. As the wood gets wet, it swells, the calks becoming a solid and inseparable part of the boot. Some riverjacks prefer to use small pieces of overall cloth instead of wood.

When a riverjack finds himself on a single log rushing downstream, he's thankful for his calked boots. It's a highly skilled art to remain upright on a slippery log, 24 inches in diameter, as it bounces along in rough water.

(Continued to page 262)

At a sheltered spot along the river, the cookhouse and bunkhouse wannigans pull up to the shore to take on more food for the always-hungry riverjacks



Smoke-Control System

In less than 10 seconds an exhaust system can detect smoke inside a building, draw it into collection ducts and blow it out through the roof. The system, installed recently in the Sage-Allen department store in Hartford, Conn., prevents the chimney-like spread of smoke and fire gases through a burning building. It supplements a sprinkler system for fighting fires. Through six small inlets on each floor, samples of air are drawn continuously and joined into a composite sample in the basement. When there is even a slight amount of smoke present, an electric eye detects it, stops the store's electric stairways, rings an alarm and starts the exhaust system. The exhaust fan pulls smoke into the collection ducts and blows it from the building while cool, fresh air is drawn into the building through another duct.



Gasoline Explosion "Poses" for Camera

Making a gasoline-vapor explosion "pose" for its picture is one step toward preventing such explosions from taking place in aircraft electrical equipment. Engineers at Westinghouse make motion-picture records of carefully planned explosions inside a test cylinder. From these films, the engineers are learning new ways of controlling any explosion so that its force is smothered before damage is done. One method of control consists of covering ventilation openings of aircraft with an aluminum-foil mesh. The mesh dissipates heat and flame and allows expanding air to escape harmlessly.



Jet Transport Plane

Passengers soon may be zooming across the continent in jet-propelled airliners. The first commercial jet transport built in North America is expected to be test-flown this spring at the plant of A.V. Roe Canada, Ltd., in Toronto. Built to carry from 36 to 40 passengers, the plane is expected to cruise at more than 400 miles an hour at 30,000 feet. Four Rolls-Royce Derwent jet engines, paired in twin nacelles on the wing, will power the speedy transport. The air-



craft has a wingspan of 98 feet and a length of 82½ feet. It will have wing fuel tanks and a tricycle undercarriage.

WHAT'S NEW *For Your Home*



ADJUSTABLE HEIGHT is the back-saving feature of a new ironing board, available in either aluminum or wood. With it, you can sit or stand as you iron

RUBBER PADS, left, will prevent those wet and dirty boots and rubbers from soiling the floor. The ridges allow the water to drain off and to dry very quickly

CHILD-LEVEL TRAY, below left, clamps on the dining table, lowering the child's food so that he can use an adult's chair without any extra padding

PLASTIC "PAPER," below, is stainproof and has a variety of uses from wallpaper to closet liners. Made of synthetic resins, it's coated with Vinylite





ELECTRIC DEODORIZER plugs into any outlet. It uses tablets which release scented fragrance in the room

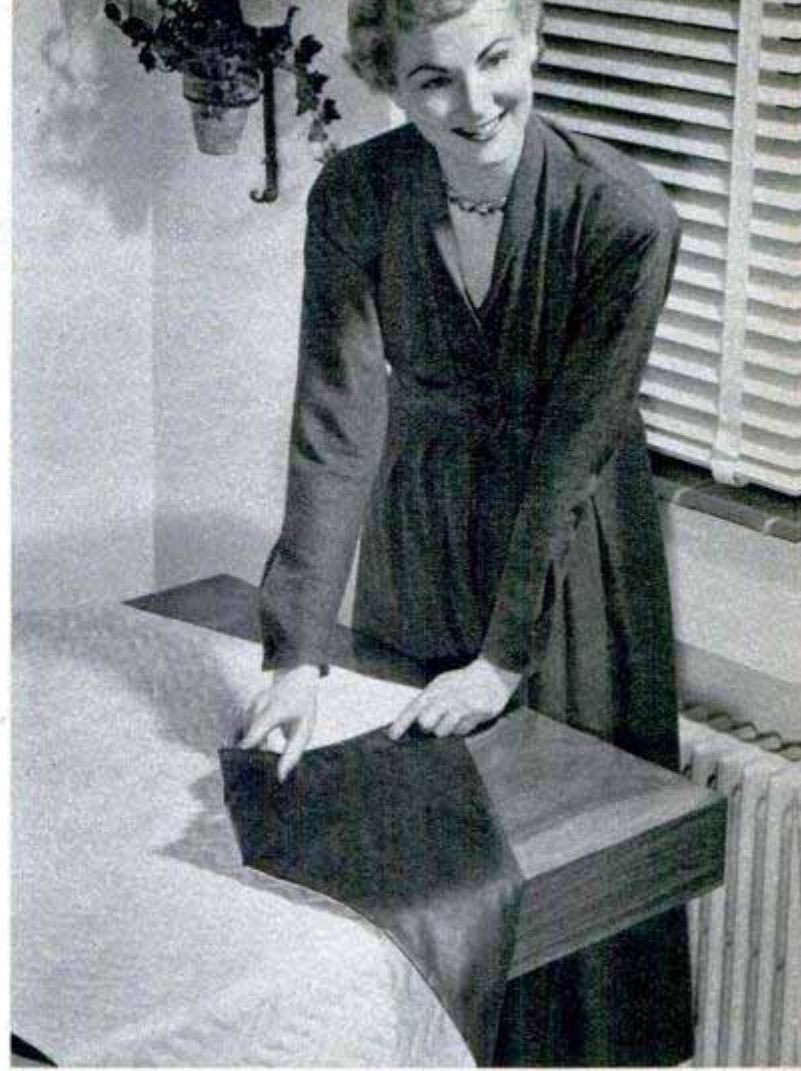
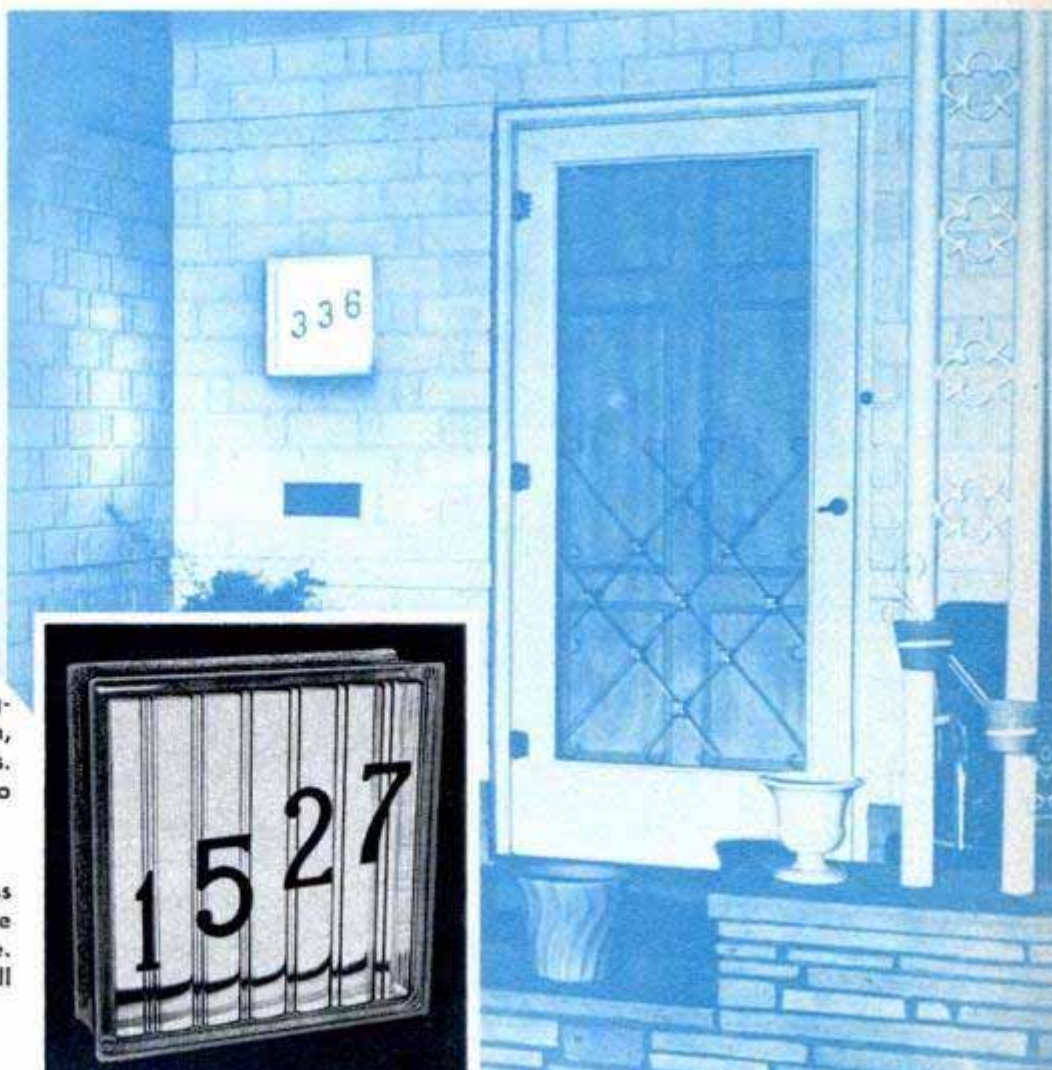


TABLE PAD made of glass fabric protects your dining table from heat and liquids. It's quilted on top



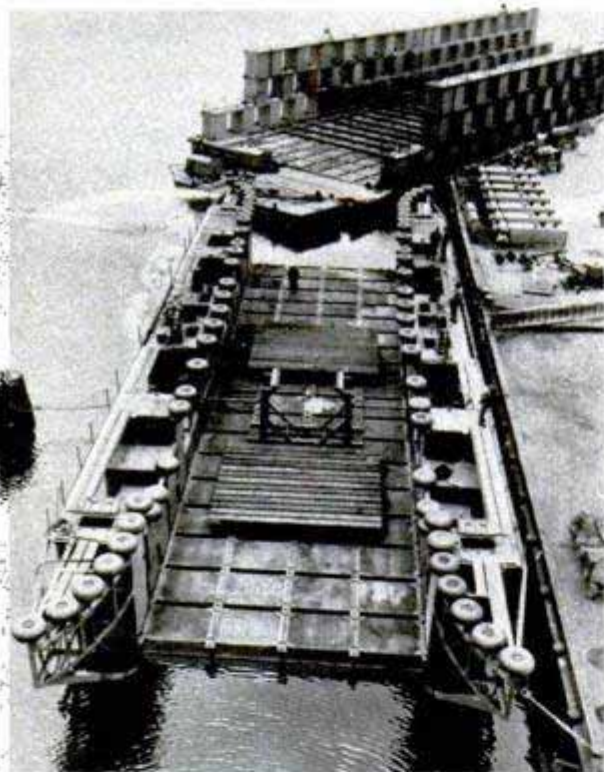
GIANT MAILBOX holds large magazines without folding. Aluminum, it won't rust, comes in four colors. It has a clip for outgoing mail, too

HOUSE NUMBERS mounted on glass block show up clearly in silhouette when lights are on inside the house. The glass block is set into the wall





Water jets on each side of the entrance "steer" a flying boat into the submerged dry dock for hull repairs



Flying-Boat Dry Dock

Huge flying boats of the U. S. Navy are dry-docked for hull repairs in a few minutes by means of an advance-base dry dock patterned after those used for ship repairs. Constructed of pontoons, the dock has a pumping system that empties the water from the many chambers to float the dock. Inside edges of the dock are lined with partially inflated aircraft tires to prevent damage to the aircraft. Three water jets on each side of the entrance maneuver the plane into position by shooting streams of water against the hull.

Left, the dry dock in the raised position. The tires along the sides serve as bumpers. Below, with tanks pumped dry, the dry dock lifts the plane out of the water for repairs

U. S. Navy photos





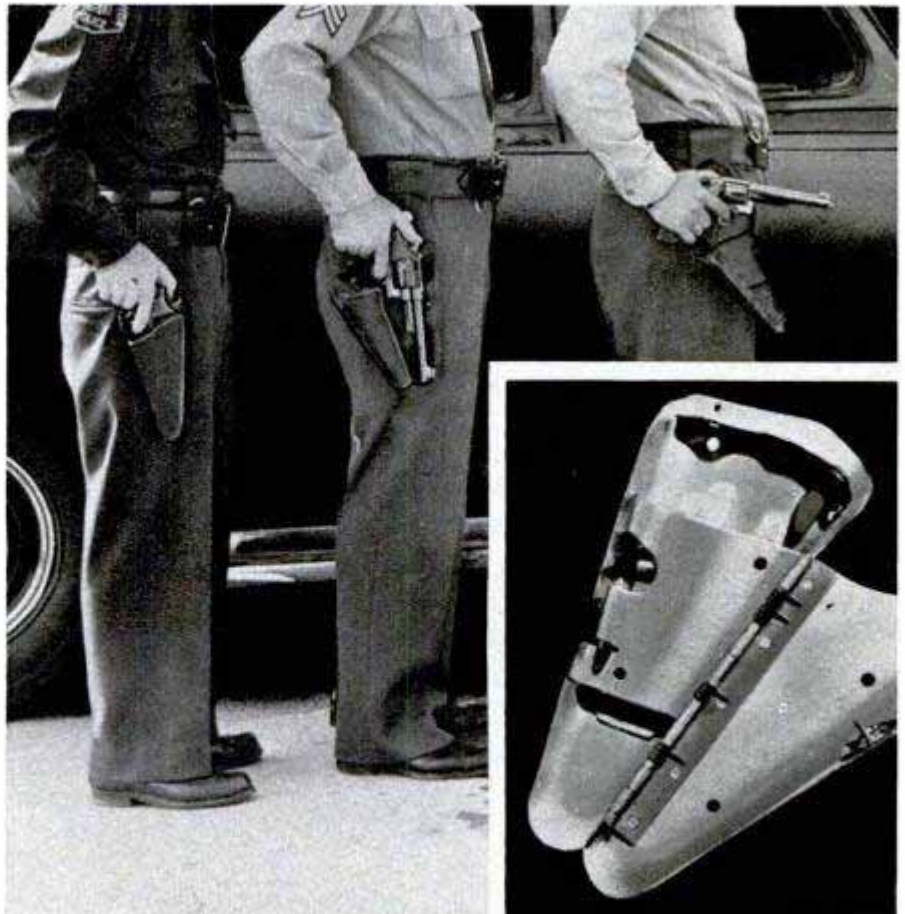
Car-Top Tent Springs Into Place

Carried atop the family auto, a combination tent and folding bed has solved the problem of overnight accommodations for Master Sergeant Charles C. Altomare of the Marine Corps. Altomare teamed with Earl Gurley of Springfield, Mass., to invent the car-top room. It consists of a plywood box 6 feet by 4 feet by 10 inches

which holds an air or cotton mattress. When released, a tent springs up over the box, complete with plastic screens on all four sides for ventilation. The windows also are provided with canvas covers. A light on an extension cord can be plugged into the cigarette-lighter outlet. The box is held on top of the auto with suction cups and safety straps. Altomare's car-top tent has proved so popular that he now is manufacturing it.

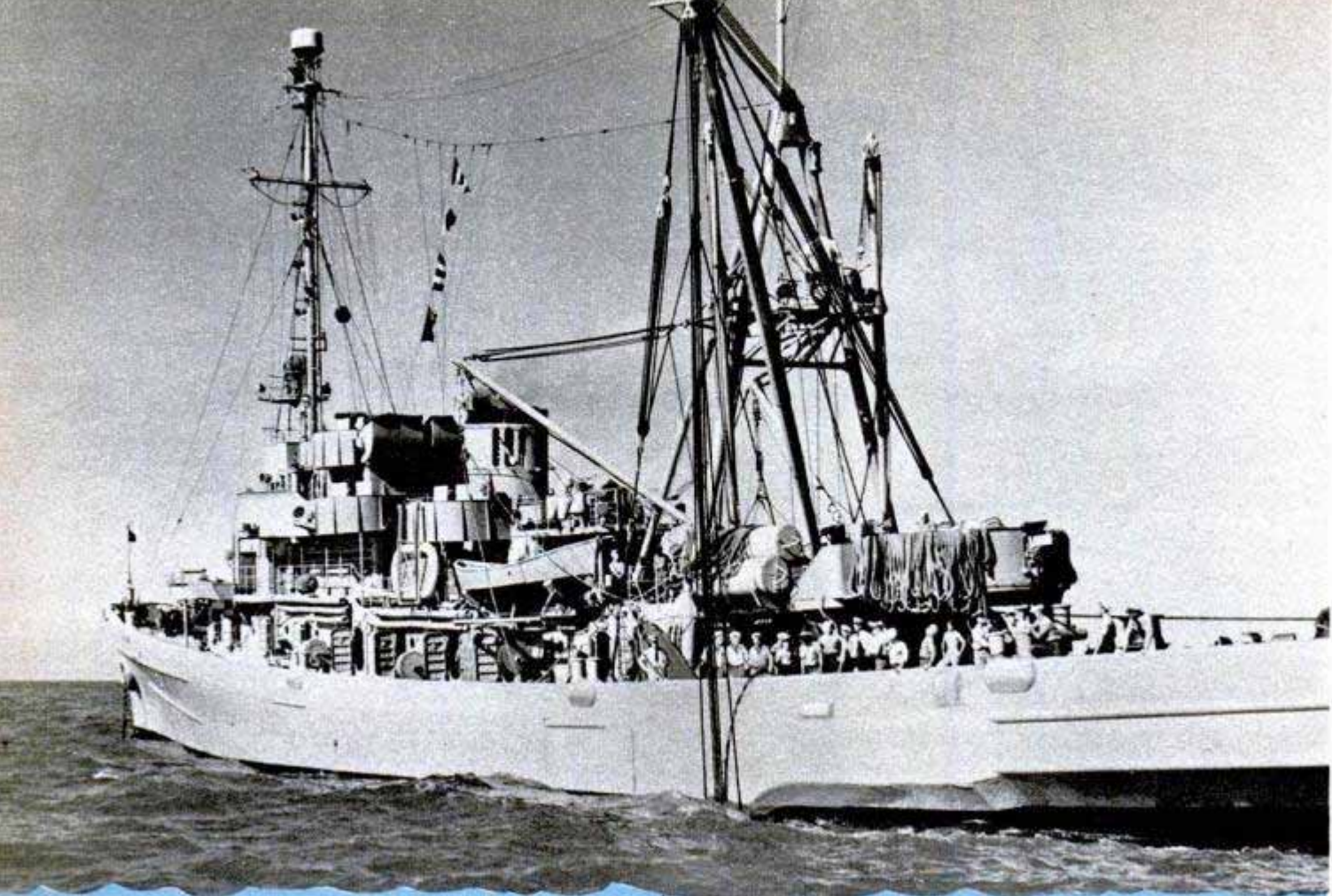
Snap-Open Holster

Police officers may save a split second in drawing their guns with a new holster that snaps open when a release is touched. Most police guns are cross-drawn from the opposite hip. The new holster hangs from a swiveled tab on the policeman's "shooting side" and opens with a snap, ready for use, as soon as the trigger finger touches the release. Thus, the officer need not draw his weapon—he merely grips it and fires. The holster also prevents the gun from being fired in the case. Developed by two patrolmen of Compton, Calif., it is made of aluminum and covered with leather.



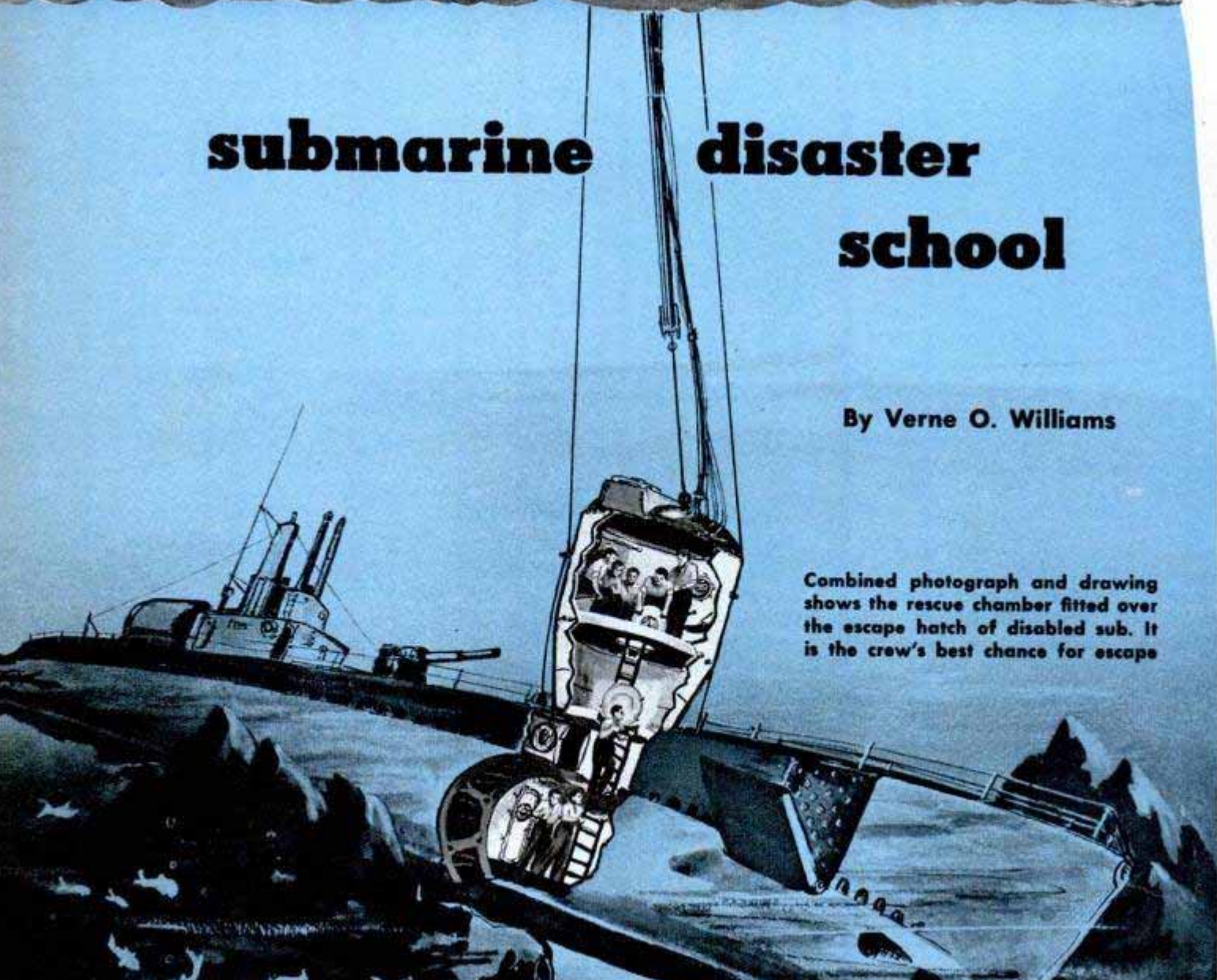
Man's deepest penetration of the earth has been to nearly 9000 feet in gold mines of South Africa.

Three officers demonstrate how revolver snaps from holster, ready for firing. Inset shows the metal case that opens with a touch of the finger



submarine disaster school

By Verne O. Williams



Combined photograph and drawing shows the rescue chamber fitted over the escape hatch of disabled sub. It is the crew's best chance for escape

MINIMIZING the dangers faced by the men who go down under the sea in the slender subs that deliver the Navy's underwater punch is continuously a high-priority project with the top brass.

The subs of today have underwater escape locks and their crews are trained to ascend a buoy line to the surface by the use of their Momsen lungs. But this is a last resort and it is extremely hazardous.

Standing guard over the fleet's submarines as they maneuver in training operations and practice Schnorkel runs, dives and torpedo firing are the Navy's ASRs, or submarine rescue vessels.

In the event of a submarine disaster, the fate of the survivors will almost surely depend upon the outcome of a desperate race between the rescue ship and the diminishing air supply of the sunken sub.

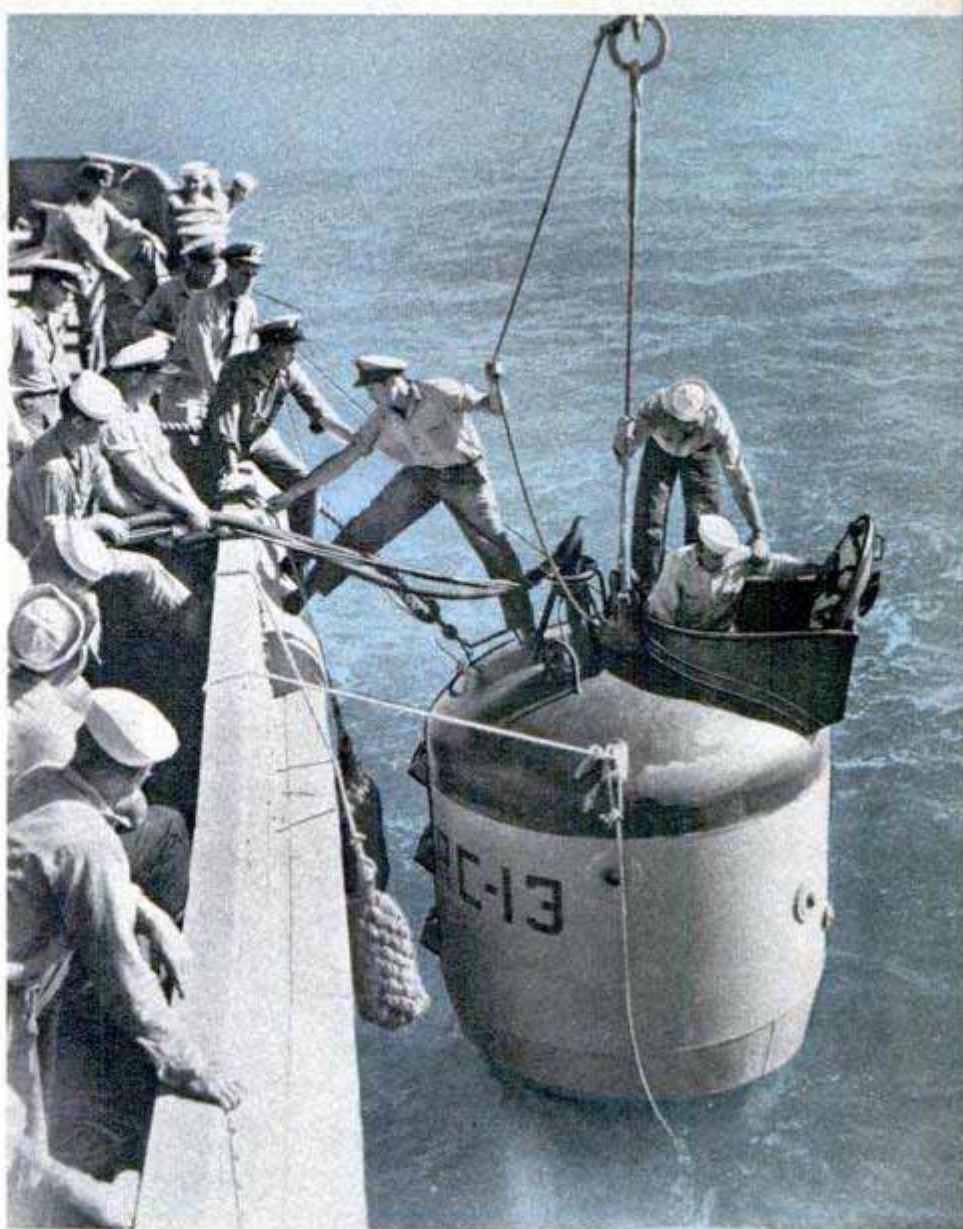
The USS Chanticleer, a typical rescue vessel, has been stationed at the Key West naval base with Subron Four, Navy jargon for Submarine Squadron Four. First of the type built specifically for the job in 1942, she carries the most modern equipment devised for saving subs.

Safety is the watchword of naval training, explains Capt. Alan B. Banister, USN, commanding Subron Four. So far all the Chanticleer's rescues since the war have been practice ones. Her record time for the training operation of search, moor, personnel rescue and raising the "disabled" sub is 6 hours and 35 minutes.

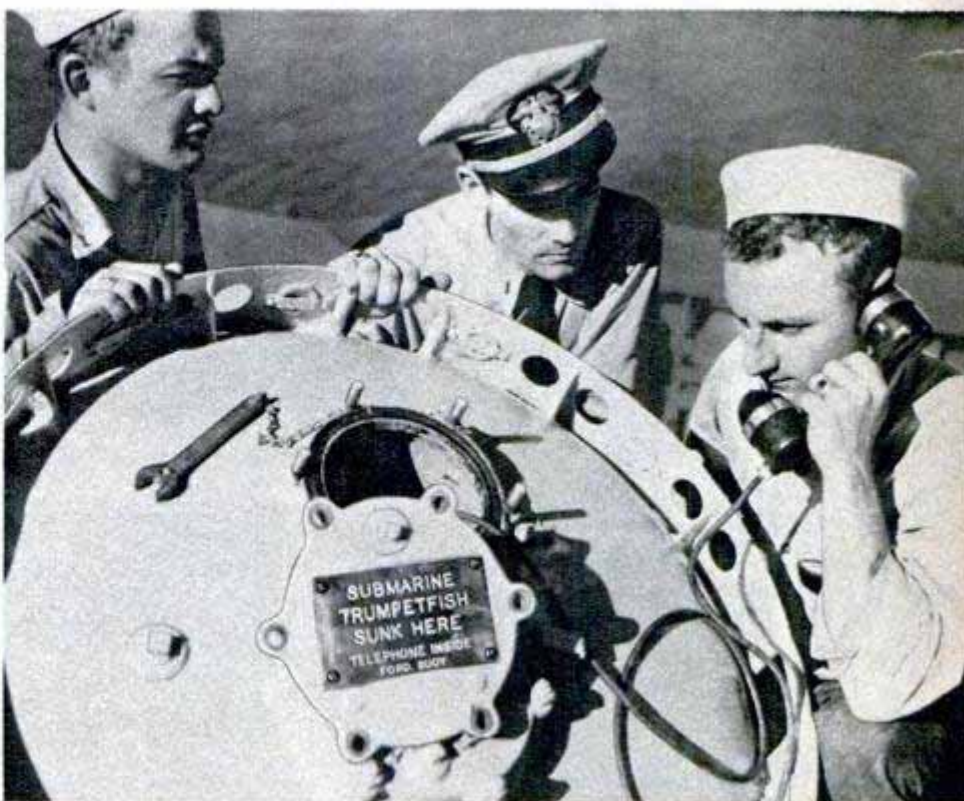
The Navy code word for the schedule of action to be followed when a sub actually is reported missing or disabled on the bottom is "Event 1000."

To understand how the Chanticleer does her rescue job, let's suppose one of Subron Four's submarines fails to radio a report on a practice dive at the scheduled time.

Event 1000 goes into effect and a hubbub of activity begins. By means of shore patrols, telephone calls, announcements over radio and in theaters, personnel are recalled. Sea and air units start to search the diving area.



Crew members of the Chanticleer climb into the rescue chamber for a quick trip to the disabled sub. Below, marker buoys sent up by the sub carry a phone for immediate contact with rescuers



The crew of the Chanticleer, always under a one-hour sailing alert, swiftly rigs the long coils of wire cable that festoon the ship's sides like spaghetti when the ship is going out on a "moor."

Subron Four's high brass hurries aboard and the Chanticleer puts out from the dock as her crew continues rigging the thousands of feet of buoy cables for quick, smooth release over the spot where the sub is found.

In the meantime, what happened aboard the sub?

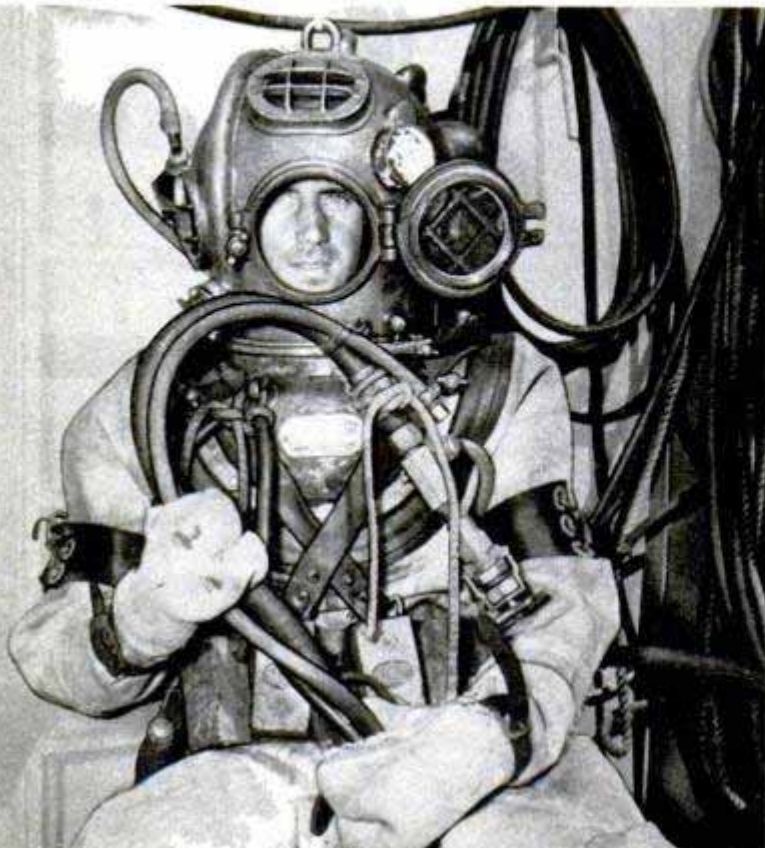
After notifying the base by radio that he was about to submerge on an hour-long dive, the commander of the submarine took her down to 50 feet.

As the craft was straightening out horizontally at that depth, he was notified that water was pouring into the after part of the ship. Instantly, he orders the blowing of ballast tanks. For a moment the sub hesitates, then begins to sink by the stern, coming to rest on the sea bottom 200 feet down.

The cause of the disaster might have been the failure of the main surface air-intake valve to close during the dive, as actually happened to the Squalus in 1939. The entire submarine, in that case, would have been flooded if a quick-acting crewman in the control room had not closed a watertight bulkhead door, saving the lives of the men forward.

A check of conditions proves the sub can't raise herself. As a last resort her crew can use the escape lock and their Momsen lungs, but that is extremely hazardous at this depth. Now the crew must help the rescuers locate the sunken sub.

Diver's job is to attach the downhaul cable of the rescue chamber to escape hatch of helpless submarine



The two marker buoys fore and aft are released and shoot to the surface. The crew also can release bubbles, oil, sea dyes, and at regular intervals send up flares and smoke bombs which explode on reaching the surface.

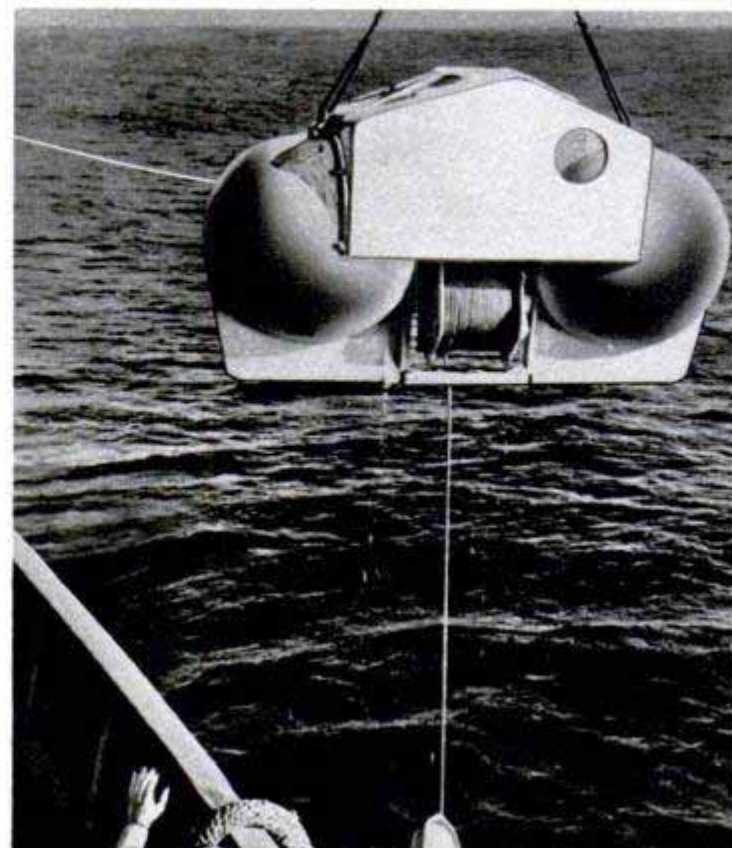
Search planes sight these and radio the Chanticleer. Arriving at the spot, the Chanticleer establishes sonar communication with the sub while one of her two motor whaleboats goes to pick up one of the sub's marker buoys and establish telephone contact through the circuit carried by its cable. Meantime, the other whaleboat grapples for the sub to provide a descending line for the divers.

In the Chanticleer's wheelhouse her skipper, Lt. Harry J. Messick, and his executive officer, Lt. William E. Cook, plot the depth of water, current and position of the sub on the bottom preparatory to planting a six-point moor to hold the rescue ship in position for diving.

Each of the six mooring anchors held ready to drop is connected by one of the long cables festooning the Chanticleer's sides to its own buoy in a release rack on the fantail. To plant the moor, the Chanticleer swings in on a bearing and range plot on the submarine, laying down three of the anchored buoys 60 degrees apart.

With a neat figure-eight maneuver she turns and puts down the other three buoys. Then she enters the moor and her whaleboats quickly run out lines to the six anchored buoys which are adjusted to center the Chanticleer over the submarine like a spider in a web.

New buoy developed for subs carries a cable to surface, eliminating need for dangerous deep-sea diving



Now the divers take over. In her crew complement the Chanticleer has 20 deep-water Navy divers. Just a few months ago a new U. S. diving record was established when one of them, G. W. McCullough, together with W. G. Singleton of the Navy's experimental diving unit, went to 485 feet in the Gulf Stream.

As the diver in his ungainly 200-pound suit enters the water on the stage, he gives himself a shot of air so he can "square himself around" in the suit. He tests his telephone and air supply—actually he's probably diving on "gas," the oxygen-helium mixture used for deep work.

The reason divers use gas is that the nitrogen in compressed air has a narcotic effect under deep-water pressure and can knock a diver out, as will straight oxygen. Thus, to attain depths over 200 feet, a regulated mixture of oxygen and helium, which research has proved nontoxic, is used instead.

The diver slides down the descending line with one hand. The other must be on the air valve to increase the suit pressure, offsetting that of the sea at succeeding depths. A 10-foot differential, such as an underwater fall from the conning tower of the sub to its deck would mean a nasty "squeeze" by the suit.

The rescue diver's first job is to attach the downhaul cable of the Chanticleer's rescue chamber to the escape hatch over the sub's forward torpedo room.

Landing on the deck of the sub with visibility limited to 20 feet, the diver finds a nearby fitting and counts its "buttons. From their number, the diving master topside, checking a blueprint of the sub, can tell him where he is.

Thus informed, the diver starts forward, possibly forced to crawl on his hands and knees to buck the strong currents prevailing in the depths. He exercises extreme care not to foul his lines by going around the hole. Other divers, fully dressed, are standing by, topside, in case he gets into trouble.

Finding the escape hatch, the diver secures the downhaul cable. For safety the

(Continued to page 260)

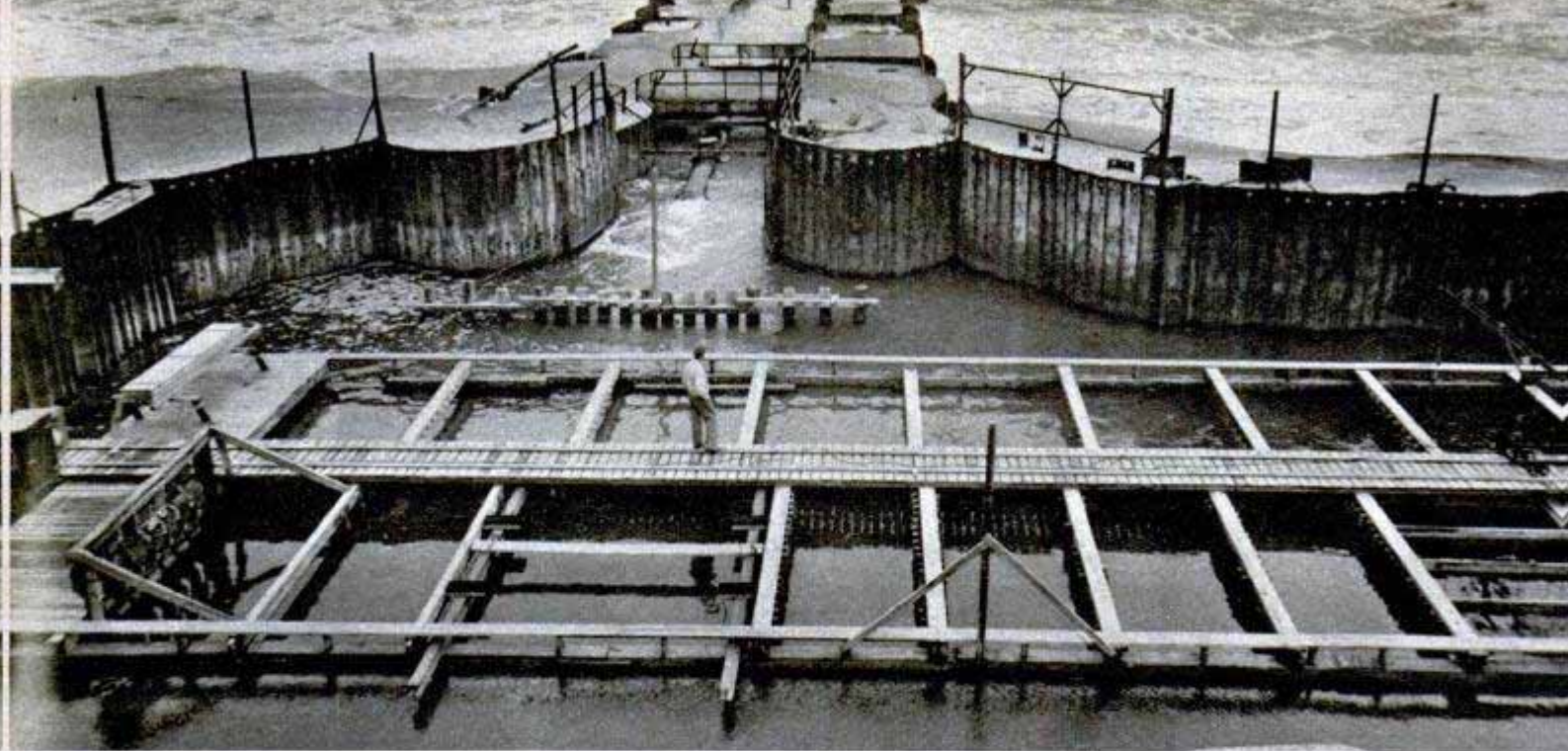


Diver stands on stage ready to be lowered to sub's deck for first physical contact with the disabled craft. Below, when wreckage holds up rescue work, divers cut it away with hydrogen underwater torches
U. S. Navy photo

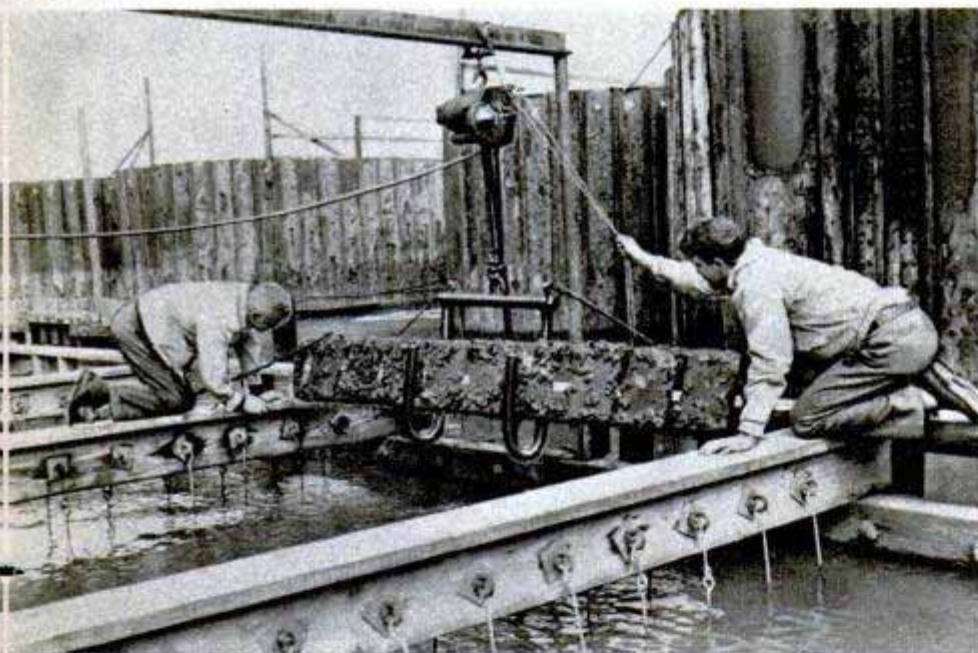


Fleet-type sub recently was converted into a transport. Watertight tank carries landing equipment
U. S. Navy photo



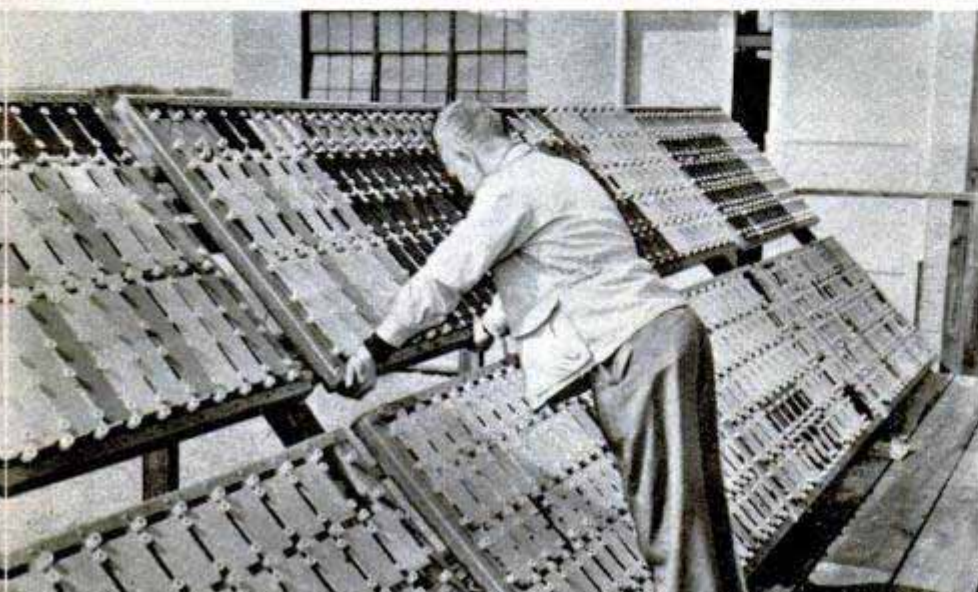


Marine testing basin along the ocean at Kure Beach, N. C., has metal racks for testing various alloys; intake is at the top



Technicians make periodic examinations of specimens—most of them are of metals to be made into underwater parts for ships. Below, examining alloy specimens tested with natural salt spray

International Nickel Co. photos

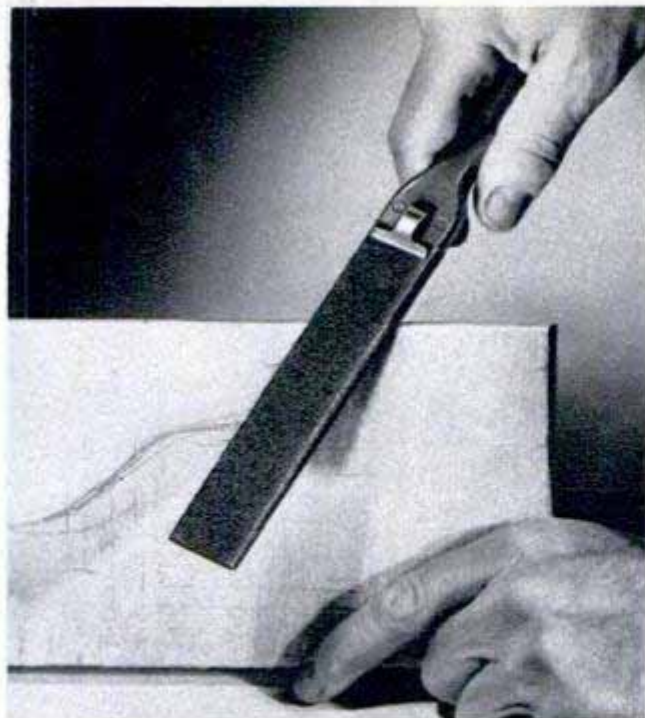


Putting The Ocean to Work To Help Save Metals

THE COMMON ENEMY of metals—corrosion—is fighting a losing battle against modern science and, as a result, thousands of dollars are being saved annually by American industries.

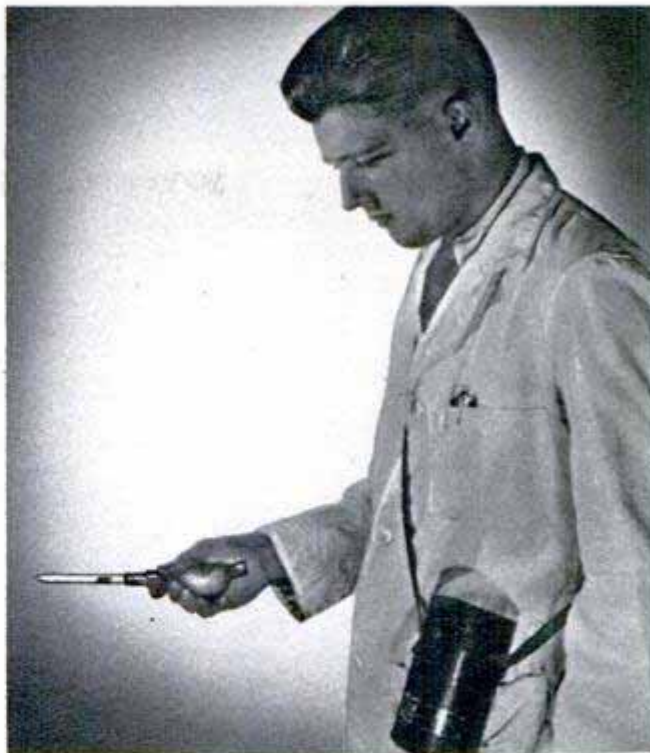
Since 1935 the International Nickel Company has been conducting extensive corrosion tests at its sea-water testing station at Kure Beach, N. C. These tests include comparing the corrosion resistance of low-alloy steels with carbon steel, comparative tests on all kinds of ferrous and nonferrous metals and alloys, observing the behavior of various types of metallic and organic protective coatings and the effects of marine growth on wood and metals.

Specimens to be tested are fastened to racks constructed of Monel, or an alloy which contains 70 percent copper and 30 percent nickel. Periods of exposure vary from six months to several years and the number of specimens exposed varies from about 1000 to 2000. Testing the erosive effects on metals for condenser tubes, pump impellers, propellers and underwater parts of ships is done by fastening the specimens on a disk which whirls through the water at velocities up to 30 feet per second.



Finishing Tool Holds Strip Abrasive

Standard one-inch abrasive strips can be clamped in a file-shaped tool for sanding wood, polishing metal, removing sharp edges from machined parts and sharpening other tools. A threaded knob on the handle of the tool permits the clamps to be released so a worn strip of abrasive can be replaced with a new one. A one-inch strip cut from a standard sheet of abrasive or sandpaper also will fit the tool.



Carbon-Monoxide Detector

About the size of a pencil, a sensitive detector indicates the presence of less than one part of carbon monoxide in 500 million parts of air. Developed by the National Bureau of Standards during the war, the detector now is available for use in airplanes, busses, automobile repair shops, refineries, mines and homes. It consists of a rubber bulb and a small glass tube sealed at both ends. When carbon monoxide is suspected, the tips of the tube are broken off and one end is inserted in the bulb. Squeezing the bulb draws a sample of air through the chemicals in the tube. If the gas is present, the yellow chemicals turn green within 30 seconds; the darker the shade of green the higher the concentration of gas. A color chart indicates the amount of carbon monoxide.



Electric Heater Keeps Piano Dry

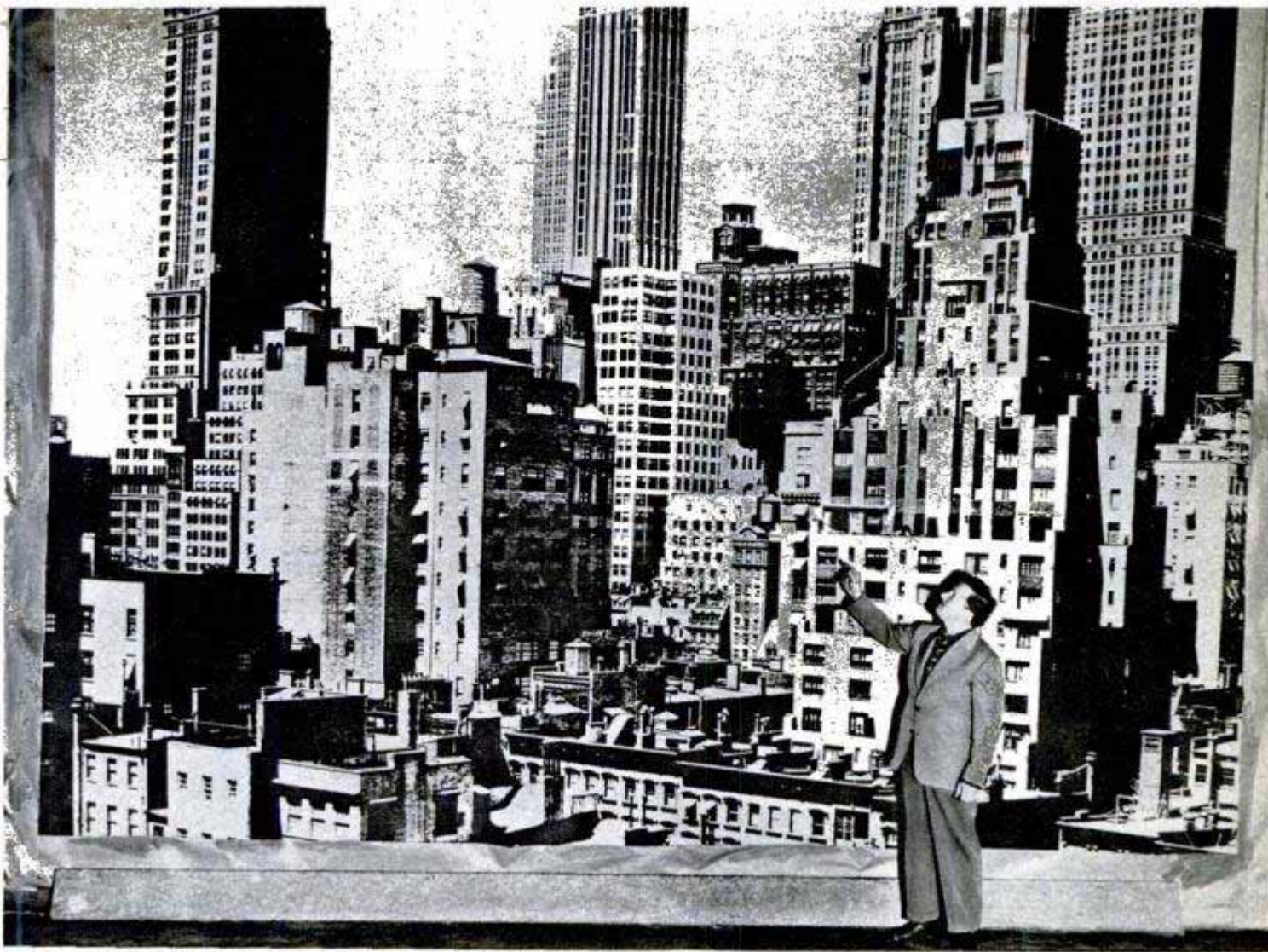
Dampness is kept out of pianos, closets and sensitive electronic instruments by an aluminum tube containing an electric heating element. The tubes come in various lengths and can be operated from any household outlet. By maintaining a constant heat inside the instrument or closet, the unit prevents dampness and mold from damaging the contents. The low heat will not char or burn.



Manhattan sky-line mural, shown on opposite page, here is used as a background to be seen through a window. The camera, out of range at left, picks up actors in the foreground against the realistic sky line

Paul, who makes the murals, sits in front of a 9 by 12-foot photo of a hallway and seems to be sitting in the hall itself. His technique for making huge backdrops is widely used in producing motion pictures





Sky-line mural is black and white when lighted from the front, appears in natural colors when lights are behind it

Mural Magic

Mural maker uses dodging panels to hold back or "burn in" image portions while he is making huge enlargement

A GIANT PHOTOGRAPH of a portion of the midtown Manhattan sky line is used as a backdrop by Hollywood motion-picture studios. Measuring 15 by 20 feet, it is said to be the largest single photo ever made. The huge enlargement was made from a 4 by 5-inch negative by means of a new technique developed by M. B. Paul, motion-picture cameraman.

When viewed by ordinary reflected light, the photograph appears to be a standard picture in black and white. When light is transmitted through the translucent material from behind, the photograph acquires the colors that are natural to the scene, making the picture adaptable for either color





Paul compares a 12 by 20-foot photo with an 8 by 10-inch print of the same scene. Below, oil paints are sprayed on rear of a photo to make it appear in natural colors

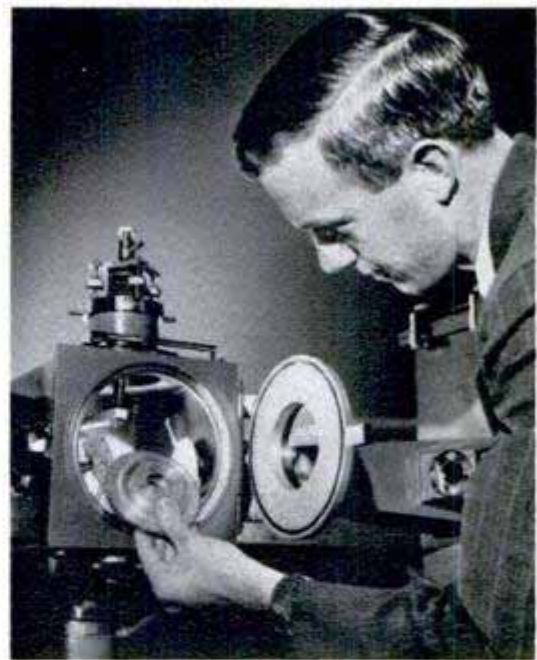
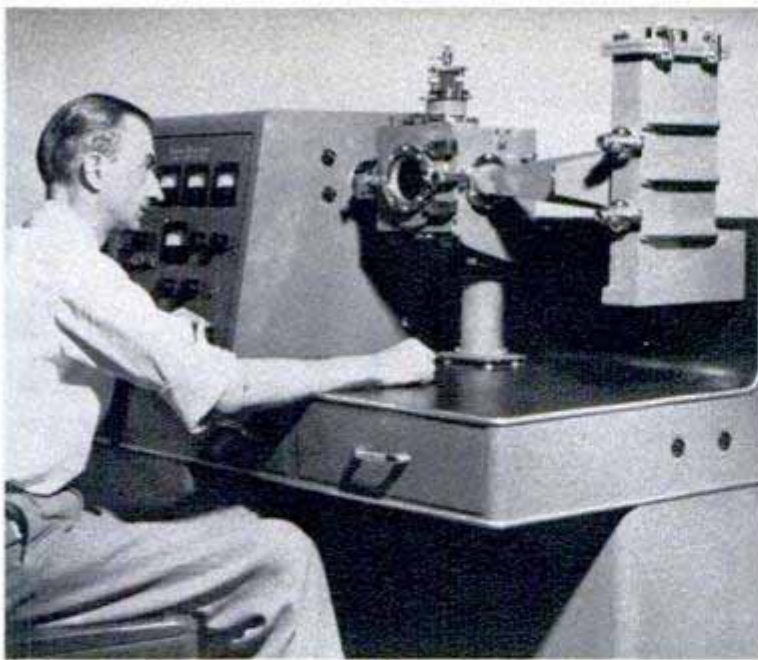


or black-and-white motion-picture use. Oil colors, sprayed on the back of the picture, and not visible when it is lighted from the front, produce the two effects.

Giant pictures on a single sheet of material and made from a single image have long been a photographic ideal but previous experimenters were unable to solve the numerous problems involved. The largest pictures made in the past were created by painstakingly matching and pasting together a number of strips of material, each containing a portion of the picture. The new technique can be applied to single enlargements measuring as much as 20 by 45 feet.

Paul manufactures his own seamless translucent backing material to the dimensions desired, flows on a liquid gelatin emulsion and cures it in the dark. The picture is then projected onto the emulsion by a special condenser-type photo enlarger, and the image is later developed and fixed in huge tanks. The finished photograph is sharp and clear and has a minimum of grain.

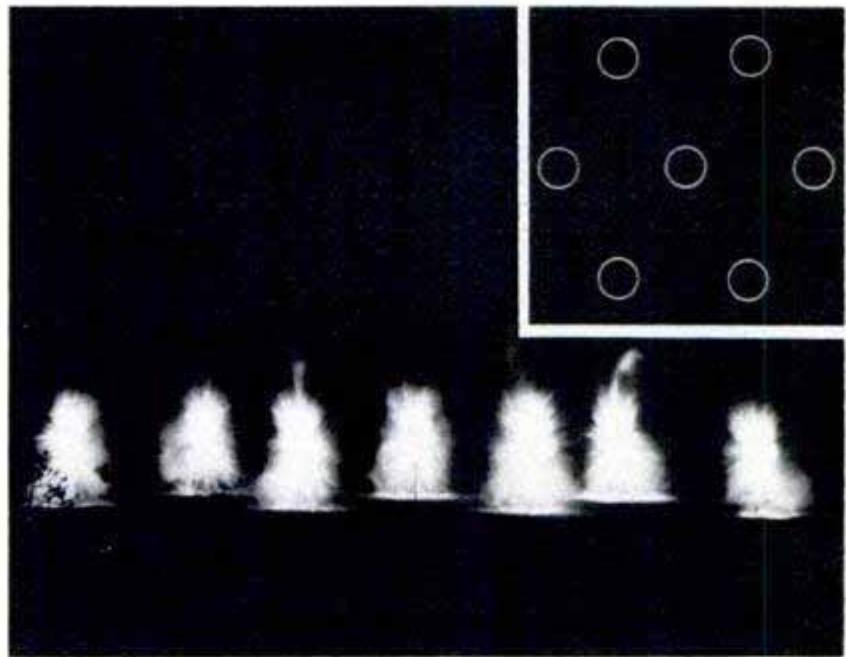
The method is applicable to motion-picture "process" screens and backdrops of all kinds, murals and giant display advertisements, either indoor or outdoor.



Electrons Help Study Metal Surfaces 1/250,000 Inch Thick

Electrons shot from a tube aid in studying corrosion and crystal structure of metal surface layers less than 1/250,000 inch thick. The new instrument is used by General Electric for developing longer-wearing metals for aircraft engines and bearings. Tests are made in a chamber pumped to

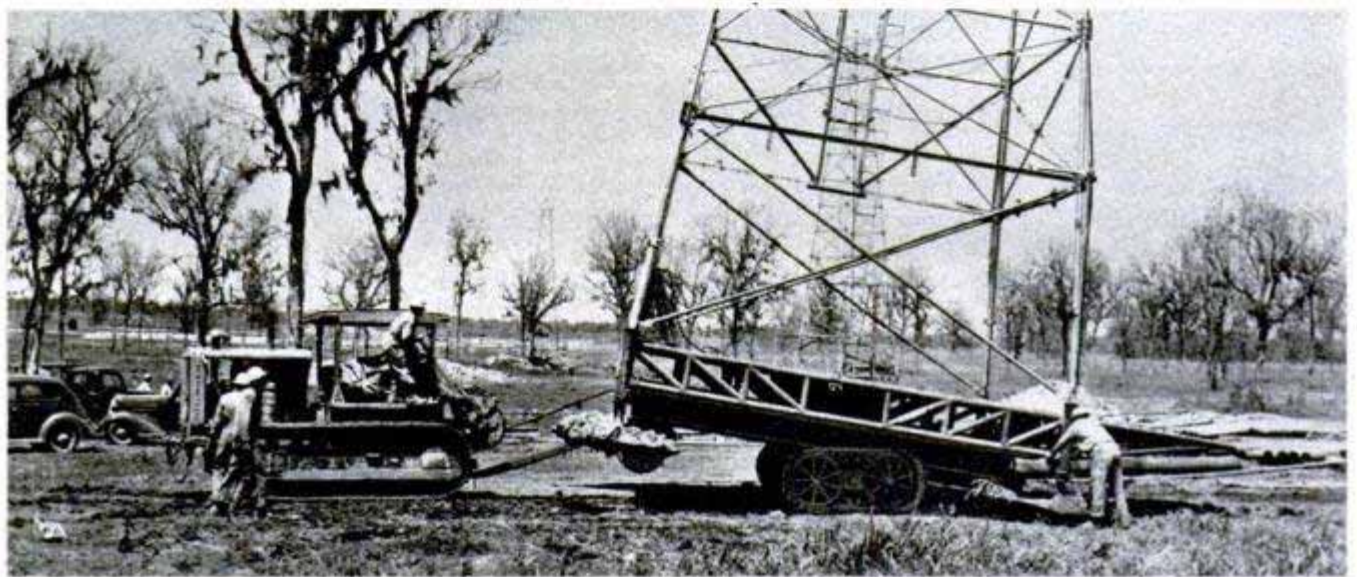
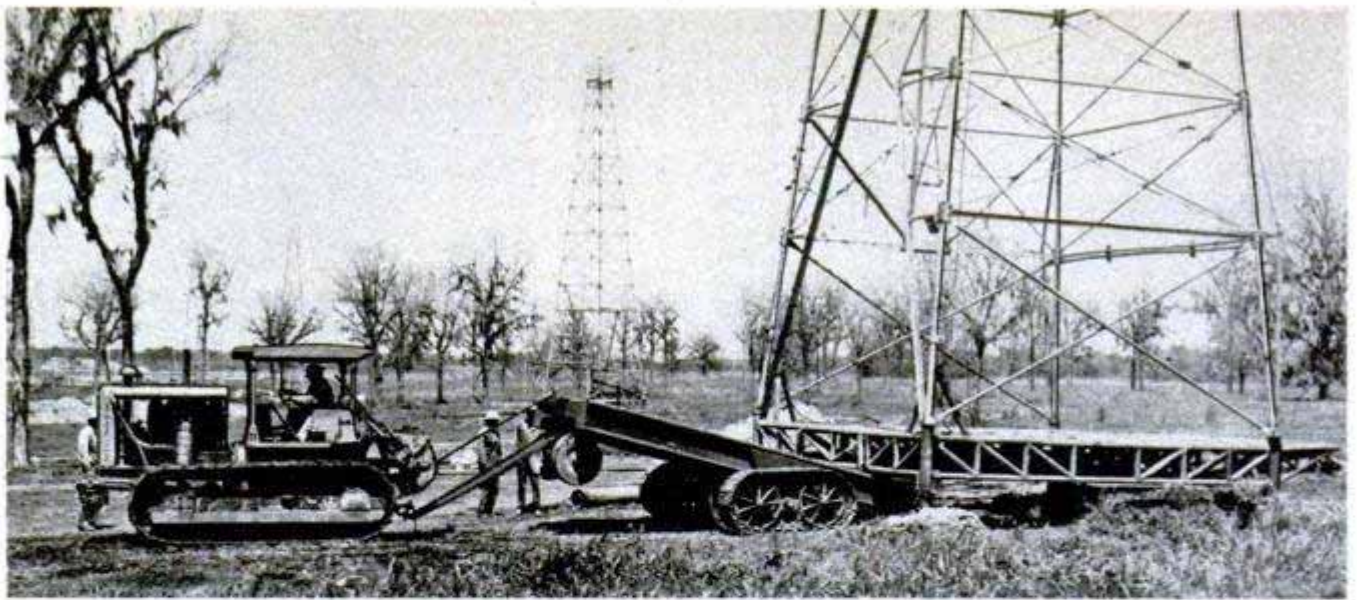
a high vacuum, since electrons will not travel through air. An electronic beam is passed through or slanted off sample metal to produce an image on a fluorescent screen. Photographic film can be substituted for the screen to make a permanent record for study.



Explosions Above Surface Find Underground Oil Deposits

Firing explosive charges above the ground is the latest method of locating probable underground oil deposits. The method, developed by Dr. Thomas C. Poulter of the Institute of Inventive Research, is a variation of the seismic method, in which an explosive is detonated within the earth, and shock waves are reflected back from some types of underground structures to instruments on the surface. Dr. Poulter discovered that a pattern of

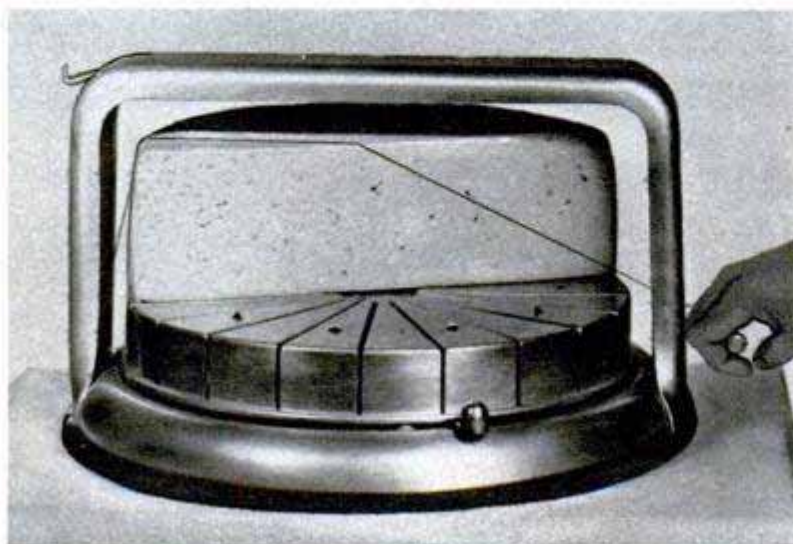
charges detonated above the earth would produce a shock wave which could be used in the same way. In the new method, charges that are hollow on one side are placed on poles in a hexagonal design, with one charge in the center. When the charges are fired, the wave echoes are picked up by a seismograph and interpreted to find out whether the underground structure is likely to contain oil. The method eliminates boring holes, which is costly in some areas.



Trailer Picks Up Derrick and Carries It Away

Sulphur-well drillers have to be able to move their 87-foot derricks quickly and inexpensively and one company has solved the problem by using a trailer that picks up the derrick and carries it to the new location. The trailer, equipped with crawler treads, consists of a heavy bed mounted on a bearing between the axles. The bed

tilts to slide under the drilling platform. When the trailer is completely under the 24,000-pound derrick, the bed is swung down to a horizontal position and the derrick is ready to roll. A Caterpillar tractor pulls the load. No guy wires are used and it is not necessary to jack up the derrick during loading or unloading.

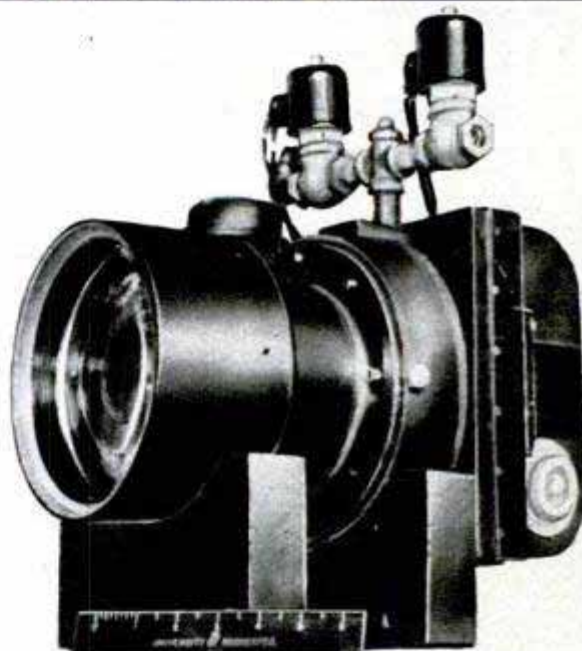
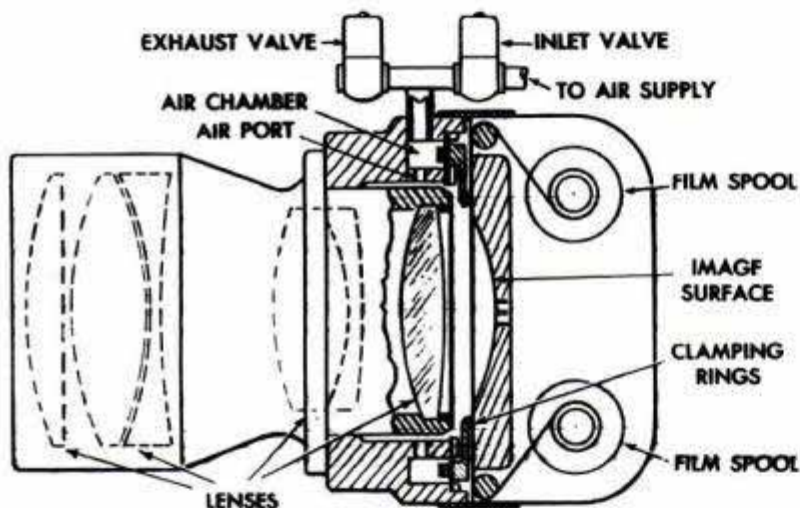


Speedy Cheese Cutter

Wheels of cheese are cut into pound slices in a fraction of the time usually required by a cutter using a stainless-steel wire. The cuts are clean and accurate since the revolving base on which the cheese rests is slotted for cutting one-pound pieces. A take-up wheel under the base keeps the wire taut. After each cut, the operator trips a lever which turns the base for the next cut. With the cutter, a 24-pound wheel of cheese can be cut into pound slices in one minute.

With an eye like an owl, this aerial camera takes photos of high image quality under poor light. Right, one small flash bulb was enough to make this night shot. The trees in distance were 600 feet from lens

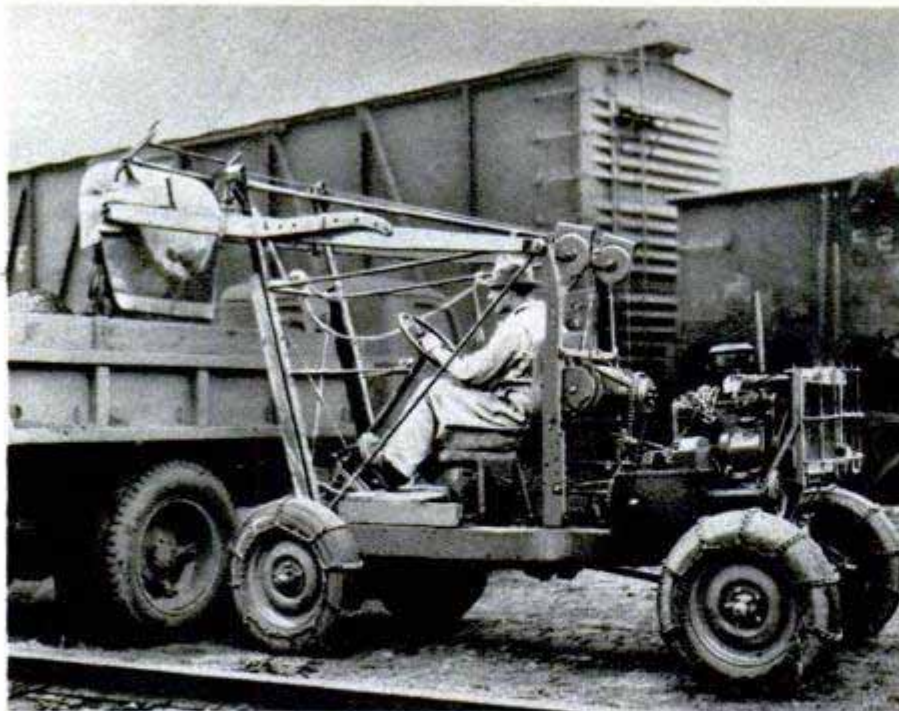
Aerial Camera With An Owl's Eye



Above, no midget, the camera weighs 55 pounds, of which 30 are lenses. Because the image surface is spherical, the film has to be curved during exposure. Compressed air stretches the film against the spherical image surface behind the rear lens. The film can be printed on standard equipment. The f:1 lens has a six-inch focal length. Shutter speed is 1/45

Designed for aerial work, the camera also takes fine indoor photographs. This basketball court was photographed using only the normal room lighting





Homemade Loader Has Engine in Rear

Turning around on a dime is almost a possibility with a homemade power loader that has four-wheel steering. Made by two Idaho mechanics, the loader also has four-wheel drive and a rear engine, giving the operator unrestricted vision. Parts of surplus Army jeeps, a Model-T clutch, frames of two cars and a truck, some chains and incidental parts of worn-out combines were used in the machine. The engine in the rear balances the loaded scoop.

Bomber Has "Brakes" On Belly and Sides

Unique flaps open on the sides and bottom of the Douglas Skyraider to slow it in high-speed dives, carrier approaches and for combat maneuvers. Newest version of the Navy utility bomber, it carries three times the rocket-torpedo-bomb load of the original of the series, conceived at the close of World War II.



Douglas Aircraft photo



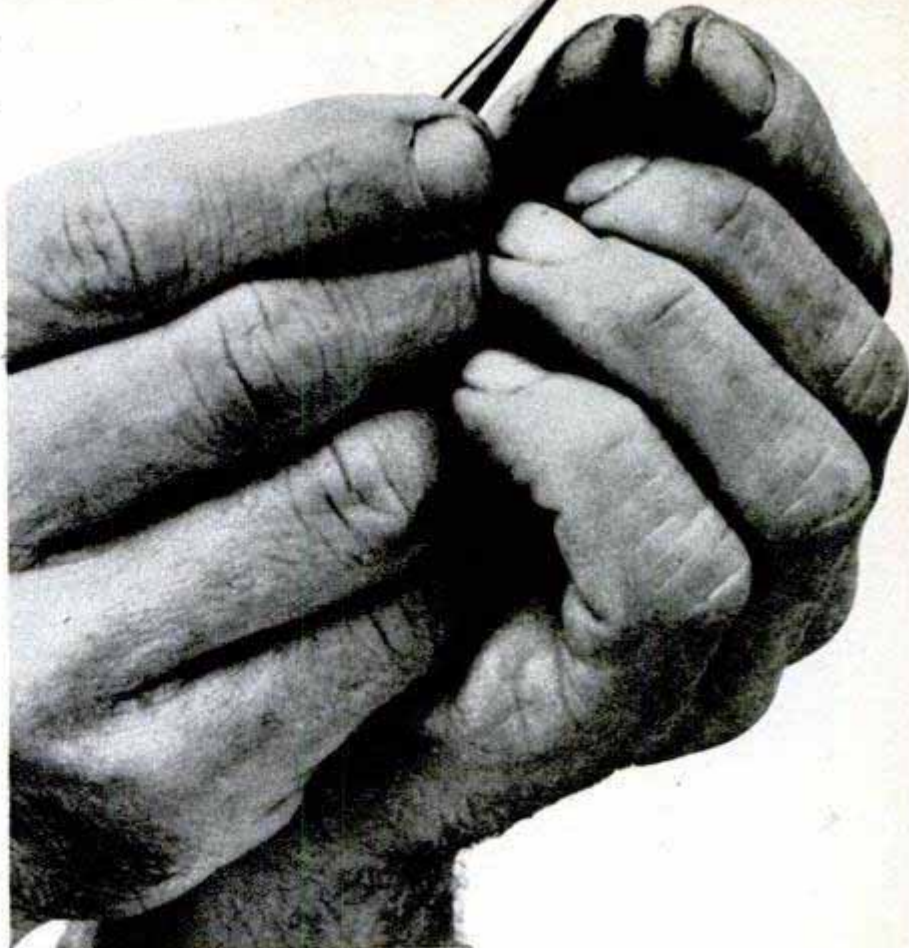
Plastic Sleeves in Incubator Allow Nurse to Reach Baby

Babies can be cared for inside a new incubator without opening the unit. The incubator is enclosed in a transparent cover. The nurse or mother inserts her arms through plastic sleeves which fit tightly around the wrists. The arm openings remain closed when not in use, maintaining constant atmospheric conditions inside the incubator. One of the incubators was flown to England recently as a gift of the American people. At the suggestion of Princess Elizabeth, it was given to King's College Hospital in London.

☐ Gasoline consumption in the U. S. hit a new high in 1948 when 30.7 billion gallons were used.

bee- sting harvest

BEE STINGS are welcomed by Alfred Guy Holmes of Devon, England. In fact, the more stings he gets, the better he feels—for he is in the unique business of collecting bee venom. Each week he removes venom-filled sacs from 10,000 bees and ships them to a London chemist, who processes the venom into ampules and ointment. Efficacy of bee venom in treatment of arthritis, rheumatism and neuritis has long been studied by physicians and is still not fully accepted by the profession, but demand for the stings continues and Holmes is busy filling his weekly quota.



Holmes can remove 500 sacs an hour from dead bees. He is working on a method for rapid removal of venom from live bees, but as yet he chloroforms the bees first. Above, he squeezes the bee's body gently and picks the minute sac from its tail with sharp tweezers



Right, chloroforming the bees before removing their stings. Upper right, the dead bees are on the plate at right as Holmes places the venom-filled sacs in the dish at the left. Above, pouring the sacs into a test tube for shipment to a manufacturing chemist



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Sections of Rowboat Nest for Storage

Nested like a stack of dishes, the four sections of a collapsible rowboat can be carried in the rear compartment of a car. The boat, built by Fred Shoemaker of Evanston, Ill., is made of $\frac{1}{4}$ -inch plywood. The four watertight compartments are fastened together with cotter pins. The craft is 9 feet long, 42 inches wide at the beam and holds three people. Handles on the largest section permit the collapsed boat to be carried easily.

Bone Saw Won't Cut Flesh

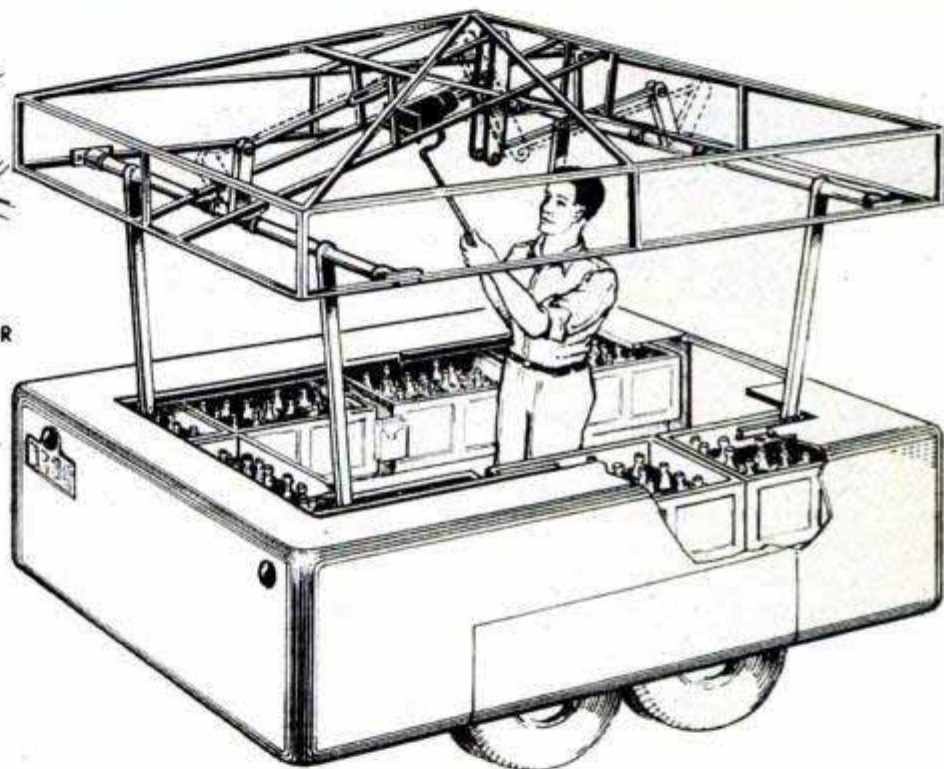
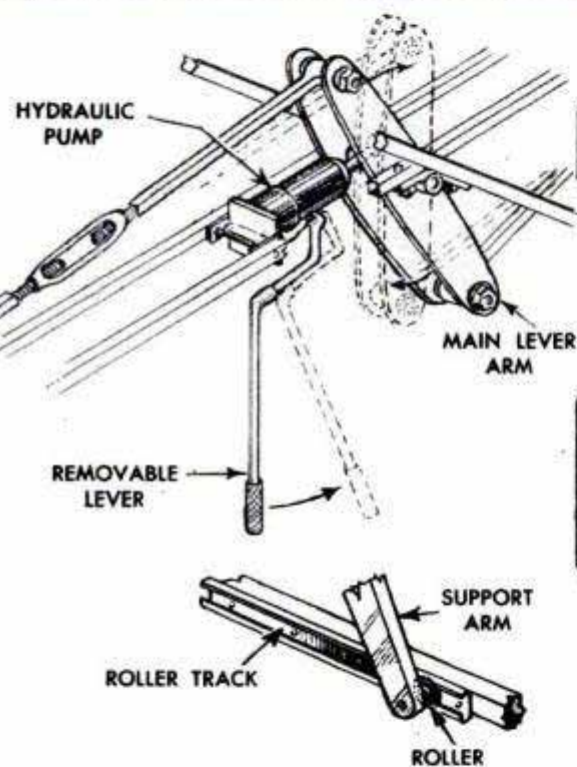
Accidental cuts in flesh during bone-removal operations are almost impossible with an oscillating bone saw that cuts bone quickly but merely massages the flesh. The blade oscillates in a $\frac{3}{8}$ -inch arc and will not cut anything that has "give" to it. When held against the flesh, the blade merely moves the surface back and forth with a massaging motion. If desired, the saw can be converted for rotary motion by adjusting a setscrew near the chuck.



Hangers Cling to Magnetic Walls

Clothes hangers seem to cling magically to the walls of a New York clothing store. They hang without any visible means of support. The secret of the wall is a magnetic core a few inches wide and several feet long, which is installed beneath the surface at a certain height. Salesmen nonchalantly place hangers against the wall where they stick, to the amazement of shoppers. The wallboard and wallpaper diminish the magnetic power only slightly.





Refreshment Trailer Has Hydraulic Top

Thirty-six hundred bottles of iced drinks are carried in a refreshment trailer which has a hydraulically operated roof. The roof is lowered for transport between jobs and is raised easily by pumping a built-in hydraulic-jack mechanism. Releasing a valve lowers the roof to a locked position. The

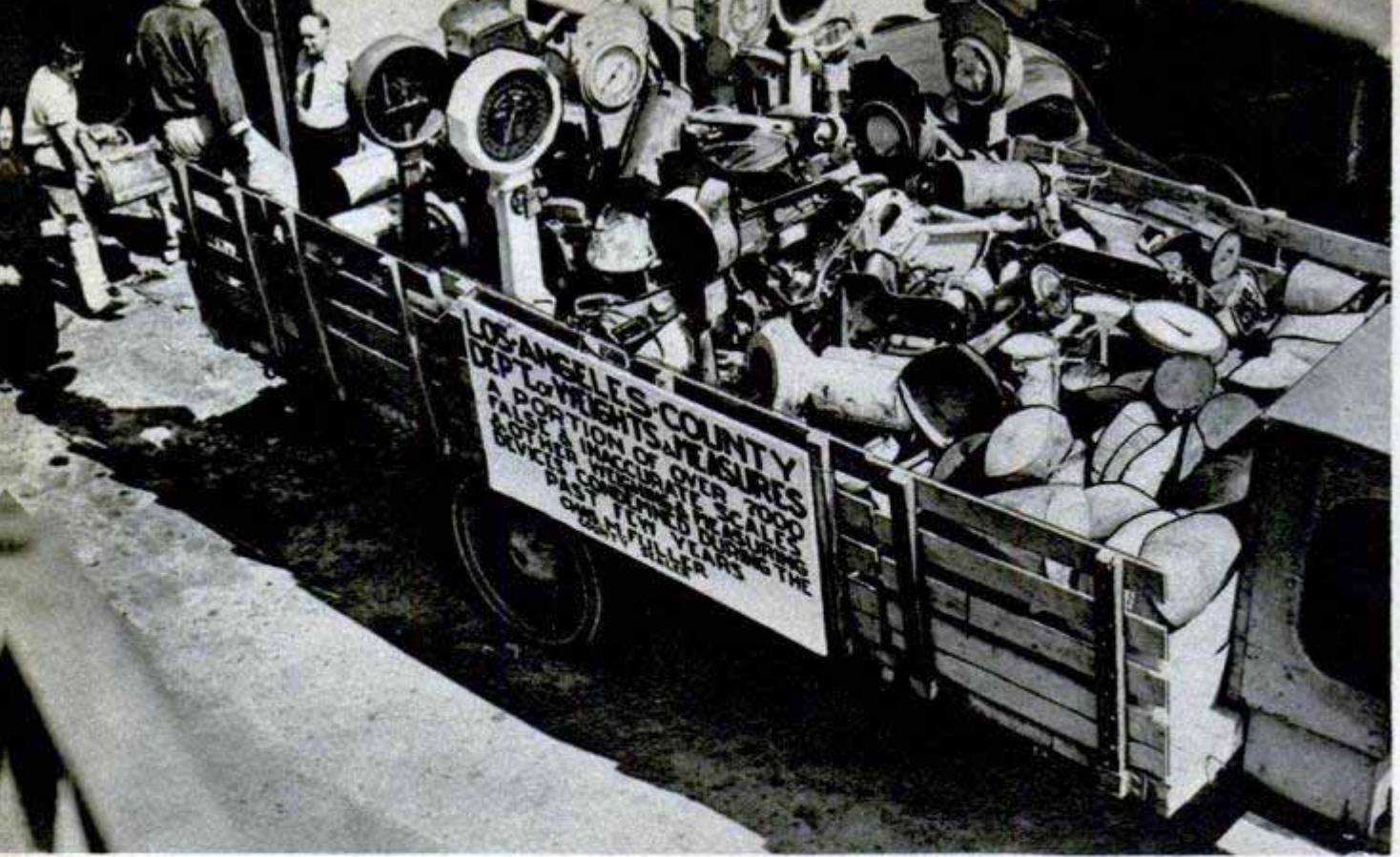
Top, left, portable refreshment stand collapses into a compact unit for transport. Top, right, when top is hoisted, the vendor is ready for business. Sketch shows how easily one-man hydraulic top is operated

trailer is cradled in "no tip" coil springs and is equipped with electric brakes, operated from the truck cab. Its entire cargo of 150 cases is iced in five coolers under the counters. The trailer is painted in bright colors to lend a carnival atmosphere to any occasion.

Spray Discourages Deer From Eating Vegetables in Gardens

Deer are discouraged from eating vegetables in farm fields by a chemical which is sprayed on the crops. Safe to use on garden products, the chemical causes a temporary irritation of the deer's palate. One

to three pounds of the material mixed with water will provide an effective spray for an acre of truck crops. The annual crop loss in the United States due to deer runs well into the millions of dollars.



Do You Get What You Pay For?

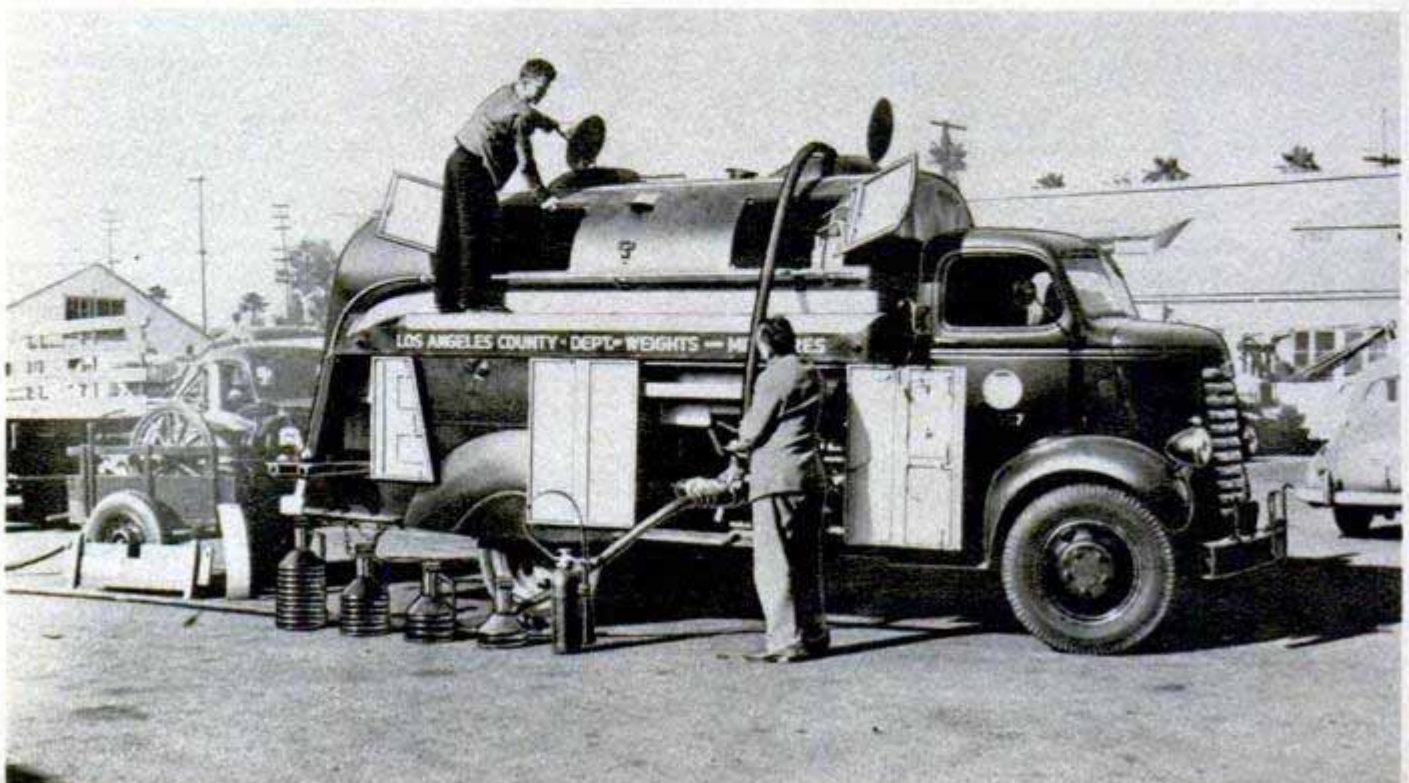
By Andrew Hamilton

BILL JONES drove into a service station. "Fill 'er up." He noticed that the gas pump was started at the one-gallon mark instead of at zero. When he called attention to this discrepancy, the attendant quickly explained: "Fellow in here on a motor-bike a minute ago. Sold him one gallon of gas.

Guess I just forgot to turn the pump back."

The same day Mrs. Jones went to market to buy Sunday groceries. She paid \$3 for what she thought was a five-pound roasting chicken. She reweighed the bird at home and discovered it was only a four-pounder. At that rate she had paid 75 cents

Checks on petroleum meters are made with a big "bandwagon" that has 400 and 800-gallon testing chambers



make test purchases,
then check scale and
have items reweighed



On opposite page, a
few of over 1300
scales condemned in
a year at Los Angeles
and sent to junk heap

a pound instead of the 60-cent price tag in the butcher's showcase.

Bill's kids skipped down to the corner candy store to buy a dime's worth of jelly beans. The proprietor's scales were set about an ounce ahead. He cheated a few pennies on each sale—not much, but by the end of the day it had mounted up to several dollars.

These are just a few of the ways in which the buying public gets gypped. It's a never-ending battle, but we're slowly winning—thanks to America's short-weight sleuths.

They are the little-publicized investigators and technicians of the Departments of Weights and Measures in America's city

and state governments. Quietly and persistently they work to protect the public from being gouged by inaccurate scales, substandard measuring devices and fast-talking gyp artists. They save shoppers approximately \$3,000,000,000 a year.

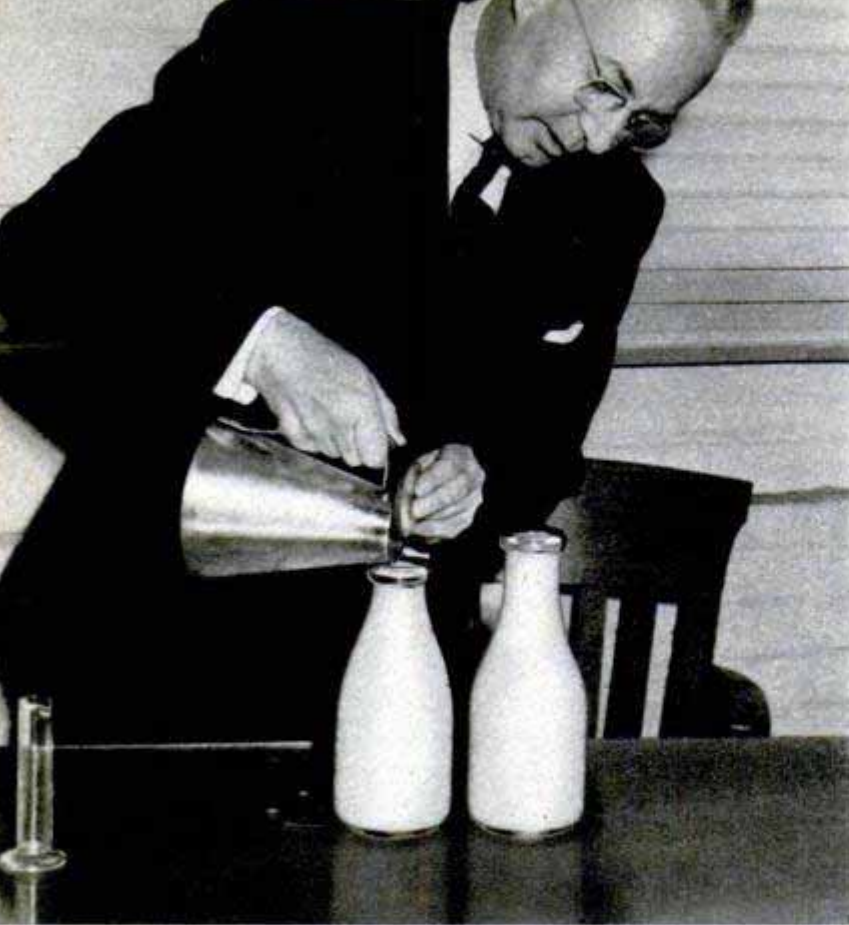
Most merchants are honest. They are among the first to applaud the nation-wide campaign against what has been called "the lowest kind of crook"—one who steals pennies, nickels and dimes out of what you spend for gasoline, meat, groceries, milk and drugs—because such schemes hurt honest business.

Short-weight sleuths work in close cooperation with the Office of Weights and Measures of the U.S. Bureau of Standards in Washington, D.C. This office maintains in air-conditioned, dustproof rooms the highly accurate standard devices by which America weighs and measures its goods—such as the standard quart, the standard yard and the standard gallon. Actual enforcement of laws pertaining to weights and measures, however, is left to the cities and states.

One of the most up-to-date Weights and Measures Departments is run by Charles Morris Fuller of Los Angeles. He's been on the job for 34 years. Last summer he moved his staff into a brand-new \$250,000 building, with testing and calibration devices ranging from equipment to measure highly accurate druggists' and jewelers' scales (so sensitive that they will record a



Testing accuracy of service-station gasoline pumps with cans measuring one, two, three and five gallons



pencil mark) to a jumbo-size 100,000-pound-capacity scale that will handle the largest truck-trailer rig on the highway. They built much of their own equipment and some of it has been adopted by other cities.

Last year they tested approximately 182,000 scales, 100,000 liquid-measure devices, 26,000,000 milk bottles and 240,000 other containers. Approximately 200 of the more serious cases were hauled into court and fined a total of \$15,485.

"The real value of our work is not represented by the fines," Fuller points out. "For every person brought to trial, scores of others are kept in line by the knowledge that short weight does not pay."

Perhaps the 43-man staff's most important job is to keep accurate the scales and balances in Los Angeles' 36,000

Some containers have a deceptive appearance. Milk bottle being checked by Charles Morris Fuller, head of the Los Angeles Weights and Measures Department, holds the same quantity as the taller one. Running water into a giant truck tank, below, for an accurate test of its capacity



places of business. Since scales are mechanical devices, they can get out of whack through no fault of the merchant who owns them. Of the 182,000 scales tested last year, 39,081 had to be adjusted, 9822 were condemned for use until overhauled or repaired, and 1307 were destroyed and sold as scrap metal because they were hopelessly out of working order.

By law, each scale is required to be checked and stamped with the department's seal at least once a year. Twelve crews, each bearing a kit of highly accurate weights and a set of adjustment tools, spend full time in going from grocery to hardware store to meat market.

If a citizen should telephone in with a complaint—an average of 12 calls is received daily—a special crew of shopping investigators is sent out. Such crews consist of a woman and a man. The woman pretends she is a housewife and does the shopping. Then the man steps in, the scale is checked, and the purchase is reweighed.

In this way, many law violators have been caught. One crooked meat-market proprietor trained an overhead fan on his scales, pushing it down several ounces. A buyer of old gold used copper pennies instead of regular pennyweights, thereby cheating the seller out of half his gold. A poultry dealer placed a one-pound lead



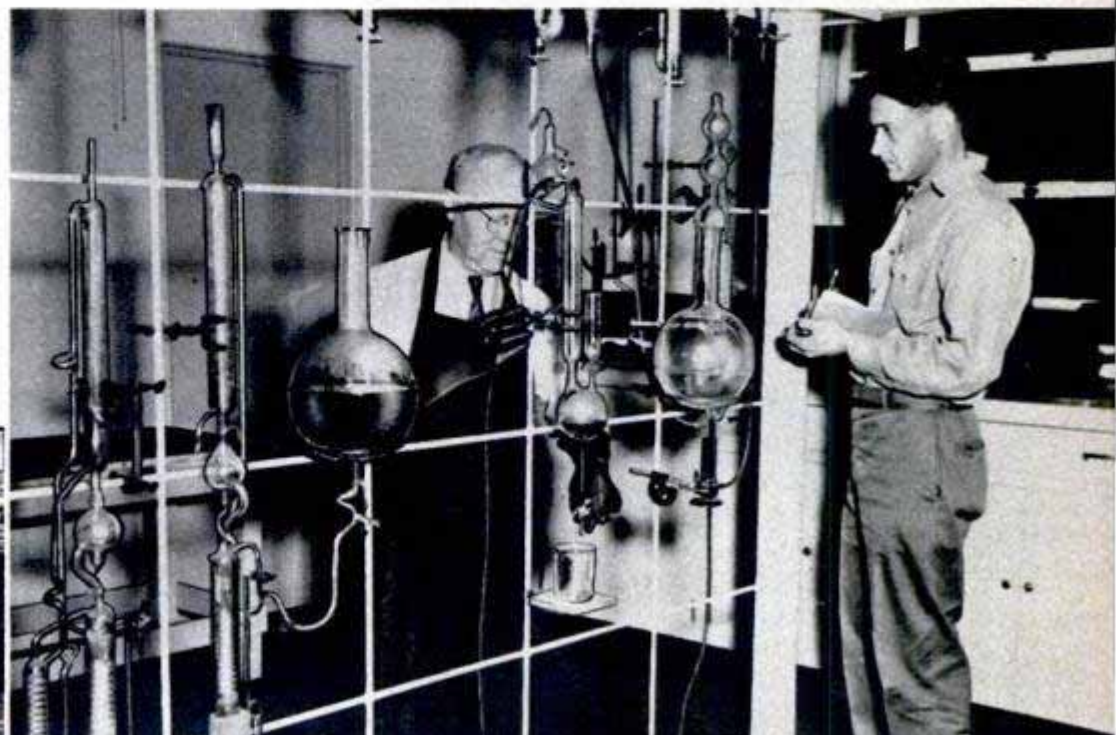
Secret tank, right, powers sleuth's car. Test gas goes into separate tank

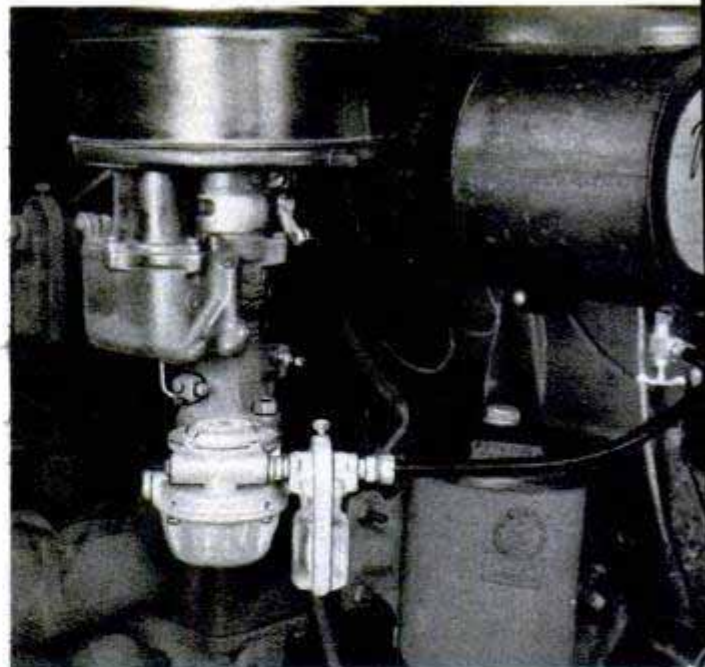
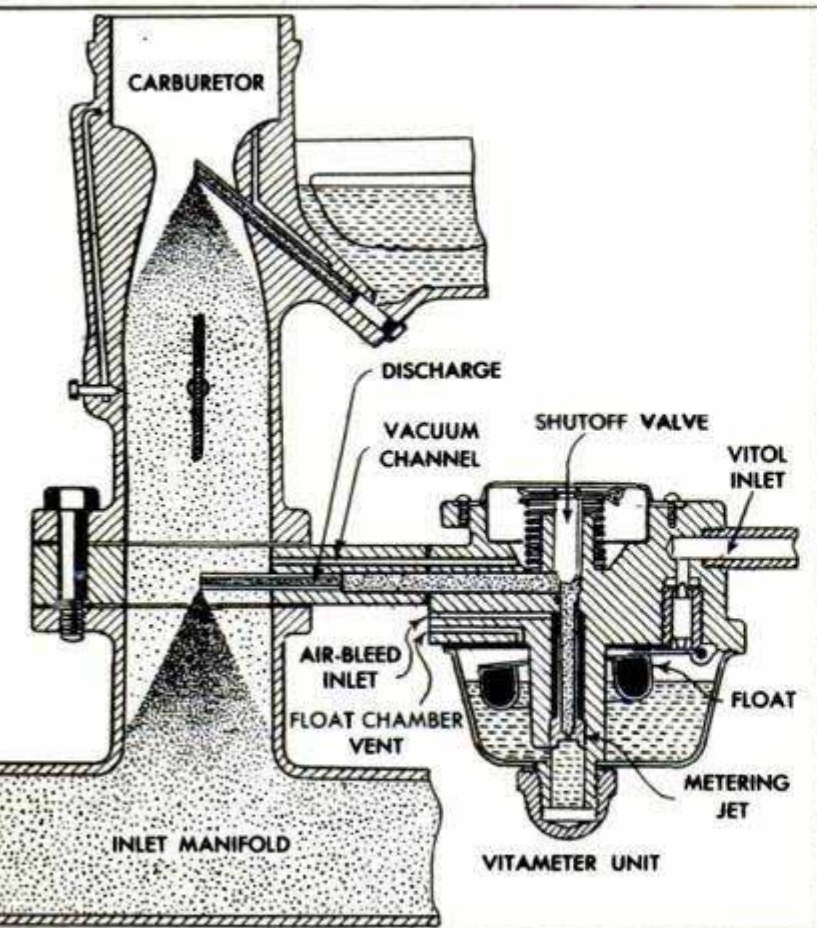
weight inside each chicken in the showcase. It was weighed with the chicken and then allowed to slide out onto a shelf behind the counter in the process of wrapping.

Large scales used for weighing trucks, trailers or livestock are also carefully checked and adjusted by the short-weight sleuths. For this task, Los Angeles has developed a heavy-capacity unit. It looks something like a light tank and is loaded with pig iron and lead, sealed to exactly 20,000 pounds. It is the largest single-unit test weight in the United States. The truck that hauls it also carries a number of 500-pound test weights. This equipment keeps the large vehicle scales, on which millions of dollars' worth of agricultural products

(Continued to page 250)

Chemists in department's petroleum laboratory analyze sample of gasoline





line's octane rating by 10 to 20 numbers to realize the full power of an engine without knock, according to engineers of the Thompson-Toledo Vitameter Corporation. Installation involves an auxiliary carburetor and a fluid called Vitol, composed of 85 percent alcohol, 15 percent water, 3 cubic centimeters of tetraethyl lead and a soluble oil. Airplane engines use a 50-50 alcohol-water solution. A five-quart tank of Vitol contains enough for 500 to 700 miles of driving, depending on the motorist's driving habits. The complete unit can be installed in a car in less than one hour.

Injection Booster for Automobiles

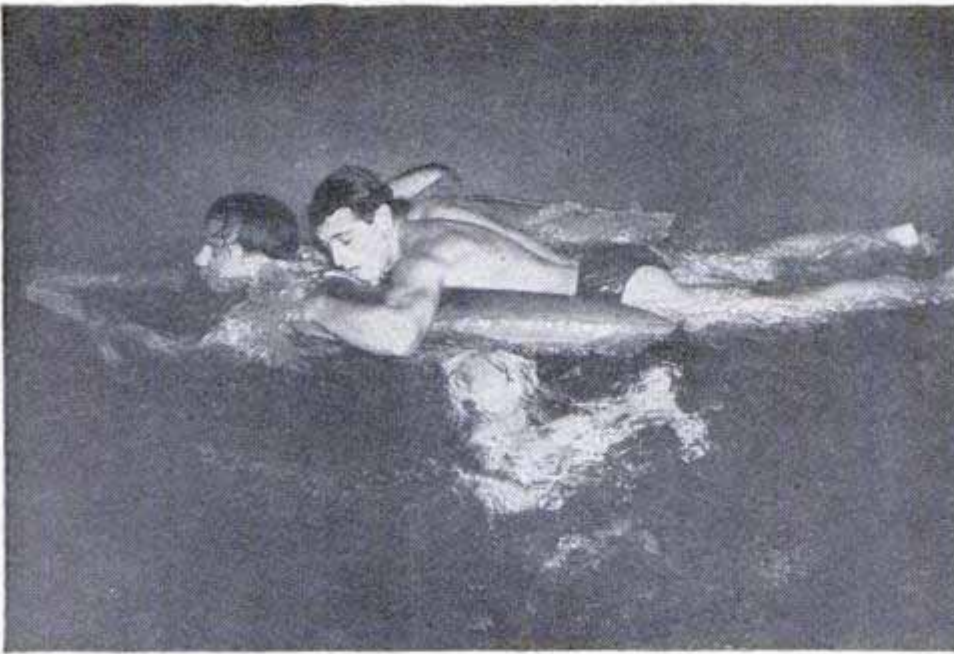
Carburetor injection, similar to that used on fighter planes for combat and more recently on commercial airliners for take-off, has been modified for automobile engines. The antidetonant injection raises a gaso-



Jeep Lays Its Own Road

Seeking new uses for the versatile jeep, the Marine Corps has designed a continuous matting that enables the small vehicle to travel over swamps, bogs, soft beaches and heavy underbrush. Supported by a light metal frame, the continuous mesh

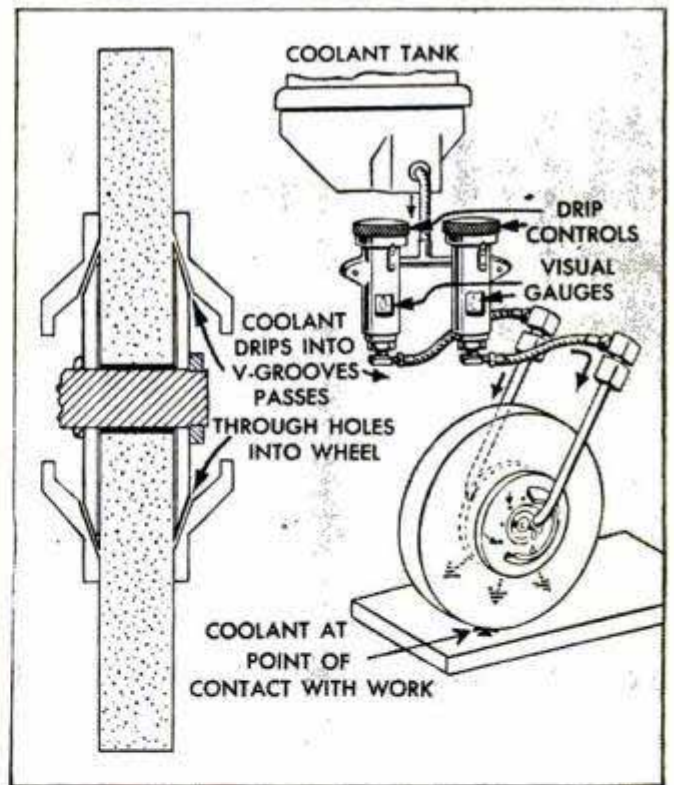
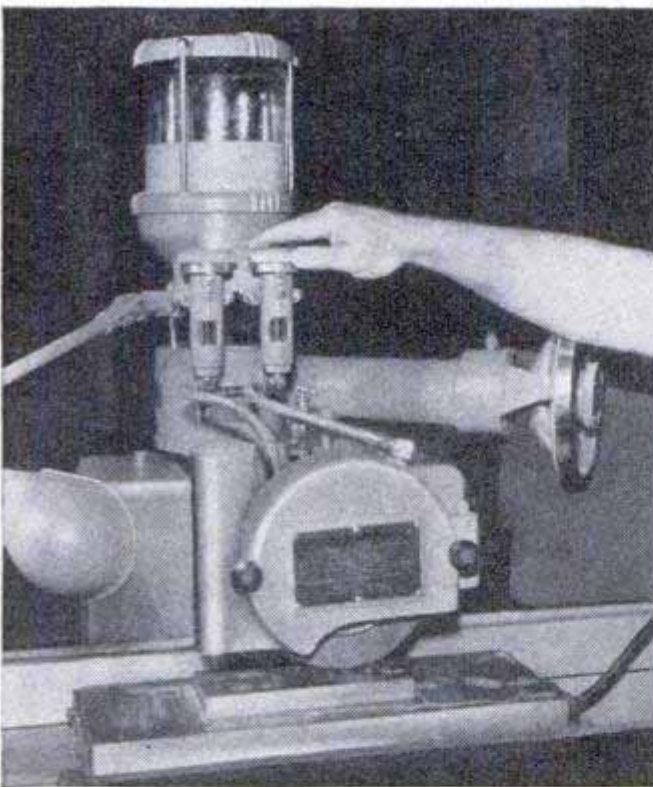
is driven by the wheels of the jeep. Called the "squirrel cage," it is undergoing tests at the Quantico Marine base. Also being tested is a system of laying the mesh roadway from trucks. A frame, mounted above the truck body, carries 250 feet of matting and, as the truck moves ahead, the matting is fed forward and down in front of it.



Lifeguard's Vest Inflates to Form Life Raft

Lifeguards now can carry a life raft with them as they swim out to rescue a drowning person. Demonstrated in Paris, the lifesaving apparatus consists of a rubber raft that is worn, deflated, as a vest by the

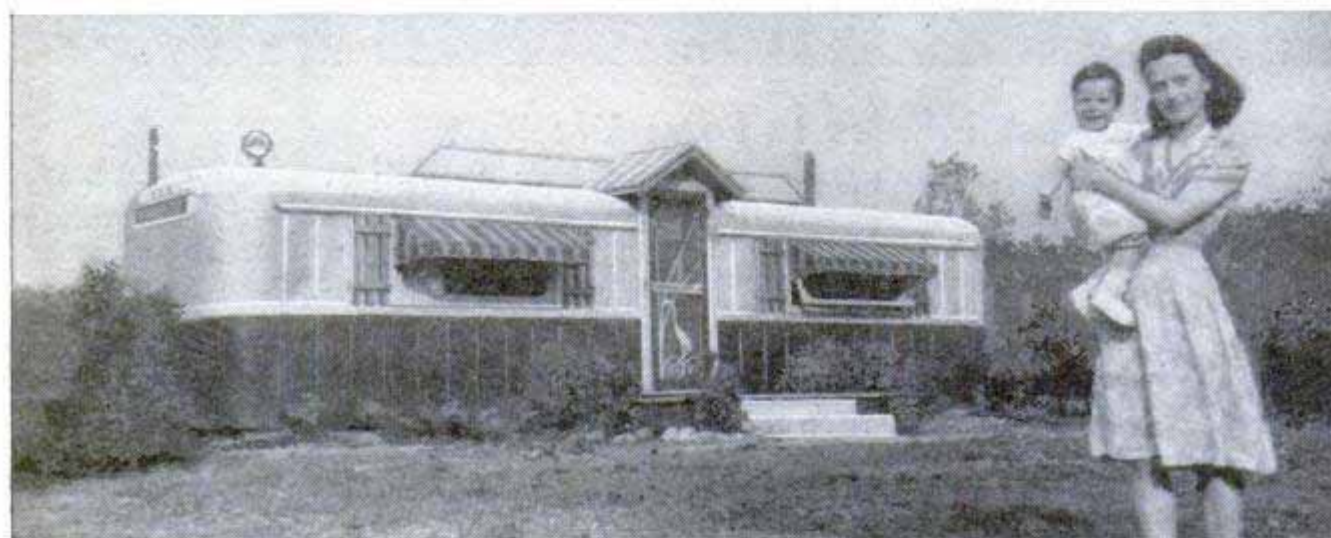
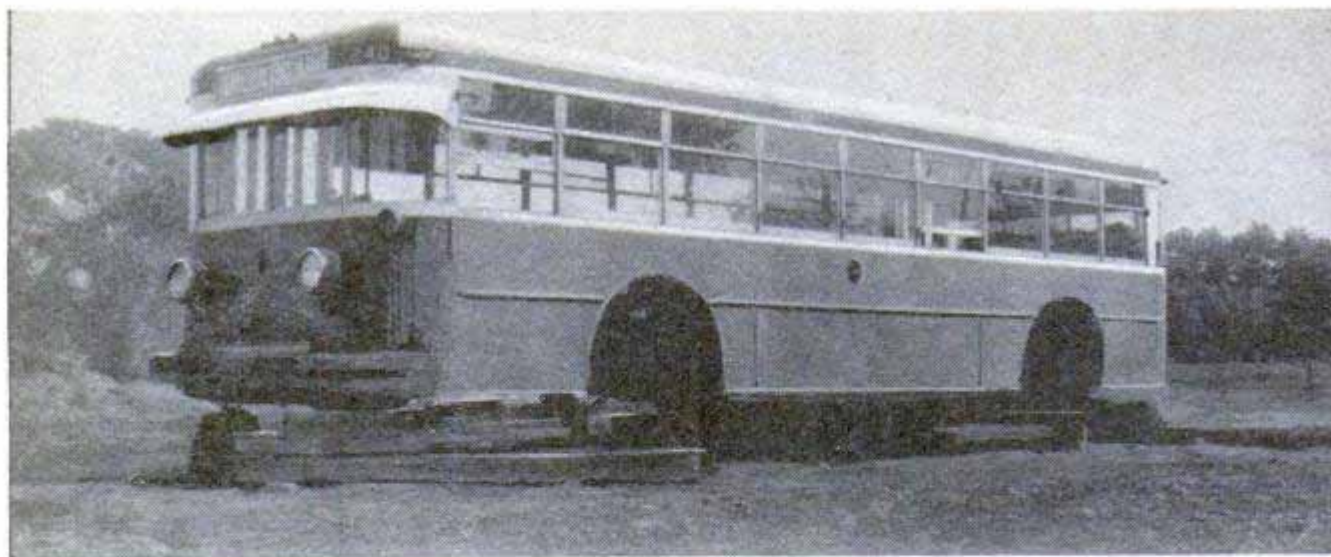
lifeguard. When he reaches the drowning person, the rescuer inflates the raft by means of an oxygen tube. The distressed person is then pulled up on the raft and towed safely ashore.



Power Grinder Cools by Spray

Instead of flooding work with liquid to keep it cool, a new grinder sprays the coolant over the work in a fine mist by introducing it into the wheel and allowing it to be applied by centrifugal force. Only small quantities of coolant are necessary since it is introduced at rates from two to eight drops a second. The liquid drips into the

collar, which can be attached to any wheel, and seeps into the pores of the wheel. As the wheel spins, centrifugal force throws the liquid out from the rim of the wheel covering the work with a fine mist that keeps operating temperatures as much as 500 degrees lower than usual cooling methods. Another advantage is that the point of grinding is not hidden by the liquid, thus making possible more efficient work.



Junked Bus Body Becomes a Home

Houses are hard to find in this day of shortages, but one New York State resident solved the problem temporarily at least by converting an old bus body into a comfort-

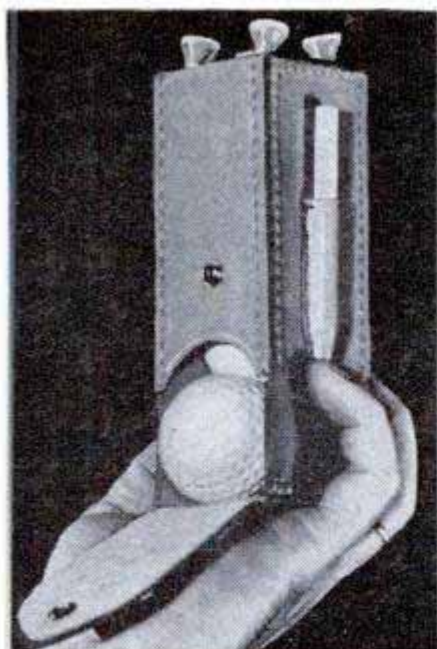
able small home. The completed house has several rooms and bears little resemblance to its original appearance. The owner plans to convert additional busses into cabins for the tourist trade. Well equipped, the cabins can be as attractive inside as out.



Microfilmer for Long Maps

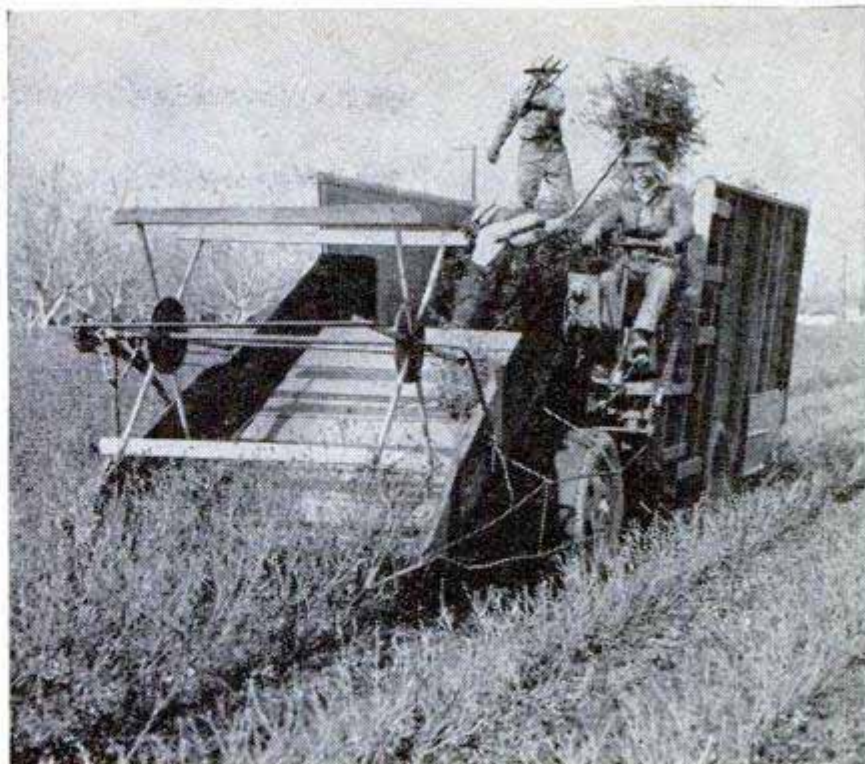
Long maps, drawings or blueprints are microfilmed in a continuous strip by a triple-purpose camera that handles large copy up to 42 inches wide and as long as desired. The camera, which also serves as a film printer and enlarger, will microfilm a half-mile-long drawing on a 100-foot roll of film. Resembling a household ironer, the camera is built upside down with the lens and film being beneath the copy rather than above it as usual.

Many of the products described on these pages are now on the market and available to readers. For names and addresses of manufacturers, turn to the WHERE-TO-BUY-IT INDEX, on page 10



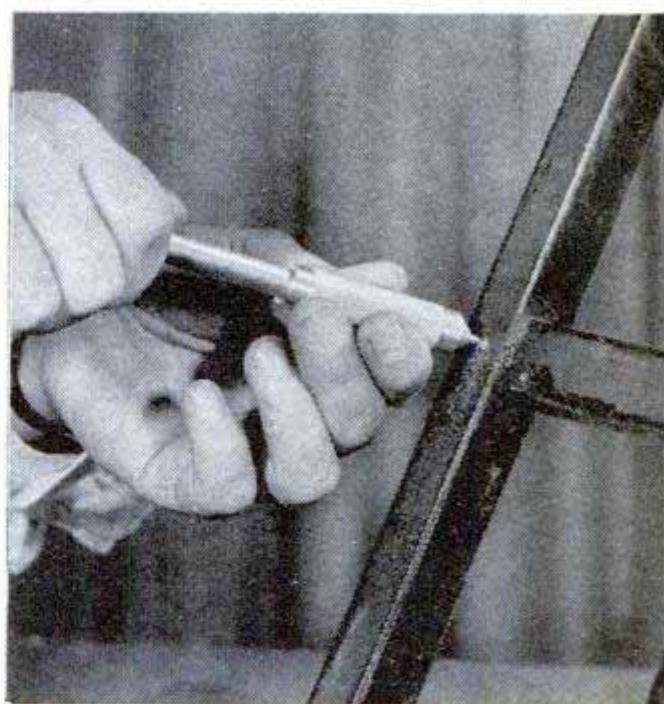
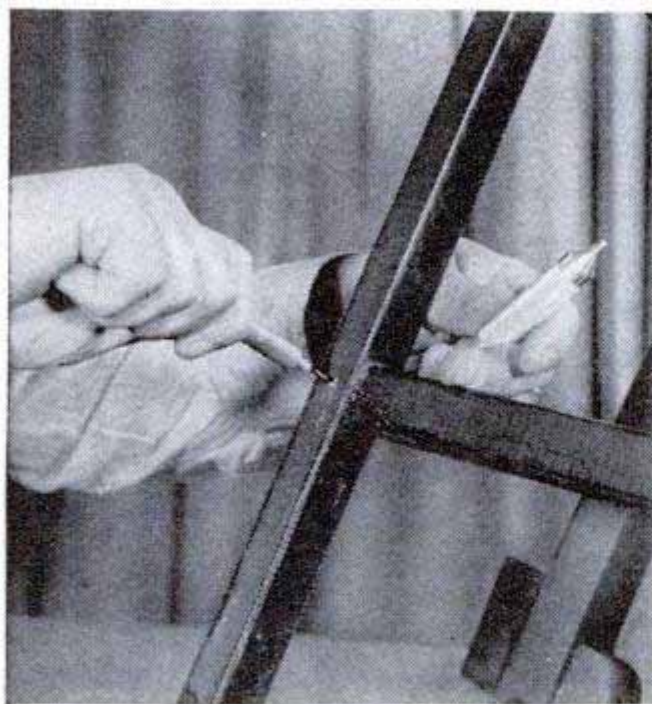
Golf Kit

Golf balls, tees and a pencil are always on tap in a leather kit that fastens to the belt. The kit holds three balls and four tees in a Neoprene lining that prevents them from falling out. The flap locks tight with a grip snap. When the kit is opened a ball rolls out into the golfer's palm. A socket on the side of the kit holds a pencil. The kit is waterproof and weighs four ounces empty.



"Harvester" Speeds Rosebush Pruning

Pruning the tops off more than 600,000 young rosebushes in a field near Ontario, Calif., has been simplified by a novel mower sickle and harvester combination on a truck chassis. An overhead reel throws the clippings onto an inclined chute leading into the truck body. One man runs the machine and two others fork clippings toward the back of the truck as they accumulate. It does the job in a fraction of the time required by large gangs of men equipped with hand clippers. Tractor-operated diggers later uproot the bushes and dump them into rows for delivery to the sorting and grading tables.



INJECTOR SQUIRTS GLUE into rickety chair joints, filling all the space resulting from shrinkage and wear. One end of the injector holds a very small drill which is used to bore a hole into the heart of the joint. The operator then fills the tool with glue and uses it as a syringe to force glue into the joint under pressure. If the hole is drilled on the underside of the joint, no sign of the repair work can be seen.

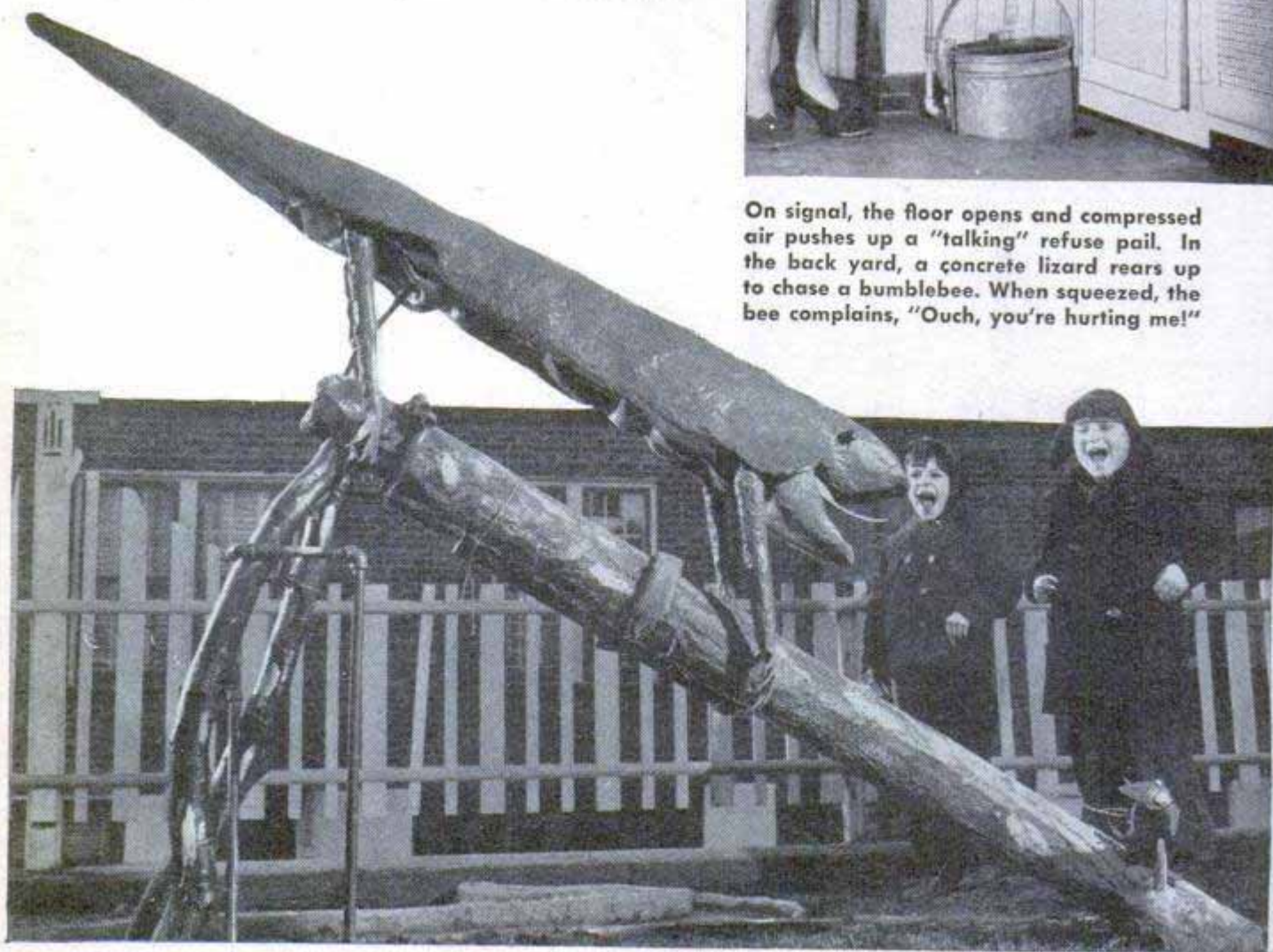
he lives



Flicking a switch starts light fixture revolving slowly about workshop ceiling until it is exactly where Tomlinson wants it



On signal, the floor opens and compressed air pushes up a "talking" refuse pail. In the back yard, a concrete lizard rears up to chase a bumblebee. When squeezed, the bee complains, "Ouch, you're hurting me!"



in a house of fun



When Tomlinson twists knob on his automobile dashboard, radio impulses start work of opening garage doors

ONE OF America's most mechanized homes is that of Alfred Tomlinson in St. Albans, N. Y. It boasts such bizarre gadgets as hands which pop out of the wall to receive your cigarette ashes, a snake which lowers itself from a ceiling to frighten guests, a motorized pencil sharpener and a disappearing garbage pail.

Tomlinson is a studious-looking Englishman who studied Sanskrit, Greek and Latin at Cambridge University, but no mechanics or engineering. He is entirely self-taught and, years ago, began to evince a mechanical ingenuity which has now led to the creation of the most fascinating house in New York.

A sales manager for a milk concern, Tomlinson does all of his work evenings and week ends in the basement of his home, where some \$8000 worth of tools are stored in neatly charted compartments. Arriving home, he twists a black knob on his dashboard and, miraculously, the garage doors some 10 feet ahead slowly rise to permit the entry of his car.

What really happens is this—the knob sends impulses to a radio in the basement workshop which, by means of electrical and air controls, opens his garage door. Once in the house, Tomlinson presses another button that just as "mysteriously" closes and locks the garage doors.

He uses some 79 motors for his gimmicks,

ranging in power from $\frac{1}{2}$ to $\frac{1}{100}$ horsepower. Nine air motors are used for the snake, garbage pail, garage doors and the giant animals in his garden. These include a bird, lizard, bumblebee and alligator. They are concrete and (except for the bumblebee) weigh several hundred pounds each. Their weight does not hamper them much. When their master presses a button, the bee starts up a log towards the lizard but.

Cigar ashes dropped into a giant papier-mache hand are neatly deposited on the other side of the wall





Card-playing guests are startled by snake that drops out of the ceiling, rolls its eyes and hisses, "Cheese it—the cops!" One of few nontalking gadgets is motorized pencil sharpener



Lunging for this disappearing snake, cat has given baseboard a thorough clawing

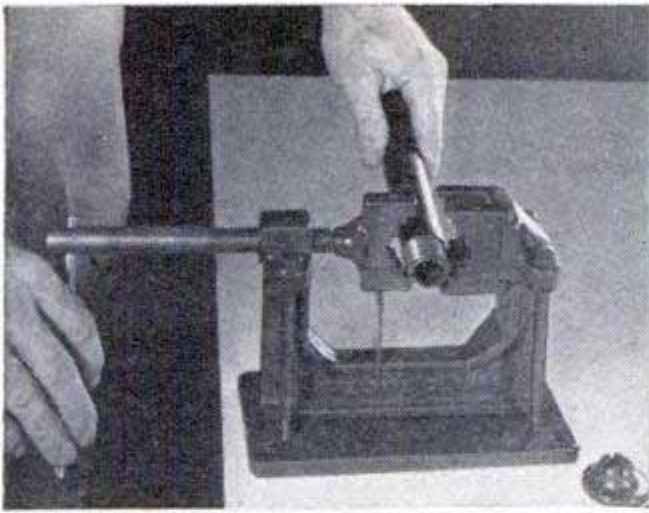
soon, the lizard rears up and makes for the bee.

Neighbors' youngsters who wander into his garden get the surprise of their lives. One boy, fondling the bee, was startled out of a few weeks' growth by its cry, "Ouch! You're hurting me!" He hasn't been tempted to venture into the garden since.

Tomlinson records short sayings on disks with home-recording apparatus and "wires" his animals for sound. The snake, which pops out of the ceiling during a tense poker game, hisses, "Cheese it—the cops!" then slowly, and with dignity, withdraws into the ceiling. In the kitchen, a twist of a wall switch sends the garbage pail soaring up through an opening that mysteriously appears in the floor. If the pail isn't loaded quickly, it is apt to bark, "For Pete's sake, Mama—shut off the air!"

This is one gimmick Tomlinson must remedy. His womenfolk know that it's only the pail talking but, somehow, they take offense, and his next assignment is to change the recording disk to, "Would you please shut off the air?" This would re-establish peace in the house, every room of which has its loudspeaker.

One device which does not talk back is a motorized pencil sharpener. A standard device, with motor attached, all it does is cut a fine point in a second or two—with no back talk. However, Tomlinson is considering "wiring" it to say, "Get the point?"

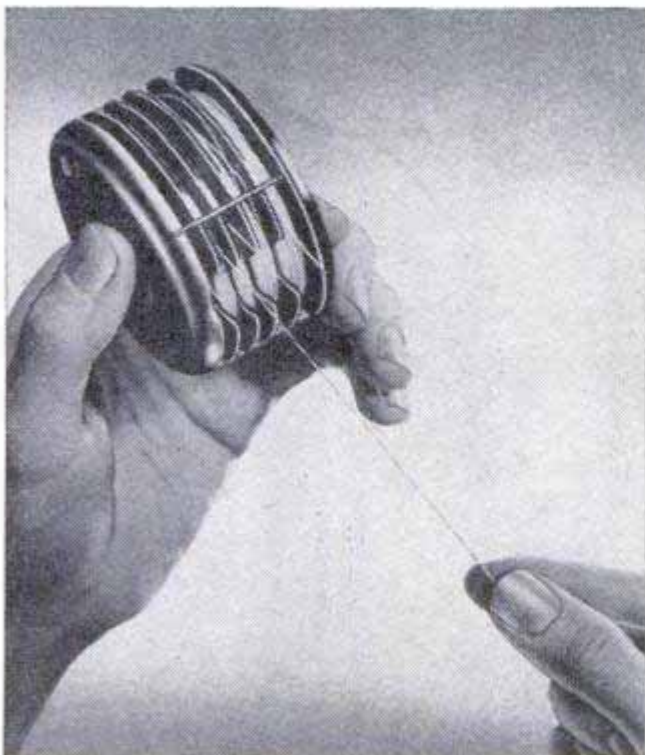


Vise Has Four Uses

Serving a variety of purposes, a combination vise and C-clamp is a handy tool for home workshops. Steel pipe jaws convert the vise into a powerful pipe vise. Removed from its base, it becomes a handy pipe wrench. For use as a regular vise, a snap-on swivel plate replaces the pipe jaws. The vise also can be made to serve as a C-clamp when removed from the bench-mounted base.

Reel Stores Fishing Leaders

Fishing leaders and the material from which they are made are stored neatly in a reel that prevents uncoiling and tangling. The reel, made of plastic, will fit into a shirt pocket. It is divided into five sections to permit the angler to store various sizes of leader material. A built-in blade cuts off the desired length. Gut leaders can be softened by winding a wet string around the section holding the gut.



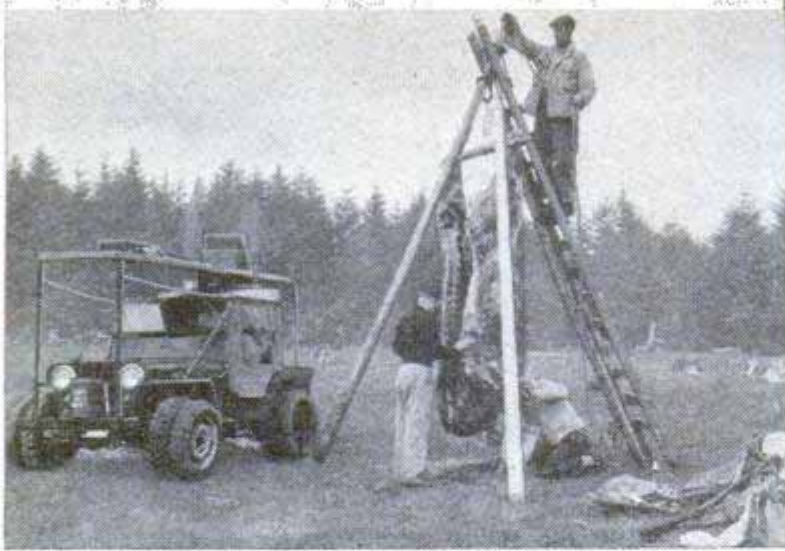
Tester for Photo Flash Bulbs Clips in Pocket

To prevent waste of film and possible loss of a picture, a simple flash-bulb tester clips into a pocket and does not have to be removed when testing. The instrument makes it possible to test a bulb before taking a picture. The tester lights up when the bulb is good. It is safe to use as it cannot flash the bulb during the test.

Miniature Camera Is Small Enough To Be Worn on a Key Chain

Not much bigger than a fifty-cent piece, a circular candid camera can be worn as a lapel camera or on a key chain. Special film cartridges containing six exposures are used and the cost of the film includes developing and printing of enlargements. Loading is practically automatic and a safety feature prevents accidental exposures.





Rancher Uses Rifle and Jeep To Get Cattle to Market

Bringing his beef cattle to market is as exciting as hunting wild animals for Ernie Perlstrom of Queen Charlotte Islands, B. C., because his herd has been running wild for years. His range, 50 miles from the nearest town, is located on the coast and is accessible only by driving along the beach for 35 miles. To haul his beef to market, Perlstrom equipped his jeep with double wheels, a power winch and an overhead frame on which the beef is carried. The dual wheels prevent the jeep from bogging down during the 70-mile run along the sandy beach. At the range, he stalks his herd with the jeep and brings one of the cattle down with a shot from his hunting rifle. He then sets up a tripod and hauls the carcass to the peak with the winch. When the animal is butch-

Left, butchering a 600-pound bull on the range. Right, rancher shoots cattle to get them to market. Below, he can drive past this stump on his 35-mile beach trip only when the tide is out



ered, it is covered with canvas and hung for 24 hours, after which the 600 to 900-pound load is packed on the quarter-ton jeep for the trip to the market.



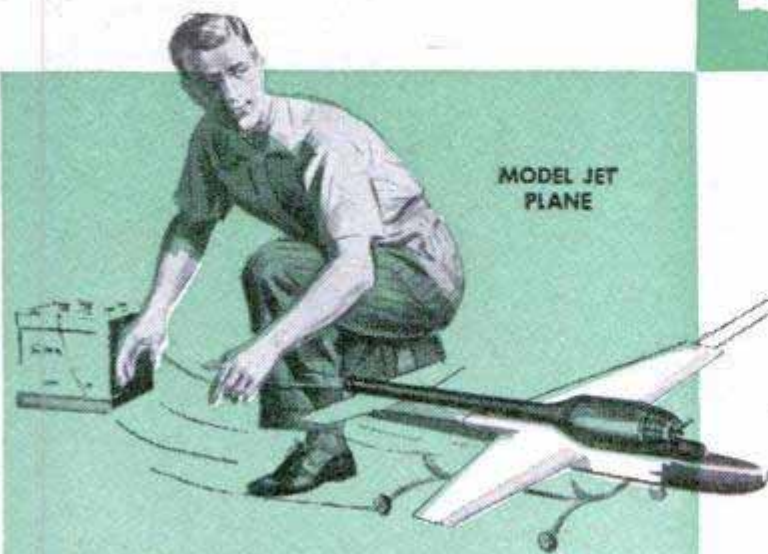
Pocket Pillow

As small as a book of matches when deflated, a plastic pillow can be inflated to support up to 250 pounds pressure. After the pillow is inflated, two plastic flaps are joined to prevent air from leaking through the opening. When the pillow is to be deflated, a paper tube is inserted in this opening and the air rushes out.

When inflated, pillow supports 250 pounds. Inset shows size compared to match book

☐ In 1948, U. S. motorists drove 395 billion miles in their 41 million automobiles, a government survey disclosed.

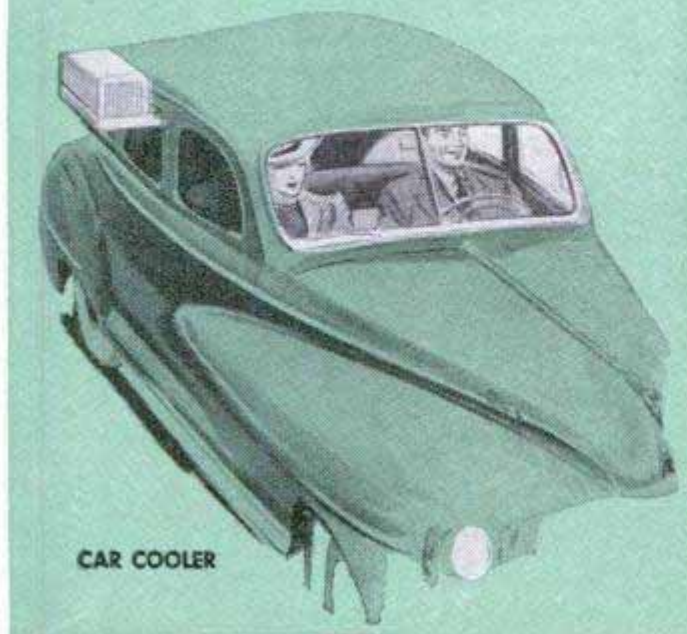
MODEL JET PLANE, prize winner in the 1948 Second International Model Plane Contest at Detroit, Mich. Complete plans for building this "air splitting" model will be found on page 206



MODEL JET PLANE



MASONRY HOUSE



CAR COOLER

Craftsman Section



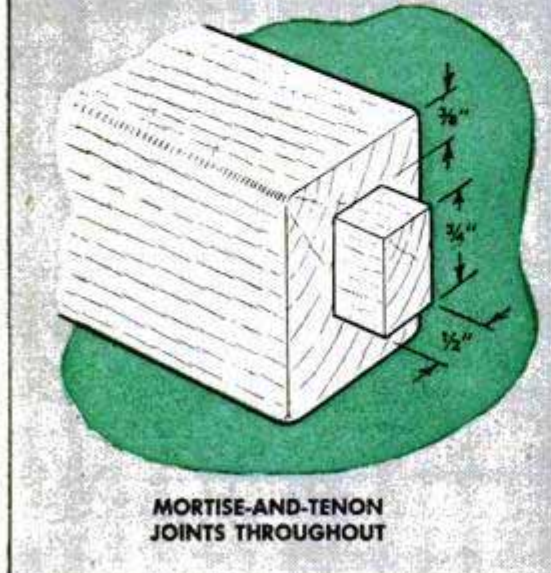
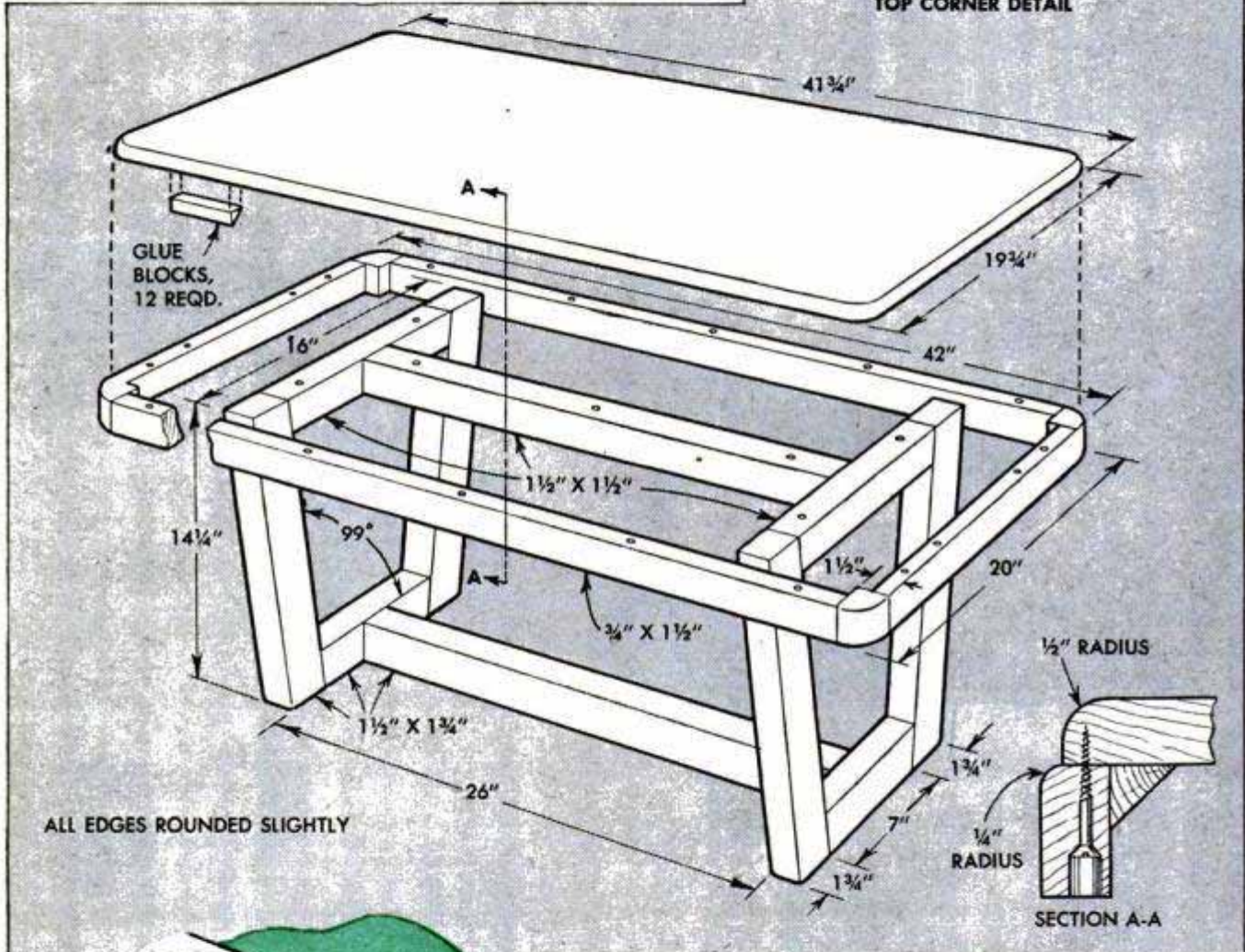
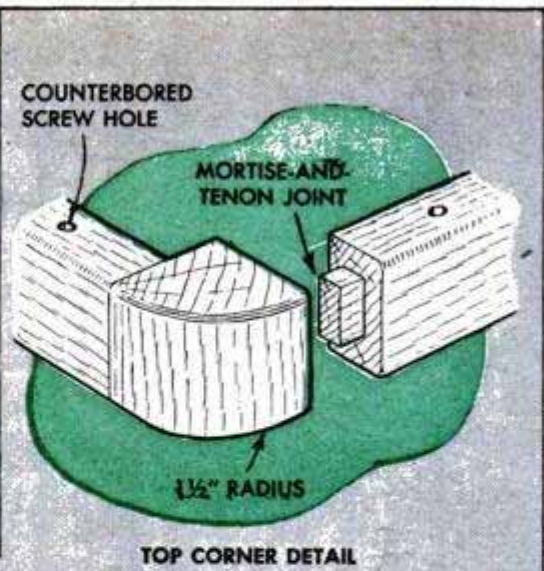
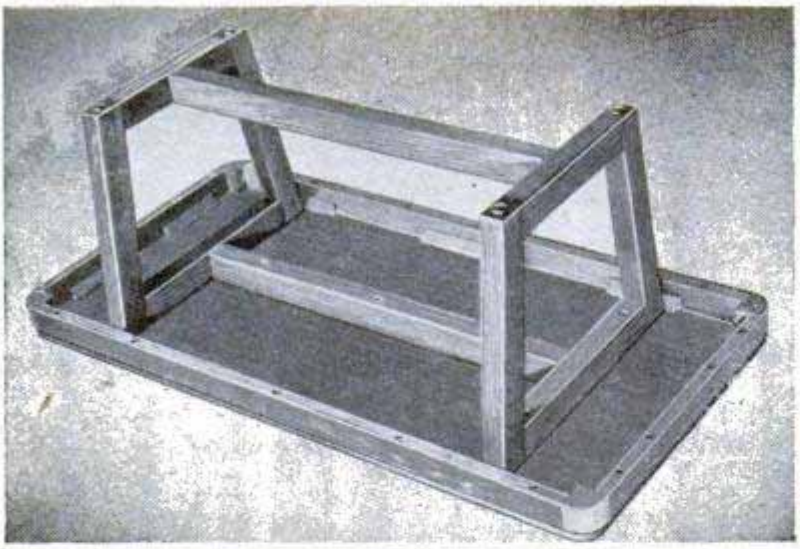
MASONRY HOUSE of concrete blocks, brick, etc., has insulated floors and walls, and is damp-proofed. Build this cozy house yourself and save money. Story on page 186

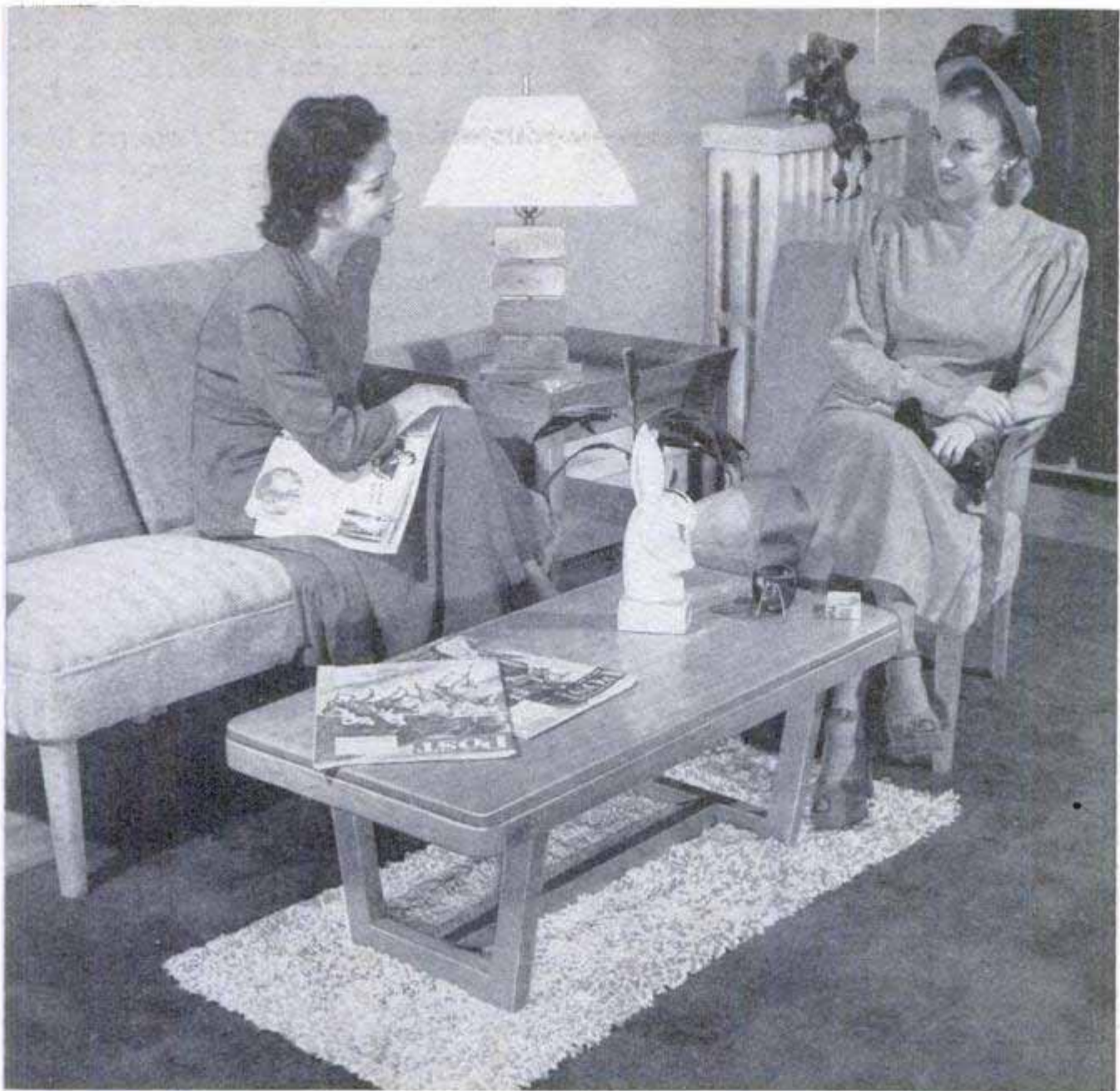
CAR COOLER lets you ride in comfort even on the hottest days. It will not increase the humidity inside the car. Evaporation of water cools the air. See page 221 for details

COFFEE TABLE in rich mahogany. Just the thing for the home furnished in modern style. Simple lines make construction easy for any craftsman. The plans are on page 178



COFFEE TABLE





Furniture You Can Build p.57

By Richard A. Buell

SIMPLE modern styling, which features an offset top rail and a subdued combination of straight and curved lines, individualizes the design of this smart-looking coffee table. Although the table shown was made of mahogany, other woods can be used when it is desirable to match the finish of other furnishings in both color and graining. White mahogany (primavera) is a popular choice as it finishes light colored with an attractive ribbon grain. The top is built up to the required width by gluing together a number of narrow strips of $\frac{3}{4}$ -in. stock. Use five $\frac{3}{8}$ -in. dowels equally spaced in each joint. After the glue is dry, sand the top smooth, trim it to the finish dimensions given on the opposite page and round the edges to a $\frac{1}{2}$ -in. radius.

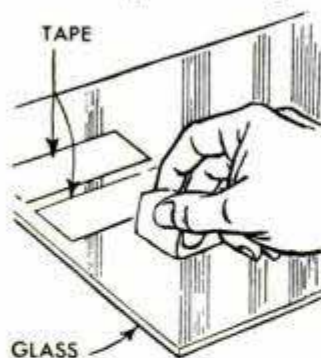
The top rail is built up as a frame, the side and end members being mortised into rounded corner blocks. Note also that the corners of the top are rounded to the same radius as the blocks. The top corners of the rails and blocks are rounded to a $\frac{1}{4}$ -in. radius as in section A-A of the assembly details. The completed rail is then attached to the top with screws and 12 triangular glue blocks spaced as shown. The legs are assembled as units, each consisting of two posts joined to a top and bottom rail with mortise-and-tenon joints. These units then are joined to top and bottom stretchers with mortise-and-tenon joints as in the assembly detail. Tenons on the top and bottom rails of the leg units are $\frac{3}{4}$ in. long and must be shouldered at an angle to give the posts the proper slant. Width of the top shoulder is given in the lower detail.

Stovepipe Over Camp-Table Legs Protects Duffel From Rodents



Before leaving a camp for an indefinite period of time, protect equipment and food from rodents by storing the articles on top of a table, the legs of which are set inside lengths of stovepipe. Force the lower ends of the pipe into the ground an inch or so to hold them steady and rodents will be unable to reach the table top. This treatment, of course, will not offer protection from leaping rodents or animals large enough to stand on the ground and reach the top of the table.—John Krill, North Lima, Ohio.

Tape Strips Placed on Glass Are Kept Ready to Use



If a number of strips of tape must be used for masking purposes or sealing of packages, cut them to size and place them, adhesive side down, on a piece of glass. They will stick lightly to the glass and can be picked up with one hand as needed. This will not affect the adhesive quality of the tape.—Michael Ligocki, Gary, Ind.

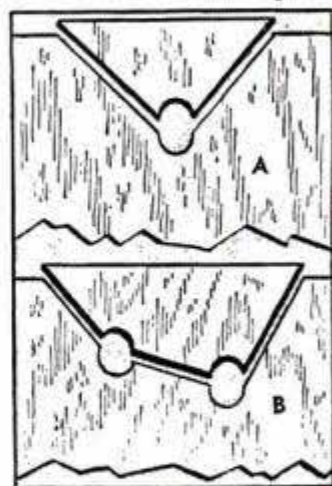
Starting Flooded Outboard Motor

Should your outboard motor flood while trying to start it, shut off the fuel at the gas tank. A couple of pulls on the starter rope will clear the carburetor of fuel, after

which the motor will often start and run for a few seconds. Then open the fuel valve and the motor should start easily.

Installing Wallboard Around Pipe

When wallboard must be fitted around a pipe, unsightly saw cuts are practically eliminated by cutting out an angular segment of board instead of making straight cuts from the edge of the board to the pipe hole. Whether cut out for one pipe, A, or two pipes, B, the sides of the angular segment will fit snugly and the saw cuts can be hidden with a coat of paint. With the segment in place, the edge of the wallboard is slightly uneven because of the saw cuts, but this irregularity can be hidden by covering it with quarter round.



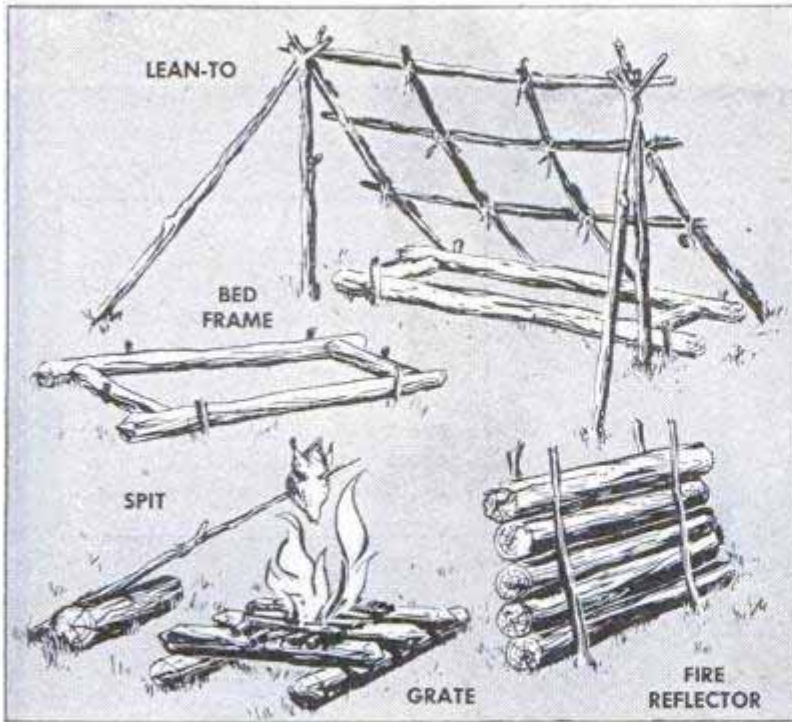
John W. LaLonde, West Allis, Wis.

Identification for Your Binocular

By simply sticking a gummed label, containing your name and address, inside one of the eyepiece covers of your binocular, you have a positive yet secret means of identifying it if it is lost or stolen. In this position, the label is protected and it takes only a moment to remove the binocular cover and prove ownership.



Emergency Camp Constructed Entirely With Ax



An ax is the only tool needed to build a complete emergency camp for spending an unexpected night in the woods. With its help and a means of lighting a fire, you can be comfortable without blankets even though the night is chilly. The first step in setting up the camp is to make a lean-to. For the uprights, use two 6-ft. saplings with forks and set them firmly in the ground, spacing them about 7 ft. apart. Then cut a long pole and lay it across the forks. Four 6 or 7-ft. saplings are leaned with their ends resting on the crosspole. Then two or three poles are cut and laid across the leaning poles. The front of the lean-to is braced with two 10-ft. poles with forked ends, and all the poles are tied securely with strips of thin bark cut from a young tree. Next, the bedframe is made from logs held in place by stakes driven in the ground. After this, gather pine or cedar branches. Lay the smaller branches in the bedframe to provide a soft mattress and lay the larger branches in rows, with their tips downward, on the lean-to roof, starting at the

bottom and working up. Several layers of cedar branches will make the lean-to roof almost watertight.

A properly made campfire is extremely important. As it must have plenty of draft, cut five small, green logs about 4 ft. in length. Place two of these on the ground several feet in front of the lean-to and lay the other three logs across the first two. Then build a fire of small, dry sticks on top of the logs so the coals will fall between them and smoulder, making a bed of coals for an all-night fire. If the night is cold or stormy, set up a reflector in back of the fire so it will throw the heat into the lean-to. This is done by placing four or five green logs one on top of the other, holding them with four stakes driven into the ground. If you are fortunate enough to have some kind of meat, impale it on a spit and broil it over the fire. Use a limber, green stick for the spit and prop it over a small log to hold the meat far enough above the fire to permit cooking it without burning.—R. A. Jenkins, St. Louis, Mo.

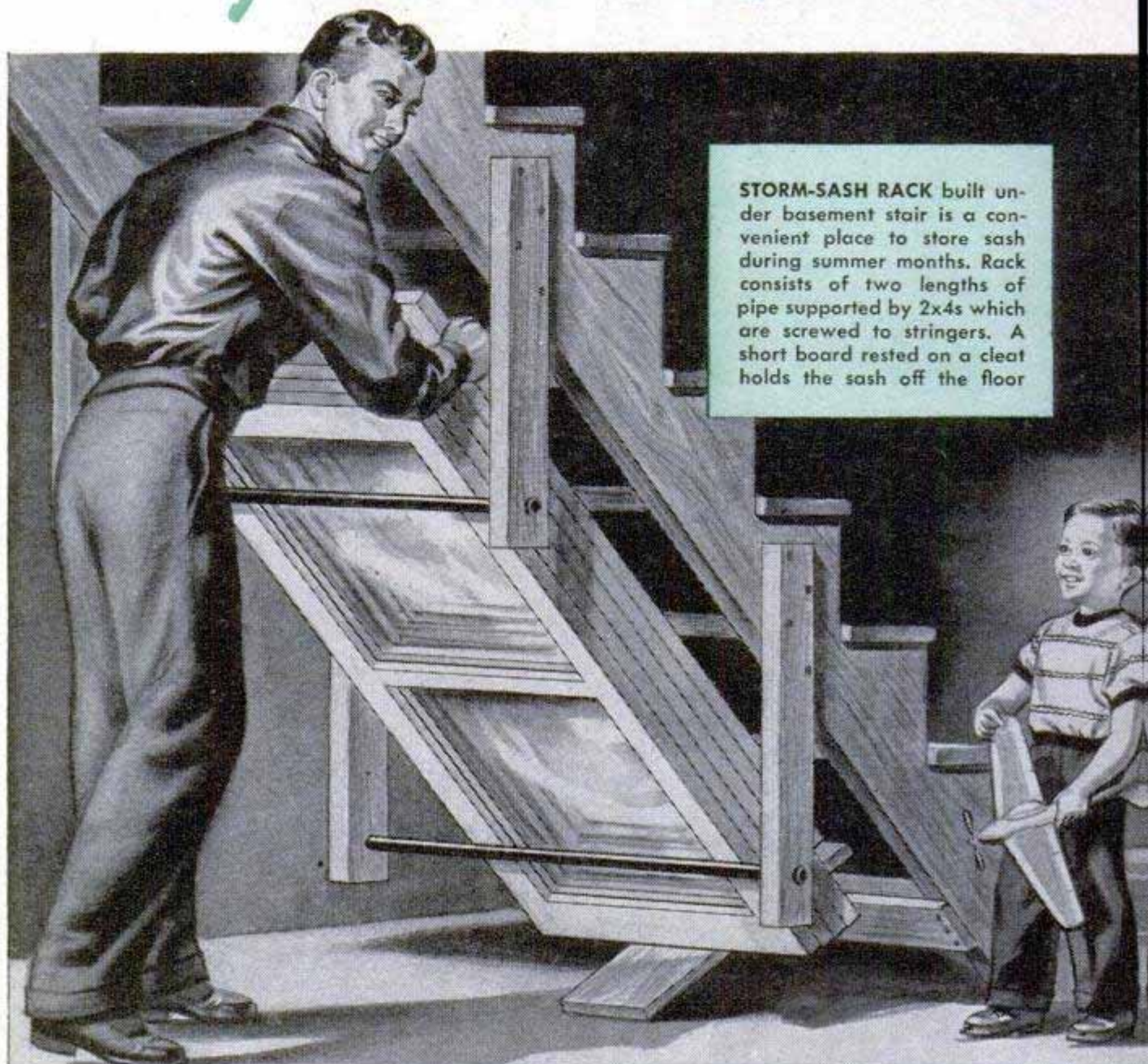
Dimension Table for Standard Pipe Minimizes Measuring Errors

When making plumbing or heating repairs in the home, costly waste of pipe is likely to result from inaccurate measurements, such as, forgetting to allow for the threaded ends of the pipe inside the fittings. This table, which gives pipe diameters and thread lengths in fractions of an inch, will help you obtain correct measurements.

Regis R. Pfoff, Homestead, Pa.

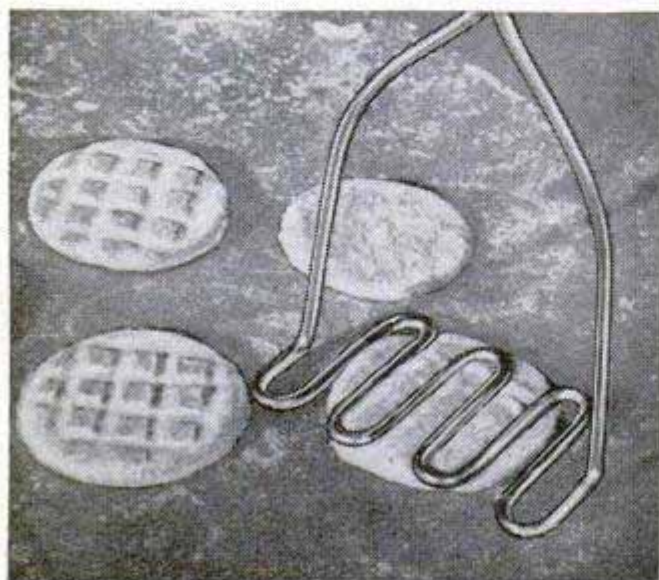
| PIPE SIZE | 1/8" | 1/4" | 3/8" | 1/2" | 3/4" | 1" | 1 1/4" | 1 1/2" | 2" |
|-------------------------------------|---------|---------|---------|---------|---------|---------|----------|----------|---------|
| INSIDE DIAMETER | 5/16" | 3/8" | 1/2" | 5/8" | 1 1/16" | 1 1/2" | 1 3/8" | 1 5/8" | 2 1/16" |
| OUTSIDE DIAMETER | 1 1/32" | 1 1/32" | 1 1/16" | 2 1/32" | 1 1/16" | 1 1/16" | 1 21/32" | 1 29/32" | 2 3/8" |
| APPROXIMATE THREAD LENGTH ONE END | 1/4" | 3/8" | 3/8" | 1/2" | 5/8" | 1 1/16" | 1 1/16" | 1 1/16" | 3/4" |
| APPROXIMATE THREAD LENGTH BOTH ENDS | 1/2" | 3/4" | 3/4" | 1" | 1 1/8" | 1 3/8" | 1 3/8" | 1 3/8" | 1 1/2" |

Solving HOME PROBLEMS

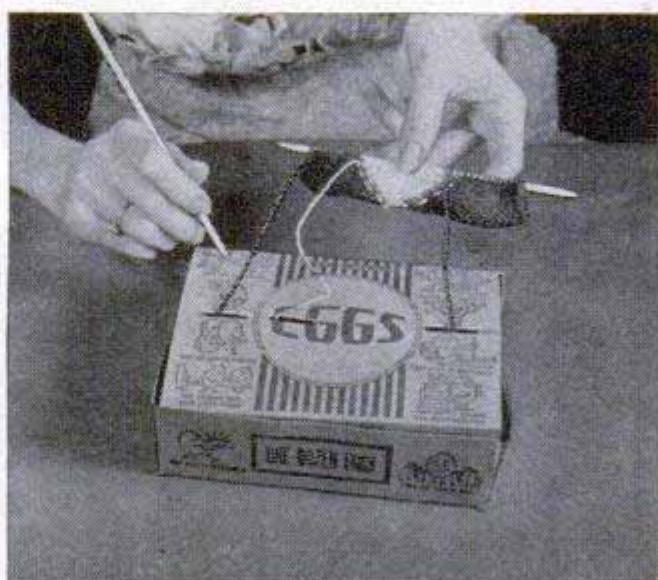


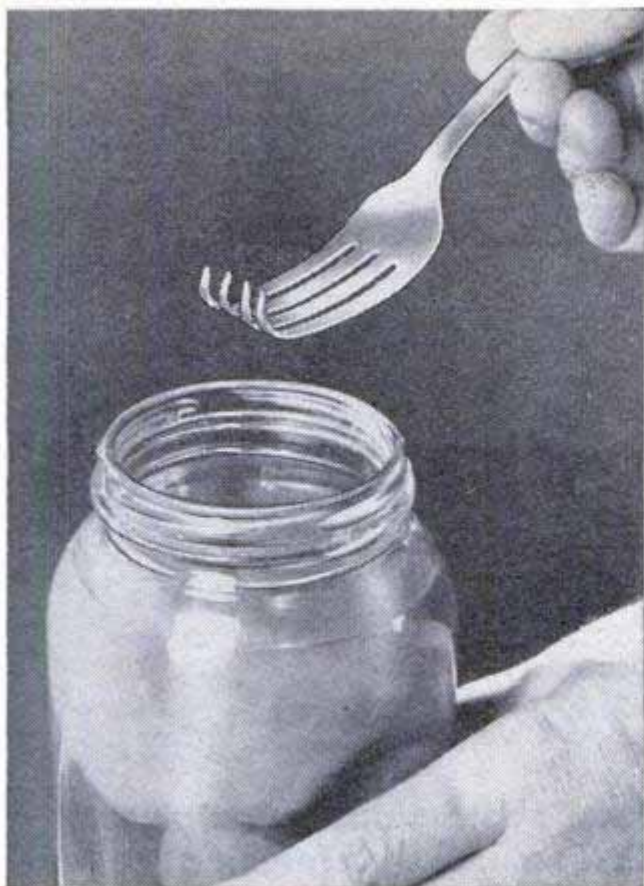
STORM-SASH RACK built under basement stair is a convenient place to store sash during summer months. Rack consists of two lengths of pipe supported by 2x4s which are screwed to stringers. A short board rested on a cleat holds the sash off the floor

NOVEL WAFFLE EFFECT on top of cookies is made quickly by indenting the dough with a potato masher

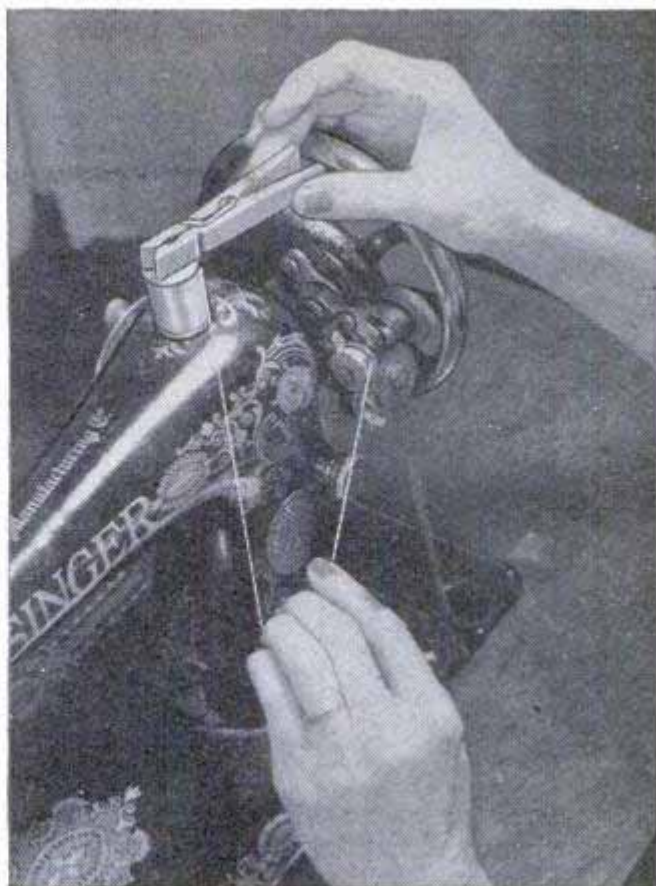


YARN WON'T TANGLE when knitting Argyle socks if the balls are stored in a cardboard egg carton

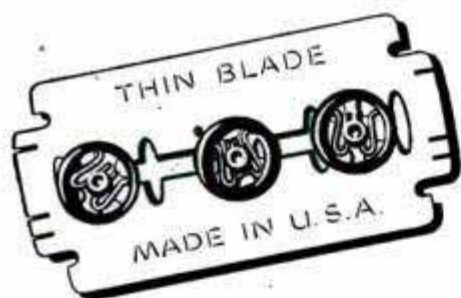




PICKLES OR OLIVES are removed from a tightly packed jar with an old fork that has tines bent upward. The tines can be bent with a pair of pliers



CLOTHESPIN HOLD-DOWN clamped to the spindle of a sewing machine keeps the spool of thread from jumping off the spindle when winding the bobbin



HOLDING A RAZOR BLADE is easier when ripping seams if dress snaps are placed in holes of the blade

COMBING REMOVES SNARLS from the matted fringe of a luncheon cloth or scarf after it has been ironed

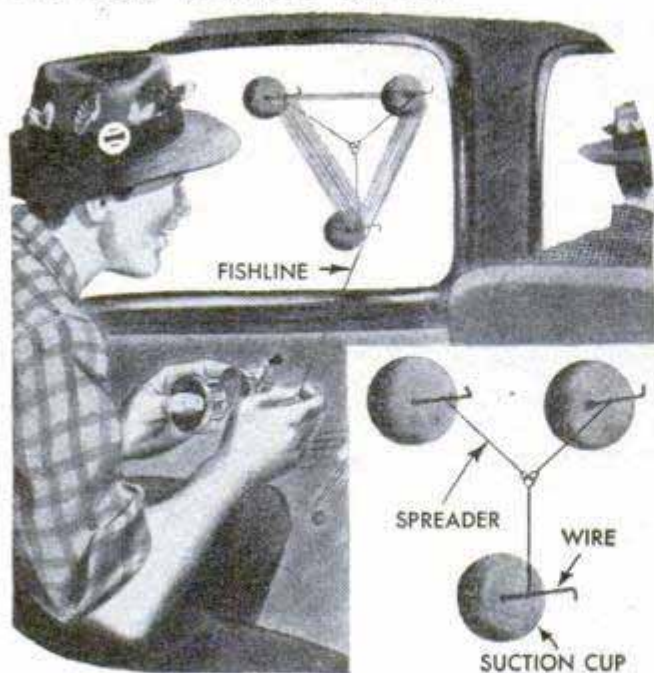


WAX-PAPER COVERS for paraffined jars of jam or jelly can be held securely with ordinary jar rubbers

APPLYING LIQUID PLANT FOOD is done without injuring leaves if funnel spout is embedded in dirt



Suction Cups Hold Fishline Drier On Rear Window of Car



Mounted on a car window with suction cups, this novel fishline drier permits drying the line while traveling in the car. It is made by cutting three sections from a wire coat hanger and bending them to form hooks. The bases of the hooks, which are bent loop-shape, are simply bolted to the suction cup. If desired, a three-pronged spreader can be made to reinforce the hooks when fishline is wrapped around them.

Lee H. Schrimpf, Palatka, Fla.

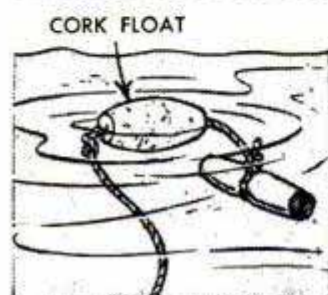
Staples Clean Paint From Scraper



Keeping the scraper blade clean by drawing it between two staples driven into the side rail of a ladder speeds scraping burned paint from the side of a house. The staples should be spaced a distance

approximate to the thickness of the blade and located at an easily reached point on the rail.—G. E. Hendrickson, Argyle, Wis.

Cork Float for Starter Rope

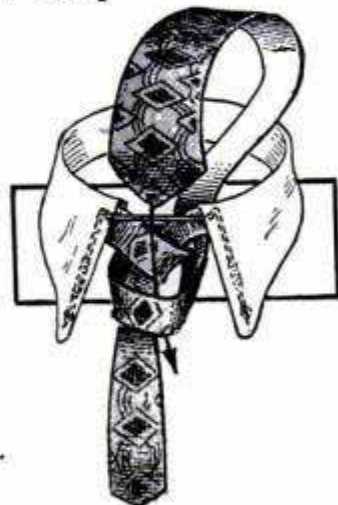


If the handgrip on the starter rope of your outboard motor is not sufficiently buoyant to float it, make sure that it will not sink, if dropped in the water, by slip-

ping a large cork float onto the rope. Push the float almost to the handle so it will not interfere with starting the motor, and then tie a large knot just below the float to keep it from sliding off the end of the rope.

Tie Secures Collar Stay

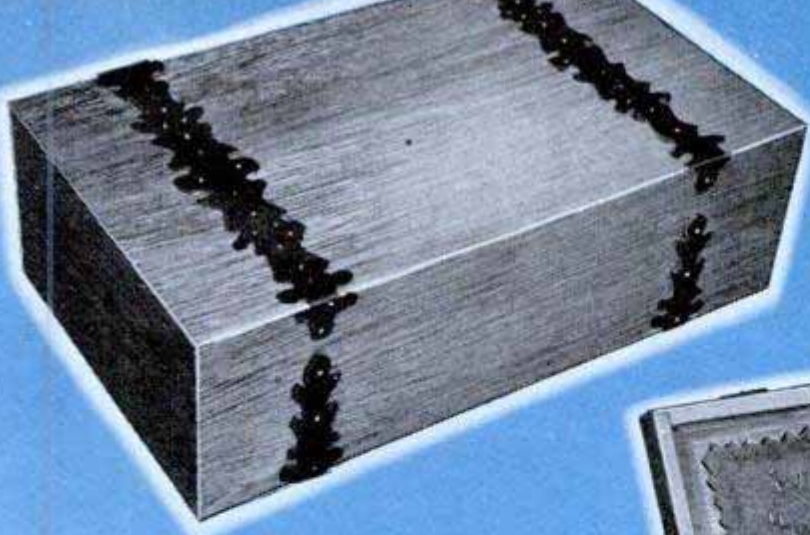
Looping a tie around the cross-piece of a wire collar stay holds the stay in place and keeps the tie centered. This also prevents the wire crosspiece from showing above the knot, improving the general appearance.—Johnny Kane, Lakewood, Ohio.



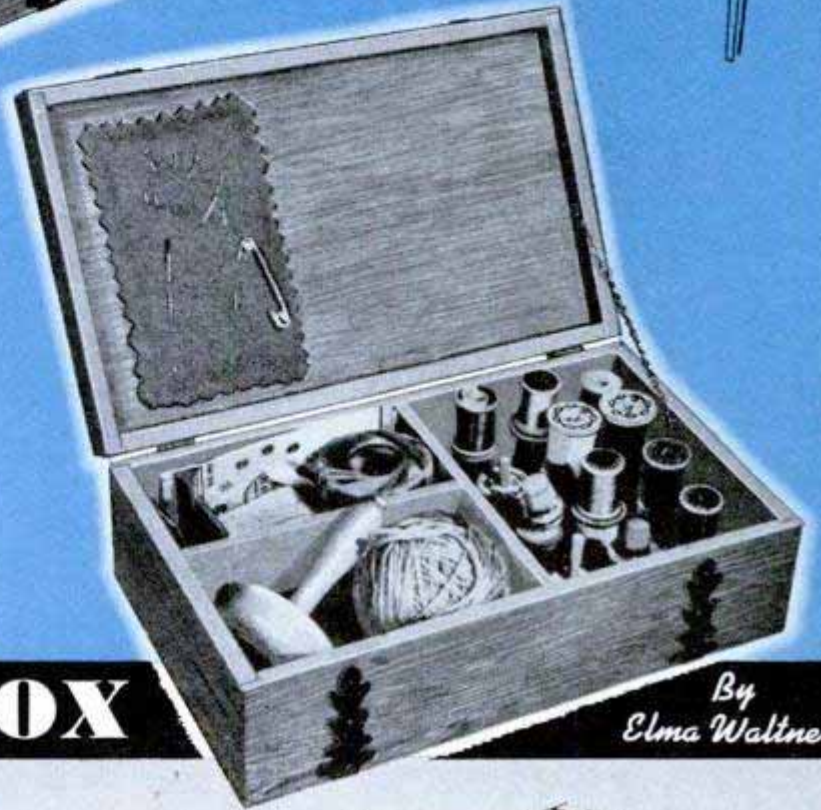
Lead Shot Balances Container To Permit Easy Weighing

To eliminate deducting the weight of duplicate containers when repeated weighings are made on a balance scale, one workman uses lead shot to balance the empty container. In use, the container is placed on one pan of the scale and an empty bottle on the other. Shot is poured into the bottle to balance the container, after which the bottle is corked to prevent spilling. Then the regular weights are employed in the usual way.



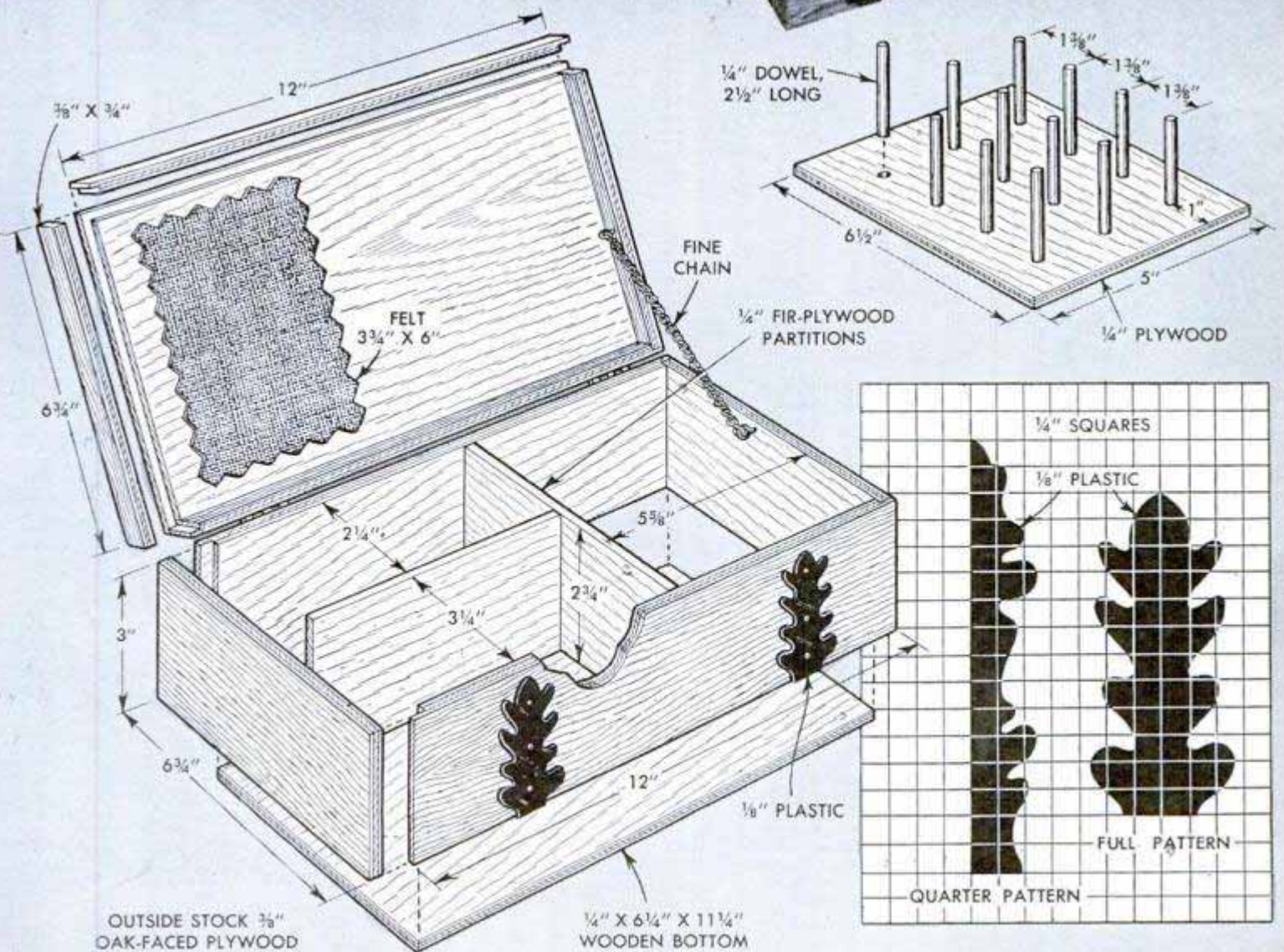


Everything will be at hand when you sit down to sew if your sewing essentials are kept in this fancy box. The box is made as a single unit, the top piece being glued and clamped to the sides, and then the unit is ripped through at the hinge line to form the lid. The bottom is fitted inside the assembly and is held with small brads. The partitions are merely glued in place. The plastic overlays are bent over the edge of the lid by heating them to make them pliable. Select small brass hinges and a support chain for the lid



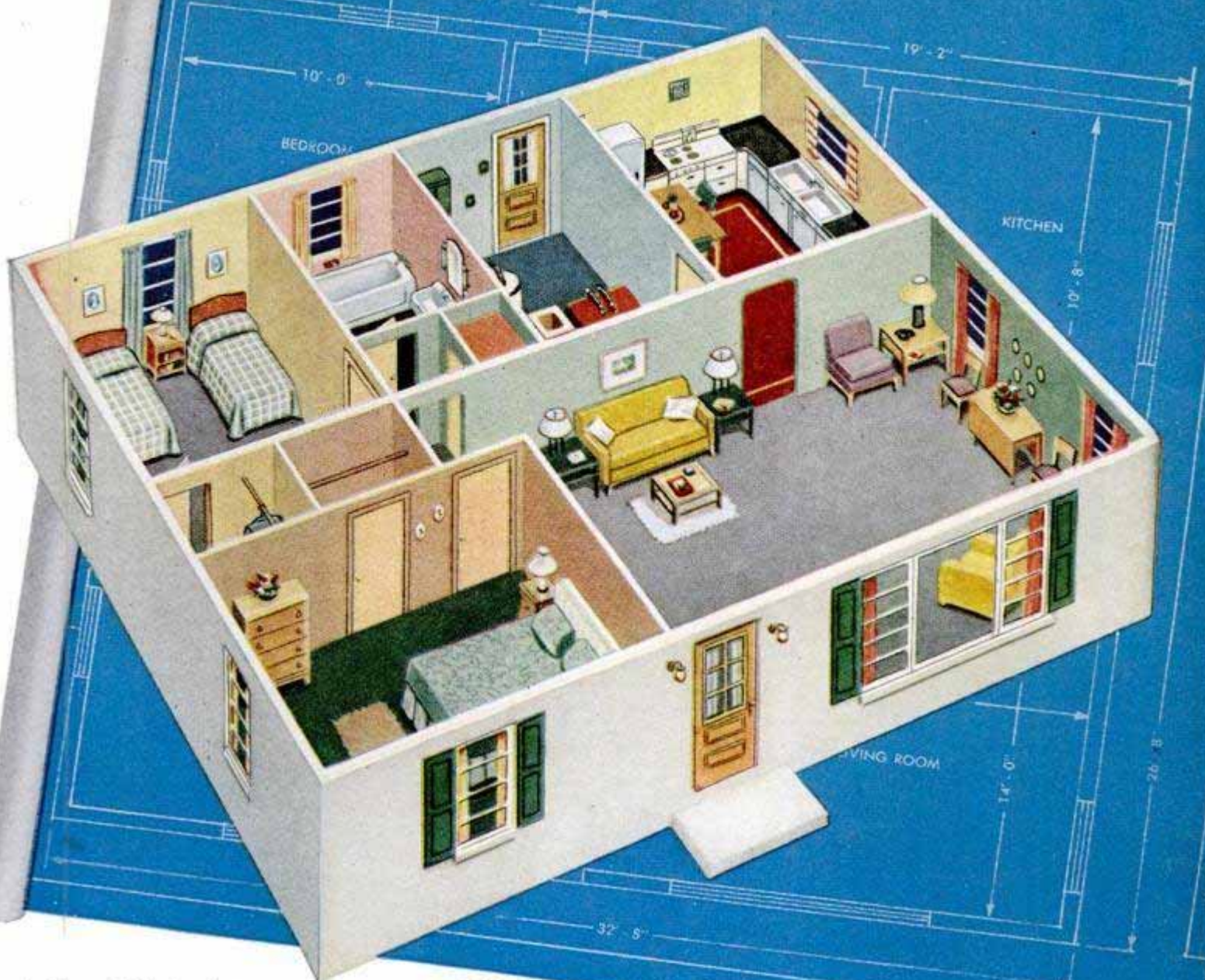
SEWING BOX

By
Elma Waltner





This dream home in stuccoed masonry, consisting of cabinet kitchen, two bedrooms, living room, bathroom and utility room, complete with laundry and heating plant, is yours for less than \$3650 if you build it yourself. Block construction is within the ability of an average man



build-it-yourself

CONCRETE-BLOCK HOUSE

FIVE COZY ROOMS FOR \$3650

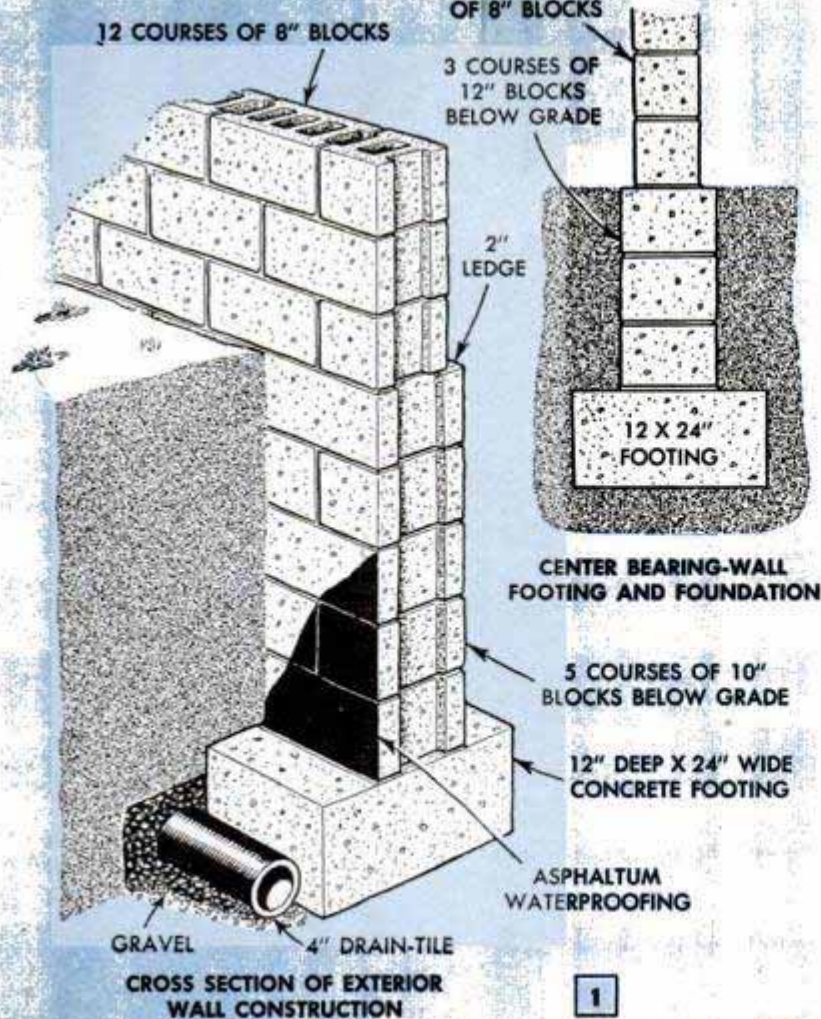
by Wayne C. Leckey

Part I

ARE YOU one of the thousands caught in the net of housing shortages? Do high costs make the problem seem insurmountable? If you are willing to devote your spare time to the problem for a few months, it can be solved by building this cozy little concrete-block house. It's not so little either—just take a look at the interior view above and then study the floor plan on page 189. Here is a home that will accommodate a family of four, and it's all yours, ready to occupy, complete with heating plant, laundry and a beautiful cabinet kitchen, for less than \$3650—merely the cost of a fine new car. That's what the

materials, including the plastering, cost Henry Nehrbaas, an artist on the *Popular Mechanics* staff, who built it in Palatine, Ill., for his young married daughter.

Now, about building it! If you can mix mortar and concrete, and saw a board straight, you can build it yourself—it's that simple. Yes, it means a lot of hard work, but it takes practically no skill. A complete instruction book giving step-by-step directions along with easy-to-follow blueprints has been prepared by the *Craftsman Editors*—just as was done for *Popular Mechanics* build-it-yourself frame house. This house, as you may know, was greeted



CROSS SECTION OF EXTERIOR WALL CONSTRUCTION

1

The number of courses of blocks required below grade varies with the depth of the frost line in different regions. Note that heavier blocks are specified for use below grade for all walls including the bearing partition. Waterproofing the walls with asphaltum paint is optional although it helps keep the earth dry below the concrete floor. Tiling, however, is very important, especially if the lot grade is low, and it is unwise to omit it for the sake of economy. The tile is laid around the footings and connected into the regular storm or sewer drainpipe

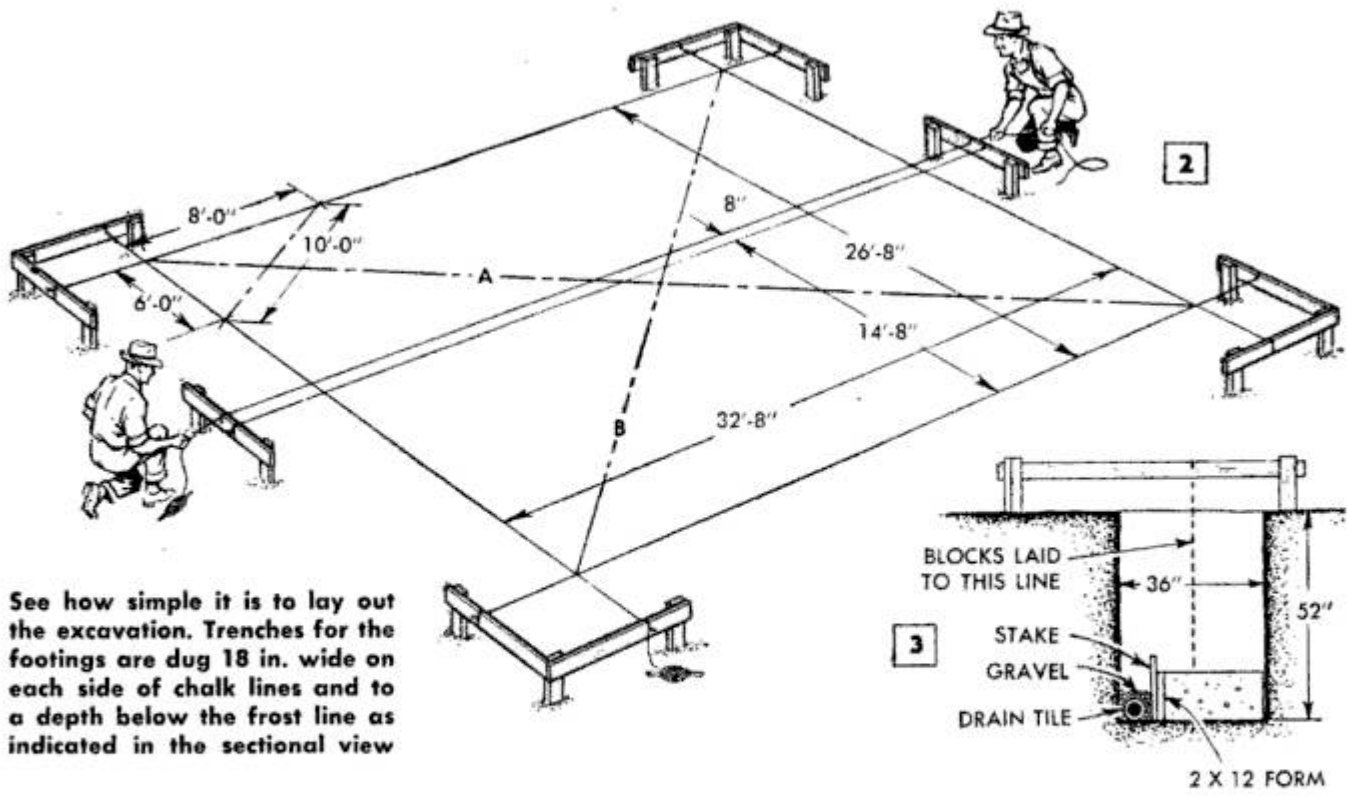
with enthusiasm by thousands of people. The editors followed the building of the block house as the work progressed and have hundreds of photos, diagrams and details which, together with a down-to-earth descriptive text, cover the entire construction of the house from the first shovelful of dirt to the last stroke of the paintbrush. The book and blueprints will be available from our Book Department about May 31st.

Like its famous predecessor, this house, too, was test-built to prove soundness of construction and to determine its actual cost. The \$3650 figure is based on prices in the Chicago area, a relatively high-cost region, and in a fairly high-cost year. In other regions, this home, no doubt, can be built for considerably less. Additional savings can be had by selecting less expensive bathroom and kitchen fixtures and doing without some of the refinements for the time being.

The original house was constructed of lightweight building blocks, which are easy to handle and have high insulating qualities. However, walls can be built of regular concrete blocks, cinder blocks and even brick backed with tile. Standard 8-in. blocks were

Below, except for stuccoing the outside face of the blocks and pouring the stoops, this view shows the outside work completed





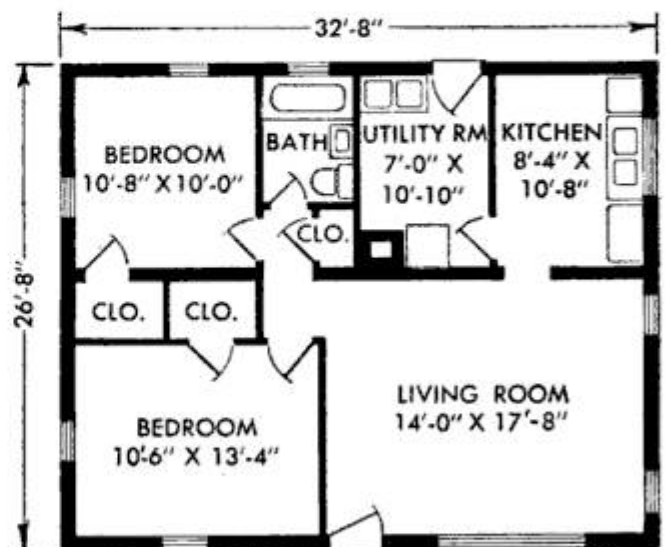
See how simple it is to lay out the excavation. Trenches for the footings are dug 18 in. wide on each side of chalk lines and to a depth below the frost line as indicated in the sectional view

used above grade for the exterior walls and the main bearing partition wall. All other walls were laid of 4-in. blocks. Exterior walls are furred on the inside and insulated before being lathed and plastered, whereas the plaster on the partitions is applied directly to the blocks. The insulated concrete floor is poured 4 in. thick over a tamped gravel fill with a vapor barrier placed between as recommended by the results of recent tests conducted by the University of Illinois.

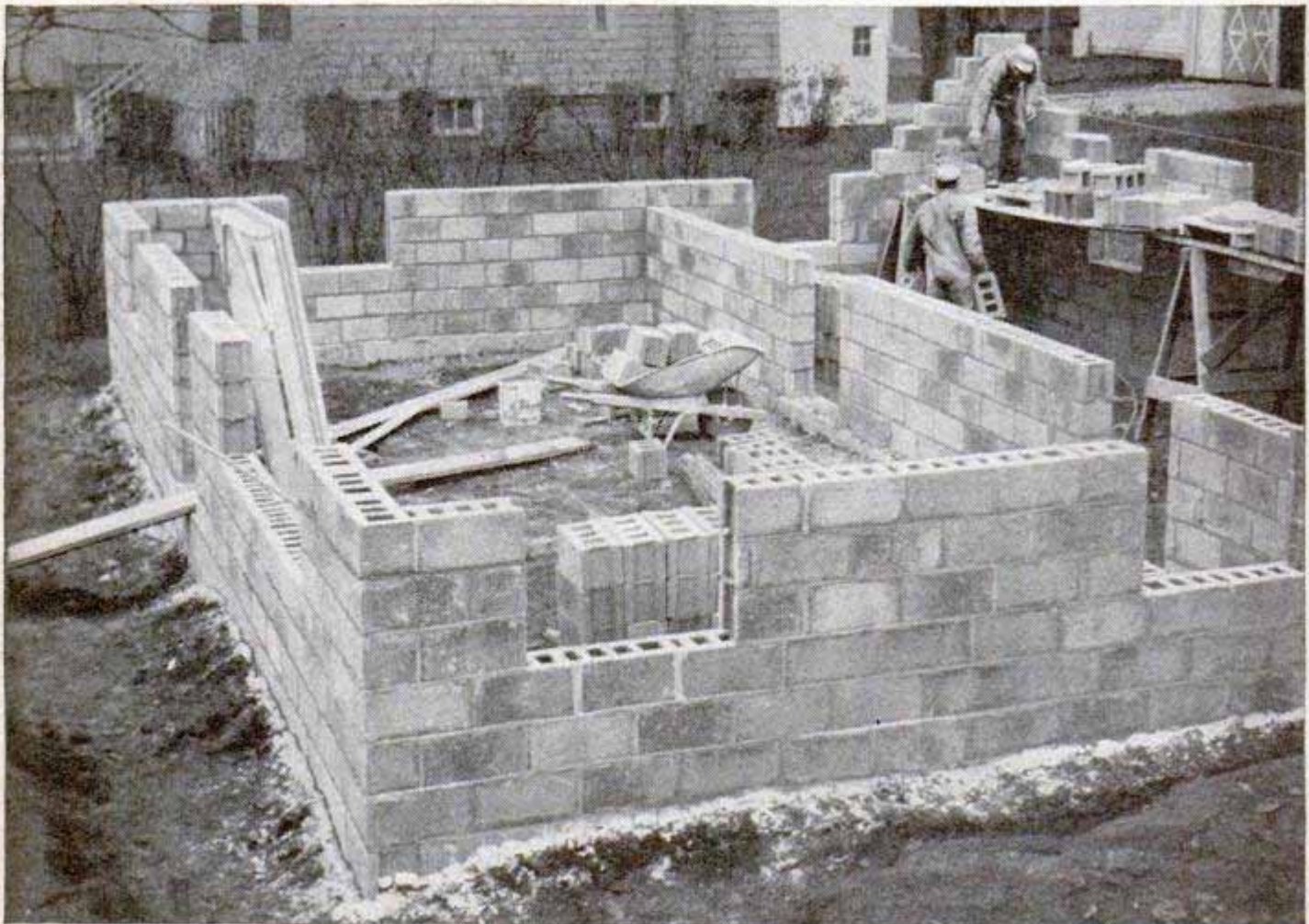
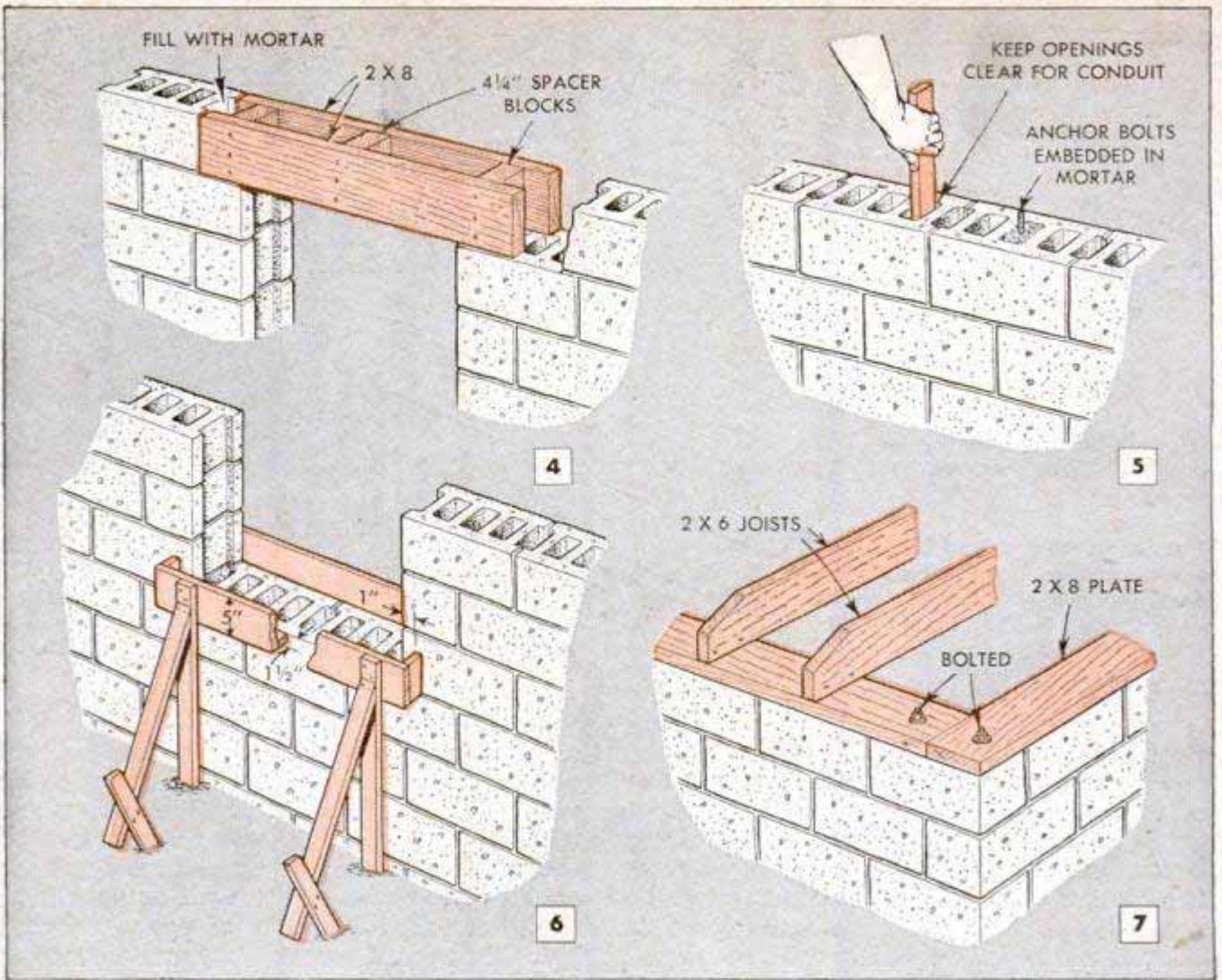
The utter simplicity of construction is apparent in the accompanying photos and sketches and those to follow in Part II. As space in the magazine does not permit giving a detailed description of the construction, these articles are presented merely to acquaint you with the basic steps. The initial step showing how simple it is to lay out the excavation is pictured in Fig. 2. A 3-ft. trench is dug completely around the house and also through the center for a main bearing partition. Where fairly severe winters prevail, the trench should be at least 4 ft. deep. Forms for the footings are erected by merely staking 2 x 12-in. planks on edge, as in Fig. 3, using the earth wall as one side of the form.

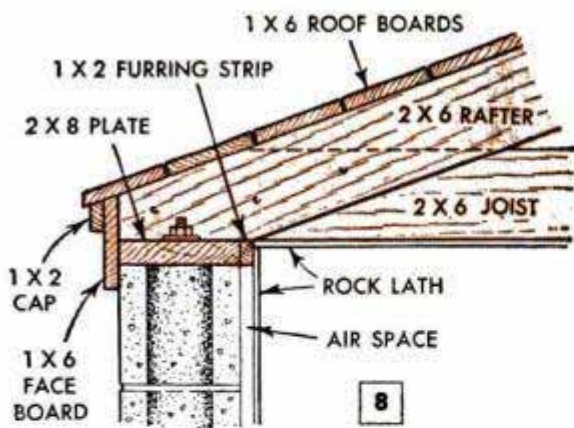
With the footings poured and the drain tile in place, you can start laying the blocks that form the foundation. Use 10-in. concrete blocks for the foundation of exterior walls and 12-in. blocks for the main bearing partition, as indicated in Fig. 1. When the grade line is reached, start using 8-in. blocks, which are laid twelve courses high. Each row of blocks is laid to a chalk line stretched from corner to corner. The starting row is plumbed from the building line,

using a long mason's level. Window and door frames can be mortared in place as you go along or set later. Half blocks are used at all openings, and the corners of the structure are plumbed and built up ahead of the rest of the wall as shown in the photo at the bottom of pages 190 and 191. Method of assembling and installing wooden lintels over the window and door openings is shown in Fig. 4, and a typical form for casting window sills is detailed in Fig. 6. Wherever an electrical convenience outlet is to be installed in a wall, keep an opening clear at that point for conduit by ramming a stick through the blocks from top to bottom as in Fig. 5. When the top course of blocks is laid, anchor bolts spaced about 4 ft. apart are embedded in concrete poured into the openings in the blocks. The bolts are used to anchor 2 x 8-in.



FLOOR PLAN

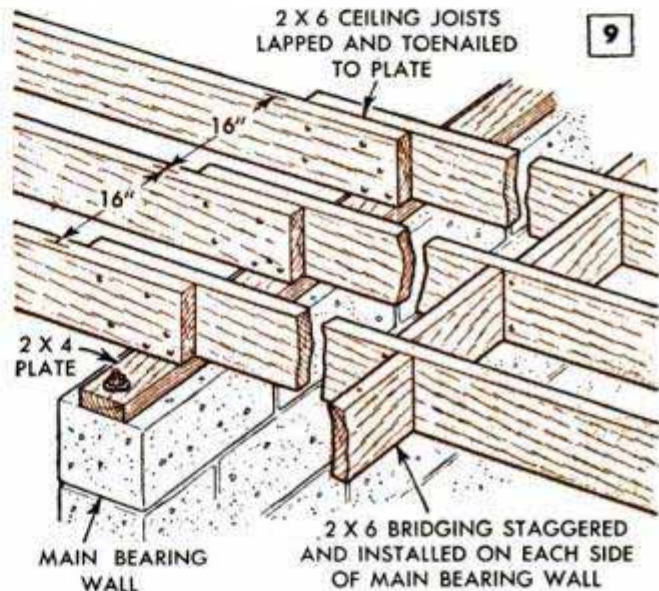
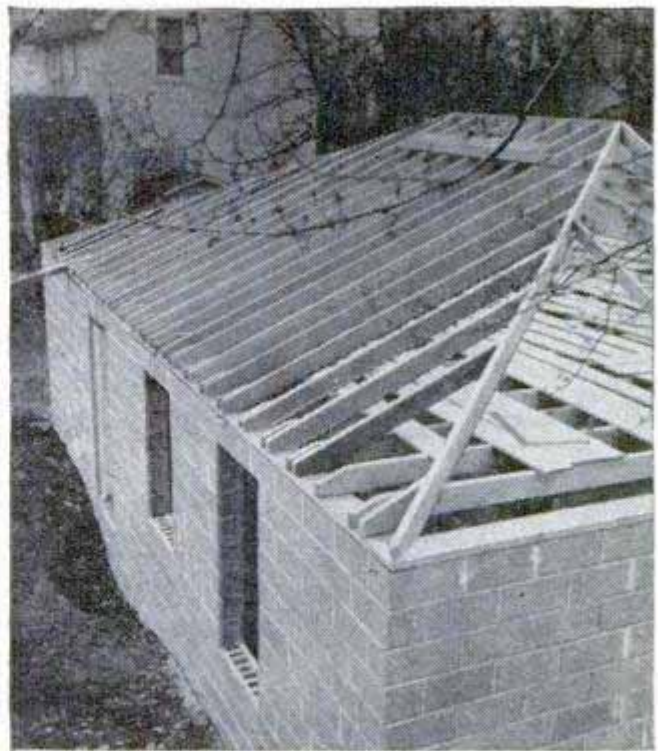




This sectional view and the photo at the right show the simplicity of the roof framing and the cornice. Rafters are spiked to the face of the joists and toenailed to a plate bolted to the top of exterior walls

plates which are placed on top of the blocks all around as in Fig. 7.

With the plates in place, the ceiling joists can be installed. These rest on a 2 x 4-in. plate bolted to the top of the main bearing partition, Fig. 9, and are lapped, spiked together and toenailed to both center and outside plates. Stock timbers (2 x 6 x 16s and 2 x 6 x 12s) are required for the joists which are spaced 16 in. on centers. When the joists are in place, they are cross-braced by bridging them with short lengths of 2 x 6-in. stock as shown in Fig. 9. A row of bridging is installed on each side of the



Ceiling joists rest on a plate bolted to the top of the main bearing partition. Ends are lapped, spiked together and toenailed to the plate. Bridging members are nailed between all joists to brace them

main bearing partition, the pieces being staggered to permit nailing.

Next come the rafters. Those in the center span of the house are raised first, using a 2 x 6-in. plank for a ridge board. These rafters are erected as if the house had a gable roof, spiking them to the face of the ceiling joists at the plate and into each other at the ridge board. With this section of the framing in place, a rafter is installed at each end, butting it against the end of the ridge-board plank. Then the long hip rafters are erected and short jack rafters are cut to fill in. The cornice around the roof consists of a 1 x 6-in. frieze board, which is nailed to the ends of the rafters as in Fig. 8. A 1 x 2-in. cap gives a slight overhang to the roof.

(To be continued)



U. L. 51

Hoe Blade on Bottom of Ladder Provides Handy Foot Scraper



Especially useful when working on newly constructed houses where the ground is muddy, half of a hoe blade screwed to the bottom rung of a ladder provides a handy foot scraper. Its use will prevent tracking mud up the ladder, thus making the rungs slippery. However, when descending the ladder, be careful not to step on the scraper.

Repairing Broken Tenon in Rung Without Dismantling Chair

A broken tenon in a chair rung or slat can be repaired by replacing it with a spring-held dowel without dismantling the

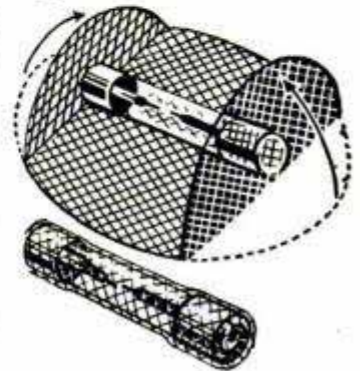


chair. After the damaged rung is removed, the broken tenon is drilled out and the depth of the tenon hole is increased. A small compression spring is placed in the hole and a new dowel is pressed down over the spring so its top is flush with the end of the rung. Then the rung is replaced in the chair, the dowel being depressed with a knife blade. When the rung is in position, the knife is pulled away, allowing the spring to force the dowel into the hole in the chair rail. The spring holds the dowel securely in place, resulting in a neat repair.

Donald F. Pecheck, Los Angeles, Calif.

Emergency Headlight Fuse

If a headlight fuse burns out while you are driving on a dark highway, a substitute fuse can be quickly improvised on the spot by wrapping the carburetor filter screen around the fuse and replacing it in the clips.



Although a disk-type screen is shown, a cylindrical one also can be used. An emergency fuse of this type will offer no protection to the wiring of the car circuit and, therefore, care should be taken to avoid any possibility of fire.

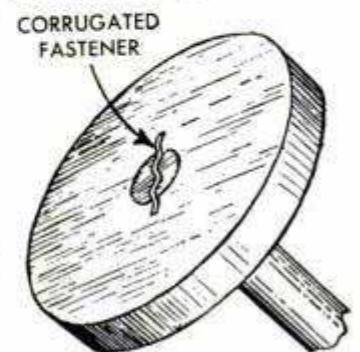
Ed Packer, Chicago.

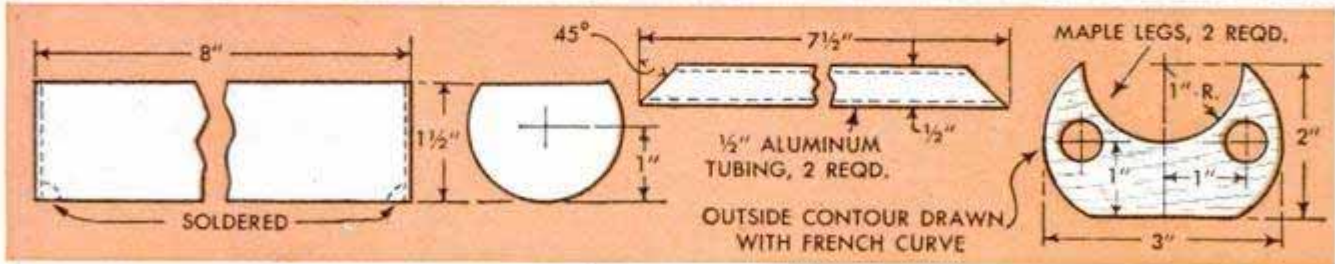
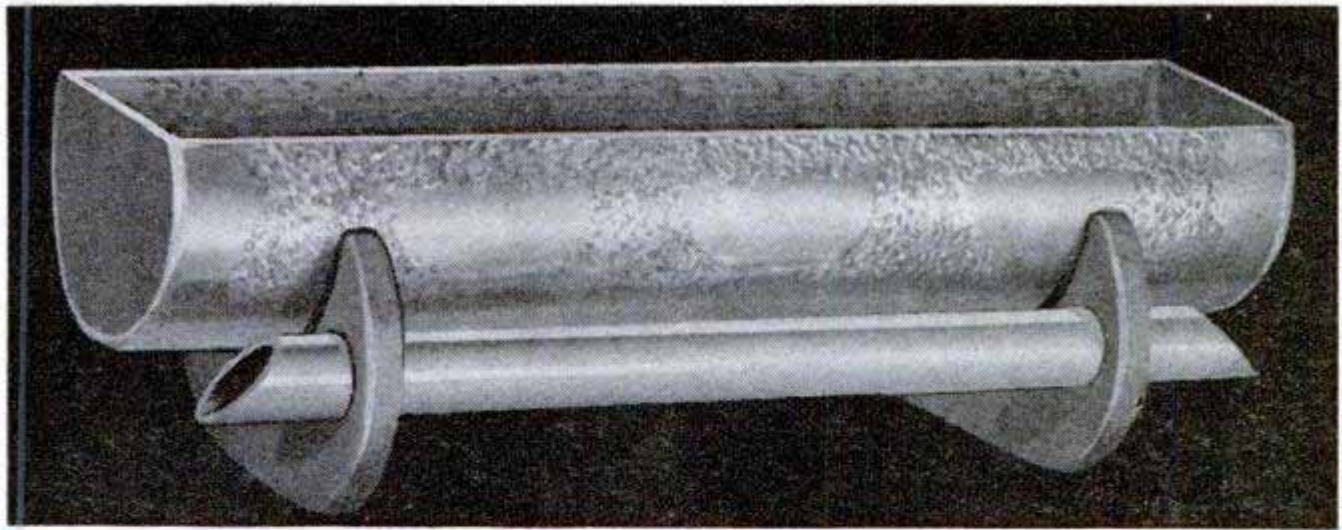
Tape Protects Rimless Spectacles

Before attaching sunglasses or reading lenses to rimless spectacles, use small pieces of clear cellulose tape to protect the lenses of the spectacles from scratches. Fasten the tape at the points where the clips of the special lenses fit over the spectacles.—Sarah Schuster, Clearwater, Pa.

Wooden Wheels Secured to Dowel With Corrugated Fasteners

When making toys, a simple way to attach wooden wheels to a dowel axle is to drive a corrugated fastener into the end of the dowel so that its ends embed in the wheel. The end of the dowel, of course, must be flush with the outside of the wheel, and the fastener should be driven across the grain of the wheel.—J. E. Long, Bethel, Vt.





Modern Plant Holder in Hammered Aluminum

Combining hammered aluminum with polished maple in a pleasing modern design, this one-evening project offers something different in plant holders. The small size pictured is just right for a window sill, coffee table or chest of drawers, and the holder can be made larger to serve as a centerpiece on a buffet or dining-room table. The plant holder consists of a length of 2-in. aluminum tubing set on legs, which are cut from $\frac{1}{4}$ -in. maple as shown in the right-hand detail. Holes are drilled in the legs for two lengths of $\frac{1}{2}$ -in. aluminum tubing and the legs are waxed and polished. To give rigid support to the legs, the tubes should be a snug fit in the holes. The side of the 2-in. tube is cut away as indicated and the ends are sealed with pieces of alu-

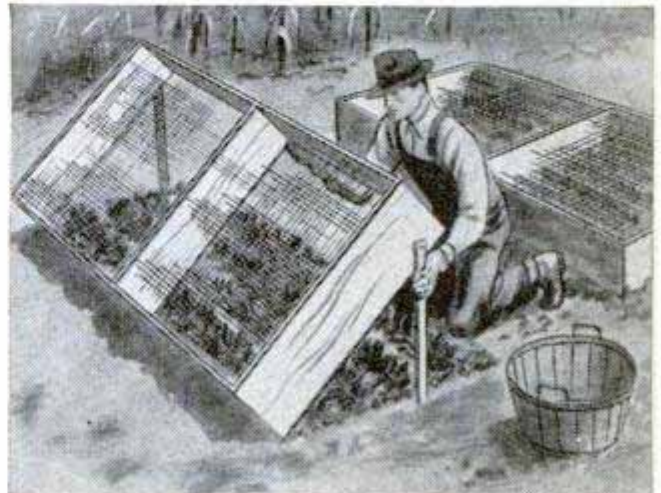
minum. This can be done by soldering or merely forcing oversize pieces in place. If the joints are to be soldered, use a special solder made for soldering aluminum. After the ends of the tube have been sealed, the corners are filed to a slight radius so the joints will not be noticeable. Designs are then outlined in pencil on the sides of the tubing and the background is dimpled with a ball-peen hammer. A piece of round bar stock or pipe, slightly smaller in diameter than the tubing, forms an excellent anvil for the hammering process. For a dull satin finish, the aluminum can be rubbed with fine steel wool and oil, or it can be buffed with jewelers' rouge if a highly polished finish is preferred.

R. J. DeCristoforo, New York City.

Worm-Free Radishes Grown With Aid of Screen-Covered Frames

Radishes can be kept worm free if they are protected by wooden frames covered with screen wire or mosquito netting. Although the frames prevent the cabbage fly from laying its eggs on the radishes, they still admit a sufficient amount of sunlight, air and moisture for healthy plant growth. The frames are made of 1 x 12-in. boards to enclose the radish beds completely, and the screen or netting is stretched taut and tacked over them. To pick the radishes, one side of the frame is lifted and supported by a wooden prop, bolted loosely to each end, which folds against the frame.

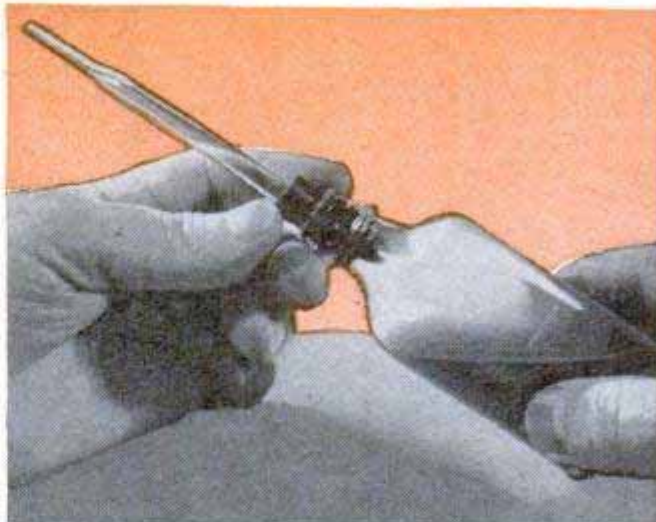
Bill Brown, Willits, Calif.



10 HOME-LABORATORY



Finger grips for hot glassware are made by cutting rubber hose into short lengths and slitting one side so that it can be slipped over the edge of the dish



To release the contents of a bottle, one drop at a time, cut off the top of a medicine-dropper bulb and insert the bulb tightly in the mouth of the bottle



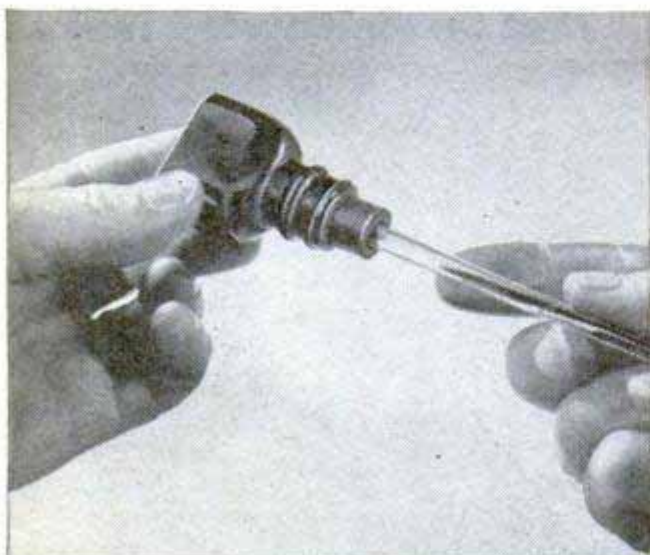
Caps of bottles containing highly volatile liquids are sealed with a hot solution of plain granulated gelatin, 10 grams, water, 6 c.c., and glycerin, 8 drops

To make a funnel tube for the home laboratory, cut a small bottle in half and insert a one-hole rubber cork in the mouth. Push a glass tube into the cork



A cigarette lighter, with wick removed, is just the thing for lighting a Bunsen burner. Fit a new flint and clean the wheel so it gives a shower of sparks

Ordinary metal food tongs are perfectly shaped for handling test tubes. The tongs also are useful for holding irregularly shaped containers when pouring



SHORT CUTS

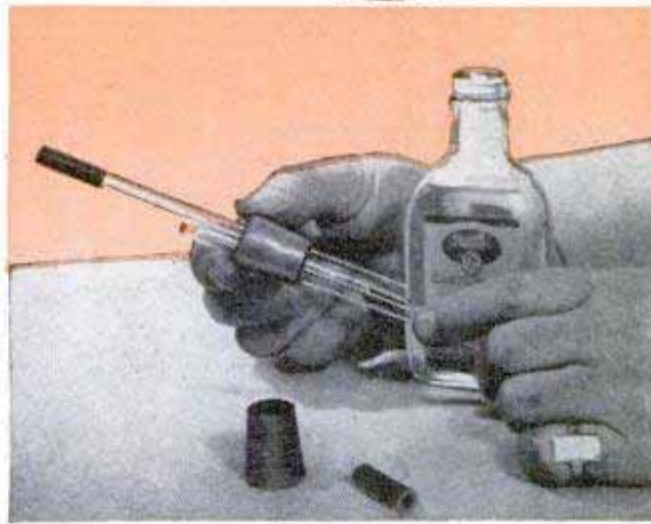
By Kenneth Murray

HOME CHEMISTS confronted with laboratory problems requiring new solutions will find these simple short cuts especially useful. In many cases, lab equipment already at hand can be adapted to serve a dual purpose when making experiments, thus eliminating the cost of additional items not often used. In other instances, equipment not ordinarily used in the laboratory can be made to serve the purpose. For example, a cigarette lighter with the wick removed comes in handy for lighting a Bunsen burner. A pair of food tongs, usually available in the kitchen, serves as a test-tube holder and is excellent for handling hot glassware. Various adaptations are pictured on this and the preceding page.



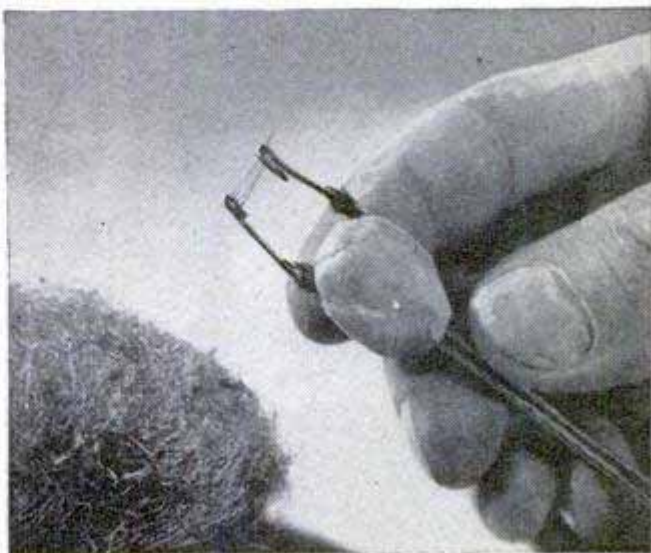
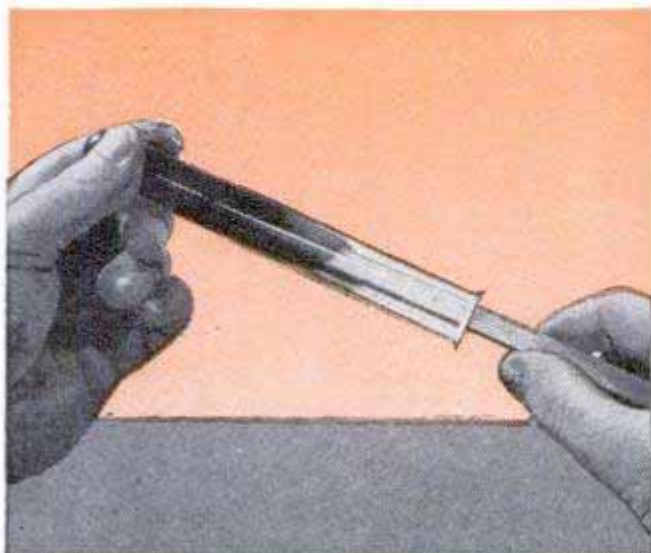
To prevent test tubes or any other glassware from shattering during an experiment, coat outside of the glass with a thick layer of modeling clay or putty

Test tubes that are incrustated with hard deposits are cleaned quickly by "lapping" with steel wool. Twist the wool around the end of a wooden stick



Glass tubing can be slipped easily inside rubber tubing or corks if castor oil is used as lubricant. This does not cause swelling or softening of rubber

To ignite chemicals from a safe distance, use a steel-wool filament wound across bared wires of a lamp cord. Hold wires apart with putty. Connect to dry cells



Protective Case for Jigsaw Blades Made From Garden-Hose Section



A handy container for storing extra jigsaw blades is made from a length of garden hose. A section of hose, slightly longer than the jigsaw blades, is sealed at both ends with tight-fitting corks. The hose is cut partially through near one end to provide a hinged cover, leaving the full thickness of one side intact to serve as a sturdy hinge. The case is easily opened, as pictured in the drawing, and the resiliency of the rubber holds the cover securely closed.

Balloon Forms Swimming-Pool Toy

Weighted with water, a toy balloon provides an excellent ball for swimming-pool or beach games. Enough water is poured into the balloon to permit it to be thrown with accuracy and then it is blown to the size of a softball. The ball is buoyant and will skip across the water. It also is safe, as it is too soft to cause injury.

Talcum Powder Keeps Stamps Dry



Stamps which are mailed for return postage or in payment for merchandise are kept from sticking together or to other enclosures by dusting talcum powder over the mucilage. If a

number of stamps are handled in this way, the talcum is applied quickly and neatly by rubbing the stamps across a powder puff.

Ridding Cabin of Insects

Here is a quick way to rid a summer cottage or cabin of flies, mosquitoes, ants, spiders and other insects. First make a solution consisting of water, $\frac{1}{2}$ pint, menthol crystals, 3 tablespoonfuls, and oil of cedar, 30 drops. After making sure that all doors and windows of the cabin are tightly closed, pour the solution into an old pan or skillet and allow it to simmer on the stove for at least 10 minutes.

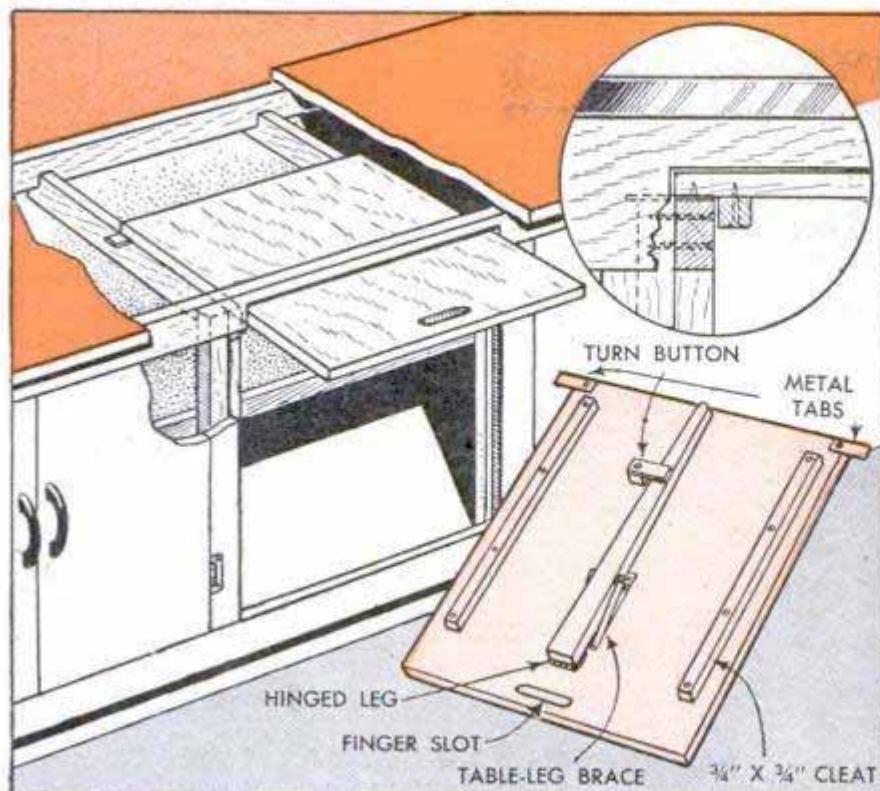
Pipe Flange on Wooden Block Provides Flagpole Bracket

Displaying the flag on national holidays requires just a few seconds if you fasten this mounting bracket permanently to the front of the house. It will hold the flagpole securely even in a high wind and prevent the pole from being pulled loose by inquisitive children. The bracket is made by screwing a brass pipe flange to a triangular wooden block, as shown, so the flagpole will be held at the proper angle when the block is fastened to the side of the house. Then, a drain groove is cut in the face of the block to prevent water from collecting in the flange. A short length of threaded pipe is fitted snugly over the end of the flagpole and fastened with a roundheaded screw. The pipe is turned into the flange when the flag is mounted.

Arthur Trauffer, Council Bluffs, Iowa.



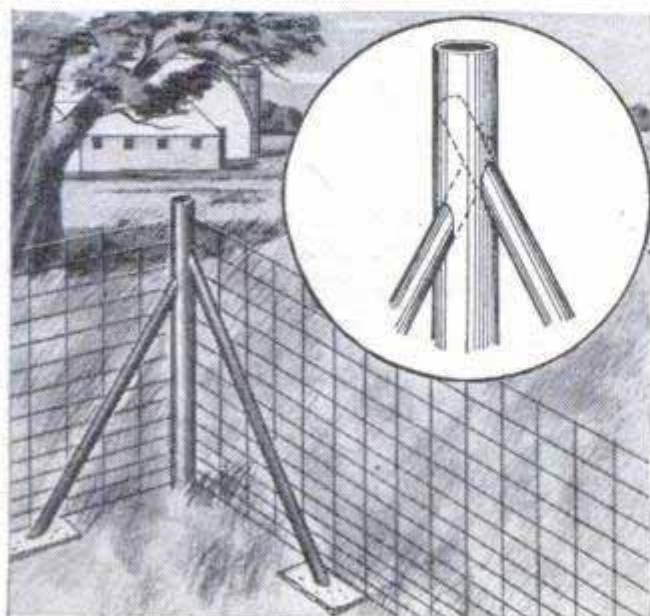
Hideaway Breakfast Table for Small Kitchen



If your home does not have a breakfast nook and there is no room in the kitchen for a full-size table, this folding one will provide plenty of space for two people. Being installed in the utensil compartment of a built-in kitchen cabinet, the table doubles as a cabinet door and is out of the way until needed. The table top is a piece of $\frac{1}{2}$ -in. plywood which slides into the cabinet on 1 x 2-in. runners and pivots on metal tabs screwed to the underside at the rear corners of the top. These tabs project a short distance from each side of the table and are stopped by the front rail of the cabinet where they pivot on the cabinet uprights. Note in the circular detail that a portion of the rail is cut out to allow the

table to drop down flush with the front of the cabinet. When making this cut, be sure to allow enough clearance for the back edge of the table to swing up and under the rail when pivoted. Wooden strips are fastened to the inside of the cabinet uprights to provide stops for the table when it is closed. Guides for sliding the table top along the runners are made by screwing $\frac{3}{4}$ x $\frac{3}{4}$ -in. cleats to the underside of the top. The hinged leg is held in the closed position with a wooden turn button, and a card-table-leg brace holds it open. A finger slot can be cut near the front edge of the table or a handle to match those on the cabinet doors can be used.

Peter B. Horsley, Brandon, Man., Can.

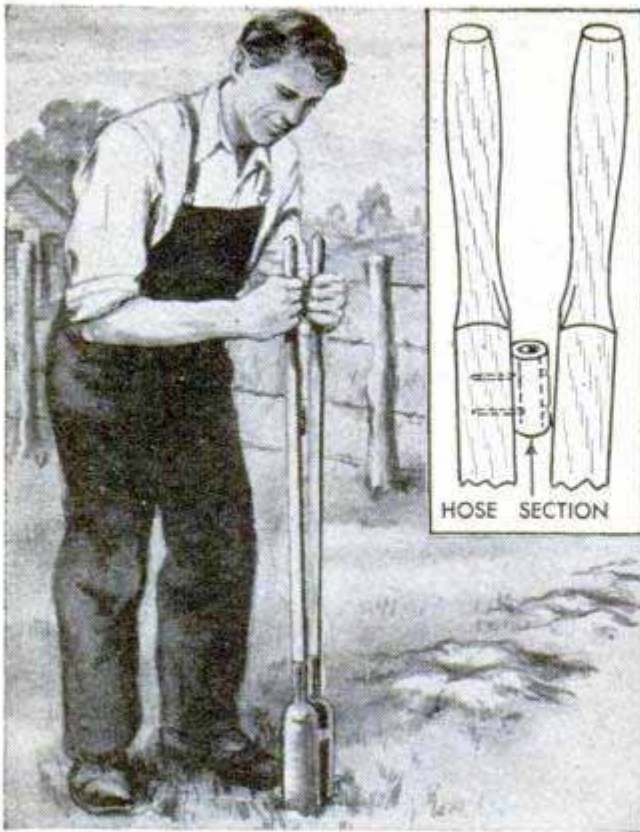


Pipe Braces Set in Corner Post Provide Sturdy Fence Support

When putting up a pipe fence on my property I supported the corner posts by embedding two lengths of small-diameter pipe, at right angles to each other, in each post. I drilled a series of small holes to rough out openings in the post for the pipe supports, knocking out the waste portions with a chisel. The braces, as well as the post, are set in concrete.

Gene Brock, Monterey Park, Calif.

☐ Rose bouquets will stay fresh longer if the stems are cut off under water. This prevents tiny air bubbles from blocking the small openings in the stems through which the water rises to the flowers.

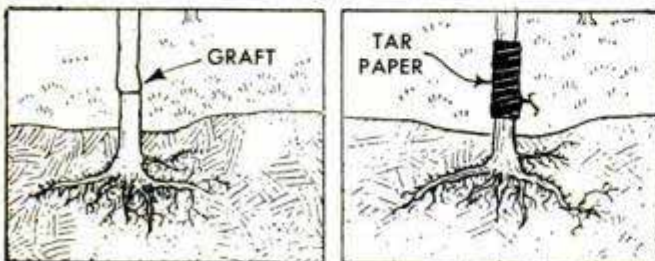


Hose Bumper Fastened to Handle Improves Posthole Digger

Working with a posthole digger is likely to result in sore fingers, as the hands are often brought sharply together when opening the tool. This is avoided by mounting a short length of garden hose between the handles to serve as a bumper. Nailed to the inside of one of the handles, the hose will keep them spread apart sufficiently to protect the fingers.

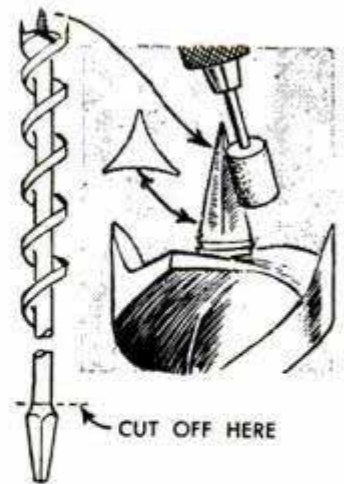
Tar Paper Wrapped Around Graft Prevents Rerooting of Tree

Even though a dwarf apple tree is planted properly with the graft above the ground, sometimes the top part of the tree will send out roots which cause it to grow to full size. This can be prevented by wrapping tar paper around the graft and tying it with cord. After one or two seasons, the tar paper will fall apart but, by this time, the dwarf rootstock will have taken a good enough hold to eliminate the possibility of roots growing out from the lower end of that portion of the trunk which has been grafted onto the rootstock.



Adapting Auger Bit for Drill Press By Reshaping Spur Center

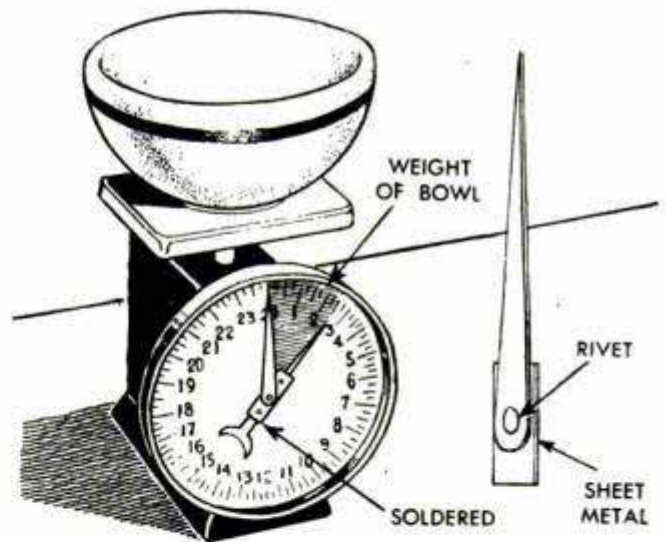
An auger bit can be adapted for drill-press use by first grinding the threads from the spur center and then shaping the center into a three-sided pyramid. If the sides are hollow-ground with a hand grinder, finer cutting control can be attained. After this, of course, the tapered shank must be cut off to fit the drill-press chuck, as indicated by the dotted line.



Simon S. Palestrant, Bronx, N. Y.

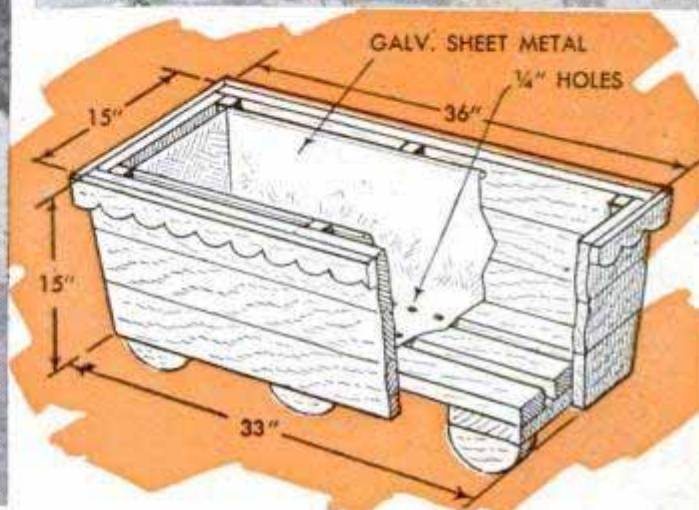
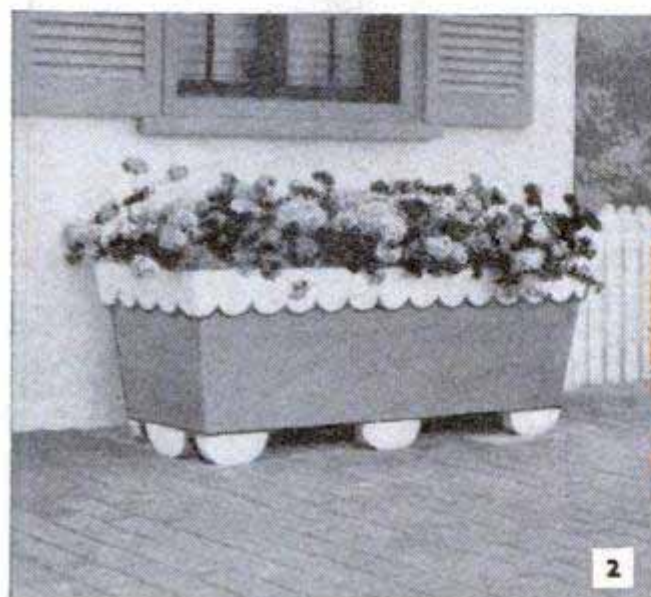
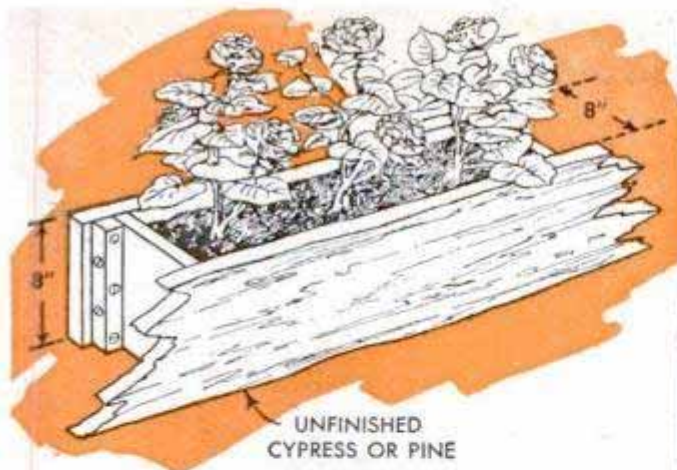
Adjustable Pointer on Kitchen Scale Subtracts Container Weight

Especially useful when canning fruits or vegetables, an adjustable hand added to a kitchen scale permits the exact weight of the ingredients to be read at a glance and eliminates deducting the weight of the container. The hand is cut from sheet metal and riveted to another piece of sheet metal



which is soldered to the original pointer. The rivet should be loose enough to allow the adjustable hand to be moved and should be centered over the shaft of the scale. Before weighing the food, set the container on the scale and move the adjustable hand back to zero. Then, when the ingredients are placed in the bowl, the adjustable hand will indicate their weight while the original pointer indicates the total weight.

☐ Fishhook leaders can be dyed by soaking them overnight in strong coffee or tea.

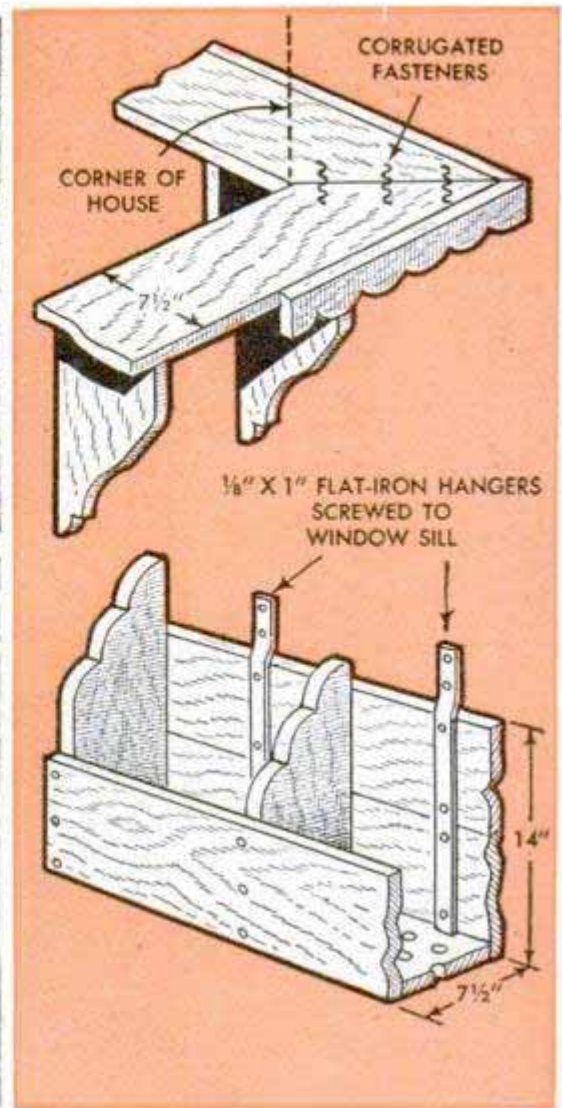
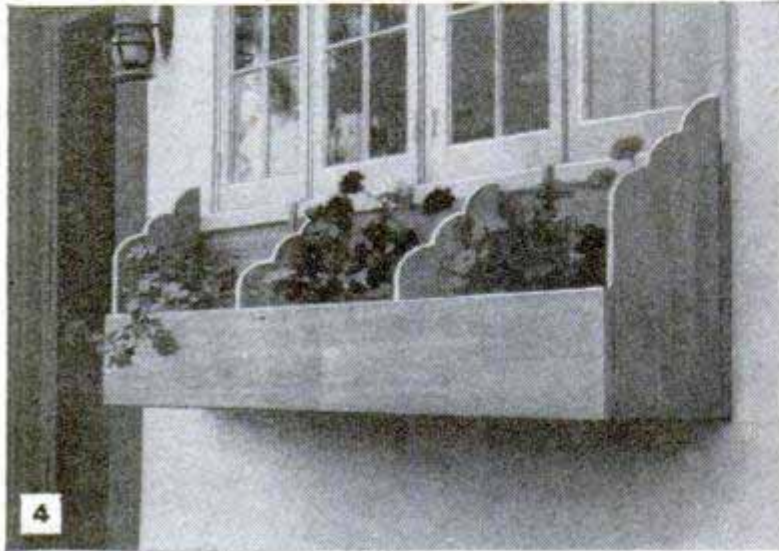
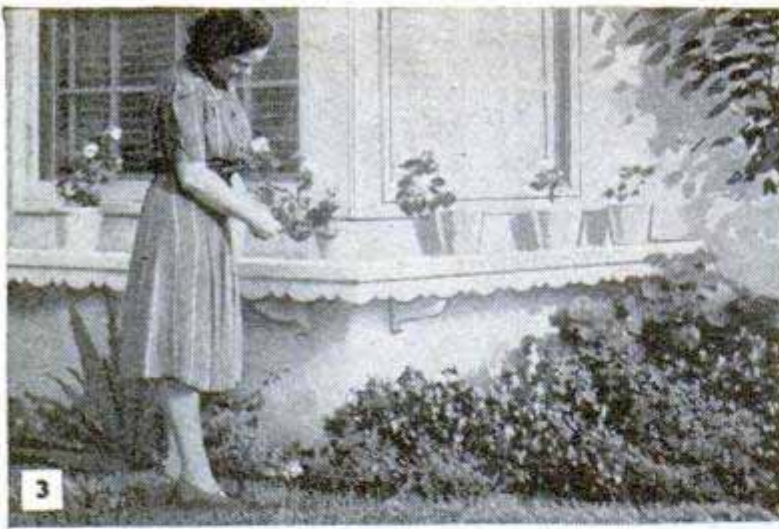


WINDOW-SILL GARDENS

HANGING gardens placed at the window-sill level are of immense decorative value to both the interior and exterior of any home. Foliage and flowering plants, certain dwarf shrubs, evergreens, potted slips, succulents, and even trailing vines can be grown in a window-sill garden and they will thrive with a minimum of care. Some varieties grow best in full sunlight; others do well in partial shade, and some in full shade. This means that, by carefully selecting the plants, you can grow luxuriant hanging gardens on all four sides of the house in a single season. Groups of plants selected for a given location should have the same or similar soil preferences, and also similar temperature and sunlight requirements. Only low-growing plants with heavy stems and short foliage should be selected for second-floor window gardens, as these will be more directly exposed to high winds and beating rains. If shelves are used at the second-story windows, holes should be scrollsawed in the shelf boards so that the plant pots can be set in the holes to about half their depth.

This arrangement prevents the potted plants from being blown off the shelves. If soil is to be placed directly in the box, the latter should be made of wood with a removable metal lining of zinc or aluminum. Cypress is the most durable wood, with redwood and pine a second choice. The selection and preparation of soils are important. As the amount of soil is limited by the size of the box, the plant food of an ordinary soil will soon be depleted. A good mixture for window boxes is composed of dark garden loam, rotted leaf mold and sand in the proportions of 2 parts loam, 1 part leaf mold and 1 part sand. After these components are mixed, a complete fertilizer is added. Then the whole mass is mixed thoroughly and sifted through a $\frac{1}{2}$ -in.-mesh screen. To grow most varieties of succulents, proportions of the soil mixture should be 2 parts loam to 1 part coarse sand, no leaf mold being used.

In preparing the window box for planting, $\frac{1}{2}$ -in. drainage holes are drilled in the bottom in an over-all pattern measuring about 3 in. each way. Small pieces of

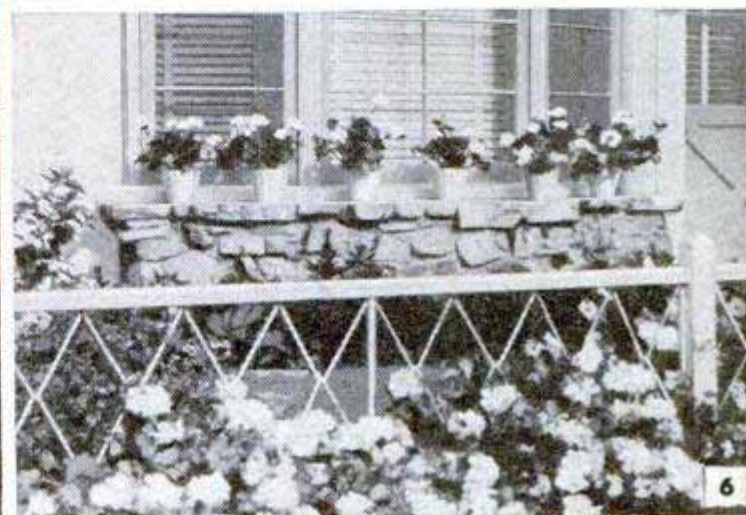
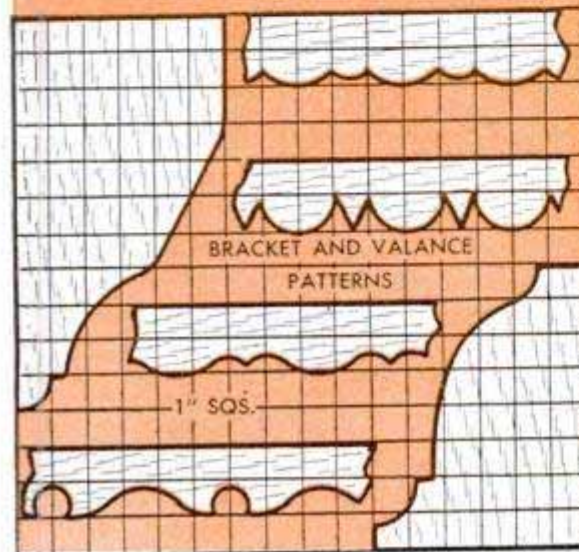
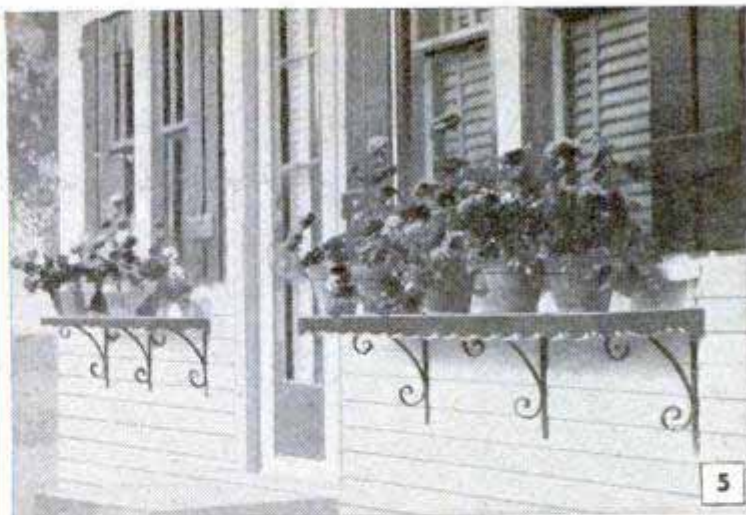
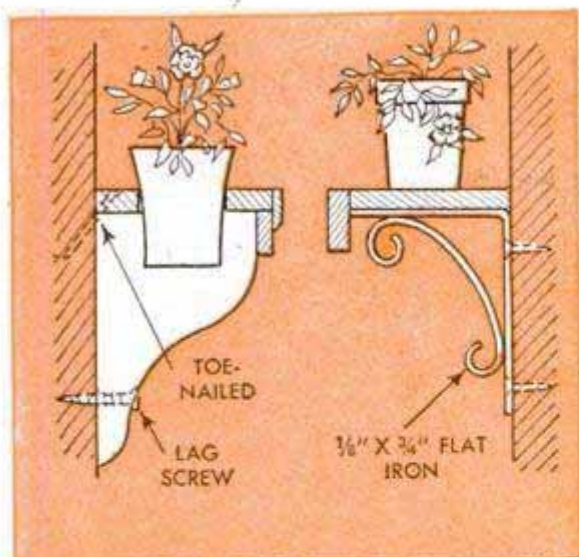


broken pottery (pieces from a flowerpot will do) are placed over each of the holes to keep fine material from sifting through. Then a 1-in. layer of coarse gravel, cinders or small pieces of broken pottery is placed in the bottom of the box. If the box is to be planted with succulents, the layer of this material should be 2 in. thick. Fill the box with the soil mixture to within about $\frac{1}{2}$ in. of the top, pressing it down firmly. The mixture should be dry enough to handle easily without sticking to the fingers.

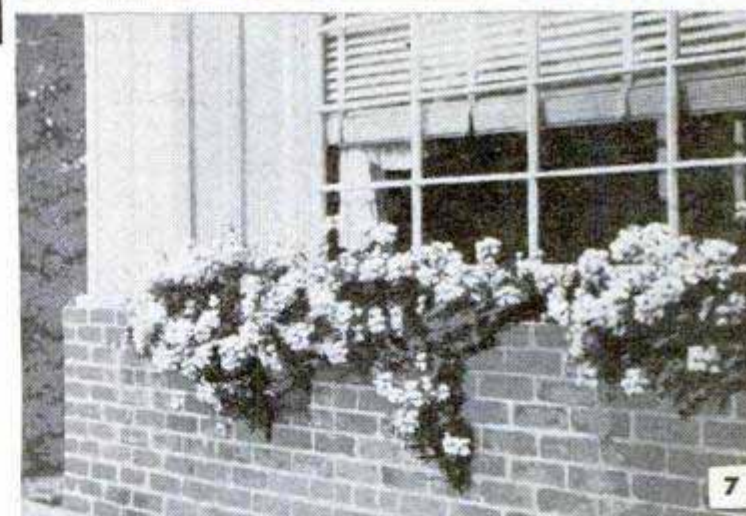
Plants to be grown in such a confined space as the average window box should be selected for type and habits of growth. Foliage plants with large individual leaves should not be planted adjacent to small, low-growing plants, except in extra-long boxes where the large plants can be placed at the ends of the box or in the center. If planted at random or alternately in a smaller box, the large leaves of the taller foliage plant will shade the smaller plants during some part of the day and may thus affect the rate and extent of growth. As a result of spreading root systems, large and vigorous growers also will rob small plants of needed soil fertility. Window-box gardeners generally select low-growing flowering plants for the sunny side, foliage

plants and trailing vines for the areas of partial and full shade and small evergreens for the year-round window garden. Suitable evergreens may be any of the low, spreading varieties which grow slowly. Certain plants that will not mature fully in the shorter growing seasons of the colder regions are suitable for outside plantings only in the warmer climates.

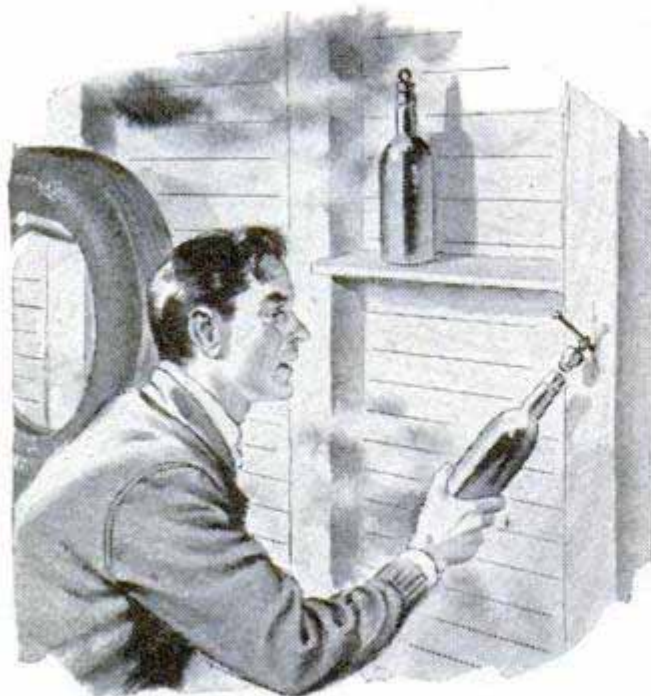
Most window-box plantings must be sprayed or dusted regularly to keep off insects and prevent disease. Spray solutions can be applied with a syringe, and prepared dusts with an applicator usually furnished with the product. As a rule, only annuals are planted in outside window boxes in temperate regions. In most cases, potted plants placed in or on window boxes or shelves are taken inside during the colder months. This simplifies the insect and disease-control problem, at least to some extent. Plantings of evergreens that are well established will flourish the year 'round in exposed locations if they are properly cared for during the summer and are thoroughly watered just before the coming of freezing temperatures. At this time, a thorough watering is especially important for if the soil freezes "dry" the plants are likely to die.



Window boxes and shelves pictured and detailed in Figs. 1 to 5 inclusive are designed for mounting outside the window. Those shown in Figs. 6, 7 and 8 are built as a part of the house and, in the warmer climates, can be used for plantings of perennials. Shelves are supported on bandsawed brackets and decorated with an edging or valance in a scrolled design as shown on the corner shelf in Fig. 3. Several scrollsawed designs for brackets and edgings are shown in the crosshatched detail above. The shelf in Fig. 5 is supported by flat-iron scrolls which are especially attractive when used on walls of white siding or stucco. When shelves are attached to the wall with brackets, the inner edge should be set out from the wall about $\frac{1}{4}$ to $\frac{1}{2}$ in. so that water and dirt do not collect at this point. Use brass screws for fastening the brackets to wooden walls and masonry drive nails or expanding fasteners on masonry walls. In either case, the fastenings should be sufficiently strong to support the weight of the box when it is full of damp soil.



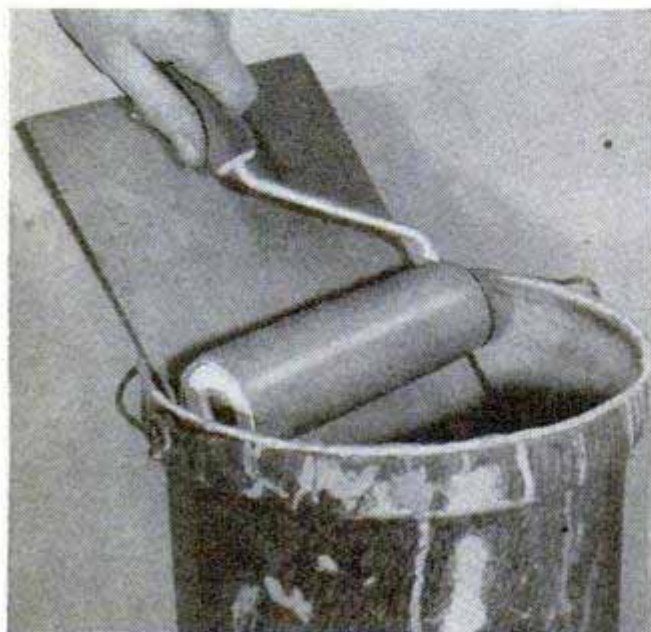
Bottles of Carbon Tetrachloride Provide Fire Extinguishers



If you do not have a regular fire extinguisher in your shop or garage, a few bottles of carbon tetrachloride kept at strategic locations will allow you to extinguish small fires or, at least, keep them under control until help can be summoned. Ordinary quart bottles, painted red, are used to store the chemical. These are sealed with corks fitted with screw eyes so that they can be pulled open quickly by slipping the screw eyes over a nail driven into a near-by wall or post.

Cold-Water Paint Rolled on Board Assures Even Application

When cold-water paint is applied to the walls of a house with a roller, it is usually a problem to charge the roller with the



proper amount of paint. However, this can be assured by placing a "wiping" board in the paint bucket, resting it against the rim. The roller is dipped in the paint and then rolled out on the board to insure a smooth, even coat on the roller.

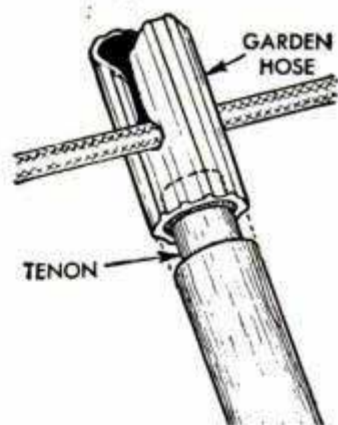
Escapeproof Bait Jar

While fishing with live grasshoppers or crickets, keep them in a jar with a piece of inner tube stretched tightly over its top. Cut a slit in the inner tube wide enough to permit inserting your thumb and forefinger. In this way, the grasshoppers can be inserted or withdrawn one at a time and the others cannot jump from the jar. Sufficient air will pass through the slit to keep the bait alive.—Roland Cueva, New York City.



Nonslip Clothesline Props

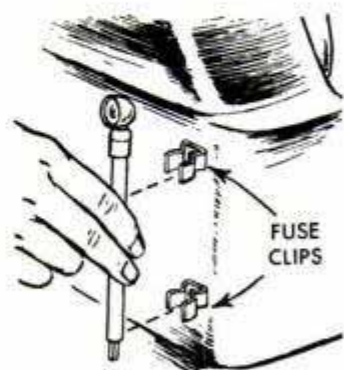
Attached to the end of a clothesline prop, a short section of garden hose will keep the prop from blowing over in a high wind. One end of the hose is cut and slotted on opposite sides so that it grips the clothesline tightly, and the other end of the hose is forced over a round tenon cut on the top end of the prop.



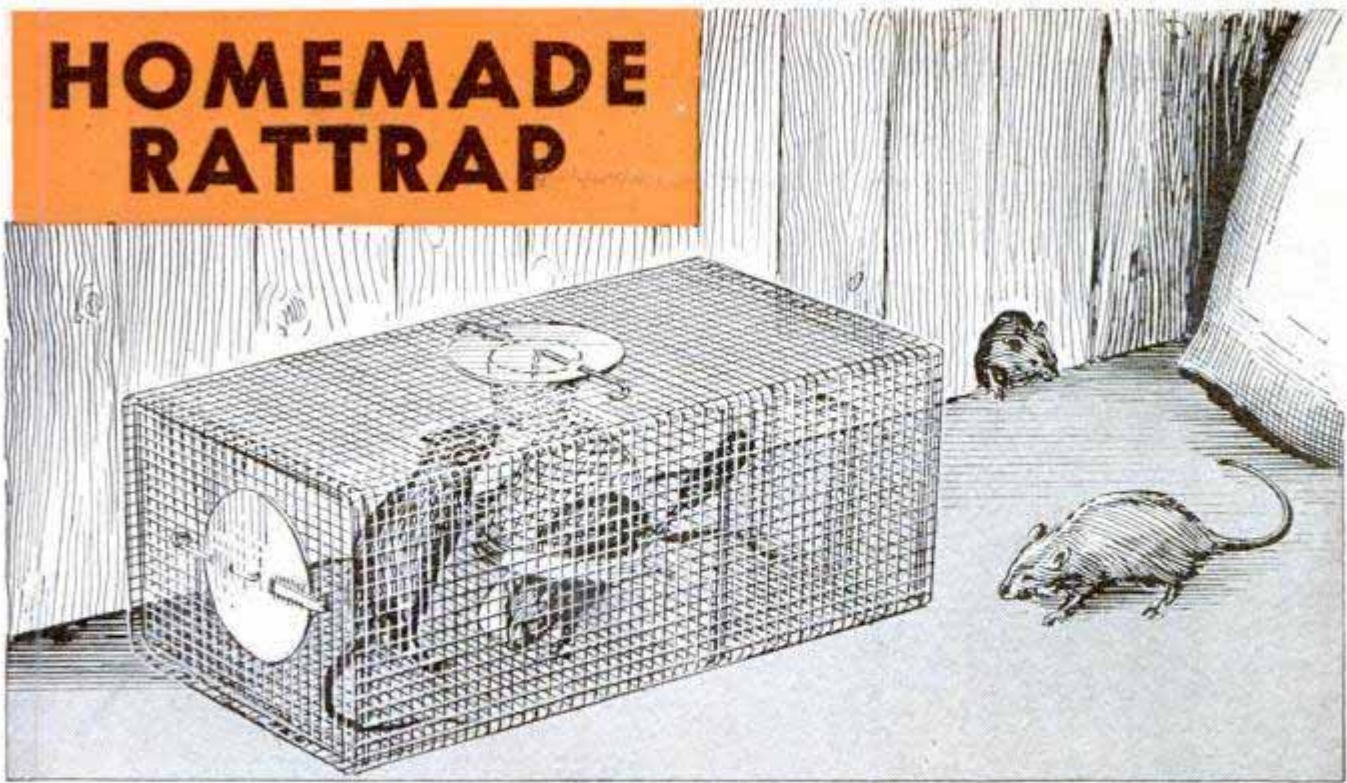
Victor H. Lamoy, Upper Jay, N. Y.

Tire Gauge Clipped to Seat Back

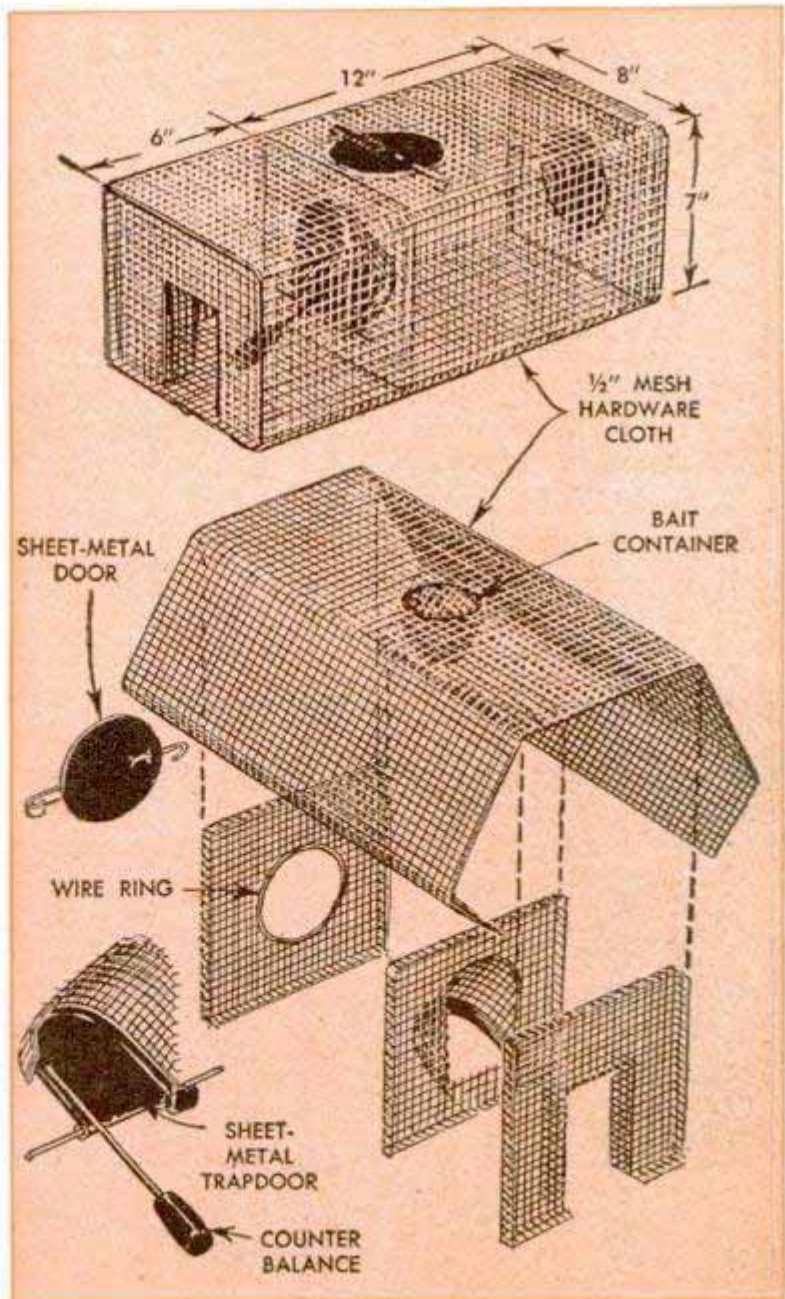
A tire gauge which is carried in the car will always be within easy reach if it is held to the back of the front seat with fuse clips. The corner of the seat near the floor is both a convenient and out-of-the-way location. Sheet-metal screws driven tightly into the seat back are used to fasten the clips one above the other, as shown.



HOMEMADE RATTRAP



UTILIZING a one-way trapdoor, this efficient rattrap is capable of catching a number of rats without resetting or replacing the bait. After the rats are trapped, they can be drowned simply by immersing the whole unit in water. The trap is made in the form of a box divided into two sections, hardware cloth being used for the sides and partitions and sheet metal for the doors. A partition containing the trapdoor separates the bait from the front compartment. The rat, entering through the front door of the trap, must pass through the trapdoor to reach the bait and is confined in the rear section of the trap. As the hardware-cloth bait container prevents the rat from obtaining the bait, several rats can be caught without tending the trap. Note how the trapdoor is pivoted on a stiff wire bar and counterweighted to return to the closed position. Another door, which is secured over a round hole at the rear of the trap, is opened to remove the rats after they have been drowned. One side of the door is hooked into the wire mesh and the other side is fastened with a spring-wire catch. A similar door covers the open end of the bait container at the top of the trap. All joints of the hardware cloth should be securely soldered together and a wire handle can be fitted to the trap.



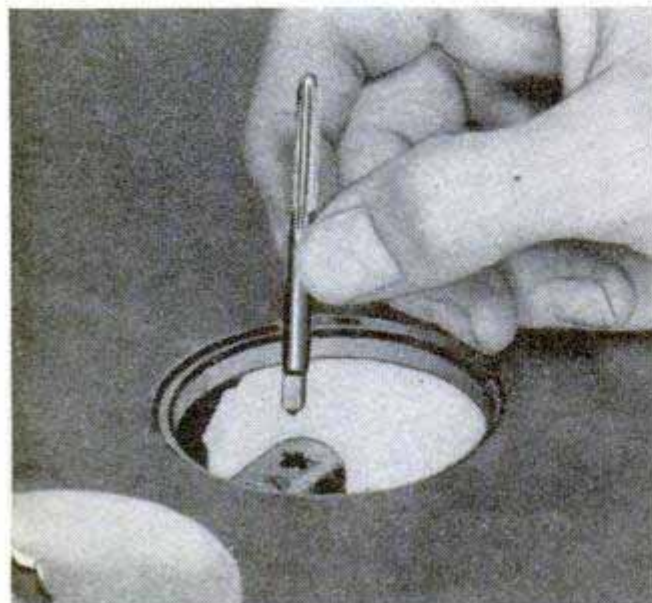
Weighted Tin Cans Support Line When Marking Garden Rows



To mark pairs of garden rows at different depths, such as shallow rows for radishes and deeper rows for beets, one gardener uses weighted tin cans to hold a length of guide line straight. Holes are punched in the sides of the cans and one end of the line tied to each can. Then the cans are filled with soil, which adds sufficient weight to hold the line taut when the cans are spaced apart. Using a wooden marker notched at the center to fit over the line, the gardener marks two rows at a time, the slack in the line allowing him to apply pressure on the marker to vary the depth of each pair of rows.

Metal Tap Replaces Jigsaw File

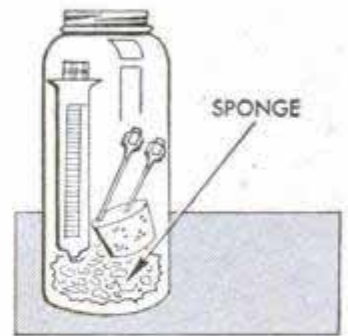
If a jigsaw file is lost or broken, you'll find that a tap makes a good substitute. The tap must be long enough to project



above the jigsaw table when the chuck is at the bottom of the stroke. With the saw operating at slow speed, the work is filed the same as with a regular jigsaw file.

Keeping Hypodermic Sterile

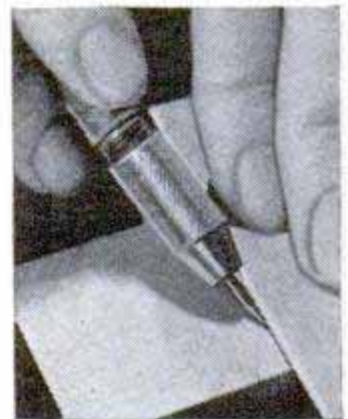
Where a hypodermic syringe must be used at home, here is a way the syringe and needles can be kept sterile and ready for use. Select a fruit jar with a screw-type cap and sterilize both jar and cap. Then soak a sponge or a wad of cotton in alcohol and drop it into the jar. After sterilizing the syringe and needles, insert the points of the needles in a sterilized cork. Then place these items in the jar and screw the cap on tightly.



Fred Cornelius, El Paso, Tex.

Pin Vise Holds Phonograph Needle To Provide Inexpensive Scriber

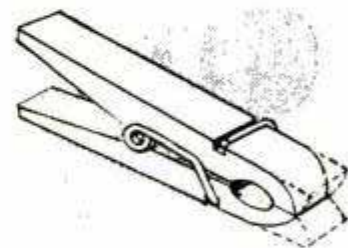
Clamped in a pin vise, a phonograph needle provides an excellent inexpensive scriber. The hard steel of the needle scribes a fine line, and it is inexpensive enough to discard rather than sharpen. If you do not have a pin vise, a little knurled holder fitted with a setscrew can be turned easily on a lathe.



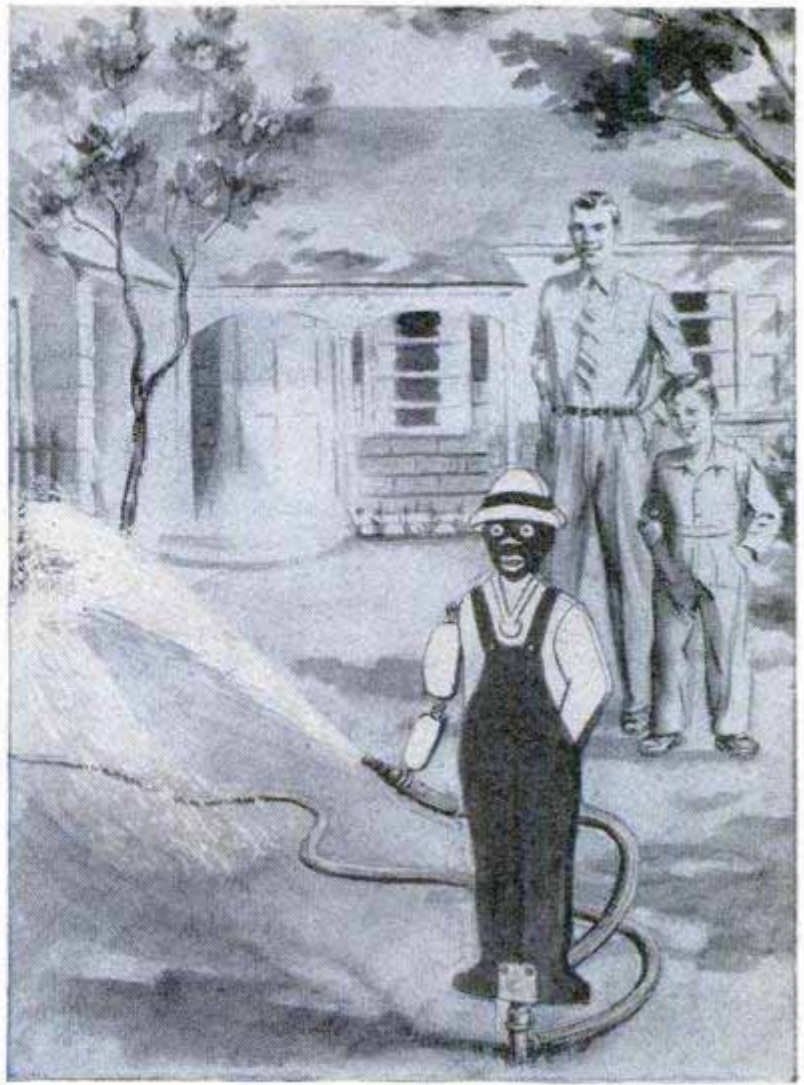
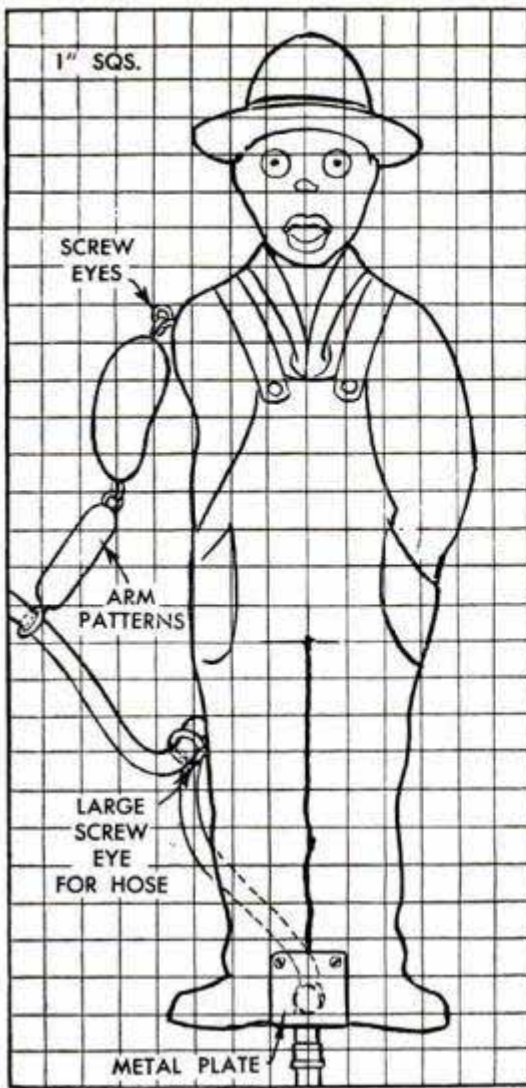
William S. Kals, Vancouver, B. C., Can.

Snub Nose on Spring Clothespin Improves It for Clamping

When gluing small, hard-to-clamp parts to the hull of a ship model, I use snub-nosed clothespins to hold them in place. These are made by rounding the tips of spring-type clothespins to bring their clamping surface to the extreme end of the pins. This permits the clamps to be used flush with the side of the hull.



Albert W. Stein, Union, N. J.



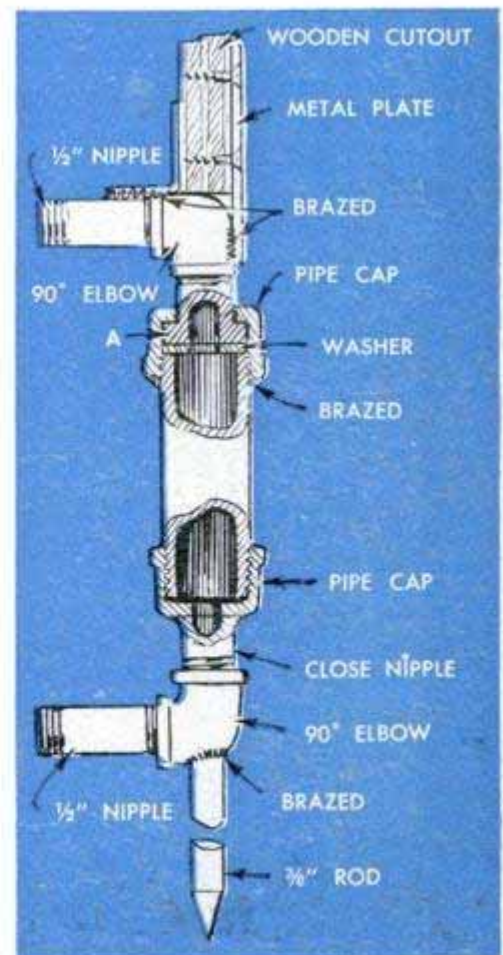
SAMBO

novel lawn sprinkler

By F. W. Ferguson

Sambo sprinkles a circular section of the lawn at each setting

ONCE he has been assigned the job, Sambo sprinkles the lawn with efficient thoroughness. When the regular hose is connected and the water turned on, Sambo rotates slowly, watering a circular section of the lawn. To make the cutout, first sketch a full-sized paper pattern from the crosshatched detail above and trace it on $\frac{5}{8}$ -in. waterproof plywood. After jigsawing the cutout, sand the edges smooth. The two parts of the right arm are cut from the plywood waste and joined to the body with screw eyes, the eye of one being opened to engage the other. Paint the cutout with a priming coat of white. Then paint the face and hatband in flat black and the overalls blue, giving the shirt and hat another coat of white. Sambo rotates on a low standpipe made from pipe fittings as in the detail. A flanged bearing, part A, which turns on a washer, is made by brazing a brass collar onto a short length of brass pipe threaded at one end. Note that the inside corners of the upper pipe cap must be machined square to receive the bearing. The cutout is attached with screws to metal plates brazed to the upper pipe elbow and a short length of hose fitted with a nozzle is screwed onto the upper nipple.





Hundreds of contestants made and broke records in the Second International Model Plane Contest sponsored by Plymouth Motor Corporation at Detroit last August. This year the Third International Contest opens on August 22nd and continues through August 29th. There will be 50 events flown in four age classes, novice, junior, senior and open, with the jet entries being restricted to senior and open-class contestants. Cash prizes totaling \$8750 in U.S. Savings Bonds, plus 167 trophies will be awarded to first, second and third-place winners in each event



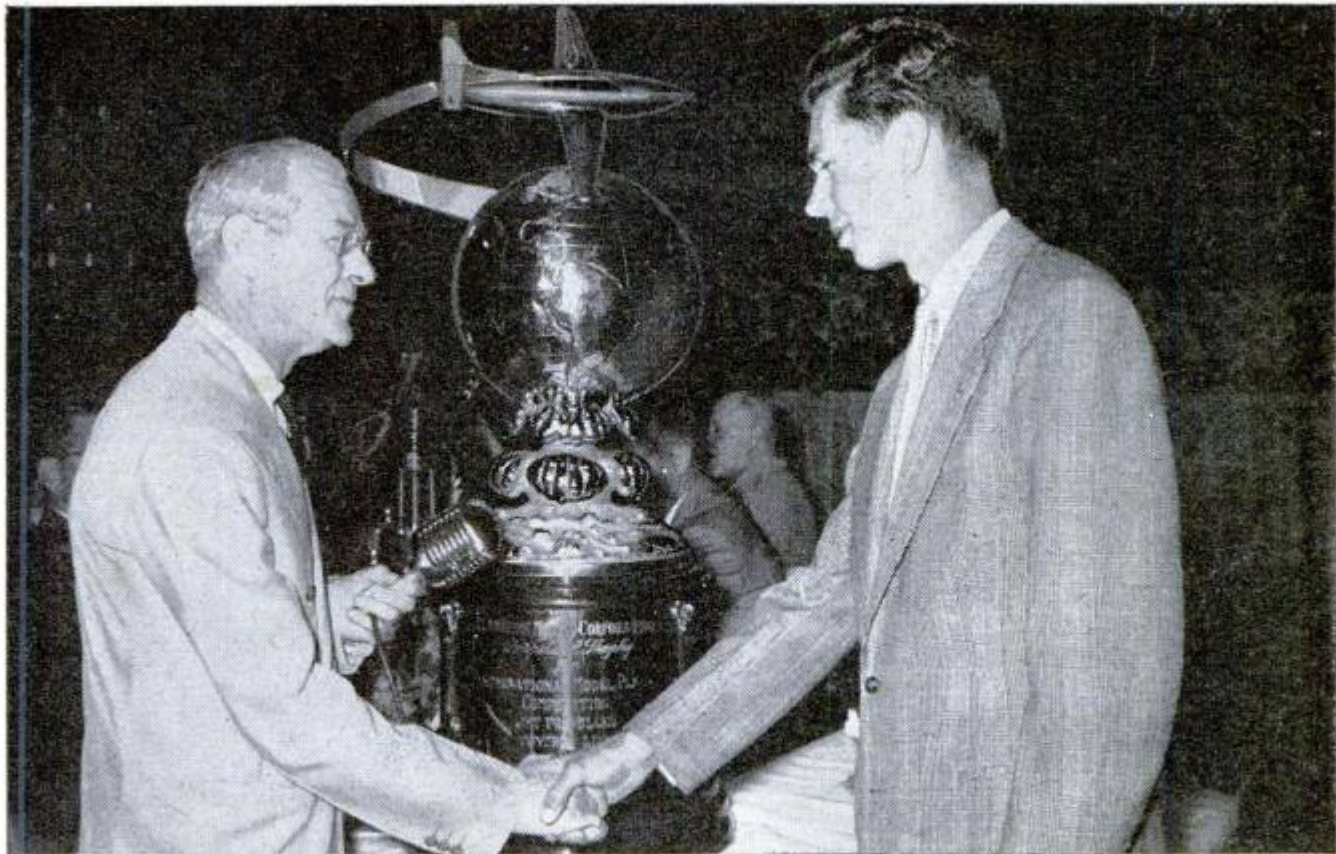
"TORCHY" Prize-Winning Jet Speedster

By Bob Thor and H. H. Lundquist

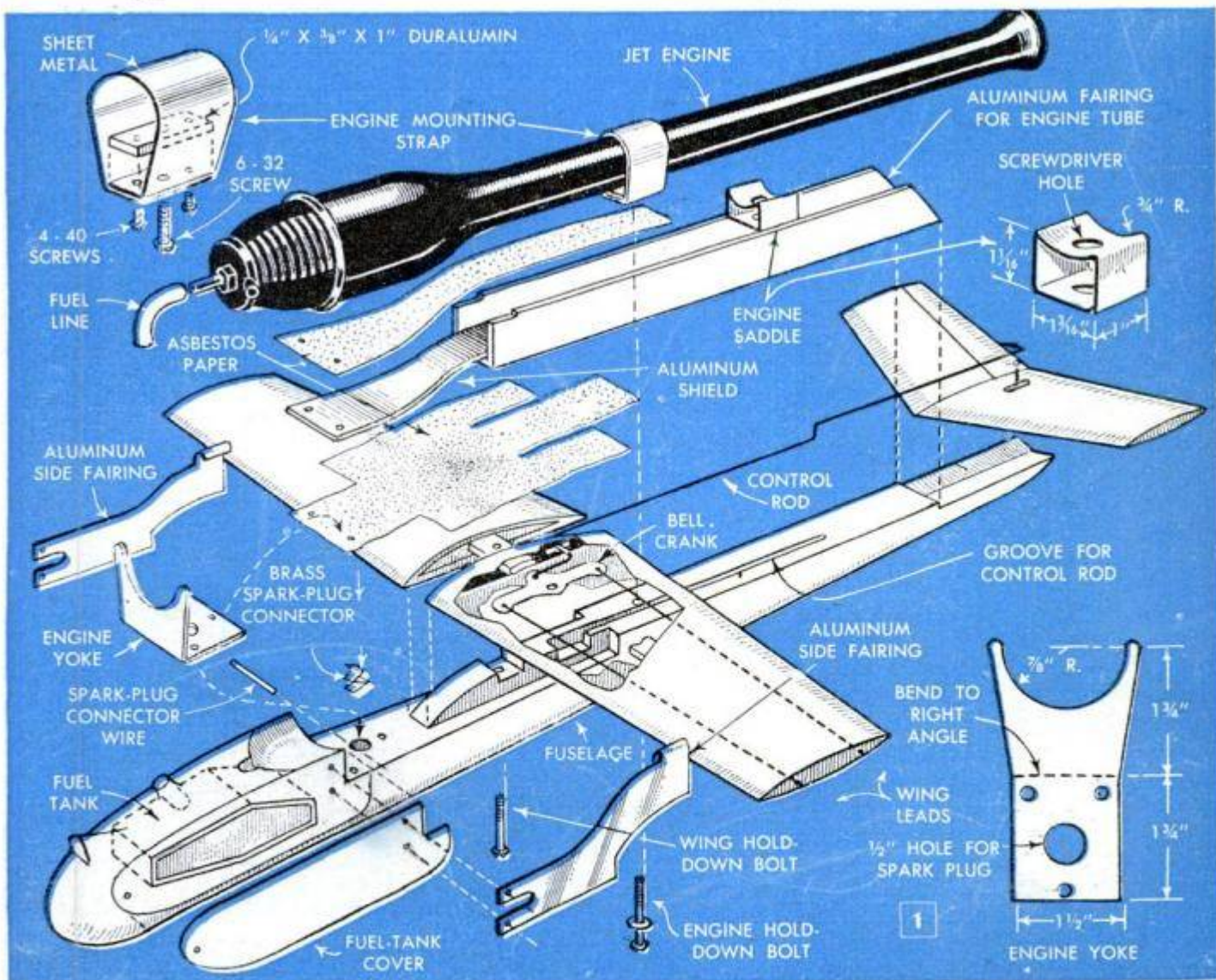
AT ALL the recent model-plane contests, jet-powered speedsters put on the most spectacular show of all, and to win at the Third International Model Plane Contest at Detroit this summer your jet job must be capable of scorching speeds. "Torchy," a pulse-jet-powered model speedster, last year tacked up a record of 141.34 m.p.h. to win in the open class for jets. Topping that record in the coming contest is going to take something really super in both plane and pilot. Yet, the record will be equaled and quite likely broken, for all model-plane technicians will make full use of contest experience to design and build still faster planes. In entering any contest, the first thing is to know the rules and make sure your entry blank is properly filled out and presented to the contest sponsor. If, for example, you are entering the Third International Model Plane Contest this summer, get the official entry blank from your local Plymouth dealer. Then put everything you've got

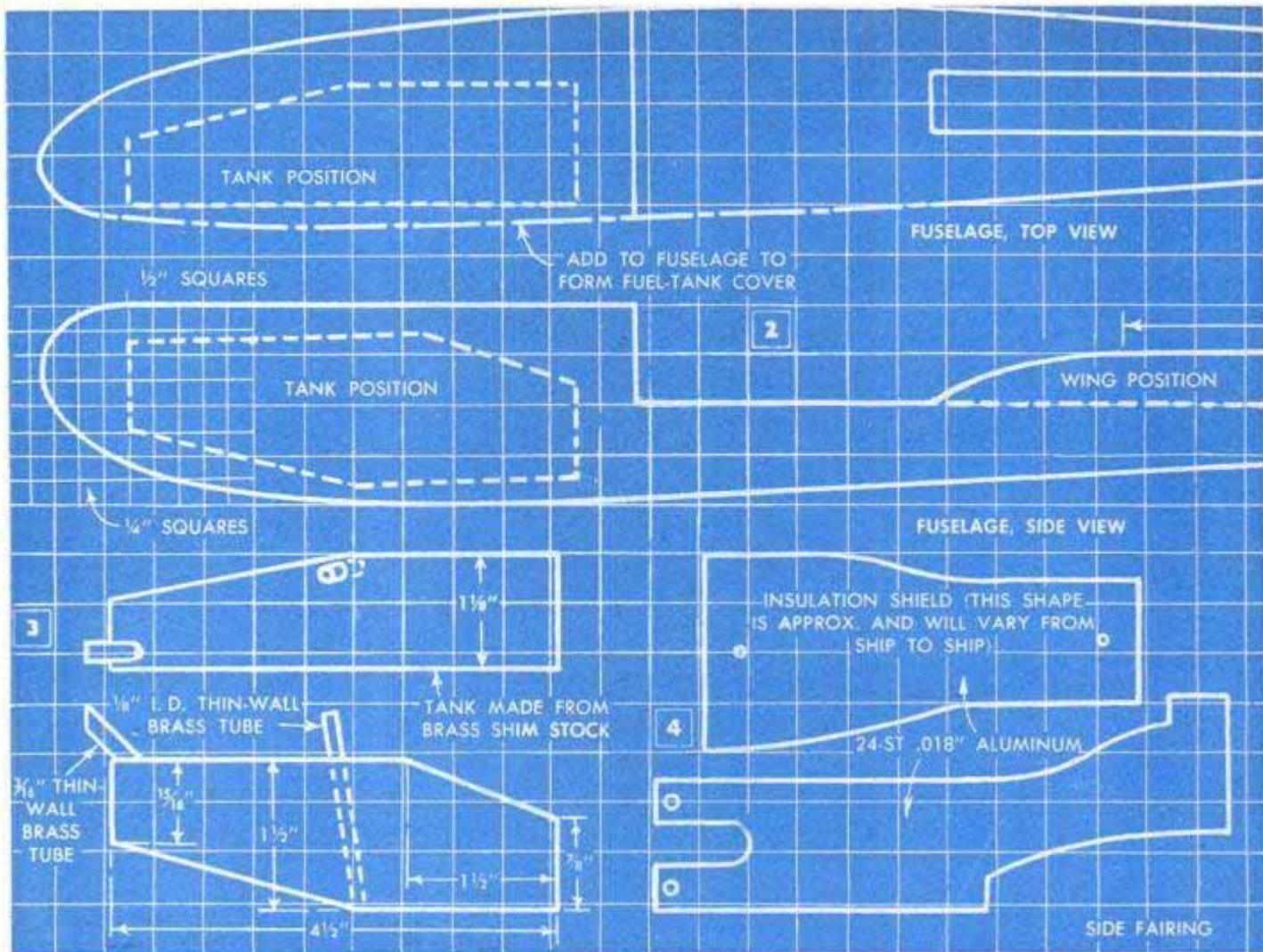
into the construction of your own jet plane. Here are the construction details on Torch, a careful study of which will give you valuable pointers on building and flying your jet-contest winner.

Fuselage: The pulled-apart view in Fig. 1 gives you a complete picture of the construction of Torch at a glance. The first part to make is the fuselage and the first step is to trace the bottom profile, Fig. 2, onto a 2-in.-square piece of balsa, bandsaw to the line, then glue the waste piece back in place with a sheet of paper in the joint so that it can be removed later. Then trace the top profile on the block and bandsaw as before. This step shapes the fuselage ready for installation of the fuel tank, Fig. 3. Note particularly the unusual position of the tank and the V-shaped bottom. The latter feature has been found an advantage as it tends to trap fuel and prevents the engine from cutting out when the plane is dived or climbed steeply. As light weight is essential, the tank is made from brass shim



Bob Thor, of Minneapolis, Minn., accepts Plymouth Motor Corporation's Perpetual Trophy in behalf of himself and his partner, H. H. Lundquist, also of Minneapolis. Thor and Lundquist worked as a team



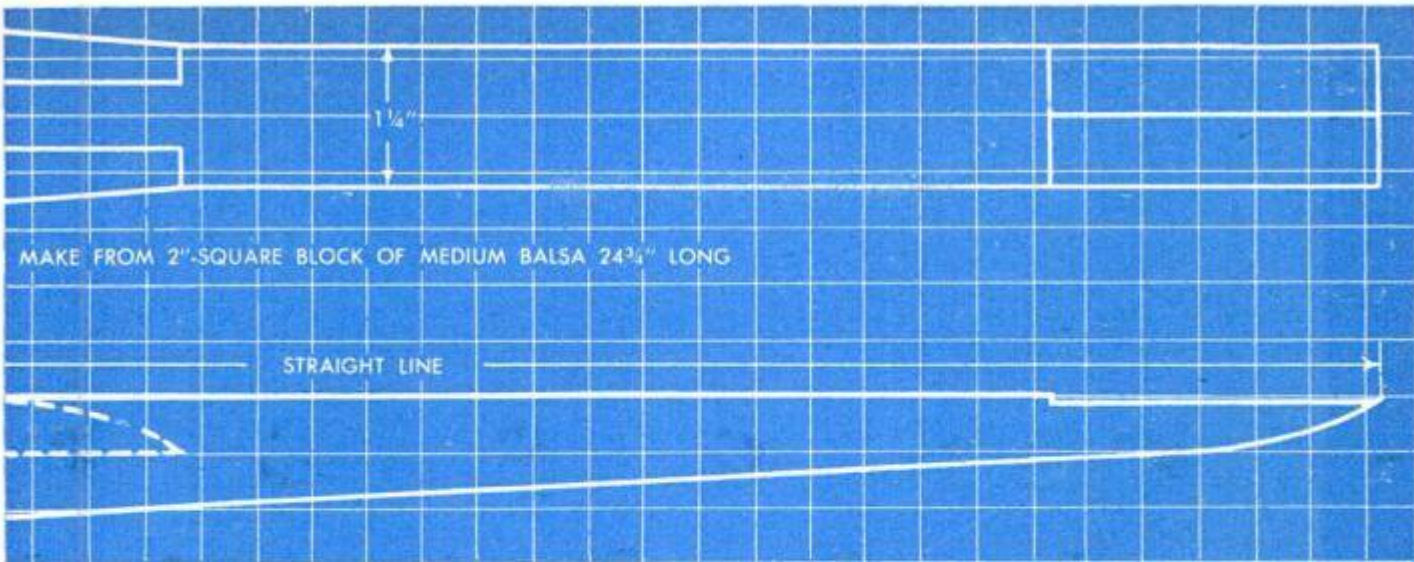


stock, .005-in. thickness, and all joints are sweat-soldered. Test the tank for leaks before installation. In Fig. 2, the top view, the nose of the fuselage is shaped for counterclockwise flight as most model-plane pilots prefer to fly their planes in this direction. The opening in the fuselage for the fuel tank is carefully cut with a chisel. First trace the outline of the tank on the wood. Then, when the opening is nearly to required size, fit the tank by trial so that you do not risk removing too much wood. The tank is anchored in place with glue and the opening is fitted with a cover of 1/4-in. sheet balsa, which is screwed into place and then faired into the curve of the fuselage. Next, cut and fit the engine mounting yoke, Fig. 1. This is made from sheet aluminum, .040 in. thick. Drill a hole 1/2 in. in dia. and 5/8 in. deep in the fuselage and a 1/2-in. hole through the yoke for the spark plug. Bend a 3/8 x 1 1/8-in. strip of spring brass to a Z-shape and place this in the bottom of the hole in the fuselage. A piece of 1/16-in. wire driven through the body from the outside locks this spark-plug connector in place, Fig. 1. The wire should project 1/4 in. to serve as a terminal for the high-tension lead from the coil. Note that when the engine is mounted, the forward section of the fuselage just above

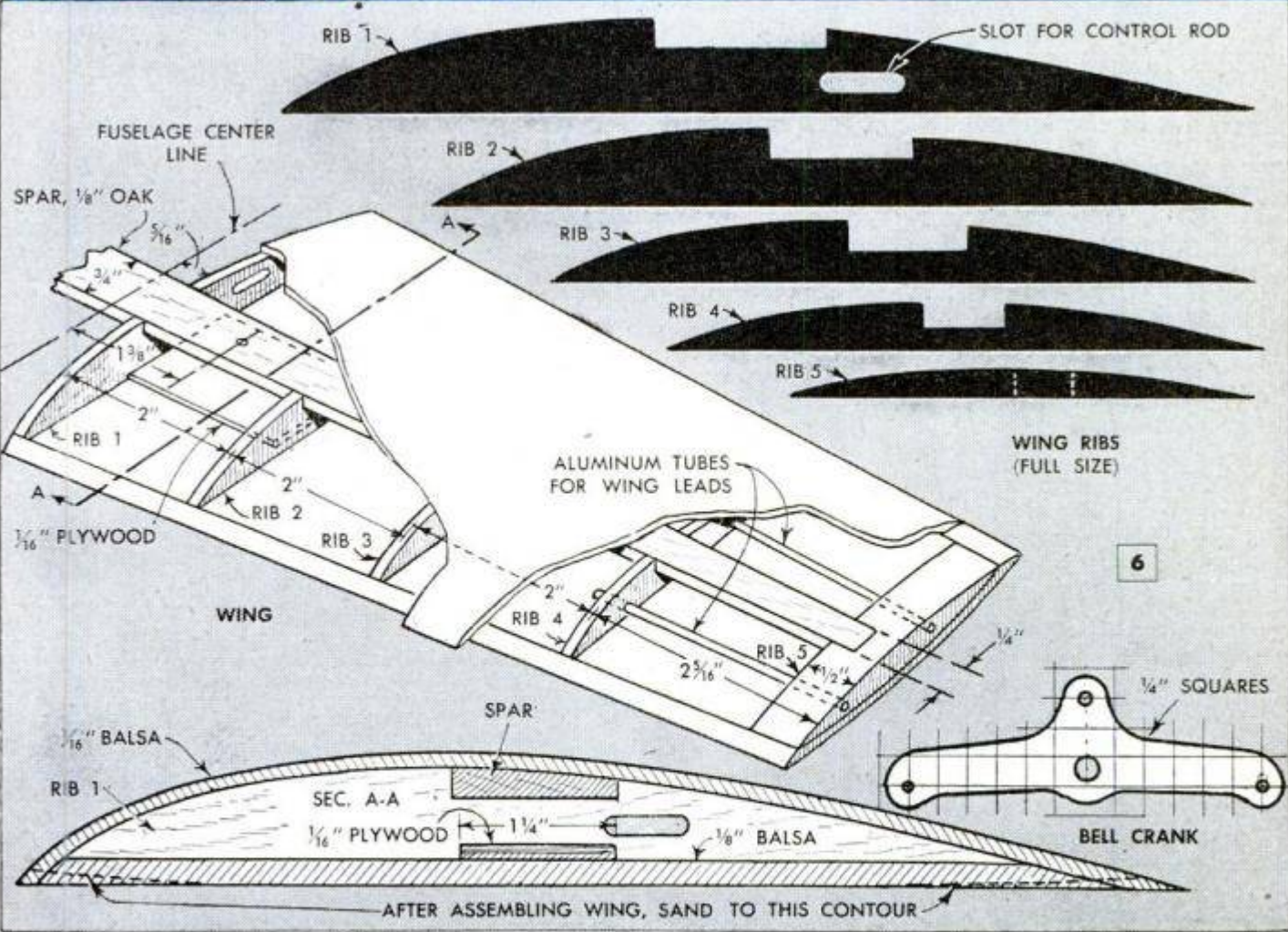
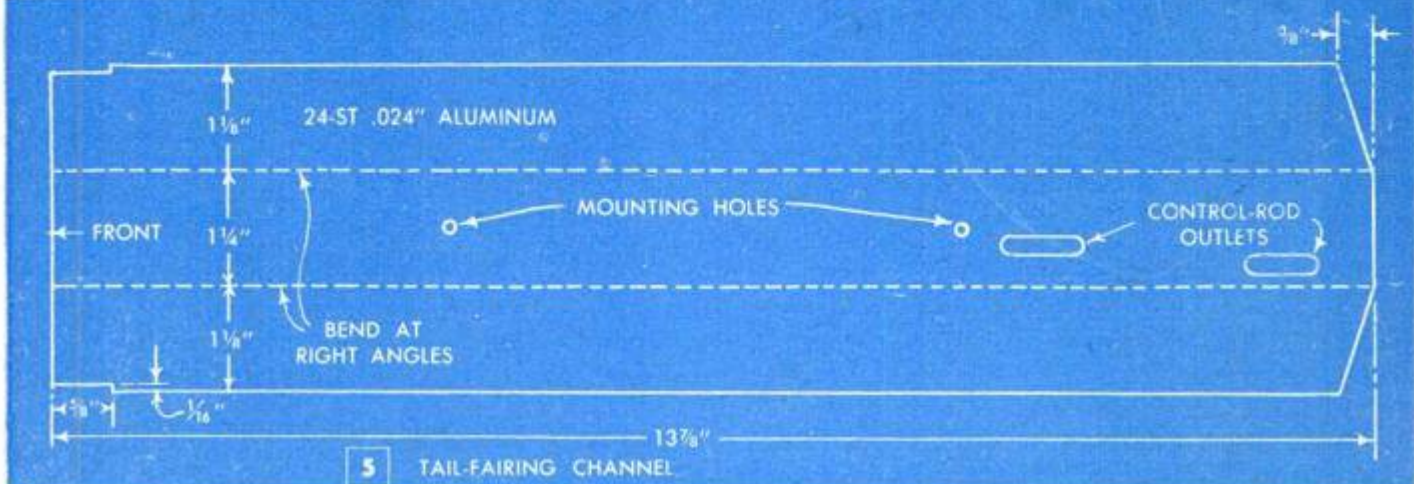
the fuel tank is relieved to the exact curve of the engine tube at this point. Be careful to get a snug, true fit here. When the final installation is made, the engine tail pipe is supported in a saddle at the rear and the engine is held firmly in place by means of a mounting strap, Fig. 1.

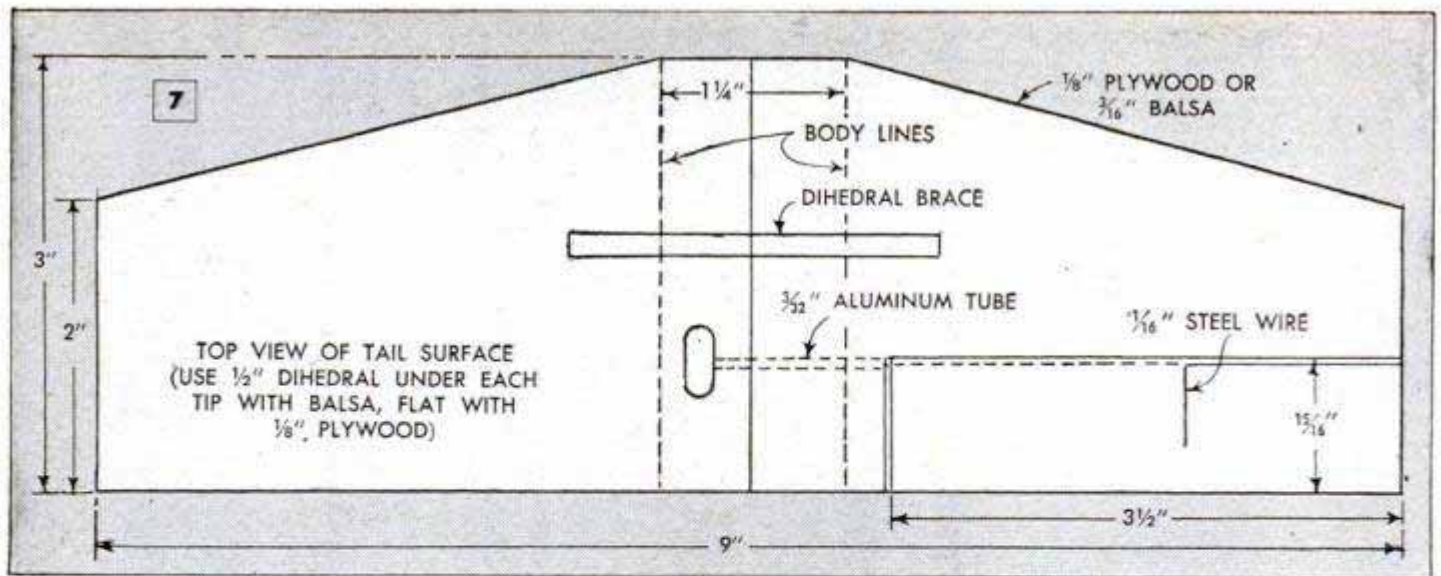
Wing construction: Fig. 6 details the wing ribs full size and shows a cutaway view of the wing assembly. After sawing the ribs, each of which is duplicated, glue them to the bottom sheet of balsa. When assembling the wing sections on the spar, allow a 5/8-in. gap at the center between the two sections. Glue on the 1/16-in. plywood reinforcing strip for the bell crank, Fig. 6, and install the crank, wing leads and control wires before gluing on the top wing covering. Then sand the wing to the finish contour and fit it on the fuselage as in Fig. 1, making the groove for the control rod at the time of installation. When installing, be sure the wing has a zero incidence with reference to the flat portion on top of the fuselage body, Fig. 2.

Tail surface: Plywood is recommended for construction of the tail surface, although balsa also is specified in Fig. 7. The single control flap pivots on a steel wire which passes through an aluminum tube. The control rod, Fig. 1, is attached to an



MAKE FROM 2" SQUARE BLOCK OF MEDIUM BALSA 24 3/4" LONG



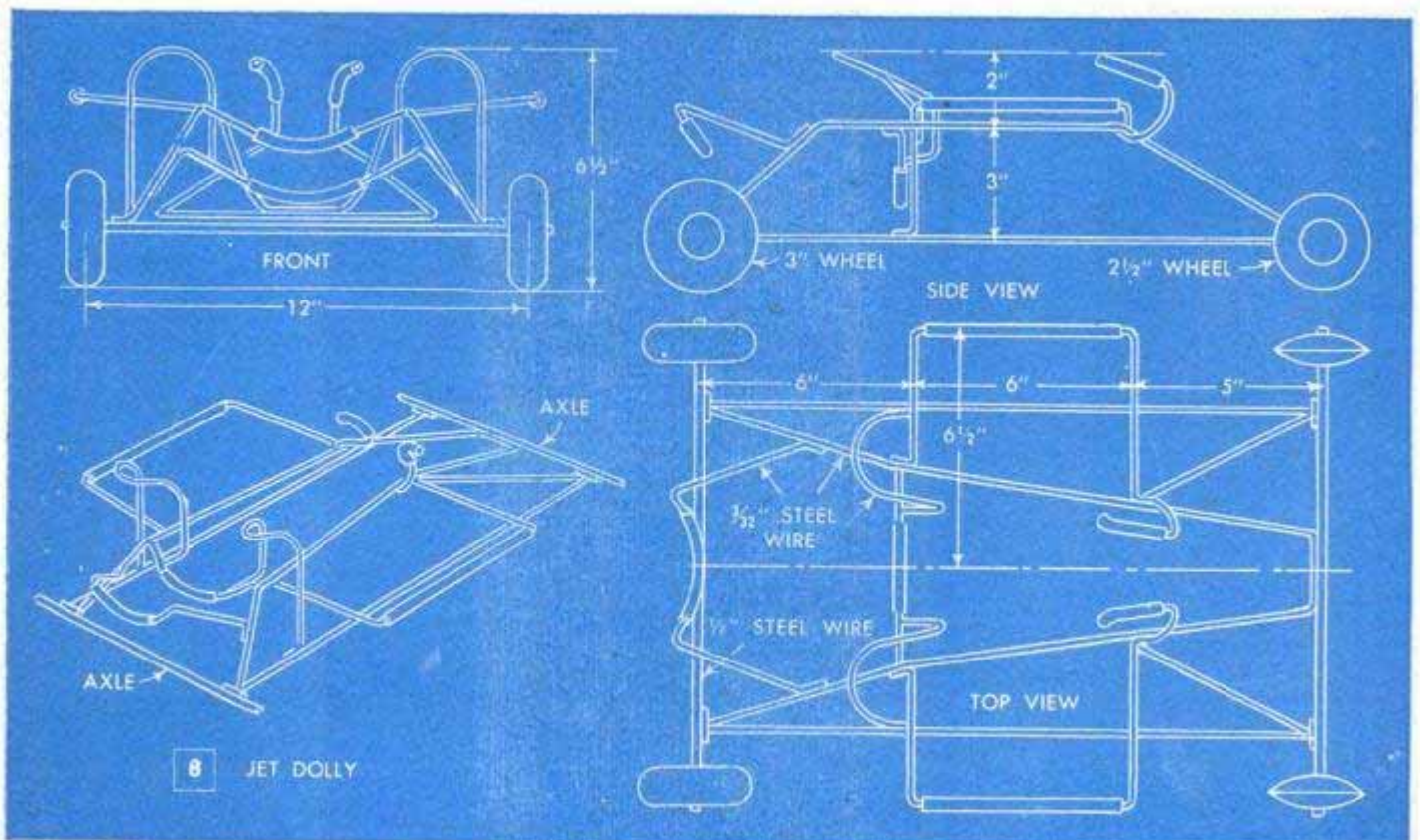


arm soldered to the pivot wire. The tail surface is slotted, Fig. 7, to allow movement of the arm. Strips of crinoline glued over the opening between the tail surface and the flap serve as a "hinge" and also as a fairing to give a smooth, unbroken surface. When installing the tail surface, notch the body of the fuselage so that the tail surface is at zero incidence with its upper surface flush with the top surface of the fuselage.

Metal fairing: This is designed to fair in the space under the jet engine and is shown in Fig. 1 and detailed in Fig. 5. It is notched, drilled and slotted and then bent to the form of a channel before installation. The fairing member and the aluminum shield, shown in Fig. 1 and detailed in Fig. 4, protect the wooden fuselage from the intense heat of the engine. Slip the channel

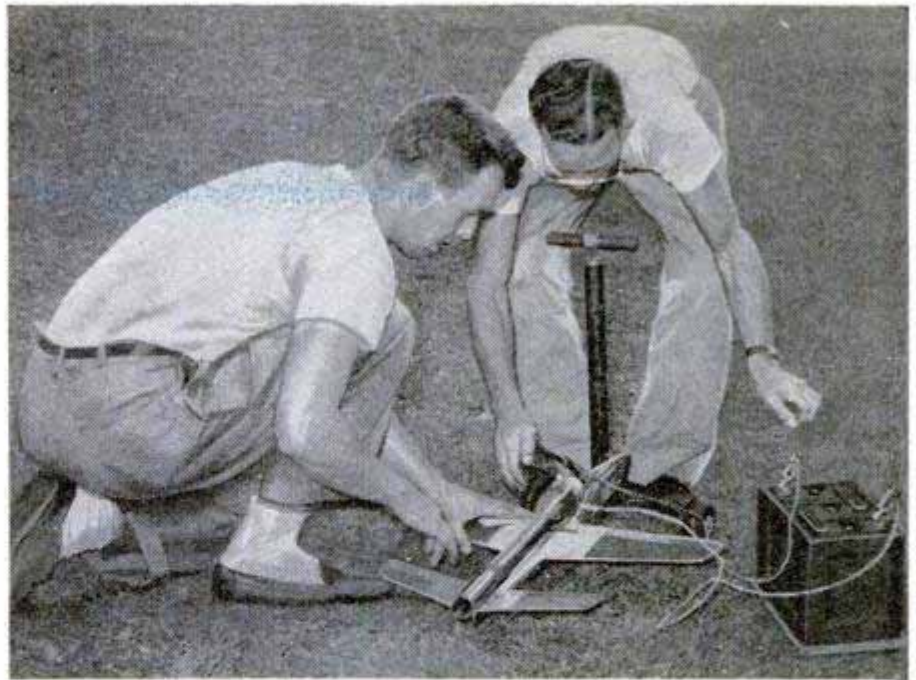
over the control rod, bend the latter if necessary to clear, and screw the channel in place. Then install the engine by following the details in Fig. 1. Note the location of the asbestos-paper insulation strips placed under and on top of the aluminum shield. These are held in place with a coating of water glass (sodium silicate). The aluminum side fairings, Fig. 1, follow the contour of the engine tube. It is important that these be fitted to perfect contact with the tube.

Launching dolly: The important feature of the dolly is its ability to run straight during the ground run. If it veers even slightly, it is nearly impossible to get the ship away smoothly. Fig. 8 details a dolly which has proved satisfactory for launching model jets from all runways except



those covered with grass. The frame is made from pieces of heavy wire bent and soldered together to give the frame shape detailed in the front, top and side views. After assembling, slight bends can be made in the wire cradles so that the dolly will hold the ship in the correct position for take-off.

Finish: Many builders of this type of plane prefer to fit all metal parts and then remove them when doing the final sanding and finishing of the wooden parts. In this case, the asbestos insulation strips are installed with the metal parts after all of the sanding and finishing have been completed. In finishing the fuselage, apply a layer of gauze to the bottom and fill with glue until the surface is perfectly smooth. Fill the wing with any preferred filler, leaving an area 1 in. wide on each side of the fuselage center line. Water glass is applied to this area when cementing the asbestos strips in place. Although a portion of the lower asbestos strip has been omitted in Fig. 1 for purposes of clarity, this strip extends from the engine

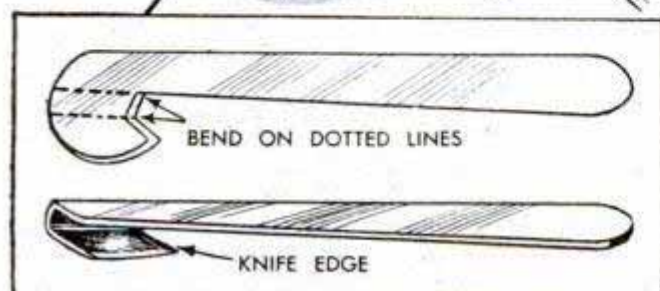
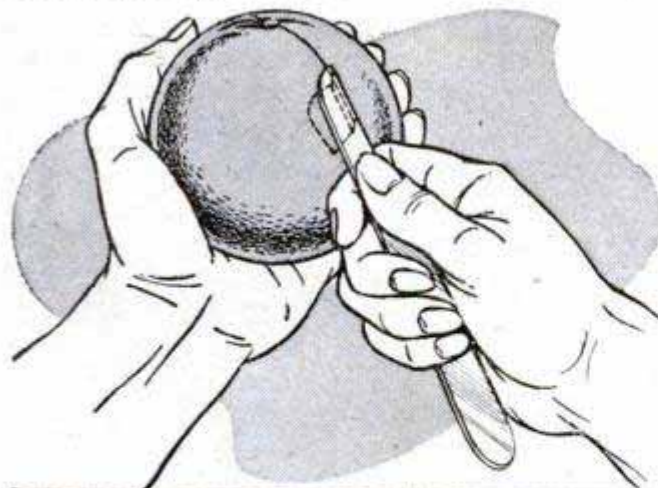


A jet-propelled model is readied for take-off in recent model-plane contest

yoke to the forward edge of the tail surface underneath the engine-fairing channel. After finishing, reassemble all metal parts on the fuselage. Be especially careful in fitting the engine hold-down clamp. Avoid drawing the 6-32 hold-down bolt too tightly. As this bolt is infrequently removed, it's a good idea to fit it with a lock washer. After finishing and reinstallation of metal parts and the starting ignition system, the plane is ready for test flights.

Stainless-Steel Knife Cuts and Loosens Orange Peel Simultaneously

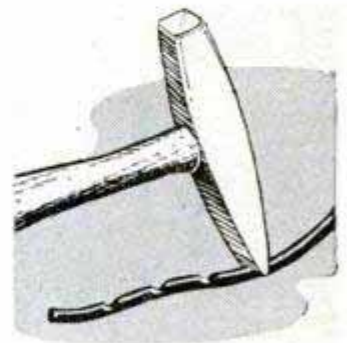
This novel orange peeler lifts the edge of the peel while cutting, making it easy to get the fingernails under the peel. Usu-



ally, two cuts, made at right angles to each other, around the orange, are all that is necessary. The peeler is cut and bent from thin, stainless steel and the cutting edges are filed. Then, all other edges are smoothed and the tool is finished with fine emery cloth. To use, push the point under the peel and pull the peeler around the orange.—E. A. Rerucha, River Grove, Ill.

Dents in Solder Dissipate Heat

When using fairly short pieces of coreless wire solder, they ordinarily become too hot to be held comfortably with the fingers. You can prevent this trouble by making dents in the solder about 1/2 in. apart, using the wedge-shaped head of a riveting hammer. Deeply dented, the depressions dissipate and slow the travel of heat.



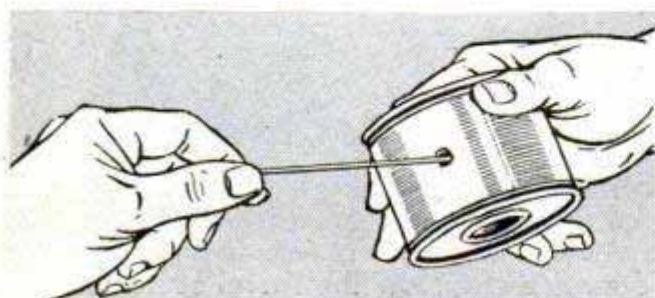
Stump Serves as Improved Vise When Sharpening Cordwood Saw



A saw cut made across the top of a tree stump provides an on-the-spot vise for holding a cordwood saw when sharpening it. The blade is inverted and set in the saw cut, which should be 2 or 3 in. deep. It is held securely in place by one or two wooden wedges driven into the saw cut.

Dispenser Made From Tape Spool Stores Odd Lengths of Wire

Instead of discarding odd lengths of wire, save them for future use by winding them on large dispensers made from adhesive-tape spools. First, set an eyelet in a hole drilled through the center of the spool cover. Then, straighten the wire and wind it loosely around the spool. After inserting the loose end of the wire through the eyelet, press the cover over the spool. Now, when you want a piece of the wire, just pull

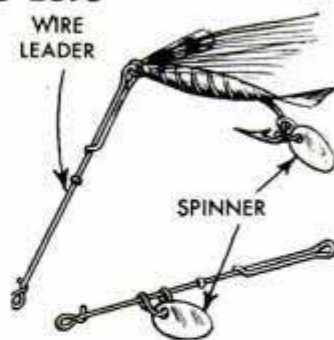


on the loose end and cut off the wire as desired. A spool rack can be made by mounting a dowel between brackets.

Spinner Attached to Streamer Fly Provides Effective Lure

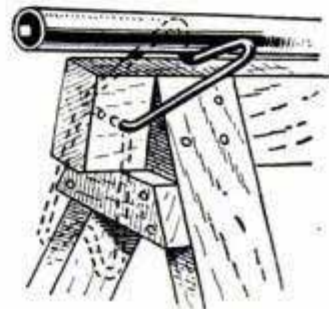
An effective lure for trout, bass and pickerel is improvised from a streamer fly and a spinner. To do this, first remove the spinner from the shank. Then, slip the latter onto the hook of the streamer fly. In this way, the streamer is provided with a flapping silver tail which is very appealing to the fish.

Donald S. Shiner, Nescopeck, Pa.



Sawhorse Saddles Hold Pipe For Cutting on Job

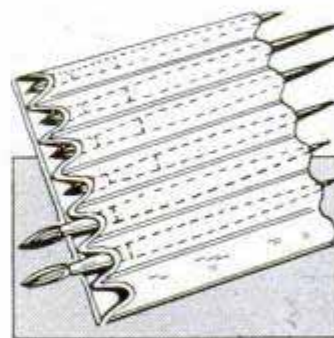
Lengths of pipe to be cut to size on the job are held conveniently for sawing by means of two saddles attached to the ends of a sawhorse. Each of the saddles is bent from a length of iron rod, a vee being formed at the center to hold the pipe. The saddles are mounted on the sawhorse by inserting hooks, bent at the ends of the rods, in holes drilled in the sawhorse. With this arrangement, the saddles are swung up into position when needed and dropped out of the way when not in use.



Cardboard Brush Keeper Protects Bristles

The fine bristles of water-color brushes are kept in good condition by storing the brushes in a holder made from a piece of corrugated cardboard. Slip the brushes, handle first, between the corrugations and pull them through until the paper covers the bristles.

Nancy Varney, New Rochelle, N. Y.



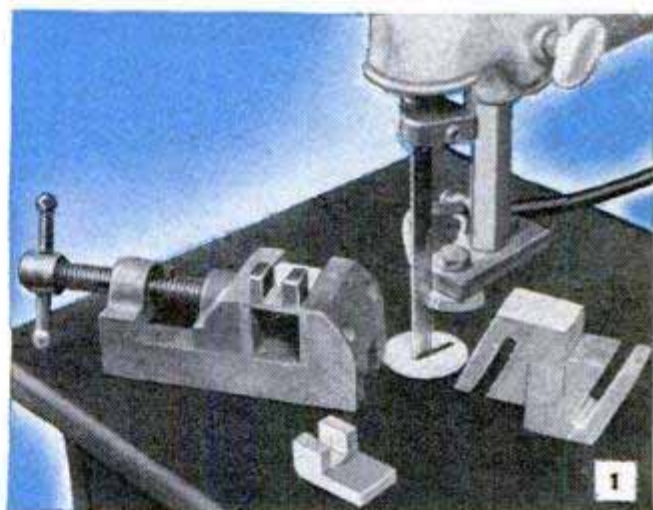
☞ To clean and extend the life of a broom, dip it in warm water once a week.

REFLECTOR WINGS

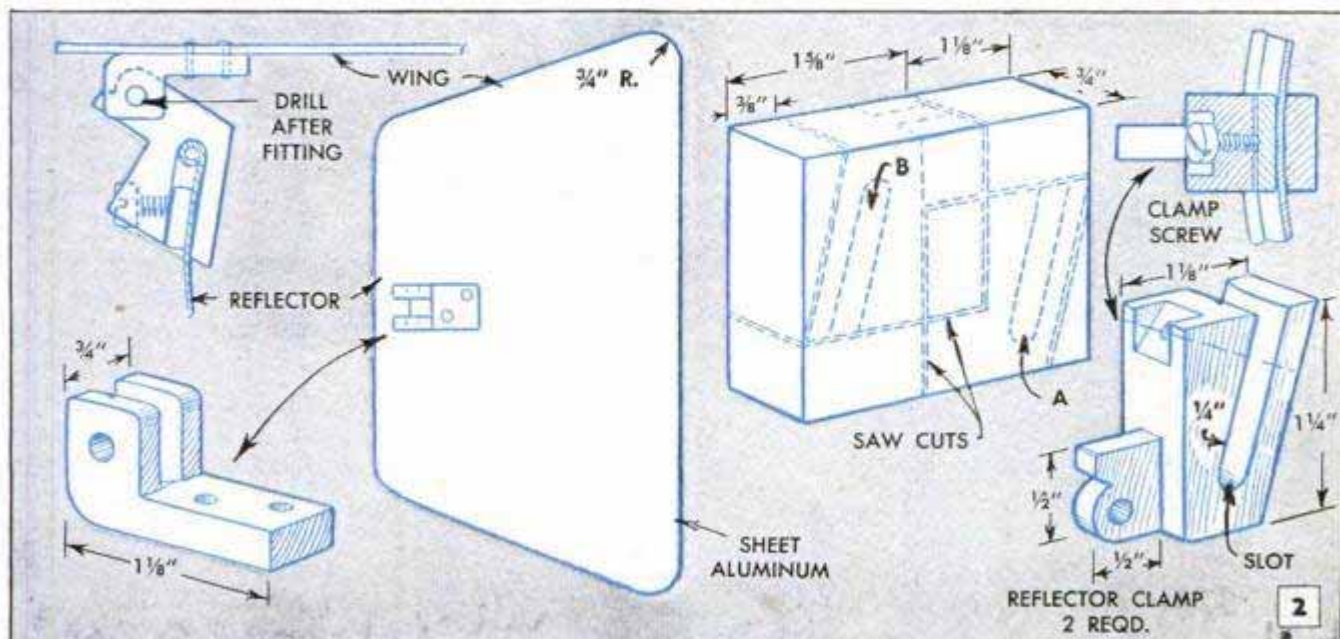
Control Photo Lighting

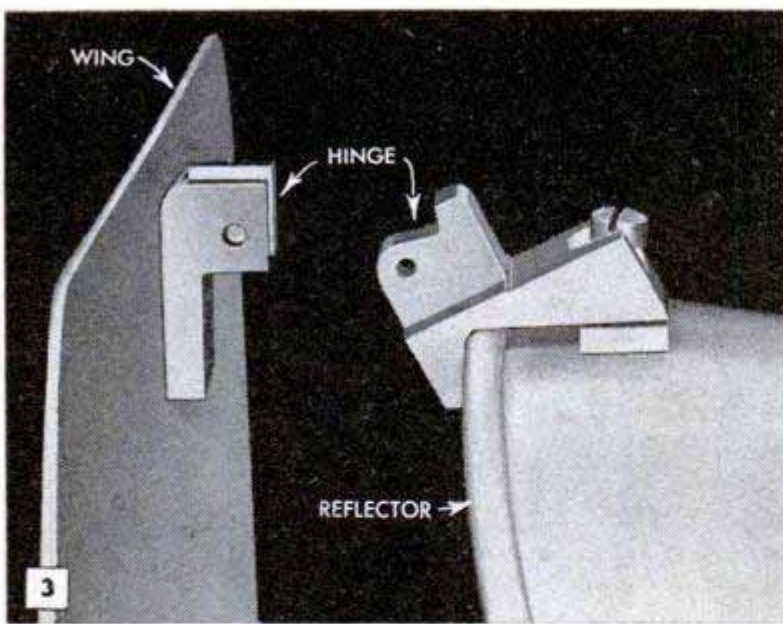
By Alexander Maxwell

WHEN photographing table-top setups, close-ups and studio stills, reflector wings on the floodlights give a closer control of lighting intensities. By adjusting the wings, you can easily eliminate glare from both the subject and the camera lens and throw high lights just where you want them. The wings are specially designed to be attached to any floodlight reflector of the clamp-on type. They are cut from sheet aluminum approximately $\frac{1}{16}$ in. thick. Dimensions are not given as the size must be varied to suit the reflector. For best results, the length of the long side should be about 2 in. greater than the diameter of the reflector and the short side a little less. The width of the wing should be slightly greater than half the diameter of the reflector. The special hinge which clamps over the beaded edge of the reflector is sawed and filed from brass or aluminum as in Figs. 1 and 2. Only the length and thickness of the metal block is given in Fig. 2. Normally, the width should be $1\frac{3}{4}$ in. but it may be necessary to vary this in order to shorten or lengthen the slots A and B. Sawing the metal block, Fig. 1, at the points indicated by dotted lines produces two clamps, each of which forms one part of the hinge, Figs. 2 and 3. The yoke member of the hinge, which is attached to the wing, Fig. 2, is cut from the same material as the clamp. The important thing in fitting the parts is close fit of the lug on the clamp member in the slotted yoke. For a small wing, cut the slot in the yoke member $\frac{1}{4}$ in. wide and file the



Hinge parts are sawed to the rough form on the jig-saw. Parts can be held conveniently in a drill vise





lug to fit. If the hinge must support a larger wing on a big reflector, cut the slot $\frac{1}{16}$ in. wide. Cut the lug $\frac{1}{32}$ in. thick and file to fit. Slots A and B in Fig. 2 will need filing to fit the rolled edge of the reflector. Ordinarily, the width of the slot should be $\frac{1}{4}$ in. as given in Fig. 2, but this may have to be varied to suit the reflector at hand. File a flat on each clamp member and drill and tap for an 8-32 machine screw as in the two right-hand details and the upper-left detail in Fig. 2. Polish the reflecting surface of each wing and attach to the reflector as in Fig. 3. The hinge pin should be a snug fit in both members.

Discolored Lenses Can Be Salvaged by Recementing Them Yourself

Because of age, exposure to sunlight or heat from an enlarger lamp, the balsam used to cement lens elements together frequently deteriorates. This results in a frosted discoloration of the lens or a crackled effect which starts at the edges and sometimes covers the entire lens. If the lens is not one which requires precise factory adjustment, the elements can be recemented to eliminate these conditions. Examine the mounting, and, if it is of the type in which the lens glass is held against a metal shoulder by a threaded ring, this repair can be made.

First, remove the retaining ring, using a rubber stopper to loosen it, as in Fig. 1. Now, the balsam between the lens ele-

ments must be dissolved. This is done by placing the lens in a covered jar filled with xylol, allowing the lens to remain in the liquid until the elements come apart. This may take from one to several days, depending on the condition of the balsam. Use either a separate container for each lens or make an identifying mark on the edge of the lens as in Fig. 2. When the elements have been separated, clean them thoroughly with xylol, applying it with a soft cloth, and remove dust and lint particles with a camel's-hair brush.

To recement the lens, place a drop of Canada balsam in the hollow of the concave element, as in Fig. 3, and bring the convex element in contact with it. Then

press the elements together gently to remove air bubbles and excess balsam. After checking to be sure that the edges of the elements are even, tie the assembly together with string, Fig. 4, winding it around in all directions. Allow the cemented lens to dry for several days and then remove the string and clean off the smeared balsam. Use only a small amount of xylol for this, especially on the edges of the lens, to avoid possible separation of the elements. Cover the worktable with a clean, soft towel to prevent scratches and to minimize the possibility of damage.—W. A. Conway, Macedonia, Ohio.

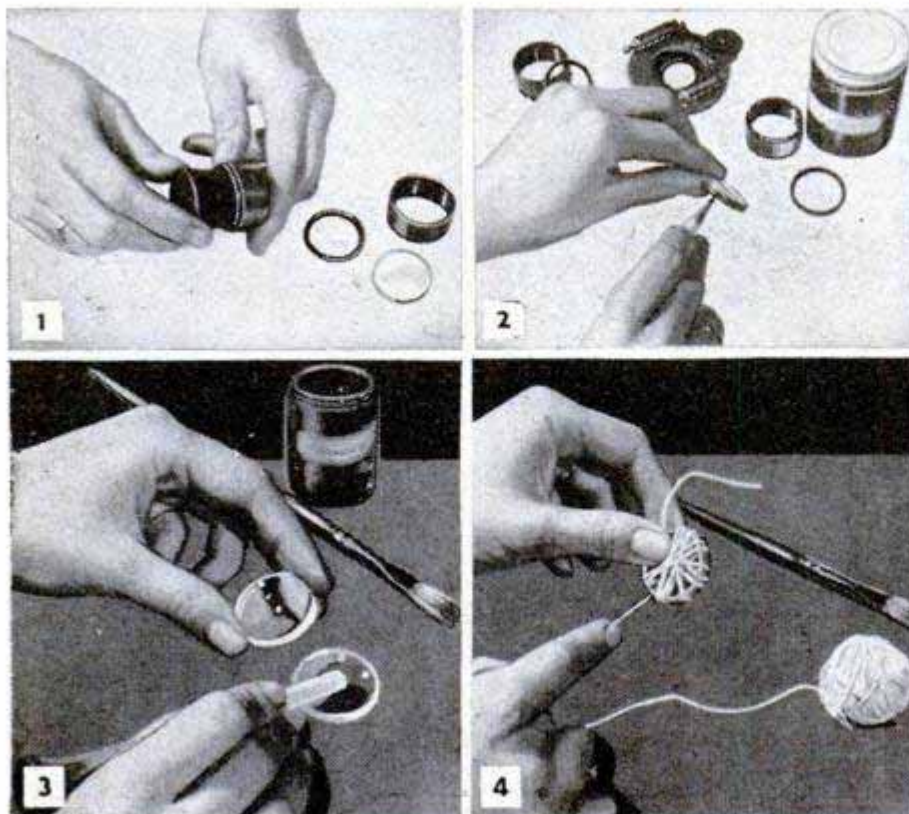
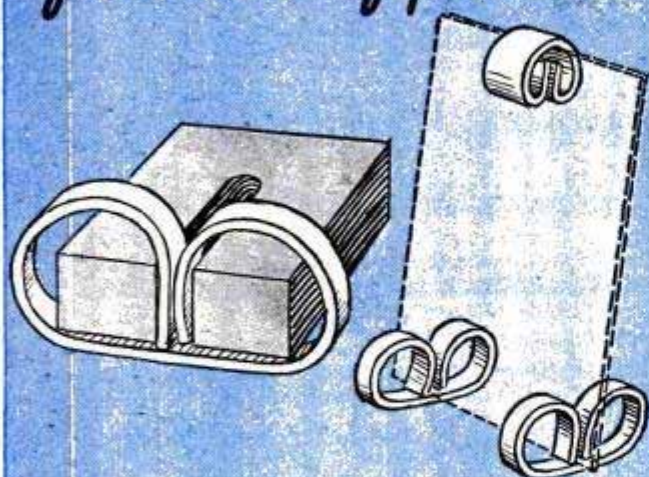
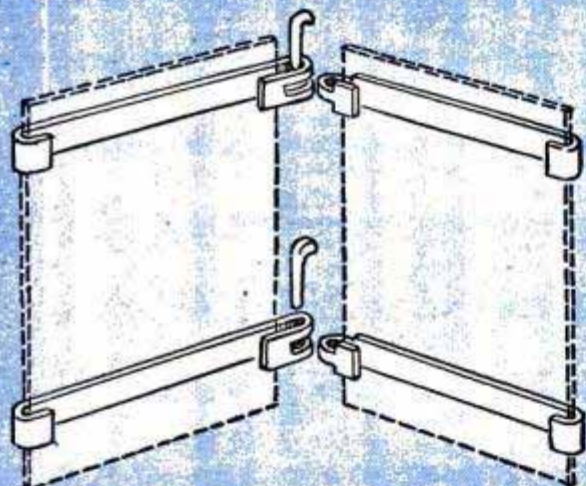


PHOTO FRAMES

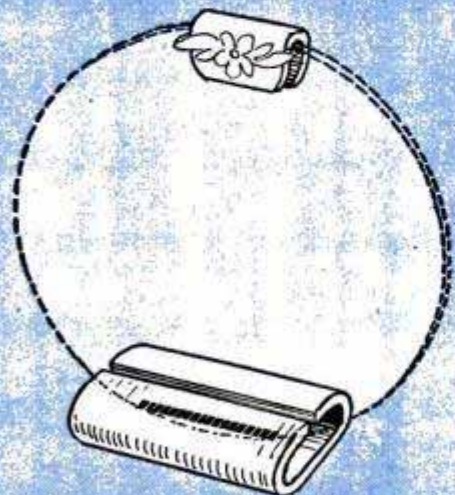
from bits of plastic



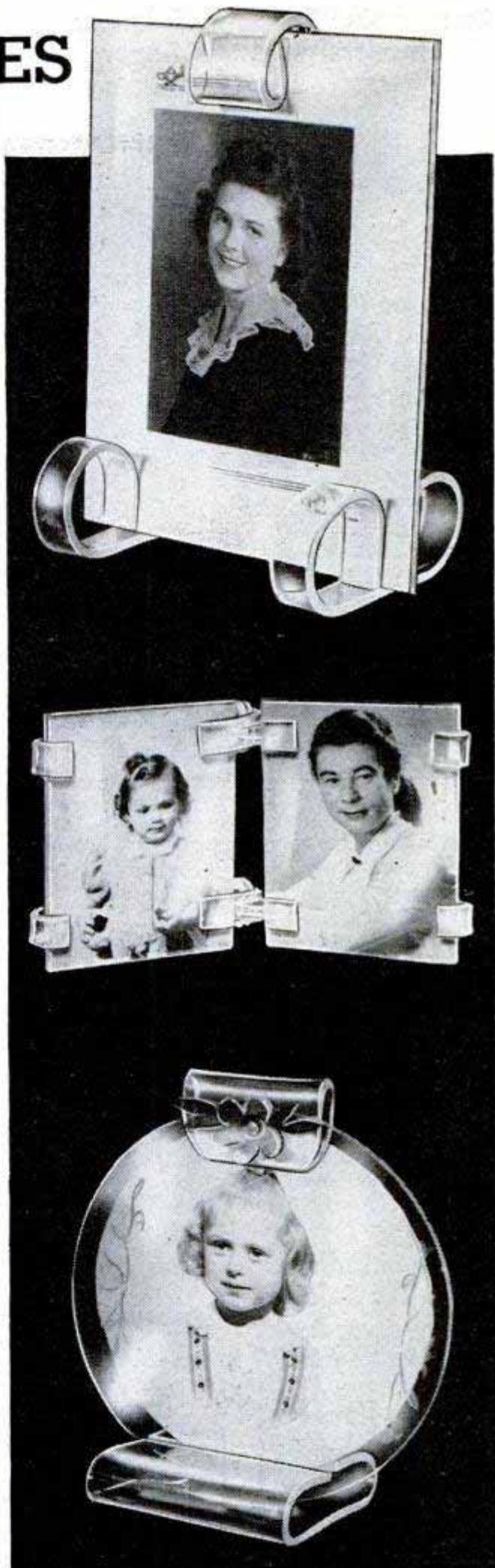
This attractive frame is merely two pieces of glass having a photo sandwiched between them and held together with $\frac{1}{8}$ -in. plastic clamps, which are heated and formed as shown



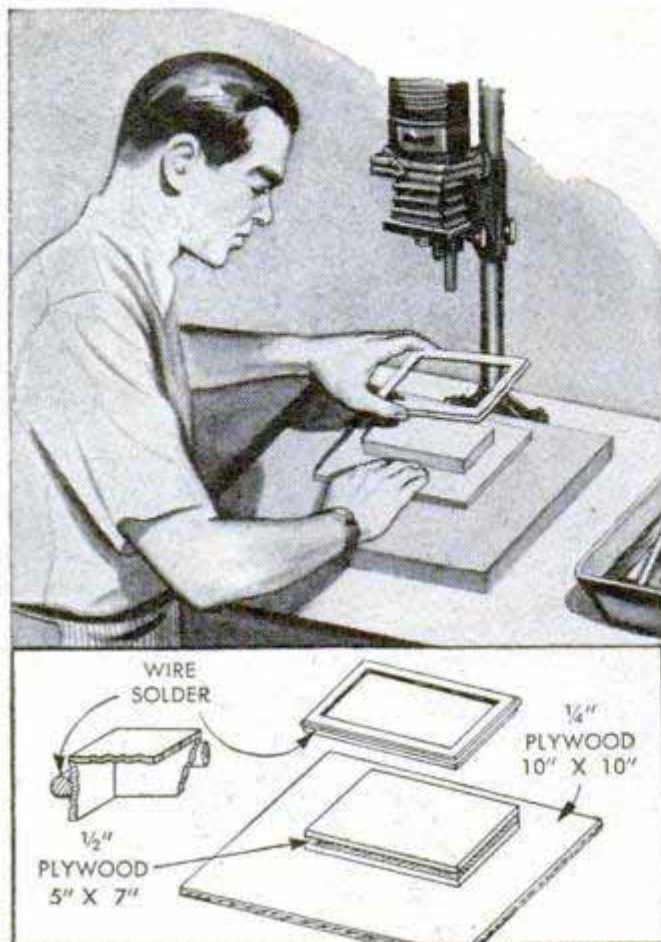
When assembled, this double-hinged frame opens as a book. Plastic strips which clamp the photo and cardboard backing to glass panels are slotted and notched as shown to form hinges



Two wide plastic clips hold glass and picture securely. Bottom clip forms base and the top one is decorated with colored-plastic overlay



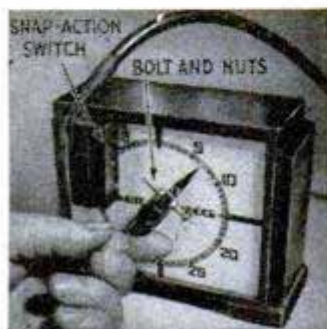
Inexpensive Easel for Enlarger Automatically Centers Paper



Whether an enlarger is used only for an occasional print or really put to work on a production basis, this inexpensive easel will prove itself well worth the short time required to make it. A metal frame which centers the paper on a plywood block forms a border around the print, thus doing away with masking. The support block is a piece of $\frac{1}{2}$ -in. plywood cut exactly to the size of the photo paper. This piece is screwed to the easel base, and its face is covered with white paper to facilitate focusing of the enlarger. The sheet-metal frame is made to fit snugly over the block and is weighted with wire solder which is tack-soldered around the sides of the frame.

Clyde Cameron, New Orleans, La.

Switch Fitted to Darkroom Timer Turns Off Enlarger or Drier



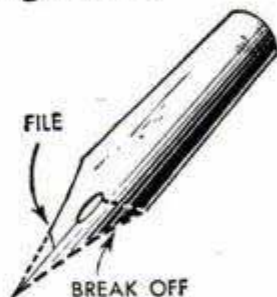
By fitting a snap-action, sensitive switch to a darkroom timer, the latter is quickly converted into a timer-switch to turn off an enlarger or print drier. A switch of the

type that is normally in the closed position is wired into the circuit to be controlled and is cemented to the face of the timer as shown. The timer knob is drilled for a bolt adjusted by two nuts, which depresses the sensitive switch when the knob returns to the zero position.

Kenneth Murray, Colon, Mich.

Pen Provides Etching Knife

If your negative etching knife is mislaid and one is needed right away, you can make a satisfactory knife from an ordinary pen. Just break off one side of the point as shown and file the other side diagonally until the desired angle and width of cutting edge are reached. To hold the etching knife for use, simply insert it in a penholder.



M. A. Richardson, Milton Junction, Wis.

Rubber Band Marks Beaker

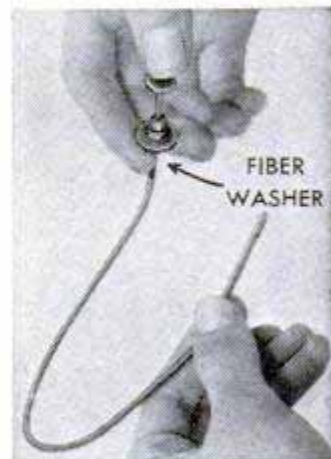
Measuring photographic solutions in a glass beaker that is difficult to read is simplified by first slipping a rubber band around the beaker and carefully adjusting it to the desired graduation. In this way, an accurate measurement is had by merely filling the beaker up to the rubber band.



Henry Hanscom, Elmhurst, Ill.

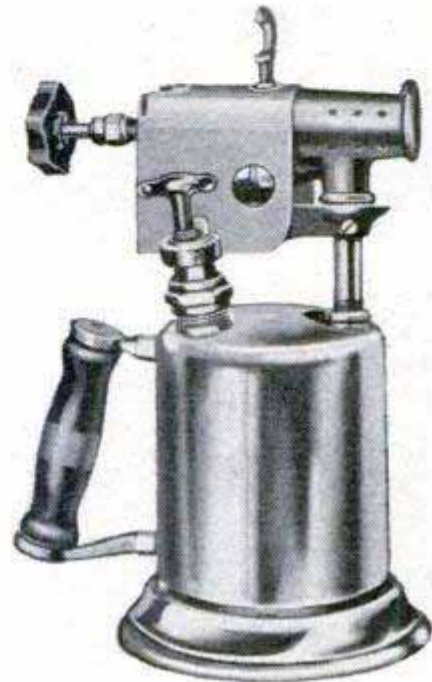
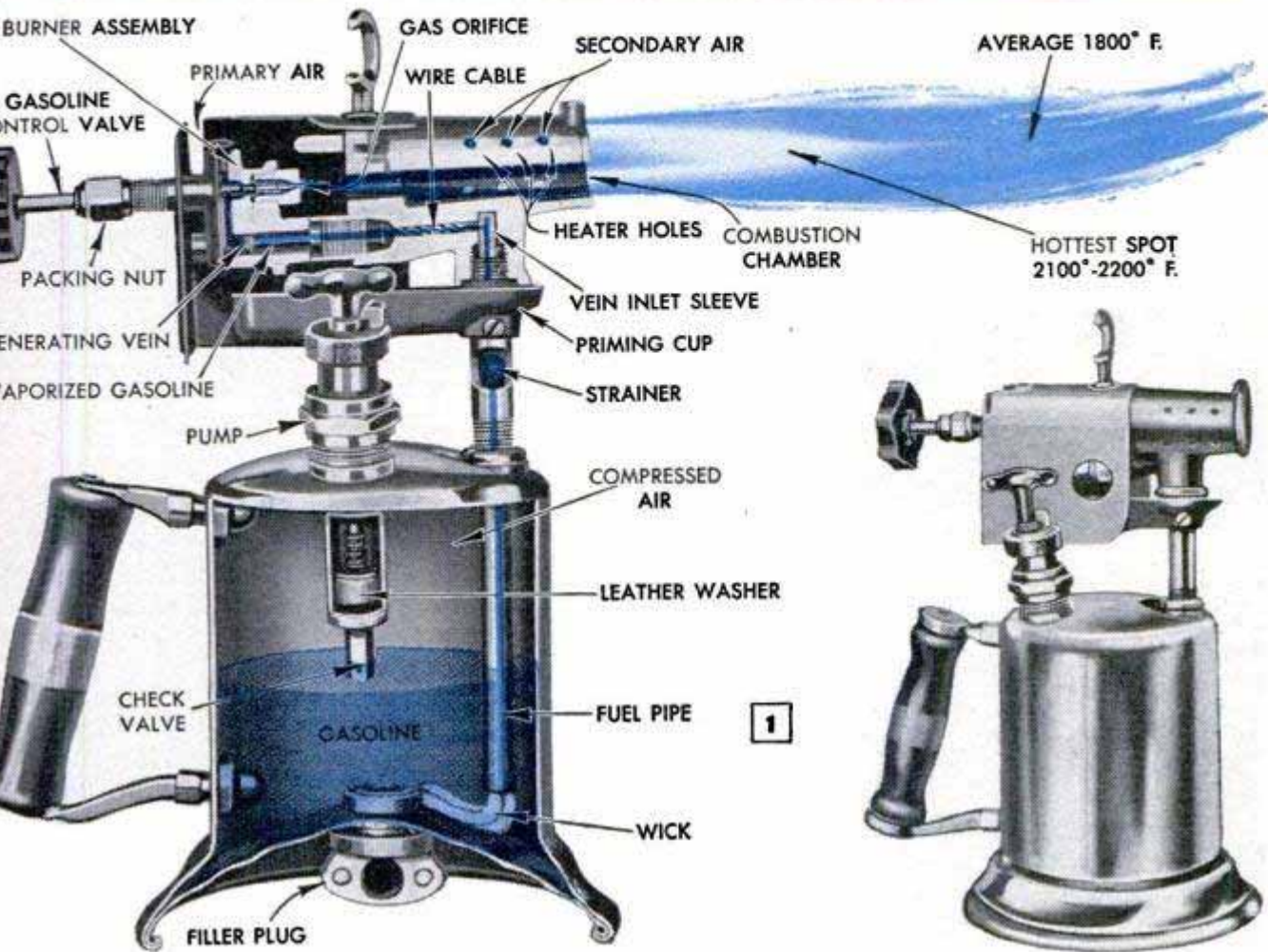
Finger Grip on Cable Release

A more convenient grip for a camera cable release is had by means of a $\frac{3}{4}$ -in. rubber or fiber washer pressed over the shoulder of the plunger. To do this, detach the cable release from the camera and slip the washer over the threaded end. A fuller ball also can be used for this purpose, in which case the ball is slit lengthwise and forced around the cable.





Shop Notes



Courtesy Clayton & Lambert Mfg. Co.

KNOW YOUR TORCH

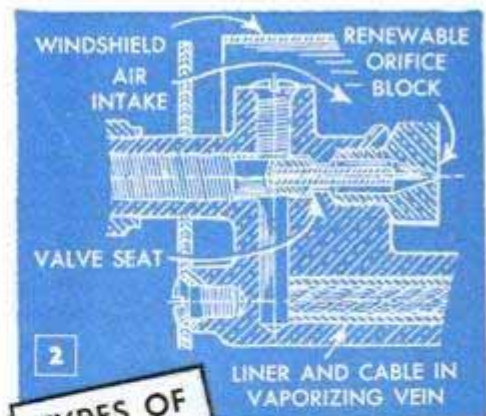
To keep your blowtorch in top operating condition, a knowledge of the principles of operation and how to clean and adjust the burner is most essential

By A. E. Youngquist

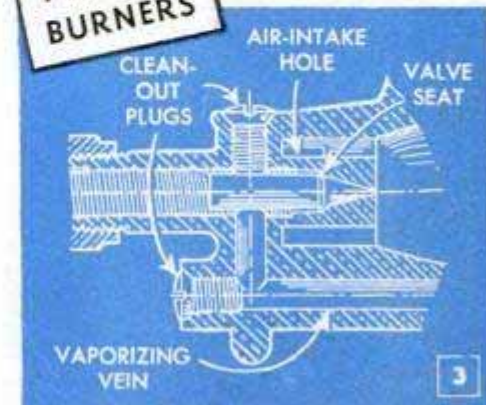
A BLOWTORCH is a versatile little heater and, if correctly maintained, it will give years of efficient service for hundreds of small heating jobs both around your home and in your shop. The mechanism of a torch, Fig. 1, is relatively simple, but it must be kept clean and correctly adjusted.

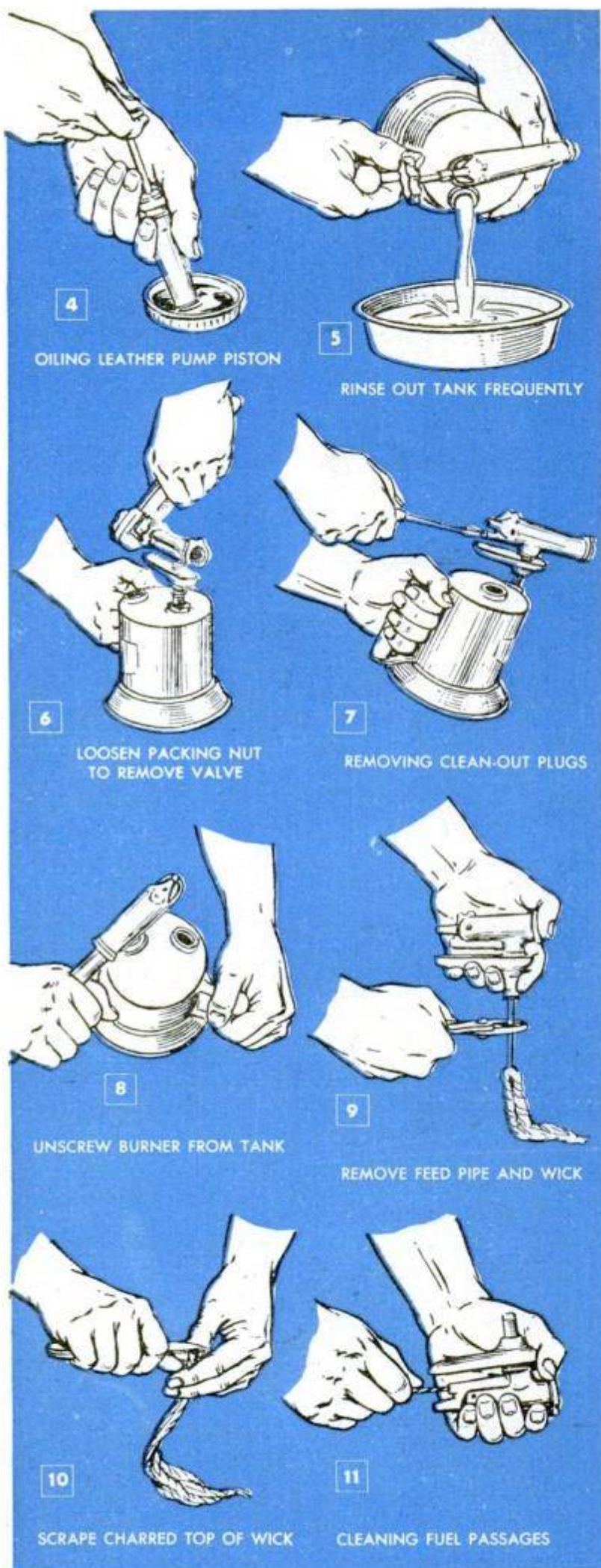
In operation, gasoline in the tank is forced up to the burner through the feed pipe and generating vein or fuel passage by air pressure inside the tank, which is maintained by occasional use of a small hand pump installed as a part of the tank unit. As the gasoline passes through the generating vein, it is vaporized by heat conducted from the combustion chamber when the torch is burning.

When a cold torch is to be ignited, the burner casting



TYPES OF BURNERS





must first be heated by burning liquid gasoline in the priming cup. The gas vapors generated in the vein emerge from the gas orifice and mix with incoming primary air. This mixture passes into the combustion chamber where it ignites and burns, causing a long, blue flame at the mouth of the burner. Secondary air passes into the flame through the heater holes in the combustion chamber to complete burning of the gas vapors. Two types of burners are used on blowtorches. The type shown in Fig. 2 has a renewable orifice block and liner and cable in the vaporizing vein. It provides a smooth flame and long-burning life before carbonizing. The type of burner shown in Fig. 3 is of the simplest construction and, therefore, the least expensive of the two. It will give a hot, blue flame and the veins are easily cleaned. Temperature of the flame, Fig. 1, is fairly constant at any given tank pressure for various torch models. However, the volume or size of the torch flame varies.

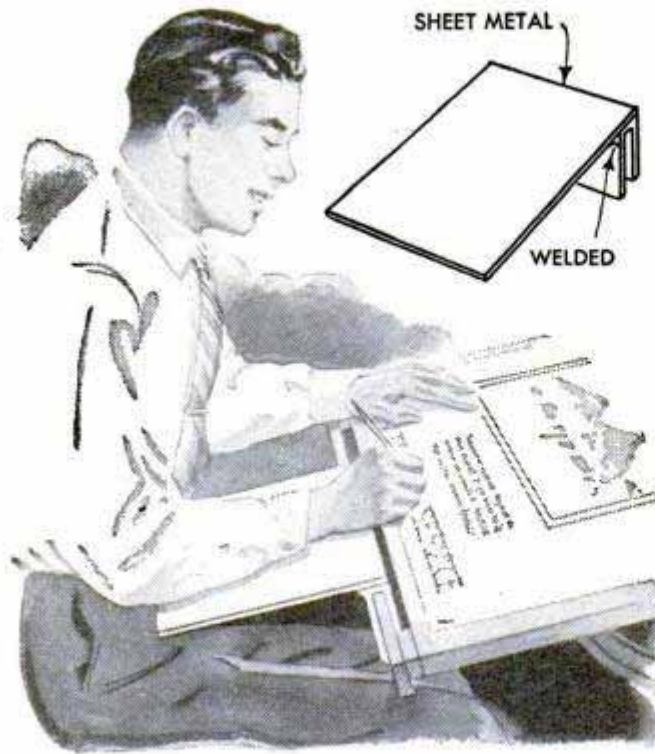
If the flame is too small and weak in force, open and close the gas-control valve several times to clear the burner orifice. If this does not return the flame to normal, the torch needs cleaning.

Allow the torch to cool before dismantling it for cleaning. Then unscrew the pump and remove and clean the check valve. Draw oil into the pump cylinder, as in Fig. 4, to lubricate the leather washer on the pump piston. Before replacing the pump, rinse out the tank, Fig. 5, with gasoline to clean out any sediment. To inspect the gas-control valve, loosen the packing nut, as shown in Fig. 6, and unscrew the control valve. Then hold the nozzle to a light and look through the fuel passage. If the orifice is enlarged, the orifice block should be replaced with a new one, if it is of the type shown in Fig. 2. Burners of the type shown in Fig. 3 should be sent to the manufacturer for repairing. Poor operation often results from carbonization of the veins. To clean the veins, remove the clean-out plugs, Fig. 7, and unscrew the burner assembly from the tank. A short length of pipe may be inserted in the

nozzle, as in Fig. 8, for leverage. After removing the burner, unscrew the feed pipe containing the wick, Fig. 9. If the upper end of the wick is charred, it should be scraped clean with a pocket-knife, Fig. 10. The fuel passages, or veins, can be cleaned with a drill turned by hand, as in Fig. 11. Before assembling the torch, carefully apply brown laundry soap, as shown in Fig. 12, to the threads of each part to prevent leaks. There's a trick to getting the wick back into the tank. First twist it tightly, then push it through the feed-pipe inlet with a screwdriver as in Fig. 13. When the torch is assembled, fill the tank three quarters full with clean, uncolored and unleaded gasoline. Most torches must be turned upside down, as in Fig. 14, to fill. After checking to make sure the gasoline control valve is closed, pump about 20 strokes of air into the tank for starting pressure, Fig. 15. The torch can be tested without lighting it by pointing the nozzle toward a container and opening the control valve. If a small stream of gasoline sprays out as in Fig. 16, the torch will burn when properly generated. To start a cold torch, open the control valve slightly to allow gasoline to flow slowly into the priming cup until about three quarters full. Some torches, Fig. 17, are equipped with a priming valve for this purpose. Then ignite the gasoline in the cup. The burning gasoline, Fig. 18, will heat the burner casting to the generating temperature. When the gasoline in the cup has nearly burned, open the control valve. Often the torch will light itself from the priming flame. If not, hold a lighted match close to the heater holes or just below the nozzle as in Fig. 19. An intense blue flame should result. A yellow flame indicates the burner has not been properly generated. When this happens, shut off the torch and allow it to cool; then fill and relight the priming cup. To increase the flame volume, regulate the control valve and increase the air pressure in the tank. After shutting off the torch, back out the control valve one eighth turn to prevent jamming when it cools.



Sliding Armrest Aids Lettering At Bottom of Drawing Board



With the aid of this sliding armrest, the lower portion of a drawing can be lettered neatly without moving the drawing up on the board. The armrest is made from two pieces of heavy sheet metal, welded together as shown, and slides on a wooden strip screwed to the bottom edge of the drawing board. Wooden spacer blocks are inserted between the strip and the board.

T. P. Ilari, Louisville, Ky.

Pencil Mark Guides Wheel Dressing

When using a diamond dresser to true a wheel on a lathe tool-post grinder, it was difficult for me to tell when the wheel was true. However, I discovered that blackening the surface of the wheel with a heavy



pencil before starting the work made it easy to see any low spots remaining on the wheel.—Richard Hanscom, Elmhurst, Ill.

Novel Signwriting Method

For a novel effect in display-window signs, one grocery-store proprietor prints the signs in reverse, that is, the background is painted and the letter left clear. He does this simply by stippling the required area of glass with

STIPPLE APPLIED WITH SPONGE



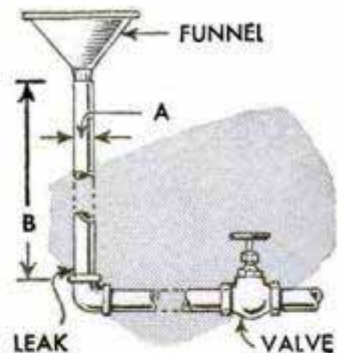
a whitening mixture and drawing in the lettering with his finger. The whitening can be applied in a variety of designs.

Removing Rusted Caster Sleeves

Rusted caster sleeves are quickly removed by turning a drill bit, slightly oversize, into the end of the sleeve. The bit will bite into the metal, gripping it so that a few turns will loosen the sleeve.

Locating Leaks in Vertical Pipe By Measuring Water Volume

By the following method, it is easy to locate a hidden leak in a run of water pipe or steampipe. This applies only to vertical runs or those in which the rise per foot in inches is equal to or greater than



the inside diameter of the pipe, A. To begin with, disconnect the pipe above the leak and close a valve at a point beyond the leak. The pipe must be full of water between the leak and the valve, so fill the pipe from the upper end, allowing the water to drain out through the leak. When the portion between the top of the pipe and the leak is empty, quickly refill the pipe using a container with a known volume. Noting the amount of water required, you can determine the distance of the leak from the end of the pipe, B. The following lengths of various sizes of standard pipe hold 1 pt. of water: 7.9 ft. of $\frac{1}{2}$ -in. pipe, 4.5 ft. of $\frac{3}{4}$ -in. pipe, 2.78 ft. of 1-in. pipe, 1.6 ft. of $1\frac{1}{4}$ -in. pipe, 1.17 ft. of $1\frac{1}{2}$ -in. pipe, .715 ft. of 2-in. pipe, and .5 ft. of $2\frac{1}{2}$ -in. pipe.

AIR-CONDITION YOUR CAR

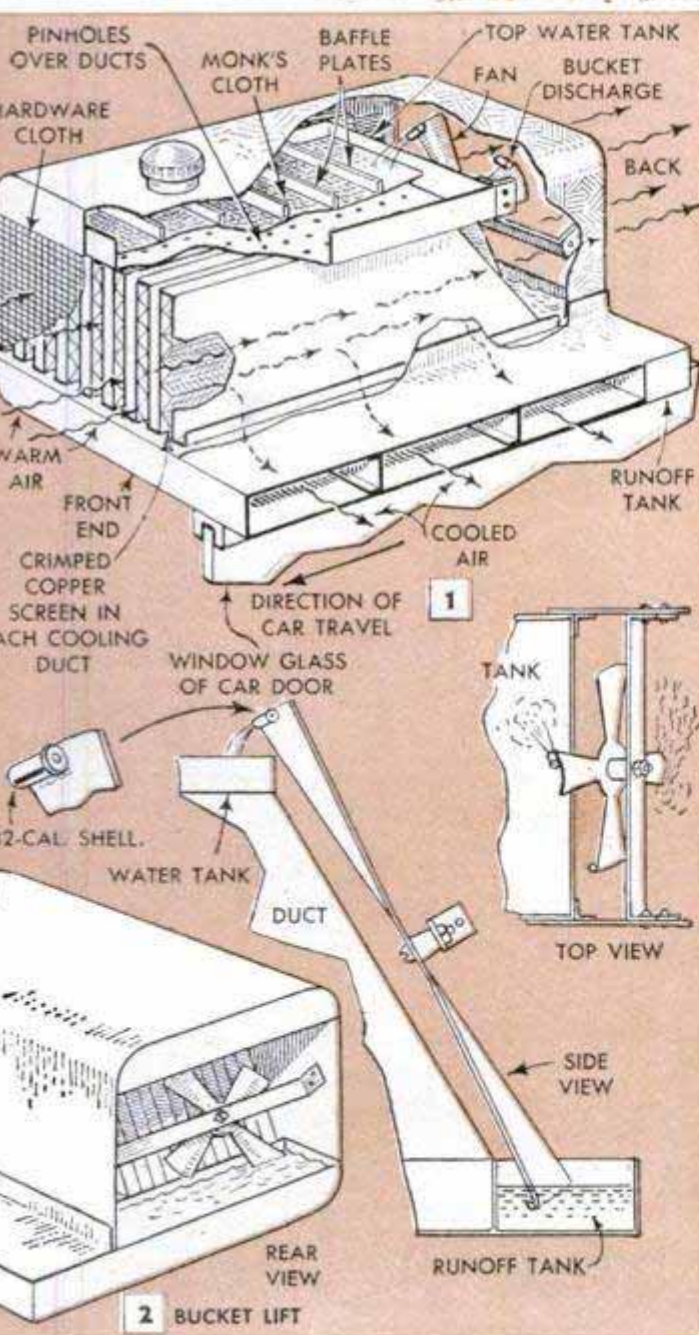
for summer driving

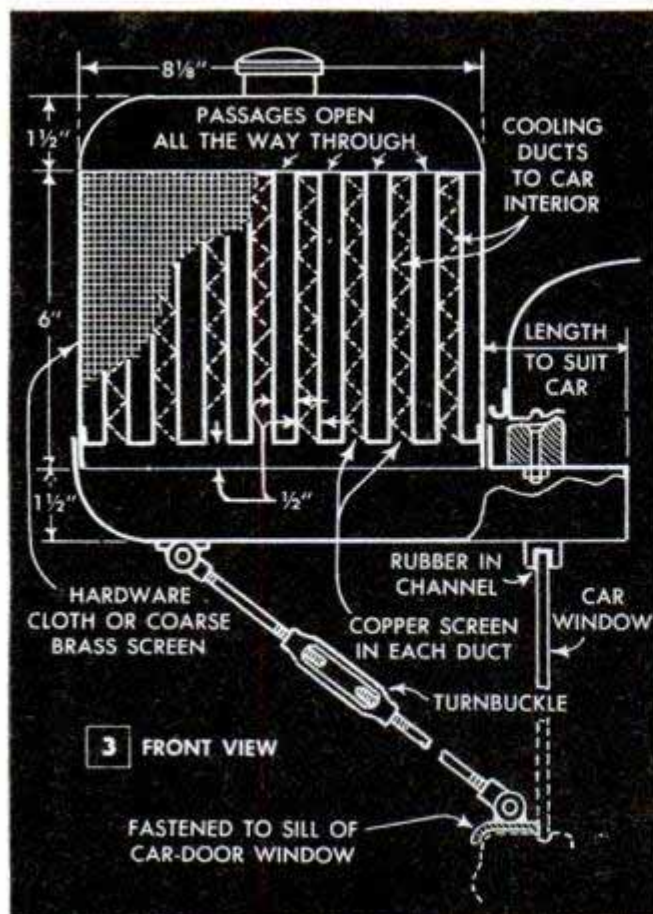


By Hi Sibley

THAT LONG vacation drive to the summer camp, or across the desert, can be made in air-conditioned comfort if you install this efficient car cooler before starting. Although the cooler operates on the well-known principle that air is cooled by rapid evaporation of water, it does not raise the humidity of the air in the car. Only dry, cool air reaches the car interior through ducts which are located at right angles to the air stream passing through the cooler.

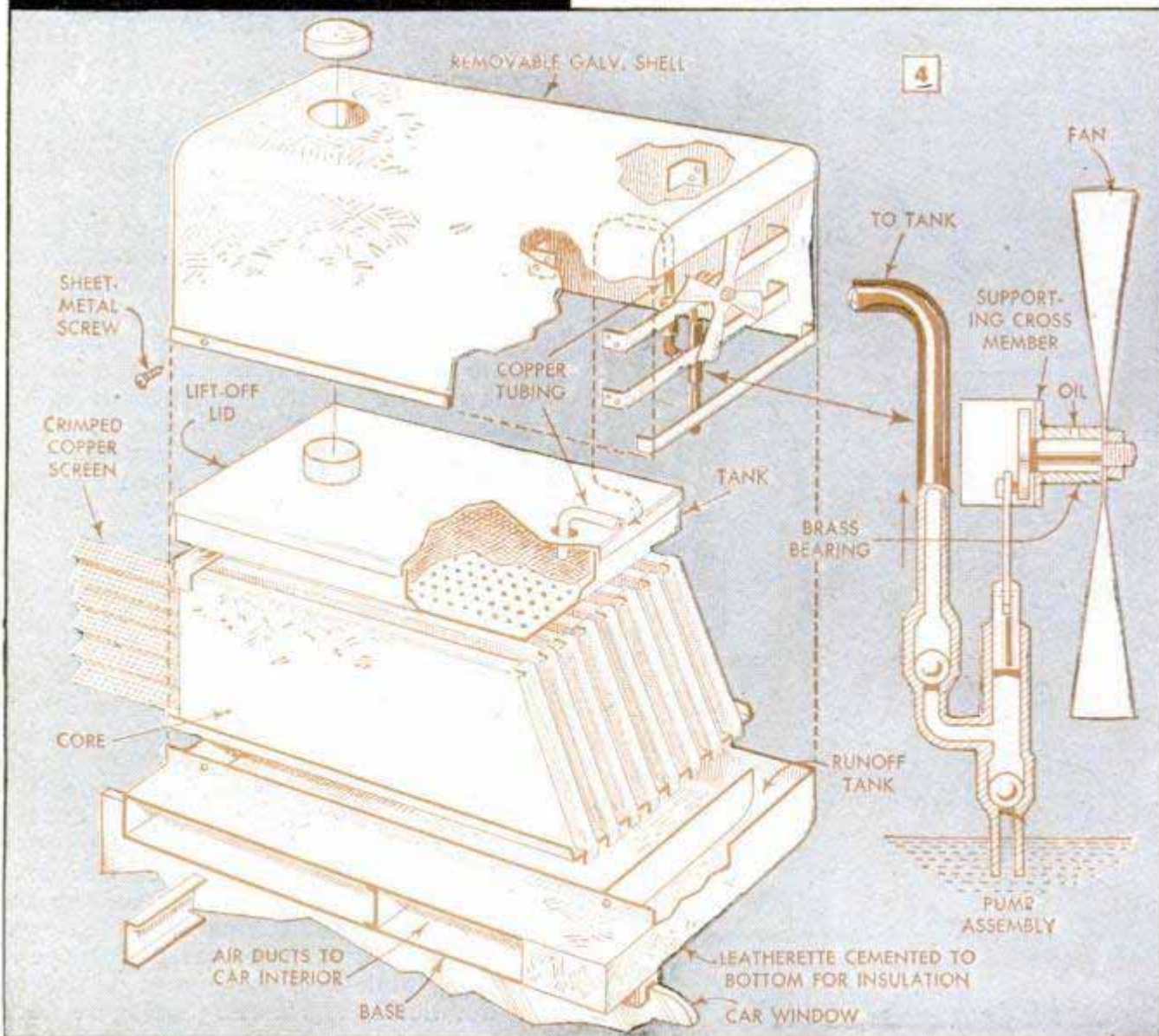
The cutaway view, Fig. 1, shows how it works. Air passes through a core which consists of a series of ducts having $\frac{1}{2}$ -in. openings between them. Each duct is closed at the rear and is covered with a fabric "wick" or jacket. The space within the walls of the duct is filled with crimped copper screen, Figs. 1 and 4. Water from the baffled supply tank drips through pin-sized holes onto the jackets, and air passes through the openings between the ducts, evaporating the water from the saturated fabric. Air passing into the ducts at the open ends is retarded by the crimped-screen baffles until its temperature is lowered by contact with the cooled sides of the ducts. It is then deflected by the slanting closure at the rear end of each duct into right-angle ducts leading to the car interior. Water that drains into the lower tank at the rear of the cooler is returned to the upper tank by a fan-operated "bucket lift" detailed in Fig. 2. Air passing between



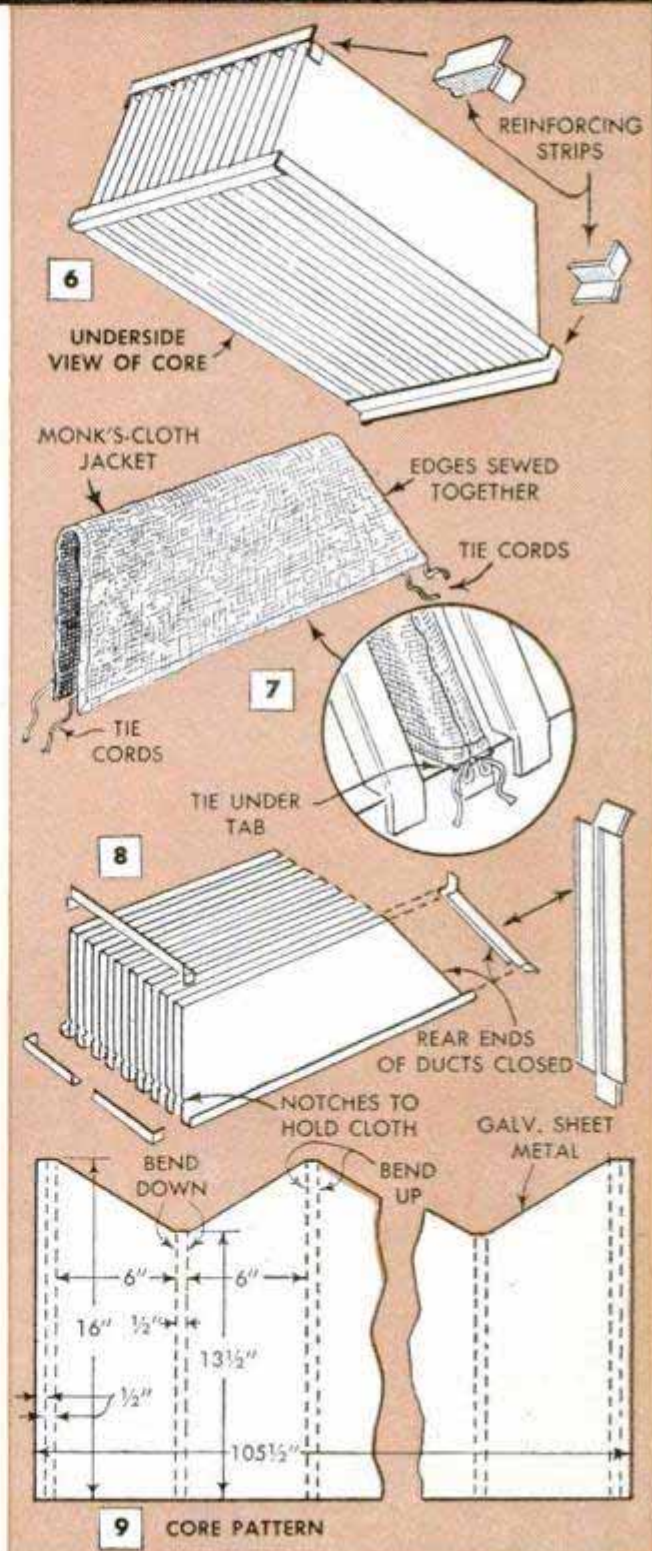
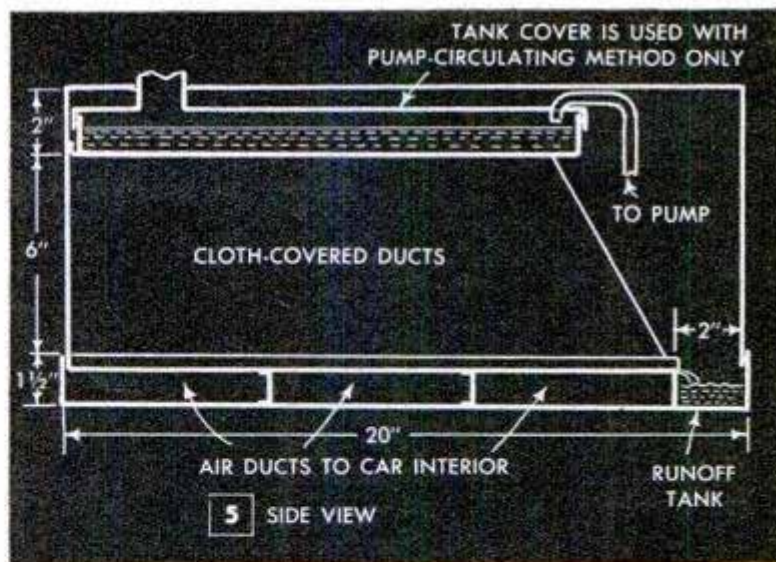


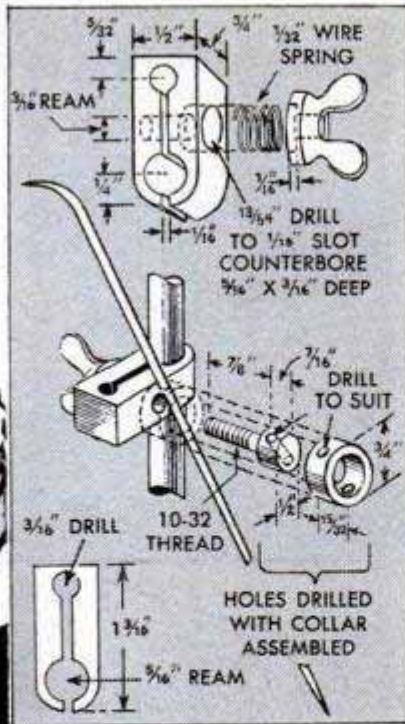
the ducts of the cooler rotates the fan, each blade of which is fitted with a bucket made from an expended .32-cal. shell. As the fan rotates, the buckets dip into the water in the lower tank and spill their loads into the upper tank, thus replenishing the water supply while the car is in motion. The speed of the fan can be altered by changing the pitch of the blades. This arrangement works satisfactorily on long trips where the car is driven at a fairly high speed. A somewhat more efficient arrangement for slower driving is the fan-driven pump detailed in Fig. 4. All parts of the pump should be of brass to prevent corrosion.

Figs. 3 and 5 are front and side views giving general over-all dimensions. The length of the ducts which carry the cooled air into the car, Fig. 3, should be carefully determined beforehand, as the required length will vary. The front of the unit is covered with a heavy brass screen and the rear end of each duct is closed by a channel bent from sheet metal and soldered over the opening as in Figs. 4 and 8. The core and upper tank, which are separate units, are covered by a removable shell made



from galvanized sheet metal as in Fig. 4. When in position, the shell houses all parts and prevents them from shifting. Where a fan-operated pump is used, the upper tank is covered, as in Fig. 4, with a sheet-metal lid. Figs. 6 to 9 inclusive detail the construction of the core. It is bent from a single piece of sheet metal laid out as in Fig. 9. The crimped retarders are made from 16-mesh bronze or copper fly screen. Reinforcing sheet-metal strips are soldered at both ends of the core as in Fig. 6 and notches are filed at the open, or front, end of each duct to form tabs under which the tie cords of the monk's-cloth jackets, Fig. 7, can be knotted as shown. The fabric jackets should be carefully cut to size so that, when tied in place over the ducts, they will be uniformly tight and without wrinkles. The runoff tank, Figs. 1, 4 and 5, is made by soldering a sheet-metal baffle in the bottom of the unit. Test it before installation to see that it is watertight. After it has been completed and the air-duct dividers have been soldered in place, set the core and upper tank in position and cut, bend and fit the shell, Fig. 4. Where the upper tank is covered, it is necessary to fit a filler neck and cap as in Figs. 3 and 4. Next, install the fan and pump, attaching the supporting cross members to the sides of the shell as shown. Fasten the shell and the core to the bottom tank with sheet-metal screws as in Fig. 4. Fig. 3 shows how the cooler is mounted on the car. A wooden strip, bandsawed to the curve of the door mold, is bolted to the top of the air-duct extension and a channel fitted with a rubber filler strip is soldered to the bottom of the duct extension. This fits over the top edge of the car window. A special brace with a turnbuckle adjustment supports the cooler in the horizontal position. The exact position of the brace lugs and the channel must be determined by trial. As the length of the cooler will not fully cover the opening at the top of the window, fit strips of sheet metal to the ends of the cooler so that they will block the opening completely. For a neat, attractive job, spray-paint the cooler with the same color and type of finish as that on the car body. To operate, fill the top supply tank with water a few minutes before starting. This will permit the water in the tank to drip down onto the fabric jackets and saturate them. Then fill the runoff tank and the cooler will be in operation as soon as the car is moving. When using the cooler on extended trips or where the air is especially hot and dry, take along an extra supply of water to refill the tank.





Positive-Locking Scriber Clamp On Surface-Gauge Spindle

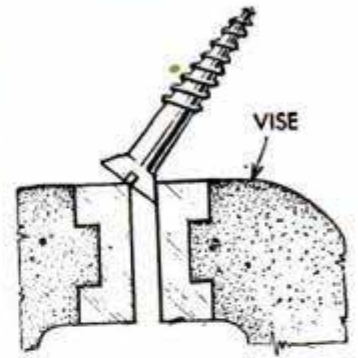
Holding adjustment of the universal scriber clamp on a surface-gauge spindle is somewhat uncertain after prolonged wear has enlarged the spindle hole. However, by making a new clamp, it is possible to restore the original accuracy of the tool. The body of the clamp is made from cold-rolled steel, finish-ground all over with a $\frac{1}{4}$ -in. radius worked on one end. Holes $\frac{3}{16}$ and $\frac{5}{16}$ in. in diameter are drilled through the blank from one edge. After reaming the $\frac{5}{16}$ -in. hole, the blank is slotted through both holes, the $\frac{1}{16}$ -in. slot running through from edge to edge of the piece, and only opening one side of the $\frac{3}{16}$ -in. hole. These operations produce the integral jaws of the spindle clamp. Next, the partly finished blank is drilled, counterbored and reamed for the scriber clamping bolt, as indicated. The $\frac{7}{8}$ -in. shouldered section of the clamping bolt is threaded 10-32, and the head is lapped to a slip fit inside a steel sleeve, which is $\frac{3}{4}$ in. o.d. The transverse hole for the scriber is then drilled with the sleeve in position over the head of the bolt. In this manner, registering holes are drilled through both parts simultaneously. Recess the bottom of the wing nut to $\frac{5}{16}$ -in. diameter and $\frac{1}{16}$ -in. depth. Obtain a coil spring of $\frac{1}{32}$ -in. wire size to fit the counterbore, then assemble the clamp with the spring under the wing nut. The spring holds all parts under a slight tension and gives a smooth, easy action when adjusting the scriber.

Thomas Coles, Detroit, Mich.

☞ A toothbrush and pipe cleaner are handy for cleaning firearms and fishing reels.

Vise Holds Screw for Cutting Without Damaging Head

When it is necessary to cut or file the thread of a flat-headed screw, I clamp the head of the screw in a vise as shown. With the tapered side of the head resting against one jaw and the other jaw engaging the screw slot, the vise holds the screw securely without damaging the head.



A. W. Larson, Minneapolis, Minn.

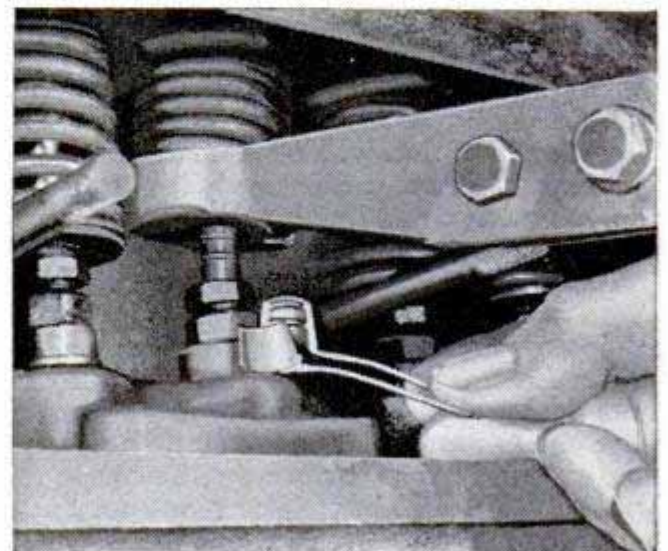
Oiling High-Temperature Bearings

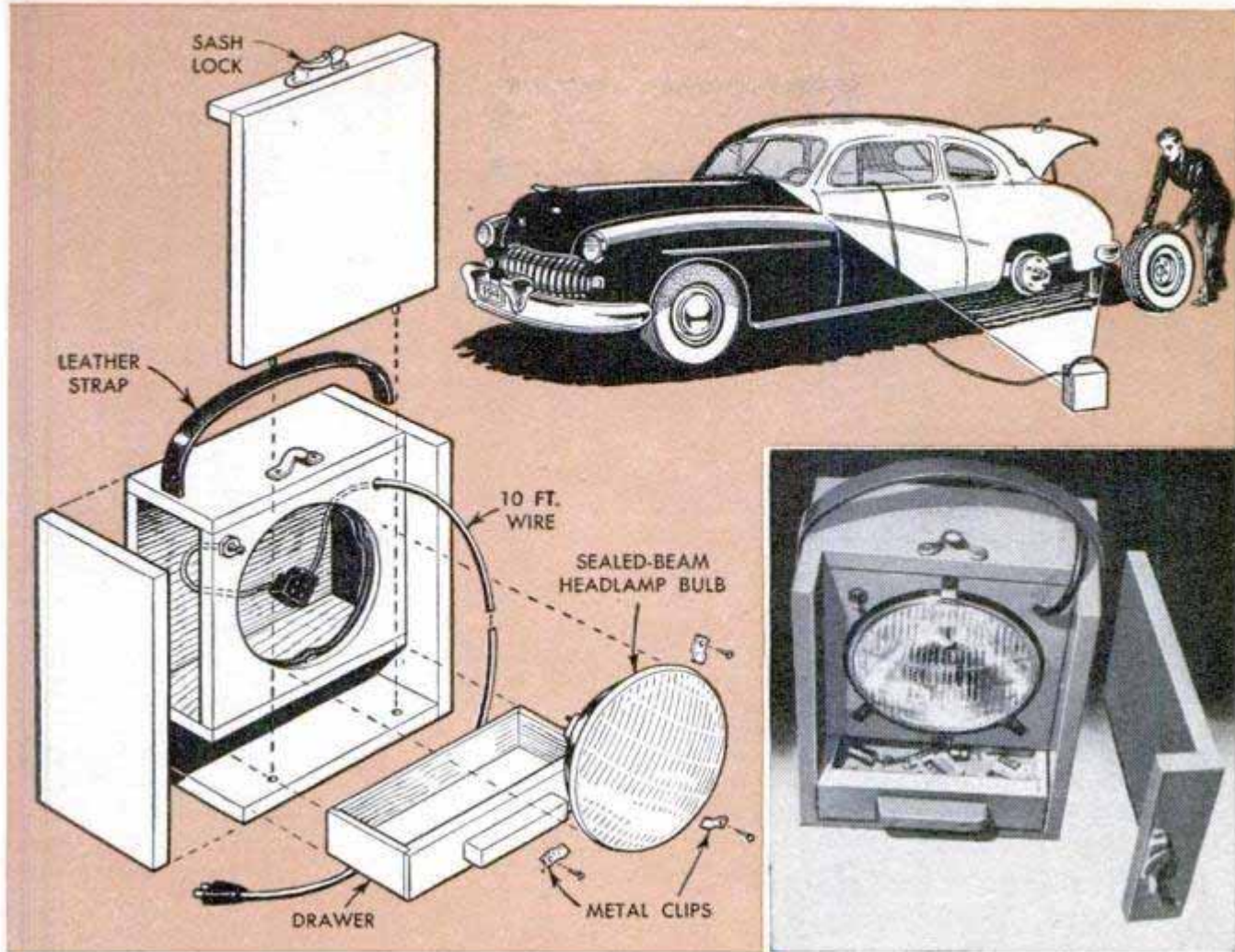
Bearings which ordinarily give trouble due to excessive heat can be lubricated effectively by adding oil when stopping the drive instead of when starting it. In this way, the grease absorbs the oil and is kept from hardening. If oil is applied directly to the grease while the motor is in motion, centrifugal force causes the oil to throw and it is not absorbed by the grease.

W. F. Schaphorst, Newark, N. J.

Wire Soldered to Valve Keys Allows Safe Installation

Soldering a length of wire to a pair of valve keys permits installing it quickly and without injuring the fingers. A 3-in. length of stovepipe wire is cut for each valve and bent to a U-shape. Then the ends of the wire are tack-soldered to the lower edges of the valve keys as shown in the photo. Using the wire as a handle, the keys are placed over the valve stem and the washer is lowered, locking them in place. After this, the wire is pulled off the keys with a pair of pliers.





Sealed-Beam Headlamp Provides Trouble Light

If you have ever had to change a tire on a dark country road without enough light to see what you were doing, you will appreciate this easily made trouble light. It throws a powerful beam of light for making tire or engine repairs and consists simply of a sealed-beam headlamp bulb mounted in a wooden carrying case. The case, which can be tucked away in a corner of the trunk compartment, is made of 1/2-in. stock and is fitted with a small draw-

er for storing spare bulbs, fuses and other items for emergency repairs. Metal clips hold the bulb in a circular opening in the front of the case, and a rubber gasket cushions the bulb. The lamp is equipped with a long extension cord that is plugged into the battery circuit of the car. For this purpose, a standard receptacle can be mounted in the engine compartment, under the dashboard or in the trunk.

John M. Avery, Dexter, N. Y.

Grille Guard From Cultivator Wheel Is Attached to Truck Bumper

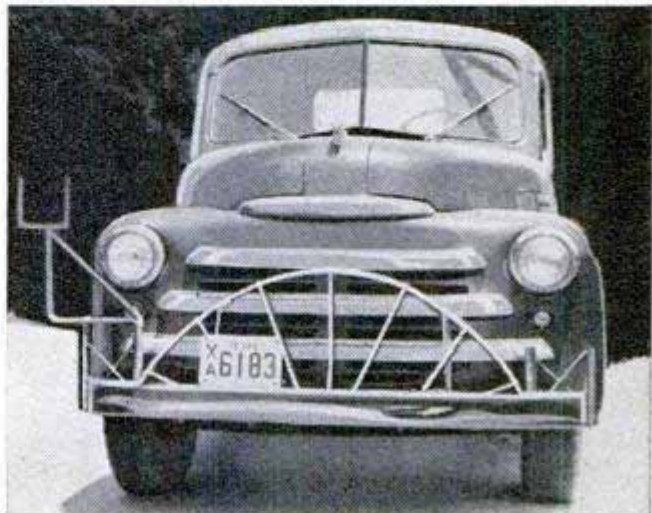
A section cut from an old cultivator wheel provides a rugged and inexpensive grille guard for a truck. The wheel section is bolted or welded to the truck bumper and braced with pieces of flat iron bolted to the bumper brackets.

Lee C. Black, Georgetown, Tex.

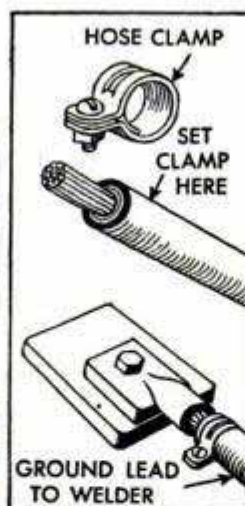
Spots of Color Identify Files

Files or milling cutters used on brass can be distinguished at a glance from those used on steel if each type is identified with a spot of a different color. For instance, red can be used for brass and blue for steel.

William A. Decker, Nutley, N. J.

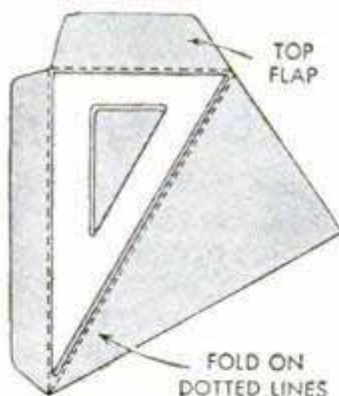


Hose Clamp on Welder Lead Secures Rubber Insulation



To keep the rubber insulation of a welder lead from pulling back or fraying at the ground-clamp connection, fasten an ordinary hose clamp around the lead at this point. In addition to holding the insulation in place, the clamp keeps oil and grease from working beneath the rubber.

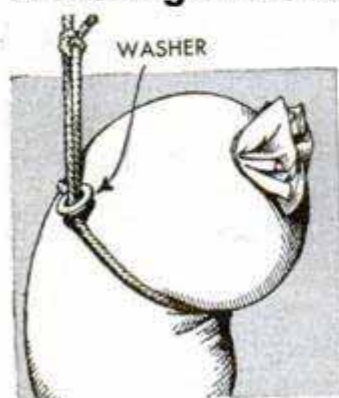
Protective Sheath for Triangle



Storing a triangle in a sheath made of heavy paper keeps it in good condition indefinitely, preventing nicks in the edges that usually occur when a triangle is stored unprotected in a drawer. The paper is cut as shown, folded along the dotted lines, and the side flaps are glued together. The top flap is left open and pushed under the side flap when the sheath is closed. To permit easy insertion and removal of the triangle, the sheath is made about $\frac{1}{8}$ in. larger.

Harry Radzinsky, Great Neck, L. I., N. Y.

Attaching Sacks to Hoist Rope

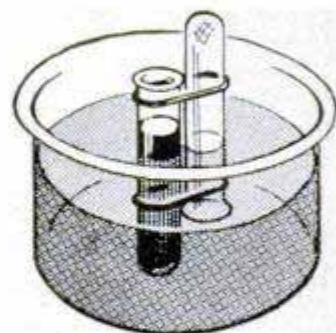


Heavy sacks which are lifted with a hoist can be attached quickly and securely to the rope by means of an ordinary metal washer. The washer is slipped over a large loop made at the end of the rope. After the

loop is thrown around the sack, the washer is pulled down and pressed against the sack, tightening the rope around it. A large knot should be tied at the end of the loop to keep the washer from slipping off the rope when the sack is released.

Floating Test Tube in Water Bath

If you do not have a cork handy when it is necessary to float a test tube in a water bath, attach an inverted empty test tube to the filled tube. Use rubber bands or string to hold the test tubes together.

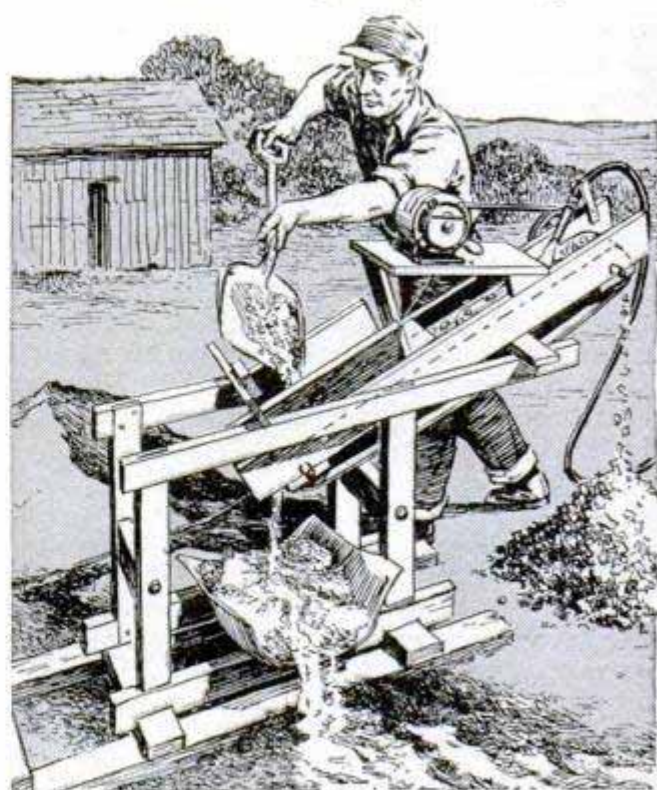


Because of the air trapped in the inverted test tube, the filled one can be floated at any desired depth.

Homemade Rock or Gravel Washer Provides Clean Aggregate

When he needs especially clean aggregate for a concrete job, one farmer runs crushed rock or gravel through this novel washer. The washer consists of a 4-in. belt, driven by a $\frac{1}{4}$ -hp. motor. The belt carries the rock uphill in a chute against a stream of water from a garden hose. Dirt and fine stone are washed out at the bottom of the chute, while larger pieces of gravel are carried up the belt and dumped out at the upper end of the chute. The spray, of course, must be adjusted to suit.

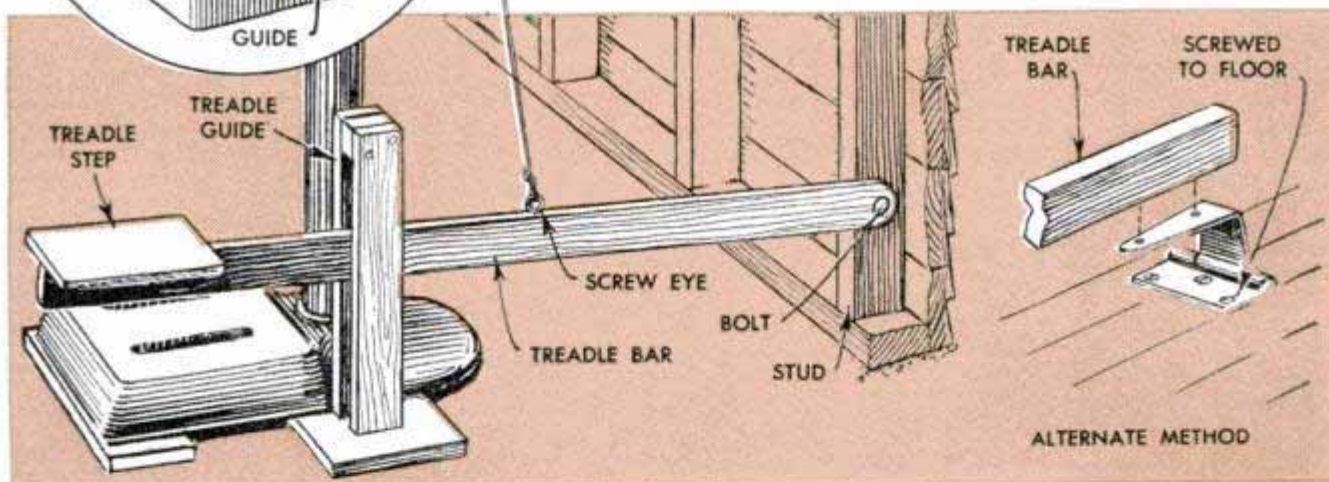
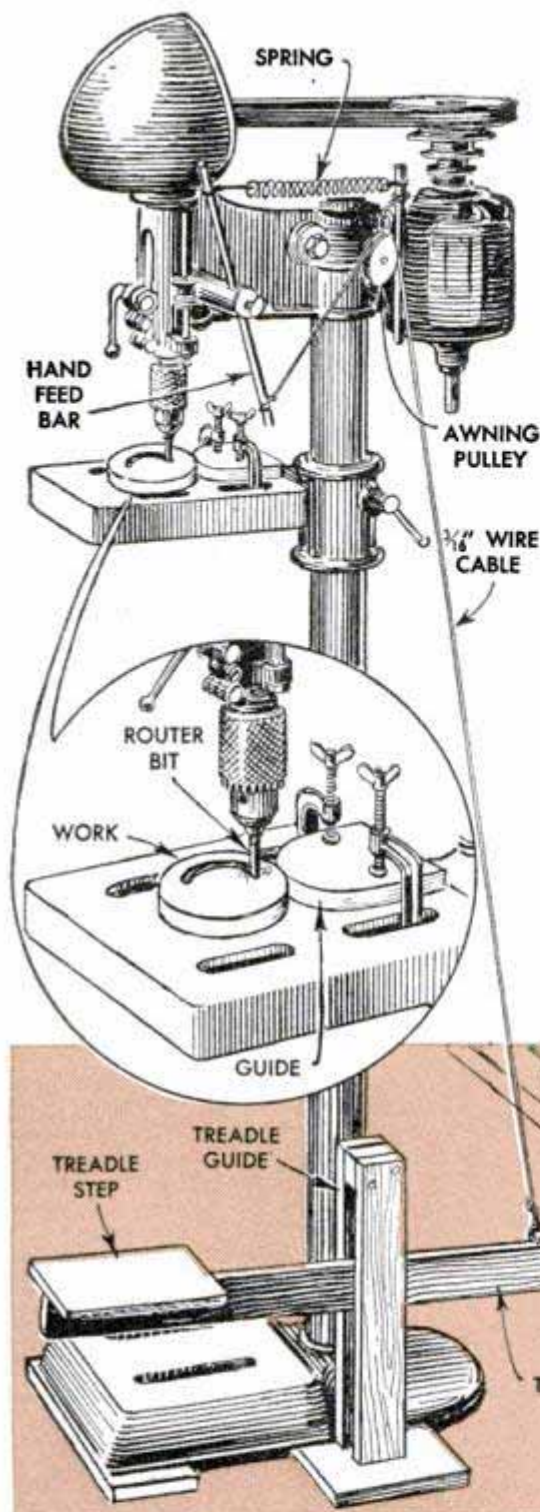
O. A. Fitzgerald, Moscow, Idaho.



IMPROVISED FOOT FEED for drill-press routing

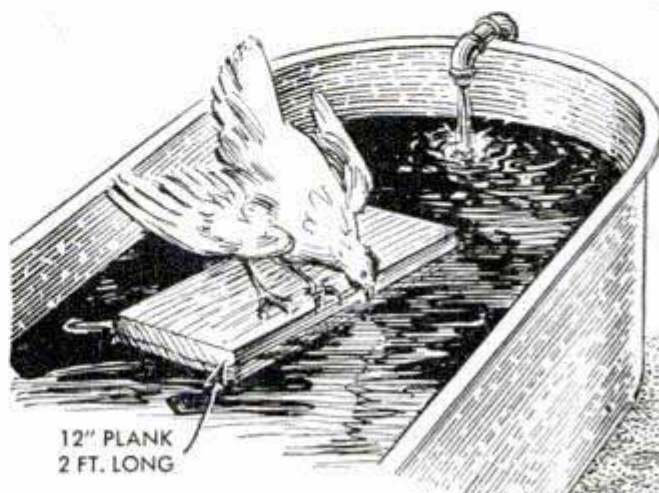
By Dick Hutchinson

CONFRONTED with the problem of routing a recess in the center of a large number of duplicate pieces, I saved considerable time by equipping my drill press with this improvised foot feed. In addition to leaving both hands free, the foot feed eliminated locking and unlocking the spindle, as the routing operation in each piece was only momentary. This same setup also is useful for rapid drilling where both hands are needed to hold the work. The end of the wooden treadle bar can be bolted to a stud or fastened to a hinge which is screwed to the floor. The treadle lowers the drill-press spindle by means of a cable linkage, and a spring arrangement helps return the spindle. The $\frac{3}{16}$ -in. wire cable is fastened to one end of the hand feed bar, and passed upward through an awning pulley and down to a screw eye turned into the treadle bar. The spring is attached to the other end of the hand feed bar and to a bracket welded or bolted to the drill-press frame. Where the work is curved, a handy routing guide can be set up in a jiffy by clamping a semi-circular piece of wood to the drill-press table directly in back of and in line with the spindle.



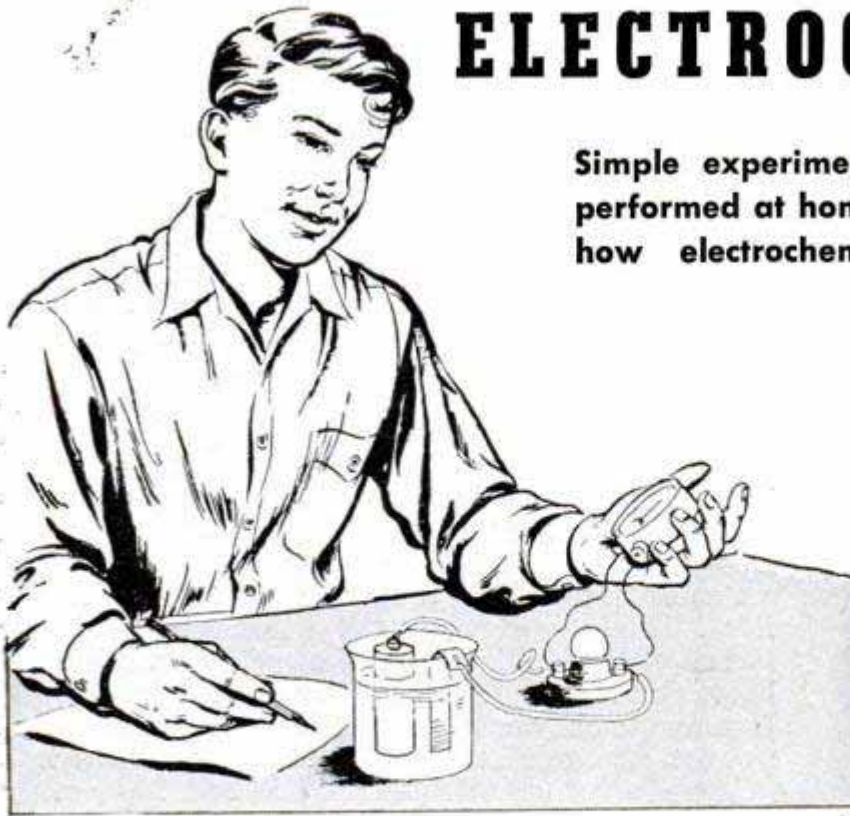
Floating Plank in Stock Tank Prevents Chickens From Drowning

Attracted by the water, chickens frequently perch on the edge of a stock tank. One farmer found that occasionally a chicken would fall into the water while trying to drink, and drown because there was no way for it to climb out. To keep from losing chickens in this way, the farmer placed a 12-in. plank, about 2 ft. long, in the stock tank and allowed it to remain floating on the water. Now, a chicken perching on the edge of the tank will jump to the plank to drink and is able to get back out of the tank without falling into the water. The plank does not interfere with stock drinking.—Opie Read, Jr., Chicago.



ELECTROCHEMISTRY

Simple experiments, easily and safely performed at home, clearly demonstrate how electrochemical processes work

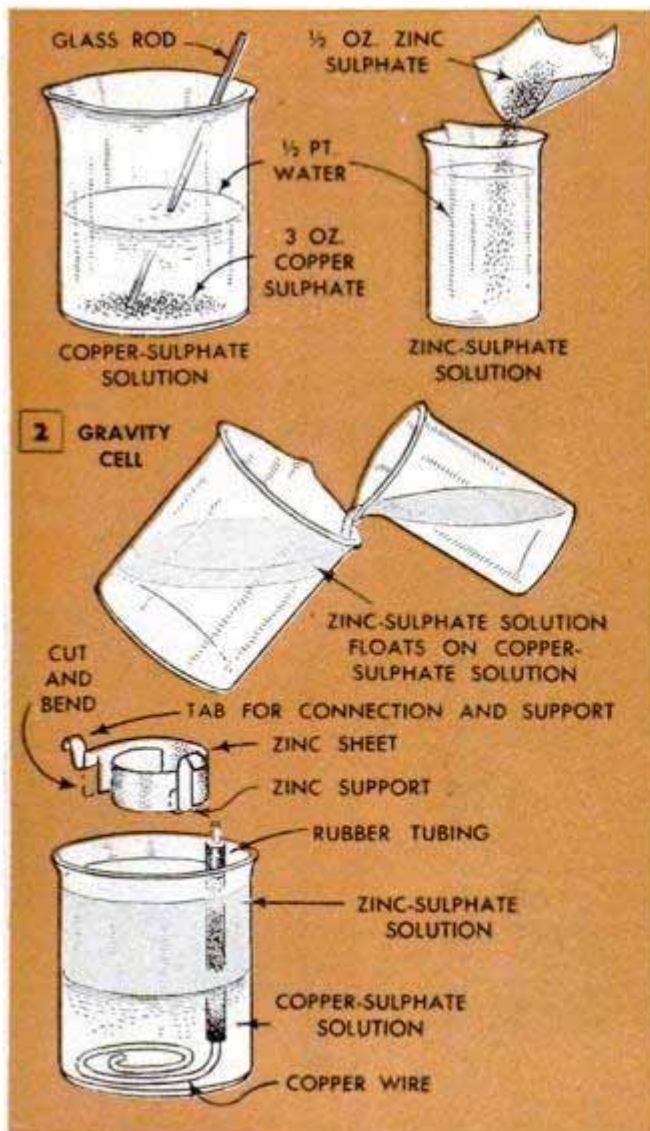


1 TABLE

METALS ARE IN ORDER OF DECREASING ACTIVITY

SODIUM
MAGNESIUM
ZINC
IRON
NICKEL
TIN
LEAD
COPPER
SILVER

A simple gravity cell is detailed below. It is made by dissolving copper and zinc sulphate in a beaker containing water and inserting copper and zinc electrodes



WHILE they are unspectacular, electrochemical processes afford vital services on which we constantly depend. In addition to the familiar flashlight and storage battery, electrochemistry is the basis of electroplating processes, the refining of various chemicals and certain metal-finishing processes. Left to itself, electrochemical action is the cause of destructive corrosion of metals. However, when properly controlled, the action can be used to prevent corrosion.

An electrical cell consisting of a combination of any two metals immersed in a conductive solution and capable of producing an electrical current is commonly called a voltaic cell. However, comparatively few combinations of metals can be used to make useful cells, that is, cells capable of producing electrical energy for a practical duration. A gravity cell, which is a useful type of voltaic cell, uses a combination of copper and zinc. It is made, as shown in Fig. 2, by first dissolving 3 oz. of copper sulphate in a large beaker or jar containing $\frac{1}{2}$ pt. of water and then carefully pouring in a solution of $\frac{1}{2}$ oz. of zinc sulphate dissolved in $\frac{1}{2}$ pt. of water. The large jar should be tilted slightly and the zinc-sulphate solution poured slowly down the side of the large jar, as shown, so it will not mix with the copper-sulphate solution, but form a layer above it. The copper or positive electrode is made of heavy wire, coiled as indicated in the lower detail of Fig. 2, and rests on the bottom of the jar in the copper-sulphate solution. A short length of rubber tubing is used to

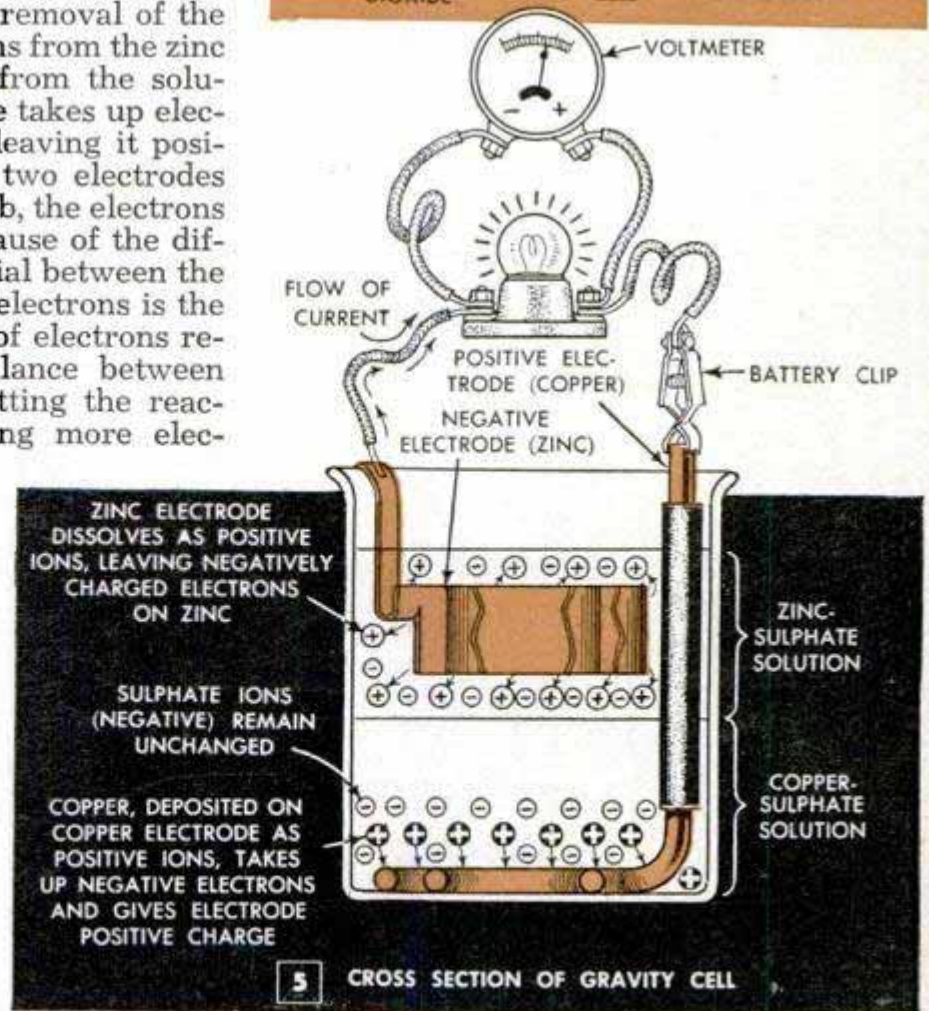
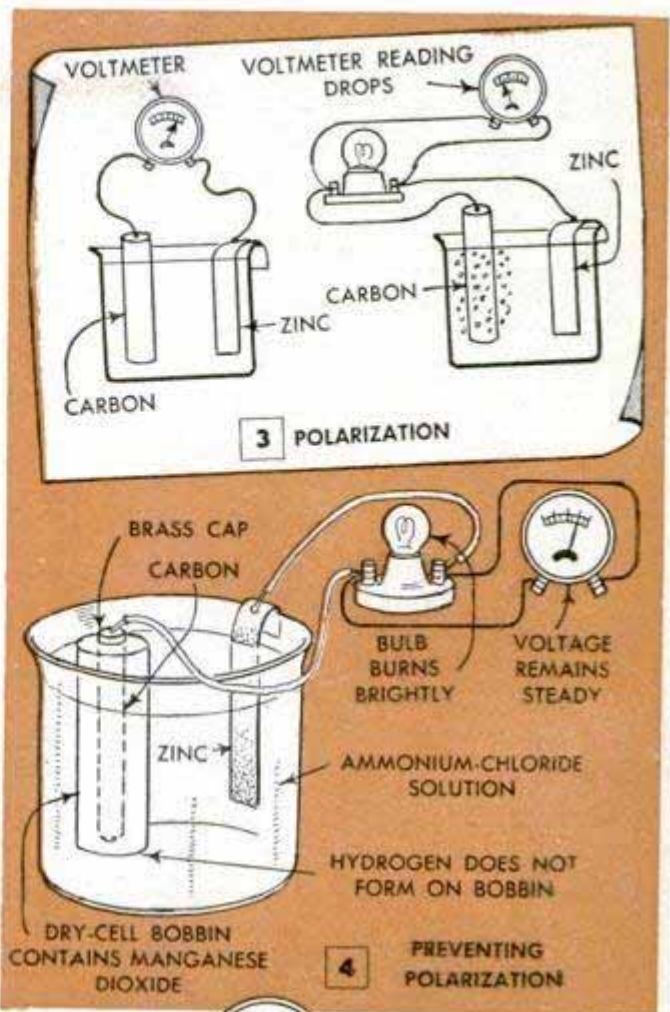
OF VOLTAIC CELLS

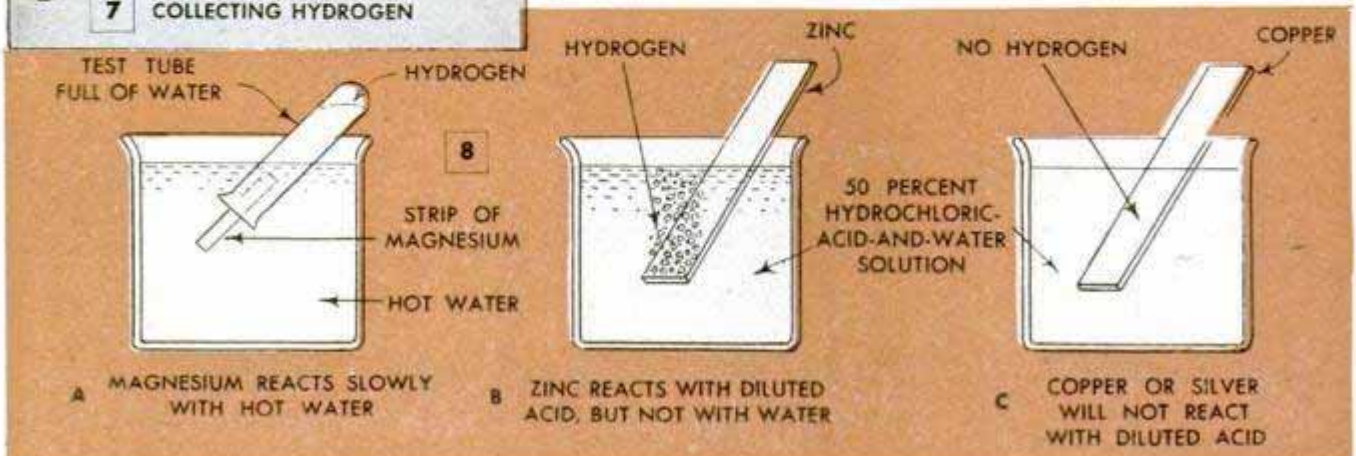
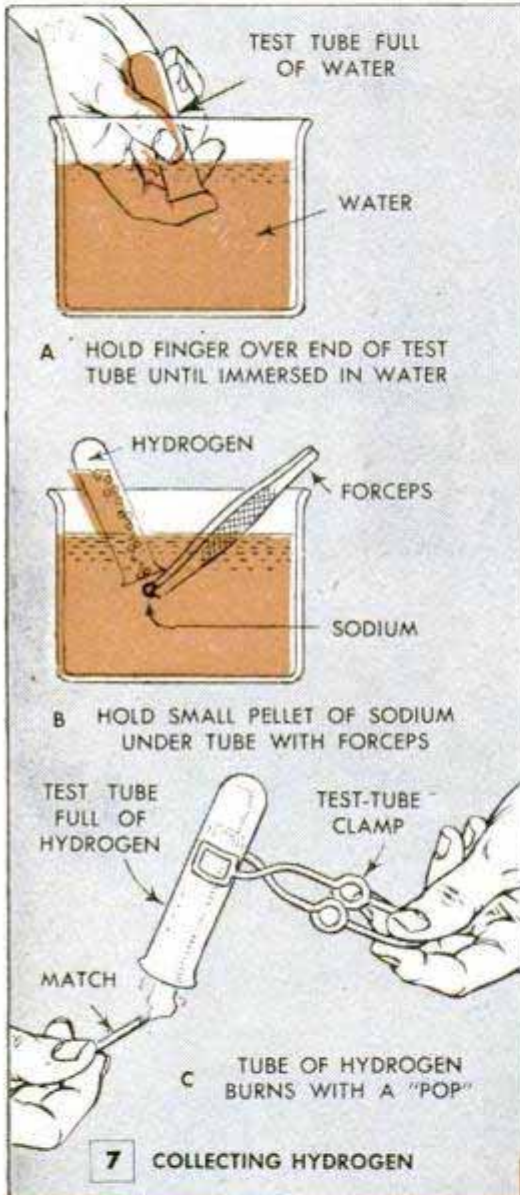
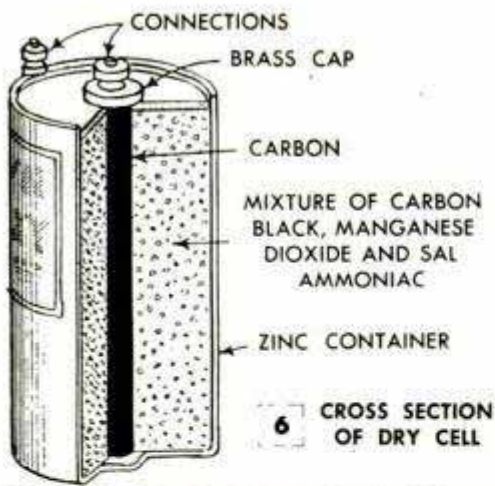
By J. B. Mullen

insulate the copper where it passes through the zinc-sulphate solution. The zinc or negative electrode is a coiled strip of sheet zinc suspended in the zinc-sulphate solution with small hooks of zinc, plastic or glass. The wire connection to the zinc electrode should be made by cutting and bending a small strip of the zinc electrode as indicated. A single-cell flashlight bulb connected to the two electrodes as in Fig. 5 will glow, although it may be at somewhat less than full brilliance. If tested with a voltmeter, the cell should register about 1 volt.

Gravity cells are best suited for applications where a steady current is required because the zinc electrode dissolves continuously. When the cell is not in use, the zinc electrode should be removed. If this is not practicable, a resistor connected permanently across the electrodes will prevent zinc deterioration to a certain extent. When the cell is in use, as shown in Fig. 5, the zinc electrode slowly dissolves into the solution leaving a surplus of electrons—negatively charged atomic particles—on the electrode, which is then at a different electrical potential or voltage than the copper electrode. The zinc particles, or ions, in the solution are positively charged because of the removal of the negatively charged electrons from the zinc atoms. The copper going from the solution to the copper electrode takes up electrons from the electrode, leaving it positively charged. When the two electrodes are connected to a light bulb, the electrons flow through the wire because of the difference in electrical potential between the electrodes. This stream of electrons is the electric current. The flow of electrons relieves the electrical unbalance between the electrodes thus permitting the reactions to continue supplying more electrons to maintain the current. When the light bulb is disconnected, these processes are automatically stopped by the electrically unbalanced condition in which the electrodes are left.

Many electrode combinations are of no practical use because the chemical reactions that occur stop themselves. This is called polarization. For example, in Fig. 3 a strip of zinc and a carbon from a dry cell are hung in a





solution of 2 oz. of ammonium chloride (sal ammoniac) in $\frac{1}{2}$ pt. of water. A voltmeter connected to the terminals of this cell will give a brief reading of about 1.5 volts. If a flashlight bulb is connected to the cell, the bulb will grow dim rapidly as the voltage drops. At the same time, fine bubbles of hydrogen gas form on the carbon. The hydrogen, which is one of the products of the chemical reactions in the cell, coats the carbon and stops the action of the cell. Electrochemists prevent this drop in voltage by adding another substance called a "depolarizer" around the carbon. If the entire mass or "bobbin" around the carbon of a dry cell is substituted for the carbon alone, as shown in Fig. 4, the light bulb will remain lighted. The bobbin contains manganese dioxide as a depolarizer mixed with carbon, and in the cell the manganese dioxide reacts to form other compounds in preference to hydrogen. Since no hydrogen is formed, the chemical action in the cell is not blocked by gas bubbles, polarization is prevented, and the voltage does not fall off. In the dry cell, Fig. 6, the zinc is in the form of a can, in which are placed the bobbin and the conductive solution in the form of a jellylike paste.

In any voltaic cell, the more active metal, or the one that will be dissolved, is always the negative electrode. The relative activities of common metals are given in Fig. 1, with the more active metals at the top. The experiments, shown in Figs. 7 and 8, demonstrate the relative activity of various metals. The most active metal, sodium, is so eager to dissolve that it reacts vigorously with water. Care must be taken when handling sodium. A piece no bigger than a pea should be used in this experiment, and it must be handled with forceps. The gas given off is hydrogen, and can be collected as shown in Fig. 7. The hydrogen will burn if a match is held close to the mouth of the test tube. Sodium is so active it cannot be used successfully in a voltaic cell.

Fig. 8 shows that less active metals, like magnesium, will react only slowly with water, and considerable time is required for the test tube to fill with gas even when hot water is used. Zinc, being less active, does not react with water, but reacts with dilute hydrochloric acid. Copper and silver, being comparatively inactive, do not react even with dilute hydrochloric acid. Since the negative electrode is the one which dissolves in the cell, it is easy to see why the more active of the two metals, with its greater tendency to dissolve, always be-

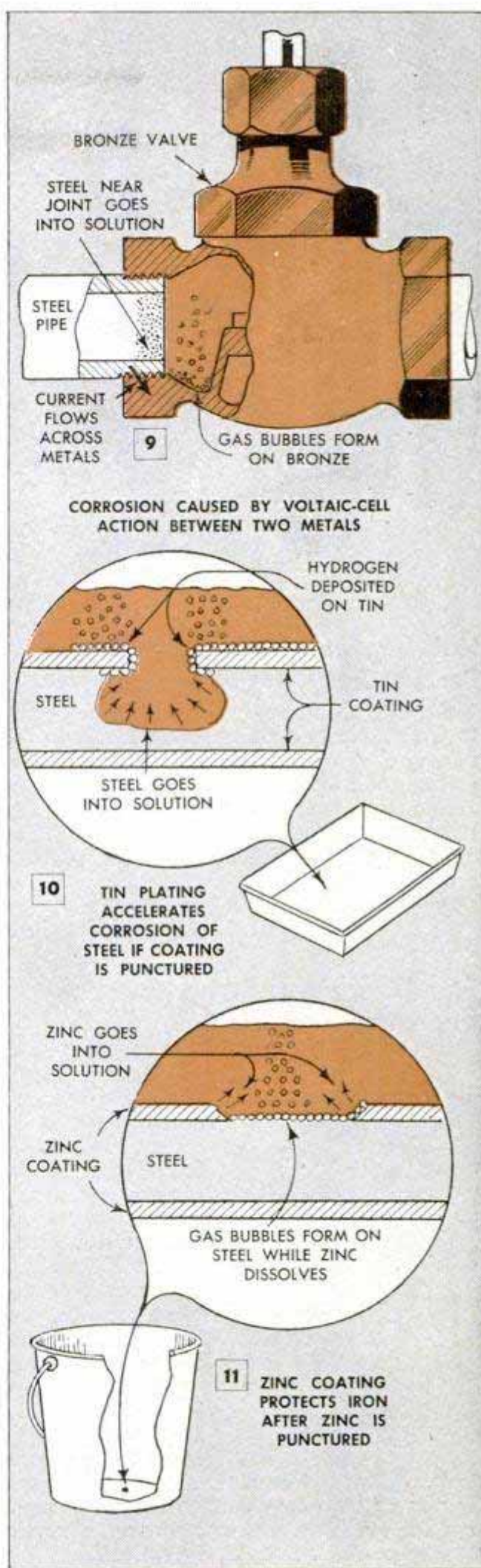
comes the negative electrode in the cell.

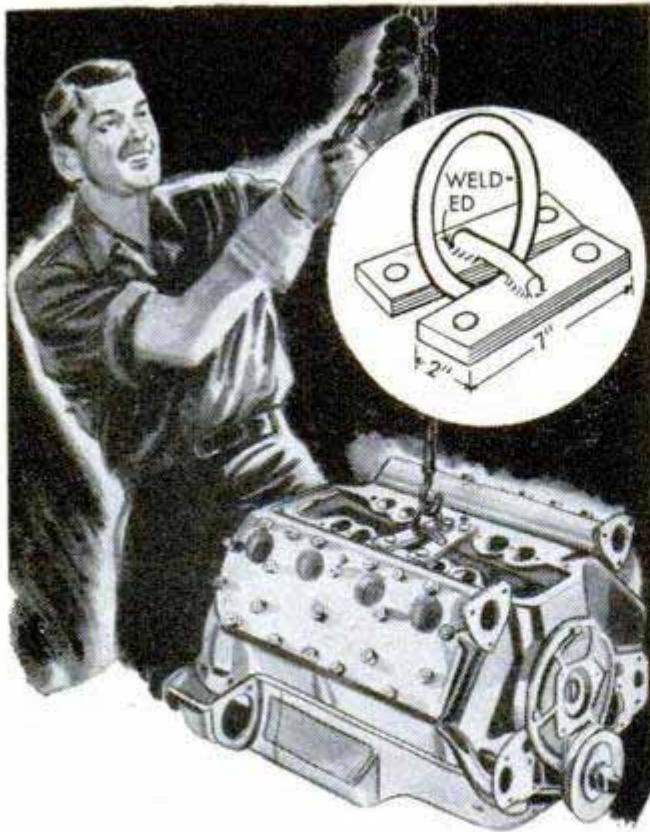
The greater the difference in activity between the two metals in a voltaic cell, the higher the voltage of the cell will be. By using different combinations of metals and conductive solutions, voltaic cells with different voltages and other properties can be made. For example, iron or magnesium can be substituted for zinc in a cell with carbon and manganese dioxide. Iron will deliver a lower voltage and magnesium a higher voltage. However, the magnesium will not last long as it dissolves rapidly when no current is drawn from the cell.

Tarnish can be removed from silverware by a simple process that actually makes use of voltaic-cell action. The silverware is put into an aluminum kettle containing a boiling solution of sodium bicarbonate (baking soda). As long as there is any tarnish, which is silver sulphide, it will be chemically changed to silver; when the tarnish is all gone, hydrogen bubbles form on the silverware. Thus no silver is removed as in ordinary polishing nor is there danger of scratching by abrasives. The aluminum dissolves but, as the process takes only a few minutes, the attack on the aluminum is slight. The silverware must be touching the aluminum kettle so the current can flow directly from one metal to the other and produce chemical change.

In many cases, an electrochemical action like that of a voltaic cell is responsible for the corrosion of metals. When two dissimilar metals are in contact and wet, a corrosion cell is formed. The voltage of such a cell may be small or great, depending on which metals are involved and whether the solution is water or a more conductive one, such as a solution of salt or fruit juice. As in any voltaic cell, the most active metal will gradually dissolve or corrode. The steel pipe in Fig. 9 will corrode as it is more active than the bronze of the valve. Note that the current flows from the pipe to the valve and that gas bubbles form on the surface of the bronze valve.

It is important which metal corrodes. For example, when a tin-plated steel pan is worn or damaged so the steel is exposed, as in Fig. 10, the steel will corrode. Tin is an excellent corrosion-resistant coating for steel but, if the tin is perforated, the steel is subject to corrosion at an accelerated rate because of the cell formed by the steel and tin. Other electroplated coatings, zinc for example, will exert a protective influence even if perforated. Fig. 11 shows how the zinc, being more electronegative or "active" than iron, is dissolved while the iron is left unattacked. This prolonged protective action of zinc is one reason for the widespread utilization of zinc-coated or "galvanized" steel.



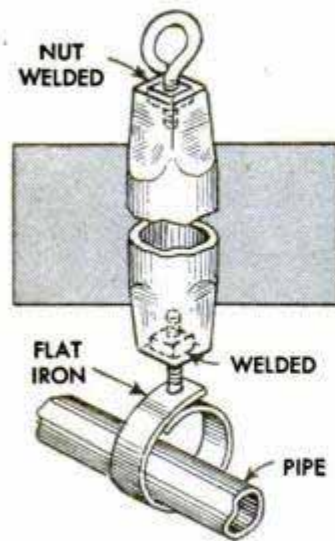


Hoisting Ring for V-Type Motors Permits Easy Handling

Finding that a V-type motor hoisted by looping a chain around it is difficult to tilt, one mechanic hoists the motor by means of a ring, making it easy to handle. The ring is held by a short length of rod welded between two pieces of steel, the latter being drilled for four bolts. This ring plate is bolted to the intake-manifold bolt holes after the manifold has been removed.

Hi Sibley, Nuevo, Calif.

Pipe Hangers of Scrap Material Improvised on Job

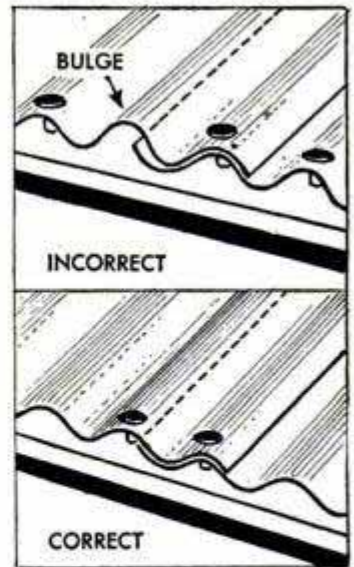


Pipe hangers of any desired length can be made quickly from scrap pieces of pipe. Each end of the pipe is crimped around a nut which is welded in place. A suitable eyebolt is turned into the top nut and a machine bolt into the lower one. A hanger ring for the pipe is bent from flat iron and held in place by the lower

bolt. If the flat-iron ring is large enough, minor adjustments can be made by turning the machine bolt with an angled socket wrench.—Jack Bronte, Surf, Calif.

Nailing Corrugated Roofing To Prevent Leaks

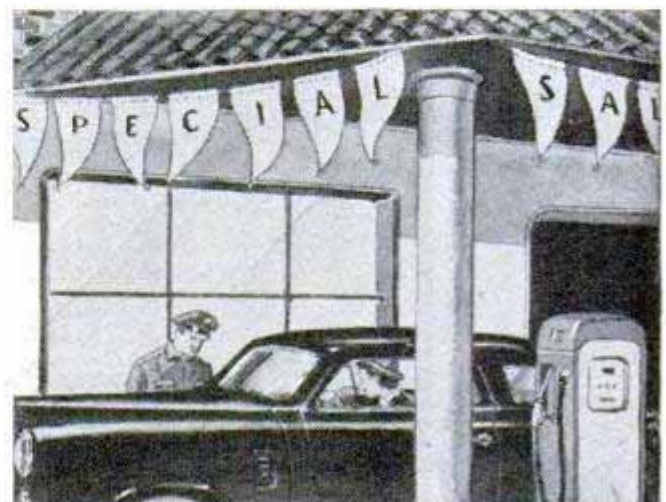
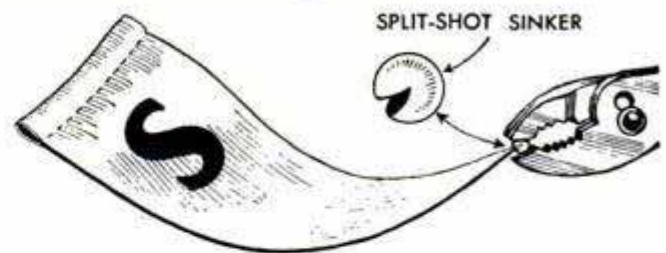
Many times, leaks in corrugated roofing are due to incorrect nailing of the lapped joints. If these joints are nailed similar to the one shown in the upper detail, a bulge is formed at the ridge between the two nails affording an opening for water to enter under the roofing. However, if the joints are nailed as in the lower detail,



as in the lower detail, that is, one nail through the lapping ridges of both sheets and the other nail through the second ridge of the top sheet, the nail through the second ridge eliminates the bulge. In addition, this nail tends to hold the joint tightly closed even though the nail through both sheets should pull loose, thus preventing leaks.

Weighted Advertising Pennants Are Not Whipped by Wind

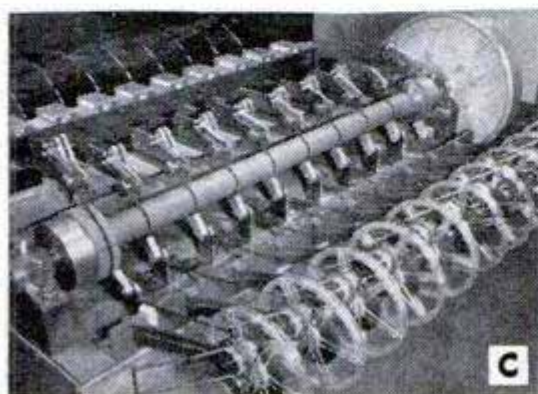
Outdoor advertising pennants will hang steady and remain readable on windy days if split-shot sinkers are clamped to their pointed ends. The weight of the sinkers also keeps the pennants from being whipped by the wind and entangled in the line.



TAPE RECORDER and PLAYER For the HOME

COMPLETE with built-in five-tube speaker-amplifier and crystal microphone, this home tape recorder and player records anything you can hear, and will play it back instantly as many times as you wish. The tape on which this instrument magnetically records sound is claimed to provide excellent fidelity; it can be edited easily by snipping out unwanted material with a scissors and splicing the cut ends with a bit of cellulose tape. After a recording has once been made on a reel of tape, it may be kept as a permanent recording, or it may be used again by simply re-recording over the original sound, the old sounds being erased as the new are recorded.

Favorite programs may be recorded off the air and played back through your radio as illustrated in photo A. By using the microphone as shown in photo B, you can make a tape recording of the baby's first words, and "snap shots" in sound of all members of the family for listening groups, as in photo D. Photo C shows a machine that has been perfected recently by a manufacturer of sound-recording tape to reproduce simultaneously 48 hour-long recordings in mass production from a master transcription. This prerecorded tape will compete with disk records.



Record Player for

By Robert W. Hawkins

THIS STURDY and safe record player has been used by the author's young son for about eight months without requiring repairs of any kind. The wiring is completely inaccessible to the children's small prying fingers, and there are only two switches to operate. One is a power switch and the other turns the phono motor on and off. No volume control is used because the plate load resistor, R3, in the 1L4 tube circuit has been selected to give proper volume. A variable volume control with high gain in the hands of small children is not a good idea.

Construction should start with the audio amplifier, which is housed in a small stand-

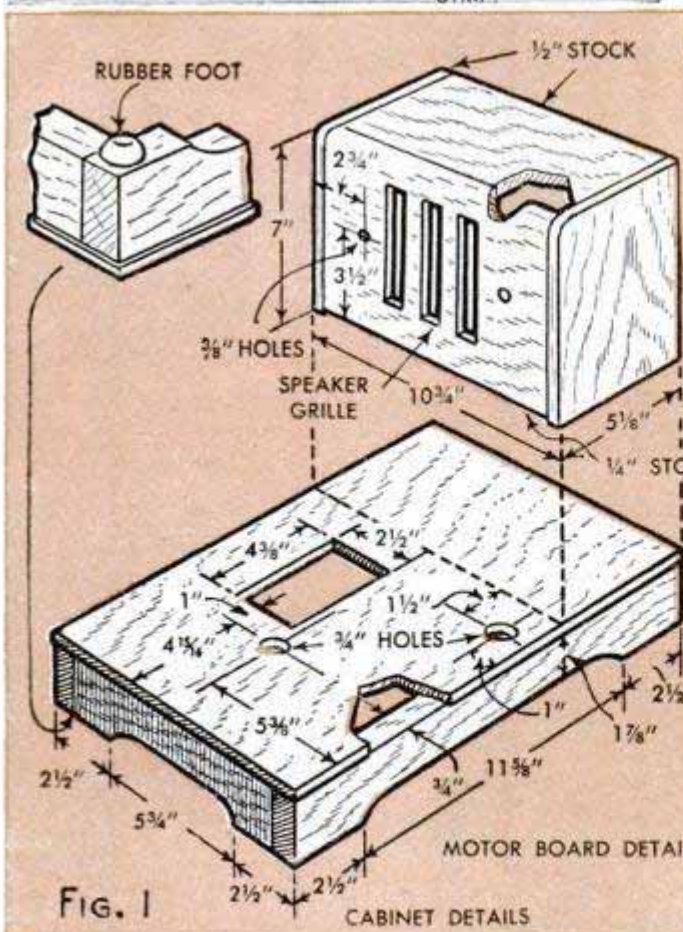
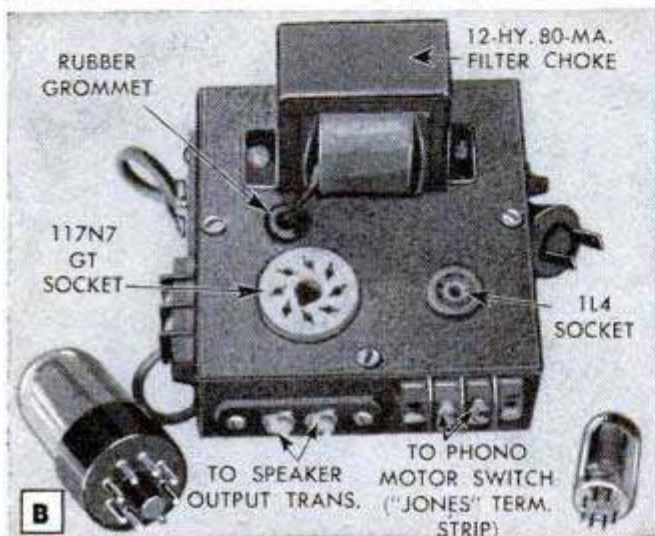
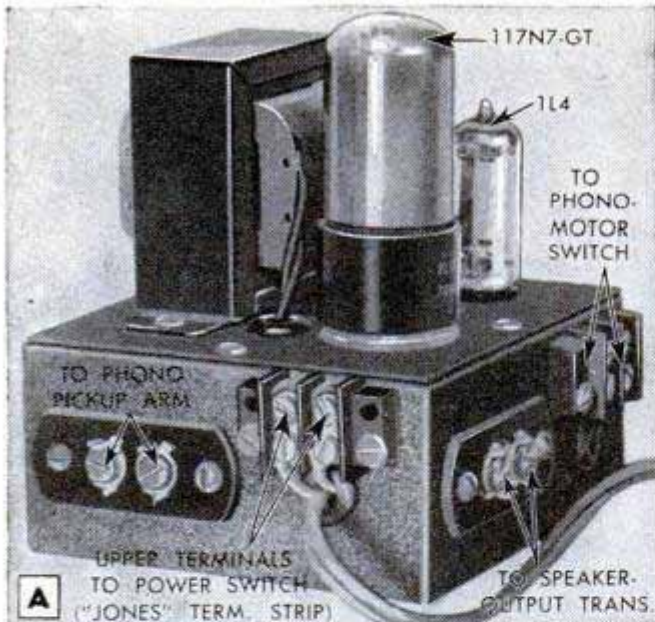


FIG. 1

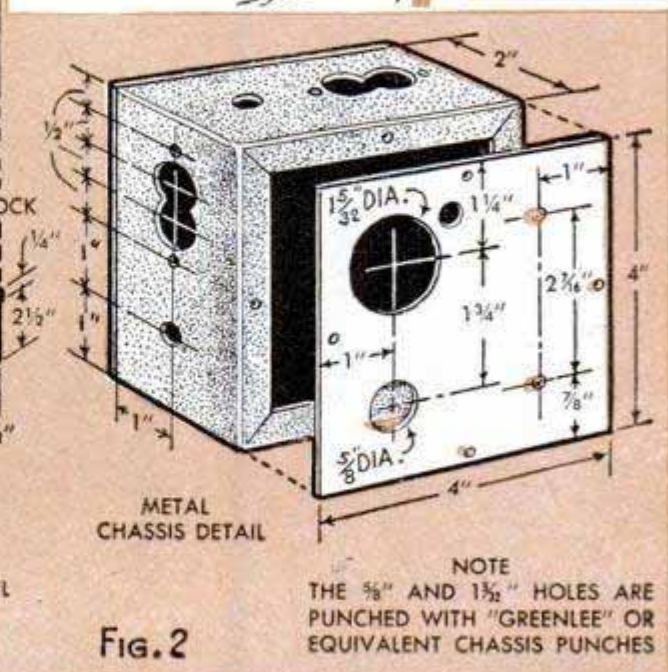
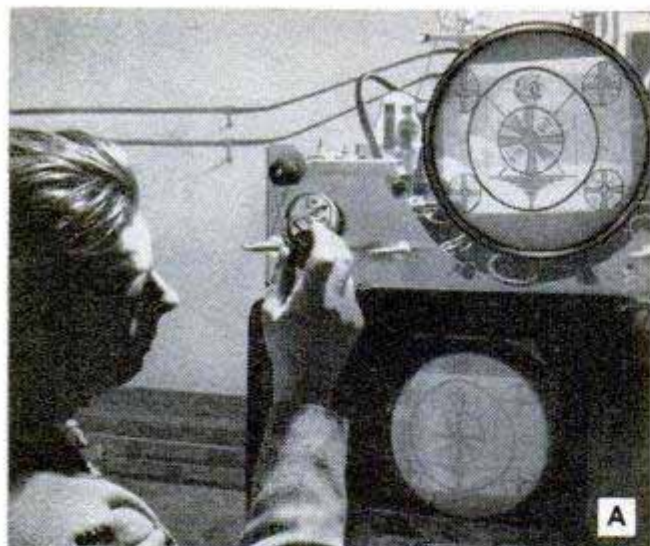


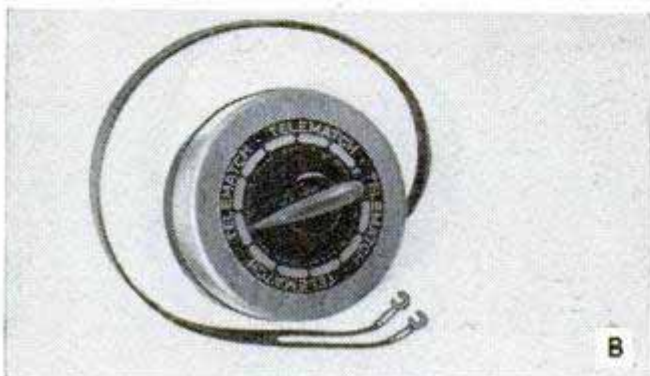
FIG. 2

NOTE
THE 5/8" AND 1 1/2" HOLES ARE PUNCHED WITH "GREENLEE" OR EQUIVALENT CHASSIS PUNCHES

Television and Electronics Today



A—Metal-type television picture tube, designed to give more viewing area in low-priced sets, has a diameter of 8½ inches and will cost no more to build than the 7-in. tubes that are now in common use. The laboratory photo shows the new tube in the top chassis compared with the 7-in. television tube below



B—TV antenna-matching device aids reception on both low and high channels. It is also claimed to reject adjacent channel interference and to pass full TV bandwidth for picture and sound fidelity. Engineers agree that in most television installations there is a mismatch between the antenna and receiver



C—Shielded 300-ohm lead-in cable for television receivers is claimed to eliminate all the interference normally induced in the transmission line by electrically powered industrial equipment, auto ignition and fluorescent lighting. In some cases, it is claimed to eliminate need for special TV antennas



D—Adaptor makes your electric hand drill a power hammer for drilling holes in tile, brick, cement or stone for installing TV-antenna systems on buildings. It is also useful wherever rapid, moderately heavy hammering may be required in electrical installation work. May be "chucked" in any ¼-in. drill



E—Any three tube-base diagrams out of over 475 different types are at the finger tips of the serviceman and experimenter with this handy pin guide. It also provides a very necessary reference book for the radio workbench. The listings are arranged in numerical and alphabetical tube-type sequence

F—Record player handles all three speeds. Conventional records are played at 78 r.p.m.; long-playing Columbia records are played at a speed of 33½ r.p.m. The new RCA 45-r.p.m. records require a 1½-in.-diameter spindle which is provided for with a brass collar that slips over the regular spindle



Its distinctive styling goes far beyond just pleasing the eye. Here's design that flows naturally from advanced engineering . . . to fit form to function . . . to offer you a great New Plymouth that, inside and out, is better in every way!

Beauty with Reason

That sweeping, new low silhouette is something to see. And this is beauty with a reason. It helps give you a car that's easier to use in all ways. Easy to start—easy to drive—easy to park—easy to see out of.

Beauty for Comfort

The beautiful new interior styling is even better than it looks. The famous chair-height seats are now even wider. There's plenty of room for long legs and high hats. Windows lift and lower easier.

Beauty for Safety

The increased glass area is nice to look at from the outside. But it's there to look out of from the inside. Both windshield and rear window are larger. You get a clear, undistorted view of the road.

Just your style!



Special De Luxe 4-Door Sedan with Longer 118" Wheelbase

the great new **Plymouth**

For More Safety

New body construction makes the New Plymouth a sturdier, safer car. Frame and body are 23% more rigid. The New Plymouth has a lower center of gravity. It hugs the road better. And it handles with ease.

Beauty for Performance

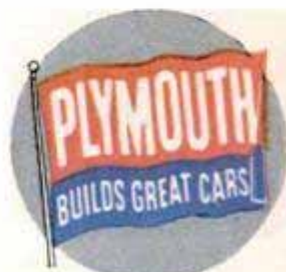
There's a more powerful engine. This is the result of a newly designed cylinder head, increased compression ratio and a new intake manifold. New chrome compression ring gives even longer engine life.

Beauty for Value

To see how new car beauty helps make a better new car—see your Plymouth dealer now! You'll find that the great New Plymouth—feature for feature, dollar for dollar—hits a new high in automobile value!

NOW there's more difference than ever in low-priced cars—and the great New Plymouth makes the difference. See this new car at your Plymouth dealer's now.

PLYMOUTH Division of CHRYSLER CORPORATION, Detroit 31, Michigan



DEPENDABLE

CHAMPION

SPARK PLUGS



← America's Favorite!



"It's Spring—Let's go" is the friendly reminder you'll see at gas stations and service garages everywhere . . . a friendly reminder to you that your winter-wearied spark plugs should be checked and cleaned . . . may even need replacement. Spark plugs are vitally important to every phase of

performance of your car at all times, and a new set of Champions represents the ultimate in quality, value, performance and dependability. That's why engine experts, like most racing champions, will use no others . . . why they are America's Favorites. Champion Spark Plug Company, Toledo 1, Ohio.

FOLLOW THE EXPERTS

DEMAND DEPENDABLE CHAMPIONS FOR YOUR CAR

Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night, over the ABC network

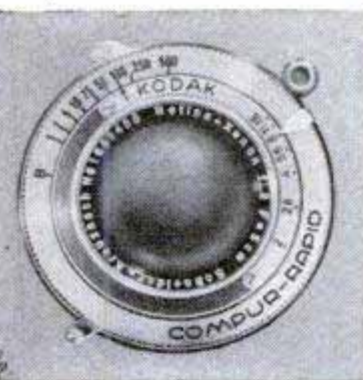
Famous 35mm. Miniature

... now finer than ever

**KODAK
RETINA II
CAMERA
f/2**

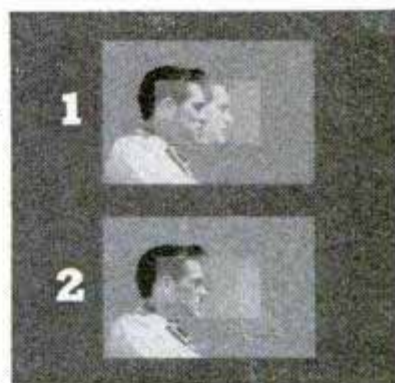


Ultra-fast f/2 coated lens. Ask your Kodak dealer for a demonstration of this famous Kodak miniature. \$197.75, including Federal Tax.

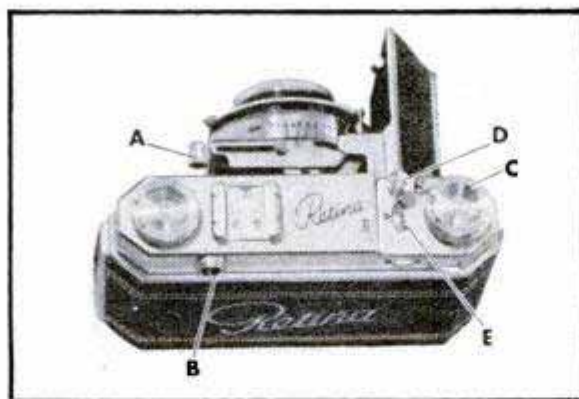


All ready for action with ultra-fast Schneider Xenon f/2 Lens and Compur-Rapid 1/500 Shutter—nine speeds plus bulb. Uses black-and-white Kodak 135 Films and Kodachrome Film.

New all-in-one view and range finder. Figure 1 shows subject out of focus with two images in the center area. Figure 2 shows subject *in focus* with one image superimposed on other.



Finger-tip operation means easy control of the camera and a better picture on every shot. A, focusing knob; B, single view-and-range-finder window; C, film-wind knob (with automatic film stop and double-exposure prevention); D, shutter release; E, automatic exposure counter.



Extreme Compactness—folds up to fit small pocket or handbag. Built for long life—with strong but light die-cast aluminum alloy body and pin-grain leather covering. Its handsome design and watchlike workmanship are unique features. You'll like its solid feel and balance.

Also ask your dealer to show you the Kodak Retina I Camera with f/3.5 lens, a wonderful buy at \$72.75, including Federal Tax. Trim and sleek in styling. One look will convince you of its value.

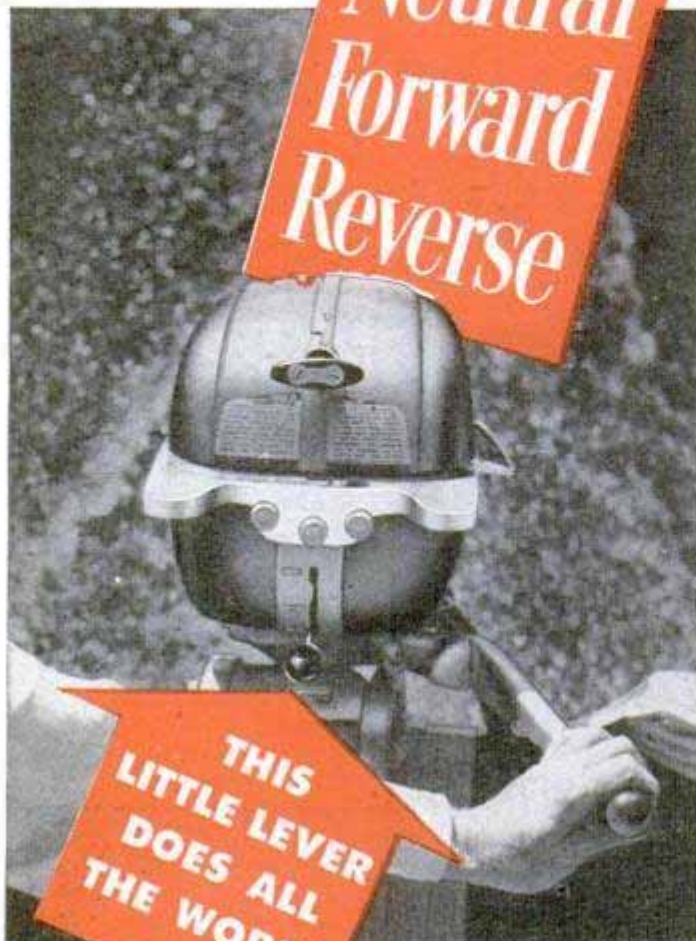
(Prices subject to change without notice)

"Kodak" is a trade-mark

Kodak

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Neutral
Forward
Reverse



THIS
LITTLE LEVER
DOES ALL
THE WORK!



1949 OUTBOARD
SENSATION!
NEW JOHNSON QD!

You operate it by Gear Shift Control. Move the knob (shown above) and go from Neutral to Forward or Reverse. It's so easy!

Fuel is automatically fed to the motor from the separate, Mile-Master Fuel Tank (5 gal.-16 lbs.). Cruise for hours without refueling.

High power* — a compact, 56-pound ball-of-fire — yet it trolls!

See the QD at your Johnson dealer's. Look for his name under "Outboard Motors" in your classified telephone directory.

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Johnson Motors of Canada
Peterboro, Canada

*10.0 — O. B. C. Certified
Brake H.P. at 4000 r.p.m.

FREE Handy Chart

Write for the 1949 Sea-Horse Handy Chart. Illustrates and charts the QD and the 4 other great Johnsons for '49. All features are fully described.

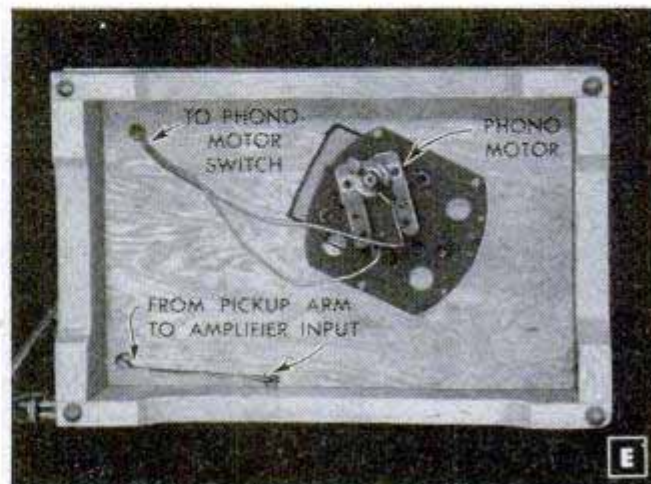
JOHNSON SEA-HORSES
for *DEPENDABILITY*

Record Player for Small Children

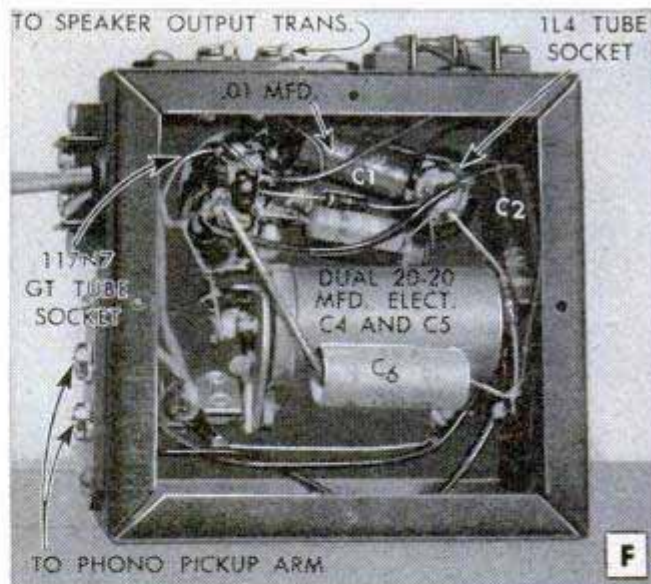
(Continued from page 235)

leads to the phono-pickup arm of the record player. All of these terminal strips are clearly identified in photos A, B and F.

The large intersecting holes in the sides of the metal chassis case, detailed in Fig. 2, are $\frac{5}{8}$ in. in dia. and are necessary to clear the soldering terminals on the rear of the twin-screw Bakelite terminal strips; the



small mounting holes at each side are for 6-32 machine screws. Grommet holes are indicated and their size will depend upon the diameter of the rubber grommets used to bring out the leads to the "Jones" terminal strips. No mounting-screw holes are shown for these strips. However, they are easily located by using the terminal strip for a

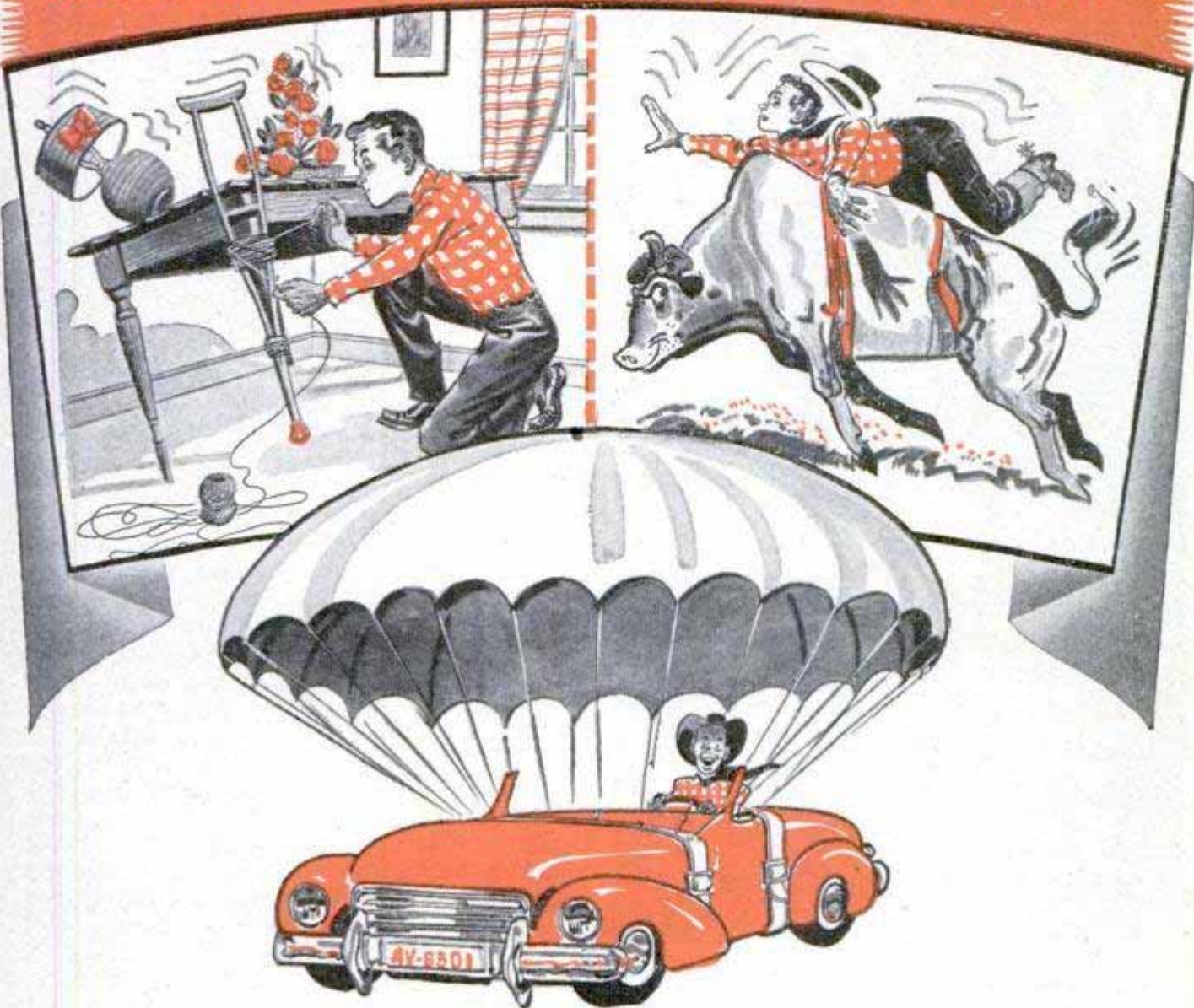


template. The large intersecting holes in the sides of the chassis case, and the holes in the top panel for mounting the octal socket for the 117N7 tube, and the smaller socket for the 1L4 miniature-type tube may be made with a "Greenlee" or similar chassis punch. If you do not have one, you can have them punched at your local tin shop.

(Continued to page 240)

IF YOUR HOME REPAIRS
LOOK LIKE THIS...IT'S TIME
TO BUY SOME TOOLS...

IF YOUR CAR FEELS LIKE THIS
and IT'S TIME FOR MARFAK
CHASSIS LUBRICATION



THAT CUSHIONY FEELING LASTS LONGER WITH MARFAK!

It's a hard, tough job to protect your car's vital wear points. So for longer-lasting, sure protection, get *Marfak* Chassis Lubrication. It is specially compounded to fight wear and friction — not for just a couple of hundred miles but for 1,000 miles and *more!* You can tell this is so by that grand "cushiony" driving ease that *stays* with you. Ask for *Marfak* today at your neighborhood Texaco Dealer, *the best friend your car ever had.*



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Twin plys of soft but sturdy fabric make Riegel's 50-50 Work Gloves a big value in comfort, safety and long wear.

OTHER STYLES FOR EVERY NEED

Canvas, jersey, leather . . . knit wrist, band top, gauntlet . . . double palm, reversible, quilted. Ask for the Riegel brand wherever work gloves are sold. Free catalog if requested on business letterhead.

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342 Madison Avenue
New York 17, N. Y.



"THIS TRADE MARK IS YOUR GUARANTEE OF VALUE"

The tube sockets are both of the Amphenol retainer-ring type.

You will note the leads from the filter choke are brought down through a hole in the top panel. The leads to the power switch and the phono-motor switch are brought out through holes and rubber grommets located under each "Jones" terminal strip, which provide dual external connecting screws. By bringing the leads out in this manner, no connections need to be unsoldered to remove the amplifier from the wooden cabinet.

The cabinet and motor-board base are detailed in Fig. 1. Drill and cut the necessary holes in the plywood motor board before assembling it on the base. When the base is assembled, it should be given two coats of cream enamel, sanding lightly between each coat. Mount the phono motor, which may be any standard rim-drive type with 9-in. turntable and crystal pickup arm, on the motor board. Then cover the top of the motor board with red leatherette, gluing it in place. Binding tape may be used for trim—it is held down with upholsterers' tacks. Photo E shows an underside view with the leads running up to the phono-pickup arm from the amplifier unit, and from the phono motor up to its switch on the front of the speaker cabinet. This plywood cabinet mounts directly on the top of the motor board and is also detailed in Fig. 1. Although any small receiver replacement cabinet may be used, the one shown is very simple to construct. It provides a housing for the small amplifier unit and a baffle for the loudspeaker. The speaker grille cloth used was a bright red to match the top of the motor board. The toggle switches are mounted on this cabinet in the positions indicated in photo C. Label the on-off switch, and mount so that both are "off" when pulled down. Four small screws hold the cabinet on the base. The cabinet is painted with cream enamel to match the base, and it is then decorated with nursery-rhyme decals. Four rubber feet are mounted on the corners of the base to prevent scratching table tops. The assembly is completed by wiring the switches and installing the amplifier and speaker as shown in photo D; the line cord can be brought out under the base either at the rear or on one side. The final step is to cover the back of the cabinet with a perforated fiber or metal screen, which should be securely screwed in position. This cover must necessarily be perforated to provide ventilation. Detailed student material list R-377 is available from Popular Mechanics Radio and Electronics department without charge upon receipt of ordinary letter postage.

SURE CURE FOR

Oil Waste



Gas Waste



and Failing Power



Our Challenge

There are thousands of designs of piston rings made by 77 manufacturers—BUT this Sealed Power MD-50 Steel Oil Ring has exclusive advantages possessed by no other. Drop us a postal for positive proof of sheer mechanical superiority!

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Save Oil! Save Gas! Seal Power!

Wouldn't you rather drive with 1949 pep and 1949 economy—than to plug along with a grunting, groaning, oil-gulping engine? Sealed Power Piston Rings will help you save oil, save gas, restore original power—no matter when your car, truck or tractor was built! The amazing Sealed Power MD-50 Steel Oil Ring has caused a sensation throughout the industry! It is giving thousands of owners the benefits of sealed-in power. It is

praised by mechanics from coast to coast. It is the only piston ring with the exclusive Sealed Power Full-Flow Spring. Ask your Sealed Power Franchised Dealer to tell you the whole story now!

Mail a postal card today for proof to back up our challenge. At the same time we'll send you our new illustrated booklet on 7 ways to save oil. It's free and may save you real money. Sealed Power Corp., Dept. G-5, Muskegon, Michigan.

There is a Sealed Power Set specifically engineered for your car, truck or tractor—whatever the make, model, or condition!



Sealed Power Piston Rings are original equipment in 15 makes of passenger cars and 24 makes of trucks and busses.

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PISTON RINGS
BEST IN NEW CARS! BEST IN OLD CARS!

MECHANICS - See this Improved "Mike" Now at your dealers



7 SUPERIOR FEATURES: "Chrome Clad," Non-Glare Satin Finish, Easy to Read, Rust and Wear Resistant • One Piece Spindle • Hardened Ground Thread • Easy Adjustment • Cutaway Frame • "Rapid Reading" (Each Thousandth Numbered) • Micro-Lapped Mirror-Like Finish on Anvil and Spindle Ends.



◀ The large throat depth and cutaway frame make entry possible in minimum clearance and enable easy measuring to maximum depth in narrow slots.



It is well balanced. Ratchet stop eliminates overpressure, gives consistently accurate measurements—important when your "feel" is off. ▶



◀ Easy to take apart and clean inside thimble and thread. Reading line keeps original position after adjusting for wear or lapping of anvil, and spindle faces.

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How to Tempt a Fish

(Continued from page 104)

to this trend is found in Florida where the bass in fresh water run up to 16 and 18 pounds and the salt-water fishes now and then tip the scales at close to 100 pounds. The expert or the stunt fisherman may use these small lures with light rods and fast reels for big fish, but we recommend having two outfits.

You can catch bass, crappies, bluegills, rock bass, perch, pickerel, northern pike, lake trout, and all the salt-water species that come into the bays, bayous, rivers, canals and ditches, but you really haven't fished until you've taken a muskellunge on light tackle.

My favorite fish is called by many many different names: muskellunge, maskinonge (Canada), muskie, muskalonge, masquel-longe (French Canadian), lunge, kin-nonge, mascanonge, mascallonge, muskal-longe, maskenosha, muscallunge, nosca-nonge and dozens more.

The muskie is a top fresh-water game fish—always ready for a fight. Because of its size, running up to 100 pounds, it is the biggest of all fresh-water game fish.

With the possible exception of bonefish addicts or tarpon enthusiasts, no anglers are more enthusiastic about fishing than those who go for muskies. At least a million have caught the great tiger-striped battler and now they are afflicted with "muskellunge-itis."

There is but one cure. A doctor's prescription for these victims reads: "Three weeks in Ontario in July, August or September on any of the following streams or lakes: Lake of the Woods, Lake Manitou, Eagle Lake, the Vermilion lakes, Lac Seul, Cliff Lake, Cedar Lake, the Winnipeg River, Georgian Bay, French River or Lake Nipissing."

There is nothing meaner or tougher than a muskie unless it's his salt-water ruffian of a brother called the greater barracuda. He's the fightin'est fish that ever tore a plug to pieces. It's no wonder muskies are so often called "tackle busters."

Muskie tackle is special. A 5 or 5½-foot rod with a stiff backbone is best. A level-wind, quadruple-multiplying reel is just right. A 12-inch wire leader is essential. A 15 or 18-pound-test line is good for a 60-pound fish. Use large plugs or spoons: surface plugs, semisurface plugs, and deep-running plugs, spoons or bucktails.

When a muskie strikes, anything can happen. The big tail lashes the water to a foam. Meanest sight of all is a muskie that takes off and heads for the boat. Until you

(Continued to page 248)



**"My race
for life
against a
Rattler's Poison!"**

A true experience
of **WILLIAM F. COLLEY**
San Diego, Calif.



1 "A piercing shriek cut the silence as I lay in wait for deer in the Laguna Mountains near San Diego. I dashed to Sam Reardon, my hunting companion. A 3½-foot rattler had dug his fangs into Sam's ankle! Twice in my own life, I'd felt the rattler's sting. I knew what to do.

2 "I shot the rattler. Then I opened up my snake kit. Night was closing in. I needed light—good, steady light. My flashlight with its 'Eveready' batteries was the answer. By its light, I made a tourniquet, cut a cross incision, removed the venom.



3 "Those long-life 'Eveready' batteries gave plenty of bright light as I carried Sam and flagged a car. I thank my flashlight for saving Sam's life. Now I know why 'Eveready' are the batteries with 'Nine Lives'!"



Just as an
active cat
...takes



a cat nap ... and



bounces
back with
new pep

...so "Eveready"
flashlight batteries re-
cover power between
uses and bounce
back for
extra life!



THE FLASHLIGHT
BATTERY WITH

"NINE LIVES"!



"Eveready," "Nine Lives," and the cat symbol are trade-marks of
NATIONAL CARBON COMPANY, INC.:

30 East 42nd Street, New York 17, N. Y.

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SAVE MONEY—EARN MONEY

EASI-BILD* Full-Size Pattern

simplifies sign-making:



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• Signs for Commercial use

• House Numbers



THESE professional-looking signs are ideal for your own use—also a profitable spare-time business. Full-size pattern contains three different size alphabets with matching numbers, plus four background signs. Just trace letters on wood or metal; saw and assemble. Use CASCOPHEN glue for outdoor use, CASCOREZ for indoor use or CASCO Flexible Cement for gluing metal to wood.

*Copr. 1949, Easi-Bild Pattern Co.

Follow These Directions.

Solve All Your Gluing Problems:



For boats, outdoor furniture, sports equipment—joints that must withstand outdoor exposure—CASCOPHEN (Resorcin Resin Glue). The first completely durable glue available to home craftsmen.



For furniture, toys, heavy-duty repairs—strong, stainfree, moldproof, highly water-resistant CASCAMITE (Urea Resin Glue). Mixes quickly with cold water!



For models, photo prints, labeling—general home, school, or office gluing, use the new, clean, white, fast-setting CASCOREZ (Polyvinyl Resin Glue). Liquid, ready to use!

SEND COUPON FOR SIGN PATTERN TO:

Casco Pattern Dept. PM-59
P. O. Box 215, Pleasantville, N. Y.

Enclosed is\$ for pattern and book checked below.

() Signs and Name Plates, Pattern No. 74—25¢.

() 32-page Pattern Book illustrating 94 pattern projects—20¢.

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Address _____

City _____ Zone _____ State _____

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Makers of Casco Glues

Clinic



for Homemakers

As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

Strawberry Leaf Spot

Q—What causes the purplish, red spots on leaves of the strawberry plant? Also, what is the cause of the tiny, round holes which appear in the leaves of the plants in the early spring? G.B., Portsmouth, O.

A—The red spots on the leaves are caused by a plant disease variously known as leaf spot, sunscald and leaf blight. The remedy is either to destroy the infected strawberry bed and to plant disease-resistant varieties or to spray existing plants with Bordeaux mixture just before the blossoms open and also once or twice immediately after the berries are harvested. Small, round holes in the plant leaves usually are caused by the strawberry flea beetle. Spraying the plants with lead-arsenate solution will discourage the beetles.

Rainwater Disposal

Q—I live in an area where there are no storm sewers and water from the downspouts has washed large holes in the lawn near the foundations. I tried filling these holes with fine gravel but this does not help. What should I do to prevent this trouble? S.W., Creston, Iowa.



A—Provide concrete splash blocks under each downspout. These are easily made by using the earth as a form. Dig a pear-shaped hole about 5 in. deep and 36 in. long. The narrow end of the pear-shaped recess should be dug directly under the end of the elbow at the lower end of the downspout. Fill the hole with cement flush with the grade and trowel the surface slightly convex. This will spread the stream of water from the downspouts and prevent the soil from washing away. Another method frequently used in outlying sections is to provide an old-fashioned cistern, or "dry well." Dig a hole not less than 6 ft. from the house foundations to a depth of 6 to 8 ft. and 5 ft. or more in diameter. Line this with bricks laid in broken courses, without mortar. Cover the bottom with gravel to a depth of 6 to 8 in. By laying each course of brick slightly overhanging the preceding course, the brick lining can be made to draw inward to a conical shape, making the opening at the top considerably less than the maximum diameter. This opening should be covered with a reinforced concrete top and provided with a manhole. All the house downspouts are then arranged to empty into the well.

(Continued to page 246)

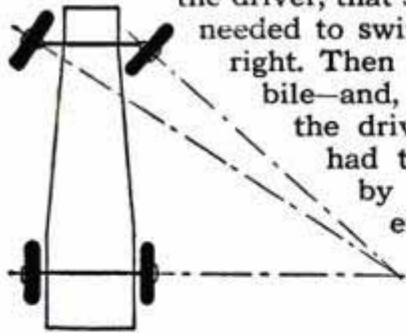


Euclid didn't know about *steering* geometry

... and you won't know its highest development till you try Chevrolet's new Center-Point Steering.

Two-wheeled carts and chariots didn't need any steering mechanism; they just naturally followed wherever the horses led. When four-wheeled horse-drawn vehicles came into use, the front axle was pivoted to swing on a central king pin—but it was the horses, not the driver, that supplied the power

needed to swing the axle left or right. Then came the automobile—and, for the first time, the driver of the vehicle had to do the steering by his own muscular effort. That's when



the modern steering arrangement—each front wheel swinging on its own king pin—came into use.

Today, a new high in perfection has been attained in Chevrolet's Center-Point Steering. Road shock is eliminated, wheel-fight is banished, tire wear is reduced; it brings a new ease of handling, a more positive and effortless control. As test drivers at the Proving Ground summed it up, the new Chevrolet, thanks to its advanced steering, is a car that has *road sense*. You're invited to drive the new Chevrolet, to experience a new high in steering satisfaction.



The Styleline De Luxe
2-Door Sedan

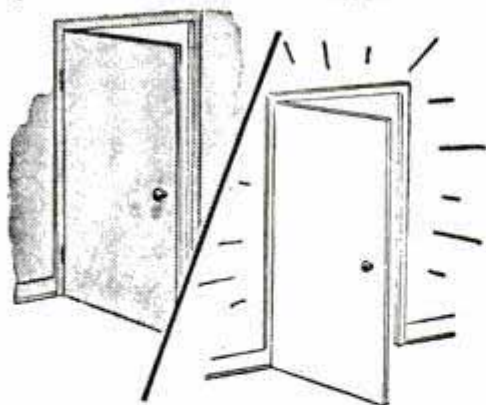


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materials and design! Costs so little!

Simply build masonry around this durable, all-metal Model OF-28 fireplace unit. Rugged, cast iron doors. Grates arranged for either charcoal or wood! Size 21" high, 26" long, 13 1/2" wide. Larger size available. See your dealer or send money order or check today. The Majestic Co., 199 Erie St., Huntington, Ind.



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SEND FOR THIS BOOK OF DESIGNS
48 pages of helpful tips on fireplace and outdoor
cooking. Send 25c for your copy.



Another Majestic Product

Limed-Oak Finish

Q—I have an old chest of drawers in solid oak with overlay carving. I'd like to modernize this chest by removing the carvings and the finish and then refinish it in limed oak. Is this practical, and, if so, how do I proceed?

J.M., Fresno, Calif.

A—We assume that the chest still is in good condition structurally and that the carvings are all overlays and not relief carvings. Use care in removing the carved overlays as they probably are glued on. Then remove the old finish with successive applications of varnish remover and scrape off all remaining residues to the bare wood. If a dark stain was used under the original finish, considerable sanding will be necessary to remove this from exposed end grain. Now apply a wood bleach to lighten the oak wood to a uniform color. (Caution: Handle bleaching materials with care as the chemicals used in these preparations are highly caustic.) After bleaching, it may be necessary to scrape all surfaces with a sharp, cabinet scraper to remove any of the old filler remaining. Sand the work thoroughly and apply a white filler. Remove all excess filler by rubbing across the grain with a coarse cloth. Allow the filler to dry thoroughly, then again sandpaper lightly and apply a sanding sealer. Sand this coat lightly and finally finish with varnish or wax.

Noisy Water Heater

Q—Our hot-water tank is heated with a coil-type gas heater. After the heater has been started and the water has been warmed, there is a peculiar, sharp rumble, and opening the warm-water faucet causes a loud, hammering sound. What is wrong with the installation? B.C., Birmingham, N.Y.



A—It could be that the tank is air-locked, although this condition usually causes noise only when the faucet is opened. The heater coil may be clogged with a hard lime deposit. If the faucets are of the older type having a fuller-ball valve, wear in the actuating parts will allow movement of the ball valve against the water pressure. This will cause a hammering sound when the faucet is opened. However, according to your description, we are inclined to believe that you are heating the water to the point where steam is generated in the tank. Steam will cause the rumbling sound you describe. Installation of a thermostat to control the gas heater probably will correct the trouble.

Killing Tree Sprouts

Q—Two years ago I cut down a tree growing in my yard, leaving a stump about 4 ft. high. Sprouts have grown from the stump each season. Seemingly, no amount of cutting will get rid of them. Is there any way I can kill the sprouts and still leave the stump? B.W., Birmingham, Ala.



A—Wait until the sprouts get a good start in the spring and are growing vigorously. Then sprinkle them with a strong solution of 2,4-D weed killer. About the best way to apply the weed-killing solution is with an ordinary sprinkling can. However, this particular can should not be used at any time thereafter for watering flowers or any other choice plants, as residues from the weed-killing solution may remain in the can indefinitely, thus endangering any other plants sprinkled with water from this particular can. If you do not wish to contaminate a sprinkling can with the herbicide solution, then cut the sprouts near the stump with pruning shears and place a drop or two of the full-strength weed killer on the cut end. Several applications may be necessary.

Only **AUTO-LITE**

**OFFERS CAR AND TRUCK OWNERS EVERYWHERE
THE SENSATIONAL ADVANTAGES OF A**

Resistor Type

SPARK PLUG

Now standard equipment
on 6 leading makes of
cars and trucks



Get these 4 Star Benefits

A SMOOTHER ENGINE IDLE
Wider spark gap helps eliminate occasional missing.

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Permits burning of leaner mixtures and reduces misfiring.

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Up to 200% and more.

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Reduces plug interference with radio, radar and television within 35 mv/m from 540 kc. to 150 mc. at 50 ft.

★ Because of its low rate of electrode erosion, the new Auto-Lite Resistor Spark Plug permits wider initial gap settings and makes these advantages possible.

ALREADY OVER 11,000,000 IN USE IN CARS AND TRUCKS EVERYWHERE!



**"Why do it the hard way?
Get an Actionrod!"**

Once you've tried Actionrod's *live* action, you won't forget it!

Actionrod is solid steel—delicately balanced, responsive to the touch. Its "custom-built" feel—the result of years of experience in tapering and tempering—is as comfortable as your old fishing hat.

For easy, effortless casts . . . for greater accuracy every time . . . you need an Actionrod. Your favorite sports store has it.

ORCHARD INDUSTRIES, Inc. • Detroit 5, Mich.

Complete price range



Wedge-Type Reel Lock



Owner's Name on Handle

ACTIONGLAS Orchard's great new development in glass rods. Available in casting and fly rods. \$25 to \$35.

Actionrod

**"SOLID STEEL
WITH LIVE ACTION"**

know his intentions, it's just a question of what to do—when and if. Many an angler has tossed his whole outfit in the water and wanted no more of muskie fishing. And many a muskie has driven straight for the boat and then leaped out of the water so high that he has cleared the craft. Others have landed inside.

When one wild muskie landed in a row-boat, the excited fisherman whipped out his six-shooter and let Mr. Muskie have it, then he and the guide had to row for shore to save themselves from drowning.

Muskies are a favorite sport and food fish and are found in weed beds and on bars in lakes and rivers of the north country.

The northern muskellunge (*Esox im-maculatus*) has a golden bronze appearance, often with reddish fins and tail, and inhabits the waters of Wisconsin, Minnesota, and from the Mississippi basin northward almost to Hudson Bay.

The Chautauqua or Ohio muskie (*Esox ohiensis*) is yellowish green in color and has a barred pattern that resembles worm tracks. It is found in the waters of the Ohio River and in many of its tributaries in New York, Ohio, Pennsylvania, Indiana, West Virginia, Kentucky, Alabama, Tennessee and North Carolina.

The St. Lawrence muskie (*Esox masquinongy*) is silvery and gray-green in color and is found in the Upper St. Lawrence River, parts of the Great Lakes and some of the rivers and lakes of eastern Ontario and western Quebec. It is famous in Lake Nipissing, Lake Ontario, the Niagara River and in French River.

The new muskie, the True Tiger (*Esox masquinongy amentus*), discovered by Mike Ament of Sioux Lookout, Ont., is a sub-species of the northern muskie. I have caught a dozen of them myself and can attest to the vast differences. There are two different muskies in Muskie Lake and in Little Lake Vermilion—the northern muskie and the True Tiger. The latter has a white skin with tigerlike bars that stand out like the stripes of a zebra. The body is shorter and the fish is heavy. The head is large for the length of the fish and the fighting qualities are greater. Biologists who have studied the differences agree—we have found a new muskie.

Tungsten-Carbide Glass Cutter

Four miles of glass can be cut by a wheel made of tungsten carbide. It is three times as hard as the best hardened steel and will cut half the length that an average-grade diamond will before the diamond needs resetting.

Every day is fun day



ON A
HARLEY-DAVIDSON
with the new **HYDRA-GLIDE FORK**



EVER ride on a cloud? Ever wish you had a motorcycle that would give you that feeling? Well, brother, here it is... the 1949 Harley-Davidson with the Hydra-Glide Fork! Glide is a *mild* word for it! Never before has such riding comfort, steering ease and roadability been built into a motorcycle. You *float* over bumps, *skim* over rough roads, *sail* down the straight-aways, enjoy every mile as never before. Even on longest trips, you're fresh as a daisy, ever ready for fun as you take in exciting race meets, endurance runs, hillclimbs, gypsy tours, sightseeing trips. Try a glide-ride and be convinced! See your Harley-Davidson dealer today. Mail coupon now.



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Send free copy of ENTHUSIAST magazine, filled with motorcycle action pictures and stories; also literature on latest models.

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Time for your **SPRING** PurOlator-Change



A CLOGGED OIL FILTER IS DANGEROUS. Engine-wrecking sludge and abrasives threaten sizable repair bills.



"MICRONIC" CONSTRUCTION MAKES THE DIFFERENCE. Pores so tiny they trap *all* the sludge, all the abrasives.



INSTALLED IN A FEW MINUTES—and now you can be sure that your oil will stay cleaner, your engine will be safer.



COSTS SO LITTLE . . . and can save so much in engine repairs. Only \$1.38 to \$2.50, depending on make of car.

Make the Spring changeover complete . . . new oil and a clean oil filter. Put in a PurOlator "Micronic" Refill. PurOlator, remember, is the filter that traps *all* the engine-wrecking sludge and abrasives.

PurOlator "Micronic" Refills fit *all* oil filters. \$1.38 to \$2.50, depending on make of car; inserted in a few minutes. If your car is *not* equipped with an oil filter, install a PurOlator. \$6.50 up, also depending on make of car.

PurOlator

MICRONIC OIL FILTER

. . . the oil filter that traps all the abrasives, all the sludge



Do You Get What You Pay For?

(Continued from page 167)

and building materials are sold, up to standards of accuracy.

Another important job is keeping gasoline pumps, trucks, storage tanks and meters in true measure and good working order.

The department's big, red "bandwagon" truck checks petroleum meters at wholesale yards, loading racks and docks in the harbor. It contains two testing chambers, one of 800 gallons capacity and one of 400. They are equipped with fittings and connections for testing and sealing meters with flows up to 300 gallons a minute.

Tank trucks and trailers are also measured and sealed for capacity. Each year hundreds of trucks roll into Los Angeles' Weights and Measures Department to receive an official O.K. on their stated capacity. Two vertical tanks, each holding 500 gallons of water, are the measuring devices. Overlapping gauge glasses, with calibrations from 0 to 500 on the sides, make rapid and accurate measurement possible.

When a motorist like Bill Jones complains that the gas pump at the corner service station is not accurate, an investigating crew is promptly sent out. Its car is powered from a secret gas tank and the regular gasoline feeder pipe leads to a test tank. If the measurement is correct, the surprised service-station operator gets his gasoline back. If not, he may be cited to appear in court.

Quality as well as quantity is important when it comes to gasoline and motor oil. In Los Angeles, suspicious samples of gasoline are put in a "Knockmeter" engine to get an accurate octane rating. Trained chemists put motor oils through elaborate tests with viscosimeters, distillation units, colorimeters, centrifuges, polarimeters and other laboratory equipment.

Not long ago, Los Angeles motorists began to complain about the quality of a certain well-known brand of Pennsylvania oil. The weights and measures men discovered that a slick crook had been buying up empty cans from service stations, filling them with crankcase drippings, recapping and selling them at standard prices. Caught red-handed, he paid a stiff fine and served a jail sentence.

Butane, a liquefied petroleum gas so volatile that it must be kept under pressure or it vaporizes, posed a new problem for the short-weight investigators. More than 200,000,000 gallons are now sold in California alone for trucks and other engines.

(Continued to page 252)

a new high...



● A New High in spark plug reliability.

Owners of cars, trucks, tractors, or boats will find that new AC Spark Plugs set a new high in reliability . . . because of AC's patented CORALOX Insulator.*

They withstand the punishment of heavy going or day-to-day driving better than plugs have ever done before.

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Get a set . . . and enjoy the new high in spark plug reliability.

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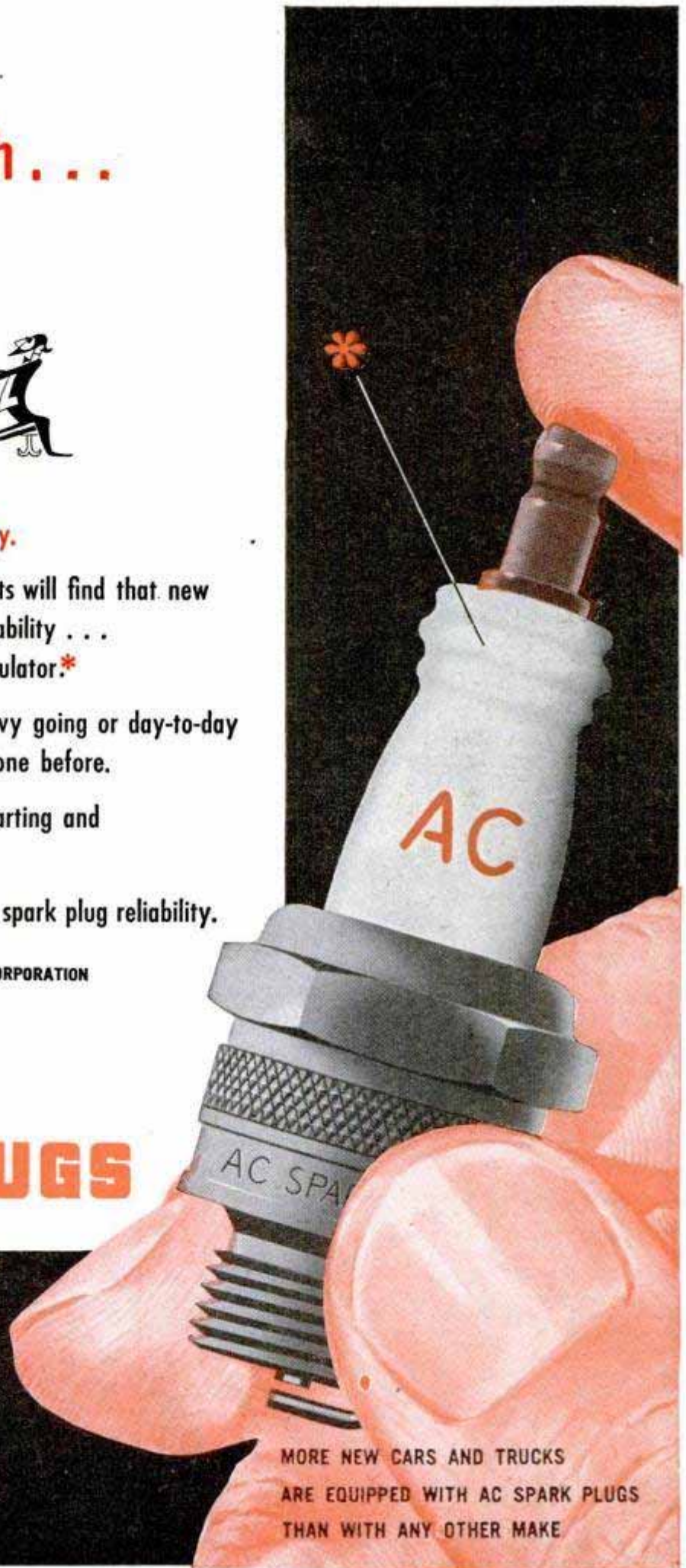


SPARK PLUGS

BUY WHERE YOU SEE THIS SIGN

AC's patented processes make Coralox the finest insulator in spark plug history. Improved electrical insulation, no matter how high the temperature. Better heat conduction. Maximum resistance to heat shock. Less fouling. Harder, stronger, longer-lived.

MORE NEW CARS AND TRUCKS
ARE EQUIPPED WITH AC SPARK PLUGS
THAN WITH ANY OTHER MAKE

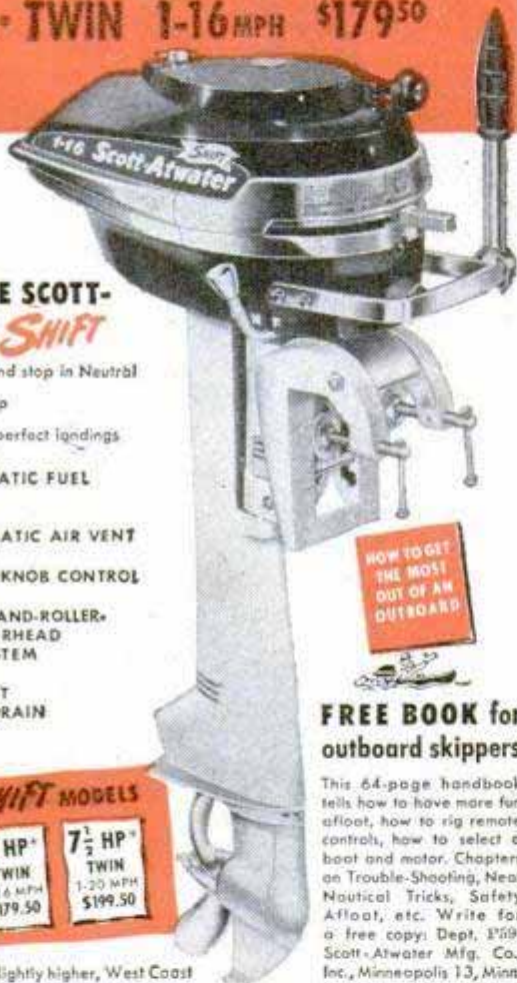


Here's America's most advanced outboard!

THE SENSATIONAL NEW

Scott-Atwater 1-16 SHIFT

5 HP* TWIN 1-16 MPH \$179.50



IT HAS THE SCOTT-ATWATER *SHIFT*

SHIFT to start and stop in Neutral
SHIFT to back up
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- IT HAS AUTOMATIC FUEL SHUT-OFF
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| THREE <i>SHIFT</i> MODELS | | |
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| 4 HP* SINGLE 1-14 MPH \$149.50 | 5 HP* TWIN 1-16 MPH \$179.50 | 7½ HP* TWIN 1-20 MPH \$199.50 |

4 and 5 HP models slightly higher, West Coast

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THE MOST
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OUTBOARD

FREE BOOK for outboard skippers

This 64-page handbook tells how to have more fun afloat, how to rig remote controls, how to select a boat and motor. Chapters on Trouble-Shooting, Neat Nautical Tricks, Safety Afloat, etc. Write for a free copy: Dept. P59, Scott-Atwater Mfg. Co., Inc., Minneapolis 13, Minn.

YOU'VE NEVER SEEN an outboard like this. It gives you cruiser control with the Scott-Atwater *SHIFT*—just *SHIFT* to Neutral, Reverse and Forward. It gives you the latest, greatest features—Rubber-Cushioned Shock Absorber Drive, Rotoflex Water Pump, Duo-Grip Carrying Handle, New Slip Clutch, Full-Expansion Exhaust—*plus all those above!* Yet the revolutionary Scott-Atwater 1-16 *SHIFT* actually costs no more than an old-fashioned outboard!


*OBC Certified
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SHIFT

For information
write Dept. P59,
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apolis 13, Minn.

to Scott-Atwater

Charlie Fuller's experts devised a butane-testing rig, which has been copied widely in other parts of the United States. It looks like an old-fashioned fire-engine boiler. Because butane boils at a temperature that freezes water, a specific-gravity kit is used to lower samples to 70 degrees below zero, Fahrenheit, where it remains a liquid at atmospheric pressure and readings may be taken on special hydrometers and thermometers. The exact weight of one gallon of the liquid is thus determined—making it possible to estimate the actual amount delivered in the test run.

Once, a well-known brand of butter began to appear in grocery stores short about one ounce. A quiet investigation followed and it was found that the Los Angeles distributor was cutting a slice from each pound and wrapping it up again. The slices were repacked and sold as additional pounds.

In one campaign, Fuller and his men destroyed more than 250,000 short-weight milk bottles. It resulted in an annual saving of \$90,000 to Los Angeles consumers. Milk bottles are now inspected before being placed in use by testing a sample taken at random from each shipment. A slight variation, over and under, is allowed, but the average must be full measure.

During the postwar building boom, the Los Angeles Department of Weights and Measures has taken on the additional task of measuring the square footage of carpeting for new homes. Cutting a carpet to allow for odd-shaped rooms, registers, doors and hallways sometimes produces wastage that a homeowner doesn't count upon. Fuller's men try to establish confidence between the homeowner and the carpet company.

Grease-measuring devices were a problem until the job was tackled by the Los Angeles investigators. Many of the early-type guns were crude affairs. They were supposed to deliver a pound of grease per "shot" to gear cases and differentials. Tests showed, however, that they would deliver anywhere from ½ to 1¼ pounds. Fuller and his men drew up specifications for accurate grease guns which have been adopted nationally.

How much does it cost to maintain an honest balance between the buyer and the seller?

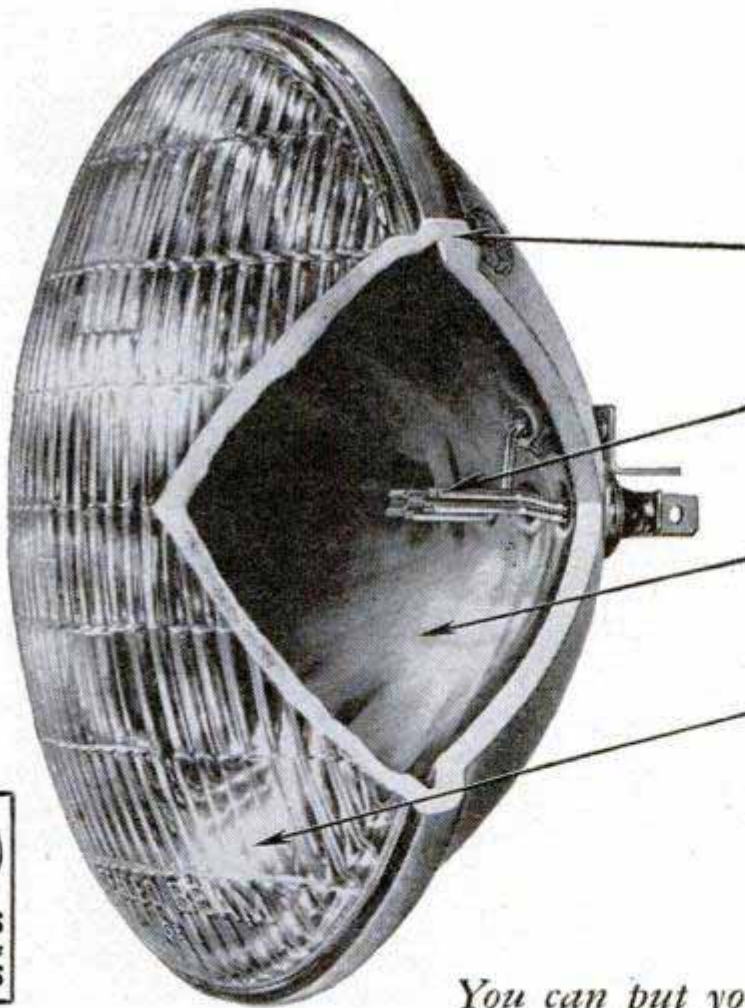
Fuller figures that his department, operating on an annual budget of \$163,000, costs the Los Angeles citizen about four cents for a year of service that saves him many dollars. That's not much to pay for "A Square Deal for All," the motto of the short-weight sleuths.

MOISTURE AND DIRT CAN'T GET IN



...that's why All-Glass

G-E HEADLAMPS DO NOT GROW DIM!



Rugged, one-piece construction keeps out *all* light-dimming dirt and moisture. The average General Electric headlamp gives 99% of original light output even at the end of lamp life.

Improved filaments give 12% more light on the road. And they won't shake loose.

Moisture and dirt can't get in to tarnish reflector. It stays mirror bright for life.

Lens is made of shock-resistant hard glass. Precision-built to put maximum light on the road.

Be sure you have your headlamps checked next time you leave your car for service—and be sure to insist on General Electric.



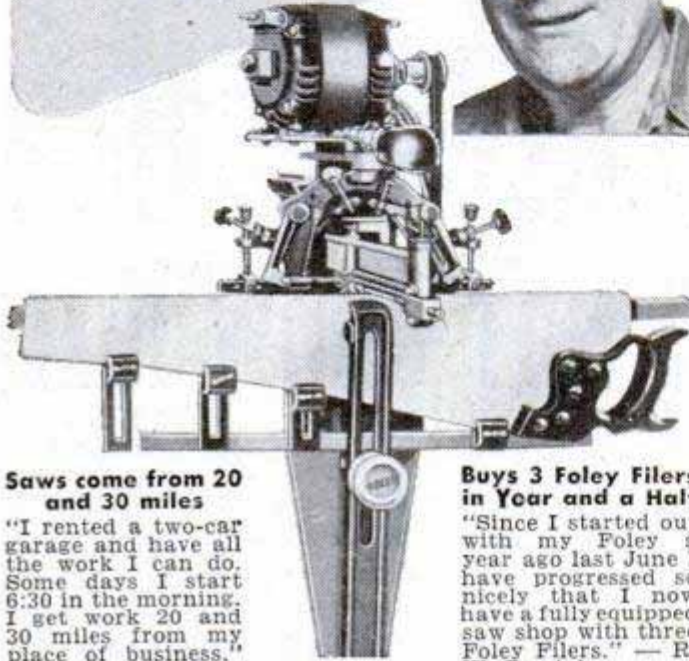
You can put your confidence in—

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FREE PLAN

Tells How to Start
Your Own Business

FILING SAWS



Saws come from 20
and 30 miles

"I rented a two-car garage and have all the work I can do. Some days I start 6:30 in the morning. I get work 20 and 30 miles from my place of business."
—Charles H. Smith.

Buys 3 Foley Filers
in Year and a Half

"Since I started out with my Foley a year ago last June I have progressed so nicely that I now have a fully equipped saw shop with three Foley Filers." — R. W. Persinke.

FOLEY FILED SAWS BRING NEW CUSTOMERS

Here is a steady repeat CASH business you can start in your own basement or garage in your spare time. Every saw you sharpen with the machine accuracy of the Foley Saw Filer is an ad that brings you more customers. S. M. Hollingshead wrote to us: "I am doing very well with my Foley Filer, and I am glad I invested in your machinery. It is very satisfactory and works very well in the small community in which I live."

You can file all hand saws, also band and cross-cut circular saws on the Foley Saw Filer. The adjustments are simple—there is no eyestrain—and you can start right away to turn out perfect cutting saws. "The first saw I sharpened with my Foley Filer came out 100%. I think it is a marvel of perfection."—writes Clarence E. Parsons.

FREE BOOK Shows How to Start

"INDEPENDENCE AFTER 40" explains how you can get business from hardware stores, home owners, farmers, carpenters, schools, mills, factories, etc. Just think—with a modest investment, no overhead, no stock of goods to carry, you can start right in on a cash business that will help pay the rent, buy groceries, or a new car. Start now—you can get IMMEDIATE DELIVERY on a Foley Saw Filer.



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Minneapolis 18, Minn.

Send me free book "INDEPENDENCE AFTER 40!"

Name _____

Address _____

The Man Who Stops Bullets

(Continued from page 132)

Jodhpur and other foreign dignitaries. He's not always sure just who will ride in the limousine because the orders usually are placed by a government department rather than an individual.

Some of the orders leave him mystified. One day he received a rush request from the Chinese government for four armored disk wheels to go on a seven-passenger sedan. A few months previous, Smart handled a complete armoring job on a seven-passenger, including armored disk wheels to protect the hydraulic brake system, for Chiang Kai-shek. Word filtered back that the Generalissimo had a decoy automobile of the same make but one had disk wheels and the other regular artillery wheels. After Smart's second shipment arrived, the decoy, flashing its new disk wheels—the only armored portion of the entire car—was outwardly the same as the Generalissimo's.

Europeans, more than Americans, have needed a lot of convincing that Smart's limousine was impregnable to small-arms fire. During a demonstration at Belgrade for the late General Mikhailovitch, Smart was asked to give the car the "human" test. It was a situation that Smart, who was to be the "human," never will forget.

"Mikhailovitch asked if I would ride in the car and allow his officers to shoot at it," Smart recalls. "I knew it would mess up the looks of the car on the outside, which was my only concern. But I would have been on an awful spot had I refused.

"'This car is for sale, General,' I told him. 'You write out your check for it and then I'll get inside and let you shoot at me.'"

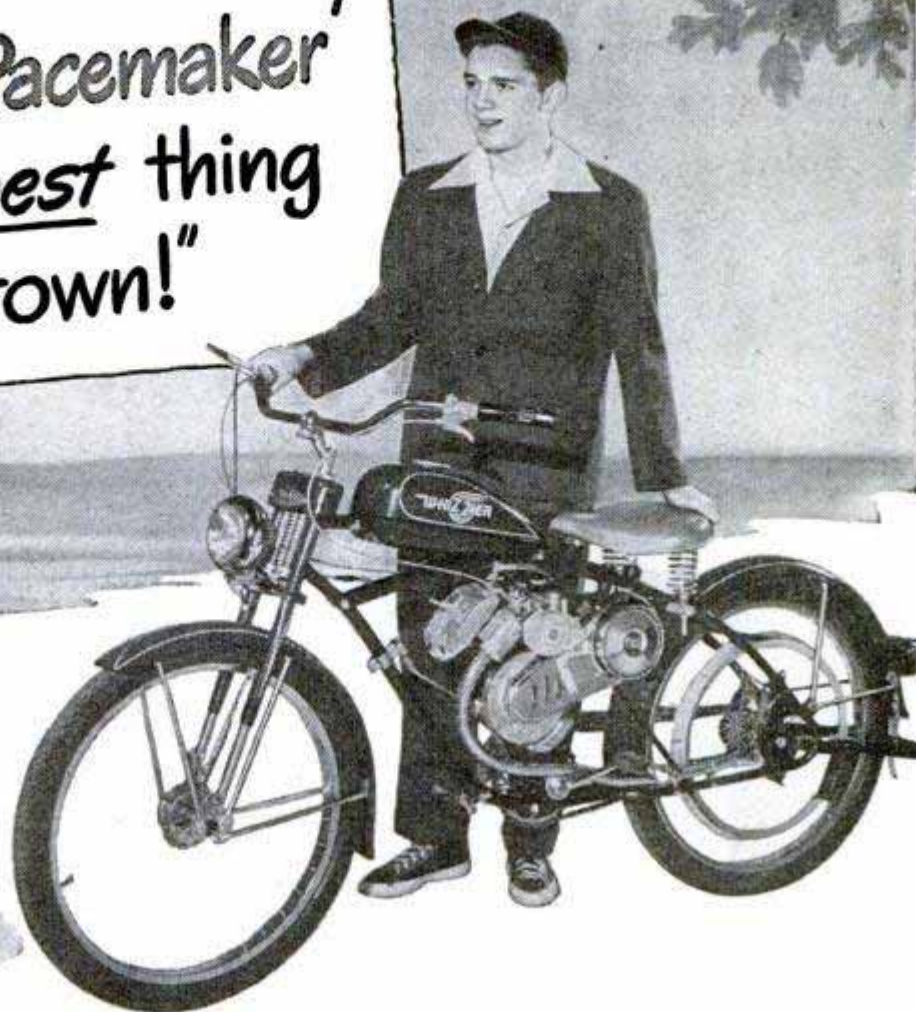
The big Yugoslav chieftain and his party roared with laughter, declining incidentally to buy the car.

Smart went into several other European countries but turned down an invitation from Moscow to put on a show there. "Those were the days when the Russians were rounding up American engineering talent, so I decided to stay away," he said knowingly.

Later Smart's engineering shop was starting work on an order from the Russian Embassy in Washington when a Russian colonel burst through the doorway carrying a leather case in which were two new pistols of Russian manufacture, a .38 and a .45, copied after the American Colt. The colonel also had his own cartridges and asked that every piece of armor plate going into the car be fired upon. Smart assured

(Continued to page 256)

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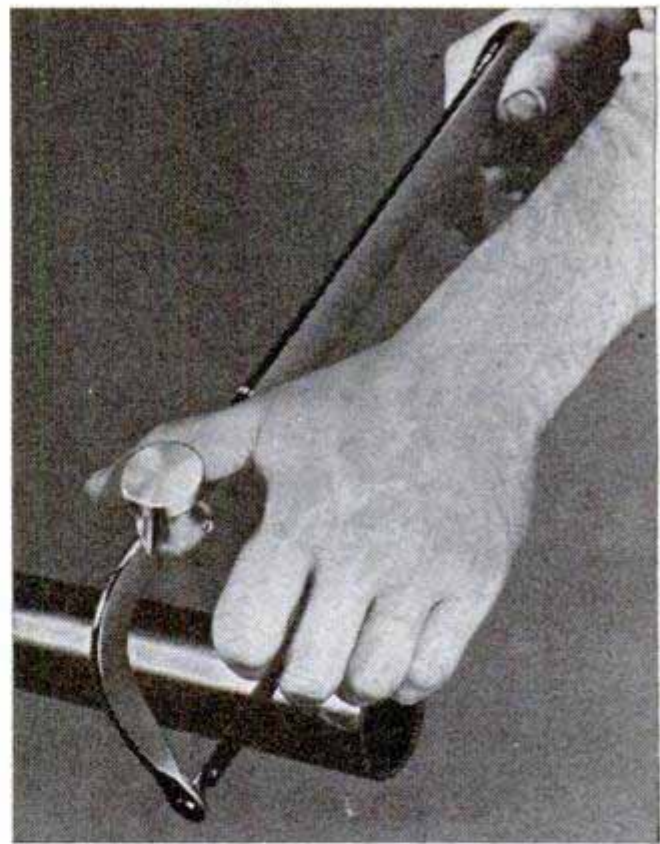
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him that the material had been thoroughly tested, but the colonel insisted upon individual tests. Smart found out afterward the car was for Stalin.

The extra weight of the armor plate does not hurt the driving qualities of any car, according to Smart. If an automobile is fully armored to resist up to and including a .30-06-caliber rifle, the added poundage will amount to between 400 and 600 pounds, which usually calls for beefing-up the springs but will not affect the handling of it on the highway. For this sort of protection, in case you're considering buying a fully tailored job for one of the more expensive makes of cars, you should be prepared to pay up to \$10,000, which will include the purchase price of the car itself.

In the early '30s, gunmen in Cicero and Chicago occasionally tried to buy Smart's engineering services but the Chicago police, answering Smart's inquiries, said: "No." For a while Smart and his wife feared reprisals but eventually discovered that the cars for gangsters were being handled by back-alley garages. "Blacksmith jobs," Smart calls them.

Extra Handgrip for Hacksaws



You can avoid smashing your knuckles while using a hacksaw by means of an extra handgrip that clamps to the frame. Made of aluminum, the grip enables you to grasp the saw more firmly and comfortably, lessening fatigue and increasing sawing speed.

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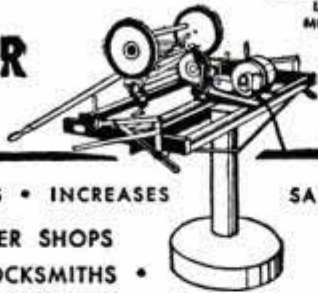
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Let the Engine Boil

(Continued from page 84)

The apparatus consists of a vapor-phase cooling unit that is mounted on a pedestal alongside the engine and that maintains the engine at 212 degrees regardless of the ambient temperature. Inside the pedestal is a storage tank from which lubricating oil is added to the engine crankcase automatically at need. The fuel is untreated, sour, oil-field gas that is piped to the engine. Thus, with constant supplies of fuel, lubricating oil and coolant, the engine keeps working for week after week. Safety controls automatically shut down the engine in case of fan-belt failure, mechanical leakage of the cooling water, or other trouble.

A mass-production closed vapor-phase cooling system for automobile engines, when it is built, will use no thermostat. The radiator, or condenser, could be about half the size of present radiators. Size of the cooling fan could be reduced and there is a possibility that steam could be used to drive a small turbine that would spin the cooling fan, saving the engine horsepower now used for that purpose. In fact, there is the possibility that the low-pressure steam of the cooling system could be made to do other work as well, such as operating an effective cooling system for the car.

Until an especially designed system is available, however, the Engineering Controls research people suggest that amateur experimenters do not try to rebuild their present cooling systems because of the difficulties they will encounter. One stumbling block, for instance, is the pressure that is built up in an enclosed system by the inevitable leakage of combustion gases through the head gasket, a leakage that is of no consequence in the present "open" cooling systems. The patented vapor-phase cooling system has a means of relieving this pressure, without permitting water or steam to escape.

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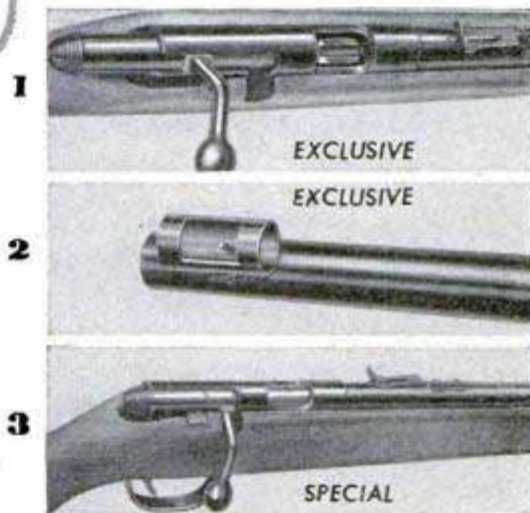
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Submarine Disaster School

(Continued from page 151)

rescue chamber can't start until he's up, so to speed the operation he returns to the surface without pausing. To prevent the "bends" it is necessary for him to decompress in one of the Chanticleer's two "iron doctors," or decompression tanks.

These are cylindrical metal tanks the size of a small room in which the pressure corresponding to the condition of the nitrogen bubbles formed in the diver's tissues by sea pressure is recreated by compressed air. Then he gradually is returned to normal.

A new underwater-rescue device just announced by the Navy permits the disabled vessel herself to haul down the rescue chamber, eliminating the need for dangerous deep-sea diving. The equipment consists of a set of buoys attached to wires at the sub's bow and stern. The trapped crew can release the buoys, which carry the wires to the surface. The wires and their winches then are strong enough to haul down the rescue chamber.

The rescue chamber is an odd pear-shaped diving bell operated from the inside by several crewmen. It floats alongside the Chanticleer for a moment while its buoyancy is adjusted by admitting sea water to ballast tanks until it barely floats.

Then the slack in the downhaul cable is pulled in with an electric winch and the chamber moves weirdly across the surface a few feet to disappear in a swirl of foam. In 8 to 10 minutes it will clank on the sub's escape hatch 200 feet down and make a watertight seal. Then, its operators will open the lower hatch and that of the sub, and take on a load of survivors.

When the submarine Squalus went down in 1939, the rescue vessel Falcon put her chamber down on the escape hatch of the Squalus, six miles offshore in 240 feet of water, before noon the following day. In four trips the diving bell brought the 33 survivors to the surface by eight o'clock that evening.

Once the crew of a sub is rescued, Event 1000 is concluded. The rescue vessel then will raise the sub with compressed air from her extensive high-pressure compressor system if enough of the sub's ballast tanks are undamaged. Otherwise, as in the case of the Squalus, a tedious salvage job with pontoons will be necessary.

But no matter what the difficulties, the men of the Navy's submarine rescue vessels are trained and equipped to handle the situation.

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EVINRUDE

FIRST IN OUTBOARDS... 40th YEAR

Rough Riders of the River

(Continued from page 142)

Balancing with the body and arms and turning the log with the feet is an accomplishment known as birling. In some parts of the United States, birling contests are annual events. Someone has called them "one of the few truly native American sports."

Following behind the riverjacks are two wannigans—24 by 84-foot log rafts on which are built a canvas-covered bunkhouse and cookhouse. Only a few old-timers still possess the knack of constructing a wannigan that will survive the log drives.

These rough-hewn "showboats" of the log drive are put together at the upper end of the river and follow the riverjacks downstream—tying up along the bank each night. When they reach the millpond, they're knocked down, thus adding a few more logs to the supply.

Guiding the clumsy flatboats calls for expert navigation. Frequently, the bows are under water in the rapids. Fifty-foot sweeps, fore and aft, are used to guide the craft. They lumber along, scraping over half-concealed rocks, slamming into the river's banks. But somehow the wannigans hold together, principally because of the tough vines used to bind the logs.

Riverjacks work from 7 a.m. to 4 p.m. This means breakfast at 6 a.m., first lunch at 10 a.m., second lunch at 2:30 p.m. and dinner at 7 p.m. Breakfast and dinner are served from the wannigans. Lunches are brought to the riverjacks on the job.

And man, what food! Great platters of ham and eggs, loaves of oven-hot bread and pans of browned biscuits, enormous two-inch steaks, great pots of beans, cookies and doughnuts by the score, huge cups of steaming coffee, crates of oranges and apples. The diet is heavy on the side of sugars and starches because they provide quick energy.

"You can get a lot of logs down the river with a sack of sugar," one millowner is fond of saying.

At night, the riverjacks make camp alongside the river. After dinner, a big black caldron is suspended over a roaring fire. This provides hot water for bathing, shaving and laundering. Boots are rinsed free of sand and hung to dry atop the hickory handles of peaveys jabbed into logs. When the boots shrink, it's easy to fill them with hot water before breakfast and pull them on—a kind of self-inflicted hot foot!

A "cat raft" (a Caterpillar tractor mounted on a raft) floats downstream in the wake of the main body of logs to help in "picking

(Continued to page 264)

Are You Building A —

- Golf bag carrier
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SEE YOUR HARDWARE or FARM STORE Today!

Buy quality wheels where you know the supplier and the delivered cost. If your dealer can't supply you, write direct for the name of your Gleason Wheel supplier.

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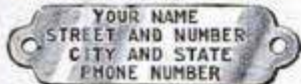
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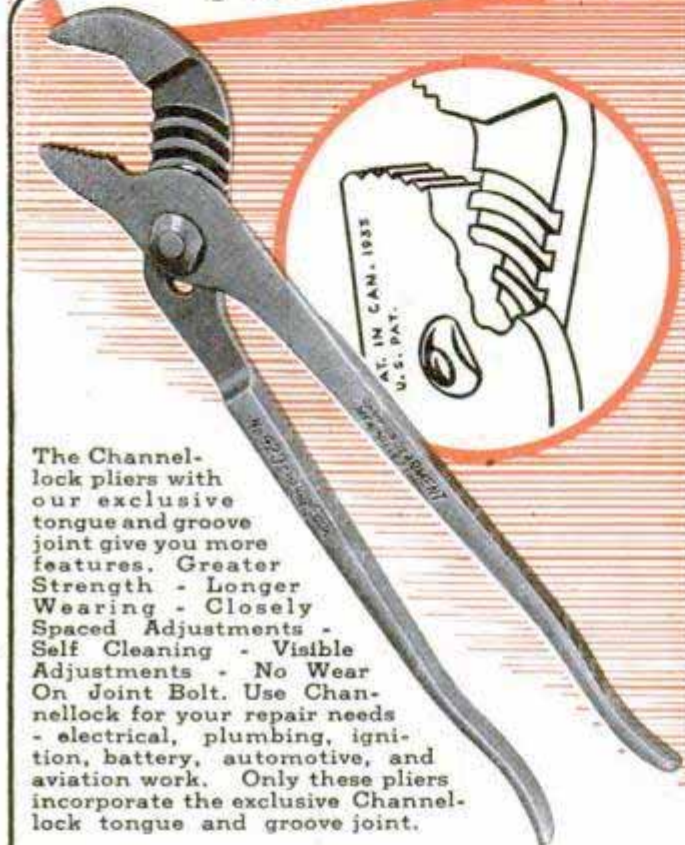
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off" or "sacking" the rear—freeing logs that have become stuck or stranded.

In the rough upper country, as a general rule, logs are moved by manpower, peavey, pike and dynamite. "Cats" can't be used because timbered slopes come right down to the river's edge and at flood crest tree trunks are below water. Down-river, nearer civilization where the river is less turbulent, snorting cats on the banks are used to unsnarl jams and free stranded logs.

A line pulled by the winch of a tractor on the riverbank is used to straighten out wing jams and to snake logs away from bridge piers. Larger cats with bulldozer attachments are used to push log jams out into the river. They can operate in water almost up to the driver's seat.

At the end of the drives, logs are stored in millponds until they can be sorted according to species and mill schedule. The Clearwater millpond of Potlatch Forests, Inc., for example, has a backwater of 769 acres, which can easily handle the 50 million feet of a log drive. Potlatch's Clearwater sawmill at Lewiston, incidentally, is the largest pine mill in the world.

Because they're breath-taking, action-packed shows and a colorful part of the American heritage, the Potlatch and Diamond Match Co. log drives have become an important tourist attraction in northern Idaho. Highways parallel the Priest River along part of the 65 miles from Priest Lake to Pend Oreille River. You can watch the Potlatch drive along the 40-mile stretch from Ahshahka to Lewiston. During June 2, 3 and 4 this year, the Priest River Chamber of Commerce is sponsoring a "Log Drive Celebration" including displays of logging equipment and demonstrations of birlers, sawyers and axmen.

Log drives may be a vanishing art in most parts of the world—but not in northern Idaho. Riverjacks are still riding logs down the Clearwater and the Priest where the cry "She's a-pullin'!" rings across the turbulent white water.

How to Build a Winning Racer

(Continued from page 126)

most of its fuel alongside the driver in the middle of the car where its varying weight will have little effect.

The same builders are using a similar idea in an eight-cylinder rear-drive car that they have rebuilt for the Bowes racing team. The car will carry 90 gallons of fuel, some of it in the tail and some of it in belly tanks placed between the frames under the driver's seat. The car will test out

(Continued to page 266)

GET THIS USEFUL . . .

"Teddy" KIT

for
**SANDING!
POLISHING!
GRINDING!**

FITS
ANY
ELECTRIC
DRILL



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6" heavy flexible rubber disc, bends into curved surfaces. 6 heavy backed, garnet sanding discs, of ass't grits, superior lambs wool bonnet. Disc and bonnet are attached in a jiffy without cementing. A handy kit to own.

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3 1/2" \$1.50 5" \$2.85
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[STANLEY] PLAN SET No. 14

Reg. U.S. Pat. Off.

• Lure the birds you like by building them a home . . . 5 types plus a feeding box. Plans also for garden seat and a trellis. Hours of pleasure and a better yard. Send 10c for Plan Set No. 14 and list of others. Stanley Tools, 159 Elm St., New Britain, Conn.

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THE NEWEST IN STILL CAMERAS—the sensational new Land camera that gives you a finished print just 60 seconds after you snap the shutter! The new Bell & Howell Foton automatic 35 mm. (takes up to six pictures a second); the new low-priced Bolsey miniature with twin lens reflex focusing; and many others.

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T. M. REG. U. S. PAT. OFF.

MAKES CARS STAY BEAUTIFUL

*Better than 10
'Here-Today...
Gone-Tomorrow'
Polishings!*



Simonizing saves you time as it saves the finish!

Don't waste your time with 'temporary polishings'! Simonizing gives long lasting beauty... protects the finish and keeps colors from fading. Do as millions of motorists... Simoniz your car. It's easy to do yourself.

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Use Simoniz Kleener (liquid or paste) to clean finish.
Then Simoniz for lasting beauty. Sold everywhere!

a new spring suspension, too, as it has been equipped with "torsilastic" rubber torsion bars. Torsion-bar suspension of one design or another is common to most of the new cars because of the easy ride and good handling that it provides.

I got into racing away back in 1922 when I put a car together and raced it at San Luis Obispo. The car blew up in practice, then I built another and won a lot of West Coast dirt-track races with it.

By that time racing was in my blood and in 1928 I had a chance to drive at Indianapolis. I placed second and from then on I was in every race until 1936. I broke down on every occasion except twice and on those times I finished third. Once a con rod failed when I was in second place with half a lap to go, once I ran out of gas 15 laps from the finish when a pin-hole leak developed in the pressure fuel tank.

For the 1938 race I put some of my ideas together and built a car that I thought could win. I was right, for Floyd Roberts won the race in it. Next year he was killed in a three-cornered crack-up on the track. In 1940 I entered two cars; one placed third, the other broke an oil line. Next year I entered three cars and Mauri Rose won the race in one of them. Since the war we've made a clean sweep of first and second places in the two races that I entered cars.

Winning at Indianapolis has won me a lot of money but it costs a lot to win. The drivers and pitmen get part of the purses, the expenses are heavy and race cars cost money to build. Counting my three cars, the shop and my tools, I've invested close to a fifth of a million dollars for the thrill of watching my cars get the checkered flag. That's what I work for, because when you figure up my winnings against the expenses and the time that I put in, it turns out that I make about a dollar an hour.

Warming Up the Great Outdoors

(Continued from page 114)

This past winter a flying service in California kept two helicopters on the job every night during freezing weather, fanning citrus groves from above. A helicopter does the same job as a wind machine by sending the warm upper air down into a grove. Its results are often more effective since the blast from the rotors is straight down, producing an immediate temperature rise.

For optimum results the helicopter flies 60 feet above the ground at a speed of 10 miles an hour, making wide sweeps across and around the trees. One plane can protect upwards of 80 acres, creating and

(Continued to page 268)

King Midget



- HOME ASSEMBLED
- MASS PRODUCED
- LOW-COST AUTOMOBILE

Drive this car for as low as 50¢ per week. Up to 90 miles per gallon. 45 to 50 m.p.h. Large enough for a husky six footer. A pleasure to assemble. Just bolt together our precision built parts. Get the facts. Send 25¢ for detailed circular with large photo, 4 view drawings, price of all parts. Better still, send \$1 (refunded first order) for this plus actual assembly book with 42 photos, drawings; blueprints of snow and ice conversions, etc.

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\$67.50

(Freight Included)



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50 LOG CABIN DESIGNS

72 large pages, packed with practical know-how on construction, costs, prefabrication, etc. Plus floor plans and drawings of 50 different cabins. 1 to 10 rooms, all types . . . modern, rustic, chalet, etc. Build for summer or year-round home. Learn how to build yourself, or pointers to save 40% if you have work done. Architects charge many times the cost for similar information and drawings.

Postpaid—**SEND \$1.00**
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NOW! PAINT STRIPING MADE EASY!

PAINTERS' STRIPING TOOL

Easy to use as a pencil! Draws parallel lines, straights, curves, circles with paint, enamel, lacquer, etc. Do your own striping on autos, furniture, toys, bikes, model planes, signs, linoleum . . . make wall board look like tile. Painters - craftsmen, order today! Type "M" Master Painters' Striping Tool complete with tip for 1/16" stripe, \$1.00. Tool with choice of 1/64", 1/32", 3/64", 5/64", 3/32", 1/8" tips—\$1.50 . . . all tips 75¢ ea. Tool with complete set of 7 tips \$5.00. (COD's postage collect.) Dealers write!

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Shakespeare WEXFORD

- A WONDER LINE
- WEARS UP TO 3 TIMES LONGER
- AVERAGES 7 TIMES MORE WATER-RESISTANT



When you hook 'em, WEXFORD holds 'em . . . because it wears up to 3 times longer than any of 10 leading lines tested. This is a fact, based on independent laboratory tests.

And WEXFORD averages 7 times more water-resistant . . . a quality that gives you smoother casts, extra enjoyment every time you fish!

Ask for WEXFORD in the two-spool blue and red box, at your favorite sports store.



FREE 1949 TACKLE BOOK and Pocket Fishing Calendar. Newest in tackle, fishing tips. Write Shakespeare Co., Dept. PM-5, Kalamazoo 2, Michigan.

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BUILD YOUR OWN POWER LAWN MOWER

WHY BREAK YOUR BACK MOWING FIELD OR LAWN?



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The Rite-Way Mower Attachment Ball Bearing



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Now anyone can save time and effort mowing field or lawn by building their own whirl type power mower. Build according to your own ideas and needs at small cost. Cut close to fences, walks, buildings, etc. Build in short time with parts and instructions we furnish. Save hours of time and back breaking labor. Write today for FREE information.

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Provides PRECISION CONTROL..

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FOREDOM #99
FLEXIBLE SHAFT
MACHINE with
PENCIL-SIZE
HANDPIECE..



KEEPS YOUR WORK WELL IN VIEW



35"
FLEXIBLE
SHAFT
\$15.95
COMPLETE
WITH
MOTOR

GRIND - POLISH - SAW - SAND -
ETCH - ENGRAVE - ROUT - CARVE -
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Use on all metals, wood, plastics,
glass, leather, linoleum, etc.

REMEMBER that in the precision-made FOREDOM you get MORE POWER—LONGER MOTOR LIFE because MOTOR IS NOT DWARFED TO FIT HAND. DOES HUNDREDS OF JOBS WITH MARVELOUS EASE because pencil-size handpiece gets into hard-to-reach places—provides positive, easy, precision control.

Profit by experience of many thousands of Foredom users—over a quarter century experience stands behind the product. Other heavier-duty models at proportionately reasonable prices. No. 25 Accessory Set (a truly versatile assortment) \$5.50 extra. Also No. 999 Kit, comprises No. 99 Machine, Illustrated, and set of 12 accessories, all in wooden case for only \$19.95. 6-step Foot Rheostat \$4.85. Over 70,000 Foredoms in use.

AND HERE'S ANOTHER AMAZING FOREDOM PRODUCT



YOUR MOTOR

Foredom PRESTO-FLEX
with PENCIL-SIZE Handpiece \$5.95

Now turn your old motor, drill press, or electric drill into a Flexible Shaft Tool. Simply attach to your electric drill, drill press or motor. Presto—a flexible shaft machine! Off again in a jiffy! Pencil-size handpiece gives you finger-tip control. Gets into tight places you can't reach with any other tool. Handy 35" overall length. And—only \$5.95 complete! Not to be confused with inferior imitations. Precision made, backed by 1/4 century experience in this field. All parts replaceable. Order NOW. If ordered for use on motor, specify motor shaft diameter and add 50c for coupling. (Available for 1/4", 5/16", 3/8", and 1/2" shafts.) No. 50 Accessory Set available \$1.50 extra. Order TODAY.

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Now

Please send me FOREDOMS checked below on 10-day trial.

- Presto-Flex Tool (\$5.95) No. 50 Accessory Set (\$1.50)
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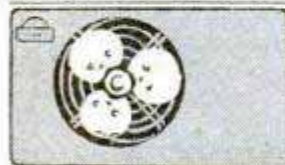
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SIZE ADJUSTABLE WINDOW FAN

Includes motor, fan front, guard, blade. Adjustable end for installation.

| BLADE | MOTOR | MODEL No. | TESTED CFM | PRICE |
|-------|------------|-----------|------------|---------|
| 16" | 1/25 H. P. | 48-DD-16" | 1500 | \$17.95 |
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Shipped knocked down. Guaranteed satisfaction or money back. Thousands in use. Fits narrow or wide window. Famous Torrington Blade. All Steel. Close out. Over 50% reduction. F.O.B. Memphis, Tenn. Send check or money order. If C.O.D. make \$5 deposit.

TROUSDALE MFG. CO., 266 Madison, Memphis, Tenn.

maintaining a temperature rise of two to four degrees.

Several attempts have been made to heat artificially the air streams produced by wind machines but the most satisfactory combination under extreme conditions seems to be the use of orchard heaters at ground level, plus wind machines. Often two or more rows of heaters are placed around the edges of the grove as a barrier against cold air, while the wind machines inside the barrier keep the warm air in motion or help prevent its upward escape.

American agriculturists have spent millions of dollars for frost-prevention equipment and they are still far from satisfied. All protective devices are satisfactory under some conditions; few, if any, give adequate protection from extreme cold.

Most frozen fruits and vegetables can be detected at a glance but a frozen orange may look perfectly normal even though its interior is dry and pithy. To cull out the bad fruit, packing houses move them through a water separator. Dry oranges float high in the water, good moist fruit floats low. The operator separates them according to their gravities. In some packing houses the oranges are moved by traveling belt across a fluoroscopic X-ray screen that allows the operator to see right through each orange. When a frozen fruit shows up, the operator presses a lever, tipping the orange from the belt. Frozen and partly frozen fruit are processed for their oil and pulp in by-product plants.

The search for methods that will provide even better protection against occasional low temperatures is still going on. One of the requirements is low initial cost as well as low cost of operation, otherwise growers may not be able to recover their costs when their produce is sold. Even at 10 cents a gallon for the cheapest fuel oil, it costs 10 cents per hour to operate an ordinary orchard heater. Multiplied by 40 heaters, this amounts to \$4 per acre per hour. Multiplied by 150,000 acres, representing the citrus acreage in southern California that is protected by heating equipment, the bill amounts to \$600,000 per hour for fuel, exclusive of labor. Some orchardists spent more money for fuel alone last winter than they received for their crops, because of the prolonged cold spell.

Nevertheless, antifrost devices of one sort or other are saving millions of dollars worth of crops every year. If and when better methods of cheap protection are devised, farmers will be able to increase materially the length of their growing seasons and will be able to raise fragile, semitropical plants in hardy climates.

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DOES THE WORK OF
6 TOOLS IN 1
Holds 20 times its
weight in water

others make
BIG MONEY

"Enclosed find 56 orders representing 9 1/2 hours work on Monday and Tuesday." "Enclosed are 12 orders secured after supper this p.m."

Housewives Pleased
Everyone that sees this outstanding CELL-U-MOP immediately want one... That's the reason our distributors are so successful... For MOPPING, WAXING, WALLS, WINDOWS, AUTOS and CLEANING RUGS. Sells quick to Taverns, Clubs, Hotels, Hospitals, Stores, Restaurants, Homes, etc. Drain Bracket squeezes out water thoroughly. Write for FREE particulars



Hands
Never
Touch
The
Water
..
Can Be
Put in
Boiling
Water

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"Fleas Don't
Bother Me
I'm Dusted with
PULVEX DDT"



PULVEX ... KILLS FLEAS
FLEA POWDER ... KEEPS 'EM OFF

NONE BETTER! SUPER DRILL GRINDER



Sharpens round shank drills from 3/32" to 1/2" in diameter, up to 6" long. Grinds old drills like new in 4 different point angles, using hand or power grinding wheels. Money-back guarantee.

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They said the fishing was extremely poor... but look what he caught. This nice string of Florida Largemouth was taken in December by Toby Shopper of Akron, Ohio, who has this to say of Hula Popper: "Just snap one on your leader, drop it into a likely pocket, pop it lightly and wait about 15 seconds for the ol' Hula Skirt to start squirming. Then... look out! The whole lake's liable to explode!"

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A-449-39

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Gives you complete details on the Set-A-Matic control that, in addition to sawing, enables you to haul large or small, straight or irregular logs onto the carriage—roll

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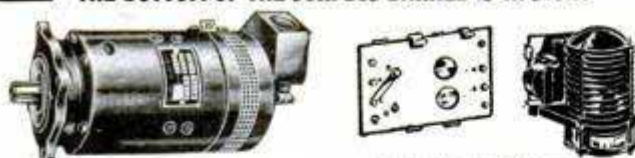
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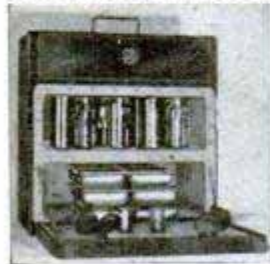
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Used by AAF for warming liquids, food, etc. Operates on 110 V, AC or 28 V, DC. Keeps foods hot for hours. Case measures 11 x 17 x 17 in. Equipment includes 6 4 1/2 in. stainless steel cups with lids, 4 stainless food trays or plates with lids, 6 each knives, forks, spoons, 1 water container, plugs, etc. Use at home, on boats, planes, etc. to warm canned goods, etc. and to keep them warm. May be packed with dry ice to keep things cold. Use also on hunting and fishing trips, picnics, etc. Shp. wgt. approx. 35 lbs. Complete, only **\$19.95**

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A complete, self powered portable light plant of 14 V, DC; 1000 watts. Powered by approx. 3 H.P., air cooled gas engine. Complete with meter, etc. Mounted on pneumatic tired wheels and dolly. Crated and guaranteed like new. (Shp. wgt. approx. 115 lbs.) Each only **\$74.50**

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Link A-12 type, good serviceable condition; in carrying case, instructions, navigation study book (AAF), etc. (Shp. wgt. 9 lbs.) Reduced to less than 10% of AAF cost. Now only **\$14.95**

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MUNICIPAL AIRPORT HOUSTON 17, TEXAS



Newest CROSLLEY STATION WAGON

Larger, longer body lines, new luxury interior appointments, speed styling, headlights in fenders, turn indicators, etc. All steel. Costs less than an 8-year-old, high upkeep used car. Real economy—up to 50 miles on a gallon. Prices range downward from the Station Wagon at only \$929 F.O.B. Marion, Ind. For complete catalog of all 5 new models, write your name and address on the margin of this page,

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SEND FOR THESE AUTOMATIC SHUT-OFFS

FOR WATER HEATERS • INCINERATORS • WATER SOFTENERS



FULL MONEY BACK GUARANTEE on these automatic shut-offs which eliminate return trips to the basement! Installed in a few minutes with ordinary tools. Comes with simple, complete instructions. Order direct from factory.

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Thousands in use. Sold direct to user. Now in our 45th year. **FREE** details. Low price.

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New 1949

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DEPT. PM-5 • 4707 EUCLID • CLEVELAND 3, OHIO

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SENSATIONAL NEW MODEL!

ONLY 11 pounds weight! One hand operation! Money-Back Guarantee of Superiority. Write for full details.

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World's largest maker of fine locators.



MODERNIZE Your Refrigerator with DEFROST-O-MATIC

Automatically defrosts refrigerator each night while you sleep. Simply hang on wall and plug in refrigerator. Set once and forget. Saves electricity—Prolongs refrigerator life. Frozen foods unaffected. Years of dependable service. 110 Volt 60 cycle AC. **SEND NO MONEY:** Pay postman \$9.95 plus postage. Or send M. O. and we pay postage. Money back guarantee.

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OUTPUT TORQUE ADJUSTMENT ZERO TO 100 INCH POUNDS



Shipping Wght. 25 pounds

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PREPAID 2 quarts oil included FREE

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OWN A FAMOUS MOTO-TOOL

The "Pocket-Size Machine Shop"
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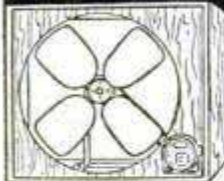
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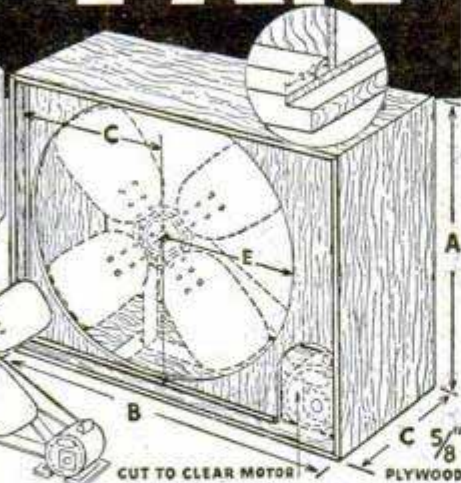
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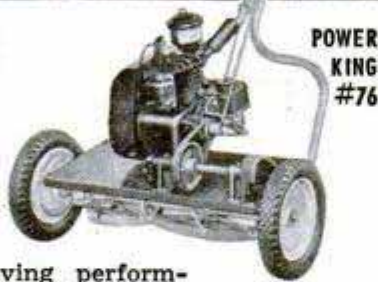
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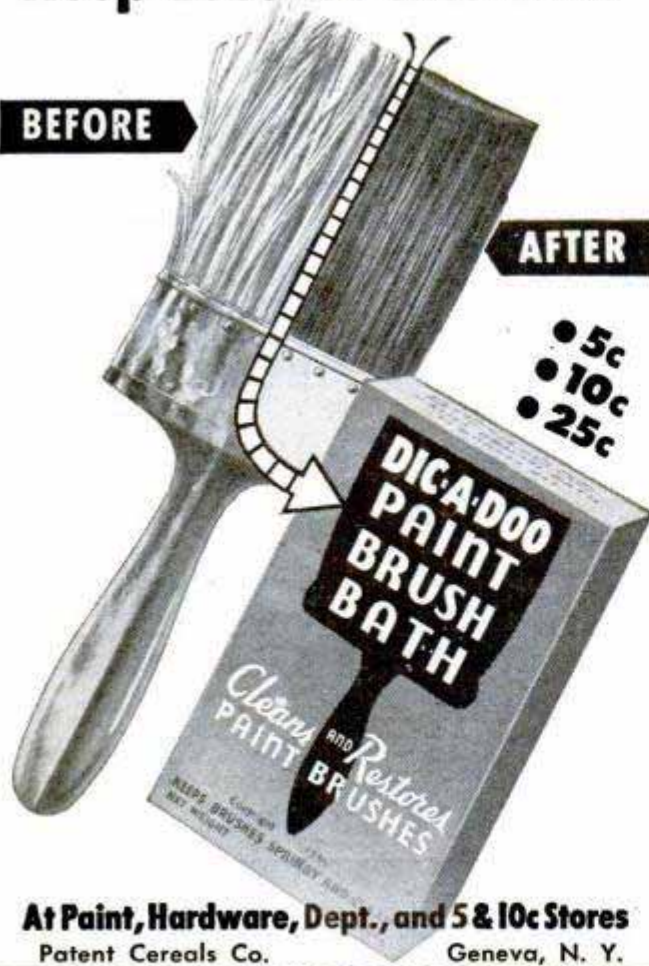
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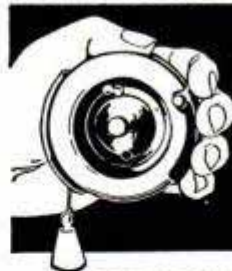
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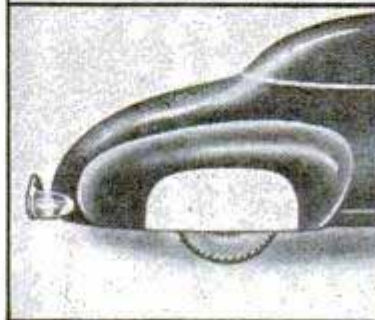
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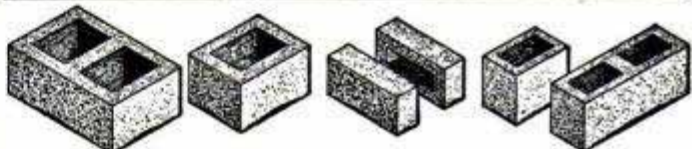
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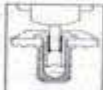


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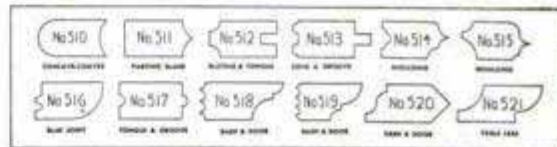
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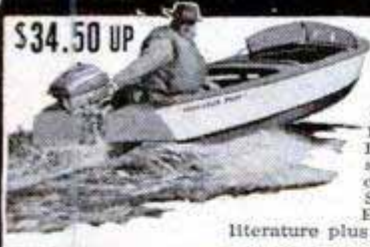
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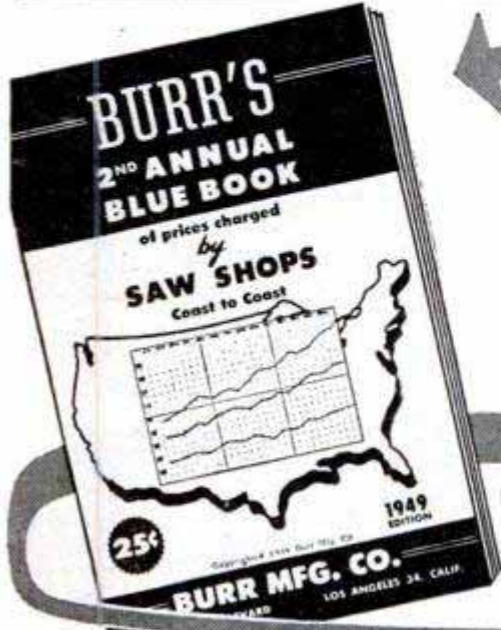
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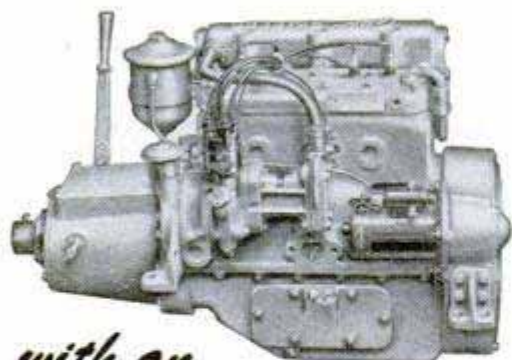
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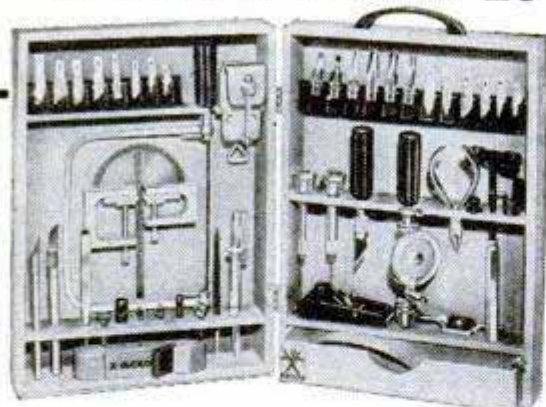
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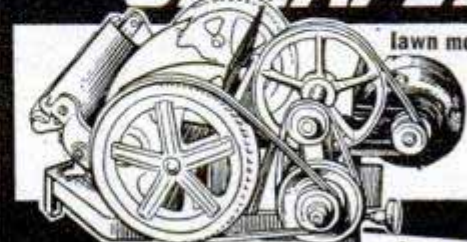
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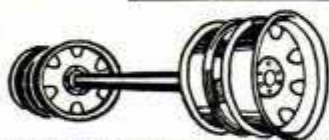
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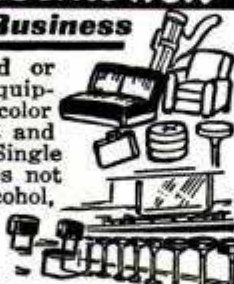
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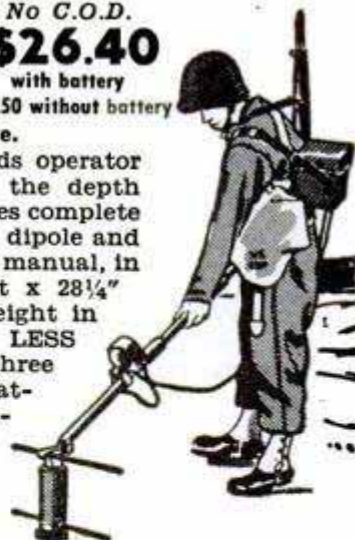
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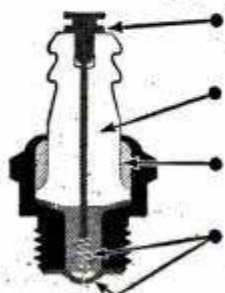


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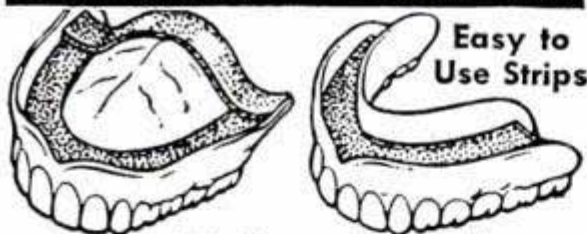
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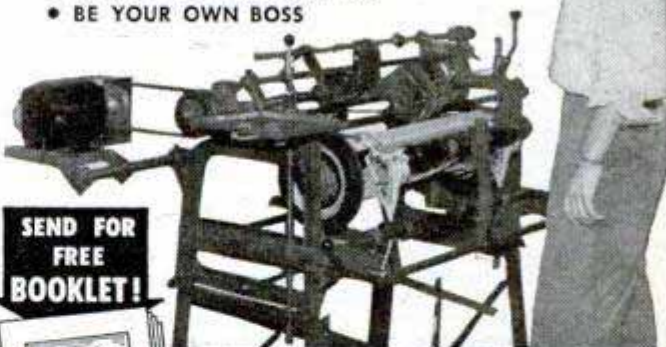
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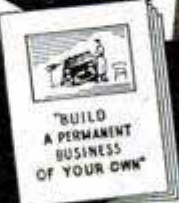
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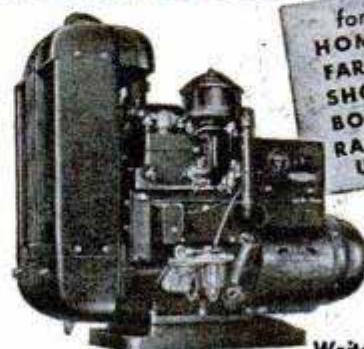
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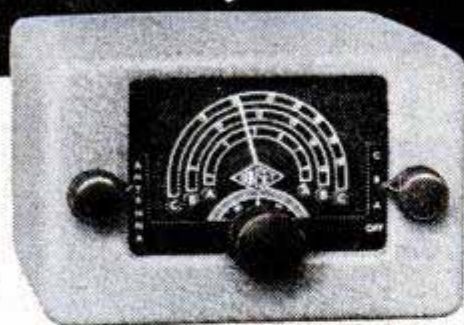
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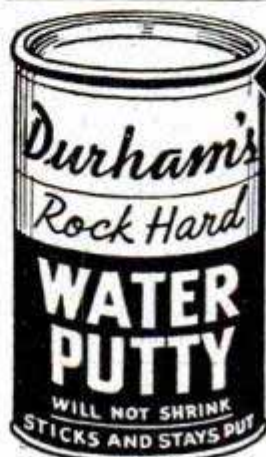
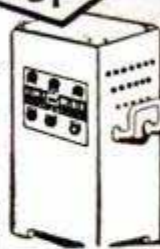
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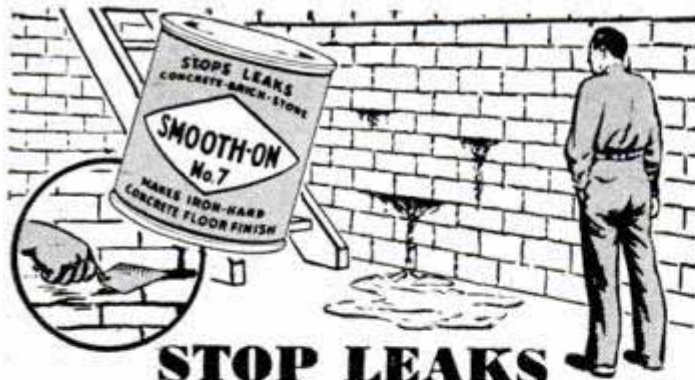
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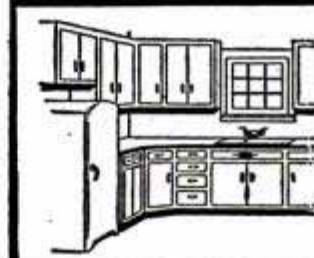
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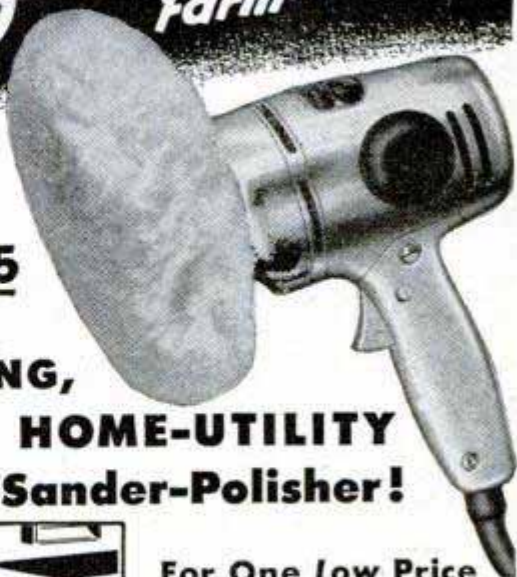
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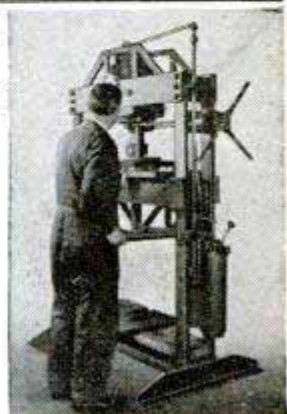
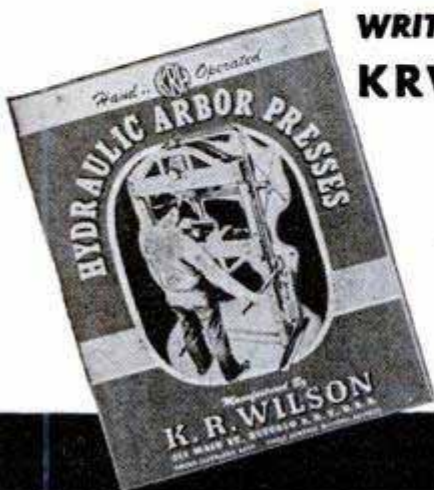
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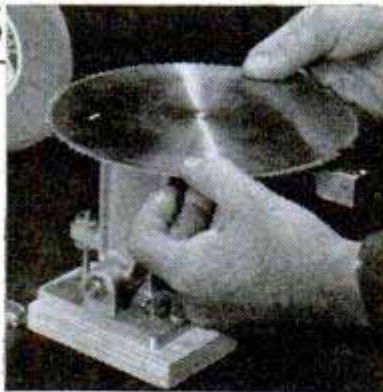
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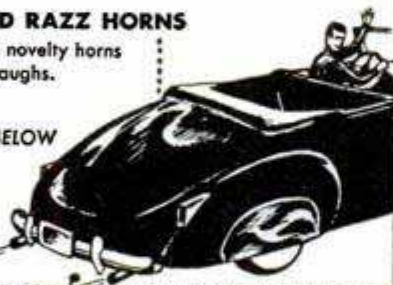
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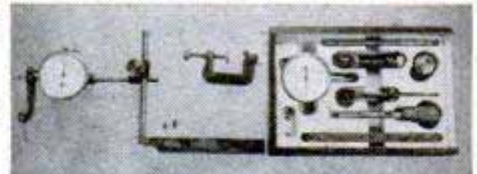
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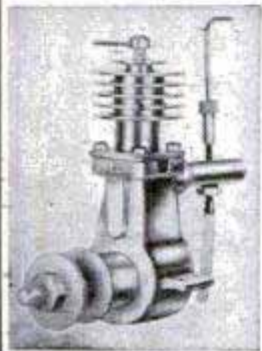


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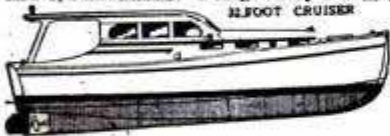
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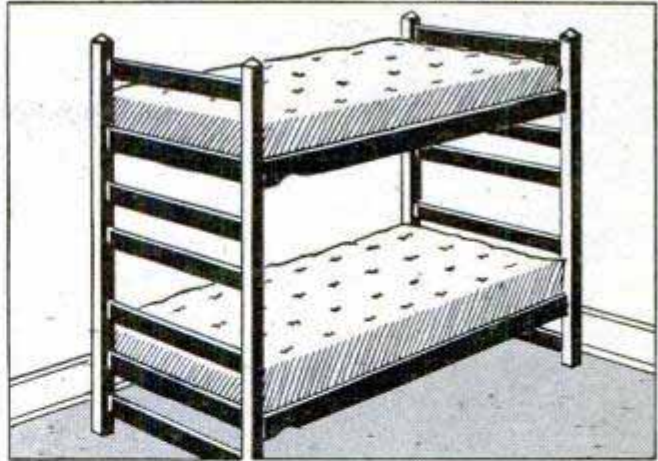
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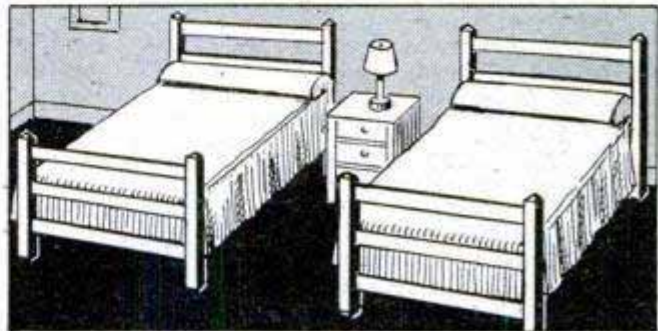
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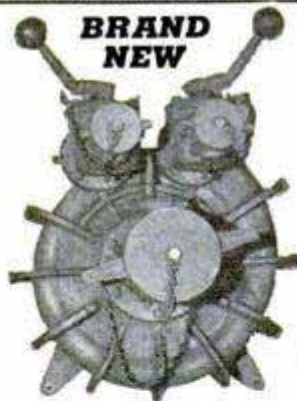
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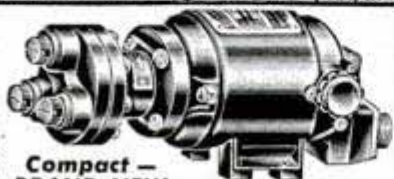
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APPLICATIONS: oil burners, aquariums, fluid metering, fuel pump, tool post grinder, coolant pump, pressure lubricating pump, general industrial, etc.

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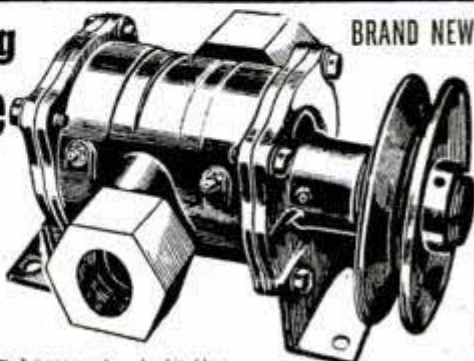


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Positive Pumping Pressure



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- 10 Sanding rolls
- 6 Sanding sleeves

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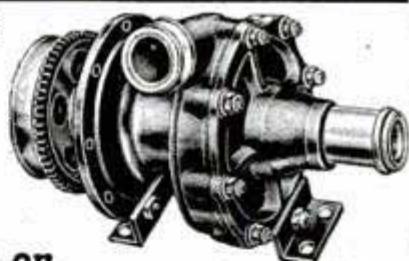
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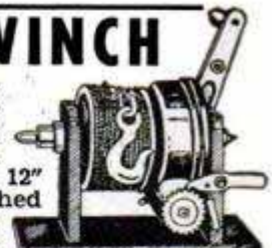
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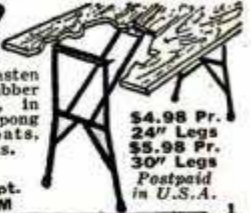
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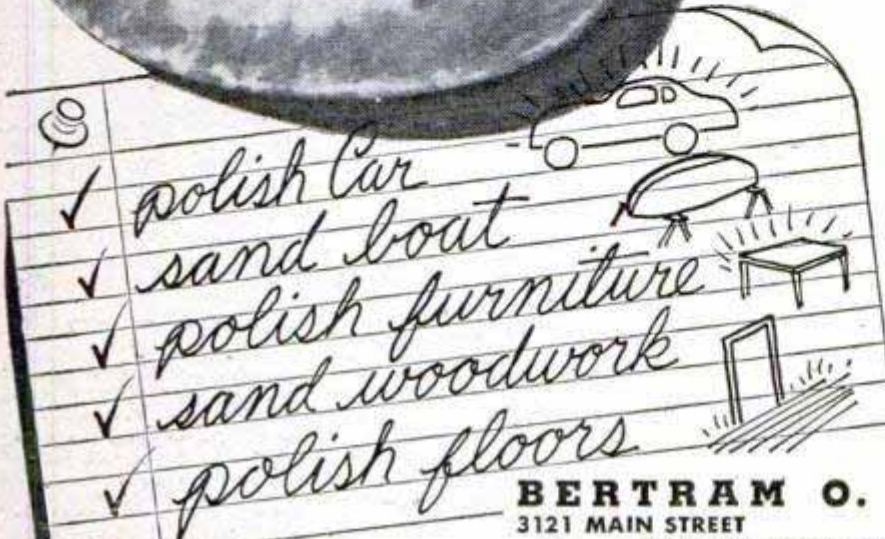


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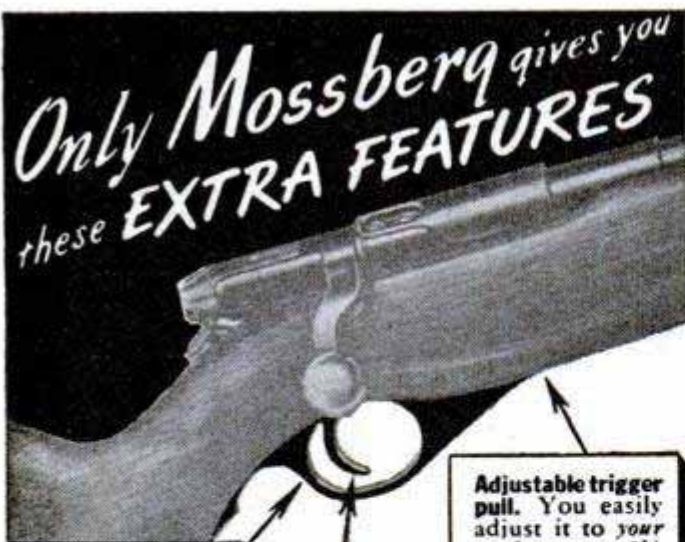
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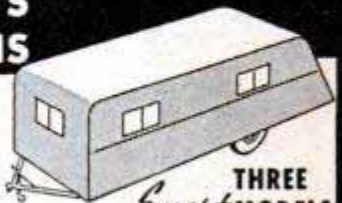
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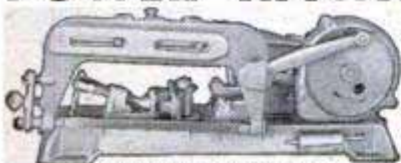
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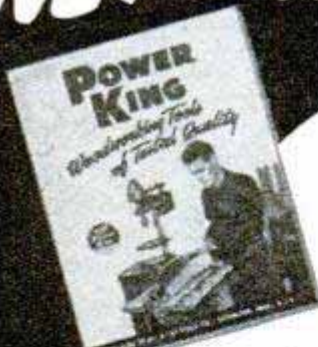
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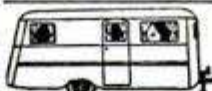
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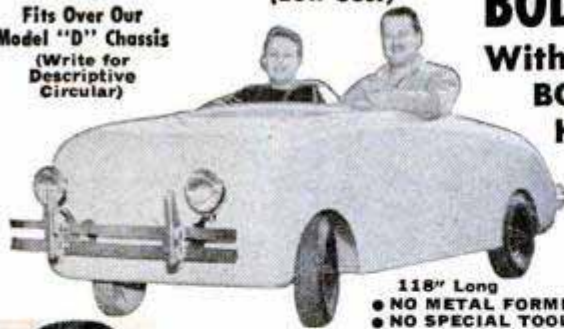
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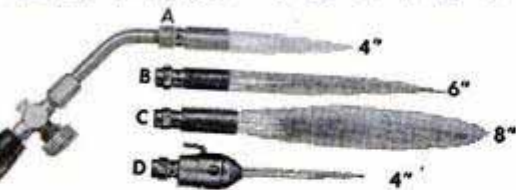
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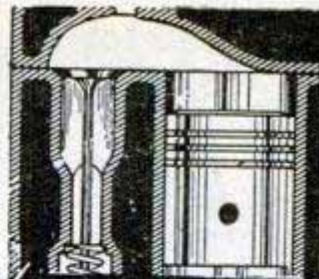
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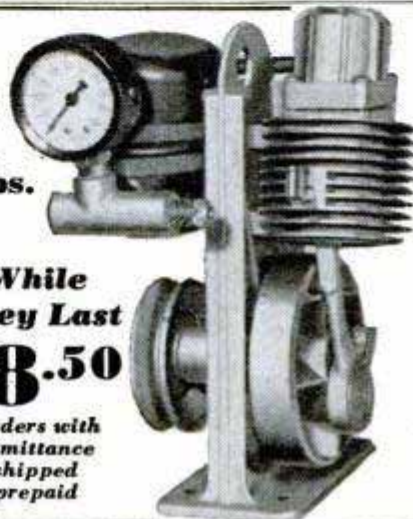
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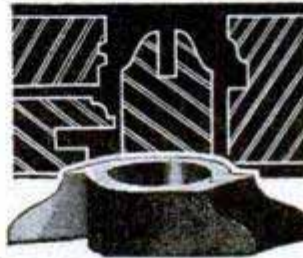
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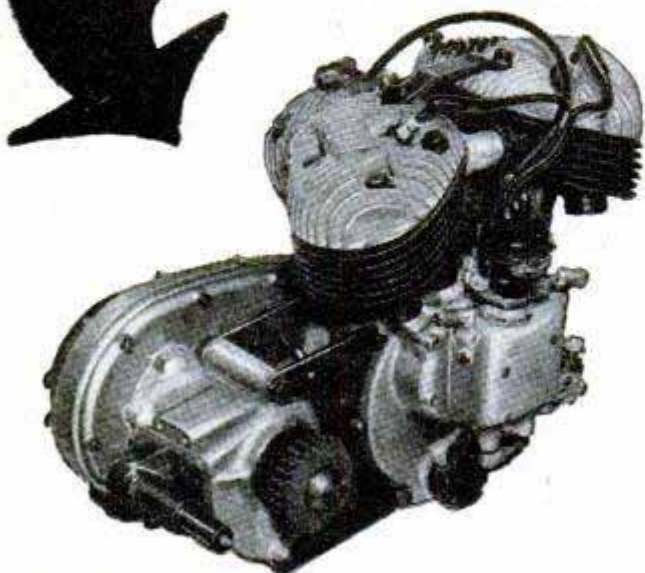
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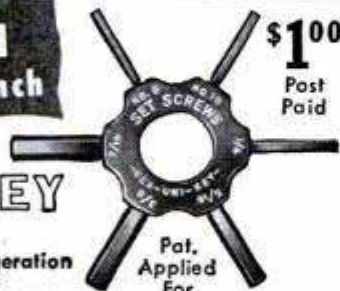
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gauge for tank, air regulator &
gauge, filter, 20 ft. air hose,
check valve & air chuck

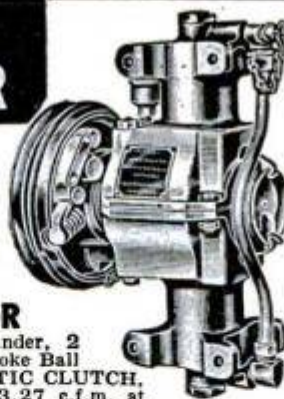
10 items
All For **\$37.50**

IDEAL FOR HOME-FARM-FACTORY
Wherever compressed air is needed

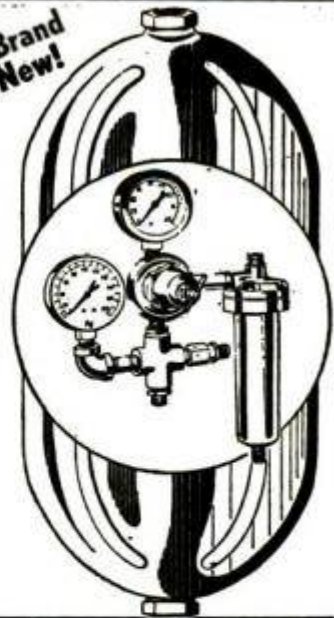
A fortunate purchase from the government enables us to offer you this amazing buy at a small fraction of its original cost. All brand new. You get the WESTINGHOUSE COMPRESSOR and all of the accessories shown for only \$37.50. Shipping wt. 50 lbs. Designed for automotive truck or tractor mounting. Can be run off fan belt or power takeoff, or mounted horizontally. Comes with automatic clutch. Can be installed for use on farm trucks, jeeps, tractors, tire or garage service trucks, contractor or road building machinery, pneumatic devices, etc. Can be operated with 1/2 H.P. or more electric motor or equivalent portable gas engine.

Compressor separately, \$21.50

Equipment Less Compressor \$18.50



Brand New!



THE COMPRESSOR

Piston Type, 2-cylinder, 2 inch bore, 1 1/2" Stroke Ball Bearing, AUTOMATIC CLUTCH, OIL FREE AIR. 3.27 c.f.m. at 600 R.P.M. 6.54 at 1200. Suggested operating pressure 75 P.S.I. DIMENSIONS: 9" wide, 11 7/8" high, 6 5/8" deep. Wt. 23 lbs.

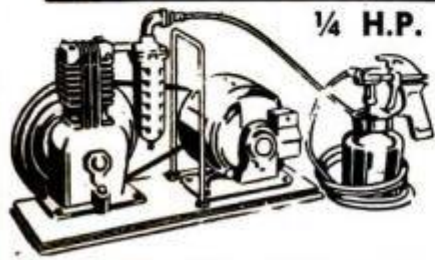
AIR TANK

Stainless steel, size 12" x 24" with 2 quarter inch openings. Suitable for 150 lb. pressure. Equipped with gauge to show tank pressure, air regulator & gauge to regulate pressure, safety valve, oil and water trap.



PORTABLE SPRAY OUTFIT

1/4 H.P. Heavy Duty



Compressor only\$17.50
Compressor and filter ..\$19.50
Spray gun and hose ..\$10.45
Adj. 1/4" pop valve ...\$1.50
2 1/2" air gauge ...\$1.75

Well balanced portable outfit for use where paint job requires large quantity of material. Sprays all types of average viscosity paints, enamels, lacquers, varnishes, etc. Piston type, single cylinder air compressor. 2 in. bore by 1 3/4 in. stroke. Displacement 2.86 c.f.m.; maximum working pressure 40 lbs. Mounted on sturdy wood base with rubber feet. Pulsation chamber equipped with safety valve drain cock. 1/4 H.P. motor, 110-volt AC, cord and plug; 20 ft. air hose and fittings. Spray gun is pressure feed type, internal atomizing, with one qt. metal cup. Fan and round spray nozzle furnished. Shipping wt. 50 lbs.

\$45.00

PNEUMATIC AIR TOOLS

Riveting and chipping hammers for many uses: riveting, chipping, hammering, auto body work, concrete breaking, etc.; used, guaranteed like new.

CHICAGO PNEUMATIC RIVETER & CHIPPING HAMMER

CP4X Pistol grip handle with air control. Takes up to 3/16" rivet. Weight 6 lbs. List price \$73.00.



Special Price **\$12.95** Same as above, brand new **\$19.50** Size CP3 Takes 5/32" Rivet **\$8.95**

Chicago Pneumatic Lever Type AIR DRILL



With 1/4" Jacob Chuck. Wt. 2 lbs. List price \$55.00 Only **\$15.00**



Ingersoll Rand AIR DRILL

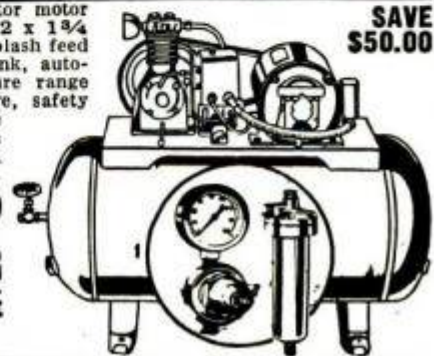
With 1/4" Jacob Chuck. Wt. 2 lbs. List price \$55.00. Only **\$15.00**

AUTOMATIC COMPRESSOR UNIT

1/3 H.P. heavy duty capacitor motor AC 110/220 volt 60 cycle, 2 x 1 3/4 inch piston type compressor, splash feed lubrication, 12 x 24 inch tank, automatic pressure switch, pressure range 100 to 125 lbs., check valve, safety valve, air regulator with gauge and filter, 20 ft. air hose with air chuck for inflating tires. V. belt drive. Shipping wt. 90 lbs.

Special Price **\$79.50**

ONLY
Same unit as above with 1/2 H.P. motor, furnished with 13" x 24" tank. Shipping wt. 125 lbs. PRICE **\$98.50**



SAVE \$50.00

Price f.o.b. Chicago. Immediate delivery. All items sold on money back guarantee. Send check or money order today. Write for free catalog.

A.V.C. 11 INGERSOLL RAND

Push button, takes 5/32" rivet. Wt. 3 lbs. List price \$65.00. Only **\$8.95**

A.V.C. 10 INGERSOLL RAND

Takes 1/4" rivet. Wt. 3 lbs. List price \$80.00. Only **\$8.95**
AVC 13, takes 1/4" rivet. List price \$93.50. Only **\$22.50**

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Dash Pot. Quiet Operating



1/4"\$ 2.75
3/8" 3.25
1/2" 4.50
3/4" 9.50
1" 12.50

AUTOMATIC PRESSURE SWITCH WITH UNLOADER



Double pole, with 2 way release valve. Set at 125 to 150 lbs. pressure. Weight 4 lbs. **\$10.25 ONLY**

WELLWORTH TRADING CO.

Merged with C & M Equipment Co.
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12 ft. Trailer Shell **\$299.00**; 16 ft. \$529.00; 20 ft. \$699.00; 24 ft. \$799.00; 28 ft. \$899.00; 32 ft. \$999.00
All prices F.O.B. Elkhart, Ind.

Easily Erected! This Modern Metal Trailer comes to you knocked down, complete with all parts for quick assembly. Windows, doors, exterior panels, complete chassis and axle assembly with tires, roof caps, bows, corners, roof ends. No expensive tools required — no experience necessary.

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Write for working plans showing detailed construction and location of parts. **\$1** Each size

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Send working plans for 12 ft., 16 ft., 20 ft., 24 ft., 28 ft., 32 ft., Custom Built.

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NEEDS **NO** COMPRESSOR
AIR HOSE
MOTOR
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ONLY
\$18.50

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SATISFACTION GUARANTEED See the amazing Spray-Gat at your dealer. If he cannot supply, order direct. We ship postpaid if you send \$18.50 (check, draft, money order). Or send only \$2.00 now and pay postman balance plus postage. Extra CO2 cartridges, 10 for \$1.00.

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with factory-direct order! **6 for \$3.50** Postpaid



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That's why you get longer flight, more "bite," and truer putting, with American "Flywheel-Action."

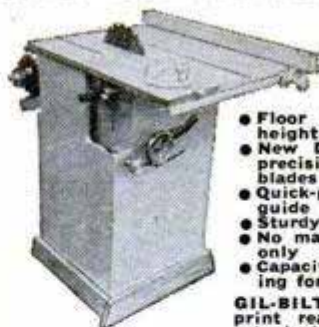
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- 27x28 in. table stays level. Blade tilts full 45 degrees
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AC or DC 110 Volts
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Comes complete with rods, unit directions and eye shield.
On C.O.D. mailing charges extra.

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GENERAL ELECTRIC 15-TUBE TRANSMITTER AND RECEIVER SET

This brand new 15 tube transmitter-receiver was designed for mobile service on 12 volts, and will operate in the "Citizens Band," where no amateur license to transmit is necessary. It's a cinch for any experimenter to connect this unit for 110 VAC operation by following the instructions and diagrams supplied, which cover numerous applications, including television. For those intending to use on car or boat, a new dynamotor, exactly as originally supplied, costs only \$15.00. Don't fail to write for FREE descriptive bulletin. Order our RT-1248 for only \$29.95, or two for \$53.90.

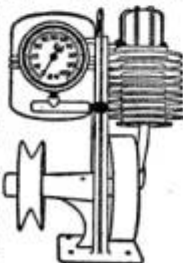
Amazing PORTABLE RADIO

The Year's hottest sensation. Powerful superhet in beautiful maroon crackle finish case with built-in 3 foot gleaming chrome telescopic whip antenna. Exactly like a car radio except works off self-contained standard portable radio batteries, easily obtainable anywhere. Theft-proof mounting bracket attached by anyone to bike or motorcycle in 3 minutes. Readily installed on any vehicle from a wheelbarrow to a witch's broom. Radio removable from mounting bracket instantly by means of special key provided, so that it can be carried anywhere for use as a portable if desired. Weight 5 lbs. Your cost with batteries—\$24.95; without batteries—\$22.50.

COMPRESSED AIR INSTANTLY ANYWHERE

Portable Air Compressor and storage tank. Ruggedly built of best materials using lifetime lubricated ball-bearing on connecting rod and oil impregnated main bearing on shaft. Unusual design forever eliminates valve trouble, the most common fault in air compressors.

PATENTED unique air intake system increases efficiency tremendously over other compressors so that air output is much greater than that from larger compressors powered by heavier motors. Will deliver approximately 3500 cu. inches of air per minute at maintained pressure of 30 lbs., or will inflate a 90 lb. truck tire in less than one minute. Comes complete with 100 lb. gauge, although finger-tip adjustment allows setting of output pressure at any value, which will automatically be maintained. Works from any 1/4 H.P. motor. Useful for spraying paints or lacquers, disinfectants, insecticides, annealing or brazing with natural gas, inflating tires, etc. Price \$14.50 postage prepaid anywhere in the U. S. Efficient, completely adjustable syphon type spray gun complete with 12 ft. of 100 lb. tested hose available for only \$7.75 with pint container, also prepaid. 25% required on all C.O.D. orders.

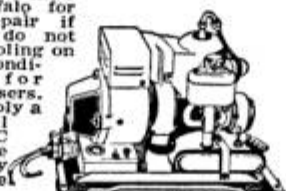


\$6.95 TAKES ALL THREE BIG BARGAINS

- (1) BANDSWITCHING TUNING TURRET** made by Western Electric. Covers 4 bands above 100 MC. ALL coils wound with #14 silver plated wire. Complete with tuning condensers and powerful electric driving motor. Diagram included. ONE OF OUR MOST TERRIFIC VALUES—ONLY \$2.95.
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- (3) AUDIO AMPLIFIER**—Brand new, dual triode amplifier having 2 of the valuable and scarce oncure type audio transformers that sell for over \$10.00 apiece. Neat aluminum case, fully enclosed (largest dimension 6 inches). Perfect for intercom systems, phono amplifiers, mike amplifiers, or signal tracer amplifier for testing radio sets. A sensational bargain at only—\$3.40 each.

Our PE-109 DIRECT CURRENT Power Plant

This power plant consists of a gasoline engine that is coupled to a 2000 watt 32 volt DC generator. This unit is ideal for use in locations that are not serviced by commercial power or to run any of the surplus items that require 24-32v-DC for operation. The price of this power plant tested and in good condition is only \$79.95 F.O.B. Buffalo, or we can supply in strictly "as is" condition for \$58.95 F.O.B. New York City. These latter are exactly as received, in heavy steel-strapped govt cases, and we are unable to determine if the individual units are new, or what the condition is if used, while the \$79.95 are some of the same that we have brought to Buffalo for testing and repair if necessary. We do not recommend gambling on the "as is" condition, except for quantity purchasers. We can also supply a converter that will supply 110v AC from the above unit or from any 32v DC source for \$12.95.



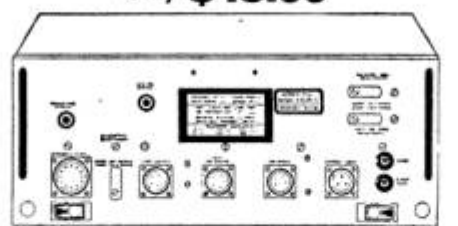
Brand New LS7 PM SPEAKER

in a fully-enclosed, black crackle finished metal cabinet. This speaker and case match communication receivers, and in addition make perfect intercom remote stations. Our price \$4.50. Including output transformer\$4.95



ELECTRONIC ALTIMETER

Only \$45.00



Brand new APN-1 14 tube electronic altimeter in original factory packing. This famous 18x8x7 unit, which weighs only 25 lbs. without plugs or cables, cost the govt \$2000 and includes a transmitter, a receiver, all tubes, an altitude metre, an altitude limit switch, and two easily installed 11" antennas. Working on the radar principle, the receiver measures the absolute altitude from 3 to 4000 feet, with precision enough for blind landings. In addition the altitude limit switch gives an alarm if the plane's height varies by more than 10 feet from a preadjusted value. Fills recent C.A.A. requirements effective Feb. 15, 1949, that all scheduled airlines must have terrain clearance indicators capable of giving warnings at 500, 1000 and 2000 ft. Another outstanding feature is that connections are provided to control an electronic automatic pilot. Send for our aircraft radio equipment catalog. Export inquiries invited. Model for 12 to 14 volts D. C.\$75.00 Model for 24 to 28 volts D. C.\$45.00

AUTO RADIO DEALERS! ATTENTION!

Nationally advertised brand of 1949 car radio which will fit practically any car and every pocketbook. Six tube superheterodyne with three gang condenser and 5 1/2" speaker. \$32.20 for sample, or Dealer price \$29.97 each, in lots of two or more.



"SO" RADAR RECEIVER complete with including picture tube. This Plan-Position-Indicator Oscilloscope has a self-contained pack designed to run from the 110V. power supply on LST or PT boats. It provides a 5" diameter picture adjustable at will to an 80, 40, 4 or 2 mile circle with the boat at the center, showing location of land, other ships or any obstruction, so that navigation can be carried out in pitch darkness or pea-soup fog with as much safety as in brightest sunlight. Also a natural for adaptation as a television set. Your cost \$39.95.

SUPER SPECIAL

FAIRCHILD bombsight POWER UNITS. Our quantity of these is too limited to justify the space required by a photo, but each unit is brand new, contains 9 tubes which alone have a total value of \$15.00; 8 electric motors or generators, 6 of which are of the permanent magnet field type; relays; and 20 valuable precision resistors plus a multitude of the ordinary kind, in addition to many condensers and potentiometers. All for only \$14.95. We will ship but one to a customer while our small quantity lasts.

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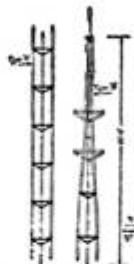
RECORD PLAYER BARGAIN



All you need for a record playing attachment for your radio except the cabinet. Special offer on phonograph arm and 115 V., 60 cycle motor, both top quality.....\$7.95

THE BUFRAD SECTIONAL TOWER

This latest addition to the famous line of BUFRAD antenna products makes up to a hundred foot tower from any desired number of ten foot sections of extremely strong welded construction. The sections are shipped assembled and painted, so that erection is a matter of minutes rather than hours. Assembly is a one man job, and is accomplished by climbing up the completed portion of the tower with the next 25 lb. section to be installed. Hand and footholds are provided to make the work safe and easy. Cap at top of tower provides bearing surface for rotating, and prevents water from entering tubes. Useful for police or amateur transmitters, and in addition the tower will provide satisfactory TV reception where otherwise it would be impossible. Ideal for supporting permanent or temporary power lines, wind generators, stadium public address speakers or spotlights for gas stations or parking lots. "B" and "C" sections together cost a total of \$15.75 and total 20 feet. "A" sections, which make up the entire tower except for the top, are each 10 feet long and cost but \$12.75 apiece. Those who wish a mast base will be able to obtain one (not shown above), for only \$6.00. The base is especially useful when erecting the tower on a sloping roof.



All sales final and no returns unless otherwise specified in ad of item. Right reserved to change prices and specifications at any time. Cable address BUFRAD.

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6" chrome vanadium blade, handle, leather grip. In leather sheath.
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Used water repellent cover \$1.95 extra. Sold only with Sleeping Bag.

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Water repellent Poplin cover . . . Heavy duty 3/4 length zipper . . . Weighs only 6 1/2 lb. . . . Prepare for that vacation NOW . . . We made a TERRIFIC BUY . . . Yours while they last for ONLY **\$13.95**

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The All Purpose Lamp. Wonderful for Indoor Photography, Floodlights, Baby Spot or Large Spot, Personal Bed Reading, Workbench, Garage, etc. Lamp Alone **99c**
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With 57 mm yellow amber lenses. These lenses are 6 base especially PRECISION GRIND. and Polished to reduce Glare of headlights from on-coming cars, also to focus objects sharply and more clearly during night driving. Absolutely one of the greatest boons for Safe Night Driving, or during stormy, murky weather. Highway Patrolmen, Truck Drivers wear by them. A must for your Vacation or Nite Driving.

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In Men's size or Ladies Harlequin style. ND-1 **\$16 VALUE \$5.89**

SAME GLASSES but clip-ons. Fit-over style without temple bars **\$4.59**

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Aviators (AN-6530) Windproof & Dustproof
Sponge and leather protected frame with ground lens in clear, amber and green. Clear set in replaceable metal frame with blinged nose bar. Ideal for Motorcycling, etc. **\$1.69** ea.

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ARMY AIR FORCE 4 base. Precision Polished and Ground. Glare-Free lens with leather case that can be attached to belt. Gold plated adjustable frame. Pearlid sweat bar and pads. **\$3.95**
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Kit #1 contains 2 lbs. plexiglass & Lucite sheet in various shapes, 1 ea. bottle of clear cement, 1 ea. bottle color set cement and 4 bottles of colors in Orange, Red, Yellow, Peach, etc. Also a Plastic Handbook of uses and instructions. This set really worth \$5.50. Our Price **\$2.19**

Kit #2 contains 1 1/2 lbs. of plastic sheet, a 1 ea. bottle of clear cement, and the Plastic Handbook. A \$2.50 Value for ONLY **99c**

Plexiglass & Nascolite clear plastic shts. at Tremendous Savings to You!

NASCOLITE—Full sheets opp 1/4 x 37 1/2" **\$12.50**
48 1/2" opp. 10 1/2 lbs. Per Sheet

PLEXIGLASS—Full Sheet
5/16" x 36" x 24" . . . Per Sheet . . . **\$13.00**
5/16" x 36" x 48" . . . Per Sheet . . . **\$25.00**

Fabricators write in for our special quantity prices. All above are new & marked. Also inquire about our other large stocks of Plastics.

For Ocean and Stream NYLON FISHING LINE
Strong, Durable, Waterproof, Especially treated. A wide assortment for any purpose. **OR 20044K**

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|--|---------------|
| a. 10 LB. TEST, 2500 FT. BLACK | \$1.75 |
| b. 25 LB. TEST, 1500 FT. BLACK or BROWN | \$1.95 |
| c. 50 LB. TEST, 400 FT. WHITE | \$1.15 |
| d. 75 LB. TEST, BRAIDED BLACK and GREY 200 Ft. | \$3.50 |
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New SUN VISOR
Adjustable arm, Swivel lead. Can be swung in any direction. Made of clear glass plastic. Mid. for Air Corp by Faben Co. A very useful accessory for your Car, Truck, Tractor or Boat. **\$1.29**

NAVY PORTABLE SALTWATER STILL
Adaptable to Lab, distillation of Alcohol, liquids, and chemicals. Can also be used as Open Pot Cooker, Grill, Trailer, Tent, Camp Heater, or Stove. Equipped with Still Boiler, Stainless Steel Pot enclosed in copper elements for instant and constant heat. Burns canned heat or Gasoline. Simple to operate. Safe, asbestos lined & sealed thru-out. Complete with instructions & 15 accessories for distilling liquids. Also flint igniter, grill, enough canned heat for at least 45 hours. ceramic immersion block for use with Gasoline. A must for your Boat, Laboratory or outing. **\$14.95** 1 QT. **\$12.95** 3 QT.

AIRCRAFT PILOT SEAT
The AAF's most adaptable seat! Has 1/2" adjustments in 5 positions! Goes UP & DOWN, slides FORWARD & REVERSE on tracks, TILTS 90 to 180°. Swings away. CUSHIONED ARM RESTS. Equipped with safety belts . . . Easily mounted . . . Aluminum construction with Chrome-Moly tube frame. Ideal for Deep Sea Fishing, Power Boats, Tractors, Trucks, Planes, Shops, etc. **\$7.49**

CUSHIONS Mid. for Aircraft seat, but can be used in trucks, autos, boats, tractors. Made to Gov't. Spec. of finest imitation leather, yellow pigskin col. filled with kapok. Will float. Same as shown in LIFE magazine saving a man from drowning.
New Back Rest, 22" x 16" x 1 1/2" thick **\$2.95**
Used Back Rest, 22" x 16" x 1 1/2" thick **\$1.95**
SEAT, New, 17" x 16" x 3" thick **\$3.49**
SEAT, Used, 17" x 16" x 3" thick **\$2.29**

NEW TARPS - HEAVY CANVAS
Mildew & Flame 9' x 16' **\$11.95** ea.
Resistant, Cheap Outside Storage. They are Really Moving at These Prices!
5' x 7' **\$3.95**
16' x 22' **\$29.95**
8 1/2' x 10' **\$8.50**
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Rubberized Linen 7' x 11' NEW **\$5.95**
Only 3 lb. light weight yet waterproof Ideal for outside car storage.

DEAD LINE FLASH! Just Purchased \$800,000 Inventory of New Cutting Tools, Taps, Drills, Milling Cutters, Metal Saws, TREMENDOUS SAVINGS! WRITE FOR LIST

Sperry Aircraft Directional GYRO COMPASS
Precision made for Positive direction. 360° swing calibrated in 1/30 degree (six min.) luminous dial. Built-in bank indicator and instrument light. Case is 4 1/2" square with 3" dia. face. Operates on vacuum. Ideal for autos, light planes and boats. Can be used in autos and boats by attaching one tube to intake manifold. Complete with caging and reset knob. Re-issuance—good condition. **\$4.49**

New Navigators Magnetic Compass
Type D-12 size 7" dia x 4 1/4 deep Rubber lined - rotating vane range rings calibrated in 1 degree from 0-360° with 2 parallel grid wires for alignment with N.S. line. Boat. **\$14.95**

COMPASSES #151 Marching. lensile, with luminous dial **\$1.59**
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NEW 1 Jeweled Watch Pocket Compass #153 **\$1.59**

WRIST WATCHES Genuine Swiss Cluser - P-10. Radium Dial, Sweep Second Hand, Swiss Movement Guaranteed for 1 Year. A Terrific Value **\$5.95**
P-15 - 15 Jewel, Waterproof Case, Sweep Second Hand, Radium Dial, Either white or blk. face, Gem. 1 yr. Sold in Army PX for \$29.95. All New. Our Price **\$16.95**

THAT FAMOUS "GIBSON GIRL" RADIO TRANSMITTING SET #SCR578 A or B
This simple rugged emergency Transmitting System provides automatic code transmission. Anybody can send distress signals which will permit rescuers to obtain bearings. Can also be used as a hand-powered signal light with manual keying to transmit instructions or as a constant signal light. All electrical power for operating either the Radio Transmitter or signal light is furnished by Hand-powered Generator in transmitter case. Complete with maintenance and instruction hand book, balloons, kite, signal lamp, spare wire, hydrogen generator, inflating tubing, packing case, bags, accessory containers, etc. **\$17.99**
A real emergency friend to small boats, fishing boats, yacht owners, or adventurers. Complete set, \$100.00 VALUE.

HS 38 NEW LOW IMPEDENCE RADIO HEADSET
The latest and most improved style, currently in use in aircraft. New. Packed in original boxes. Rubber hand band, sponge rubber ear pads, includes CORD and JACK **\$3.25**
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Just the thing for tuning beam antenna. Powered by 1 1/2 k. p. 24v. C. E. Motor. Removable 5" Reel-Limit Switch - Cam Worn gears, Bevel gear, Solenoid clutch. Motor engaged to gear reduction only when electrical contact made. Operates in either direction. Ideal for auxiliary power take-off opening and closing doors, etc. **\$4.29**

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3/16" dia. 3 strand, cotton .01 ft. **\$1.95**
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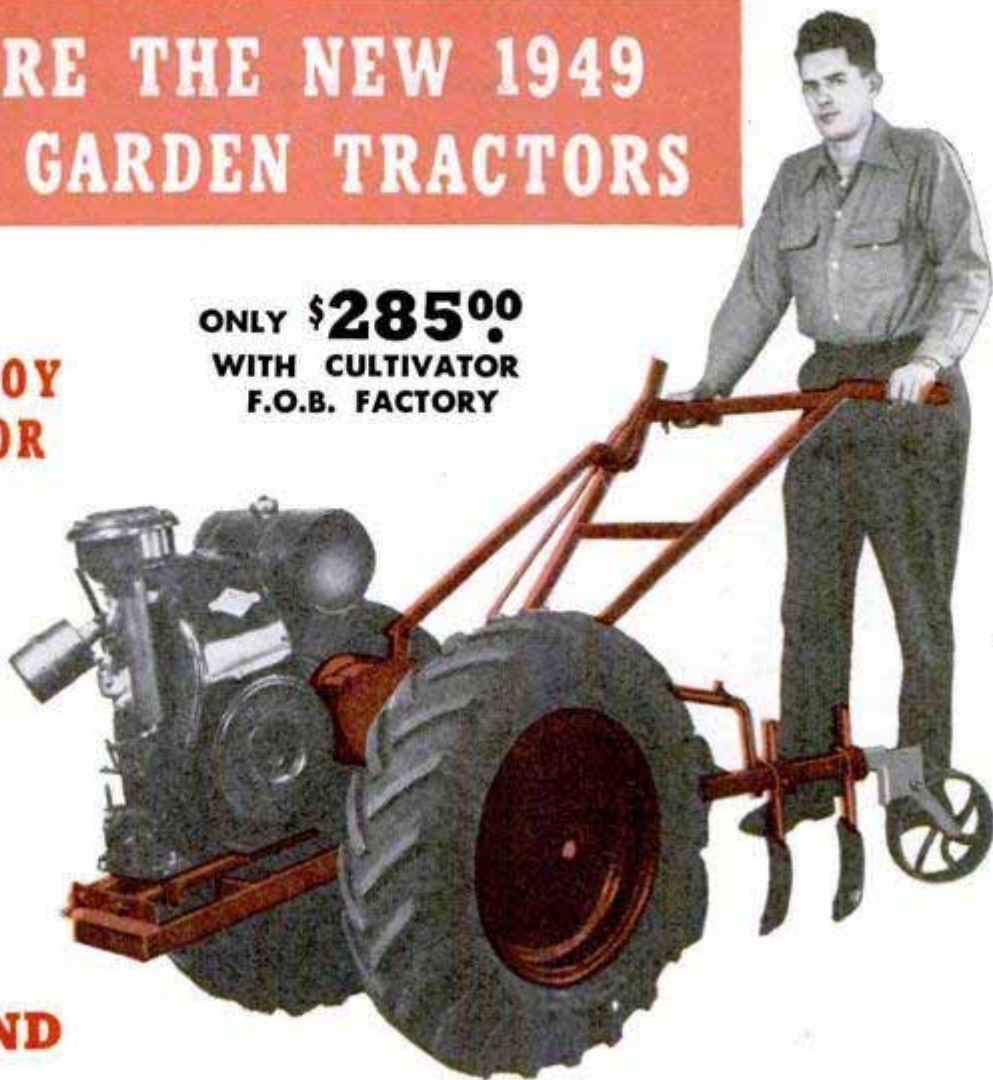
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