

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG. U. S. PAT. OFF.



Dr. Vannevar Bush  
top American scientist  
and photo-typesetting machine  
he helped develop

**INVENTING . . .**

*Hobby of Famous People*



Twain



Thurston



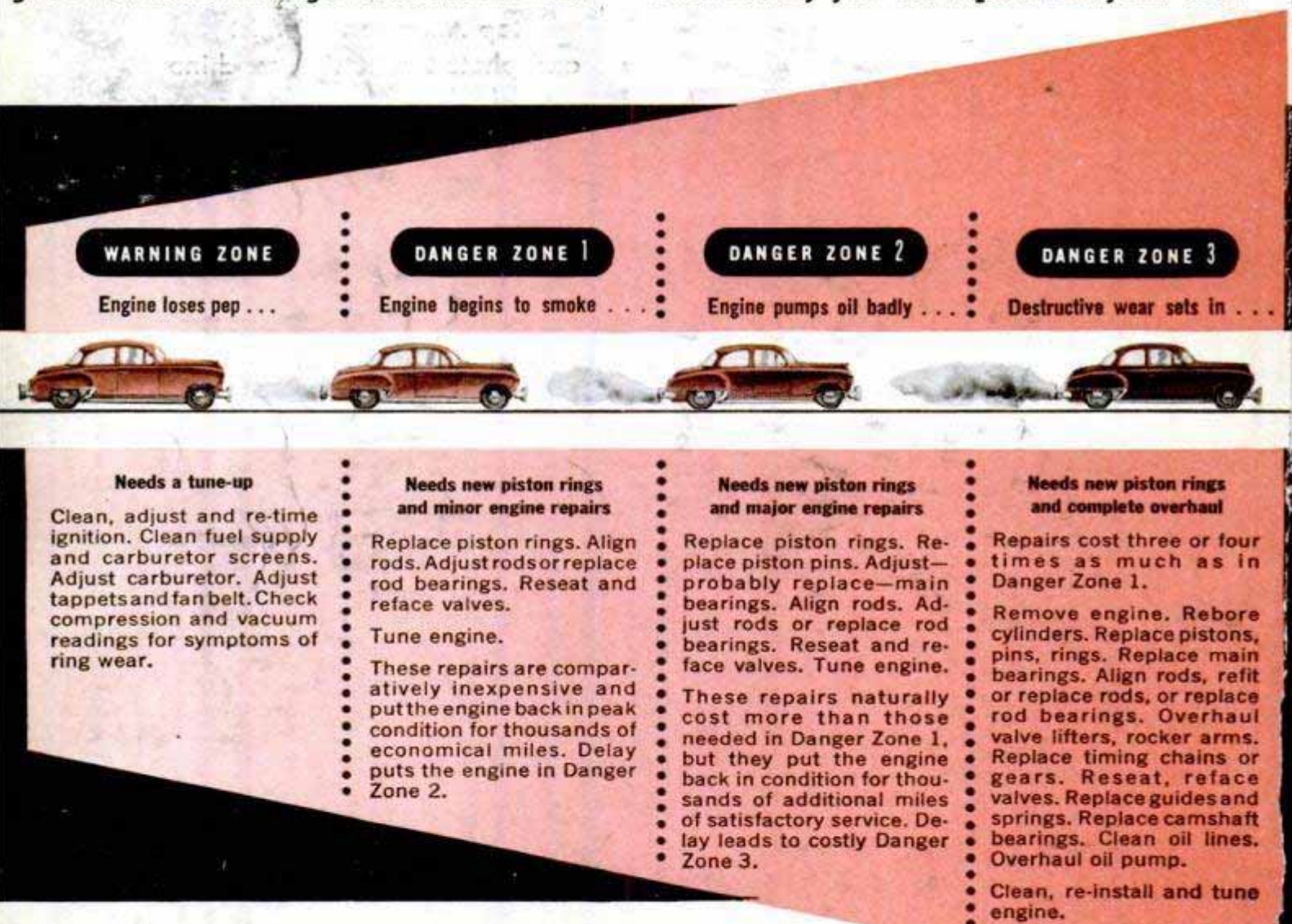
# Where are YOU in the Danger Zone

## The More You Delay—The More You Pay

There's always danger ahead when piston rings wear out—danger of much greater expense unless new rings are installed promptly.

But if you *do* install new rings at the first symptom of wear, you can protect your engine and insure its long and economical life.

Check your own situation on the Danger Zone chart, with the help of your service man. This simple precaution may save you both money and headaches. For the more you delay the more you pay. And when you need new piston rings, get Hastings, the rings designed for replacement service. It's the best money you can spend on your car.



# HASTINGS

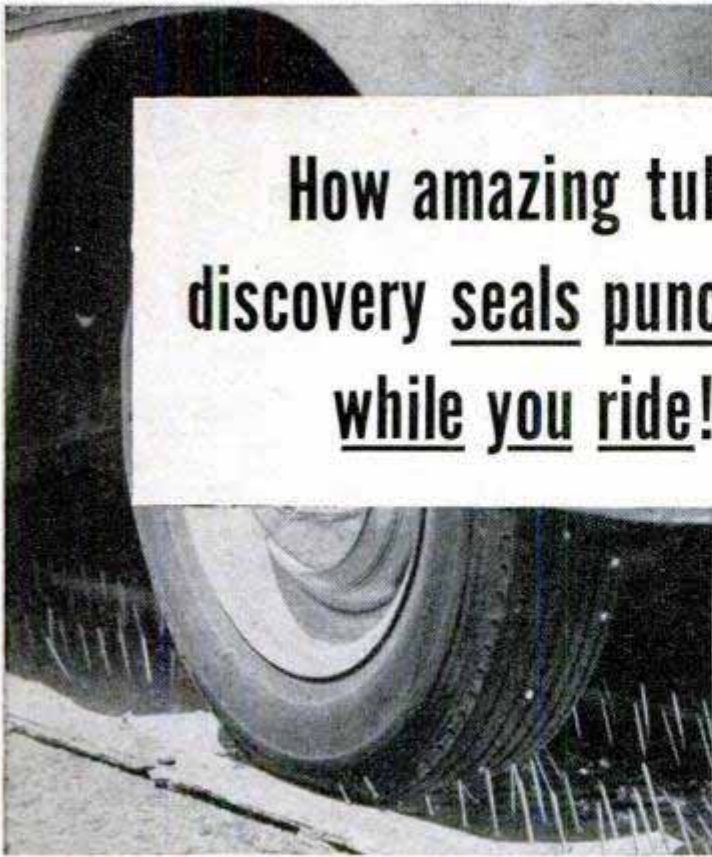
MANUFACTURING COMPANY  
HASTINGS, MICHIGAN  
HASTINGS LTD., TORONTO

## STEEL-VENT PISTON RINGS

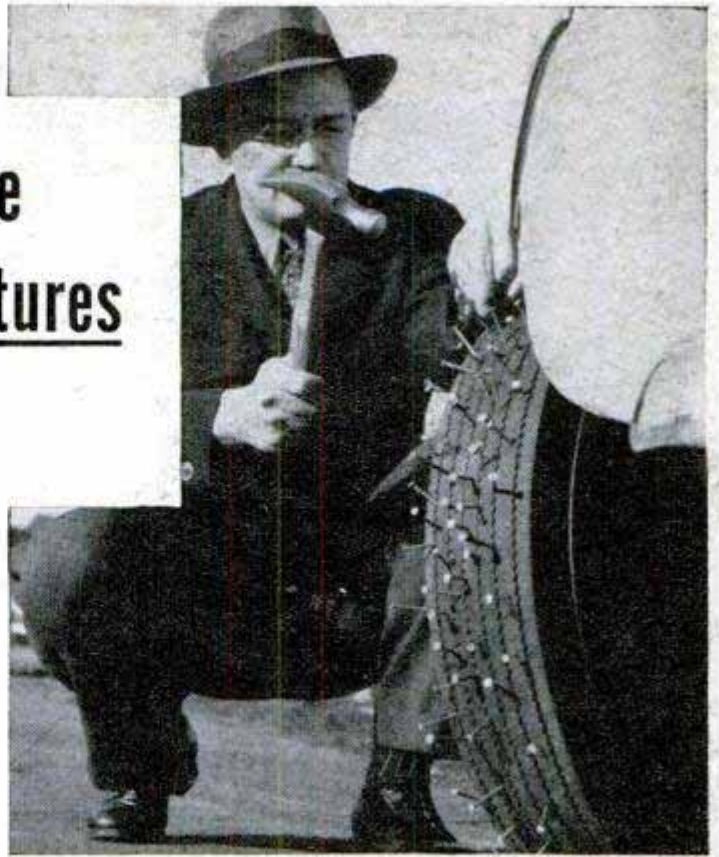


TOUGH on Oil-Pumping • GENTLE on Cylinder Walls

How amazing tube  
discovery seals punctures  
while you ride!



1. Sharp nails—*hundreds of them*—pierce deeply into this tire in grueling "Torture Test". What happens? Nothing! The tire does *not* go flat . . . the car keeps right on rolling!



2. For good measure, *more* nails are pounded into the tire and through the tube. *Still no flat!* The secret lies in the amazing Sealed-Air Tube with patented Bulkheads perfected by Seiberling.



3. Here's how you "fix" a puncture when you have Seiberling Sealed-Air Tubes with patented Bulkheads. Just pull out the nail or other sharp object, and the tube seals itself *permanently!* No further repairs necessary!

How can this tube  
outlast four tires  
WITHOUT GOING FLAT?

How can this amazing Seiberling Sealed-Air Tube—the tube *no one* can imitate—actually outlast four tires, run as high as 300,000 miles—without even *one* flat? How can it save you many times its purchase price by eliminating the expense of tube repair bills and ruined tubes and tires? How can it make your driving immeasurably safer by protecting you from the dangers of sudden flats and blow-outs, and from the hazards of roadside tire changes? If you drive a car or truck, it will pay you many times over to fill in and mail the coupon below for the amazing story of what the Seiberling Sealed-Air tube can do for you.

**SEIBERLING**  
*Sealed-Air* TUBES  
WITH PATENTED BULKHEADS

**FREE!** Send coupon before you have another flat!

Learn more about the *only* tube built around the amazing Bulkheading principle. We'll send you, without obligation, our new book "10,189 PUNCTURES—AND NOT ONE FLAT!" Seiberling Rubber Company, Dept. PM-3, Akron 9, Ohio.

Name.....  
Address.....  
City.....State.....

This One



NEW FACTS FROM DU PONT HELP YOU

# SAVE MONEY ON ANTI-FREEZE

Instead of using expensive anti-freeze, most motorists can get complete winter protection from \$1.25-a-gallon "ZERONE"

This may surprise you—but here's what exhaustive winter road and laboratory tests made by Du Pont now prove about anti-freeze performance.

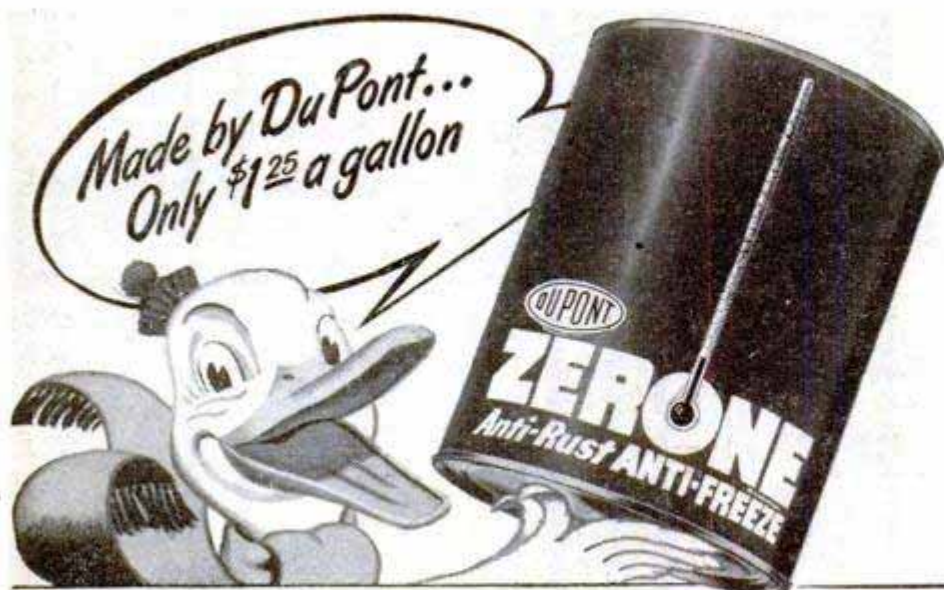
Du Pont "Zerone"\*—at only \$1.25 per gallon—will provide efficient, proper protection against cold weather, rust and corrosion for four out of five cars on the road today. These are the cars with low-opening thermostats, operating at normal altitudes, and requiring protection no lower than  $-30^{\circ}$  F.

If you've been overspending on anti-freeze in the past, you can save money with Du Pont "Zerone."

- With "Zerone," there is no evaporation problem—it needs only an occasional check-up.
- You buy less—3 quarts of "Zerone" do the work of 4 quarts of most other kinds of anti-freeze.
- "Zerone" has a chemical rust-inhibitor that helps keep a clean cooling system clean and won't attack rubber. Because it stays in solution, it can't clog the cooling system.

This winter, save good money on anti-freeze. Ask your service station attendant if you, too, can use inexpensive Du Pont "Zerone" in your cooling system.

\*REG. U. S. PAT. OFF.



The dealer who displays this emblem offers you a special winter service. Make an early date with him for anti-freeze and for a thorough cooling system check-up—before the anti-freeze rush jams his driveway.



BETTER THINGS FOR BETTER LIVING  
... THROUGH CHEMISTRY

More motorists use Du Pont "ZERONE" anti-freeze than any other brand

# Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

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

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**this month's cover**

**DR. VANNEVAR BUSH**, distinguished director of the Carnegie Institution, is presented with considerable pride in our cover painting by Robert Korta. Doctor Bush, who ran the Office of Scientific Research and Development during the war, is shown with the new "typesetting" machine which he developed with associates at Carnegie and two French engineers who, he discovered, were working on the same idea. The machine makes a photographic record of letters on positive or negative film and this film is used to make engraving plates for printing — eliminating the need for typesetting machines which cast each line in metal. Aubrey D. McFadyen of the United States Patent Office tells more about the machine and the inventions of other famous persons in his entertaining and authoritative article beginning on page 106

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**For the Craftsman**

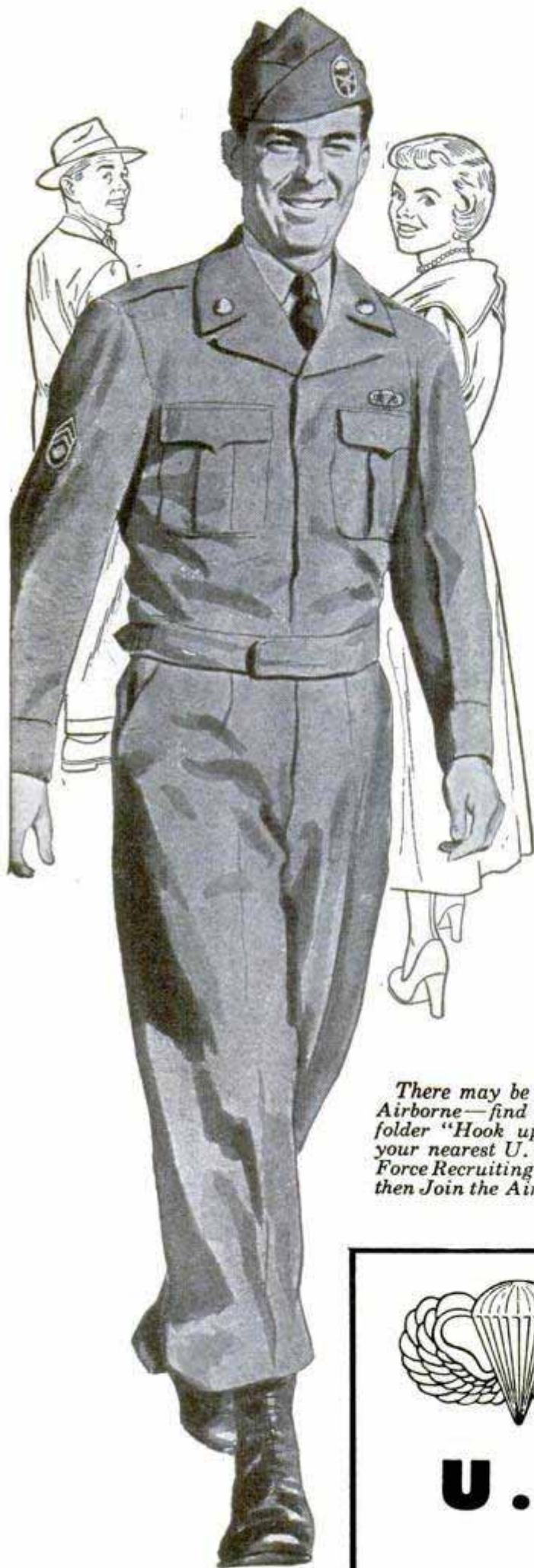
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Other items, and manufacturers of available products described, are listed on pages 10, 14 and 16

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EVENING**

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makes anyone a  
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### Create your own individual floor designs with MA-TI-CO's richer, clearer colors

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- Pyroil cleans your motor and keeps it clean
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## in this corner..... **THE EDITORS**



### Letter to the Editor

Dear Sir:

As a reader of P.M. since I was knee-high-to-a-grasshopper (I'm 50 now and residing in this far-away land of the kiwi), I find your publication so full of informative matter that I often take a half day off to thoroughly digest the contents. Long live *Popular Mechanics*.

Your records show my name as a subscriber. But I have been taken off the list because the agent can get a license to import only so many, and the older subscribers have preference. However, I still get my copy but have to pay over six shillings a copy. In the old days . . . N. Z. currency was on a par with the American dollar; six shillings now would be about one dollar and fifty cents. But who cares so long as we get a copy monthly?

In a recent issue you showed a midget car called the "IMP" . . . may I have the name of the manufacturer? I am associated with an automotive engineering firm making farm tractors and am interested to know if we might obtain the manufacturing rights here under license. . . . Best wishes to *Popular Mechanics* and its staff of excellent editors.

Cordially yours,  
Hal Richardson,  
Wellington, New Zealand.

\* \* \*

### Letter to the Editor

Dear Sir:

On behalf of the Three-Quarter Midget Racing Association, Inc., I would like to thank you and your staff for the fine article on our cars in your June issue. We have received over 3000 letters in regard to them and the Post Office is very unhappy about the way they are coming in. Most of the letters are addressed either to the TQMRA or Mr. Cecil Buck, Sheriff, Norwalk, Calif. . . . He has received over 500 letters himself.

We will call our first TQMRA promoted track "Pop Corn Bowl."

Sincerely,  
Jerry Wright, President  
TQMRA

\* \* \*

☐ Carried 100 miles high by V-2 rocket, a photographic plate "snapped" an action shot of a cosmic ray smashing an atom.

(Continued to page 8)



# Why be a BOOKKEEPER?

... When Accountancy  
offers more Money  
and Success...

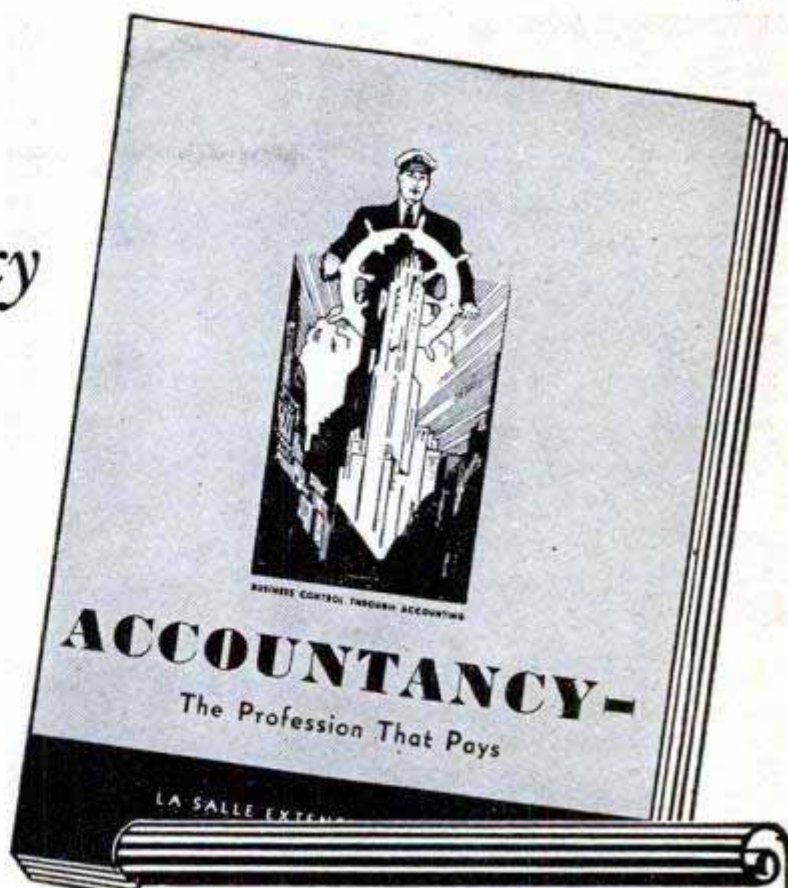
If you are a bookkeeper, you are right on the threshold of a profession that pays far above average—where there's real opportunity to get ahead and move up fast.

Why not step UP from bookkeeping—be an accountant—make *real* money!

You can learn Accountancy by the interesting LaSalle Problem Method—in your convenient spare time, at home, without losing a day from your work. You learn by *doing* . . . you study Accounting principles and solve Accounting problems under the clear guidance of experienced C.P.A.'s. You cover Accountancy from the basic principles right up through Accounting Systems and Income Tax Procedure—to advanced training for the C.P.A. degree if you so desire. And as you go along step-by-step, you master the principles of auditing, business law, statistical control, cost accounting, organization, management, finance, etc.

You go as fast or as slowly as you choose. And you may start "cashing in" on your new ability long before you complete the training—as thousands of others have proved. Many advance quickly to better positions, even before they are half way through. And that is only the *beginning* of a growing and continuing success for the rest of your business life.

Why remain "just a bookkeeper" when Accountancy holds so much for you? Our free 48-page booklet, "ACCOUNTANCY, THE PROFESSION THAT PAYS," tells you what you must know to be an Accountant, and how you can prepare in your



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# ESSENTIAL

## in peace or war

### A MESSAGE TO YOUNG MEN... AND PARENTS

We have an urgent demand for Embry-Riddle graduates. Aircraft manufacturers and operators need thousands of properly trained young men for essential positions in civilian aviation.

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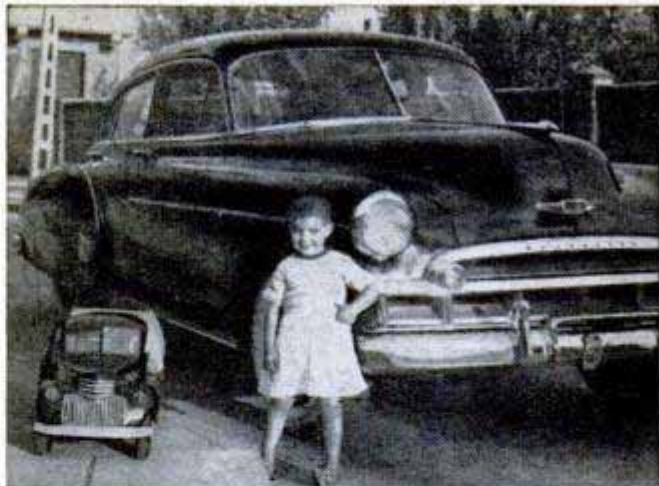
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- Engineering
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- Flying Mechanic
- Drafting & Design

Check One  Veteran  Non-Veteran

**TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD**

(Continued from page 6)



Above, realistic in all details, the tiny Chevrolet truck was built by a hobbyist in Chile. Below, the steering and driving motors are controlled remotely



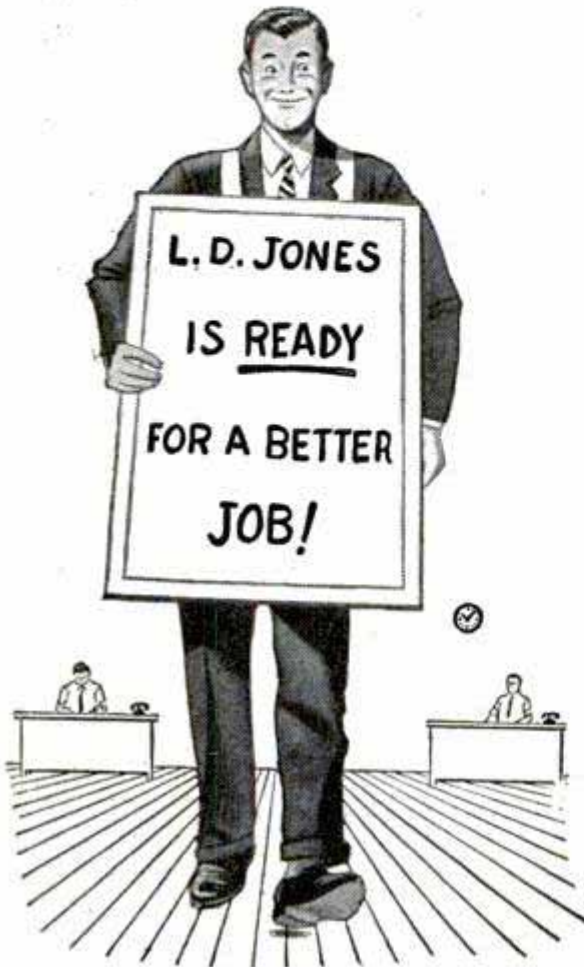
### Chilean Hobbyist

National boundaries mean nothing in the hobby world, as a letter from Señor Jorge Petit of Santiago, Chile, proves. Señor Petit built a remote-controlled truck, a scale model of a popular General Motors product. Simply by pressing a button, he can make it go forward, backward or turn in either direction. It is battery-operated and even has sealed-beam headlights and a horn. On the wheels, he used the small tires that a U. S. manufacturer puts around his souvenir ash trays. Incidentally, Petit saved himself some money by reading *Popular Mechanics* advertisements. First, he bought a six-volt motor for the truck in Chile. It cost him \$21. Then he decided the truck needed a second motor and, seeing one advertised in our magazine, he sent for it. It turned out to be a duplicate of the one bought in Chile—exactly the same except for price. The second one cost him only \$5.95—so he came out \$15 ahead on the deal.

\* \* \*

TV's Little Brother makes his debut in the November issue. Don't miss it!

# HOW TO IMPRESS THE BOSS



Suppose you do prepare for advancement in your spare time. Can you be sure news of it will reach the right ears? Will your boss be impressed?

I.C.S. regularly reports the progress of its students to their employers, regularly receives letters expressing appreciation of this service.

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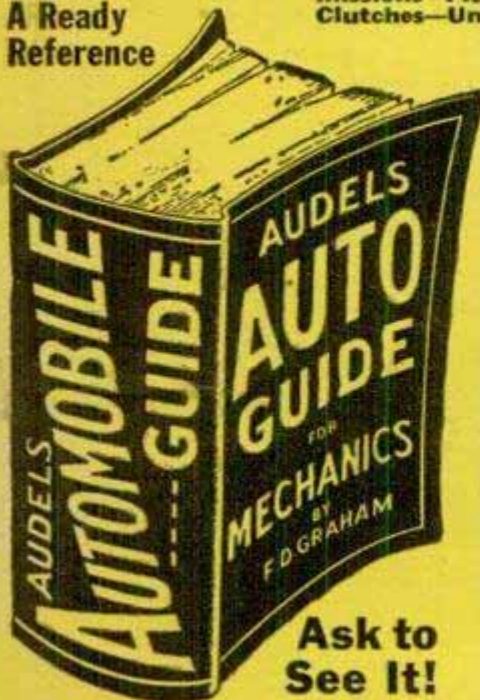
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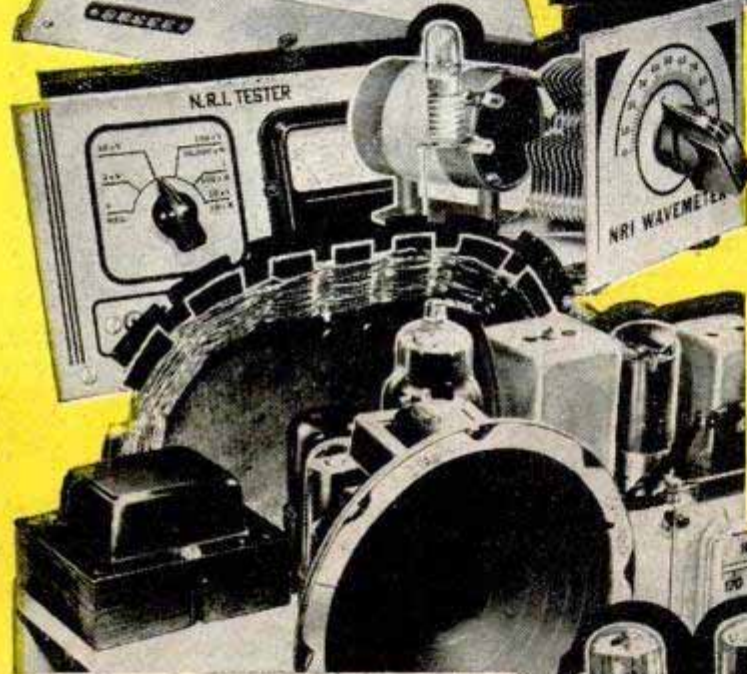
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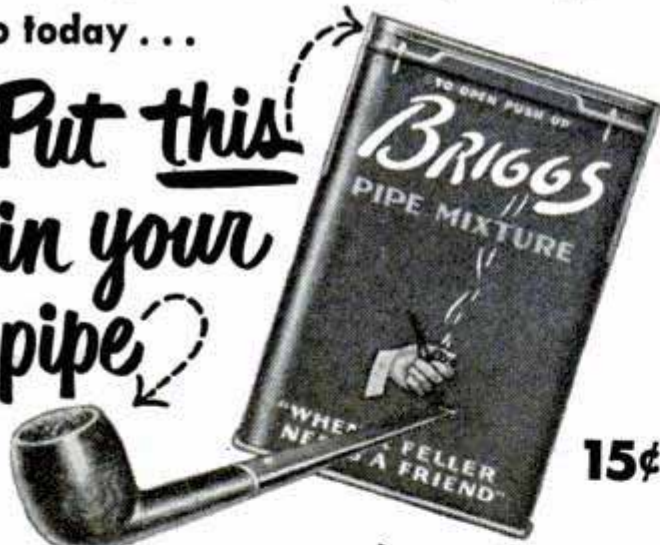
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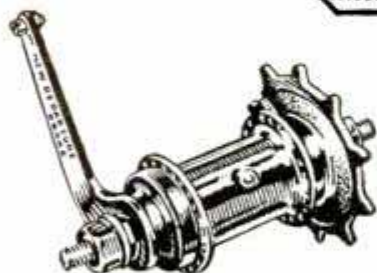
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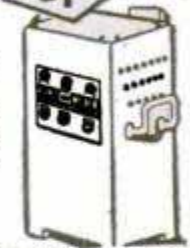
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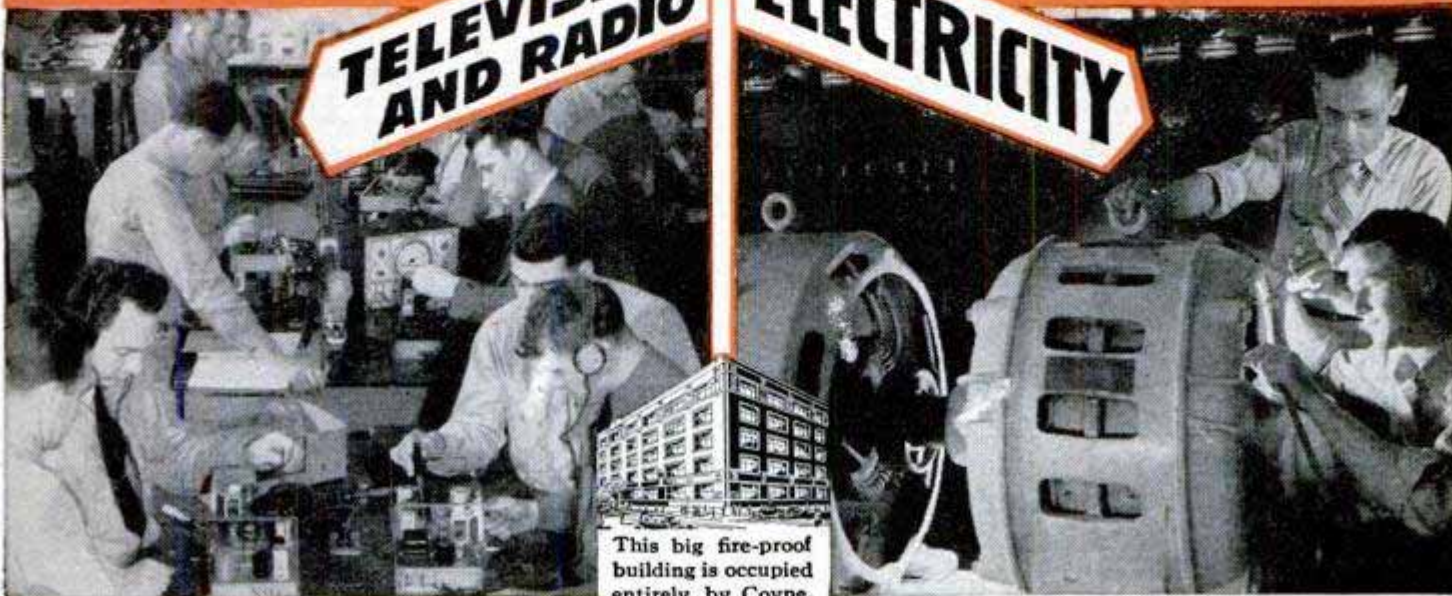
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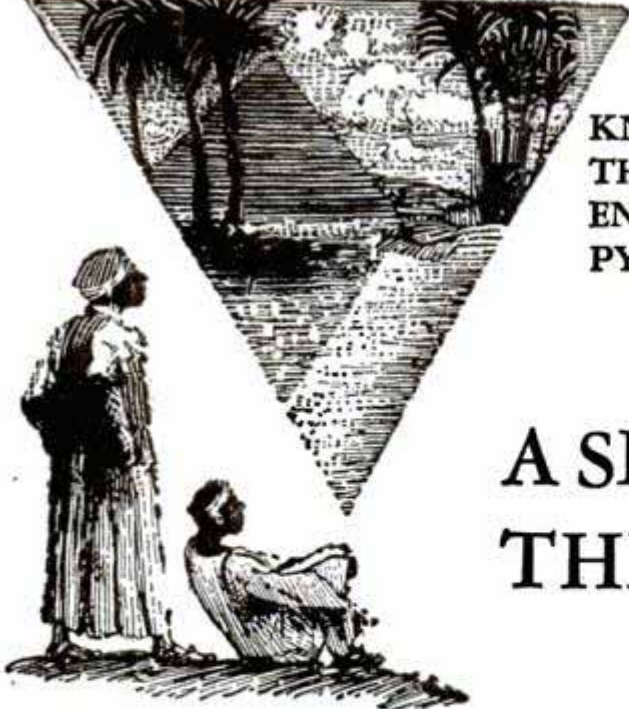
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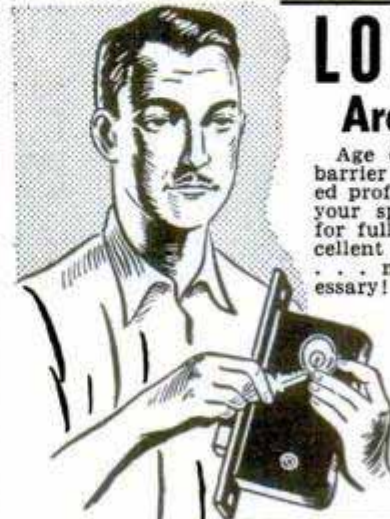
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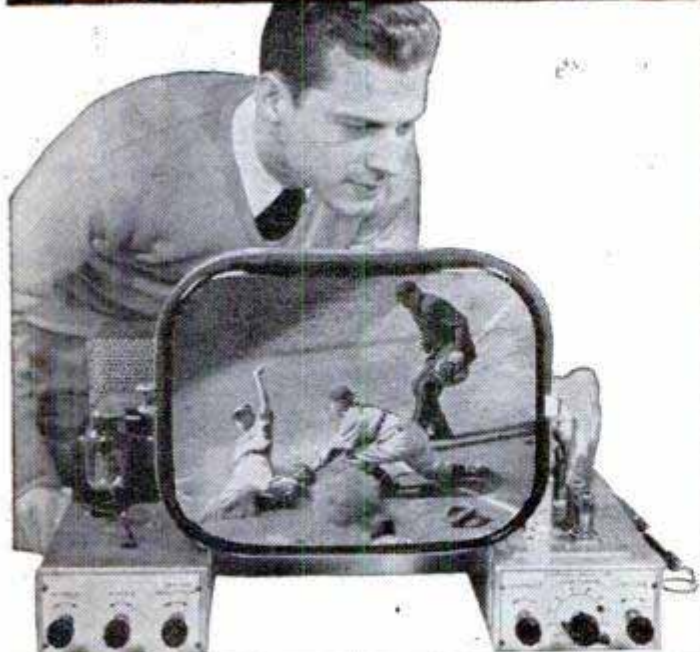


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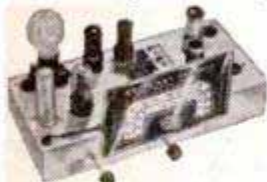
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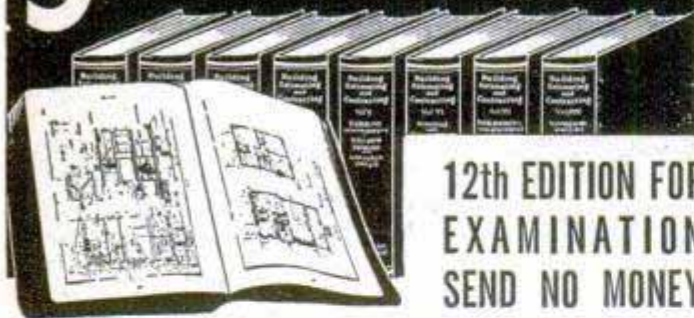
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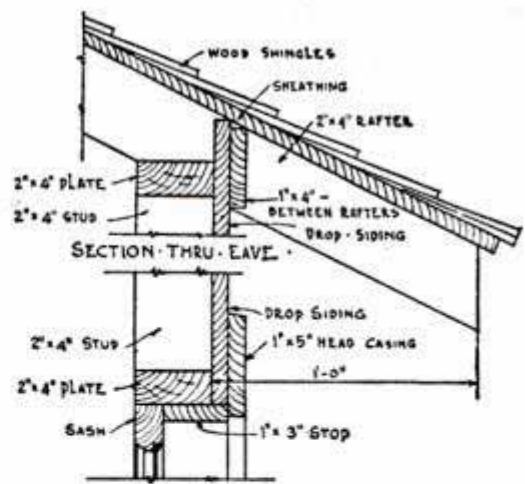
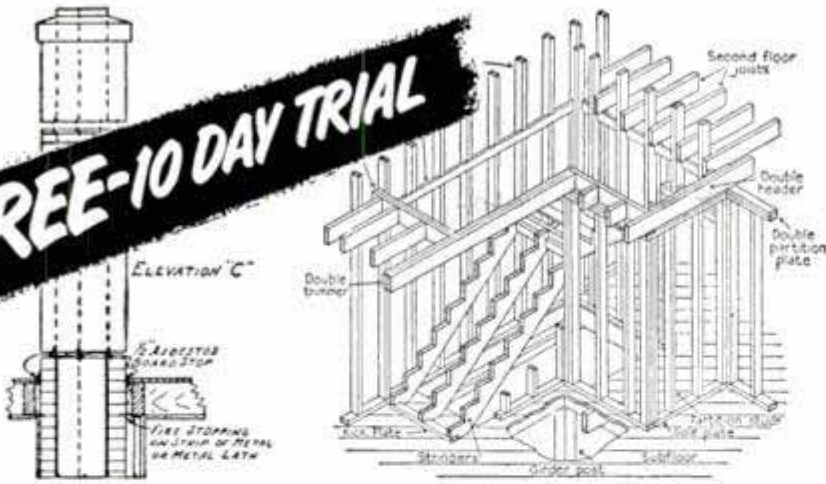
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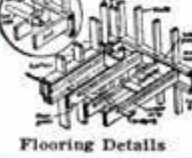
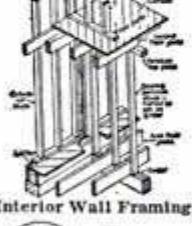
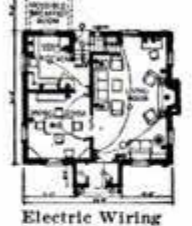
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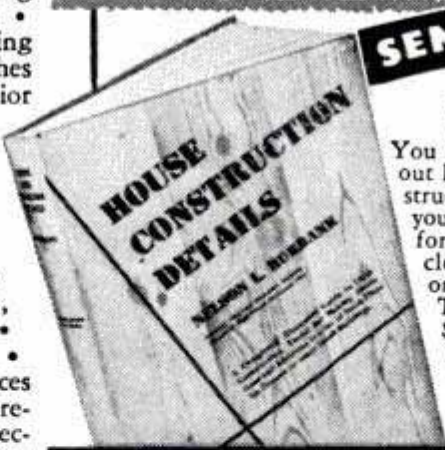
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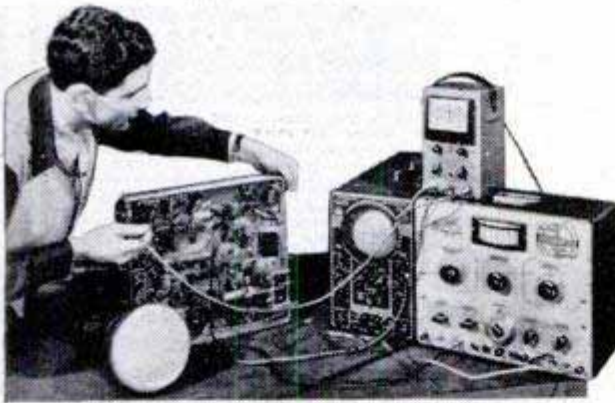
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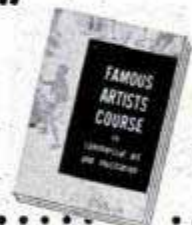
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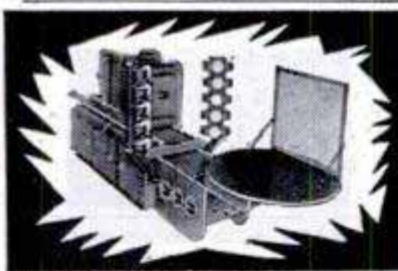
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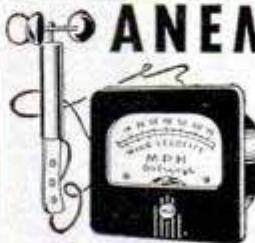
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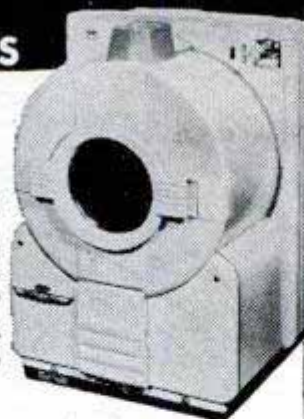
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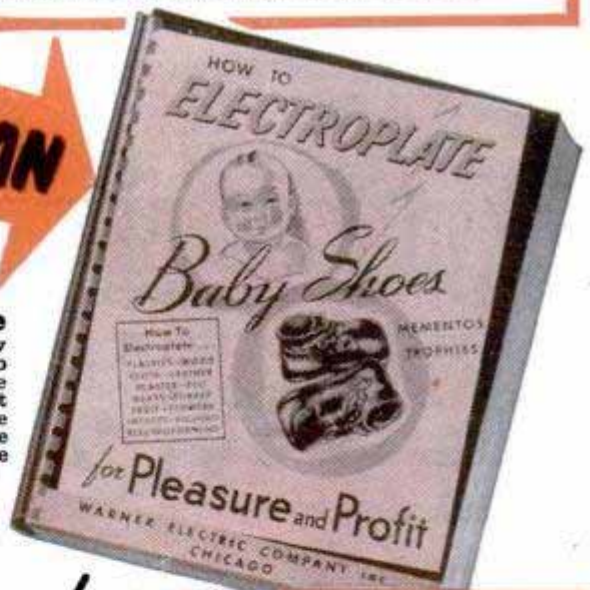
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**HOME** Business making statuettes, plaques, artificial marble, rubber molds. Silvering mirrors. Formulas. Folder free. Creative, 236-L, Winnetka, Illinois.

**LEARN** Gun repairing at home. Profitable. Modern Gun Repair School, Box 717, Dubuque, Iowa.

**SPIN** Angora wool into yarn. Interesting work. House of Angora, PM5, Springfield, Illinois.

**WEST** And northwest Canada. Tourist attractions, oil, mining, farming, trapping, hunting, Alaska highway. Land of opportunities. Booklets, maps. Any information. \$1.00. Box 354, Edmonton, Alberta, Canada.

**BUY** It wholesale! Manufacturers, distributors offer 850,000 items. Literature free. Olsen, 1231-A East Third St., Duluth 5, Minn.

**UNPAINTED** Figurines. Beautiful models. Write for new wholesale price list. Oman, 642J Broadway, St. Paul 1, Minn.

**COPUBLISH** Leading m.o. paper. Latest copy Mail Sale Advertiser, details, dime. Vanroy Shirk, Lebanon, Penna.

**MADE** \$24,500 Using money making plans from Schemer Magazine, world's oldest mailorder publication. Box 775M, Alliance, Ohio. Year \$2.00. Sample 20c.

**WRITE** For free booklet and catalog telling how to earn substantial profits in your spare time by forwarding new and renewal subscriptions to all magazines for your friends and neighbors. Oldest U. S. agency. Established 1869. Moore-Cottrell, North Cohocton, New York.

**MAKE** Flexible molds! Cast plaques, bookends, figurines! Free sample! H. Tooker, 630-R Chestnut, Hamilton, Ohio.

**BE** Appointed state notary public now! Details. Stationers, Helotes 50, Texas.

**COMMERCIAL** Deep frying course. Mock chicken legs, potatoes. New and proven methods. Learn about this money-making field. \$2.50 p.p. Concession, Toledo 13, Ohio.

**NATURAL** Molding Latex. Extra thick. Free sample. W. Wooley, 115-A Donald, Peoria, Ill.

**PROFITABLE** Business making and building with easy-laying interlocking building blocks. Rex Products, Dept. 10, Piqua, Ohio.

**\$250 WEEK** Reported! Free illustrated book "505 Odd Successful Businesses." Work home! Expect something odd! Pacific-E, Oceanside, California.

**\$25 WEEKLY** Working two hours daily. No canvassing. No manufacturing. Lycke, Box 2471-A, Cleveland 12, Ohio.

**POPCORN** And potato chip equipment. Long Eakins Company, 5060 High, Springfield 99, Ohio.

**WANTED** Unused U. S. postage stamps, small discount. Advance Stamp Co., 24 East 23rd St., New York.

**CO-PUBLISH** And advertise in The Central Mail Advertiser. Sample copy 10c. Low rates. Large circulation. Bagby Printing Co., Georgetown, Ohio.

**EARTHWORM** Breeding. Valuable bulletins on successful methods mailed free. Earthmaster Publications, Dept. 14, Sun Valley, Calif.

**LIQUID Marble**—Colorful, glossy! Molded, brushed, sprayed! Cast novelties, statuary, colored tiles. Flexible molds. Composition floors. Particulars free. Marbleizing Service, Edwardsville, Illinois.

**EXTRA** Money. No selling; operate vendors. Amazing profits, details free. Silver King, Suite B, 622 Diversey, Chicago 14.

**UNPAINTED** Bookends, plaques, statuettes, figurines. List. Haverty Products, 1219 8th Ave., Altoona, Penna.

**HOW** To set up and run a mirror shop! Resilver mirrors. Make chipped glass nameplates. Electroplating salts and rectifiers. John Sprinkle, V60, Marion, Indiana.

**MAKE** Money making new greaseload doughnuts at home on electric machine. Wholesale to grocers, drug stores, cafes, hamburger shops. Send for free recipes and plans. M. Ray Company, 3605 South 15 Ave., Minneapolis 7, Minnesota.

**RECAST** Old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

**READ** "Advance"—The voice of mail order. Offers money-making opportunities, sources of supply, personal guidance, etc. Issued monthly. Sample copy 25c. Yearly subscription \$2.00. Advance Publishing Company, 313 East 21st Street, Suite 450, New York 10, N. Y.

**START** Mailorder bookshop—Everything furnished. 25c brings booklet, samples, exciting ideas. General Publications, Ossining, N. Y.

**OPERATE** Profitable mail order business. Write Walter Service, 4159-A East 112th, Cleveland 5, Ohio.

**MAILING** Postcards selling repeat merchandise is profitable. Everything supplied. Details free. Gordan Publishers, Box 23, Pawtucket, R. I.

**137 WAYS** To make money, in home or office, business of your own. Full particulars free. Elite Co., 220 Grand St., New York 13.

**BRUSH** Plating outfits connect to a battery. No tanks necessary. Good paying business at home plating autoparts, bathroom fixtures, bicycles, reflectors, silvering mirrors. No shop or experience required. Outfits furnished. Free booklet. Gunmetal Co., Ave. H, Decatur, Ill.

**COLORGLAZED** Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries Company, Grand Rapids, Minnesota.

## MONEYMAKING OPPORTUNITIES

**COLORLED** And light reflecting crystals, luminous pigments. Catalog and samples 25c. Glowell Co., 475-D, Fifth Ave., New York, N. Y.

**YOU** Can buy thousands of articles wholesale. "Supply Source Directory" 10c. Ideal Service, Park Ridge 40, Illinois.

**WINDSHIELD** Wiper rebuilding brings big profits. Free particulars. Arlington Products, 878 East Waterloo Road, Akron 19, Ohio.

**BARGAINS,** New and used arc welders. Electric or gas engine, a.c. or d.c., all sizes, portable or stationary. Write needs. Hobart Welders, Box M-1004, Troy, Ohio.

**MAKE** Money crinkle painting typewriters, sewing machines, etc., plans for crinkling outfit \$1.00. R. Mix, Box 394, Williamsport, Penna.

**SELL** By mail books, folios. Real money makers. Big profits. Write, Wolf's, 3240 Glenview St., Philadelphia 24, Penna.

**MAKE** Back-yard profits! Unusual opportunities! Interesting booklet free. Pickett's, Florence, Kentucky.

**6 DIFFERENT** Moneymaking mail-order magazines, \$1.00. Wilbur Erickson, Englishtown, New Jersey.

RESILVER Mirrors at home! Order 25c. Ideal Service, Park Ridge 8 Illinois.

WIN Cash, cars in prize contests! Write for copy filled with current contests, winning hints and tips. Send only 25c. Wright Contest Digest, Dept. 17-K, P.O. Box 2266, St. Louis 9, Mo.

WIN Contest money. General Contest Bulletin gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609½ East 5th, Duluth, Minn.

MANUFACTURE Own products. Any formula \$1. O. S. McCollum, 383 Miller, Vaux Hall, N. J.

EARN Money at home! Thousands do! "Home Worker Magazine" tells how. Sample, 25c. Sizemore, Box 7, 4917 Kostner, Chicago 30, Ill.

BOOKKEEPERS Boost income operating simplified bookkeeping service. Kern, 4942 Vineland Ave., No. Hollywood, Calif.

HOW To sell it—By mail. What have you? Personal reply free. Smith Advertising Co., PM, Excelsior Springs, Mo.

FREE Particulars "profitable home business enterprises." Cottage Industries, 2804-P Hanover, Omaha 12, Nebr.

RECEIVE Free merchandise! Postal brings items list. Athons, 2815-F Voughn, Ft. Worth 5, Texas.

MEN, Women—Start business at home. Easy. No cash needed. Trade? Send 25c deposit. Credited. For details and gift, Bishop Novelities, Box 877-1, Milwaukee 1, Wis.

ASSEMBLE And sell Swiss musical churches. Kit \$3.95 postpaid. Tremendous seller. Piltzcker Imports, Wood-Ridge, N. J.

SALESMEN—Sell 12 oz. bottle vanilla with premiums. Write, Economy Supply Service, 913 Asa St., Defiance, Ohio.

DOLL Repair book \$1.25 prepaid. Parts available. Grand Rapids Doll Hospital, 3824 South Division, Grand Rapids, Mich.

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

CLOSE-Out! Retractable ball point pens, gold colored metal, \$2.00 dozen. Watches, silverware, cookware, appliances, etc., lowest wholesale prices. Complete list 25c. Kriston Sales, Pemberville, Ohio.

CHURCHES, Organizations, agents sell candies. One pound tins only. Ralph Missimer, 251 Chelton, Philadelphia 20, Penna.

SCHOOL Seniors—Sell classmates America's most beautiful graduation name cards. Largest selection. Highest commission. Outsells all others. Free sample kit. Printcraft, Dept. M, 1425 E. Elm St., Scranton 5, Penna.

DOLLARS In personalized baby record books. Sell by mail. Use same literature we do. No-Co-Ro, Oakland 6, Calif.

INDEPENDENT Income! Make leather belts, billfolds, purses. Big catalog and genuine steerhide keyholder, 10c. Tandy Leather, Box 397E, Tulsa, Okla.

BUY Nylons direct from mill. Make good profits on fast selling nylons. Quick delivery on any quantity. Write for confidential wholesale price list. Joy Hosiery Mills, Delaware 13, New Jersey.

RAISE Your business value, standing, as state notary public. Information. Stationers, Helotes 50, Texas.

EASY Ways to earn extra income are described in Money-Making Hobbies, 132 projects you can make at home and sell anywhere. 160 pages, \$1.98. Popular Mechanics Press, 200-MH East Ontario, Chicago 11, Ill.

\$250 WEEK Reported! Free illustrated book "505 Odd Successful Businesses." Work home! Expect something odd! Pacific-E, Oceanside, California.

PUBLISH Your own magazine. Hand-some 52 page format, well edited, illustrated. Cost low as \$1.00 month. Brings you prestige, profits. 25c brings sample, details. National, Ord, Nebr.

READ Progressive Mailtrade, the magazine that tells how to make money by mail. Dime brings sample and special offer. Progressive Mailtrade, Box 357, Sheboygan, Wisconsin.

## CHEMISTRY

ATOMIC Calculator (Vinylite) — 96 elements. Atomic weights, valences, symbols, etc. Useful laboratory instrument. \$1.00. Slyd-Rul Company, Box 603, Brooklyn 1, N. Y.

Laboratories, 2849-A Birchwood, Chicago 45, Illinois.

NEW Idea chemical and apparatus outfits for home experimenting. Photo-scales, microscopes, chemicals, biological and laboratory supplies in small quantities. Catalog 15c. Established 1931. John H. Winn, 124A West 23rd Street, New York 11, N. Y.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology. 10c. Tracey Laboratories, Evanston, Illinois.

CHEMICALS And apparatus for industrial, analytical, and private laboratories. Catalog 15c. Dept. M-56, Biological Supply Co., 1176 Mt. Hope Ave., Rochester, 20, N. Y.

## PLASTICS

AMAZING Liquid plastic kit \$3.25. Embed photographs, keepsakes, coins, make solid objects, clear, colors. Beautiful results in half hour. Easily tooled. Inexpensive hobby. Send 15 cents for catalogue. Kristalon Plastics, Dept. Z-100, Box 29, Wilmette, Illinois.

NEW Liquid plastic. Clear, colors. Cast without heat. Embed flowers, insects, coins. Saw, drill, carve. Send 25c for exciting new home project manual showing how to get started. Castolite, Dept. L-101, Woodstock, Illinois.

COMPLETE Line internally carved gifts and jewelry. Free catalogue. Pilot Plastics Co., 67C3 Fulton St., New York City 7.

PLASTICS—Our catalog lists the widest variety in the country stocked for immediate shipment. Wholesale, retail. Prices? You'll like them. Information? Furnished in catalog. Personal service? Try us. Catalog, bargain lists, 10c. Gem-O'-Lite, Box 686C, North Hollywood, Calif.

LEARN To cast plastic letters for personalizing gifts. Particulars and samples including your three initials, two dimes. A. H. Dreher, 2232 Brockway, Cleveland 18, Ohio.

PLASTIC: Sheets, cut pieces, and scrap in clear and colors. Rod, tubing, acetate, dies, jewelry findings. Send \$1.00 for 4 pound scrap assortment and fabricating manual. Regal Plastic Supply, 720 Main, Kansas City, Missouri.

LUCITE, Plexiglas, Any size sheets, masked. Square foot (12 x 12) cost, 1/16", 98c; 1/8", \$1.25; 3/16", \$1.52; 1/4", \$1.80. Colors add 10%. Include 10% postage. Almac Plastics, 230 Fifth Ave., New York 1, N. Y.

INTERNAL Carved roses, orchids, swans, goldfish, butterflies, etc. Jewelry and gifts. Crystal Floral Novelty Co., Bound Brook, New Jersey.

PLASTIC, Sheets, rods, tubes, etc. Free list. Plastic Supply Co., 2901 N. Grand Blvd., St. Louis 7, Mo.

## FORMULAS, PLANS, ETC.

ANY Formula \$1.00, or money refunded. Nelko Chemical Service, 3462-F Merchandise Mart Sta., Chicago 54, Ill.

BIG Profits manufacturing auto waxes, specialties. Seven formulas \$2.00. Plastics, Box 1574, Boston 4, Mass.

FREE Formula catalog, anything analyzed \$20.00. Western Chemical, Salem, Oregon.

10,000 FORMULAS And trade secrets. Free literature. Stillman, 555 Kingston Ave., Brooklyn 3, N. Y.

50 FORMULAS—Make soaps, polishes, cosmetics, etc. \$1.00. Star, Box 21, Brooklyn 14, New York.

PRODUCTS Analyzed. Improved. Guaranteed formulas. Consulting Scientific Company, Swarthmore, Pennsylvania.

MAKE—Sell cleaners, soaps, polishes, flavors, cosmetics. No machinery. Formula literature free. Kemico, Park Ridge 16, Illinois.

WATERLESS Hand cleaner. (No ammonia.) Easily made. Good profit. 2 dependable formulas \$1.00. Nelko Chemical Service, Box 3462, Chicago 54, Ill.

TESTED Formulas. Interesting descriptive booklet free. Pont, Box 635-PM, Terre Haute, Indiana.

FORMULAS For nearly everything. Catalog free. Write Creative, Winnetka, Ill.

REAL Manufacturing formulas. Lists free. Cummings, Chemist, Gordon Ave., Syracuse 4, N. Y.

## HELP WANTED

EARN Cash in kitchen. Special pleasant work at home. Good earnings. Send no money. Styleco, Dept. B155, Cincinnati 10, Ohio.

NEW Plastic rayon towels selling rapidly everywhere with spectacular demonstration. Large profits. Sample package \$1.00. Sunbeam Products, 634 4th St., South, St. Petersburg, Florida.

IMAGINE—Extra cash for you! Sell friends amazing value metallic, felt applique, comic, 50 for \$1.00 Christmas cards. Exclusive gift wraps. All-occasion assortments, scented stationery, animated books, gifts. Profits to 100%. Special offers. Bonus. Write today for free samples name imprinted Christmas cards, napkins, stationery, feature assortments on approval and free catalog. Elmira Greeting Card Co., C-2409 Elmira, N. Y.

SHINE Shoes without "polish." New invention. Lightning seller. Shoes gleam like mirror. Samples sent on trial. Kristee 157, Akron, Ohio.

BENTONIZE, The new wonder combination automobile and furniture polish sells fast. Steady repeat. 100% profit. Agents, dealers, distributors, write. Henry, 2815 Boulevard, Jersey City 6, N. J.

NEW Way to make money! Sell ladies' rain sandals to friends, others. Includes free carrying pouch. Spectacular \$1.00 seller. Amazing profits. Write for sample on approval and money-making details on complete line Christmas, everyday greeting cards, novelties. Experience unnecessary. Bargain offers. Hedenkamp, Dept. PM-44, 361 Broadway, New York.

YOUR Own business selling army surplus, new clothing. Lowest prices. Enormous profits. Catalog free. Moro, 558J Roosevelt, Chicago 7.

AMAZING Offer—\$40 is yours for selling only 50 boxes Christmas cards. And this can be done in a single day. Free samples. Other leading boxes on approval. Many surprise items. No experience needed. Free samples personalized Christmas cards, stationery, napkins. Write today. It costs nothing to try. Cheerful Card Co., 1688 White Plains, N. Y.

BRAND New! Amazingly different and smart Christmas cards bring you big money! Take easy orders for sensational new Christmas cards. Pays up to 100% cash profit. Christmas cards with name 50 for \$1, up. Big line. Personal stationery and book matches. Get sample assortments on approval. Imprints free. Write today. North Star, 31 Glenwood, Dept. M-18, Minneapolis, Minn.

SELL "Unilarm" fire detector. Protects homes, barns, stores. Easily installed. Liberal profits. Uses door-bell transformer. \$2.25 brings sample and proposition. Stoddard, Market St. National Bank Bldg., Philadelphia, Penna.

THERE'S Big money taking orders: Personal initialed buckles with belts, tie holders, choice of over 3,000 emblems, cap and breast badges for every purpose. Uniforms, work clothes, embroidered with company name, trademark, sales message, etc. Prospects everywhere. Latest styles, finest fabrics. Write for selling kit. Hook-Fast Co., Box 480PM, Roanoke, Virginia.

MEXICAN Feather pictures. Sell on sight; 200% profit! Free details; sample 10c stamps. Sylvia-PG, Apartado 9036, Mexico City.

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

CASH In on tremendous demand for new low priced burglar alarm for cars, homes and farm building. Nothing like it. Everybody wants one. 286% profit. Unique sample offer. Northwest Electric Co., Dept. J-10, Pukwana, S. Dak.

ABSOLUTELY Free! Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 5625, Cincinnati 3, Ohio.

FREE Samples, and amazing plan giving you gorgeous dress without penny cost. Rush name today with dress size. Harford, Dept. C-435, Cincinnati 25, Ohio.

SELL DuPont nylon uniforms. Complete line famous exclusive Hoover styled nylon uniforms for beauty shops, nurses, doctors, waitresses, others. Best quality, splendid values. Exceptional income. Real future. Equipment free. Write fully. Hoover, Dept. J-100, New York 11, N. Y.

PHOTO-Salesmen, agents. Sell beautiful hand colored plastic enlargements and sensational new photo compacts, rings, bracelets, lockets, etc. Collect deposit, we deliver. Profitable sideline. Send card, for free sample kit. Novel Portrait Co., 3343 North Ave., Chicago, Ill.



business on credit. Sell some 200 farm-home products. Thousands our dealers now make quick sales, big profits. For particulars write Rawleigh's, Dept. J-192-PPM, Freeport, Ill.

AT Last! Something new and sensational in Christmas cards. Show gorgeous satins, velours and metallics never before offered. Gets easy orders fast! Pays up to 100% cash profit. Free samples of 30 Christmas cards with name, 50 for \$1.00 up. 80 assortments. Personalized book matches and stationery, gift items. 2 assortments on approval. Write Puro Co., 2801 Locust, Dept. 040-M, St. Louis, Mo.

NYLON Uniforms. Immediate delivery, immediate profits. Sell to doctors, dentists, nurses, waitresses, beauticians, housewives. Free sales kit. Superior Fabrics, Dept. P10, 3936 Market, Philadelphia 4, Penna.

NEW Eyeglass polisher. Amazing polishing cloth stops fogging, blurring. Cleans glasses beautifully. Samples sent on trial. Kristee 156, Akron, Ohio.

\$1.00 STARTS You in business. Sell men's neckwear full or part time. Low investment, big profits. Send \$1.00 receive sample tie, free color catalogue, selling plan, wholesale price list. Radio City Neckwear, Dept. M6, 112 W. 50th, New York City 19.

SELL Direct finest quality, fastest sellers in \$1.00 and \$1.50 neckwear. Hosiery. Lowest prices, top profits. Write: Wolfmark, 931-P West Roosevelt, Chicago, Ill.

MAKE \$20 A day! Sell Staybright brass name plates for front doors. Write Hubstamp, 357-E Congress, Boston, Mass.

MANUFACTURE Easy way. Add water our concentrates. Make flavors, lotions, perfumes, shampoos, cleaners, polishes. 125 products. Labels your name, bottles. Qualco, E20030 Russell, Detroit 3.

PERFUME—Sideline to independence. Learn all—free. "International," 6347 Parnell AM-10, Chicago 21, Illinois.

\$1 STARTS You in business. Sell fine \$1 ties. \$1.50 and up values only \$7.20 dozen, you make \$4.80. Send only \$1 for 2 sample ties. Catalog free. Philip's Neckwear, Dept. K-45, 20 West 22nd Street, New York 10.

SELL Gold embossed Christmas cards, napkins, matches, coasters. 50 for \$1 imprints. Samples free. Dunbar, New Brunswick 20, N. J.

FIRST Out—'51 models. Power mowers. Gas-electric. War "boom" demand. Rotacut, R-2010, Excelsior Springs, Mo.

IS \$210 A week worth a penny postcard to you? Then rush card with name and address for special free trial plan that sells amazing new automatic refrigerator defroster "like hot cakes!" Write to Mr. Lewis, D-Frost-O-Matic Corp., Dept. PMC-10, 6 N. Michigan, Chicago 2, Ill.

SELL The famous "Sunshine Line" greeting cards. New de luxe 21 card assortment with, or without. Scripture texts; fast selling religious plastics; brand-new gift wrap; Christmas notes; specialty items such as Christmas bell; holiday high lights; swing along; children's assortments; etc. Write for samples. Triumphant Art Publishers, Dept. G9, Anderson, Indiana or San Jose 6, Calif.

NYLONS Direct from mill. Sample free. Guaranteed against runs. No experience or money needed. Also Nylon slips, briefs. Earn big money spare or full time. Become manager, appoint agents. We pay you 40c for every \$1 your agents earn. Sell 14K neckchains "flat-curb" \$6, cost \$2.50. Ergim Co., 992 Columbus Ave., New York.

SELL Tax tables. Double your money bookkeeping, social security records. Details free. Goerke, 530 East 7th, Long Beach, Calif.

NEW Antifog prevents windshield fogging. Distributors, jobbers wanted. Sample 35c. Pankey Co., 3731 Wascanna, Hapeville, Georgia.

TIES Christmas boxed free. New patented tie and regular ties. Sensational Christmas gift line. Perma-Knot Tie Company, Dept. 101, Williamsville 21, New York.

\$184.00 CONTINUOUS Profit from every \$8.00 investment. Shampoo powders in bulk. Bottle yourself or sell powders. Request convincing facts. Moraal Manufacturing Company, 505-R Fifth Ave., New York City 17.

BE A money maker. Represent magazines year around. Wonderful home work. Big Christmas profits now. Liberal commissions. Everything furnished. Write for free catalog. McGregor Magazine Agency, Dept. 500A, Mount Morris, Ill.

only nationally advertised hosiery line actually guaranteed against runs, snags or excessive wear, regardless of cause! It's amazing but true. Every weight from sheerest 15 denier to heavy 70 denier—all gauges to luxury 60 gauge. Amazingly low prices, starting at \$1.08 prepaid for sheerest 15 denier 51 gauge. Not sold in stores. Good Housekeeping guarantee seal. Also complete line men's hosiery guaranteed one full year or replaced free. Full variety lingerie in crepe, satin and nylon, featuring all nylon slip at \$2.95, satin slip at \$1.58, etc. Housecoats and robes. Kendex sales people will earn one million dollars this year. Get your share. No money or experience needed. Pay nothing now or later. Just show free outfits. Write orders. We deliver and collect. Advance cash plus huge bonus. Earn money spare or full time. Become manager; appoint others to sell for you; earn steady income on their sales. Man or woman—young or old, you can earn more money than you ever thought possible. Everything you need is furnished free and prepaid, including nylon stocking, samples of materials, sales books, 36-page salesmanual, color cards, etc. Simply write your name and address on postcard and mail to Kendex Corporation, Babylon 73, N. Y.

FREE Literature—Thousands wholesale supply sources. Moneymaking business ideas. Wilkin Company, Hillsboro 4, Ohio.

NOVELTIES And household items! Fast sellers for agents, dealers, and gift shops. Write for 16-page Sunshine Catalog. Sunshine Sales, Dept. WP4, Loudonville, Ohio.

PROFITABLE Spare or full time selling NuSilver Polish and Plating Liquid, cloth applied products. NuSilver, 508-PM10, New York St., Aurora, Illinois.

AGENTS—Big line including food products. Fast selling premium and bargain deals. Low prices. Send card for big outfit offer with gift. Ho-Ro-Co, 2770 Dodier, St. Louis 7, Mo.

BUY Thousands of nationally advertised products direct from manufacturers and distributors. Write for "Buy Direct and Save." Service Publishing, 1420-A Investment Bldg., Pittsburgh 22, Penna.

MUSIC Greeting cards. Dorby Publications, P.O. Box 738, Morristown, New Jersey.

CASH In on plastics! Big profits with our 350 new plastic home needs. Perfect for party demonstrators, canvassers, stores. Lowest prices—highest quality. Write for free details. Durever, 2781-G Atlantic Ave., Brooklyn 7, N. Y.

SCHOOL Seniors! Your postal will bring our wonder, Kwick-Sell cardalog of popular graduation name cards. Biggest profits! Only firm giving free souvenir chest and card case. Don't miss out! Hurry that postal! Craftcards, Box 235 (L), Pittsburgh 30, Pennsylvania.

BIG Money selling tooth powder. J. Walker, 633 Plymouth Ct., Dept. 1, Chicago 5, Ill.

\$2 FIRE Extinguishers, locally, mailorder. Lorrac, Box 1086-X, Albany 1, N. Y.

SCHOOL Seniors—Earn sensational profits selling classmates America's most beautiful graduation name cards. Largest selection. Outsells all others. Free sample kit. Printcraft, Dept. M, 1425 E. Elm St., Scranton 5, Penna.

EARN Big money taking orders for attractive boxes of Xmas cards, 50 for \$1.00 up. Also metallics, plastics, wraps, children's cards and books, name-on stationery, napkins, etc. Samples on approval. Call, write or phone. Rainbow Greeting Cards, 38-T E. 1st St., New York 3.

BRITISH Imports—Sell world's most beautiful stationery (free samples), fine perfumes, etc. Kenneth Boyea, Indian Orchard, Mass.

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

BIG Bargains for big profits. Over 100 sensational values. Men's used suits \$2, pants 35c, topcoats \$1.25, overcoats \$2, shoes 20c. Experience unnecessary. Free wholesale catalog. Superior, 1250-A Jefferson, Chicago.

QUICK Money—Sensational Christmas cards, plastics, metallics, stationery, napkins. 50 cards with name \$1. Approval sample. Torres, 373 A-Fulton St., Brooklyn 1, N. Y.

FREE Samples. Big profits showing amazing Glow-in-the-Dark specialties. House numbers, pictures, plastic novelties, ashtrays, keyholders, religious and nursery objects, etc. Madison Plastics, 303 Fourth Ave., New York 10, N. Y.

Hotter than a firecracker. Big profits. Sample free. Bestco, 4642 No. Central, Chicago.

CHRISTMAS Card agents. Sell America's only \$1.00 Gift wrap assortment containing 30 full size sheets; giant plastic pencil containing personalized pencils; Santa stocking with name; Rudolph, the red nosed reindeer assortment. Over 100 Christmas card box assortments and surprise items. Write today for five free portfolios of personalized Christmas cards. Elmcraft, Dept. 13, 5930 S. Western, Chicago 36.

1950 XMAS Card catalog ready! Earn more money as a wholesale jobber! Large selection of dollar box assortments, imprints, religious, personalized Christmas cards! Three dollar sample boxes \$1, postpaid! Write for free holiday bulletin. Elfko, 438 North Wells, Chicago 10.

DRESSES, 18c; Coats \$1.00, blouses 35c. Free catalog. Crown, 164-P Monroe Street, New York.

WRITE for free booklet and catalog telling how to earn substantial profits in your spare time by forwarding new and renewal subscriptions to all magazines for your friends and neighbors. Oldest U. S. agency. Established 1869. Moore-Cottrell, North Cohocton, New York.

SELL Balloons! Combs! Novelties! Excellent sideline. Carleton House, Texas City, Texas.

NEWEST Money making sensation. Sell personal initialed belts, buckles, cap and breast badges, tie holders, etc. Choice 2000 emblems. Write special outfit offer today. Hook-Fast, Box 1425PM, Providence, R. I.

JEWELRY Factory desires salesmen, distributors, jobbers. Pickcraft, 19 Bank Street, Attleboro, Mass.

SELL Big money-maker to men and women. Easy handwork makes fast-selling useful articles. Sunmade Company, Brockton 64, Mass.

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

AGENTS: Stamping names on key protectors. Sample 25c. Stamping outfits, checks, social security and name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

EXCELLENT Sideline for printing and advertising salesmen. Decalomania name plates in small quantities. Great demand. Also, make money with our line of automobile initials and sign letters. Free samples. "Ralco" 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.

FAST Profits—No investment. Send for big, free catalog. Plastic aprons, tablecloths, etc. 150 sure-fire items. We guarantee sales. Write The Halliday Co., Dept. M-10, 15-19 Pennington, Passaic, N. J.

## HIGH-GRADE SALESMEN

IMMEDIATE Earnings as factory salesmen. Build your own permanent year-round repeat business. Sell patented air cushion shoes. Not available in stores. Complete family and work line. Dignified work calling at business places. Full time or side-line. Advance commissions up to \$25.00 per day. Free outfit. Chas. Chester Shoe Co., 80 Foundry St., Brockton, Mass.

AD Matches! Sell amazing designs—20, 30, 40 and 240-light book matches. Big spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. Match Corp., Dept. PM-10, Chicago 32, Illinois.

EARN More with new family insurance—pays for disability, death, retirement. Costs only \$1.00 month. Reliance, Phoenix 5, Arizona.

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-1050, 7530 Greenwood, Chicago.

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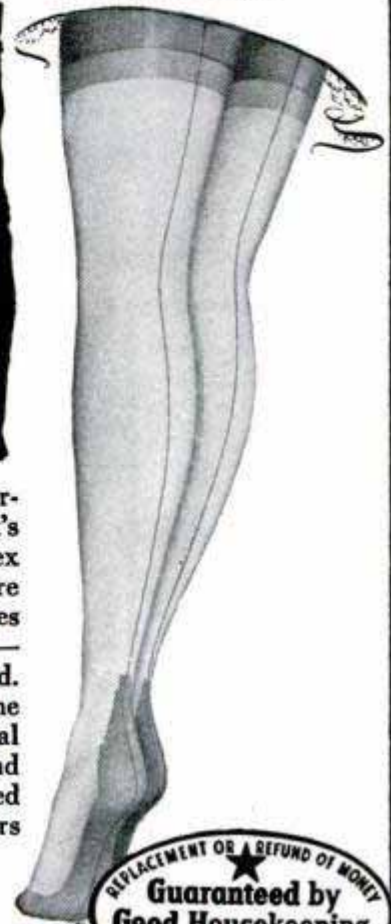
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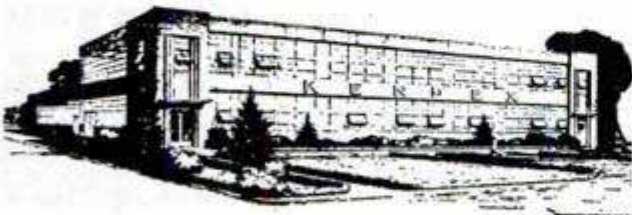
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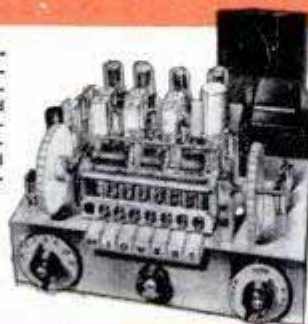
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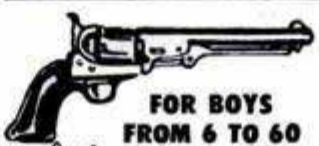
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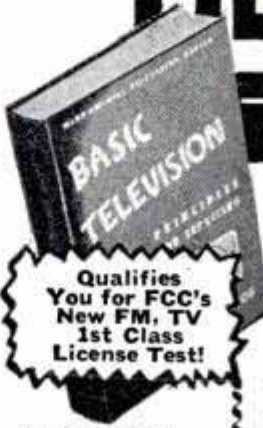


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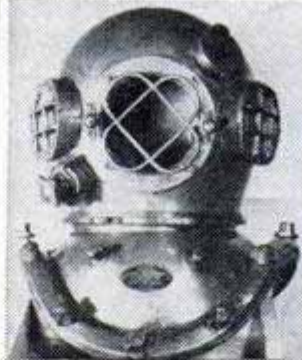
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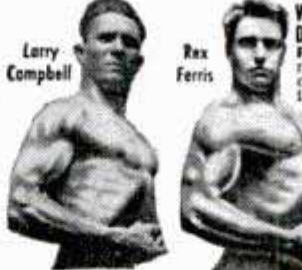
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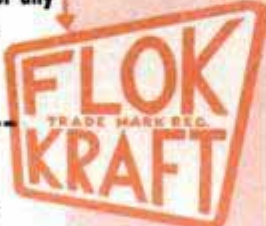
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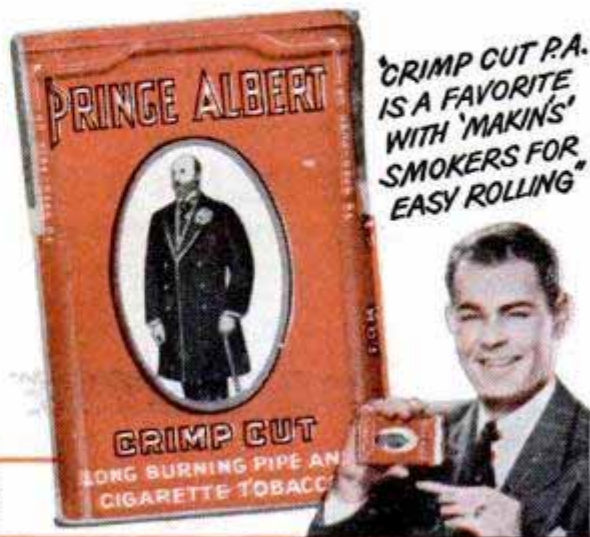
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OCTOBER  
1950

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 94 NO. 4

By Michael Day

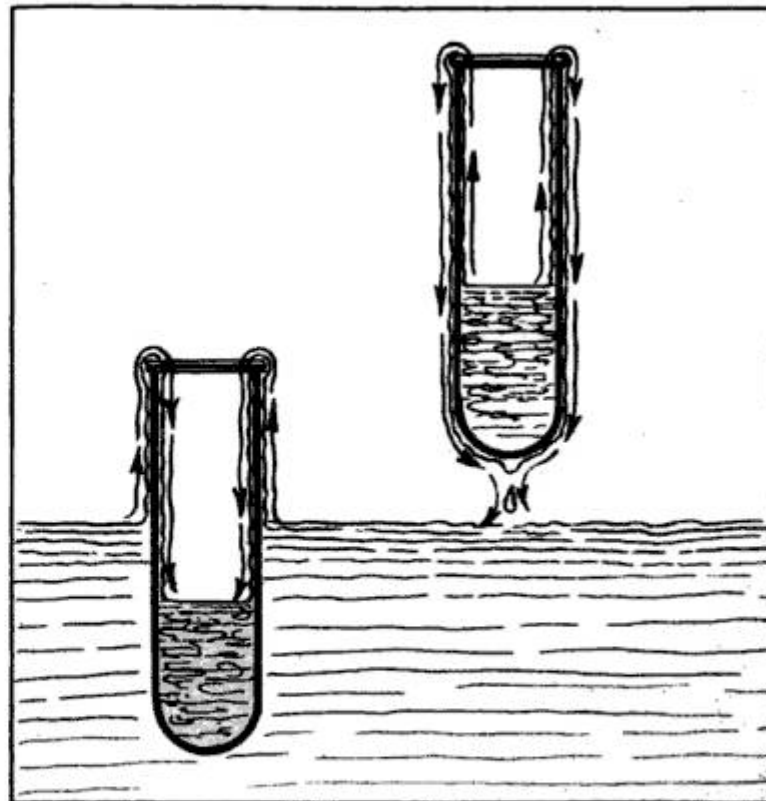
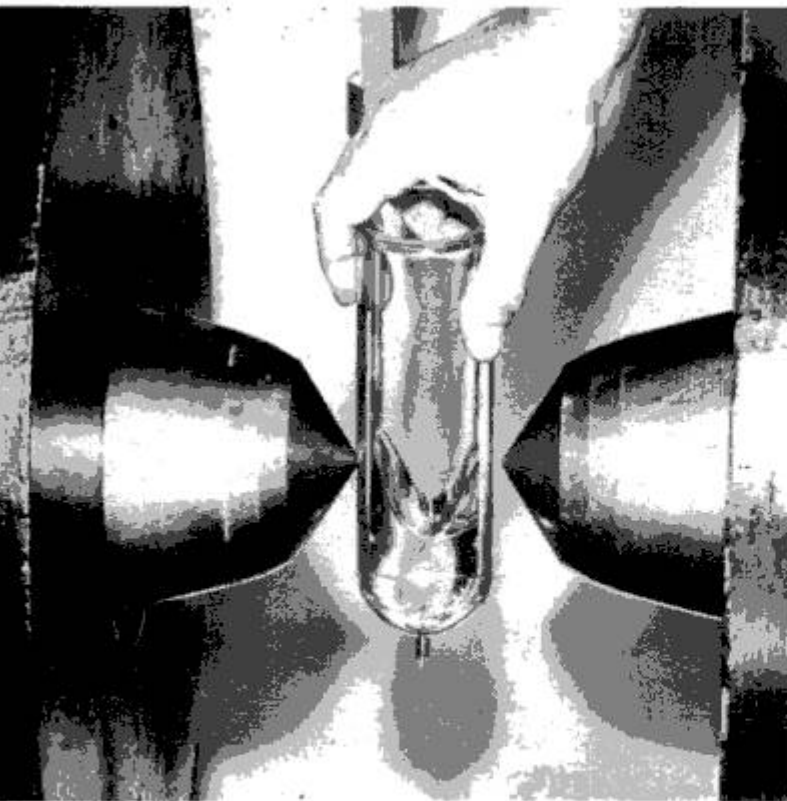
**T**HERE was a time when 50 degrees below zero, Fahrenheit, was considered a fairly crisp temperature. And for all practical purposes you can still get your nose nipped by it, freeze your fingers and toes or crack the block of your car if you haven't enough antifreeze.

But up in Schenectady, N.Y., in a big new glassed-in laboratory sitting on a bluff overlooking the Mohawk River, Dr. Milan Fiske, General Electric scientist, will look you straight in the eye and state flatly that "50 below" is practically red hot. Here, in this "super deep freeze" plant, sit the reasons for his attitude—big metal containers with conical tops and long necks, shaped like the nickel-plated stacks on old-horse-drawn fire engines. They are filled with

Above, liquid air ( $-340$  degrees F.) is so "warm" that it makes liquid helium ( $-452$  degrees) boil when the two are mixed. Below, the G. E. laboratory

## IT'S 530 DEGREES COOLER INSIDE





Left, liquid oxygen forms a U-shaped gully when held between magnets. Right, a hair's breadth from absolute zero, helium II flows up and into a partially submerged test tube, reverses its flow when held above surface

liquid frigidity: Hydrogen at minus 422 degrees Fahrenheit, nitrogen at minus 322 degrees Fahrenheit, air at minus 300 degrees Fahrenheit. There are frosted, steaming, multilayered flasks, too, containing the most frigid liquid of them all — helium, which boils at the near ultimate in cold — about 452 degrees below zero Fahrenheit or a scant four centigrade degrees from absolute zero. It will produce a burn like a white-hot poker if you spill any on your skin. Shake these containers and frosty white vapor puffs from the tiny pressure vent in their throats. Spill some of it on the cold concrete floor and it behaves like water spilled from a teakettle on the top of a red-hot coal range; it splatters into a hundred droplets that bounce around, sizzle and quickly evaporate.

"In normal room temperatures," explains Doctor Fiske, "these ultracold liquid gases are boiling continually. They evaporate at a rate of half a liter per hour and we have to keep making them as fast as they go."

For years, scientists have been experimenting with cooling processes and machines that will haul temperatures down to within thousandths of a degree of the fantastic, supercold world of absolute zero (about minus 459.69 degrees Fahrenheit), beyond which they now think there is nothing colder. No one can ever hit bottom, since there is no energy left to measure at absolute zero. At this point all thermal motion in matter ceases, the usually dancing molecules slow down and stop their gyrations in the frost of frozen space.

Down in this incredible range of ultimate frigidity, weird things happen to ordinary materials, and low-temperature scientists in some 35 laboratories around the country are trying to find out how they behave and why. Rubber refuses to bounce, for instance. A ball dunked in supercold will drop to the floor like a steel sphere and shatter like glass. Dip a banana in the frosty depths and you can "slice" it with a hammer. Some metals become brittle and you can crumble them with a tap. In other metals, electrical resistance vanishes; you can start a current going around a ring of pure metal, remove the source of power and the current will run forever. "A bar magnet dropped onto a superconducting tray," explains Doctor Fiske, "will be repelled by the tray and will hover above it in midair. The metal in the tray becomes a magnetic shield at near absolute zero."

Liquids behave oddly, too. Some lose all frictional resistance and, if set swirling like stirred coffee in a cup, would swirl until doomsday if they didn't evaporate. One will flow straight upward at eight inches per second on the sides of its container and will transmit heat just like sound waves.

"But," says Doctor Fiske, "we're not interested in the curiosities. By studying materials at near absolute zero we hope to find why they behave as they do at normal temperatures and perhaps improve them."

Already from low-temperature labs throughout the world have come better glass, longer-wearing rubber, cheaper fertilizer, stronger steel and better gasoline.

Right, this big cylinder is a super refrigerator for testing at near absolute zero. Helium gas is cooled until it liquefies by making it drive pistons. This work results in loss of heat. Repeating this process, the gas cools to almost absolute zero. Below, cut-away drawing shows how pistons are used to cool gas.

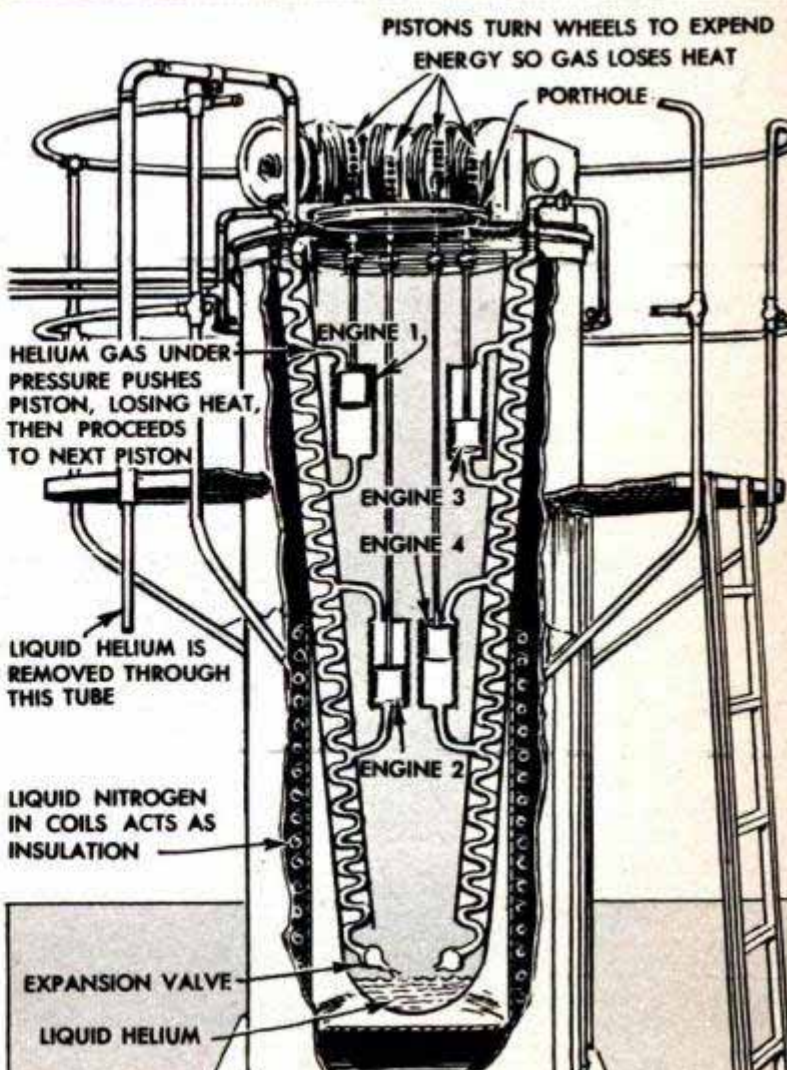
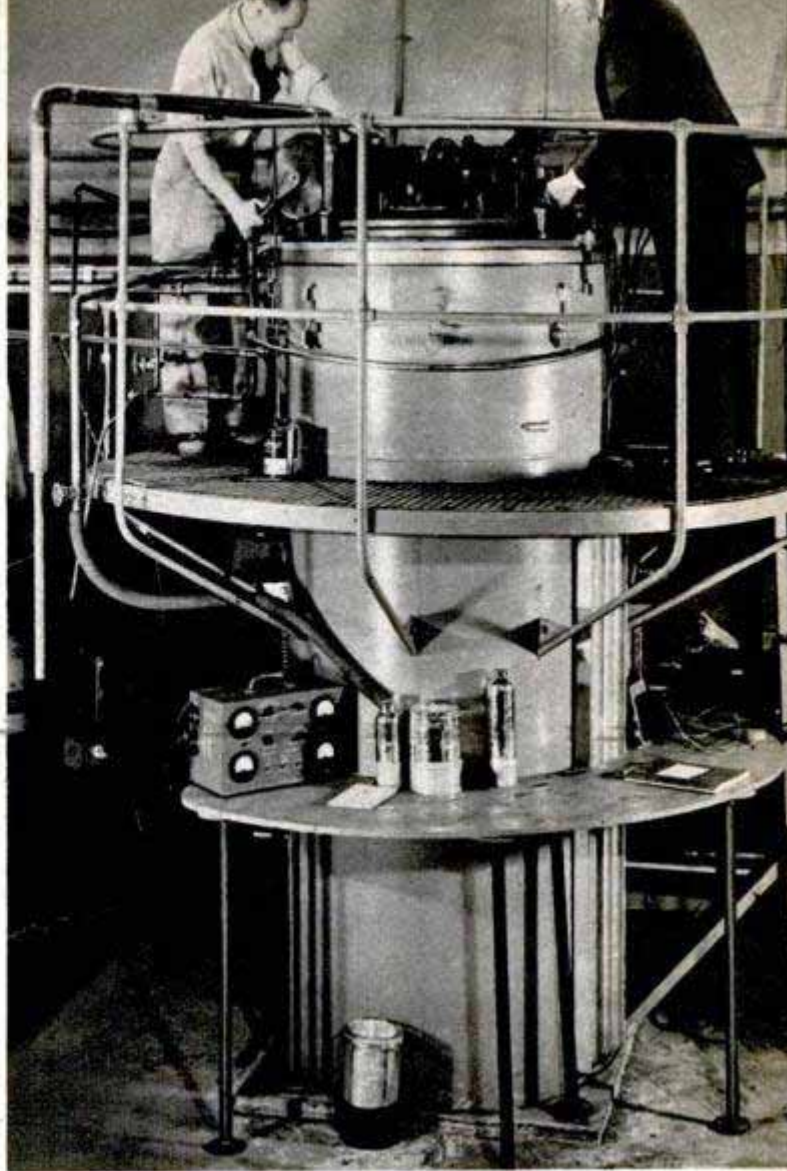
A miniature rocket engine at Ohio State University fueled by liquid hydrogen at about 425 degrees below zero and using liquid oxygen for the oxidizer has roared up the highest exhaust velocities ever obtained (15,000 miles per hour) and may well provide the pilot fuel for the first interplanetary rocket.

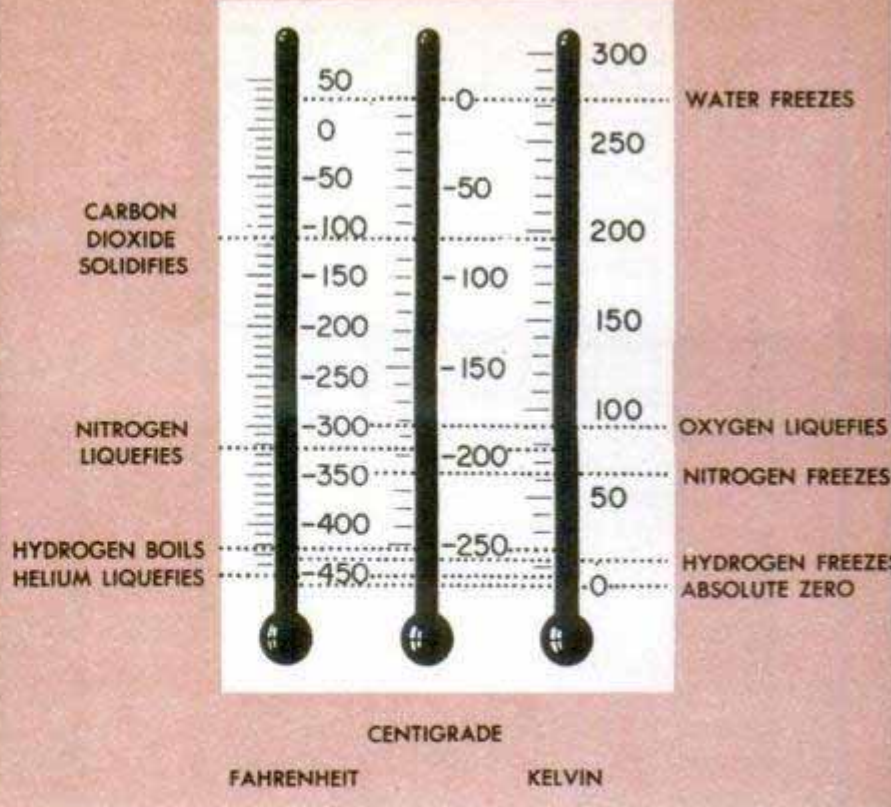
Scientists have been trying to out-frost each other ever since the 1700s when Gabriel Fahrenheit used combinations of snow, ice and salt in an ice-cream-freezer type of machine to achieve a minor chill. He thought, naively, that that was the bottom and set zero on his thermometer accordingly. It wasn't long before men found that it got colder than Fahrenheit's zero during Nature's own winter. But it was another century before European scientists discovered that by putting precooled gas under pressure, then letting it expand suddenly through a narrow opening, that its temperature would plummet to unheard-of depths. It was by this method that Sir James Dewar first liquefied hydrogen in 1898 and Kamerlingh Onnes made the first liquid helium in Holland in 1908.

The system is similar to that used today in the refrigerator in your kitchen. And it's the same basic pattern, with many embellishments, that will be used to produce the frigid liquid gases for deep-cold experiments at G.E.'s new Knolls Laboratory in Schenectady.

To facilitate their work, today's low-temperature scientists have abandoned the arbitrary scales of both the Fahrenheit and centigrade thermometers. They involve too many minus signs. Around low-temperature labs you may hear men muttering things about one, two or three degrees "K." This is the Kelvin or "absolute" scale, devised by Lord Kelvin when he determined back in 1848 that the rock bottom in fridity was about minus 460 degrees Fahrenheit. The Kelvin scale is graded in centigrade units of measurement, but it starts from absolute zero and works its way up. Naturally, normal thermometers are useless at ultralow temperatures. Mercury freezes solid at a mere minus 39 degrees Fahrenheit. Alcohol isn't much better. Even helium gas has limitations because it will not function below one degree absolute. So the professors of fridity use a gadget that measures the magnetic properties of the substance and translates these to its heat content.

When Drs. Fiske, Warren DeSorbo, F.



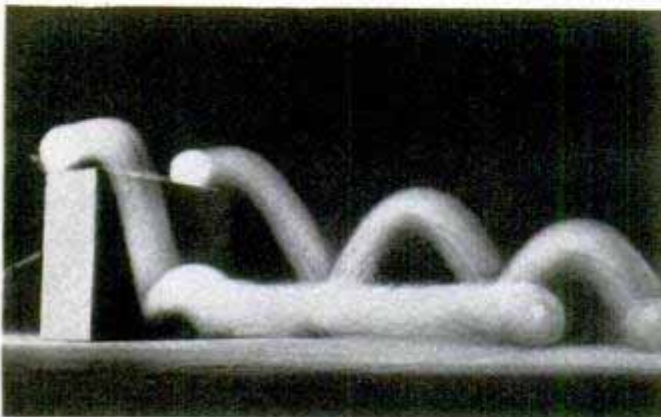


Left, liquid-helium flask is placed in container insulated with liquid nitrogen. The helium is kept in the dark, as light is warm enough to make it boil. Right, comparison of Kelvin, centigrade and Fahrenheit scales

Hubbard Horn and John F. Youngblood set out to design and build their lab, they spared no horses. Their \$250,000 super refrigerator is the first big laboratory tailor-made for low temperature in this country. The building is 60 by 70 feet, made of concrete and steel, with over 80 percent of the outer walls given over to explosion-venting sash.

Hydrogen, when mixed properly with oxygen, does explode. And though Doctor Fiske sneers at such a possibility, he took pains to divide the building with 12-inch concrete shields, separating personnel from liquefying machinery and stored gas and from the compressor room. "Mostly to deaden the racket," he says. Heavy-duty cranes for moving the equipment run on an overhead track with switches to route them from liquefying room or compressor room

Bouncing tennis ball, rear, is normal. At minus 340 degrees, front, ball has no more bounce than a brick



to the maintenance shop. They slide through the concrete walls via long, narrow steel doors.

No smoking is allowed in vital areas, all contact equipment is sealed against sparks and a hydrogen detector continually samples exhaust air from the building. When it hits more than .4 percent a double-barreled alarm goes off. But properly handled, hydrogen is harmless.

Actually the liquid hydrogen is not used for much real low-temperature work. "It's too hot," Doctor Fiske explains with a smile. "It becomes liquid at about 20 degrees Kelvin. We use it mostly as a coolant for the coils when we liquefy helium, which dribbles from the liquefiers at its boiling point of about four degrees absolute. When we're really rolling, we'll produce about seven gallons of liquid hydrogen or two of liquid helium per hour."

Producing the subchill fluids at G. E. is something like taking off for the moon in a rocket ship. The operator stands at an 11-foot double panel of dials behind the liquefiers. Beyond the thick concrete wall in the compressor room, a 60-horsepower electric motor whines as it starts the big hydrogen pump. A huge array of smaller ones pump helium. Multicolored pipes in the liquefier room grow a coating of frost. The operator's eyes flick from dial to dial. Occasionally, he peers through a thick glass porthole toward the gauges on the compressors. The gas is pouring down from big laboratory gas holders on the second

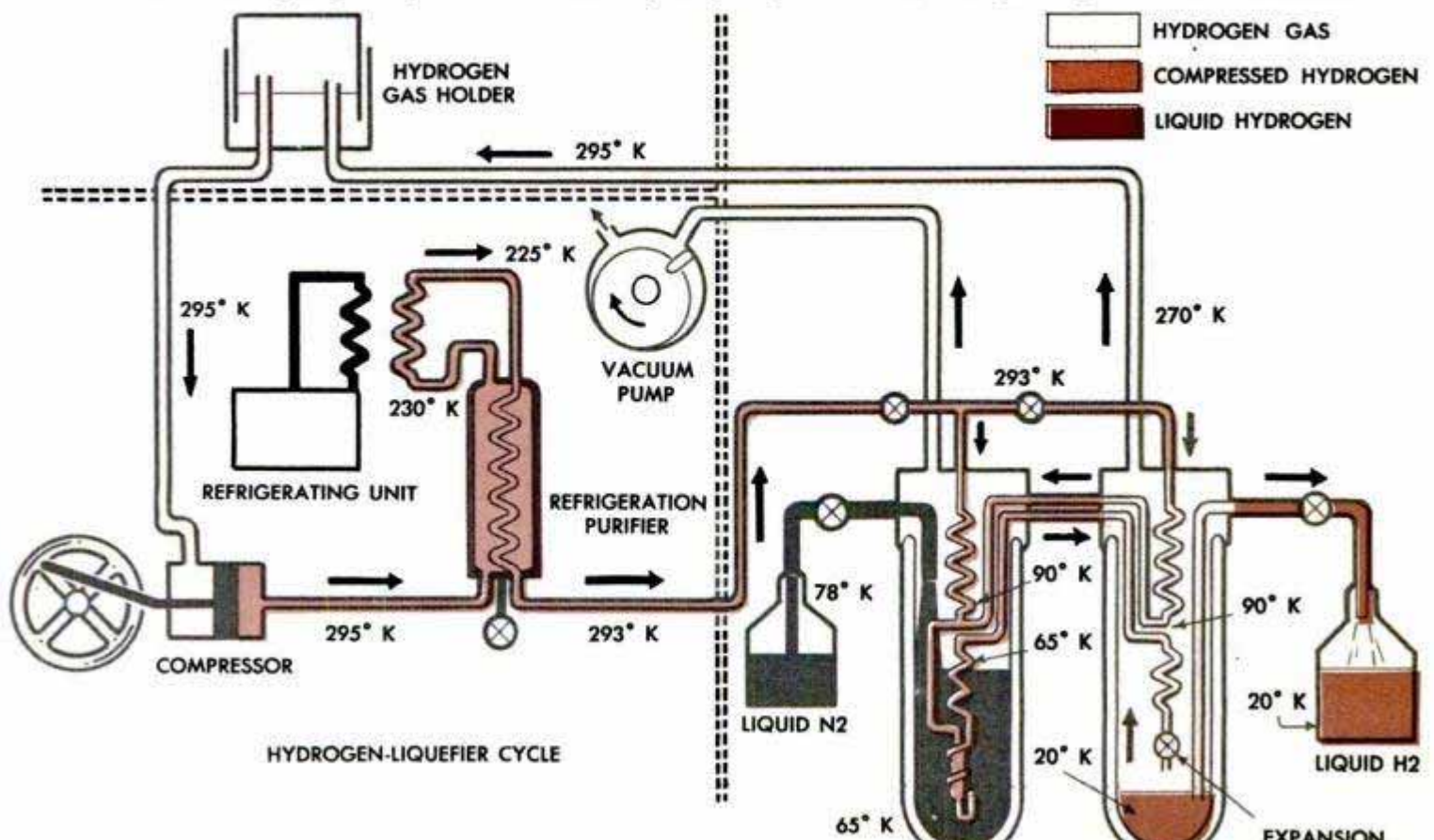


Experiment shows how supercold reduces electrical resistance. Bulb burns dimly, left, but when copper coil, carrying current to bulb, is dropped in some liquid nitrogen, right, the light output increases many times

floor. A hundred cubic feet of hydrogen per minute are pounding down to 2200 pounds per square inch. Helium, to 400 pounds. From the compressors the high-pressure gas feeds through purifiers, races through coils for cooling, roars into a chamber that is completely surrounded by a liquefied gas. The hydrogen chamber floats in liquid nitrogen at about 70 degrees absolute. The helium chamber is in liquid

hydrogen at about 15 degrees absolute. Now the roaring gases are cold enough to be on the verge of liquefying. All they need is a little push. They get it as they are rammed through pin-point nozzles and expand violently into the liquefying chamber. Twenty percent of them are chilled into liquid instantly by the expansion and rain to the bottom of the chamber to form a  
(Continued to page 244)

Chart of the hydrogen liquefier at the lab. Liquid hydrogen is "warm," being 20 degrees above absolute zero



# Plastic Glasses

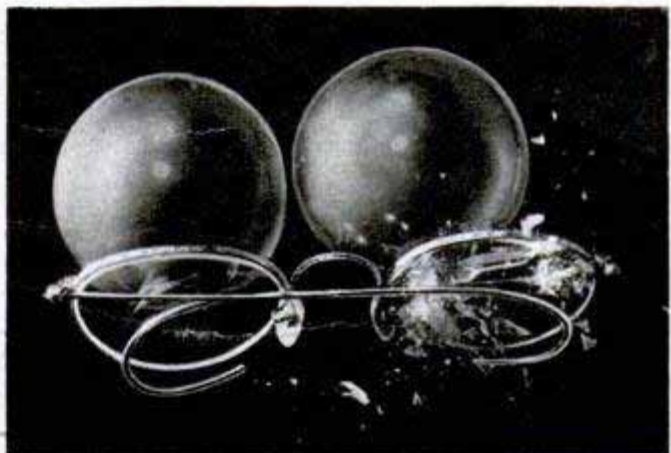


Above, welding splatter stuck to glass lens at left, but the plastic lens, right, is still in good condition

Right, two 1¼-pound steel balls were dropped on this pair of glasses to test impact resistance of lenses

Below right, when the balls hit the lenses the glass lens shattered while the plastic lens was undamaged

Below, dropped on a concrete floor and stepped on, the plastic lens was not broken or even scratched



Worried about breaking your glasses? If so, your worry will be over when you get a pair of spectacles with plastic lenses that are virtually unbreakable and unscratchable. Forty times harder than previous plastic lenses, the new type won't scratch even when subjected to rough usage. Its impact resistance is several times greater than that of case-hardened glass. A 1¼-pound steel ball dropped on the plastic lens did not damage it. The lenses

were undamaged when placed on a concrete floor and walked on. Molten splatter and flying abrasives, always a problem for welders, did little damage to the spectacles, which weigh only half as much as regular glass lenses. The lenses are formed by pouring the plastic into molds, with each prescription requiring a different mold. They are heat-cured to prevent softening at high temperatures. Clear, flesh-colored and green-tinted lenses are produced.

## "Seeding" of Storm Clouds Decreases Lightning

Just as man has learned to produce rain artificially, scientists now believe the amount of lightning during thunderstorms can be decreased by using similar cloud "seeding" methods. Their hopes are based on the physical fact that when water freezes, as it does when moisture is carried into the upper level of a storm, electricity is generated. Researchers have found in

laboratory experiments that ammonia and some acids are able to limit the amount of electricity generated. Chemicals introduced into actual storm clouds on three occasions have decreased lightning. The U. S. Air Force project, headed by Prof. Horace Byers of the University of Chicago, is gathering the data to improve protection of power lines, buildings and airplanes.



# TRUCKERS' GOLIATH

WHEN a mammoth tractor-trailer rig rolls off the highway into a ravine, getting it back is often a major engineering feat. To speed salvage operations, Walter Reddaway of Oregon City, Ore., designed and built a powerful wrecker that bulges with mechanical muscles.

Weighing 36,500 pounds, the wrecker has four winches and a boom that extends to 62 feet. The one-inch steel cable that runs through the sheave on the boom tip winds up on a winch of 80,000 pounds' capacity. This Herculean tug can be increased by hooking on a second cable pulled by an auxiliary winch of 65,000 pounds' capacity. The boom, with three 14-foot girder sections that telescope for highway travel, is raised and lowered by a separate winch of 30,000 pounds' capacity. The fourth winch, mounted at the front end, develops a 45,000-pound pull.

All winches are driven by the truck's 265-horsepower engine and are controlled either from the cab or from a panel on one side of the vehicle. A broad anchor bar under the rear end is cranked down to provide solid support when a heavy load is being lifted.

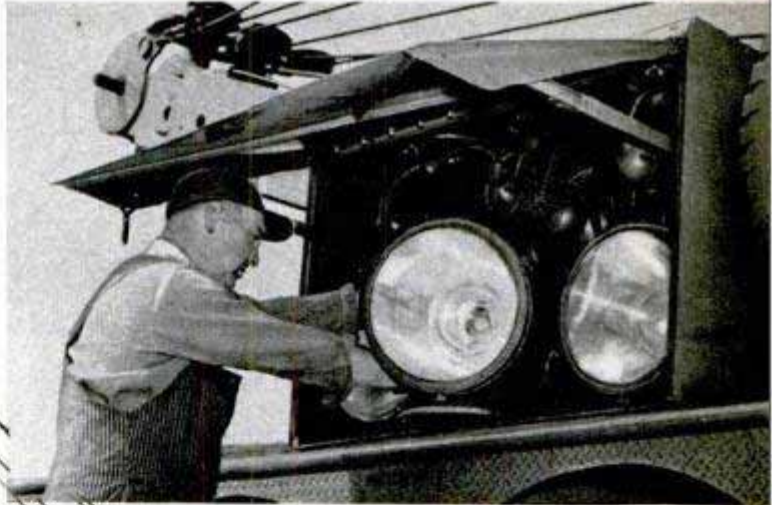
The mechanical Goliath carries its own 110-volt lighting plant and six floodlights for night operations.



Coffee, brewed right in the cab, peeps up the crew



A steel bar at the rear adds stability for a hoist



Six floodlights are part of the equipment. Below, this looks easy, but it is an 18,000-pound load



By Richard F. Dempewolff



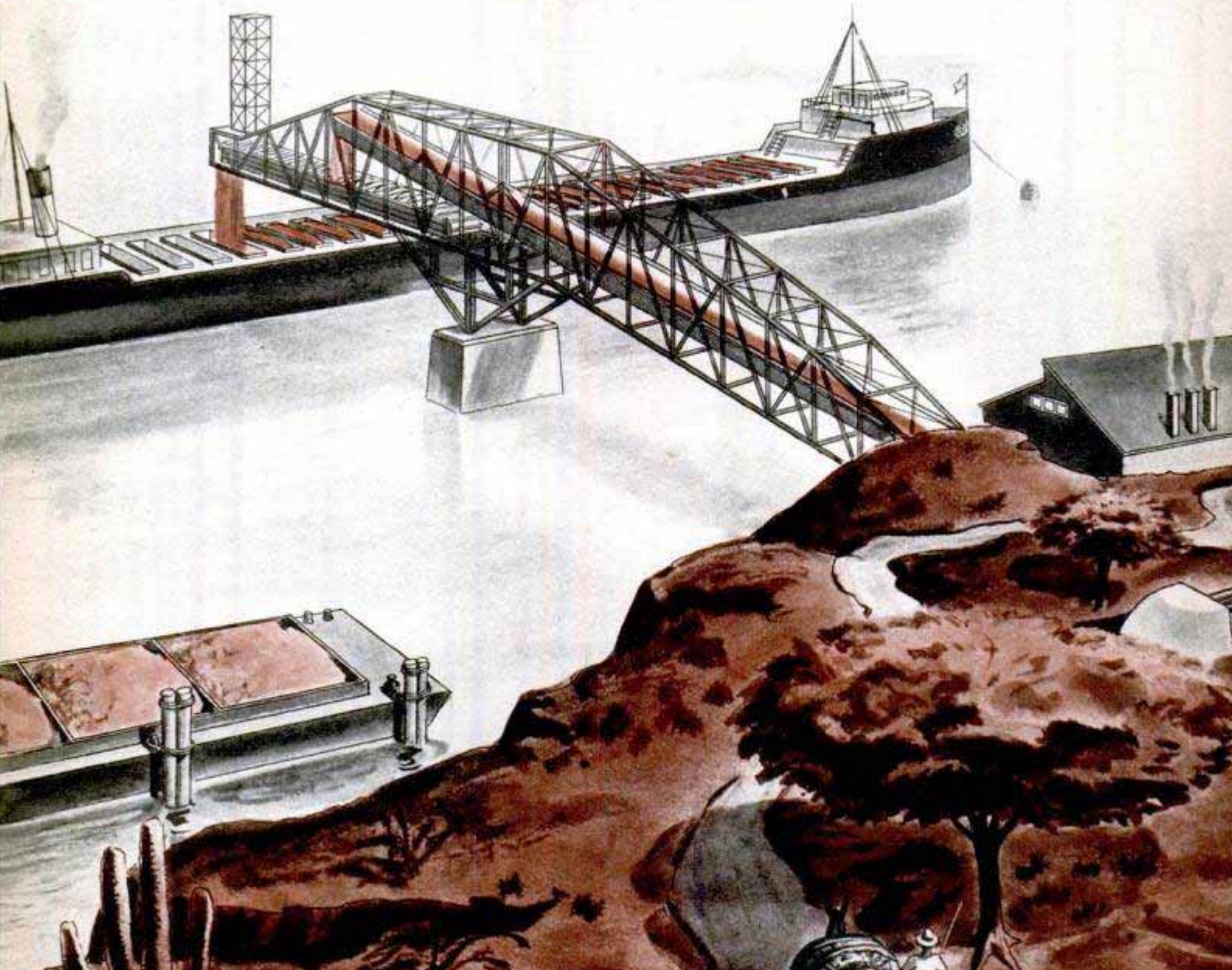
Native crews helped build 32-mile railroad to move ore to Bethlehem Steel Co. barges (below) in Orinoco River

**I**T'S ONE THING to know there's a bunch of luscious blackberries in the middle of a mile-square brier patch, and quite another to go in, get them and haul them out. That's the way it is with Venezuela's fabulous wealth.

In a virtually roadless interior that varies from snow-capped Andean peaks, 20,000 feet high, to dense equatorial lowlands shot through with rivers, gorges, desert and impenetrable jungle, the simplest mission may take weeks and months of planning just to find what you're looking for, grab it and get out.

Ruth Robertson, veteran Caracas photographer, some of whose pictures accompany this article, saw Angel Falls from an airplane back in 1947. She decided to go in on foot as soon as she could arrange things, measure it (its actual height was then in question) and take pictures. Though it's only 300 miles

# Treasure Hunt in a



from Caracas, she finally made it last year. First a base-camp air strip had to be carved out of the jungle. Guide, radioman, supplies including waterproofing, jungle hammocks, snake-bite kits, compasses, machetes, rope, ammunition, guns, lamps—and a hundred other things had to be made ready. A DC-3 was to take the party of five into Uruyen, south of Ayuan-tepui. Small shuttle planes then would move them over the jungle one at a time to the advance strip, from which they would move up a Caroni River tributary into Churun Canyon by native dugout. The last 10 miles they would hack their way through deep jungle with machetes.

After all those plans, they got in to Uruyen but couldn't locate the advance strip. Their radio went on the "fritz" and they had to wait for a hand-crank set to be flown in. After days of battling with bugs, they took off by water all the way, supplementing their supplies with Indian fare and slogging it out through rains that pelted them

# Lost World

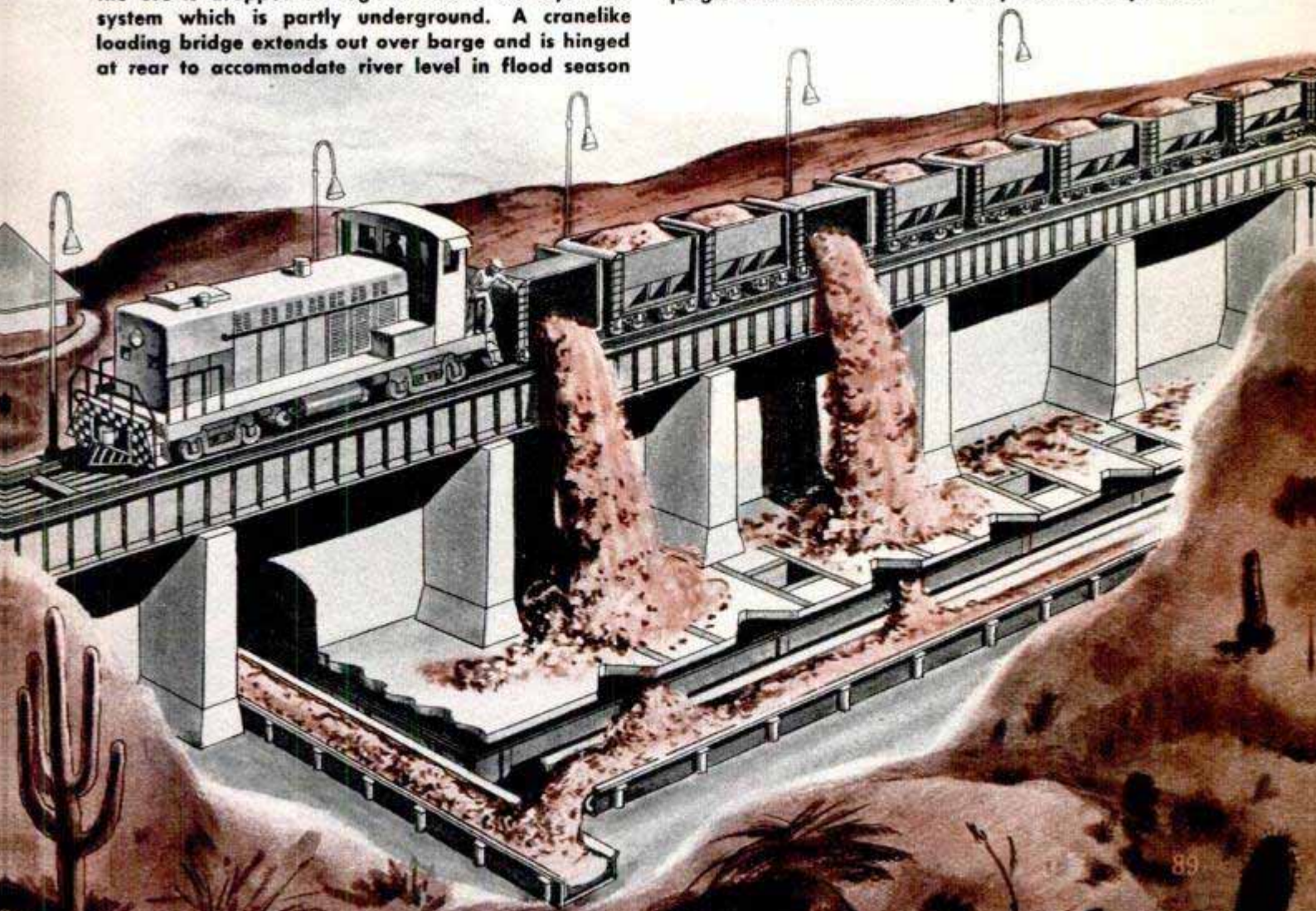
## Part II

When ore train from El Pao mine reaches the Orinoco the ore is dropped through chutes to conveyor-belt system which is partly underground. A cranelike loading bridge extends out over barge and is hinged at rear to accommodate river level in flood season



Ruth Robertson photo

Angel Falls, highest in the world, is hidden in the jungle and has been seen by only few white persons





Oil wells along shore of Caribbean Sea as seen from air rival Oklahoma and are evidence of the oil boom in Venezuela

Oil rig (opposite page) is ablaze with lights at night to frighten Indians who attempt to shoot poison darts at the crew

Core drilling rig at right on opposite page penetrated 400 feet into mountain of iron to prove up vast reserve

daily. They made it all right. It took 19 days to get a matter of 20 air miles. The surveyors measured the falls (2648 feet for the first free drop, then a lower drop of 564 feet). "It's the most breath-taking sight in the world," recalls Ruth. "The wind blows spray in a half-mile semicircle around the base." She got her pictures, and off they went for home, returning a month after they'd started. And they weren't carrying anything but pictures, statistics, supplies and themselves!

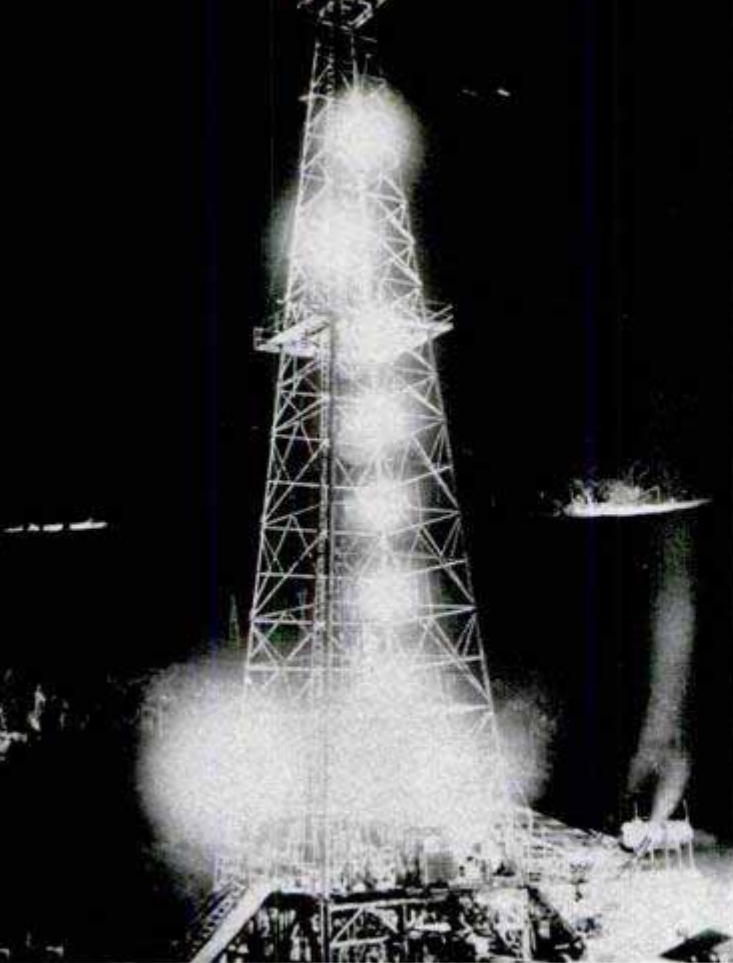


"To date," says Ruth, "the only practical means of transportation in the interior is the airplane. Even that has its shortcomings. You can't set it down on jungle tree-tops, or river rapids. Furthermore, we saw several bucket seats adorning the sparsely furnished interiors of thatched roof native huts—a grim indication of what can happen when you try to."

Transportation is the toughest handicap facing men who would exploit Venezuela's vast wealth. On the plains and swamps of the vast llanos, oil companies like Creole, Standard Oil's Venezuelan subsidiary, have solved it by devising odd vehicles for their prospecting. There's the "marsh buggy," which looks like a big tent perched on a set of upended bass drums. The hollow-drum driving wheels up front are fluted for traction. Rear wheels are plain-surfaced. It will thump along smartly over swamps and shallow water, or dry grassy ground. The large riding surface of the drums keeps it from sinking into bogs and it will carry a respectable cargo of company explorers and well pipe.

Tiny Army surplus bulldozers, which can be flown anywhere in a DC-3, also show up in open country where they're used for road building, hill removing, or just riding through tough terrain on their wide steel Caterpillar treads. Jeeps are the modern burros of the Venezuelan prairies, used for hauling trailers and people through every

Pipe lines of the Creole Petroleum Corp. snake way through miles of rank jungle and must be patrolled



conceivable kind of country — not excluding rivers.

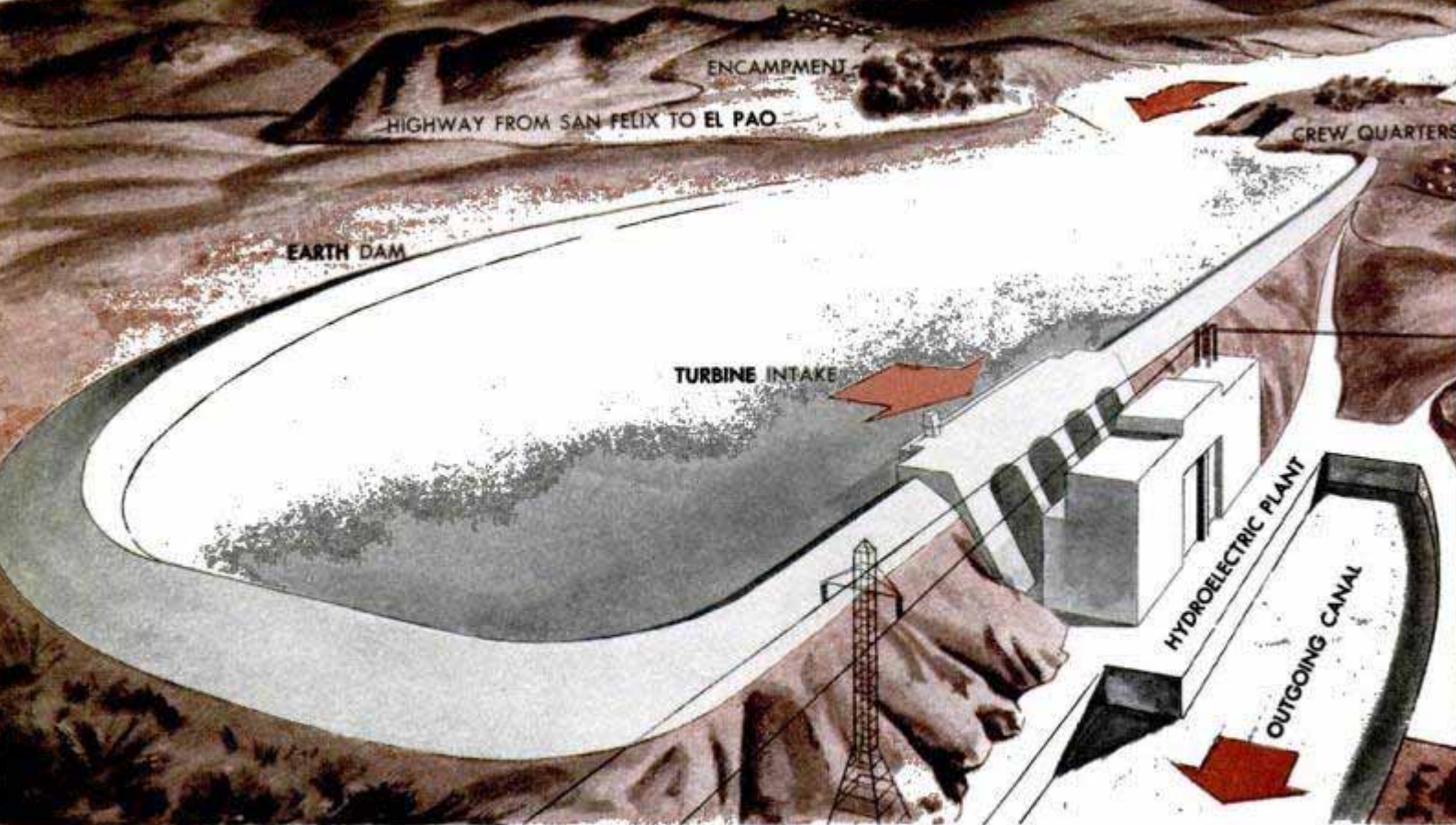
But how do you get oil, iron and other heavy raw materials out? By dint of incredible labor, ingenuity and expense. Oil companies' pipe lines snake through hundreds of miles of jungles, across plains and water to bring out more than a million barrels of black gold daily. Up in the northwestern jungles, Creole has more than pipe lines to worry about. Here are the little aboriginal Indians with six-foot blow-

pipes, who still plip their long, deadly, poison-tipped darts at strangers in their jungles. Time and again they have attacked Creole camps. Many a well digger has fallen victim to their arrows, many a camp has been disrupted by their onslaughts from the dense treetops.

To establish the most recent Creole wild-cat up there (Alturitas), Creole engineers first had to carve an 18-mile road through the jungle, clear a half-mile-square area around the rig to guard against attack, and

Map shows three major oil basins — Maracaibo Falcon, Apure and the Orinoco from which are flowing millions of barrels to create dizzy oil boom. Mountains of almost pure iron ore in the Gran Sabana region may start a second boom





truck in the ponderous equipment on trailers drawn by rearing "cats." Medical men cleared the place of malaria; camps and schools had to be set up for workers.

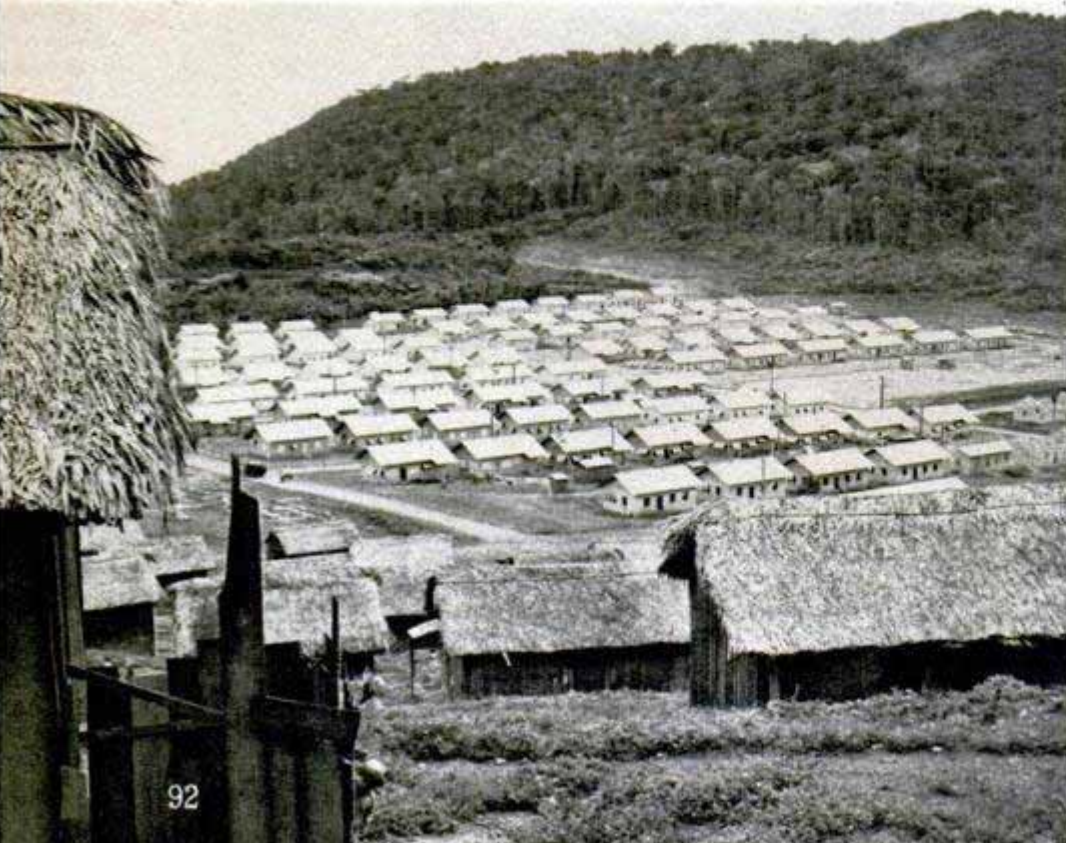
Since the Indians in that area will attack only under cover of darkness, the Alturitas rig is kept ablaze with powerful lamps that light the entire clearing all night. Thus dazzled, the Indians have apparently decided to steer clear so far.

Not only does exploitation of Venezuelan oil cost lives, but heartaches and money—

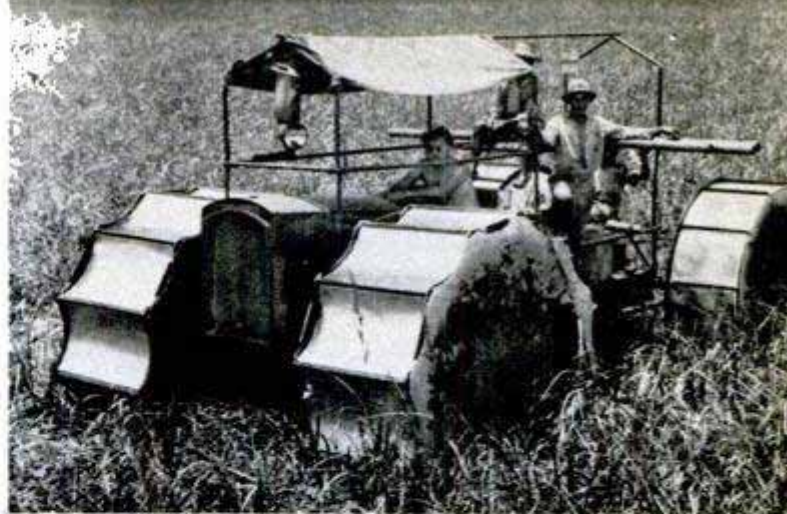
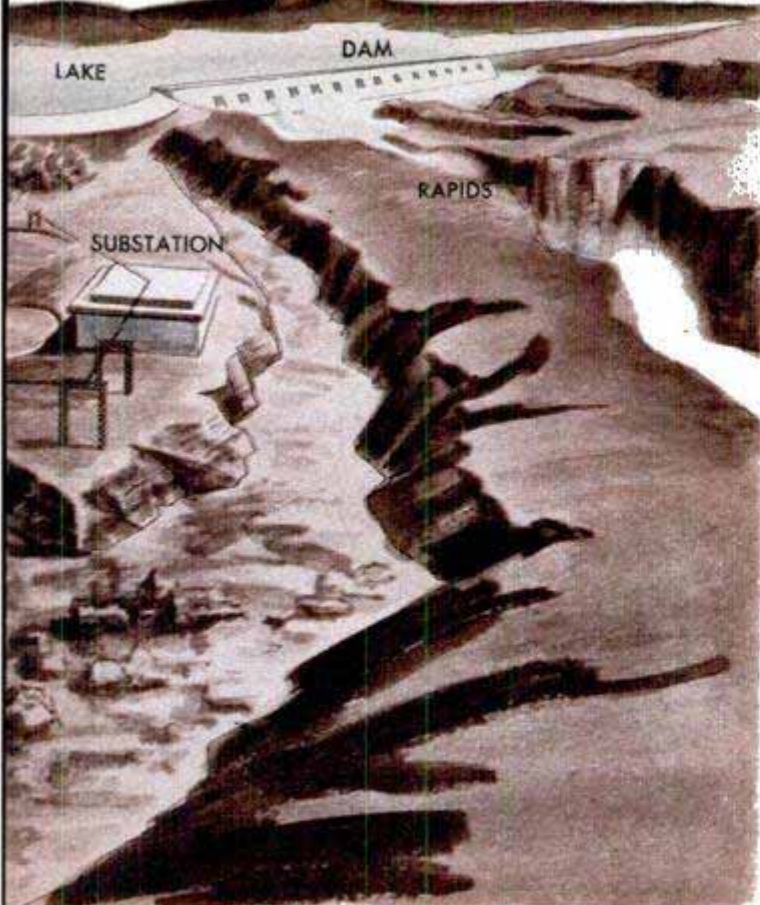
like the 180-mile road and modern camps forged into wild central Venezuela to a territory that yielded exactly 11 dry holes! So far oil prospectors in "the land of opportunity" have spent half a billion dollars finding and getting out their black gold.

Today, acres of derricks out on the water of Lake Maracaibo in western Venezuela bring in 270 million barrels a year. Getting those wells drilled—some in water over 200 feet deep—seemed an impossible job. For shallow water, huge concrete piles were

Native huts and workmen's new homes rub elbows in mining town of El Pao



carried to location in barges, driven into the lake bottom for the rig platform. In depths over 80 feet, hollow concrete and steel caissons are now floated out on the lake in 100-ton, 185-foot lengths. The caissons are tipped up, filled with water and plunged nose first to the depths, where they drive themselves into the mud. Then 200-ton blocks of concrete are dropped on top of them to sink them in to final resting place. Platform, derrick, drilling rig are built on top; special drilling barges with built-in mud troughs, settling pits, pipe deck and a diesel power supply drop anchor alongside, and another shaft sinks into



Oil-exploration crew moves over swampy parts of Gran Sabana in "marsh buggy" with drumlike wheels

←Caroni Dam will trap water from several streams of this branching river in a huge horseshoe-shaped earth dam. Big hydroelectric plant shown in center will provide needed power for many new industries

Below, one of many deserted ranchos which are boarded up because labor has left farms for oil fields

Maracaibo's bottom — not always without more grief. Some time ago, on the east side of the lake, a well "blew" in the course of drilling and made history by oiling the water and land in all directions with 100,000 barrels of crude in nine days before it "sanded in."

To facilitate lake-oil shipment, Creole has just had to build a fantastic 145-mile pipe line to Amuay Bay. Fifteen miles of it stretch across the wind-tossed Gulf of Coro —some of the roughest water in the world.

To do the job, pipe was assembled in two-mile lengths ashore, covered with spun glass, fiber felt and sprayed with concrete to prevent corrosion, sealed at each end and towed over whitecaps to the tie-in point at dead tide. As each section went out, huge cranes on barges picked up each butt and wiggled them together. Welders, in a swaying scaffold hung between the barges, made the joint. The pipe was then lowered between a "roadway" of pilings to keep it in place till the next section came out. Half-way through, wind and tide flipped a half mile of the pipe over the piles and bent it out across the bay like the hand of a big clock. Finally it was towed back and repaired. The bay link completed, the pipe



was pumped full of water and sank to the bottom intact—where it rests today, carrying 325,000 barrels of Venezuela crude per day to tanker-loading facilities at Amuay.

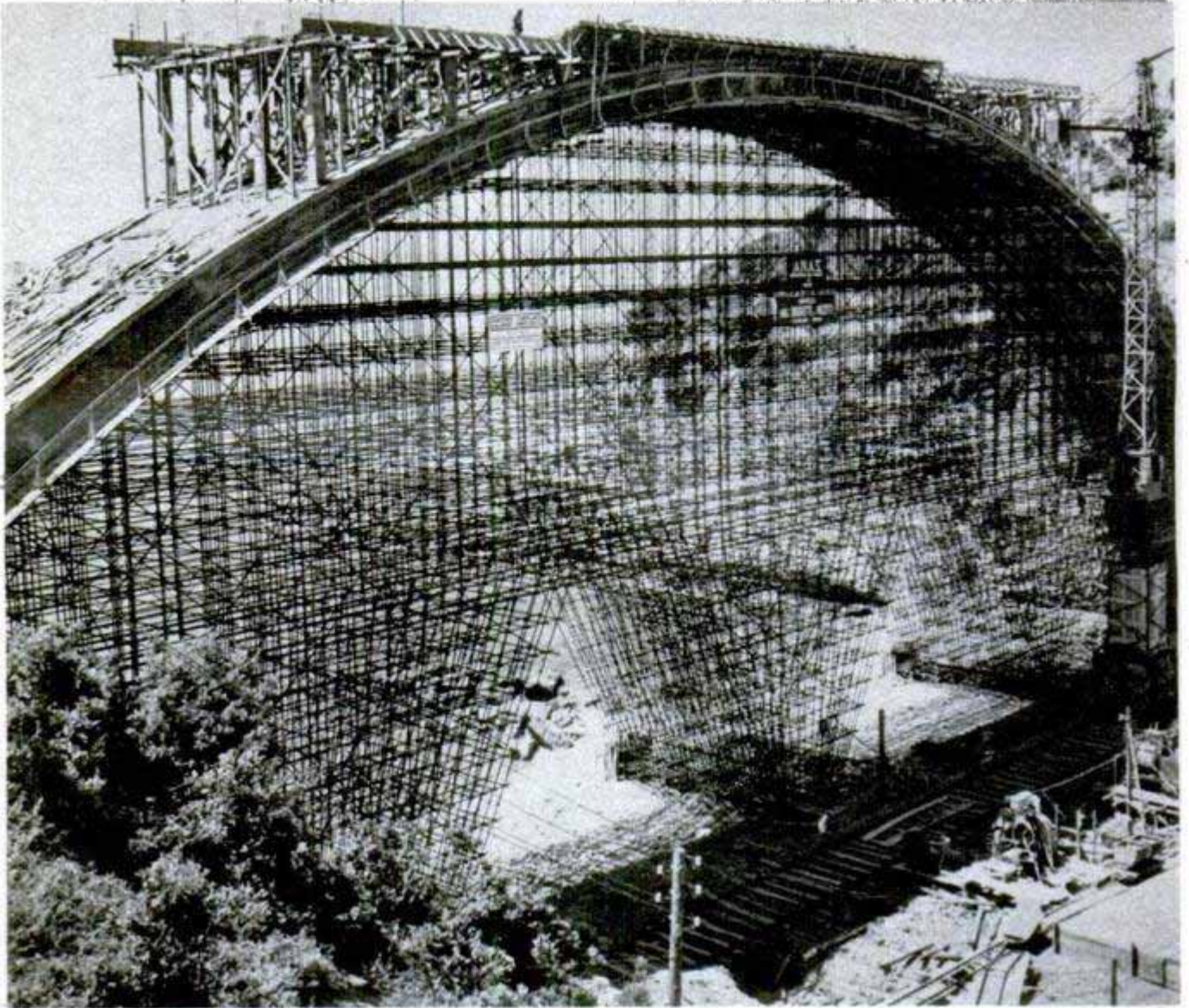
If oil's problems are tough in this rugged frontier, big steel's are practically a menace. The grim job of finding and removing heavy, unwieldy ore from the country is being tackled right now by Bethlehem and U. S. Steel in cooperation with the Venezuelan government.

For years it was known that somewhere on the Gran Sabana there was ore. The old

(Continued to page 256)

Cerro Bolivar is a mountain of almost pure iron ore discovered last year in the Gran Sabana of Venezuela

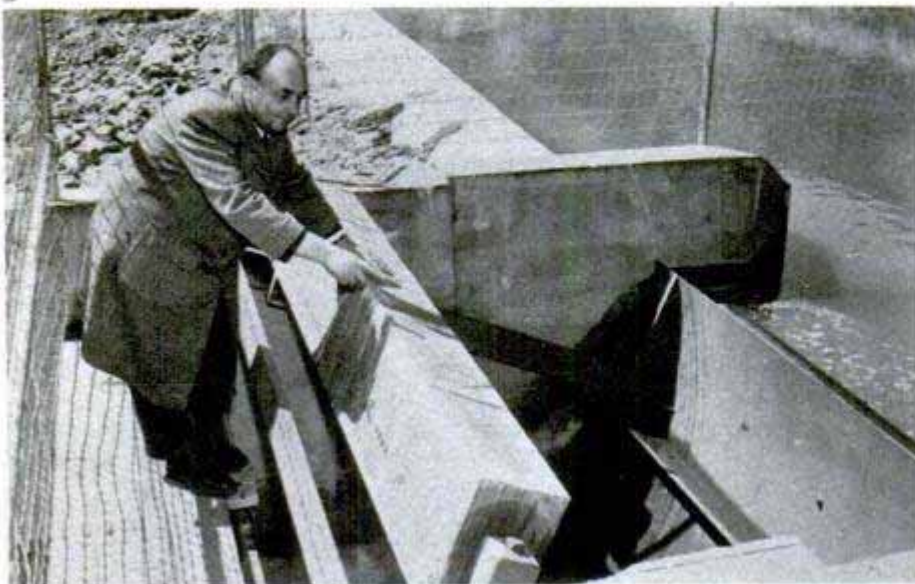




## Maze of Steel Pipe Supports High Italian Bridge

Steel pipe, built into an intricate maze, supports the roadway of a bridge spanning a deep valley near Leghorn, Italy. The

former bridge across the valley was destroyed during the war. The maze of pipe forms three supports for the new bridge.



Counterbalanced, the automatic gate can be moved up and down with little effort. A float attached to the face of the gate controls its operation

## Automatic Gate Controls Water

Counterbalanced by a weighted arm, a steel gate automatically controls the flow of water from streams or reservoirs. A float attached to the face of the gate lifts the gate as the water level rises and lowers it when the water drops below any preset level. Trouble-free in operation, the gate maintains any level of water under all conditions, including flood. It was developed by a French hydraulic laboratory.





B. F. Goodrich Co. photo

## Air Holds Up Tent

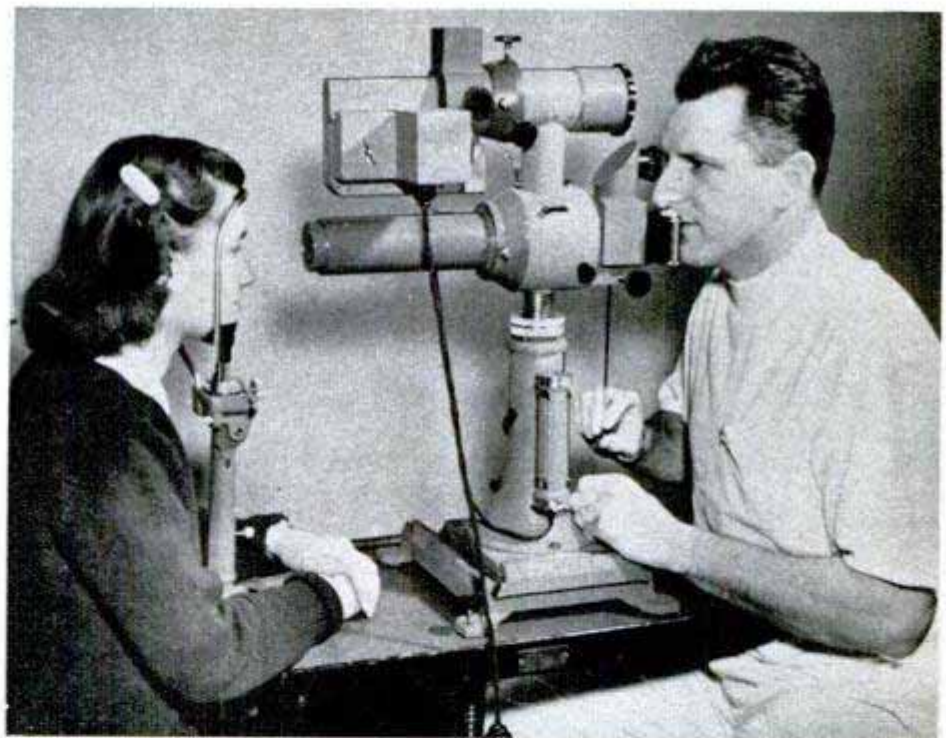
Columns of air support an 80-foot-long tent that can be "erected" in six minutes. Its nine beams are made of rubberized Fi-

berglas-nylon and each takes three pounds of air to inflate. The waterproof tent weighs 740 pounds and can be deflated in 25 minutes. It was developed for the Air Force as a portable darkroom and briefing tent.

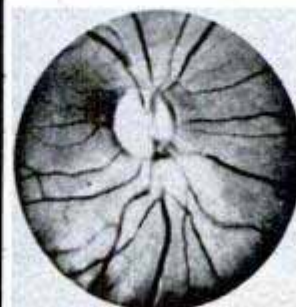
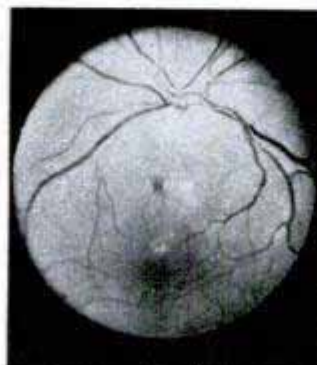
## Interior of Eye "Shot" By Camera

Doctors can now photograph the interior of the eye with a high-speed camera developed by Bausch & Lomb. The photographs, in color or black and white, show in microscopic detail the retina, nerve fibers and other structural elements within the eye. The camera is equipped with an extremely long focal length lens.

Telescopelike camera, right, photographs inside of the eye. Below, left, healthy eye. Center view shows start of optic atrophy. Right, degenerate eye



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## BRITAIN'S BRABAZON— "Queen Mary of the Sky"



In addition to 38 seats in the main compartment, above, there will be first-class cabins with sleeping accommodations. A cocktail bar and aft lounge, with movies, provide ample room for 100 passengers, who would leave London at midnight and arrive in New York at 8 a.m.



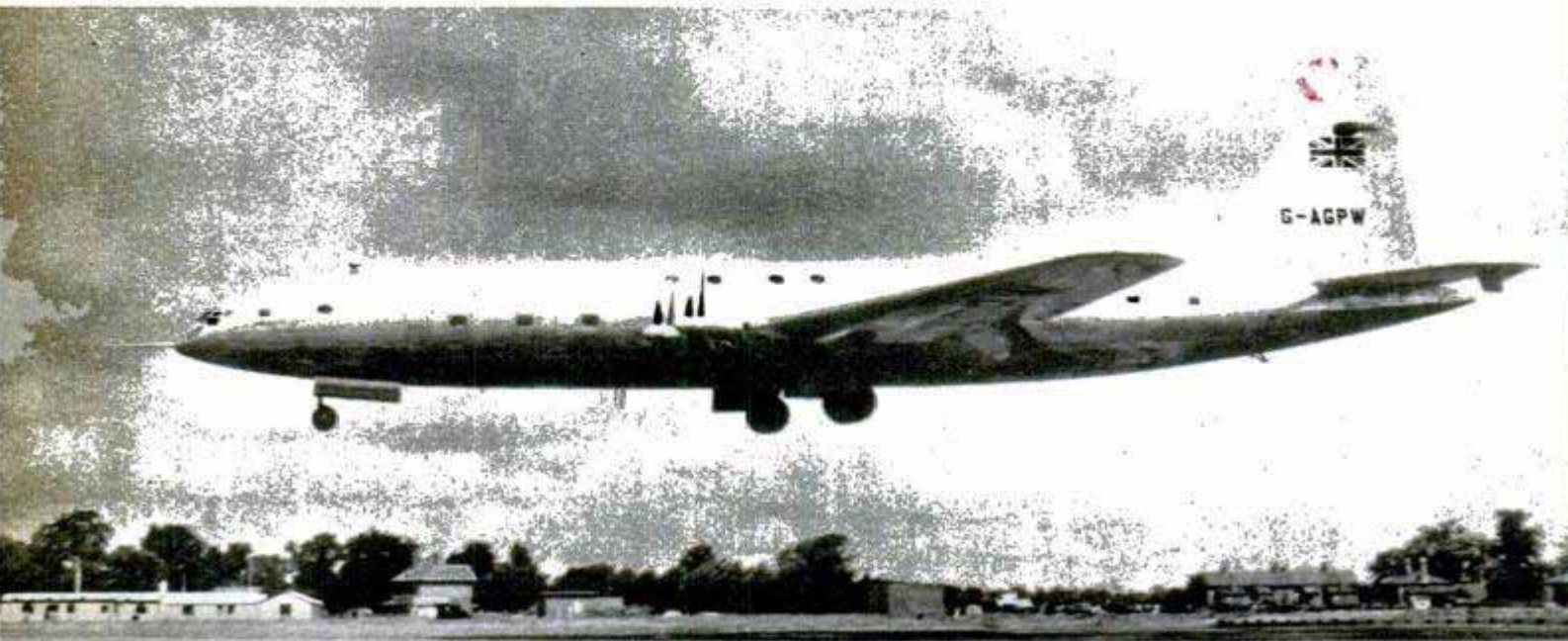
Above, the engineers' room on the flight deck. Below, Brabazon I making its first landing at London airport

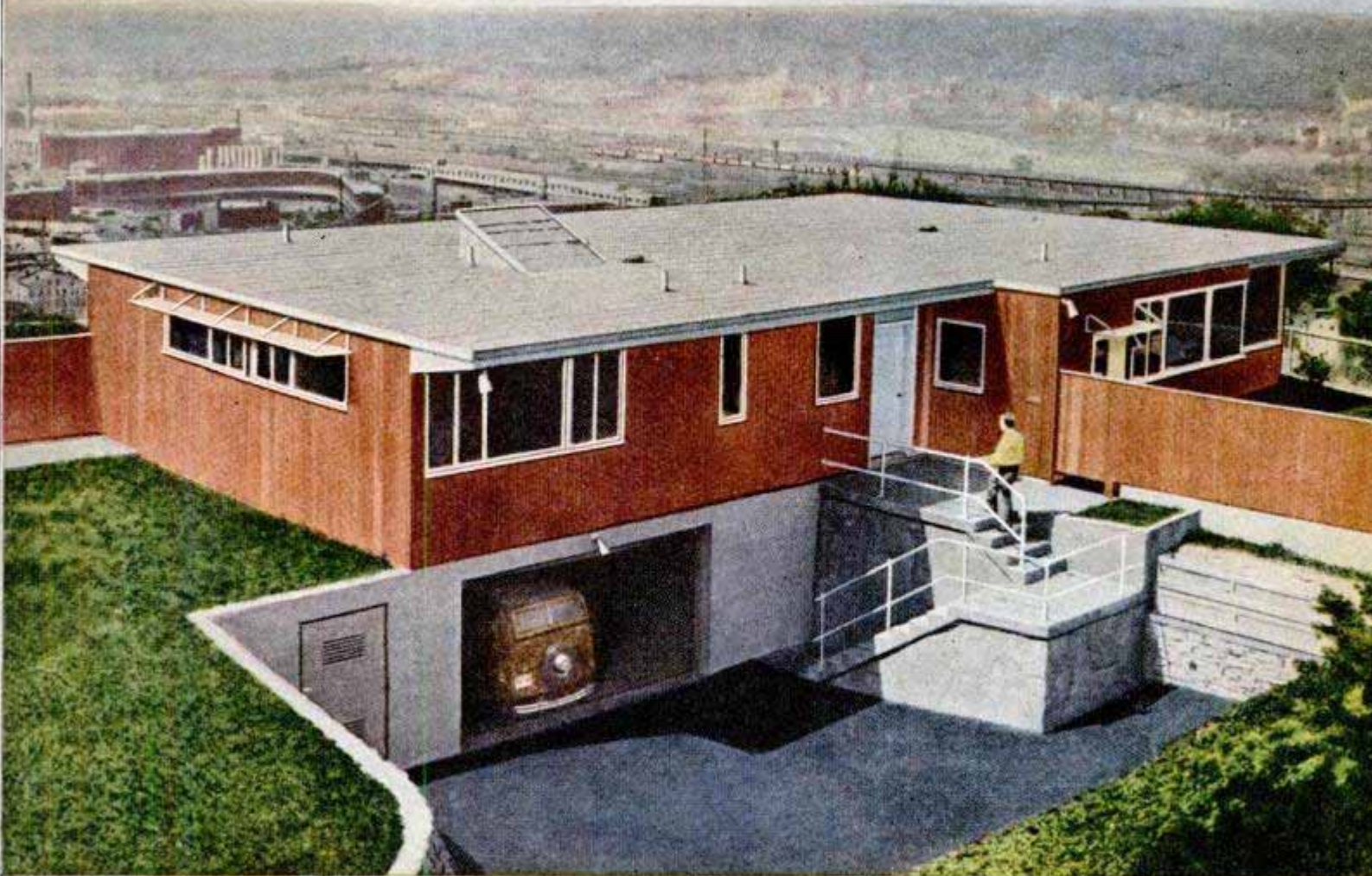
PASSENGERS won't play shuffleboard, but the flight from London to New York on the Bristol Brabazon will be as close to the luxury of an ocean liner as air travel can be. And the passengers, 100 of them, will enjoy the luxury as they speed 35,000 feet above the Atlantic at 350 miles an hour. For shorter flights, the plane could carry 224 persons in ample comfort.

Weighing 290,000 pounds, the "Brab" is the largest non-military landplane in the world. The B-36, with its 320,000 pounds, is the only landplane that tops it. Its 230-foot wingspan is equal to the B-36's and its 177-foot fuselage is 5½ feet longer.

Eight engines power the giant. To the uninformed, the Brabazon appears to be a four-engined craft because the engines are "buried" in the wing in pairs, driving four pairs of contrarotating propellers.

The Brabazon I, now being flown, is used only for research. Slated for 1951 completion and possible London-New York service is the Brabazon II. This newer model will be powered by Proteus gas turbines instead of the piston engines used in the original. These turbines will develop 30,000 horsepower.





High on a bluff overlooking Cincinnati, the Mills house introduces reflective radiant heating and cooling

# The House That's Heated With "Mirrors"

By Wayne Whittaker

**Forget everything you ever knew about air conditioning. It's the body temperature and not the air that makes you comfortable, says a noted Cincinnati doctor who built this unique house to prove it**

**J**UST LIKE A MIRROR that reflects the sunlight, the foil-covered walls and ceilings of a revolutionary house in Cincinnati reflect heat. The air itself—neither its temperature nor humidity—is of little concern in either the heating or cooling of this amazing house. The same principle that enables a skier at Sun Valley to strip to the waist and be comfortable in freezing air temperature and winter sunshine warms this modern home.

Dr. Clarence A. Mills, professor of experimental medicine at the University of Cincinnati and author of "Climate Makes the Man" and other books, has developed what he calls reflective radiant heating and cooling. After 15 years of laboratory experimentation he has built a reflective radiant home on a bluff overlooking down-

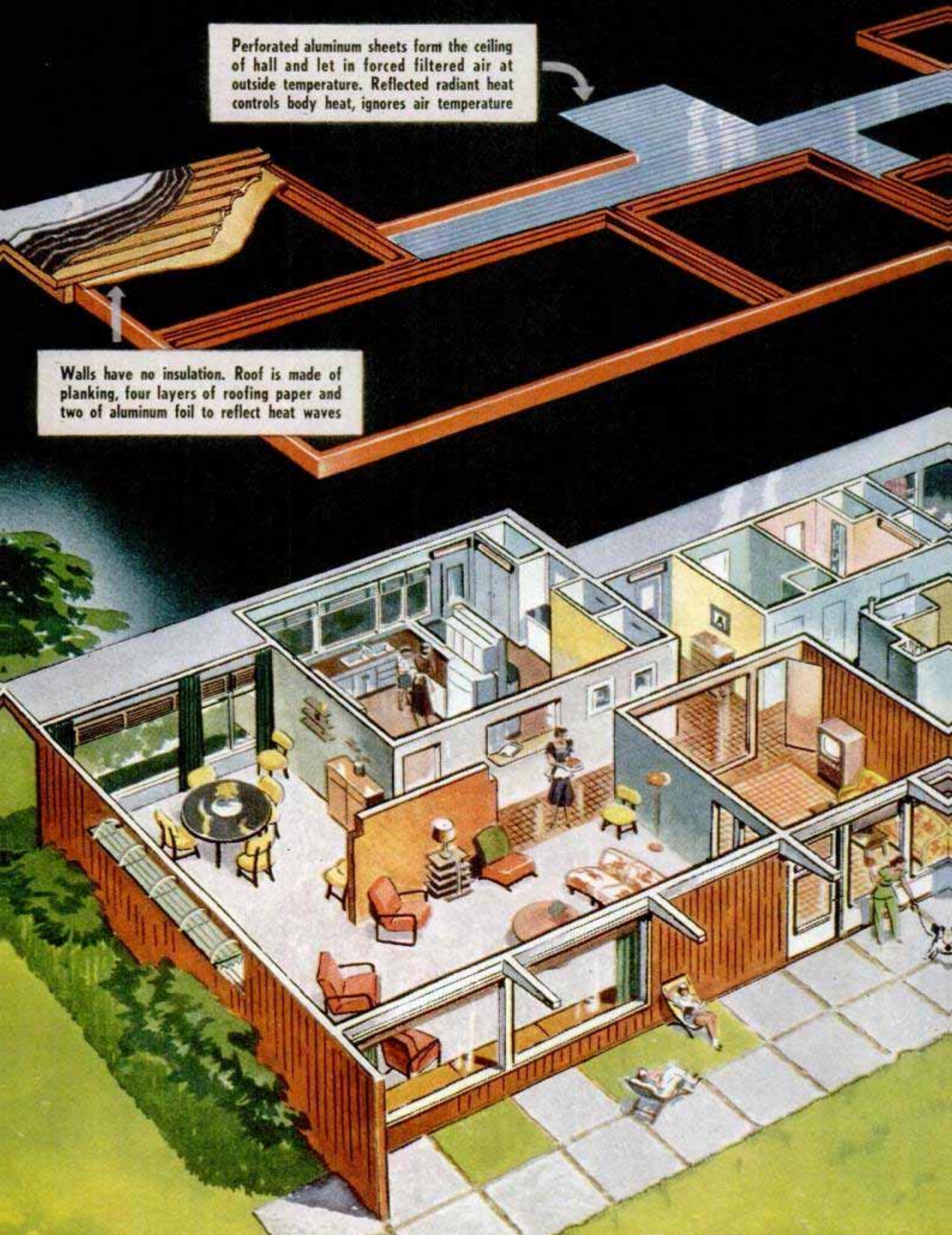
town Cincinnati and the winding Ohio River just to prove what he has been preaching. He calls his home Reflection Point and believes that it may revolutionize the conditioning of houses and commercial buildings throughout the world.

In order to understand Doctor Mills' heating and cooling theory one must drop all thought of air conditioning. Reflective radiant conditioning is not concerned with the air but with man and the rate at which a person loses body heat. If a man is made comfortable by controlling the loss of his body heat, reasons Doctor Mills, the air temperature or humidity means nothing. In other words, you can sit in your shirt sleeves in air temperature of 32 degrees Fahrenheit or lower and be perfectly comfortable. The doctor admits it is a little

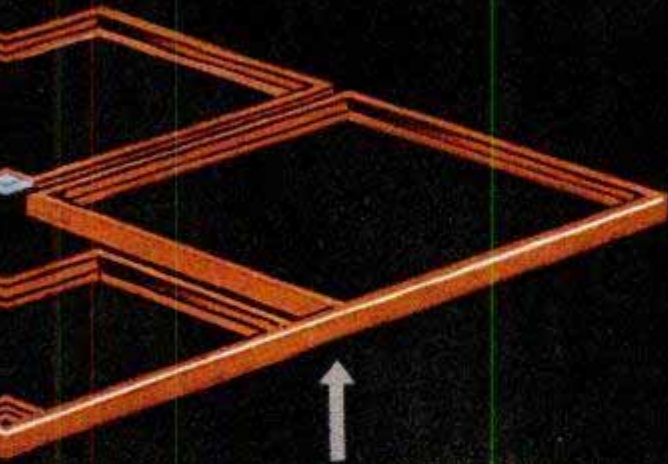
# HEAT WAVES FROM CEILING COVES REFLECT FROM

Perforated aluminum sheets form the ceiling of hall and let in forced filtered air at outside temperature. Reflected radiant heat controls body heat, ignores air temperature

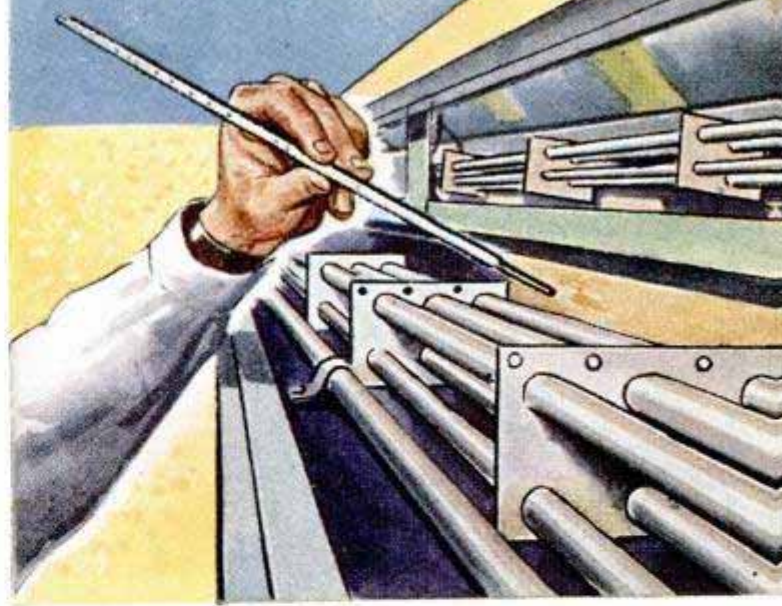
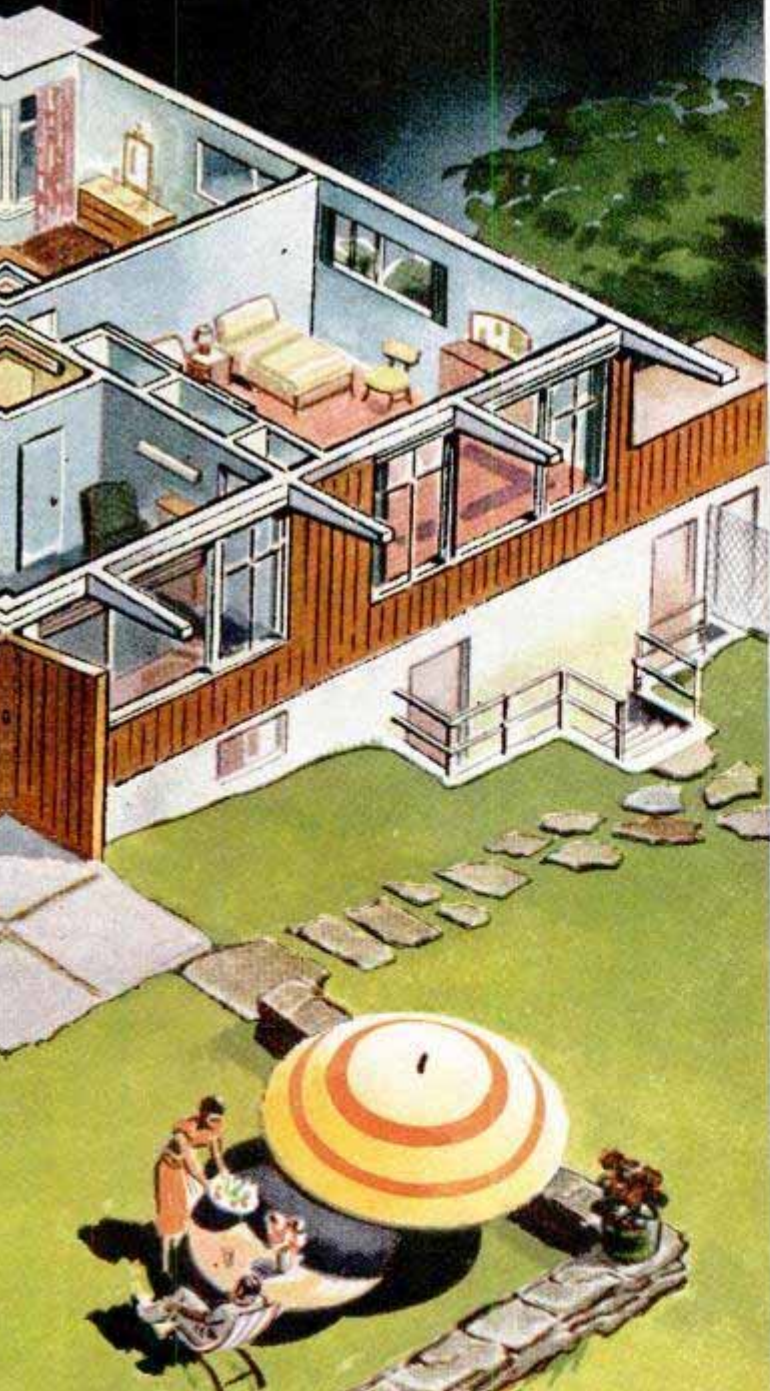
Walls have no insulation. Roof is made of planking, four layers of roofing paper and two of aluminum foil to reflect heat waves



# FOIL-COVERED WALLS



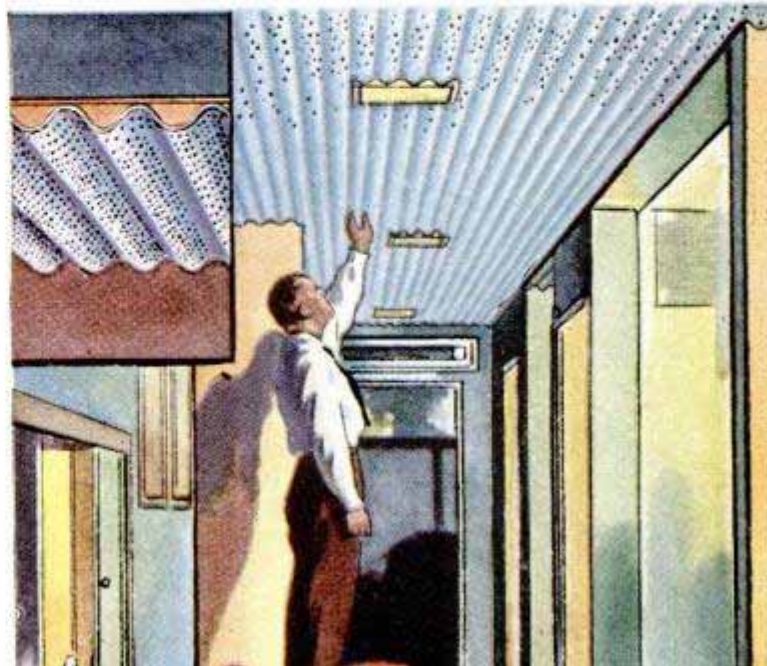
Coves hold both heating and cooling units. Original installation is electric rods for heating. The cooling tubes carry Freon gas



Thermometer registers low temperature in heating-cooling cove in summer. Lower pipes carry Freon gas. Electric current for heating passes through small rods at top. Cove is 12 inches below ceiling



Embossed aluminum foil paper pasted to plywood on side walls serves as passive reflector for heat or cooling waves. House has no insulation. Below, the perforated aluminum ceiling in hall lets in air





**Dr. Clarence A. Mills before picture window explains conditioning system to guest. The heating-cooling cove can be seen above window. Beneath carpet is aluminum foil which reflects heat waves like side walls**

disconcerting to see your breath freezing in front of you under such circumstances, but he contends that people will get used to the idea.

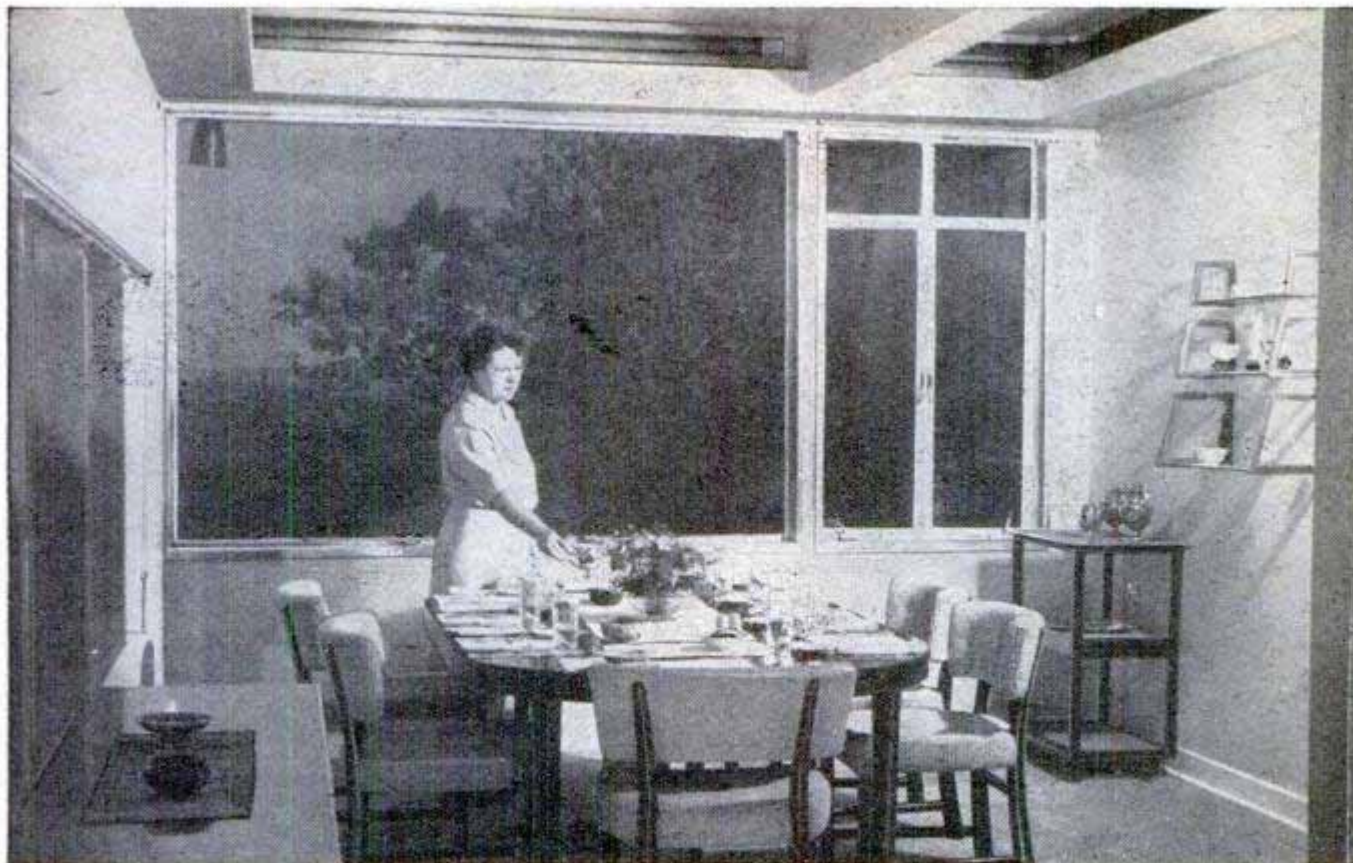
"The story behind Reflection Point starts back in 1930," says Doctor Mills. "I had long been dissatisfied with our antique heating systems and felt that our best answer lay in the radiant control of body heat loss. I made a long study of radiant heating—but that was only part of the answer. Do you know that only one fourth of the human race needs heating compared with

three fourths that need cooling? For health reasons there has been a great need to get away from the sharp contrast between inside and outside air. What I have sought is a combined system."

In his early research, the doctor discovered that Westinghouse had had a laboratory at New Kensington, Pa., which demonstrated that it was possible to make a person comfortable in air from zero to 120 degrees Fahrenheit. Westinghouse used metal walls with hot or cold air behind them, but the experiment was abandoned.

**Left, this end of living room leads to enclosed porch with sliding glass door. Right, long terrace at rear**





Small dining-room window at right is one of few that open. Aluminum Venetian blinds were installed later

"I have merely gone a step further," he explains. "One of the great difficulties with the cold metal wall was that it dripped constantly in summer under direct radiant cooling. I hit upon the idea of lining the inside walls with aluminum foil to obtain a reflective surface. Also, if you use hot or cold surfaces direct for radiant conditioning, air currents are started which result in actual air conditioning."

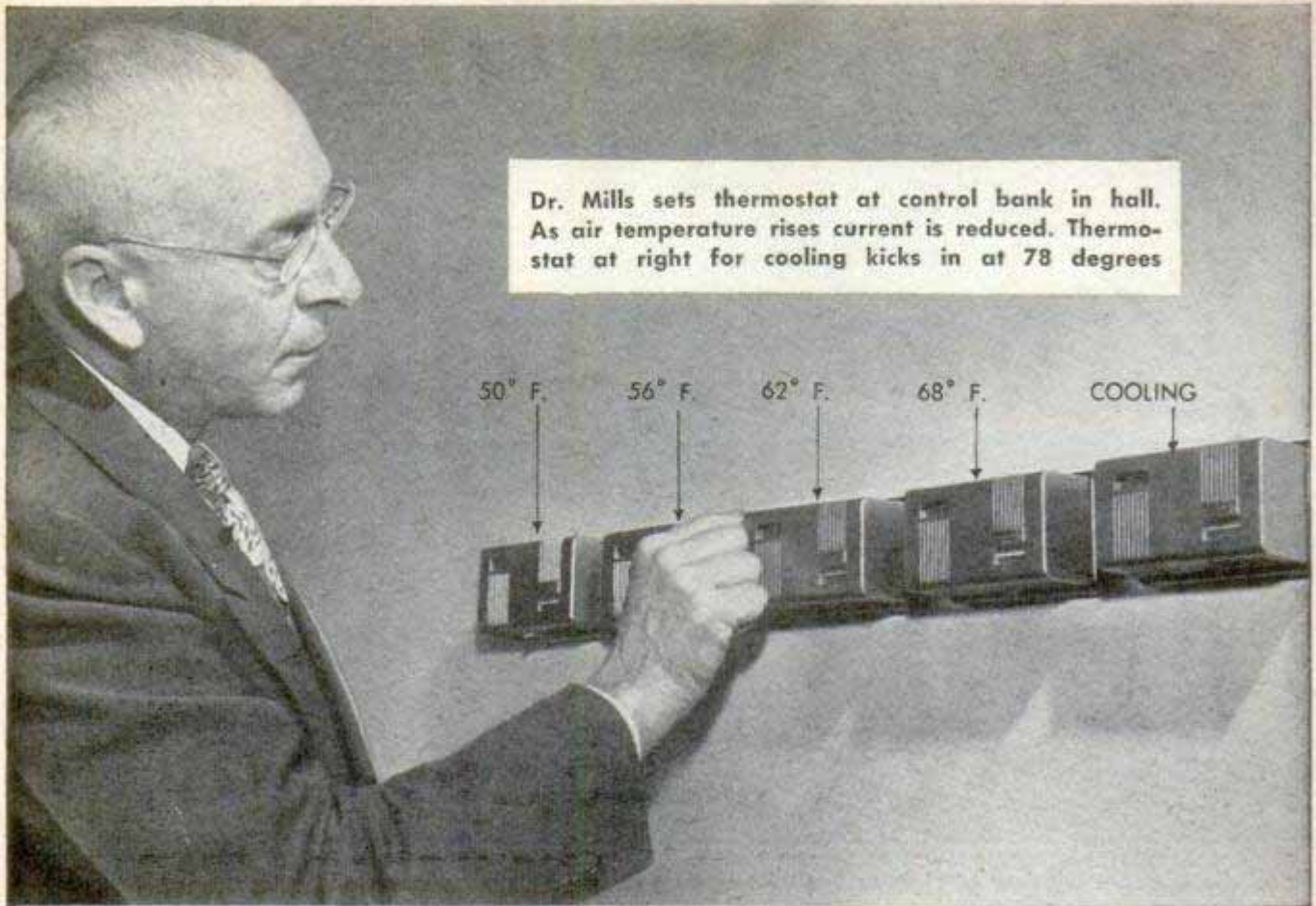
Doctor Mills' wall covering of aluminum foil serves as what he calls a "passive reflector." That is the key to his "mirror" heating. The walls themselves do not absorb the heat waves any more than a mirror absorbs the sunlight which it reflects. Both are passive reflectors. In the Mills system the heating or cooling source is pocketed in a cove or trough near the ceiling. The heat waves bounce off the ceiling to the side walls and into the human body or any other material which will absorb them. In this way the walls are kept at air temperature in both heating and cooling operations and during the latter there is no condensation of moisture.

"After getting the theory ironed out," he continued, "I built four experimental rooms in the Cincinnati General Hospital. Two of the rooms I lined with foil, one for heat tests and the other for cold. The two other rooms were not lined with foil but were kept at identical temperatures and humidity (one hot and one cold) for the tests. We used rats in the experiments and the temperatures ranged from 35 to 95 degrees

Fahrenheit in very moist air. In the non-reflective rooms the animals became weak and stopped growing. But in the foil-lined rooms, under reflective radiant conditioning, the animals thrived at identical air temperatures and humidity. Both rats and people did well at 35 degrees Fahrenheit when radiant heat was reflected on their skin to keep them warm. These experiments spread out over a number of years and finally convinced me that I really had something."

There were also hints in the early experiments, Doctor Mills recalls, that it might be possible to "spot heat" various parts of a house. This was not to be proved until Reflection Point was completed last summer. The living room and dining room of the house are connected with a wide opening, yet it is possible to spot heat—or cool—the dining room and not the living room and vice versa. This is done by the flip of a switch, much as you would turn on a light. Spot heating is made possible because the air is not concerned in the heating system—a radical idea which is hard to grasp in our "air minded" generation. Doctor Mills believes that spot heating or cooling may eventually bring down heating or cooling costs near what we pay today for light.

One problem during the early experiments was that with the use of smooth foil there were cold spots or hot spots in a room. What was needed was a surface that would break up the heat or cold waves and send them out at every angle. An embossed

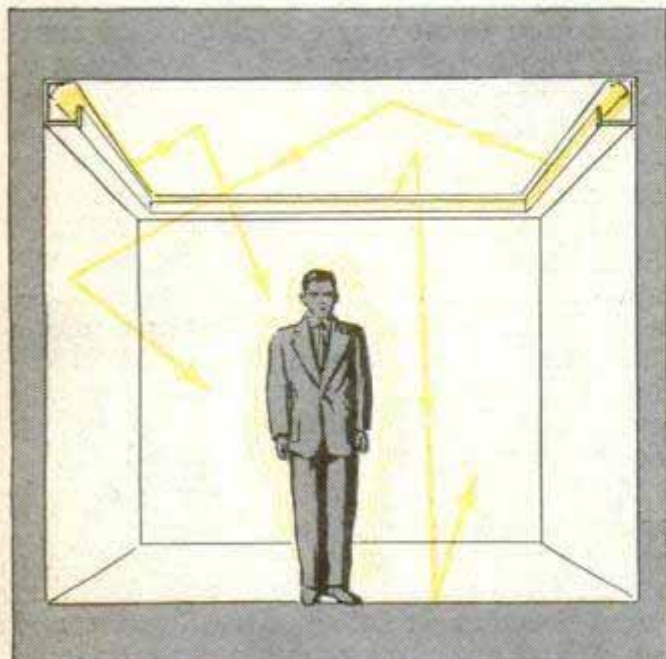


Dr. Mills sets thermostat at control bank in hall. As air temperature rises current is reduced. Thermostat at right for cooling kicks in at 78 degrees

paper was the answer. Doctor Mills discovered that one company made such a paper in attractive designs and colors for Christmas-package wrapping. And so, the handsome wallpaper in Reflection Point, which ranges in color from bronze, green and yellow to a neutral light gray, was originally made for wrapping gifts.

The house was designed and decorated by two other teachers at the University of Cincinnati, Robert A. Deshon of the department of architecture, and Robert J.

Lines show indirect or reflected path of all heat waves which start in cove and bounce off ceiling



Stevens, decorations architect. Reflection Point is "conservative modern" with flat roof, wide picture windows and every inch of space utilized. There is a large living-dining room area, combined kitchen and utility room, two bedrooms, two baths, a study, and enclosed porch which adjoins the living room, entrance hall and long central hallway. The basement harbors a two-car garage and three rooms for storage and service equipment.

The ceiling of the central hallway is cov-

Bedroom rug is rolled back to show waffle-design rubber mat, aluminum foil and cork floor covering







Night scene taken from rear terrace shows the open arrangement of rooms and glowing foil-covered walls

ered with corrugated and perforated aluminum through which outside air is brought into the house via an electrostatic air filter in the basement. One thousand cubic feet of clean air a minute can be pumped into the house without perceptible draft. This air system serves for ventilation and for maintaining an outward air current through all cracks or any openings, such as a door or window. Incidentally, there are only five windows in the house that open. They were put in to satisfy some conventional members of the family, says the doctor, and not because they were necessary. Next time, all windows would be fixed plate glass.

The house sits on a reinforced-concrete slab and is of wood construction with vertical redwood siding. There is no insulation in the walls, ceiling or floor construction. The sidewalls consist merely of ½-inch Gypsum wallboard on the inside of the studding and a layer of plywood for rigidity and the redwood outside. The roof is made of 7 by 12-inch built-up beams, spaced every eight feet to carry the planking and surface roofing. The entire roof is covered with aluminum foil. The concrete slab is heavily reinforced over the basement areas but otherwise lies directly over gravel-covered rocky earth and contains no

insulating material. Heat loss downward is minimized by aluminum foil (facing upward) directly over the concrete. A waffle-design foam-rubber mat which gives point contacts is placed over the foil and finally nylon carpeting in the living room, dining room, den and one of the bedrooms.

(Continued to page 234)



"Accordion" doors of bedroom and hall closets are made of corrugated plastic resembling gray leather



# **Detroit Listening Post**

*By Siler Freeman*

**S**TUDEBAKER is on schedule to come out with its 1951 models. It is expected to go into production on the new cars early this month.

There will be few changes outwardly, mainly a face-lifting job with most of the differences being found in the grille and trim. Maintaining its pioneering in the so-called postwar design, present Studebaker styling is considered good enough to keep the South Bend firm in an enviable position in the automotive field. Use of its automatic transmission will be extended.

The new Nash, now in production, shows considerable styling revisions. It has new rear fenders and a different deck shape as well as a new grille. The exterior trim is also new and different.

The 1951 Nash Ambassador and Statesman lines went on display in September. Principal change from 1950 models is the elongated rear fenders which come with streamlined vertical fins. Tail and directional-signal lamps are moved from the trunk lid to the rear fenders. The airline-lounge type rear seat is retained in the club coupe. The Ambassador has a 115-horsepower engine with a compression ratio of 7.3 to 1. The Statesman uses an L-head, 85-horsepower engine with a 7 to 1 ratio.

The new Ford, due later in the year, will feature many engine and transmission refinements. It will also have improved shock absorbers. The new automatic transmission, with which the company has been concerned for some time, will show up in the 1951 cars.

The auto industry is still going heavily to new engines, despite the threat of allocations and war orders. Studebaker has one, an overhead-valve job that resembles the Cadillac's V-8. It will be given to the Commander and Land Cruiser for 1951. The engine has been tested and shows much of Cadillac's economy as well as power. It is slightly smaller however, having a cubic-inch displacement of about 280 against Cadillac's 331.

Lincoln-Mercury engineers have been driving around behind their new V-8, high-compression power plant, equipped with

the new automatic transmission. The combination is reported to be hard to beat on getaway and high-speed driving, as well as terrific power.

Kaiser-Frazer is also working on a new engine, or rather two engines. One is a six cylinder with a seven-bearing crankshaft and the other is a V-8 with a five-bearing crankshaft. Because of the long testing period plus the huge investment in an engine program, K-F is probably two years away from production of the new engines.

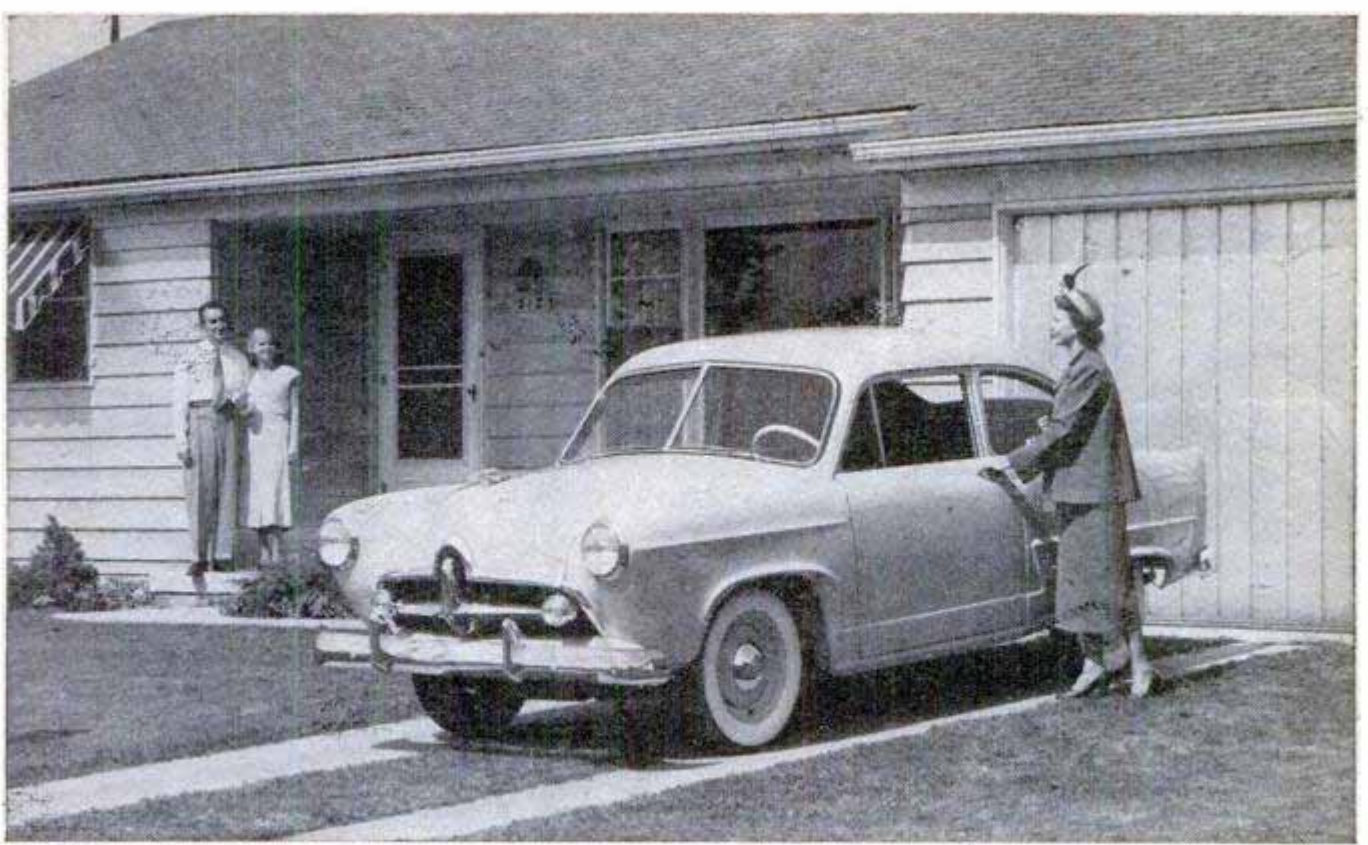
General Motors' new-model program was somewhat in the balance only a couple of months ago. Although the 1951 lines have been finalized, a big difference of opinion came up at one of the policy-committee meetings on how the corporation should go.

Several wanted to halt all preparations for new models this year, as well as 1952 and 1953 planning, until the government came to a decision on its defense program and its effect on the auto industry. But Harlow H. Curtice, executive vice-president, led the group which urged the corporation to keep on as usual until all-out war was in the offing. He won out so GM customers will have their new cars, a bit late perhaps but nevertheless as planned.

GM is already committed to its annual showing of new models at the Waldorf-Astoria in New York in January. What worries the top GM executives is the inroads the government may make on its engineers who are already packed to move into its new \$600,000,000 technical center in Centerline, Mich.

If anything, GM has planned a larger staff of research and lab experts when it finally completes its new center. The defense program's extent and needs will determine it, however. Fisher Body is taking over the research center's old quarters, behind the GM Building in Detroit.

Production, kept high since last February by the huge demand for new cars, will probably start sliding the other way this quarter. Changeovers by those companies which have not yet brought out new models for 1951 will keep output lower than for the past six months.



## Kaiser's Henry J

Coincident with the showing of the highly publicized Henry J, the Kaiser-Frazer Corp. has released specifications for the first time. The low-priced offering of the Willow Run company is being shown only in the six-cylinder models but the four will be put on the assembly line shortly. The six is rated at 80 horsepower, while the four is 68. Both are L-head high-compression types, made by Willys-Overland for K-F. The Henry J has an over-all length of 174½ inches. The tread is a standard 54-inch front and rear and its turning radius is 17½ feet. It is less than five feet high but has a road clearance of 7½ inches. Great power is claimed for the engine, as well as smooth operation through use of a counterbalanced crank-

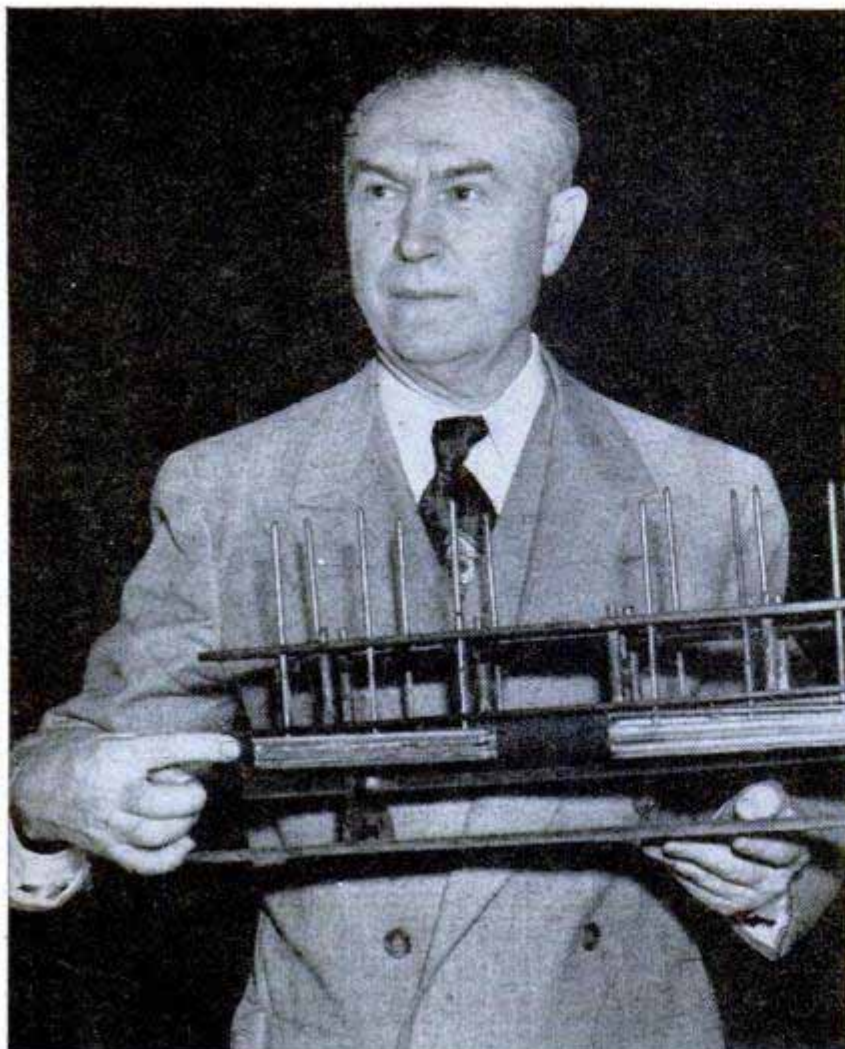
shaft with a stroke of only 3½ inches. A ventilation system, which pipes clean air for the crankcase through the carburetor air filter and exhausts it through the manifolds, is another feature. The company tests have shown the car goes from zero to 50 miles an hour in 10 seconds, to 60 in 14 and 70 in less than 20 seconds. Gas mileage between 30 and 35 miles to the gallon is claimed. The car was put through grueling tests before being put on the market, according to company officials. Back-country roads of Arkansas, reputed to be the worst in the country, were selected for the tests, which ran up 5000 miles. A team of five specialists accompanied a production model to Jonesboro, Ark. Experts computed that each 100 miles on the twisting, tortuous terrain would equal 5000 miles of normal driving.



## Ranch-Plank Flooring

Plank flooring especially designed for ranch-style homes has a typically Western appearance. Walnut pegs are glued into the random-length planks at the factory. The oak flooring is laid in alternate strips, 2¼ and 3¼ inches wide. Prefinished with a penetrating seal, the planks can be nailed in place by the homeowner himself.

☐ Lubricating-oil stocks are shipped hot from Houston to New Orleans in a 240-foot barge heavily insulated to reduce heat loss.



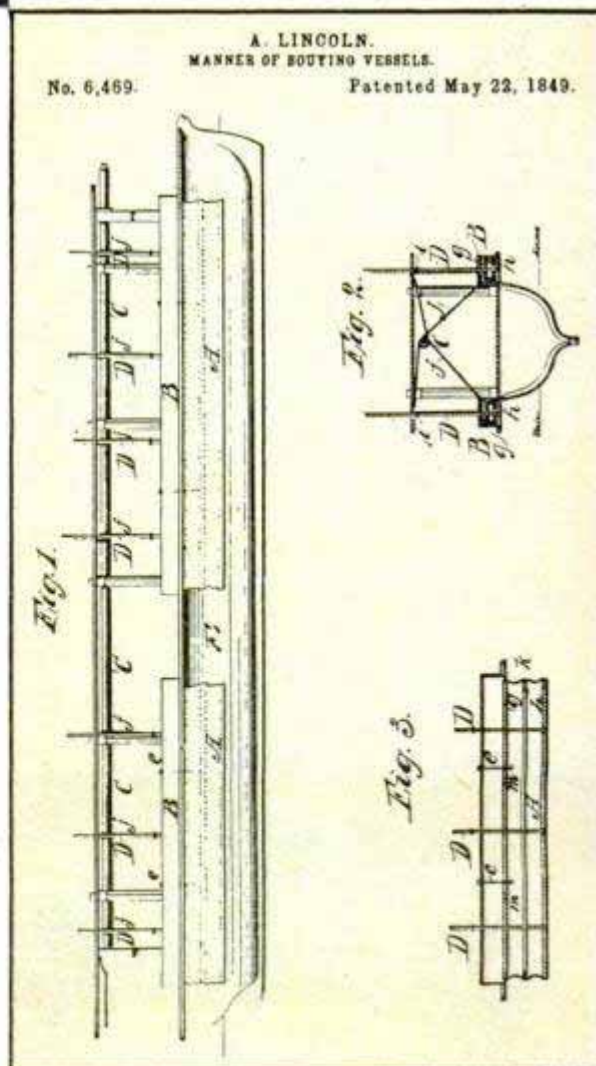
The author holds boat model made by Lincoln and points to bellowslike affair on side which could be filled with air by pumps to lift a boat off sand bar. Patent drawing below

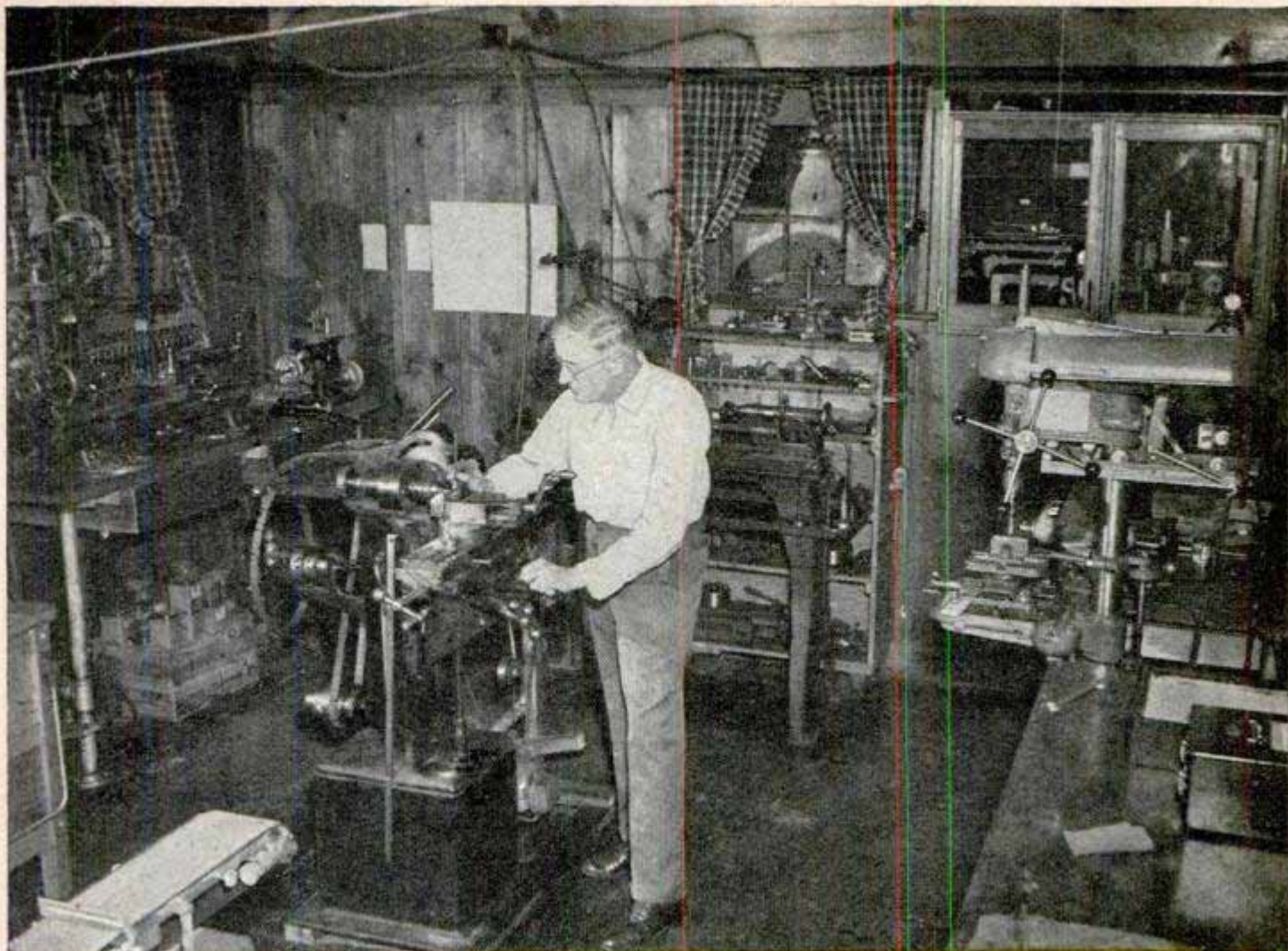
# INVENTING— Hobby of Famous People

By Aubrey D. McFadyen

**J**AMES BRYANT CONANT, president of Harvard University, was a young man just out of college when he patented two of his pet ideas for manufacturing benzoic acid. With Stanley Pennock, all-American guard at Harvard, he ventured into production. The commercial practice of Conant's idea proved tricky and misfortune plagued the enterprise. Twice their plant was destroyed by fire. Pennock was killed in an explosion which started the second fire. Finally, Conant sold his patent rights and became a chemistry professor at Harvard.

Like Conant, nearly everybody, from presidents to prisoners, has been inventing. It excites little wonder when a noted pianist patents automobile parts, or when a world's champion pugilist patents a monkey wrench, or when a scion of one of the nation's wealthiest families patents a shoe-polishing device. The name of Albert Einstein is so much in the public



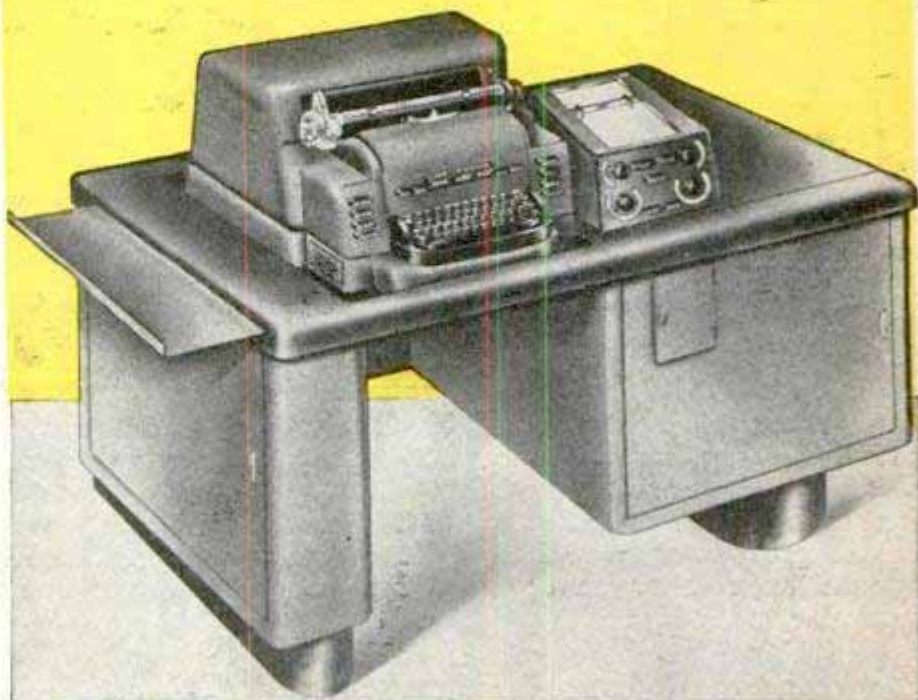


print in connection with atomic energy that his patenting a new refrigerator, or a novel camera structure goes unnoticed.

Of the 2,500,000 patents granted to date by the United States Patent Office, approximately a million of the inventors are alive today. Win or lose, not one of them is likely to deny that his fling at inventing was an exhilarating adventure. These inventors represent a true cross section of our population and include names few of the public will recognize as inventors.

Take Abraham Lincoln, for example. As a young man, working along the Mississippi and Ohio Rivers, Lincoln noticed that steamboats frequently became grounded on the shoals and flats. He designed a system of inflatable bellowslike gadgets for attachment to the hulls

Dr. Vannevar Bush, director of the Carnegie Institution, in his well-equipped workshop where he has turned out many inventions. Below is newest invention he has been instrumental in developing, an automatic typewriter which can photograph type to speed printing. The film is transferred directly to engraving plates, eliminating the need for casting each line in metal by Linotype





Josef Hofmann, the noted pianist, at left, with compressed-air shock absorber; right, his key-action device

of boats. In case a boat were grounded, or had to traverse shallow water, the bellows could be expanded to lessen the draft of the ship.

While Lincoln is the only one of our presidents who received a patent on an invention, others have made inventions. George Washington invented a wine coaster, a seeding plow and other farm devices, all of which are recorded in his diary. Thomas Jefferson originated, among other things, the folding buggy top, lap desk, modern plowshare, one-arm lunchroom chair, and swivel chair, the latter now in use all over the world.

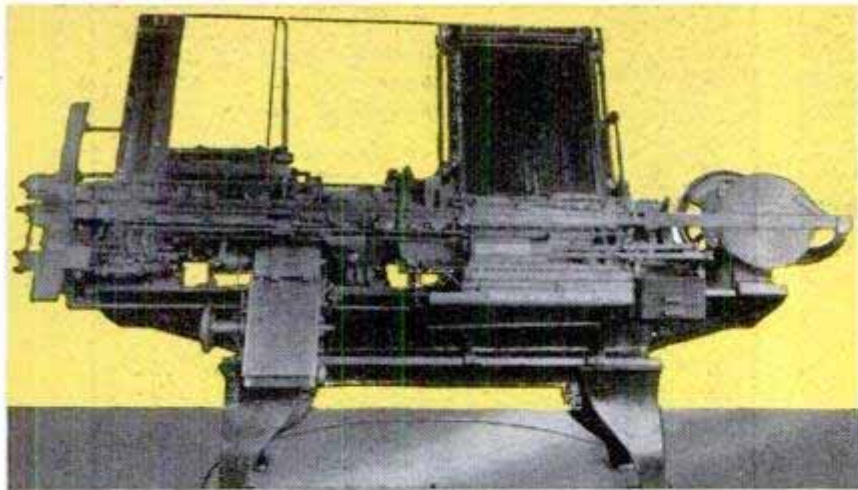
Lincoln's trips up and down the Mississippi recall the patents of another famous character who used to be a steamboat pilot—Samuel L. Clemens, better known as Mark Twain. Clemens patented three inventions—an adjustable strap for gentlemen's vests, a game to assist in memorizing historical dates and a self-pasting scrapbook. In the scrapbook, blank pages were provided with spaced patches of dried glue. Clemens made money out of his scrapbook, which, he admitted, "was pretty good for a book that contained not a single word for criticism"; but he lost all the profits from the scrapbook and his accumulated fortune besides, on the inventions of another man. He staked his entire fortune on an invention of James W. Paige, of Rochester, N.Y., an oil prospector, who had an idea for a typesetting machine that promised to revolutionize the industry.

The Paige machine was designed for composing the individual characters and

justifying the lines to duplicate hand composition. After a decade of intense work—four years on the keyboard alone—the idea was ready for patent application and manufacture. In the Patent Office the Paige patent is still known as the "whale," because of the 176 sheets of mechanical drawings necessary to portray the invention, for the machine included more than 18,000 parts.

Just when the Paige enterprise seemed to be going to town, Otto Mergenthaler brought out his relatively simple and cheap Linotype, which, in addition to eliminating the handling of small pieces of type and returning the same to their cases after use, made a fresh cast each time. The Paige machine was so complicated and costly that it could not compete.

Though misfortune plagued Clemens and Paige in their development of a typesetting machine, another famous man recently achieved spectacular results in the same field. Dr. Vannevar Bush, wartime director of the Office of Scientific Research and Development, has announced a photo-typesetting machine which may make obsolete the process by which this page was printed. The machine, about the size of a desk, has an ordinary typewriter keyboard. When the operator presses a key the machine photographs a letter either on positive or negative film. The film is transferred directly to engraving plates for printing, thereby eliminating the need for casting each line in metal. An electronic "brain" justifies the lines as they are set. The material also is typed on a sheet of

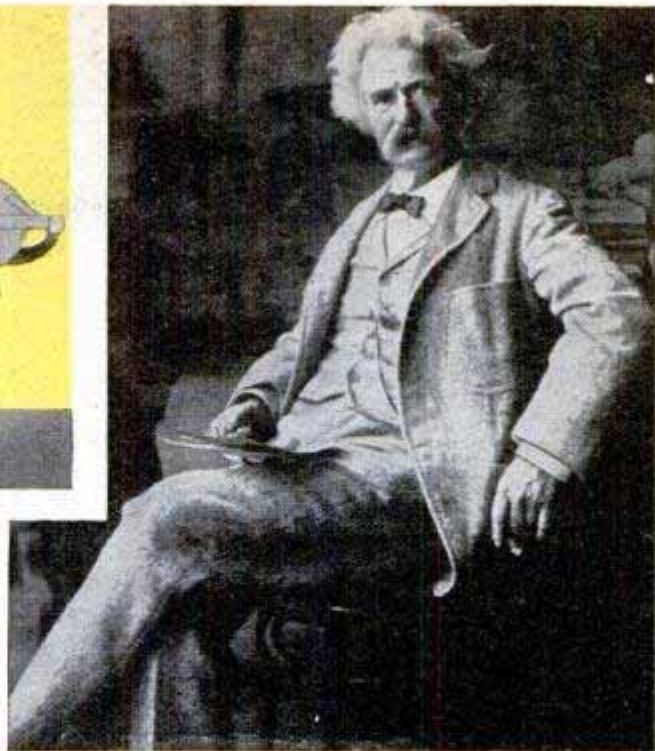


paper, enabling the operator to proofread his work as he proceeds. He can make corrections by pushing a button which "erases" erroneous letters and brings the machine into position to type the correct letter. The machine "sets type" four to five times faster than modern Linotype machines. It was developed by Doctor Bush, his associates at the Carnegie Institution of Washington, and two French telephone engineers who were doing independent work in the same field.

In general, inventions are the by-products of one's occupation and contacts. Thus, Bernarr MacFadden, of physical-culture fame, was granted a patent on a practice golf range. Walter Hagen, one-time champion of the fairways, patented a golf ball which, his patent states, is "accurate in flight as well as in putting and rolling." Glenn S. Warner, football coach, patented improved shoulder protectors for his players. Charles Brickley, famous Harvard drop kicker of 30 years ago, whom sports writers described as having an "educated" toe, wore a patented shoe which was his own invention.

Other sports celebrities who have patented inventions include René LaCoste, French tennis star; Eugen Sandow, once the "strong man" who patented apparatus for measuring his strength; and Max Carey, one-time star of the Pirates, who patented the special pad he wore to save his hide when sliding into a base. The Shibes—Benjamin, Thomas and John—names long synonymous with baseball in Philadelphia, hold more than two score patents on baseballs and apparatus for making them. Gertrude Ederle, who in 1926 gained renown as the first woman to swim the English Channel, holds design patents for a doll in a bathing suit, and goggles for swimmers.

Of the heavyweight-champion prize fighters, Bob Fitzsimmons and John Arthur "Jack" Johnson are listed as inventors. Fitzsimmons invented a punching-bag support and Johnson patented an automobile lock and a monkey wrench.

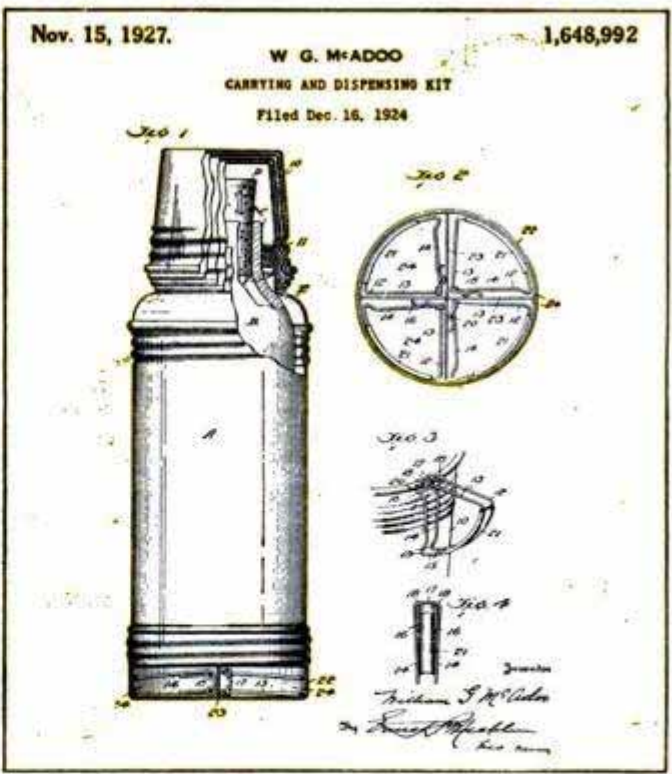


Mark Twain, author and inventor, lost a fortune on another man's brainchild—the Paige typesetter, at left above, which was extremely complicated and outmoded by Otto Mergenthaler's more practical Linotype



Gertrude Ederle invented a pair of goggles which she wore when she swam the English Channel. Below, Miss Penny Pendleton and her holder for spectacles





Left, the author holds lap desk invented by Thomas Jefferson. Right, William G. McAdoo's vacuum-flask cups

It is a long jump from Jack Johnson to the Astors, Vanderbilts and royalty, but all are in the same boat as amateur inventors. Col. John Jacob Astor, who went down with the Titanic, patented a road-cleaning machine operating on the principle of a vacuum cleaner.

Three of the four men to bear the name Cornelius Vanderbilt have made inventions. The present Cornelius Vanderbilt, the journalist, patented a shoe polisher in which a cloth unrolls from a penlike barrel. His father, Gen. Cornelius Vanderbilt, invented a locomotive firebox that was long standard equipment on railroads.

Lord Louis Mountbatten, who served Great Britain as Viceroy of India and is a British Navy officer, has patented several inventions pertaining to gunfire and ship control.

In the field of entertainment, dozens of patents were granted to the magicians, Harry Houdini and Howard Thurston. Oscar Hammerstein, theatrical magnate and opera impresario, patented some 30 inventions on cigar-making machines. Cigar-making was Hammerstein's first occupation and provided much of the fortune he invested in theatrical productions.

Edgar Bergen, radio and screen star, has taken out several design patents on doll heads invented by him. Charles Ray, movie idol of the early '20s, is found in the Patent Office index as a pioneer inventor of electrical automobile turn signals. In general, the movie colony has left the matter of improving their art to its skilled technicians. However, David W. Griffith was granted

five patents and the name of William Fox appears three times as a patentee. Jimmy Durante holds a trademark registration on his profile, with the word "schnozzle."

Col. Charles A. Lindbergh invented a navigation wrist watch, which permits direct reading of the hour angle, necessary in determining longitude. This instrument was used by the Lindberghs in their early intercontinental flights.

While Wiley Post and Harold Gatty were making their round-the-world flight, Gatty thought up a gadget by which he could determine, while in flight, the stratum offering most favorable tail winds.

When the patent law was broadened in 1930 to allow granting of patents on new plants and flowers, Harold Ickes, long-time Secretary of the Interior and flower fancier, was one of the first to apply. He was granted patent No. 19, covering a dahlia of coral-red color. Only one plant patent was issued to Luther Burbank, the noted horticulturist, and that posthumously.

Two members of Woodrow Wilson's cabinet also took out patents. Newton D. Baker, Secretary of War, patented a special brush for dusting shelves and books. William Gibbs McAdoo, Secretary of the Treasury and later senator from California, burned his hand on a hot Thermos-bottle cap and invented the familiar cap-and-cup arrangement. The second patent to McAdoo covered a safety razor in which new blades could be inserted without taking the razor apart. This invention set the present trend in safety razors.

Josef Hofmann, concert pianist, has taken





Harold Gatty invented a device for world-girdling Winnie Mae that told wind force at various levels

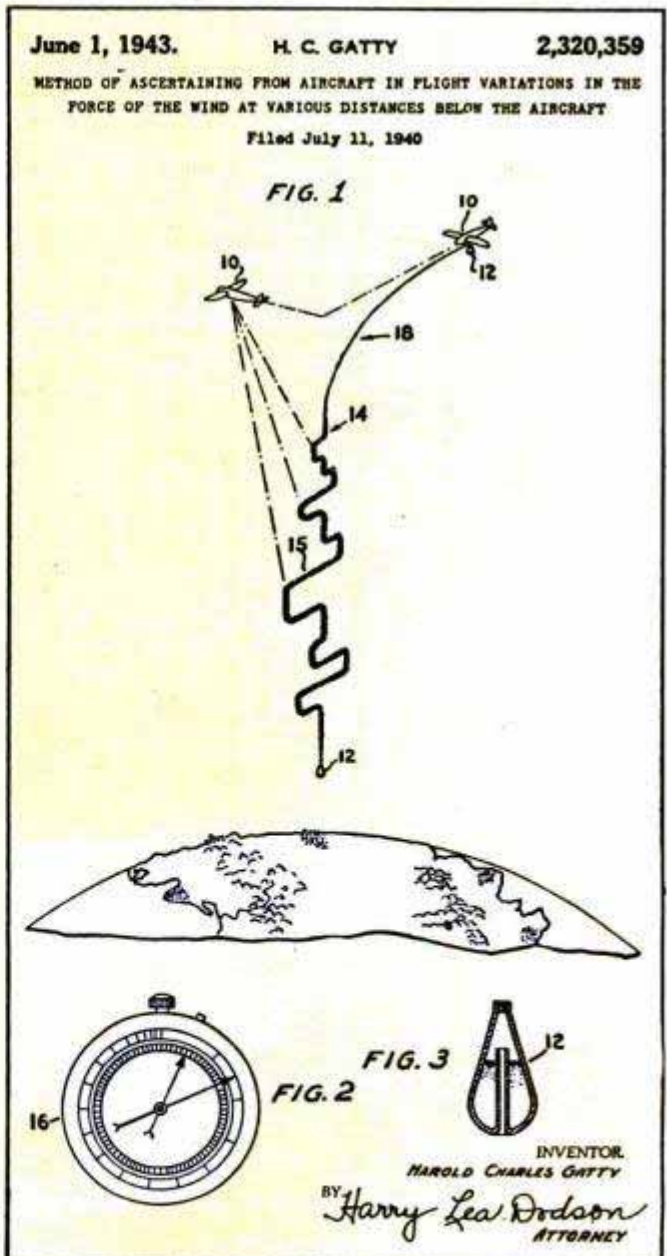
out a dozen or more patents, several for automobile steering mechanisms and stabilizers. Before coming to this country, he built one of the first steam-propelled cars.

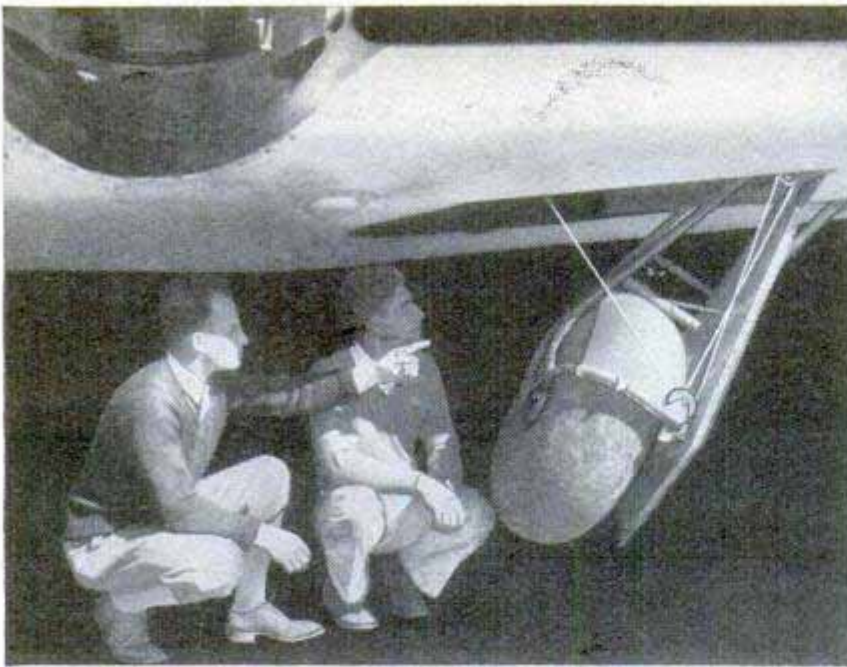
The joint inventions of the sons of two famous musicians made possible present-day amateur color photography, both movies and prints. These men are: Leopold Godowski, Jr., son of the pianist-composer; and Leopold Damrosch Mannes, now successor to his father as director of the David Mannes School of Music in New York.

These inventors became acquainted during childhood. Both manifested an early interest in photography and in time they conceived the idea that color photography was possible by the use of multilayer coatings. They communicated their idea to the Eastman Kodak Company, and in turn were invited to join the Eastman staff in Rochester. Godowski and Mannes spent 10 years at the Eastman laboratories exploring their idea. While their first basic concept turned out not to be novel, they did develop the basic color sensitizers upon which Kodacolor and Kodachrome photography are based.

Jumping to the other extreme in music, we find that Borrah Minevitch, the harmonica king, has confined his inventions to his business, all his patents relating to harmonica construction.

It is not surprising to find patents to Ardé Bulova on watch improvements, nor to the late Henry Ford, who made and patented more than a hundred inventions. But it is surprising to find that the name of André Dubonnet, probably the most famous wine producer and merchant of France, appears six times in the Patent Office records as





Disappearing landing gear of Sirius monoplane was invented by Col. Charles A. Lindbergh. Most of his ideas are given to public domain

inventor of various knee-action arrangements for automobiles. When knee-actions were introduced in 1935, Dubonnet began collecting royalties far exceeding the yield from his wine business.

Another executive who struck it rich with his invention is Sanford L. Cluett, president of the Cluett, Peabody Company, shirt manufacturers of Troy, N. Y. During manufacture, fabrics are stretched, and Cluett devised a process and apparatus for

crowding the fabric back together again, leaving small residual shrinkage. Today, Sanforizing is a commonly used process for preventing shrinkage of many fabrics.

While many celebrities have dabbled in inventing, with varying success, other persons have become celebrities by reason of making but a single invention. For instance, Samuel F. B. Morse and Robert Fulton were well-known portrait painters of their day, but now are known almost exclusively for their work on the telegraph and steamboat, respectively. Both Alexander Graham Bell and Eli Whitney probably would have remained obscure teachers save for their inventions. Charles

Goodyear was a physician; Eli H. Janney, inventor of the railway-car coupler, was a clerk; George M. Pullman, inventor of the sleeping car, was a street contractor; George Westinghouse, a 23-year-old carpenter-machinist, invented the modern air brake. The world has about forgotten that the Wright brothers operated a bicycle business in Dayton, Ohio. King C. Gillette, of safety-razor fame, was a hardware

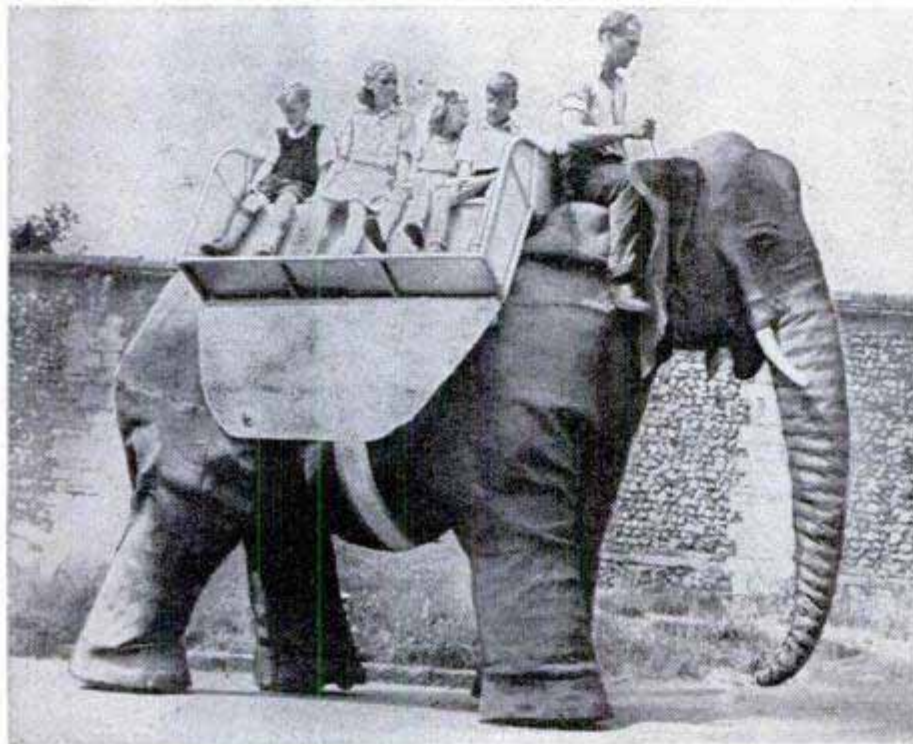
(Continued to page 264)

Howard Thurston, the magician, held dozens of patents. He never told how he kept a man alive underwater



## Highway Tanker

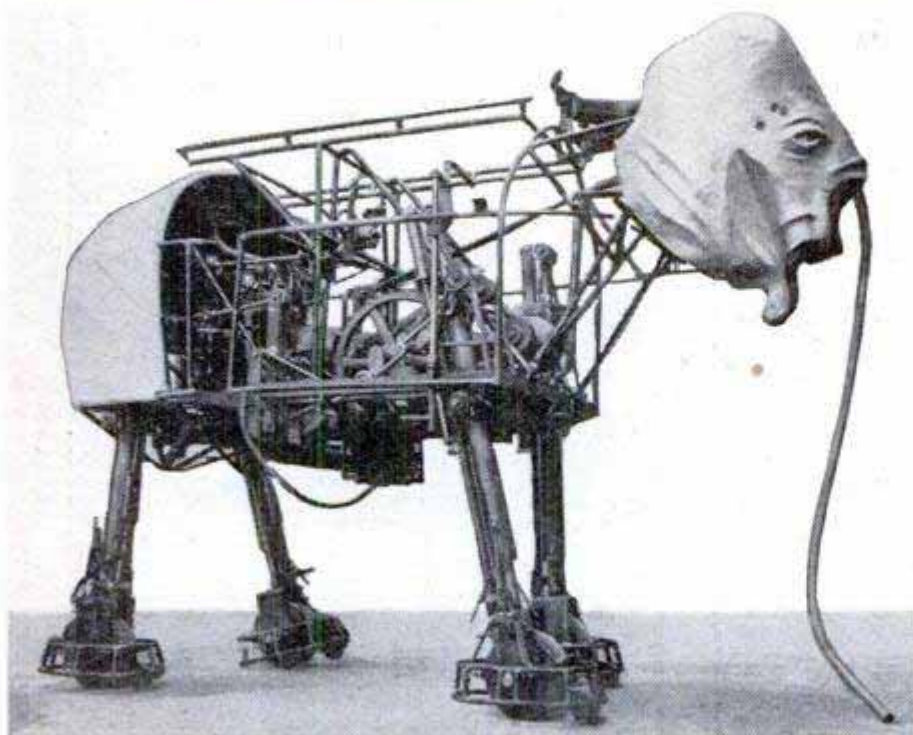
It takes a crew of six to operate a giant French tank truck that has a capacity of more than 44,000 gallons. The crew includes a chief driver, front and rear drivers, a mechanic and two helpers who ride on outriggers at the rear to watch clearances on each side. Designed to cut petroleum-transportation costs, the 56-ton vehicle travels between Bordeaux and Le Havre.



## Mechanical Elephant

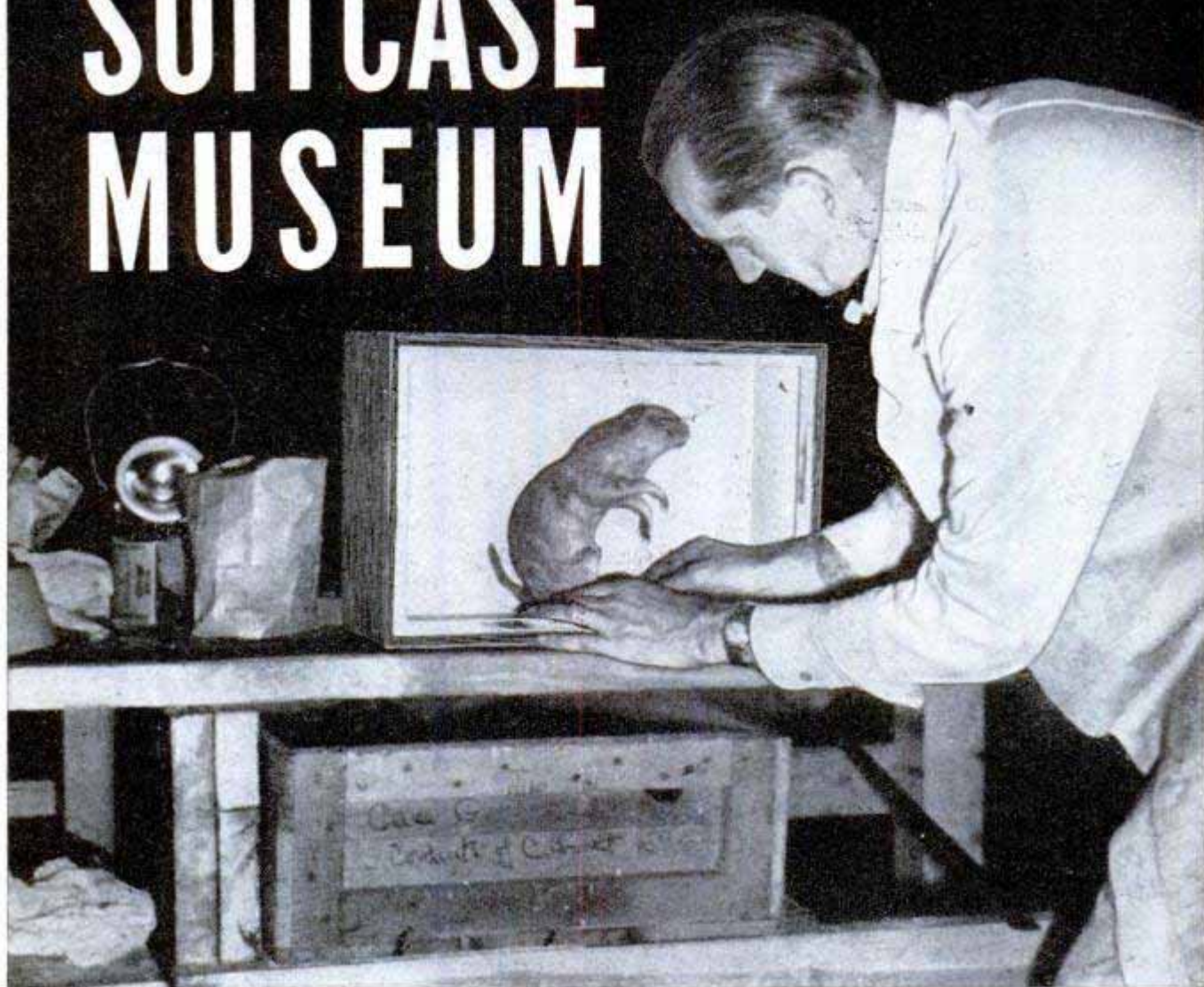
Walking, waving its trunk and flapping its ears in a realistic fashion, a mechanical elephant may soon be popular at amusement centers because its "feed" bill is small. An attendant sits on the robot's neck, operating the controls. The 8½-foot model is powered by an 8-horsepower engine and has a ½-inch-thick "hide" of toughened paper. The exhaust pipe is hidden in the trunk. Made in England, the elephant contains 9000 parts and walks on a set of wheels concealed in the hollow feet. The elephant's leg "bones" are filled with compressed air to add a natural "spring" to the ride.

Above left, this elephant lives on a gasoline diet. It can step along at 27 miles an hour with its load of thrilled youngsters. Left, stripped of its tough skin, it looks like a plumber's nightmare



Sources of available products described in this issue are listed in the index, starting on page 10. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11

# SUITCASE MUSEUM

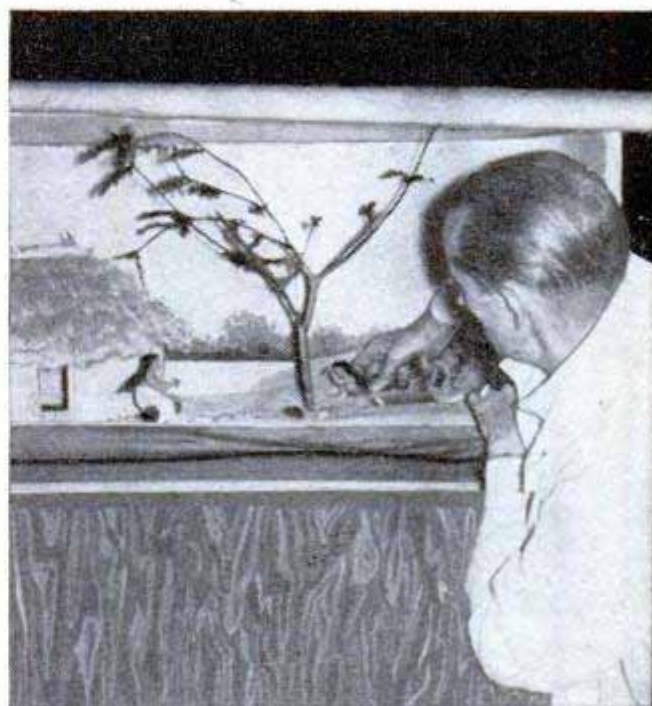


Staff member poses a lifelike muskrat in case. Background will be painted, then animal mounted permanently

Dury, who cooked up the suitcase-museum idea, tells a class how to tell mushroom from poisonous fungi



Worker puts finishing touches on a portable showcase which shows how the early Ohio mound builders lived



**I**N CINCINNATI they carry museums around in suitcases.

It isn't just a local peculiarity, but a novel idea for bringing educational exhibits to school children who otherwise might not have an opportunity to see them. Visual-education authorities across the country are enthusiastic about the plan. Furthermore, the head of the American Museum Association recently stated that very few museums in the United States are giving as much service per dollar spent as the Cincinnati Museum of Natural History, despite its cramped quarters.

Those cramped quarters originally inspired the plan. One day Ralph Dury, director of the museum, sat in his piano-box office and tried to unravel the problem of exhibiting a good deal of valuable nature material packed away in the basement because there was no room for it in the exhibit cases. The schools could make good use of the birds, insects, stones and shells if there were some way to show them off. That started him thinking about the suitcases.

His small staff went to work making cases of plywood fitted with handles and glass windows. Backgrounds were painted inside the boxes, and everything from fossils to feathers was mounted properly behind the glass. Within a few days the first suitcases went out to Cincinnati schools.

The response was immediate. Calls came in to the museum for the traveling exhibits so fast that a waiting list developed. In less than three months 60 of the portable museums were completed, and Dury says that eventually he'll have 500 of them making the rounds. The plan is to give every school child in the city a chance to study nature exhibits. In the first three months of its existence the suitcase museum brought natural history right up to the desks of 35,000 school children, who now know what a fossil is, can identify a good many birds and have seen with their own eyes a stone

Off goes another suitcase museum to a school. It's a better teaching aid than a textbook and a lot more fun for kids



ax and bone awl made by some primitive man before recorded history.

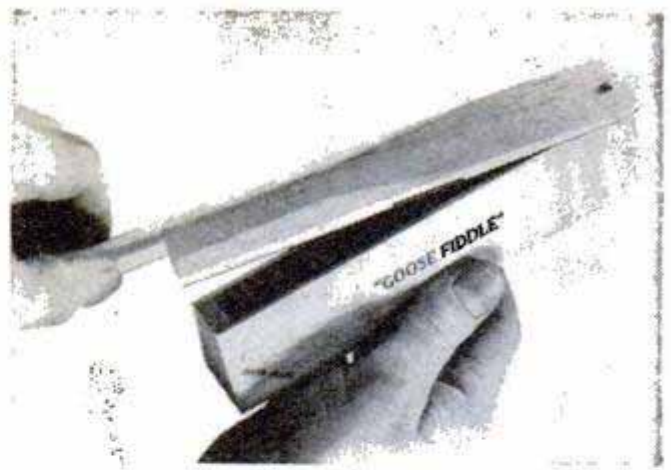
Dury points out that the success of the traveling museum is not in the cases but in their contents. The museum contains one of the most valuable shell collections in the country.

How do the kids like it? One of them recently wrote the director a letter which stated emphatically: "Dear Mr. Dury: You have taught us all about everything."



### "Atomic Robot" Locates Brain Tumor

Doctors can diagnose and locate brain tumors within a few minutes with the aid of an "atomic robot" which detects radioactivity. In the past such diagnosis often required hospitalization of the patient and incisions in the skull. In the new method, the patient is given an injection of a radioactive isotope. If tumor tissue is present, the "tracer" accumulates in it. Two arms of the instrument are placed against the skull and readings are taken in 32 places. Geiger counters detect radioactivity to indicate location of the tumor tissue.

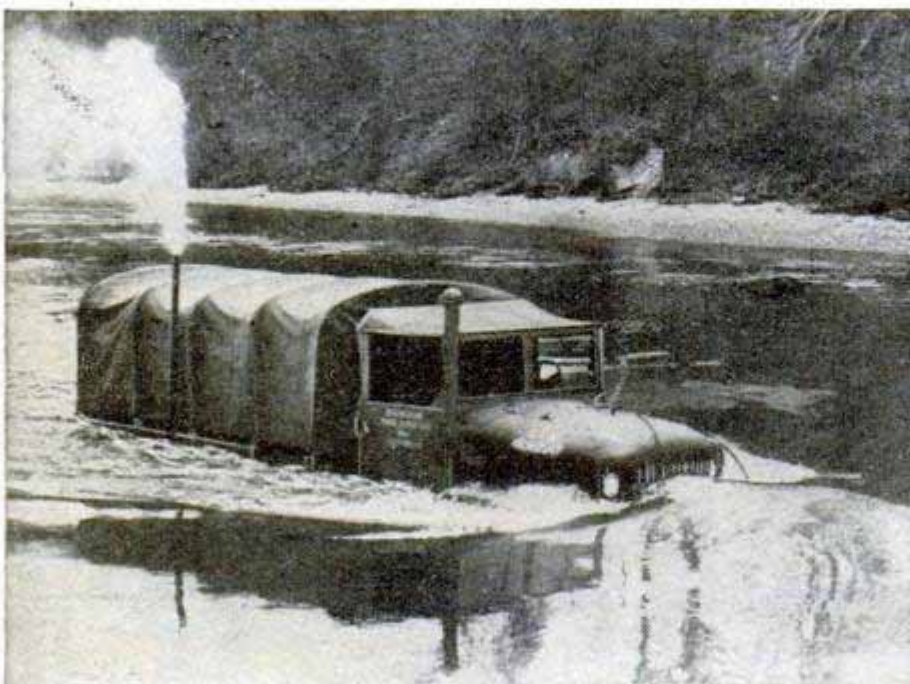


### Goose Caller

Realistic imitations of a goose call are made with a new device for hunters. Made of six kinds of woods selected to give accurate tones, it gives the call when the handle is rubbed across the sound box.

### Year A.D. 2000— Plenty of Oil and Plenty of Uses

Despite gloomy predictions that our oil reserves will soon be exhausted, Dr. Gustav Egloff of the Universal Oil Products Company believes that in the year 2000 we will be refining 16,000,000 barrels of petroleum daily. The present rate of production is 6,000,000 barrels per day. Furthermore, he believes natural gas production in 50 years will be 21,000 billion cubic feet per year compared with the present 6,000 billion cubic feet. Today, about 12 billion pounds of chemicals are made from petroleum each year; Doctor Egloff says in the year 2000 the production will have quadrupled. He predicts that most of our clothing in the next half century will be made basically from petroleum.

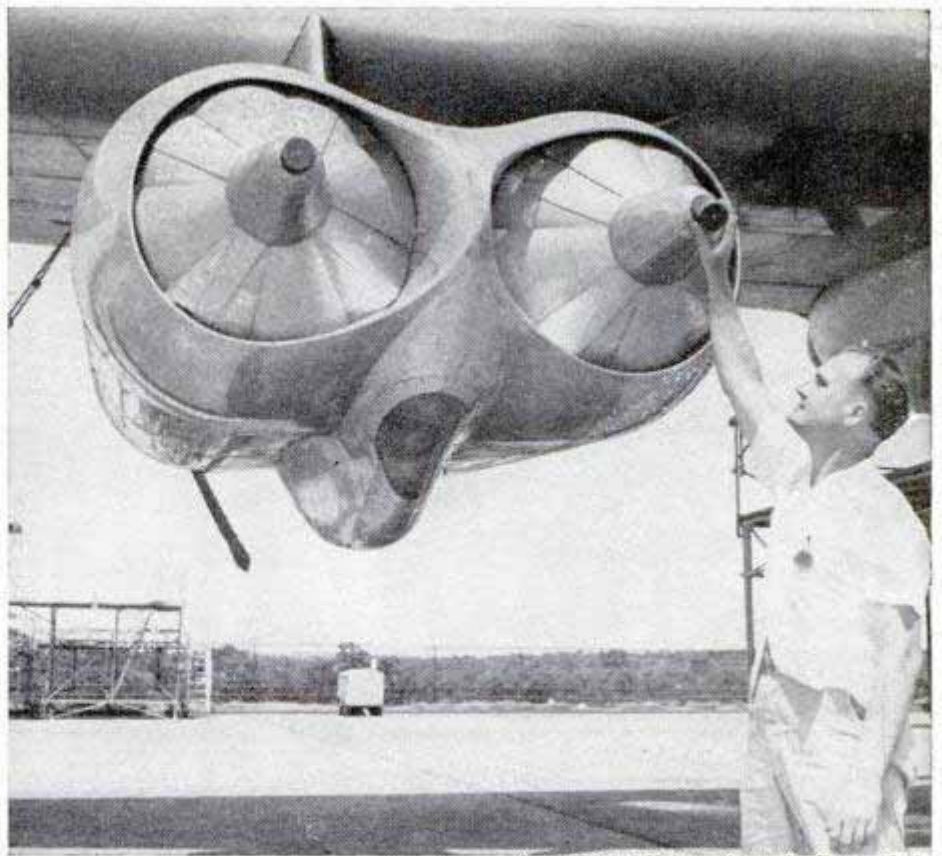


### Underwater Truck

Swimming may soon be a requirement for Army truck drivers and mechanics. In addition to operating in subzero cold and blistering heat, the new "Eager Beaver" 1½-ton truck travels underwater. All the driver has to worry about is keeping his head above the surface, one foot on the accelerator and his hands on the wheel. A "schnorkel" extension pipe brings air to the submerged engine and the exhaust is emptied out a similar "snorter" tube.

## Doors Shield Jets From Blowing Dirt

To keep dust out of the jet engines when the plane is on the ground, "doors" are being put across the air intakes of the B-36's four units. The doors are operated by an actuator switch in the pilot's compartment when the jets are to be started. They are also kept closed in flight to reduce drag when the plane is relying entirely on its six piston engines for power. Largest bomber in the world, the B-36 has a range of over 10,000 miles and is also being used extensively by the U. S. Air Force for long-range reconnaissance missions.



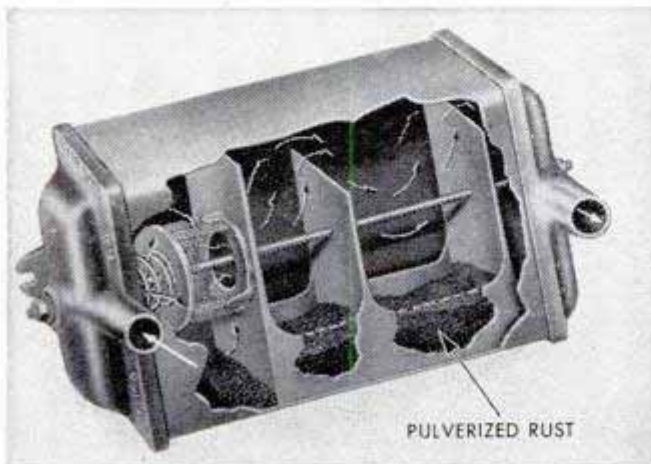
Consolidated-Vultee Aircraft Corp. photo

## Insulating Building Panel

Providing more insulation than a 16-inch concrete wall, a new laminated building panel less than two inches thick can be used for either exterior or interior walls. The core of the panel is a calcium-silicate insulating material which is faced with cement-asbestos boards. Each panel, 4 by 8 feet, weighs 200 pounds and will withstand an hour's exposure to fire.

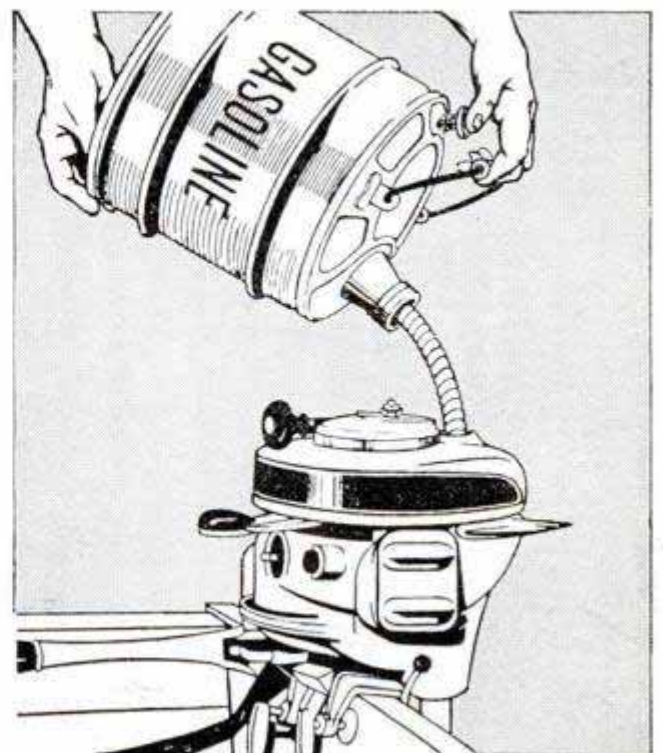
## Rust Remover Protects Engine

By pulverizing and trapping rust particles suspended in the water of a car's cooling system, a rust remover protects the radiator and prevents overheating due to poor circulation. No chemicals are used in the trap; the swirling path of the water as it passes through a screen pulverizes the particles which are trapped by a series of baffles.

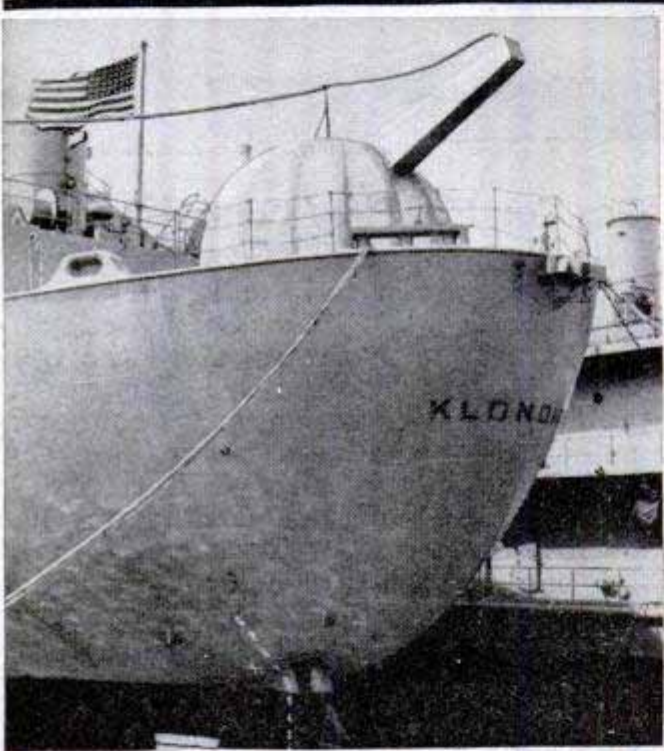
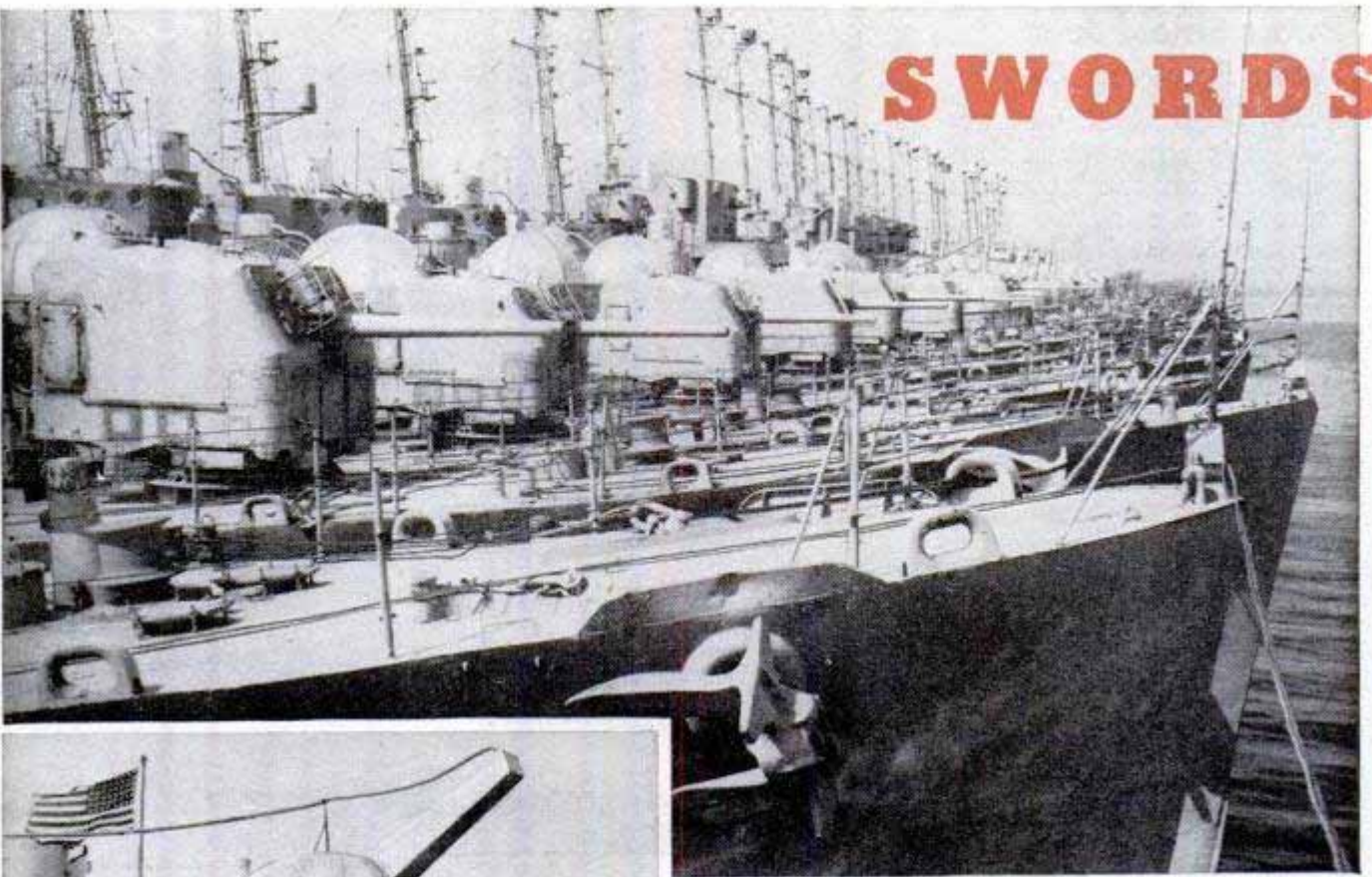


## Gas Can Has Flow Control

Simply by pressing a button on the top of the can, you control the flow of gasoline from a fuel container that eliminates spillage. Available in several sizes, the container is designed to solve the pouring problem on outboard motors, power mowers and other small gasoline engines. The flexible hose is attached to a reversible screw cap and is stored inside the can when not in use. The push button regulates the flow of air into the can, controlling 99 percent of the flow.



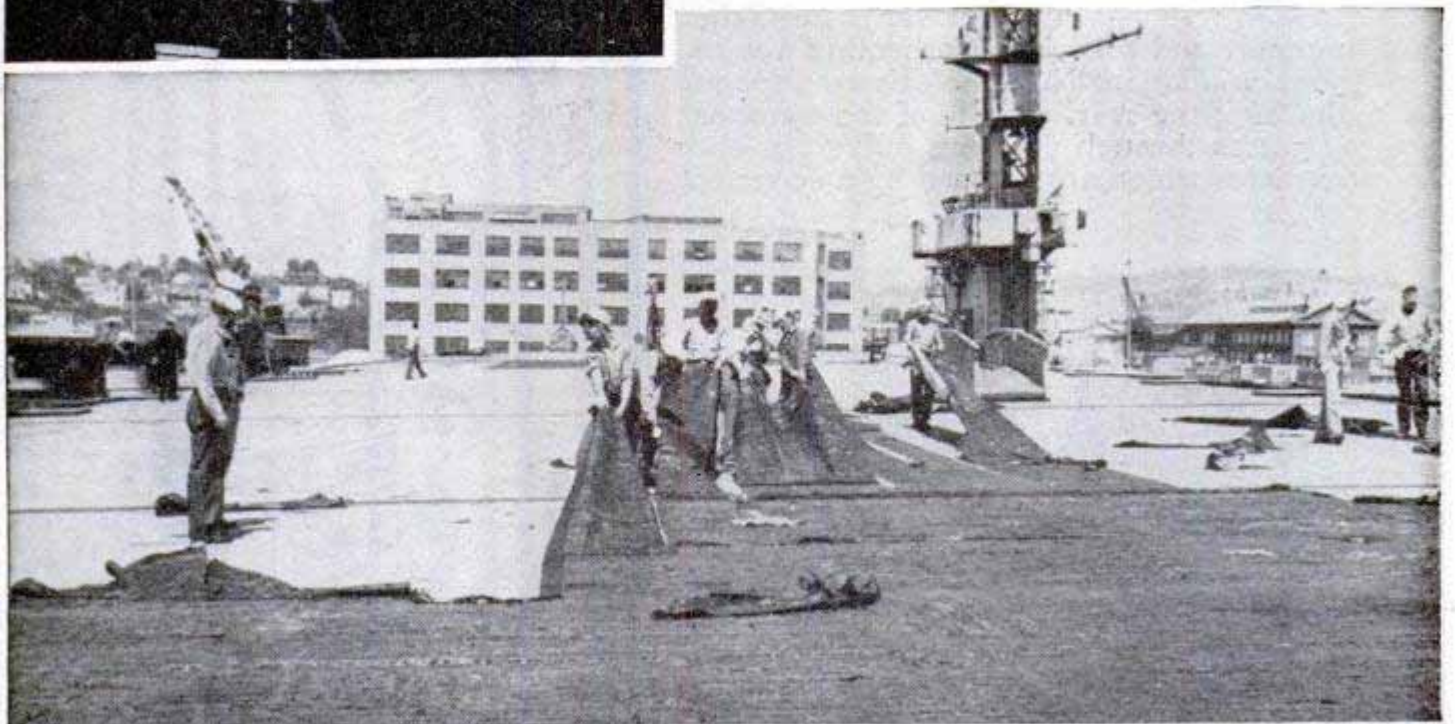
# SWORDS



Line of escort vessels awaits resurrection from the "moth ball" fleet. Deck gear is protected with "liquid envelopes" and compartments are sealed and kept dry

← Igloo over the stern gun of a naval auxiliary is sealed to the deck and fitted with a pipe through which dry air flows to prevent formation of rust

Below, sailors peel the protective covering off the flight deck of an escort carrier. Close examination showed that the deck was still in perfect condition



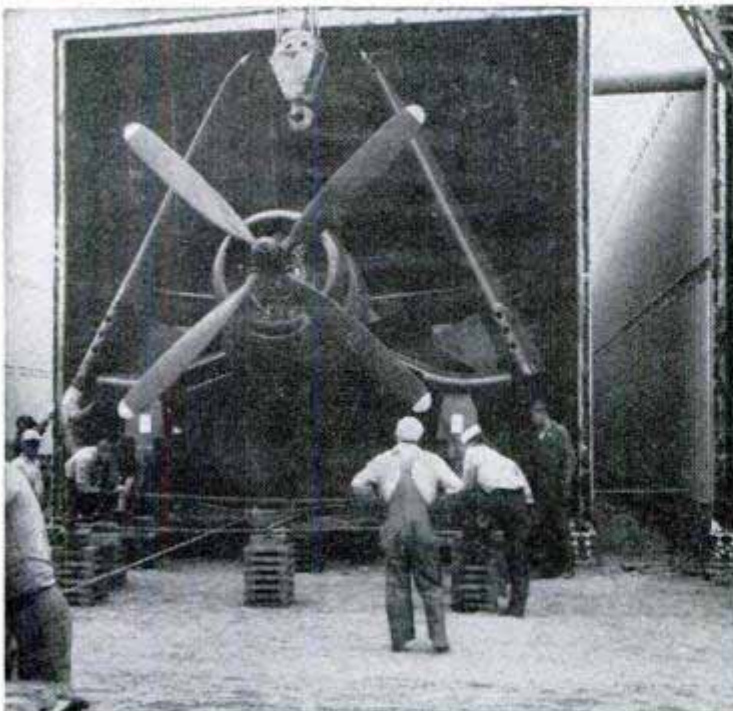


# WITHOUT RUST



**I**NSTEAD OF beating his sword into a plowshare after the last war, Uncle Sam wisely laid it away for future use. It was a farsighted move, for now he is reaching into the cupboard and there is his sword, ready for action. Translated into battle lingo, this means that thousands of tanks and guns, ships and aircraft are being unwrapped for use again. When workmen began unwrapping planes and ships, after being stored about four years, they found Uncle Sam's sword in fine condition.

"Canned" plane is exposed to the air once more after several years of storage inside an airtight steel box



Once these warbirds haunted Tokyo and Berlin. Then they hibernated for a time on acres of desert. Now they are coming to life once more to arm Uncle Sam

Thoroughly tested and refitted for service, a plane is hoisted aboard a waiting carrier for sea duty again





U. S. Air Force photos

**Plastic-coated plane is towed along a desert road to the Tucson airport where it will be unwrapped and test-flown**

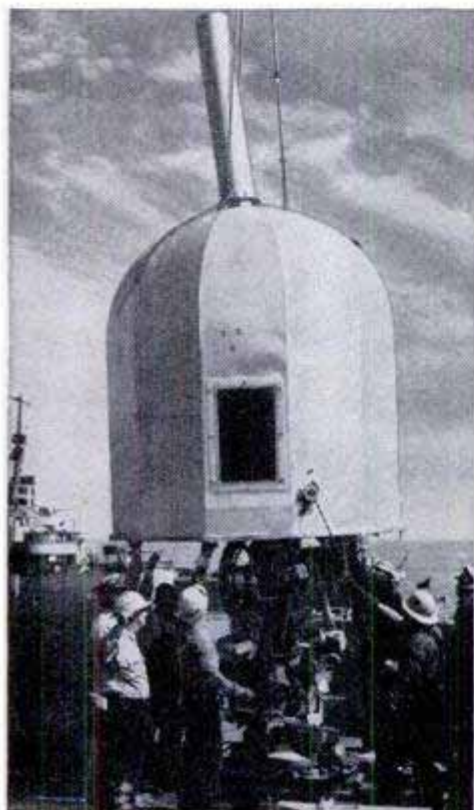
**← First step in taking the big "butterfly" out of its cocoon is to tear the sprayed-on coating off the propeller hubs**

**Chemicals loosen the rubberlike coating from the skin of the aircraft. Cocoon material then is ripped off by hand**



A veteran of the Pacific war, with a record of 36 bombing strikes painted on its fuselage, emerges from its desert cocoon

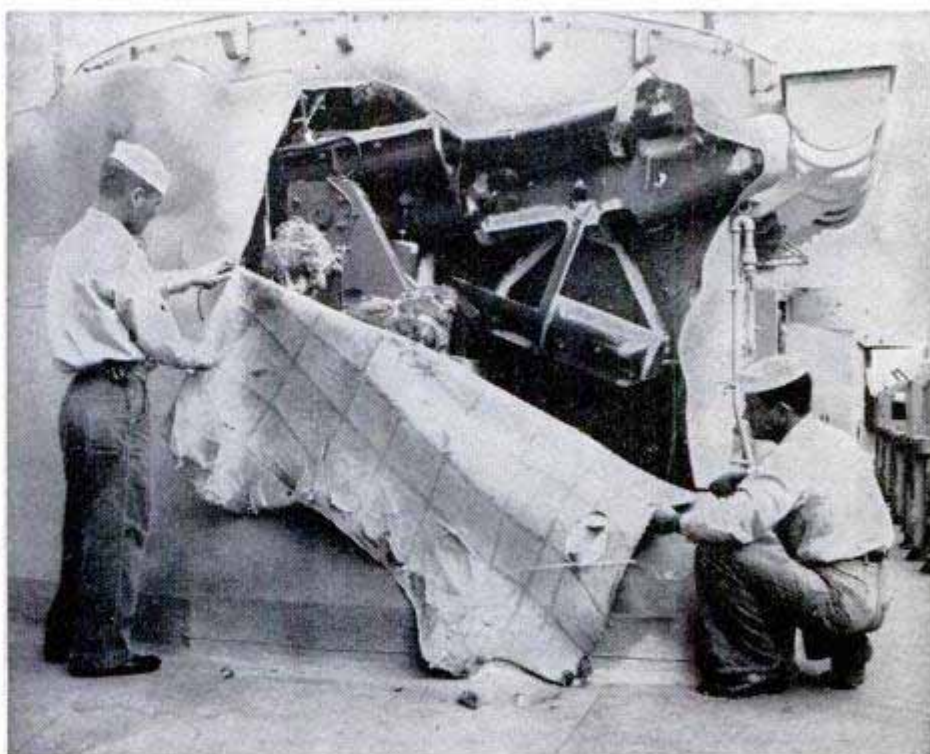
Below, metal igloo that had been welded to ship deck around an anti-aircraft gun is raised after weld was broken

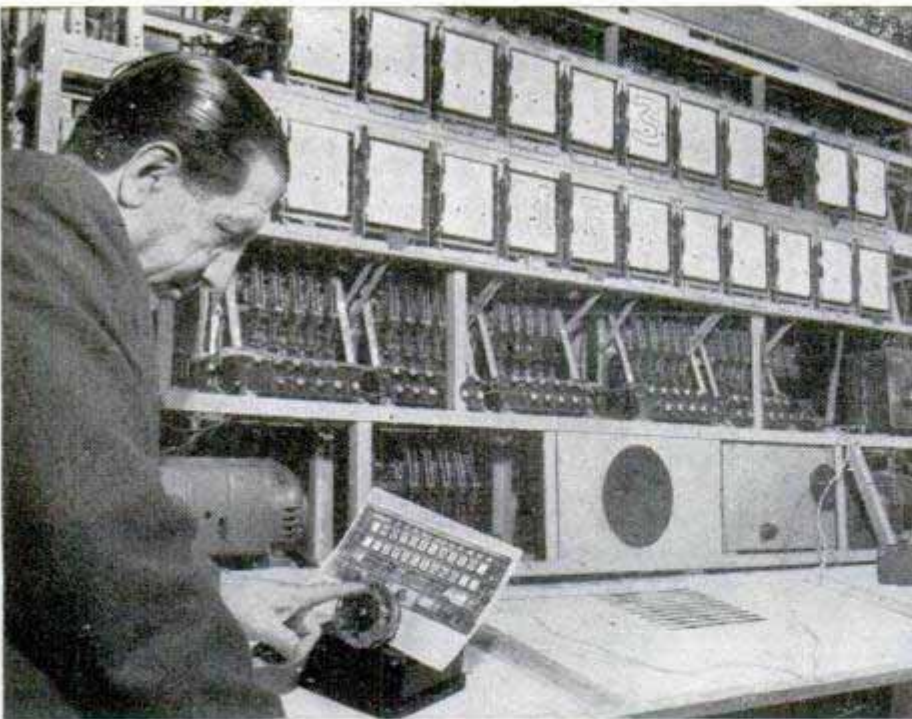


Hundreds of millions of dollars worth of equipment—everything from radar instruments to automatic weapons—is being withdrawn from storage under the terms of the MDAP, the Mutual Defense Assistance Program, under which the United States is arming other nations. And now Uncle Sam is reaching into his arsenal himself. Aircraft are being flown to active duty from one to three days after they are taken from desert storage. Ships are readied for a cruise 45 days after sailors begin peeling away deck coatings. Most of the planes have been sprayed with a plastic coating and stored on the desert or have actually been “canned” inside hermetically sealed steel boxes. Ships were sealed and their interiors kept dry by machines that constantly pumped dry air through them.

Deck gear is covered with oil and oxide paint. Here a sandblaster removes the paint from deck stanchion

Two sailors rip the plastic sheeting from a piece of deck gear. Ship can be ready for sea in 45 days



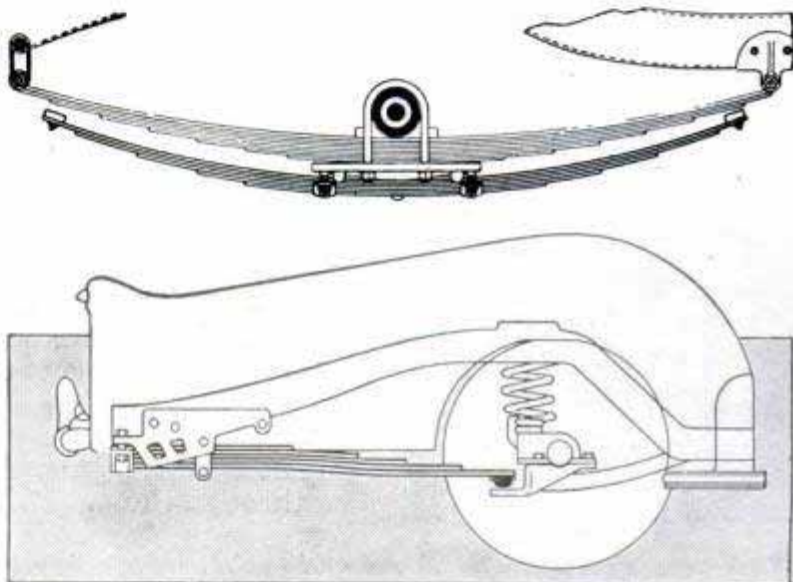


## Dial-A-Sign

Something new in signs has been invented by an Italian radio engineer who can "write" any message simply by dialing a series of impulses on a standard telephone dial. This remote-control system will make it possible to write messages simultaneously on display signs scattered all over the country from a central dial station. The letters of the alphabet are printed on paper rolls and the dialed impulses cause the rolls of paper to rotate until the correct letter appears on the face.

## Adjustable Overload Springs Protect Autos and Trucks

Protection against overloading of automobiles or light trucks is provided with adjustable overload springs designed in two models, for cars with either coil or underslung rear springs. The springs do not change the riding characteristics of a car under normal loads and support the standard car springs only when a vehicle is overloaded. By simply loosening or tightening four nuts, the springs can be adjusted for different loads or to counteract spring sag due to constant flexing. Overload springs for coil-spring suspension are of the cantilever type and are mounted at the rear end of the frame behind the differential. The over-



load unit for leaf springs is mounted beneath the regular spring and can be put on or taken off in a few minutes.

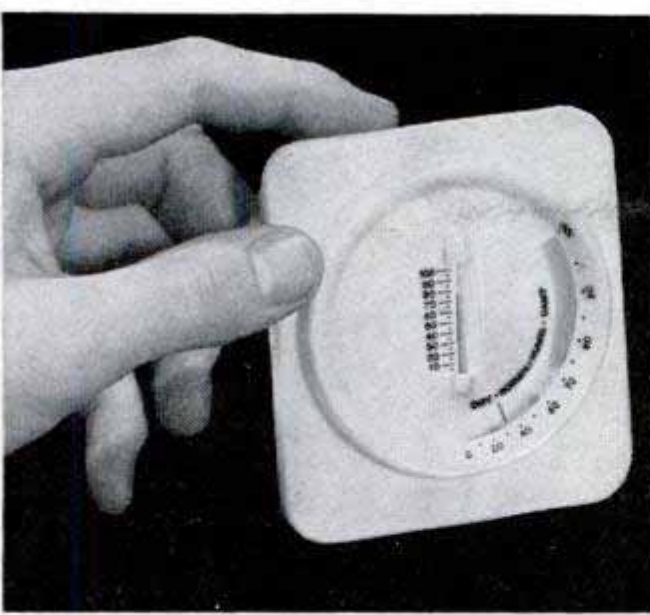


## Double-Folding Wings

Double-folding wings that reduce their width to 19½ feet ease the shipboard storage problem for Britain's big Fairey 17s. The twin-turbine submarine hunters have a wingspan of over 54 feet.

## Washington's "Diggings"

Washington, D. C., may become a mining town now that rich deposits of the vital war material, germanium, have been discovered in the Capitol's parks. Germanium is a semiconductor, essential in the manufacture of radio and other electronic devices.



### Moisture-Sensitive Plastic Measures Humidity in the Air

Homeowners, who are anxious to maintain the proper humidity inside their houses for comfort and health, will be aided by a new hygrometer or humidity-measuring device which uses a moisture-sensitive plastic pointer. The pointer consists of two plastic strips that are bonded together. One strip is not affected by moisture and the other is. Changes in the moisture content of the air cause the needle to bend, showing the relative-humidity reading on a scale. Also incorporated in the device is a small thermometer.



### Rain Repellent

Heavy rains that normally obscure and distort a pilot's vision are harmlessly shed from aircraft windshields sprayed with a new wax repellent. Developed by Dr. D. F. Stedman of the National Research Council of Canada, it forms a film that does not become wet. In flight tests through storms there was less than 300 feet of visibility through the untreated portion of the windshield and three to five miles through the treated section.

### Gearshift Shoes For Hill Climbing

Doctors are studying a French invention that makes it easier for invalids to walk up and down hills. The invention is a pair of shoes, worn like snowshoes, which provides a horizontal platform for the feet despite the slope of the ground. When the wearer is descending a hill, the toe is elevated. When walking uphill, the heel elevates to maintain the level platform.

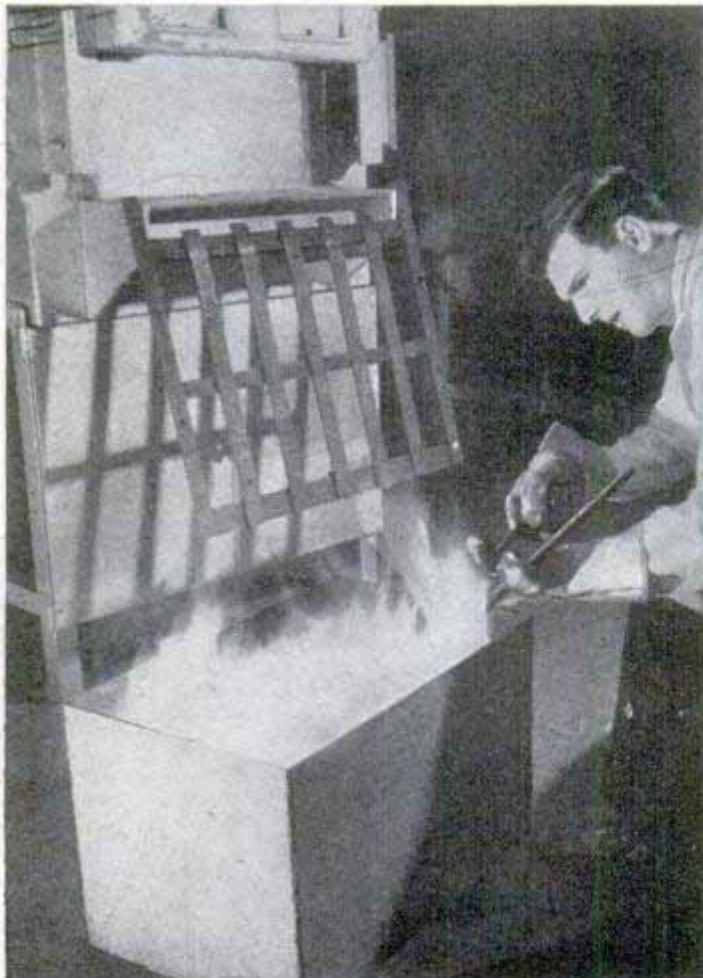
☐ America's sweet tooth certainly will be satisfied this year since the amount of sugar available will average about 110 pounds per person, a larger supply than we have had in any other year in history.



# "VEST POCKET" STEEL MILL

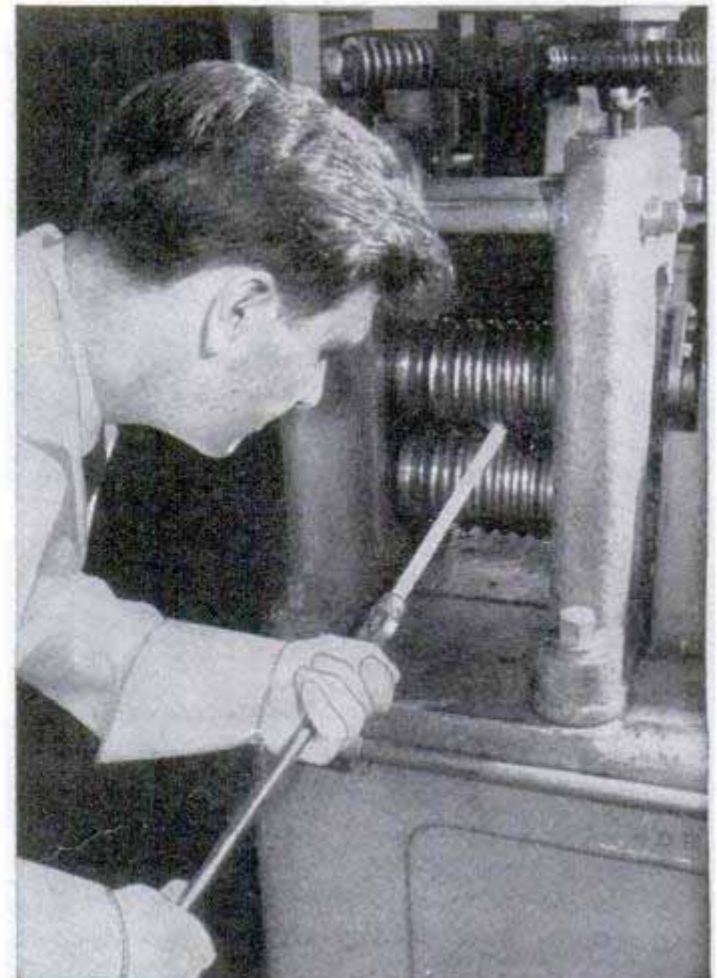
IMAGINE a steel mill—with complete equipment from furnace to rolling mill—so small the works would fit into one open hearth with plenty of room to spare. Such a mill is in full production today, turning out new metals and alloys at the Westinghouse Research Laboratories. Daily production isn't measured in thousands of tons, but in miniature ingots and test pieces weighing less than 25 pounds. The purpose of the little mill is to find new alloys for industrial and military use—metals with exactly the right degree of hardness or ductility, better electrical conductivity or the ability to withstand extremely high temperatures. Technicians "cook" each experimental batch in an electric furnace not much larger than a Thermos jug. Each new test metal is checked in a "torture chamber" where torsion machines twist it until it breaks and other instruments subject it to hardness, heat and fatigue tests. The "Tom Thumb" mill may produce new alloys which will make possible more powerful jet engines and gas turbines.

New ingot is suddenly plunged into an oil quenching bath to cool the metal without destroying its ductility



Metallurgist weighs out ingredients of a new alloy with the precision of a chef mixing a special dish

Next the ingot is rolled out in a miniature mill. Variety of rolls produces bars of different sizes





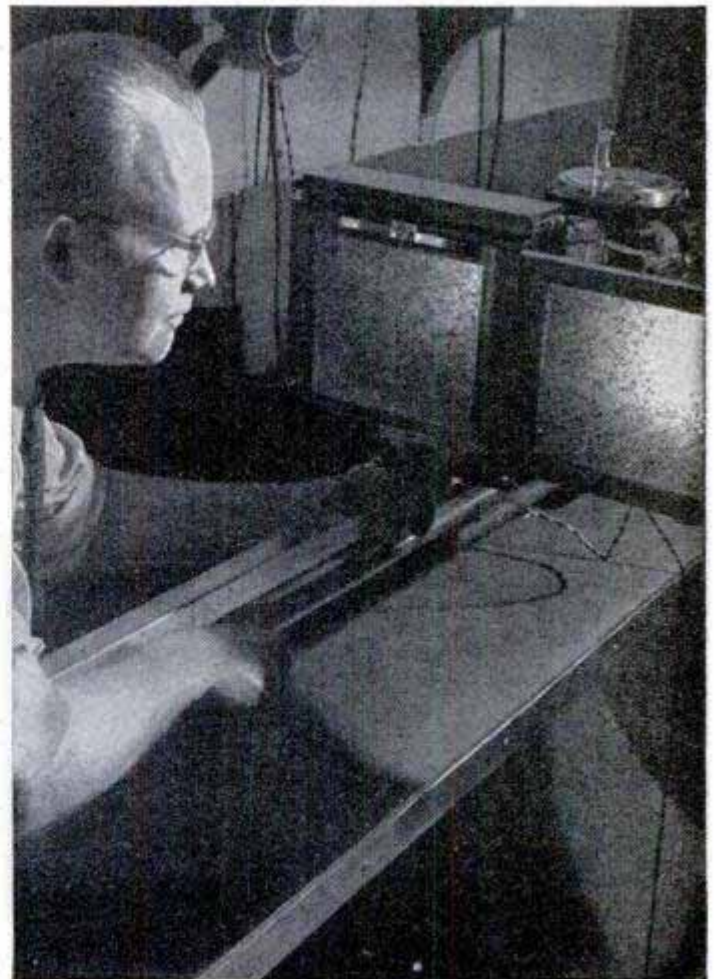
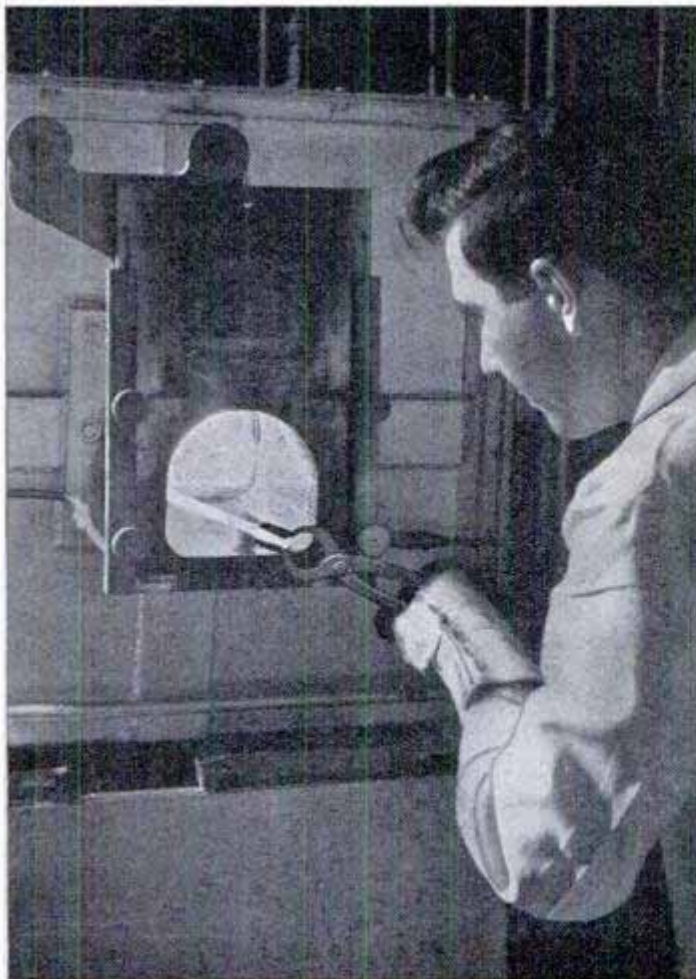
**Will this new alloy have the needed characteristics? Molten metal is poured into a casting mold**

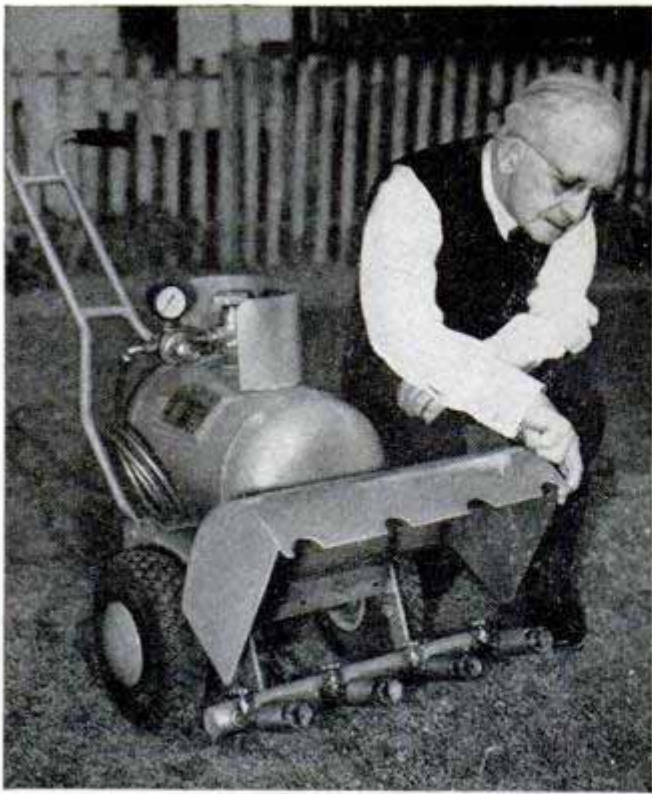
**Test piece is removed from an oven in which it has been "aged" to increase hardness of the metal**



**White-hot ingot is lifted from the mold. Entire process from mixing to final casting takes less than an hour**

**Grain-size comparator shows the nature of a new alloy by comparing its grain with standard grain structure**



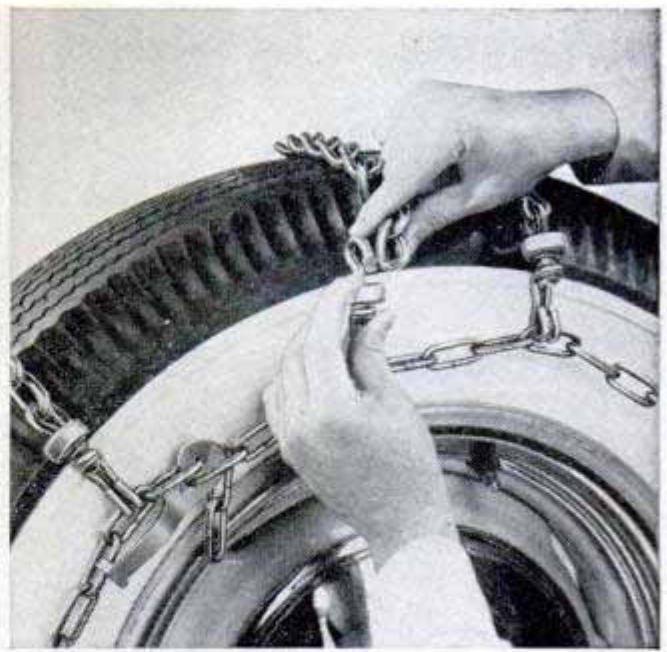
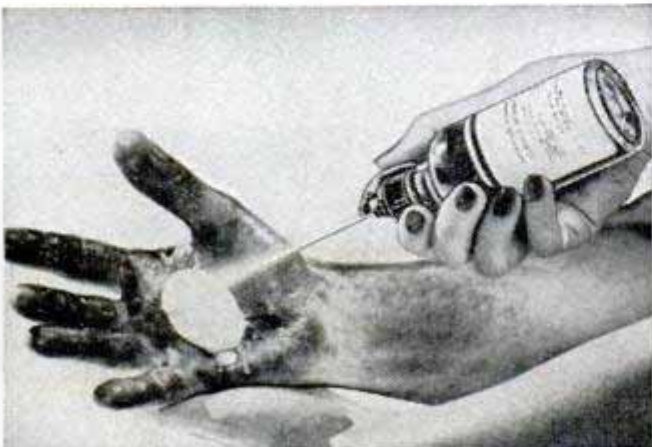


### Don't Shovel It — Melt It!

Backaches resulting from snow shoveling are no more when you use a snow-removal machine that melts away the ice and snow with four butane-gas flames. The machine is mounted on two rubber-tired wheels and its tank holds enough fuel to operate for 10 hours. It was invented by a man in Glendale, Calif., and why he needs such a machine is not clear!

### Squirt-On Detergent Speeds First Aid

Oil and grease are quickly washed from cuts and burns by a nonirritating detergent designed for factory first-aid stations. The detergent is sealed against contamination in its bottle and is dispensed by pressure when needed. No water is required as the detergent produces a lather as it is sprayed on the flesh. It is also used for removing ointment dressings and as a cleanser for soap-sensitive skins.

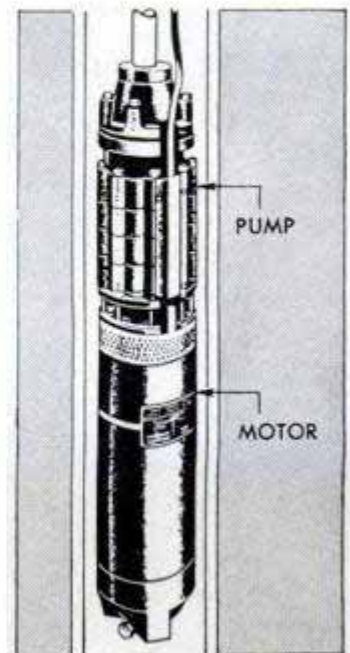


### Revolving Tire Chains

Cross links of a new tire chain slowly revolve, distributing wear on two sides of the chain instead of one. The revolving action prolongs the life of the cross links. Small rollers on both sides of the tire snap on the ends of the cross links, permitting them to turn. In addition, the snap-on rollers make it possible to replace worn cross links without tools. The chains can be used on cars of different wheel and tire sizes by snapping on longer or shorter cross links.

### Down-the-Well Pump

Supplying water to homes and farms, submersible electric pumps are simply lowered into wells and suspended under water by their own piping. No pump house and no pits are required, and the pump is noiseless because it is inside the well. The electric motor—a part of the underwater unit—is designed to use water as a lubricant. Only the field windings and the cable connections are protected in a hermetically sealed tube. All the pump components are made of bronze or stainless steel to resist corrosion. A heavy-duty submersible cable runs down the well shaft and is held to the pump's piping with clips to carry current to the motor.







### Housewife's Third Hand

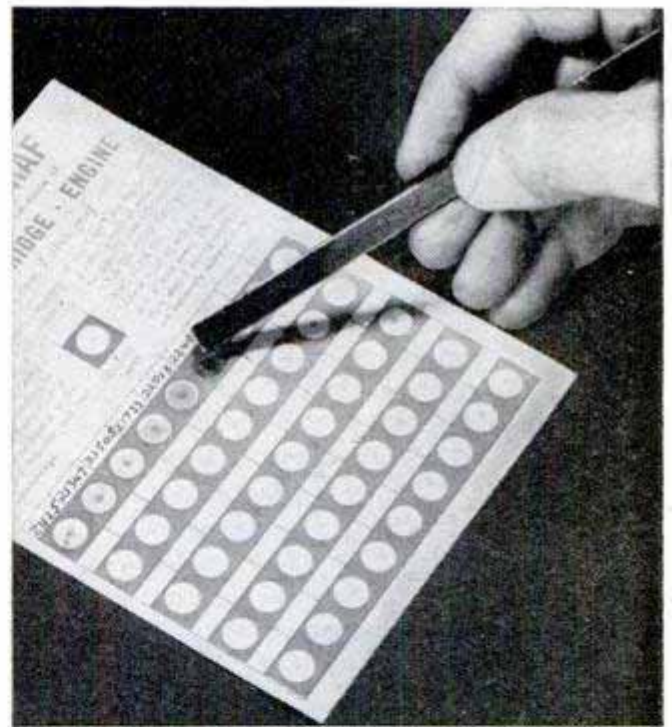
Just like a third hand, a double suction cup grips a mixing bowl tightly so the housewife can use both hands for pouring and mixing ingredients. One giant rubber suction cup forms the base, anchoring the

device to the table or cabinet top. The upper half holds the mixing bowl at any angle by suction. A release valve instantly breaks the vacuum so the bowl can be picked up whenever desired. A similar base is available for "nailing down" the baby's dish to eliminate spillage.



### Goldfish Clock

There are novelty clocks of all kinds and one of the newest combines a goldfish bowl and a timepiece. Made in Japan, the clock tells time by means of a circular scale that rotates behind a pointer on the lid of the bowl. Suspended from the clock mechanism are two artificial goldfish and, as the clock rotates, the fish "swim" slowly around the bowl. Live goldfish can be placed in the bowl if desired.



### Test Chart Shows Motorist When Oil Filter Needs Changing

Taking the guesswork out of oil-filter changes, a test chart on which a drop of oil from the crankcase is placed shows the motorist when the filter is dirty enough to replace. The dipstick is touched to an indicator spot on the card. If the oil obscures the color dot, it's time to replace the filter cartridge. The chart is designed to fit in the glove compartment.

# WHAT'S NEW

## For Your Home

A four-page "shopping section"  
dedicated to modern homemakers

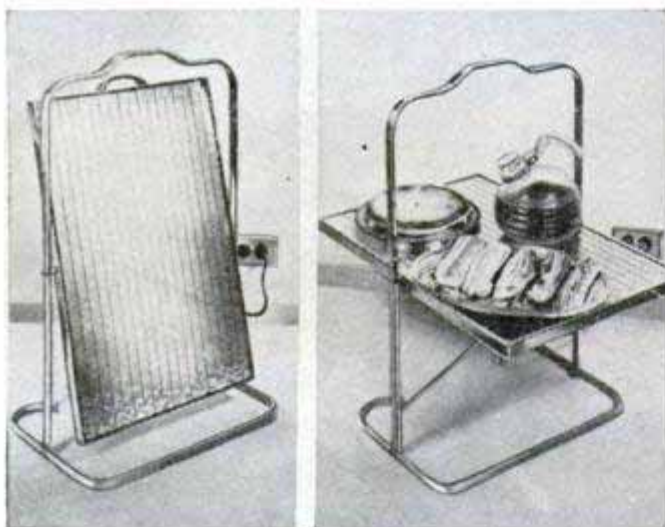


**BATH PAD**, above, makes lounging in the tub just as comfortable as it is relaxing. The inflatable pad is made of Vinylite plastic and is held to the tub by suction cups, providing a seat, back and headrest

**TWO-WAY HEATER**, left, can be used to take the chill off a cool room or to keep food hot alongside the table. Turned up to high heat, it fries eggs or hamburgers. The radiant-glass panel is shatterproof

**ROLL CUTTER**, bottom left, adds a professional touch to your rolls and eliminates hand shaping of the dough. You simply press the cutter into the dough. One end makes clover-leaf, the other fan-tan rolls

**CLOTHES SPRINKLER**, below, has gone modern to make bottle-shaking obsolete. Connected to a faucet by a long hose, the sprinkler produces a fine mist at the touch of a button, dampening clothes evenly



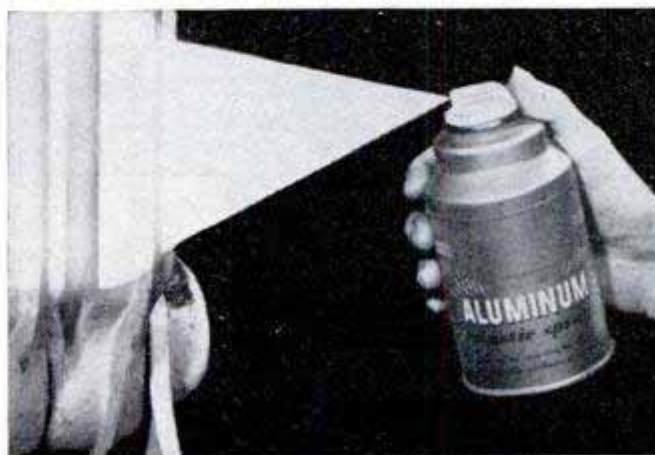
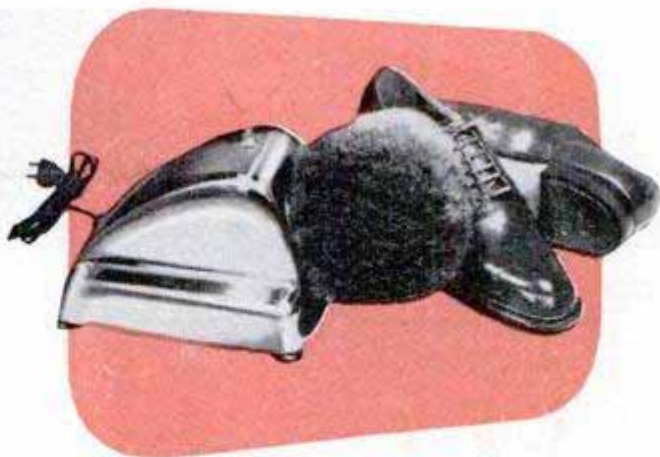


**INDOOR BARBECUE**, above, broils meatballs or cube steaks and toasts marshmallows on your dinner table. It burns alcohol and a filling will last for hours

**SHOE SHINER**, above right, takes work out of the polishing chore. Electric powered, it has a wool-pile buffer that can be removed easily for dry cleaning

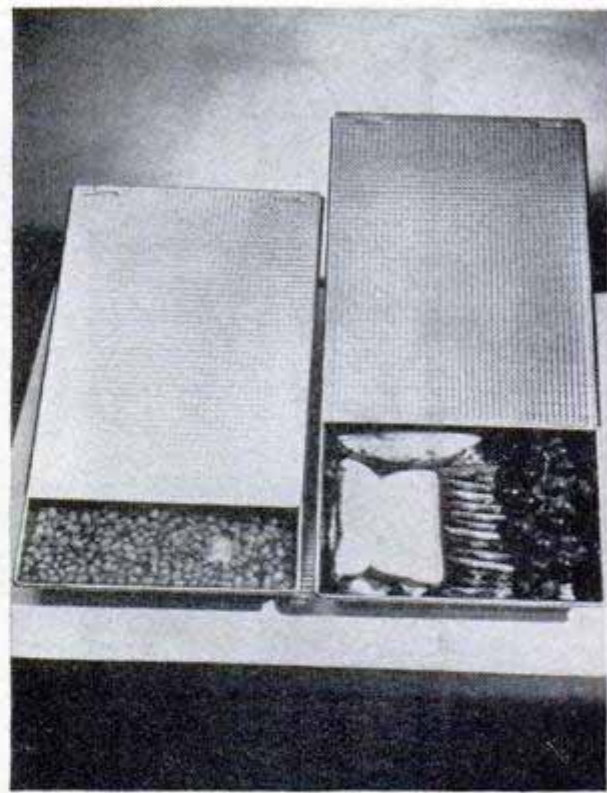
**ALUMINUM SPRAY**, right, is ready to use at the touch of a button. Pressure packed, the paint is a combination of aluminum and plastic for long outside wear

**PLUG-IN THERMOSTAT**, below, makes a portable electric heater automatic. Connect heater and thermostat cords, set a dial and presto — controlled heat



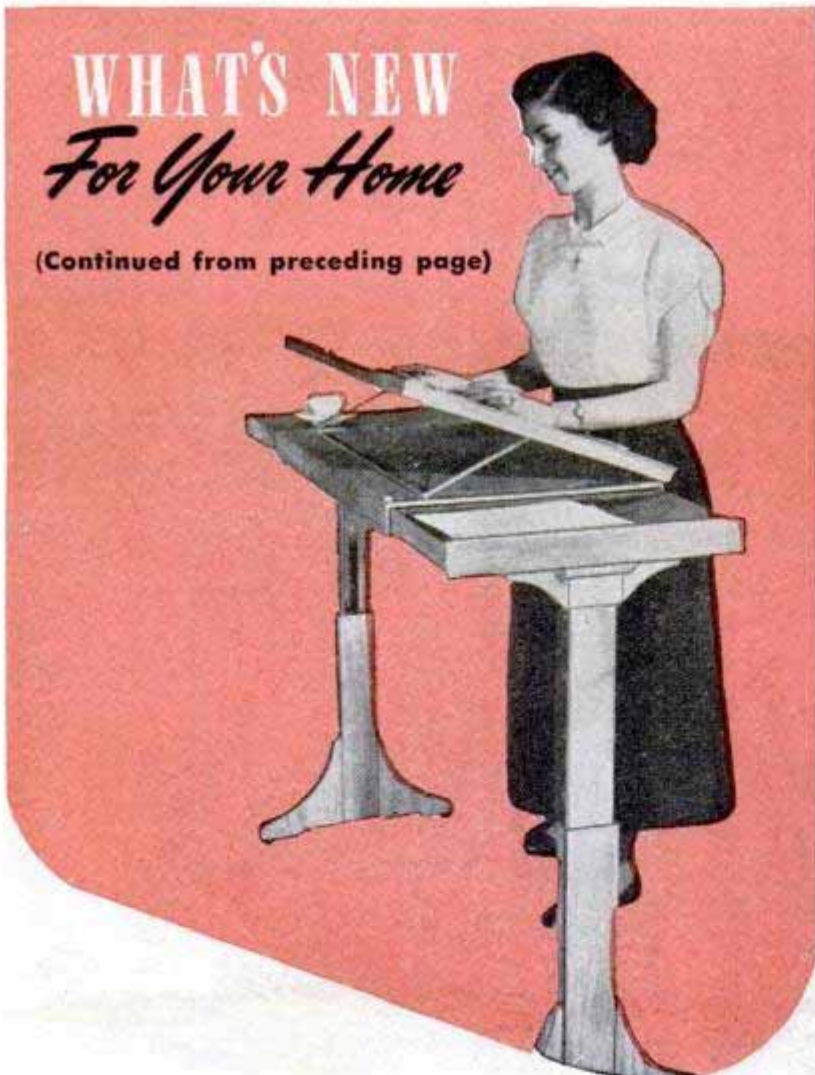


PRESENT SHELF



**COOK-AND-CARRY PANS**, above, are just right for use at church suppers or picnics. Tight-fitting covers prevent any spillage

**DOUBLE-DECKER SHELF**, left, for a crowded closet, swings forward and down, bringing it within easy, convenient reach

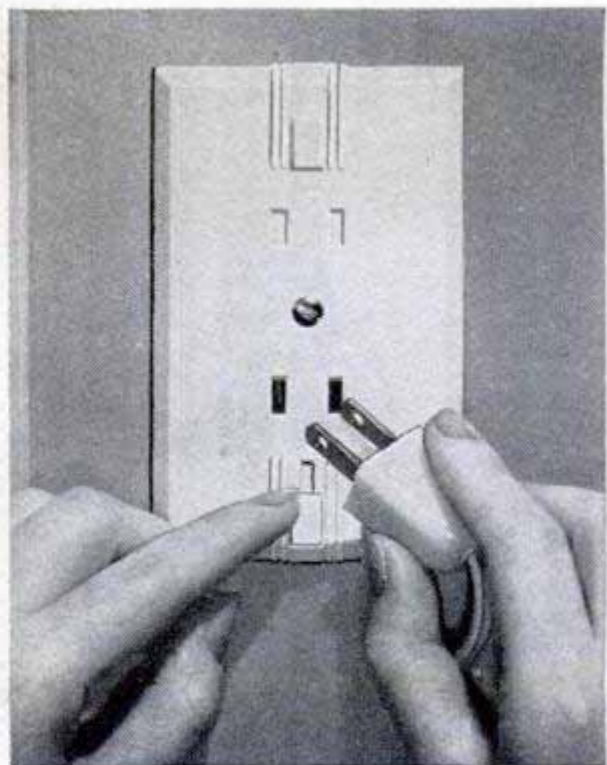


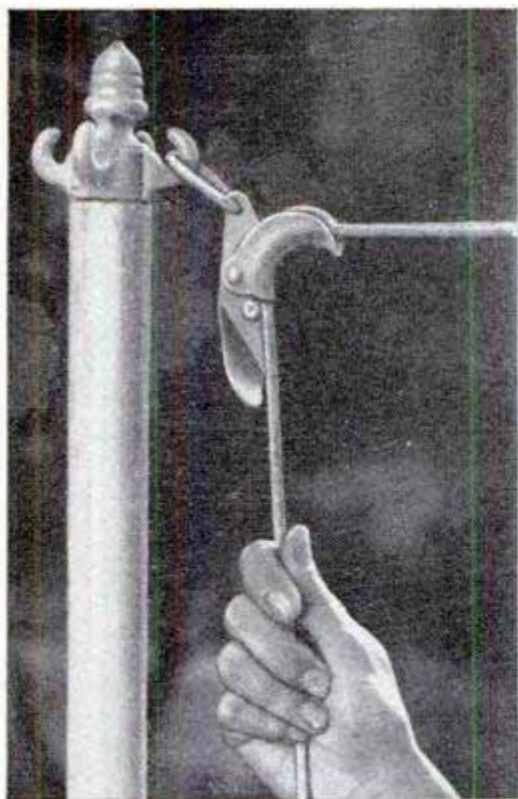
**WHAT'S NEW**  
*For Your Home*

(Continued from preceding page)

**VERSATILE TABLE**, left, stretches vertically and horizontally to perform many jobs. Here, it's used as speaker's table

**SAFETY PLATE**, below, fastens over any outlet. Holes are covered to prevent shocks. Sliding button opens them for use



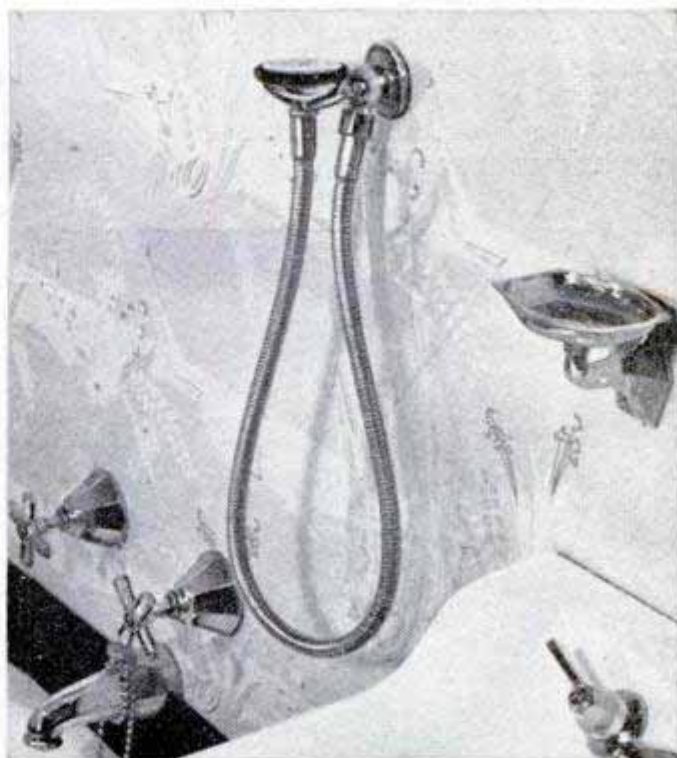
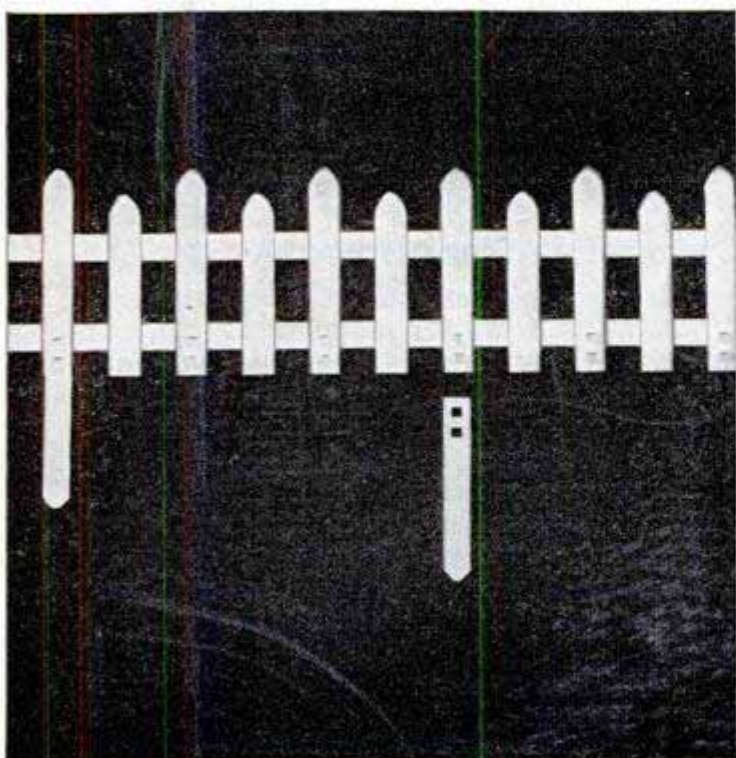


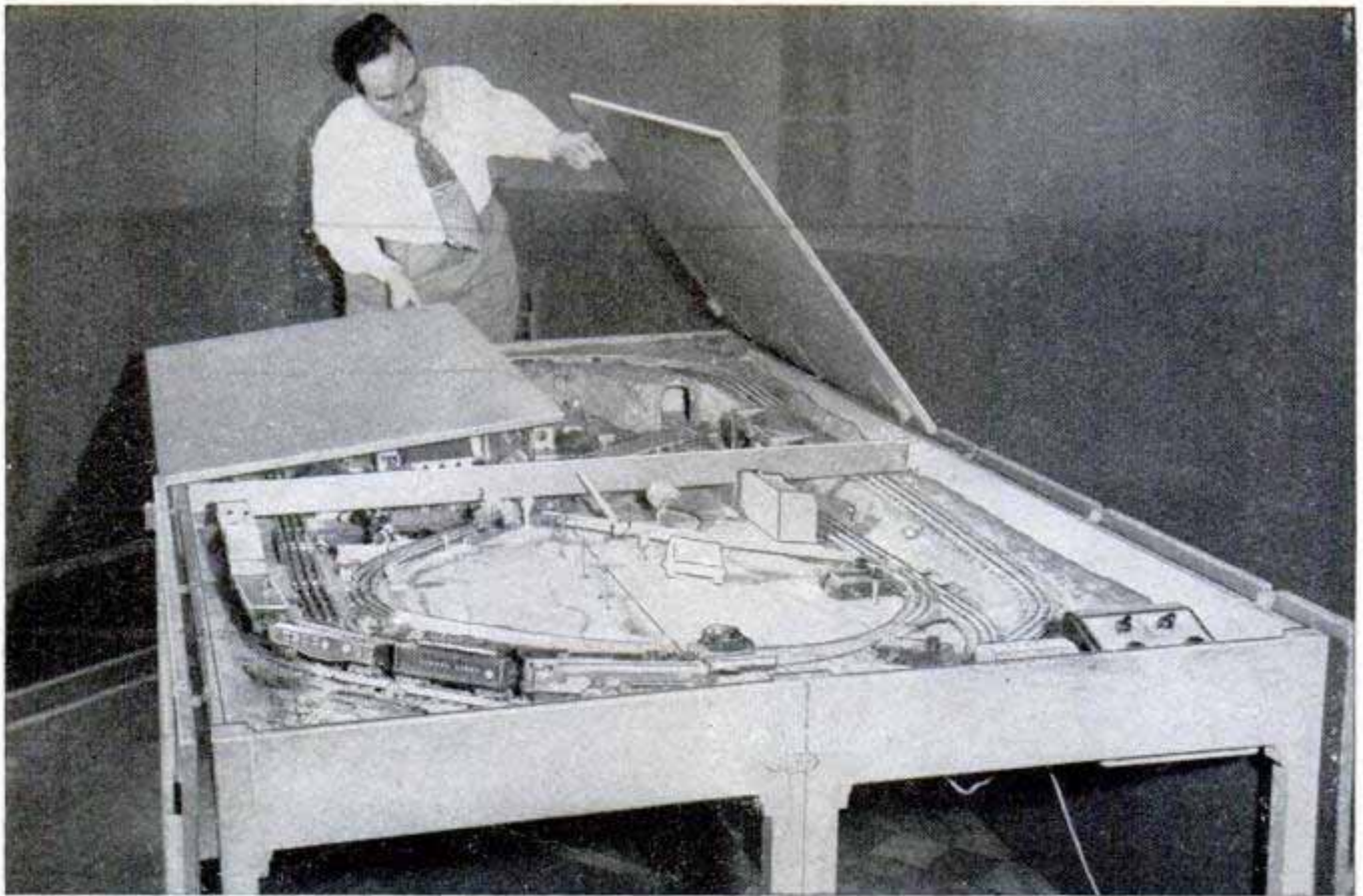
**LINE LOCK**, above, requires no knots to keep clothesline tight. Used on any line, it won't slip

**TRAVEL CRIB**, right, is light and folds to fit in the trunk of a car. Screening protects baby from bugs

**SHAMPOO SPRAY**, below right, is a permanent installation. Its flow is controlled from the washbasin

**GARDEN FENCE**, below, is all aluminum, has 8-inch pickets. It can be bent around circular beds





## Triple-Purpose Table

Model-railroad layouts usually take up a lot of space, but a Brooklyn hobbyist, Bernard C. Eisenberg, made this space do triple duty by setting up the track inside a ping-pong and party table. The hinged top pieces fit over the railroad, protecting it from dust and damage when the table is used for ping-pong. With the top open, Eisenberg simply plugs in the electric cord and the railroad is ready to operate. The table also divides to form two party tables. Hinged sidepieces swing up to enclose the fourth side when the two halves are used separately.

Hinged covers, above, protect the train layout and convert it into a regular ping-pong table, below. For parties in the game room, the table splits lengthwise into two refreshment tables



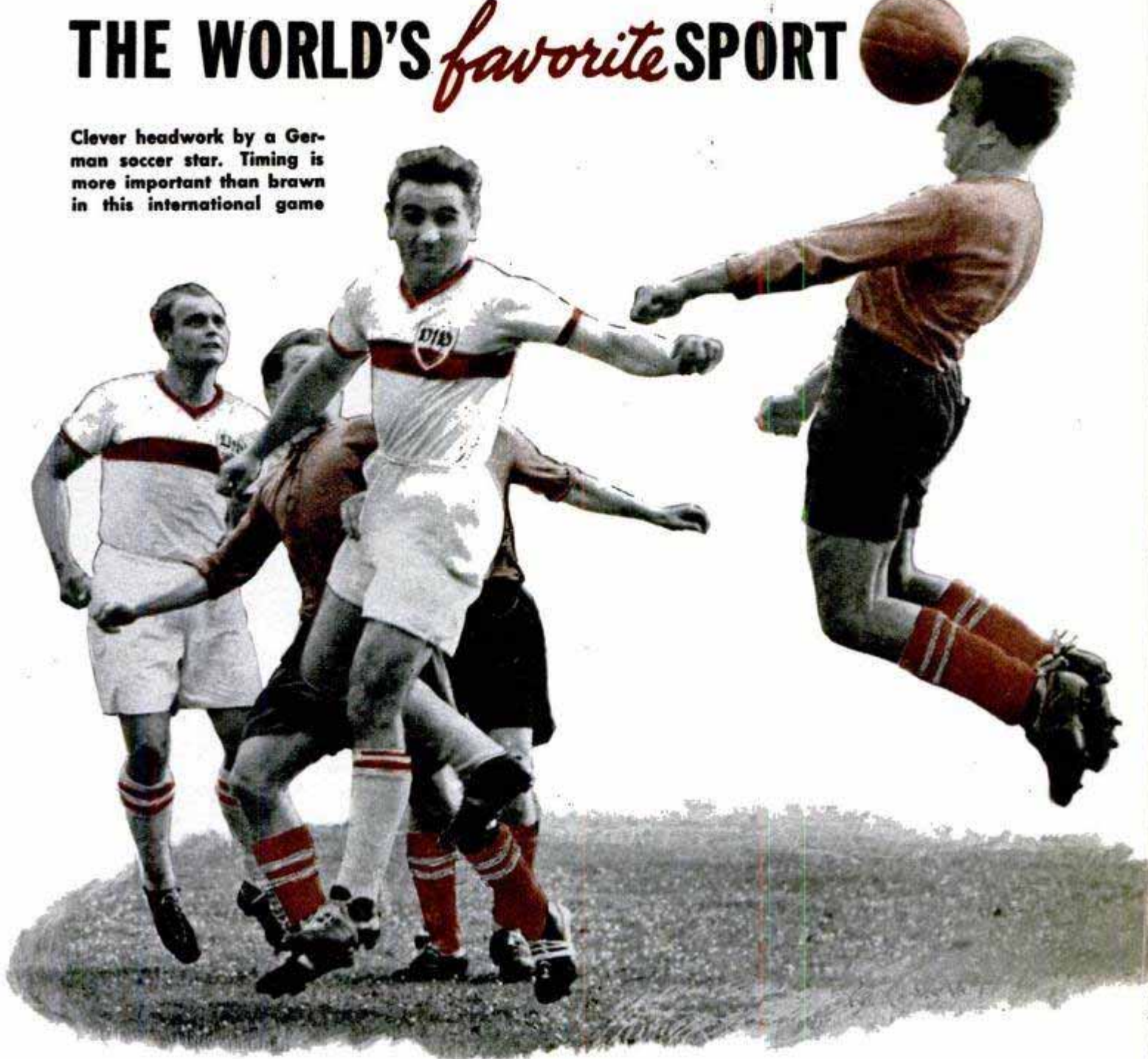
## Cotton-Bale Sampler

Cotton samples are cut from bales quickly and uniformly by a portable electric saw with a toothless, razor-sharp blade. This new technique, developed in a New Mexico cotton gin, replaces the slower method of slicing into the bale by hand. Every one of the millions of bales produced annually is sampled three or four times and the power-saw method saves money by eliminating frequent honing and replacement of hand knives.

☐ Candy and gum can be given a licorice flavor with an oil that is distilled from the familiar yellow goldenrod.

# THE WORLD'S *favorite* SPORT

Clever headwork by a German soccer star. Timing is more important than brawn in this international game



**W**HETHER moved by anger, curiosity, jubilation or the spirit of competition, man has always evidenced a great urge to kick things, which explains why soccer is the world's most widely played game, as well as one of the oldest. It is the national sport of 54 nations, and 68 nations are affiliated with the Federation Internationale de Football Association, with headquarters in Paris.

There is documentary evidence that this ancestor of American football and English rugby was a great favorite with the Greeks, Romans, Saxons and Danes. Even then it appealed to the masses, with whole communities sometimes comprising "teams"

Goalies lunging through space to stop balls headed for scores provide some of soccer's most thrilling sights. They are only players allowed to use hands

**By John W. Wood**

*Soccer player and coach for 57 years, coach for the last 25 years at Oak Park and River Forest (Ill.) High School, the author was president in 1949 of the National Soccer Coaches Association of America*



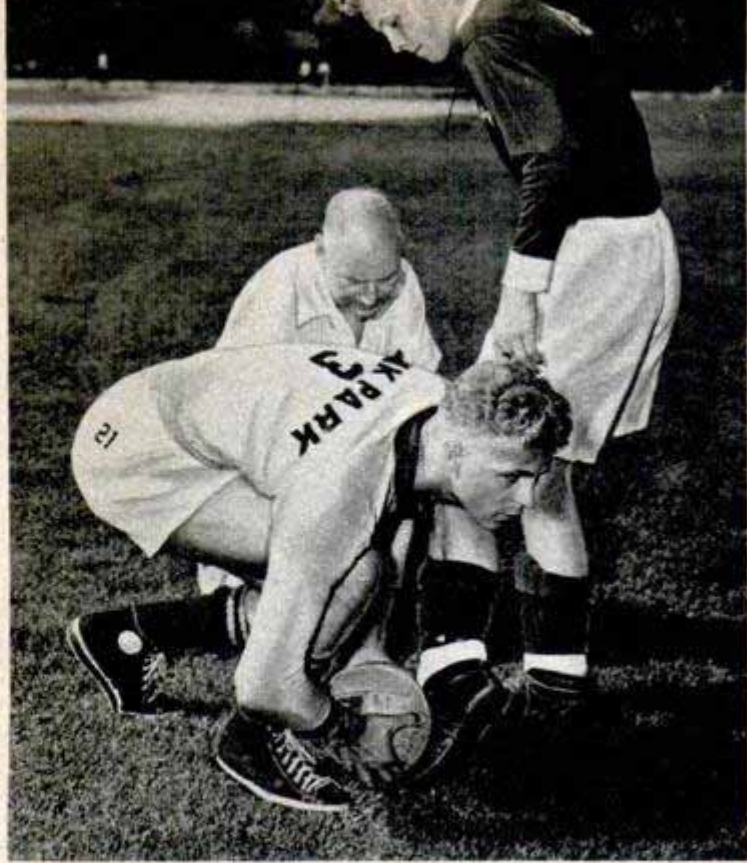


Coach John Wood, the author, shows a student how to "trap" a moving ball with the bottom of his foot

and endeavoring to kick a sphere through the gates of neighboring cities, defended by town teams.

History doesn't definitely record when soccer was first played. However, Chester, England, claims it originated there in Saxon times in A.D. 217 from gleeful kicking through the streets of heads of conquered Danes. Histories of London tell of school-boys playing soccer in the city in 1175.

One of Wood's high-school players demonstrates how soccer ball is kicked with the instep, not the toe



Goalie is being coached in technique of charging in to take ball off opponent's foot before he can kick

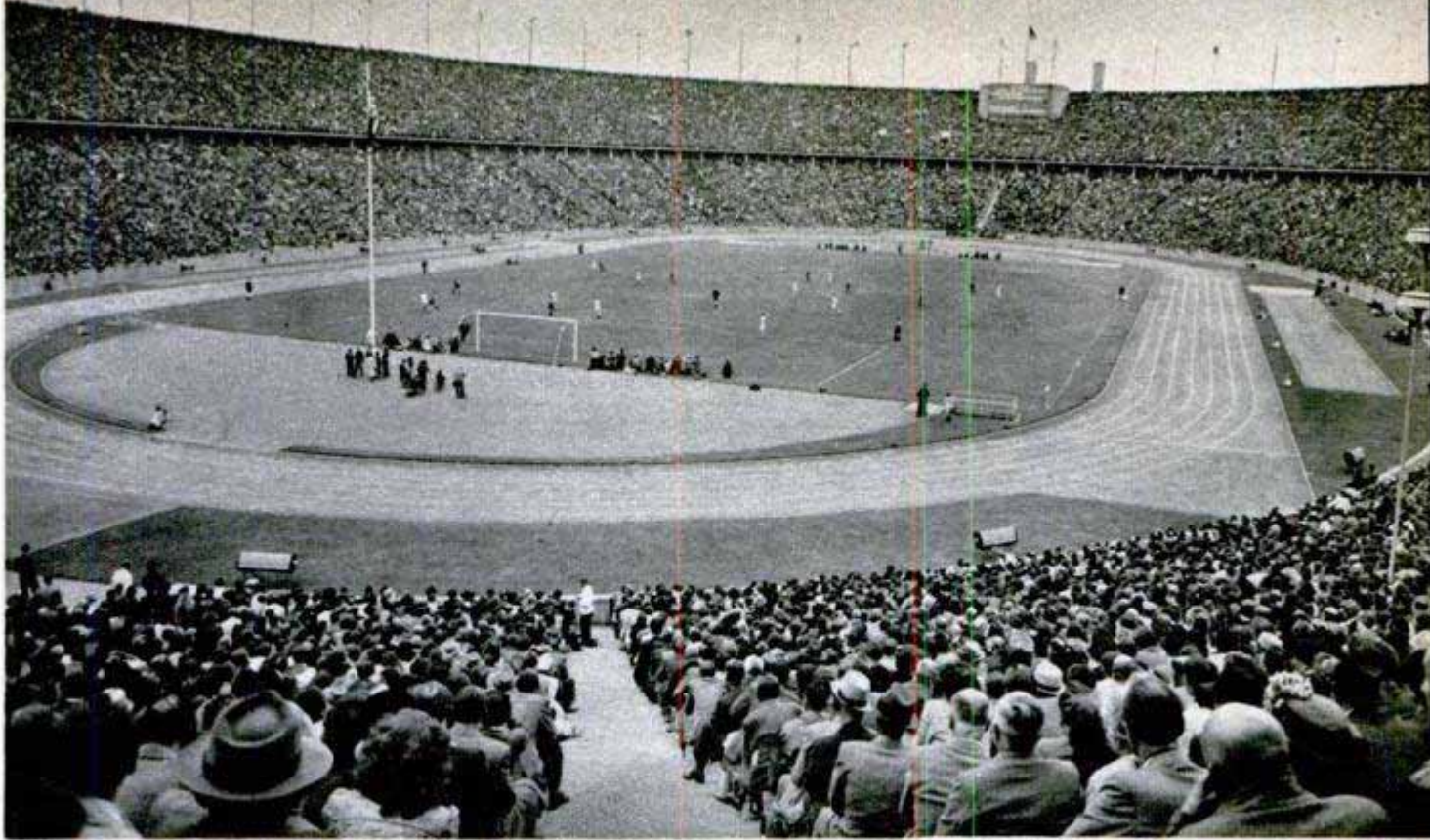
Edward II forbade it altogether in 1314 and Edward III enacted a law against football and similar "foolish games," stating the young men took greater delight in animal pursuit of a bladder than in fitting preparation in arts of war. He felt that at all costs he must have a nation trained to archery and not to useless games. Scottish kings also forbade it.

Oliver Cromwell played football. The

Passing is the key to good soccer. Player is flicking ball to man at his right, using outside edge of foot





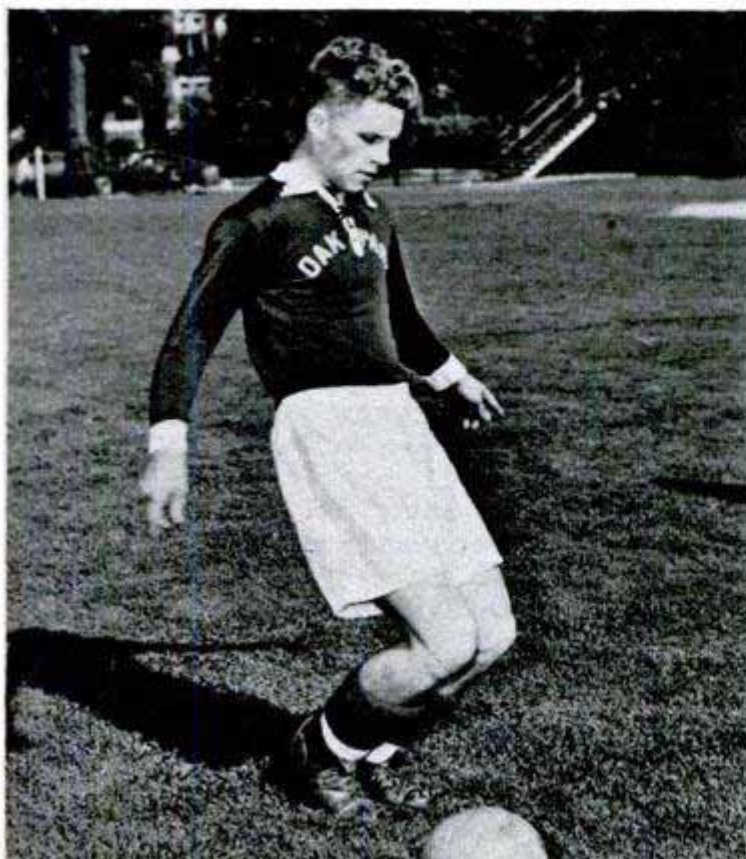


There were no vacant seats in Berlin's vast Olympic Stadium as teams from Offenbach and Stuttgart met for the German championship. Crowds of 125,000 have seen big games in Glasgow and Buenos Aires

Reverend John Wheelwright, a noted wrestler, declared he would rather do anything than meet Cromwell on a football field, because he was sure to be tripped up by him.

There were no strict playing rules in these earlier times. The ball was frequently stuffed with corks and there were any number of players on a team. Kicking an opponent was considered only slightly less laudatory than kicking the ball.

Another way to stop the ball, with knees and shins. This is particularly effective against very long kicks



In 1823 William Webb Ellis, a player for Rugby School, disregarding custom, picked up the ball and ran with it. That was the inception of the present rugby game, from which our American football came. There is a tablet at Rugby School commemorating the occasion.

In England, the Ellis-originated style of football was called rugby football, and soccer is called "association football." Soccer came from "association" when the Londoners abbreviated the word "association" to "soccie"—soccer. The game is called football in every country except in the United States, where it is known as soccer.

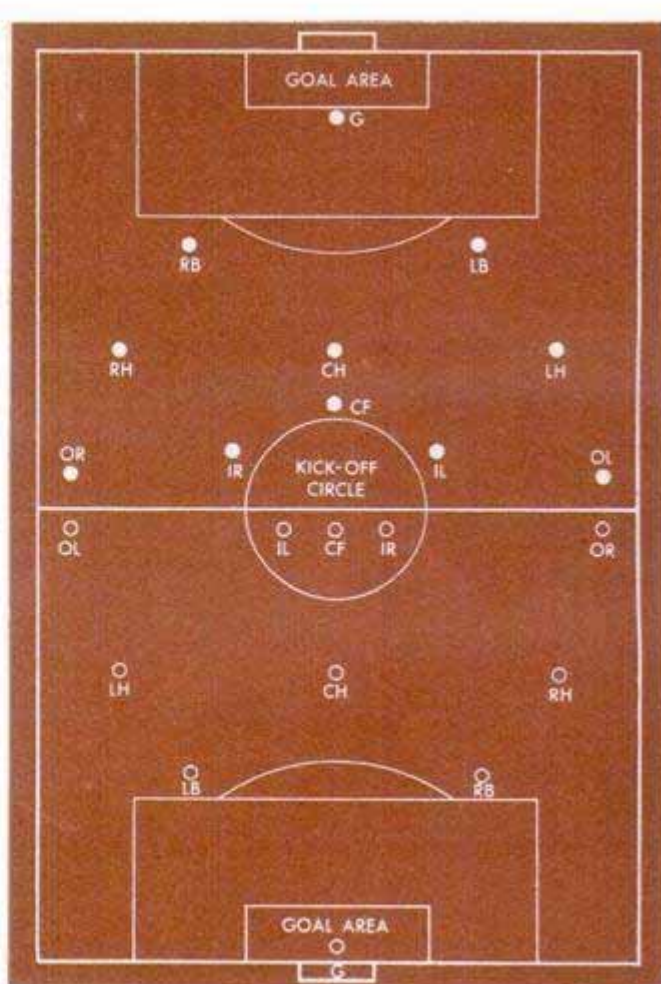
No country or continent outdistances the world in soccer, as the Americans do in baseball and the Scandinavians in skiing and skating. Since 1906, for example, the Olympic championship has shifted from Denmark, to England, to Belgium, to Uruguay, to Italy and to Sweden in 1948.

The Indians are reported to have played something resembling soccer before Columbus arrived. Yale, Harvard and Princeton took a fling at the game in 1840, with the first two barring it in 1862 as "too rough." Soccer was played at the University of Virginia in 1875. About 80 years ago Irish, Scotch and English immigrants formed the first real soccer clubs in the United States, but not until 1913 did the sport gain national recognition. That year the United States Soccer Football Association was organized and affiliated with the international governing body.

Now there are over 3000 teams listed in



All of India's Olympic team, except the goalie, play in stocking feet. They are clever ball manipulators



Players' positions at kickoff. The field's size can be from 100-130 yards long and 50-100 yards wide



the United States alone, with more than 60,000 players on their squads. Thousands more play on informal playground and school teams.

Most Eastern and Southeastern high schools and colleges and universities play intercollegiate soccer. The National Soccer Coaches Association of America, with a membership of about 500 high-school and college coaches, selects an all-American team every year. The first Soccer Bowl game took place in Sportsman's Park, St. Louis, Jan. 1, 1950, when undefeated Penn State and the undefeated University of San Francisco played a 2 to 2 tie. This will now be an annual affair.

Several all-American collegiate soccer players played on the U. S. A. team that surprised sports fans by upsetting England in the world's championships in Rio de Janeiro in July. Little Uruguay won the title. International championships are scheduled for 1954 in Switzerland and 1958 in Sweden.

Soccer crowds dwarf all other sports spectacles in size. Nearly 137,000 saw a game in Glasgow, and in Buenos Aires, a city of 2½ million, almost five million tickets were sold for games in one season. Two clubs in the latter city, incidentally, main-

With a well-directed punch, the Australian goalie, in the air at right, bats ball away from the danger area



At the start of a back flip, Brazilian in striped shirt grabs ball from Mexican opponent with his toe and kicks it in opposite direction. At the end of this acrobatic maneuver he landed on his hands and knees

tain stadiums seating 80,000 and 125,000 respectively—larger than our biggest major-league baseball parks.

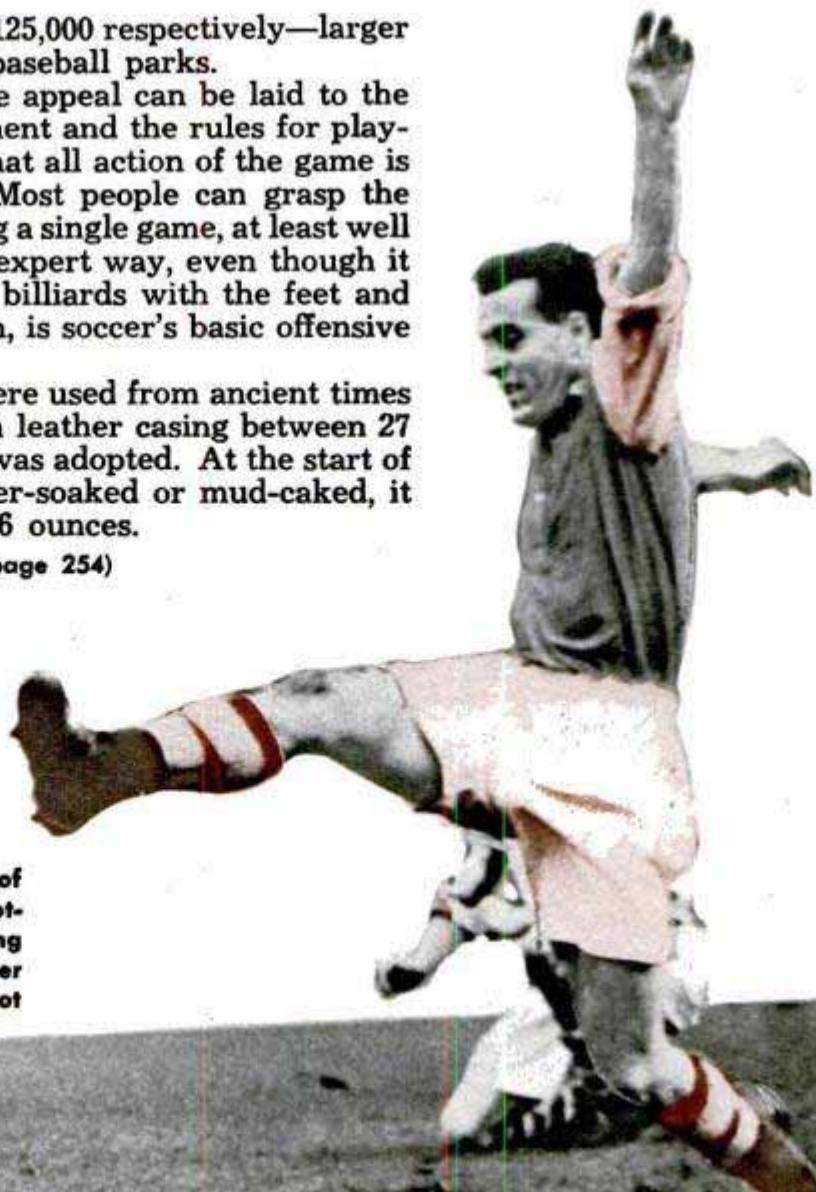
Much of the game's worldwide appeal can be laid to the fact that it requires little equipment and the rules for playing are simple; also to the fact that all action of the game is easily seen by the spectators. Most people can grasp the essentials of soccer after watching a single game, at least well enough to play it in a simple, inexpert way, even though it is a very scientific game, really billiards with the feet and head. Kicking, a familiar motion, is soccer's basic offensive action.

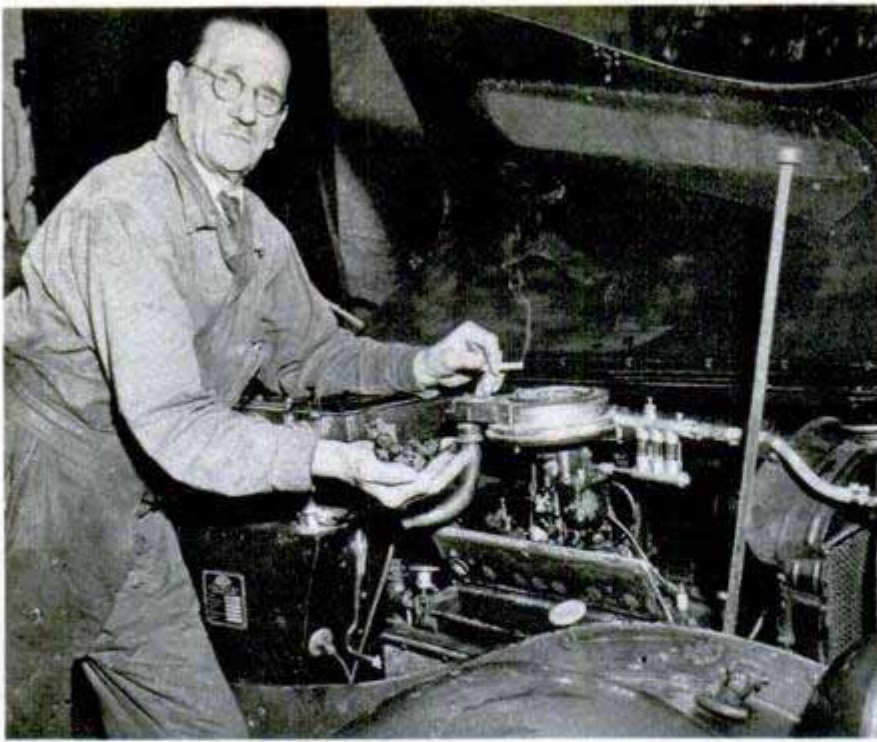
All sorts of kickable objects were used from ancient times until today's inflated ball, with a leather casing between 27 and 28 inches in circumference, was adopted. At the start of the game, before becoming water-soaked or mud-caked, it has to weigh between 15 and 16 ounces.

(Continued to page 254)



At a glance this looks like the finish of a long field-goal try in American football, with the ball holder still kneeling in the background. Actually it is a soccer player getting off a long downfield boot

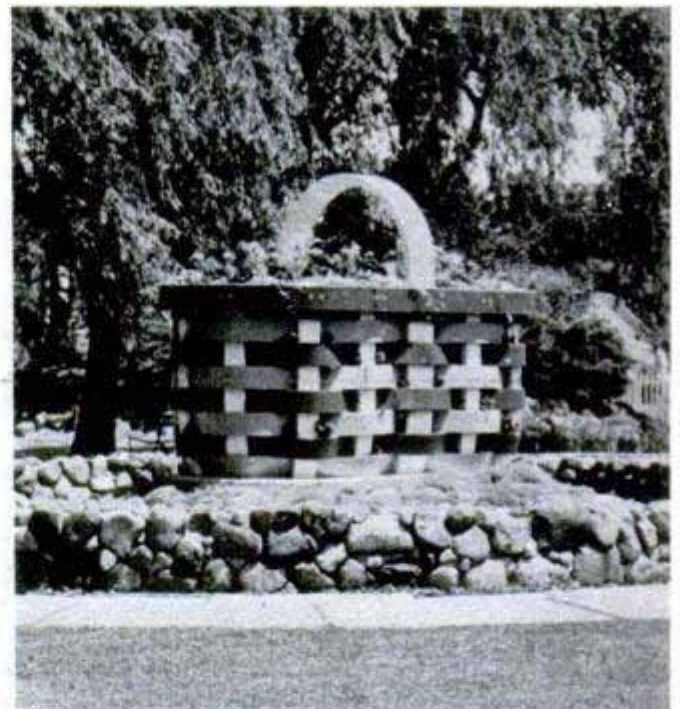




### Auto Runs on Peat

Peat serves as the fuel for a new auto engine invented by Hans Gebhardt, a German engineer. Gebhardt says his engine's operating costs are only a third those of a gasoline engine, but the driver must stop

every 65 miles to refuel. The engine runs that distance on a mixture of peat, a few pounds of carbide and three gallons of water. One advantage of the engine, he says, is that the driver can stop along the road, feed the gas generated by the engine into a small stove and cook a meal.



### Flowers From Tin Cans

Converting old tin cans into beautiful bouquets is the hobby—and part-time business—of Mrs. Rosie Perdue, Dallas, Tex. Mrs. Perdue first shreds a tin can and makes the stems for an entire bouquet out of one can. The bottom of the can is left intact. Artificial blossoms of paper and cloth are attached to the stems. Mrs. Perdue can make a dozen bouquets in a day.

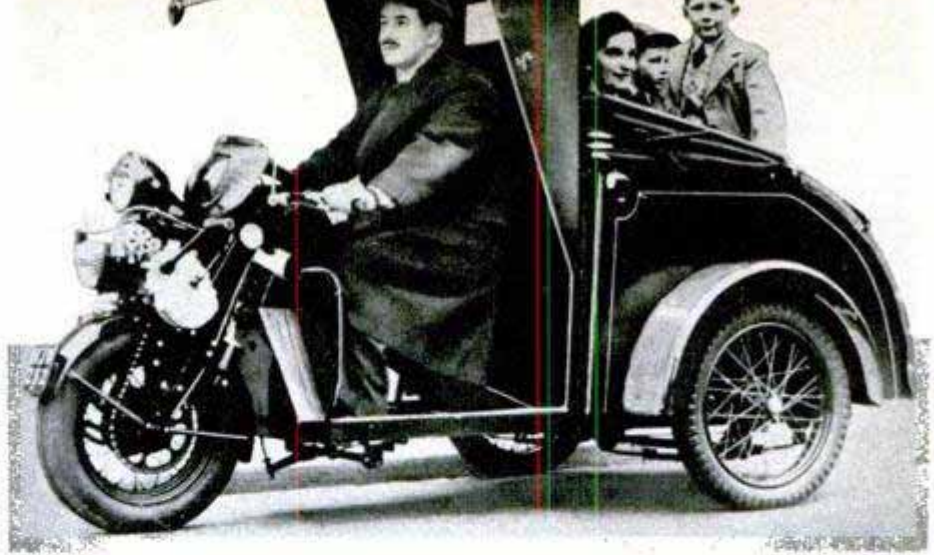
### Huge Flower Basket

Center of attraction in a Lorain, Ohio, park is a giant flower basket, so large it dwarfs the near-by benches. The basket is woven from long, brightly painted boards. Flowers cover the top of the basket and grow out through openings in the sides.

☞ Butyl inner tubes have now been improved for use in subzero temperatures.

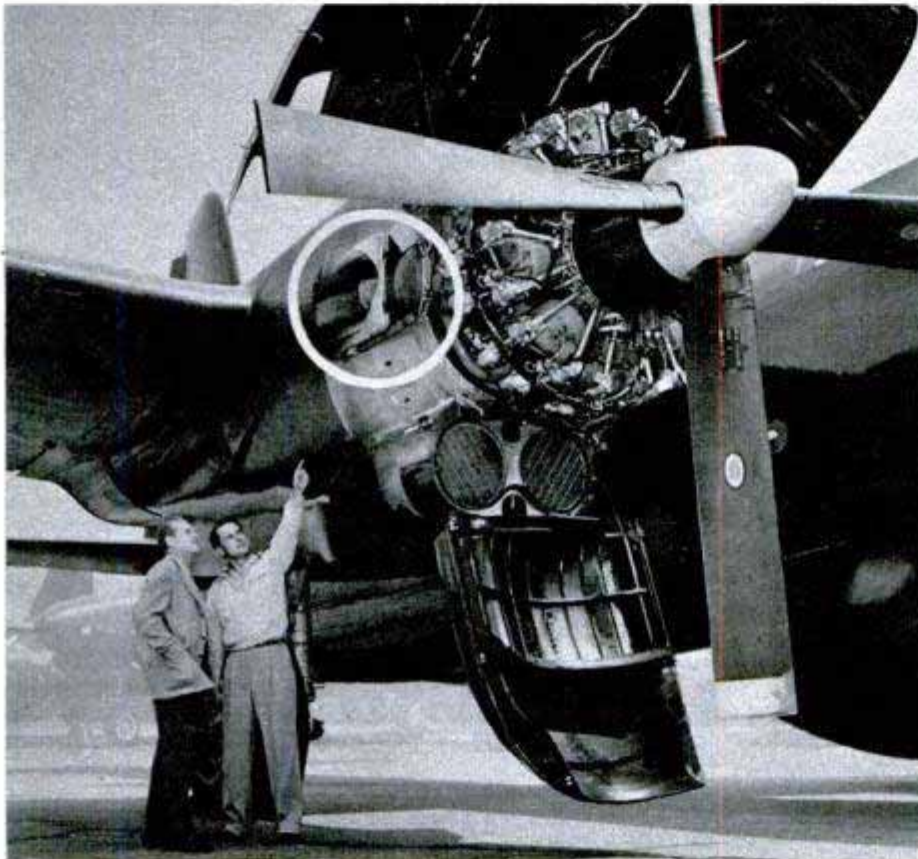
### Three-Wheel Taxi

Small enough to scoot in and out of city traffic, a three-wheel motorcycle taxi, built by a British cabbie, still is roomy enough to seat three persons. The passengers sit backward in the "rumble seat" body. Economical to operate, the taxi does 80 miles to a gallon with its two-stroke motorcycle engine, mounted over the front wheel.



### Neptune Adds Power

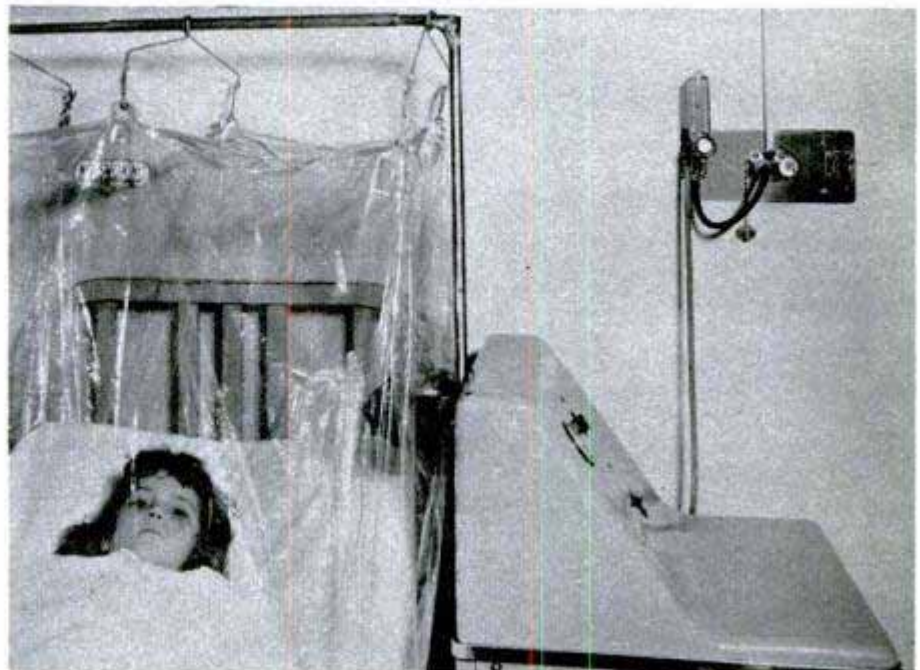
Compound power plants—two sets of three turbines driven by exhaust gases from a pair of piston engines—have lengthened the range of Navy Neptunes 20 percent. They are used for long-range antisubmarine patrol and one now holds the world's distance record of 11,236 miles. The force of the gases drives the turbine wheels, which are geared to the crankshaft through a series of gears and fluid couplings that transmit the extra power to the engines. The new combination provides 6500 horsepower at take-off and also lessens engine noise, reducing crew fatigue on long trips.



Lockheed Aircraft photo

### Piped Oxygen System In Hospitals

Liquid oxygen is stored in a low-pressure cold converter at the University Hospitals of Cleveland and piped to the users. The new system is less costly and more convenient than hauling heavy cylinders of gas to the points where needed. About 50,000 cubic feet of gaseous oxygen are stored in liquid form in a 440-gallon tank at minus 297 degrees Fahrenheit. Automatic controls and low pressure eliminate the possibility of explosion.

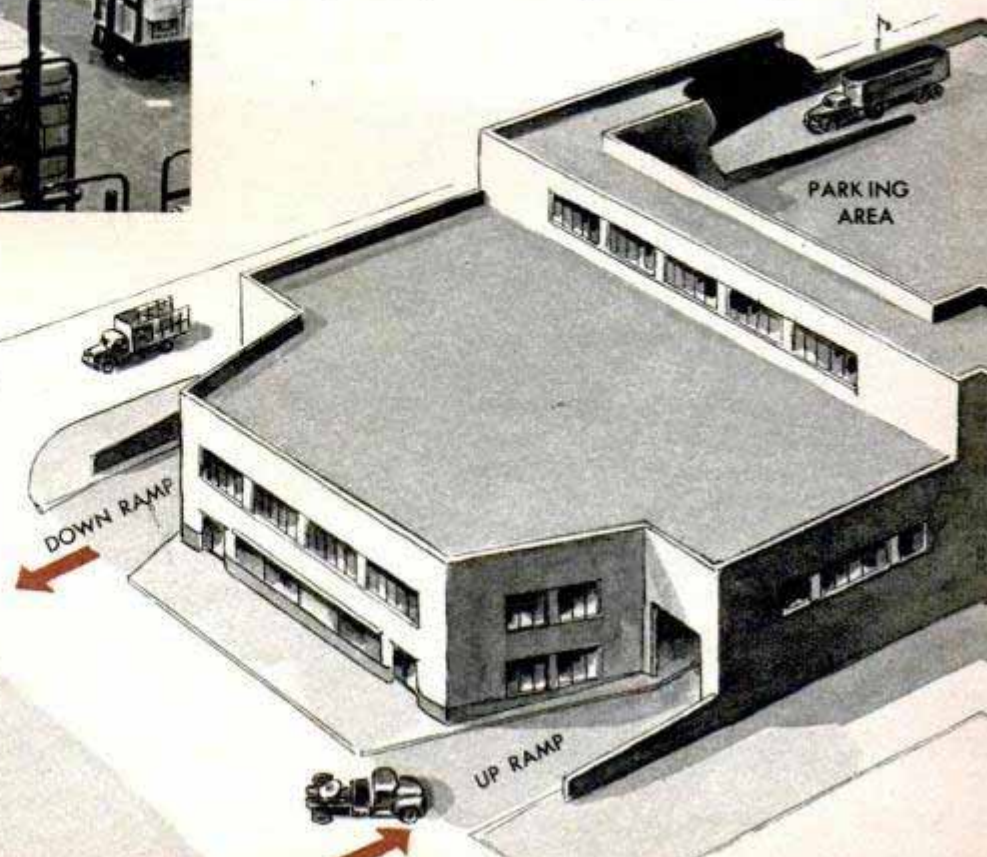




Here's a familiar sight in Manhattan—a truck traffic snarl. Terminal takes 25 percent of long-haul trucks off streets, eliminates 12 percent of "mosquito" fleet

← Model of efficiency is the loading platform. Freight is being shifted from hand trucks to highway trucks

Cutaway shows facilities of the vast terminal. Highway trucks pull in on one side of four-block-long building. Workers sort freight on hand trucks which move by conveyor to delivery trucks across platform



Steel beams and safety pins, potatoes and people in an endless procession of trucks and busses stream into two vast new terminals that serve as

# FUNNELS FOR A CITY'S FREIGHT

By Clifford B. Hicks

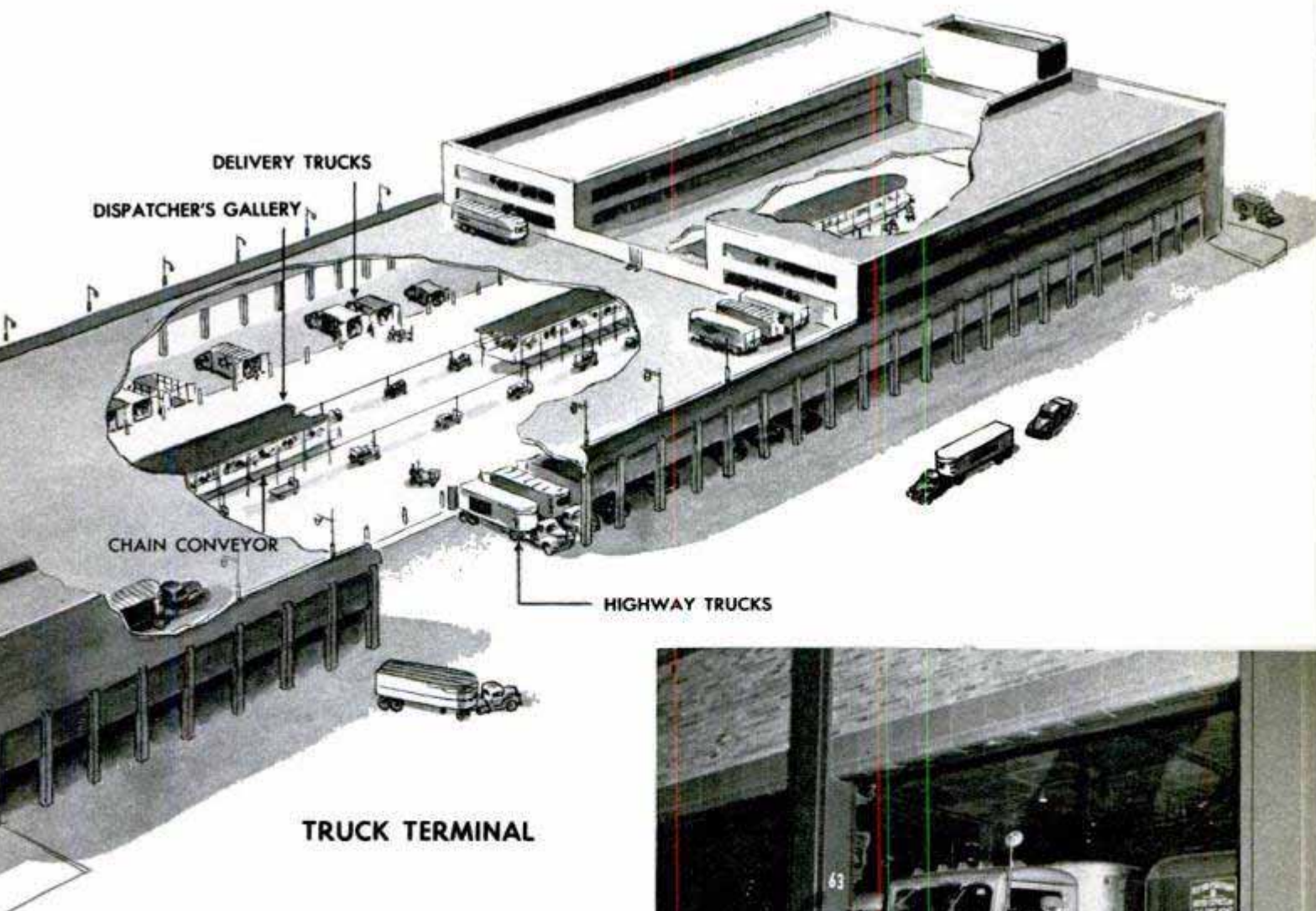
**B**ILL EGAN waited 10 minutes, finally saw his chance and pulled his big semi-trailer truck out of the alley into the snarl of Manhattan traffic. One wide swing didn't do it, so he ground to a halt, whipped the wheel around and started to back up.

That's when he clipped the fender of the motorist who had crawled up behind him. And behind that car were a hundred others, scores of trucks and busses, all blaring the lid off Manhattan. A traffic cop worked 10 minutes untying the knot. Worst of all, Bill knew he'd likely get tangled up again when he made his next delivery.

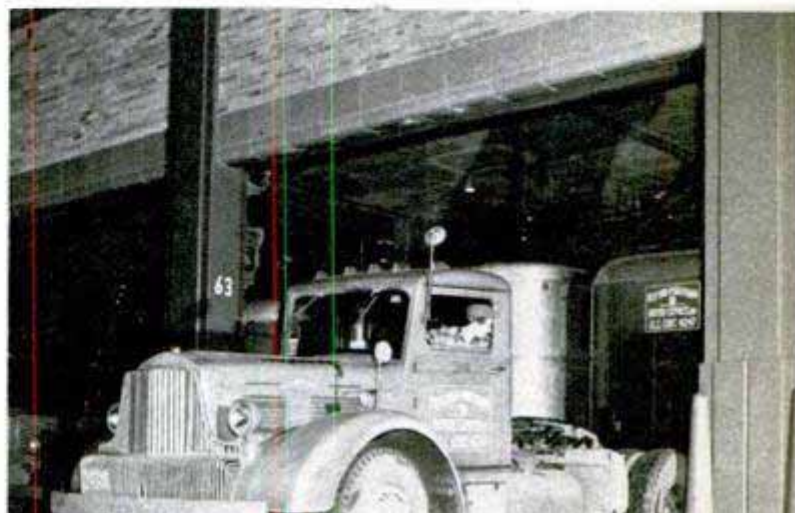
Thousands of trucks like Bill's are at once a lifeline and a garrot for New York. But the big rigs are just one of the factors

in the traffic troubles that plague Manhattan Island. Another is the 2500 intercity busses which each day shuttle some 65,000 people to and from the terminals scattered across the city.

Now New York is whipping the problem with a one-two punch which will give the city top terminal facilities for handling freight and human beings. One blow is a cavernous truck terminal, recently completed, which serves as a "post office" for the common carrier, mixed freight carried by Bill Egan and his fellow drivers. Officials estimate the terminal will remove 25 percent of the long-distance trucks and 12 percent of the local "mosquito" trucks from the jammed streets. The other punch is a walloping bus terminal, to be completed in mid-December, which will keep about 2500



Right, drivers never had it so good—no unloading, no reloading. Here a driver backs in to pick up his preloaded trailer for a long haul out of New York





Platform worker shoves loaded hand truck into position so conveyor "fingers" will snap around its mast

busses out of the island's troubled traffic.

The two projects are ripples in a stream, for they already are serving as patterns for similar proposals in other cities. Both are built and operated by the Port of New York Authority, which does its job without levying a penny against the taxpayer. Operating expenses are paid by the truck and bus lines which lease the terminal facilities.

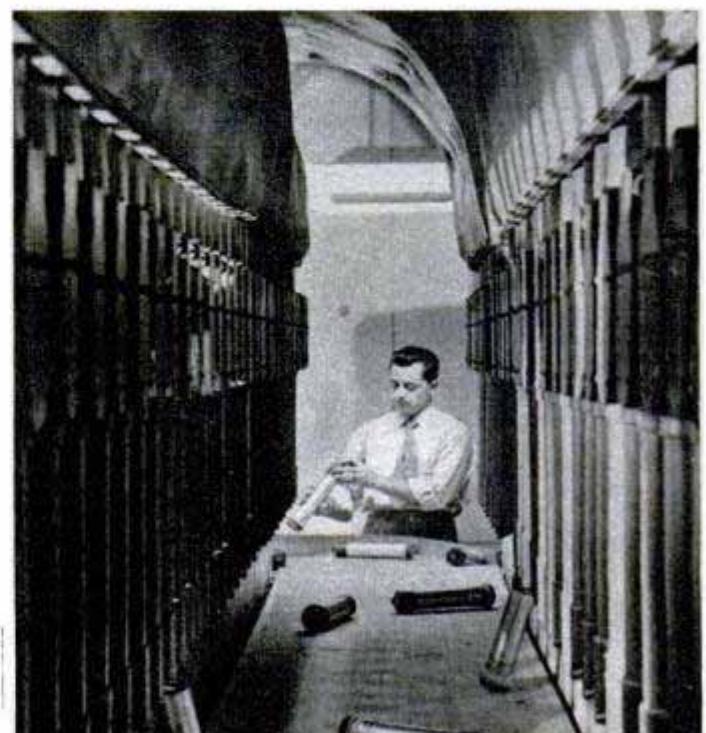
Bill Egan is one of the 7256 drivers who roll their big rigs onto the island of Manhattan each day. Like Bill, about 65 percent of these drivers haul hodge-podge loads that must be dropped piecemeal at various destinations. In the past, Bill sometimes operated this delivery route himself; at other times he unloaded at his company's makeshift terminal in lower Manhattan,

where the mosquito-fleet drivers took over the freight. Bill knows from hectic experience that the average truck with a mixed load rumbles 50 or 60 miles through New York streets, making an average of 40 sporadic stops before the run is completed.

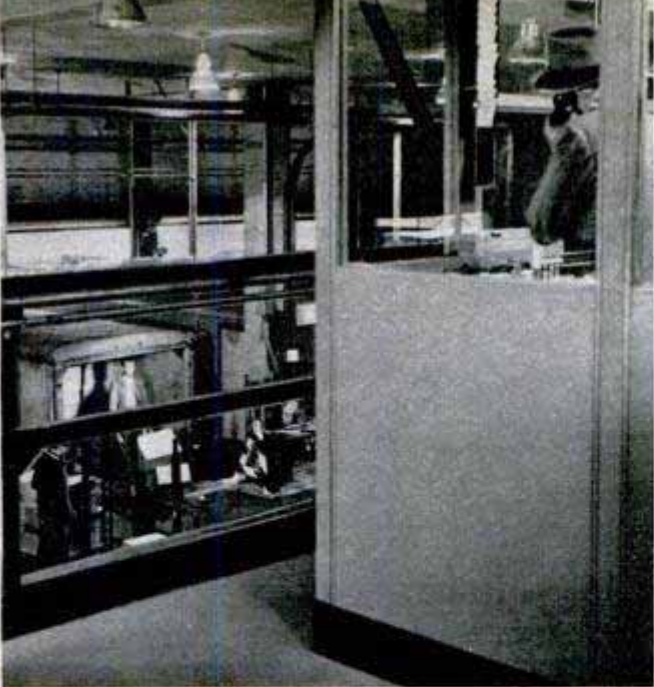
The truck terminal has changed Bill's life. The \$9,000,000 building is a vast cavern four blocks long equipped with countless robots from a merry-go-round freight carrier to pneumatic tubes that swish paper work from one end of the building to the other. Inside this "post office," men and machines manhandle huge freight shipments, sorting, routing and reloading them for delivery. The terminal will clip an estimated 945,000 truck-miles from the budgets of long-distance operators each year, saving them about 238,000 gallons of gasoline. Mosquito-fleet operators will whittle their expenses accordingly. The total saving to truckers will be somewhere around a million dollars a year.

Gone are Bill Egan's delivery worries. Today he rolls his rig through the Holland tunnel, then rumbles only four blocks to the terminal. Swinging the semi backward through one of the 40 broad doors, he inches into one of the 142 big, floodlighted truck berths. This entire side of the vast freight platform is reserved for over-the-road trucks. Bill switches off his engine, climbs down, unlocks the trailer and ambles over to the registration room where he checks in the papers which cover the mixed shipments in his truck. Then he's through for a while. No irritating paper work. No unloading. No responsibility until he climbs into a loaded truck a few hours, a day or two later. Bill wanders up to the neat locker room, stores his road clothes and takes a quick shower. Spruced

In platform control section, operators trace movement of every box in the building by watching numbers flash on panels. Below right, cylinders which hold shipping papers drop out of pneumatic tubes onto a moving belt







From a long gallery high above the loading platform a dispatcher checks on a shipment. Right, other dispatchers see that local trucks are loaded in street-address sequence, give drivers instructions on their local pickups

up, he heads for the truckers' restaurant inside the terminal, eats and strikes north for a night in New York. Bill never had it so good.

An hour before, as soon as Bill unlocked the trailer, the platform workers plunged into the big truck and started wrestling the packages out onto the platform. High overhead, running like a balcony above the center of the 800-foot platform, is the dispatcher's gallery—the link between the paper work and the big, crated shipments. And down at one end of the gallery is the central control room, the nerve center of the building, where operators determine the destination of each bundle in Bill's mixed load, then send instructions down to the platform workers on how to sort the stuff for reloading. Three communications


systems link the room with the big bay where Bill's truck is parked—an intercom system, a telephone and a pneumatic tube.

The platform workers have a wide variety of hand trucks and machines to help them sort and stack the freight for reloading. Ordinary flat trucks carry standard-shaped crates; motorized lift trucks scoop up heavy shipments; barrel trucks cradle cylindrical objects. If the worker finds a shipment of long pipe inside the semi, he merely hitches little trailers to a flat truck, stretching it out until it will hold the pipe. If there is a mountain of small bundles, all going to the same destination, he erects a portable roller conveyor in a couple minutes and sends the bundles shooting down the line to the trucks.

Circling the center of the big platform is

In truck bay, a worker signals the control room his disposal of a particular shipment. Right, freight handler chalks number on hand truck. Carried around platform by conveyor, truck will be picked off by another man





the merry-go-round conveyor—an overhead chain almost a third of a mile long. At 16-foot intervals along the endless chain, metal fingers gape open. The conveyor has but one purpose—to haul the loaded platform trucks from one side of the big concrete slab to the other. To do this job, it moves them at the rapid rate of 148 feet per minute down the length of the platform, around the corner and down the other side. Each little truck has a tall mast on one end. When the workman has loaded the flat truck, he chalks its code number (received from the platform control room) on the truck's blackboard. Then he wheels it over to the belt conveyor, lining up the top of the mast with the open metal fingers. When the fingers strike the mast, they lock around it and the conveyor spins the shipment around the platform to the other side, where a designated workman recognizes the code number and unclips the truck. If he misses the first time, the truck will always be around again. The conveyor eliminates the need for pushing the trucks clear across the platform, and the endless confusion that might result if they were delivered by hand.

Meanwhile, paper work on Bill's truckload is fanning out through the building along the 6½ miles of pneumatic tubing. Carriers zoom through the tubes to each operating section and every important room in the terminal. Each destination has a code number.

Up in the routing section, one of the operators rifles the manifests which are to be sent down to the unloading berth. He glances at the huge blackboard

lining one wall and decides the proper route for one shipment. Slipping that manifest into a carrier, he turns a disk on the cylinder until it shows the proper code number, then inserts it into the tube. It is sucked immediately to the tube control room, where it is deposited on a moving belt, swung around and dumped in front of the router. He glances at the code number and inserts it into one of the 65 tubes for delivery to the truck bay.

One room in the vast building is lighted like a pinball machine. In the platform control section, big electronic panels with flashing code numbers show the movement of every item of freight in the terminal from a box of pins to a shipment of steel beams. Down on the platform, the worker turns a dial as he unloads or reloads each shipment. Numbers instantly pop up on the panel in the room, and the operator processes and sends out the papers covering that shipment.

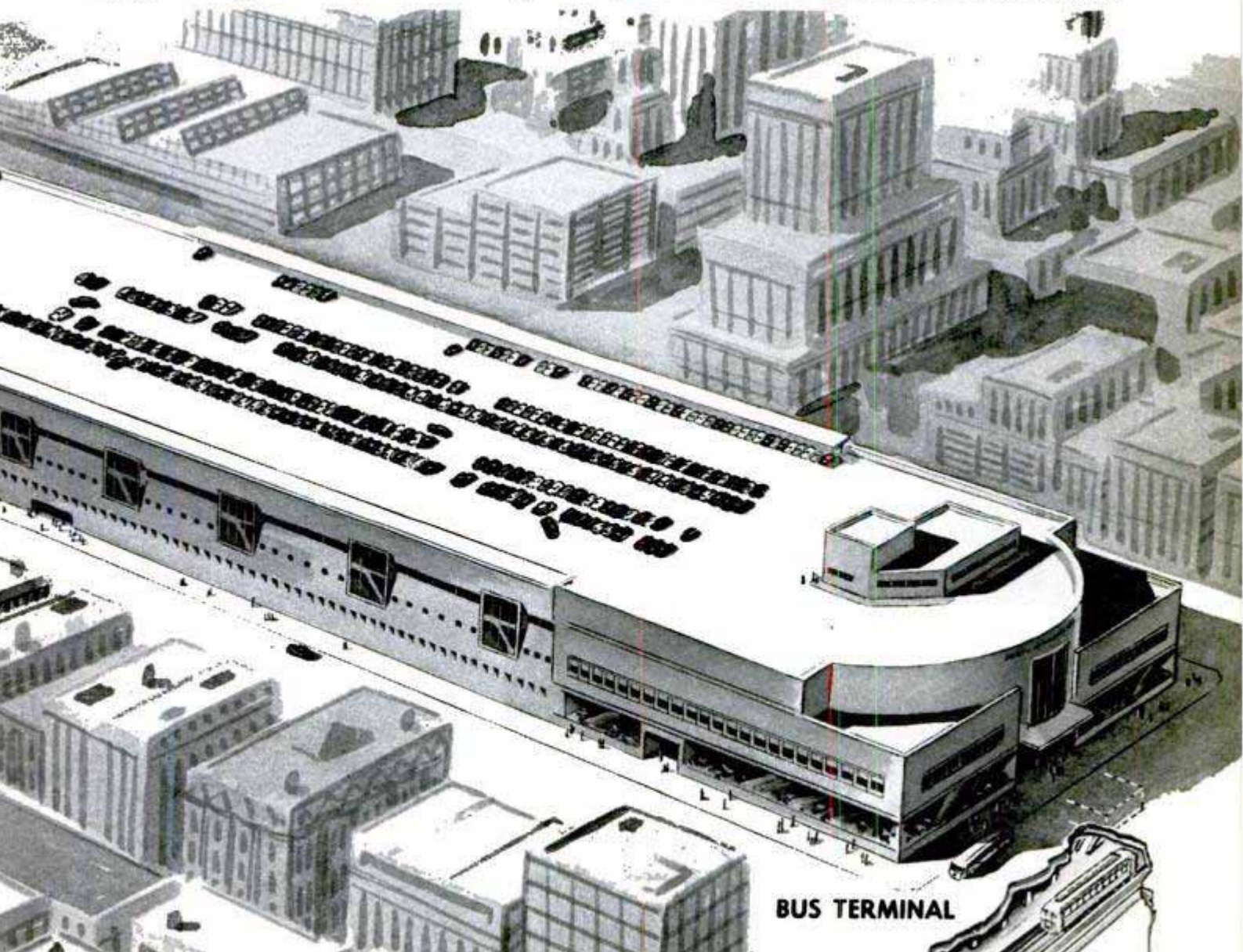
Each dispatcher has 20 telephone lines at his command for ordering deliveries and pickups. He prepares each load in street-address sequence, then sends out the mosquito-fleet trucks on their delivery runs. When a driver telephones that his truck is empty, the dispatcher routes him for pick-

ups on his return trip to the terminal.

Just about every known device for jockeying freight from one point to another is built into the terminal. A cruising overhead crane zips tonnage shipments from one side of the platform to the other. Four big scales, including a 10-ton job, are spotted along the platform. In the recoopering shop, complete power equipment turns out new crates to replace those that have burst their seams. There are an in-bond room, short-term storage room and a special room for the storage of valuable merchandise. Automatic sorting machines and punch cards keep the paper work flowing. Topside, on the roof of the terminal, there are two fire stations and parking berths for 115 trucks. And spotted through the structure are banking facilities, a doctor's office and various conference rooms.

Across the river, in Newark, N. J., a twin terminal has been completed. Similar in  
(Continued to page 240)

Busses will roll into new bus terminal every five seconds during peak periods. Located near Times Square, terminal will handle 130,000 passenger movements each day. Four-level building accommodates both suburban and highway busses. Ramps are radiant-heated to melt snow as it falls. Arrows show traffic patterns busses will use to and from Lincoln tunnel





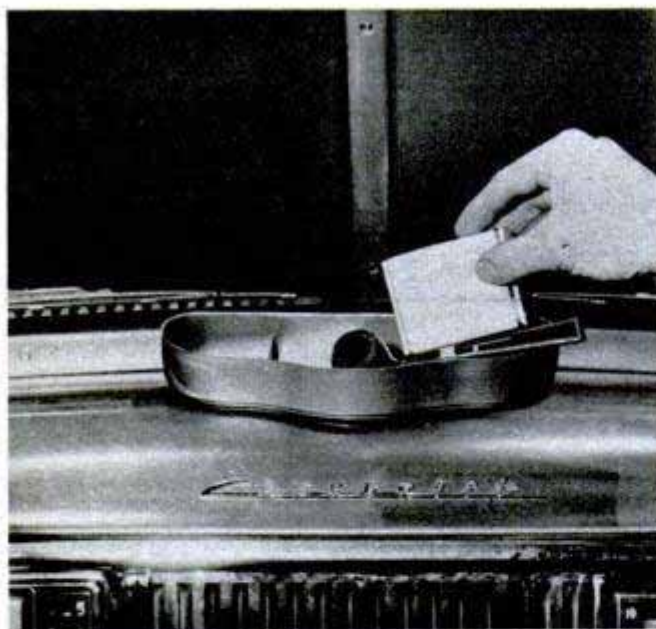
## Food Alarm

Timed feeding, which has become traditional for infants, is extending to the poultry world. An Englishman has invented an



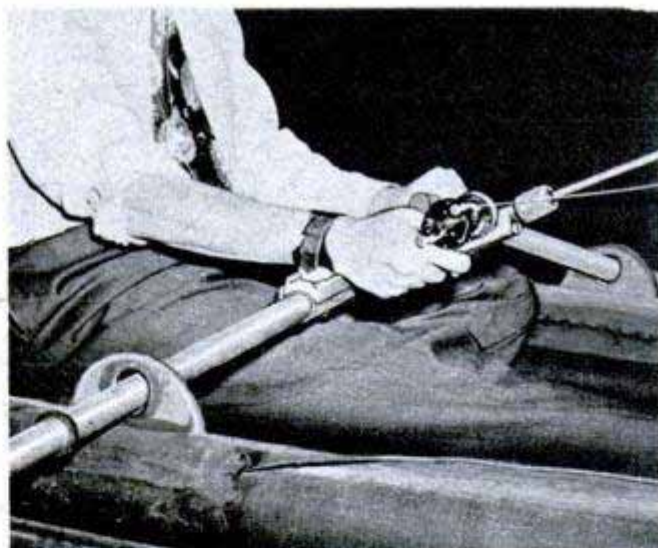
Mirrorpics

alarm-clock controlled device which releases food from a hopper into a container at a preset time. The owner can leave for the day and know the chickens will be fed on time.



## Magnet Holds Utility Tray On Car Dashboard

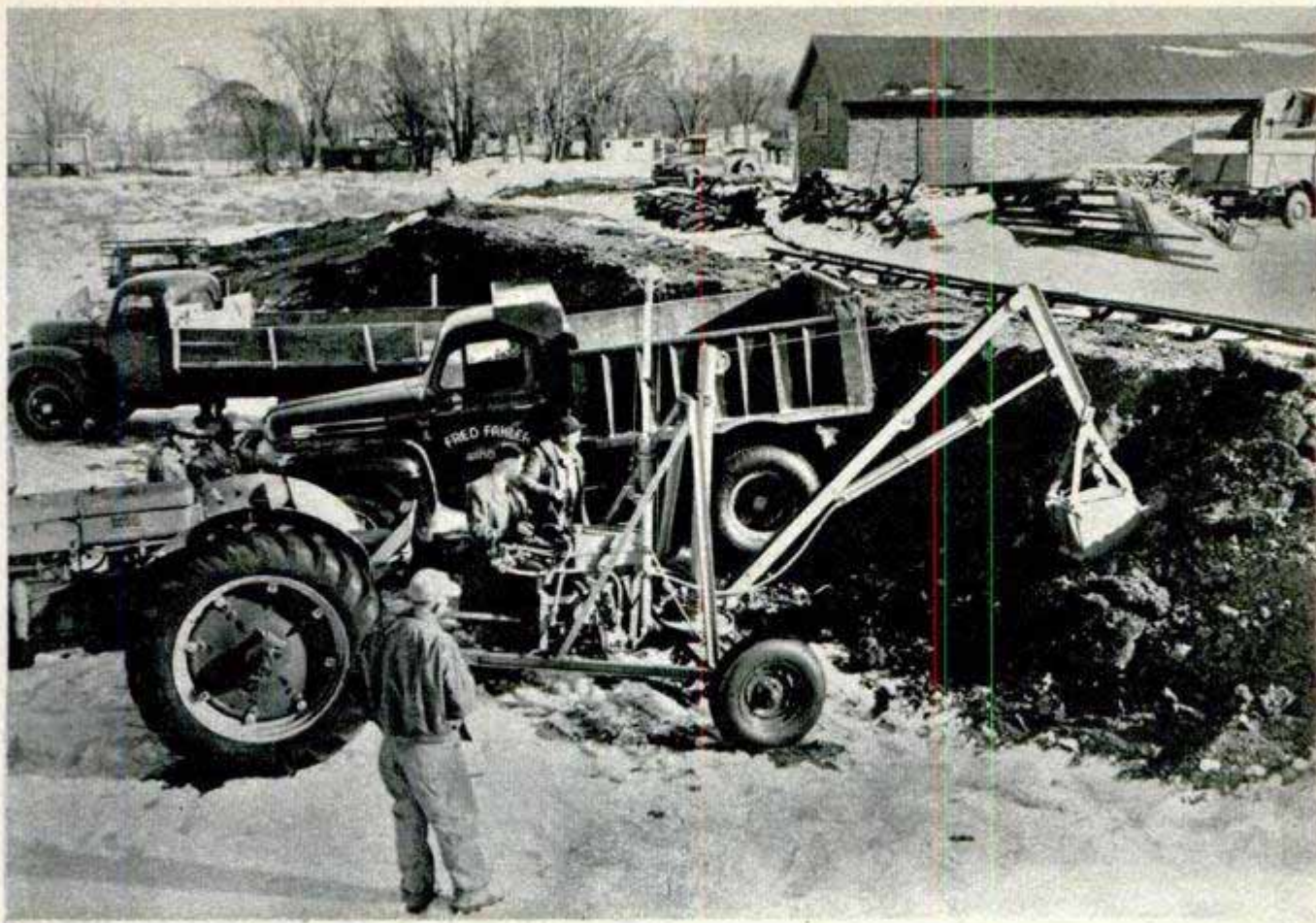
There's no installation problem with a new utility tray for motorists—you simply place it on the dashboard and a strong magnet holds it there. The tray is large enough to hold smoking supplies, parking-meter coins, keys and other items. The permanent magnet, cemented to the base of the tray, is coated to prevent scratching.



## Fisherman's "Handcuff"

You can fish and row at the same time with a "handcuff" that straps to your wrist and fastens to the end of the oar. When a fish strikes, you can release the oar instantly by a sidewise motion of the arm. The slow movement of the arm in rowing gives the lure a better action in the water.

☐ Cooking doesn't affect the taste of a synthetic noncaloric sweetener, Sucaryl, which has a more natural sweetness than saccharin.



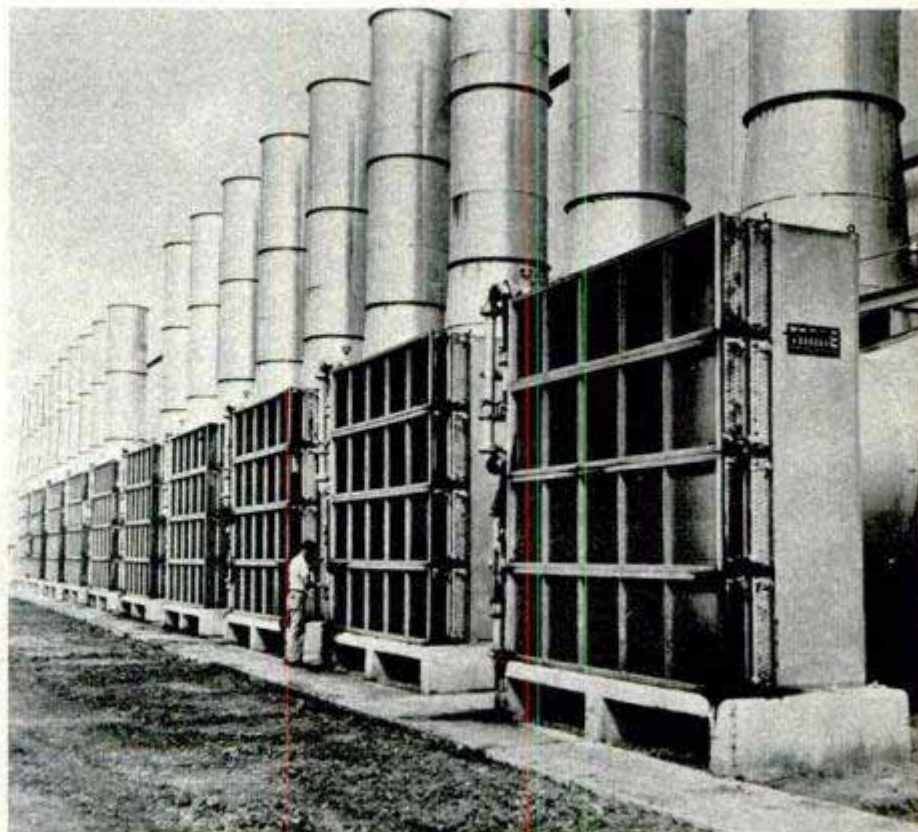
## Trailer-Type Digger Hooks to Tractor

Attached to the power take-off of a tractor, Jeep or truck in less than a minute, a trailer-type digger has a capacity up to 30 yards an hour. Because the unit supplying the power acts as a counterbalance, swinging counterweights are unnecessary, enabling the machine to work in close quar-

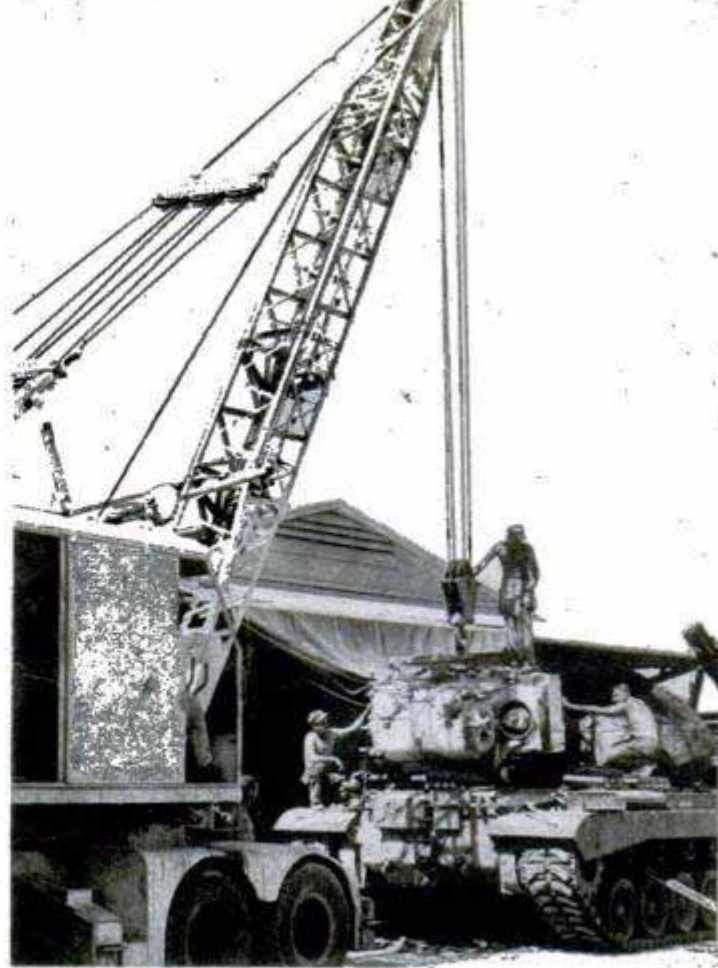
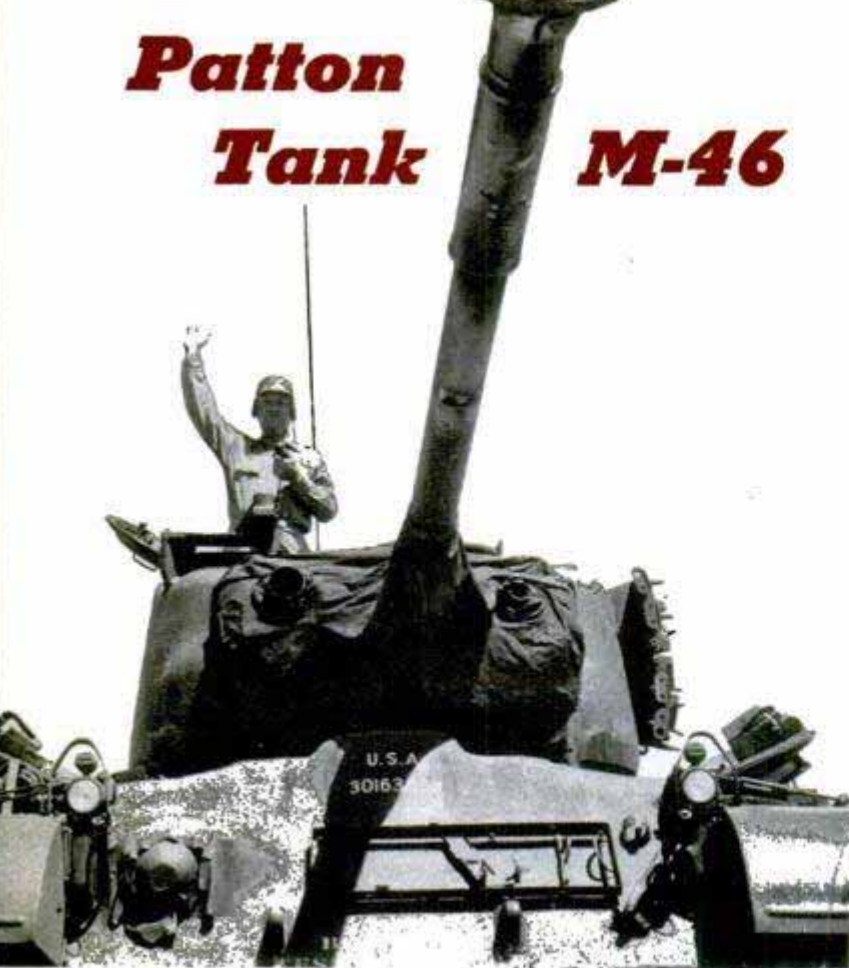
ters. Three controls operate the hydraulic cylinders that actuate the swing, boom and dipper-stick mechanisms. The digger works down to a depth of 9 feet and its shovel can be raised to 14 feet for easy loading into any truck. Shovel buckets for the machine vary in width from 14 to 24 inches.

## Three Blocks of Radiators

It's always warm along a three-block-long bank of giant radiators that cool the 120 engines of the largest internal-combustion power plant in the world at Port Lavaca, Tex. The large radial engines drive 120 direct-current generators, each turning out 1000 kilowatts for the aluminum reduction works of the Aluminum Company of America. Each radiator is over 11 feet tall and has a six-bladed fan 7 feet in diameter. Both water and oil are cooled in the radiators. The total heat dissipated is 317,700,000 BTUs an hour.



# Patton Tank M-46



U. S. Army photos

Muzzle brake on 90-mm. cannon helps eliminate dust when firing, preventing the tank's position from being given away. Right, engine and transmission can be lifted out as a unit for quick change if power plant fails

AGILITY and heavy fire power are combined in an improved version of the General Patton medium tank, now receiving exhaustive field tests. The 48-ton armored monster, with a 90-mm. cannon, can speed at 40 miles per hour across level ground. Its driver steers with a short wobble stick that also serves as the gearshift and with which he can spin the tank around in its own length. Designated the M-46, the Patton tank has a 12-cylinder, 810-horsepower air-cooled engine. Semi-air-conditioning is provided by fans that drive hot fumes aft, out of the engine compartment, away from the driving compartment and the turret. The engine has mufflers to silence the exhaust noise and pads of cold rubber fixed

to the track cleats permit travel over good highways without damage to the road surface. Part of the field testing of the Patton and other redesigned track and wheel vehicles was conducted at El Centro, Calif., at temperatures that ran as high as 120 degrees in the shade.

Among them were improved Jeeps and various sizes of military trucks, all of which could run circles around their World War II counterparts. They all have 24-volt electrical systems and low-pressure tires for better flotation in mud and sand. Their engines are waterproofed and all can be changed quickly. Also under test are an 18-ton light cargo tractor and a 49-ton heavy cargo tractor.

Patton can travel over rough ground at 40 miles an hour. Gun muzzle is turned and shrouded when traveling over dusty terrain. Right, looking down at driver, holding wobble stick used to shift gears and steer



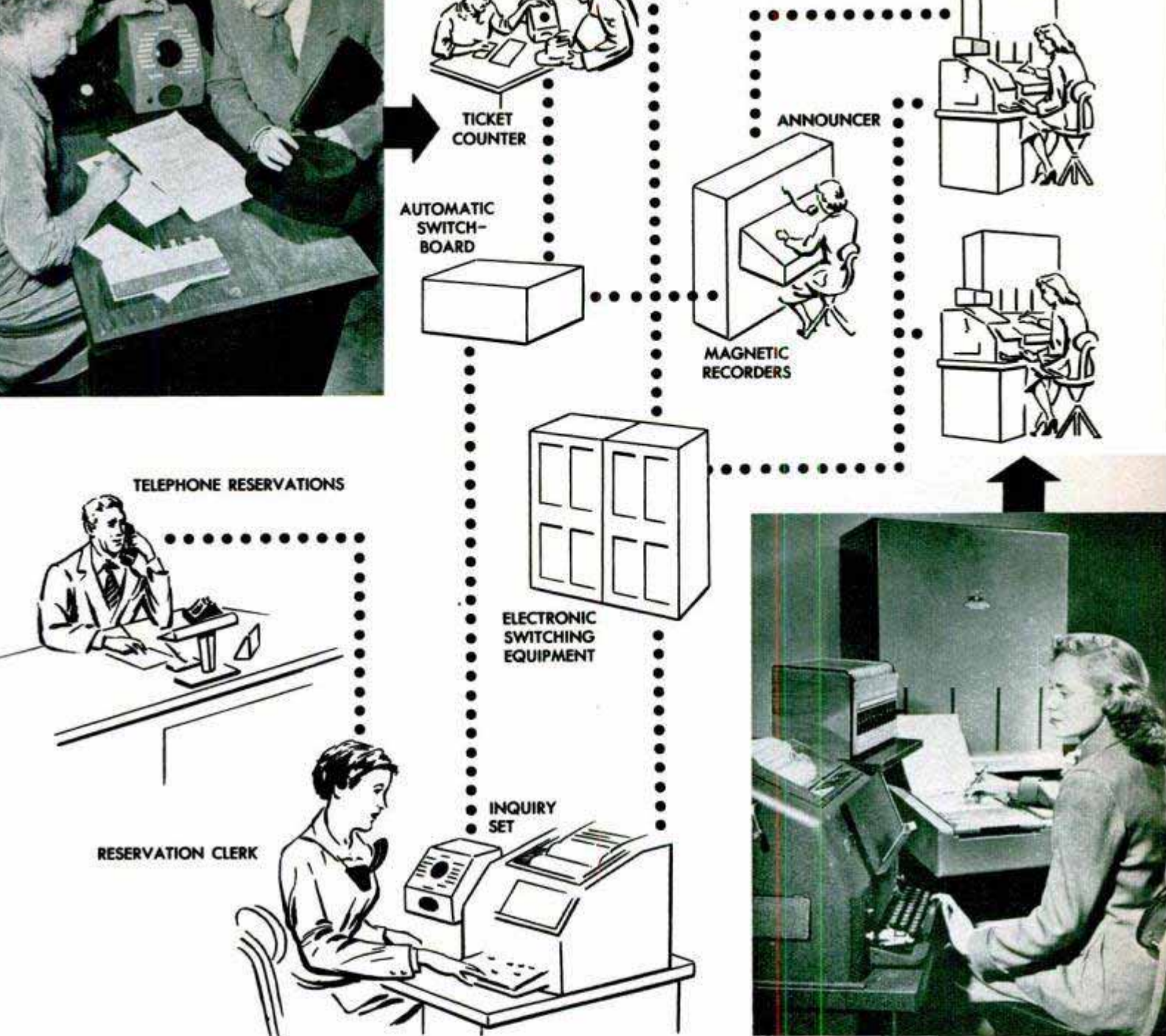


Diagram of Pennsylvania Railroad's speedy reservation system. Ticket agent, top left, or reservation clerk, lower center, uses electronic equipment to make your reservation with clerk at automatic file, lower right

## Railroad Reservations Made Automatically

IF YOU'VE ever waited impatiently in line at a ticket window, you'll welcome an automatic railroad-reservation system that cuts handling time by 70 percent. Accomplishing this long-needed miracle is an electronic system that eliminates all usual conversation between the ticket agent and reservation file clerks.

When a customer comes in for a reservation, the ticket agent simply dials a code number denoting the destination and date of departure on an inquiry set beside her. This code number connects the inquiry set to a magnetic recording which announces all accommodations available on that date for that destination. The recordings, a different one for each day and destination, are

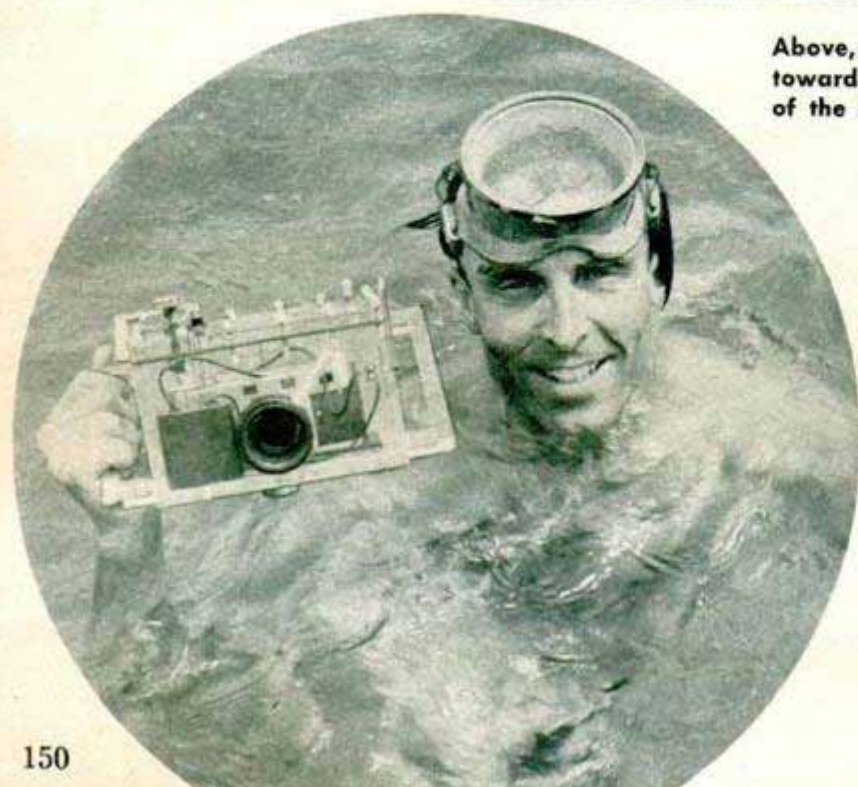
kept up to date by an announcer who makes a new one whenever the last unit of any type of space is sold.

Learning the available accommodations, the customer selects the space he wants for his trip. The agent then "types" the order to the space-control unit, an automatic book-keeping machine. This machine "reads" the order as it comes in over the wire and automatically selects the proper train file, ejecting it on the desk in front of the clerk. She looks over the diagram, assigns the space and types a confirmation to the ticket agent, which usually requires less than 30 seconds. During busy periods, the machine automatically "stacks" messages, handling them in order.



# DIVING

# CAMERA- MAN



Above, aiming his camera, photographer swims toward a subject. Left, Howard Deichen, designer of the box, comes up from a picture-taking dive

PENS that write underwater have nothing on Roy Pinney's camera. Sealed snugly inside a plastic box, it takes pictures as easily underwater as it does on land. Extension shafts, sealed by waterproof packing, allow the photographer to focus, cock and trip the shutter and wind the film while swimming far below the surface. There's even a flash synchronizer for use when lighting is poor. Ten pounds of air pressure are maintained inside the box to keep water out should a small leak develop.



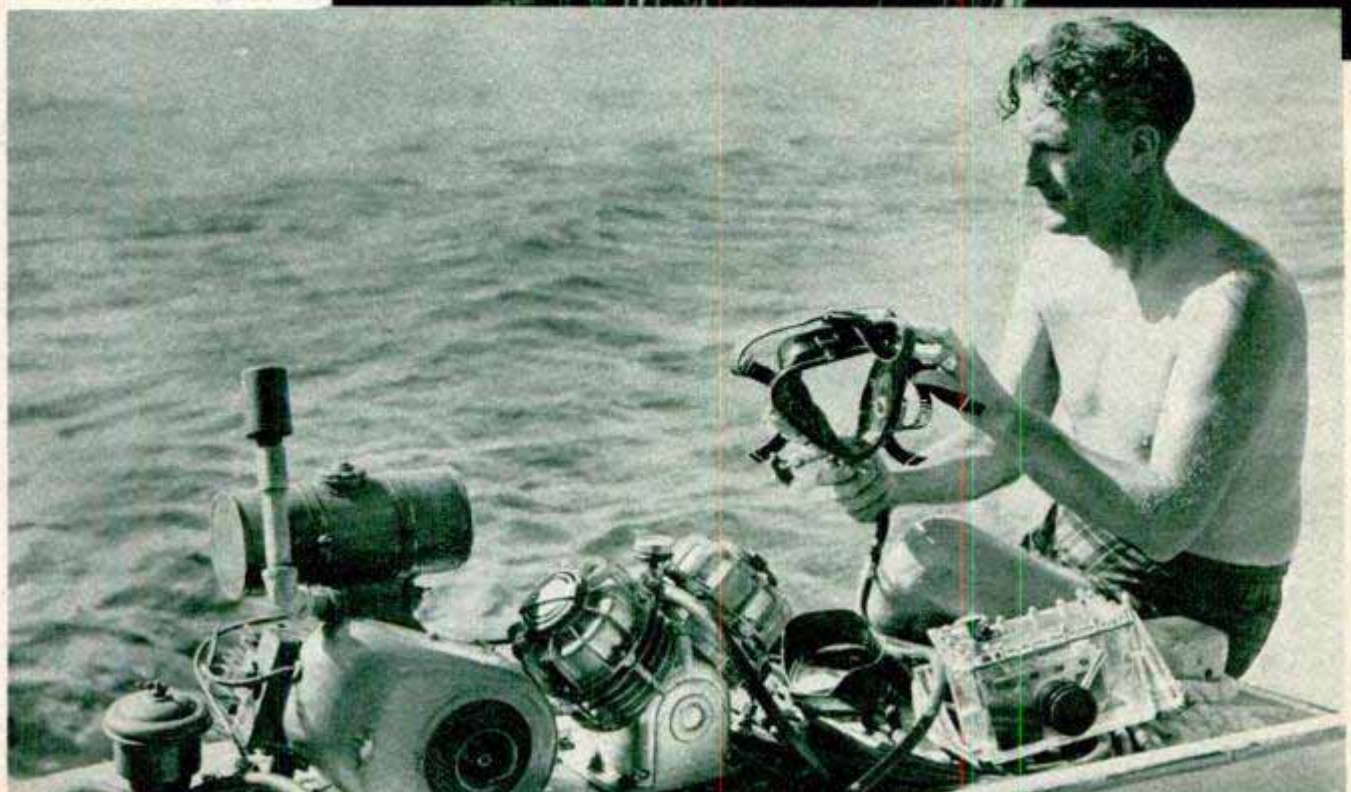
This action shot of an underwater "hunter" is typical of the photos Pinney takes with his plastic-encased camera

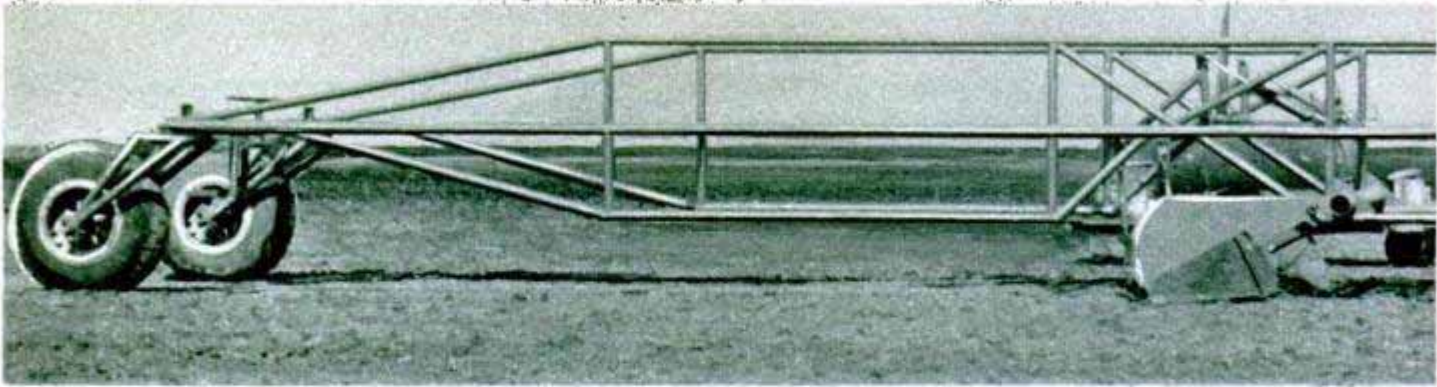


Spear fishing, popular at Nassau and other island resorts, provides excellent action shots for submarine camera



Sportsman Roy Halvorson uses a Pinney camera on visits to the ocean bottom. Motor-driven compressor enables him to stay down over half an hour





## Long Land Leveler

With a 60-foot-long machine they built from surplus equipment, two enterprising brothers of southeast Texas can level four acres of ground in an hour. Howard and



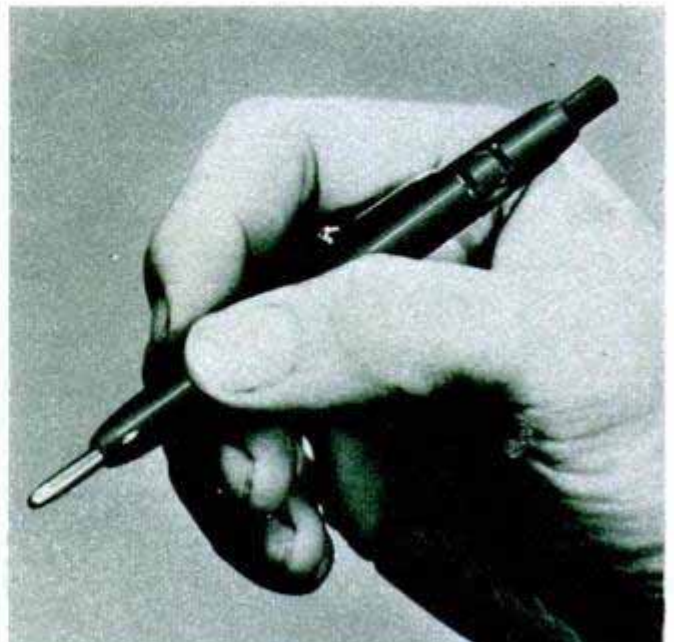
## Tailgate on Truck Forms Electric Lift

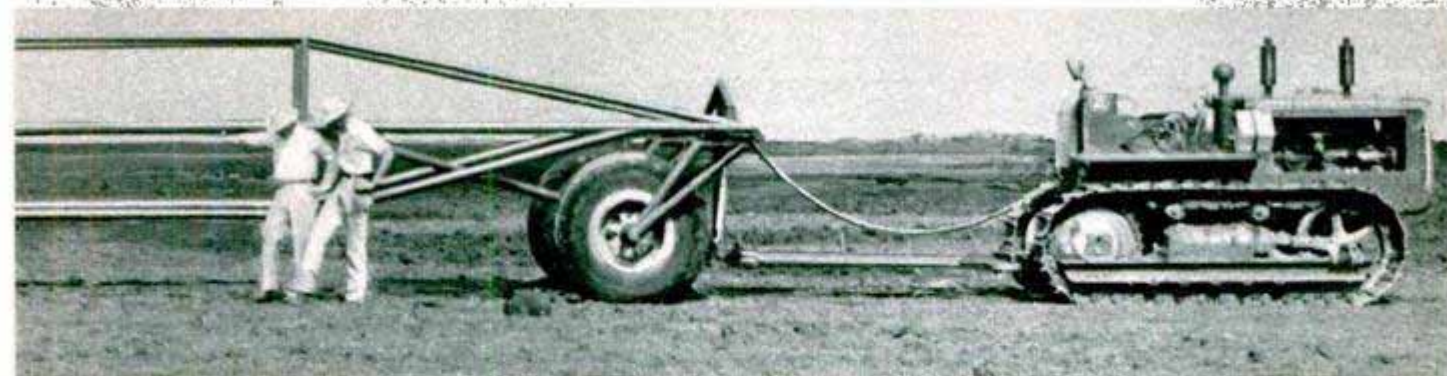
Hard-to-handle shipments are easily loaded aboard any truck equipped with a new electric lift. The lift platform replaces the conventional tailgate on the truck. A winch and cable, powered by the truck battery, draw the platform up to the truck body level. After the load is inside, the gate closes automatically. A portable switch controls the winch, and the operator can ride up with the load if he desires. The lifts are made in a variety of sizes.

## Pocket Magnet

Small metal pieces dropped in hard-to-get-at places are quickly retrieved by a powerful magnet that moves in and out of its plastic case like the lead in a mechanical pencil. A spring clip on the barrel of the magnet makes it convenient to carry in the shirt pocket. It is especially useful in factory first-aid stations where it safely removes steel splinters from the eyes or flesh of workers.

Information not listed on articles in the index, starting on page 10, frequently is listed in the WHERE-TO-FIND-IT LIST, available to readers without charge from Bureau of Information, Popular Mechanics, 200 E. Ontario Street, Chicago 11



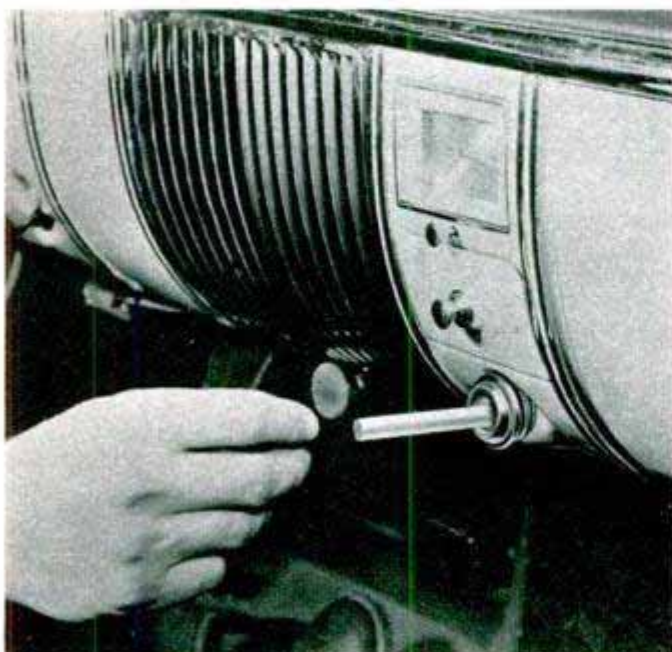
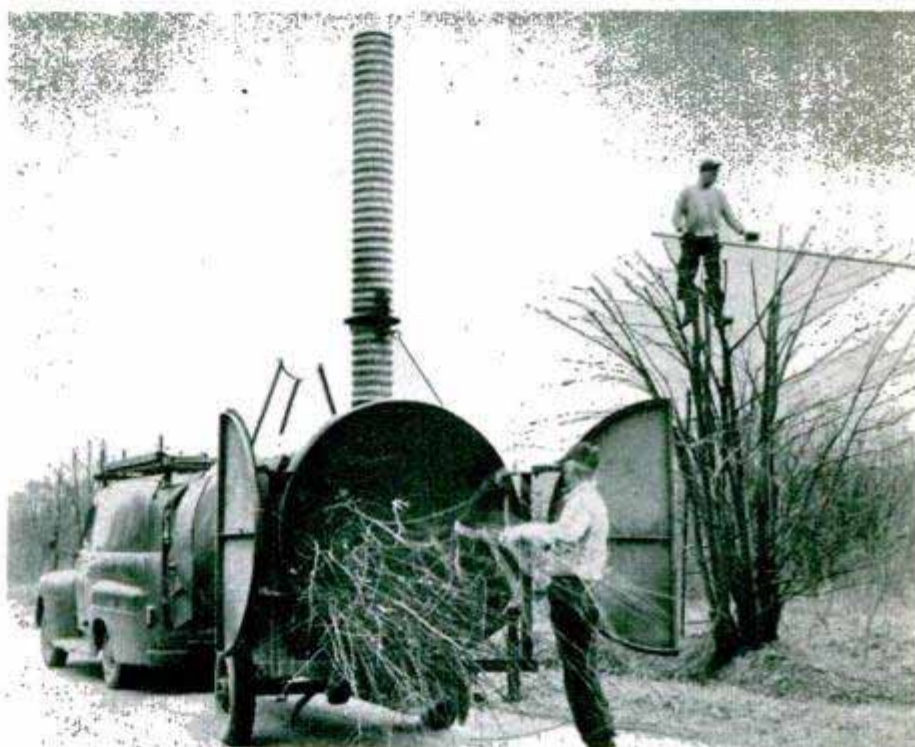


William Clayton built the tractor-drawn leveler to slice humps off their rice fields, making possible efficient irrigation. They made the frame from three-inch refinery

pipe, welded at the joints. Under each end they placed two surplus bomber wheels. In the center of the frame is a 16-foot blade controlled by hydraulic lifts.

### Brush Burner

Brush trimmers along Indiana highways and power lines get rid of green branches quickly and completely in a portable furnace mounted on a two-wheeled trailer. Once a bed of hot coals is formed in the firebox, the green branches burn quickly with a minimum of smoke. The smokestack, which folds down for traveling, carries the smoke high enough so that it does not bother highway traffic. The front end of the furnace is thickly insulated to protect the tow truck from the heat.



### Car Lighter Puffs Cigarette

Cigarettes are lighted automatically for the motorist by a new car lighter that is never removed from the dashboard. Instead, the motorist inserts the cigarette into a socket and pushes in a metal ring. A few seconds later the ring pops back out and delivers the lighted cigarette. A hose connects the lighter with the windshield-wiper vacuum line to provide air for the light. Electric current is supplied through a connection to an ignition-switch terminal.

¶ Although chemical industries in this country extract 5,000,000 tons of nitrogen from the air each year, life processes replace almost that amount; and even if the nitrogen were not replaced, the supply would last about 930,000,000 years.



# HARVEST

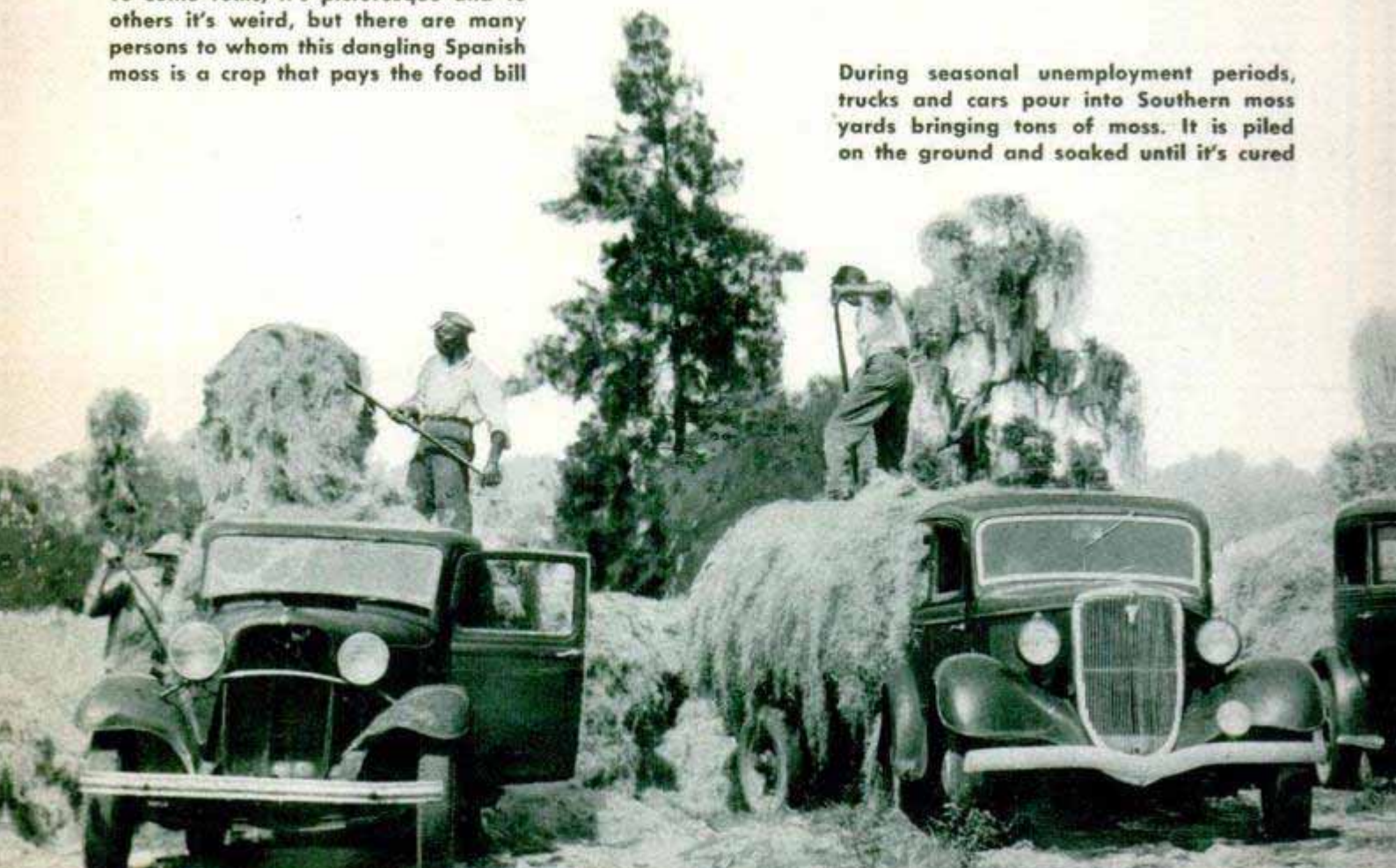
**A**SK ANY FARMER to describe the perfect crop and he'll probably say it's one that would require no plowing, no planting, no cultivating, no fertilizing, yet could be harvested all year 'round!

Strangely enough, there is such a crop. However, you won't see farmers rushing to produce it because, compared with such money-makers as corn, wheat and oats, it's just a poor relative. You'd better not plan to grow it because Nature can do it cheaper. It is Spanish moss, the gray plant that hangs like a shaggy beard from the trees in the South. Growing wild and in great abundance, it has a steady but low-priced demand.

The inner fiber of the plant somewhat resembles horsehair and it is commercially valuable as stuffing for upholstered furniture, mattresses and other items. For many Southern workers, Spanish moss is a form of unemployment insurance provided by Mother Nature. During periods of seasonal unemployment, the worker can always go out and collect a load of moss to be sold at the nearest buying yard.

To some folks, it's picturesque and to others it's weird, but there are many persons to whom this dangling Spanish moss is a crop that pays the food bill

During seasonal unemployment periods, trucks and cars pour into Southern moss yards bringing tons of moss. It is piled on the ground and soaked until it's cured



# FROM BEARDED TREES

Spanish moss is an excellent example of misnomers in nature, for it is neither moss nor Spanish. Instead it is an air plant, or epiphyte (the opposite of parasite), belonging to the pineapple family. Its lengthy strands seen growing along Atlantic and Gulf Coast states from Virginia to Florida and westward to Texas, take no nourishment from the tree on which they grow. All the plant needs is a place to anchor its seeds. Food is supplied by the air and by moisture.

The feathery, wind-blown seeds frequently find anchorage in rough-barked trees, though if they happen to land on wires with worn insulation, they will start growth there as readily as on a tree, demonstrating that they are a true air plant and not a parasite which needs nourishment from its host. The only harm that Spanish moss can do is to become so dense on a tree that leaf growth is smothered. When frequently harvested, it does not damage the host tree in any way.

Close inspection of the twisted strands of Spanish moss in springtime reveals a tiny three-petaled, greenish blossom. When the seed pod ripens it is much more conspicuous than the minute bloom. It contains numerous feathery seeds with tiny barbs which cling to any rough surface wherever they are blown by the wind.

Finding an anchoring place, the tiny seed grows into a twisted, pendant plant. Normally, the moss is gray, but during heavy showers it becomes greenish for as long as the rain lasts. Like a camel it seems to store up enough moisture until the next rain. On the day following the shower, the green disappears and the plant becomes a drab gray again.

In regions bordering streams, lakes or swamps, Spanish moss reaches its greatest abundance. It knows no seasons and can be harvested any time of the year. Spanish moss is one crop of which it can be said that "money does grow on trees." It is usually possible to harvest it free of charge wherever it grows, for the owner of the place is generally happy to have it removed from his trees—that is, unless he wishes to harvest it himself.

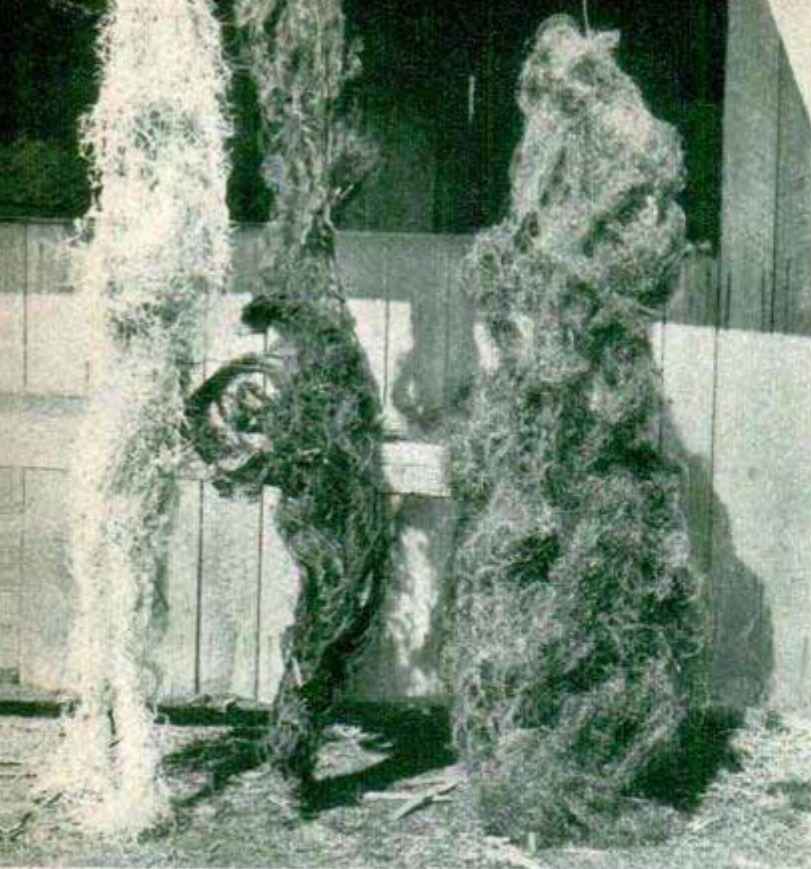
To harvest the crop, a long bamboo pole is used. This is studded on one end with nails that are hooked over the strands to pull them loose. Sometimes entire families work at the harvest. The adults work on the ground while the younger and more agile members climb into the trees to tear the moss free.

The load of moss is hauled to the nearest moss yard in whatever conveyance is available. Anything from an ancient wagon to a modern automobile serves as a carrier. It is even brought in on bicycles by youngsters anxious to earn spending money.

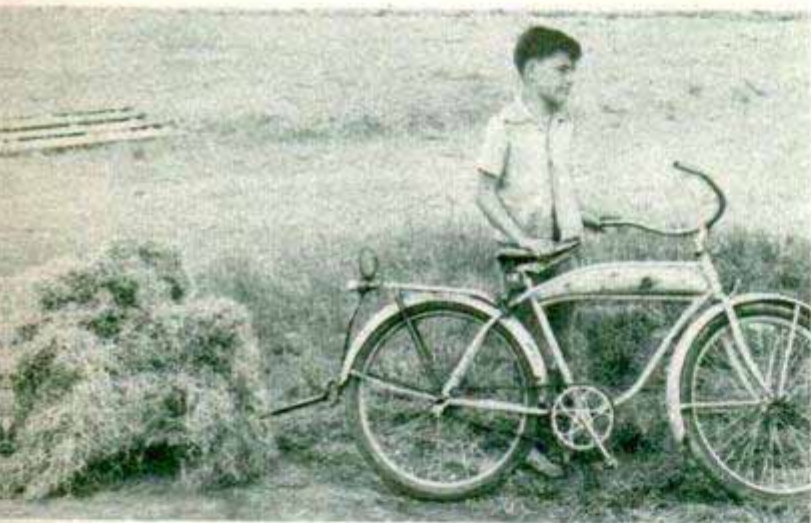
Arriving at the moss yard, the load is weighed and the pickers are paid for their crop. When the moss is unloaded it is piled up to five or six feet high around the yard. During periods when the moss is being harvested steadily, there are often acres of ground covered with it. After large heaps have accumulated, the plant is thoroughly soaked until it settles to less than half the height of the original heap. It is then left exposed to the elements for about 60 days for curing. Since only the inner fiber of the plant is used, the outer covering must be removed. Therefore, much of this covering is allowed to rot away before the moss is ginned.

Left, frequent wettings speed the curing. Right, when cured, the moss is transferred to these drying racks





Above, from left to right, three stages of Spanish moss: freshly harvested moss; cured moss, and the valuable hairlike fiber that is removed by the gin



Above, even youngsters find moss-harvesting profitable. Below, moss is used here to shade shuffleboard fans



After lengthy exposure to weather, the color of the moss turns from its original gray to dark brown. It is then loaded on trucks and transferred to the drying racks.

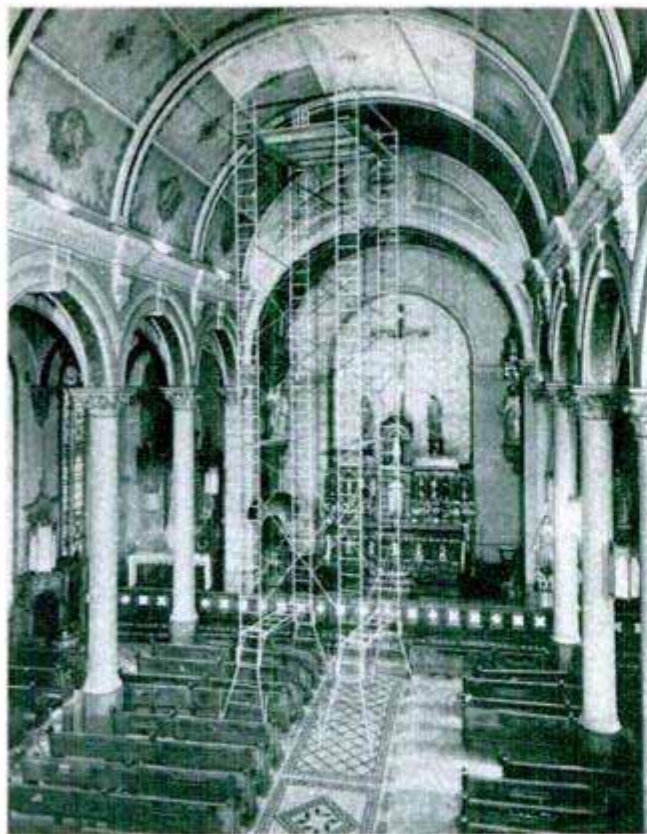
Next the moss is piled in sheds to keep it dry until the ginning. The machinery that gins the moss is often homemade by the owner of the plant, based on his own ideas. Ginning removes the remaining outer covering of the plant, also taking out twigs or other foreign matter which may be mixed in with the moss. This waste material accumulates at the gin and it is sold at bargain prices as fertilizer. The valuable inner fiber resembles horsehair both in appearance and in toughness.

Before ginning, the moss is often separated into different grades, each grade being run through separately. The highest quality fiber is used for better grades of upholstered furniture and for mattress making. The poorest quality may be used for stuffing horse-collar pads.

Strands of moss are used to shade newly set-out plants and to protect tender plants from freezing. Moss is woven into the mesh of wire fences along the sidewalls of plant sheds. City residents hang strands of the material over wires to make a back-yard screen for more privacy.

Strands of moss have been used to provide a temporary sun shelter over Florida shuffleboard courts. Moss has been hung over the frames of window awnings after a storm destroyed the canvas, providing shade until a permanent covering could be provided.

It is truly a plant of many uses. The best part of it all is that it is almost always available for harvesting without cost to the individual. Only the necessary time to harvest it and haul it to the moss yard is needed. No other crop requires so little effort to convert it into cash. It is truly the "perfect" crop.

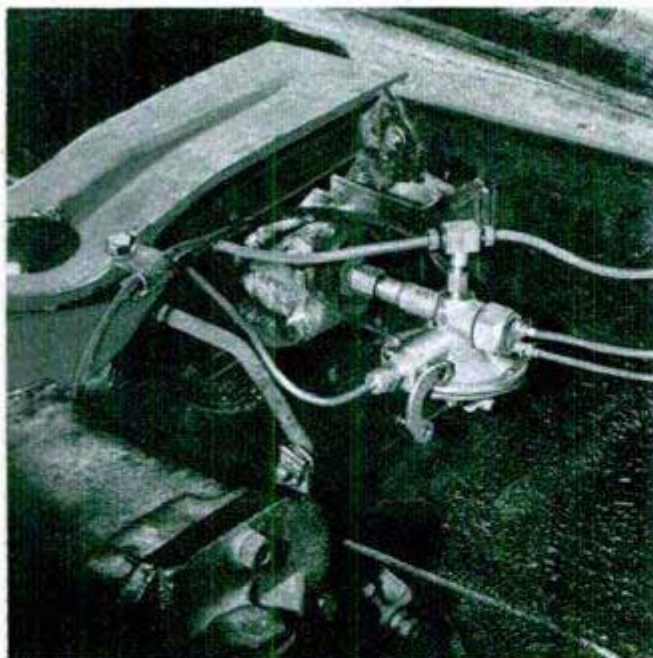


## Tubular Trestle

Virtually unlimited combinations are possible with a tubular-steel trestle that can be assembled in a variety of shapes to provide safe scaffoldings for maintenance crews. The basic trestle unit is designed to



permit passage underneath and to bridge obstacles such as desks, church pews, furniture and aisles. The vertical members serve as ladders and make it possible to add working platforms at each rung level. The caster stems are adjustable to permit level erection on steps or uneven floors.

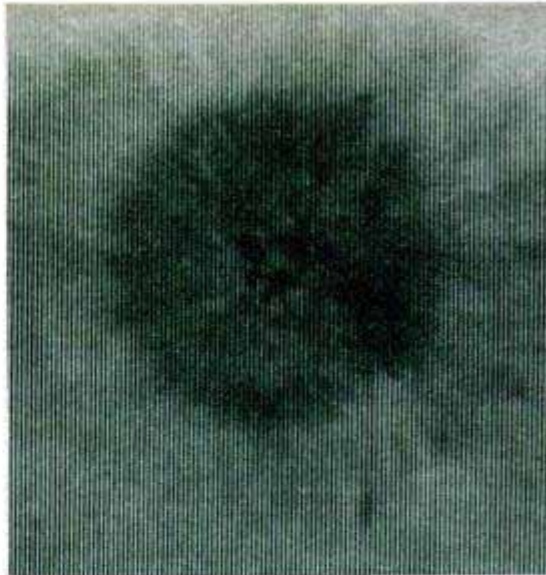
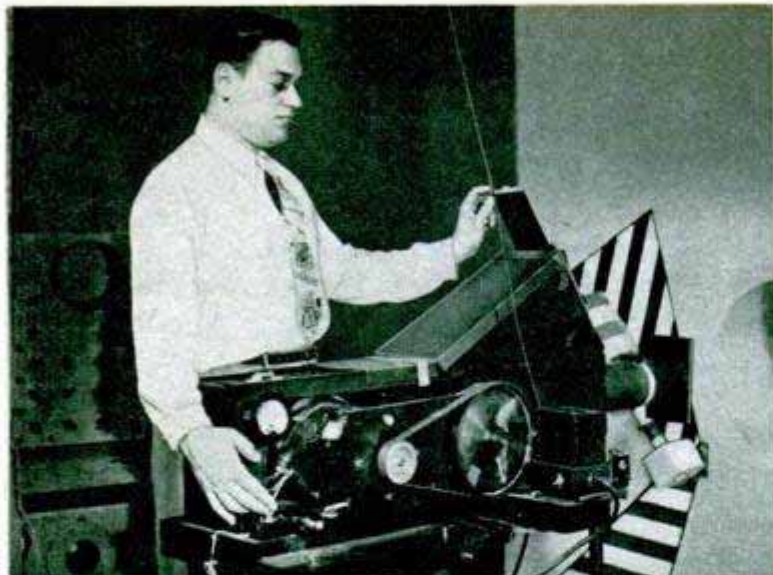


## Hill Holder

Cars are held motionless even on steep grades by a mechanical hill holder. The attachment, which fits any hydraulic brake system, can also be installed on trucks and industrial lift trucks. It is a casting with connections to fit the master cylinder, the brake line and the intake manifold. When



the engine is turned off and the foot pedal depressed, the hill holder automatically retains pressure in the brake system to hold the car in place. Flipping a lever and inserting the car key releases the pressure. When the engine is running, a knob on the dash is pulled out to hold the car. Pushing in the knob returns the brake system to normal operation.



Dept. of Defense photo

Left, inventor pulls slide on superspeed camera. Left, shock-wave photo shot at 100-millionth of a second

## Superspeed Camera Films Shock Waves

By crowding as many as 300 exposures on a single film, a new high-speed camera developed by Army Ordnance takes pictures at a rate of 100 million a second. Designed by Morton Sultanoff of the Aberdeen Proving Ground, the camera can record shock and detonation waves during explosions and other high-velocity phenomena. Sultanoff first thought of the unusual shutter system when he saw an animated greeting card on which a moving picture is produced by sliding a transpar-

ent grid across a composite picture. A framing grid, actually a focal-plane shutter with a series of narrow slits across it, and a rotating mirror break down each exposure into a series of parallel lines. During the filming of the explosion, the mirror moves the grid image rapidly across the film, sandwiching the grids of 300 pictures on a single film. The resulting picture, really 300 in one, is meaningless unless viewed through another grid which permits the eye to see only lines forming an individual picture.

## Adjustable Projector Table Folds Into Small Space



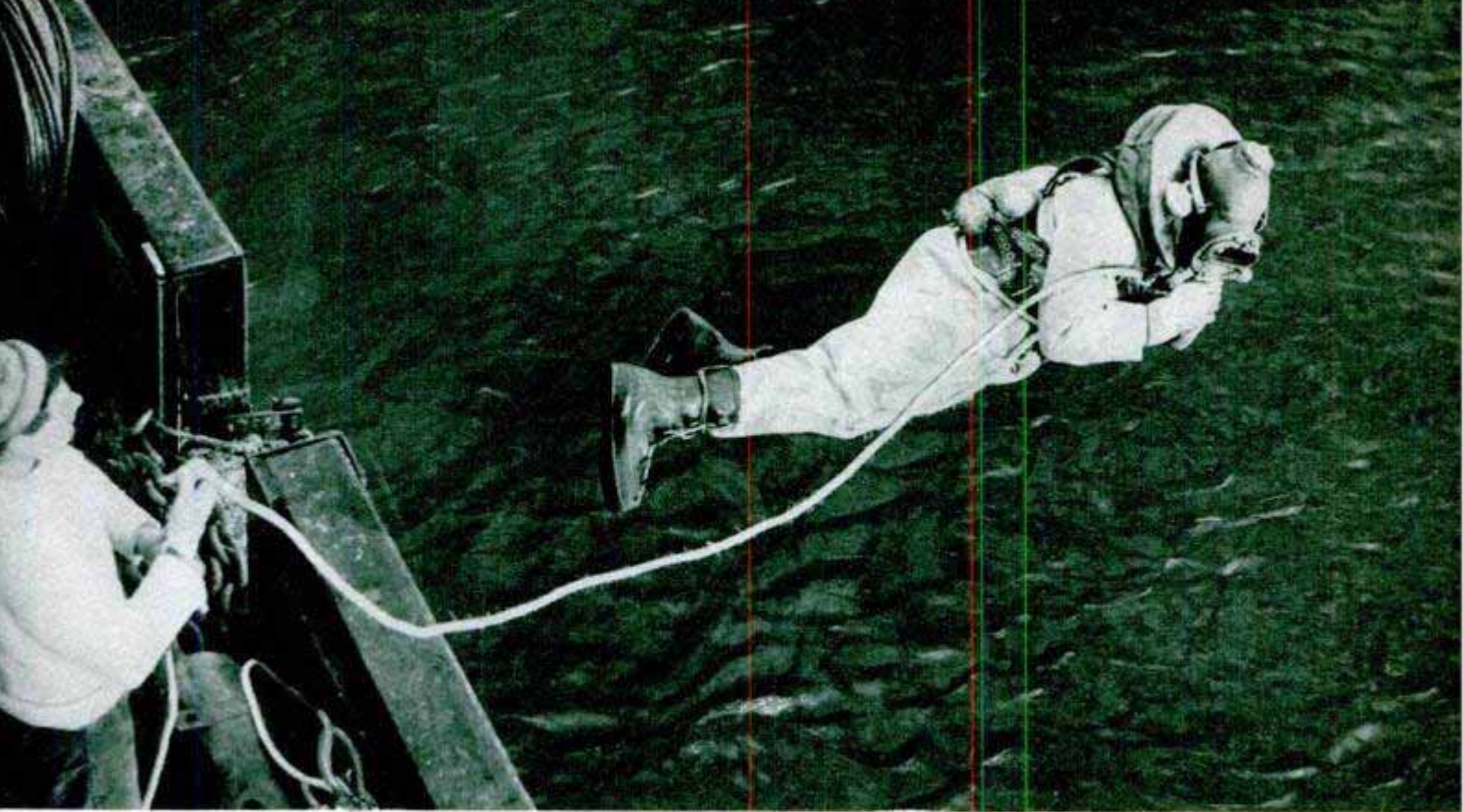
Adjustable to any height from two to more than three feet, a folding table is designed for slide or movie projectors. Its broad tripod legs provide a firm base, assuring vibration-free pictures. When collapsed, it can be stored in a small space.

## Quick-Change Motor

One small electric motor in a "giant brain" electronic computing machine can be stopped and started again in the reverse direction in four thousandths of a second. It is relatively easy to stop a motor rapidly with brakes, but rapid starts either in the same direction or in reverse are limited if electromagnetic means alone are used. In the National Bureau of Standards' new rapid-reversal motor, the energy of the rotor which would be dissipated as heat during braking is stored in a spring for use in restarting. The reversal spring consists of a steel torsion bar 31 inches long and less than  $\frac{1}{2}$  inch in diameter.

☐ Throughout the country, the average worm population is estimated at 53,767 worms per acre.





British naval diver leaps into waters of Tobermory Bay in search for sunken Spanish Armada treasure ship

## QUEST FOR A GALLEON'S GOLD

THE SHIP lies sunck off the Shore about one finger-stone-cast, her sterne lyes into the Shore norwest and her head to the southwest she lyes under ye water at ye deepest nine fatham at a low water and 12 fatham at ye high water. In the forepart lyes great ballast stones. We got within the ship a pretty distance and saw a great gunn and other brass gunns. We lifted the kempstone (capstan) of curious worke pauled with a spring at every inches."

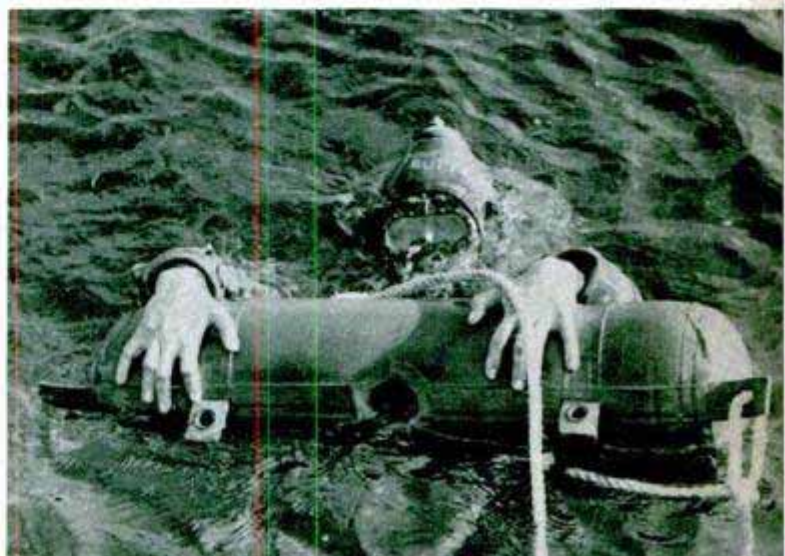
This report, written by a Scottish diver in 1683, was recently reaffirmed by 10 British naval divers at Tobermory Bay, Island of Mull, Scotland. Since 1588, a Spanish treasure ship, believed to be the *Florenzia* or the *San Juan de Sicilia*, has lain under some 70 feet of water in the bay. The *Florenzia*, a four-masted galleon, was reported to be carrying the pay of the entire Spanish Armada and even a crown to be placed on the Spanish king's head in London. Both ships carried large amounts of gold from the coffers of Spain's King Philip II—the amount has been reputed to be as high as \$84,000,000. The ship was a survivor of the ill-fated Armada and had fled north along the coast to escape the Royal Navy. It was blown up in Tobermory Bay and for nearly 400 years the dukes of Argyll, whose castle overlooks the bay and

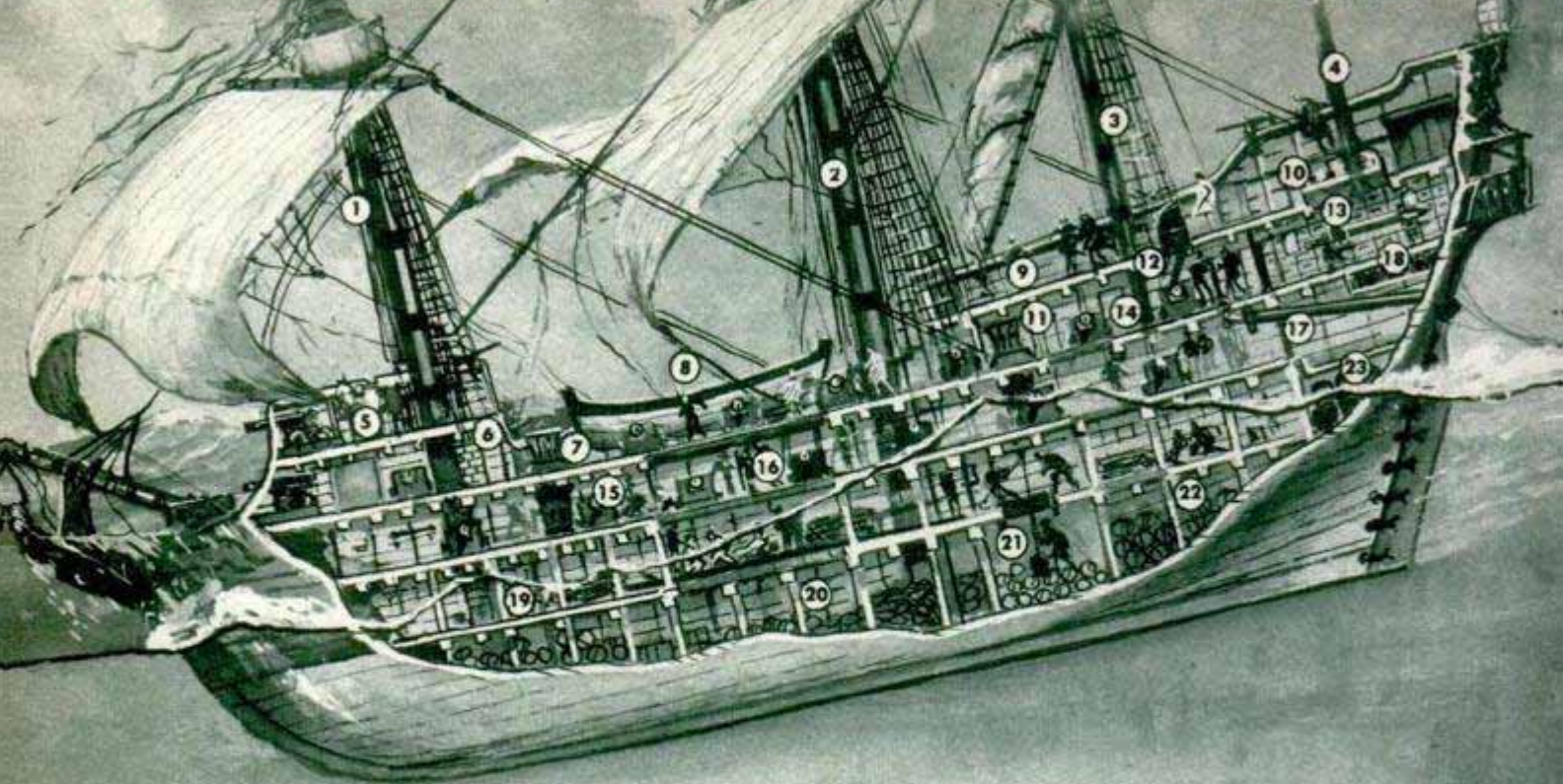
who were granted the rights to the treasure by Charles I, have tried at intervals to recover the gold.

Attempts through the centuries—dwarfed by the 1950 recovery effort—have been unsuccessful in locating the treasure. By 1665 the diving bell had been invented and a major expedition was organized. A year later, a search headed by James Mauld raised three large guns, two of bronze and one of iron. In the next few years, six more guns were recovered and added to evidence of the ship's armament.

Archibald Miller, the Scottish diver

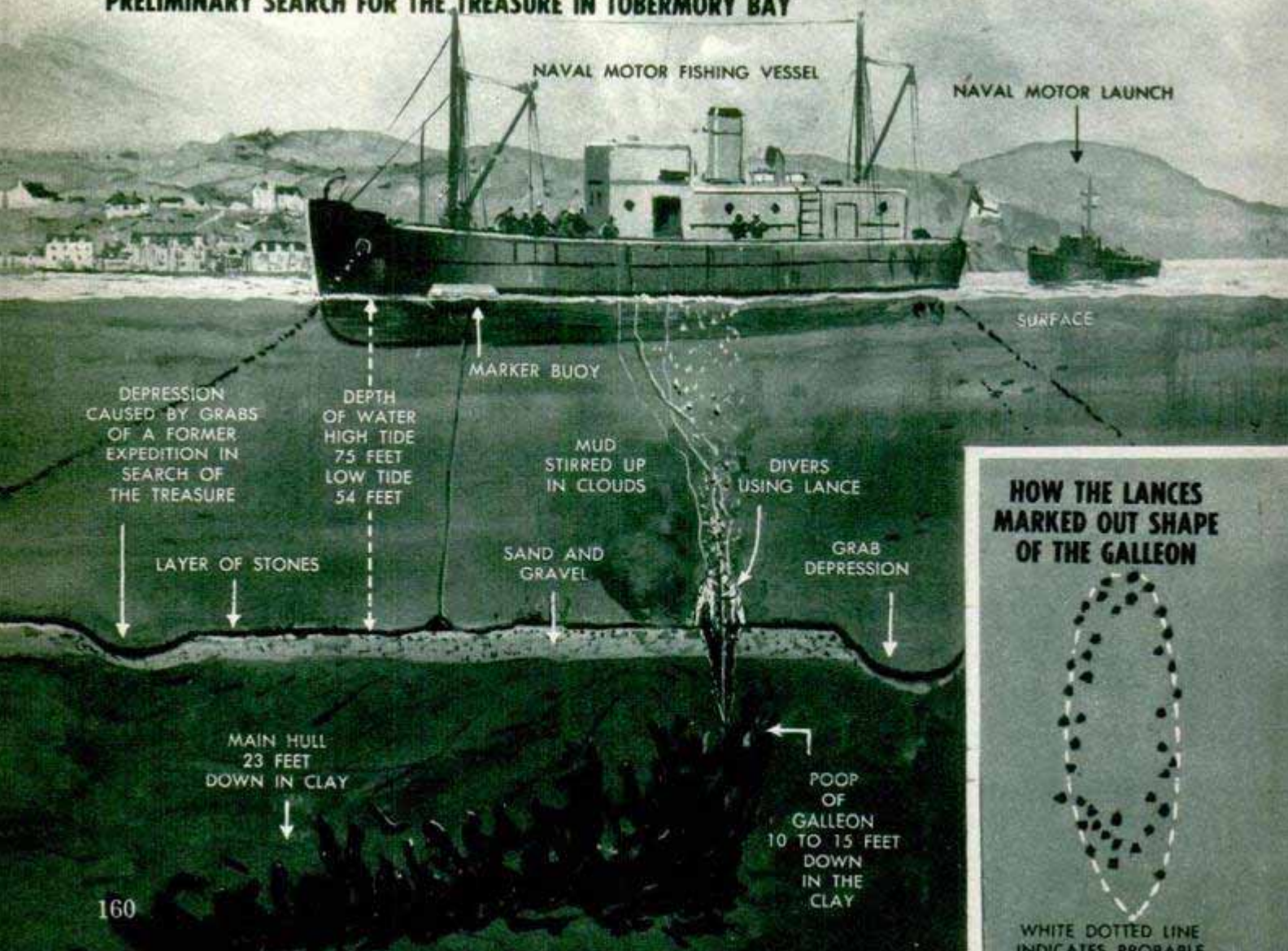
After treasure hunt on floor of sea, diver comes to surface for a rest and clings to the "blob" float





1—FOREMAST. 2—MAINMAST. 3—MIZZENMAST 4—BONAVENTURE MAST (BROKEN OFF). 5—FORECASTLE. 6—COOKING STOVE. 7—UPPER DECK. 8—LONG BOAT. 9—HALF DECK. 10—QUARTER DECK. 11—MAIN CAPSTAN. 12—HELMSMEN AT THE WHIPSTAFF. 13—GREAT CABIN. 14—DEMI-CULVERINS (CANNON, 45-LB. SHOT). 15—LOWER DECK WITH CULVERINS (34-LB. SHOT). 16—MAIN HATCH. 17—TILLER. 18—POSSIBLE POSITION OF TREASURE. 19—ORLOP (LOWEST) DECK, CREW SPACE, SPARE ROPES OR SPARS. 20—HOLD. 21—MAGAZINE. 22—WINE STORE. 23—PROBABLE POSITION OF TREASURE

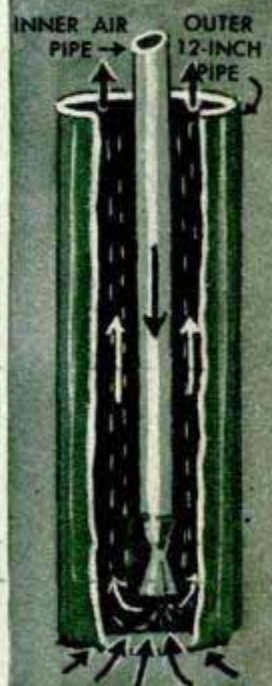
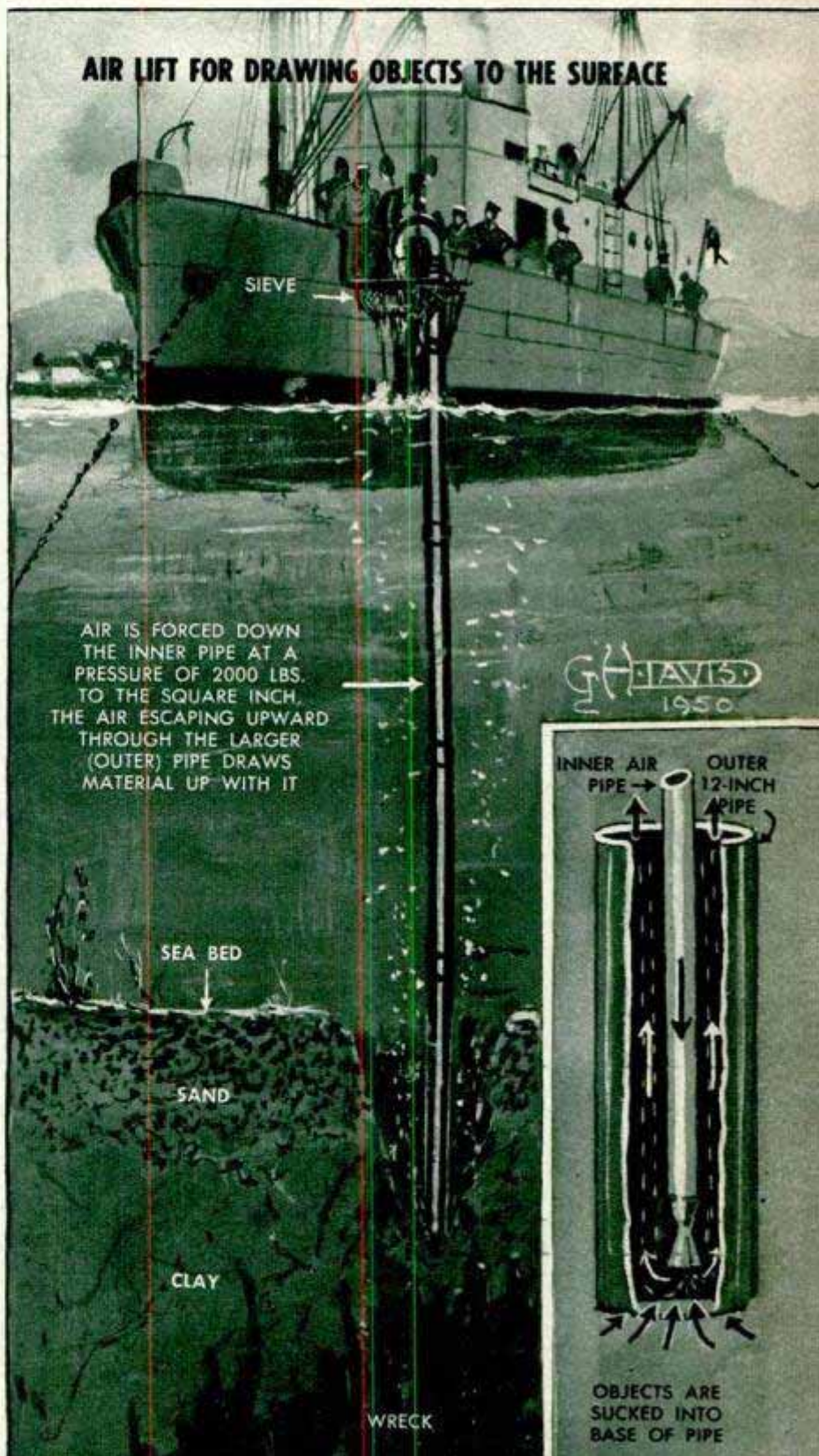
### PRELIMINARY SEARCH FOR THE TREASURE IN TOBERMORY BAY



**FOR THE SUNKEN GALLEON**



**AIR LIFT FOR DRAWING OBJECTS TO THE SURFACE**



**HIGH-PRESSURE AIR FLOW**



THE AIR HELPS DIVERS TO PUSH THE LANCE DOWN THROUGH SAND AND CLAY



Diving crew examines piece of wood brought to surface and believed to be a timber from lost galleon

quoted above, raised nine guns, all made of bronze, three anchors, a 28-foot-high rudder and a silver bell. A major expedition in 1912 brought historical relics to the surface valued at several thousand dollars.

Early this year the present Duke of Argyll made a deal with the British Admiralty to locate the galleon and mark out its position. The expert diving crew, using self-contained suits which free the diver from air tubes, has pin-pointed the wreck. In this work they used specially designed

lances and probes that are forced through the sand and clay of the sea bed under high air pressure. Working in pairs, the divers would place the pipe against the sides of their helmets and by listening carefully could tell when they struck a timber of the sunken galleon.

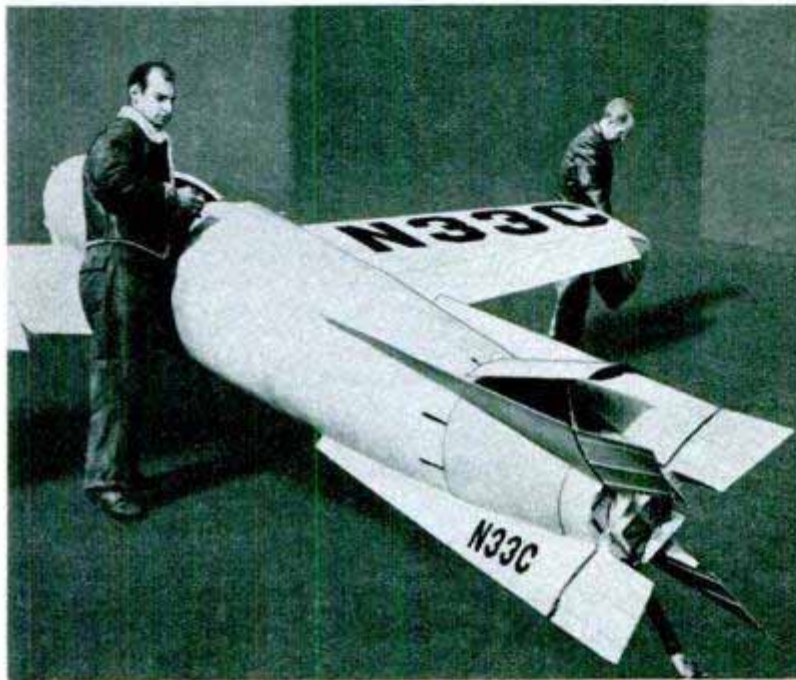
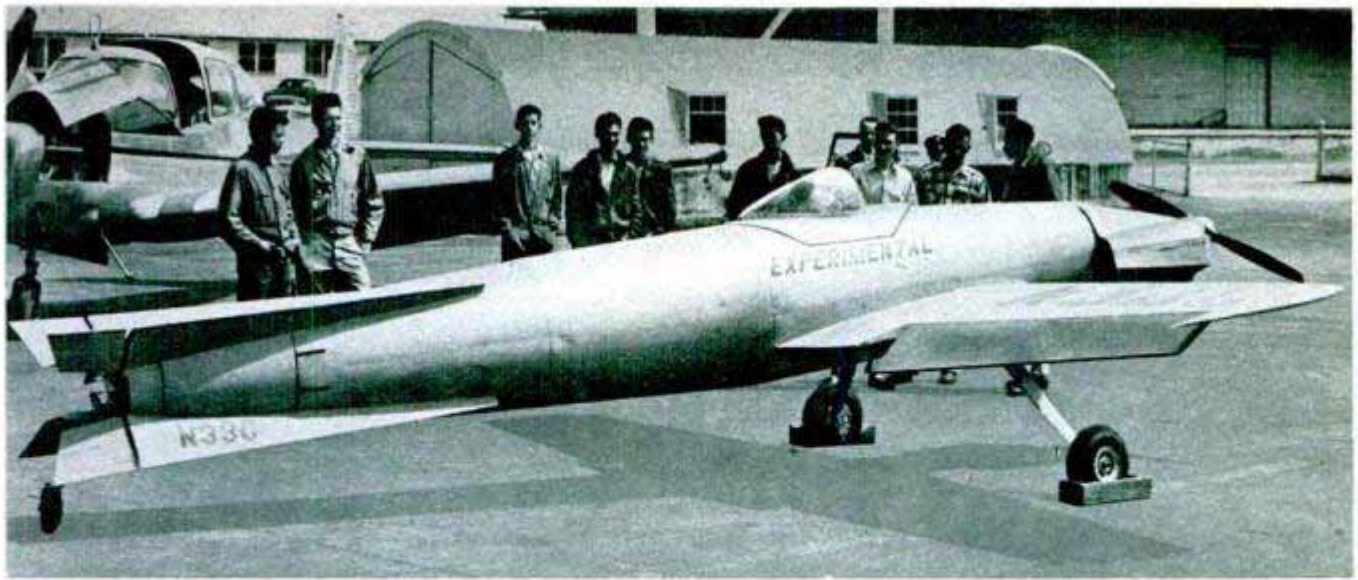
In addition to the probes, an experimental air lift was employed. This consists of a series of lengths of pipe screwed together and lowered from the ship to the bottom. The outer pipe of 12-inch diameter has an inner pipe with about a one-inch bore. Through the smaller pipe air was forced at 2000 pounds' pressure to create a suction within the big pipe and draw up any loose objects. Several coins and two medallions were brought up by this method. Since the success of this experimental suction pipe a larger one is being made for final operations to be resumed late this year.

The concluding phase of the quest is expected to bring to the surface many stern timbers (which are nearest to the surface), old guns of various types, cannon balls and scores of fascinating historical items. It will also reveal once and for all time whether there is a fabulous treasure hoard on the ship and fix the identity of the vessel. Everything that is recovered from the treasure ship will be exhibited at the Festival of Britain Exhibitions next year.

Between the two naval vessels and 70 feet below surface lies the sunken Spanish galleon in Tobermory Bay

Copyright, The Evening Citizen, Glasgow





When its wheels are retracted in flight, airplane built by Cliff Kysor resembles a torpedo. Below, top control raised from normal flush position to lower the tail

### Torpedo-Shaped Airplane

Resembling a torpedo when aloft, an airplane designed by Cliff Kysor of Alameda, Calif., has tail controls built flush with the fuselage. The conventional elevators and rudder were eliminated to minimize air drag and permit greater speed. The four control surfaces, at the top, bottom and sides of the tail section, are operated by a stick and by rudder pedals. Small tabs at the trailing edge of the fins are used only to trim the aircraft.

### Volkswagen, 1950

Low-slung and racy in appearance, a new German automobile, the Porsche 356, makes 30 miles to a gallon of gas. The car is a streamlined version of the Volkswagen which was designed for mass production during the Hitler regime. It has an engine similar to that in the original Volkswagen and is equipped with twin carburetors. Top speed of the car is 90 miles an hour.

◻ Marks of varying shapes and sizes have been painted on a runway on Long Island to help pilots judge distance and altitude during landings.





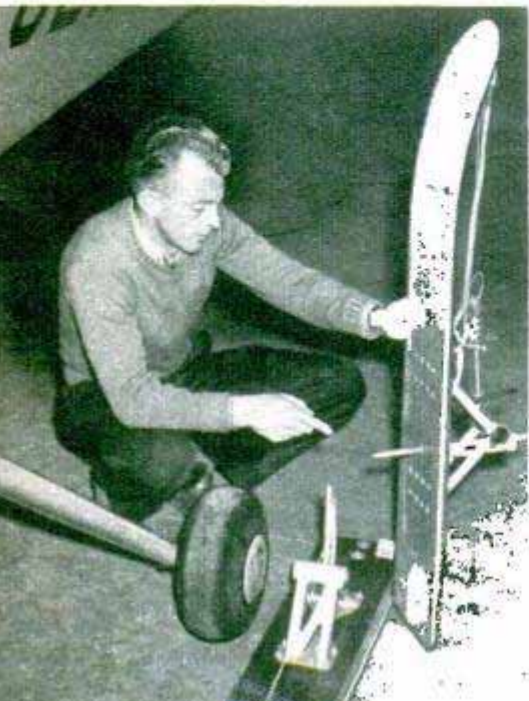
In the Cascades, this ski-equipped helicopter reaches the highest peaks to survey snow depth and moisture

## FLYING SNOW MAN

WANT TO KNOW about snow conditions in Washington state's towering Cascade Mountain Range? Ask Vern Montgomery—it's his job to know. Montgomery uses a ski-equipped helicopter to reach remote elevations and measure moisture and depth of snow fields. His information helps forecast stream flow to power plants and irrigation projects, and to control floods. Previously, the snow surveying was done by

parties of seasoned mountaineers, traveling through the frozen wilderness for days with bedrolls, food and equipment strapped to their backs. The helicopter does the job in a few hours. Four ski-shoes enable the craft to land and take off in deep snow, with the front two maneuverable from the cockpit to aid in taxiing. The rear two have retractable plunger spikes to pierce the ice crust and hold the ship fast when parked.

Retractable spike plunger, left, pierces ice crust when craft is parked. Right, measuring snow's water content



*the* **POPULAR MECHANICS** **CRAFTSMAN**



Spare rooms to spare in your attic. Remodeling story, page 196, tells how

*In This Issue—*

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- Lean-To Greenhouse . . . . . 186**
- Electric-Roaster Cabinet . . . . . 195**
- A Darkroom for Everyone . . . . . 206**
- Saw Kerfing Know-How . . . . . 211**



*Korta*

Spinet-size desk has unique built-in wastebasket. Turn to page 190





# Hobbies

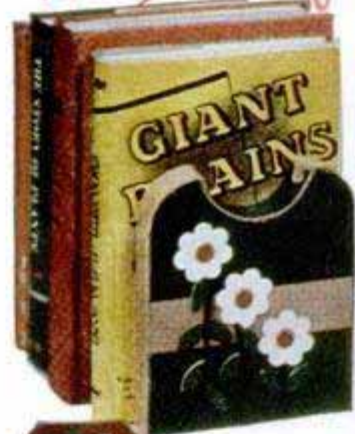
## LEATHER GOODS

### FLORAL PICTURES

A HOBBY that is not only fascinating, but profitable as well, is that of drying flowers and framing them in beautiful floral displays as pictured above. Anyone can do it at practically no cost and, according to Mrs. Mae Delano of Los Angeles, Calif., nearly all small flowers such as larkspurs, pansies, delphiniums, cockscombs, etc., can be dried. The flowers are picked at full bloom and immediately buried in processed sand, such as that obtainable for a child's sand pile. Place about 2 in. of sand in a tight box and arrange the freshly cut blooms face down on the sand. Then sprinkle more sand around the blooms to cover them, taking special care not to crush them. The sand must be sprinkled under and around each individual petal so that the flower is supported in a lifelike position. Finally, add about 1 in. of sand on top and place the box in a warm, dry room or closet for about two weeks. At the end of this time the dry sand is carefully poured off and the dried blooms are left exposed for at least six hours. To arrange the flowers in an attractive display they are mounted with transparent glue on a backing of heavy cardboard, as pictured below. Although the bouquets can be arranged and mounted in rectangular picture frames without glass, the best mounting is in an oval frame under curved glass.



*Mrs. Mae Delano  
2719 Alsace St  
L.A., Calif.*





2322 Bury  
Albert P. Belanger

# That Pay!

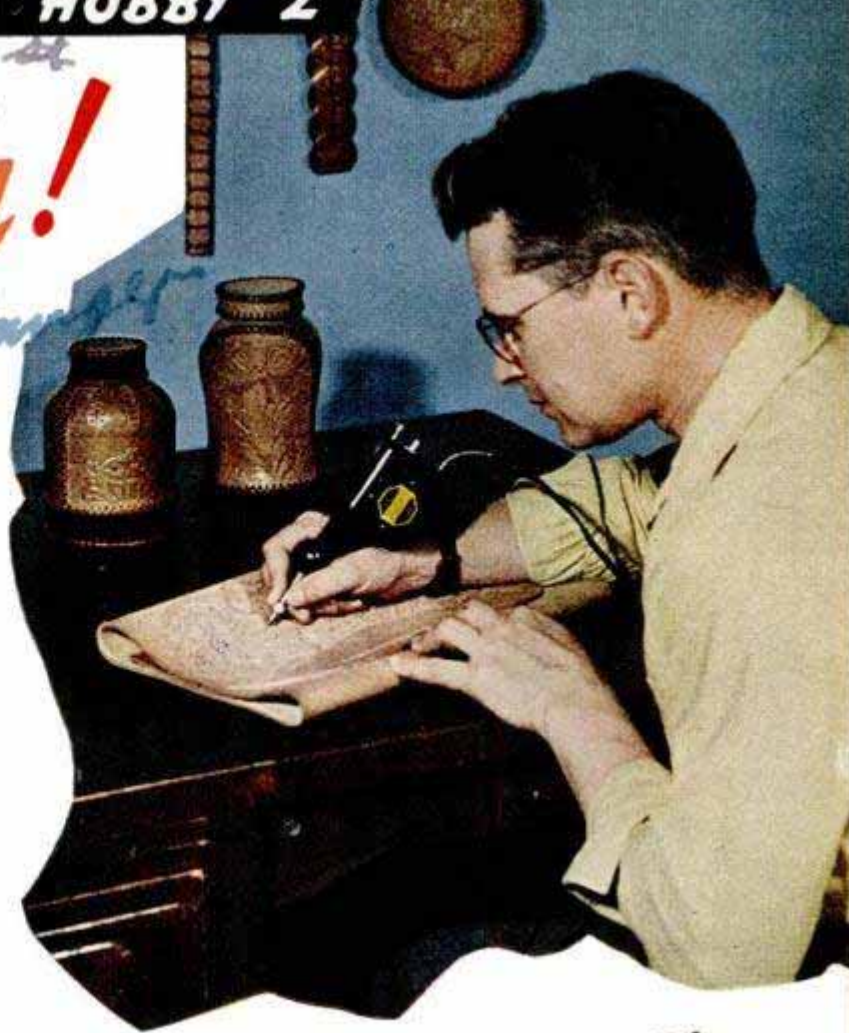
## SELL READILY

**VIBRATOR-TYPE** tools make leather tooling as easy as writing with a pen so that attractive projects can be produced in a fraction of the time required by hand. Mr. Albert P. Belanger, noted craft authority, in this informative article on leathercraft, shows a number of beautiful projects that he has made and tooled, and he takes you through the steps of making a few of them.

**Selecting leather:** Steer and cowhide generally are used for heavy projects, such as large handbags, while calfskin is used for billfolds, small purses, key cases, book covers, etc. While some sheepskin can be tooled if it is tanned, it is mainly used to line bags, boxes, and the like. Dyed sheepskin can be obtained in a finish which closely resembles grained leather and alligator skin. However, the dye is not too permanent and will fade if exposed to strong sunlight. Goatskin cannot be tooled and is used mostly for lacing.

Leather should always be stored flat, if possible, or rolled with the finish side out. Never roll leather with the finished side in as this will cause wrinkles and spoil the tooling surface. In salvaging a skin that has been folded, it can be grained all over by folding it with the finished side in and then pressing it evenly while rolling it back and forth. This will produce a long-grained finish and, if you wish to make the grain even finer, fold the leather at right angles to the grain and roll the leather the same as before.

**How patterns are made:** While full-size patterns for the tooling designs can be purchased, you can make your own by enlarging the squared drawings given. Some of the designs presented require only a half section to be enlarged; others require laying out a complete





pattern. Where only half of the design need be drawn, carbon paper is used to duplicate the opposite half to form the complete pattern. A final pattern is made from this by laying tracing paper over it. This is done to avoid the possibility of getting ink on the leather from the carbon transfer when tracing the pattern onto the work.

**Transferring pattern to leather:** Before the pattern is transferred, the leather must be dampened. Avoid getting it too wet as it will not hold the tooling. Excess moisture can be removed, however, by placing the leather between blotters or newspapers. Spring paper clamps are excellent for holding the paper pattern to the leather, small pieces of cardboard being placed under the clamps to prevent marring the leather. A ball-point stylus is the best tool to use in tracing the pattern, although a medium-hard lead pencil can be used. To make sure that no part of the pattern is skipped, it is a good plan to lay tracing paper on top of the pattern. Then if any part of the de-

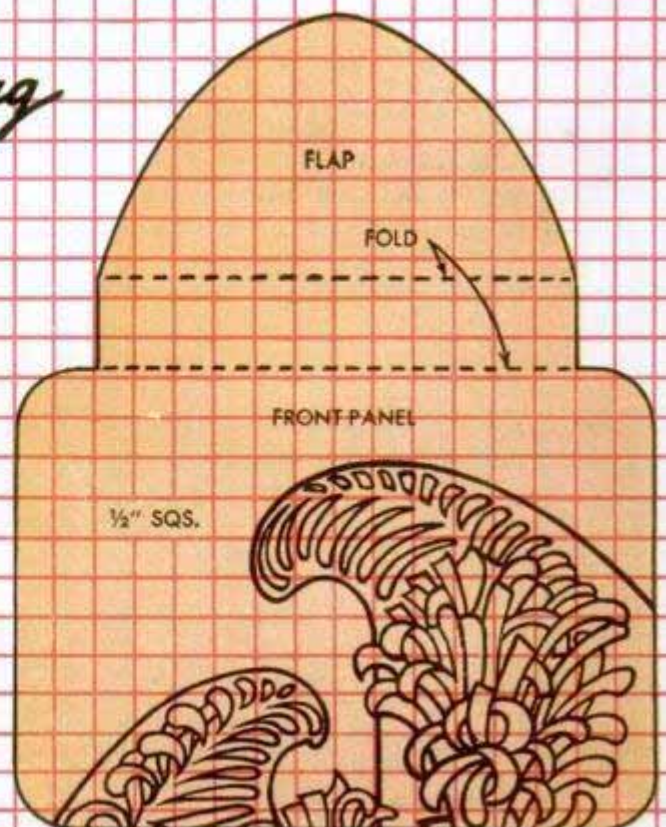
sign has been missed, it can be readily noted. After the design has been transferred, the light impression in the leather is deepened by going over the lines with the stylus. This step can be done also with a vibrator tool, using the smallest ball tip.

**Steps in tooling:** The first step in tooling leather after it has been dampened is to go over all the lines as mentioned, and then work in any background before tooling the design. Tooling by machine is done in much the same manner as with hand tools, except that ball tips are used extensively and, of course, the tool is held like a pen or a wood-burning tool. For flat tooling, the flat diamond point is used. For cutting and punching leather, a cutter set such as pictured in Fig. 15 is very useful.

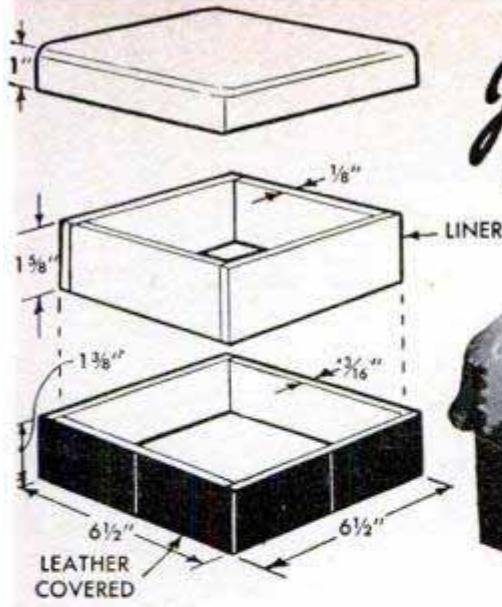
**Small handbag:** The attractive handbag shown in Fig. 1 requires a minimum of material. It is made of two kinds of leather, each of a different shade. The tooled front is cowhide and the back, including the flap, is calfskin. The squared drawing incorpo-

## Handbag

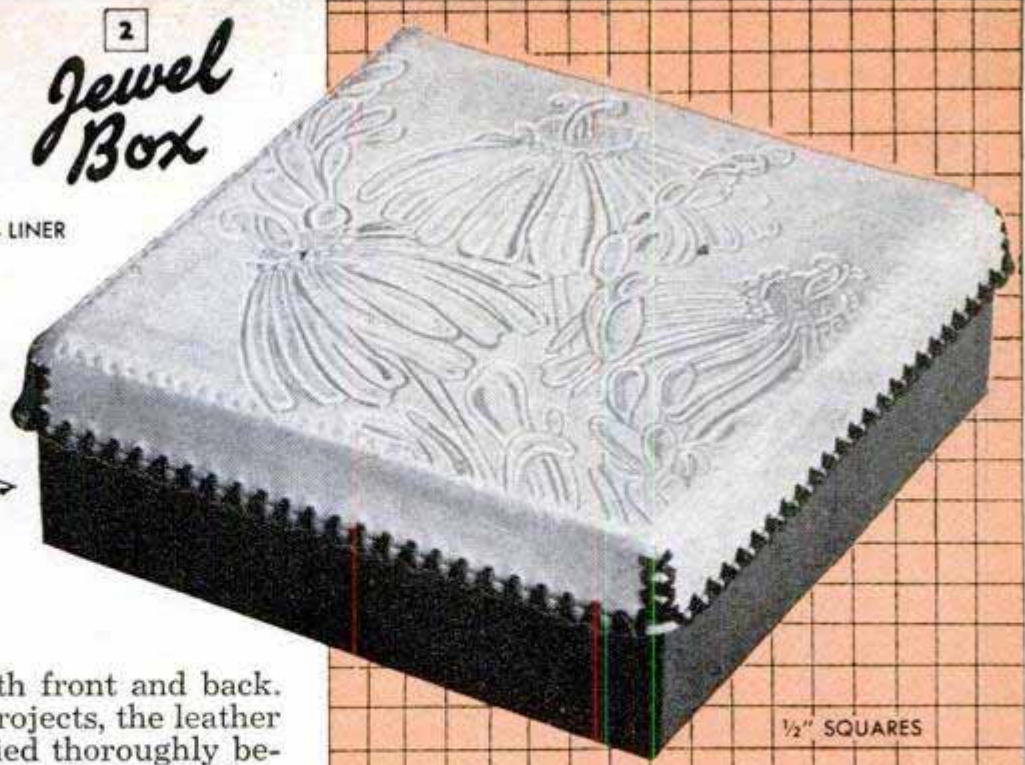
1



1" X 20" STRIP



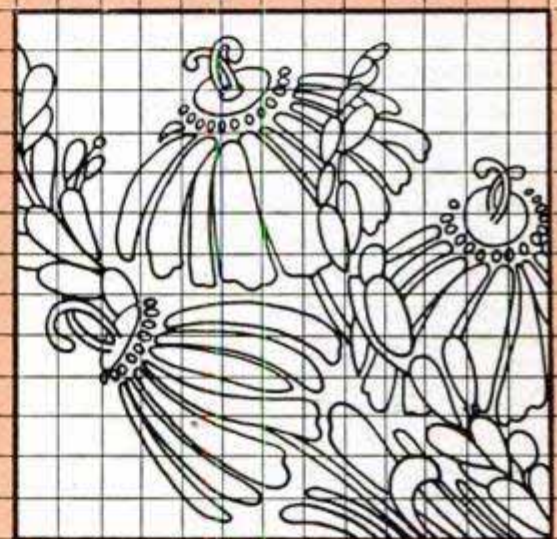
## 2 Jewel Box



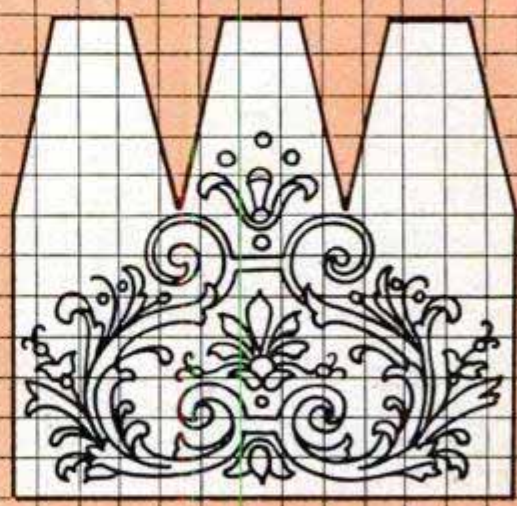
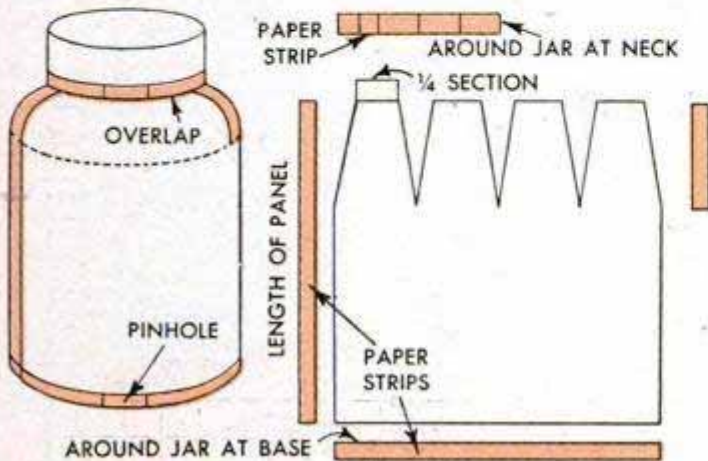
1/2" SQUARES

rates patterns for both front and back. As in the case of all projects, the leather is tooled and then dried thoroughly before it is cut to shape. Being softer than cowhide, calfskin must be lined to stiffen it. Cement a sheepskin lining to the calf portion of the purse before lacing together. The lining is applied in three separate pieces, the lining for the top being cut 1/4 in. narrower than the width of the top. The handle is made from a scrap piece of leather 1 x 8 in. and is covered with calfskin before being laced. The calfskin is cemented to the handle and brought around to meet on the underside. The edge banding requires a piece of leather approximately 1 x 20 in., although the actual length should be determined by the bag itself.

In lacing a curved and straight piece of leather together, a spacing punch cannot be used to punch the holes in both pieces because the distance between the



## 3 Glass Jar Humidor



holes on the curved piece must vary in order to round the curve. Therefore, the straight piece must be punched first, using equal spacing between the holes, and the curved piece is punched three or four holes at a time as you progress with the lacing in order to prevent bunching of the straight piece. On this project, punch the banding strip for the sides of the purse, spacing the holes  $\frac{1}{4}$  in. apart and  $\frac{1}{8}$  in. in from the edge. The back and front pieces and flap are punched as the lacing progresses. Method of lacing is shown in Fig. 10.

To determine the amount of lacing required for any project, punch and lace together two pieces of scrap leather at least 3 in. long, using the same stitch and spacing you plan to use. Then remove the lacing and measure. This will give you the amount of lacing required for a given distance. If you are lacing the edge of a single thickness, do your trial lacing along only one edge of a piece, as less lacing is required in finishing an edge than in joining two pieces together.

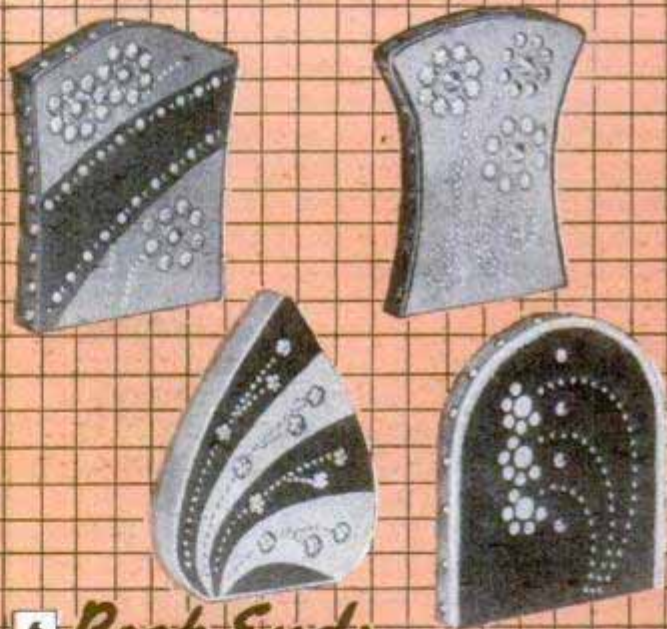
To join the back and the handle to the side and front, start at one of the upper corners of the back and lace down the side, across the bottom and up the other side, continuing around the flap and joining the handle to the top part of the purse as you lace. Close with a fastener.

**Jewel box:** To cover a wooden box such as the one shown in Fig. 2, the leather is first tooled and allowed to dry thoroughly, then cut to fit the box top snugly. You will note that the cover is laced at the corners and all around the edge, and that a round plastic lace is inserted in the lacing to strengthen the edge. To lace the cover, start at one corner and lace down to the edge. Continue across the edge to the next corner, cut off the extra length of lacing and tuck the ends under, securing with a bit of cement. Lace the remaining corners and edges as just described and then cement the cover to the box top. The bottom half of the box may be covered in the same way as the top or smaller pieces of leather may be used, as on the original box. Here there are no joints at the corners. Instead, the pieces are butted together at the center of the sides and glued in place. See detail, Fig. 2. The remaining leather is then brought down and cemented to the underside of the box, mitering the corners.

**Glass-jar humidior:** First find the circumference and height of the jar by using narrow strips of paper and punching them with a pin, as shown in Fig. 3. When the strips are laid flat, the distance between the pinholes is the exact



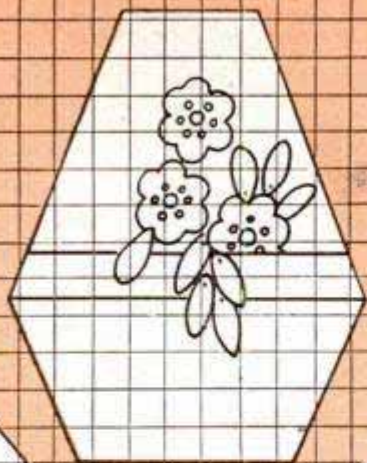
5 Photoalbum



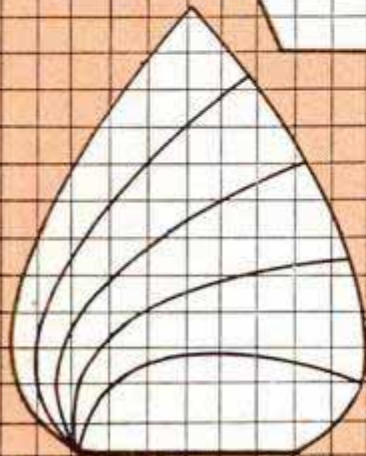
6 Book Ends



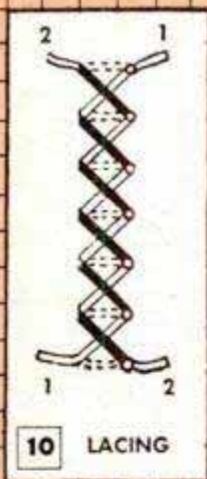
7 Checkerboard



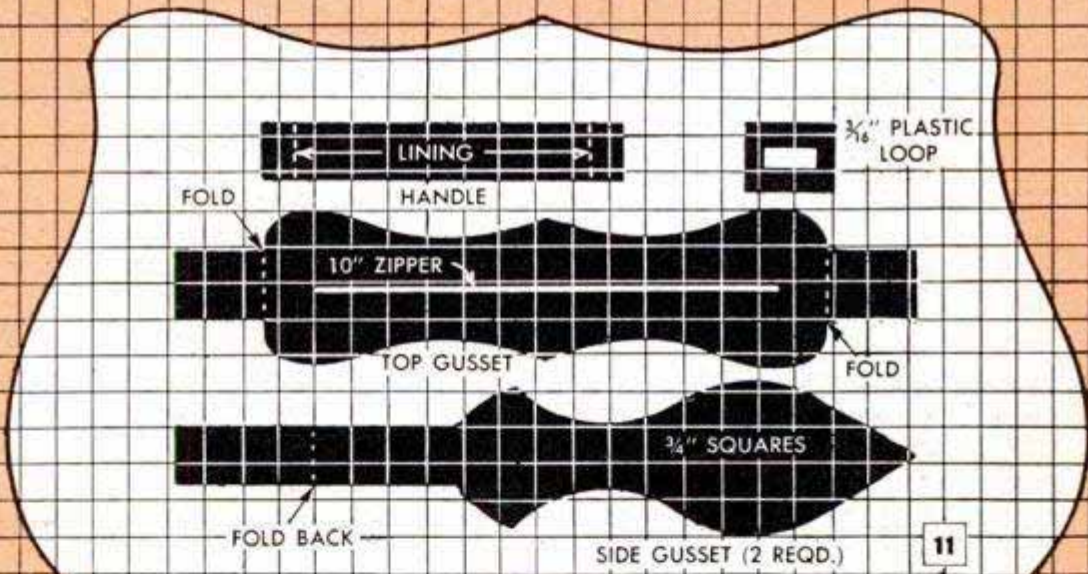
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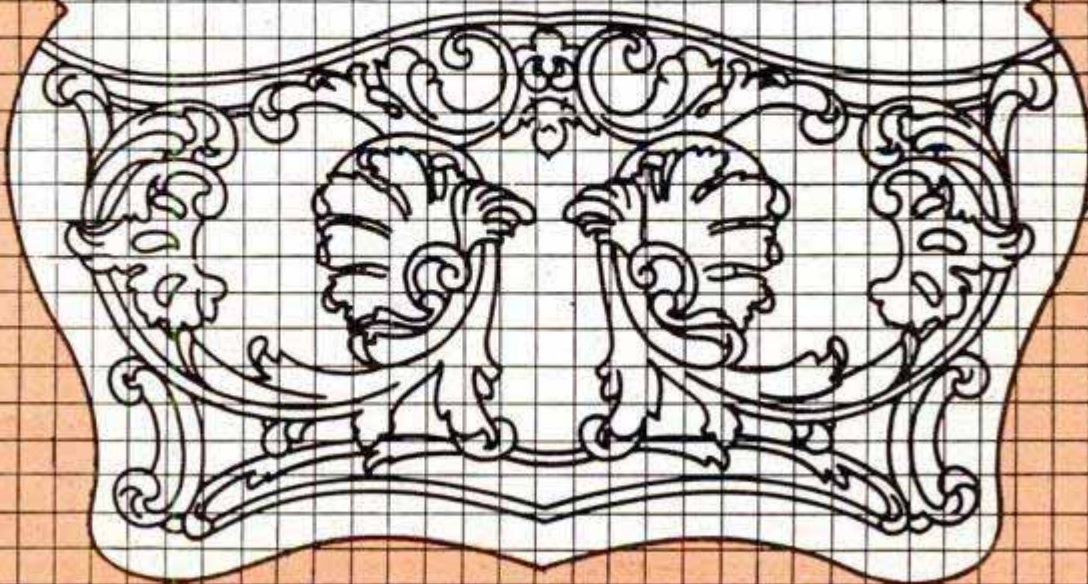
9 *Purse*



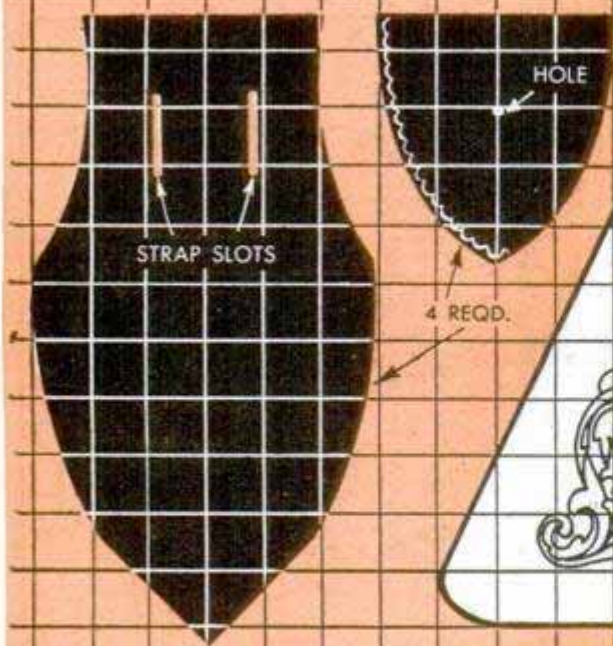
10 LACING



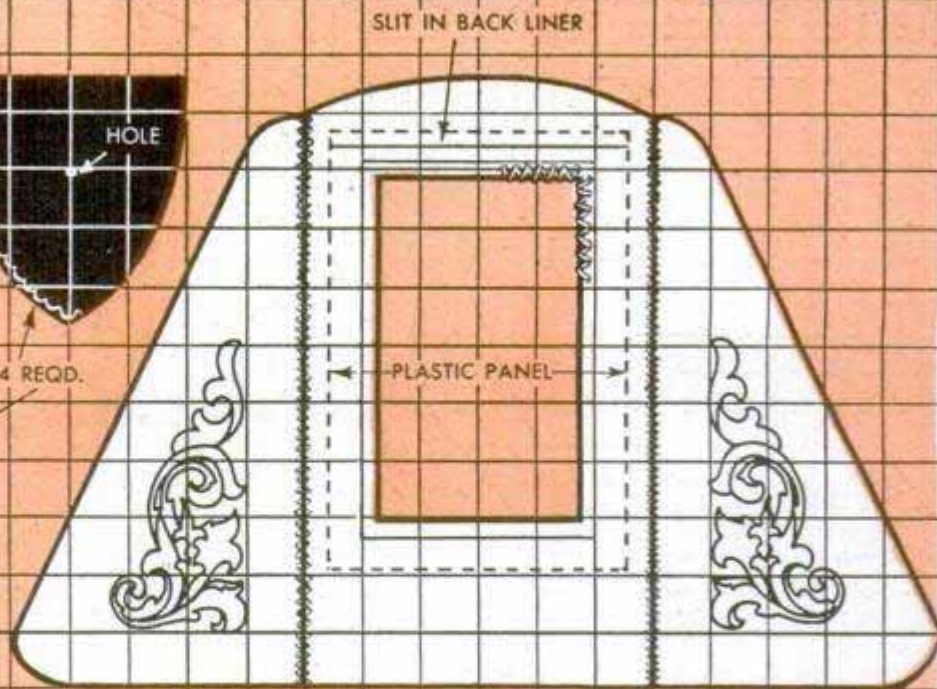
11



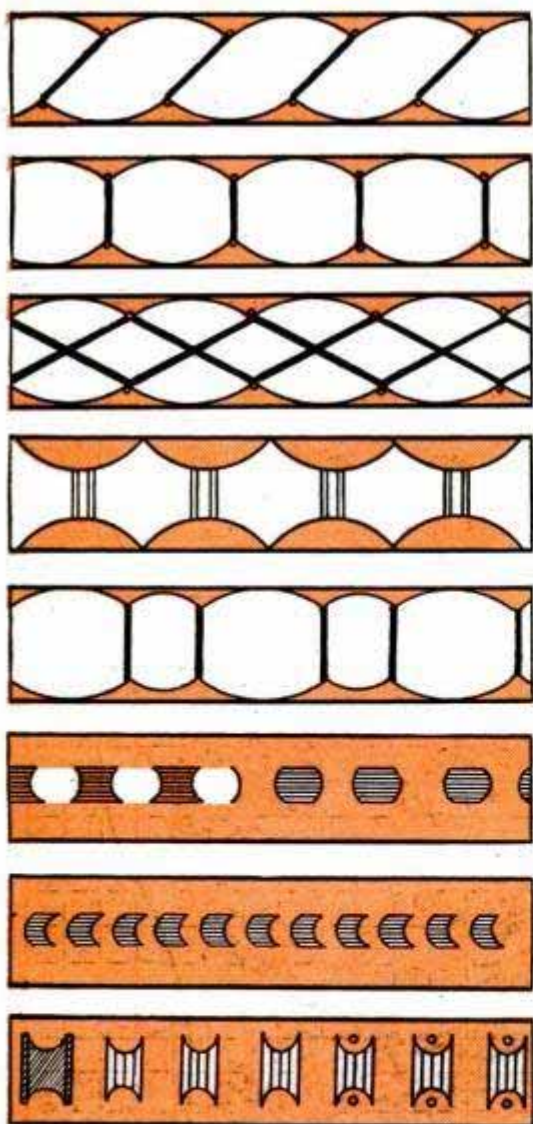
1/2" SQUARES



12 *Handbag*



13 *Photo Frame*

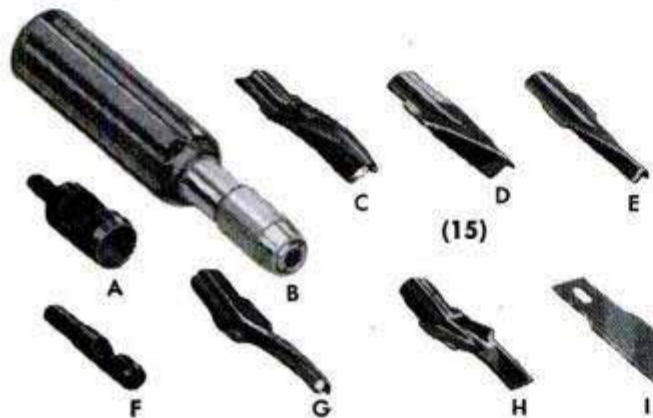


14 *Belt Designs*

length for use in making the paper pattern. The circumference of the jar may be divided equally into three or four parts. If three sections are used, each section should have four tapered tabs cut at the top as shown. After the design has been traced and tooled on the sections and the pieces allowed to dry, cut the leather according to the pattern. If a contrasting band is desired at the bottom of the jar, as on one of the models shown, be sure to make allowance for it. Now, punch the sections, making the holes  $\frac{1}{4}$  in. apart and  $\frac{1}{8}$  in. in from the edges. Punch the meeting edges of the tabs also, using the same spacing. Now, join the side sections, lacing only up to the tapered tabs at the top, using the stitch illustrated in Fig. 10. Insert the jar and lace the edges of the tabs together around the neck. This is done with a single strand approximately six times as long as the circumference of the jar. Fasten one end of the strand under a tab and lace the strand in and out the first row of holes completely around the jar, pulling it tight. Then proceed to the next row of holes and repeat the step. The rest of the holes are laced in the same manner. Cut a disk the same diameter as the bottom of the jar but do not punch it until you begin to join it to the sides. Then, do not space the holes the same distance apart as on the sides but locate them so that the sides and bottom can be joined without bunching or buckling of either piece. For the cap, cut a disk equal to the outside diameter of the mouth of the jar and a strip long enough to encircle the cap. Join these pieces in the same fashion as the sides and bottom.

**Purse:** The purse shown in Fig. 9 was made of cowhide. Accompanying patterns in Fig. 11 give the dimensions. The edges of the gussets are beveled 45 degs. for a distance of about 7 in. on each

side and the edges of the bag where the gussets fit are likewise beveled. The beveling makes a square corner when the bag is laced together. Punch lacing holes in the front and back of the purse, spacing them  $\frac{1}{4}$  in. apart and  $\frac{1}{4}$  in. in from the edge. Punch the gussets as they are joined to the main part of the bag, spacing these holes to allow a smooth join of the parts. The gusset for the top of the purse is fitted with a 10-in. zipper attached by sewing through holes made along the edges of the opening with an awl. The tabs that extend from the ends of this gusset are bent down and cemented to the side gussets after lacing. The handle of the bag is lined with thin leather which is cemented in place before the handle is punched for lacing. The upper end of each side gusset is turned back through a plastic loop and punched and laced to hold the loops in place. The ends of the center portion of the handle are secured in the same way. See Fig. 9. Finish the purse by attaching a leather button to a loop on the zipper pull.



A.  $\frac{7}{16}$ -in. punch. B. Tool handle. C.  $\frac{1}{4}$ -in. gouge. D.  $\frac{1}{4}$ -in. V-gouge. E.  $\frac{1}{8}$ -in. V-gouge. F.  $\frac{1}{8}$ -in. punch. G.  $\frac{1}{8}$ -in. round gouge. H. Flat chisel. I. Knife blade

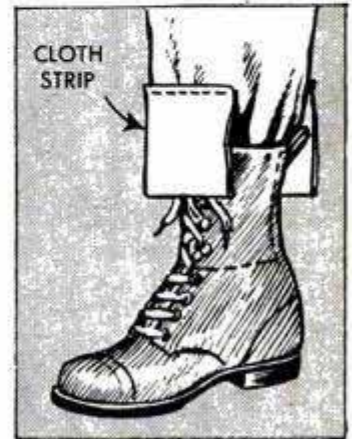
**Photo frame:** To make the photo frame shown in Fig. 13, you'll need a piece of cowhide 6 x 10 $\frac{1}{2}$  in. for the center panel and two pieces 5 x 10 in. for the side panels. The center panel is backed up with light-weight cardboard and then covered with a piece of light leather or cloth, such as is used in bookbinding. After the tooling has been done, the panels are laced, a round plastic lace being first placed against the edge of the leather. The lacing joining the sides to the front forms a hinge for adjusting the wings of the frame. The center panel is laced around the inside.

**Other projects:** Figs. 5, 6, 7, 8 and 12 show other projects that can be made. The book ends consist of wood covered with leather and decorated with fancy upholstery nails. Sheet-metal bases, about 5 in. long, are attached to the bottom edge of the wood. The patterns for the pouch-type handbag are given in Fig. 12. Four pieces are cut from each pattern and laced to-

gether, a strap being used to draw the bag shut at the top. A bright red button adds a touch of color to each side flap of the bag. Study the color photo on page 166. A number of suggestions for overlay and pierced belts are given in Fig. 14. A common wood gouge is used to cut the repeat design of the scalloped edges and the pierced patterns shown.

## Trouser Flaps Cover Boot Tops To Prevent Seepage of Snow

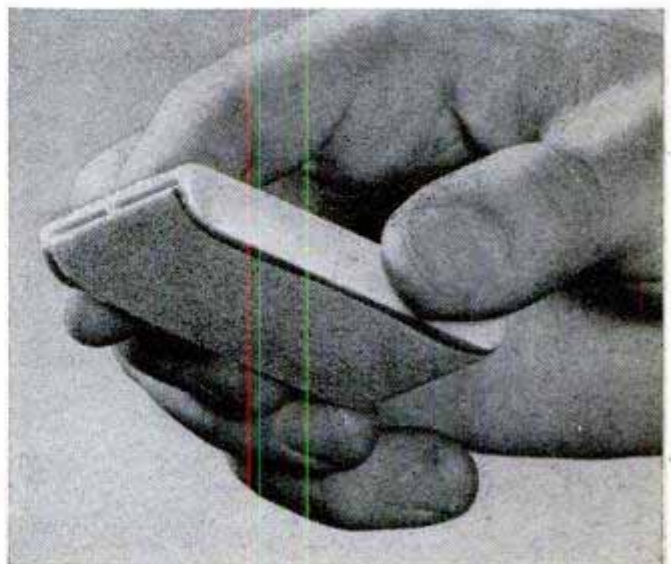
Farmers and laborers who work in low-cut boots or overshoes during the winter can keep snow from seeping into the tops of the boots by flaps that are sewed to the trouser legs. The flaps, which are made of material cut from old trousers, are sewed a few inches above the trouser cuffs so that they will overhang the boot tops when the cuffs are tucked into the boots.



## Empty Razor-Blade Dispenser Makes Handy Sanding Block

Here is an idea for those of you who are model builders and have been looking for a small but adequate sanding block. Take an empty plastic double-edge razor-blade dispenser and open the case very carefully, removing the metal spring. Then lay a piece of sandpaper on the outside of the bottom of the case and fold the ends of the paper over the edge so that they extend a short way within the case. Replace the spring and snap the lid back in place.

Robert Kan, Plattsburg, N.Y.



# Solving

—1—

**FRUIT-JAR TOPS ARE PROTECTED** from chipping if the threaded portion of the metal cap is turned on each jar as soon as it is emptied and washed. Then, when the jars are taken out of storage for the next canning season, all the tops will be in good shape

—2—

**WHEN WAXING FLOORS** in a room where furniture makes it impractical to roll back the rug, the edges of the rug can be held off the floor by propping them up with children's building blocks or pieces of wood. These are left in place until the wax dries

—3—

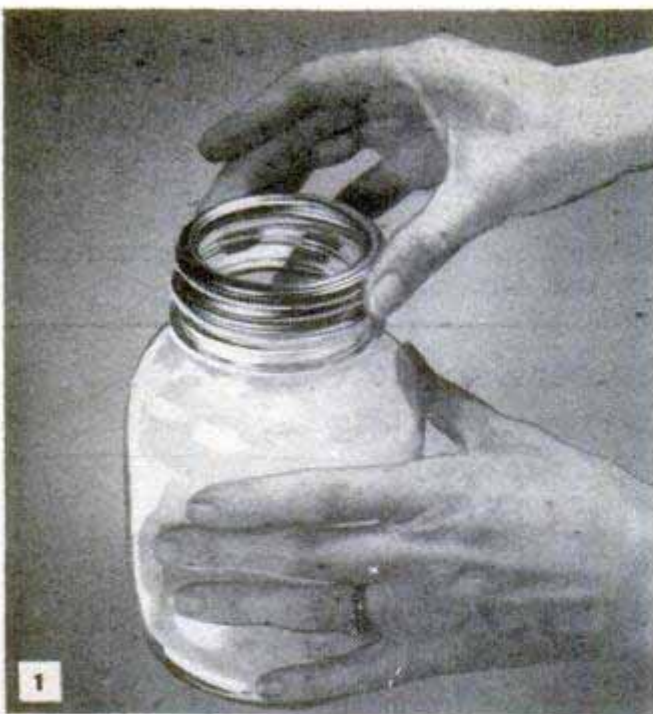
**RECIPE CARDS AND CLIPPINGS** won't be soiled by spilled batter if they are placed beneath an inverted glass baking dish while being used. Although the glass shields the recipe from drippings, the type can be read easily through the bottom of the dish

—4—

**STUBBORN STAINS IN FABRIC** can be cleaned quickly by using the teeth of a comb as a miniature washboard. You will find that rubbing the material along the comb removes the stain with a minimum of effort and also requires less cleaning fluid than usual

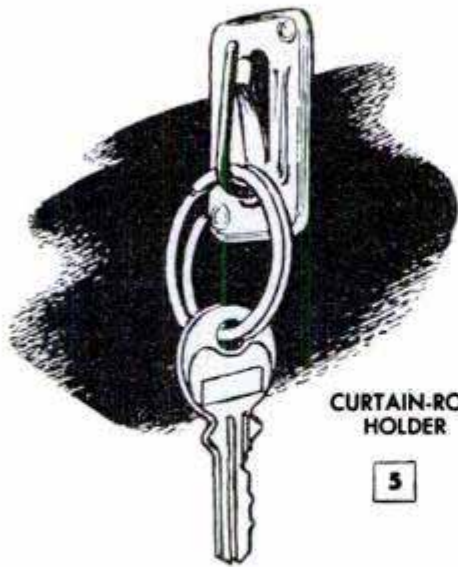
—5—

**WHERE TO HANG THE KEYS** for the garage and basement was solved neatly by one homeowner who fastened a curtain-rod holder to the trim of the kitchen door. The key ring slips over the hook with little danger of the keys accidentally falling to the floor





# HOME PROBLEMS



CURTAIN-ROD  
HOLDER

5

— 6 —

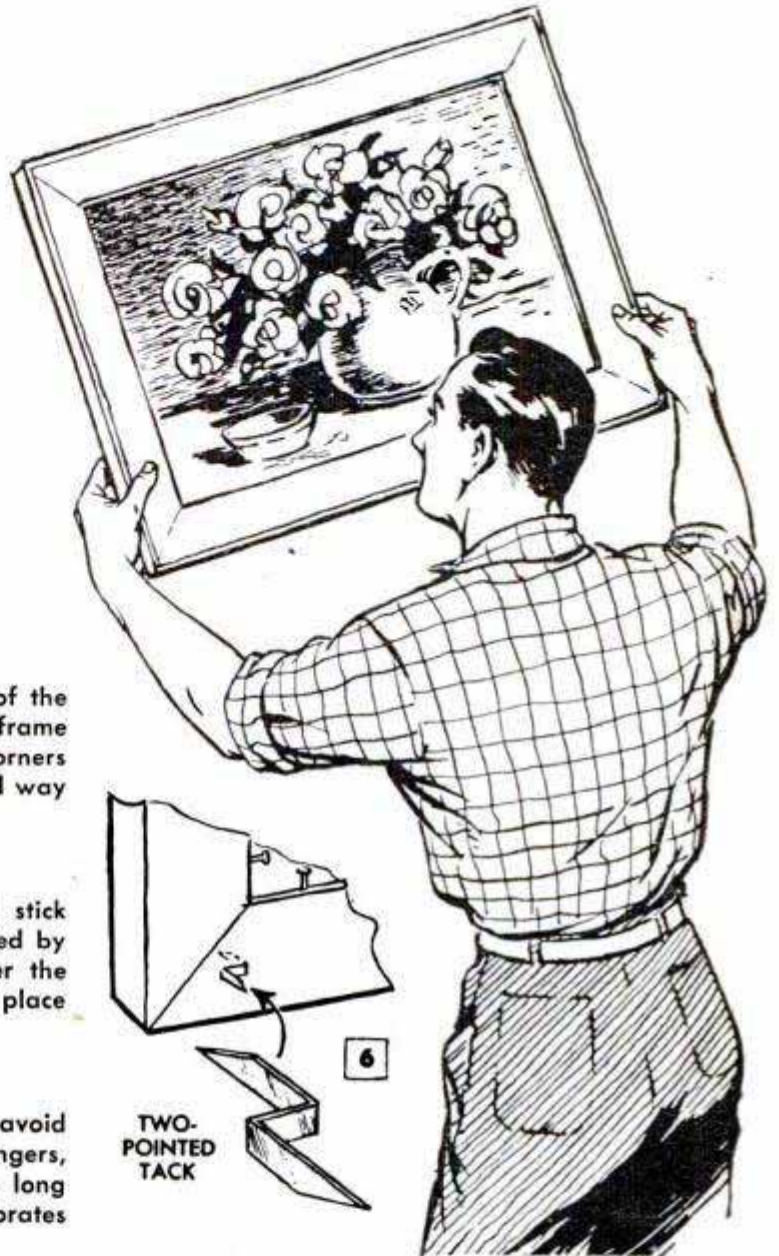
**STRAIGHTENING PICTURE FRAMES** is a thing of the past if two-pointed tacks are used to hold the frame level. Just drive the tacks into the lower corners of the frame and hang the pictures in the usual way

— 7 —

**IF METAL BOTTLE CAPS TEND TO RUST** and stick tightly to the glass, the trouble can be corrected by placing a small square of aluminum foil over the neck of the bottle before screwing the cap in place

— 8 —

**TO ASSURE FAST IGNITION OF CANDLES** and avoid delaying a party or perhaps burning your fingers, dip the wicks in lighter fluid. Don't wait too long before lighting the candles, as the fluid evaporates



6

TWO-POINTED  
TACK

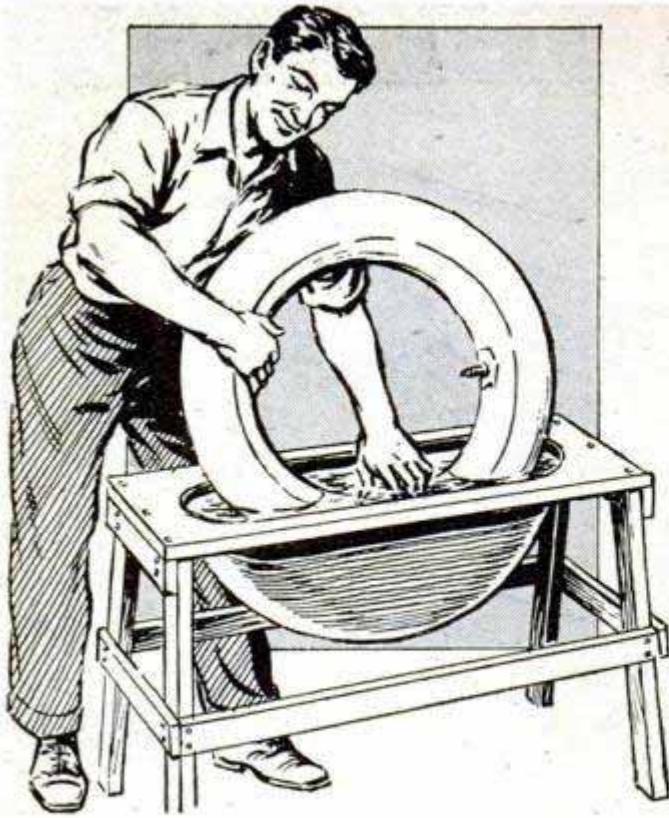


7



8

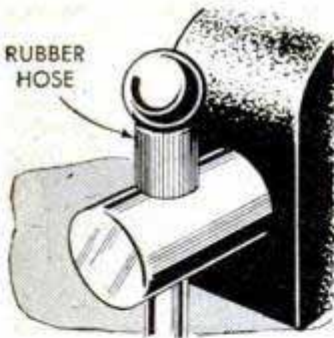
## Water-Filled Fender Well Provides Tank for Testing Inner Tubes



Testing inner tubes for leaks is quick and easy if they are submerged in a water tank improvised from an old fender well. Holes in the bottom of the well are patched and soldered to make it watertight and the well is mounted on a wooden frame. The top of the frame consists of a board which has been cut out for the fender well, and the sheet metal is nailed or screwed to the board.—Victor H. Lamoy, Upper Jay, N. Y.

## Rubber Cushion on Vise Handle Prevents Pinching Fingers

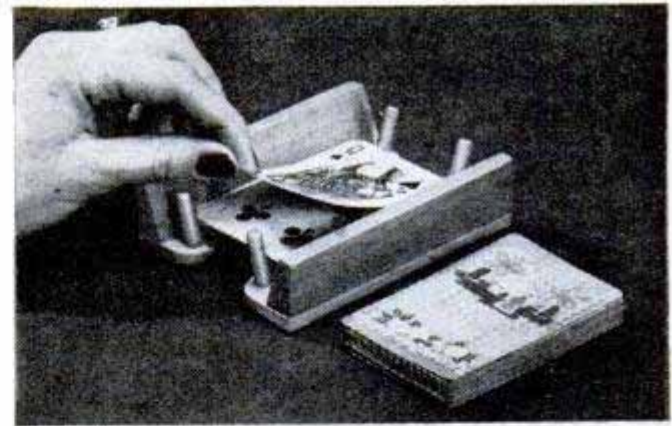
Pinching the fingers between the shaft of a vise and the knob on the end of the handle can be prevented by fitting each end of the handle with a rubber cushion. Use a split washer or slit a short length of rubber hose and place it around the handle shank just below the knob.—Joseph Osborne, Milwaukee, Wis.



## "Canasta" Tray From Scrap Stock

This neat Canasta tray is a one-evening project that not only provides a useful item for the home but also forms a gift that will be greatly appreciated. The sides of the tray, which are of  $\frac{1}{2}$ -in. stock, are beveled on the inner surface and mounted on the  $\frac{1}{4}$ -in. base with glue and brads. The pegs are glued in holes which are drilled through the base at a slight angle. After the tray has been stained or painted, felt is glued to the underside. Although only one tray is pictured, it is best to make two of them to a set, one for the draw pile and the other for the discard pile. If desired, the base can be made approximately twice the width indicated and the two trays combined, using a dividing strip across the center. Also, an opening can be made in one side of the tray to permit placing a card crosswise when "freezing" the deck.

J. S. Turnbull, Seattle, Wash.

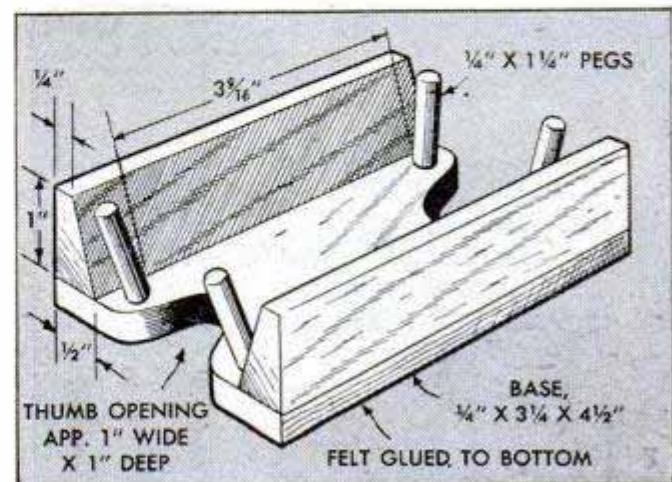


## Ferretting Predatory Animals With Gasoline Fumes

Fumes from gasoline will drive foxes, coyotes and other predatory animals from their dens and into traps set at the entrances. Just soak a piece of burlap in gasoline, and then with a long pole push the burlap as far into the den as possible. Set a trap just inside the den entrance and plug up the entrance tightly with leaves covered with dirt so that none of the fumes will escape. No animal can withstand the gas fumes for long and, when it comes up for fresh air, it will be caught in the trap.

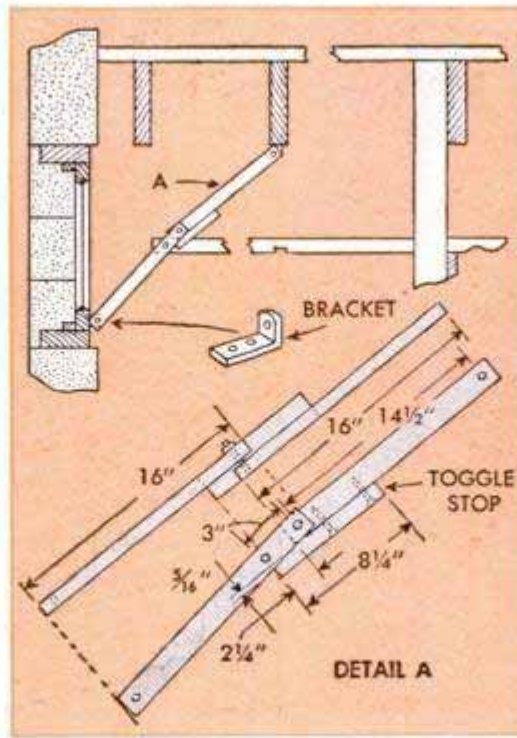
R. A. Jenkins, St. Louis, Mo.

Plain vinegar is an excellent cleaner for windows. Wipe dry with a clean cloth.



# Extension Opens and Closes Coalbin Window

Scrambling over the coal pile to open and close the bin window will be a thing of the past if the window is fitted with this toggle latch and extension arm. The combination permits the window to be pulled open or to be locked shut from outside the bin. Make the toggle from hardwood as shown in detail A, varying the dimensions to suit. Then, using angle-iron brackets, loosely bolt one end of the toggle to the bottom of the hinged sash and the other end to the edge of one of the ceiling joists. Note that when the window is tightly closed, the pivoted toggle arm rests against the beveled face of the stop, thus providing a lock that prevents pushing the window open. The extension handle is a strip of wood (doorstop will do) pivoted to the toggle. A notch cut in the lower edge of the



arm engages the edge of the coalbin to hold the window in the open position. If the bin is enclosed all the way up to the ceiling, an opening for the extension arm can be cut as pictured in the illustration.

W. Arthur Lofft, Collingswood, N. J.

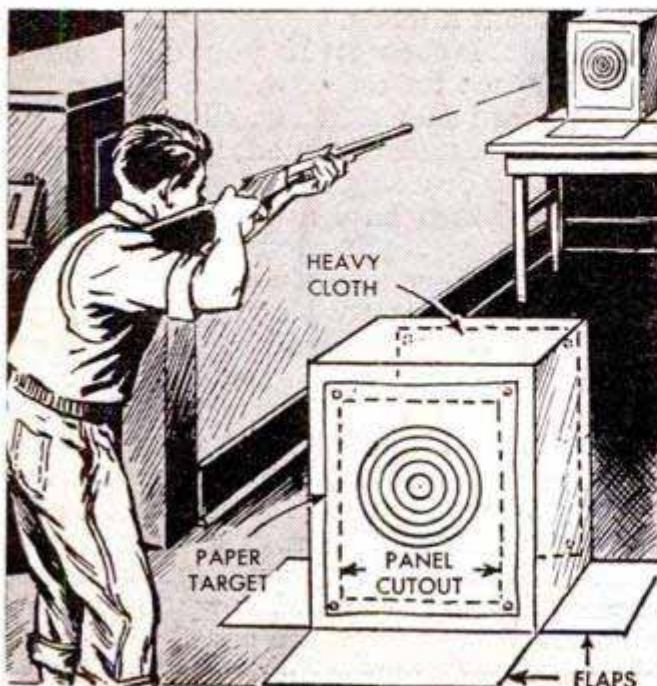
## Wrapping Linens in Opaque Paper Prevents Yellowing With Age

When linens are stored over long periods of time they are likely to become yellow unless protected from light. However, they can be kept white and new looking indefinitely if they are wrapped in opaque paper before storing. Dark-blue paper is best, al-

though several layers of ordinary heavy wrapping paper will serve the purpose. To prevent breaking the fibers of the cloth, roll the linens in the paper instead of folding and creasing them.

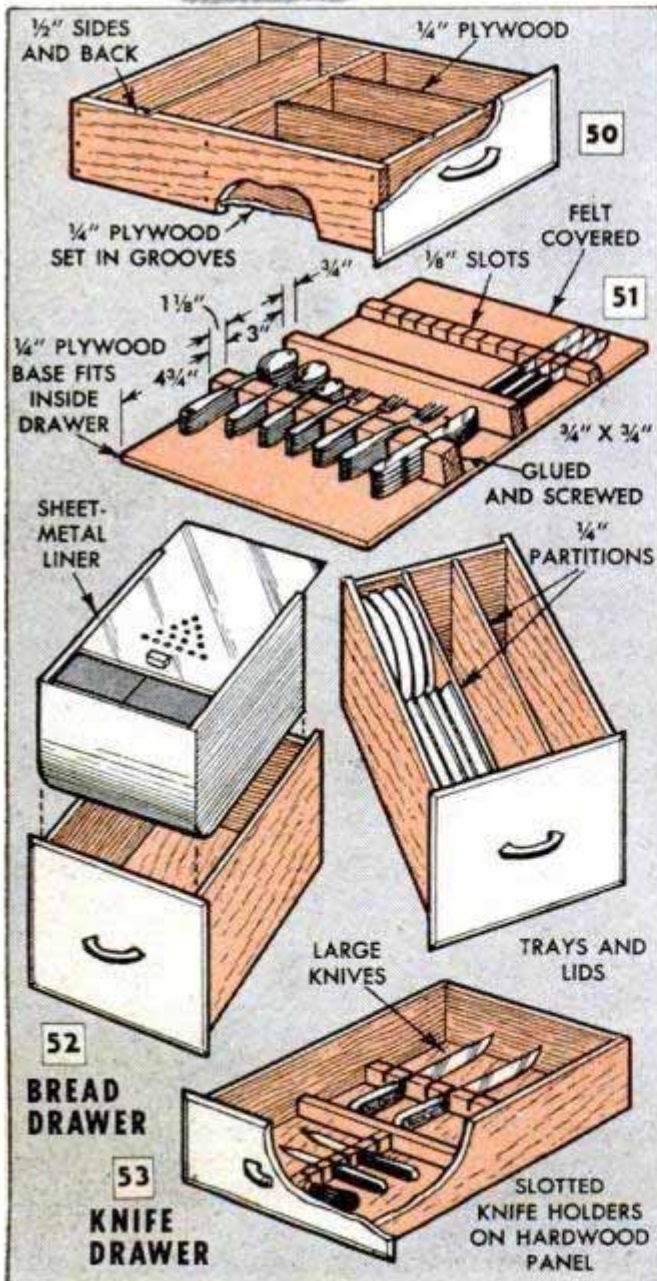
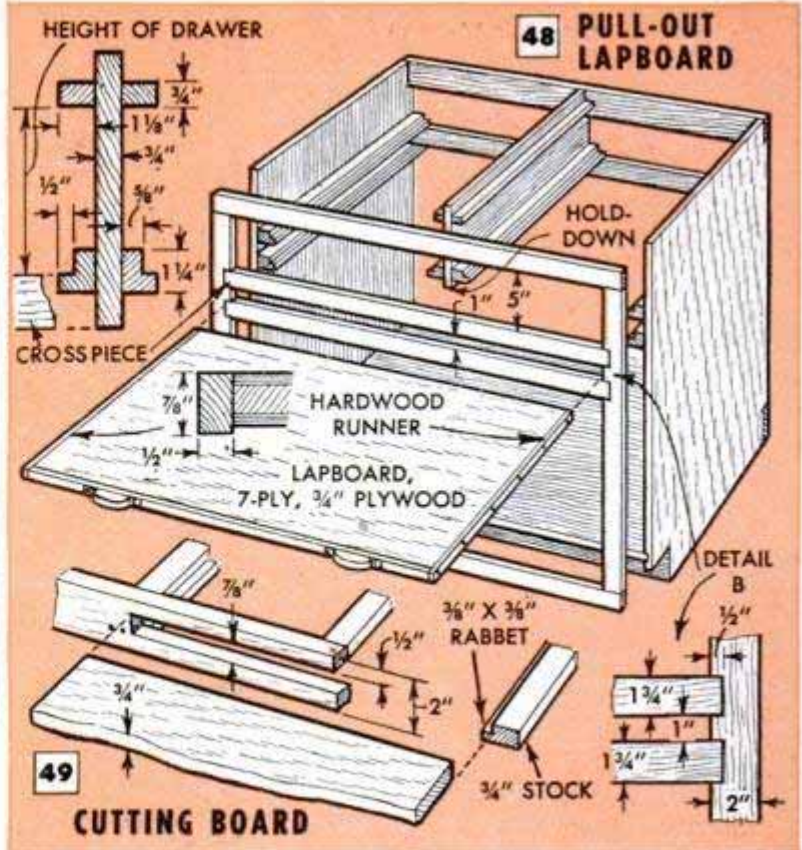
Nina Kay Morris, Norman, Okla.

## Indoor Air-Rifle Target Box Retrieves BB Shot



In addition to retrieving BB shot for use over and over again, this indoor target box for a low-powered air rifle or pistol prevents ricocheting of the pellet when it strikes the target. To make the box, cut a hole in one side of a large cardboard carton, the opening being slightly smaller overall than the dimensions of a paper target. Then tack a piece of heavy cloth or canvas to the inside of the box opposite the cutout panel. This will keep the BB shot from embedding in the cardboard after passing through the target. Stand the target box, open end down, on a table or on the floor and fasten the paper target over the cutout panel with thumbtacks. If the box is set up on a rough wooden floor or other surface which might cause the BB shot to be lost, spread a piece of cloth under the box to catch the pellets.

Charles H. Hardy, Los Angeles, Calif.



# Your MODERN

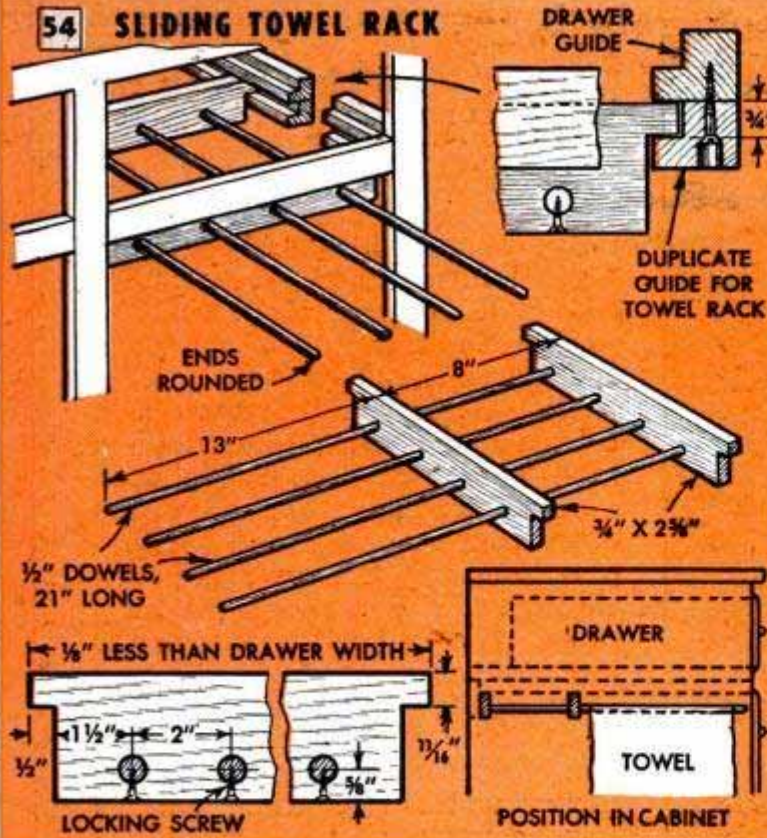
Practical arrangements to ease kitchen chores and provide convenient storage

By E. R. Haan

THERE ARE many minor yet important things that you can do to get extra convenience and efficiency from your kitchen without taking on major remodeling jobs as described in the two preceding articles. Adding a few improvements here and there will perform stepsaving miracles in your present kitchen.

**Pull-out lapboard:** If you don't have enough space for an extra table, the pull-out lapboard shown in Fig. 48 may be just the thing you need. Located right under two top drawers or a single long one, the board is installed in a base cabinet 26 to 28 in. from the floor. If you are building the cabinets yourself as explained in Part II of this series, and you wish to include a lapboard, the cabinet front should have two crossrails instead of one, with sufficient space between them to accommodate the lapboard. Hardwood runners screwed to the ends slide on hardwood guides that are made just like regular drawer runners and are installed below them. The runners extend  $\frac{1}{8}$  in. below the panel and a clearance of  $\frac{1}{16}$  in. above and below the runners is required to prevent the board from rubbing against or binding between the cross-

## 54 SLIDING TOWEL RACK



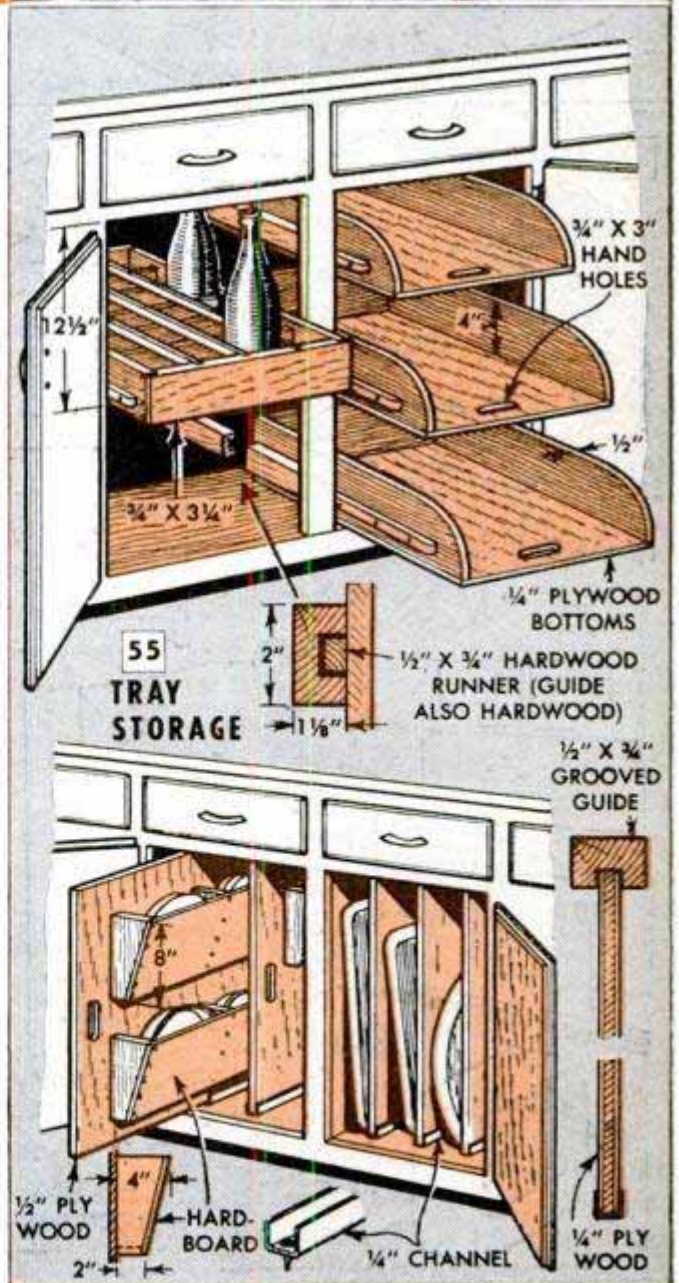
# KITCHEN PART III

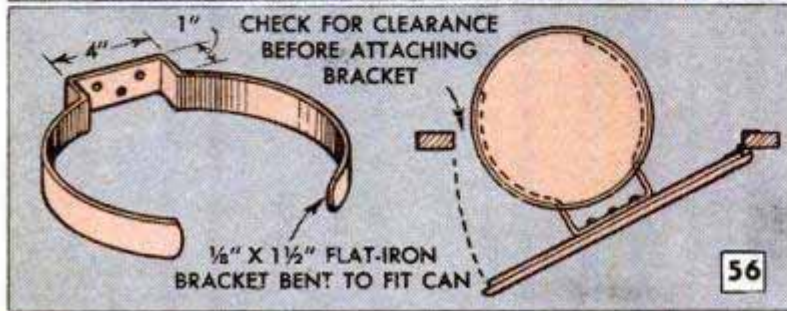
*Kitchen Plans 50*

rails. The partition between two drawers above a lapboard should be wide enough to serve as a hold-down for the board to prevent its tipping down when pulled out. The guides and hold-downs of the drawers above the board are screwed to the partition. Note how the front crossrails are mortised into the side rails as in detail B, Fig. 49, which provides maximum resistance to downward pressure.

**Drawer arrangements:** Partitioned drawers, Fig. 50, are convenient for storing everyday silverware, but the felt-covered holder shown in Fig. 51 offers better protection against scratching. Blocks slotted to hold the silverware are attached to a removable panel that fits inside the drawer. The felt is glued on, even in the knife, fork and spoon slots, but on the steak-knife rack, the felt is just slit down the slots with a razor blade. Carving and paring knives can be stored in drawers with less risk of getting their sharp edges nicked and with less danger of cutting fingers if they are set with their sharp edges down in slotted holders as in Fig. 53. The holders are screwed to a removable panel of plywood or hardboard.

A deep drawer can be partitioned for storage of tins and lids. The partitions are held in grooves, metal channels or between lengths of 1/4-in. quarter-round molding. Fig. 52 shows a sheet-metal bread-drawer





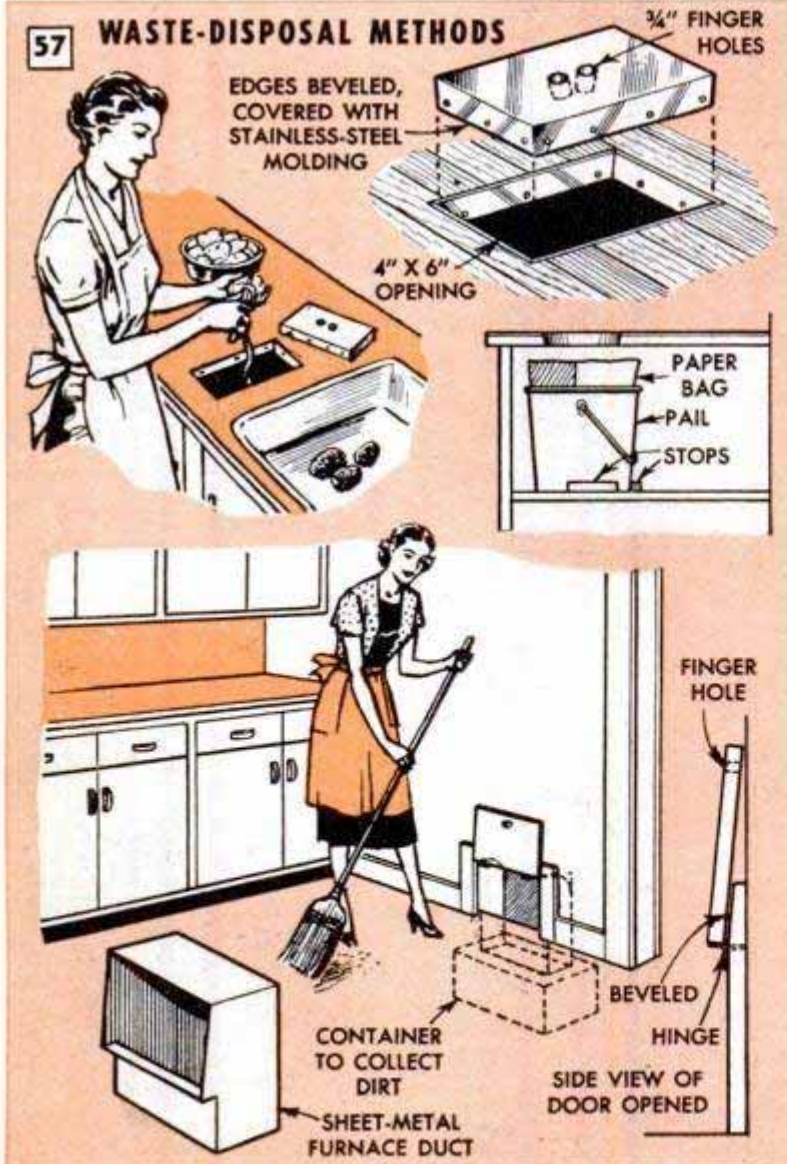
liner which can be purchased ready-made.

**Sliding towel rack:** Towels can be kept at hand but out of sight on a sliding towel rack in a base or sink cabinet, as in Fig. 54. The rack consists of a number of hardwood dowels fitting snugly in holes drilled in two crosspieces that slide on drawer guides. The guides of a drawer above the towel rack serve as hold-downs. In case there is no drawer above the rack, as in a sink cabinet, you will need rack guides having a U-shaped cross section. The front ends of the dowels are rounded and sandpapered smooth. Screws are driven through the crosspieces to keep the dowels in position and make the assembly rigid. Ventilation through the towel-rack compartment is highly desirable. Some manufacturers provide an electric heater and a circulating fan for towel compartments.

**Other storage facilities:** Vegetables and heavy cooking utensils such as skillets, and also empty beverage bottles, can be kept in orderly fashion if you provide sliding units in base cabinets as shown in Fig. 55. Hand holes are cut in the bottom of sliding shelves that have no front. For vegetables, you may prefer a drawer having a front, in which case a row of holes for air circulation should be bored in the sides near the lower edge just above the bottom. Hardwood strips on the sides of the units fit grooved hardwood guides as shown in the detail. Use of roller bearings on sliding shelves, as described in Part II of this series, will greatly reduce friction. Divider strips on the unit for empty bottles provide individual wells for holding them.

To keep trays out of sight, set them vertically between partitions in a base cabinet as in Fig. 55. The partitions may be held in channels or between molding strips. Shallow pans, lids and tins can be kept in pockets attached to vertical panels that slide in channels. The pockets can be attached to both sides of the panels. Hand holes are provided as shown.

**Waste-disposal methods:** One of the handiest places to hold a container to take table scraps, vegetable peelings, etc., is the cabinet door under a sink. It saves steps



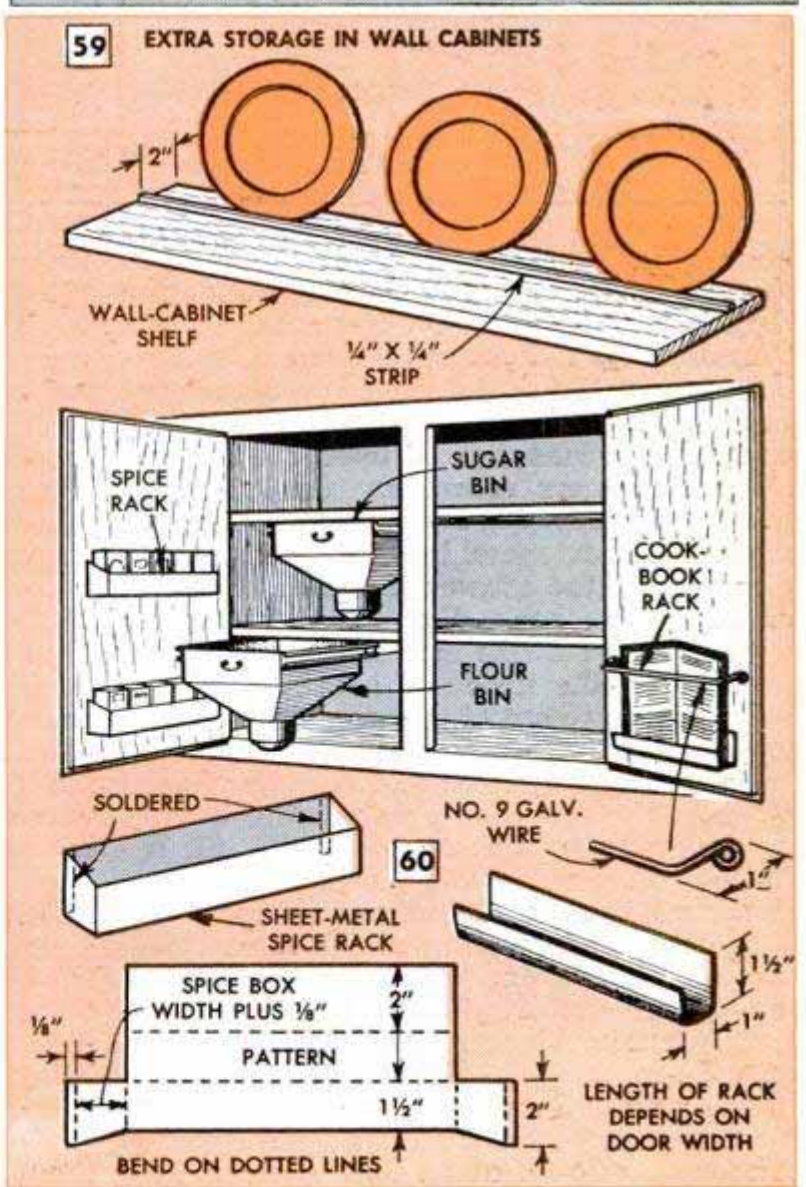
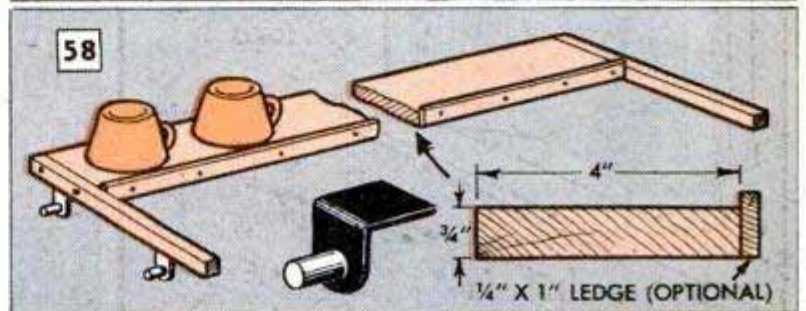
and avoids stooping. A simple arrangement consists of a rimmed container that can be held by a bracket bent to fit as in Fig. 56. Three screws hold the bracket to the cabinet door. Before attaching it, check for clearance when opening the door. Keep a waxed bag in the container for easy removal of contents to the outside waste can. The bag also eliminates constantly washing the container.

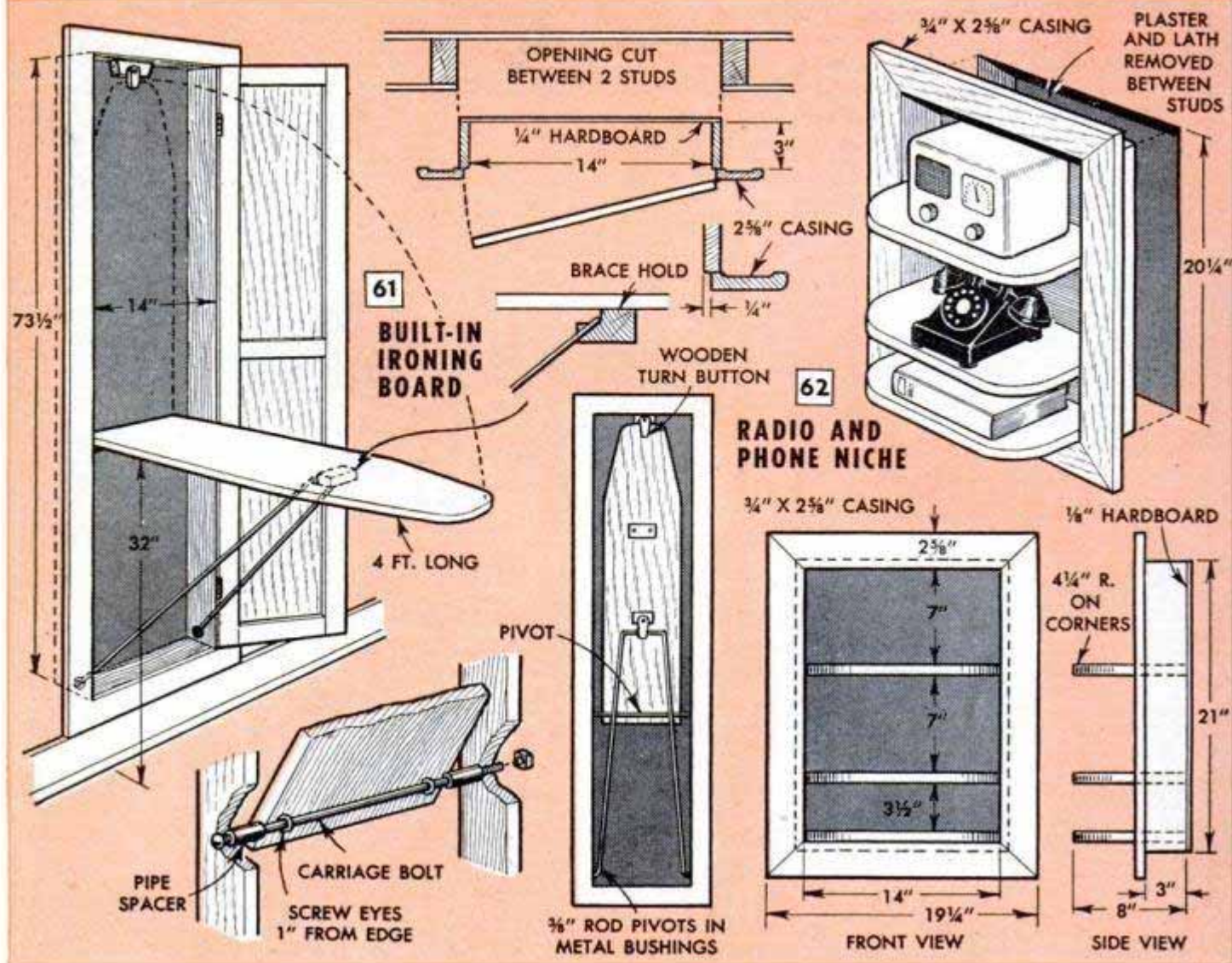
A somewhat similar idea is shown in the two upper details of Fig. 57. An opening is cut in a counter top to center directly over the container, which is set on a shelf below and is held in the proper position by stops nailed to the shelf. The edges of the opening are lined with stainless steel, which also is used on the edges and top surface of the hardwood-block cover. It fits flush with the counter surface and has two finger holes drilled at a slight angle toward each other. Cutting and chopping of vegetables, meat, etc., should be done on a hardwood board unless the counter itself is laminated hardwood.

Floor sweepings simply drop into a pan hung on the basement ceiling if you install a dust chute in the kitchen wall at floor level as shown in the detail below Fig. 57. Cut out the plaster, baseboard, floor boards in the partition, part of the sole plate, and a section of the basement ceiling to install a wall-register fitting of a warm-air furnace duct. Finish the job with a neat frame and provide a door, hinged at the top. By beveling the top of the frame, the door can swing back far enough to prevent it from dropping down of its own weight. A wall chute of this kind is preferable to an opening in the floor which entails accident risk.

**Extra storage space:** A separate shelf to store cups makes more space available for other dishes. The cup shelf has a cleat at each end so that it is held by four shelf brackets which can be adjusted for height, Fig. 58. Similar narrow shelves can be used for tumblers.

Another convenience is a plate rail on a cabinet shelf, as in Fig. 59, for large serving dishes that cannot be stacked. The rail is merely a strip of wood nailed to the shelf. A long one can be located near the rear edge, and short ones at the





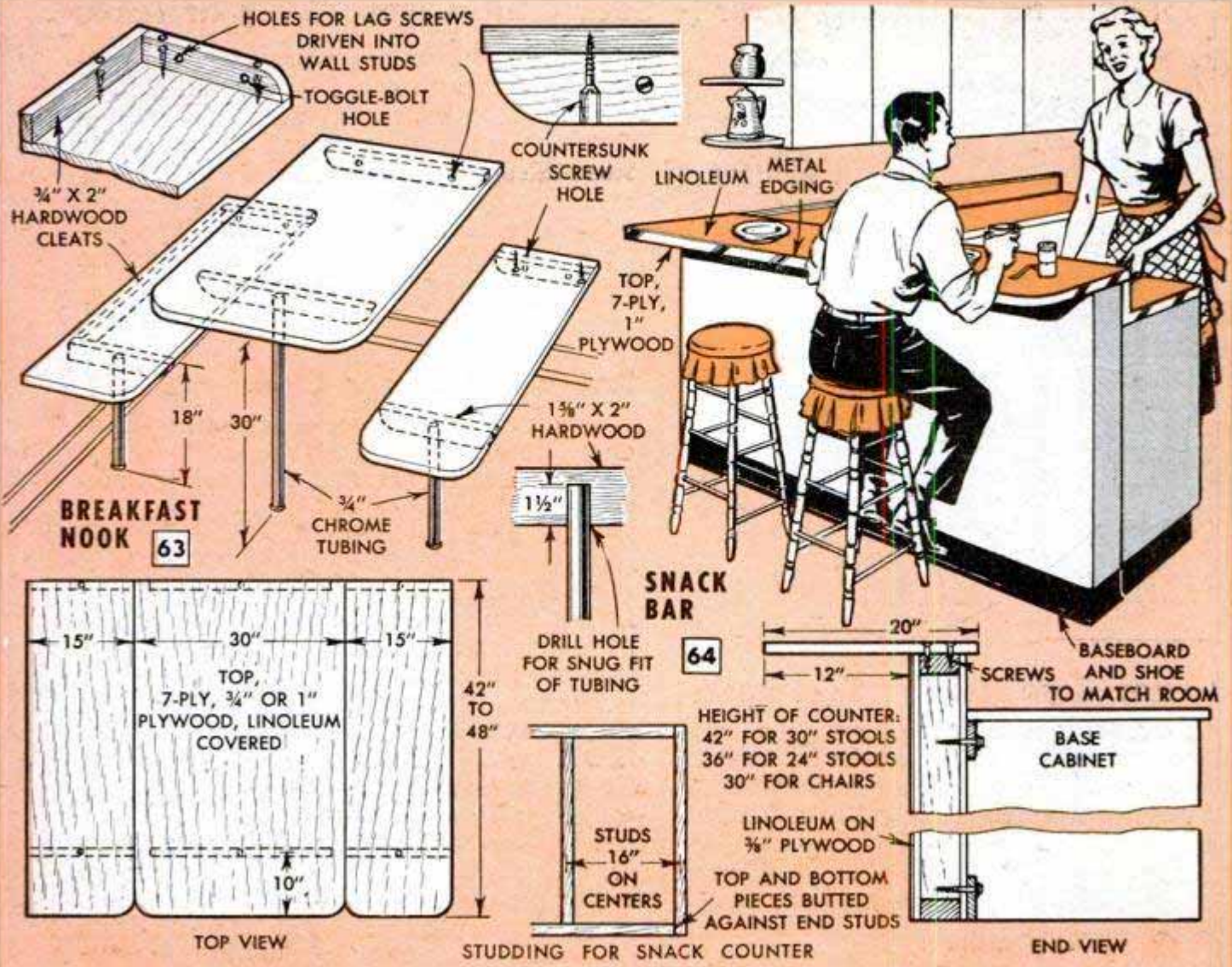
ends of a shelf. Ready-made flour and sugar dispensers can be attached to the underside of wall-cabinet shelves as in Fig. 60. This drawing also shows easily made spice-box racks which are attached to the doors between the shelf positions. Because the exact dimensions depend upon the size of spice containers commonly used in the kitchen, the drawing does not give all sizes. A piece of sheet metal is cut and bent as indicated and the tabs at the ends are soldered to the back. By the simple rack shown, recipe books can be held in open position on the inside of a cabinet door, where they are out of the way and not apt to be soiled, yet easily read while at work.

**Built-in ironing board:** You can purchase a ready-made cabinet-type ironing board or you can build one as shown in Fig. 61. It fits above the baseboard to avoid removing or cutting the board. Cut plaster from the wall between two studs at the most convenient location and then install the cabinet, nailing it through the casing to the studs with finishing nails. The board pivots on a 3/8-in. carriage bolt slipped through large screw eyes or eyebolts installed about 1 in. in at the wide end of the board. Although a 14-in. dimension is given for

the width of the cabinet, this will vary as the distance between wall studs is not always the same. Therefore, the opening in the wall should be cut first and the cabinet made to fit. If you find the studs to be 16 in. on centers, the cabinet will have to be made narrower than indicated. In some cases, where existing studs are not located where you prefer the ironing board, it may be necessary to straddle a stud and install headers and vertical members to provide the necessary framework for the cabinet. Pipe spacers on the bolt keep the board centered. After the nut is turned on,peen the ends of the thread to lock the nut in place. Allow just enough clearance to permit the board to be raised and lowered without rubbing against the back of the cabinet.

A wooden turn button prevents the raised board from falling unexpectedly. A 3/8-in. steel rod, bent to a U shape as shown in the detail, provides sturdy bracing for the board when in use. The ends of the brace are bent outward to fit in metal bushings or sleeves in the cabinet sides at the bottom. The natural spring of the brace keeps the ends in place. The other end of the brace butts into a notched block on the





underside of the board. When not in use, a wooden turn button on the board keeps the brace from falling. An electric outlet should be provided in the inside of the cabinet at the top so that the ironing cord hangs out of the way.

**Built-in radio and phone niche:** Installed like the ironing-board cabinet, a wall niche as shown in Fig. 62 keeps a radio and phone out of the way, yet convenient. Install it at the right height for dialing. The shelves must extend beyond the casing to provide the necessary space and the corners are all rounded the same radius for good appearance. The niche should have an electric outlet for the radio, preferably at the top.

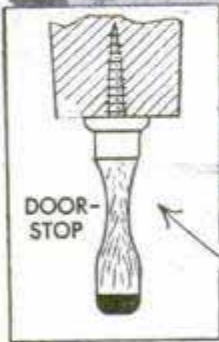
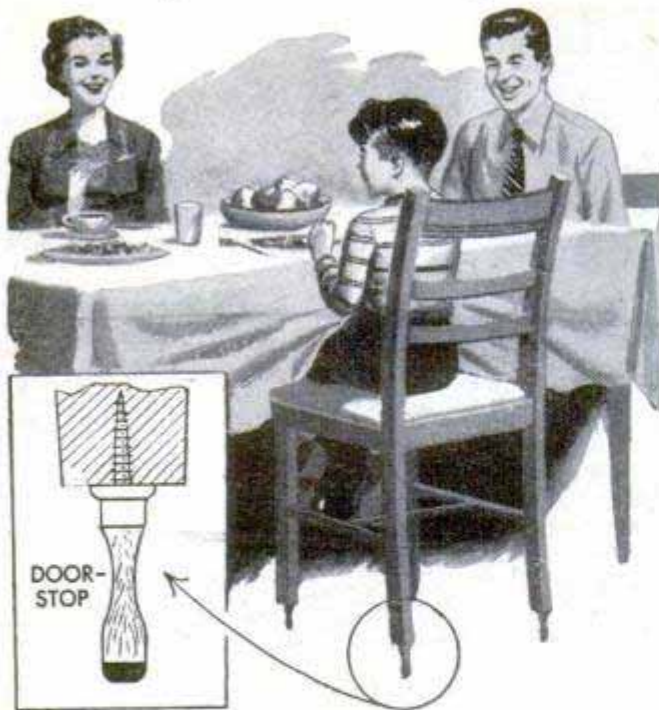
**Breakfast nook:** About the simplest construction for an attractive breakfast nook is shown in Fig. 63. Table and backless benches are cut from a single 4 x 5-ft. plywood panel. Hardwood cleats on the underside provide a means of sturdy support. The cleats used for attachment to walls are flush with the edges and are drilled for lag screws driven into wall studs. Bench cleats are attached with one lag screw and one toggle bolt as they are not wide enough to pass two studs. Where one bench fits against an end wall, a cleat is provided at

this wall edge also. A seat corner adjoining a wall is not rounded. Wider cleats located about 6 or 8 in. from the other end of table top and benches are bored centrally to take chrome legs. Since there are only three legs, floor cleaning is easy. Benches are simply enameled and the table top may be either painted or covered with linoleum.

**Snack bar:** Even though space is at a premium, you may still be able to install a three or four-stool snack bar. It can be attached to a wall with brackets or may extend into the room, backing against a base cabinet or range as in Fig. 64. For good support, build a wall of regular studs, including sole and top plate. Flat-headed wood screws, 3 in. long and spaced about 12 in. apart, hold the counter to the top plate. Studs are covered with plywood, and linoleum may be cemented over it on the counter side. The wall end of the counter is screwed to a cleat fastened to the wall with a lag screw and toggle bolt. The height of the counter may be varied according to the height of the stools. These, when not in use, are pushed under the counter.

(The End)

## Doorstops Raise Dining Chair to Seat Child Comfortably at Table

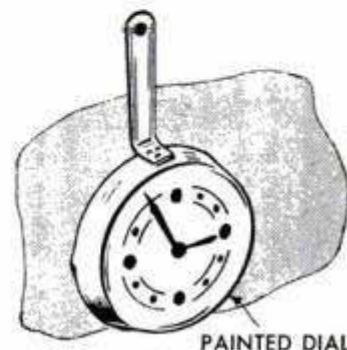


One family, whose youngster has outgrown his youth chair but is still a little too small to be seated comfortably in a regular dining chair, used doorstops to raise the chair instead of resorting to books and other props. The doorstops are screwed into the ends of the legs and, as they are tipped with rubber, they do not mar the floor or damage the rug.

Jos. E. Ciboch, North Judson, Ind.

## Frying-Pan Kitchen Clock

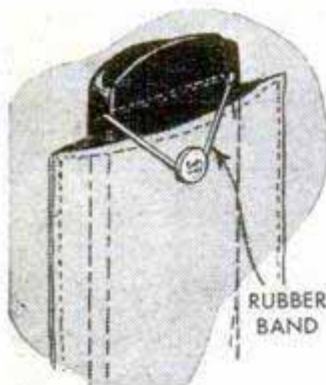
By combining an electric or spring-driven clockwork with a frying pan you can fashion an attractive and appropriate timepiece for the home kitchen or small restaurant. Polish the bottom of the frying pan with steel wool and coat it with clear lacquer or varnish to preserve the shiny finish. Drill a hole for the clock shaft centrally through the bottom of the pan and then drill two smaller holes near the outer edge for stove bolts which anchor the clock mechanism. Mark off twelve equal sections around the face of the pan and paint dots to represent numerals. If desired, metal furniture glides can be used to provide a modern clockface, the necessary mounting holes being drilled through the pan. Still another way is to buy a paper or cardboard clockface ready-made and glue it to the bottom of the pan.



George J. Berkwitz, New York City.

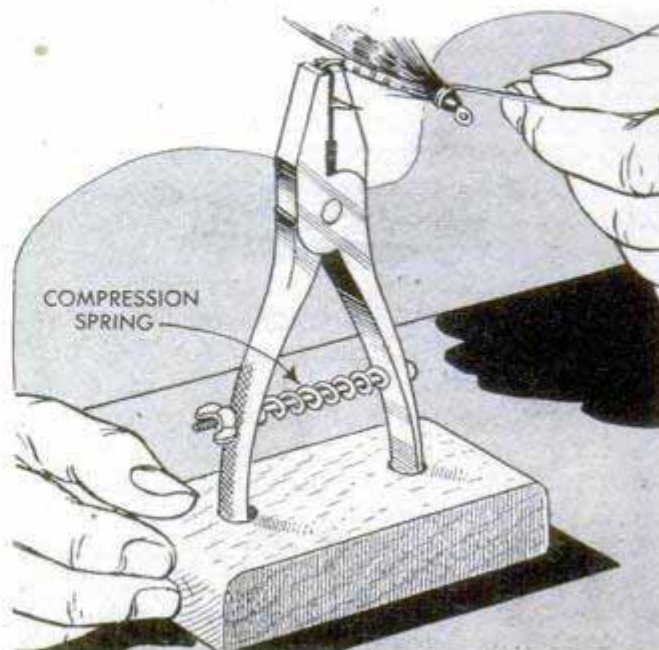
## Glasses Case Held in Shirt Pocket

If a glasses case is too large to allow a shirt-pocket flap to be buttoned over it, the case can be held in the pocket with a rubber band which is slipped over the button. The rubber band is placed around one end of the case lid so it can be pulled over the edge of the pocket, thus making removal of the case merely a matter of disengaging the rubber band from the button.

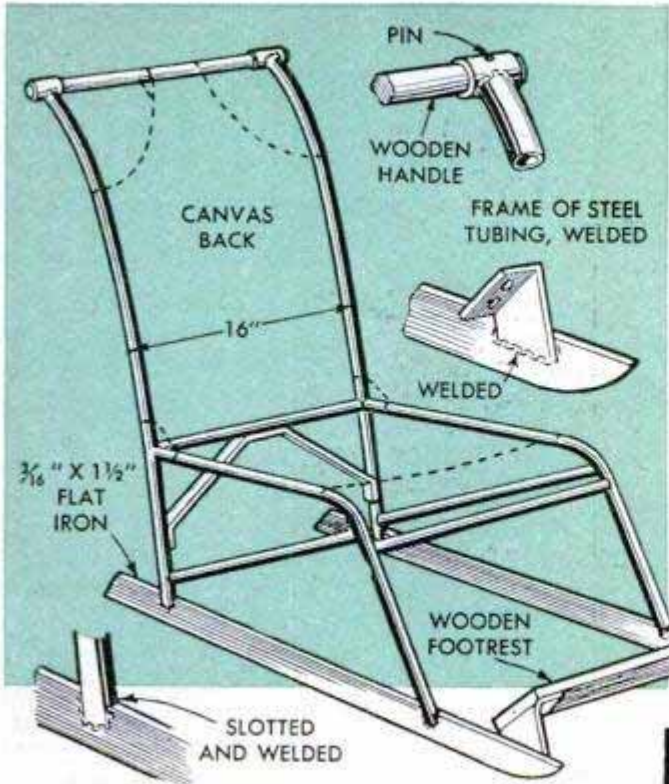


## Pair of Pliers Mounted on Base Doubles as Fly-Tying Vice

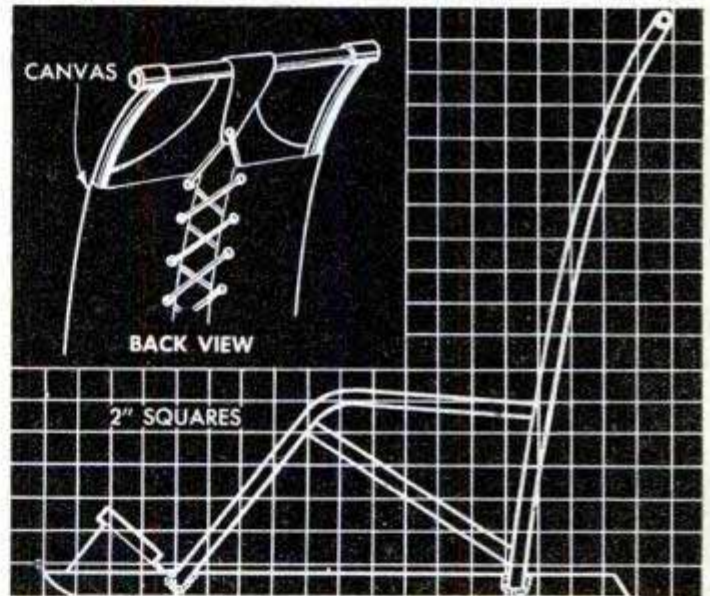
Mounting a pair of ordinary pliers on a wooden base provides an excellent vise for tying fishing flies. Aligning holes are drilled through both handles of the pliers to take a bolt, a compression spring being slipped over the bolt so that it holds the handles of the pliers apart. A wing nut which is turned on the bolt locks the pliers closed. Blind holes drilled in the wooden base receive the ends of the handles to hold the pliers upright. Tightening the wing nut clamps the jaws of the pliers over the hook and, as soon as the wing nut is loosened, the compression spring automatically spreads the jaws to release the hook. Be sure that the bolt used is of as small a diameter as possible so that the holes in the pliers handles will not be large enough to weaken them for ordinary uses. A C-clamp can be used to fasten the block to a table.



# Fast "Taxi Service" on Large Skating Ponds



It's no trick for a good skater to handle this ice taxi, even though it's only skate-driven, as it glides easily over the ice on polished runners. The light, tubular frame of the chair is of all-welded construction. Only the handle and footrest are of wood. The seat and backrest are formed from one piece of canvas with all edges folded once and hemmed. The part of the fabric forming the seat is cut wide enough to allow for hemming the edge and looping the flaps around the tubular frame members on both sides. The looped flaps are sewed with two seams each. On the back section of the canvas, flaps fold around the frame uprights and over the handle. Grommets spaced along the edges of the fabric permit lacing the edges together as shown at the right. If desired, this same construction can be used across the bottom. The bottom edges of the runners are filed to a wide



V-shape and polished smooth with fine emery cloth. Filing the runners to the V-shape makes the taxi steer easier, as the runners slide freely, without cutting the ice as a hollow-ground skate runner would. Smooth the runner edges with an oilstone.

## Tire Chains Held Tightly in Place With Screen-Door Spring

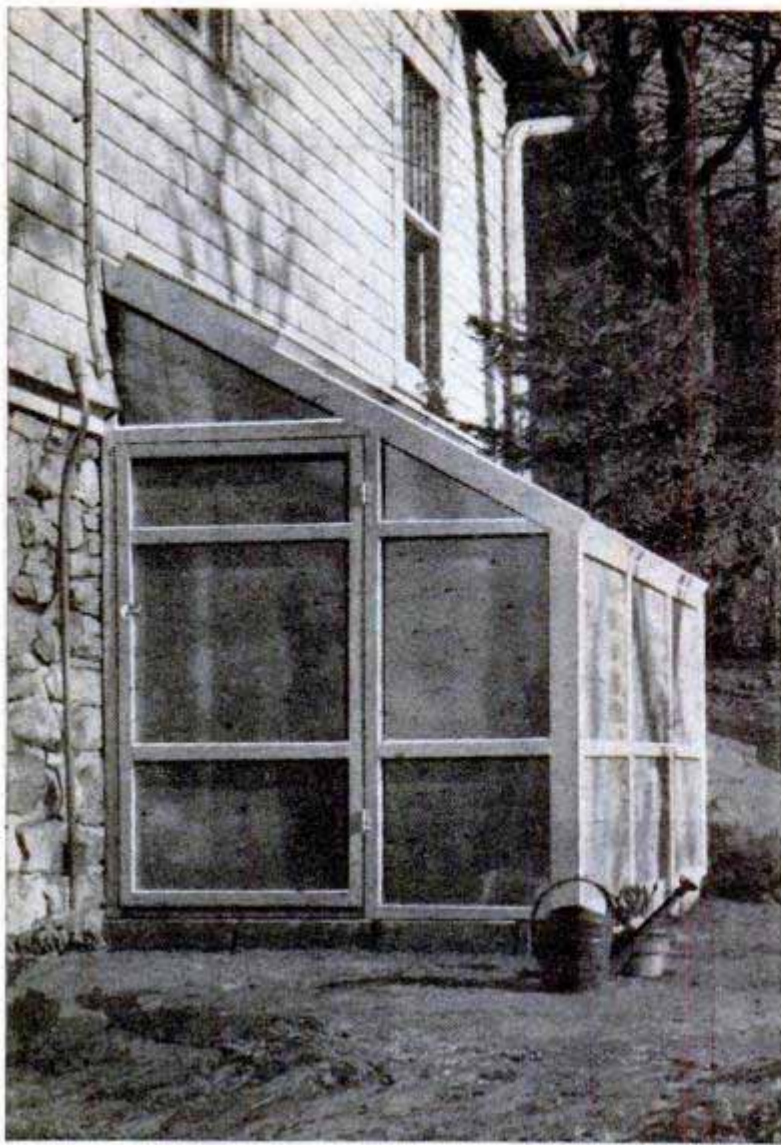


Tire chains that fit loosely can be kept from slipping by drawing them tight with a screen-door spring. The spring is stretched over the side wall of the tire and fastened to the chains with S-hooks at three or four points. Tension can be increased by fastening the spring to the chain at additional points around the tire.

□ Paper shopping bags can be waterproofed to a certain extent by coating them with shoe polish of a neutral shade.

# LEAN-TO

**You can have cut flowers out of season and start seedlings early by building this walk-in greenhouse against a side of your home**



Above, this lean-to greenhouse, covered with plastic-sheeted screening is the place to start seedlings for early plantings. Below, there's plenty of room for seed flats and potted plants



**T**HERE'S no need to clutter up the window sills with seed flats or freeze your fingers breaking out snowbound cold frames in late winter in order to get seedlings started in time for transplanting when warm weather arrives. A lean-to greenhouse is the answer to this perennial problem of gardeners. Moreover, by timing greenhouse plantings you can have cut flowers out of season. The lean-to greenhouse pictured is covered with plastic-sheeted screening and gives you a floor space 5 x 9 ft. Of course, the length of the structure can be increased as much as desired simply by adding studs and rafters on a uniform 3-ft. spacing.

Locate the greenhouse unit on the south side of the house or other suitable building where it will be exposed to late winter and early spring sunlight during the greater part of the day. In severely cold weather, heat can be piped from the furnace or supplied by a small space heater. Use concrete blocks or flat stones for the foundation. Lay the first foundation course of either blocks or stones on a concrete footing below the normal frost line. Half-lap the sills at the outer corners as in Fig. 2 and be sure that the sills are level before setting up corner posts and studding. It will pay to notch, or house, the ends of the braces, or nailing strips, into studs and corner posts as detailed in Fig. 2. This results in a much more durable structure. Because of the high humidity always present in a greenhouse, redwood is the best material for framing. Cypress and white pine are a good second choice.

As the construction of the frame proceeds, plumb all vertical members and check corners for squareness. Note that the eave strip is beveled on the lower edge so that it will fit flush against the outside edge of the plate. The weather stripping over which the ventila-

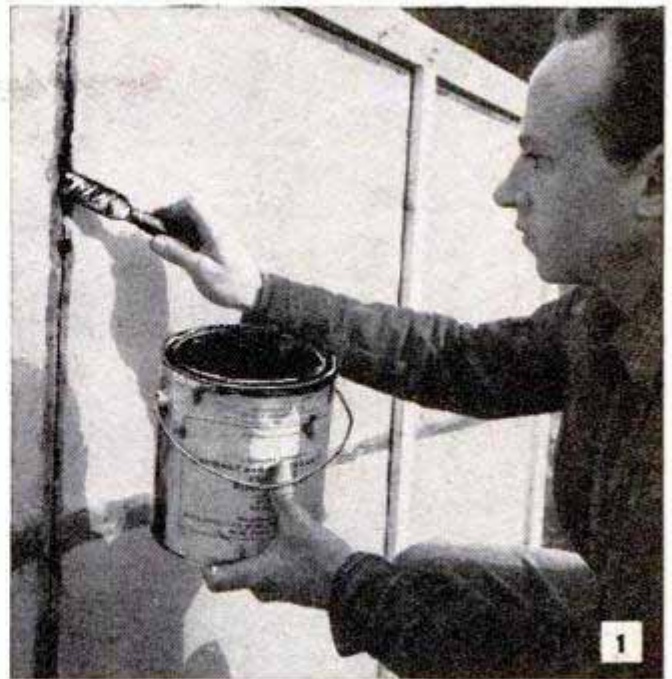
# GREENHOUSE

By  
Richard F. Dempewolff

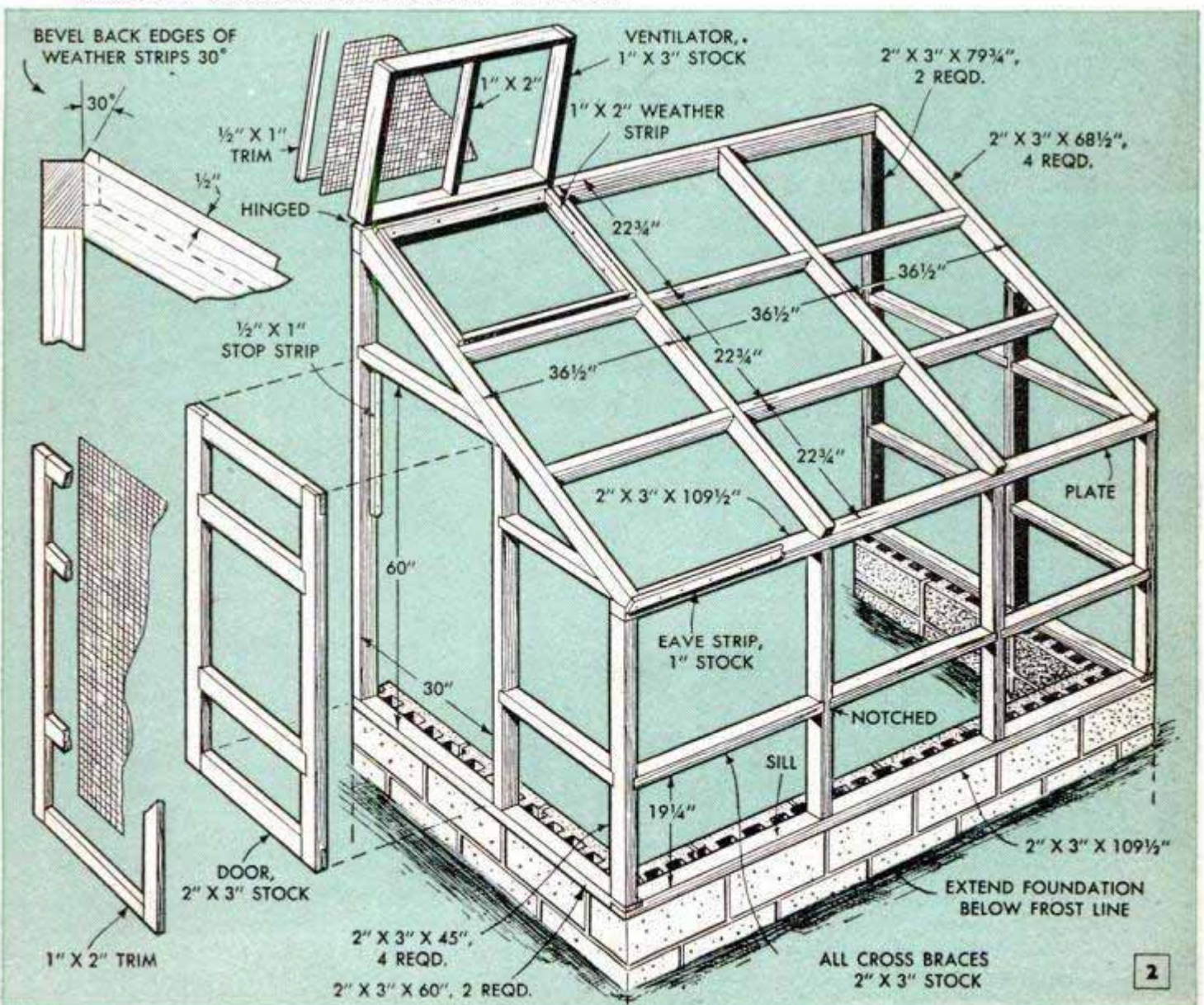
tors fit is beveled slightly on the outside edges to permit the ventilator frames to close without binding. Set the weather strip in nonhardening mastic before nailing to the rafters. The doorframe is made up as detailed with half-lapped corner joints and housed center cross members. Use screws in assembling the joints of both the door and ventilator frames.

After hinging the door and ventilator frames in place the job is ready for the plastic-sheeted covering. Apply mastic to all surfaces which the covering will join, then tack it in place with screen staples spaced about 3 in. apart. Then apply a second coat of mastic over the joints as in Fig. 1 and nail trim strips over all joints. That finishes the job except, perhaps, for a line of calking run in at the joint where the structure joins the house foundation and across the roof joint back of the ventilators. Paint all interior woodwork with two coats.

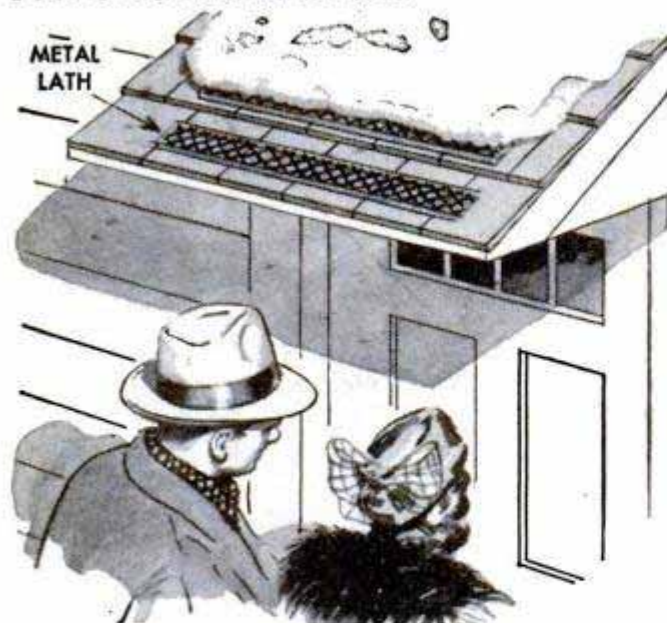
[Design and photos courtesy Celanese Corp. of America]



Mastic applied under and over plastic-covering joints makes tight, waterproof job on walls and roof

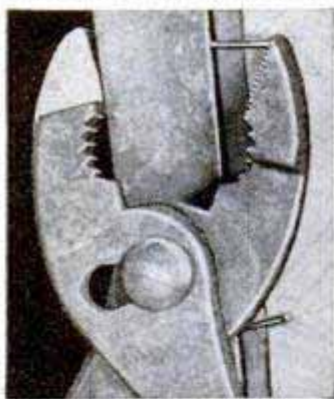


## Metal Lath on Porch Canopy Prevents Snow Slides



Melting snow that slides off a porch canopy is not only annoying but may prove embarrassing if it should fall on guests. To prevent such an accident, tack two or three strips of metal lath to the lower portion of the canopy as shown. The lath will retain the bulk of the snow until it has had a chance to melt. Paint the lath to minimize rusting and tack it in place lightly so it can be removed in the spring.

## Pliers Drive Picture-Frame Brads



Framing pictures with a hammer often results in damage to the frame or the glass. However, on smaller frames, this difficulty is easily overcome by using pliers to drive the brads. Use brads short enough so that the

jaws of the pliers will fit over the head of the brad and the edge of the frame. Simply force the brads into the wood by squeezing the pliers. Tape the surface of one jaw of the pliers to prevent marring the frame.

Virginia Hanson, Santa Monica, Calif.

## Coating Glass With Lubricant Foils Halloween Pranksters

If you expect the youngsters to "decorate" your windows with wax or soap this Halloween, much troublesome cleaning-up can be saved by coating the outer surface of the glass with petroleum jelly or lubricating oil. Spread the oil in a thin film, applying it with a soft cloth, and later remove

the oil and any markings with a soap-and-water solution. Although the oil will not cause appreciable interference with vision through home or store windows, it is best not to coat the car windows until it has been parked for the night. If soap markings have already been made on an unprepared window, they can be removed with hot water and a scrub brush. Marks from wax crayons or candles can be cleaned off with an organic solvent such as gasoline or turpentine. This should be followed by washing the glass with soap and water.

## Furnace Operation Improved By Basement-Window Vent

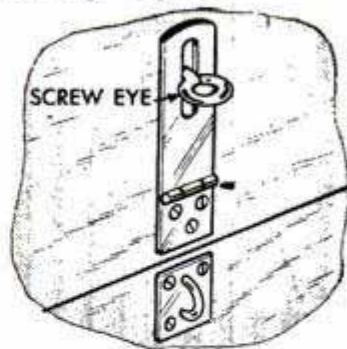
From the poor operation of his gas-fired furnace, one homeowner discovered that weather stripping can be too thorough. To remedy this difficulty, he fitted a basement window with a permanent air intake.



Selecting a three-paned window about four feet from the furnace, he removed one of the panes and replaced it with an L-shaped vent frame. The latter was made of outdoor plywood and contained a screen to keep out insects. The top front panel overhangs the lower panel and the opening between them provides the air intake. The overhanging construction prevents driving rain and snow from entering. Robert Hertzberg, Jackson Heights, N. Y.

## Screw Eye Holds Hasp Open

When a tool chest or storage bin is locked with a padlock, it is often convenient if the hasp can be kept from falling over the staple, particularly when you are carrying



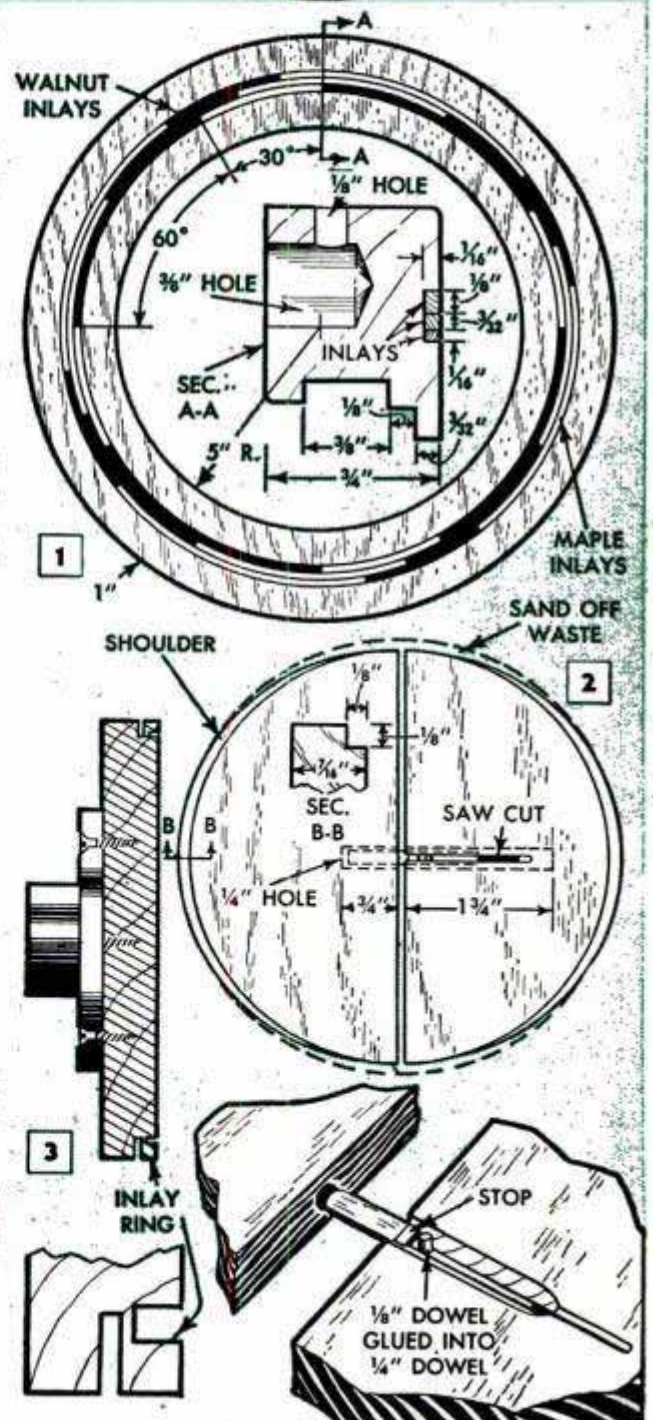
an armload of tools or other items to be placed in the chest. A screw eye turned into the lid is just the thing to hold the hasp open when you do not want to lock the chest. Turn the screw eye into the front of the lid so that the slot in the hasp fits over it, and merely turn the screw eye at right angles to the slot in order to hold the hasp open.

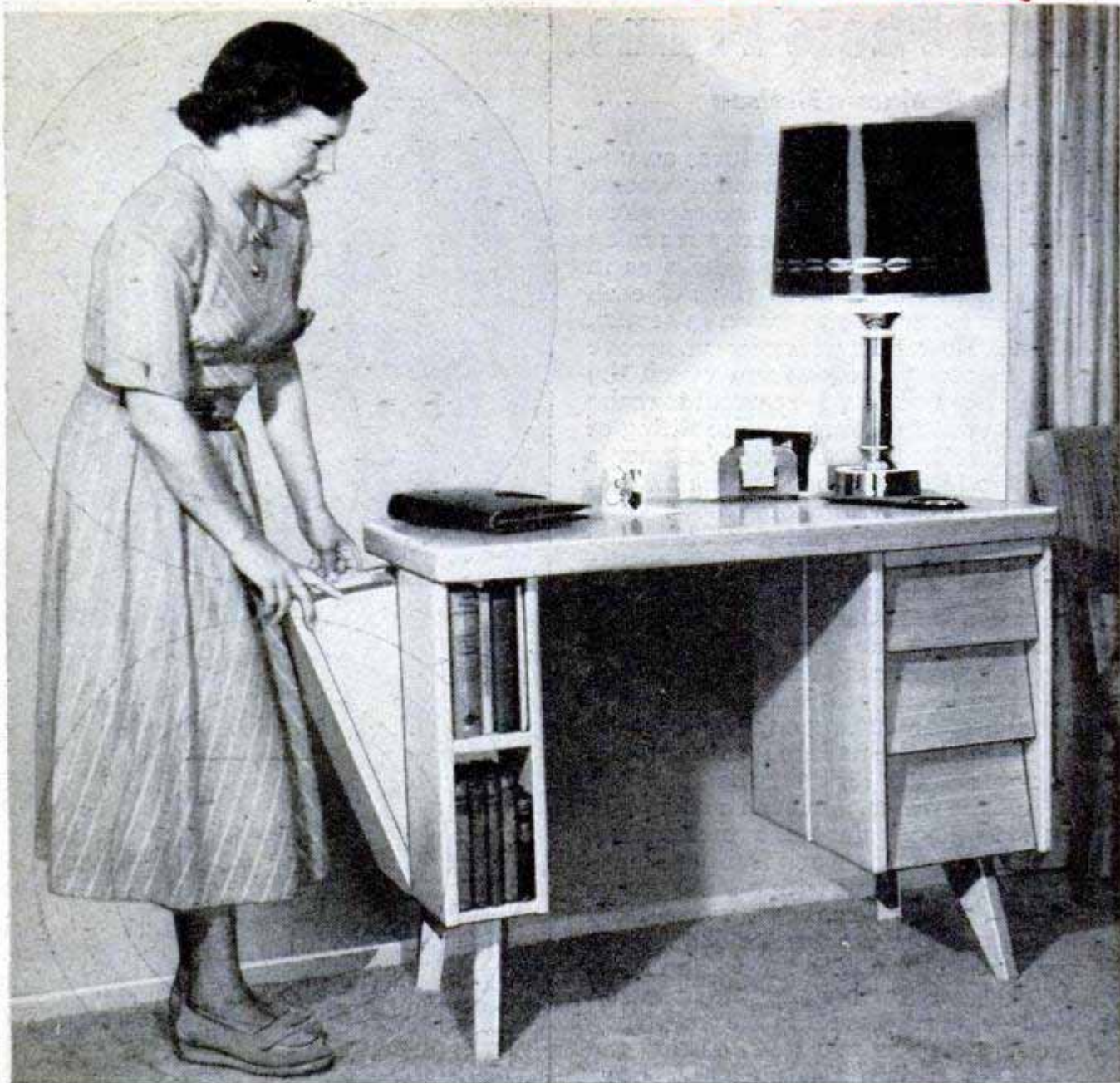
Use a dampened wad of cotton or tissue paper to wipe up fragments of glass.

# Inlaid Photo Frame

By Benjamin Nielsen

THIS turned photo frame features an unusual segment inlay of contrasting woods. First, turn a disk to the outside dimensions of the frame and face off. Next, turn inlay rings from walnut and maple disks as in Fig. 3. You will need three rings of each wood of the sectional size given in section A-A, Fig. 1. Now, turn a  $\frac{1}{16}$  x  $\frac{5}{32}$ -in. groove into the face of the disk from which the frame will be cut later. Be careful to make an exact layout to assure precise fitting of the inlay. Cut the inlay rings into segments and fit these into the groove in the pattern shown in Fig. 1 and the photo below. Glue the segments in place and face off after the glue is dry. Now, reverse the disk on the faceplate and recess the back so a small undercut can be made as in section A-A, Fig. 1. A suitable tool for undercutting the  $\frac{3}{8}$ -in. groove can be made from an old file. Bend a short length of the shank at a right angle and grind a cutting edge on the end. After running in the undercut to width and depth, reverse the disk on the faceplate and cut off the frame. Run the cut straight in but stop just before the tool breaks through. Remove the work from the faceplate and finish the cut with a sharp knife, then trim off any remaining waste from the inside edge of the frame. Now, drill the two holes indicated in the section A-A, Fig. 1. These are for hanging the frame on a small L-hook screwed into the wall. Turn the backing disk as in Fig. 2, cutting the rabbet as in section B-B. Sand off the shoulder as indicated by the dotted lines, split the disk and fit the sliding dowel and stop as shown in the lower detail. To assemble the frame and picture, cut a circular piece of glass to fit in the rabbet in the inner edge of the frame. Place the picture back of the glass, lay the backing over it and then force the two halves open so that the shouldered segments of the backing enter the undercut groove in the frame. A snug fit will keep the segments in place.





### By Robert Hoppough

**T**HIS MODERN DESK combines good design with several interesting and useful features that adapt it exclusively to home use. One pedestal provides ample drawer space and the other one consists of a small open-front bookcase and a built-in wastebasket. The latter is a feature of special decorative and practical value in small homes where space is limited. The construction of each pedestal is almost as simple as that of a box and, owing to the type of assembly, nearly all joints and fastenings are concealed. Begin construction by making the top first. The edges of the top are curved as in Fig. 2 and the first thing to do is rip out the edging strips from

striated, or "comb surfaced," plywood. Then lay off the length and the three widths of the top from a center line drawn directly on the sheet of plywood from which the top is to be cut. Now, lay out the curved edges, using the plywood edging strips to strike the arcs. Drive brads into the plywood just outside the ends of the 16 and 18-in. dimension lines of the layout. Place the ends of the edging strip against the projecting brads and draw the strip outward until the curvature is slightly past the end of the 20-in. dimension line, as in Fig. 2. Then strike the arc with a pencil point held against the inner edge of the strip. Do the same on the opposite edge of the top. Saw outside the layout lines along the curved sides and across the ends, and then true the edges with a plane to the layout lines. Note that the trim pieces on the ends are of  $\frac{3}{4}$ -in. striated plywood while those along the sides are only  $\frac{1}{4}$ -in. plywood. Note also that these parts overlap at the corners. Attach the endpieces

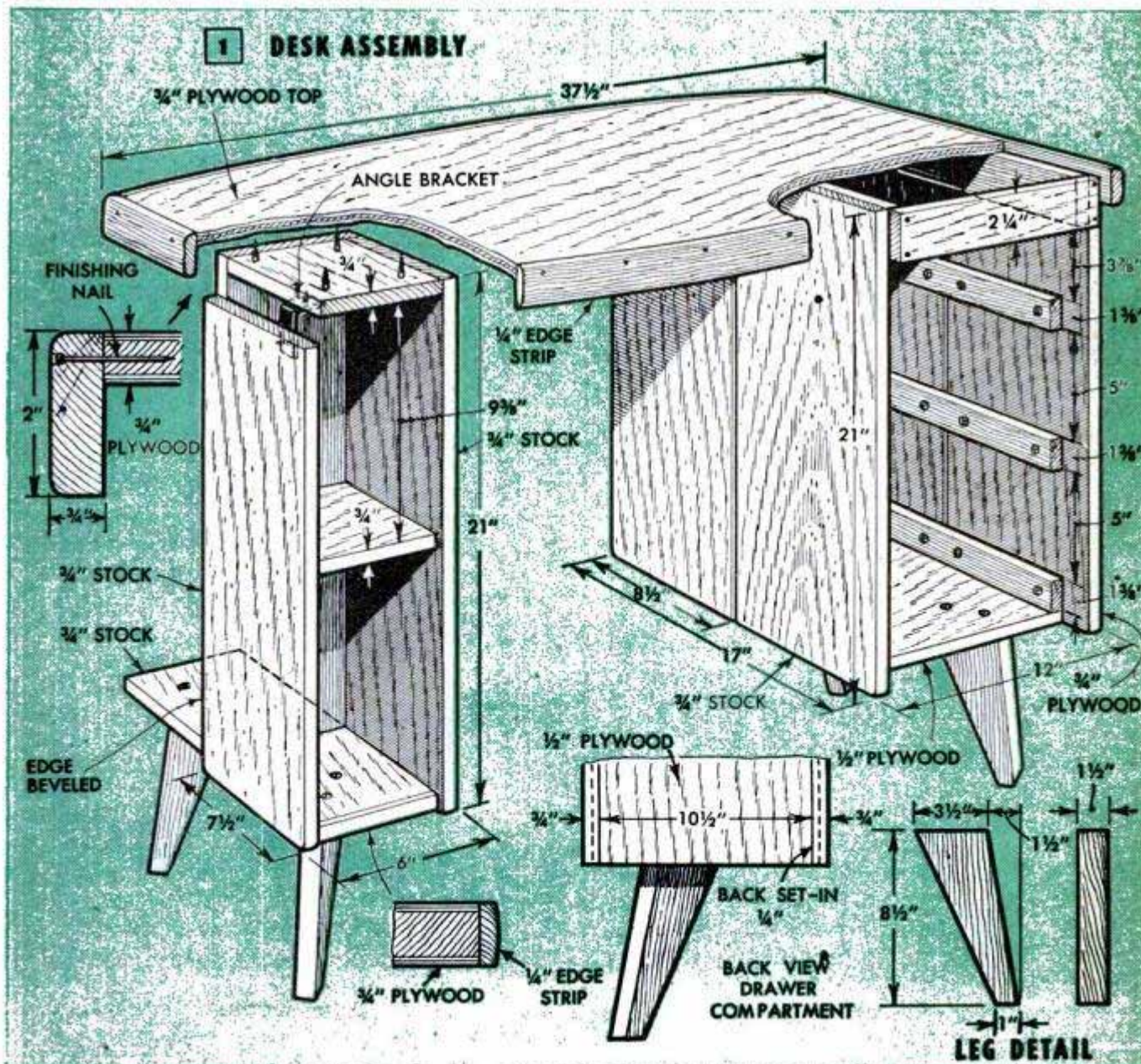


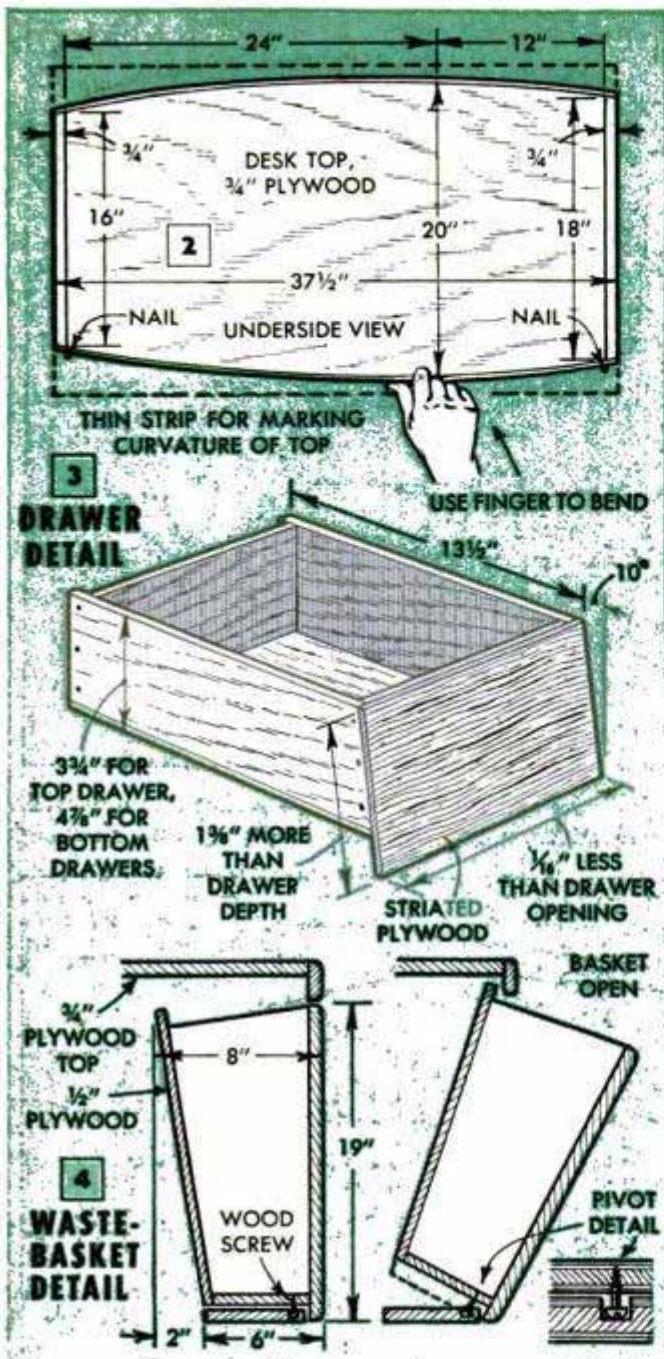
first, using glue and finishing nails. Set the nailheads below the surface and fill the holes with wood putty. Then bevel the projecting ends of each endpiece so that the thinner sidepieces fit neatly over them. Glue and nail the side strips in place. Then sand all exposed edges and round them slightly.

Both the drawer pedestal and the open bookcase are of simple box construction with butt joints fastened with glue and screws. The back panel of the drawer pedestal fits into  $\frac{1}{4}$ -in. grooves cut in the inner and outer side panels. Cleats are attached to both side panels with glue and screws to serve as braces and drawer runners. A  $\frac{1}{4}$ -in. groove about  $\frac{1}{8}$  in. deep divides the inner and outer panels vertically so that the effect is that of two separate panels on each side.



Back view of desk shows how built-in wastebasket tilts outward. It is easily removed from the desk for emptying and cleaning.





Drawer fronts of striated plywood are inclined at an angle of 10 deg., making rails unnecessary



Edges of the groove are rounded slightly before assembly of the parts. Another important design detail is the manner of attaching the top rail, Fig. 1. The ends of the rail are attached to cleats screwed to the side panels and the ends of these cleats come within  $\frac{3}{8}$  in. of the front edges of the side panels. Thus when the rail is screwed in place the corners project about  $\frac{3}{8}$  in. The corners are then rounded as in the photo below Fig. 4. No bottom rail is necessary because of the design of the drawers, Fig. 3.

Now, note the short outer panel which forms one side of the bookcase, Fig. 1. The outer edge of the panel is supported by an angle bracket and the corner is rounded. This also is a design detail as it gives the effect of separation which you will note in the photo above Fig. 1. This simple design motif is characteristic of modern furnishings of this type. Invert the top on a table or bench and attach the pedestal and bookcase with screws. Be careful to get the parts correctly positioned. Make and attach the four legs in the positions shown. Glue strips of matching wood to the front edges of the bookcase shelf and bottom.

Next, make the wastebasket to the dimensions given in Fig. 4, using  $\frac{1}{2}$ -in. plywood for the back and sides and  $\frac{3}{4}$ -in. plywood for the front. Round the edges of the front panel to match the corner contours of the outer bookcase panel. Note in Fig. 4 that the back of the wastebasket is extended so that it engages the edging strip across the end of the desk top when it is tipped forward. The basket pivots on the heads of screws which are driven about half their length into the bottom of the basket at points equally spaced from the

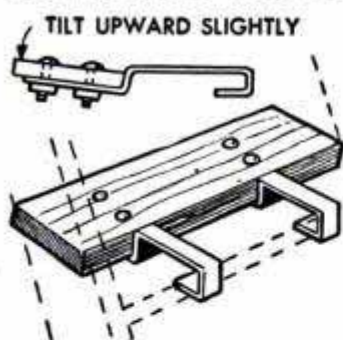
End view of the desk with wastebasket removed. End panels of basket and bookcase are shaped to match



front panel. Registering holes are drilled part way through the extended bottom of the bookcase as shown in the sectional view, Fig. 4. The basket is removed from the desk by simply tilting it forward about halfway, then raising it slightly and pulling out the bottom until the screwheads clear. Construction of the drawers is pretty well covered in Fig. 3. Note that the drawer fronts are of striated plywood and that the sides are fitted into rabbets cut in the ends of the frontpieces. The ends of the drawer sides are cut at an angle of 10 deg. Assemble with screws and glue and then sand all corners slightly rounded.

The type of finish applied depends on the kind of wood used. Fir plywood is the most inexpensive and is easily available, but oak, birch or maple-faced plywoods make the best job. Fir plywood can be given an attractive finish by first applying a white filler and immediately wiping the coating so the prominent grain of the wood shows through. Allow the filler to dry, sand lightly and follow with a sealer. Sand this when dry and finish with clear varnish or water-white lacquer. Maple or birch can be given the same treatment with good results. Oak can be finished in the same way, but will require careful sanding of the filler in order to high-light the grain. If a painted finish is desired, use fir plywood and apply the filler first. Sand lightly when dry and apply an enamel undercoater. Follow this with one or two coats of enamel in the color desired. Of course, only the flat surfaces can be sanded. Parts made from striated plywood are smoothed with steel wool.

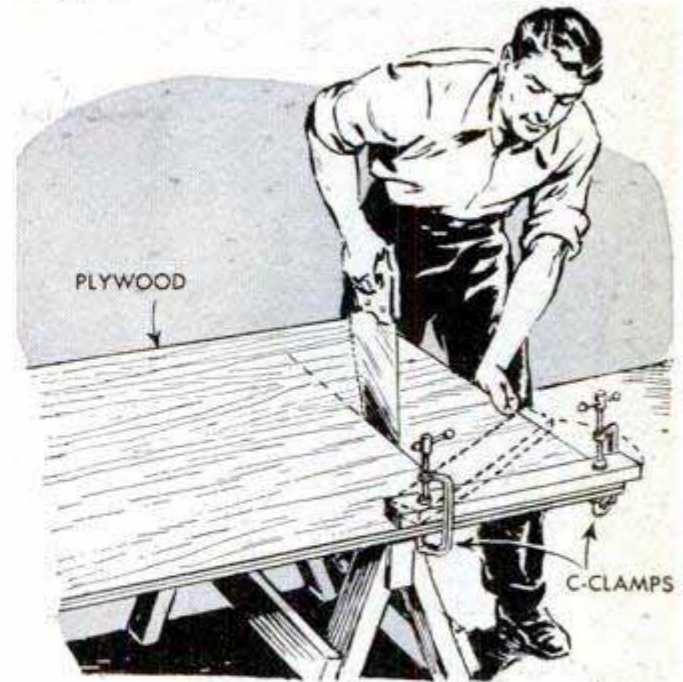
### Removable Toe Rest on Stepladder



When working from a stepladder for hours at a time, standing on the narrow step is less tiring if the step is fitted with a toe rest. The rest is simply a length of wood bolted to two flat-iron brackets which slip over the ladder step. The ends of the brackets are bent to engage the front edge of the step, permitting the rest to be moved from one step to another in a moment. Note that the portions of the brackets to which the toe rest is bolted are bent upward slightly to give better support.

☛ Particles left on the skin by adhesive tape can be removed by rubbing with acetone and rinsing with water. Use absorbent cotton to apply the acetone to the skin.

### Two C-Clamps and Scrap Board Support Plywood When Cutting



Cutting a piece off the overhanging end of a large plywood panel usually is an awkward task. Trying to hold the piece and saw at the same time usually results in the saw binding and the piece cracking off before the cut is completed. To overcome this, Herbert E. Fey of New Braunfels, Tex., supports the work in the manner illustrated. He first saws the panel for a distance of about 12 in. Then, using two C-clamps, he clamps a scrap board across the end of the unsupported piece, attaching one clamp to the plywood at the right side of the line and the other to the outer edge of the piece being cut. This keeps the end from dropping down. The sawing is continued to a point about 12 in. from the rear edge and then the board clamped across the edge is swung down, as indicated by the dotted lines, to give support to the work as the sawing is completed.

### Handle for "Hot Shot" Battery

Dry cells wired in series may be easily carried if you merely connect a metal screen-door handle to opposite poles on two of the dry cells. Fasten the handle to the terminals with the terminal nuts and wrap friction tape around the cells to hold them together. The handle doubles as a connector and a carrier.



Arthur Trauffer, Council Bluffs, Iowa.



## Weather Stripping for Garage Door Provided by Old Inner Tubes

Cold air, rain and snow are kept from blowing under swinging or sliding garage doors by tacking strips of inner-tube rubber to the lower edges of the doors. The strips are tacked on the outside so that they rub against the ground, thus providing an effective seal. If desired, additional strips may be fastened vertically to one of the doors so they cover the joint between the doors when the latter are closed.

## Painting Drawer Pulls



Several drawer pulls can be painted at the same time and without handling by first mounting them on a cardboard box. This permits the job to be done quickly and neatly as the box also serves as a drying rack. Attach the pulls to the box by passing the bolts from the inside through holes which have been punched in the cardboard.

Benj. Nielsen, Aurora, Neb.

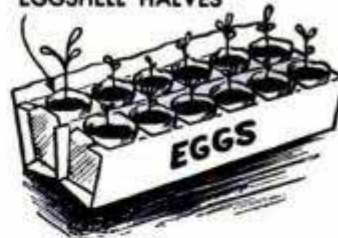
## Steam Iron Perfumes Garments

Linens, lingerie, dresses and the like, which often take on a slightly unpleasant odor when finished with a steam iron, can easily be given a delicate scent while ironing. Simply mix a few drops of perfume with the water before filling the iron. Mrs. Margaret A. Brokop, Alhambra, Calif.

## Flowerpots From Eggshells

To start seedlings, try using eggshell halves filled with loam as individual flowerpots. The shells can be stored in egg cartons and moved easily to

EGGSHELL HALVES

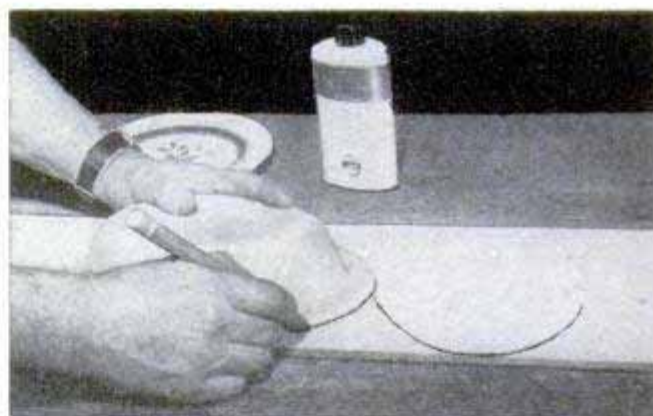


any sunny window sill. Later, the seedlings can be transplanted right in the shells as the roots will break through and will be supplied with fertilizer as the shell decomposes.—LeRoy J. Hebert, Lexington, Mass.

## Dishes Facilitate Layout Work

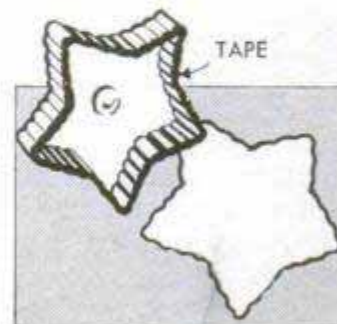
Kitchen utensils, dishes and ordinary cans readily available around the house provide suitable curves for quickly laying out repeat designs. These are particularly handy when marking a scalloped window valance or cornice board prior to sawing the decorative edge. Just experiment with dishes and cans of various sizes and shapes until the desired effect is attained.

Harrison Neustadt, Miami Beach, Fla.



## Cookie Cutters Transfer Designs

Standard designs such as stars and hearts are quickly transferred to paper or wood surfaces by using an ordinary cookie cutter to stamp them on the surface. Press a narrow strip of masking or friction tape tightly over the edge of the cutter all the way around and then ink the tape with a stamp pad. Press the cutter over the spot where you want the design and then fill in with the desired color. The cutters also come in handy to make a number of outlines for coloring by children.

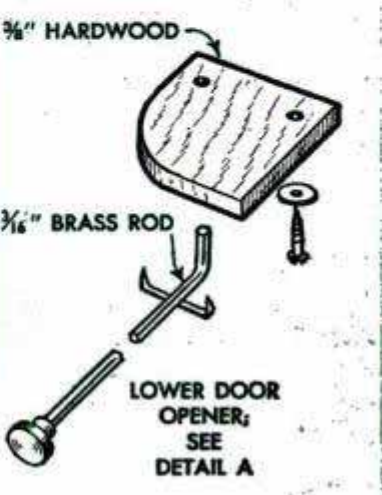
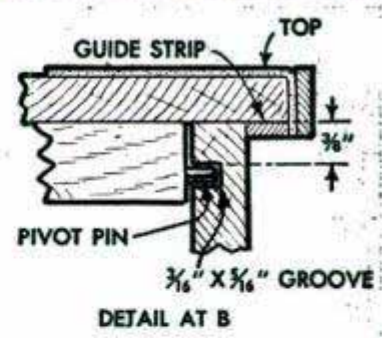
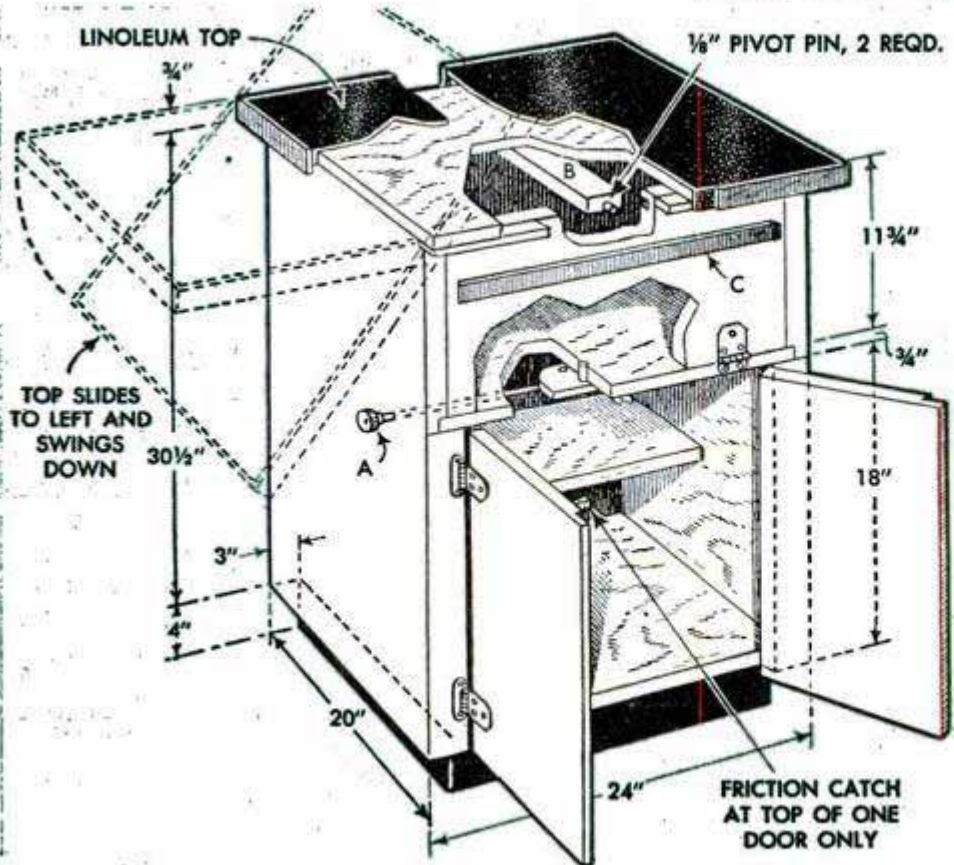
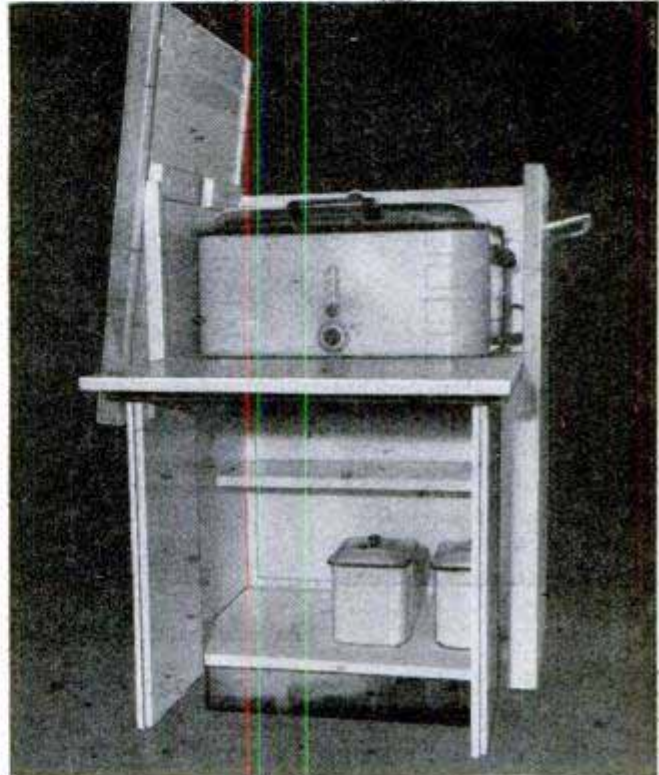


John J. Rea, Urbana, Ill.

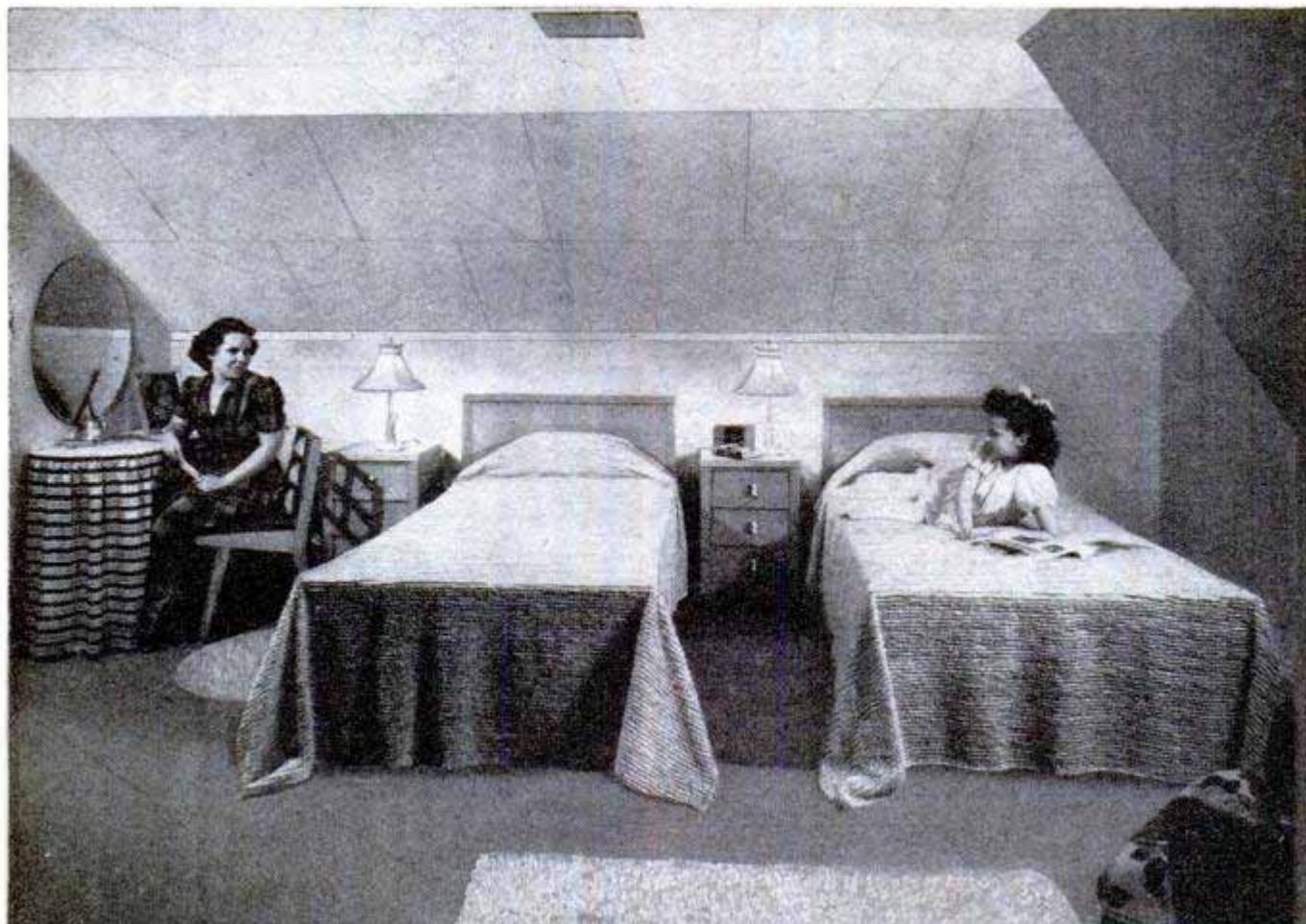
# Slide-Top ROASTER CABINET

By Richard L. Smith

SEVERAL unusual features adapt this roaster cabinet to use in small kitchens where space is limited. The pivoted top slides sidewise to open and tilts to a vertical position as pictured. This releases the hinged front panel which drops down on the open cabinet doors to form a service shelf. The lower doors are opened by pulling on a single knob which projects from the left side of the cabinet as in the detail A below. This operates the cam mechanism shown in the lower right-hand detail and pictured in position in the center detail. Detail B, upper right, shows how the sliding top is pivoted. The pivot pins slide in grooves cut in the back rail and the inner face of the front panel. Registering grooves also are cut in the front and back facing strips on the edge of the side panel. After the top has been pushed to the left as far as it will go, the pins enter these grooves and permit the top to swing to the vertical position, as in the photo. With the exception of the base, top and bottom rails at the back and the facing strips, all parts are made from plywood. Strip C serves as a spacer between the front panel and the top edges of the doors when the panel is dropped to the horizontal position.



# POINTERS ON REMODELING



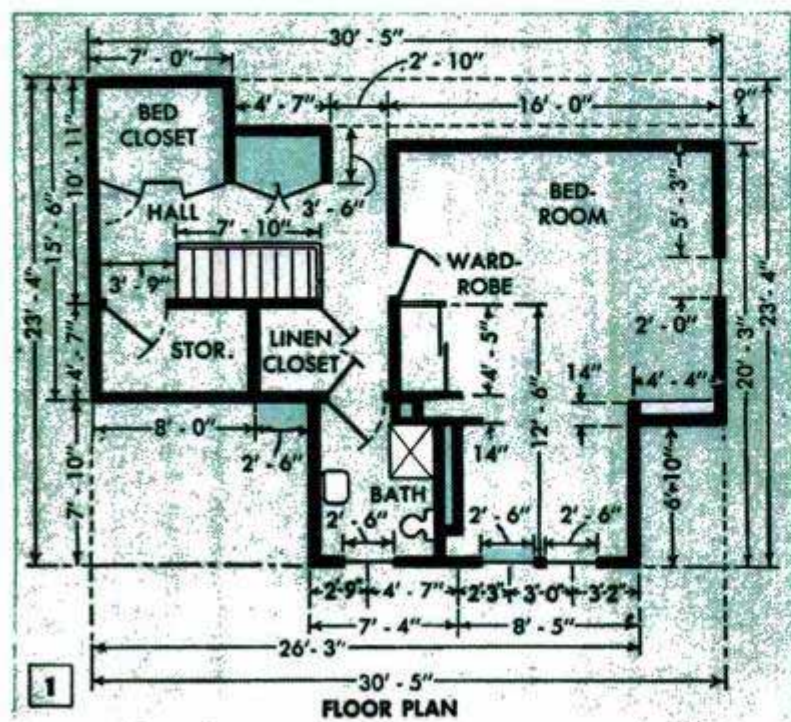
Article courtesy of Douglas Fir Plywood Association

**I**F YOU ARE crowded for space in your home, how about the attic? In most houses the attic can be converted into two large rooms that can be used as extra bedrooms with bath, or even one large recreation room. With new wall coverings which are available, particularly plywood, you

can do most of the work yourself. After the walls have been framed in, the job is half done because the big sheets of plywood build a solid wall quickly. After nailing in place, they are ready for finishing. Just how you proceed depends first on the type of attic that is to be remodeled,

whether it is long and rectangular under a low-pitched gable roof or whether it is more nearly square and the roof is high-pitched. Because of the limited height available in relation to the over-all size in the smaller home, it may be necessary to include the entire attic space along the length and slant a portion of the walls along one or both sides. The alternative is the installation of a Dutch-type dormer along one side, preferably across the back of the house. Fig. 1 shows a typical floor plan of an attic-remodeling job requiring the construction of a dormer. Figs. 3 and 4 detail the framing of this job and Fig. 2 is an exterior view of the finished dormer.

Unless one is familiar with the type of carpentry required in framing a dormer, it's a good idea

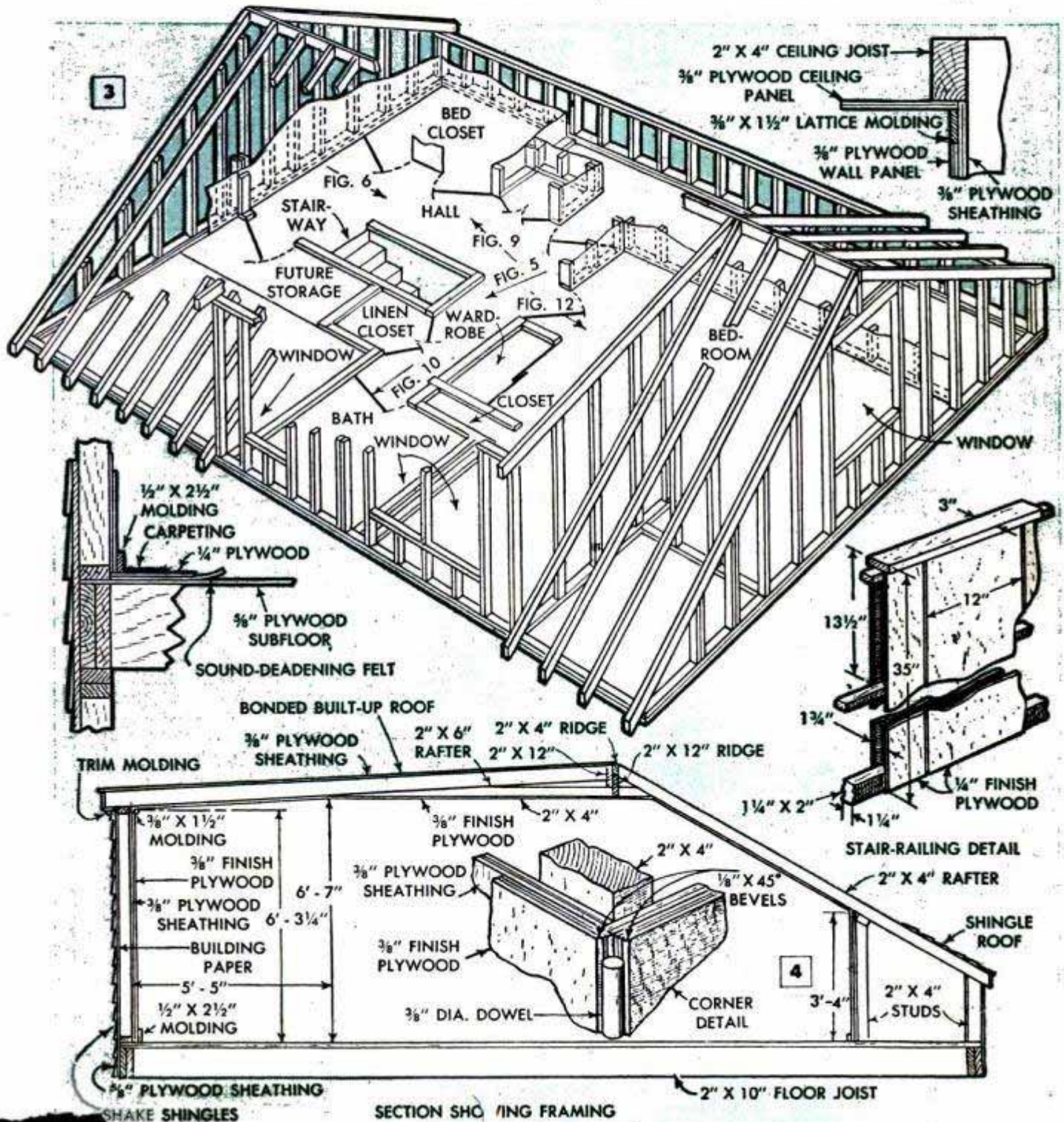


# AN ATTIC

to have this part of the job done by an experienced carpenter. As soon as the dormer is enclosed you can take over and finish the job. However, unless the attic is already completely floored, sub-flooring comes first, as the dormer sills are placed on top of the sub-floor. New subflooring should be of  $\frac{5}{8}$ -in. plywood. Then, after the dormer is framed, and all other wall studding is in place, the top floor is laid. Sound-deadening felt is placed between the top floor and the subfloor as in the left-hand

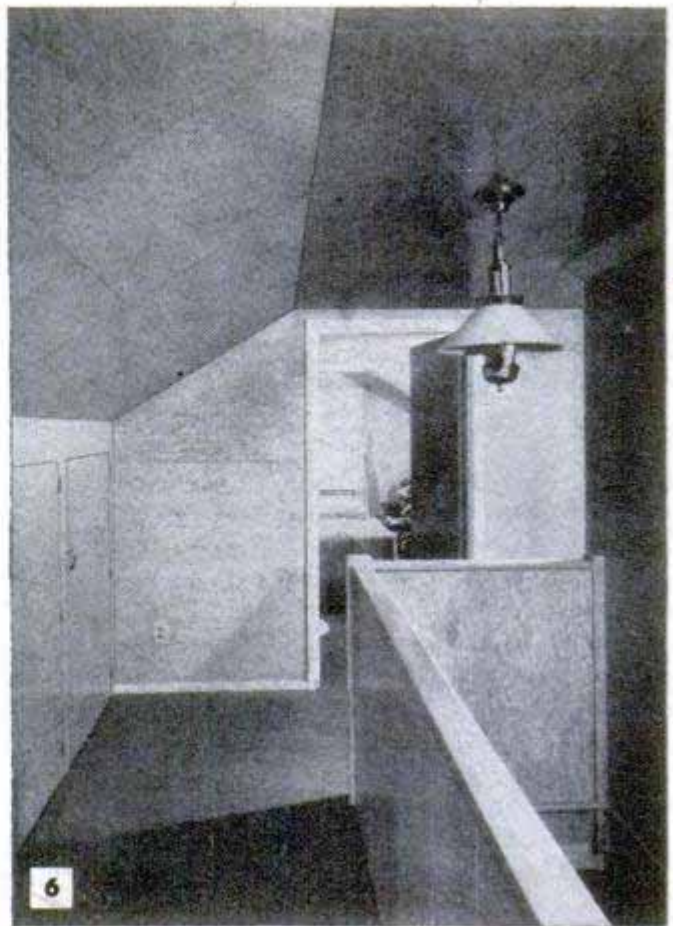


Here's how the finished dormer looks from the outside. Adding a dormer greatly increases the usable area of attic rooms under a low-pitched roof. Double windows admit light and air

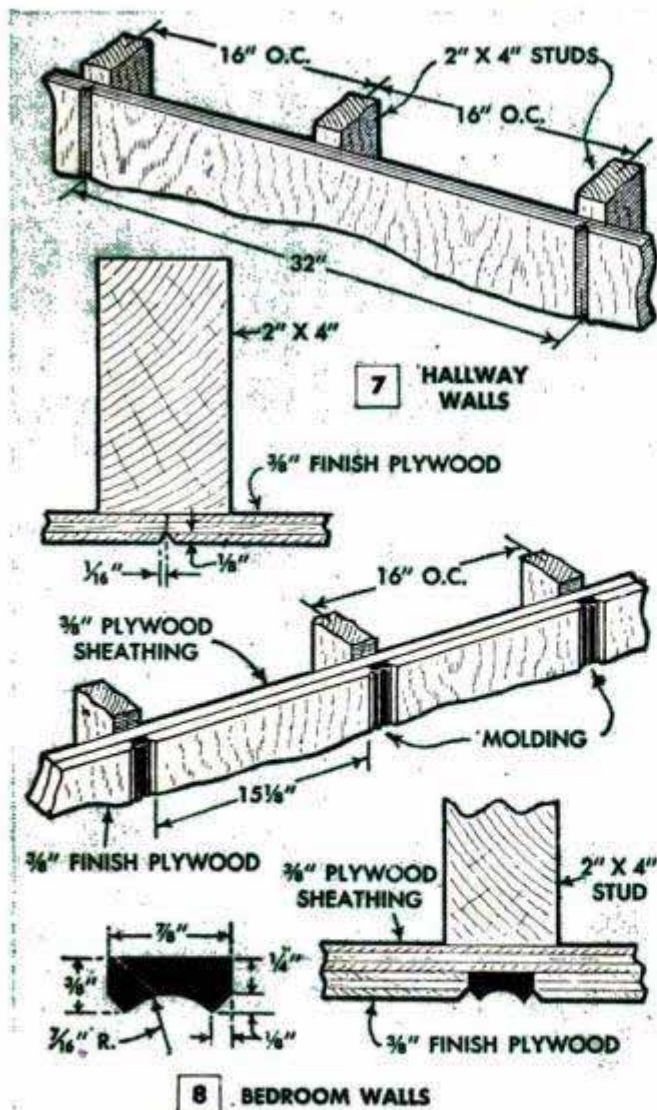




Ample linen storage is provided by closets opening onto hallway. Closets are fitted with plywood doors



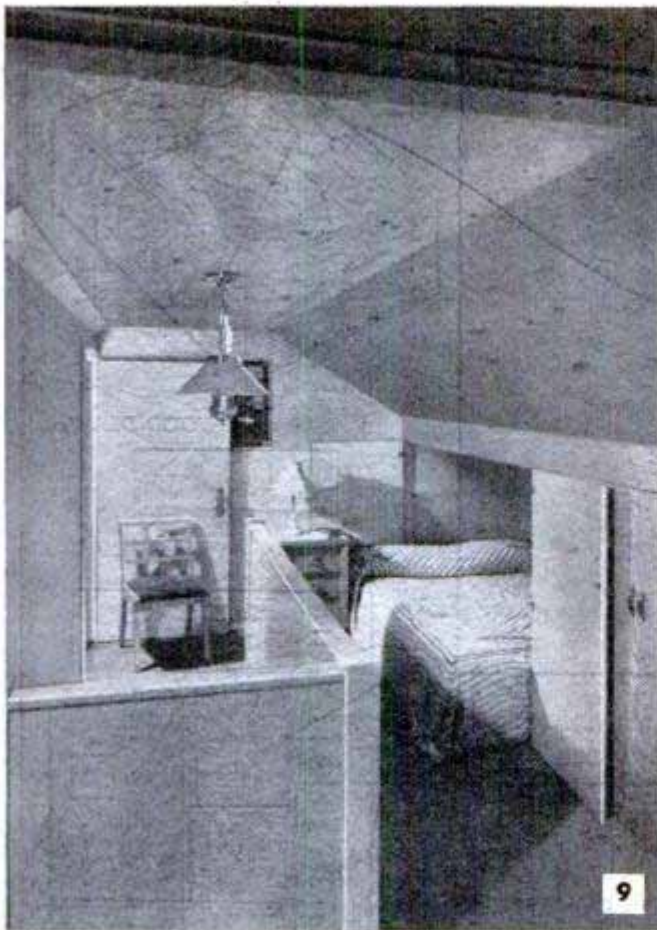
Hallway walls, ceilings and stair rail are finished in plywood paneling with horizontal grain on the walls



sectional detail, Fig. 3. With the dormer framed and the subfloor and top floor laid, you're ready to tackle the interior walls, cabinets and other fittings. Many homeowners now favor plywood ceilings and the material is available in 1/4-in. thickness and cut into pieces 20 x 32 in. and 32 x 32 in., especially for this purpose. The small panels are beveled on all four edges and are applied to rafters or ceiling joists with 4d finishing nails spaced 6 in. apart. The nailheads are set about 1/16 in. below the surface and the holes are filled with wood-putty compound. The joint pattern of the smaller ceiling panels can be anything that suits your fancy, but breaking the joints as in the photo above Fig. 1 simplifies the job somewhat and results in a very attractive ceiling. When applying the smaller panels to rafters on a sloping ceiling it probably will be necessary to add extra 2 x 4s or 2 x 6s to provide nailing strips under the plywood joints. Now, note the upper right-hand detail in Fig. 3. As a rule, where only one thickness of plywood is applied to walls and ceilings, it's the practice to put on the ceiling first. But in this case, a sheathing plywood is first nailed to the walls, then the ceiling is put on and, finally, the finish plywood is applied to the walls. The detail referred to shows how the corner joint is made.

Details in Figs. 7 and 8 show methods of applying finish plywood to walls. In





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Slide-away double bed at the head of the stair is enclosed by two plywood doors and removable panel

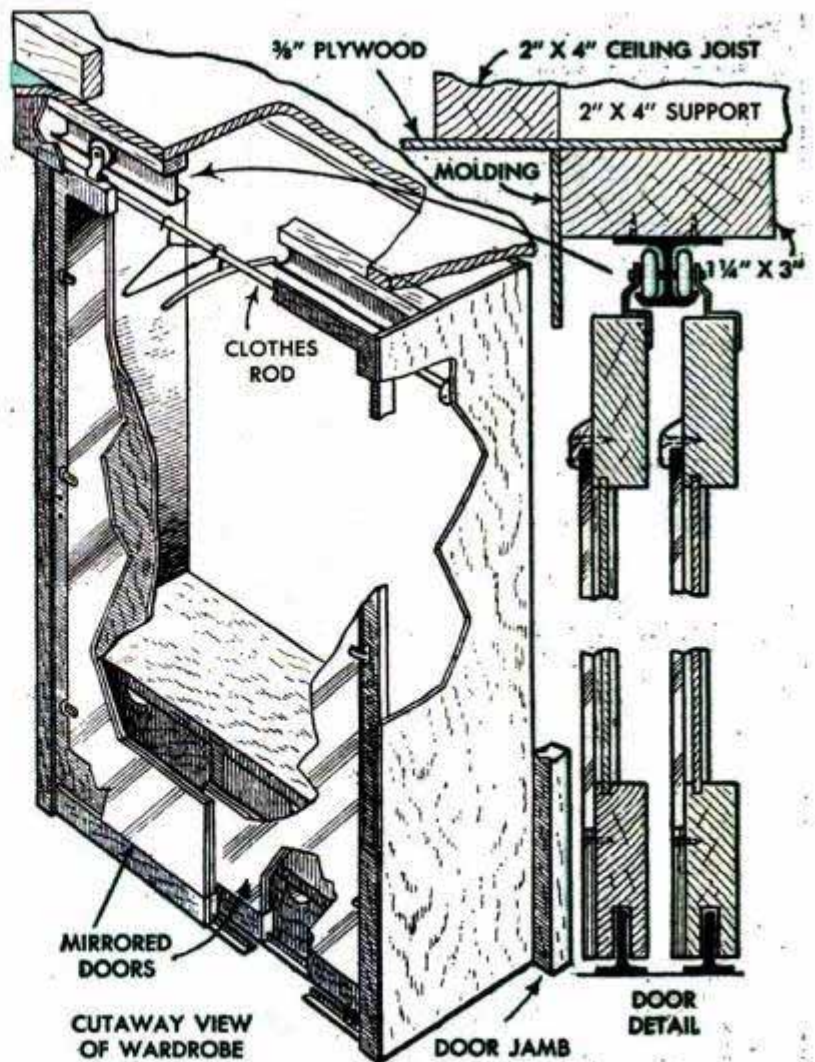


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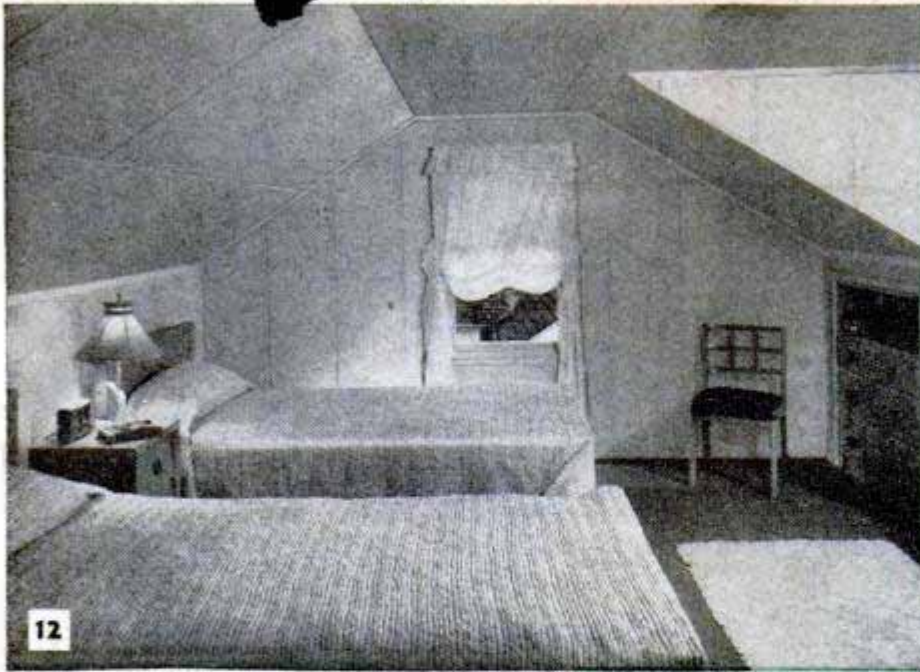
Bathroom has plywood walls and ceiling finished in gloss enamel. Note neat job on the plywood walls

7 the panels span three studs as in the upper detail. This type of panel is suitable for hallways and it can be installed with the grain running vertically, as shown, or with the grain running horizontally, whichever you prefer. Fig. 6 shows the large panels installed in a hallway with the grain of the wood running horizontally. In inside corners the panels are cut to meet in a tight lap joint, but on the outside corners the ends are cut to fit corner-to-corner and the vee is filled and rounded with a length of dowel as in the corner detail in Fig. 4. This detail, of course, shows sheathing plywood under the finish plywood but the procedure in either case is the same. The lower right-hand detail in Fig. 3 shows how to frame and cover a stair railing, or balustrade with plywood. Fig. 6 pictures the finished job. On a stair rail of this type the grain of the panels should always run vertically.

Built-ins in the hallway are two simple storage cabinets with doors of  $\frac{3}{4}$ -in. interior plywood, Fig. 5, and a slide-away double bed which is stored in a closet when not in use, Figs. 8 and 9. The bed closet is closed with two doors



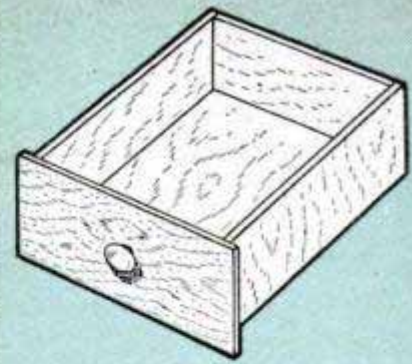
11 WARDROBE DETAILS



Here's a view of the finished bedroom with a built-in chest of drawers. Plywood can be finished natural or with enamel

of plywood and a removable panel shown in the plan, Fig. 1, and also in Fig. 3. This panel is fastened at the bottom by means of dowels driven into holes drilled in the end. The dowels project about  $\frac{1}{2}$  in., the ends entering registering holes drilled in a base strip when the panel is set in place. The panel is fastened at the top with two throw-type door bolts. Walls and ceiling of the bathroom, Fig. 10, are covered with  $\frac{3}{8}$ -in. plywood. On the ceiling the plywood is applied at right angles to the rafters and on the walls the panels are placed with the grain running horizontally. All panels are beveled at the edges.

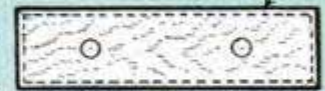
Because of the low ceilings, the paneling in attic bedrooms generally is applied vertically, using narrow panels and molding spacers as in Fig. 8. Note in the upper detail, Fig. 8, that the panels are only  $15\frac{1}{8}$  in. wide and that they are beveled only on two edges. At the top end the panels butt against a  $\frac{3}{8} \times 1\frac{1}{2}$ -in. lattice strip as in the upper right-hand detail in Fig. 3. Fasten the panels with 4d finishing nails spaced 6 in. apart. The bedroom wardrobe is built-in in addition to a closet, Figs. 1 and 3, and is fitted with sliding doors of plywood to which full-length mirrors are attached. Note that the doors are framed with rails and stiles as in the sectional detail, Fig. 11, which also shows the installation of the top and bottom door tracks. A low cabinet containing deep storage drawers is built into the wardrobe. The door to the bedroom closet is made from a single panel of  $1\frac{1}{8}$ -in. plywood. The bed-



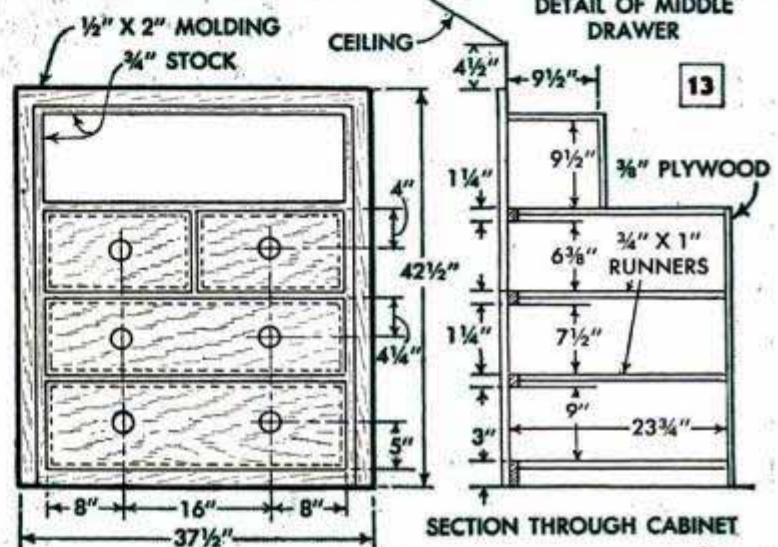
$\frac{3}{8}$ " PLYWOOD DRAWER



$\frac{5}{8}$ " PLYWOOD



DETAIL OF MIDDLE DRAWER

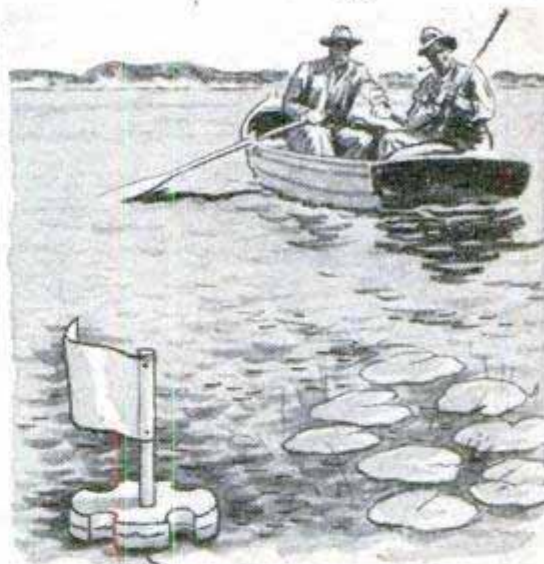
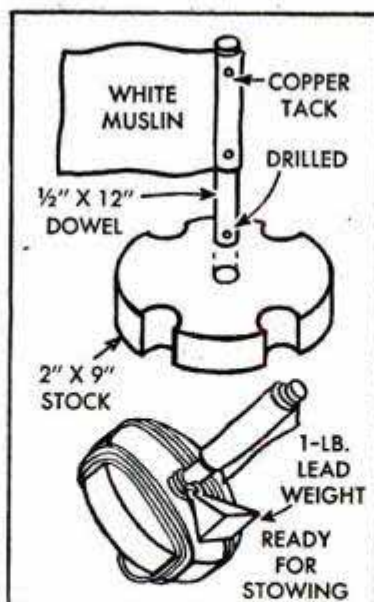


room door opening onto the hall also is made from the same material. The remodeling job finishes up with a built-in chest of drawers which is located on a low wall in a corner of the bedroom. The cabinet is detailed in Fig. 13 and shown in place in Fig. 12. The dimensions given on the chest are suited to the representative job pictured and described. They probably will have to be altered to suit variations.

Panels in the hall and bedroom were given a light natural finish. First, a coat of white resin sealer was applied and wiped to the desired grain show-through. This was then sanded lightly after drying. Next, a coat of shellac was applied and sanded lightly when dry. The job was finished with one coat of high-grade varnish of the non-rubbing type. The bathroom was finished with one coat of resin sealer, one coat of enamel undercoater and a third coat consisting of one half undercoater and one half white enamel. The final finish coat of white enamel was applied.

# Wooden Marker Buoy Locates Fishing Hole

Trying to bring your boat back over the spot where you were pulling in the big ones last time out is no cinch, especially if the check points on the shore are somewhat vague. To make sure that the fishing hole will be easy to find, carry along several small wooden marker buoys whenever you go out in the boat, and then set one of the buoys before leaving a good spot. The buoy consists of a length of dowel pressed into a hole drilled through the center of a wooden float. A white flag is tacked to the top of the dowel and a chalk line is tied to the lower end. The dowel should project below the underside of the float and this portion is drilled to permit tying



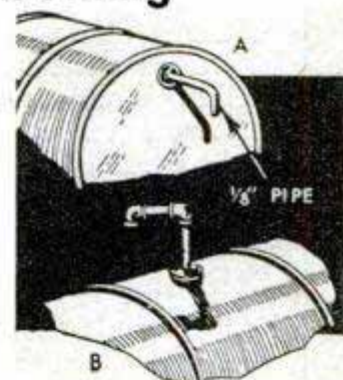
the line. A 1-lb. lead weight will hold the buoy in most lake water, and enough line should be carried to reach bottom even in the deepest parts of the lake.

Hi Sibley, Nuevo, Calif.

## Air-Lock in Fuel-Oil Drum Eliminated by Special Fitting

By fitting the bung of a fuel-oil drum with an air intake, air-lock is completely eliminated making it unnecessary to remove the bung each time fuel is dispensed. Drill and tap a hole through the center of the bung to receive a length of 1/8-in. pipe threaded at one end. If the bung is in the end of the drum, bend the pipe to an L-shape, as in detail A, or thread the pipe and fit it with an elbow. Should the bung be on the side of the drum, bend the pipe to

an inverted U-shape or use two elbows and a nipple as shown in detail B. This will keep rain water from entering the drum through the air intake.—Jerry Pokorny, Kewanawana, Ind.

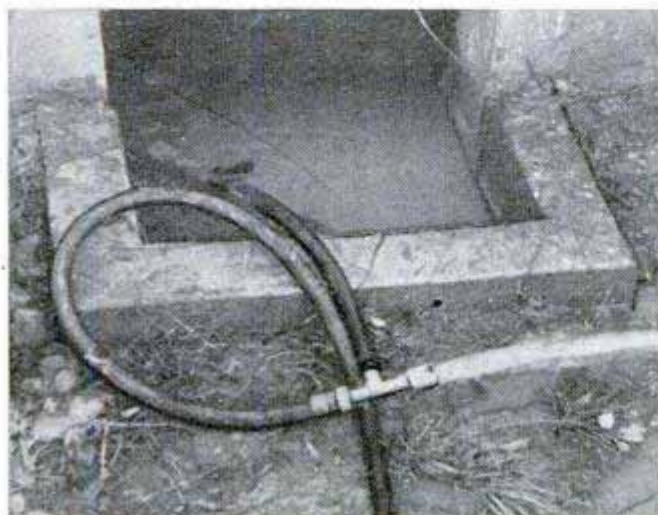


## Pressure-Type Siphon Connected to Sill Cock Drains Flooded Basement

If water pressure is available, it is easy to drain water from a flooded basement. Connect a pressure siphon of the type used on low-priced washing machines to a length

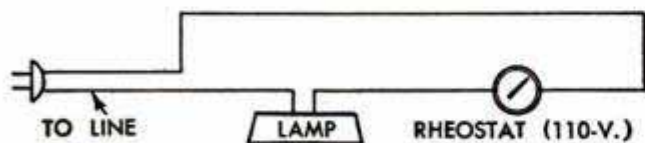
of hose. Place the other end of the hose in the flooded basement. Then attach the garden hose to the siphon and connect it to the sill cock. To prime the siphon, turn on the water and plug the siphon outlet with your finger until the length of hose running from the basement fills with water. When the siphon is working properly, a heavy loose stream of water will flow from the outlet. A solid, thin stream indicates that the siphon is not operating. It is necessary, of course, to keep debris from plugging the siphon intake hose.

Clinton R. Hull, Costa Mesa, Calif.



Gold-plated belt buckles and other jewelry can be kept from tarnishing for a period of several weeks by coating the surface of the metal with colorless fingernail polish. The polish will not harm the finish and will protect it from scratches.

## Rheostat Controls Bed Lamp



If one of the occupants of a double bed prefers to read while the other wants to sleep, a rheostat wired into the bed-lamp circuit can be used to soften the light. In this way, adequate light for reading may be had without disturbing the sleeper. The rheostat allows the lamp to be used at its full brilliance or turned down to the point where it will just cast a soft glow similar to a night light.

## Preparing Outboard Motor For Winter Storage

When preparing an outboard motor for winter storage, these few necessary steps are important to make sure that the engine will be in top operating condition for that early spring fishing trip. The first step is a thorough cleaning with a cloth dampened with a little motor fuel. This will reveal any minor exterior defects in the motor and simplify the succeeding operations. Completely drain the water jacket, as severe damage to the motor is likely to result if the water freezes. Many motors have a drain plug on the lower unit, and this should be removed as well as the vent and grease plugs. To expel all the water, including any that may have worked into the gear case, rock the flywheel back and forth a few times and turn the motor from side to side. Fresh grease in the gear case will protect all working parts in the lower unit from corrosion and also will expel the last of any water which has collected there. Use the grade of grease recommended by the motor manufacturer. At this time, inspect all parts of the motor and gear case carefully, and have any necessary repair

work completed before storing the motor. The fuel tank should be drained and rinsed with a little fuel mixture to eliminate formation of any gummy deposits. Fuel lines can be disconnected and blown out to free them from sediment. Be sure to clean the sediment bowl. The carburetor requires draining and the fuel screen cleaning with compressed air. When replacing the parts, use only a wrench on fuel-line fittings, as pliers will deeply burr the soft metal. Cover the vent in the fuel-tank cap with adhesive tape. To protect the interior of the motor from corrosion, remove the spark plugs and place about two table-spoonfuls of oil in each cylinder. Then ground the spark-plug wires on any part of the motor and turn the flywheel slowly several times. This will coat the piston and cylinder walls with oil. Put the spark plugs back in the motor to keep dampness out of the cylinders. After this has been done, wipe the entire motor with an oily cloth. Store the motor in an upright position and in a dry place.

## Clothes Stored in Shopping Bags Are Suspended From Rafters

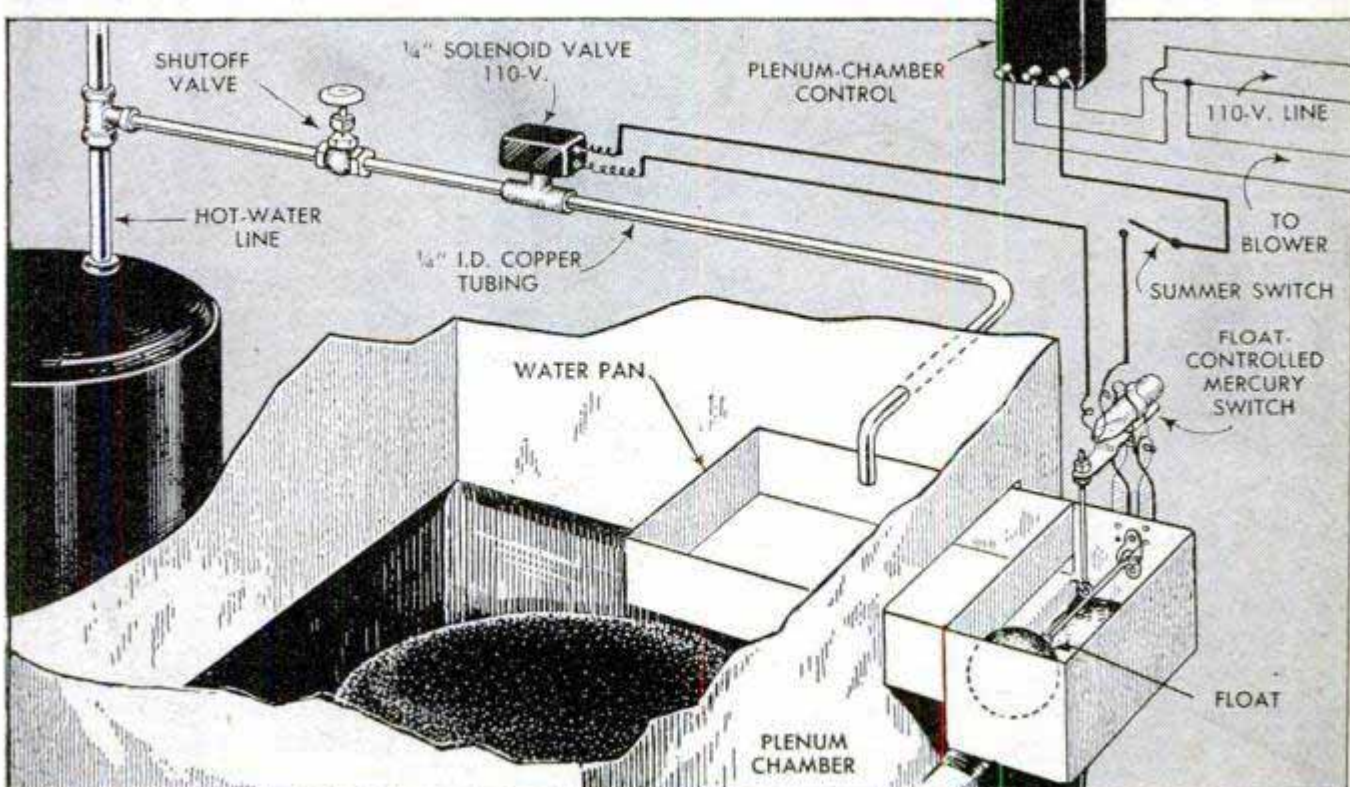
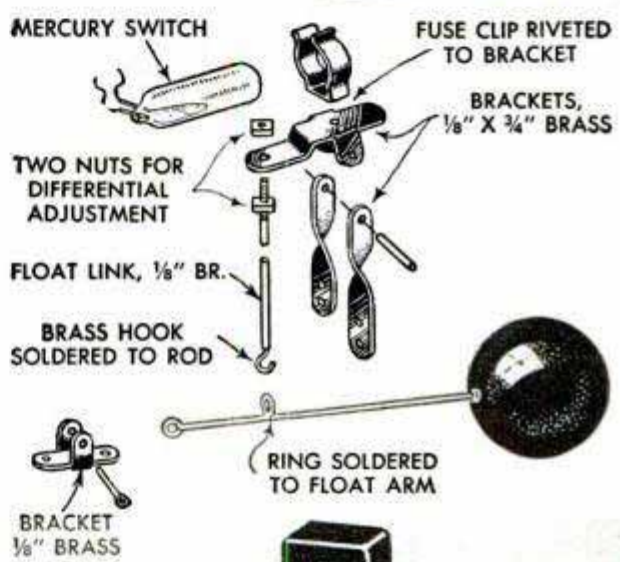
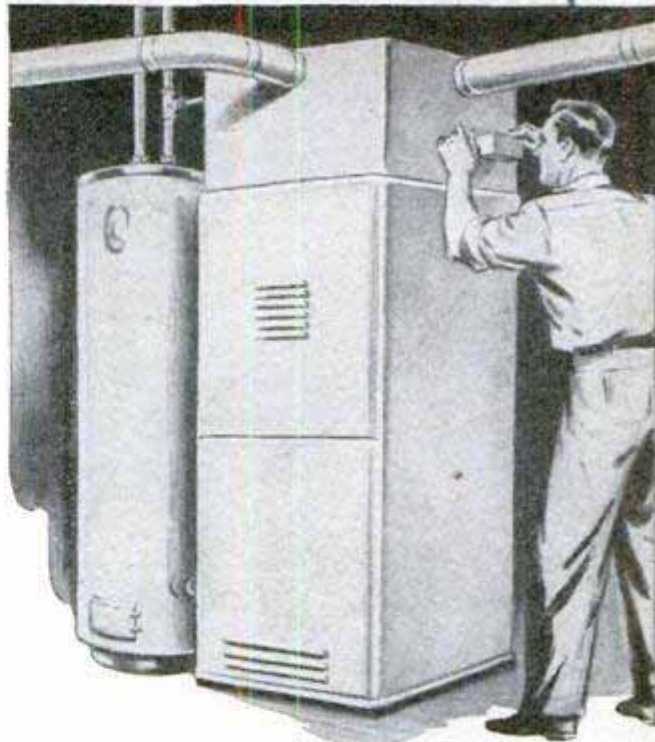
Storing old clothes in the attic is done neatly by placing each type of article in an individual shopping bag and hanging the bag from a rafter or stud. This keeps the floor clear to facilitate cleaning and allows use of available space to the best advantage. Label the bags to indicate the contents and hang them from nails driven at convenient intervals. After placing a sheet of newspaper or wrapping paper over the contents of the bag to protect them from dust, hang the bag by interlocking the handles. This is done by passing one loop through the other before slipping it over the nail.—Paul Will, Chicago.



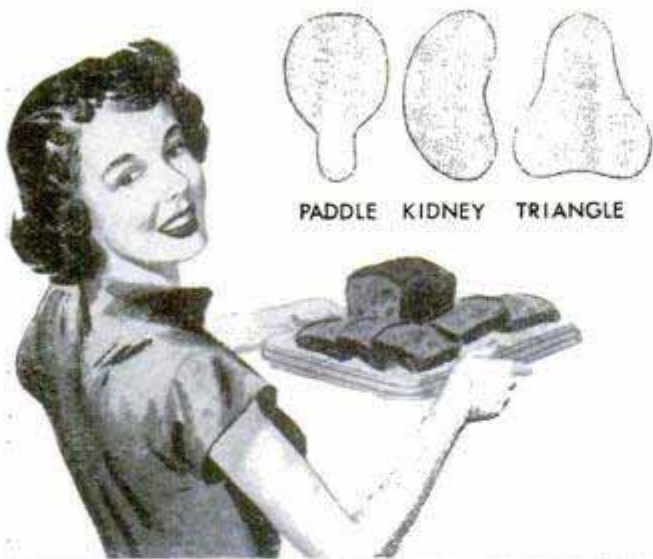
# ELECTRIC CONTROL FOR HUMIDIFIER

By R. Boettinger

FLOAT CONTROLS on furnace humidifiers that depend solely on evaporation of water to actuate the float-controlled valve often give trouble because of sediment collecting in the valve. Since the water in the humidifier pan, or tank, evaporates slowly, the valve generally is slightly open for long periods of time, permitting water to drip. Because of this condition, sediment and lime deposits build up on the valve seat, preventing complete closure. This sometimes results in flooding. To solve this problem one homeowner designed and built the all-electric control detailed below. Power to operate the solenoid valve is taken off the blower control box by connecting leads to the terminals in the manner shown. The advantage of this type of control is that it can function only when the heating unit is in operation. Lowering of the water level in the pan closes the circuit through the mercury switch and opens the solenoid valve, permitting water to flow into the evaporating pan from the hot-water heater. When the float rises sufficiently to open the mercury switch, the solenoid valve closes tightly. This cycle continues as long as water is required in the evaporating pan. Note that the solenoid-valve circuit is provided with a summer switch, which also serves as an emergency switch should it be necessary to adjust the float mechanism.



## Attractive Serving Boards Are Fashioned From Hardwood Scraps



Scraps of hardwood that you may have in your basement will provide all the raw material necessary for several cutting boards of attractive design. They can be turned on the lathe or cut into any of various patterns, such as pear and kidney shapes, or in rectangles, triangles and squares. Sand the board smooth and finish in a natural color, applying two or three coats of clear shellac. Use the underside of the board for slicing, mincing and chopping, and the finished top for serving.

Norbert Engels, South Bend, Ind.



## Funnel Forms Nontip Candleholder

When power fails and a candle must be used to make emergency repairs, an old metal funnel is just the thing to use for a candleholder that will not tip over. The candle is pressed into the end of the funnel spout, the bottom of the candle being tapered slightly with a knife if it is too large to fit in the opening.

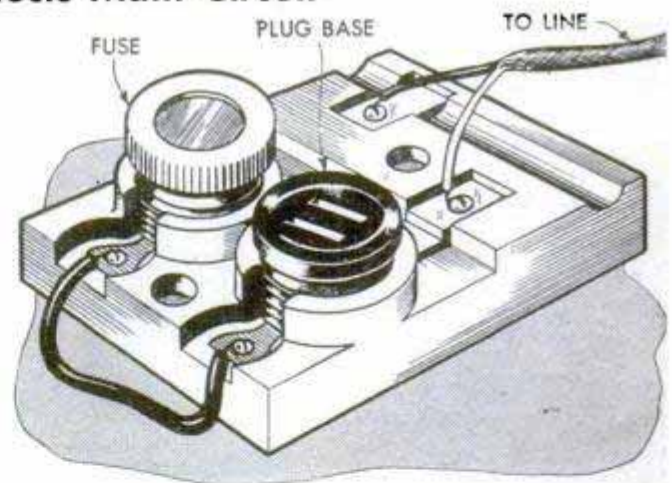
T. P. Ilari, Louisville, Ky.



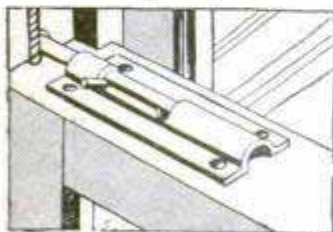
## Auxiliary Fuse Block for Testing Protects Main Circuit

There is no danger of blowing the main fuse if electrical equipment is tested by plugging it into this auxiliary fuse block. The setup consists of a one-branch, two-wire entrance fitting, the two outlets being wired in series, and an extension to the line connected to the terminals as shown. A fuse of less capacity than the one in the main line is inserted in one of the outlets and a plug base is turned in the other outlet. If the appliance being tested is defective, the auxiliary fuse only will blow and it can be replaced in a moment.

Edward A. Mendyk, Chicago.



## Partially Open Window Securely Locked With Door Bolt



To keep your window partially open during warm nights without fear of burglars, use this simple but sturdy lock made from a hook and

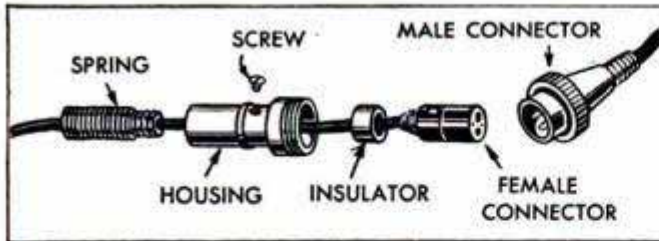
eye and a barrel-type door bolt. Secure the upper sash to the top of the window frame with the hook and eye and fasten the bolt to the top of the lower sash. Then drill a

hole for the bolt pin in the sash channel, locating it about 8 in. above the top of the lower sash when the latter is in the closed position. Press a short length of tubing into the hole to improve the action of the bolt and also to keep from wearing away the wood by the end of the bolt.

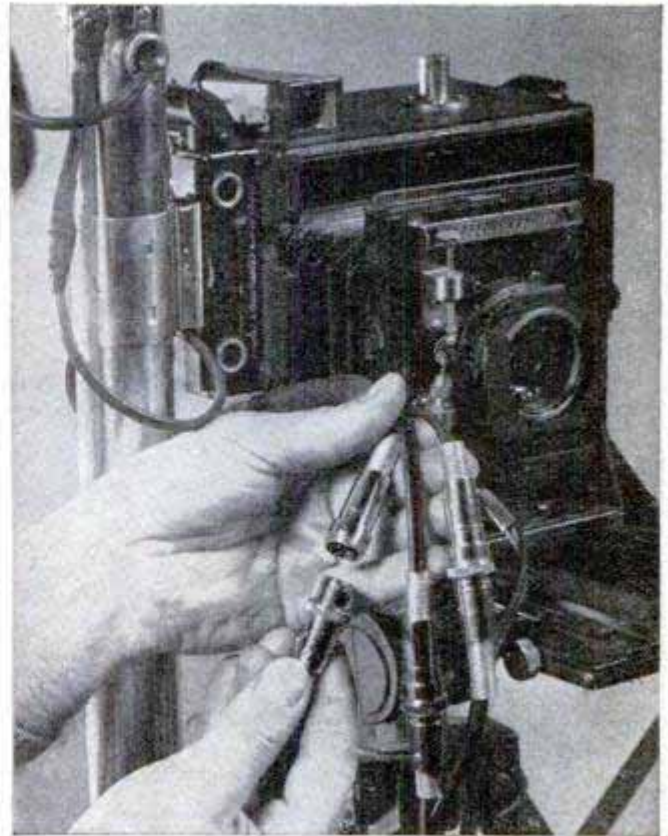
Floyd V. Bookout, Kansas City, Mo.

☞ The problem of a sweating bathroom flush box can be solved by covering it with a slip cover of terry cloth or toweling.

# Positive Connectors for Multiple Flash Units



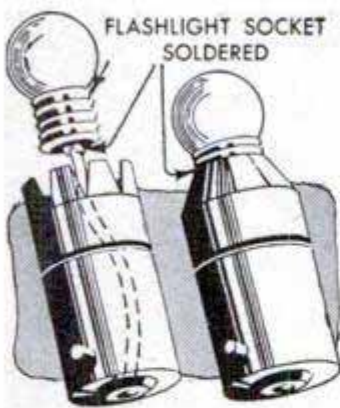
Professional photographers and others who shoot pictures in difficult settings with multiple flash equipment often experience trouble with poor electrical contacts in the wiring harness used with synchronous flash units. This usually is due to breakage of plugs or bending of the copper contact strips. Also the weight of the cords frequently causes worn contacts to pull apart easily. Positive electrical connections that do not pull apart or wear rapidly can be maintained by using Series 80 double-pole connectors of the type used on micro-phones. As shown in the detail above and also in the photo at the right, the male and female sections of this connector are held together by a screw collar. Three jack sections are connected to one cord for three side-light extensions from the gun, or two side-light extensions and a solenoid tripper. The plug sections are attached to one end of each light cord and the shutter trip cords. In this way, all the "hot" lines are permanently attached to the gun and need never be removed. Taping the cords at the point where they are attached to the gun and also at the bottom of the gun will prevent the cords from pulling out. This pre-



caution also will prevent the cords from pulling in front of the lens when shooting from a high position. The extra lengths on the tripper cords resulting from this type of hookup permit the photographer to remove the gun from the camera and shoot the flash high off the camera when it is necessary to avoid flat-lighting the subject.

Frank P. Fritz, Bensenville, Ill.

## Battery of Flash Gun Tested With Bayonet-Base Bulb



You won't waste film as a result of battery failure of your miniature flash gun if you test the battery with this bayonet-base test lamp. After breaking away the glass and cement from an auto taillight bulb, cut notches

around the top of the base. Melt or drill a hole through the contact in the center of the base and insert a short length of insulated wire through the base, soldering the end in this hole. Then solder the other end of the wire to the center contact of a flashlight-bulb receptacle, being careful not to damage the insulation around either of the contacts or to short-circuit them with the solder. Crimp the notched end of

the taillight base around the flashlight receptacle and solder the joint. Turn a flashlight bulb of the correct size for your flash gun into the receptacle and insert the test lamp in the gun. If the battery is in good shape, the bulb will light.

## Keeping Developer Solutions Fresh

If kept in partly filled bottles, developer solution soon loses its strength. However, your solutions can be kept fresh for several months by storing them in completely filled bottles which are tightly capped. Use 12-oz. beverage bottles for print developer and 1-qt. bottles for film developer. The corks can be made airtight by dipping them in melted paraffin before pressing into the bottles.

☞ When a kitchen serves as a darkroom, easily cleaned sheet plastic protects furniture from scratches and chemical stains.



*Elaborate or Simple*



## YOU'RE MISSING HALF THE FUN

**I**F YOUR PART in making a snapshot ends with the clicking of the shutter, you're missing the biggest thrill of this fascinating hobby—processing your own photos. There's a definite feeling of excitement at catching the first glimpse of a newly developed roll of film as it comes from the fixing bath. And, it's fascinating, too, to watch a picture suddenly spring into being from a blank sheet of paper. There's nothing really difficult about processing photos, anyone can do it, and in almost every home there is space somewhere for you to set up shop and really enjoy the hobby.

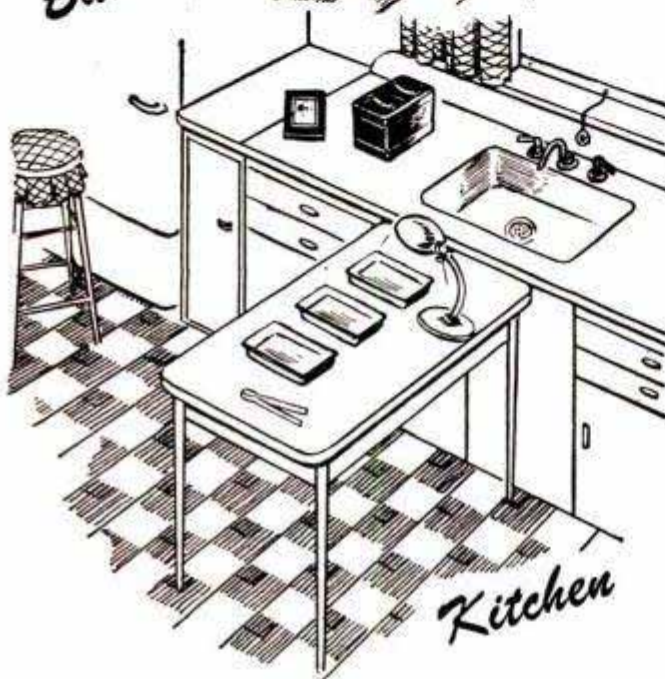
If you can't find permanent quarters, there are a number of temporary spots that can be used. For a short session of developing and printing you could simply take over the kitchen for a few hours, or you might very easily set up your trays and chemicals in the bathroom, or in some little-used closet, using a simple darkroom kit. Of these possible locations, the kitchen is wonderfully convenient for temporary quarters. Water and electricity are handy and usually there is plenty of working space for your trays and equipment. It is

No great outlay of cash is required to get started. You can begin with an inexpensive kit like the one above which includes all the basic items needed. In time you can graduate to a more elaborate darkroom

required, of course, that the room be made lighttight. This is especially important with film because it is much more sensitive to light than printing paper. Some fans utilize roll-film developing tanks which, after being loaded in darkness, can be processed in full daylight. The tank can be loaded in a small closet which is easy to darken, and then all subsequent operations can be carried out in some convenient spot like the kitchen sink without further darkening. With printing paper, you don't have to be quite so careful about extraneous light, and a brighter darkroom working light can be used without fear of fogging your work.

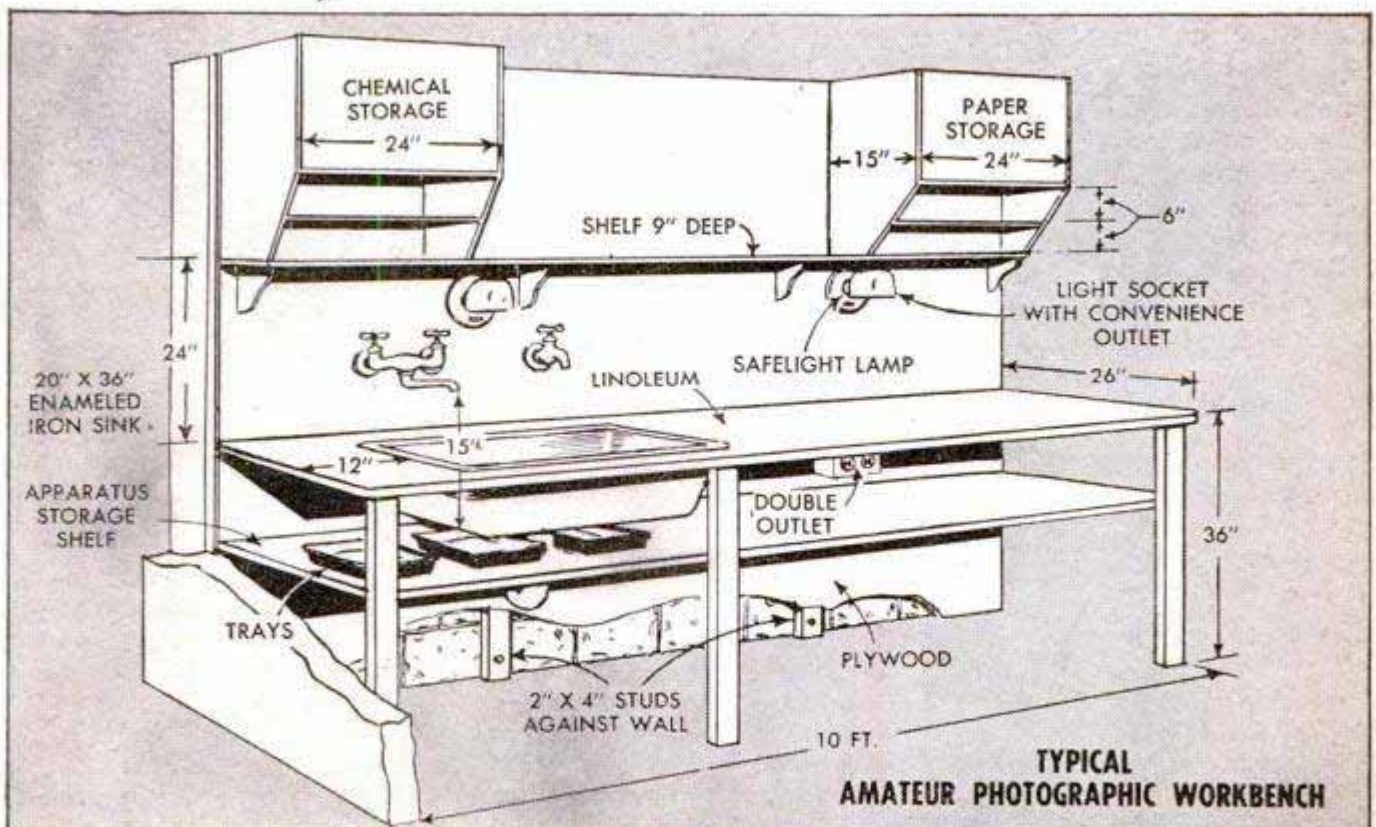
If you are interested in setting up quarters of a more permanent nature, possibly you can take possession of a closet seldom used. It may mean that you will have to



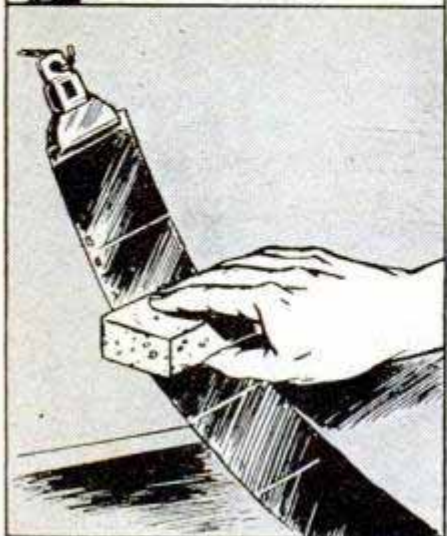
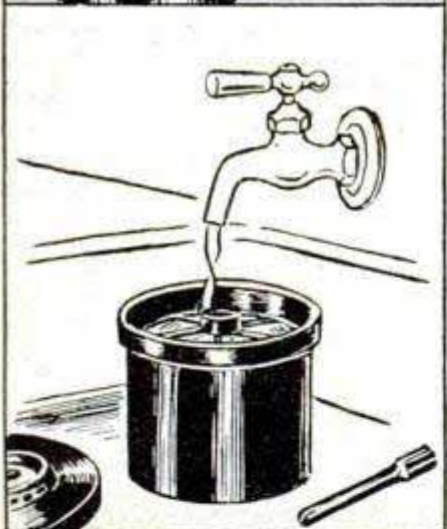


Tray development of roll film proceeds in a left-to-right sequence. In each case, the film is developed, rinsed and fixed by dipping it with a seesaw motion

carry in a water supply each time and run a few extension cords to get electricity, but these are minor inconveniences. Fundamentally, you will require two working areas. One shelf should be installed about 36 in. from the floor to hold trays. Another one, at the same height and a little wider, will hold the contact printer and enlarger and furnish additional working space. A



## DEVELOPING



◆ A roll-film tank makes developing a matter of time and temperature. Once film is loaded in tank, it is not touched again until ready for drying. Except for loading, all operations may be done in daylight which makes it ideal when a closet is used

Printing can be done with either a contact printer or a printing frame. As printing paper is sensitive only to blue and white light, you can work with a fairly bright orange safelight. Place the negative on the printer dull side up and the paper on top

◆ Time and temperature are very important, so follow directions that come with the developer. Mix enough chemicals to fill the tank completely and pour it in the filler hole. Then insert the agitator rod and twirl the reel a few times during development

Exposure is timed with a clock ◆ having a second hand. Try an interval of five seconds, the first time, then vary it, if necessary, to obtain the correct exposure. After a few seconds in developer, image will begin to appear and develop fully in 60 seconds

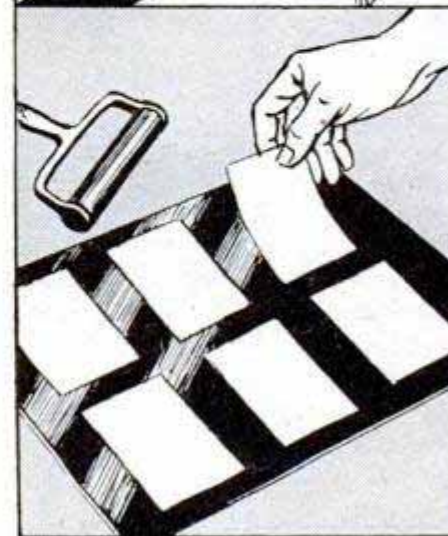
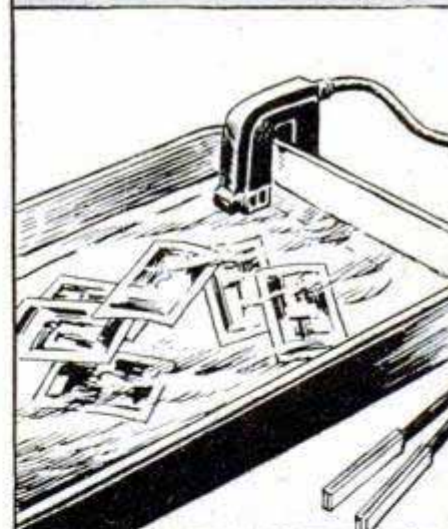
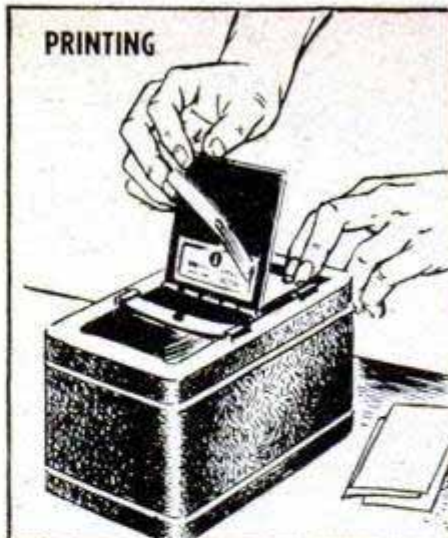
◆ Time the period accurately and then pour off the developer, flush with clear water and add fixative (hypo). After 15 min., pour off hypo and wash. Washing is done right in the tank, setting it under a running faucet for approximately a half hour

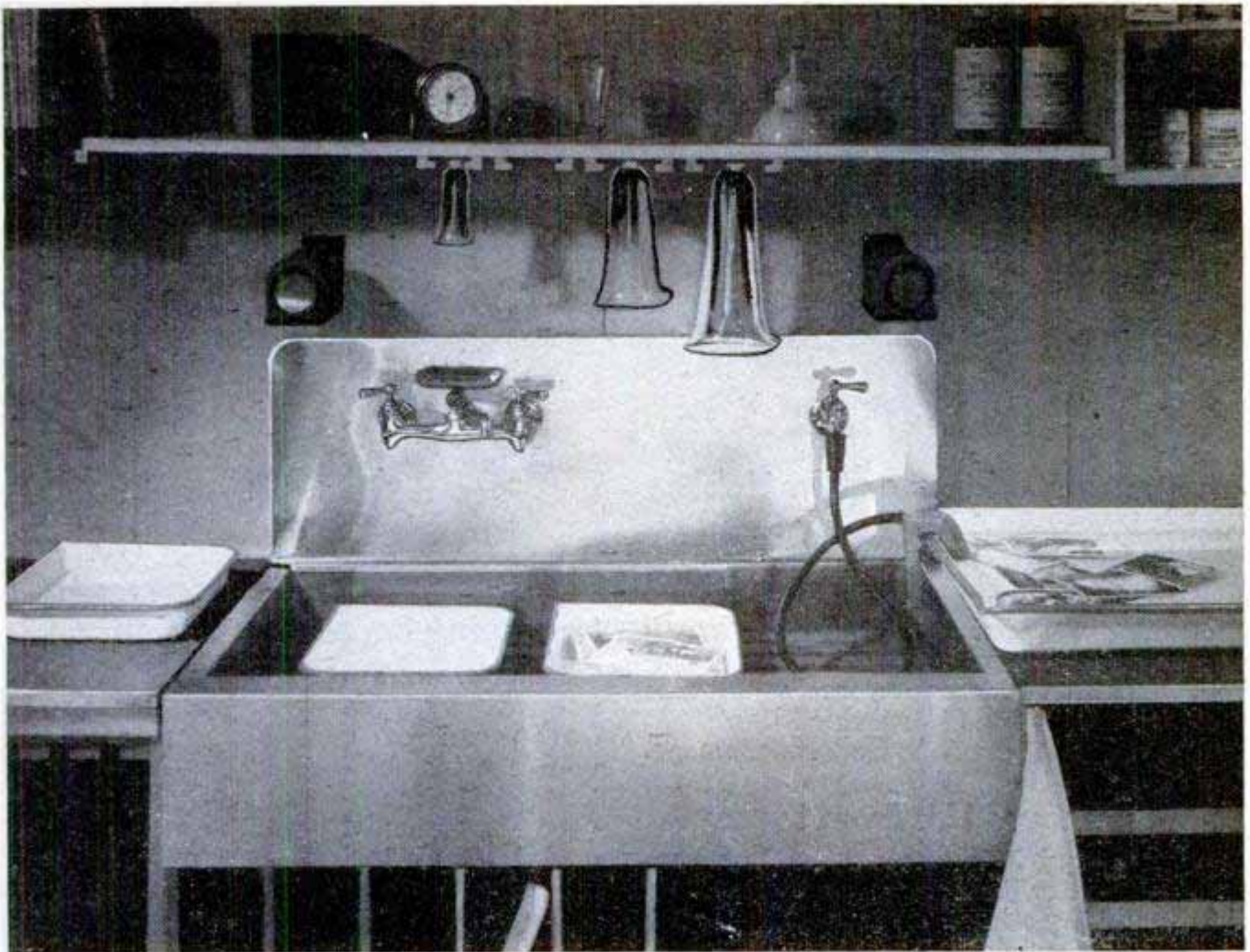
To avoid contaminating hypo ◆ bath, the print is removed from the developer and placed in water and rinsed. From here it is transferred to hypo. After 10 min., the print is fixed. Then it is placed in tray and washed in running water for one hour

◆ After film has been washed, a spring clip is attached to each end and the film is hung up to dry. Water spots are eliminated by gently wiping both sides of the wet film with a wet sponge wrung nearly dry. Hang the film in a dust-free place to dry

For a glossy finish the prints ◆ are dried on a ferrotype tin; for a matte finish they are dried in a blotter book. The prints are placed face down on ferrotype and rolled flat. When dry, the prints will fall off by themselves or are easily peeled off the tin

## PRINTING





**This is the processing or wet area of the darkroom, located around the sink. Prints go from left to right through printing solutions and finally to washing tray**

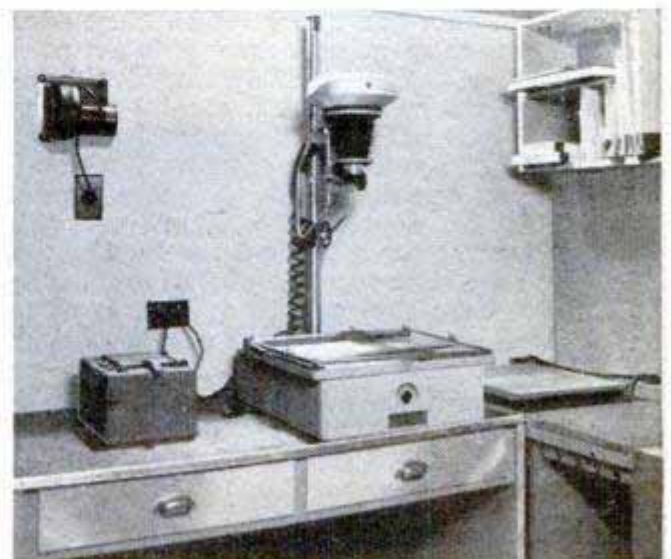
smaller shelf 2 ft. above the tray shelf will be needed to hold bottles of solutions. Above the printing or enlarging shelf, smaller shelves and a cabinet can be added to hold paper and other supplies.

If it is not too damp, a basement makes an excellent location for a darkroom. Dampness is a factor to be considered because photographic materials tend to deteriorate more rapidly under damp conditions. A simple solution to this problem, however, is to store your supplies elsewhere when they are not being used. For the most efficient layout, the floor area should not be less than 5 x 6 ft. and not more than 10 x 12 ft. A darkroom such as this is usually built with specific space for dry work (the printing and enlarging) and the wet work (processing the film or paper through the solutions). The wet-side operations lead finally to the sink where the material is washed. It will be convenient if there are both hot and cold-water faucets at the sink, for this will allow you better temperature control of various solutions.

A good working height for the shelves for the wet and dry areas is about 36 in., and 26 in. for width. The surfaces should be covered with a waterproof covering,

such as linoleum, and waxed. Trays, when not in use, can be stored under the working shelves, as can larger pieces of equipment. It is very convenient to have graduates and thermometers and also cut-film holders hanging in their own racks above the working space.

The wiring in your darkroom should be adequate to provide for safelights over each working area, a general room light and, of course, outlets for the printer and enlarger. All the electrical and plumbing work should be done carefully and should comply fully with local building codes.





### Aluminum Markings on Film Holders Resist Wear and Are Easily Read

To identify your cut-film holders quickly, number each one with aluminum paint applied to an upper corner with a small brush. Unlike paper or cloth tabs, the aluminum paint will last for years, and it also is easy to read even in subdued light.

Frank T. Sokolik, Chicago.

### Comb Removes Lint From Lenses

Here's a quick way to remove lint from camera lenses without danger of scratching. After rubbing a hard rubber comb briskly with a woolen cloth, pass the comb over the lens, coming close to the glass but not touching it. Static electricity will cause the lint to jump to the comb where it will remain until wiped off. The same procedure can be used for removing lint from negatives.—Robert C. Aughtry, Ware, Mass.

### Pitcher Doubles for Misplaced Funnel

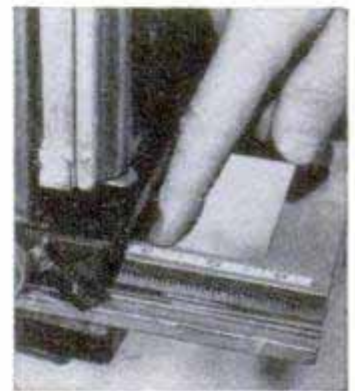
If you have to pour a photo solution from one small-necked bottle into another and can't find your darkroom funnel, use a small cream pitcher as an emergency substitute. Hold the pitcher in pouring position with the end of the spout inserted in the neck of the bottle to be filled, and then pour the solution into the pitcher.



P. R. Wilson, Brooklin, Ont., Can.

### Measuring Bellows Extension

For close-up photography, the extension of a view-camera bellows can be measured at a glance, if a dressmakers' tape is glued to the bed of the camera. Position the "zero" mark of the tape directly beneath the center of the lens barrel and run it straight back to the end of the bed. The length of the extension can be read below the camera back.



## Books That Help You Make and Save Money

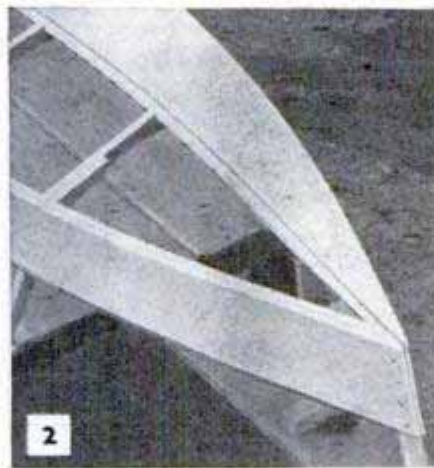
The first in a series of books to be published by *Popular Mechanics* for the car owner, the **MANUAL FOR PLYMOUTH OWNERS** will enable you to save its cost the first day. Every part of the Plymouth car is explained in nontechnical language so that any owner can understand it. The book shows how to make adjustments to get peak performance at all times and thus avoid unnecessary wear and tear. A careful study of the book may not make you a mechanic, but it will enable you to be your own "doctor" so that you can detect and diagnose trouble before it can develop into a major repair bill. All garage owners and mechanics, too, will find the book most helpful as practically all the information can be applied to other makes of cars. A remittance of \$3.50 brings the book to your door.

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All books are available from **Popular Mechanics Book Dept., 202 E. Ontario St., Chicago 11, Ill.**



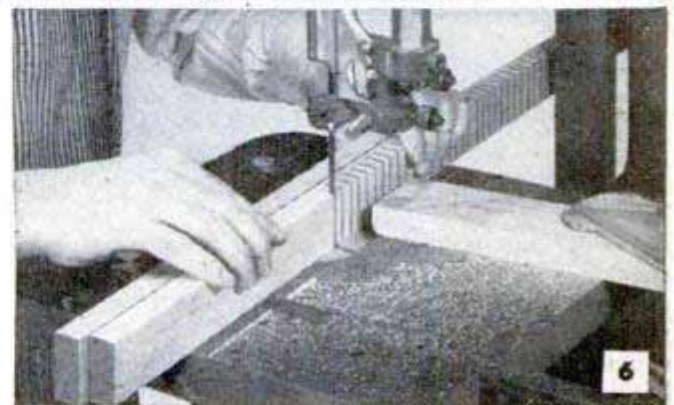
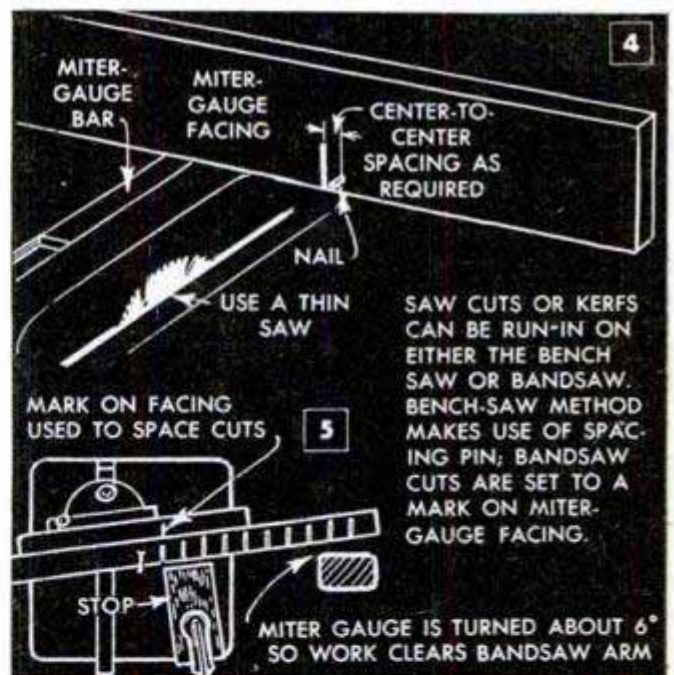
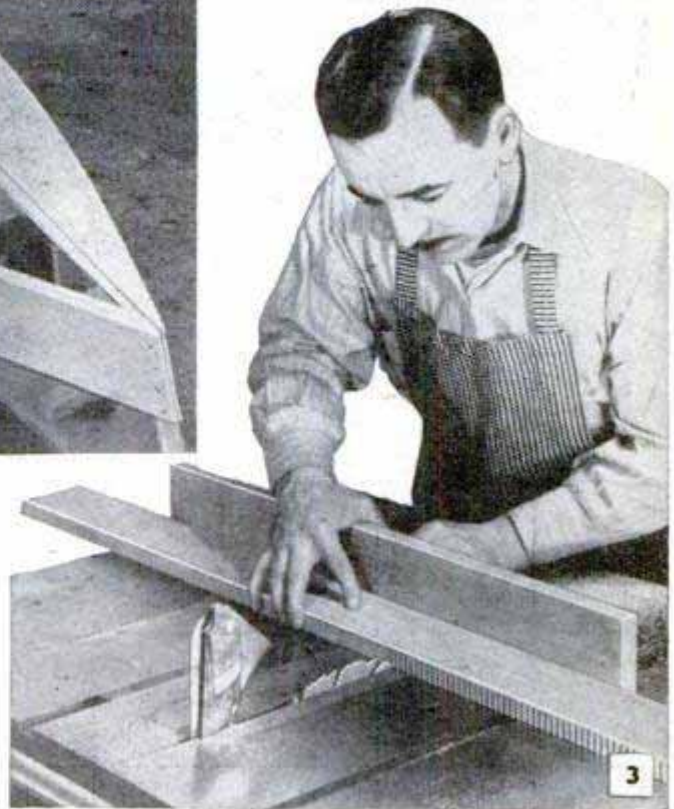
## Curve it by **KERFING**

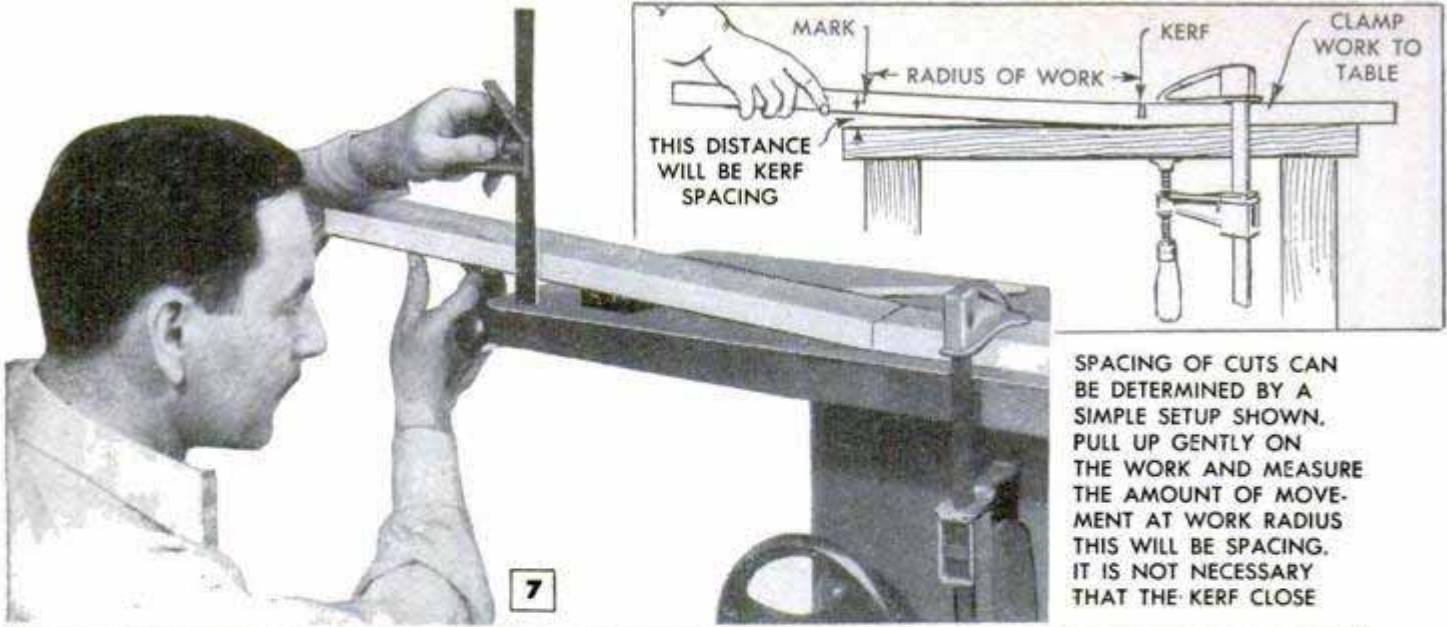
By Sam Brown

**K**ERFING provides a simple and practical method of bending wood without steaming, and consists of running in a number of saw cuts (kerfs) across the wood to reduce its mechanical thickness. Once used extensively in wooden casket construction, the operation is sometimes referred to as an "undertaker's bend."

The craftsman's usual approach to a kerfing job is to space the kerfs close together and cut the wood as thin as practical. For average work,  $\frac{1}{4}$ -in. center-to-center spacing of kerfs is used, while the uncut portion of wood can be as thin as  $\frac{1}{16}$  in. The job is set up as shown in Figs. 3 and 4, with a nail driven into the miter-gauge facing to space the cuts exactly. A thin-gauge saw is preferable, but good work can be done with any bench-saw blade.

Kerfing also can be done on the bandsaw, Fig. 6, a method which has the advantages of being faster and producing a narrower kerf than a bench saw. The advantage of the narrow kerf is that it can be closed completely when the work is bent and will make the job stronger. When bandsaw kerfing, you cannot make use of the spacing pin, but you can make an equally accurate measure by advancing each kerf as it is cut to a mark on the miter-gauge facing, as shown in Fig. 5. Note that the miter gauge is rotated about 6 deg. to allow the work to clear the bandsaw arm. A stop clamped to the saw table assures cuts of equal depth.

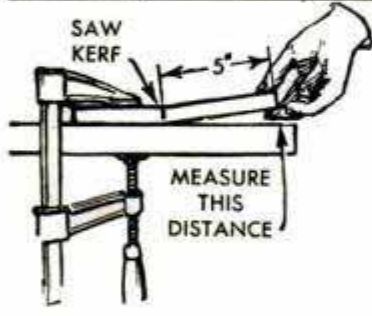




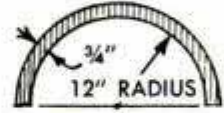
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**8 KERFING TABLE**

① TEST BEND	② NUMBER OF CUTS IN CIRCLE	③ KERF TO CLOSE	SPACING OF CUTS ④													
			RADIUS OF WORK IN INCHES													
			3	4	5	6	7	8	9	10	11	12	13	14	15	16
1/8"	258	.018 (1/64)	1/16	3/32	1/8	3/32	3/32	3/16	7/32	1/4	1/4	9/32	5/16	5/16	3/8	3/8
3/16"	171	.027 (1/32)	3/32	1/8	3/16	7/32	1/4	9/32	3/16	3/8	3/8	7/16	7/16	1/2	9/16	9/16
1/4"	129	.036 (1/32)	1/8	3/16	1/4	1/4	3/16	3/8	7/16	1/2	1/2	9/16	5/8	11/16	3/4	3/4
5/16"	100	.047 (3/64) (AV. BAND SAW)	3/16	1/4	3/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8"	83	.056 (1/16)	3/16	1/4	3/8	7/16	1/2	9/16	5/8	3/4	13/16	7/8	15/16	1	1 1/8	1 3/16
7/16"	72	.065 (1/16)	1/4	3/16	7/16	1/2	9/16	11/16	3/4	7/8	15/16	1	1 1/8	1 3/16	1 5/16	1 7/8
1/2"	63	.074 (3/64)	1/4	3/8	1/2	9/16	11/16	3/4	7/8	1	1 1/16	1 3/16	1 1/4	1 3/8	1 1/2	1 9/16
5/8"	56	.084 (3/64)	3/16	7/16	9/16	5/8	3/4	7/8	1	1 1/8	1 3/16	1 5/16	1 7/16	1 9/16	1 11/16	1 3/4
⑤ 3/4"	50	.094 (3/32) (AV. CIRC. SAW)	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2
1 1/16"	46	.102 (7/64)	3/8	1/2	1 1/16	1 3/16	1 5/16	1 1/16	1 3/16	1 5/16	1 7/16	1 9/16	1 3/4	1 7/8	2 1/16	2 3/16
3/4"	42	.112 (1/8)	7/16	9/16	3/4	7/8	1	1 3/16	1 5/16	1 1/2	1 5/8	1 3/4	1 15/16	2 1/16	2 3/16	2 3/8



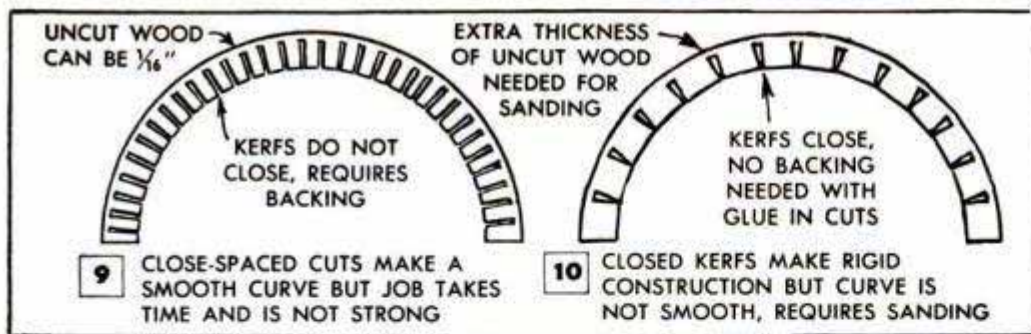
1. Test bend is made on scrap piece being worked. Amount of lift at end is value used in first column.
2. This gives number of cuts in a circle. Half circle requires half as many cuts.
3. Width of saw kerf.



**HOW KERFING TABLE IS USED**

Make a test bend as shown in drawing at extreme left. For maximum strength, leave as much uncut wood as possible. Gradually deepen cut until test piece can be bent 1/8 in. Then find 1/8 in. in column 1. On same line, column 2 shows 258 cuts needed for full circle, or 129 cuts for half circle. Under 12-in. radius column, 9/32 in. is the spacing required. Note in column 3 that the kerf needed to close is 1/64 in. wide. As this is not practical, a wider kerf is used, even though it will not close tightly when stock is bent. **Second example of same job:** If you want the kerf to close, start with the .047-in. bandsaw kerf in column 3. Then all the figures on this line will apply. Test bend must be 5/16 in. and spacing will be 3/4 in. Kerfing is done on the bandsaw as pictured in Fig. 5

This column applies only to 3/4-in. stock. Kerf can be wider but will not close. 4. Center-to-center spacing of kerfs. Cuts can be spaced closer but not wider. 5. Spacing in this line works out exactly and values are used to check work sizes not listed. A 6-in. radius needs twice the spacing of 3-in. radius. If test bend is 5/16 in., a 12-in. radius requires 3/4-in. spacing

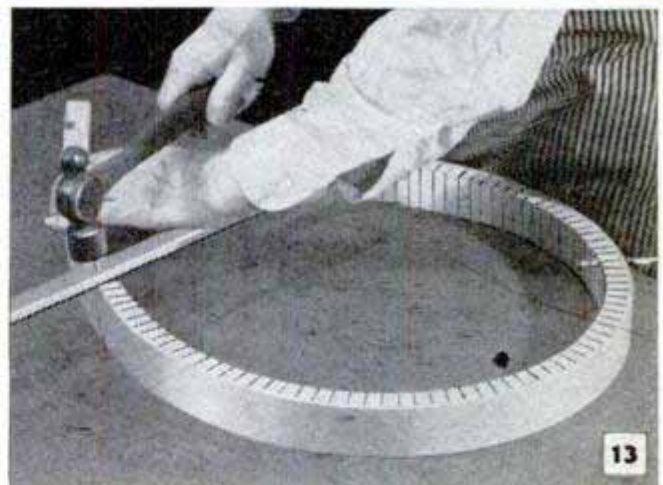
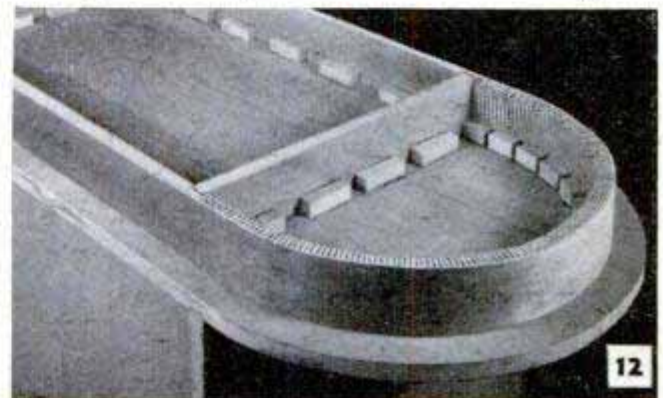


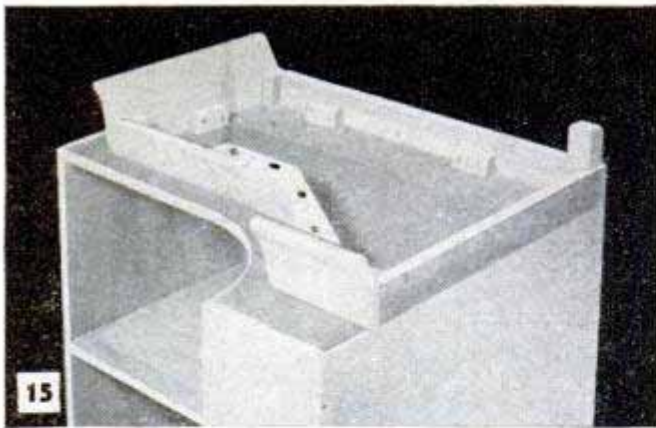
Sanding work is required when kerfs are wide-spaced

A scientific approach to a kerfing job calls for spacing the cuts exactly as required to make a specified bend. One method to determine the spacing is shown in Fig. 7. First, a test kerf is cut on a scrap board and the board is clamped to a level surface. Then the board is lifted and the amount of lift at the work radius is measured to determine the spacing required. While exact, this method is subject to considerable variance, for the deeper the kerf is made, the more the wood will bend and the wider the spacing will be. You are assured in all cases, however, that if one kerf allows the wood to bend a certain distance at the radius, further cuts will allow the same bend all around and will ultimately make a circle of the specified radius.

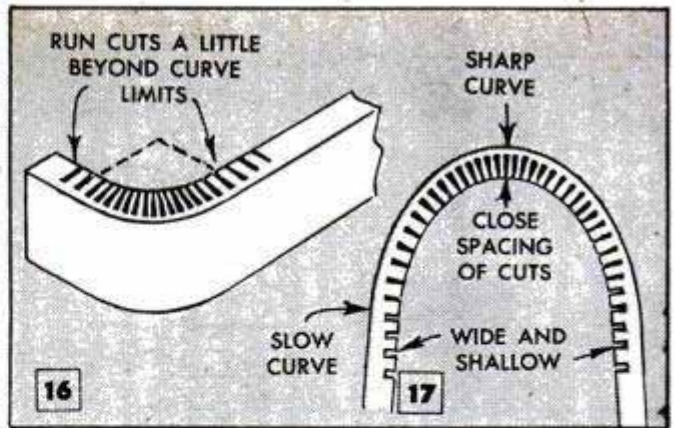
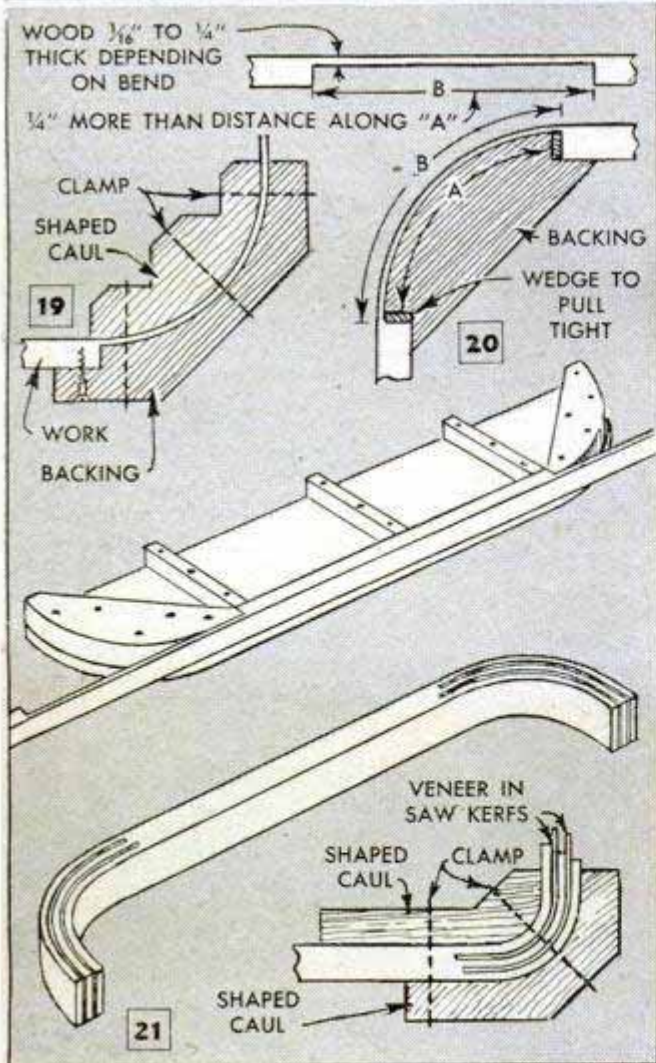
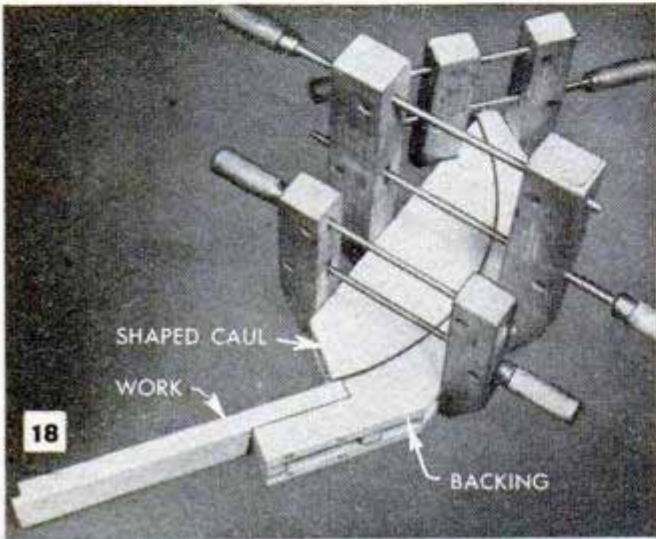
All of the various factors in kerfing are brought under control by the use of the kerfing table shown in Fig. 8. By referring to the table, you can control any of the factors which may be needed for a certain job. You can make the kerfs close for maximum flexibility, or determine the maximum thickness of uncut wood which can be left and still permit the bend. Any allowance made should lean to closer spacing than the table shows. The fault of wide spacing is that, while it permits the bend, the curve will form in a series of flat faces, Fig. 10, and may require sanding to bring it to a smooth curve. The advantage of wide spacing is that it allows the kerfs to close; if you run glue into the cuts before bending, the final product will be a bent piece of wood capable of standing alone. On the other hand, close-spaced kerfs, Fig. 9, consume time and the job is not strong. They must always be backed by a number of glue blocks as shown in Fig. 12.

After the kerfing is completed, the actual bending of the wood should be done gradually to avoid any danger of splitting. Give the work a comfortable bend and span a piece of wood across it to hold the shape, Fig. 13. After setting to this curve for an hour or two, the work can be given another bend. Sometimes it is necessary to sponge the work for about five minutes with warm water, as shown in Fig. 14. This will allow nearly double the bend possible with dry wood, a fact which should be kept in mind when determining the kerf spacing.





The thin-section method of producing bent work can be used for forming both inside and outside curves



Kerf spacing is always uniform if the curve is uniform. On slight bends, however, the spacing may vary. Fig. 17 is an example—closely spaced cuts are used to make the sharp bend, while a few widely spaced cuts serve for the flat curve. Fig. 1 is an example of a flat bend where two or three cuts about halfway through the wood are enough to take the strain off the wood. The job shown in Fig. 2 makes use of a number of uniform and closely spaced kerfs cut very shallow; the idea is to reduce the effective thickness of the wood to make a more comfortable bend. Fig. 16 shows a quarter-round curve with kerfing extending beyond the curve limits.

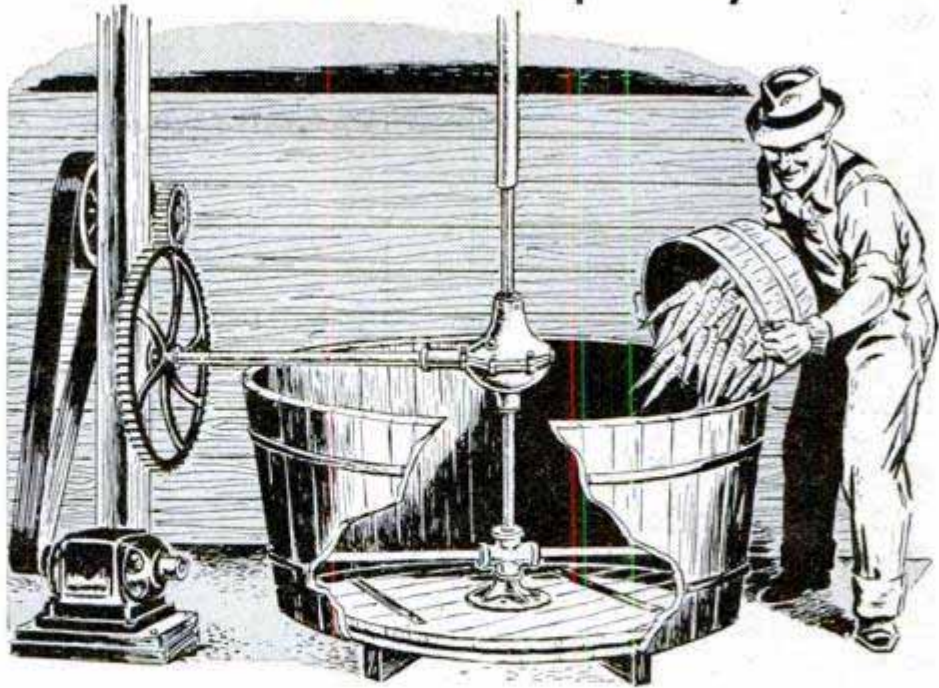
An alternate to kerfing for most bent work is the technique of thinning the wood, as shown in Figs. 15 and 18 to 20 inclusive. Like close-spaced kerfing, this work always requires a backing, which, in this case, must be a solid block of wood or an equivalent built-up backing. The thin section is glued to the backing, necessitating the use of a shaped caulk or pressure block in the clamping operation, as shown in Fig. 18. This is an example of an inside curve; Fig. 20 is an example of an outside curve. When one end of the thinned section is free, the shoulder is butted tightly against the backing block; when the work does not have a free end, it is more practical to cut the thinned section a little overlength to permit stretch-fitting with wedges.

Still another technique used for bent work is kerfing lengthwise with the work, as shown in Fig. 21. The cuts should be run in on the bandsaw with the use of a ripping fence and can be spaced to suit. Dependent on the sharpness of the curves and the number of kerfs, work of this kind may require some steaming. Strips of veneer are placed in the saw kerfs and the work is clamped without glue, using hot-water sponging or steam if needed. After the work has dried, the clamps are released and the permanent assembly made with glue. Although this method of bending is more work than the other systems, it has advantages in that the work will stand alone and the edge can be exposed.



Market gardeners who specialize in root crops will find this inexpensive washer just the thing for cleaning freshly dug carrots, radishes and beets. It will thoroughly wash 15 bushels of carrots in 20 minutes. The container is a wooden tank of the type used for watering livestock and measures 30 in. deep and 60 in. in diameter. A false bottom installed in the tank is raised on 1-in. blocks so that dirt washed from the vegetables can collect underneath. An agitator consisting of two arms of pipe turned into a cross fitting is driven by one axle extending from a car differential as shown in the illustration. Note that the axle housings have been cut off near the differential housing. The other axle turns in a bearing improvised from a short length of pipe and a floor flange. The latter is attached to the ceiling and the lower end of the pipe telescopes over the axle. A hole is drilled through the pipe and shaft to permit the insertion of a pin to prevent the axle from turning. After the drive has been assembled to this stage, a lower bearing consisting of a floor flange and a sheet-metal plate,  $\frac{1}{8}$  in. thick and about 5 in. square, is attached to a block screwed to the bottom of the tank. The metal plate is placed under the flange and both

## Vegetable Washer Utilizing Car Differential Cleans Root Crops Ready for Market



are attached to the block with screws. Then a short length of pipe is threaded at one end and turned into the lower opening in the pipe cross. The lower end of this pipe bears on the metal plate under the pipe flange. If desired, the threads can be reamed out of the pipe flange to make a somewhat more durable bearing. Any spur gear giving about 10 to 1 reduction will serve as a driving jack, and a  $\frac{1}{2}$ -hp. motor will furnish power for average work. In use, place vegetables in the tank, then fill the tank with sufficient water to cover the tops. Although not shown, the false bottom is made in two removable sections for cleaning, one on each side of a permanently attached center section.

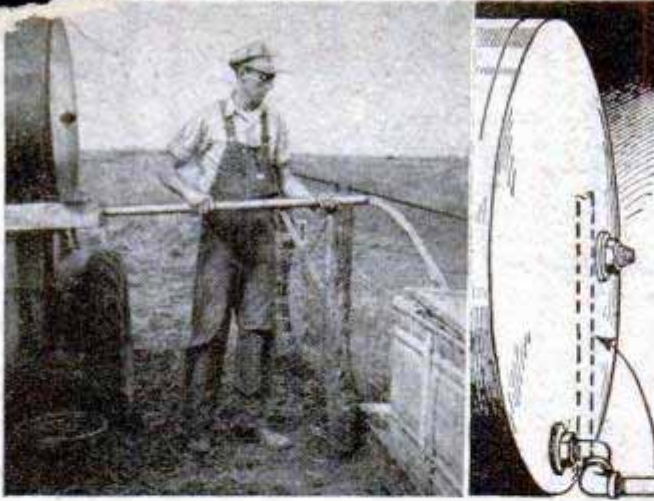
are attached to the block with screws. Then a short length of pipe is threaded at one end and turned into the lower opening in the pipe cross. The lower end of this pipe bears on the metal plate under the pipe flange. If desired, the threads can be reamed out of the pipe flange to make a somewhat more durable bearing. Any spur gear giving about 10 to 1 reduction will serve as a driving jack, and a  $\frac{1}{2}$ -hp. motor will furnish power for average work. In use, place vegetables in the tank, then fill the tank with sufficient water to cover the tops. Although not shown, the false bottom is made in two removable sections for cleaning, one on each side of a permanently attached center section.

## Electric Trailer-Bed Winch Unloads Chopped Hay

Unloading chopped hay or grass silage from a trailer into a blower hopper is a slow, tiring job by hand methods. Some farmers have used elevator jacks to dump the trailer load with fairly satisfactory re-



sults, but the best method of unloading this material is by means of a trailer-bed winch driven by a detachable motorized jack like the unit pictured. It's farm-built from scrap farm-machine parts, standard roller chain, sprockets, and angle and flat iron. A spur gear and pinion taken from an old manure spreader provide the necessary gear reduction. The completed drive unit attaches to a corner of the trailer bed as pictured. The drive shaft of the unit has a squared end which engages a square socket welded into the end of the windlass barrel. Wire cables run from the barrel to a high endgate at the forward end of the trailer bed. As the cables are wound on the windlass by the drive unit, the endgate is drawn to the rear of the bed, carrying the load with it. The slow backward movement of the load causes the material to drop into the blower hopper in a uniform stream.

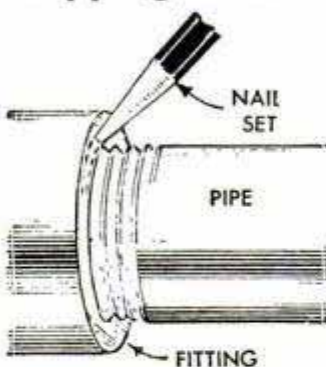


## Field Waterer Filled Easily From Large Portable Tank

When hogs or other livestock are placed on newly fenced pastures, a permanent water supply is not always at hand. One large hog raiser makes hauling water an easy chore by mounting a 250-gal. tank on a trailer and providing the tank with a handy turn-down spigot. This is the feature that saves time, as all that is necessary is to drive the trailer close to the field waterer and turn down the long spout. Raising the spout shuts off the water. Two pipe elbows, a short nipple and a 36-in. length of pipe are assembled to form the spigot. The first nipple is screwed into a reducer which is turned into the threaded plug opening in the tank. Turn this one up tightly. Draw the nipple tight also, but turn the second elbow on loosely as it must turn easily to allow the pipe, or spout, to swing down. Plumber's pipe-thread compound will prevent leaks at the threaded joints.

A. M. Wettach, Mt. Pleasant, Iowa.

## Stopping Leaks in Pipe Joints

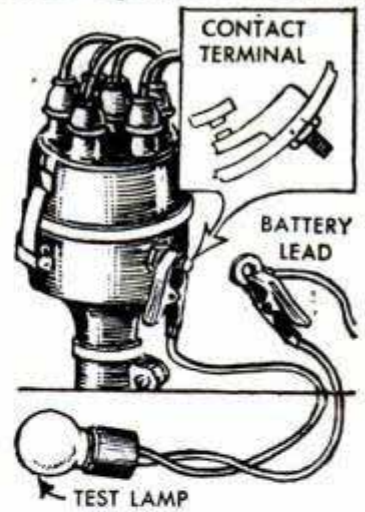


Especially where an iron pipe is connected to a brass fitting, leakage between the threads can be stopped in a jiffy by using a nail set to form a slight lip around the threaded end of the fitting. With the nail set or a countersink having a somewhat rounded point, tap completely around the end of the fitting about  $\frac{1}{32}$  in. from the pipe threads. This will form a continuous line of indentations resembling a shallow groove and will upset the metal to reduce the inside diameter at the end of the fitting, thus sealing the leak.

Edmund C. Biggin, Philadelphia, Pa.

## Test Lamp Indicates Spark Position

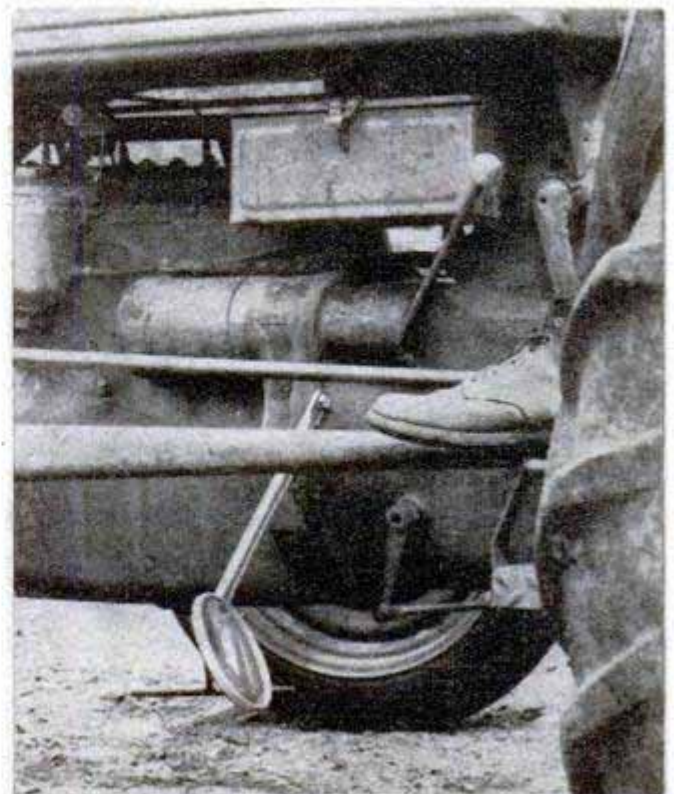
Frequently it is necessary for the auto mechanic to know precisely the time a spark occurs at the plug with respect to the position of the piston in that particular cylinder. A small test lamp placed in the circuit will show when current is flowing and also when the distributor points open, or break.



The leads from the test-lamp socket are provided with clips and the lamp is placed in the circuit by detaching the battery lead from the distributor terminal and clipping the test-lamp leads to the terminal and battery wire as shown. When current is flowing, the lamp burns. Breaking of the points is indicated when the lamp goes out.

## Rear-View Mirror on Tractor Permits Checking Implements

So that the work of a breaking plow or rear-mounted cultivator can be checked frequently without turning around in the tractor seat, one farmer fastened a rear-view mirror to the transmission housing. He used a large, truck-type mirror and positioned it so he can glance down from his seat and obtain a clear view of the operation of the drawn implement.





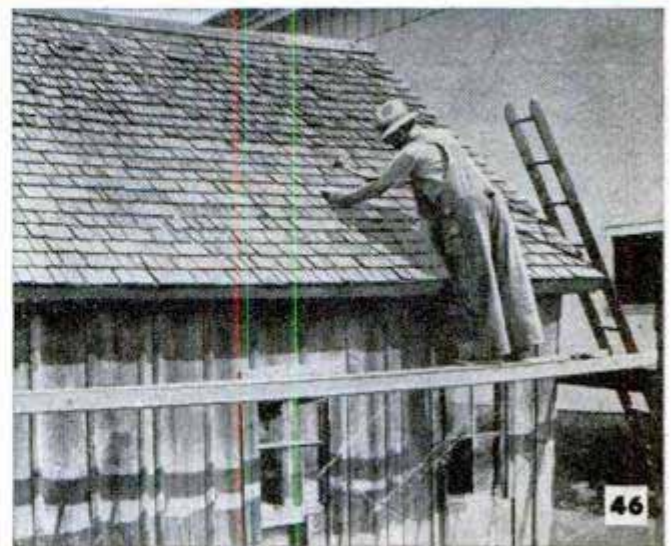
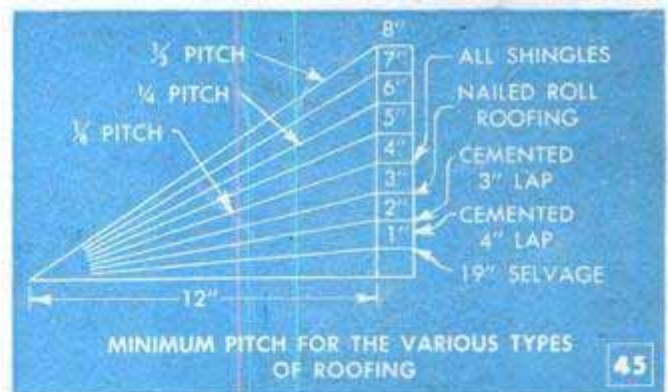
# ROOFING IS EASY

## Application of Roll Roofing






### Part II

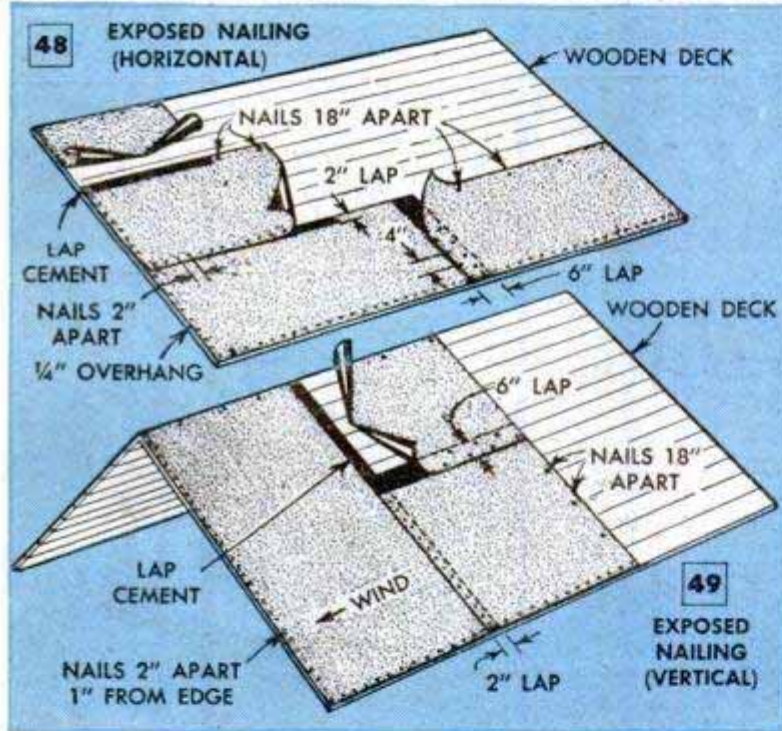
AS DESCRIBED in Part I last month, laying composition shingles is one of the easiest home repair jobs, but laying roll roofing is even simpler as it comes in continuous rolls of a uniform width and length. You simply unroll the covering, cut it to the lengths required and nail it down. It's less expensive than shingles and where appearance is not of the first importance it has a wide application.

**Mineral-surfaced roll roofing:** This probably is the most popular type as it can be applied either vertically or horizontally and with exposed or concealed nails, Figs. 48 and 58. The edges of the roofing should overhang slightly at the eaves and along the rise, Fig. 49. Another method is to turn down the edge and nail it, Figs. 44 and 50. Old shingled roofs are prepared for reroofing by nailing down loose shingles, Fig. 46, and applying drip boards at eaves and gable ends



To prepare old shingled roofs, nail down loose shingles and apply drip boards at eaves and gable ends

Roll roofing	Weight Per Square	Unit Size	Nails Per Square	Coverage Per Roll	Remarks
 SATURATED FELT	15 LBS. 30 LBS.	36" X 144' 36" X 72'	½ LB., 1" 6" SPACING	400 SQ. FT. 200 SQ. FT.	15 LB. WEIGHT IS CALLED No. 15. 30 LB. IS No. 30. No. 15 IS COMMONLY USED FOR UNDERLAY ON NEW WORK
 SMOOTH SURFACE	45 LBS. 55 LBS. 65 LBS.	36" X 36'	1¼ LB., 1" OR 1¾ LB., 1¾" (2" SPACING)	100 SQ. FT. (1 SQUARE)	INEXPENSIVE ROOFING FOR BARNs, GARAGES, ETC. WEIGHTS ARE SOMETIMES CALLED MEDIUM, HEAVY AND EXTRA-HEAVY
 MINERAL SURFACE	90 LBS.	36" X 36'		100 SQ. FT. (1 SQUARE)	MOST POPULAR ROLL ROOFING FOR ALL PURPOSES. CAN BE APPLIED WITH EXPOSED OR CONCEALED-NAILING METHOD
 PATTERN EDGE	105 LBS.	36" X 42' 32" X 48'	1¾ LB., 1" OR 2¼ LB., 1¾"	100 SQ. FT. (1 SQUARE)	AN ATTRACTIVE YET INEXPENSIVE ROOFING. CAN BE APPLIED WITH EXPOSED OR BLIND NAILING CLIPS
 19" SELVAGE	140 LBS.	36" X 36'	1 LB., 1" OR 1¼ LB., 1¾"	50 SQ. FT. (½ SQUARE)	THE BEST ROOFING FOR LOW PITCHES. CAN BE USED ON ROOFS HAVING AS LITTLE AS 1" RISE PER FT. (CEMENT REQ'D)



roofs require wider laps, Fig. 45. The second sheet is held in place with widely spaced nails along the top edge while cement is spread on the lapped area. Then the lower edge is pressed into firm contact with the cement and nailed, the nails being spaced about 2 in. apart. If concealed nailing is desired, the roof edges are fitted with strips of roofing, Fig. 55, and the roofing is applied with a 3-in. head lap and 6-in. end lap, all cemented.

**Pattern-edge roofing:** This can be had in a variety of edge patterns, Figs. 47, 54 and 56, and makes an attractive, inexpensive roof. Concealed nailing, Fig. 55, is recommended although exposed nails can be used if desired. Pattern-edge roofing must be unrolled to break



Edges of the roll roofing can be folded over and nailed as in Fig. 50. Measure and snap a chalk line to show the amount of lap as in Fig. 51. Finish the ridge as in Fig. 52, using a 10 or 12-in. strip of roll roofing



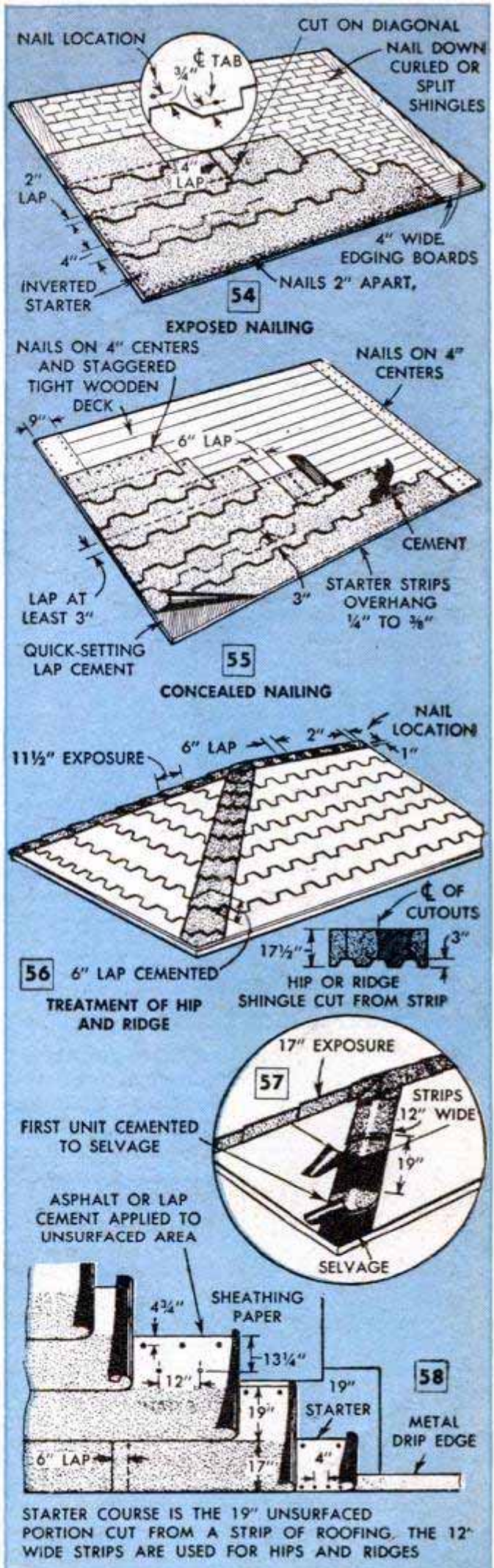
the tabs which hold the strips together. Allow them to flatten for several hours before laying. The strips are then loosely rerolled for application as in Fig. 53. Valleys, Fig. 59, are treated in the same manner as described in Part I. Ridges can be covered with a single strip of roll roofing 9 to 12 in. wide, Fig. 52, or with individual short strips as in Figs. 56 and 57.

**Wide-selvage roll roofing:** If you are covering a roof that is nearly flat, 19-in. selvage roofing makes a tight double-coverage job with laps cemented the full 19-in. width, Fig. 58. The 19-in. lap is smooth surfaced for easy application of the cement. Only the exposed surface is mineral coated. Note that the starter course is a strip of the unsurfaced portion. This type of roofing usually is laid over sheathing paper.

(The End)



Pattern-edge roll roofing is available in a variety of patterns and makes an attractive, inexpensive roof

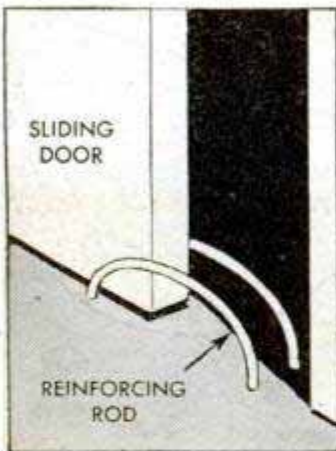


## Hinged Perches on Poultry Nests Permit Trapping New Layers



For culling laying flocks of pullets many poultrymen use trap nests of various types. One poultryman built his own trap nests in portable units of six compartments each and in the construction he hinged the perches in such a way that they can be made to serve a two-fold purpose, that of trapping the layers during the day and preventing the birds from roosting on the perches at night by simply raising them to the closed position at the end of the day. The nest units are made from ordinary pine lumber and the hinged perch design has the added feature of providing easy access to the interior of the nests for cleaning.

## U-Shaped Rods Set in Concrete Form Sliding-Door Guide



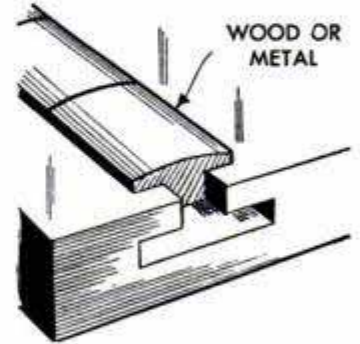
When pouring concrete ramps leading to sliding corncrib or barn doors, farmers usually install braces to hold the leading edges of the doors firmly closed at the bottom. The brace protects the doors from damage by wind or crowding livestock. At the

same time, the two-member brace serves as a guide for closing the doors by keeping the meeting edges in line and preventing damage to the weatherboard which covers the narrow crack between the doors when they are fully closed. The braces are bent to a wide U-shape from 1/2-in. iron rods and

are placed in the cement before it hardens. When installing the braces it's a good idea to drop a plumb line from the door track so that you are sure to get them located an equal distance on each side of the center line of the doors. Be sure that the braces are the correct distance apart so that the doors will close without binding.

## Slot Covers for Machine Table

If you would like to eliminate the job of digging chips out of the T-slots in a machine table, try covering the slots with T-shaped inserts. Cut from wood, metal or plastic in a variety of lengths, inserts are easily selected to cover completely all the exposed slots after setting up a job.

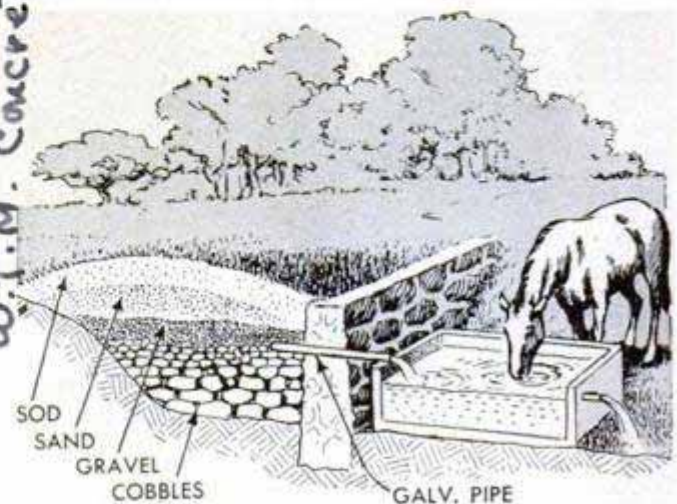


Laurence H. Seibert, Little Silver, N. J.

## Stock Supplied With Clean Water By Damming Spring Flow

Water from boggy open springs is readily impounded and piped to a livestock watering tank by constructing a small dam of concrete or field stone on the downgrade side of the spring. If the spring opens into a fairly steep gully or natural waterway, the dam should be wide and high enough to prevent water from flowing over the top or around the ends. When the dam is laid up of field stone, or poured, as the case may be, a length of pipe large enough to take the normal flow of the spring is installed in the masonry as shown in the illustration. The pipe is inclined slightly to discharge into a steel or concrete tank which is located below the dam. Backfill the dam with field stone and gravel, then with sand and finally cover with sod.

G. E. Hendrickson, Argyle, Wis.



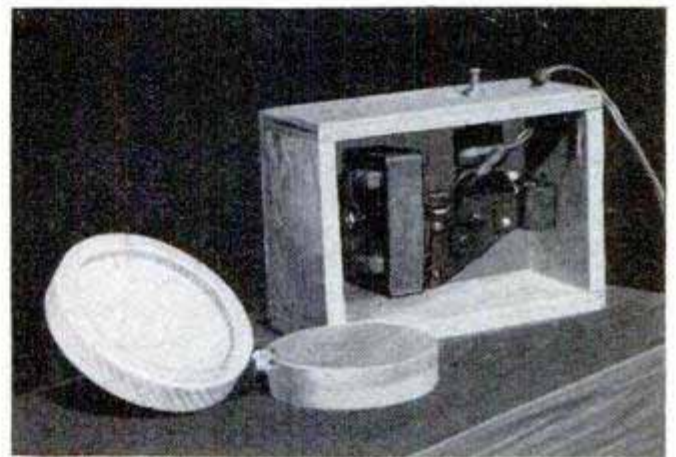
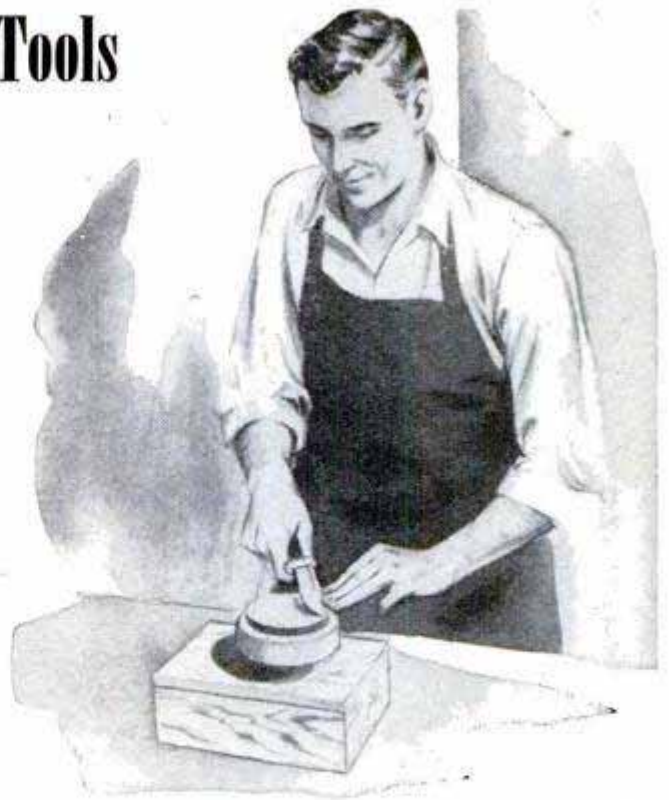
W.T.M. Concrete

W.T.M. Concrete

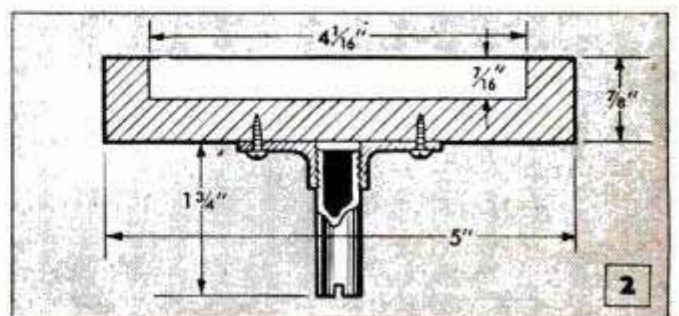
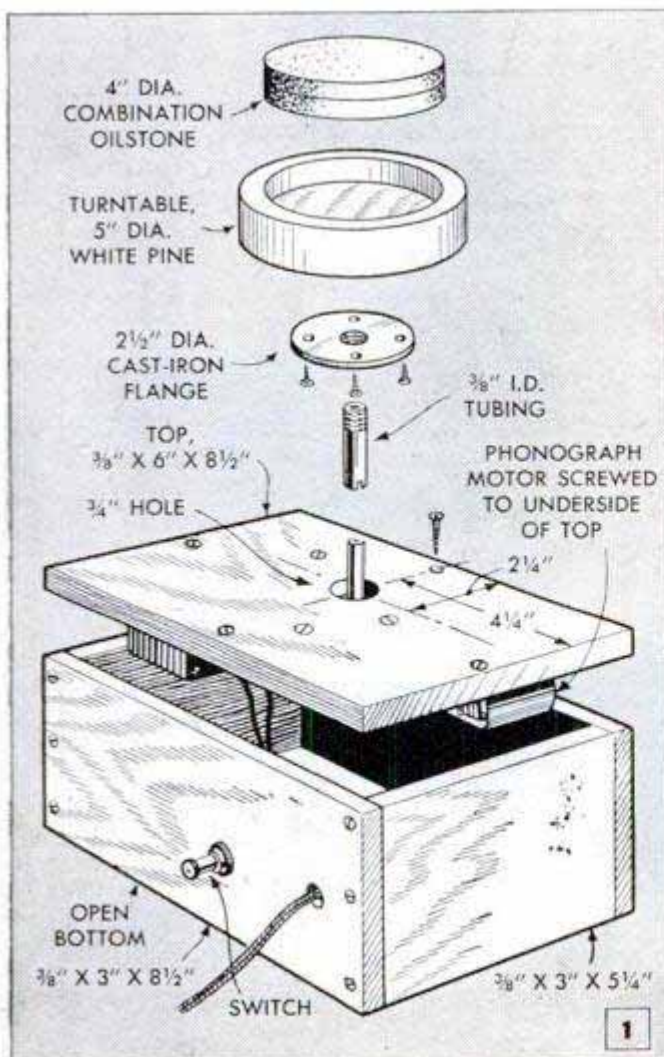
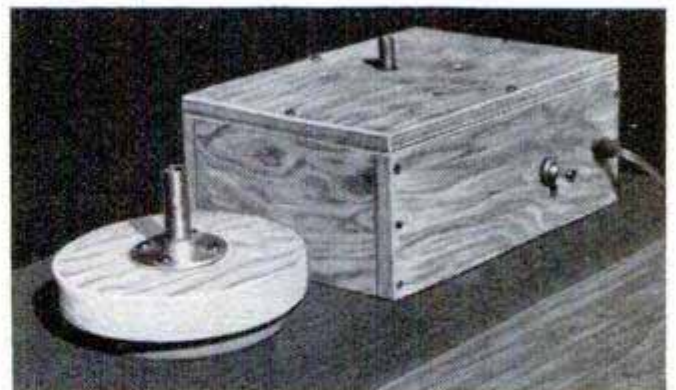
# Electric Oilstone for Edge Tools

By Hi Sibley

IF YOU experience trouble in honing edge tools, such as knives and chisels, because it is difficult to stroke them across an oilstone without distorting the bevel, this electrically driven oilstone may solve your problem. Here, the stone moves instead of the tool, and the tool can be held against the stone at the correct angle. All you need to make the outfit is an old phonograph motor, either electric or spring-wound. Just make a box in which to house the motor as in Fig. 1. Mount the motor on the underside of the box top and drill the top for the turntable shaft. Then thread a short piece of tubing to take a cast-iron flange and slip this over the shaft, shimming it if necessary. The turntable is turned from wood and screwed to the flange as indicated in Fig. 2. It may be necessary to bevel the inner sides of the table slightly to hold the stone firmly and yet allow it to be removed and turned over. If you use an electric motor, a toggle switch can be mounted in one side of the box. When a spring-wound motor is used, provision should be made for winding.



Motor is mounted with screws on inside of box as above and controlled from outside by toggle switch

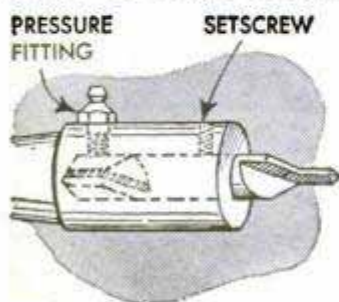


## Toxic Liquids Siphoned Safely By Blowing Into Container



When siphoning liquids such as chemical solutions or gasoline from one container to another don't chance getting a mouthful of the harmful or distasteful liquid by drawing it through the hose in the usual way. Instead fit the storage jar or tank with a special stopper that allows you to blow into the container to start the siphoning action. To do this, drill two holes through a cork or rubber stopper and press short lengths of glass tubing through the holes. A rubber hose for blowing air into the jar is pressed over the outside end of one of the tubes, and a length of hose is attached to each end of the other tube. The hose on the inside of the second tube should reach the bottom of the jar while the hose on the outside leads to the container to be filled. After the siphon has been started by blowing into the container, the flow of liquid will continue until the level in both containers is the same. It can be shut off at any time by placing your thumb over the end of the tube through which you blew.

## Broken Center Drills Removed With Grease-Gun Pressure

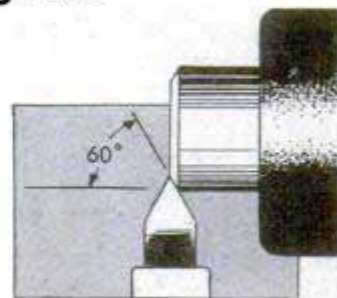


In many machine shops shell-reamer arbors are adapted to hold center drills for center-drilling work in the lathe or drill press. In order to do an accurate job, the center drill must be a light press fit in the arbor and when it breaks, as it sometimes does, trouble is had in removing the broken section from the arbor. To overcome the

difficulty, one mechanic drilled and tapped the arbor transversely for an ordinary pressure grease fitting which is installed as shown in the detail. Then, when the drill breaks, he applies the shop grease gun to the fitting. One stroke of the gun usually builds up sufficient pressure to remove the broken section of the drill.

## Setting Threading Tool

This thread-tool setting gauge is always ready because it's part of the lathe. To make it, simply remove the tailstock quill and turn and grind a 60-deg. chamfer on the outer end.



Then replace it and run the threading tool up against the chamfer as in the detail. Setting the tool to the chamfer automatically squares it with the work.

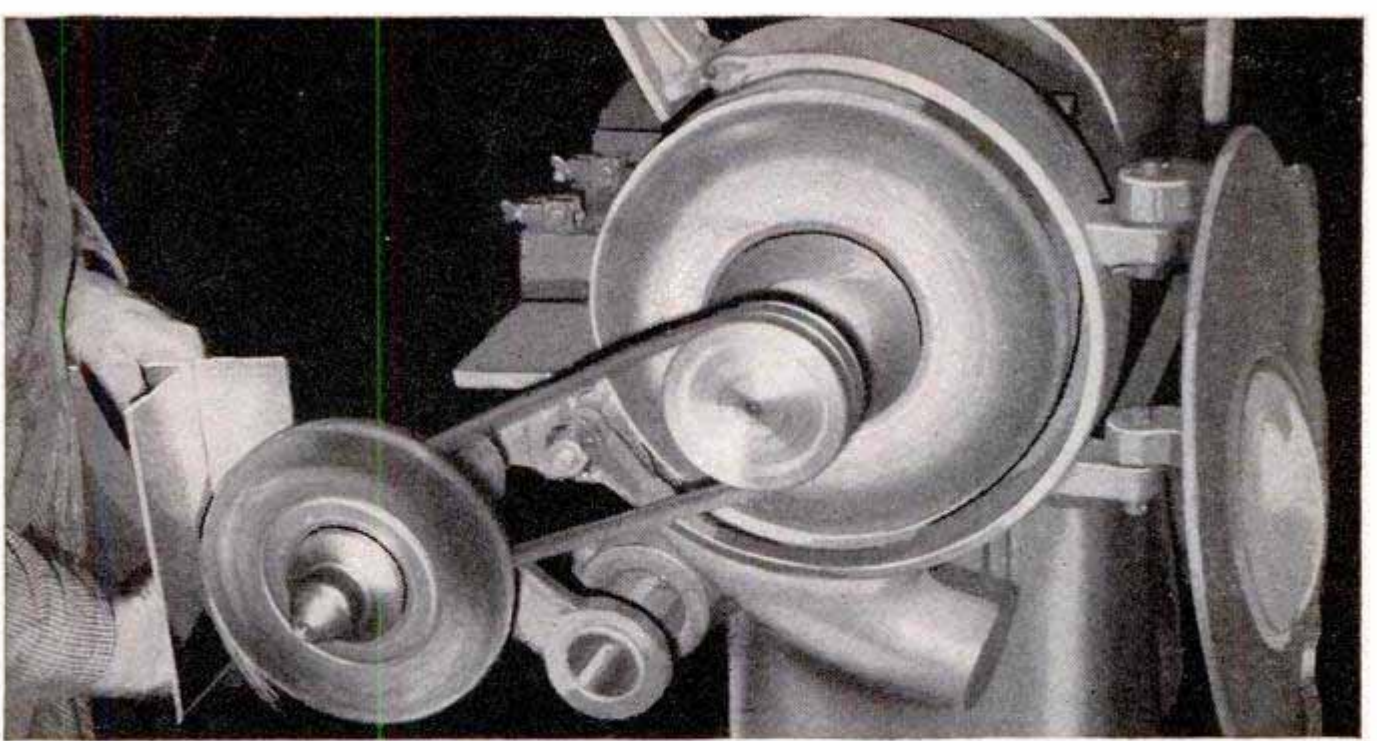
Robert J. Lemp, Woodhaven, N.Y.

## Divided Door on Brooder House Facilitates Inspecting Chicks

To aid in inspecting young chicks, one poultryman fitted the brooder house with a split door, the top half of which can be swung wide open while the bottom half is tightly closed. This feature also comes in handy for ventilating the house on warm clear days while still keeping the chicks safely enclosed. Each half of the door is hung with two hinges and fastened with a separate latch.



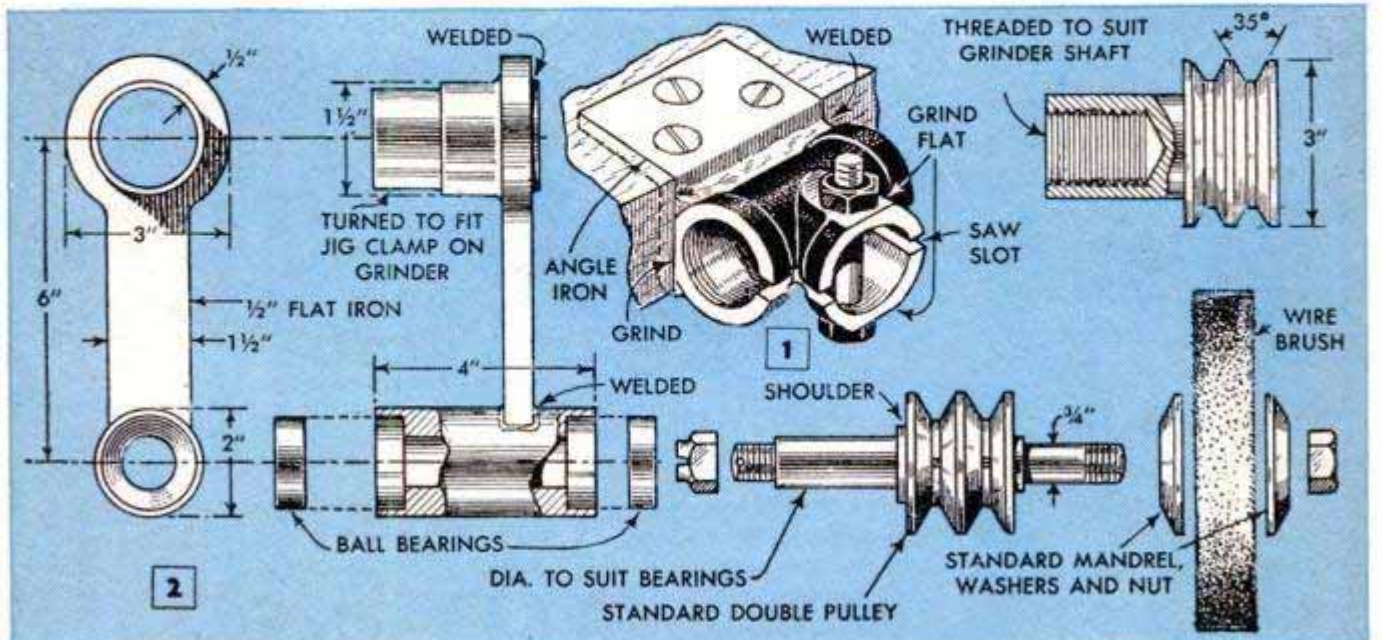
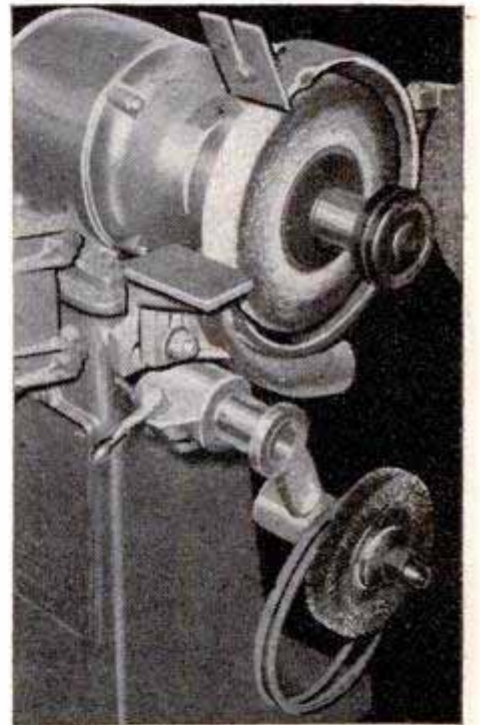




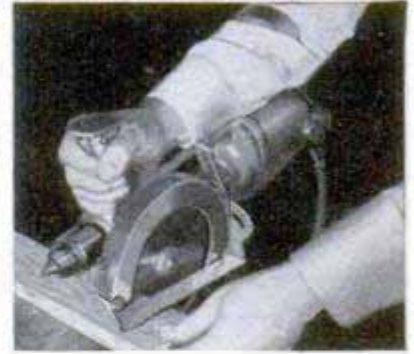
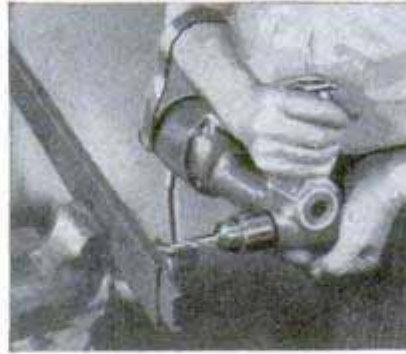
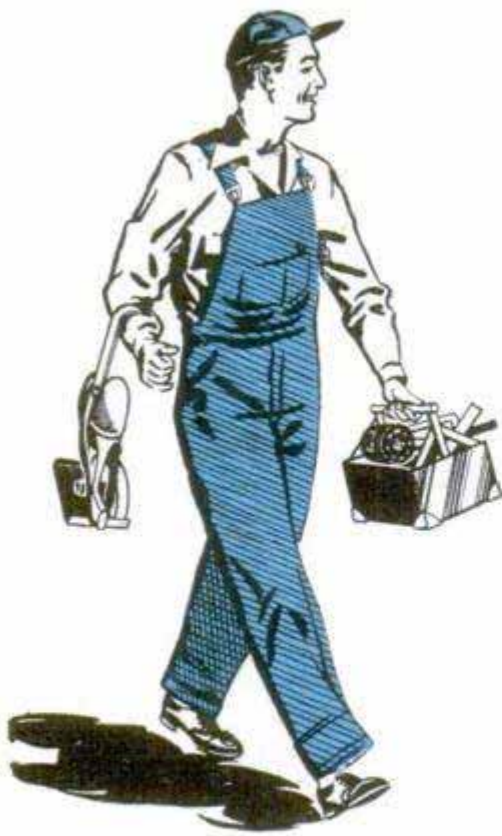
# Auxiliary Polishing Head

By Don Pittwood

THIS AUXILIARY polishing head is just the thing for the small shop having one grinder, either of the bench type or pedestal type. It saves the time and inconvenience of changing the grinding wheel when polishing and buffing are to be done. The polishing head is driven from a short spindle mounting two V-pulleys and internally threaded to screw onto the end of the grinder shaft in place of the nut, which normally turns up against the wheel flange. The head, Fig. 2, is supported in a jig clamp attached to the grinder pedestal. A jig clamp for the bench-type grinder is made from a pipe tee and a short length of angle iron as in Fig. 1. The head, Fig. 2, is a machined and welded job mounting ball bearings to carry the high-speed polishing spindle, which is shouldered and threaded at both ends for washers and a castle nut which provides bearing adjustment.

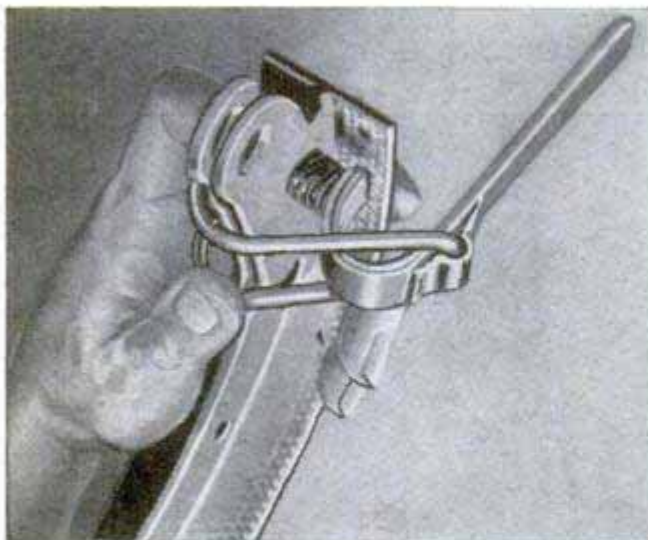
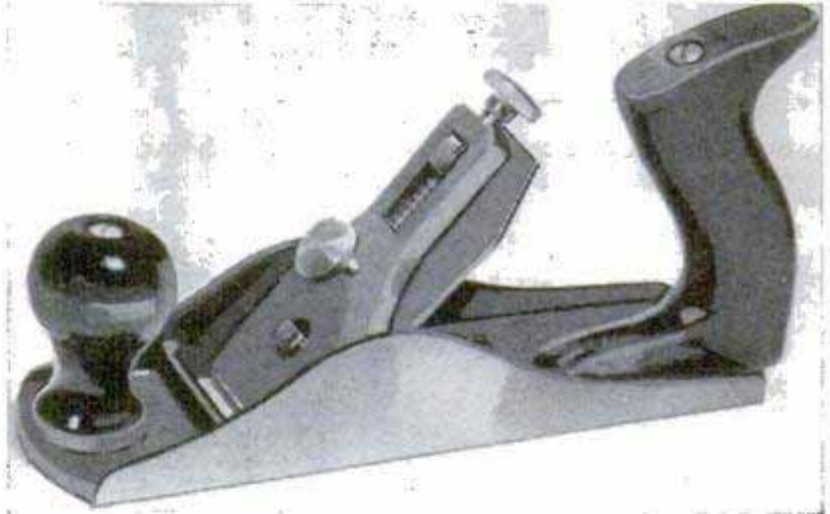


# SHOPPING

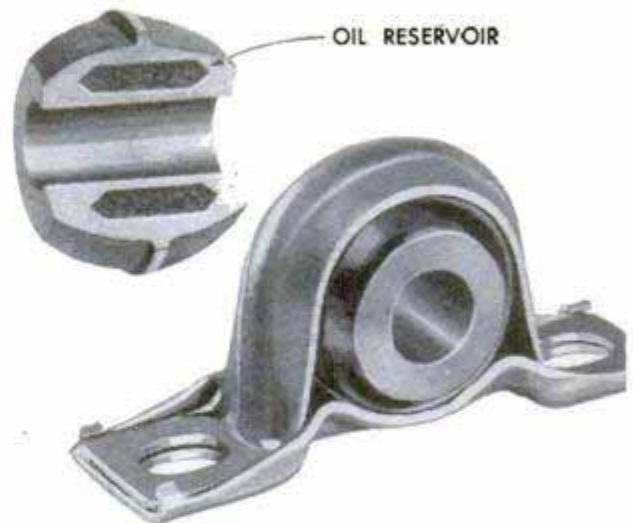


**ELECTRICALLY DRIVEN MULTIPURPOSE TOOL** now available to carpenters, plumbers, electricians and home craftsmen has several new and novel features. It consists of an a.c.-d.c. motor of portable-drill size driving a two-speed angle head fitted with two threaded sleeves for mounting accessories for sawing, drilling, sanding and grinding. Angle head is fitted with a handle and the motor is supported by a metal sling over the forearm

**THIS HAND PLANE** has a simplified blade adjustment which completely replaces the conventional frog, chip breaker and lever construction that has been standard for so long. New plane is fitted with screw-type blade lock having fine-thread screw which acts directly on the blade. The depth-adjusting screw also is direct-acting and is located at the top of the blade for convenient operation. The plane is chatterproof and chip-breaker action is automatic with blade settings

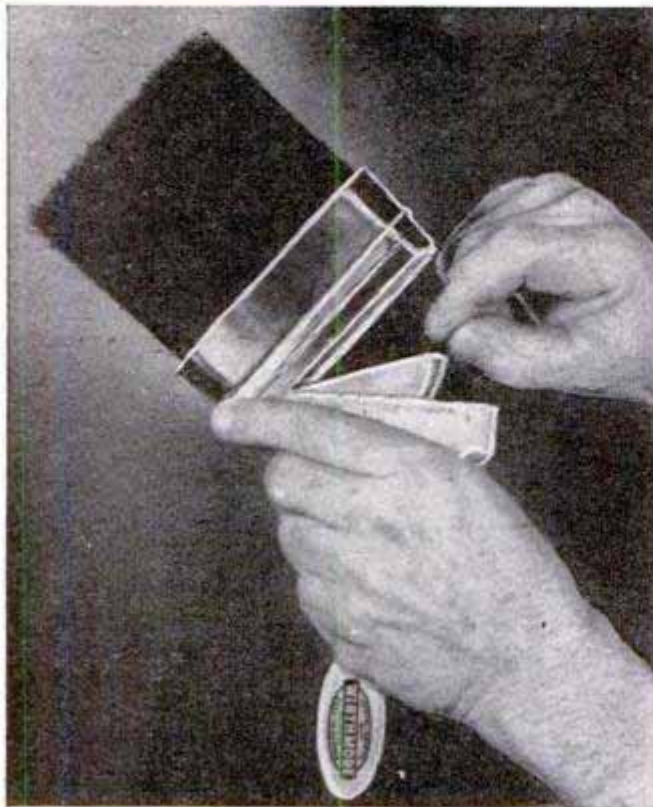


**SIMPLE BRAKE-SHOE TOOL** for quickly removing and installing the friction-pin lock on Chevrolet brakes saves time and prevents injury to the hands. With this tool at hand it is not necessary to dismount the brake shoe as the troublesome friction pin can be quickly removed or installed right at the car



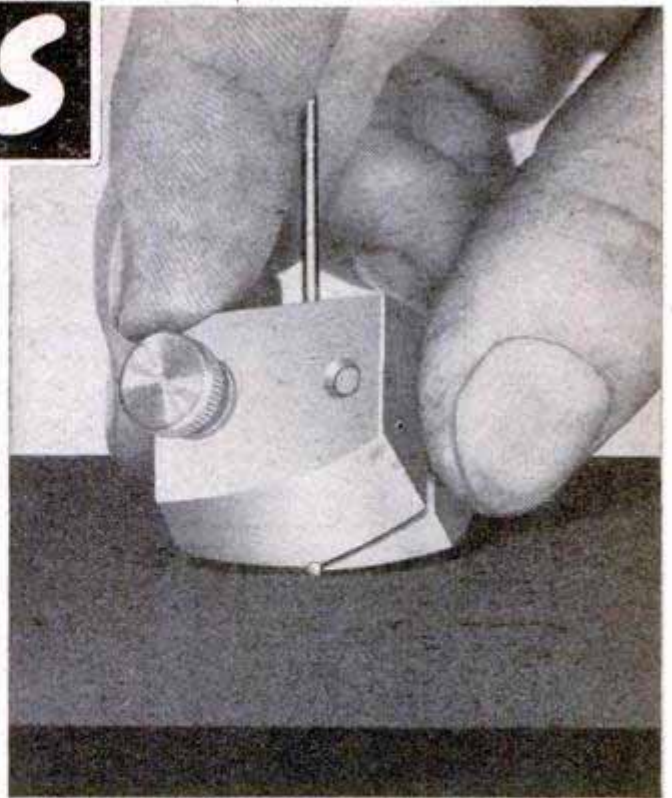
**PILLOW-BLOCK BEARINGS** which will withstand heavy loads and speeds up to 4000 r.p.m. now are used in many installations to replace ball bearings. The bearing sleeve is formed from sintered metal and contains a cavity which is filled with sponge iron that will retain lubricant for the life of the bearing

# FOR TOOLS

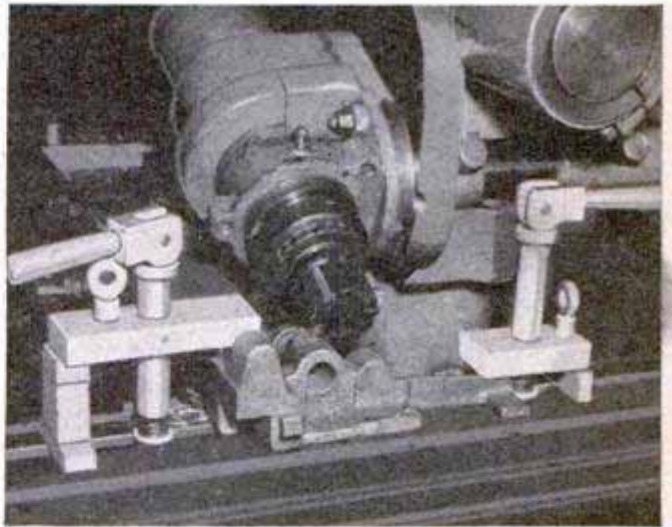


**THERE'S A NEW COME-APART PAINTBRUSH** now available which is designed to eliminate paint dripping from brush when painting ceilings. Paint which runs from bristles is trapped and funneled into a cup fitted in a recess in the handle under the metal ferrule. A simple thumb catch releases the ferrule from the handle, permitting easy access to the metal cup

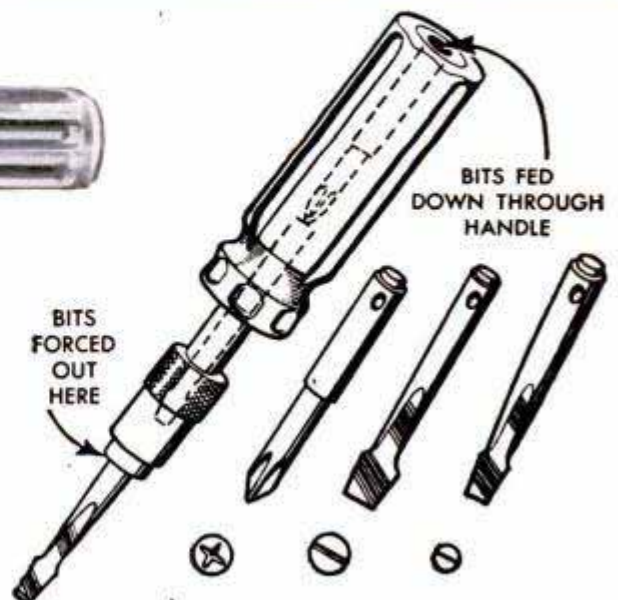
**A NEW MILLING-MACHINE CLAMP** designed to speed repetitive operations has a straight-line clamping bar actuated by a cam lock instantly released by lever action. The locking mechanism can be fixed at any height by means of teeth milled in the cam unit which mesh with teeth on the locking post. Once set, the clamp can be adapted to various operations

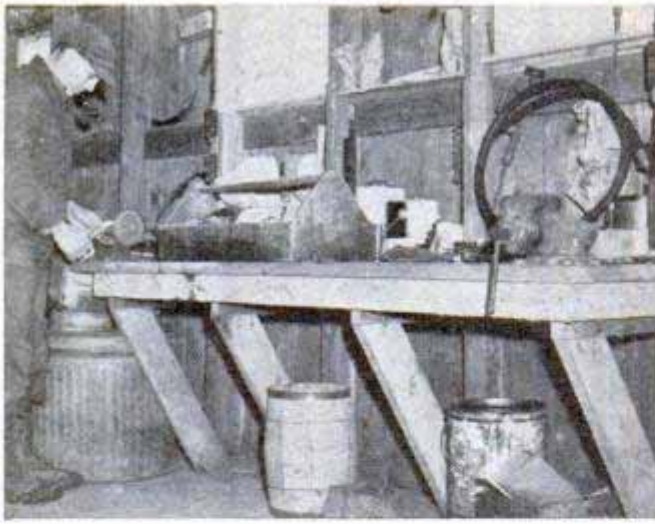


**THIS GUIDE** for honing drill bits in the number sizes holds the drill at just the right angle to the oil-stone. Honed drill bits, especially those in the smaller sizes, cut clean, true holes in either wood or metal



**MAGAZINE-LOADING SCREWDRIVER** can prove to be one of the handiest tools in the kit for electricians, auto mechanics and home craftsmen, especially if it has been designed to permit quick changes from one type of bit to another. The one pictured above and detailed at the right does just that. It comes with three special bits which are fed to the chuck from a magazine built into the handle. There's one bit for No. 2 Phillips-head screws and also 9/32 and 3/16-in. flat bits for driving round and flat-headed screws in several sizes. Handle is of tough plastic

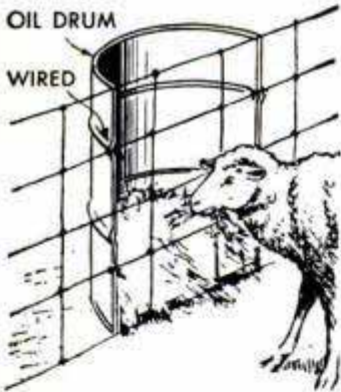




### Angle Braces Support Shop Bench

By using angle braces instead of the standard vertical legs to support his shop bench, one farmer found that storage space under the bench could be used to better advantage. The angle braces of 2 x 6-in. stock are nailed to the wall studs and to individual horizontal members which support the bench top as shown in the photo.

### Feeders Mounted on Wire Fence Are Made From Oil Drums



Small racks for feeding roughage to sheep or goats without waste are easily made by attaching halves of oil drums to a woven-wire fence. After one end has been removed from the drum, the latter is cut in half lengthwise to

provide two feeders. Holes drilled near the front edges of the feeder allow it to be wired to the fence, and hay placed in the feeders is easily pulled through the fence wire. If using a torch to cut the oil drum, be sure that the inside of the drum has been thoroughly steam-cleaned to prevent any possibility of explosion.

Albert H. Blackmon, Neeses, S.C.

### Magnet in Bag Picks Up Filings

A quick and easy way to pick up iron filings and shavings is to use a strong magnet placed in a paper bag. The filings which cling to the outside of the bag can be discarded by holding the bag over a trash can and removing the magnet. In this way, the filings will drop into the can and the magnet will still be clean.

Warren Norcross, Philadelphia, Pa.

### Brake Drums Provide Wheels For Small Caster Truck

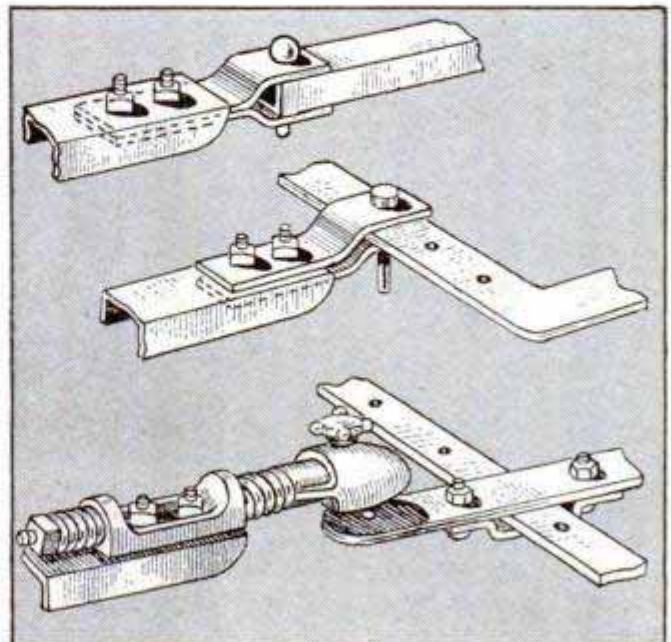
Old brake drums in various sizes make good wheels for small special-purpose carts, caster trucks and any other application where a sturdy, small-diameter wheel will serve. Note the neat swivel truck in the



illustration. Here, long wheel hubs are welded on and the wheels are fitted onto a short axle which is pivoted on a kingpin by means of a special yoke. This construction permits the truck to swivel and the axle to oscillate. Wheels can be mounted with the flange in or out as desired.

### Interchangeable Trailer Hitch

The difficulty of hooking the same trailer to tractors having different types of drawbars led one farmer to devise this handy interchangeable hitch. The arrangement permits using both wide and narrow yoke, or clevis-type, hitches and also the ball-joint car hitch on the same drawbar. One is quickly substituted for the other simply by removal of two bolts. The center detail shows the clevis hitch adapted for a tractor having a U-type drawbar of thin cross section. The adaptation is made by removing the two bolts and turning the lower bent member over. In the top view the clevis is adapted for a swinging drawbar of a thicker cross section. This change is made by placing the lower half of the clevis with the bend down as indicated.

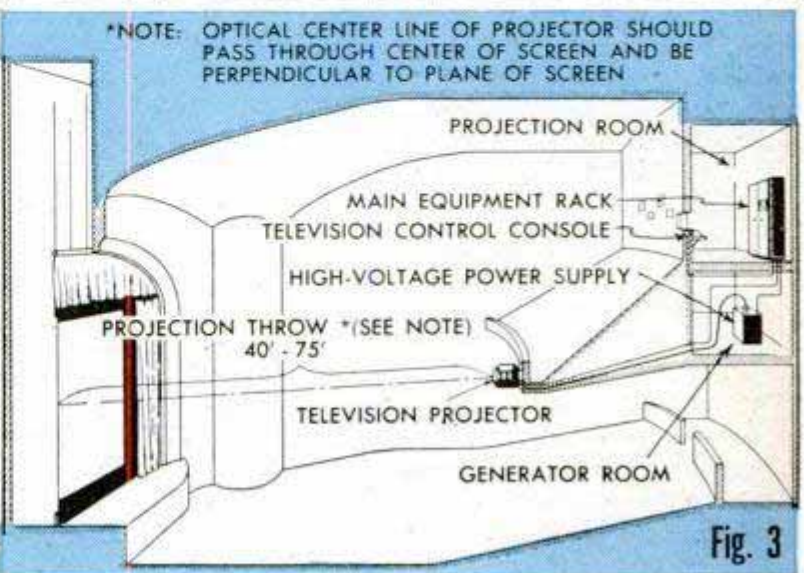
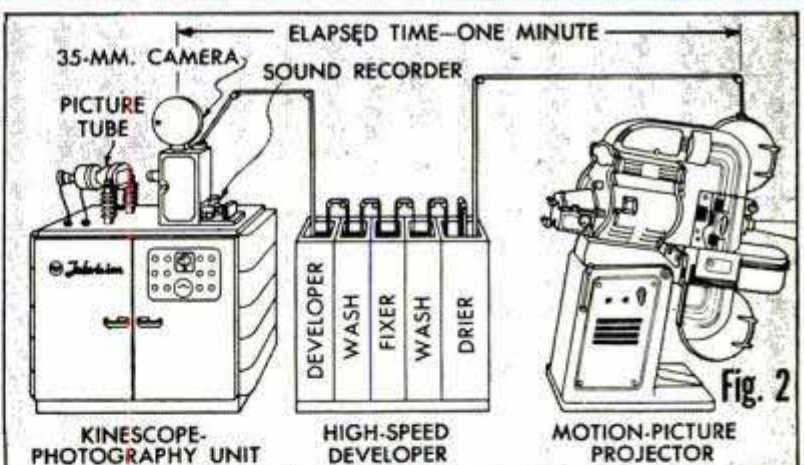
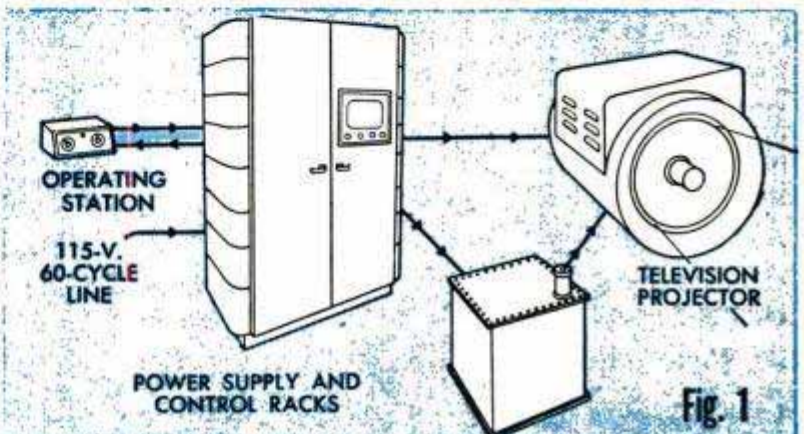
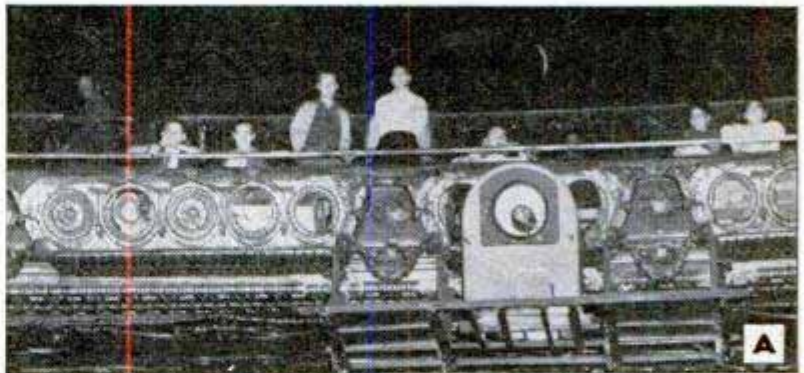


## TELEVISION IN THE THEATER

THERE ARE two basic RCA systems for theater television, one is the "intermediate film system" and the other is an "instantaneous projection system." In the instantaneous-projection system, shown in Fig. 1, a television picture is created on the face of a special high-brilliance kinescope "picture tube." This bright picture is then projected directly to the theater screen by means of a highly efficient reflective optical system. In this way, the audience sees the action at the exact instant that it is taking place.

In the intermediate-film, or "kinescope photography" system (sometimes called the film-storage system), Fig. 2, the television picture is again produced on the face of a special kinescope picture tube. This image is photographed by a 35-mm. motion-picture camera. The accompanying sound is simultaneously recorded directly on the film by a film-recorder attachment. The exposed film is then run into a high-speed developer where it is developed, washed and dried. It is then fed directly to a standard motion-picture projector in the projection room which projects it onto the theater screen. The whole process, from photographing to final projection, takes approximately one minute.

A typical theater instantaneous-projection installation is illustrated in Fig. 3. The operating station and control rack are mounted in the projection room; the power-supply rack may be installed in this or an adjacent room. The high-voltage supply is in a vault, or generator room. The TV projector is mounted out in the auditorium, as shown in photo A, about 75 feet from the screen in such a manner that the light beam passes through the center of the screen. This equipment projected a 15 x 20-ft. picture at the projection throws indicated.



# "HANDI TALKIE" POCKET SET FOR EXPERIMENTERS

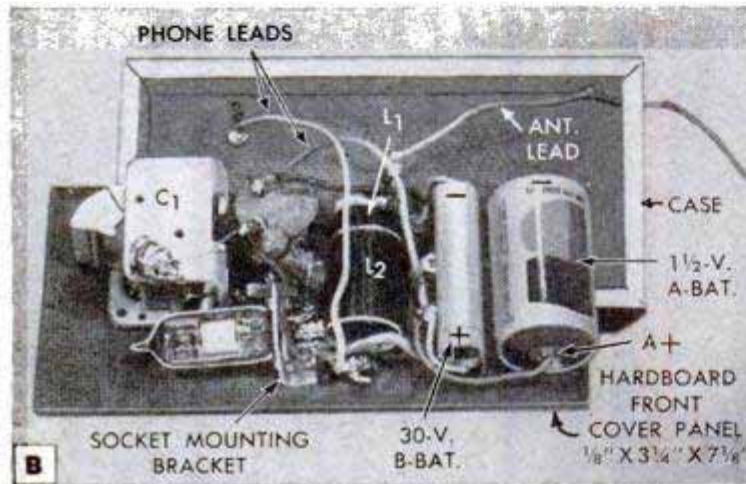
By S. A. Johnson



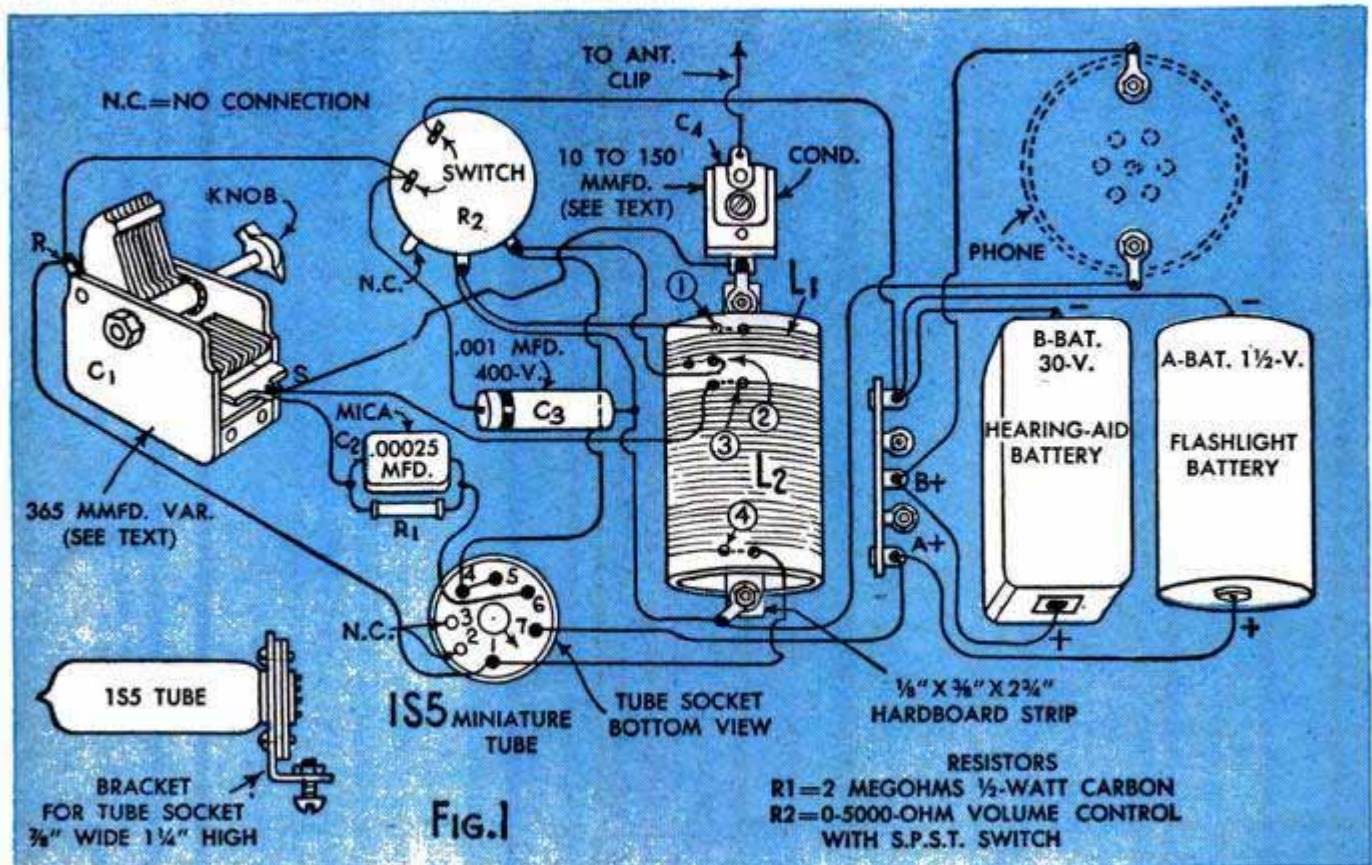
ONLY ONE miniature tube is used in this "handi talkie" type pocket receiver. It is so compact it will slip into a coat pocket—yet sensitive enough to bring in strong local broadcasting stations with only an emergency antenna. The short antenna lead shown in photo A terminates in a spring clip which may be clipped to the metal finger stop on a dial telephone, a metal lamp base as illustrated in photo C, bedsprings, window screen, or any similiar metal object in the home. Out of doors, practically any metal railing, wire fence, downspout, bicycle frame, or other metallic object will provide a suitable emergency antenna.

All parts are inexpensive standard materials. The case is made of 1/4-in. pine or plywood, and the top and bottom covers are made of 1/8-in. hardboard. The over-all dimensions of the case are given in photo D. Most of the parts are mounted directly on the hardboard front panel as shown in photos B and E. The single earphone, which is from a 2000-ohm headset, should be a type which has outside terminals. It is mounted on the back panel by means of its terminal screws.

The coil for the set is hand-wound on a cardboard case from a "C" size of flashlight cell, see Fig. 3. Coils L1 and L2 are both close-wound in the

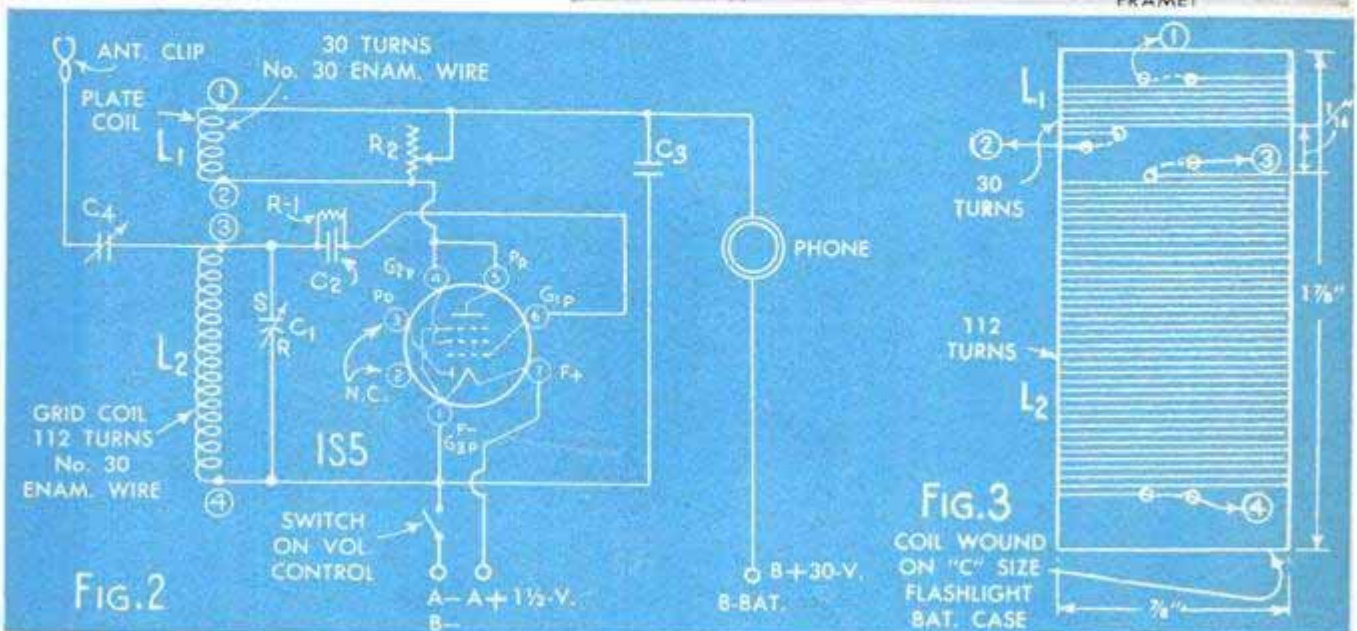
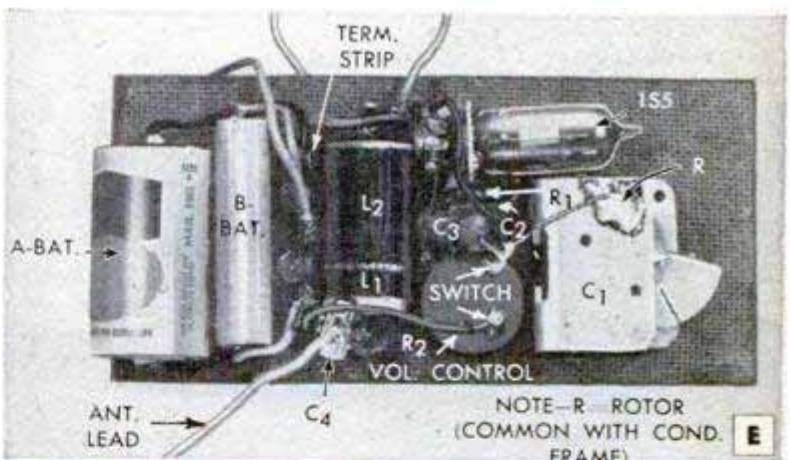
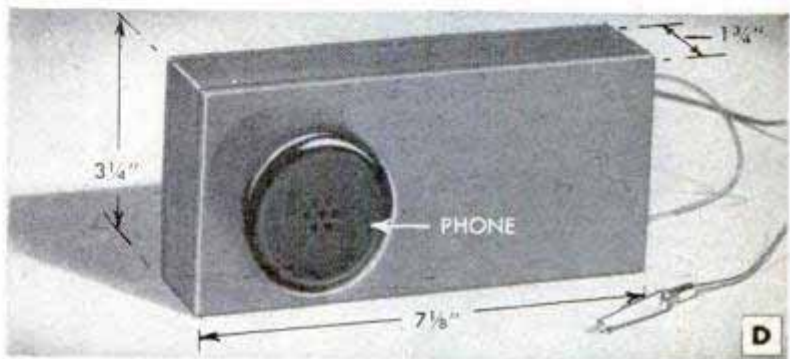


The coil for the set is hand-wound on a cardboard case from a "C" size of flashlight cell, see Fig. 3. Coils L1 and L2 are both close-wound in the



same clockwise direction as shown in pictorial diagram Fig. 1 and diagram Fig. 3. Two small holes are punched in the cardboard form to anchor the wire at the start and finish ends of each coil. The schematic circuit diagram appears in Fig. 2; No. 18 or 20 flexible insulated hookup wire is used for all connections except those to the coil, which are made with the coil-wire ends. The rotor plates of condenser C1 are common with the condenser frame. This is the terminal R. Power for the set is provided by one standard-size flashlight cell and a 30-volt hearing-aid battery.

Test the set first with a standard outdoor antenna or a long indoor wire. Assemble it in the case temporarily and open the setscrew on the small trimmer condenser C4 as far as it will go. The on-off switch is combined with the volume control. Turn this control "full on" and rotate the variable condenser until you hear a whistle indicating a station. Now back off the volume control very slowly until the whistle disappears and the station comes in clear. After the set is in working order with a standard antenna, connect it to any convenient emergency antenna and adjust condenser C4 until it is closed as much as possible without eliminating the oscillation whistle at the low (550 kc.) end of the band. The case cover can now be closed with two small brads or wood screws to complete the assembly. The detailed student material list for this article is R-394.



# HOW TO BUILD A MULTI-

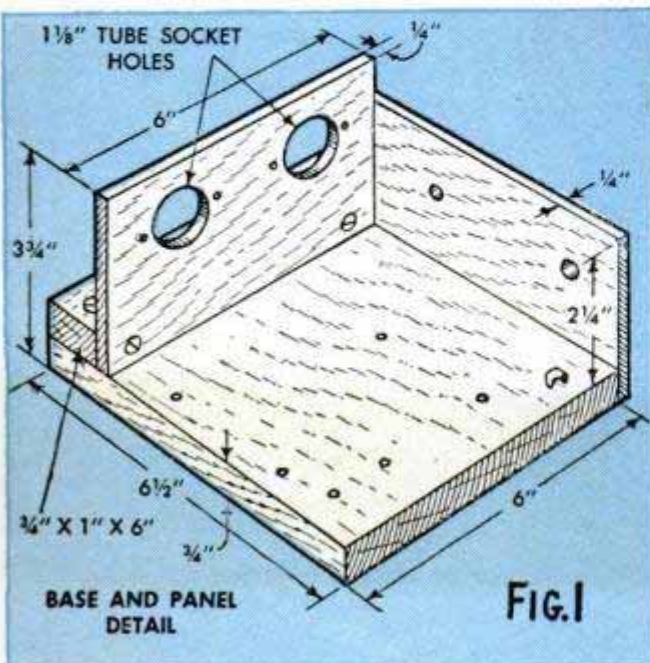
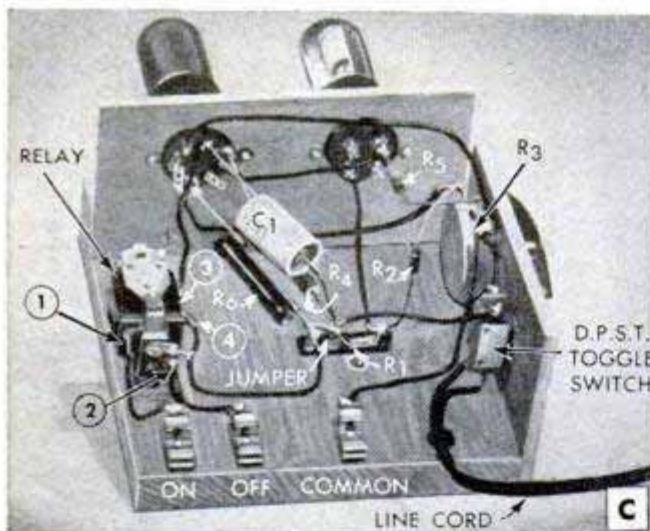
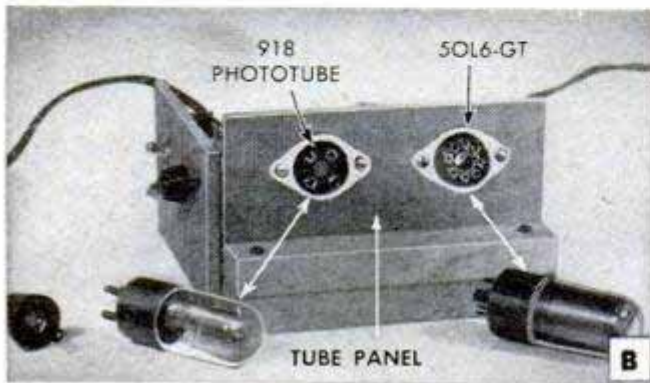
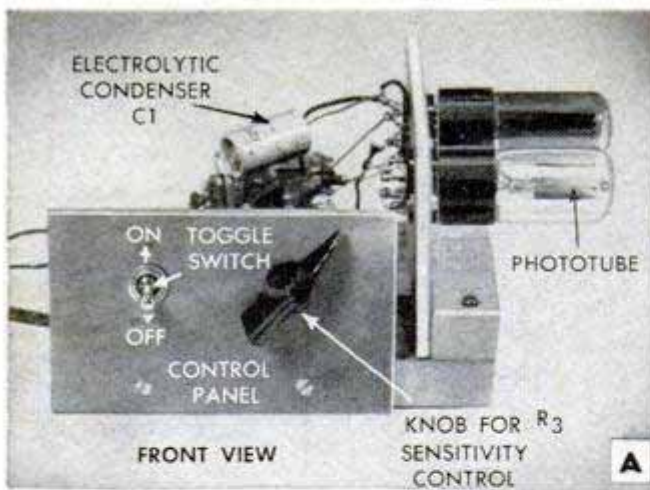
By L. M. Dezettel

**T**HIS MODERN phototube circuit will permit you to turn your lights or other electrical appliances on or off by either shining a light beam onto the phototube, or breaking a light beam that is shining on the tube. It has many applications, such as counting items going down a conveyor belt, announcing the entrance of a customer passing through a doorway, etc. By adding an infrared filter, available from any photographic supply house, to the light source, it can be converted into a "black light" burglar-alarm system. The unit may also be made into an intermittent, electronic light flasher.

A sensitive s.p.d.t. relay is employed in the plate circuit of a 50L6-GT tube. The type 918 RCA phototube anode and cathode are connected in the grid circuit of the 50L6-GT tube so as to cause the grid voltage to vary with the light that falls on the phototube. Decrease of negative bias on the 50L6-GT causes a flow of plate current in this tube through the relay and closes the armature. The contacts on the armature supply 115 volts a.c. to a light or other appliance, or disconnect the a.c. from it, depending upon the terminal connections made on the unit.

Photos A, B, C and E show various views of the completed relay; the simple base and panel construction is detailed in Fig. 1. The use of a double-pole, single-throw toggle switch disconnects the entire circuit from the house line. While the unit is operating, precaution should be taken not to touch any of the unit wires or clips. Disconnect the unit from the wall socket, or throw the toggle switch to "off" before making connections to the clips. The sensitivity control is a 4-watt wire-wound potentiometer. The phototube faces the light source, as indicated in photo A. A schematic circuit diagram is given in Fig. 3. Fig. 2 shows pictorial bottom views of the tube sockets. Use rosin-core solder for all connections, and be sure to observe the polarity of the electrolytic condenser C1.

After completing the wiring, experiment with proper sensitivity control by playing a flashlight beam across the phototube. The click of the relay will indicate proper action as it closes and opens. Adjustment of the sensitivity control is determined by experience. A slight adjustment of the relay spring may be necessary. A good source of light can be made with an automobile headlight bulb operated from a 6.3-volt filament-type transformer. A suitable inexpensive lens for focusing the light in

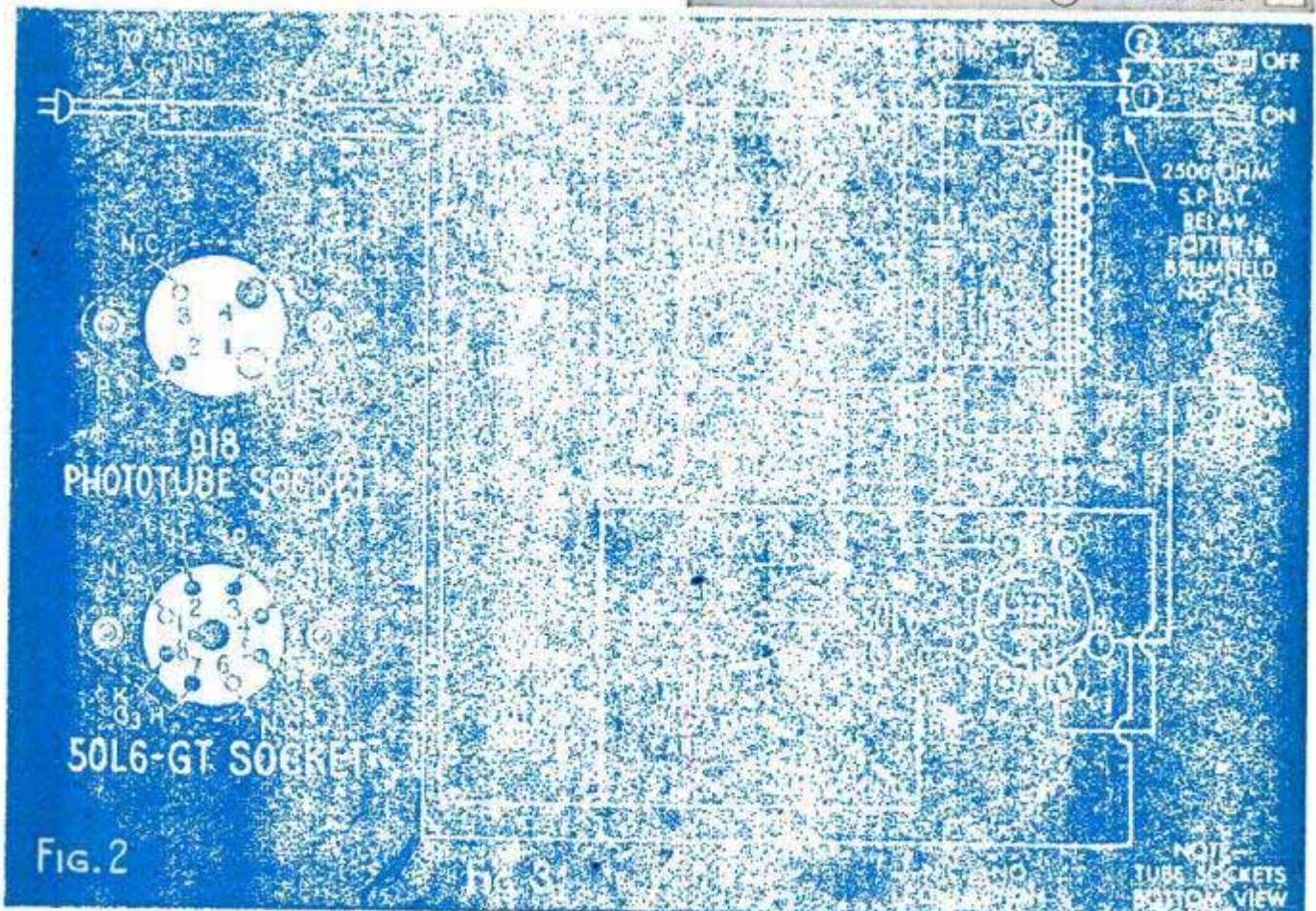
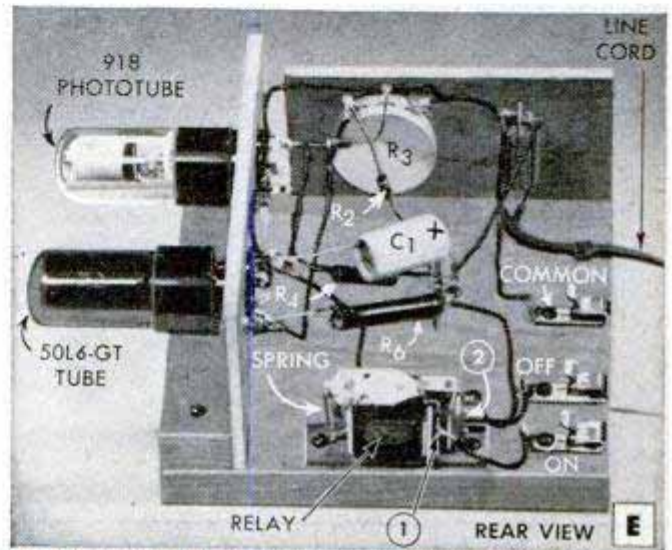
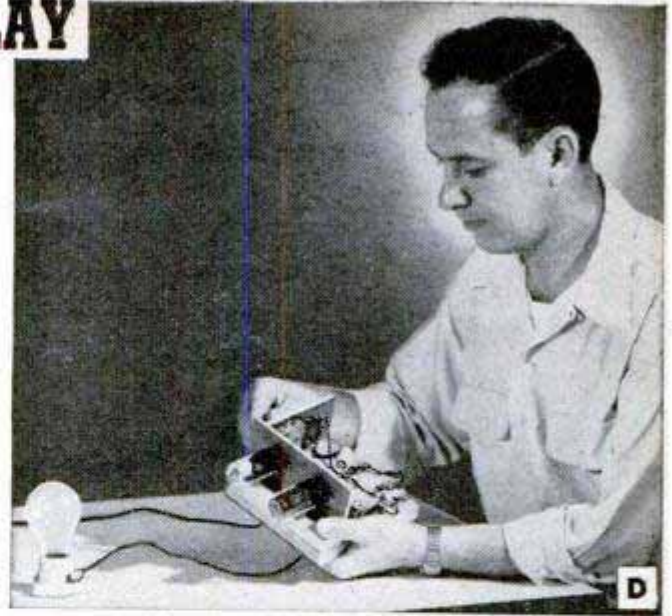




# PURPOSE PHOTOTUBE RELAY

a beam can usually be purchased in a local dime store. Installation can be made in a lighttight box (except for the beam opening); provide a frame or slot in front of the lens for the infrared filter, if desired.

As an experimental start, for a light to be controlled by the relay, mount a 115-volt light bulb in a base-mount type of socket with wires about 3 to 5 ft. long as shown in photo D. The leads may be connected to the Fahnestock clips marked "common" and "on," or "common" and "off," depending upon the type of operation desired. When connected to "common" and "off," the light will be off until the beam from the light source falls on the phototube; this is the connection for opening doors and similar applications. When connected to "common" and "on," the lamp is off when a steady beam of light is on the phototube, and comes on when the beam is broken. This is the hookup for counting articles on a conveyor belt, for a burglar alarm, etc. By connecting the lamp to "common" and "on," and placing the controlled light in front of the phototube, the relay will turn on and off at a moderate rate, and you have an electronic flasher. Detailed student material list R-395 is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage.



# TELEVISION TODAY



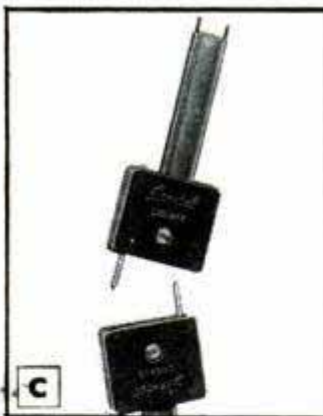
A

**A**—Giant spherical mirror designed for use in a reflecting-type of optical projecting system which allows a small bright picture on the face of a special cathode-ray television picture tube to be greatly magnified and projected to fill a large theater screen. The mirror is 26 inches in diameter and it weighs 90 pounds. Rigid tolerances are met in producing these giant mirrors. Following the grinding and polishing, they receive a special aluminized coating

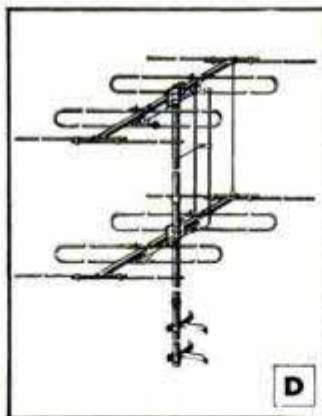


B

**B**—Indoor TV antenna of unusual design employs no rods or external elements to be adjusted. It is claimed to receive signals on all channels and is finished to harmonize with any type home furnishings. A switch adjusts the device to the channel desired and the antenna is electrically tuned to the station



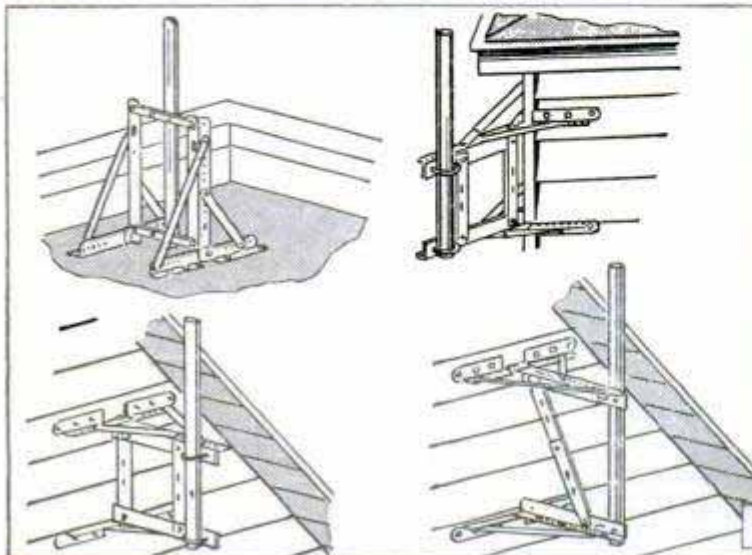
C



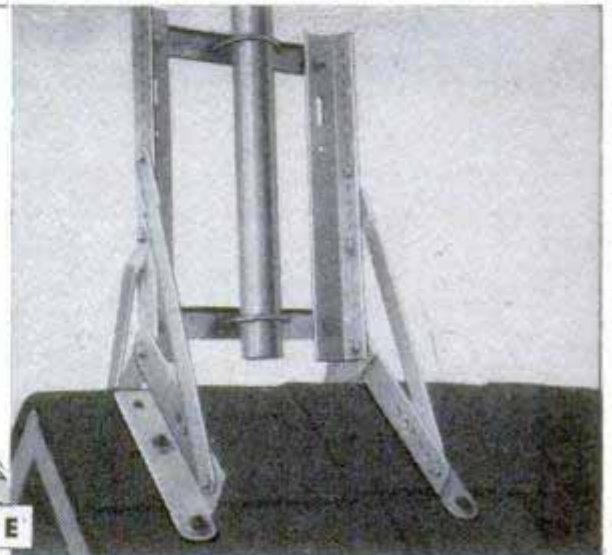
D

**C**—One of the most needed and convenient devices for the TV set owner is this connector for the 300-ohm twin-lead transmission line that connects the TV receiver to the receiving antenna. It provides a speedy means for connecting accessory equipment into a television receiver circuit as different combinations are required by varying conditions. Such accessories as inside and outside antennas, boosters, matching stubs and matching devices can be quickly connected. Added lengths of 300-ohm line can be inserted for standing wave correction. TV sets may be moved to different locations if they are of the small table type since the connectors provide instant antenna connections for an emergency installation

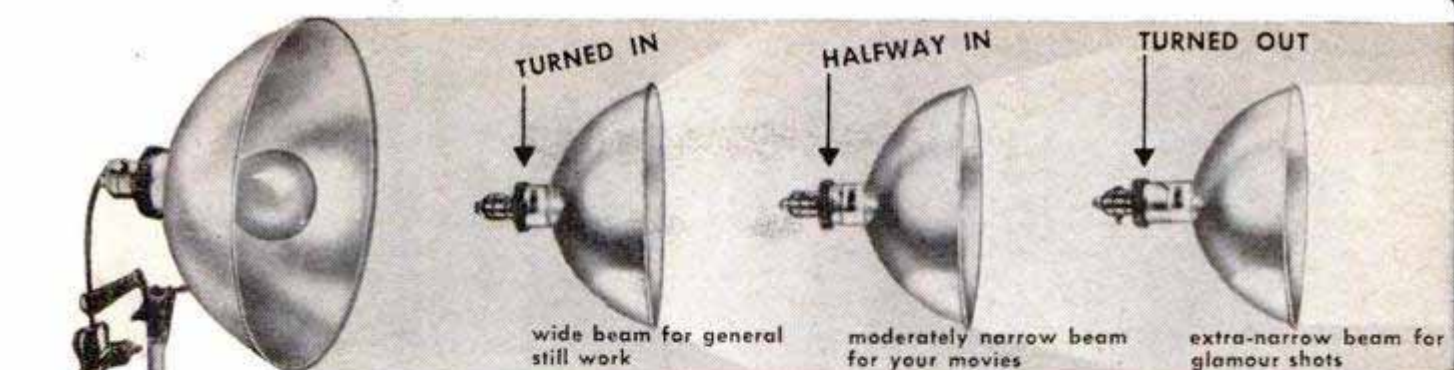
**D**—Twin-driven Yagi-type TV antenna is stagger-tuned for channels 4 and 5. With this new design, it is now claimed that it is possible to achieve the unusual gain heretofore possible on only one channel with this type of high-gain directional antenna. In fringe areas, or where signals are weak, this improved Yagi is claimed to bring in signals and at the same time not require the mast height necessary for comparable signals with other antenna types. The Yagi type of high-gain directional single-band antenna system is well-known to many amateur radio operators all over the world for efficiency



E



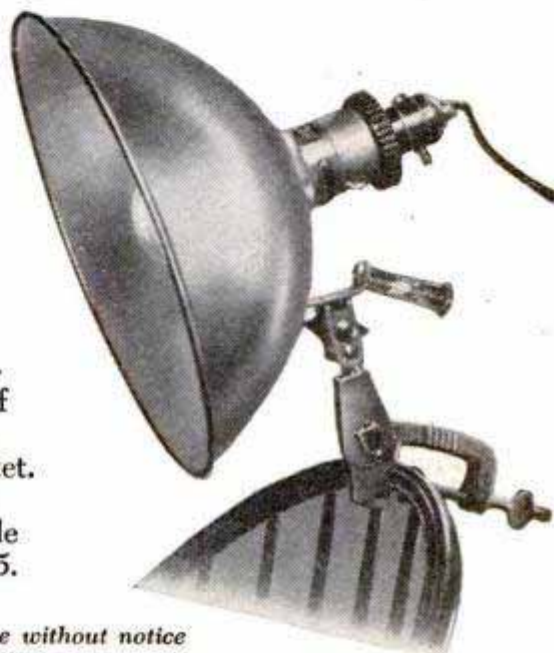
**E**—All-position antenna mount adjusts to any position on a roof, parapet, side wall or corner of a building, as illustrated in the sketches. It is pre-assembled for quick and easy service installations



## For "on-the-beam" flood shots **KODAK VARI-BEAM**



**Kodak Vari-Beam Standlight—**  
12-inch reflector with a #2 flood lamp gives powerful illumination . . . convenient handle aims the lamp . . . telescopic column adjusts height from 3 to 5½ ft. . . special rubber rim on heavy base protects furniture. \$15.



**Kodak Vari-Beam Clamplight—**  
lamp unit has all the features of the Vari-Beam Standlight unit, but is mounted on flexible bracket. Padded clamp attaches quickly and securely to chair backs, table tops, and tubular surfaces. \$9.75.

*Prices on this page are subject to change without notice*

## For sparkling flash shots—**MULTIPLE flash**

**Flash pictures** taken with multi-unit flash illumination have a more pleasing, natural look. You eliminate possibility of burned-out highlights and dense shadows in flash shots this easy way:



**Start with the KODAK FLASHHOLDER** with *Flash-guard* connected to camera—easy to attach. Exposure data on back of reflector. \$11.50.

**Then connect a KODAK FLASHHOLDER EXTENSION UNIT, MODEL B.** Attach to a chair for side lighting. More than one unit can be used. \$12.75.



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**Kodak**  
TRADE-MARK

(Continued from page 103)

The most intriguing part of the house is the heating-cooling cove with turned-up edge which extends outward from each sidewall 12 inches below the ceiling. In this aluminum-lined trough are the Freon cooling coils, or pipes, so placed that no part of them extends above the edge of the cove. In the present arrangement, the heating elements are in a smaller cove nearer the ceiling. For experimental purposes and ease of metering, the present heat system is electric. Doctor Mills expects eventually to convert the system to hot water (with a small gas heater), using the same pipes as are now used for cooling. Bathrooms, hallway and kitchen have small direct radiant-heating units.

In severe winter weather or extreme summer heat, window draperies will be pulled over the large glass surfaces. All curtain and wall draperies in the house are woven from nylon and foil yarns so the surface presents at least 90 percent foil exposure for reflective purposes. Venetian blinds made of aluminum are also used for reflection.

In reflective radiant conditioning any type of fuel can be used so long as the heat is introduced in the living space in radiant form and not as hot air. Hot water or steam radiators can be used but should be so placed as to emit heat rays freely toward the reflective wall and ceiling surfaces.

To understand the reflective radiant cooling system, all you do is reverse the heat procedure. Excess heat from your body is reflected to the walls and the ceiling and then to the cold pipes in the cove. The doctor insists that the air temperature in a room can be at 90 or 100 degrees and you will be perfectly comfortable due to your body heat loss to the reflective surfaces. On one 96-degree July day of muggy heat, perfect comfort in the entire house cost only two kilowatts of current per hour—25 cents a day at Cincinnati power rates.

A legion of automatic devices controls the reflective radiant heat input in winter and its removal in summer. A 25-kilowatt industrial-type transformer feeds 240 and 120-volt alternating current to a large panel board in the basement. Part of this current is used directly for hot-water heater, kitchen range, household utilities and lighting. The balance feeds into a transformer through four contactors, each of which is operated by its own air thermostat in the central hall upstairs. These four

(Continued to page 240)



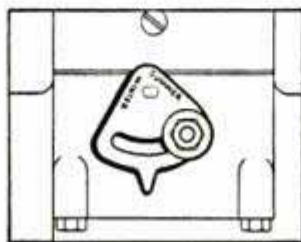
# Care and Feeding of Engines

BY S. P. CORP

## ONE CAUSE OF STARTING TROUBLE

So it gets cold. So you have starting trouble. So you hunt and hunt to find what's wrong. Early in your hunting, it may pay you to check on the heat control valve in the exhaust manifold. This is a little gadget that either diverts hot gases over and around the intake manifold or passes them on through the muffler.

There are two types of these heat control valves, manual and automatic. The manual type has a cam lever with a dial marked "Summer" and "Winter." As of now, the lever should be set at "Winter" and the lock bolt set for that position until next spring. If you have already had a cold snap, and starting trouble, make sure the dial is set correctly. Such a simple matter may solve your starting problem in a jiffy.



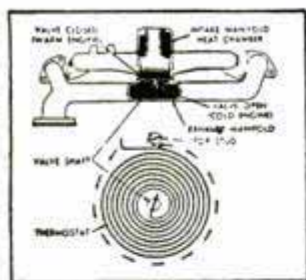
MANUAL VALVE

## AUTOMATIC CONTROL IS TOUGHER

Proper working of the automatic control depends on the thermostatic spring. If there is too little tension, the valve won't open, no heat gets to intake manifold, and you have starting trouble. Check while your

engine is cold. Check the valve shaft to be sure it turns freely. Check the spring to be sure it has enough tension to open the valve.

Why? Because, if the valve doesn't open, your engine is bound to be slow in warming up, with a lot of coughing and spitting. On the other hand, if the valve stays open in warm weather, the trouble can



AUTOMATIC CONTROL

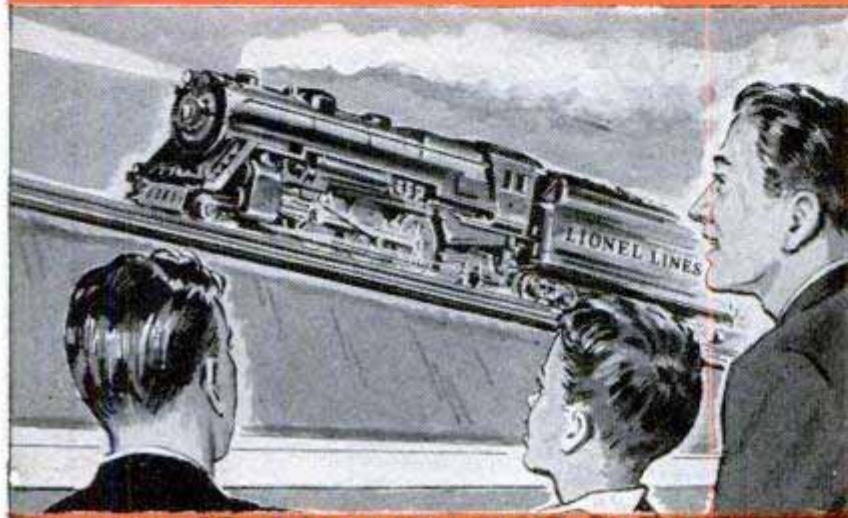
be serious. Your car will lack power, and the engine will have a tendency to cut out at high speed because the mixture is too hot and too lean—and your exhaust valves may even become burned!

## RINGS IMPORTANT IN ALL WEATHER

Winter and summer, you need good piston rings. Starting trouble is only a very minor result of rings that don't seal the cylinders properly. For top performance, get the best rings made—Sealed Power Piston Rings. There is a Sealed Power Ring set specifically engineered to do the best possible job in your engine, whatever the make, model, or wear condition. The best oil control ring in the world is the Sealed Power MD-50 Steel Oil Ring, the only ring with the Full-Flow Spring. It helps you save oil, save gas, and restore original engine power, even in badly tapered or out-of-round bores. Ask for the free booklet, "7 Ways to Save Oil." Just address a postal card to Sealed Power, Dept. G-10, Muskegon, Mich.

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## MAGNE-TRACTION



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MORE SPEED

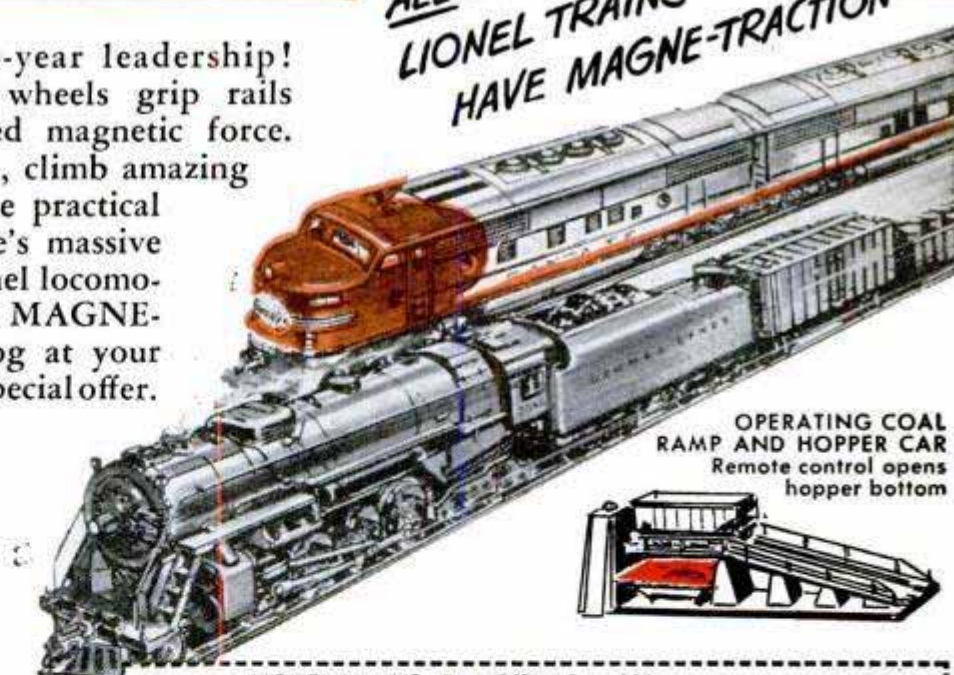
MORE PULL

MORE CLIMB

MORE CONTROL

ALL and ONLY  
LIONEL TRAINS  
HAVE MAGNE-TRACTION

Grand climax to Lionel's 50-year leadership! MAGNE-TRACTION makes wheels grip rails with permanent, motor-shielded magnetic force. Trains take curves at top speed, climb amazing grades, stop on a dime. It's the practical equivalent of a real locomotive's massive *weight!* And it's in all 1950 Lionel locomotives...exclusively Lionel. See MAGNE-TRACTION work. Free catalog at your dealer's, or send coupon for special offer.



OPERATING COAL RAMP AND HOPPER CAR  
Remote control opens hopper bottom

LIFT BRIDGE  
Raises center span;  
automatic  
or remote control.



OIL DERRICK & PUMP  
Motor-operated beam;  
illuminated oil column.



LIONEL TRAINS, Post Office Box 466  
Madison Square Station, N. Y. 10, N. Y.  
I enclose 25c. Please send me special Lionel Train Catalog offer postage prepaid.

1. The Big New Lionel 44-page full-color catalog.
2. The "Magic of Magne-Traction Book" with new track layouts, scenic effects, landscaping, etc.
3. The Lionel "Portfolio of 19th Century Locomotive Art Prints" —in color—suitable for framing.

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**ALL FOR 25¢**

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News for model railroaders—a new handbook on Model Railroading published by Bantam Books is now on sale for 25c.



# New Tricks You Can Do

with these **Wizards with Wood**

Do you get a kick out of making things with wood? You'll rave about the dandy new effects you get with these time-tested products. . . .

## A MUST for Finishing Fir Plywood



Tame that wild grain with FIRZITE. It tight-seals the pores . . . virtually prevents grain rise or checking . . . readies the surface satin-smooth for paint, stain or enamel. (For blond, pickled, wiped or tinted effects use White Firzite).

### FIRZITE

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Pints, Quarts, Gallons

For "natural wood" finishes on furniture or woodwork, there's nothing like Satinlac. Brings out the natural grain and color beauty of any plywood or solid wood. Avoids that "built-up" look, and will never turn yellow or darken with age. "Water-white", easy to brush or spray, dries ready for next coat in 2 or 3 hours.

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To make things or fix things, use Weldwood Glue for all wood-to-wood bonds. Makes joints stronger than the wood itself. Mixes easily with water. Stain-free, rot-proof . . . highly water-resistant! 15¢, 35¢, 65¢, 95¢ and larger sizes.

### WELDWOOD PLASTIC RESIN GLUE

Ask for Weldwood Glue, Firzite and Satinlac at hardware, paint or lumber dealers.

Send post card for interesting glue and finishing leaflets.

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## 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.

### Painting Gutters



**Q**—Recently I had new galvanized gutters and downspouts installed. I painted them immediately for added protection, but only lately the paint has peeled badly, more especially at the gutter joints and on the downspouts. What causes this and can anything be done to prevent it?

W.M., Superior, Wis.

**A**—Many tinsmiths recommend that galvanized gutters and downspouts be allowed to "weather" for a period of from two to six months before painting, as certain residues from the galvanizing process, as well as soldering salts at the joints, affect the bonding properties of paint. You did not say whether you used a metal primer, but a common procedure is to allow two to six months for the parts to weather, then apply a metal primer and follow with outside paint in the desired color. Some primers used by builders are said to contain ingredients which tend to neutralize the lifting action of the acids remaining from the galvanizing and soldering processes. However, we believe that where the owner does the painting himself it is advisable to wait the specified time before applying primer or paint. In your own case, where the paint has already been applied, there is little you can do except to scrape off all loose paint and apply a fresh coat in the color desired. You probably will have no further trouble, provided, of course, the old paint remaining after scraping is bonded solidly to the metal.

### Waxing New Furniture

**Q**—I have new living room and bedroom furniture in a blond finish. I would like to wax this furniture to preserve the finish, but I have been told this is not advisable. Why?

D. W., Sacramento, Calif.

**A**—We know of no reason why you should not wax your new blond-finished furniture if you prefer, except perhaps that in normal use the surfaces will require rewaxing and polishing periodically and this requires considerable labor and time to produce a first-class job with non-liquid wax. We would not advise the application of self-polishing wax on finely finished furniture, not because these waxes will cause harm, but because of the difficulty of obtaining a uniform coating by ordinary

(Continued to page 238)

# Whiz-Master

## 10-inch BAND SAW

**Sensational, New, LOW Priced Saw does anything that any other band saw on the market will do**

One of the most versatile saws ever produced. For cross-cutting, ripping or on complicated curves and circular cuts, it performs with remarkable efficiency. Table tilts to 45° and has miter gauge slot. All mechanism fully enclosed but readily accessible. Adjustable blade guard allows cuts up to 3¾" thick. Top wheel adjustable for tension and tilt. Rip Fence and Miter Gauge furnished at small additional cost.

All parts except blade and mechanical units are made of wood . . . birch plywood and hardwood, guaranteed against warping.

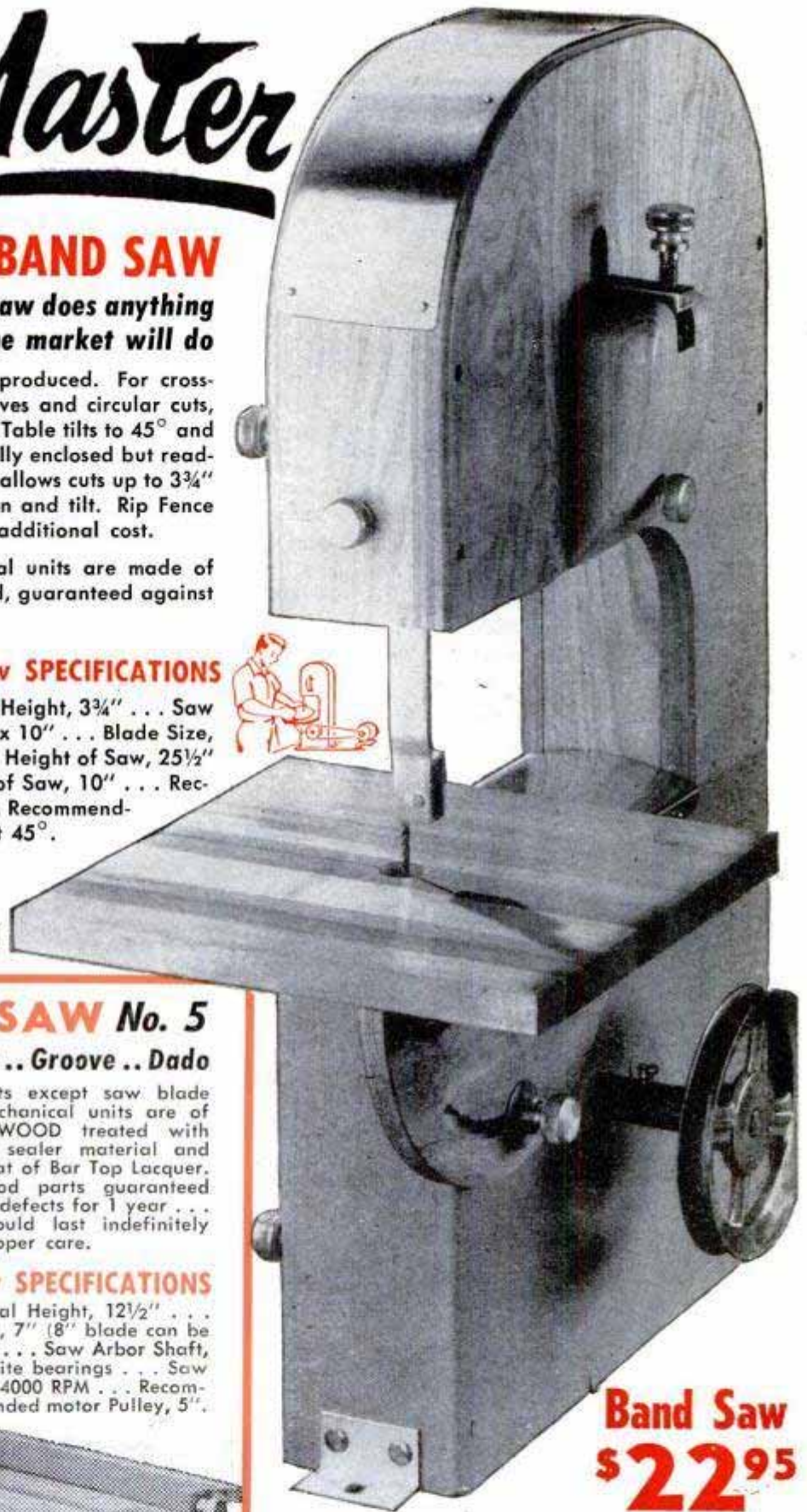
### No. 10 Whiz-Master Band Saw SPECIFICATIONS

Capacity in Depth, 9" . . . Capacity in Height, 3¾" . . . Saw Blade Length, 60" . . . Table Size, 10" x 10" . . . Blade Size, 3/16" . . . Bearings, Chrysler Oilite . . . Height of Saw, 25½" . . . Length of Saw, 17½" . . . Width of Saw, 10" . . . Recommended Motor, 1750 RPM, ½ HP . . . Recommended Pulley on Motor 2½" . . . Table Tilt 45°.



*The ideal, efficient, economical saws for the home shop or any shop*

**MONEY BACK GUARANTEE if not satisfied**



**Band Saw  
\$22.95**

Shipping Weight 24 lbs.

Parcel Post Prepaid

Extra Band Saw blades, each . . . . . **\$1.25**  
Miter Gauge calibrated to 45° each way . . . . . **1.50**  
Band Saw Rip Fence, complete . . . . . **1.75**  
Quick Change Mounting Board with motor bracket bolts and nuts for either Whizmaster Band Saw or Table Saw. Board 7x2x¾" . . . . . **\$2.50**

## Whiz-Master TABLE SAW No. 5

**For Cross Cut .. Ripping .. Miter .. Groove .. Dado**

Performance matches that of saws costing several times this price. The ideal table saw for the home shop. Fence extends full length of table. . . Saw can be used on either side of blade. . . Miter gauge graduated for 15° - 30° - 45° cutting.

All parts except saw blade and mechanical units are of HARD WOOD treated with specific sealer material and final coat of Bar Top Lacquer. All wood parts guaranteed against defects for 1 year . . . and should last indefinitely with proper care.

### No. 5 Whiz-Master Table Saw SPECIFICATIONS

Table Size, 18x20" . . . Total Height, 12½" . . . Size of Saw Blade Furnished, 7" (8" blade can be used) . . . Depth of cut 1¾" . . . Saw Arbor Shaft, ½" . . . Oil-Lite bearings . . . Saw Speed, 4000 RPM . . . Recommended motor Pulley, 5".



**Table Saw**

**\$16.95** Parcel Post Prepaid

7" Combination Saw Blade \$2.75

Shipping Weight 20 lbs.

Telephone Victor 5592

**W. R. VERMILLION CO.**

2201 Grand Ave. Kansas City, Mo.

# Give your son a gun he'll be proud of

No other name in firearms says "quality . . . dependability . . . craftsmanship" so surely as Winchester. This single-shot, bolt action Winchester Model 67 is a truly fine 22, designed as a beginner's rifle . . . yet its high accuracy has won the admiration of experts.

The Model 67 shoots 22 Short, Long, and Long Rifle cartridges interchangeably. It is a light, finely-balanced rifle with a full man-sized stock and sporting type forearm of genuine American walnut. Extra safe . . . the Model 67 does not cock upon opening or closing the bolt; it must be cocked manually. See it at your dealer's.



**FREE!** Folder giving full details of all Winchester 22 caliber sporting and target rifles. Address: Dept. 342-D, Winchester Repeating Arms Co., Division of Olin Industries, Inc., New Haven 4, Conn.



The World Famous Model 67  
**WINCHESTER**  
TRADE-MARK  
SPORTING RIFLE

(Continued from page 236)

means of application. We believe you would find it more satisfactory to use an ordinary furniture polish to brighten up the finish when the luster becomes dulled by finger marks and dust. Make it a rule to use only a high-grade polish and be sure to follow the manufacturer's directions in every detail. You can then be assured of consistently good results. Many manufacturers of high-grade furniture make specific recommendations for the care of the finish. It's a good idea to follow these instructions.

## Roof Leaks

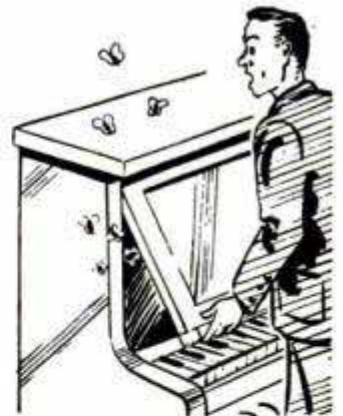
*Q—My home is over-roofed with composition shingles which are now about 15 years old. I've noticed lately, during hard rainstorms, that the roof leaks in several places. The roof is quite flat and the leaks seem to be mostly in the lower half of the roof above the eaves. How does one locate these leaks so that they may be repaired?  
I.D., Jacksonville, Fla.*



*A—If you go into the attic during a hard rainstorm, it will be easy to locate and mark the spots where the water drips from the rafters or roof boards. When marking, use colored chalk or a lumber crayon so that the marks are readily seen. Then, later on when weather permits, drive nails through the roof from inside the attic at the points marked. Use nails long enough to pass clear through the boards and shingles so the nail points will be visible from the top side of the roof. The projecting nail points will enable you to spot the location of the leaks and repair the roof at these points. One thing to keep in mind when locating the leaks in the attic: It often happens that water from a leak will run for some distance down a rafter before it finally drips onto the attic floor. If you discover water dripping from a rafter examine the area carefully to determine just where the water is coming through the roof boards. The actual leak may be some distance above the point where the water drips from the rafter.*

## Moths in Piano

*Q—We have an old piano of rather ornate design and on opening it recently for cleaning we found that moths had damaged a lot of the felt facings on the parts which strike the notes. How does one go about repairing this damage? Is there a moth proof felt available? Will moth balls prevent damage after repair?  
D.T., Bay City, Mich.*



*A—You probably mean that the felt linings on such parts of the action as the checks, backstops, damper blocks and perhaps the hammer heads and rails have been damaged by moths to such an extent that the hammer action has been affected. While you probably could tackle this type of repair job yourself with a fairly good chance of success, we believe that where one is inexperienced in this particular work it would be more satisfactory to call in a local piano tuner. After an examination of the damage to the action of the instrument, he will know what to do. Preventing moth damage in older pianos is not so much a matter of keeping the moths out of the instrument as getting rid of them entirely by using approved methods. While moth balls placed in a suitable container located inside the piano case might be effective in preventing a new moth infestation, it is likely that the odor would be objectionable. There are other types of repellents in use which are more satisfactory.*

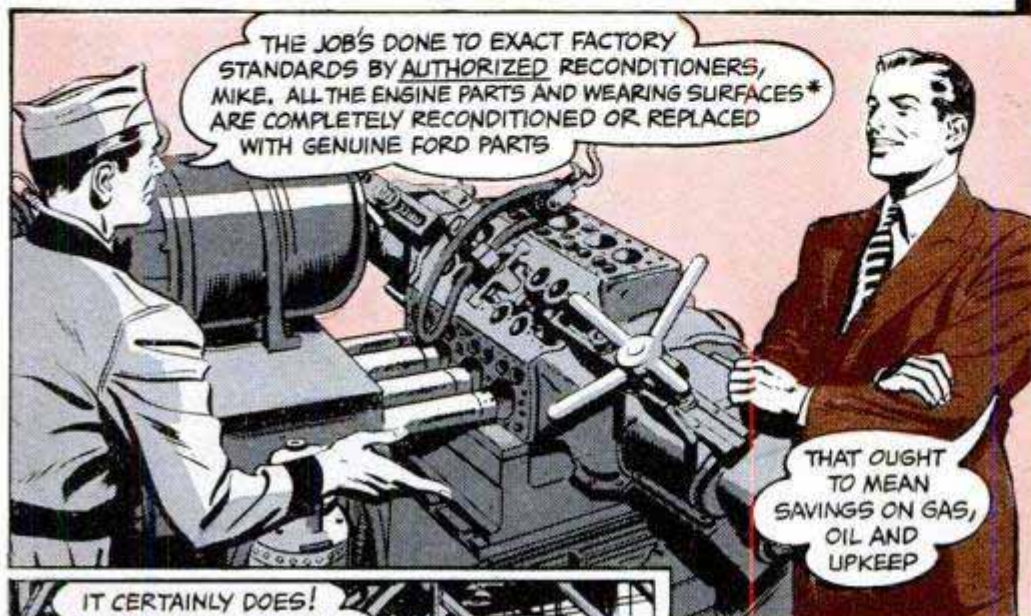


# "They showed me,"

says Mike  
(FROM MISSOURI)

## "How to give my faithful Ford a new future!"

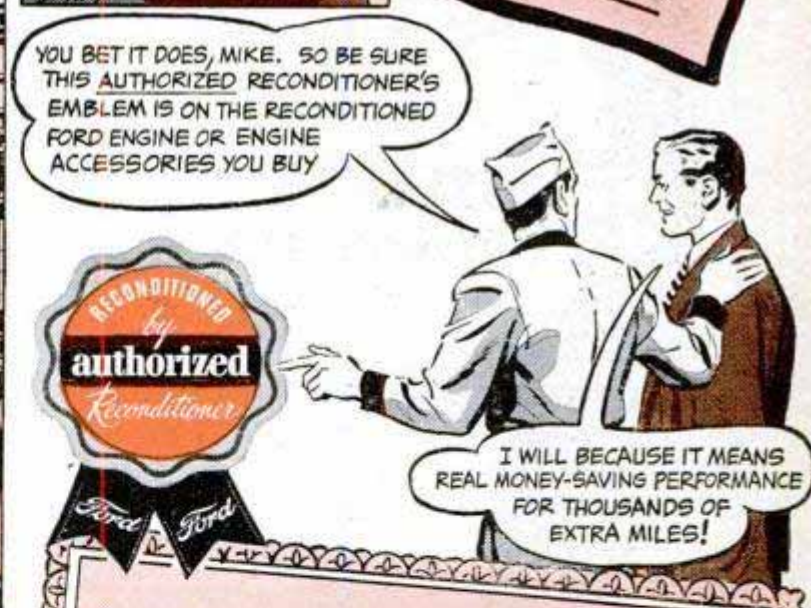
WHEN I VISITED ONE OF THE FORD-AUTHORIZED RECONDITIONING PLANTS



\*CRANKSHAFTS, CAMSHAFT, BUSHINGS, VALVE GUIDES, TIMING GEARS, PISTONS, RINGS, BEARINGS, RODS, VALVES, GASKETS, STUDS, NUTS

— ALL COMPLETELY RECONDITIONED OR REPLACED WITH THE PARTS THAT ARE MADE RIGHT, FIT RIGHT, LAST LONGER....

**GENUINE FORD PARTS**



**AUTHORIZED RECONDITIONED FORD ENGINES AND ENGINE ACCESSORIES**

GIVE "LIKE NEW" PEP AND POWER....  
SAVE ON GAS, OIL AND REPAIRS

**RECONDITIONER'S GUARANTEE**

90 DAYS OR 4,000 MILES

Costs only a few dollars per week

No. 1950

\$4<sup>50</sup>\*  
10-INCH  
SWEEP

Outstanding  
**NEW  
VALUE!**

High on looks . . . low in price — you'll like this new Millers Falls Ratchet Brace with head and handle of glossy red unbreakable "TENITE"

It's the new No. 1950 — latest addition to Millers Falls famous line of fine braces. Jaws of forged steel and rugged ratchet mechanism assure long service. Ball bearing head gives smooth, easy operation. Heavy nickel finish keeps it shining. Best of all — it's Millers Falls quality throughout and priced at only \$4.50.\* See it soon at your hardware dealer's. In looks, in performance, in price — it's the biggest bit brace value on the market.

\*Price slightly higher in the West

**MILLERS FALLS  
TOOLS**

SINCE  
1868

MILLERS FALLS  
COMPANY

GREENFIELD  
MASS.

thermostats are set to cover air-temperature ranges from 50 to 68 degrees. At the lowest air temperature, full heating power is available to the heating elements in any room whenever the wall switch in that room is in the "on" position. As the air temperature rises, the amount of heating power is reduced.

A fifth thermostat cuts the current to the Freon compressor on and off. This makes hot-weather cooling available to any room whenever the wall switch in that room is turned on. The thermostat is set for 78 degrees Fahrenheit.

Among the advantages of reflective radiant conditioning, Doctor Mills points out, is the fact that it can be applied to old houses without expensive insulation or sealing of windows. He warns, however, that the system must include cooling facilities. Foil coverings on walls, ceilings and floors make any room uncomfortably warm in summer weather without a cooling unit. He believes the system is also applicable to factories, office buildings, hotels, theaters, airplanes, Army tanks, or military barracks in arctic or tropical regions.

"The possibilities are tremendous," says the doctor, "because the system frees man from his age-old dependence on air temperature for the comfort of his body."

Anyway, reflective radiant conditioning is just what the doctor (Mills) ordered.

## Funnels for a City's Freight

(Continued from page 145)

plan, the New Jersey terminal is even larger than the Manhattan building, and is expected to receive, sort and deliver some 2500 tons of freight each day when it achieves full operation.

Whereas these terminals are built for the unbelievably fast handling of freight, the bus terminal up in the center of Manhattan is designed for just as efficient traffic in human beings. Located smack in the center of the world's busiest business district, connected by direct ramp to Lincoln tunnel, the bus terminal will be a great new landmark only a block from Times Square. About 130,000 passenger movements will be funneled through the \$24,000,000 structure each day. Virtually all of the 2500 busses which roll into the city each 24-hour period will wind up in the new terminal instead of the present terminals spotted around the island. In a peak period they'll roll in at the rate of 750 each hour and depart just as frequently.

The four-level building, which will be completed this fall, will blanket an entire

(Continued to page 244)

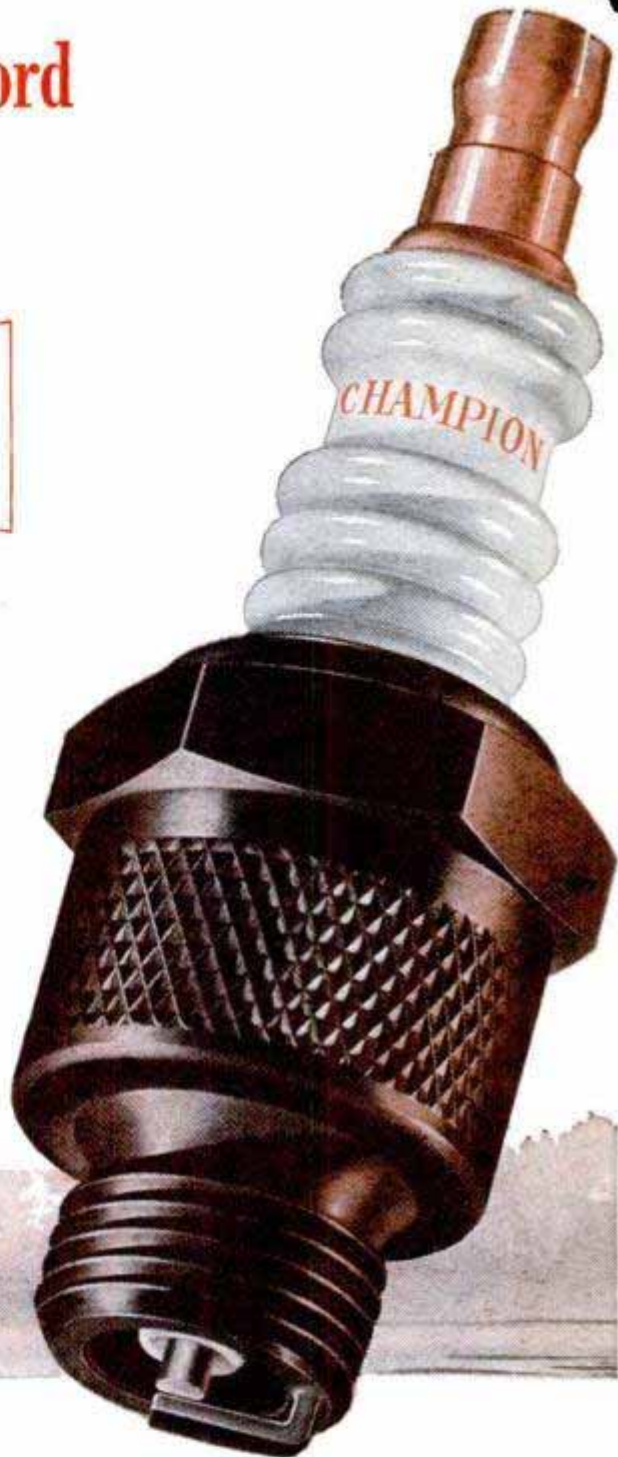
# New World's Speed Record

160.323 M. P. H.

set with Dependable

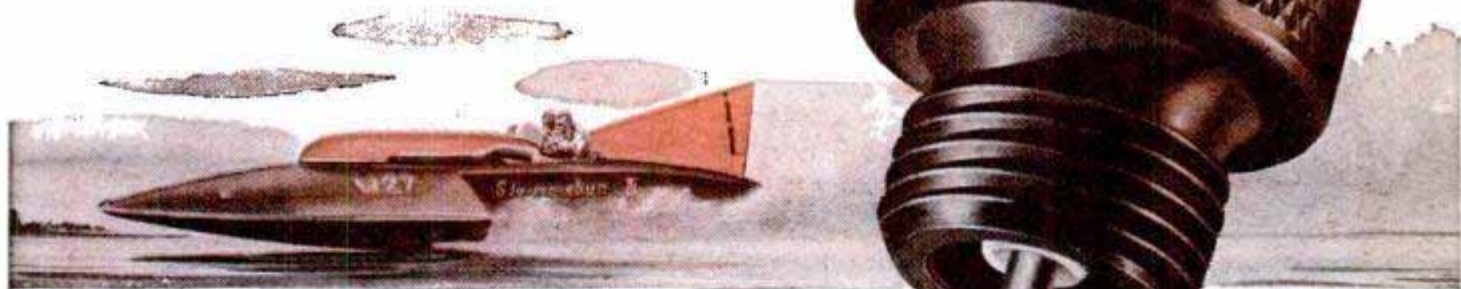
## CHAMPION

### Spark Plugs



#### FLASH:

Detroit, Mich. July 22. Slo-Mo-Shun IV Also Wins 1950 Gold Cup Race in Record Time!



**BE A CHAMPION DRIVER...** Get this extra performance for Your engine!



Here is the news that electrified the speedboat world recently. The new record broke the old mark, which has stood since 1939, by over 18 miles per hour.



Mr. S. S. Sayres, owner and driver of Slo-Mo-Shun IV, is a qualified expert on engine performance, and his choice of dependable Champion Spark Plugs for his world's record speed run speaks for itself.



Follow the experts, who in overwhelming majority choose Champion Spark Plugs for their outstanding performance and dependability. That's what has made Champion America's Favorite for over a quarter century.

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night, over the ABC network



# America's most complete line Big! Accurate! Priced to give

Here's why Sears quality power tools are a "better buy"! They're deliberately designed with the plus-performance and features professional craftsmen want. Precision-built by the most expert, efficient manufacturing methods known. Laboratory-tested... and **GUARANTEED** for your complete satisfaction, or your money back! Big, in size and capacity! Accurate for faster, better work! Rugged, to serve you longer under hard use! Handsome, streamlined beauties that you'll be proud of!

**CRAFTSMAN 8-inch  
Electric Hand Saw**



**\$100<sup>00</sup>\***  
Cash  
Without case  
\$10 Down

**CRAFTSMAN 1/2-H.P. 1750 R.P.M.  
Ball Bearing  
Capacitor Motor**



**\$2295\***  
Cash  
1/2-H.P.  
\$2.50 Down

**DUNLAP 1/4-inch  
ELECTRIC DRILL**



**\$1395\***  
Cash

**CRAFTSMAN  
3-Drum  
Belt Sander**



**\$5895\***  
Cash  
Without case  
\$6 Down

**DUNLAP 1/2-inch  
Electric Drill**



**\$2995\***  
Cash  
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**CRAFTSMAN  
Wood Shaper**

**\$4795\*** Without motor  
Cash \$5 Down



**CRAFTSMAN Disc Sander-Polisher**

**\$3695\*** Without case  
Cash \$4 Down



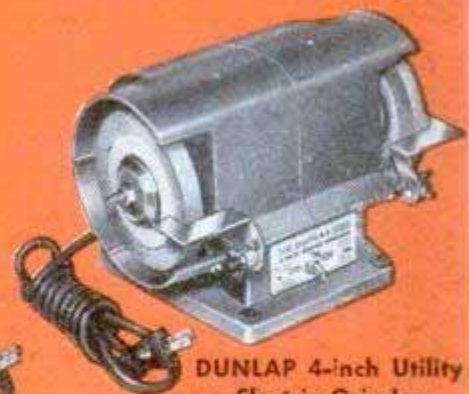
**CRAFTSMAN Rotary Tool Outfit**

Complete 54-piece set  
**\$2895\***  
Cash  
\$3 Down

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**\$1095\***  
Cash  
Complete



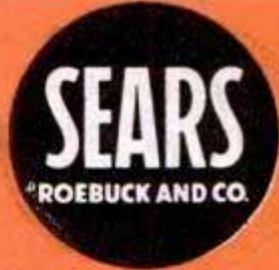
**DUNLAP 4-inch Utility  
Electric Grinder**

**\$1495\***  
Cash

\*Prices slightly higher south of the Ohio and west of the Mississippi rivers

**CRAFTSMAN** and **DUNLAP** Tools by **SEARS, ROEBUCK and CO.**  
REG. U.S. PAT. OFF.

# of fine quality Power Tools! you more for your money!



Sears famous power tools are the finest that can be made for the money . . . at the lowest possible price to you! And Sears complete range of tool-types and sizes is an extra convenience. See these sensational extra-value tools at your nearest Sears Retail Store TODAY! Note how completely equipped each is (not always true of others). Compare them feature for feature with ANY others! Prove to yourself Sears tools are a "better buy"!

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Tilting-Arbor Bench Saw**



**\$54.50\*** Without motor  
Cash \$5.50 Down

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**\$64.95\*** Cash  
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**CRAFTSMAN  
18-inch Jig Saw**

**\$29.95\*** Cash  
Without motor  
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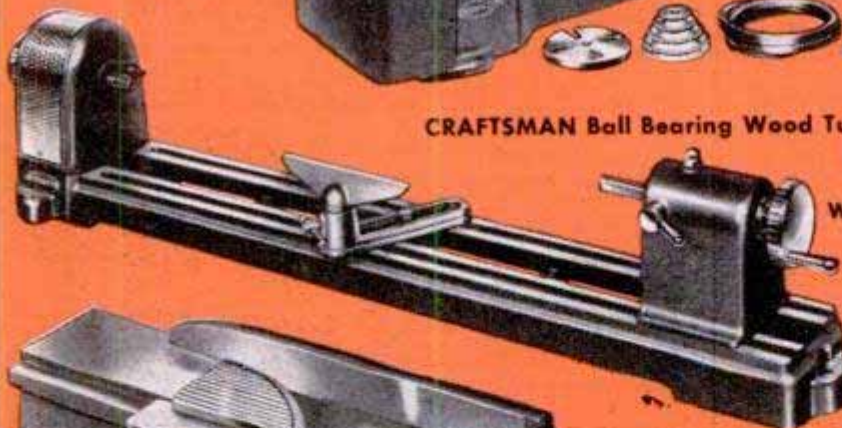
**CRAFTSMAN  
Metal Turning Lathe**

**\$43.50\*** Cash  
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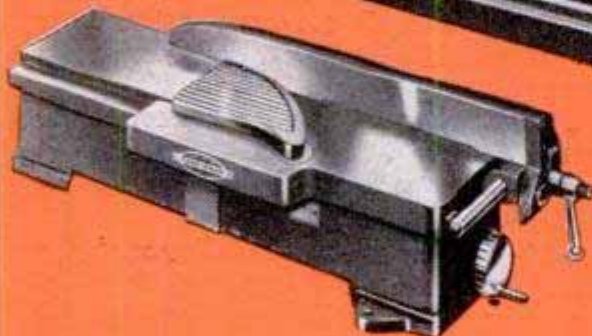
**CRAFTSMAN Ball Bearing Wood Turning Lathe**

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**CRAFTSMAN 4 1/2-inch  
Jointer-Planer**

**\$44.95\*** Cash  
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SEARS new 1951 Power Tool Catalog free! Get yours NOW, at the Hardware Dept. of your nearest SEARS Retail Store!

Sears Easy Terms make it easier to own the tools you need NOW . . . pay while you enjoy using them!

**Famous for fine quality . . . precision performance . . . low price!**

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**NO SCHOOLING!**

**STEADY WORK!**

**BIG MONEY!**



Stake your claim now to a money-making future—get started in a good, respectable, solid business of your own as a floor surfacing contractor!

This is not difficult—no schooling—no experience needed. Sanders are easy to operate—and you can start making money the first day your machines arrive! Earnings of \$25 and more a day are not uncommon! Hundreds of prospects everywhere in your community—new and old homes. Original investment small—no large overhead—you need no elaborate offices, workshop, storeroom or heavy trucking equipment. Many men operate from their own homes and use regular passenger car to transport equipment from job to job. Pleasant indoor work—steady year 'round—a real opportunity to **MAKE MONEY** and be your own boss! Send for "money-making" booklet entitled "Opportunities in Floor Surfacing"—use coupon and enclose 25c in coin or stamps to cover handling.



# AMERICAN

**FLOOR MACHINES  
PORTABLE TOOLS**

**SEND COUPON  
TODAY**

The American Floor Surfacing Machine Co., 535 So. St. Clair St., Toledo, Ohio  
Enclosed find 25c in stamps or coin for booklet "Opportunities in Floor Surfacing", telling me how I can start sanding business.

my own floor sanding business.

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Street \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

city block. Two of the floors actually will be constructed on a slant, making the building itself a huge ramp for the busses. Long-distance busses will roll into the bottom floor, which tilts downward to make more overhead room for the vehicles. Passengers will step off the busses and take one of the terminal's 30 broad escalators up to the second floor, where they will find waiting rooms, shops from a beauty parlor to a hardware store and the main concourse. Suburban busses, on the other hand, will roll up an outside ramp, radiant-heated to melt snow as soon as it falls, and into the top floor of the terminal. Passengers will move down the automatic stairs to the suburban concourse on the third floor. The vast building will be a boon to motorists, too; there will be parking spaces for 450 private autos on the roof.

Every five seconds a huge bus will roll into the completed terminal. The driver will glance above the doorway where an indicator will tell him which dock his bus is to occupy.

Not only will the passengers have the facilities of a brand-new building, the biggest bus terminal in the world, but they will save from 6 to 20 minutes of travel time on each trip.

Transporting freight and human beings into a big city is only half the problem today. Shipments, whether inside crates or walking on two legs, must be unloaded swiftly and dispatched immediately to make room for the inexorable stream of similar shipments on the way to the city. Other cities now are looking to the New York terminals as one solution to this perplexing problem of mass movement.

## It's 530 Degrees Cooler Inside

*(Continued from page 85)*

puddle. The rest recirculate, cooling the coils on their return, and are run through the system again in a never-ending cycle of faster and faster frigidity.

Out in the liquefier room, attendants busily set their big, long-necked, insulated containers on tiny hydraulic floor elevators which lift them until the long needlelike liquid-gas spouts are sunk deep in the necks. The strange fluids dribble into their storage tanks.

These metal cans are not good enough for liquid helium, though. To protect this liquid, laboratories use a device invented by Sir James Dewar, the man who first liquefied hydrogen. Besides keeping helium cold, Dewar flasks keep coffee hot. The Thermos bottle you take on picnics is the same thing

*(Continued to page 248)*

Tomorrow's battery is here TODAY—

# it's the GREAT NEW EXIDE!

A NEW HIGH IN STARTING POWER  
LONGER LIFE THAN EVER BEFORE  
MORE BATTERY FOR YOUR MONEY

Outstanding improvements! Amazing performance! This is the result of ceaseless development by the largest research-engineering staff in the battery industry, plus 62 years of battery-making experience.

Ask your service station about the new Exide. And remember—you can depend on the Exide Dealer for good products, good service.

THE ELECTRIC STORAGE BATTERY COMPANY  
Philadelphia 32

*Exide Batteries of Canada, Limited, Toronto*

*"Exide" Reg. Trade-mark U.S. Pat. Off.*



WHEN IT'S AN  
Exide  
YOU START

## Exide has EVERYTHING

# SHOPSMITH OUTPERFORMS SAWS, SANDERS, LATHES, DRILL PRESSES COSTING \$500<sup>00</sup>

It's a performance-proved fact! With SHOPSMITH you can do more jobs, actually do better work, than with any \$500 combination of single-purpose tools with motors. And here's why:

**SHOPSMITH IS VERSATILE!** It converts into five big, heavy-duty power tools. Takes all standard accessories. Can do 116 wood, plastic and metal working operations.

**SHOPSMITH IS EASY TO OPERATE!** Even without practice you can change it from tool to tool in less than sixty seconds.

**SHOPSMITH TAKES BIG WORK!** Its effective table width is so great you can saw to center of 8-foot plywood panels, sand and drill room-length pieces—with no interference from other tools. Lathe turns work bigger than a nail keg.

**SHOPSMITH IS PRECISION-BUILT!** It combines features found only in the finest tools. Grease-sealed ball-bearing action. Induction hardened spindle tip. Centerless ground steel ways. A score of precision features that assure hairline accuracy, lifetime service.

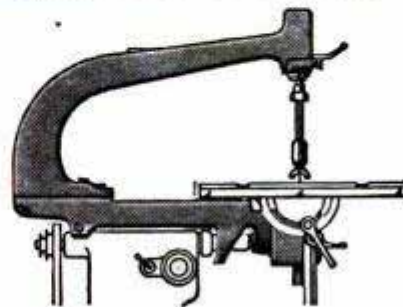
**SEE SHOPSMITH DEMONSTRATED!** At any Montgomery Ward, leading hardware or department store. And write for free 16-page, fact-packed illustrated booklet.



## \$169.50

complete except for motor. With special, 1/2-hp., capacitor type motor (shown). \$199.50

**CONVENIENT TERMS**

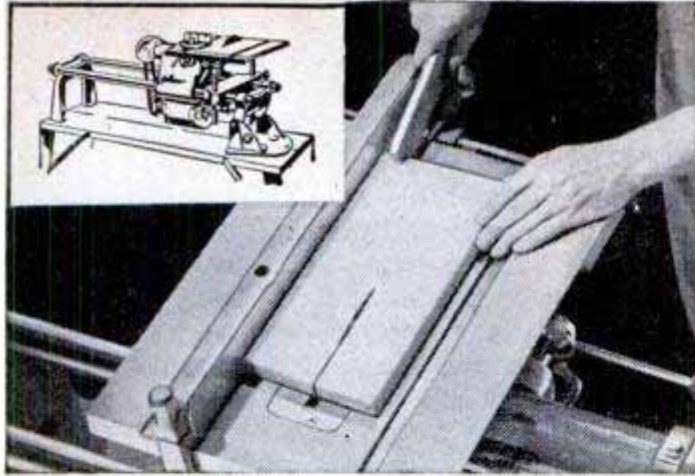


## JIGSAW FOR SHOPSMITH

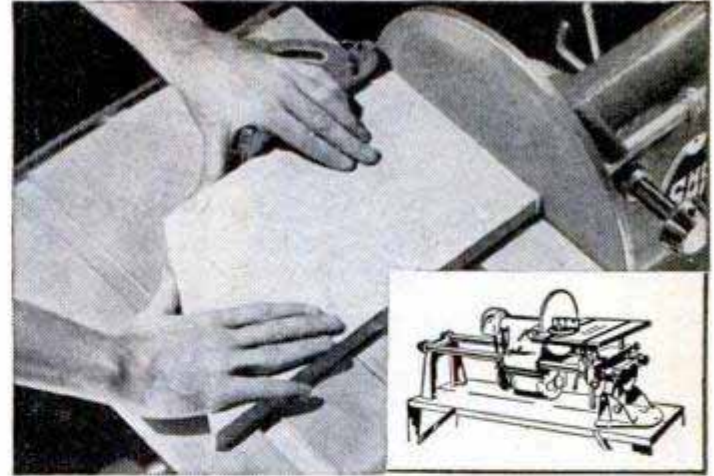
*The finest precision jigsaw you could own*

Rugged construction. 18" throat. Large tilting table. Built-in blower. Attaches quickly with one bolt. Can be used also for saber sawing, machine filing. Complete attachment, \$34.50

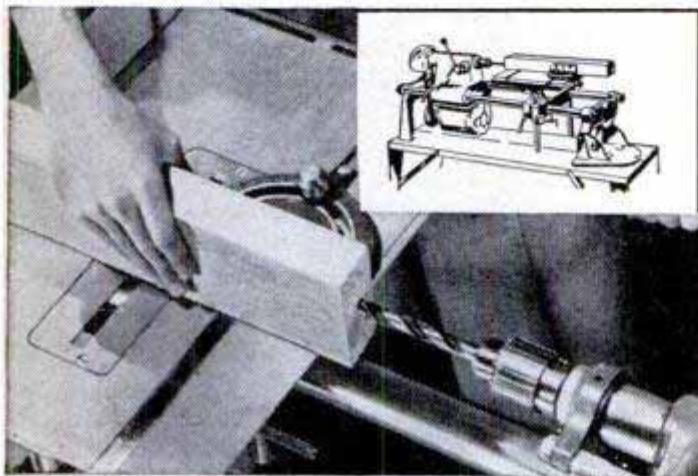




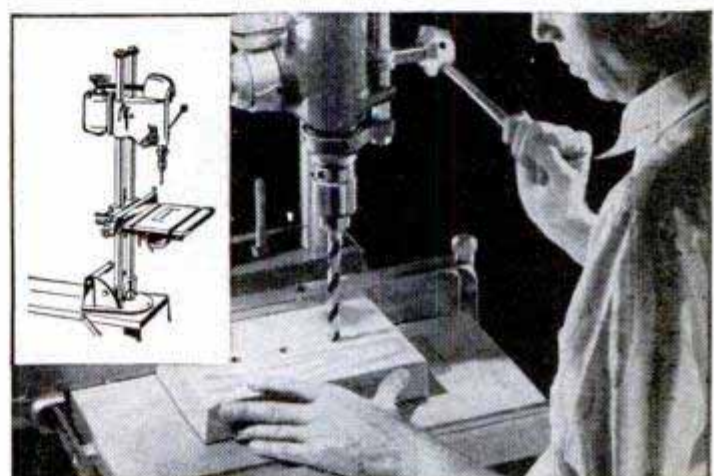
**1 8-inch Circular Saw.** You'd pay \$120 for a saw of equal quality, equal capacity. Effective table width, fence to blade, up to 48". Depth of cut 2 1/4". Sturdy tilting table with ball-crank raiser. Precision-tooled miter gauge with automatic stops. Self-aligning rip-fence.



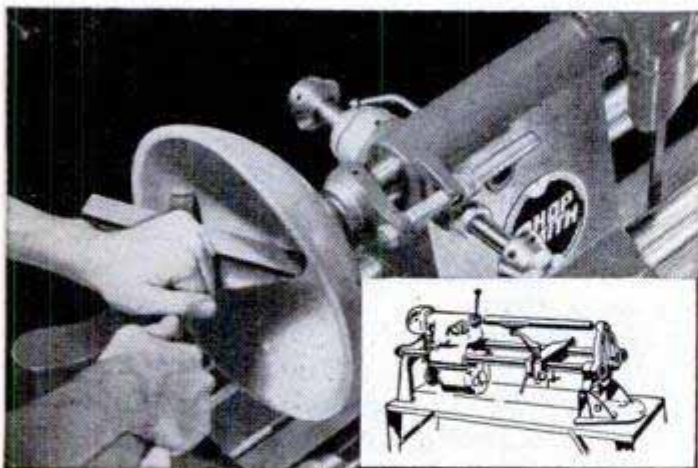
**2 12-inch Disc Sander.** No other disc sander can match it. None has 12" precision balanced disc, 14 1/2" x 17" tilting table, both miter gauge and fence. And with SHOPSMITH you can feed disc into workpiece with feed lever for greater accuracy, speed and safety.



**3 Horizontal Drill Press.** Ever try to drill the end of a table leg? Dowel stock for table tops? Mortise doors for locks? You can do it quickly and easily with SHOPSMITH. Work lies flat on table, no special jigs needed. Speeds from 875 to 3500 rpm. 4" quill feed.



**4 Vertical Drill Press.** In vertical position, SHOPSMITH is both a bench and floor-type drill press. Drills to center of 15" circle. Has 4" spindle feed with right or left hand feed lever. Jacobs key chuck takes drills from 5/64" to 1/2" in diameter. Extra-large table.



**5 33-inch Wood Lathe.** Turns stock up to 15" in diameter, 3" more than most heavy-duty lathes. Swivel-arm tool rest slides parallel to ways, lever-locks in position. Absolutely rigid lathe bed assures maximum accuracy—tubular steel ways each take over one-ton stress.



**FREE**

**GET ALL THE FACTS!** Compare before you buy! Fact-packed, 16-page booklet brings you detailed specifications, describes SHOPSMITH'S many operations. Send for it! It's FREE!

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**BURGESS** *Flashlight*  
**BATTERIES**

**BURGESS BATTERY COMPANY**  
FREEPORT, ILLINOIS

—a double thickness of silvered glass surrounding a vacuum. Helium is kept in a small one that fits in a bigger one, with an insulating chill of 80-degree-absolute liquid air between them.

Since helium boils at 4.2 degrees absolute, and is continually boiling away inside its little Dewar refrigerator, special tricks must be used to reduce the temperature further. If you've boiled eggs at sea level and at high mountain altitudes, you know that the mountain eggs take longer to cook. It's because the water boils at lower temperature in the rare mountain air where atmospheric pressure is less. Scientists have found that by putting a vacuum pump on a Dewar flask and reducing the pressure over the liquid helium, the same thing will happen. The boiling point drops as low as one degree absolute.

But even that isn't cold enough. The final chill is achieved by a magnetic process devised by Dr. William Giauque of the University of California. By applying magnetism to bodies of salt immersed in a Dewar and already chilled to about one degree Kelvin by helium boiling under reduced pressure, the temperature of the salt can be made to plummet even more. Recently, one low-temperature laboratory achieved the sublime frigidty of .0015 degree above zero.

Supercooled helium is full of surprises. It shimmers like faint heat waves as you view it through the tiny observation slit in the silvered glass. "Turn it toward the dark," the scientist will tell you. "Don't let it see that 'hot' wall or it will evaporate." Mere light has heat, so liquid helium is kept in total darkness. Its behavior is preposterous. At 2.19 degrees Kelvin it produces a "superfluid," helium II, which scientists think may contain particles that have actually reached the bottom hole. Some of the most recent discoveries about it have been made by Dr. John Pellam of the U. S. Bureau of Standards. It is neither solid, liquid nor gas, though it has properties of all three. Baffled scientists call it the quantum fluid, or "the fourth state of matter." It can flow through almost anything, and readily finds its way through airtight seals. For some reason, it will flow up the sides of an open container and drop to the bottom of the outer insulating container until the level in both is the same. Drop the level of the inner container, and the superfluid outside will climb back in until the level is reached again. Give it a shot of heat, and it will geyser up through a tiny tube of tightly packed emery in a spectacular 12-inch fountain effect. Heat travels through it in

(Continued to page 250)

# Now 2 great SAVAGE hi-power rifles

## FAMOUS MODEL 99

### HI-POWER LEVER ACTION REPEATING RIFLE

Two cal. — Savage .300 and Savage .250-3000. Three great models: 99EG (illus.) Standard, 99R — same but with longer stock and higher comb. Semi-beavertail fore-end. Screw eyes for carrying strap. Receiver tapped for Weaver top mount telescope sight. Model 99RS — same as Model 99R, but fitted with No. 31 Lyman front sight, middle sight slot blank and Redfield No. 70 LH receiver sight with elevation and windage adjustment knobs.

## NEW MODELS 340-342

### BOLT ACTION REPEATING RIFLES

Model 340 — .30-30 cal. Model 342 — .22 Hornet cal. Newly designed, improved bolt handle, larger stock of selected American walnut. "Hornet" receiver tapped for scope mount and micro peep sight. Ramp front sight and new type disc elevator rear sight, standard. *Deluxe Grade* — Models 340-342 available with micro rear peep sight; hooded front sight; checkering on grip and forearm and screw eyes for carrying strap.

The SAVAGE MODEL 99 is the world's most famous lever action repeating rifle. The "smashing power" of the Savage .300 cartridge and the flat trajectory and extreme accuracy of the Savage .250-3000 cartridge, have made and kept the "99" "First in the Field" among big game hunters everywhere.

The SAVAGE MODEL 340 is a compact, fast handling bolt action rifle priced within the reach of every shooter. It is chambered for the ever popular, dependable, widely available .30-30 cartridge. Model 342 is chambered for the hi-speed, flat trajectory .22 Hornet cartridge. Ideal for varmints and small game.

For "hi-power action" buy a Savage. At your dealer's. Write for free catalog.

SAVAGE ARMS CORPORATION  
Firearms Division      Chicopee Falls, Mass.



First in the Field



# SAVAGE

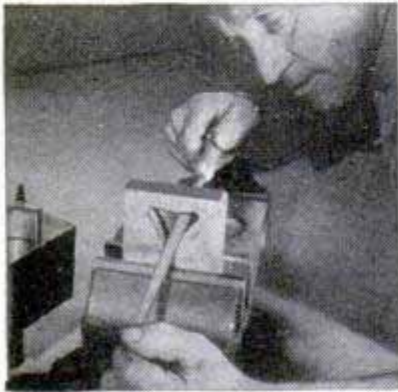
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REG. U.S. PAT. OFF.

SAVAGE • WORCESTER Power and Hand Lawn Mowers



## HAVE FILING JOBS GOT YOU CORNERED?



**C**ROSS-SECTIONWISE, you're looking at twelve basic file shapes used by amateur and professional craftsmen. They're shapes that operate in almost every kind of slot, corner, hole or curve (not to mention flat surfaces); file shapes that come in many kinds of cuts—like single, double, curved-tooth, shear-tooth, rasp—and in various degrees of coarseness. Many also, in Nicholson and Black Diamond brands, have special cuts for use on brass, aluminum, lead and babbitt, stainless steel, plastics, lathe work\*.

All of which leads to the conclusion that the best results and half the satisfaction of filing come from using *The right file for the job*—especially when it's a high-quality Nicholson or Black Diamond. These world-famous brands are sure to heighten your satisfaction by their trueness and uniformity. Both these important file qualities are reflected in Nicholson's sweeping guarantee of *Twelve perfect files in every dozen*.

They're brands which also give you the feeling that hardware stores selling them are good places for obtaining dependable merchandise and sound values.

\*Write us for your free copy of the famous Nicholson Book, "FILE PHILOSOPHY"—48 interesting, informative, illustrated pages on kinds, use and care of files.



**NICHOLSON FILE COMPANY**  
22 Acorn St., Providence 1, R. I.  
(In Canada, Port Hope, Ont.)



# NICHOLSON FILES

FOR EVERY PURPOSE

waves similar to sound waves. A shot of heat at the bottom is quickly transmitted directly to the top. Scientists have called this phenomenon "second sound."

So far, the small area inside the Dewar which can be kept at a fairly constant chill between zero and two degrees absolute has been a handicap. Only tiny bits of things could be tested. But at M.I.T., Dr. S. C. Collins has just built a new liquid-helium producer that will refrigerate an area bigger than your home refrigerator. It's a cylindrical affair standing about 12 feet high, looking for all the world like the conning tower of a dry-land submarine. The scientist stands on a circular deck atop the machine and can see his supercold materials down below through a big porthole.

The Collins machine produces liquid helium by an entirely different system from that used by G. E., Doctor Giauque and others.

Collins' machine utilizes the fact that if you make a gas do work, it gives off some of its heat in the energy it produces. The water vapor exhausted from a locomotive cylinder, for instance, is much colder than the steam that shoved the piston a second before. His helium gas feeds through coils and into a series of pistons so minutely machined that they are frictionless and need no lubricant beyond the helium itself. The engines turn wheels outside the machine, thus performing work. The cylinders are so arranged that the exhaust gas from one cools the intake of another in a perpetual cycle that makes the gas get colder and colder (without the aid of liquid hydrogen) until it finally liquefies and drops to the conical bottom of the big tank and can be drawn off. The compactness of Collins' unit is amazing and already, with the aid of H. O. McMahan, a former student now working with the Arthur D. Little Company a few blocks away in Cambridge, 29 two-cylinder machines the size of your console TV set have been manufactured and sold to laboratories throughout the country. You can buy one yourself for \$22,000.

Collins' big baby has four pistons, and a man could climb into the frigid compartment and frost himself to an instantaneous lump if he wished. In four hours it starts producing liquid helium.

"The big samples which have been quickly removed from the Collins cryostat," says Doctor Collins, "are so cold that the room-temperature air sits right down on them. It liquefies before your eyes. If you held a pan under such a test sample you'd have a panful of liquid air instantly."

(Continued to page 252)

What's **NEW**  
in Batteries?

**AUTO-LITE Sta-ful**  
**BATTERY...needs water**  
**only 3 times a year**  
IN NORMAL CAR USE

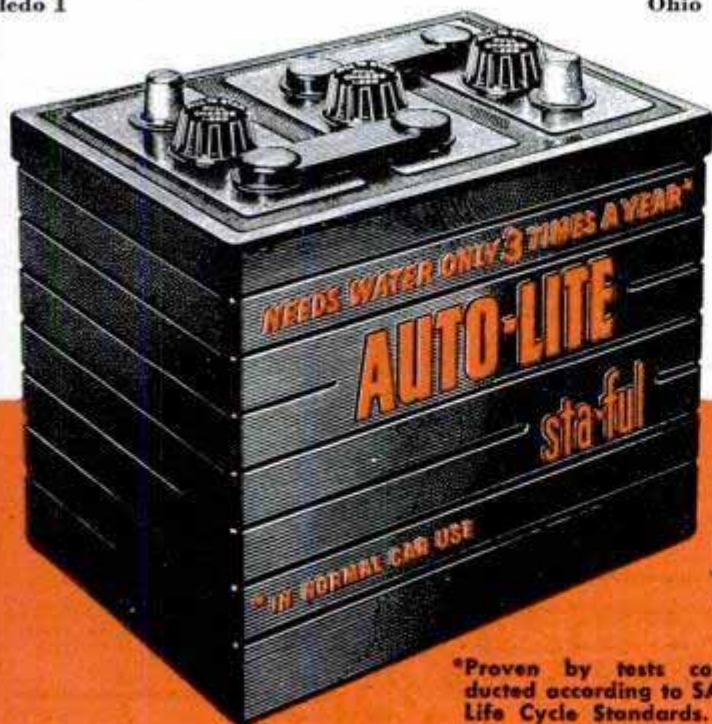
A revolutionary new development, the Auto-Lite "Sta-ful" Battery, protects you against a major cause of battery failure . . . damage to plates due to liquid loss. This new "Sta-ful" Battery Design permits a liquid reservoir with more than 3 times the reserve capacity of ordinary batteries . . . keeps plates fully covered and active months longer in normal car use.

In addition, "Sta-ful" gives you 70% longer average life\* than batteries without Sta-ful features. Fibre-glass retaining mats protect every positive plate and keep the power producing material in place for maximum dependability. Get more for your battery dollars—replace with an Auto-Lite "Sta-ful" Battery. See your Dealer today.

**AUTO-LITE BATTERY CORPORATION**

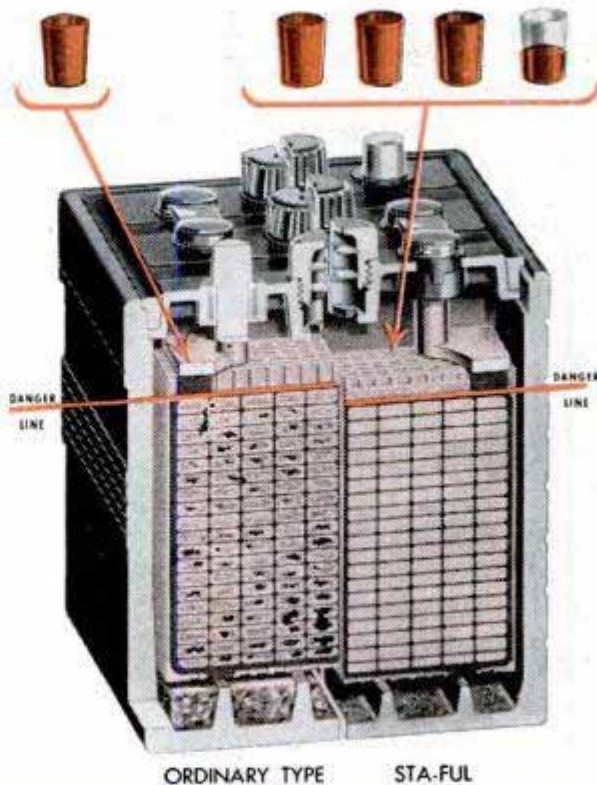
Toledo 1

Ohio

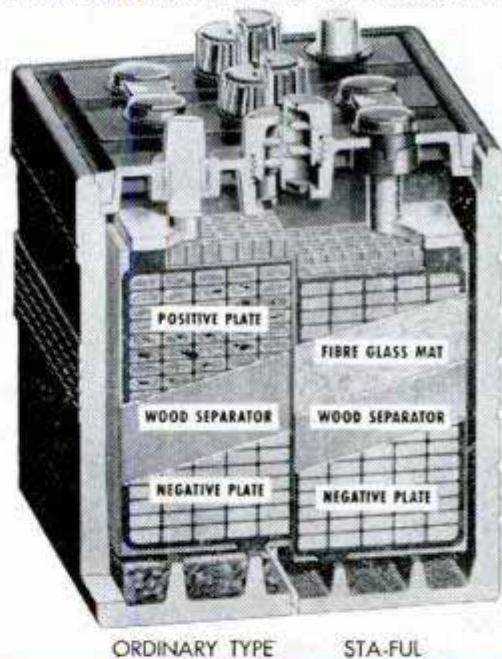


\*Proven by tests conducted according to SAE Life Cycle Standards.

Because of its unique design and construction, the new Auto-Lite "Sta-ful" Battery holds more than 3 times the liquid reserve of ordinary batteries.



Note how the protective Fibre-glass mat retains the power-producing material in the positive plate while ordinary battery plates shed the active material until it fills the sediment well.



**AUTO-LITE**  
**Sta-ful BATTERIES**

With such a machine, great blocks of metal can be tested. "We expect to gain a better understanding of 'creep' in steel," says Doctor Collins. "Certainly we'll have a better laboratory to investigate the behavior of all kinds of things at near absolute zero."

A host of secrets about matter and its properties are gradually being let out of the bag by the shimmering liquids of our low-temperature labs. And they're finding their way toward practical usage.

When the first liquid oxygen drizzled into a container, no one guessed it would provide a fuel for torches that cut through steel like a hot knife through butter or for the oxidizer that would burn fuel fast enough to send a rocket through space at twice the speed of sound. Its compact lightness is already a boon to industry. One tank car of liquid oxygen equals 11 freight cars of the tanked gas.

Today, liquid nitrogen is the best "shrink fitter" known. When a metal worker wants a tight fit, he sprays the inner piece under a withering blast of minus 320 degrees Fahrenheit, inserts it immediately in place and as it warms up it expands into as tight a fit as you'd care to find.

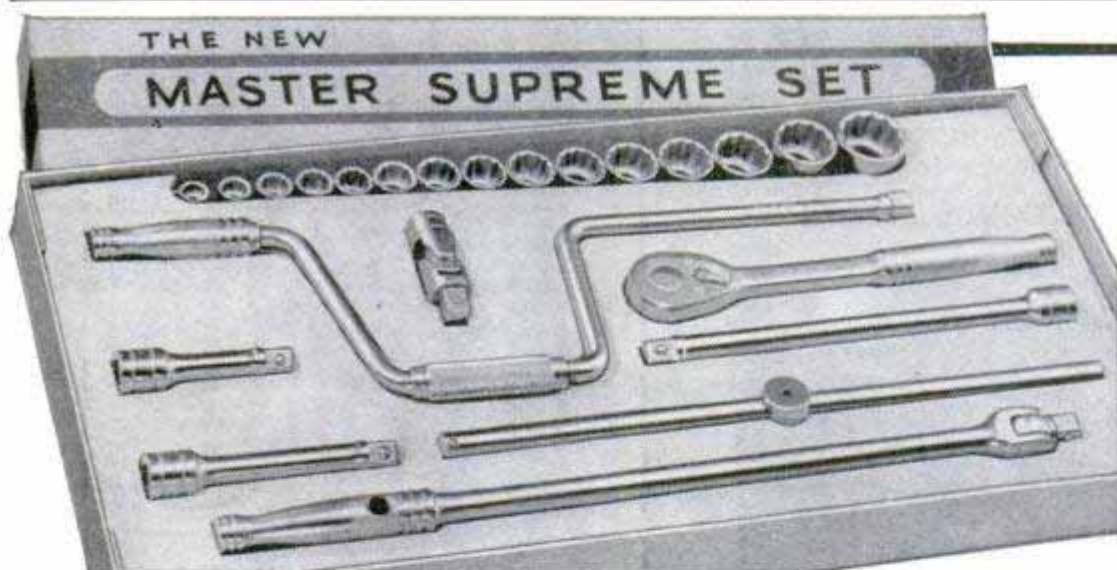
Already there are inklings of what will come from the depths of near absolute zero.

Scientists are excited about the superconducting qualities of metals at liquid-helium temperature levels. Not long ago, a ring of columbium nitride immersed in frigidty at Johns Hopkins for experiments in the weird perpetual current phenomenon suddenly began to broadcast music from a local radio station. It was acting as a superdetector of radio waves. Visionary low-temperature men can see in the future ultrasensitive radio sets that will pick up fantastically faint signals. The crystal for the set will simply be refrigerated. Since all thermal motion of molecules is stilled by the cold in the crystal, there will be no hum in such radios.

Such crystals will also pick up infrared light signals and work is afoot to develop a detector that might pin-point the heat from exhaust stacks of enemy sea or air craft at great distances.

"We've only begun," the frosty fellows will tell you. "We haven't even done more than look at the new world we've reached down there in the subcold."

But they're still not content. Already they're talking about using powerful nuclear magnetism to wring the heart out of that last degree. This may bring them within a millionth of a degree of absolute zero. "Think what that would mean to science," they sigh.



**Snap-on**

**MASTER SUPREME  
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**\$36<sup>50</sup>**  
Plus  
Local  
Tax

In this 1/2" sq. drive set, you will find highly engineered design, accurate balance, perfect fit, and a comfortable grip that results in faster, safer, more satisfactory work. Full chrome finish.

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- ★ 32-tooth ratchet action. Double-tooth contact gives added strength.
- ★ Easily removed Welch plugs for servicing friction-grip device.
- ★ Four-way socket grip for faster interchange of various units.
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- ★ Controlled heat-treating for skin-to-core toughness.

SNAP-ON TOOLS CORP., 8062-J 28th Ave., Kenosha, Wis.

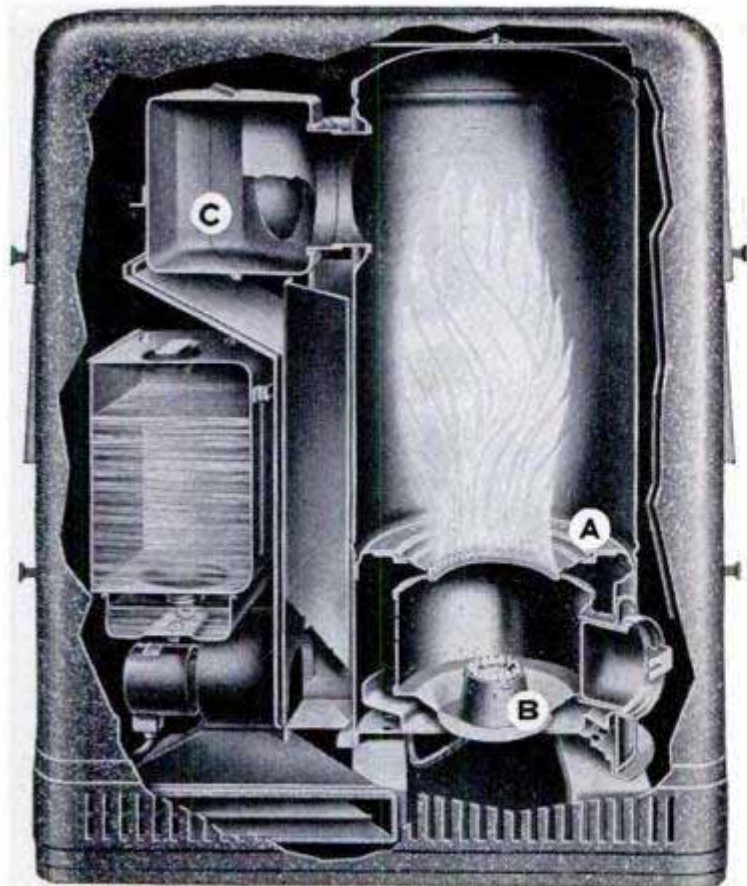
Please send me the Master Supreme Socket Set.

I enclose  Check,  Money Order,  
 Company Purchase Order.



Name.....  
Address.....  
City.....State.....

\*Snap-on is the trademark of Snap-on Tools Corporation.



# New Burner-Pilot Principle Gives Perfection Oil Heater Greater Efficiency

Too much fuel oil was being wasted with heaters having only one burner. In cold weather, the burner needed constant adjustment from high to low heat. And, during mild weather when only low heat was needed for a few minutes at a time, it was necessary to light it, turn it off and then relight it. So, because of this inconvenience, many times the burner was left on longer, causing unnecessary fuel waste.

So Perfection Stove Company engineers designed a "Multi-Heat" burner (A) which had a high and a low burner-fire. This took care of the cold-weather problem—but left the mild-weather problem unsolved, until . . . an actual pilot (B) was made and installed, too. This pilot did a great deal to help "kill the chill" and at the same time "cut the bill"! And, it saves bothersome relighting, because, coupled with thermostatic controls, the burner cuts back automatically from low burner speed to money-saving, labor-saving pilot!

## "Heat Extractor" Prevents Heat Loss

Inefficient use of fuel cropped up in another way, too . . . heat which could be used to an advantage in the room was going up the chimney instead. So for better efficiency, a "Heat Extractor" (C) was designed to catch this surplus and use it to warm the home.

## No More Cold Feet

The age-old problem of getting the heat distributed properly was solved by a quiet-blower—not merely a fan. Heat is distributed over the floor, into the farthest corners. This Perfection feature has the additional advantage of bringing comfort in summer as well as winter by its continuous circulation of air.

## Money Spent is Money Earned

A lot of experimenting went into this project of getting more efficiency from a heater . . . but Perfection found it paid for itself finally . . . because, of course, their "exclusives" made the demand for their heaters really great.

### AND HERE'S THE HANDIEST PORTABLE MADE



Over ten million safe, convenient Perfection Portables in use! Ideal for workshops, camps, cottages, recreation and laundry rooms.

For additional information see your dealer or write:

**PERFECTION STOVE COMPANY**  
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CLEVELAND 4, OHIO



(Continued from page 137)



## How to get smoothest jobs ever with wonderful new NYLON paint brushes!



Dip only half the length of the bristles in paint—on overhead work dip to only one inch. Tap off the excess paint. Don't scrape off on edge of can.

Nylon brushes hold a full load of paint. And they are ideal for nearly all finishes.



To get the best results, use a long, steady, even stroke, painting toward the surface already coated.

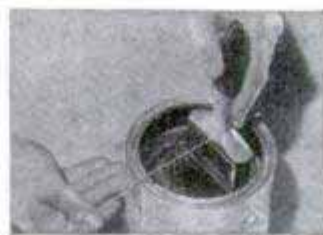
Durable nylon bristles don't break off and mar your work, and an independent research laboratory has found that nylon brushes paint smoother.



Use correct brush for each job. Poking large brushes into corners causes "fingering."

You can get a set of nylon brushes for every job, from touch-up work to wall and roof painting. They're made by leading manufacturers.

The next time you paint, try a smooth-painting, easy-to-clean nylon paint brush. You will never use any other kind. They're sold in paint, hardware and variety stores everywhere in all types and sizes.



Clean thoroughly, suspend brush on wire in turpentine or linseed oil for storage between jobs. Resting bristles on bottom of can deforms them.

Nylon brushes clean quickly and easily. Work out paint on newspaper, clean with thinner, rinse with soap and water. Then comb the bristles and wrap the brush for storage.



Better Things for Better Living  
... through Chemistry



Considerable leeway is permitted in the size of the playing field, or "pitch"—as the British call it. It can be from 100 to 130 yards long and 50 to 100 yards wide, with small variations in size for amateur and college games. The goals at each end of this rectangle are marked by uprights eight yards apart and eight feet high, usually backed by a netting to stop the ball after a score.

Eleven players, including a goalkeeper, form a team. He is the only one permitted to touch the ball with his hands or arms, and then only in the penalty area, which extends 18 yards out from the goal line through the center 44 yards of the field's width. Within that space he can also run with the ball, provided he bounces it at least once every four steps. To distinguish his eligibility to handle and run with the ball, the goalkeeper has to wear different colors from his teammates, who can only kick or "head" the ball.

Soccer is a rugged, "he man's" game, requiring and developing great stamina, coordination, initiative and endurance, but is more a scientific game than a rough game, when properly played. It is a game particularly suited to the slightly built boy—the wiry type, as well as to his sturdily built brother.

The action of a soccer game is almost constant, requiring much running and the use of every muscle of the body. The ball may be headed or played with any part of the body except hands or arms, with the exception of the goalie. A game has two 45-minute periods, broken only by a five-minute intermission when the teams change goals. No time-outs are allowed for rest and in most international matches substitutions are not even permitted for injured players. When permitted, the limit is two who cannot be resubstituted.

The game can be played where teams and officials do not understand each other's language. The officials are one referee and two linesmen.

Experts, using only their feet, can pass precisely, feint and dribble the ball almost as cleverly as star cagers can manipulate a basketball with their hands. Some can move the ball along almost as fast with short, light kicks as they can run when there is no ball in sight. Propelling the ball with the head is another offensive maneuver that requires long practice to master. Most goals are scored by power shots to the corners of the goal.

(Continued to page 256)

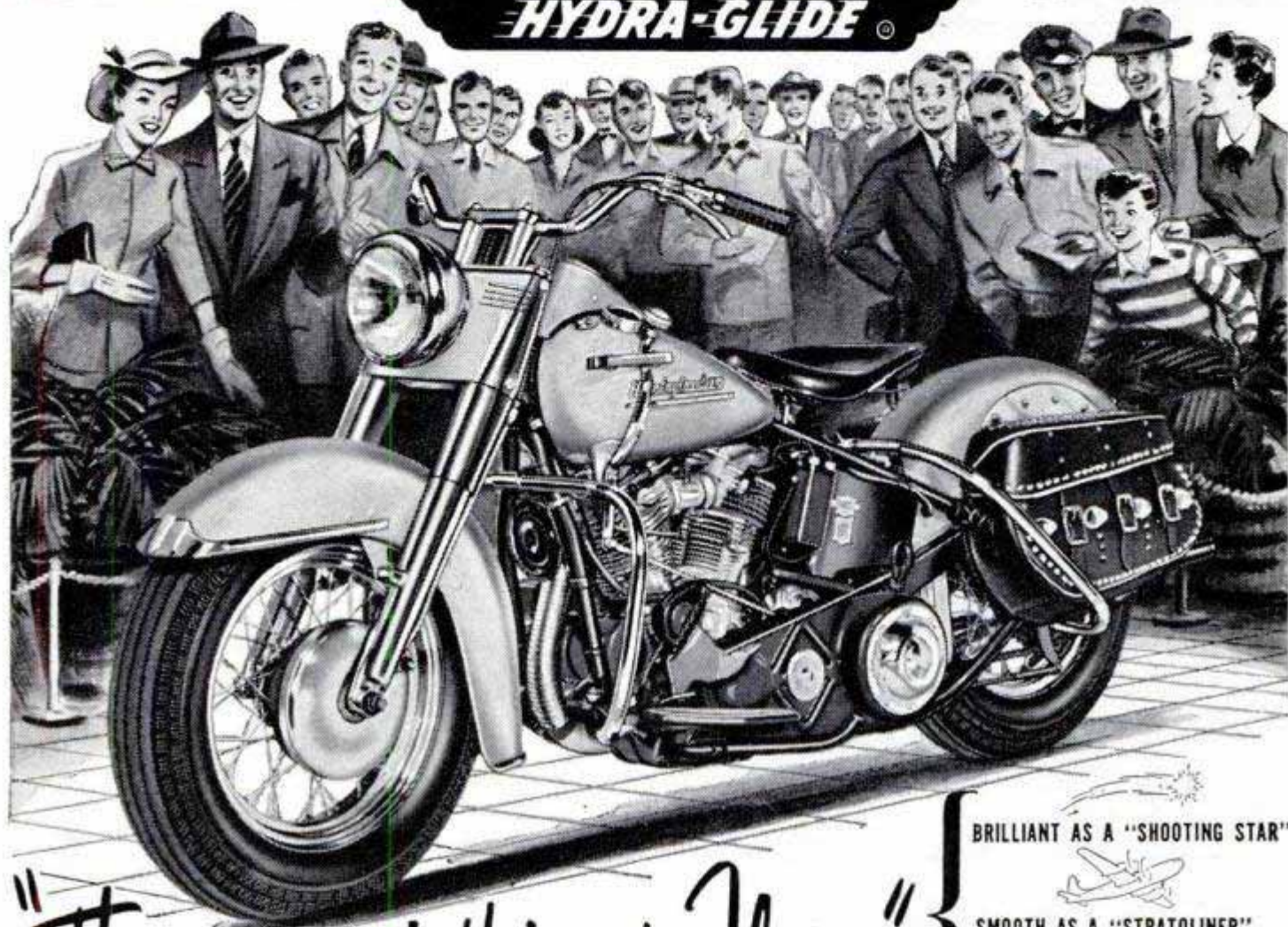


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*The new 1951*

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*"The nearest thing to flying"*

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SMOOTH AS A "STRATOLINER"



MODERN AS A "SPACESHIP"

Take off to thrill-land! Ride the perform-  
in'est motorcycle of all time . . . the 1951  
Harley-Davidson Hydra-Glide! Every mile  
is a new sensation! Hills melt away like  
magic! Rough roads level out like boulev-  
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flying! And you steer and hold the road so

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fresh and untired. You're ever-ready for fun  
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is fast, safe, easy-to-use**

Klean-Strip changes any finish into loose, wrinkled film. Use only a brush or putty-knife to peel off all layers of the old finish at one time.

Klean-Strip leaves the surface clean, smooth and dry. No sticky mess to wash off, no waxy residue to scrape. And Klean-Strip is absolutely safe: will neither burn nor explode.

Klean-Strip is brand new . . . not like any paint remover you've ever used. Takes all the danger and drudgery out of refinishing. Buy Klean-Strip whenever you buy paint. Available at better paint, hardware and department stores, everywhere.

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**New! No-Wash!  
Non-Inflammable!**

*"I'll take the WHITE one  
every time!"*



WYTEFACE Steel Tapes, with their jet black markings on a white background, are easier to read in any light. They are rust-resisting, hard to kink and easy to clean.

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## WYTEFACE

TRADE MARK

### STEEL TAPES

KEUFFEL & ESSER CO.

The three men stationed closest to their own goal, the goalkeeper and the right and left fullbacks who flank him, in addition to the center halfback, are defensive specialists, adept at stopping opposing kicks and passing the ball forward to their teammates. Three halfbacks—right, center and left—switch their roles from offensive to defensive play. The center half is the key man in all plays, defensive and offensive.

The remaining five—center forward, inside left, inside right, outside left and outside right—comprise the front line. They are usually the fastest, shiftiest players and score most of the goals.

Soccer is a fall and spring sport, except in warmer countries where it can be played the year 'round. An indoor version, with seven-man teams, is spreading fast in the big-city arenas.

Much of soccer's current popularity boom here was generated by Americans who first played it or saw it played overseas during the war. In a nationwide poll, 41 percent of the public and 68 percent of the sports-writers questioned voted soccer as the sport with the best prospects of catching on as a major attraction.

Soccer embodies the science of football, the speed of ice hockey, the grace of tennis, the thrills of baseball and the scoring accuracy of basketball.

## Treasure Hunt in a Lost World

(Continued from page 93)

Indian tales of mountains that attracted lightning, attracted prospectors. Back in 1945, big steel faced the dilemma of depletion of the Mesabi ore reserves by 1970 at present consumption. John G. Munson, vice-president of U. S. Steel, decided to look around. He searched from Sweden to Brazil, finally wound up in Venezuela. A year later, Mack C. Lake, long-time geologist, and two young men, set to work taking aerial pictures of the area west of the Caroni.

For a year Lake's planes circled the Gran Sabana, photographing the entire country. Steel men's eyes popped at the mosaic. In the area west of the Caroni and south of the Orinoco, where no ore ever had been found before, the pictures showed formations indicating high-grade ore, and huge geologic folds to show it was near the surface, permitting open-pit operations. The mountain, 11 miles long and a mile wide, was known as La Parita.

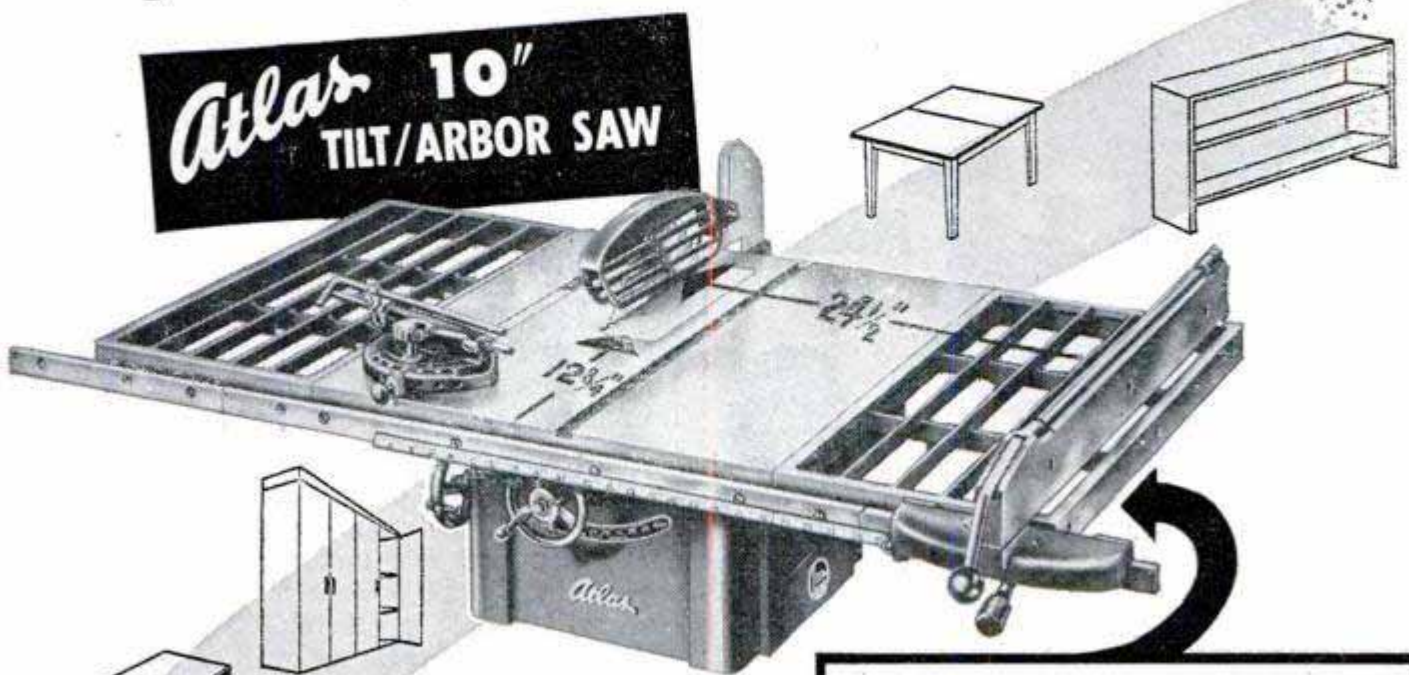
Lake borrowed a magnetometer. In Jeeps, planes, on horseback, the men swarmed in. The magnetometer readings

(Continued to page 258)

# It's BIG... It's HUSKY

Ready To Save You Hundreds of Dollars!

**Atlas 10" TILT/ARBOR SAW**



Finest Rip Fence On Any Saw! Vernier control for fine adjustment . . . positions smoothly and easily . . . locks at BOTH ENDS . . . LIFTS OFF!

You are equipped to handle *every* table sawing need for a *lifetime* with this big Atlas saw in your shop. It has the capacity to help you build a garage, utility buildings, a house . . . or to finish off a recreation room or attic. It has the accuracy for "factory-quality" work on fine cabinets and furniture and saves you money on shelves, cupboards, bookcases, and home repairs. You'll like every feature: The big *precision-ground grey-iron* table (25" x 45 1/2" with extensions as shown) with its *super smooth* surface; the quiet smoothness of its *large sealed-for-life ball bearings*; the easy, accurate operation of the rip fence; the smooth-working blade height and angle controls. Blade cuts 3 1/4" deep — tilts to 45° — table is always flat. Yes — this Atlas is big, and rugged, and fast, and dependable — sure to make your shop and your work outstanding in the neighborhood. See it at your Atlas dealers today!

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Same fine construction as the 10" saws.



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at a  
HOME WORKSHOP PRICE**

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were submitted to a California geophysicist. "They're fine," he said. "But your decimal points are in the wrong places." What the instrument showed was the highest reading ever recorded — and the decimal points were right!

La Parita, renamed Cerro Bolivar by the steel company, turned out to be a mountain of solid ore—ranging to the almost unbelievable purity of 72 percent pure iron.

Lake's men rushed to file claims. Drills were flown in to Cerro Bolivar, only 60 miles south of the Orinoco port of Bolivar City. Ninety holes drilled to 400-foot depth proved up the incredible reserves—more than half a billion tons of ore purer than big steel's fabulous Hull-Rust-Mahoning mines in Minnesota! Enough to supply U. S. Steel's hungry furnaces with 10 million tons a year for half a century.

But to get it home the company will have to spend \$900,000,000 in the next 10 years. A four-foot, two-mile conveyor belt will carry the ore a quarter mile down the mountain. On its journey, the descending iron will generate electricity to serve the entire village now being built at the mountain's base. Once down, it must be carted away. This will be done in one of two fiendishly expensive ways: either by building a 274-mile railroad to the Caribbean coast, with a ticklish bridge across the Orinoco high enough to allow for the whimsical river's rise of 65 feet in rainy season, or a 90-mile railroad to the Orinoco, and barges. But if the latter plan is carried out, U. S. Steel plans on a fleet of monster 45,000-ton ore boats, as big as the battleship Missouri. This will mean dredging some 70 miles of the big river to a depth of 34 feet to accommodate the ocean-going monsters that will ferry the ore to Mobile, Trenton and Baltimore. Right now, the latter plan is favored. Venezuela would love to have the Orinoco deepened for ocean-going traffic, for it would open up the whole interior of the country.

Furthermore, across the Caroni, lies Bethlehem's mountain of ore, which is producing this year for the first time. Already, four big electric shovels are chewing at the mountain, dumping each mouthful into monster trailer trucks that haul it to one of four big trains tugged by 1500-horsepower diesel locomotives.

The trains run it 32 miles over narrow-gauge track to the Orinoco, where it is emptied into a vast pit. Under the pit is a row of trap doors, which open as the ore is required, dropping it through funnel-shaped chutes onto an underground conveyor belt. The ore is then carried up to a

(Continued to page 260)

Repair Electrical Appliances and Utilities with the aid of  
THE NEW MODEL 50

# UTILITY TESTER



Compact—Measures 3 1/8" x 5 7/8" x 2 1/4"

A NEW KIND OF INSTRUMENT FOR TESTING ALL ELECTRICAL CIRCUITS AND APPLIANCES SUCH AS—

- RANGES
- SHAVERS
- HEATERS
- IRONERS
- WASHERS
- FANS
- VACUUM CLEANERS
- AIR CONDITIONERS
- REFRIGERATORS
- SUN LAMPS
- TOASTERS
- WASHING MACHINES and MOTORS

[ALL MOTORS—single phase, multi-phase, universal, squirrel cage, induction, in fact every type of motor from fractional H.P. to 2 H.P.]

## THE MODEL 50 UTILITY TESTER:

- Will measure the actual current consumption of any appliance or utility either A.C. or D.C. and will measure it while the unit is in operation. The reading will be direct in amperes. The appliance or utility may be plugged directly into the front panel receptacle. A special pair of insulated clip-end leads is included for motors, etc.
- Will measure the actual voltage and indicate whether the current is A.C. or D.C. and if the frequency is 25 cycles or 60 cycles.
- Incorporates a sensitive direct-reading resistance range which will accurately measure all resistances commonly used in electrical appliances, motors, etc. This range will enable continuity checks and tests for shorts and opens.
- Will indicate excessive leakage between a motor and a line up to 10 Megohms.
- Will indicate when a three phase motor is running erratically due to a "blown" fuse
- Will test Thermostats under actual working conditions.
- Is the ideal trouble-shooter as it will instantly locate opens, shorts and grounds.
- Will test all bulbs, radio tube filaments, pilot light lamps, all fuses including cartridge, screw, etc., fluorescent bulbs, etc.

- Will test condensers for both opens and shorts.
- Will accurately check and locate the exact cause of failure in 3 way heat control switches.
- Will check field coils for opens and shorts.
- Will indicate when one side of an appliance or motor connected to the line under test is "grounded".

## SHIPPED ON APPROVAL NO MONEY WITH ORDER—NO C.O.D.

**TRY BEFORE YOU BUY!** Yes, you need send no money with order or pay anything on delivery. Simply fill out this order form and mail it today. Try the Model 50 for 10 days. If completely satisfied, remit \$13.90. If not, return the instrument—no explanation necessary.

The Model 50 Utility Tester comes housed in a round cornered molded bakelite case. Complete with all test leads and operating instructions—only.....

# \$13<sup>90</sup>

GENERAL ELECTRONIC DISTRIBUTING CO.  
98 PARK PLACE, NEW YORK 7, N. Y.

PM-10

Please rush one Model 50 Utility Tester. I will either remit \$13.90 after a 10-day trial or return the instrument via Parcel Post.

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### FREE PREMIUM!!

Check here if you include \$13.90 payment with order. In return for saving due to bookkeeping, we will include a set of 6 assorted key chains with your Model 50. If the Model 50 does not meet with your wholehearted approval after a 10-day trial, return it for full immediate refund of \$13.90—keep the premium for your trouble.



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Comes an AMAZING  
HEAT INVENTION**

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Burners ECONOMICALLY.**

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CHEAP OIL BURNER**

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**with Cheap, Furnace Oil**

**No Coal to Carry In • No Chopping Kindling  
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**Read How You Can Test This Amazing QUIK-HEAT Oil Burner in Your Own Home for 30 Days—Then MAIL COUPON for Full Details.**

Here's an oil burner entirely different—easy to install—easy and economical to operate. It sets in the fire or ash box of your coal or wood range, cook stove, heating stove, laundry stove—larger size for furnaces and boilers. Makes one of the quickest, hottest, cheapest fires from No. 1 Furnace Oil, Distillate, Diesel, Range, Heater Oil and Kerosene. A great convenience by simply turning a valve and lighting the Fuelizer Starter—great heat for cold winter, moderate heat or just a simmering heat for slow cooking or chilly fall and spring weather.

**USERS SAY:** "A wonderful burner and a money saver—easy on fuel" says Clarence Gothe. "Started selling yesterday, sold six. Send me 5 more," says J. Klappenstein. "No trouble to keep house warm even at 8 below zero," says Harold H. Bumer.

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**30 DAY TRIAL OFFER**

The QUIK-HEAT Oil Burner carries our famous Iron Clad LIFETIME GUARANTEE. So confident are we of the unusual satisfaction given by the QUIK-HEAT that we make \$1.00 BONUS OFFER FOR TESTING and let you try it in your own stove or furnace for one month. You can get yours for introducing—big profits QUICK. Be first. MAIL COUPON for details and cash in on the tremendous demand for this amazing invention. DO IT NOW.

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**MAIL COUPON NOW**

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Without cost or obligation send TRIAL OFFER and  
details about your amazing QUIK-HEAT Oil  
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Check here if interested in our REAL money making offer.

long steel loading track, that extends out over the river's edge like half a steel bridge. Out over this rig the rich ore slides, dumping off the end into shallow river barges that will float it to the delta for loading on big ore carriers.

Odd part of the loading bridge is that it raises and lowers like a drawbridge to accommodate the 65-foot rise or fall of the Orinoco in wet or dry seasons.

So far, the system has been successful. But if Bethlehem could move its big ore boats all the way up the river, immense sums of money and time could be saved.

How does all this activity on the Gran Sabana affect the rest of Venezuela? Economists are scratching their heads. Already the country's economy is a list under an oil boom that has been booming for 20 years, pouring \$180,000,000 a year into the government till through taxes and royalties—and untold millions into workers' salaries. And that's the trouble. Everyone is out working on the oil fields. What will happen, they wonder, when the iron mines begin to tap the long-depleted labor ranks?

Throughout the once great cattle ranges and agricultural farms on the rich plains, big old ranchos are boarded up. No one in Venezuela needs to be out of work. In a country a little larger than Texas, there are only a third as many people to be found. There is no one to take care of the home industries. Everything from butter and eggs to automobiles is imported from outside.

The government is working like fury to arouse interest in home industries. Much of the oil money is being plowed back into experimental farms and industrial projects.

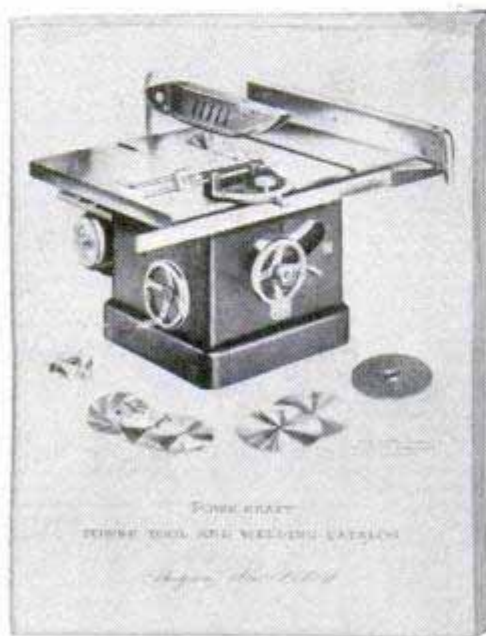
Like every boom frontier, Venezuela is popping, and probably will continue to pop. Vast projects are afoot. Caracas, the capital city of 300,000, nestled in a cool valley atop the coastal ranges, is a boom town "busting its seams." Its new modern buildings are stretching down the valley and climbing precipitous mountainsides. The city is a bedlam of clattering machinery building higher structures, tearing down old colonial streets, boring vast multilayered traffic tunnels under the streets. Out along the coasts, the four major oil companies have built or are building mammoth refineries to handle the ever-increasing abundance of black gold. Below Caracas, on the Caribbean coast, a mighty seaport is being constructed to provide docking facilities for a dozen big ships. Out where the Caroni River tumbles over a ledge and joins the Orinoco, work is progressing to harness the massive falls with a huge earth dam, and a

(Continued to page 262)



# FREE . . . WARDS 1950-51

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power plant capable of producing 1,000,000 kilowatts an hour—second greatest producer of electrical energy in the world.

On a square mile of land north of Caracas sits what will be the biggest educational institution in South America—University City. Its medical-school hospital alone, with room for 1000 beds, can be emptied in seven minutes in case of fire. Beds on casters are simply rolled to a series of ramps from each floor and coast to the wide outdoors.

Most of this is happening under the guiding hand of a Venezuelan government department known as the Ministerio de Fomento. Its job is to foment, and it does it well.

Other government projects include a vast road-building program which will double the present mileage. There are 38 new airports under way throughout the country, half a dozen major domestic airlines, a cattle program with slaughterhouses and breeding stations to revive the fallow industry. One irrigation project will reopen 250,000 acres of forgotten farmland. In cooperation with Nelson Rockefeller's Venezuelan Basic Economy Corp., the government is also creating markets in the interior for the big fishing industry, through the introduction of refrigeration.

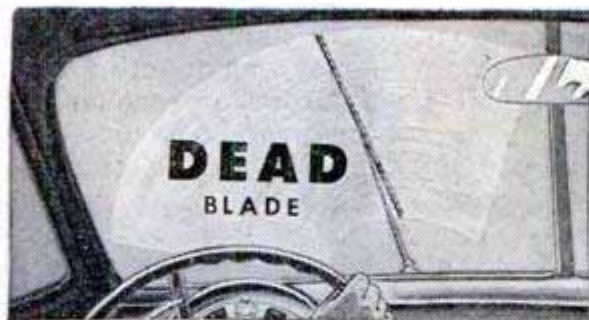
There's plenty of opportunity in Venezuela. But if you're planning to hop a freighter, think it over. Where there's gold there are high prices. In Caracas, orchids, gold, diamonds and gasoline are cheap, but they are the only cheap products to be found anywhere in the country. A nickel candy bar is thirty cents. Cheap shoes are \$20. U. S. cigarettes are almost a dollar a pack. Americans working for U. S. companies get "cost of living" bonuses up to 100% of their salaries and continually scream "poor."

Before you go to Venezuela there are several things you should know: Spanish, a U. S. employer who'll backstop you with a job, and enough to go there with the idea of staying. What's more, the ground is Venezuela's. All mines are on government mineral reserves, to which rights must be leased on percentage. Taxes are low, but anybody in business must hire 75 percent Venezuelan labor—which is hard to find. What's more, the government isn't interested in buying tickets back home for people who flop. Venezuelans are friendly. But they don't like foreigners who plan to grab a fortune and run back home with it. Nine times out of ten it won't pan out like that anyway.

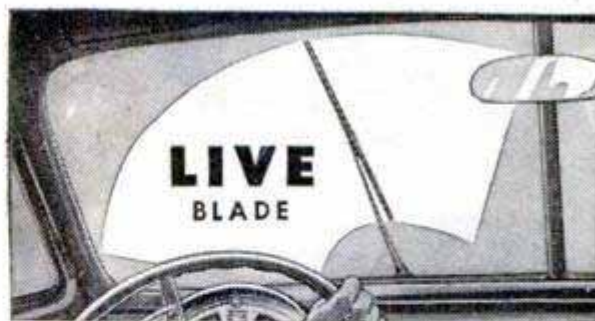
☐ Aureomycin, the antibiotic drug, is now being used to treat sinusitis in turkeys.



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**THIS DEAD BLADE** still looks new but it blurs rain, smears muck, streaks glass. DEAD blades make dead drivers!



**THIS LIVE ANCO BLADE** wipes clean, clears rain, clears road muck . . . lets you SEE. Protects your loved ones.

**WHAT LASTS FOREVER?** Nothing does. This is especially true with Windshield Wiper Blades—even though made of finest natural rubber. Corrosive windshield film, wind burn and hot sun BAKE the life out of wiper blades, often in six months or less. DEAD blades cause dangerous windshield smear. DEAD blades make dead drivers. Make sure your car has live, new windshield wipers.

## Change Your Wiper Blades

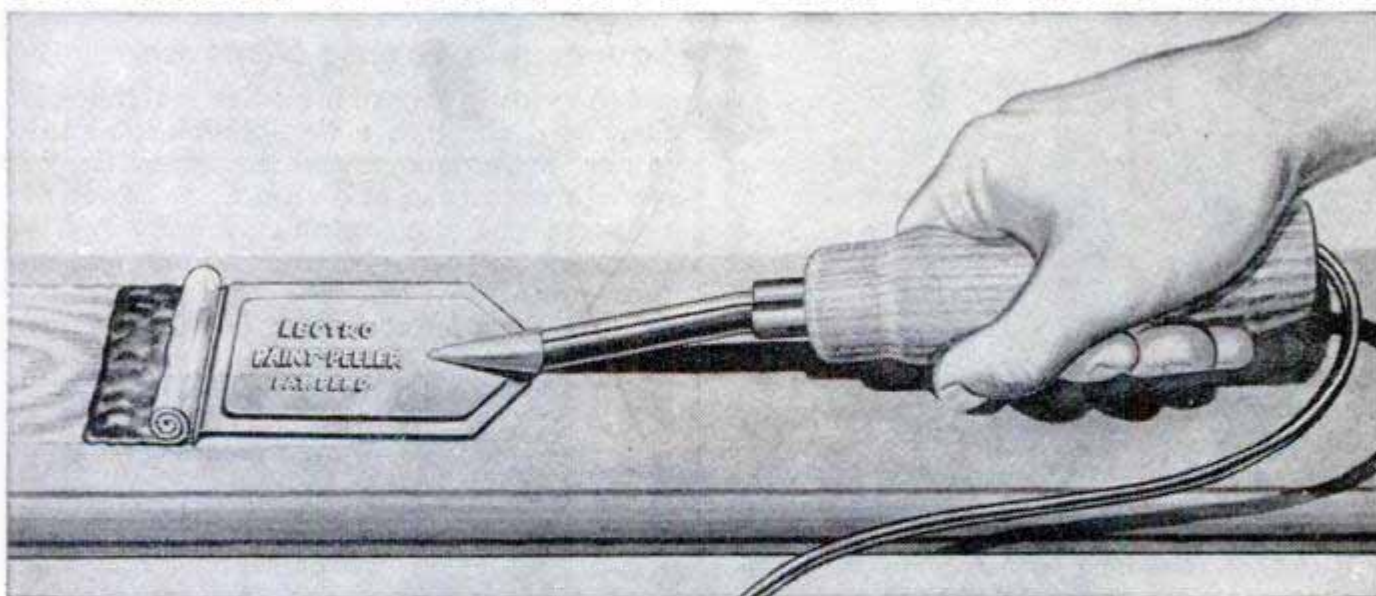
Next time you buy gas, change to LIVE,

NEW ANCO BLADES . . . RAIN-MASTER for Flat windshields . . . CLEAR-FLEX for Flat or Curved windshields. They fit all cars—wipe quicker and cleaner than any other blades.

**Mr. Dealer:** Ask your ANCO Distributor about the sensational new ANCO Wiper Motor. A quick, easy replacement for lazy vacuum motors. Gives lots more power . . . lots less stall. Compensates for linkage wear to control wiping arc. Eliminates blade slap.

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## NO CHEMICALS — NO FLAME

With one easy stroke, the Lectro Paint Peeler removes any number of coats of paint right down to bare wood. No danger of fire. Will not scorch or burn delicate wood surfaces. No messy chemicals. Crisp paint curls that you remove are dry, won't stick to rugs or furniture. Removes paint, enamel, flat or semi-gloss from wood surfaces. Nothing else to buy. Complete instructions included. Just plug in any 115 AC or DC outlet, heat, and go to it. Will pay for itself in a few hours in savings of your time, materials, and

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## ORDER NOW!

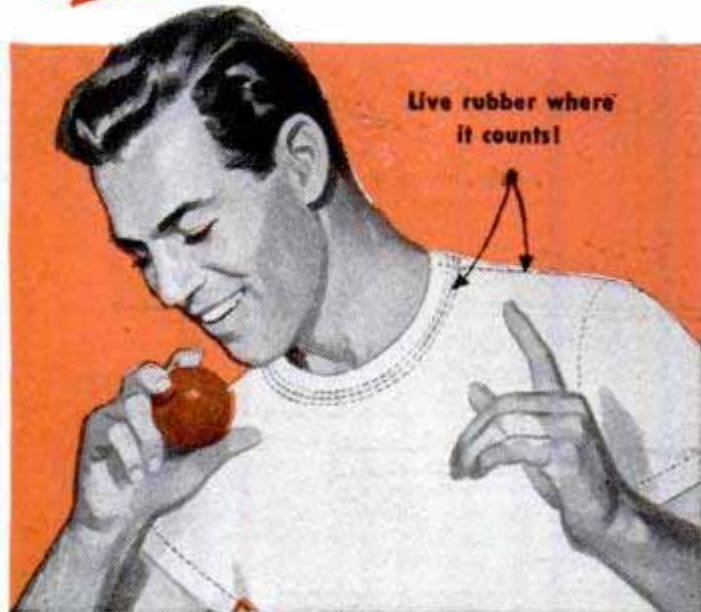
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engineered with "live rubber"

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\*Reg. U. S. Pat. Off.—Pat. No. 2,282,217

# Inventing—Hobby of Famous People

(Continued from page 112)

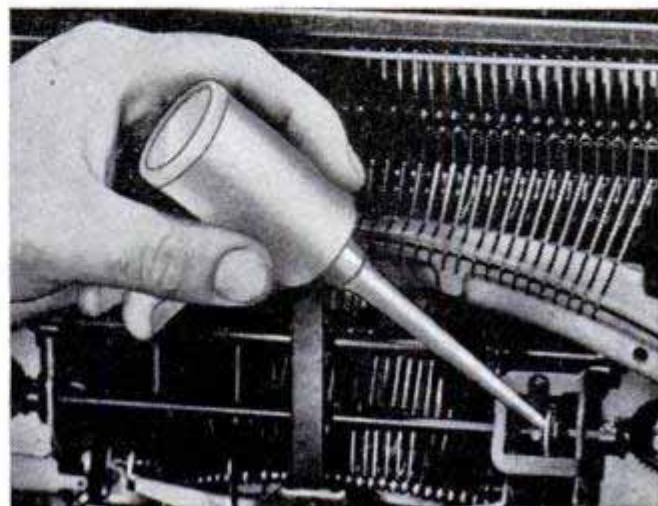
salesman. And, while their inventions are not known by the name of the inventor, the vacuum cleaner was invented by a department-store janitor, a preacher invented photographic film and a barber invented the power loom. The dial telephone is an outgrowth of the work of an undertaker who thought that a rival mortician had bribed the operators to bungle his calls!

Even those who have not sought fame and fortune in inventions, often have found Lady Fortune at their elbow. This is illustrated by the invention of Miss Penny Pendleton, of St. Louis, and United States patent No. 2,481,946 issued to her on September 13, 1949. Miss Pendleton's invention is a holder for spectacles and consists of a piece of ribbon or chain long enough to be hung about the wearer's neck. Each end of the ribbon is provided with an elastic socket into which the ends of the bows of the spectacles may be inserted and retained. Though Miss Pendleton intended the device for her personal use, friends soon were pleading with her to duplicate the holder for them. In a matter of a few months she had launched a business that now embraces a million users.

Casual inventors, such as Miss Pendleton, continue to far outnumber professional inventors. This year one out of each thousand persons in the United States will take a fling at **inventing**. Perhaps this will be your turn—or that of your neighbor.

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**STANLEY NO. 106 ZIG-ZAG RULE.** All the features of 227 but without extension. White enamel finish.

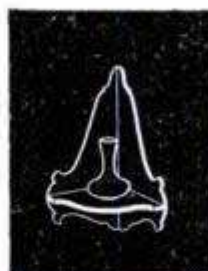


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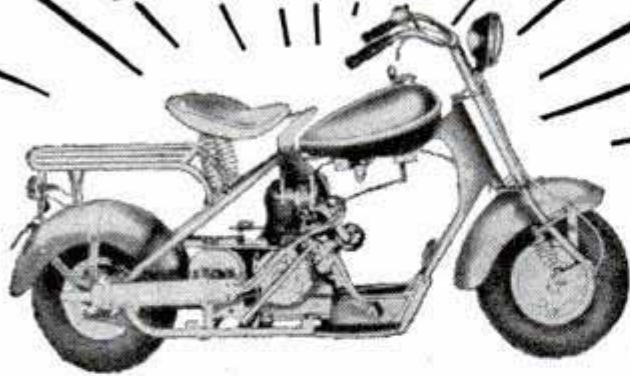
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GOLF COURSES • PARKS  
101 OTHER JOBS

Sharpens All Reel Type Mowers • Hand, Power or Gang • 10 to 20 Minutes • No Dismantling • No Extra Attachments Needed.

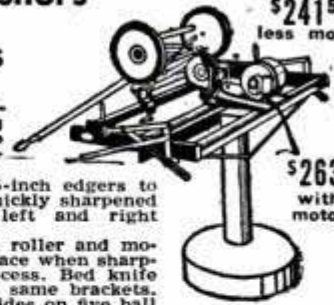
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NEW FULL SIZE

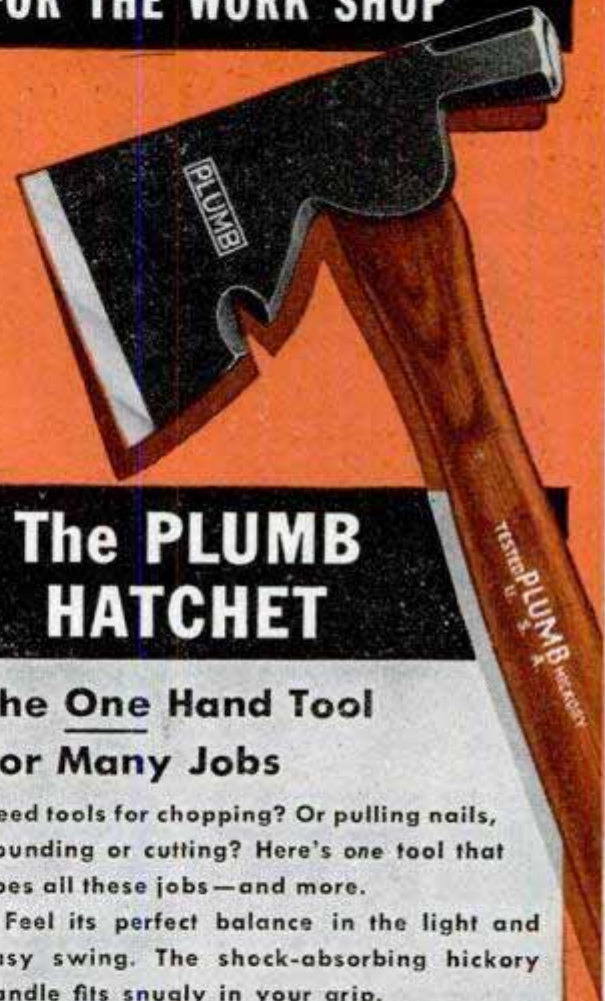
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Need tools for chopping? Or pulling nails, pounding or cutting? Here's one tool that does all these jobs—and more.

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Complete instructions for easy installation with each lite.

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DO DOZENS OF JOBS Both riding and walking tractors quickly and easily plow, cultivate, harrow, disk, bulldoze, spray, haul, grind, saw wood, etc.

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70% longer average life\*!

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GIVE your cranky engine the sure-fire lubrication treatment it needs! Simply add one quart of BARDAHL to regular oil.

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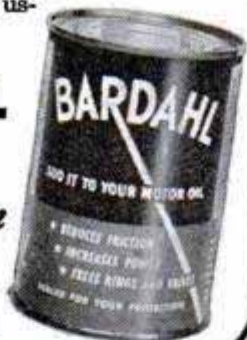
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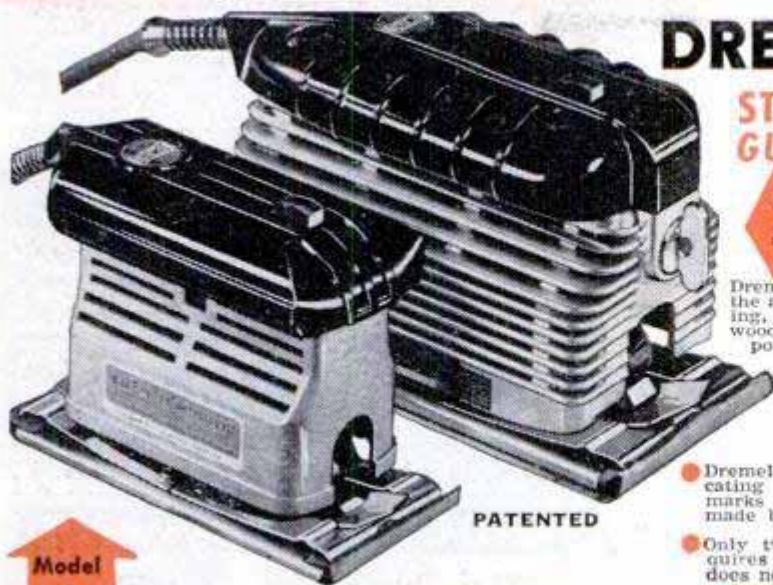
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## DREMEL *Electric* SANDERS

**STRAIGHT-LINE RECIPROCATING ACTION  
GUARANTEES SCRATCH-FREE SURFACES**



PATENTED

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**\$24.50**

**FOR HEAVY-DUTY CRAFT AND  
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Dremel's new Model 2000 is a fast-cutting, production sander. It has the added stroke and extra power required for furniture and cabinet making, boat building or refinishing. Great for building operations, sanding woodwork, dry wall joints, siding and other surfaces. Does a superb wax polishing job, too. Weighs only 5 pounds yet has 21 sq. in. sanding surface. Over-all size 3 1/4" x 4 1/2" x 7". Complete with steel carrying case, 25 asstd. sheets sandpaper, polishing pad. \$24.50.

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(IN MODEL A AND MODEL 2000 SANDERS)

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- Only two moving parts . . . requires no oiling . . . sanding dust does not affect action.
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- 8 ft. Underwriter's approved cord . . . operates on 110-120 volt, 60 cycle A.C. . . . fully guaranteed.

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**\$14.85**

**FOR HOBBY WORK, REFINISHING  
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**MOTO-TOOL KIT NO. 2**  
With 23 Accessories  
(High Speed Steel Cutters, Grinding Wheels)  
**\$23.50**

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Moto-Tool is the most versatile tool you can own—grinds, routs, drills, carves, engraves, polishes, etc. Look at these features: Approx. 27,000 R.P.M. • Dynamically balanced armature eliminates vibration. Oilless (oil-sealed) bearings • Dust-filtered air-cooling system • Weighs 13 oz. • Uses 110-120 v. AC • Used in plants of General Electric, Ford, Remington Arms, Nash-Kelvinator, etc.

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Portable  
**DRILL  
PRESS**

Only  
**\$9.95**

(Less  
Moto-Tool)



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BLADE  
FACES  
4 WAYS

JUST  
GUIDE IT!

Only  
**\$5.85**  
with 3 new blades

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For home, hobby, repair work—no other tool pleases so much for so little cost. Works in any direction—delivers 7,200 strokes per minute smoothly, effortlessly. Saws through 3/4" medium-hard wood at a foot-a-minute speed. Touch-of-the-trigger, foolproof action. Only 2 moving parts, never needs oiling. Uses 110-120 v. A.C.

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Moto-Tool Kit No. 1 contains the lighter Model No. 1 Moto-Tool and 34 practical accessories (steel cutters, grinding wheels, etc.) in an attractive lacquer-finish wood case. It's the biggest value in the field. With 34 Accessories Only . . . **\$17.50**

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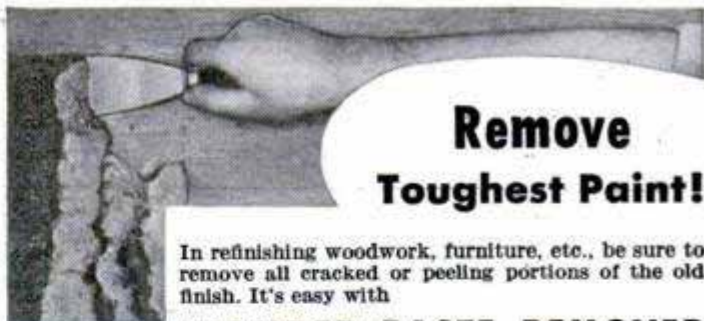
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Learn about MARVEL Mystery Oil too—the nationally recognized leader among oil improving additives. Added to your regular motor oil, it shields vital parts from excessive frictional wear with its great film strength—produces a slow idle, faster engine pick-up and an even power pull.

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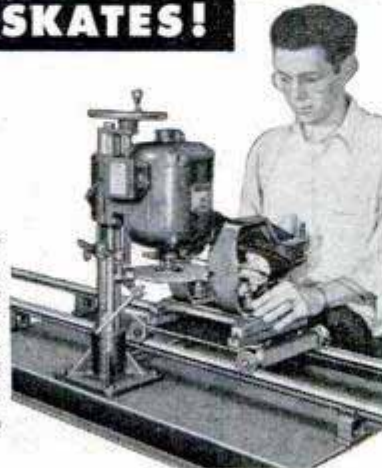
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**THE FATE-ROOT-HEATH CO., Dept. J-3, Plymouth, O.**  
OCTOBER 1950

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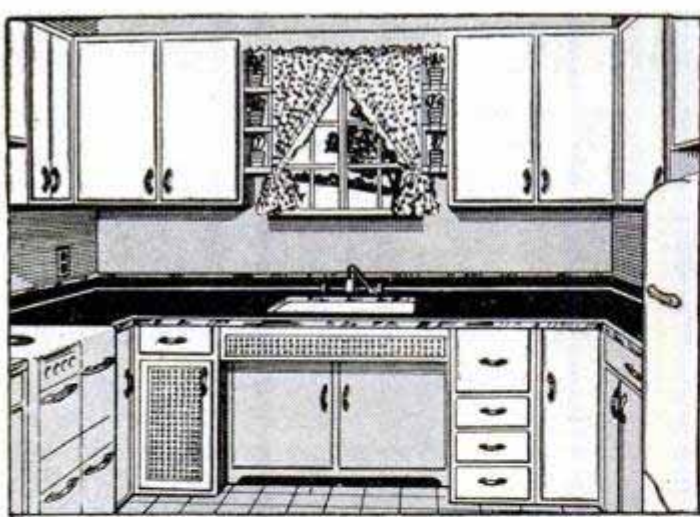
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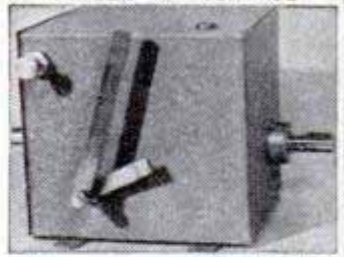
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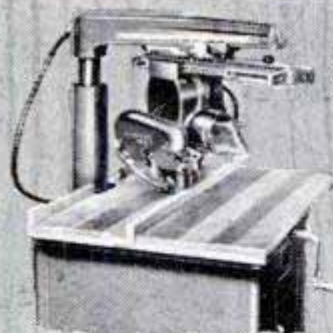
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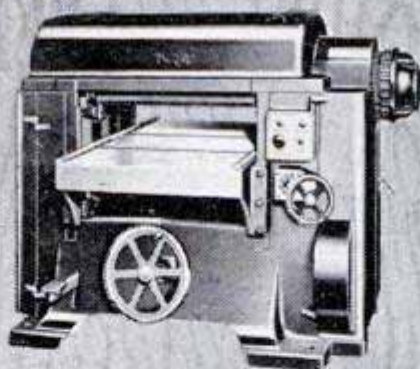
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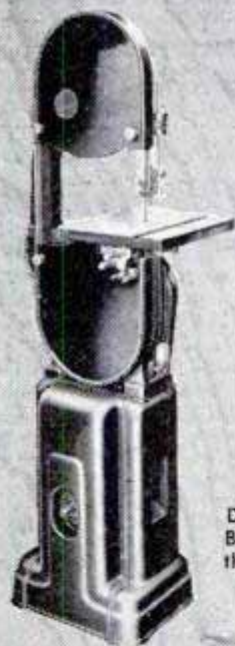


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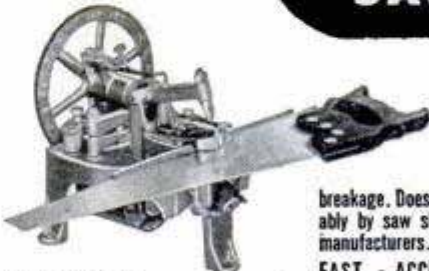


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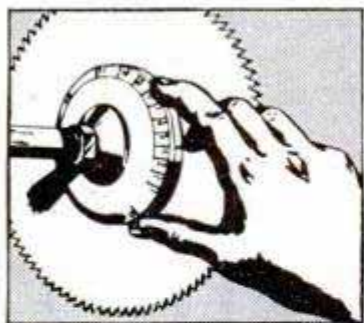
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Here are the famous P. S. Stubs Needle Files, used and preferred by highly skilled watch makers, tool and die makers. Now available for the Hobbyist who works on Railroad, Airplane, Ship Models, etc. Ideal for shaping any type of material, such as wood, plastic, steel, aluminum, etc. Truly the finest in perfect, fine Needle Files. 5 1/2" long. Cut #2—Packed 1 doz. Assorted shapes to a box. \$4 prepaid. Send check or money order Now. Sorry, no C.O.D.'s.



1 Doz. assorted  
**\$4 PREPAID**  
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Finest Imported Swedish Steel Blades

- Prices Now Lower than Most American Chisels.
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Fine Swedish quality in accurate cutting chisels that every craftsman will appreciate. Gensco chisels take and hold the finest edge for better work.



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keeps blades clean and sharp. Strip it off when ready for use.

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11 SIZES  
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## The Safe Saw that Cuts One Inch Wood 50% Faster and with 70% Less Noise!



ARM  
ADJUSTS TO  
PERMIT SAWING  
ANY LENGTH  
MATERIAL

NOW ONLY  
**\$17.50**

New No. 201

# SYNGRO ELECTRIC JIG SAW

Ideal for Dad's workshop—safe for children! Largest, most powerful of its kind! Quiet operation. Cuts any length 1" wood, thin metal, plastic. Portable. 14,400 Safety Strokes a minute: Entire Saw approved by Underwriters' Laboratories, Inc. Power Unit **GUARANTEED** against Burn-out all during your ownership.

No. 401  
**\$12.50**

Complete with Built-In Motor, \$17.50



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**Greatest Sharpening Development Since Invention of the Hone!**

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SYNGRO's stone-that-moves-240 strokes a second enables you to hone SHARP almost anything—tools, knives—easier and in your favorite honing style! Safe to use. With Built-In Motor, 4 Stones — **\$12.50**



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**QUALITY TOOLS**



Operate on 60 cycle, 110-120 volt. AC only. Buy at dealers. If none near, send article price, we'll ship POSTPAID. (Dealers write!)

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**You own the BEST money can buy... when it's P & C**

SMOOTH handles  
DEEP grooves give a better grip  
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SWAGED blades will not turn  
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There is a P & C tool for every job. Ask your hardware dealer for the finest wrenches, sockets, punches, pliers and screwdrivers made—P & C—"the BEST tools money can buy".

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THE IRON CEMENT OF 1 000 USES

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Five Red luminous Plastic fins whirl, looking like jet propulsion in action. 9 inches long, has internal lights. Metal parts are gleaming chrome. Fits all cars.

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**NEW PACKAGED BOATS**  
17 models. 8'-16': Tredronic racers, cruisers: Outboard, inboard, skiffs. Assembled frames: Tri-Keel construction: Tredronic bottom: spray rails: easy to build!  
**SEND 25c FOR CATALOG!**  
Catalog and booklet "Plywood Boats", \$1.00

**BOAT PATTERNS-BLUE PRINTS**  
1950 Catalog—100 designs by naval architects. Racing classes, cruisers, inboard, outboard, sail, 6 to 35 ft. Plywood—Steel—Plank. Construction plans, full-size patterns. SEND 35c FOR CATALOG or \$1.00 for catalog and booklet on "Boat Building."  
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# WAR SURPLUS BARGAINS!

ALL ITEMS BRAND NEW — UNCONDITIONALLY GUARANTEED

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## D.C. ARC WELDER

250 AMPS. MODEL 252  
FOR ANY WELDING JOB,  
LIGHT OR HEAVY

Stop Costly Repair Bills,  
Weld It Yourself and Save

Designed for many years of trouble-free service. This precision engineered Direct Current ELECTRIC ARC WELDER is offered at but a fraction of its original value. It can be mounted permanently or easily transported for portable use. Does the job instantly where and when you need it. Has dial type rheostat for easy pinpoint control and a high-low range switch. Run welder at 2500 RPM from drive pulley or power take-off of tractor, a 7 1/2 HP electric motor or a 10 HP gas engine. Use two V belts or flat belt (on pulley). Now ... AT A FRACTION OF ITS VALUE. Price includes double V or flat belt pulley and instruction book. Shipping wt. 107 lbs. F.O.B. Chicago. **99.50**

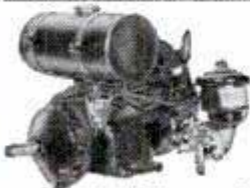
ACCESSORY KIT including welding helmet, electrode holder, two 10 ft. cables with clamp and 5 lbs. of assorted welding rods. (ITEM #65) Shpg. wt. 17 lbs. F.O.B. Chicago. **10.50**

IF MORE INFORMATION IS DESIRED, write for WELDER CIRCULAR.



(ITEM #65)

Only one or two jobs will pay for entire welder.



## SURPLUS SPECIAL! CONTINENTAL RED SEAL 1 1/2 H.P. ENGINE

1 cylinder, 4 cycle gas engine with 6:1 gear reducer for 300 to 400 RPM output. For Lawn Mowers, Garden Tractors, Light Farm machinery, Feed Mills. To drive Pumps, Compressors, Generators. Engine rated 1800 to 2400 RPM. Complete with starter rope, muffler, oil bath air cleaner. Shpg. wt. 60 lbs. A \$74.00 VALUE. NOW ... WHILE THEY LAST. (F.O.B. Chicago) **39.50**

(ITEM #97)

oil bath air cleaner. Shpg. wt. 60 lbs. A \$74.00 VALUE. NOW ... WHILE THEY LAST. (F.O.B. Chicago)



## G-1 STAINLESS STEEL TANK

Use these tanks on compressors, for tire inflators, pulsation chambers, floats, buoys, hydraulic reservoirs, fluid and milk containers, fuel containers, etc. Tough, light, shatterproof, 450 P.S.I. Aviator's Breathing Oxygen bottles, type G-1, 2100 cu. in. (approx. 9 gallons) int. vol. 24"x12", 1/4 threaded openings at ea. end. Wt. 19 lbs. F.O.B. Chicago. **5.95**

(ITEM #63)

## SELF-PRIMING ELECTRIC PUMP

APPLICATIONS: Oil burners, aquariums, fluid metering, fuel pump, tool post grinder, coolant pump, pressure lubricating pump, general industrial, etc. Motor Mfd. by Black & Decker: Double ball bearing series wound, continuous duty 1/30 H.P. electric motor, rated 12,000 R.P.M. Transformer included for use on 110 V AC current. Also applicable for 24-32 V DC. Pump Mfd. by Weldon Tool Co. with standard 1/4" tubing ports; rated 2 G.P.H.; remove pump and use motor as high speed grinder. Overall Dimensions: 7 3/4" long x 3 1/4" wide x 3 1/4" high. Approx. wt. 5 lbs. \$51.00 value. (Item #1) postpaid. **12.95**



## Hydraulic Cylinders-Air or Oil

Large supply of new labor-saving, economical hydraulic equipment in many types and sizes. Use these positive, highly efficient, smooth pressure hydraulics on presses, arbors, lifts, loaders, power control, positioning, brakes, plastic dies, auto frame alignment, etc., etc. ITEM #4—All steel double action hydraulic cylinder, 1 1/2" bore, 2 3/8" stroke. Clevis mounting. Will lift 1000 lbs. with 1000 P.S.I. line pressure. Perfect for positioning and feeding movements. Shpg. wt. 4 lbs. F.O.B. Chicago. **4.95**



(ITEM #42)

ITEM #33C—Double action hydraulic cylinder, 1 1/2" bore, 4 1/2" stroke. Clevis mountings at both ends. Uses 1/4" pipe fittings. Postpaid. **8.95**

ITEM #32—Double action, 1 1/2" bore, 9" stroke, will lift 1760 lbs. with 1000 P.S.I. line pressure. Wt. 4 lbs. A \$45.00 value. Postpaid **10.95**

ITEM #41—Double action hydraulic cylinder, 2" bore, 6" stroke, clevis mounting at base end of shaft. Overall length closed 12 1/2". Has 3/8" stainless steel shaft, uses 3/4" tubing fittings. Will lift up to 3100 lbs. with 1000 P.S.I. line pressure. Weight 7 lbs. Postpaid. **12.50**

ITEM #16—Double acting cylinder, 1 1/2" bore, 27" stroke. Will lift 1760 lbs. with 1000 P.S.I. line pressure. Wt. 8 lbs. A \$55.00 hydraulic cylinder value for only Postpaid. **12.95**

ITEM #15—Double acting cylinder, 3" bore 10 1/2" stroke. All steel hydraulic cylinder, will lift up to 7000 lbs. with 1000 P.S.I. line pressure. Wt. 12 lbs. A \$78.00 value, Postpaid **19.50**

ITEM #40—Double action, 3 1/2" bore, 20" stroke. Rated lift capacity 9600 lbs. with 1000 P.S.I. line pressure. Clevis mounting, aluminum alloy barrel with 1 1/2" stainless steel shaft and piston. Wt. 20 lbs. A \$25.00 value. F.O.B. Chicago. **25.00**

ITEM #6A—Double action hydraulic cylinder, 3" bore, 25" stroke, will lift 7070 lbs. with 1000 P.S.I. line pressure. Steel barrel, 1 1/2" stainless steel shaft. Gov't. acq. cost. \$178.00. Shpg. wt. 26 lbs. F.O.B. Chicago. **28.00**

ITEM #42—Double action hydraulic cylinder, 4" bore, 18" stroke. Rated lift capacity with 1000 P.S.I. line pressure is 12,560 lbs. Ship. wt. 30 lbs. AN EXCELLENT BUY for F.O.B. Chicago. **32.50**

HI-PRESSURE FITTINGS for cylinders and valves available at 50c ea. for 3/8" pipe and 65c ea. for 1/2" pipe.

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Brand New



(ITEM #88)

## AUXILIARY ELECTRIC A.C. GENERATING PLANT

FOR GENERAL UTILITY AND EMERGENCY USE  
2500 WATTS - 115 VOLTS A.C.  
60 CYCLES

Plenty of current to operate your: Oil Burner, Sump Pump, Refrigerator, Home Freezer, Power Saw, Lights, Radio and Television, Home Water System Pumps.

Complete integrated heavy duty electric power plant. Signal Corps Model PE-75, driven by Briggs & Stratton, one cylinder 6 1/2 H.P. Model ZZ, 4-cycle engine with killer button, oil bath air cleaner, governor, muffler, starting rope, and radio interference filter. The self-excited Leland or Westinghouse generator is rated 2500 Watts, 115 Volts, 60 Cycle A.C. single phase, belt driven, with guard and duplex receptacle. When generator is not in use, you can use the engine separately to power other equipment. Mounted on adjustable steel skids, notched for carrying poles. Net wt. 310 lbs. Shpg. wt. 440 lbs. Dimen. 36"x19 1/2"x24". 12 month guarantee. \$726.00 value. NOW **295.00**

F.O.B. Chicago

## UTILITY PUMP ROTARY VANE TYPE

Perfect For Water, Oil or Insecticides  
Sprays DDT, 2-AD, sulphur compounds, etc. Pressures to 150 lbs., 15 gals. per min. at 1200 RPM using 2 HP. As vacuum pump for milking machines: lab use, etc., delivers 26" vacuum, 4.5 cu. ft. per min. at 1500 RPM using 3/4 HP. Rotate either direction, 1/2" pipe thread ports, 1/2" standard shaft, 4 ball bearings. Easy to mount — Ready to run. Shpg. wt. 13 lbs. (ITEM #51) F.O.B. Chicago. **16.50**



(ITEM #51)

## DIRECT CURRENT GENERATORS



For welders, plating, truck and marine use, D.C. appliances, lights, etc. Aircraft quality—lifetime grease sealed ball bearings. Heavy duty.

ITEM #89—Type M-2, rated 50 Amps.—24 Volts. Mfd. by Leecce-Neville Co. Shpg. wt. 32 lbs. Gov't. Acq. Cost \$178.00. F.O.B. Chicago. NOW ONLY **16.50**

ITEM #90—Type P-1, rated 100 Amps.—28 Volts, 2500 RPM. Mfd. by General Electric, Ford, Delco-Remy and Westinghouse. Gov't. Acq. Cost \$300.00. Shpg. wt. 70 lbs. F.O.B. Chicago. **22.50**

ITEM #91—Type R-1, rated 300 Amps.—30 Volts. Mfd. by Jack & Heintz. Gov't. Acq. Cost \$380.00. Shpg. wt. 70 lbs. F.O.B. Chicago. **35.00**



(Item #99)

## D.C. GENERATOR FOR 12 VOLT SYSTEMS

BRAND NEW. Rated 15 Volts at 50 Amps. Use on 12 Volt circuits on trucks, tractors, ships, planes, battery chargers, auxiliary lights, etc. Base mounting with 4 bolt holes. 5/8" threaded shaft with keyway. Mfd. by Bendix-Eclipse. Gov't. acq. cost \$136.00. Shpg. wt. 53 lbs. F.O.B. Chicago. **21.50**

LOGAN HEAVY DUTY

## HYDRAULIC PUMP

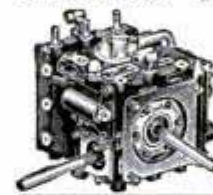
For operating hydraulic cylinders and hydraulic motors on tractors, bulldozers, construction machinery, lift trucks, industrial applications, etc. Delivers 10 GPM at 1200 RPM at 1000 P.S.I. using 6 HP. Has a 3/4" inlet, 1/2" outlet, 3/4" shaft with flat and keyway for direct or pulley drive. Has flange with 4 bolt holes for convenient mounting. Ship. wt. 22 lbs. Overall dimen.: 7" L. x 5 1/2" H. x 5 1/2" W. A \$105.00 value. FOR ONLY. **22.50**



(ITEM #29)

## VICKERS HYDRAULIC TRANSMISSION

MODEL AA16801A  
Ideal for lathe drive, miniature cars, power machinery, gearing, etc. Rated 2 HP maximum input at 3750 RPM. Output speed continuously variable from 0 to 1/2 of input speed in either direction. Self contained reservoir. All controls external. Even power at all speeds. Complete with two 1/2" shafts with flat for pulley attachment. Ship. wt. 20 lbs. Gov't acquisition cost \$325.00. A tremendous value at. **25.00**



F.O.B. Chicago (ITEM #85)

## HYDRAULIC CONTROL VALVES

ITEM #24. Four-way control valve with built-in relief valve, for use with one double action hydraulic cylinder, may be used with 1500 P.S.I. hydraulic system to open and close hydraulic cylinders. Ship. wt. 8 lbs. A \$38.00 value. **7.95**

ITEM #26. Four-way control valve for use with two hydraulic double-action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Ship. wt. 6 lbs. A \$60 value. **10.95**



(ITEM #24)

# You can build this SINK ENCLOSURE



## from full-size patterns

Famous Easi-Bild\* Pattern Method of Construction shows you the simplified way to save many, many dollars in your "homework"... by doing it yourself.

Send 50¢ for Easi-Bild Pattern #41, and dress up your sink with this convenient, modern cabinet-work. Another 20¢ brings you the Easi-Bild Pattern Book, illustrating over 100 other "Build It Yourself" patterns.

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**YOUR ANSWER TO  
SMALL ITEMS STORAGE**  
at home, office, and shop  
(IDEAL GIFT, TOO)

So handy to keep nuts,  
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THIS 32 DRAWER UNIT ONLY \$8.95 POSTPAID

Stop searching, get a 32 or 64 drawer Jiffy to keep those small items that usually get mislaid. Spot welded steel, gray enamel finish, metal drawer guides. Dividers included with aluminum drawers make possible three compartments per drawer. Looks good anywhere. Send check or money order, please—no C. O. D.'s. Prices below. Your money refunded if not satisfied. Dealers write for quantity discount.

**SPECIFICATIONS**  
**32 Drawer Unit**  
6" Deep  
12 3/4" Wide  
15 1/4" High  
**64 Drawer Unit**  
6" Deep  
25 1/2" Wide  
15 1/4" High  
**Drawer Size**  
1 1/4" Deep  
2 3/4" Wide  
6" Long

**WITH ALUMINUM  
DRAWERS**  
**Dividers and Index  
Cards Included**  
One piece rustproof aluminum drawers for heavy service—good for work bench and industry use.  
**32 drawer - \$8.95**  
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OHIO ORDERS ADD 3% SALES TAX  
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**NEW SPECIAL!**  
**ONLY \$2.95**  
**8 DRAWER UNIT**  
(24 compartments)  
**16 Drawer Unit \$4.95**  
(48 compartments)  
**SPECIFICATIONS**  
6" Deep—8 1/4" High  
8 Drawer 6 3/4" Wide  
16 Drawer 12 3/4" Wide  
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A FINE CAR

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\$10,000  
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High Sensitivity,  
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## Save HALF! Slight Factory Imperfect Dress PANTS

Genuine 100% GABARDINE

Imperfections very slight — positively do not affect wear. Ideal for dress, school, play, work. Firm hard finish. Wrinkle and shine resistant. Retains neat press. Zipper front. Roomy pockets. Blue, Tan, Gray, Sand, Lt Brown, Dk. Brown, Blue-Gray or Green. Waist: 28-42.

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Worth \$10  
**\$4.95**

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**NEW LOW PRICE**  
**8.95**  
with Steel Expansion Band Plus 10% Tax (90c)

FULLY GUARANTEED for One Year

Plus Lifetime Service Certificate 5-Day Free Trial.

31-Day Calendar Changes dates automatically! For Sportsmen, Scouts, Photographers, Engineers, Chemists, Navigators, Doctors.

Remarkable Import Buy—these ideal all-around timepieces and chronographs at an unbelievable low, low price. Imported Swiss jeweled movement, Radium Glow 1" dial, red sweep-second hand, shock-resistant case, unbreakable crystal. And—included is the handsome, rich-looking steel expansion wristband. Complete instructions included together with guarantee and service certificate. White, Pink or Black dial face, specify color.

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I enclose  Check  Money Order  Send C.O.D.  
Send..... Chronograph watches at 8.95 (Postpaid), plus 10% tax on 5-day free trial. Money Back Guarantee, Name & Address on Margin.

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QUICKER PICK-UP . . . BETTER MILEAGE WITH ECONOMICAL NEW VAPORIZER

Drivers claim up to 25% savings with new water Vaporizer operating on fighter plane principle. Eliminates carbon and "pinging". Get faster pick-up, better performance. NOW, for first time, fully automatic unit available at LOW COST! For cars, trucks & tractors. Won't harm engine. Water vapor improves efficiency. Easily installed. Give make, year, no. cylinders of car. ONLY \$5.95 Postpaid. Send Money Order.

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### BUILD YOUR OWN ARC-WELDER

For Light or Heavy Work

No rewinding necessary—use coils taken from old auto generators. Works on 110 or 220 A.C. Has 20 different heats. Complete plans and BIG Catalog 35c.

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**NEW LOW PRICE! \$11.50 1 YR. GUARANTEE**

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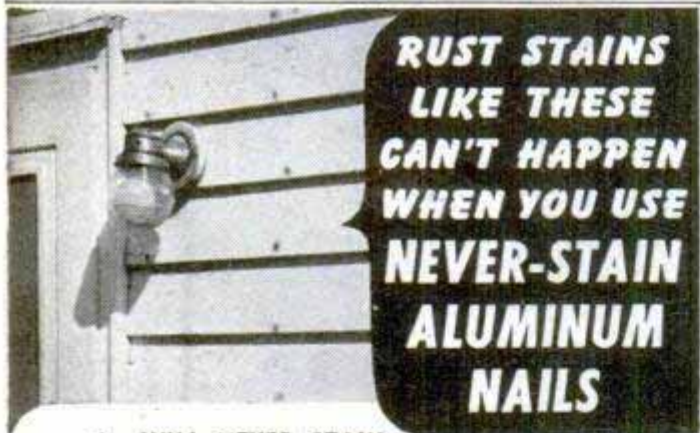
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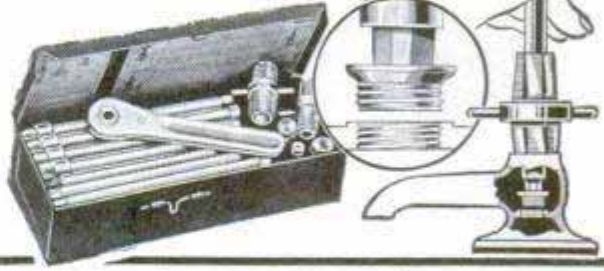
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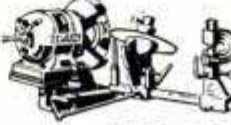
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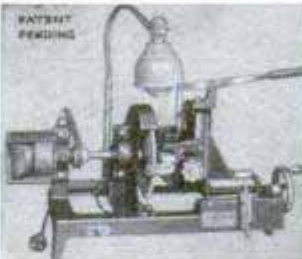
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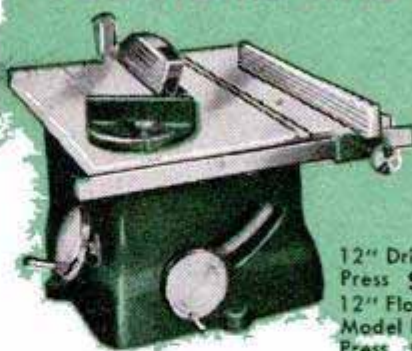
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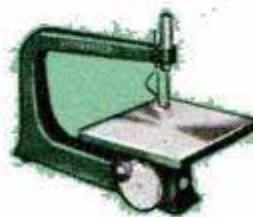
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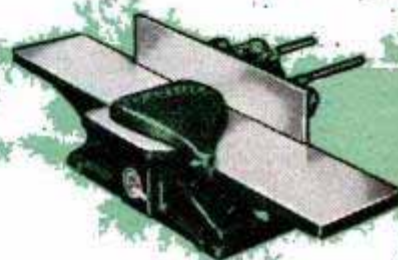
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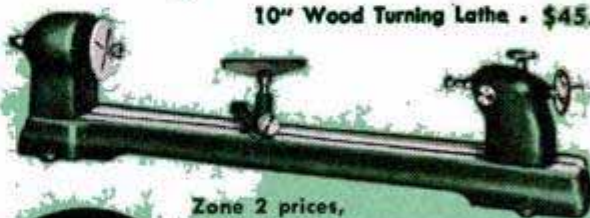


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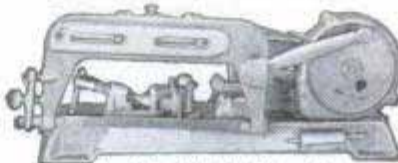


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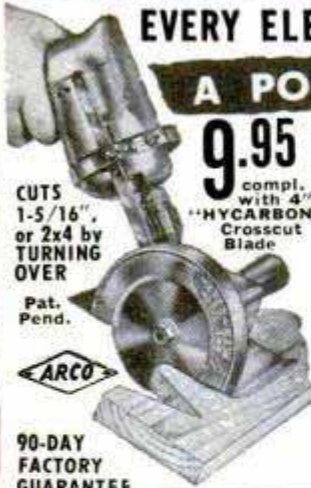
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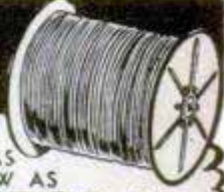
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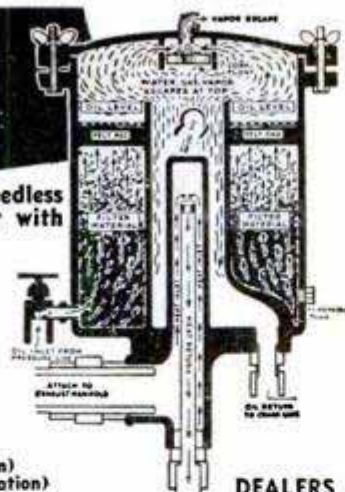
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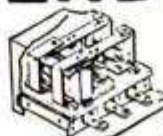
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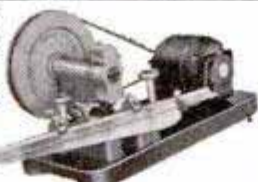
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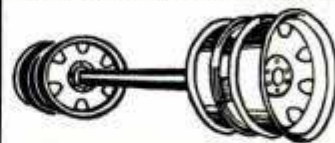
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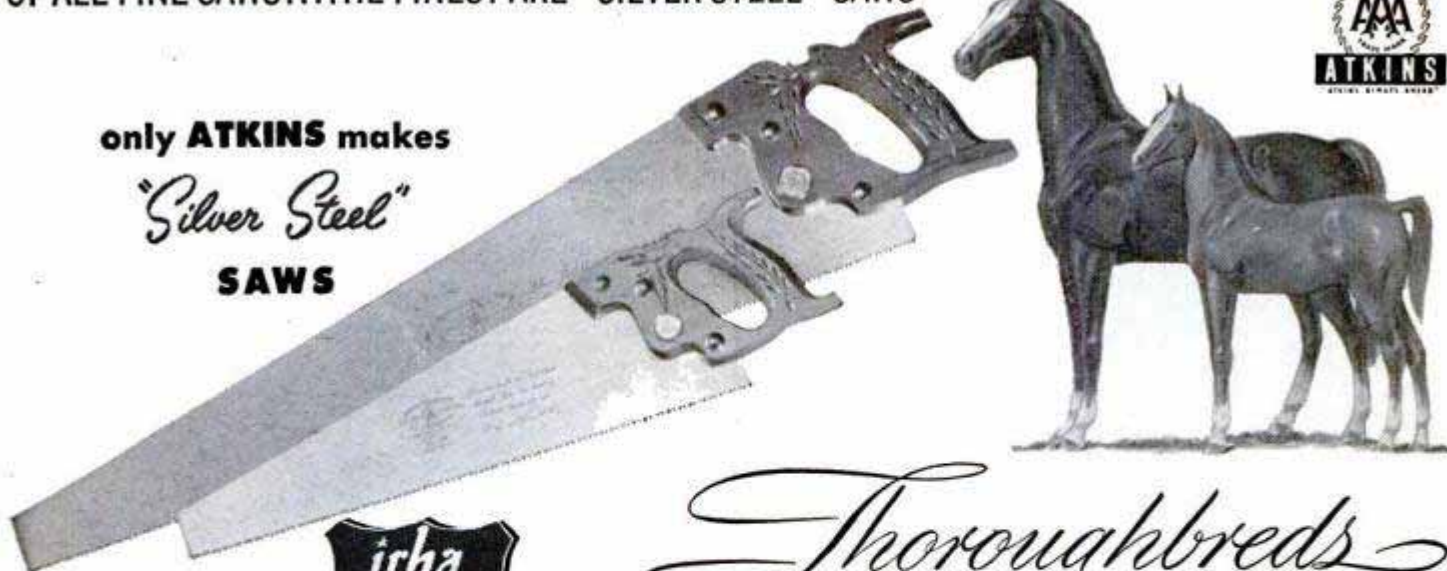
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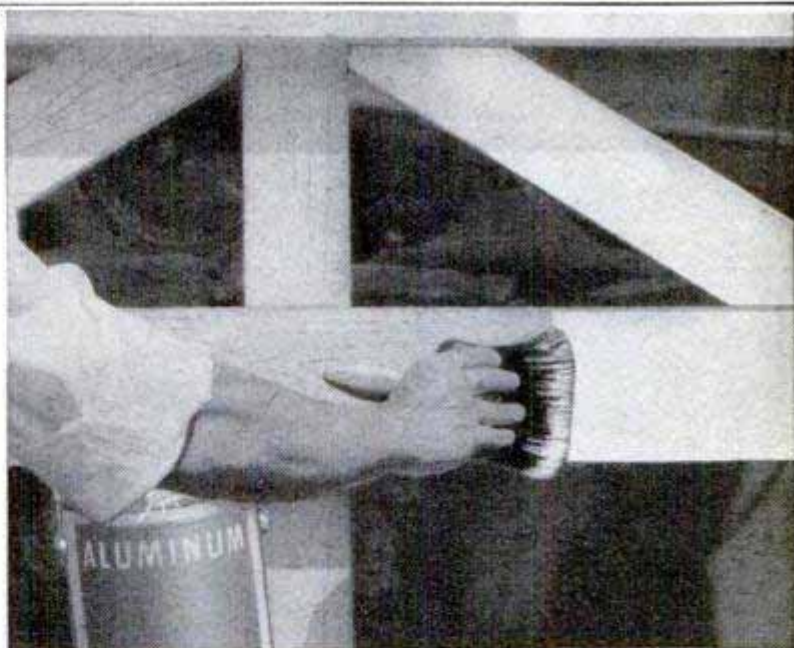
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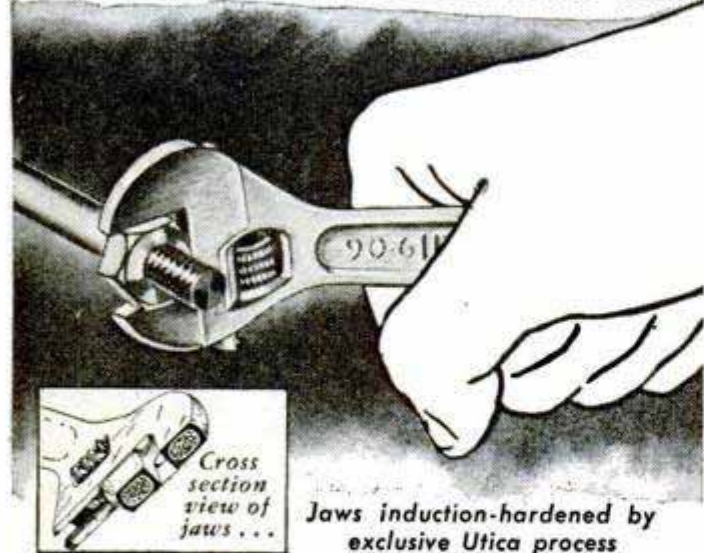
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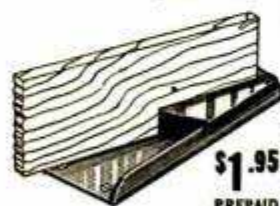


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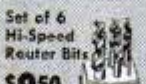
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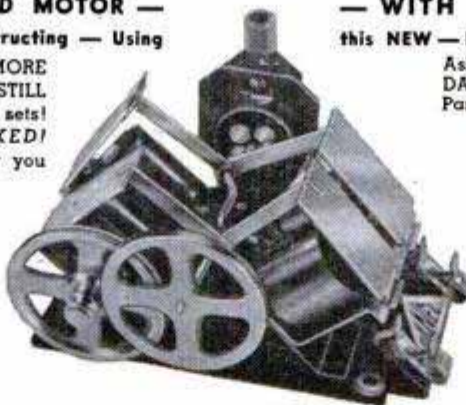
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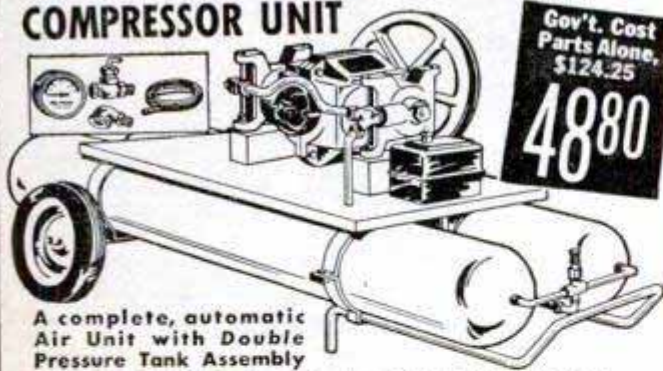
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A complete, automatic Air Unit with Double Pressure Tank Assembly

Terrific Value in this Large Capacity Unit for Farm, Home, Industry, Painting, Air Tools, etc.

**INCLUDES:** • **COMPRESSOR:** horizontally opposed, 2 cylinder piston type, huge volume, 6.54 CFM, 2" bore, 1 1/2" stroke. • **TANKS:** 6" x 45", 400 PSI test, heavy gauge steel, 1000 cu. in. capacity each tank, pressure capacity—13.8 cu. ft. each tank. • **PLATFORM:** 12" x 32" for easy mounting of electric motor or gas engine. • **WHEELS:** 10 x 1.75, full ball bearing with semi-pneumatic, puncture proof tires, can be drawn as a trailer. • **PRESSURE SWITCH:** Cutler-Hammer, adjustable automatic motor control, with overload protection for motor. • **PETCOCK:** for air shut-off and water drainage. • **SAFETY RELIEF VALVE:** adjustable. • **GAUGE:** by U. S. Gauge Co. • **HOSE:** 25 ft., 2 braid, high pressure, with fittings and tire chuck. • **CHECK VALVE:** seals air in tanks. Shipping wt. 85 lbs.

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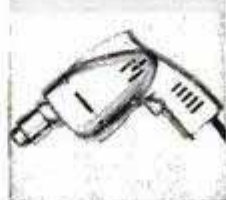
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**SKIL Home Shop 1/4 inch Drills**

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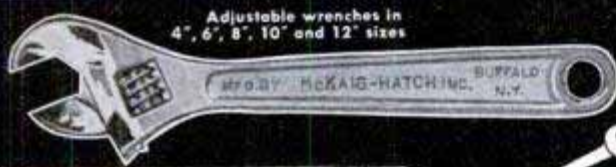
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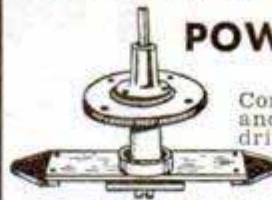
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HIGH SPEED STEEL  
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WILL OUTLAST ORDINARY CARBON STEEL CUTTERS MANY TIMES

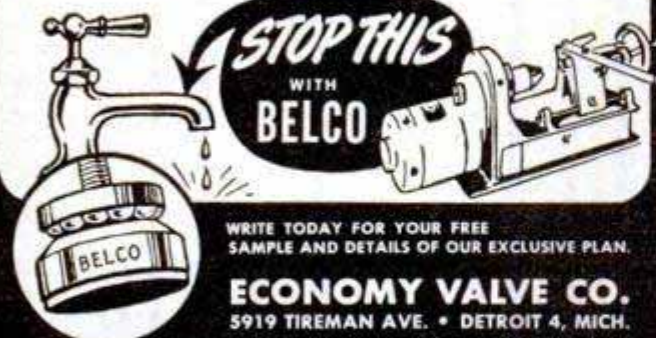
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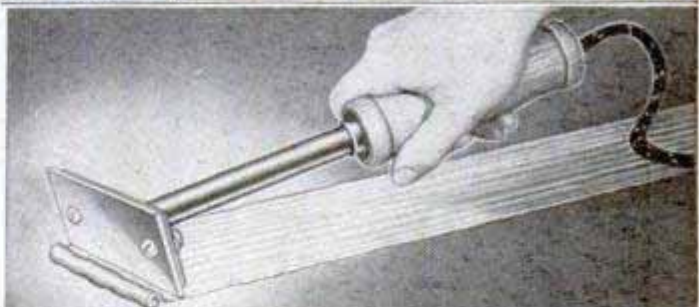
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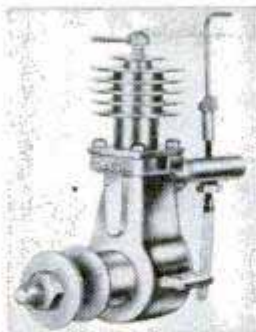
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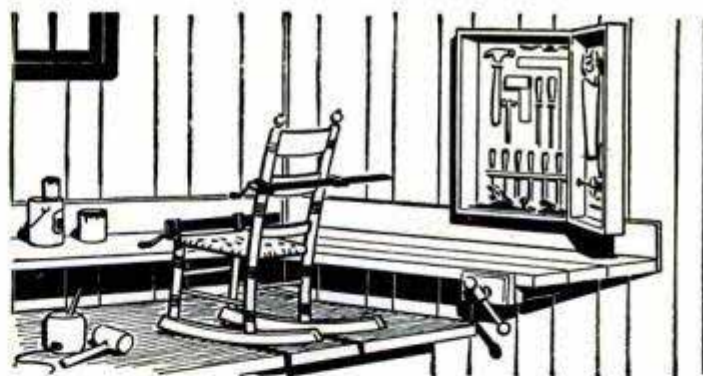
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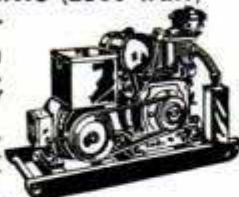
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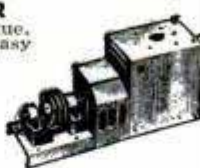
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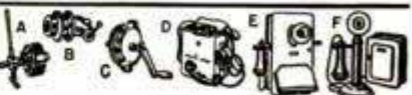
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*Gives more  
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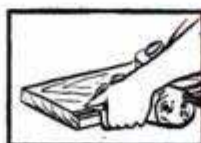
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Try it. You'll agree that as a labor-saving device it's more than the equal of any tool in your shop. It does jobs your other tools cannot do, in real professional manner. And the hardened, razor-sharp spiral cutter is F-A-S-T—20,000 rpm. Zips off the shavings, leaving a straight, smooth, non-fuzzy surface with or against the grain, with no bumps, no gouges. Enables you to do perfect surfacing, fit doors, windows, drawers, screens, storm sash, trim of every kind. Ideal for hobby projects—built-in furniture, cabinets, bookcases, benches.

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Yes, you can even use this plane as a bench jointer-shaper, or as a moulding plane. Spiral cutter for jointing work; variety of shaper cutters for decorative edging, grooving and channeling. Optional Sharpener (extra) puts keen edge on plane cutter in 3 minutes.



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Send me full information about the Guild Power Plane and attachments . . . Also name of nearest Guild Tool dealer.

Name .....

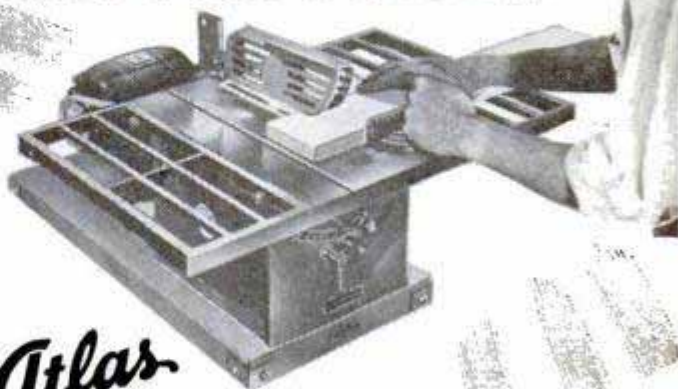
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**SIDE MILLING CUTTERS**

Dia.	Width	Arbor Hole	Price Ea.	Quantity
6	3/4	1 1/4	7.00	none

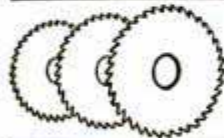
**PLAIN MILLING CUTTERS**

1 3/4	1/8	5/8	1.00	none
1 3/4	1/2	3/4	1.05	none
2	1/4	1	1.00	none
2 1/2	2	1	3.50	6/\$16.00
3 3/4	7/8	1	3.00	6/\$15.00
4	3/4	1 1/4	2.95	6/\$14.00

**STAGGER TOOTH CUTTERS**

4	1/2	1 1/4	3.00	6/\$15.00
6	5/8	1 1/4	5.95	6/\$25.00

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## NEW CARBON STEEL MORSE TAPER SHANK DRILLS

1-9/32...\$1.95    1-11/32...\$2.39    1-7/16...\$2.69  
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Capacity 400 GPH @ 1750 RPM, 1/2" drive spline. Maximum head pressure 30 PSI. 3/4" pipe inlet and outlet. Rotate either direction. Built-in relief valve. Ideal for all types of sprayers, etc. Reconditioned guaranteed. Priced at only..... **\$4.98**

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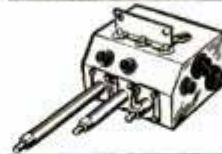
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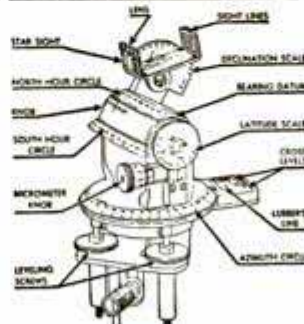


Will operate 1 or 2 hydraulic cylinders independently of each other or together by means of 3 control handles. Valve made of heavy steel with standard pipe ports. Cost new over \$125. Priced to you at only..... **\$7.95**

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**PARKER CONTROL VALVES** 200 to 500 lb. regulators and 300 regulators. Price, each only..... **\$2.50**

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Brand New Mark II Airforce navigation instrument. Excellent for schools, math classes, etc. Can be adapted for transit or level. Precision built throughout. Government cost over \$125.00. Comes complete in wood carrying case and web strap. Weighs only 6 lbs. Priced at only..... **\$9.95**

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TULSA, OKLAHOMA



# The Only SANDER with POWER UNIT **GUARANTEED** ALL DURING YOUR OWNERSHIP AGAINST **BURN-OUT OR REPLACED FREE!**

SYNCR0 is the only sander of its kind that *guarantees* its Power Unit—heart of ANY sander—against burn-out *all during your ownership*—or replaces it FREE! And *only* SYNCR0 gives you a magnetic-electric SANDER *approved* ENTIRELY to be free from shock and fire hazards by UNDERWRITERS' LABORATORIES, INC.—not just the cord but the ENTIRE Tool! This Power Unit GUARANTEE—and Seal of Approval from internationally-famous "UL" *plus* the exclusive SYNCR0 DOUBLE ARC MOTION makes SYNCR0 your safest and best buy. For all light sanding, high polish jobs in tight places, corners and on flat or curved surfaces. A marvelous massager. 240 Strokes Per Second! Just guide it. Get this safe, GUARANTEED POWER UNIT, UL-Approved, at your hardware store! All Chrome body, bakelite top.

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## WARNING!

BUY ONLY ELECTRIC SANDERS TESTED AND APPROVED BY UNDERWRITERS' LABORATORIES, INC. "UL" has *approved* the complete SYNCR0 Sander to be free from shock and fire hazard. Always look for the UL Label in advertisements — and on the product — before you buy!

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to Ask For!



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ELECTRIC  
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Exclusive GIL-BILT Build-It-Yourself Features

- No machining—build easily with hand tools only
- No blueprint reading—step-by-step pictorial plans, full scale patterns, actual photographs
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- Capacity and performance of commercial saws selling for \$60 and up

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**\$50**  
 OR MORE

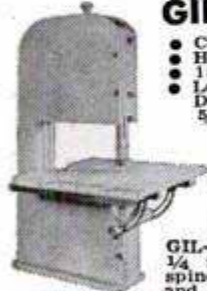
### GIL-BILT 10-INCH TILTING ARBOR SAW



- 27x28 in. table, 13 1/2 in. capacity in front of blade
- 10 in. blade cuts 3 1/4 in. deep, tilts full 45 degrees
- Floor model 34" high, table always stays level
- New Departure ball bearing arbor, 3/4" precision shaft turned down for 5/8" bore blades, alum. housing, shipped ready to run
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- Cast aluminum miter gauge and self-aligning rip fence guide

GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jack screw mechanism and handwheel, and all other metal parts (less blade)..... \$20.95  
 Same Kit with 10" Combination Blade \$24.90  
 Same Kit with 8" Combination Blade \$23.90

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- Cuts to center of 24 inch circle
- Handles stock up to 6 inches thick
- 18x18 inch table tilts 45 degrees
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- Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
- Rubber tired wheels. Choice of cast aluminum or make-your-own wood wheels on metal hubs.
- Uses standard 78 inch blades up to 3/8 in. wide.
- Fully enclosed mechanism for utmost safety.

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Return Kits in 10 days for refund if not satisfied.  
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Complete with 3 blades



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GOODRICH, U.S. & others. FREE TUBE WITH EVERY TIRE.

Our policy is to select your tires so carefully, as if our very future depended on the service given by that particular tire.

ONE TOP GRADE, 26 MONTHS GOLDEN RULE GUARANTEE BOND. THIS GRADE MADE THE "BLATT" NAME "WORLD" FAMOUS.

**TAKE \$2** off the price of each of these tires if you do not wish the tube.

600-16 \$7.35		650-15 \$7.75		MATCHED BALANCED TRUCK TIRES	
600-16 (6)	8.95	670-15	7.75	600-20	\$10.95
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700-16	7.95	710-15	7.75	700-20	11.95
750-16	8.75	760-15	8.35	32x6(8)	12.50
550-16	7.25	820-15	8.00	32x6(10)	13.75
550-17	7.75	875-19	7.45	750-20	13.50
525-18	7.35	550-19	7.95	825-20	17.50
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EXTRA DEEP- END TREAD FOR EXTRACTION	750-16 Reg. \$10.95 Rugged 12.22	900-16 Reg. \$9.65 Rugged 12.50	750-20 Reg. \$10.45 Rugged 16.40
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Send check or money order and this ad for rush shipment. We won't ship a tire we wouldn't use. The name to trust in rubber.



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POST PAID  
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Develops 1/20 HP 3200 RPM. Piston driven, has nickel-plated steel boiler, automatic safety valve, throttle control, water level gauge, pulley attachment, electric cord. UL appr. 9" long, 6" wide, 9" high. Powers all models.

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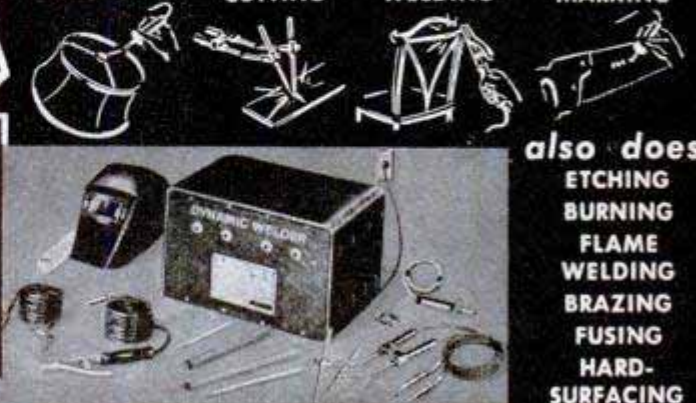
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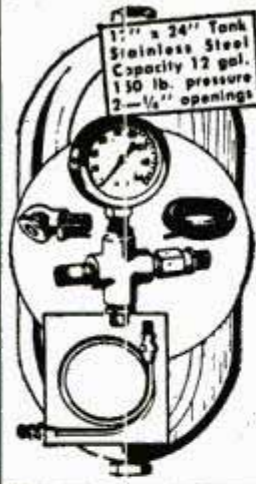
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# WESTINGHOUSE Air Compressor

Reg. \$60.50 . . . Only

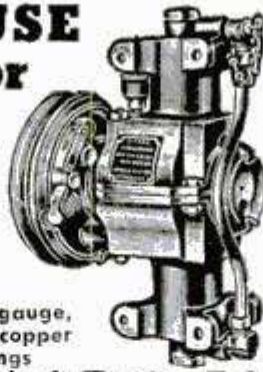
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Operates with 1/2 H.P. Motor or equivalent gas engine.

Compressor has 2" bore, 1 1/2" stroke, ball bearing, 3.27 CFM at 600 R.P.M. Capacity up to 6.54 CFM. Size 9" x 11 1/8" x 6 5/8". Wt. 26 lbs.

Compressor, pressure tank, air gauge, air chuck, 20-ft. hose, pop valve, copper tubing with 4 brass flared fittings for connecting compressor to tank, 4-way cross and 3 nipples.

COMPLETE OUTFIT, wt. 52 lbs. . . . . \$32.50  
EQUIPMENT LESS COMPRESSOR, \$12.50  
COMPRESSOR SEPARATELY, \$21.50—TANK ONLY \$5.95



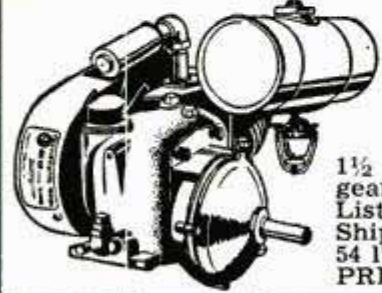
# 140 CFM "WELLWORTH" BLOWER

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Quiet operating. Double wheel inlet, double width blower. For heating, ventilating, cooling, air washing, exhausting and forced draft. DIMENSIONS: 10" wheel; outlet 1 3/8" x 1 3/8"; inlet 8 3/4". Height 10"; width 18"; Depth 16 1/2". C.F.M. 1/4" S.P. 1600; outlet vel. 1575; motor 1/4 H.P. with overload relay, cord & plug, 110 v. 60 cy. A.C. Ship. wt. 67 lbs. Special price . . . \$39.50



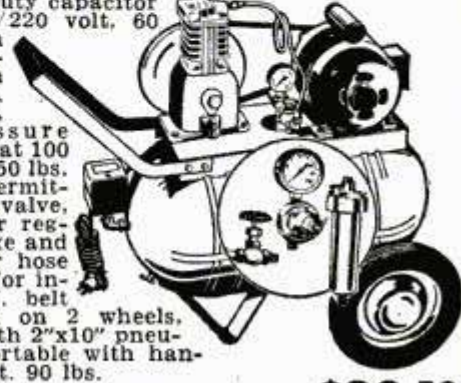
# Red Seal Continental GAS ENGINE

6 to 1 Reduction Gear

1 1/2 HP with 6 to 1 reduction gear. Operates at 450 R. P. M. List Price \$79.50 Shipping weight \$39.50 54 lbs. SPECIAL PRICE . . . . .

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Chrome plated, precision engineered and carefully tooled to give long life. All new. 0-1" capacity . . . ea. \$2.25. 1-2" cap. \$3.50. 2-3" cap. \$5.50. 3-4" cap. \$6.50.

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High Speed Steel, like new. Asst'd sizes from No. 1/4 to 40. Lengths from 6" to 12". Approximately \$20 value. Set of 12 . . . . . \$3.75



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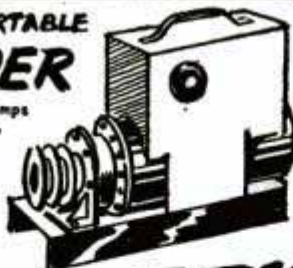
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Fits any  
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**MUMMY BAG** Has outer cover of forest green, water repellent balloon cloth. Filled with 15% Duck Down and 85% Chicken Feathers. 1/2 length zipper. Size 34" x 84" . . . . . **12.95**  
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**16 mm MOVIE CAMERA** Has semi-telephoto 1 3/8" (35mm) lens with yellow filter - 3 shutter speeds: for normal (16 frames) semi-slow motion (32 frames) and slow motion (64 frames per second). Uses any standard Eastman film magazine or Type 'G' AAF magazine. Takes Black & White or Full Color pictures. Operates on 24V (dry cell batteries) & requires slight conversion for hand use. Diagram furnished. Cost Gov't \$235.00. NOW **\$24.50**  
**CONVERTED GUN CAMERA** - Fully reconditioned with start switch on front. Choice of finishes - Grey, Black, Blue . . . . . **\$33.95**

**EISENHOWER JACKET**

Trim, smart military cut jacket for sports and outdoor wear. Warm and comfortable. Has 2 patch pockets, 2 inside pockets, & adjustable side straps. Waist belt with buttons and snaps. **ONLY 5.95 EA.**



**FLYING HELMET**  
Fine grade leather - Chamouis lined with chin cup on strap. Intermediate weight - Ideal for summer wear. **NEW ONLY 1.59**



**NAVY WADING SUIT**

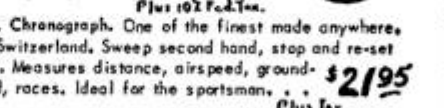
Here's a suit that will make surf fishing a pleasure. Made of rubberized canvas, with vulcanized seams. It will keep you absolutely dry. Has built in rubber gloves and 1/2 length rubber boots. Air tight Buoyancy pockets inside keep you balanced in deep water. Has 100% waterproof liner. **16.95** Guaranteed condition.



**NEW WATCH**  
Here's a real Shock Absorbing watch. Has jewel movement, Sweep second hand, luminous dial, chrome case. Guaranteed for one year. Ideal for young and old. . . . . **16.95**

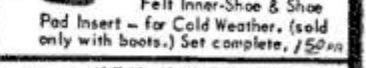
**ELGIN 7 JEWEL TIMER** Pocket type. 60 second dial divided into 5th's of second. Also 30 minute recorder dial, shatterproof crystal. This genuine Bureau of Ordnance watch has \$35.00 value. Shipped in steel, shock-absorbing suspension case. **15.95** Plus tax

**17 JEWEL Chronograph**. One of the finest made anywhere. Cased in Switzerland. Sweep second hand, stop and re-set buttons. Measures distance, air speed, ground-speed, races. Ideal for the sportsman. **\$21.95** Plus tax



All New! Winter type with fleece or chamouis lining. Has ear puffs & chin cup. Ideal for pilots, cycle - drivers, sportsmen, etc. **1.95**

**RUBBER BOOTS**  
A Sturdy Boot of finest pliable Rubber. Completely Waterproof with adjustable strap. Wear with or without shoes. **3.95 PR**  
Felt Inner-Shoe & Shoe Pad Insert - for Cold Weather. (sold only with boots.) Set complete, **1.50 PR**



**AAF CASE**  
Genuine top grade leather. Multi-compartment. Lock and Straps. Ideal for Artists, Students, Salesmen, etc. Used, good condition. . . . . **7.95**

**AIR CORPS BRIEF CASE**  
This is a genuine piece of AAF equipment. Made of best grade Brown Leather in a handsome Pebble finish with a light canvas liner. Has two full length map or paper compartments and three smaller pockets. An ideal case for students, salesmen, artists, etc. Full heavy duty zipper closure. 12" x 16". Shpg. Wt. 3 lbs. **ONLY 2.95**

**Loose Leaf BINDER**  
3 metal post. Cylindrical locking heavy duty 3/16" fabricated hinged cover. End identification window. Ideal for price books, salesmen catalogues, photoalbums, students, publications, Reference books, etc. Will hold 500 sheets, 8" x 11". **59c ea**

**PLEXI DOME**  
Overall length 21" - Width at widest point 11" - at base 4". 6" deep. For Fish & Flower Bows - Cab Roof - Lights. **1.89**

**GOOSENECK LAMP**  
Consists of 24 volt control box with dimmer switch, 18" flexible extension & frosted glass shade. Can be used on 110 volt current. **2.49**

**NAVIGATORS LAMP**  
A handy light for desk, work bench, chart table, engine room, etc. Can be used on 6-12-24-110 V by changing bulb. 3 ft. shaft has 4 joints to adjust position. . . . . **2.95**

**NAVY Sealed Beam LAMP**  
U.S. Navy Portable Pistol Grip light. Has sealed beam and aiming sight. Ideal for search, spot or Emergency light on auto, boat, farm etc. . . . . **2.95**  
12 Volt light, 4" lens . . . . . **2.95**  
24 Volt, 5" lens & carry case . . . . . **3.49**  
Set of 3 filters, Red, Grn, Amber (specify type lamp) . . . . . **99¢**

**Genuine ARMY AIR FORCES SUNGLASSES**  
HERE'S THE REAL MCCOY!  
**ARMY AIR FORCE - 6 base.** Precision Polished & Ground. Glare-Free caliber lenses. Leather case to be attached to belt. Gold plated adjustable frame. Pearlloid sweat bar and pads. \$17.50 Palley value for **ONLY \$13.95**

**NIGHT DRIVING GLASSES**  
With 57mm yellow, amber, 6 base lenses. Optically precision ground and polished! Your doctor will recommend these. Not a cheap "Process" lens. Reduces headlight glare and sharpens 'object focus' during night driving. Men's size or Ladies Harlequin style. ND-1, \$16.00 VALUE. **14.29**  
SAME GLASSES but clip-on's. **\$3.95** Fit-over style without temple bars.

**Aviators (AN-6530)** Windproof & Dustproof **GENUINE GOGGLES**  
Rubber or chamouis covered frame. Clear or Green **GROUND LENSES** are inter-changeable. Adjustable nose bar. Ideal for flying, motor cycling, etc. . . . . **\$1.69**

**GO-1 GOGGLE KIT**  
NEW! U.S. Navy - Has soft sponge rubber frame. 4 Polaroid lenses. 2 green, 1 red, 1 clear. Perfect for racing, cycling, etc. **89¢**

**JEEP CANS 5 GALLON**  
For reserve gas & water. Top condition. . . . . **1.95**  
**ARMY PUP TENTS** - 2 Man. Used. Perfect . . . . . **5.95**  
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**HUNTING KNIFE** - 6" polished blade, leather sheath. **1.69**  
**BOLO KNIFE** - 10" Parkerized blade, with case. **1.19**

**15 MONKEY WRENCH**  
Adjustable Jaw - Opens to 4"  
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Telephone type - Highly Sensitive with excellent, clear tone. This was the Signal Corps favorite. An ideal instrument for the radio 'ham' and professional recording studio, broadcasting, home recording, public address, etc. A Sensational Buy! Complete with cord and plug. . . . . **2.29**

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Low Impedance. Ideal for amateur radio, crystal sets, or professional use. Adjustable ear phones. Used and in excellent condition. . . . . **1.59**  
**HS-300** - Two Magnetic Type receivers in watertight brass case. Soft rubber inserts in each receiver to fit into wearers' ear. Pliable steel head band. Ideal for communications, divers, workers in noisy compartments, etc. **NEW 1.59**

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A private phone or intercom. system - Easy to operate. Reception up to 20 miles. Uses 2 standard flashlight batteries. Several phones can be used on same line. Set contains generator for ringing, leather carrying case & phone. **7.95 PER UNIT**  
**COMPLETE SYSTEM OF two generators & two phones. PER SET 15.50**

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72 lb. Test - 300 ft. blk. & grey. **3.49**  
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**COMPASSES** - Match Box . . . . . **39¢**  
Jeweled Watch - Pocket . . . . . **1.59**  
Wrist Strap Type . . . . . **69¢**  
Pocket Card Type . . . . . **89¢**  
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For Fly Casting . . . . . **1.25**

**PLASTIC PARALLEL STRAIGHT EDGE**  
with knees and rubber pads for non slipage on each section. A must for navigators, mechanics, draftsmen, and engineers . . . . . **97¢ ea.**

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D-12 Type. Rotating verge range ring, calibrated in 1 degree increments from 0 to 360°. Two parallel grid wires for N-S line alignment. . . . . **14.95**

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Servicemen's Buddy. 2 large outside pockets. Snap down panel for folding clothes. Canvas divider. Heavy duty zipper. Bag opens flat for packing. You can't abuse this bag on trips, vacation or camping. Reconditioned and ready to go. **ONLY 6.49**

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A-4-5 1/2 x 15 inches. 280 Cu. In. capacity . . . . . **USED 2.25**  
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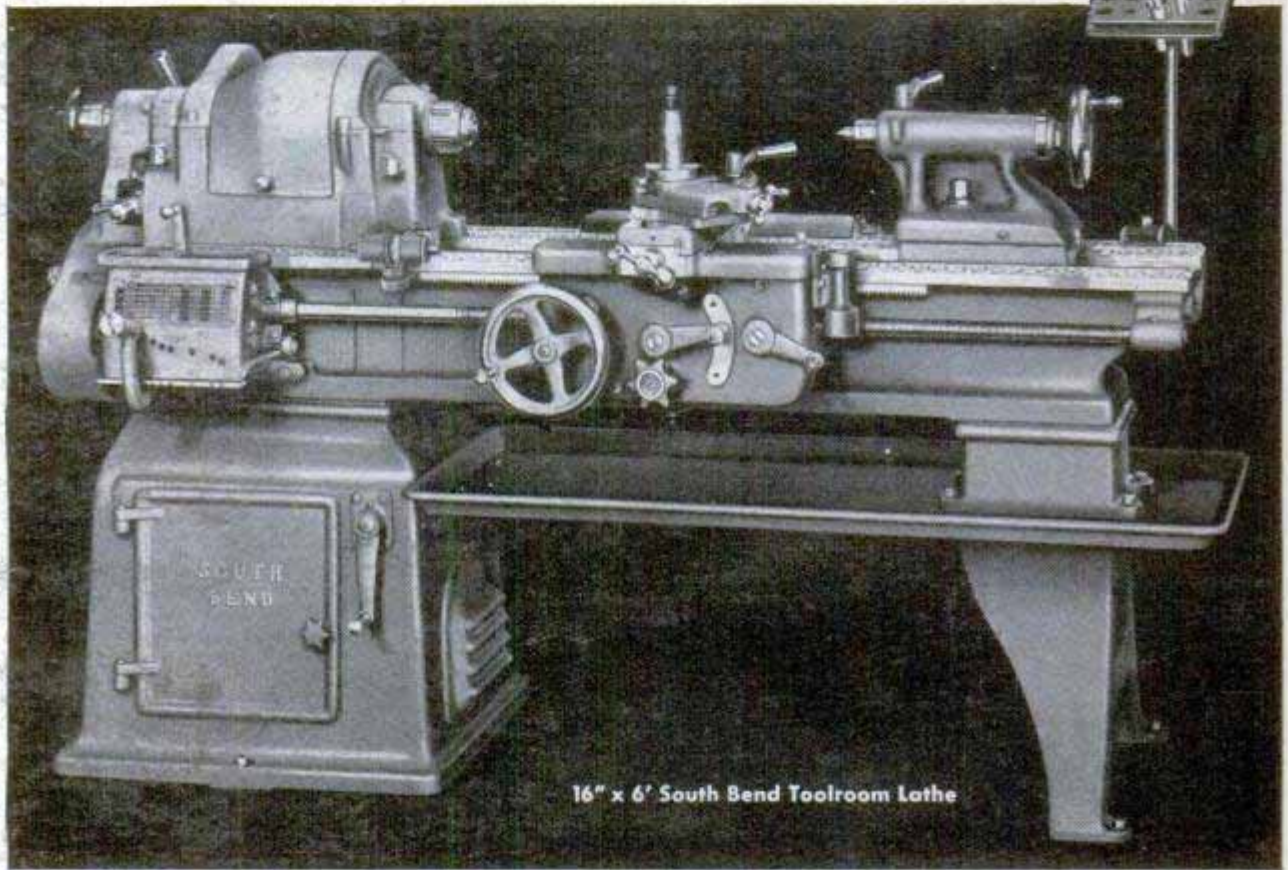
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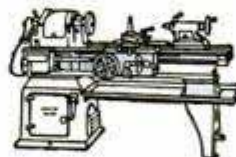
16" TOOLROOM LATHES

LATHE TOOLS AND ATTACHMENTS

TIME PAYMENT PLAN



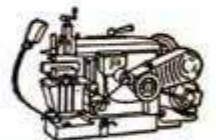
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