



POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG. TRADE MARK GREAT BRITAIN NO. 410426

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in this issue



**THE HOUSE
YOU CAN BUILD
YOURSELF!**



ONE OF THE GREATEST EDITORIAL
FEATURES IN OUR HISTORY



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FIRST IN RUBBER



TYPICAL EXAMPLE: THE B. F. GOODRICH TIRE THAT OUTWEARS PREWAR TIRES

NOBODY even knows just how far a tire can go without being worn out. It depends on too many things. Shown above is one of the new B. F. Goodrich tires—the tires that outwear prewar tires. It had been shifted from wheel to wheel, and the wheels were *balanced*.

When this tire was first put on a car owned by Howard E. Reeder, plant superintendent of Funk Bros. Seed Co., Bloomington, Ill., the speedometer read 33,001 miles.

When the photo was taken, the speedometer showed a total mileage of 93,802. The tire had trav-

eled 60,801 miles, and it still wasn't quite smooth.

"As scarce as tires have been," said Mr. Reeder, "we would probably have been driving on bare rims if it had not been for such exceptionally good service from B. F. Goodrich tires."

A full report on this tire and the other B. F. Goodrich tires on Mr. Reeder's car was made, along with this picture, by photographer Kenneth H. Berglund of Bloomington, Ill. A copy will be sent on request to any reader of this magazine. Just address Advertising Department M, The B. F. Goodrich Company, Akron, Ohio.

Wheel balance is one of the things that keep tires wearing *evenly*. Any B. F. Goodrich dealer can tell you about it.

Most people who need tires can now get the new B. F. Goodrich Silvertown tires. A few sizes are still scarce, of course, but most dealers have a fair assortment right in stock.

Talk to your B. F. Goodrich dealer—you may not have to wait at all. *The B. F. Goodrich Company, Akron, Ohio.*

B.F. Goodrich
FIRST IN RUBBER

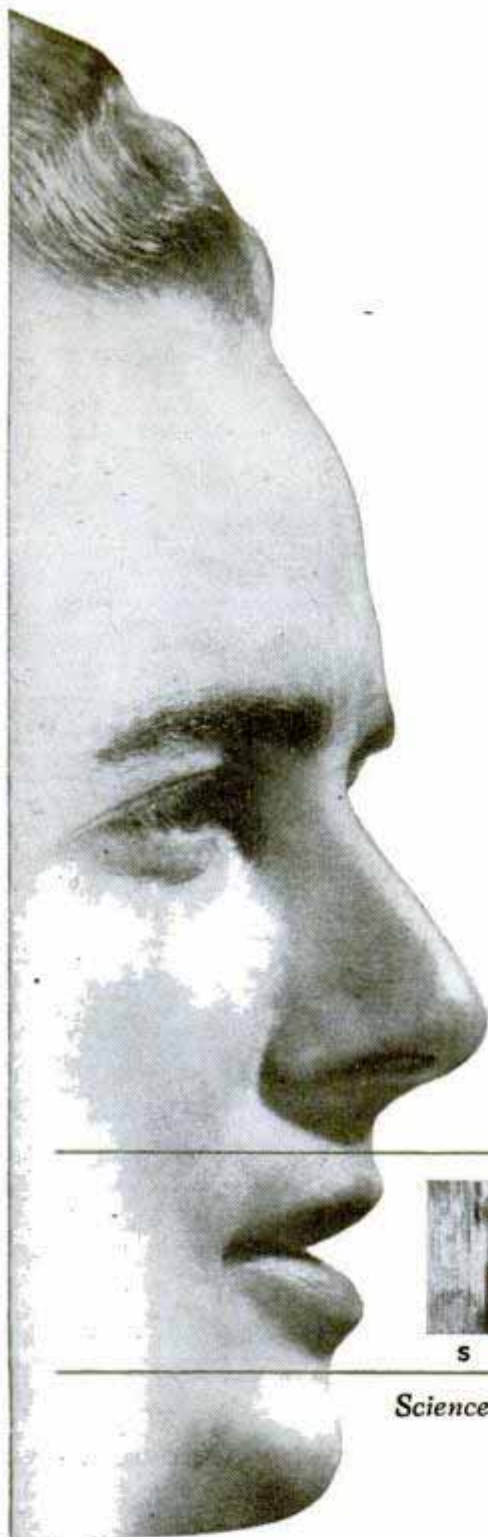
Writing with your voice

Years ago Alexander Graham Bell dreamed of "a machine that should render visible to the eyes of the deaf, the vibrations of the air that affect our ears as sound." He never realized that dream, but his researches led to the invention of the telephone.

Today Bell Telephone Laboratories have turned the dream into a fact—translating the spoken word into readable pictures.

By this new invention of the Laboratories, the talker speaks into a microphone. Vibrations of the voice are unraveled through electronic circuits, and then are reassembled as luminous patterns which travel across a screen. Each syllable of sound has a distinctive shape and intensity.

Visible speech is still in its infancy, and is not yet available to the public. But educators of the deaf are now evaluating it.



S I E N S U N R A V U L S S P E E T S H

Science unravels speech

Indications are that the deaf can learn to read the patterns and, by comparing the patterns their own voices make with the patterns of correct speech, can improve their diction.

Patterns of visible speech also provide a means for analyzing and recording sound in the study of phonetics and of languages. Eventually, visible speech may make possible visual telephony for the deaf.

This is but one of many contributions by Bell Telephone Laboratories to the understanding and control of sound.



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Next Month

THIS month's color story of the Build-It Yourself House will be followed by an article in the May Craftsman section, taking you indoors to admire the built-in chests, the pine-paneled recreation room, and the spacious closets Jacques Brownson built behind double doors. The article will guide prospective home builders through the first steps of planning their homes.

MOST of us are very happy when our number comes up on a new car from Detroit, but out in California is a little coterie of folks who sneer at factory jobs. Nothing less than an out-of-this-world custom-designed car will do for them. The resultant dreams on wheels, which purr along Sunset Boulevard to the accompaniment of swoons from the sidewalks, are pictured for you next month in "They Tailor Their Own Cars."

GOING camping next summer? Timely tips in a May feature, "Get Ready for Camp," will save you a lot of last-minute headaches.

ANOTHER piece pointed for the outdoorsman appears in next month's Craftsman Section. It's the how-to-build story of a motor-driven surfboard, with hull of pontoon construction and an outboard motor housed in a low blister.

THE EDITORS had to be shown before they would believe the story they present next month—the story of one of the most revolutionary airplanes ever built. There's nothing like it in the air!

DARKROOM denizens will turn to the Craftsman section in May for the story of an electrically controlled unit for processing color photo prints at home.

RADIO experimenters will find a description of a compact all-wave self-powered four-tube set in the Radio and Electronics pages.

Volume 87

APRIL 1947

Number 4

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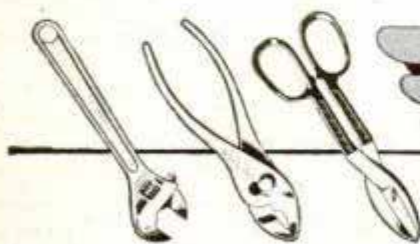
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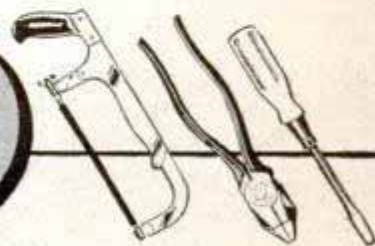
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MISSING IN THIS HOUSE"**

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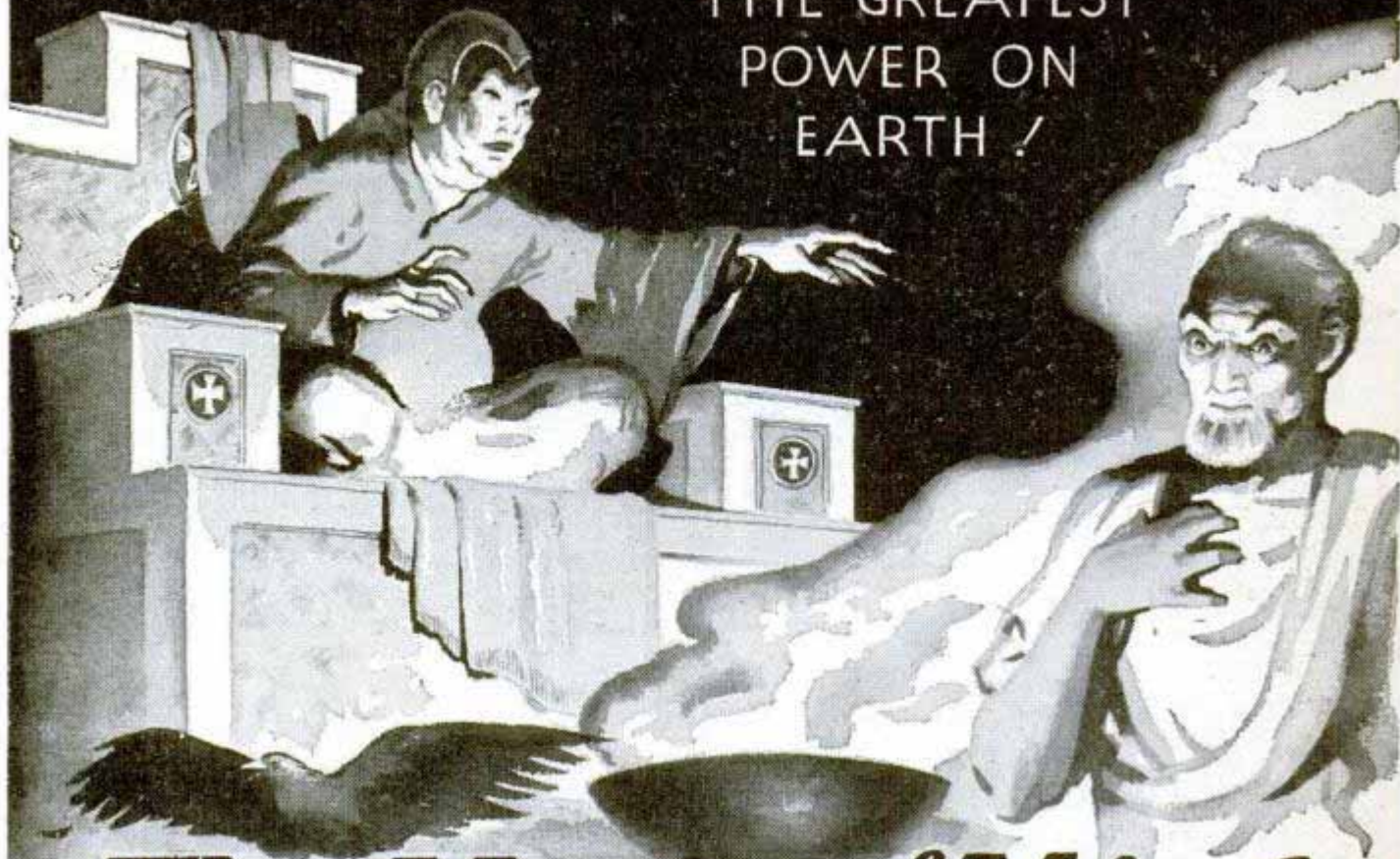
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THE GREATEST
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EARTH!



The Magic of Mind

WERE the great personages of the past victims of a stupendous hoax? Could such eminent men of the ancient world as Socrates, Pericles, and Alexander the Great have been deluded and cast under the spell of witchcraft—or did the oracles whom they consulted actually possess a *mysterious faculty of foresight*? That *the human mind can truly exert an influence over things and conditions* was not a credulous belief of the ancients, but a known and demonstrable fact to them. That there exists a wealth of infinite knowledge just beyond the border of our daily thoughts, which can be aroused and commanded at will, was not a fantasy of these sages of antiquity, but a dependable aid to which they turned in time of need.

It is time you realized that the rites, rituals and practices of the ancients were not superstitions, but subterfuges to conceal the marvelous workings of natural law from those who would have misused them. Telepathy, projection of thought, the materializing of ideas into helpful realities, are no longer thought by intelligent persons to be impossible practices, but instead, *demonstrable sciences*, by which a greater life of happiness may be had.

One of America's foremost psychologists and university instructors, says of his experiments with thought transference and the powers of mind—"The successes were much too numerous to be merely

lucky hits and one can see no way for guessing to have accounted for the results." *Have you* that open-minded attitude of today which warrants a clear, positive revelation of the facts of mind which intolerance and bigotry have suppressed for years? *Advance with the times*; learn the truth about your inherited powers.

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Jerry, the talking dog, is entertaining hospitalized veterans, by courtesy of the PYROIL Company. Picture of Jerry, sent on request.

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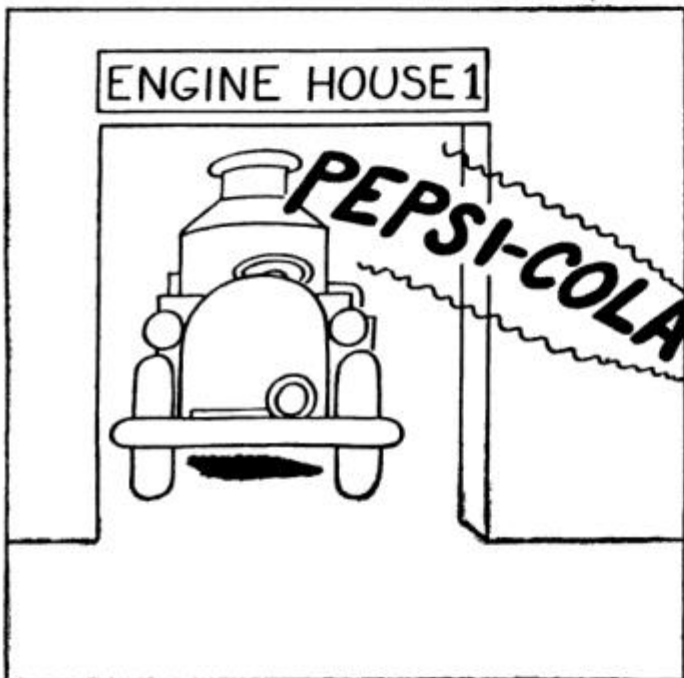
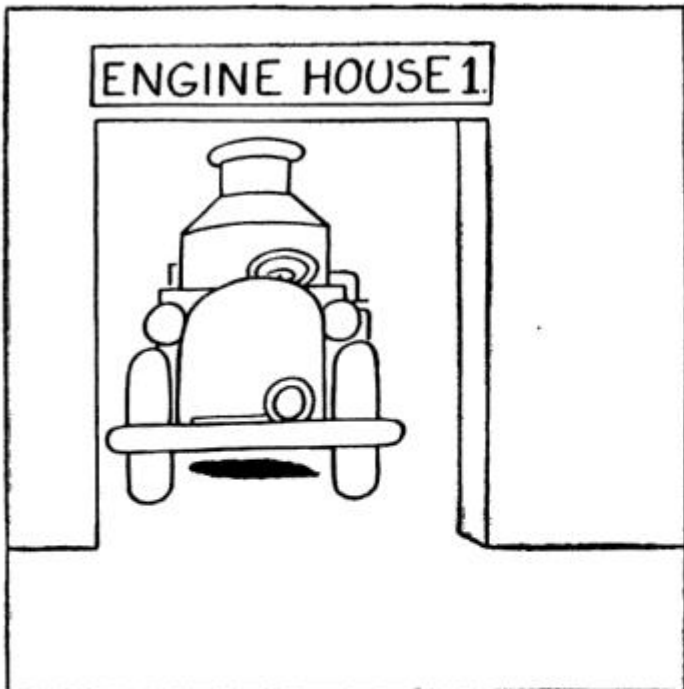
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O. SOGLOW

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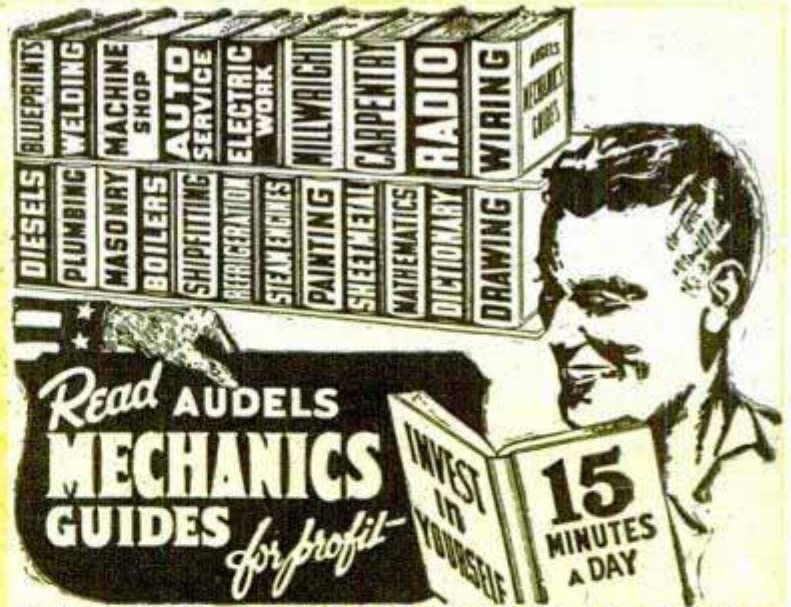
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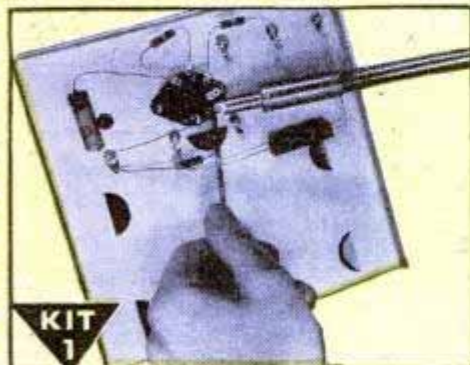


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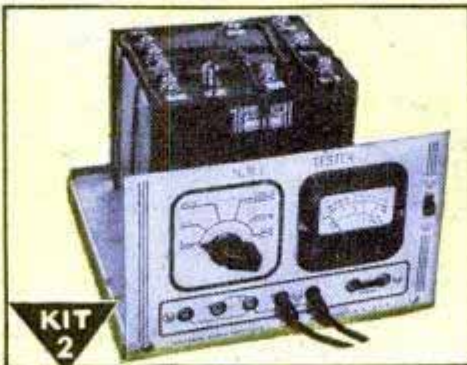
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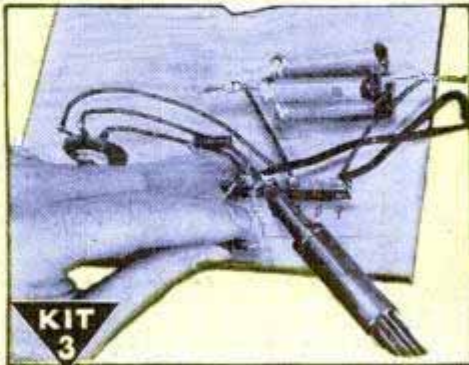
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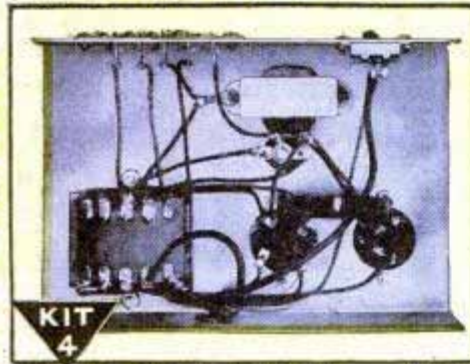
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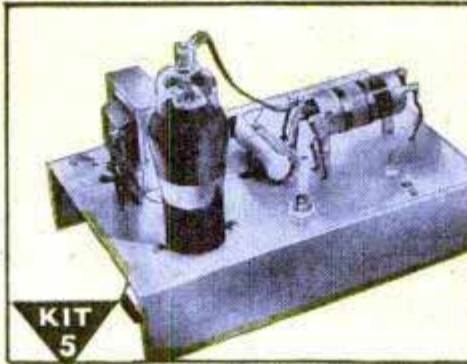
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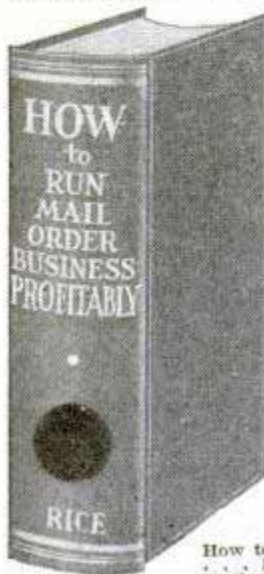
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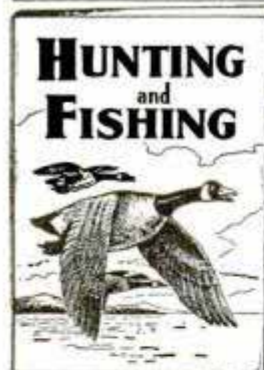
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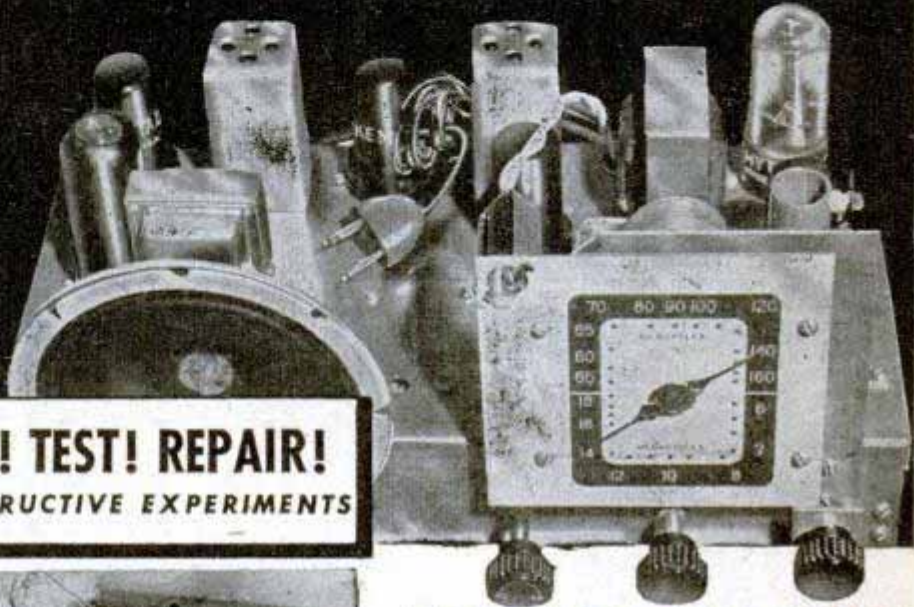


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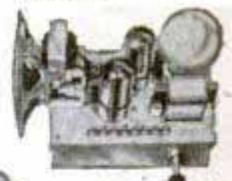
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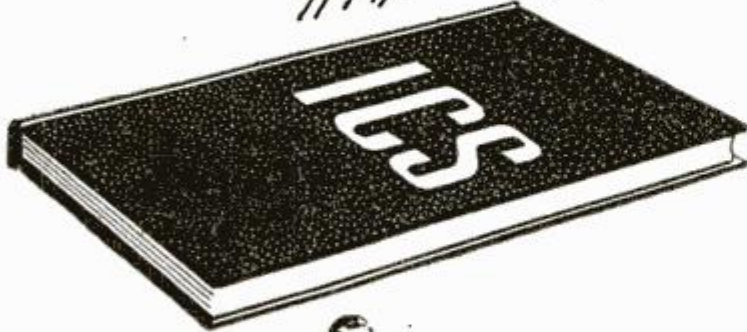
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By S. T. CHRISTENSEN

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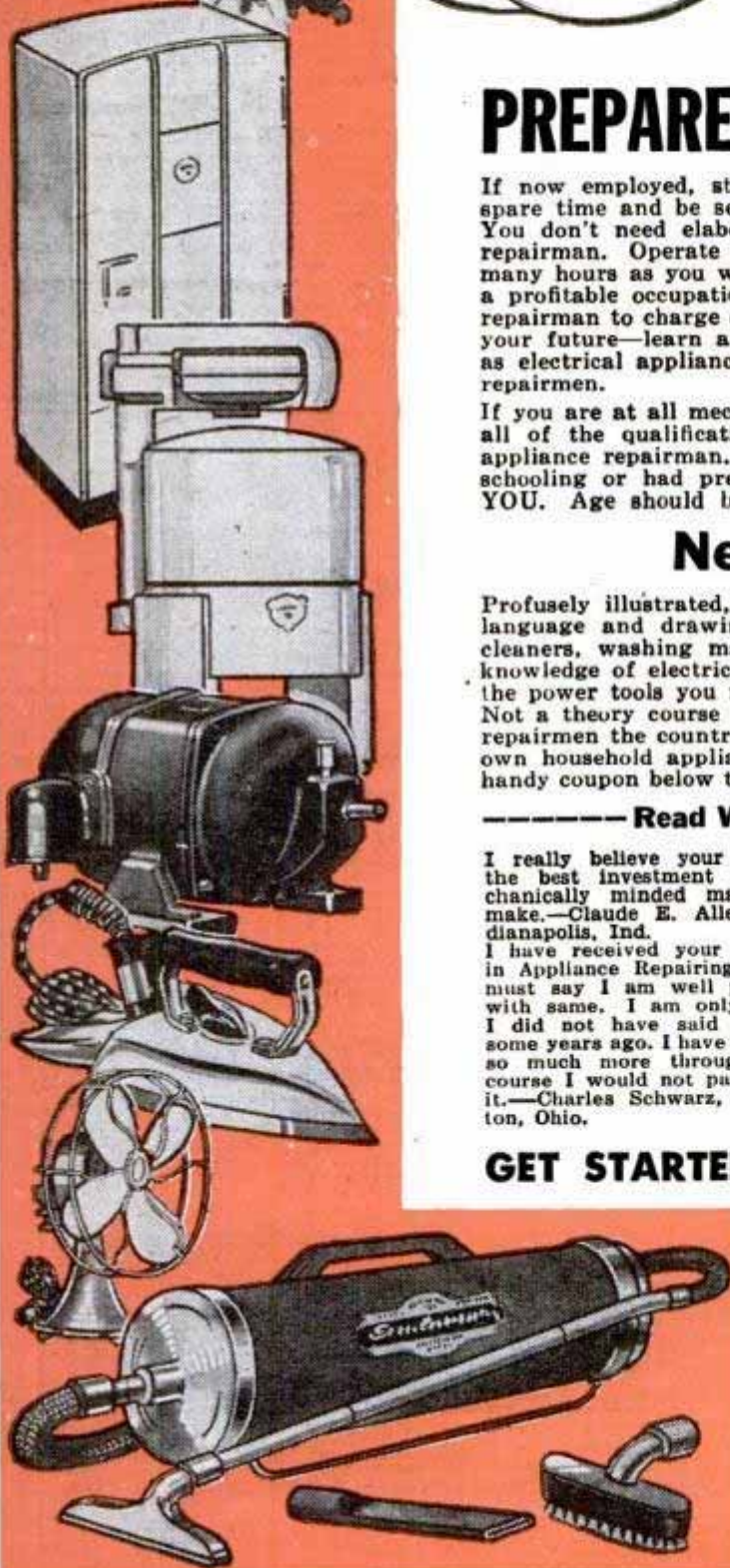
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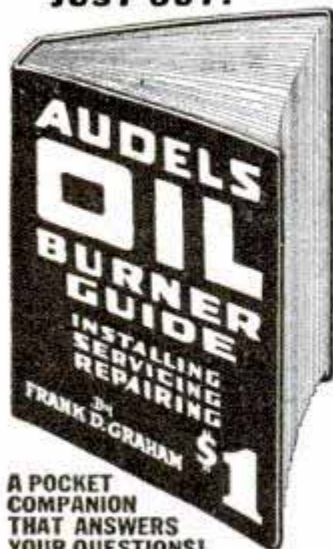
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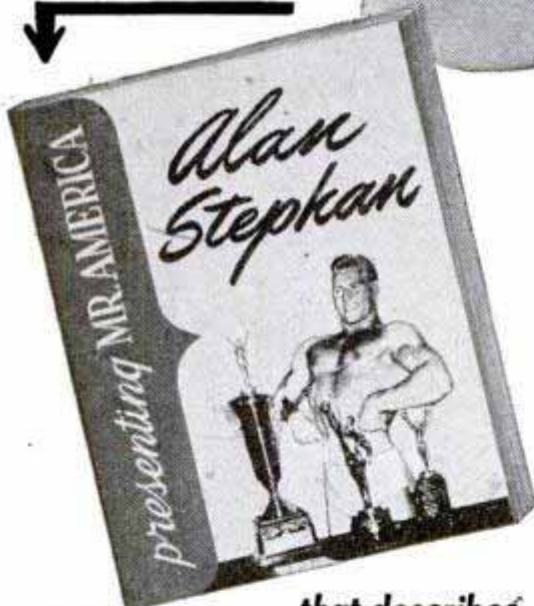
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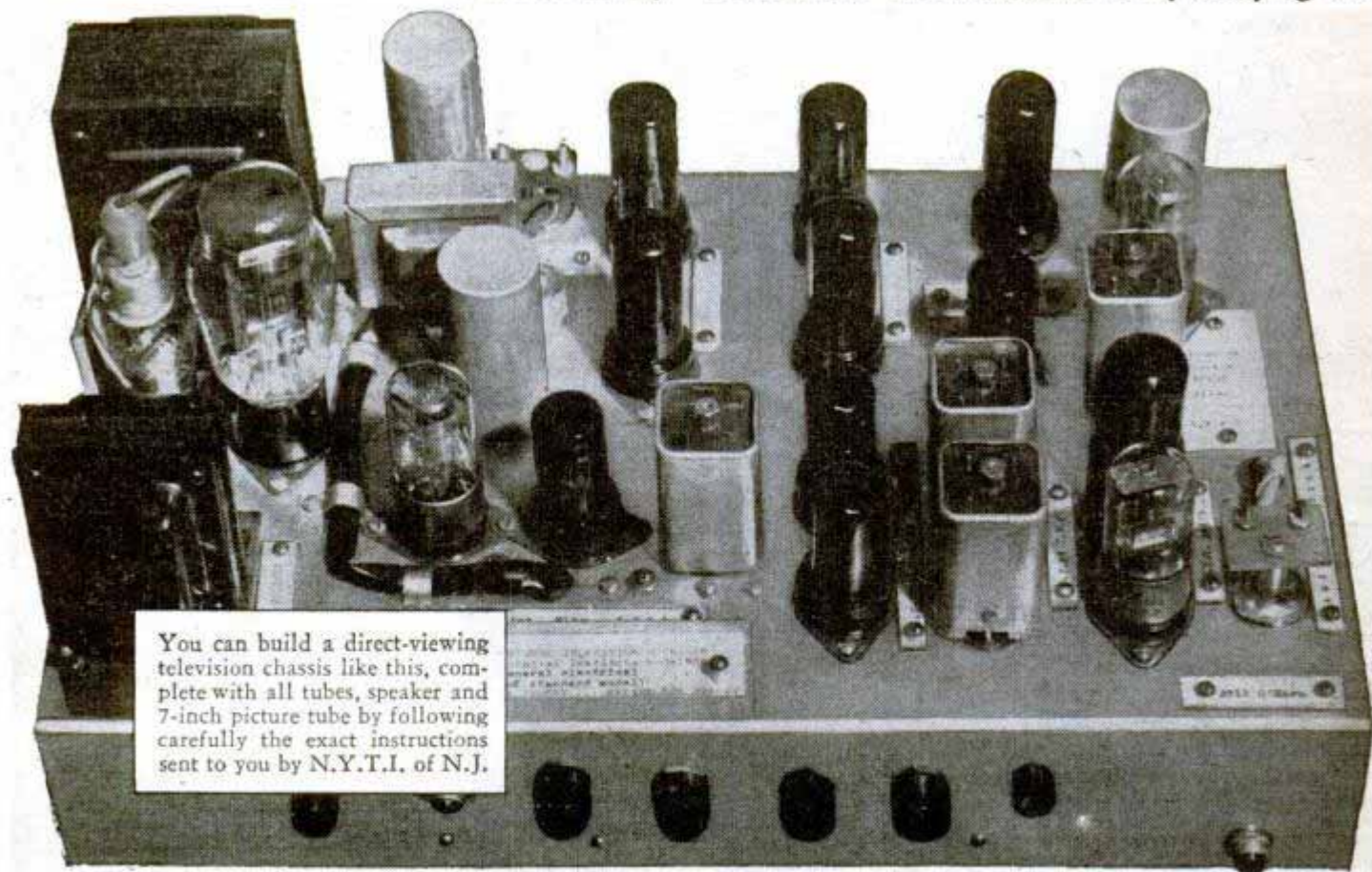
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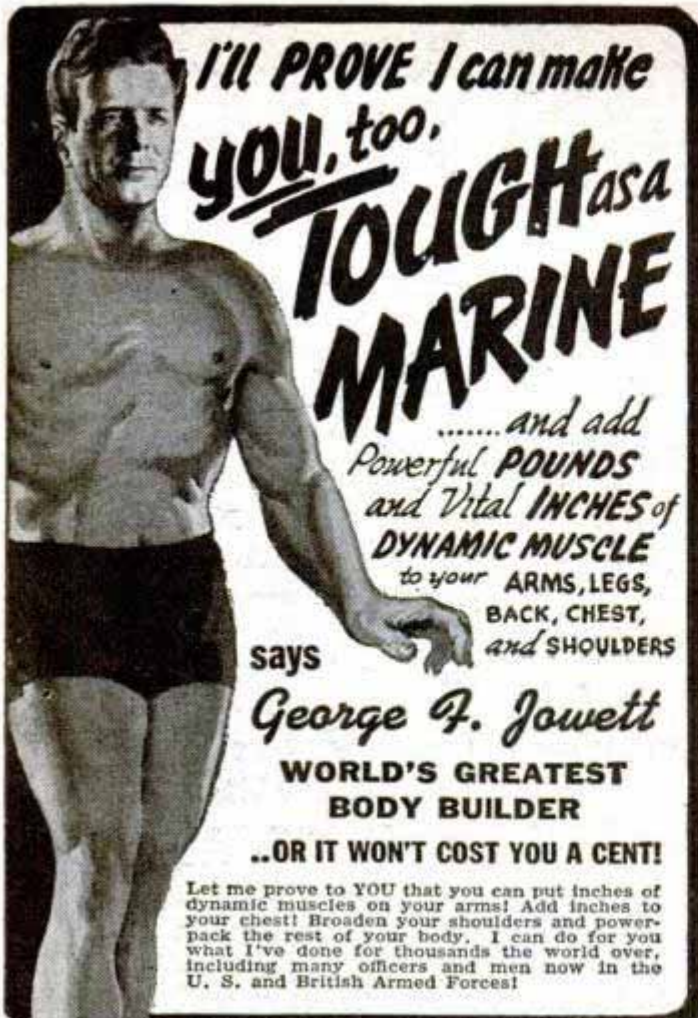
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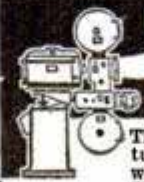
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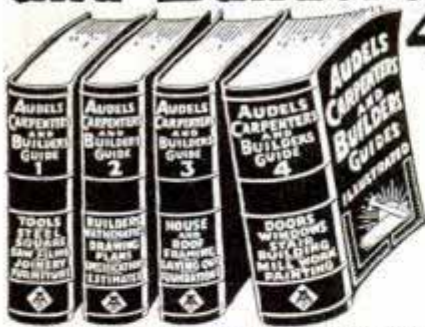
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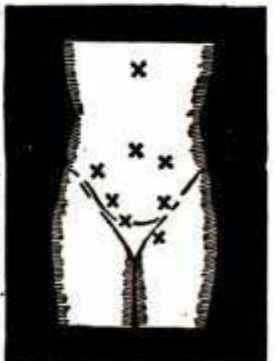
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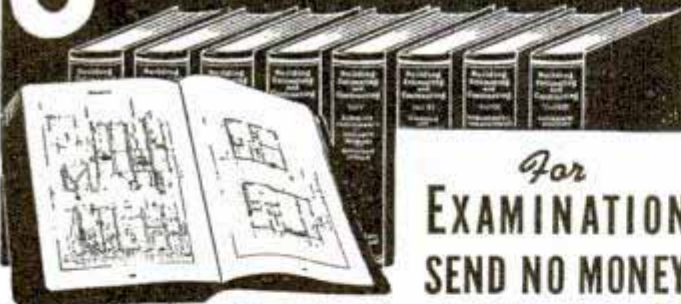
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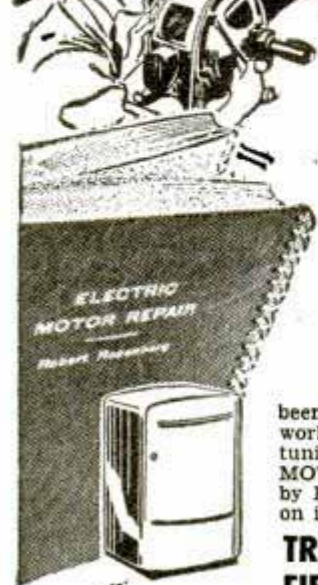
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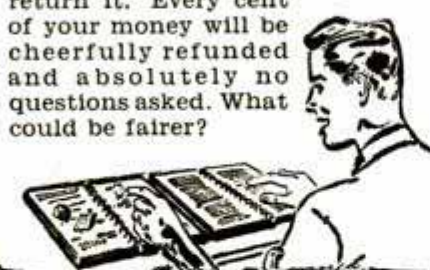
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ELECTRIC Pencil—writes, engraves all metals. Battery model \$1.00—110 volt model, \$2.00 postpaid. Guaranteed 5 years. C.O.D.s accepted. Reb Industries, Dept. 265-X, Elmhurst, Illinois.

OIL Burners, motors, pumps, circulators, converters, Expeditors and distributors of building materials. List your needs with us. Bruce Industries, Staten Island #1, N. Y.

WASHING Machines. Parts all makes. Northeast Burner, 1358 H St., Washington 2, D. C.

SENSITIVE Photo-Electronic equipment, operates hundreds of hours from 4 flashlight batteries! \$10.95 postpaid. Write: Electronics, 234 Clayton, Ottumwa, Iowa.

APPLIANCES, Tools, parts, radio tubes at bargain prices. Postcard brings free list. Robbie, 1900 Classen, Oklahoma City 6, Okla.

ELECTRICAL Supplies bought, sold and traded, agents wanted. Estes, Box 155, St. Matthews, Louisville 7, Ky.

SELSYNS 6G 110 a.c. bronze, pair \$7.50. Majtner, 201 W. 16, New York City.

MAGNETS — Alnico. Postcard brings 1947 list. Terry Sales Company, 3726 South Detroit Avenue, Toledo 9, Ohio.

FLUORESCENT Fixtures with tubes. Commercial, industrial, home units. Free price list. A. Kramer, Box 112, McDonald, Penna.

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HAND Brick and block machines. Howe Brick Machine, Beaufort, N. C.

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WE Pay you \$25 for selling fifty \$1.00 assortments birthday, all occasion cards. Tremendous demand. Sell for \$1.00—your profit 50c. It costs nothing to try. Write for samples. Cheerful Card Co., 80 White Plains, N. Y.

CUT Cigarette smoking cost in half. Smoke Fire-Safe way. New Cig-Smoker is world sensation. Millions want it. Free data by airmail anywhere. Safe-Gard, 21 Perry-Payne Bldg., Cleveland 13, Ohio.

\$1 STARTS You in business. Sell deluxe ties, 100% wool interlining. Costs you only \$7 per dozen, you make \$5.00 dozen. Send \$1.00 for special introductory offer two deluxe ties. Catalog complete line free. Philip's Neckwear, 20 West 22nd St., Dept. K-10, New York 10.

SELL Greeting cards—Everyday, birthday, humorous, Easter assortments. Wrappings, stationery, correspondence notes. Over 100 money-makers. Special offers. Fast sales, big profits, extra bonus. Experience unnecessary. Request \$1.00 Everyday assortment on approval. Hedenkamp, 343 Broadway, Dept. A-21, New York 13.

AGENTS — Distributors \$28.00—\$140.00 daily. Flo-Glo plastic linoleum finish. Write, Acme, Box 404, Mount Vernon, N.Y.

HOUSE Numbers that glow in the dark. Luminous pictures, etc. Large mfr. wants factory representative. Wonderful new product. Fast seller. Free samples. Madison Mills, 303 4th Ave., New York City.

SELL Ultra blue stock signs to stores. 700 slogans, comedy, general, religious. 7x11, cost 6c, sells 35c. Make money. Sample free. Lowy, 8 West Broadway, Dept. 308, New York City (7).

DOUBLE-DUTY Shopping bag. Zips open. Instantly changes from small to large size. Lightning seller. Samples sent on trial. Kristee 134, Akron, Ohio.

DEALERS And distributors for amazing new Tel-A-Tale motion sign. Miniature reproduction in effect of moving electric light signs seen at Times Square, New York. Tel-A-Tale sign flashes sales messages 24 hours a day. Every store a prospect. Write today for further details, stating territory desired. Tel-A-Tale Sales Co., 120 East 86th St., New York 28.

NEW, Novel way to make money. Sell 5c and 10c individual greeting cards, \$1.00 and 60c box assortments. Up to 100% profit. Bonus. Special offers. Request free samples personal stationery and special feature \$1.00 All-Occasion assortment on approval. New England Art Publishers, Box C, North Abington, Mass.

MEN'S Watches, Swiss movement, sweep second, radium dial, precision made, sample \$6.50, retails \$9-\$10. Ladies' watches \$9.25. No c.o.d.'s. Dumont Watch Co., 307 Fifth Ave., New York 16.

EARNING Less than \$200 weekly? Boost income quickly. Fast selling celluloid price tags, metal moulding, menu covers. Every store, restaurant buys. Pricing Press, Dept. P.X., 124 White Street, New York.

BIG Cash year 'round profits. Show friends sensational value 14 card All-Occasion box assortment. Wildfire \$1.00 seller. Your profit up to 50c per box. Also quick money making birthday, get well, correspondence notes, gift wrapping boxes. Extensive personalized stationery line. No experience needed. Special offers. Request \$1.00 Everyday box on approval and free stationery samples. Holiday Card Co., 463 Congress St., Dept. E, Portland, Maine.

POCKET Pal: The All-Purpose cutting tool. 150% profit. Every man and housewife a prospect. 50c seller. Steady repeat item. Sample 25c. Nelson Mfg. Co., 222 W. Kellogg, St. Paul 2, Minn.

AMAZING New chemical discovery keeps trousers creased entire month for 4c. Gives crease knife-like edge. Sample and details for 25c. Sta-Rite Products, 355 Imperial Street, Youngstown 9, Ohio.

SELL Ball point pens wholesale. Free details. Friendly, 17 South Penn Ave., Philadelphia 11, Penna.

SALESMEN, Saleswomen, Agents—Establish your own all year round business. Tremendous demand sweeping country for glass animals and brass miniatures. Sells on sight everywhere — homes, offices, stores, shops; everyone a prospect. Exceptional earning opportunity, large profits, quick turnover. Write for convincing details. P Box No. 531, Roosevelt Park Station, Detroit 32, Michigan.

JUST Out! History of World War II. Huge volume. Popular price. Authentic text. Official photographs. Big profits. Riverside Book Company, Iowa Falls, Iowa.

DISTRIBUTORS—Exclusive territories with iron-clad sales contract for live wires. Cash in on the tremendous Spring season profits with "Wonder Plastic Linoleum Finish" and "Wonder Plastic Wood Finish." Sells to grocery, hardware, paint, department stores. You also receive profits on repeat orders from accounts already established in the territory. Write Wonder Plastic Products Company, 2609 S. Kedvale Avenue, Chicago 23, Ill.

"PIPE Smokers"—"Wedg-Y," world's smallest pipe rack-tray and adjustable bowl cleaner, send 50c. Borders, 5011 S. Hoover St., Los Angeles 37, California.

IS This My Opportunity? The NuProcess Products Laboratories, Dept. 286, Aurora, Illinois, is asking for letter inquiries from salespersons who would like to become genuine, exclusive, protected territory Sales-Distributors of their two products in territories where no introductory sales work is being done now. The letter inquiry should come from a man or woman of selling ability and experience, who has a car to work with, and enough funds to finance their first order. Very liberal cash profits should start coming in to them within one hour after they start work. The two products are . . . (1) Silver Plating Liquid (NuSilver and Re-Plate-O patent trademarks) a liquid in \$1.00 glass bottles, also in glass Pints, Quarts and Gallons, which cleans, silverplates and polishes (3 results) from the one application. It is basically a superior quality product for cleaning and preserving silverplated tableware and silverplated pieces of all kinds and sizes. But it also silverplates out onto copper, brass, bronze, zinc and some other new composition metals. It is put on either by being rubbed on with a cloth by hand or by immersion of the piece into the liquid for 1 minute. More uses are being constantly found for this Silver Plating Liquid in stores, offices, shops, factories; and even large Industrial Concerns, Institutions and Universities now purchase it. There is a very large potential market for NuSilver Plating Liquid wherever it is introduced and demonstrated . . . (2) The second product is the Lectrik Silver Kleaner Atomic Metal Electrode Plate. This is a metal de-tarnishing plate which, when used as directed, draws the tarnish off silverware, instantly . . . like a magnet will draw tacks to it . . . Restaurants, Hotels, and Eating Places like this de-tarnishing method because it is so quick and simple for the help to do. These 2 products are demonstration sellers. No demonstrations, no sales. Lots of demonstrations, lots of sales. Both products sell wholesale and retail. All sales in your territory are yours as long as you continue to introduce and sell the products. You are expected to secure, appoint and stock-up new selling agents and dealers at all points in your territory. This is a steady, permanent, well-paying job of your own. You are the boss of yourself and of everything in your territory. If this is the kind of a business you are looking for write a letter of full details about yourself to this concern and receive on return mail fuller and more complete details for your further consideration.

SELL Electric razors for \$5.00. Your cost only \$4.00 postpaid. Henderson, 1333 Santa Fe Ave., Los Angeles 21, Calif.

DEMONSTRATE Vanishing cigarette trick. Working sample, 25c. Scheetz's, Sellersville 1, Penna.

BEAUTIFY Your automobile or luggage with gold initials. Agents charge 25c per initial. Send \$1.00 for 135 initials. (Roman or Old English). Paskow's, Gold Letter Co., 1662 Cropsy Ave., Brooklyn, N. Y.

MAKE Flexible molds! Few cents each! Cast plaques, novelties, bookends! Free sample! H. Tooker, Hamilton 2, Ohio.

MEN And women: Sell household utility. Needed in every home. Earn \$75 per week. Write today. H. M. Jerome, 1600 Junction Ave., Dept. 6, Racine, Wisconsin.

OIL Burners \$145.00. Fully automatic, ready to install. 1/3 deposit, bal. c.o.d. Essex Shop, 172 Washington St., Newark 2, N. J.

EASY Money galore. Up to 100% profit plus bonus. Sell friends complete line greeting card box assortments, gift wrappings, correspondence notes. Experience unnecessary. Special offer. Request peak quality 14 card \$1.00 all occasion assortment on approval and free personal stationery portfolio. Tom-Wat Studios, Dept. PM, Bridgeport, Conn.

100% PROFIT on a 100% seller. Add the plastic twin rotary brush Kwik Komb Kleaner to your line. Costs 12½c, sells for 25c and up. For details write Rotary Brush Co., Dept. PM, Bay City, Mich.

SELL Genuine briar pipes direct. All men prospects. 100% profit. Lightweight sales kit. Write Abbott Pipes, 62 East 87th, New York 28.

OPERATE Profitable business selling, packaging products under your own name. Lyle A. Products, 5 E. Spaulding, Willoughby, Ohio.

FLUORESCENT Kitchen fixtures. Two 20 watt tubes \$3.65 in quantity (less tubes). Sample \$4.95 postpaid. Literature. Essex Shop, 172 Washington St., Newark 2, N. J.

POCKET Knives—largest variety! \$1.00 brings novelty sample and wholesale price-list for dealers. Rabinowitz, 108 Neptune, Brooklyn 24, N. Y.

AGENTS. Substantial profits. Repeat order products. Not mere "job" but opportunity establish steady income. Additive lubricant. Limitless field. Factories, autoists, service stations, fleet owners buy in huge quantities. Write Kidder Oil Company, LaCrosse 1, Wisconsin.

PHOTOGRAPHS And cards sealed in durable plastic, permanent lifetime protection, wallet size. 50c. Agents wanted. Plasticraft, Box 135, Wollaston, Mass.

NEW Patented invisible belt, keeps shirttail in. Men, women, unlimited earnings. Sell easily. Millions prospects. Free particulars. Invisibel, PM1, Box 26, Elmwood Station, Omaha 6, Nebraska.

EVERYDAY Cards. Earn \$5.00 with every ten \$1.00 assortments you sell. Also wrappings and note paper. Unusual quality. Send for samples today. Howard P. Ellis, Dept. PM-4, Pitman, New Jersey.

LIQUID Shampoo. Available in bulk—retail sizes, fast sellers. Details free. Delfa Co., 3956 Avondale, Chicago 41.

AUTOMATIC Crayon. New, practical. Whirlwind seller to offices, stores, stock-shipping rooms. Big profit. Hobby Bureau, Chicago 23-P.

300% PROFITS. Commodity used by millions since 1923. Sample 10c. Safe-Nu, 937 Withnell, St. Louis 18, Mo.

MAN Or woman to sell profitable steady repeat necessity on quick easy demonstration. Permanent business chance. Write Box 5672, Cleveland 1, Ohio.

QUICK Money! Men! Women! "You'll love this!" Free details! Battery Shop, Grand Junction, Colo.

MONEY In your spare time! Easy-selling Riteheat, only automatic room temperature regulator for wood or coal stoves. Every home needs one. National advertising builds big market. No experience needed. Just show neighbors and friends. Sells itself. Liberal commissions. Others making extra dollars. No obligation. Riteheat Regulator Division of Caloric Stove Corporation, Widener Bldg., Philadelphia 7, Penna.

BUILD Prosperous, steady business of your own. No investment, no experience necessary. Wonderful year 'round profits selling everyone quality shoes at exceptional values. Free outfit starts you making cash immediately. Merritt Shoes, Dept. PM, Brockton, Mass.

DISTRIBUTORS — Agents. Something really new. No competition. Year 'round item. Get exclusive territory rights now before national consumer advertising starts when territories will not be available. Sells to variety, drug, department, shoe, hosiery stores, gift shops. An item women have been waiting for! Prevents spotting hosiery and leg makeup after-snow thaws and rainy weather. Colored plastic. Must be seen to be appreciated. \$1.00 brings sample or write for full particulars. Tarrant-Demko & Co., 9606 So. Ridgeway, Chicago 42, Illinois.

AT Home—Your own business making, selling, popular \$1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. S-6003, Loveland, Ohio.

WONDER Cleaner. Different bubble bath, Glasklean—three money makers. Sell homes and stores. Everything furnished. Courier, 3829-I Delmore, Cleveland Heights 21, Ohio.

MAKE Money in your spare time! Helps furnished. Easy sales. Voluntary repeat orders. Liberal commissions. Write for free wholesale price list today! McGregor Magazine Agency, Dept. P.M.-7, Mount Morris, Illinois.

MAGIC Cleaner—Hotter than a fire-cracker. Saves soap—Big profits—Sample free. Bestco, 5007 Irving Park, Chicago.

BABY Shoes electroplated, shiny copper finish. Krall, 1627 Memorial Drive, Pittsburgh 16, Penna.

BIG Bargains for big profits. Over 100 sensational values. Men's used suits \$2.00, pants 35c, topcoats \$1.25, overcoats \$2.00, shoes 20c. Experience unnecessary. Free wholesale catalog. Superior, 1250-B Jefferson, Chicago 7.

FREE—Mexican novelty curiosities. Fast seller. Exceptional profits. "Productos," Apartado Postal 9318, Mexico City.

GREETING Card agents, "line up" with "Pines" for bigger, better, quicker profits. Rush name, address on postcard today. Box 32, Flushing 5, New York.

90c PROFIT Each \$1 sale. Sell positive mothproofing solution to housewives, stores, agents. Experience unnecessary. Postal brings details. Kinford, Wayne 3, Penna.

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

SELL New-Used clothing from home, auto, store. Men's suits \$1.17. Leather jackets 85c. Overcoats 62c. Dresses 17c. Ladies' coats 38c. Other bargains. Catalog free. S & N, 565A Roosevelt, Chicago.

137 COMPLETE Plans for starting own business: local—mail order. Particulars free. Elite Co., 220 Grand St., New York 13.

COLLEGE Students! 100% profits selling costume jewelry. Wm. Morris, Maywood, New Jersey.

AGENTS—Big line including food products. Fast selling premium and bargain deals. Low prices. Send card for big profit offer with gift. Ho-Ro-Co, 2796 Dodier, St. Louis 7, Mo.

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

200 MONEY Making deals. Plans, rare formulas. Schemes. Folio free. Formico Service, Box 572, Dayton, Ohio.

\$3 FIRE Extinguisher; quick sales, wholesale or direct; liberal profits. "Fire-Killer," 109 N. Franklin, Syracuse 1, N. Y.

PLATING Outfits for autouparts, reflectors. Connect to a battery. No tanks necessary. Free booklet and particulars. Gunmetal Co., Ave. N. Decatur, Ill.

FREE Water and our concentrates, makes flavors, lotions, shampoos. 72 products, labels, bottles furnished. Qualco, E-20030 Russell, Detroit.

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

SELL Full, part time individualized belts, buckles, cap badges, tie holders. 2,000 emblems to choose. Fast profits. Repeats. Write today special outfit offer. Hookfast Specialties, Box 1425, PM, Providence, Rhode Island.

SELL Personalized soap. Name on every cake. Ideal for gifts. Get sample offer. Dunbar Soap, New Brunswick, N. J.

EXCELLENT Sideline for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also make money applying initials on automobiles. Free samples. "Ralco" XL-Roxbury, Boston 19, Mass.

HELP WANTED

NAMEPLATES—Homes, offices. Profitable sideline. Quality. Whitney Signs, Box 41, Waterbury 85, Conn.

RELIABLE Man with car wanted to call on farmers. Wonderful opportunity now. \$15-\$20 in a day. No experience or capital required. Permanent. Write today. McNess Co., Dept. 25, Freeport, Illinois.

MAKE More money selling individualized buckles, belts, tie holders, cap badges. Choice of 2000 emblems. Quick profits—repeats. Special outfit offer, write Hook-Fast Products, Dept. A, Columbus 6, Ohio.

PARAMOUNT Atmospheric conversion gas burners. Quickly installs into any heating plant. Blowers. Gas floor furnaces. Sell and install. Peerless Sales, 4322 Sheridan, Lincoln 6, Nebr.

HIGH-GRADE SALESMEN

SENSATIONAL Offer! New fluorescent table lamp. Selling fast. Commissions advanced. Also complete line fluorescent fixtures. Write for free kit and sample offer. Rose Company, 529L South Franklin, Chicago.

LIQUOR Dispenser. New adjustable type. Sell bars, clubs, taverns on sight. Repeats. Sample \$3. Hawkeye Sales Company, 258 Highland Drive, Cedar Rapids, Iowa.

AMAZING New zipper shoe sells on sight. Big profits for salesmen. Leads line 200 splendid styles. Territories open. Get free sample outfit. Write, Consolidated Shoe, Dept. S-756, Chippewa Falls, Wis.

AMAZING Discovery, Master Glaze, puts brilliant glass-like surface on cars. Free sample, information. Big commissions. Master Glaze, Dept. 583, 7720 Harwood, Milwaukee, Wisc.

CALLING On auto repair shops. New small patented labor-saving equipment. Big demand; fast seller, large commission. We deliver. Write Johnson Equipment Co., Dept. PM-4, 1940 East Sixth, Cleveland, Ohio.

SELL Gift shops, department stores, etc. Write Kimley, 103 Highland, Williamsville, N. Y.

START Your own business on our capital. Always your own boss. Hundreds average \$6,000 to \$25,000 annual sales. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. D-U-PPM, Freeport, Ill.

OPEN Territory—Paakus Chips exclusive product. Send 25c coin for sample box. Write Paakus Chips, P.O. Box 310, Binghamton, New York.

ADVERTISING Book matches—Cash in on political campaigns—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. M47, 7530 Greenwood, Chicago.

BALLOON Assortment \$2.95 gross. #4 balloons, \$1.95 gross. Ellswood Distributors, La Junta, Colorado.

SALESMEN Wanted for advertising pencils (wood, mechanicals, bullets). New York Pencil Co., 70 Fulton Street, New York 7.

FRANCHISE Available. Supervise salesmen, make surveys for management engineering firm. Valuable training given. Sims & Associates, 120-C S. LaSalle, Chicago 3.

\$70.00 WEEKLY Selling twenty boxes greeting cards daily. Eighteen money makers. One earned \$160.00 weekly. Samples on approval. Details. Carleton Distributors, 25 W. 17th, Bayonne, N. J.

DISTRIBUTORS, Salesmen—Patented cigarette case holder for automobiles, trucks. Fine seller. New, 200% profit. Samples \$3.00 per doz. Literature free. Little Giant Holder Company, 919 South Vermont, Los Angeles 6, California.

STATE Distributors to sell simplified bookkeeping system small stores and public accountants. Sells \$13.50, your commission \$8.00. Exclusive franchise. Write Hawthorne Sales Co., Decatur, Ala.

DEMONSTRATE, Sell to taverns, amazing, original glass rinse "Clear Glass." No toweling, no water spots. Guaranteed. Sample 25c. Riesen Chemical, 419 Vliet, Milwaukee 12.

SELL Calendars full or part time—every business house a prospect—also wholesale to printers—calendars, novelties, sheet pictures. Fleming Calendar Company, 6535 Cottage Grove Avenue, Chicago 37, Ill.

WAGON—Jobbers, agents! Big profits selling stores, individuals sensational ball point pen. \$2.98 retailer. Free details; also list hundreds fast sellers. Salesmanager, Box 27, Atlanta, Georgia.

QUICK Profits with individualized belts, buckles, cap badges, tie holders, uniforms. Choice of thousand emblems. Sure repeat orders. Easy-selling outfit offer. Write Hook-Fast Company, Dept. 12, Roanoke, Virginia.

WAGON Salesman—Fast moving carded goods and 10c line. Long profit. Free facts. Peerless, 2717 Dodier, St. Louis 7, Mo.

FREE! Latest issue Opportunity Magazine. Salesman's Guide. Inspiring, constructive. Shows how to earn money selling for others or in your own business. Hundreds postwar opportunities. Send name and describe what you have sold or are selling. Illustrated copy sent free. Opportunity Magazine, 620 N. Michigan, Dept. 17, Chicago 11, Ill.

EDUCATIONAL AND INSTRUCTION

CORRESPONDENCE Courses. Unusual books all subjects. Bargain catalogue free. Baker, 5509-B Winthrop, Chicago 40.

LEARN Trigonometry better than others. Master method instructions \$1. Guaranteed. J. Ziemba, 6123 Orchard, Dearborn, Mich.

HAVE An office. Many earn up to \$5,000-\$15,000 annually. Learn credit-collection agency business by home study course. Write for free bulletin. Franklin Credit School, Dept. 202-E, Roanoke 7, Virginia.

LEARN Landscaping. Profitable, healthful career—absorbing hobby, for men, women. Thorough 45-lesson home-study course takes 8-12 months spare time. Hundreds of successful graduates. 31st year. Send for free catalog. American Landscape School, 6396 Grand Ave., Des Moines, Iowa.

PREPARE For Civil Service Examination. Pay for course after securing position. Write Free School, Dept. PM4, Kokomo, Indiana.

FACTS, Figures, faces, stick like burrs! New improved Supermemory course. Write Thor Books, ZC-3, Box 1210, Chicago.

"HOW To Break and Train Horses"—a book every farmer and horseman should have. It is free; no obligation. Simply address Beery School of Horsemanship, Dept. 1104, Pleasant Hill, Ohio.

HERBALISM—Complete course in 2 volumes. 1000 recipes. Home Service, Forestville 2, Va.

LINOTYPE—Intertype practice dummy with extra keyboard layouts, fingering charts, spelling aids, etc. Complete, postpaid \$3.00. Callaghan, Box 1493, Great Falls, Montana.

BETTER Your conditions through nerve force development. Instructions reveal all, tells how to overcome fear, nerves, worry obstacles; free details. O'Leary, Box 594-A3, Baltimore 3, Md.

BUILDING Boom is here. Free particulars about most lucrative trade. Lidemark, 226 Potomac Ave., Buffalo, N. Y.

TYPING. Learn at home easily in 60 hours. Amazing new system. Literature free. M. E. Egan, 205-J W. Cherry, Shendeah, Penna.

WANTED—Publication rights on trade, occupation and business training courses. Purchase or royalty basis. Box 1058, Omaha, Nebraska.

AN Amazingly interesting circle relationship for carpenters, engineers, teachers, mathematicians, puzzle enthusiasts, etc. Send 50c cash for cycle progression. Pure Science, Box 310, Moscow, Idaho.

3800 USED Correspondence courses. Cat. 25c. EG Mfg., Elmsford 1, N. Y.

LEARN To "speak in public." Banish fear. Speak fluently with confidence. Amazing new method. Easily mastered. Absolutely guaranteed. Literature free. Trissell-Heymann, Publishers, Mason City 2, Iowa.

LEARN Mail order business, \$5 capital, profitable, fascinating. Write, Crafts, Davison 2, Mich.

TUTORING Practical mathematics. Send postcard for circular. Math Tutor, Box 1214, Indianapolis 6, Indiana.

LEARN Modern-day auctioneering at home. All facts and instruction \$5.00. Col. Glenn R. Parrick, Box 71, La Grange, Illinois.

USED Correspondence courses and educational books bought, sold, rented, catalog free. Educational Exchange, Henagar, Ala.

LEARN Piano tuning. Prepare for career in fascinating profession. \$5000 year easily earned. Real security, pleasant easy work. No profession paying so well can be mastered so quickly. Natural aptitude, desire to get ahead chief requirements. Continuous enrollment. Veterans enter under G.I. Bill of Rights. Prospectus and full information on request. Harmony School of Piano Tuning, Box 582, Harrisburg, Penna.

HOME Study course, drugless therapy. Free literature. Institute of Drugless Therapy, Tama, Iowa.

AMAZE Others. Add faster than adding machine. Free details. Math Institute, Box 633, Mobile 4, Ala.

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog free! Write—Nelson Company, Chicago 5.

USED Educational books on all subjects sold, rented, also bought and exchanged. Moneyback guarantee. Write today for free catalog and details. Lee Mountain, Pisgah, Alabama.

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

BIG Money rebuilding shoes. Help needed everywhere or start big-income business of your own. Learn practical, sure, easy way in 3 months. Anyone from 18-60 years can learn easily. Approved for GI training. Rush postcard today. Modern Shoe Rebuilding School, Est. 1927, 2935 Belmont, Chicago 18, Illinois.

29 LANGUAGES By Linguaphone. Russian, Spanish, Portuguese—Direct conversational method for mastering any language quickly, easily, correctly at home. Available under G.I. Bill of Rights. Send for free book. Linguaphone Institute, 83 RCA Bldg., New York 20.

LEARN Photo-engraving at home or in oldest, largest school in America. Work for newspaper or establish own profitable business. New Tasope' Photo-Engraving equipment available soon. Write for information. Veterans ask about G.I. training. The Aurora School of Photo-Engraving, Tasope' Bldg., Aurora, Mo.

MODERN Welding school gives thorough training for one of industry's best paid jobs. Experienced instructors. Individual attention. Non-profit institution. Qualified under G.I. Bill. Write for literature and details. Hobart Brothers Co., Box M-1067, Troy, Ohio.

SECRET Investigation. Experience unnecessary. Investigators particulars free. George Wagner, M 125 West 86th, New York.

HOME Bible course. Simple, helpful, instructive. Total cost \$3.00 includes textbooks, stationery, examinations, certificate. \$1.00 starts you, or simply request prospectus. The Bible Study School, Reverend Leslie Marshall, Secretary, 382 Van Houten Street, Paterson 1, N. J.

MEDICAL Laboratory technicians in great demand. We train you in your spare time, in your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-E, Austin, Texas.

PLAYS, STORIES, MANUSCRIPTS

POEMS Wanted for publication consideration, details free. J. Barnes, Publisher, Box 490 Times Sq. Station, New York 18, N. Y.

I WANT New writers to cash hundreds of checks for \$1 to \$100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for free details. No obligation. Saunders M. Cummings, 467-M Independence Bldg., Colorado Springs, Colo.

NEW Writers needed to rewrite ideas in newspapers, magazines and books. Splendid opportunity to "break into" fascinating writing field. May bring you up to \$5.00 per hour spare time. Experience unnecessary. Write today for free details. No obligation. Postcard will do. Comfort Press, Inc., 210-P South Seventh St., St. Louis 2, Missouri.

BUSINESS SERVICE

RECEIVING And re-forwarding mail. For further particulars write to Dunn Mail System, 216 West 69th Street, Box 42, New York 23, N. Y.

5000 GUMMED Labels, 2"x1 3/4", postpaid \$5.50. J. Barnes, Publisher, Box 490 Times Sq. Station, New York 18, N. Y.

NEW York mail-address. Receiving, forwarding, Confidential. Free details. Arlington, 131-H West 42nd Street, New York 18, N. Y.

BUSINESS — Personal representation, World's principal cities. Associates wanted. Universal, Butler Building, Chicago 1.

SAVE—Buy direct from manufacturer. Any article. Guaranteed lists. Pittshire Research, Box 90, Pittsfield, Massachusetts.

To Whom it may concern: We will represent you in all principal cities of the world. Personal or business assignments \$1 per hour. James W. Farley, Citizens Bldg., Cleveland 14, Ohio. Note: Would appreciate hearing from someone who wishes to enter this business in your city. Will send you assignments immediately. References exchanged. State qualifications.

SPECIAL SERVICES

\$2.00 MONTHLY Maintains Washington, D. C., business, personal mail address. Letters reforwarded daily. "Hawkins," 1300-f Taylor.

DO You want representation in Honolulu. Letter, phone or personal contact. Lutts, Box 785 CHA3, Honolulu, TH.

PERSONAL Poetry is now being offered the public. Written under your instructions, by outstanding literary artist. Inquire: Hillscript Studios, 6427 Begole, Detroit 10.

SURPRISE Friends from Hollywood. Three beautiful post cards 25c. You address, return (stamped self-addressed envelope), we mail. Guaranteed. Letters forwarded (or mailed); give friends our address, we forward to you, 25c—monthly \$2.00. Box 57, Pacific Palisades, Calif.

DETROIT Postmarked letters remailed for you, 25c each. Morgan, North End Station, Box 127, Detroit 2.

LETTERHEAD Designing. Highest quality artwork. 200 attractive designs \$1.25. Samples free. Jacobson, 3510 Palmer, Chicago 47.

LETTERS Forwarded 25c each, \$2.00 monthly. E. Burroughs, 411 Greenwich, San Francisco.

MFG.—Wholesale sources. Most any item. Write: "Service," 1332B Findlay, New York City 56.

GLOBAL Mail—Receive picture postcards; surprise your friends; let us mail your letters from any place on earth. Free particulars. Travelpost, Box 528, El Centro, California.

GOOD "Used" self-instructional books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog free! Write—Nelson Company, Chicago 5.

CARTOONING, COMMERCIAL ART, SHOWCARD WRITING, SIGN PAINTING

"HOW To Make Money With Simple Cartoons"—a book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists' Exchange, Dept. 94-C, Pleasant Hill, Ohio.

MAKE Extra money painting signs. Easily, quickly. \$1.00. Jantzen, 252 West New York, New Jersey.

UNEQUALLED Offer! Beginners outfit given away free with every purchase of our famous showcard writing course. Rush postal for full information. Sherwood Publishing Co., Dept. 104, Irvington 11, N. J.

LISTING Of major cartoon markets for free-lance cartoonists, 70 magazines and addresses, 25c. Cartoonists' Guide, Trudeau, N. Y.

CREATE Original pictures, don't copy. New painting method for everyone shows how. Colorful details free. Weidner, 1321 Wellesley, Los Angeles 25, California.

YOU Can draw. Amazing invention. Professional looking drawings, cartoons, pictures, produced easily. For fun, profit. Artcraft, Box 7, Cincinnati 30, Ohio.

754 QUICK Pictures in modern poster art-lettering. Free literature. Art Book Shop, Arnold, Mo.

ART Students—Write for commercial art talent test. Art Institute, Box 8066, Dallas 5, Texas.

SIGN Painting taught at home by an old master. Ben Kerns, Box 812, Greenville, S. C.

MAKE Signs. 9 complete alphabet pattern sets. 3 complete numeral pattern sets and catalog \$1.00. Sign Letter Distributors, P.O. Box 101, Mineola, N. Y.

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

ADVERTISING AGENCIES, LETTER WRITERS, FOR ADVERTISERS

LET A topflight advertising agency write and place your ads. Costs no more. Expert counsel and copy services free. John Moran Advertising Agency, Box 104, Wilkes-Barre 2, Pennsylvania.

PRODUCTIVE Cash buyer names. 300, \$1. 1,000, \$2.95. Underhill, Beebe, Ark.

FREE! 1947 Advertisers Rate and Data Directory. 52 pages! E. H. Brown Advertising Agency, 20 N. Wacker, Chicago 6.

ADVERTISERS: Mail order ad covering United States—2,000,000 circulation—\$21.00 1mo. Classified ad, 24 words, 20 metropolitan Sunday newspapers—\$25. Magazine, newspaper, mailing-list ratebook, advertising assistance—free. Chicago Advertising Agency, 20-PM West Jackson, Chicago 4.

NAMES, New, guaranteed. 1000 men \$5.00. 1000 housewives \$5.00. Bert Research, 1516 Jackson, New Orleans 13, La.

WALDO Advertising Agency, Box 266, Dallas 1, Texas. Mail order specialists.

I WRITE Mail order ads, letters, campaigns that pull inquiries, orders. Suggestions free. Gardner Service, 60 East 54th St., Kansas City 2, Mo.

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

INCH Display advertisement Mailorder World, year \$24. Wood's Popular Services, Atlantic City, New Jersey.

ADVERTISE: 24 Words, 40 newspapers \$3.50. Lists free. Advertising Bureau, 4515-C Cottage Grove, Chicago 15.

ADVERTISING Service, art work, C. Sanford, 5029 Maple, St. Louis, Mo.

ADVERTISERS! Reach nearly 18,000,000 readers. 25 Sunday national key newspapers, 18 words, \$42.25. "Terrific pullers." 20 popular newspapers, \$8.50. "Free booklet." Special—One inch display 2,600,000 circulation, \$32.90. Newmark's Advertising Agency, (Established 1893) 217-7th Ave., New York 11.

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

24 WORDS In 64 weeklies \$4.96. H. J. Darnell, 730 Hays, Jackson, Tenn.

TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

NEW, Improved duplicator, no stencils, ink, anyone can operate. Fully guaranteed. \$19.75. Premier Sales Company, 28 Conestee Avenue, Greenville, S. C.

"PRINT-O-MATIC" New adjustable model. Send for circular. Mimeographs bought, sold. Schubert, 2600 Sunset, Los Angeles 26.

MIMEOGRAPH, Multigraph, typewriter, multicolor, addressing machine. Folder. Printing press for sale. Grimsteads, Edwardsville, Illinois.

"PRINTOMATIC" Selffeeding post card stencil printing duplicators \$9.50 up. Office size duplicators, Speedprints, Hilcos, Excellographs \$33.41 up. Literature free. Pittsburgh Typewriter Supply, 336-WK Fourth Avenue, Pittsburgh 22, Penna.

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

RUBBER STAMPS AND OFFICE SUPPLIES

QUALITY Rubber stamps, gold-indexed, rubber-cushioned, full size handle, 35c line. 3 lines \$1. Bernel Products Co., 170 Broadway, New York 7.

3 LINES 40c; Pads 25c; signatures \$1.75. Stamprite, Wauwatosa, Wis.

3 LINES Or less 45c. Newman, 2020 Loma, Whittier, Calif.

PROMPT Service. 1 line 40c, 3 lines 60c. Guaranteed. Stamcraft, 1707 Virginia Street, Gary, Indiana.

QUALITY Rubber stamps. Three day service. Estimates given. Free catalog. Black's, Box 201, Bay City, Mich.

ADDING Machine stylus portable. 99.-999.99 capacity. \$19.90. Folder free. Appliance Mart, 21 Castine, Bangor, Maine.

RUBBER Stamps. Buy direct from manufacturer. Literature free. Lee-Vall Press, Box 1242, Indianapolis 6, Indiana.

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SPECIAL! 100 5 1/2 x 8 1/2 Letterheads and envelopes, \$1.25. Loweco, 915 Tunnel, Chattanooga 4, Tennessee.

MONEY Saving printing price list free. Low prices. Driscoll, 1619 Third Avenue, Los Angeles 6, California.

MORE Prestige for businesses, small or large, with printed stationery. Free samples, prices. Buffalo Printers, Buffalo, S. Dak.

1000 BUSINESS Cards \$2.35, 1000 6 3/4 envelopes \$4.45. Madison Printing Service, Madison, Ohio.

PHOTO-OFFSET, Printing, multigraphing. Samples free. Mango, 555-A, South 20th, Newark 3, N. J.

1,000—3 1/4 x 5 1/2 ADVERTISING Cards—\$4.95. 100 word limit. Schultheis, Box 449, Irwin, Penna.

100—8 1/2 x 11 HAMMERMILL Letterheads \$1.00 postpaid. Envelopes, billheads, statements, business cards same. Race Printing, Hudson, New York.

BUSINESS Cards to booklets. Correctly printed. Ace Printing, Brentwood, Md.

STATIONERY, Laundry-gas station lists, garage repair orders, free estimates. Southern Standard Publishing Company, Panama City, Florida.

WEDDING Invitations, announcements. Quality Vellum, double envelopes; smart Park Avenue type; box of 50, only \$4.00 postpaid. Williams, Specialty Printer, 2866 Madison Ave., San Diego 4, Calif.

1000 6 1/2 x 9 1/2 20 LB. Catalog, envelopes \$8.50. Trial 100 \$1.35 postpaid. Spender & Son, Millington, Mich.

1,000 POSTCARDS Printed, 15 lines, \$5.50. Castell, 2107 East Ninth, Brooklyn 23, N. Y.

100 TWO-COLOR Letterheads \$1.25. One color, larger quantities less. Samples, pricelist free. D'Yarmett Printing, Newark, Ohio.

FINE Printing for every use. Samples. Treaster Printing, Milroy, Pennsylvania.

SALES Books, prompt delivery, free sample. Doerr Printing, Lewiston, N. Y.

MIMEOGRAPHING—Lowest prices and highest quality. Universal, Butler Building, Chicago 1.

PERSONAL STATIONERY—extra quality, 50% rag content white bond. Name, address, beautifully printed, blue ink. 200 letterheads (6"x9 1/2"), 100 envelopes, post-paid \$2.95. Money back guarantee. Free samples. Cottage Bookshop, Box 726-M, Lincoln, Nebr.

MIMEOGRAPHING—Pricelists, letters, circulars, forms. Reasonable. Prices, samples free. Martin Mimeo, 3212 Harper St. Louis 7, Missouri.

250 **LETTERHEADS** \$1.50. Envelopes same. Mallo, 767 Leith, Flint 5, Mich.

QUALITY Printing: business, personal stationery. Prepaid delivery. Samples free. Mero Products, 100 Morrison, Punxsutawney, Penna.

QUALITY Mimeographing, multigraphing, printing and office supplies at the lowest prices. Catalogue free. National Sales Company, Dept. ND, 357 Halsey Street, Brooklyn 16, N. Y.

1000 **FOUR Line stickers,** \$1.00. Printing, mimeographing, best and cheapest in the country. Imprint, Emporia, Kansas.

500 3/4x2 1/4 **FOUR Line gummed stickers,** 35c. Moritz Printery, Saginaw, Mich.

CUT Printing costs, 1,000 offset 8 1/2x11 printed \$3.95; 5,000 \$15.75; larger quantities less. 48 hour service, Samples, price-list free. Fidelity Company, Parkersburg 14, W. Va.

MIMEOGRAPHING Specialists—Any copy. Reasonable. Mailers Service, Box 606-A, Chicago 90, Ill.

1000 **BUSINESS Cards** \$2.50, prepaid. Reliable Print Shop, 901 E. Jefferson, Louisville 6, Ky.

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BETTER Grade printing reasonable. Estimates on anything. Economic Press, Leonia, N. J.

MIMEOGRAPHING—Letters, pricelists, formulas, instructions. Lowest prices. Lem's Letter Shop, 5710 Stanton, Detroit 8.

PRINTING OUTFITS AND SUPPLIES

PRINTERS Galley, quarterly magazine containing valuable information. 25c—year. Steiner, 24 Rockwell Road, Danbury, Connecticut.

CUTS—Make real halftones, line cuts yourself! Samples 25c. Particulars free. Rapid Chemical Service, Edwardsville, Ill.

PRACTICAL Printers, printers handbook, 50c. Steiner Publishers, R.F.D. 5, Danbury, Connecticut.

LINOTYPE—Intertype practice dummy with extra keyboard layouts, fingering charts, spelling aids, etc. Complete, post-paid \$3.00. Callaghan, Box 1493, Great Falls, Montana.

PRESSES. Cutters, perforators, cabinets, type. Bulletins 3c. Box 918, New York 8.

PRESSES. Type, cabinets, supplies. List for stamp. Lincoln Press Co., 220M Hartwell, Fall River, Mass.

PRINT At home—Send 10c for catalogue—presses, type, supplies. Barnhard Co., 6 Columbia St., Newark 5, N. J.

PRINTING Equipment, type and supplies. Send stamp for details or dime for complete illustrated supply book. Kelsey Inc., X-11, Meriden, Conn.

PRINTERS. Make a quick-etch etcher for cuts, halftones. Details. Charles Medlock, Box 256C, Goodland, Indiana.

HOME-MADE Presses. Proofs free. Riegel, 1111 Harrison, Phila. (24), Penna.

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

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PATENTS. "Proof of Invention" folder mailed without obligation. E. E. Vrooman, Registered Patent Attorney, 871 Woodward Building, Washington 5, D. C.

INVENTORS: Without obligation, write us for information as to what steps an inventor should take to secure a patent. Randolph & Beavers, Registered Patent Attorneys, 21-C Columbian Bldg., Washington 1, D. C.

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"**INVENTOR'S Guide**" free on request. Frank Ledermann, Registered Patent Attorney, 154 Nassau St., New York 7, N. Y.

INVENTORS: Write for free brochure "Evidence of Invention." Labiner, World Building, New York 7.

C. A. SNOW & Co., M-427 Snow Bldg., Washington 1, D. C. Registered patent attorneys. Established 1875. Literature mailed on request.

PATENTS—Trade marks. Irving L. McCathran, 315 McLachlen Bldg., Washington 1, D. C. Registered Patent Attorney.

PATENT And Trade-Mark Practice before U. S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommel, Registered Patent Attorneys, Suite 411, 815-15th Street, N.W., Washington 5, D. C.

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PATENTED, Unpatented inventions promoted. M. Joyce Humphries, 1424 Landtitle, Philadelphia 10, Penna.

MACHINES. Machine parts, inventions designed, built. Louis, 86 Walthery Ave., Ridgewood, New Jersey.

WRITE FOR "Cooperative Combination," Explains patent protection and procedure. Invention sales help if you use my patent application services. Charles Morton, 11 West 42nd Street, New York.

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HIGHEST Royalties and cash for your inventions when we market them. Free particulars without obligation. Universal Marketing Co., Dept. 4M, 126 Lexington Ave., New York 16, N. Y.

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INVENTORS: You save up to 300% when dealing with your patent searcher direct. Complete search with patent copies \$6.00. Reports mailed in 5 days. Invention protection forms free. Write Raymond L. Smith, Patent Searcher, 703-M Albee Building, Washington 5, D. C.

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I SELL Patents. Established in 1900. Charles A. Scott, 773PM Garson Ave., Rochester, N. Y.

THE Inventor who believes he has a new and useful invention, and needs advice, should consult a competent registered patent attorney. Without obligation, write for full information on how to secure patents and trademarks. Randolph & Beavers, Registered Patent Attorneys, 11-E-Columbian Bldg., Washington 1, D. C.

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WANTED: Small, simple, patented inventions for royalty manufacture. Bleefeld Products, New Knoxville 2, Ohio.

INVENTORS! Have you good, patentable ideas? Write Patent Agent Metzler, 11 West 42nd, New York.

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WANTED: Practical inventions by manufacturers, patented or unpatented. John D. & Son, Dept. PM-4, Box 3213, 285 Howard Ave., Bridgeport 5, Conn.

WANTED Patentable ideas. Write A. Rehkop, Box 4805, San Francisco 1, Calif.

WANTED: Practical inventions suitable for sale through 5c-\$1.00 stores, drug-stores, cigar stores; also sportsmen's items of all kinds. Write Matt, 1412-P, Great Northern Bldg., Chicago 4.

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INVENTIONS Wanted. Patented or pending. Inventors Exchange, Dept. B, Hartford 1, Connecticut.

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information, free. Institute of American Inventors, Dept. 40-D, 1926-Eye St. N.W., Washington 6, D. C.

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THE Perfect rat and mouse trap. Always set; no springs. Simple, will work when others fail. Lewis Christensen, Ellsworth, Wis.

TINY All rubber hat holding device for restaurants, hotels, etc. Amer, Box 1575, Medford, Oregon.

COUNTER Shoe heel support, patent pending. F. Kincaid, Mt. Vernon, Oregon.

INVENTORS: Test the commercial value of your patented or unpatented inventions, quickly and inexpensively. Write for free information. Institute of American Inventors, Dept. 40-B, 1926-Eye St. N.W., Washington 6, D. C.

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MANUFACTURING Machine, inventions, models, patents, devices, made. Baums Metal Specialties, Kansas City.

RUBBER Molds made to order. Stock molds. Vallance Art Products, 1873 E. 70 St., Cleveland, Ohio.

EXPERIMENTAL Work, models. Reasonable. Nelson Manufacturing, 948 First, Woodburn, Oregon.

MACHINING—Models, tooling, production. Eastside Mfg., Box 1585, Rockford, Illinois.

WANTED: Manufacturing or assembly of small products, light press and bench work, drilling, milling, etc., on job basis or cost plus. Jewel Industries, P.O. Box 889, Canton, Ohio.

MODELS—Small lot manufacturing. Metals, plastics, etc. Milburn, Burlington, Kentucky.

A BRAND New inventor's service. Write for information. J and M Company, Burlington, Kentucky.

MODELS Developed and built. Small run manufacturing. The Thompson Engineering Co., 206-C Winchester Bldg., Grand Rapids 2, Michigan.

MODELS AND MODEL SUPPLIES

MOTORS—Kits (Aeroplanes, racing cars, boats, model R.R.)—Tools. Everything for the hobbyist. Catalog 15c. Westchester Hobbies, Inc., 259 Mamaroneck Ave., White Plains, N. Y.

GAS Modelers! Powerful midget ignition coil weighs only 2/3 ounce. \$2.00. Electric Miniatures, 1607 S. Western, Los Angeles 6, Calif.

RAILWAY Models, complete informative catalog HO and O gauge. 128 pages, 50c. Walthers, 247 Erie, Milwaukee, Wisconsin.

SHIPS In bottles, easy to build. Instructions, 25c. Steiner's, R.F.D. 5, Danbury, Connecticut.

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CAMERON .23 Engine for model airplanes, etc. Nationally advertised for \$16.95, now \$9.75 direct from factory. Send \$9.75 for immediate shipment post paid with money back guarantee or write for particulars. Cameron Bros., Chino, Calif.

FUN Building models—Airplanes, trains, ships. Everything furnished. Giant catalog 10c. Ben's Hobby Shop, 72 West Washington, Chicago 2, Illinois.

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SEA Shells, supplies. Wholesale catalogue. Tropical Shell Company, P.O. Box 1509, Sarasota, Florida.

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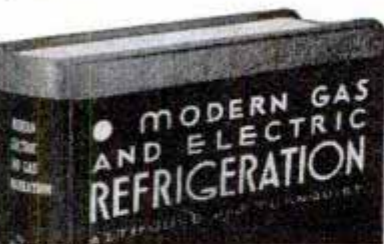


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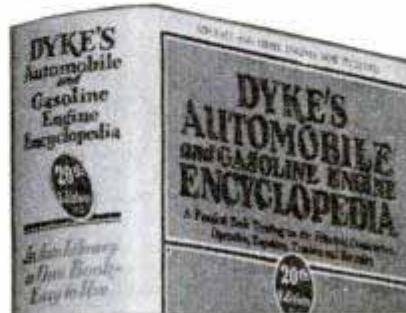
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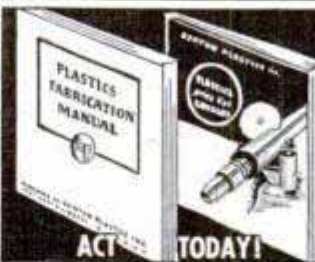
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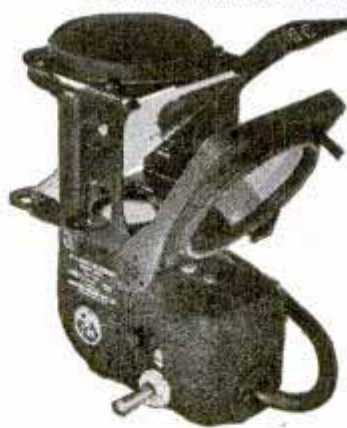
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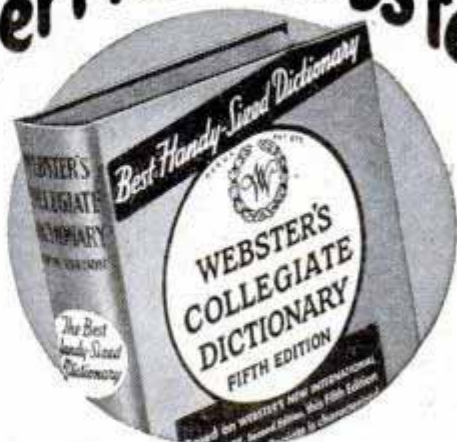
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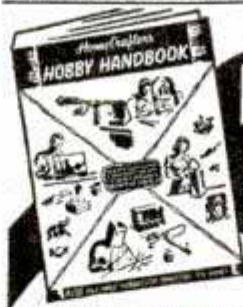
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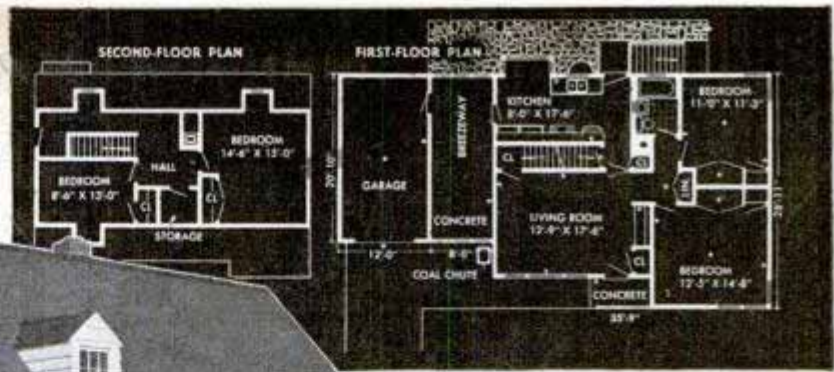
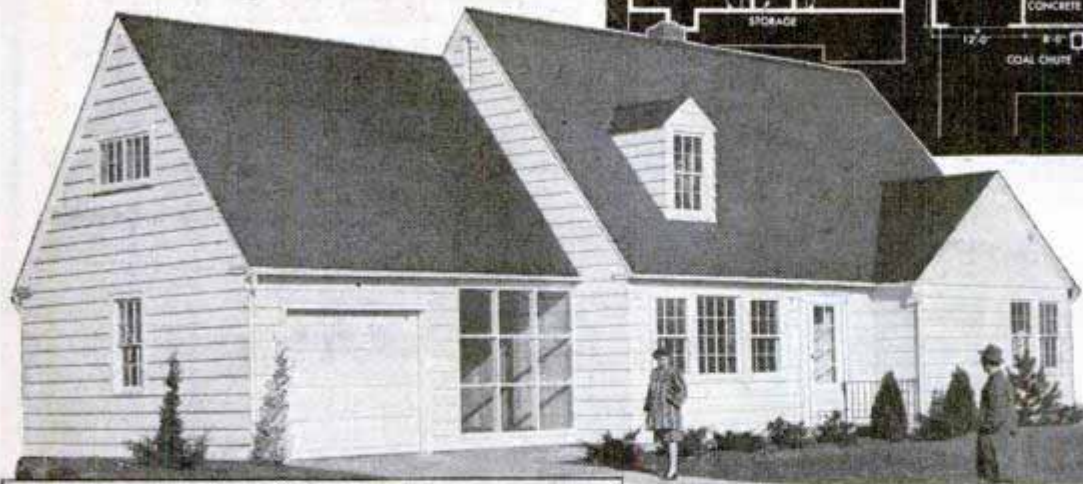
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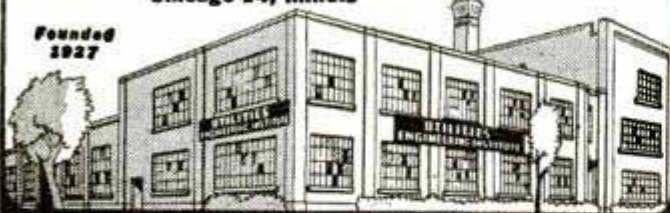
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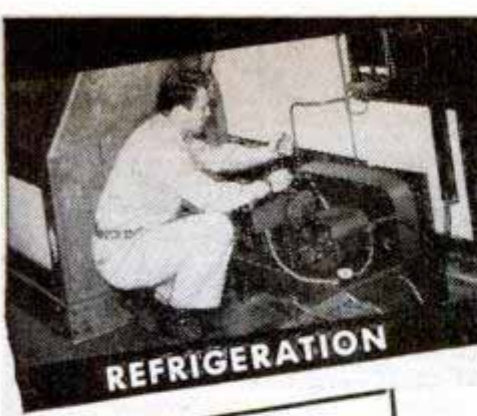
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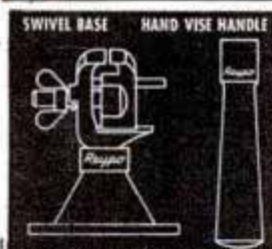
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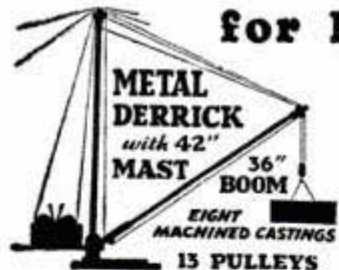
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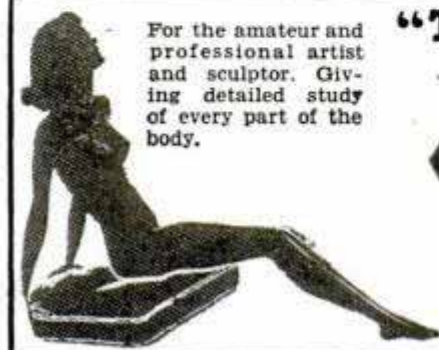


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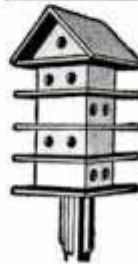
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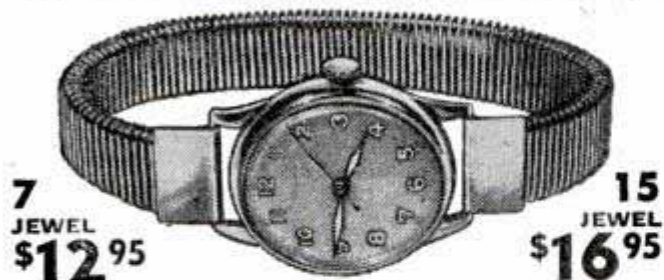
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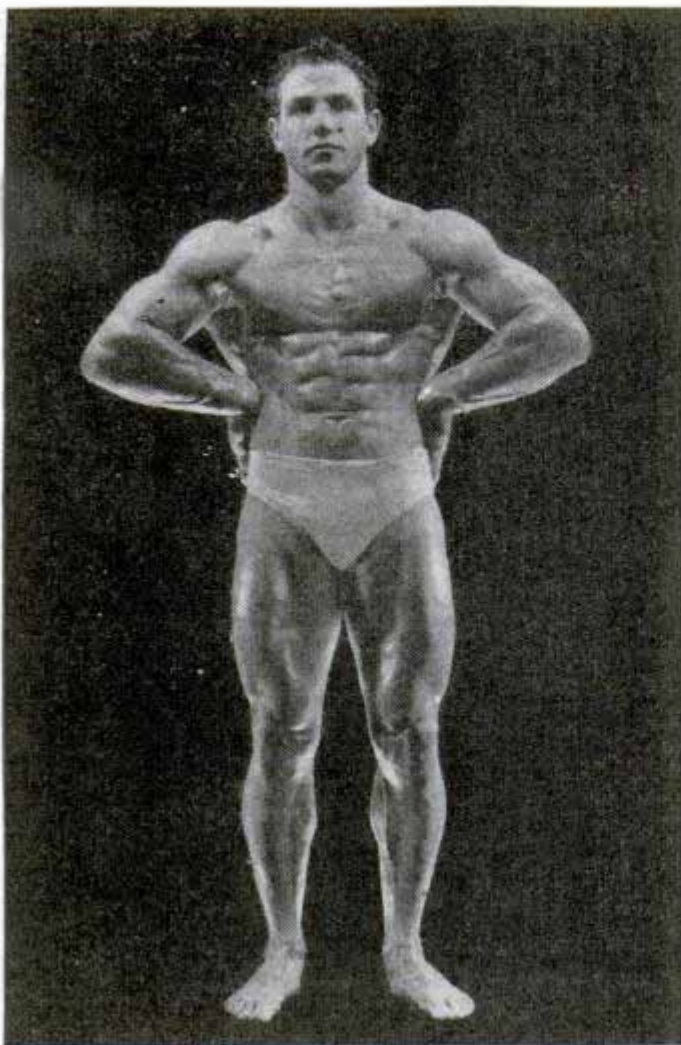
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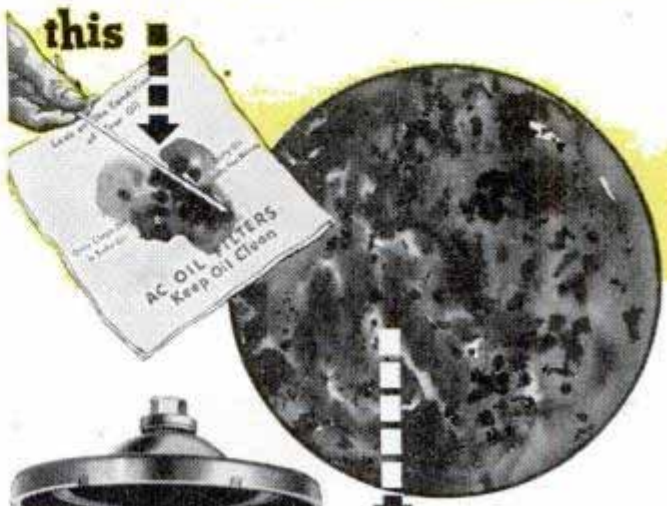
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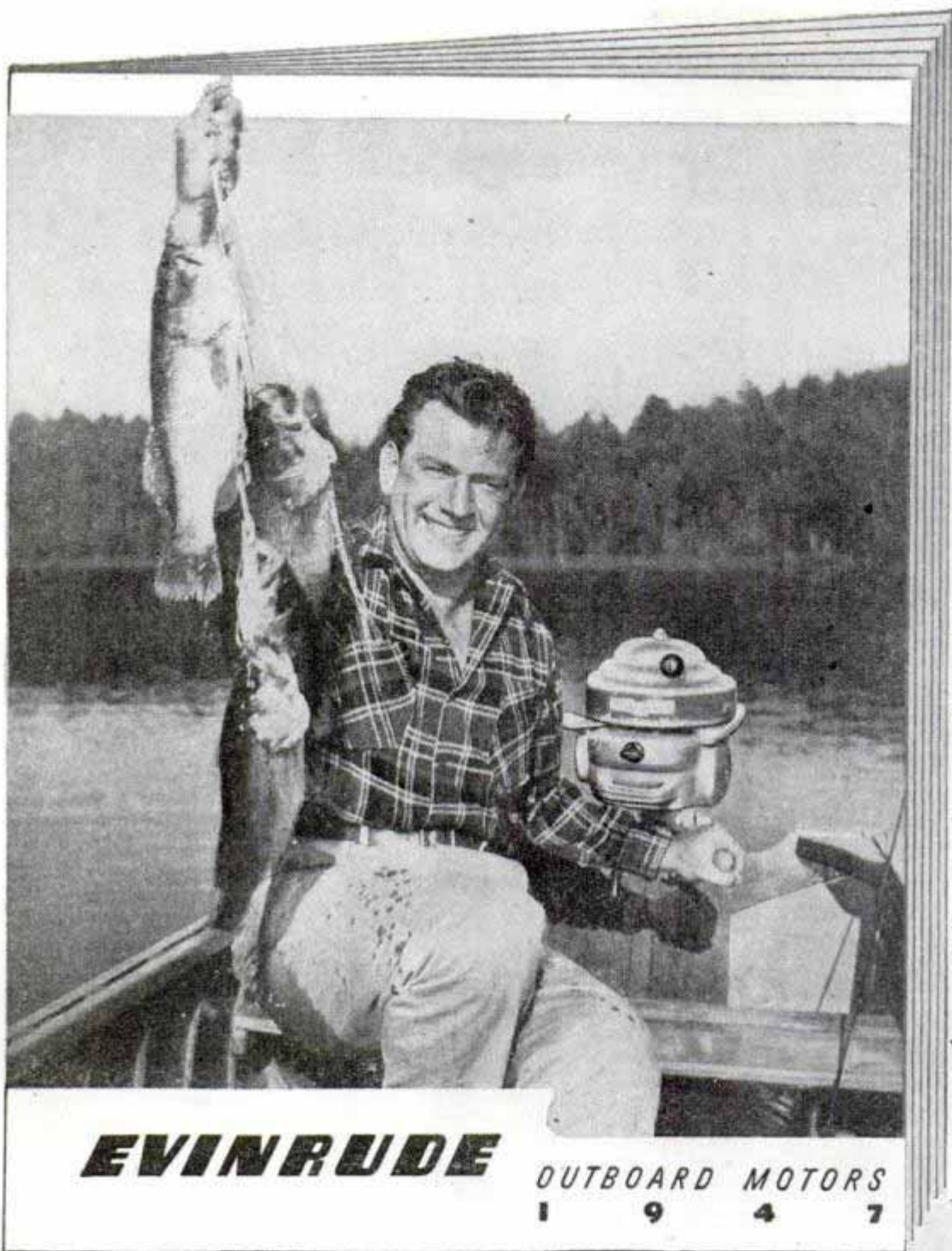
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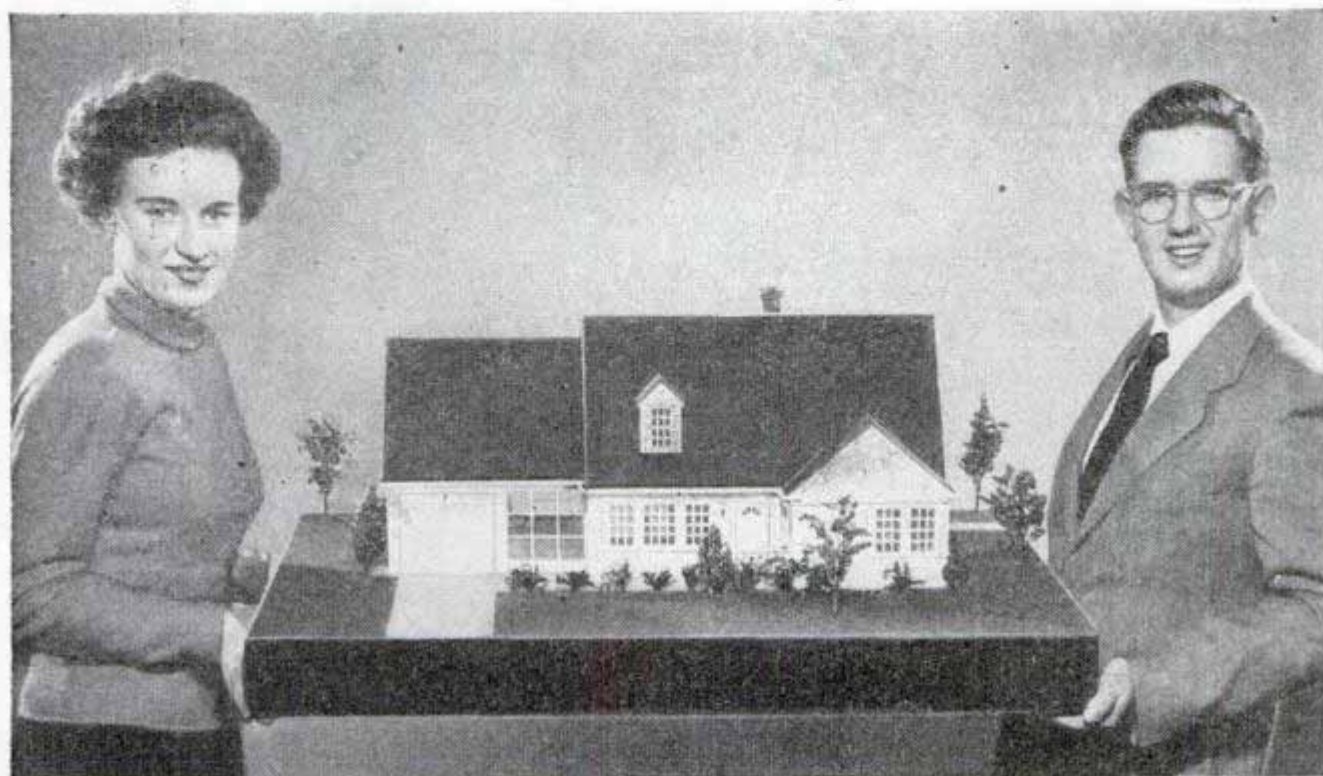
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The House That Jacques Built

WITH THE HELP OF POPULAR MECHANICS

On page 105 we begin the inspiring story of how Jacques Brownson, young veteran of Aurora, Ill., met the housing shortage the American way—with fine craftsmanship and determination. He built his own home, the home planned for the average family by Popular Mechanics Magazine. It is a home you will want to build yourself. The full-color article in this issue introduces what we regard as one of the most important editorial projects in the history of this magazine.

THE EDITORS

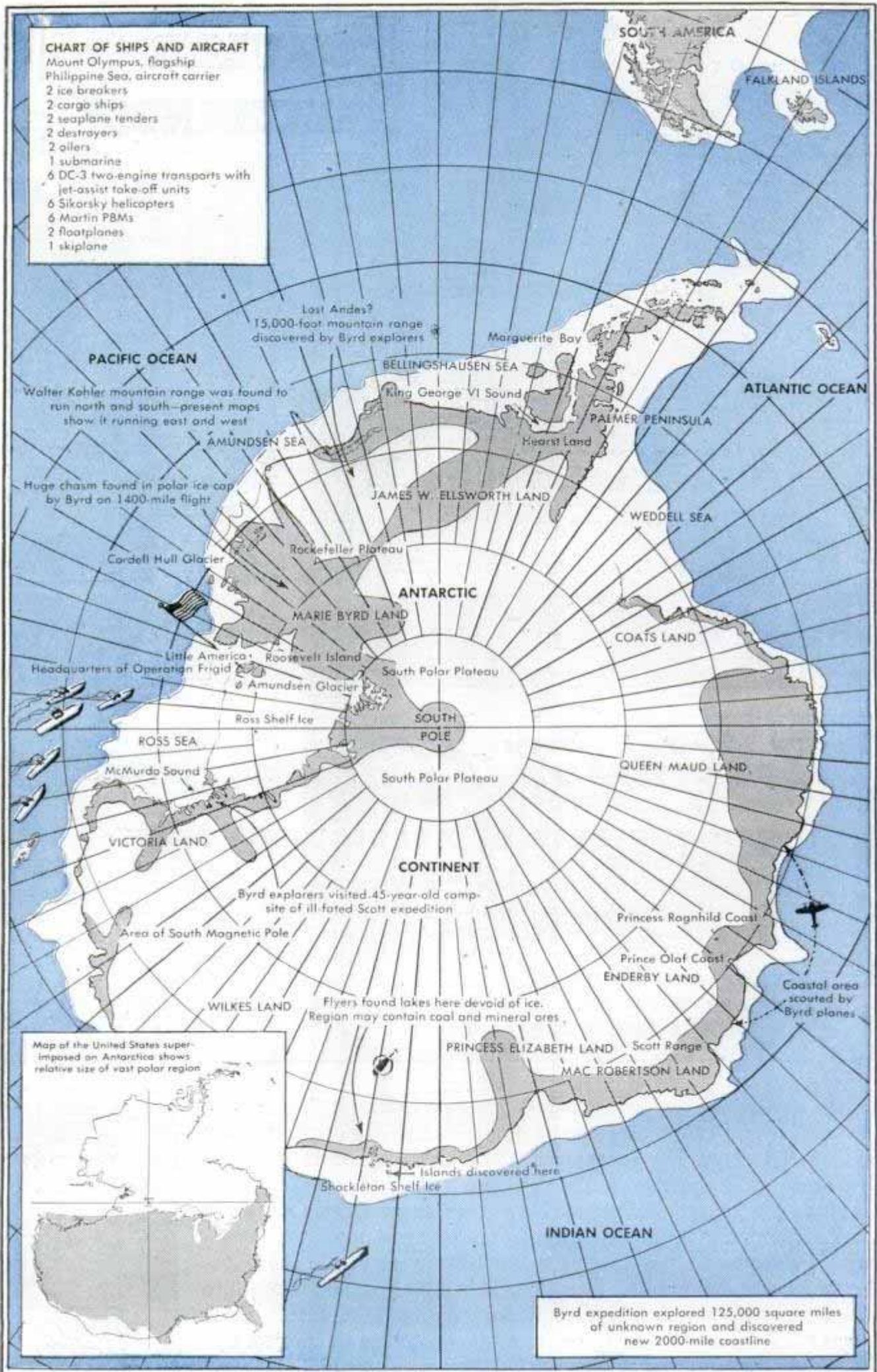
“The *Popular Mechanics* BUILD-IT-YOURSELF HOUSE strikes close to the heart of every American who has pounded a nail or put up a storm window. This attractive house is actually a blueprint for many a family’s dream. The entire project of designing the house, building it and keeping a careful record of materials and requirements, and then giving this information to the public, is a truly unique and important achievement. Presented at this time of acute housing shortage, the house should have an enthusiastic reception. This is a practical approach to one of our greatest national problems. As governor of the state in which it was built, I congratulate the editors who conceived the project and the man whose craftsmanship translated the dream house into reality.”



Dwight H. Green
GOVERNOR OF ILLINOIS

CHART OF SHIPS AND AIRCRAFT

- Mount Olympus, flagship
- Philippine Sea, aircraft carrier
- 2 ice breakers
- 2 cargo ships
- 2 seaplane tenders
- 2 destroyers
- 2 oilers
- 1 submarine
- 6 DC-3 two-engine transports with jet-assist take-off units
- 6 Sikorsky helicopters
- 6 Martin PBMs
- 2 floatplanes
- 1 skiplane





Crew member of icebreaker Northwind heaves a towline aboard the sub Sennet which was trapped by ice pack

REPORT from ANTARCTICA

By Tom Henry

(Correspondent with the Byrd expedition)

PART I

ABOARD the USS Mount Olympus (By Navy Radio)—The greatest exploring expedition in history is now at work on this planet's largest unknown territory—the six million square miles of land around the South Pole. Prior to this expedition science had more accurate maps of the moon than of this frigid land.

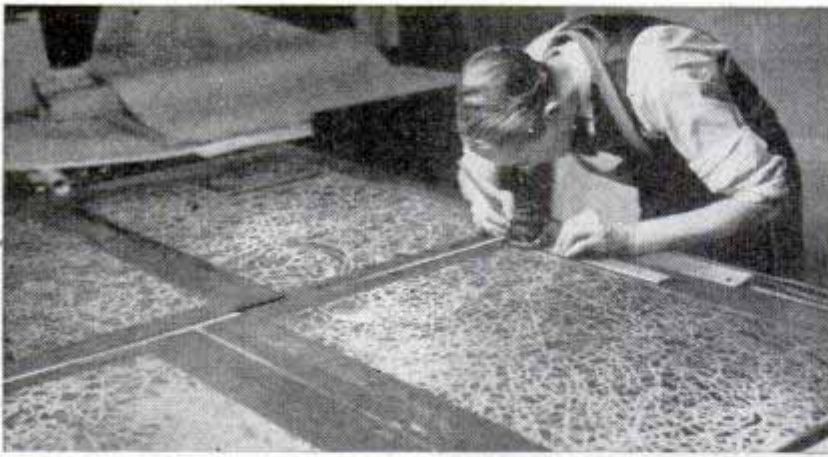
This is the first experiment in mass production exploration, as different from past laborious mile-by-mile progress beyond known frontiers as an old handicraft shop differs from a modern industrial plant. Thirteen Navy ships, numerous aircraft and 4000 men including a small regiment of photographers are engaged in outlining unknown coasts and mapping surface features of the trackless interior of the antarctic continent, most of which is a complete mystery. This lifeless land of everlasting ice, blizzards and cold has been by far the most difficult part of the world to penetrate. Few

have ever ventured beyond the towering blue walls which face the sea and constitute a nearly impassable barrier.

Out of the war came new exploration tools. Some of these were used in air operations to study enemy territory; others for plotting undersea conditions to combat

Left to right, Admirals Byrd, Sherman and Cruzen study explorers' "last frontier"—the bottom of the world



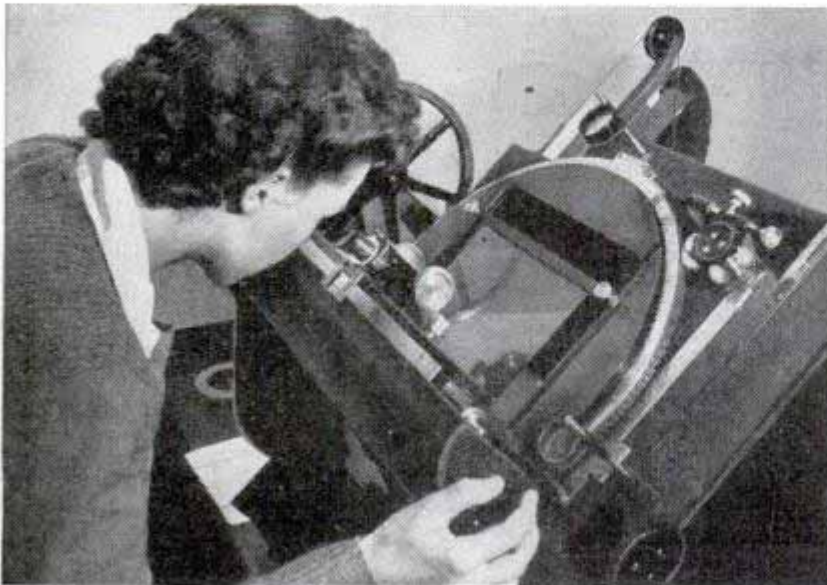


Four huge negatives, snapped by an aerial camera over adjacent regions, are assembled by a photo interpreter into a single large map



↑ Projectors in this 14-foot "bar" contain negatives taken from the air. Line-up represents plane's course when maps are made from photos

↓ Precision instrument checks finest measurements of negatives. The elevations of mountains can be determined within a couple of feet



submarines. Many of these now are converted to the peaceful purpose of increasing human knowledge under the direction of the veteran polar explorers, Admirals Richard E. Byrd and Richard H. Cruzen, both long familiar with the peculiar difficulties of the antarctic.

Their major tools are air reconnaissance and photo mapping. The techniques of these two military arts have been improved since they were used in actual war operations.

This is the biggest single photographic job yet attempted. The intention was to obtain a composite photograph of mountains and ice fields never before seen by man, thus accomplishing in a few weeks with few men what would have required several years' work by an army of surveyors, even in easily accessible country. A single plane with a battery of cameras can, under favorable conditions, photograph nearly 50,000 square miles in six hours—the approximate duration of a 750-mile round-trip flight. Ordinarily such pictures show only the outstanding features when taken from an altitude of about three miles, but a new technique makes it possible to get an accurate photograph of unknown terrain.

At least four cameras are mounted in each plane. One points straight down and two are mounted at angles of 30 degrees from horizontal, thus sweeping almost from horizon to horizon. The fourth camera photographs a clock and other recording devices. An automatic switch clicks all four cameras simultaneously several times a minute. The number depends on the plane's speed and altitude and the nature of the country below. Sometimes there is only a flat waste of whiteness for hundreds of miles, so that all pictures are indistinguishable duplicates. The timing is so arranged that each set of pictures overlaps the preceding set by 60 percent. Ordinarily, two planes fly parallel courses

60 miles apart and the photos are taken so that both overlap. All are sent to Washington for coordination by photo interpreters who assemble them into an enormous composite from which a map can be constructed. Cooperating with the cameras in each plane are various other instruments including one which makes a continuous altitude record above ice surfaces, operating by radio pulse echoes similar to radar. This system is much like mapping contours of the sea bottom by sound echoes.

Map making by these methods is the same in principle as the triangulation used by surveyors on the ground but has the advantage of producing a visual picture of the countryside. Sometimes minute details are shown even from great heights. It was found during the war, for example, that truck tracks across an open field are shown clearly by air photos long after any disturbance to the grass disappears to the naked eye. Photos taken in England recently from a three-mile altitude show Roman fortification lines across fields plowed for a thousand years. Photo interpretation, largely developed for use as military intelligence during the war, was credited with obtaining about 75 percent of all the knowledge of enemy movements and installations. When the war ended there were great refinements in progress that had never actually been used. They are now available for peacetime mapping of the antarctic wastes.

Antarctic photo mapping missions are hardly less perilous than war reconnaissance. Here there are no guides for pilots in trackless skies over trackless snow. Even the weather predictions are unreliable, due to the lack of data on conditions around the pole, where storms start. White cloud blankets wrap themselves around the plane, producing zero visibility almost without warning. No-

Twin-engine transport used by Admiral Byrd in flights over the polar region is lashed to the deck of the aircraft carrier Philippine Sea

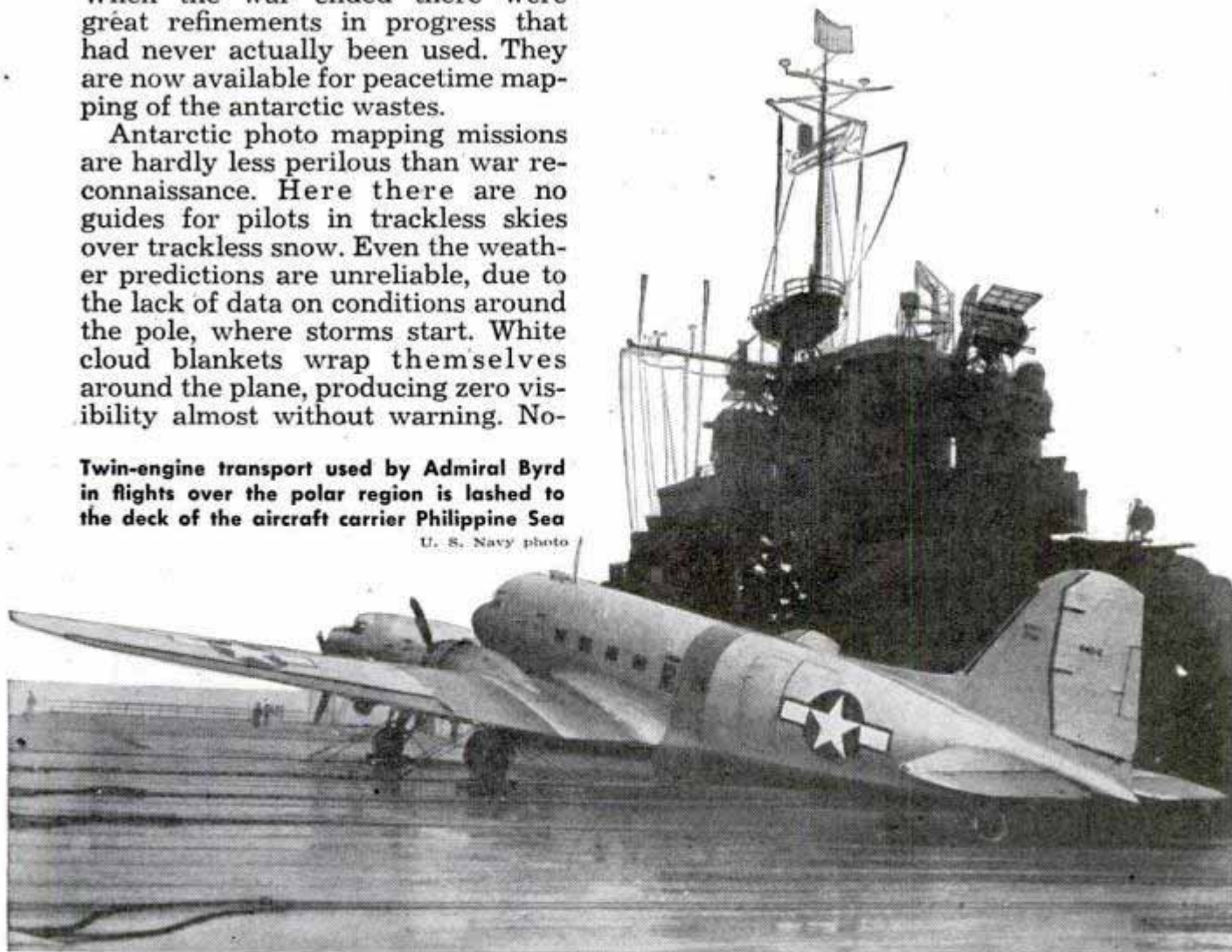
U. S. Navy photo

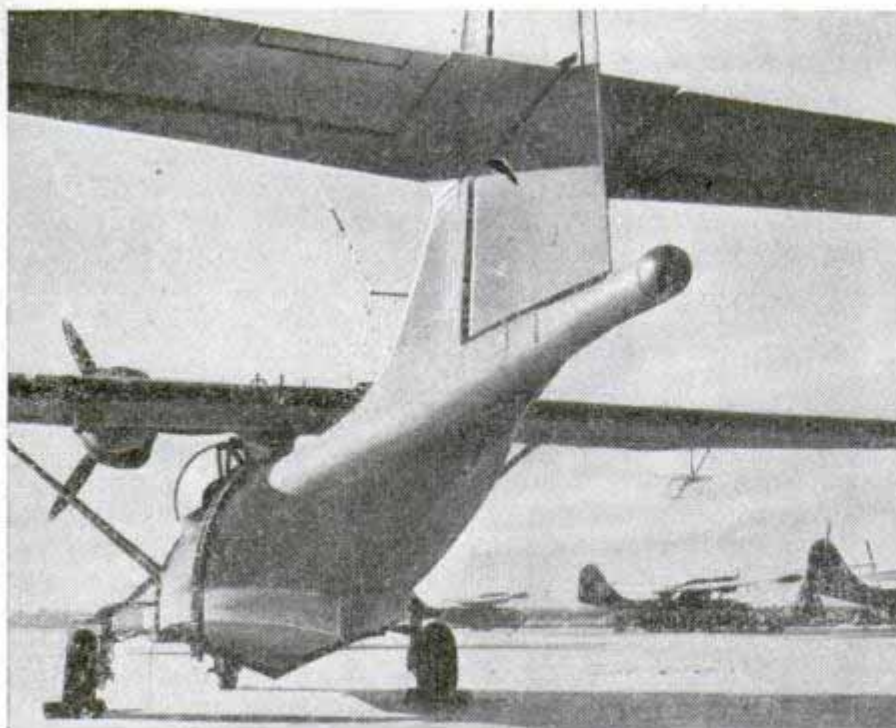
where else on earth do weather conditions change so suddenly.

The likelihood of completing a great composite picture during this brief polar summer declines each day. There is an average of only four or five days a month of good flying weather, and flights on bad days, with low white mist shrouding the ice surface, are both dangerous and useless for photography. The January and February schedule was badly delayed.

The expedition is divided into three groups, one skirting the continent eastward, another westward and the third entirely inland from the Bay of Whales, approximately on the international date line. During all January, eastern and western groups together were able to fly only about a dozen missions, and some of these without results, because of bad visibility. The greatest value of the work this year is expected to come from mistakes made and lessons learned that will guide future missions.

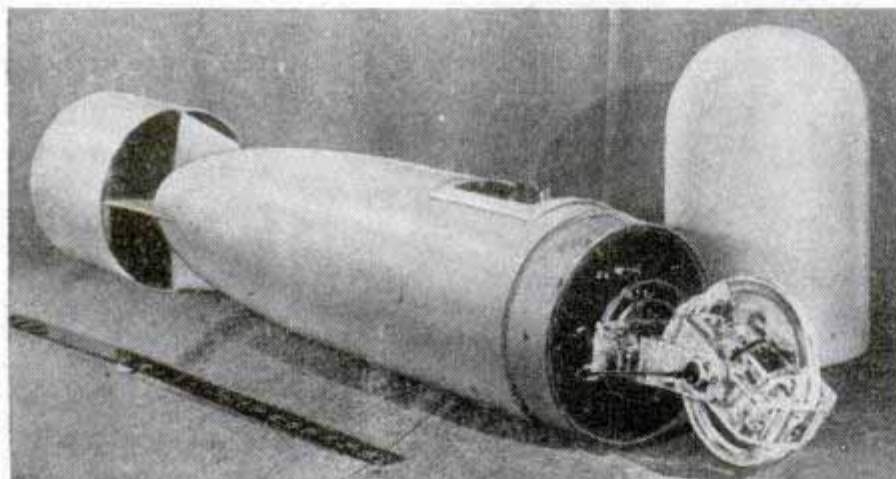
On the continent's threshold both eastern and western groups reported notable discoveries. Greatest to date is a mountain range about 150 miles south of the Amundsen Sea. The range appears, from preliminary observations, to be one of the highest in the world. Its average altitude for about





↑ Strange tail on this PB4Y houses the magnetometer, a war instrument that spotted subs, which now penetrates the ice cap to map the ground beneath.
↓ Magnetometer's intricate mechanism detects minerals through mile of ice

U. S. Navy photos



100 miles is 15,000 feet. This may be the long-sought "Lost Andes." A possible link in this range was found during one of the expedition's first flights on which one plane was lost with three members of the crew.

Considerable time was spent surveying the coastline west of the international date line. Parts of this coast were among the first sections of the continent seen almost simultaneously by the American Wilkes and the Frenchman Durville more than a century ago, but the region remains one of the least known in the world. No human ever has looked before on the all-white vastness reaching from the coast to the pole. The coastline surveyed to date for nearly 500 miles shows little resemblance to that on all antarctic maps. The difficulty has been that the land is usually buried in a low mist and seen only across the wide ice shelf from ships at sea. Visual illusions under those circumstances are probable.

is buried under an ice cap in most places a mile thick, an accumulation of a million winters. Only black crests of high mountain ranges protrude from the great "white desert." Hence all the land surface features, such as plains, hills and valleys, are unknown, but they are being explored by this expedition with an air-carried instrument which "starts where radar leaves off." This is the magnetometer, developed for detecting submarines during the war. Until recently a military secret, the magnetometer promises to be one of the greatest aids for rapid exploration ever developed. It has already proved valuable in locating oil reservoirs in the United States. Operated by Doctor James R. Basely of the Geological Survey, the instrument makes a magnetic map of the country traversed by the plane. It has extreme sensitivity for any magnetic materials below the ice, especially iron,

(Continued to page 276)

Although low mountains are found near the sea, most of the territory known as Wilkes Land appears to be a flat plateau of about 6000 feet elevation for at least 200 miles from the coast. The work of camera explorers was handicapped from the start by bad weather with poor visibility.

The topographical observations reported here are only preliminary, taken from verbal descriptions of what pilots saw. All photographs were sent to Washington for the Navy's expert analysis and interpretation of ground features.

Besides map makers, groups of government scientists are on the expedition to investigate in finer detail antarctic phenomena in fields of magnetism, wild life, geology and electrical disturbances. Their efforts have been handicapped by the brief summer, with unfavorable weather for field parties across the ice barrier. Life here is filled with almost constant bafflement, as is inevitable in a land of strange paradoxes, where often nature's laws seem to act in reverse.

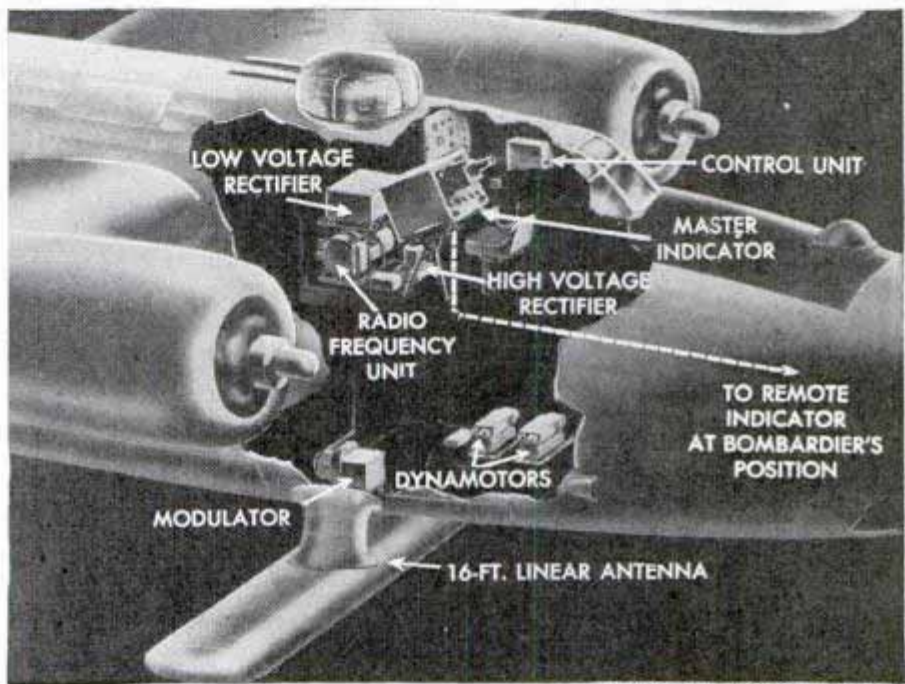
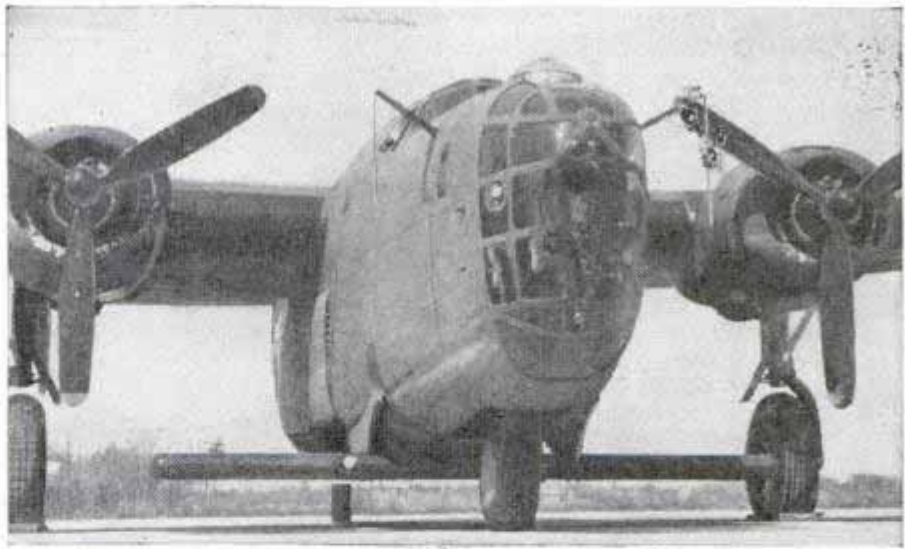
The antarctic continent

Bombing by Radar Rivals 'Eye' Method

Blind bombing results at night with the Eagle radar system are nearly as good as those scored on visual targets, according to the Army Air Forces. The unique feature of the system is a 16-foot linear antenna which gives exceptionally sharp detail to images on the radar scope. With it bombardiers operating in complete darkness and through heavy overcast can distinguish specific objects from the surrounding terrain and drop bombs with precision. There are 250 tiny individual antenna spaces along the 16-foot framework, which is carried in a vane or wing beneath the fuselage and parallel with the plane's wing.

New Atomic Bomb May Use Hydrogen

Are American scientists working on a new kind of atomic bomb? Physicists best informed on this subject won't say, but a recent article in the *Infantry Journal* by former Assistant Secretary of War John J. McCloy has created a lot of conjecture. McCloy's hint of a new type of atom bomb raises this possibility: Research work may be under way to convert hydrogen into helium and release atomic energy, simulating the process which presumably takes place in the sun. Conversion of hydrogen into atomic energy would have tremendous significance, for hydrogen is very abundant whereas uranium and thorium, atomic-bomb raw materials, are scarce.



Air Materiel Command photos



Sanding Tool With Long Handle Used for Hard-to-Reach Spots

Sanding wood or metal surfaces is simplified with a tool equipped with a handle and a flat surface around which sandpaper or emery cloth is wrapped. Available in three sizes, the sander is useful for smoothing large areas and hard-to-reach spots. It is handy for carpenters, painters, cabinetmakers, workshop hobbyists and others.

ⓁDry cell batteries developed during the war for arctic regions produce electrical energy in frigid temperatures as low as 40 degrees below zero, whereas ordinary ammonium chloride dry cells cease functioning at four degrees below zero.



A HOUSEHOLD appliance manufacturer recently suggested to a group of college engineering students that they try to improve a modern electric kitchen mixer. What happened then surprised him; soon he had a dozen mixers awaiting inspection and all of them had new features. One, a combination mixer and grinder only seven inches high, performed 19 different kitchen food-preparation jobs.

The ideas came from a unique class in California Institute of Technology's School of Industrial Design. Students there are constantly trying to find ways to improve familiar products and processes. One, Dick Spencer, tried putting a small headlight on an electric iron. Housewives liked the idea and bought the iron. Another, Herman Heidt, designed a chair that saves furniture manufacturers sizable amounts in shipping costs. Heidt's chair can be shipped flat and then assembled in 30 seconds simply by tightening two screws.

The story of the electric mixer is typical of the way the class functions. When the manufacturer suggested the subject, the students first made surveys among house-

In Cal Tech's School of Industrial Design, top, students study chair model and then try to improve it. Above, School Director J. Paul Youtz looks over student Herman Heidt's idea of something new in chairs



In a Jap prison hospital, Harry T. Petterson made surgical tools of scrap. Now he designs home appliances

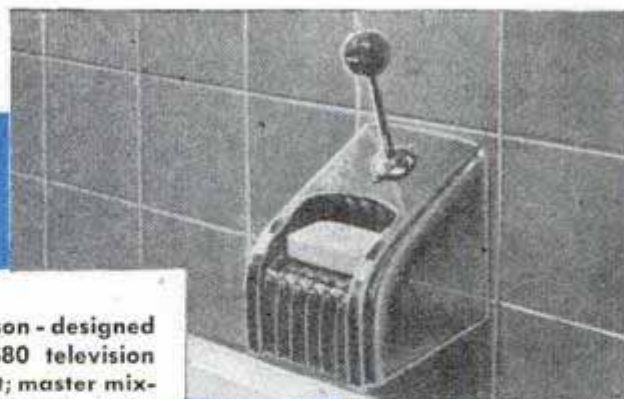
wives who used mixers. Then they studied potential markets, cost of making the machines and availability of necessary materials. By the time they incorporated their ideas in pilot models they had produced mixers which would suit the users and which could be manufactured profitably. Then a whole group of appliance manufacturers met with the students to consider and criticize the new designs.

Among the students is Harry T. Petterson whose mechanical genius while a prisoner of the Japanese in Shinagawa hospital saved the lives of American fellow prisoners. The story of how Petterson made intricate surgical instruments from scrap

metal was told in the March 1946 issue of *Popular Mechanics*.

It was Petterson's electric mixer that performed 19 different jobs. He decided that motors in present mixers do not do enough work to justify their expense. His new model shreds, grates, crumbs, slices, cuts shoestring potatoes, grinds meat, coffee or nuts, crushes ice, extracts vegetable juices and mixes in any size or shape container. Also it is detachable from its holder and can be used in any position.

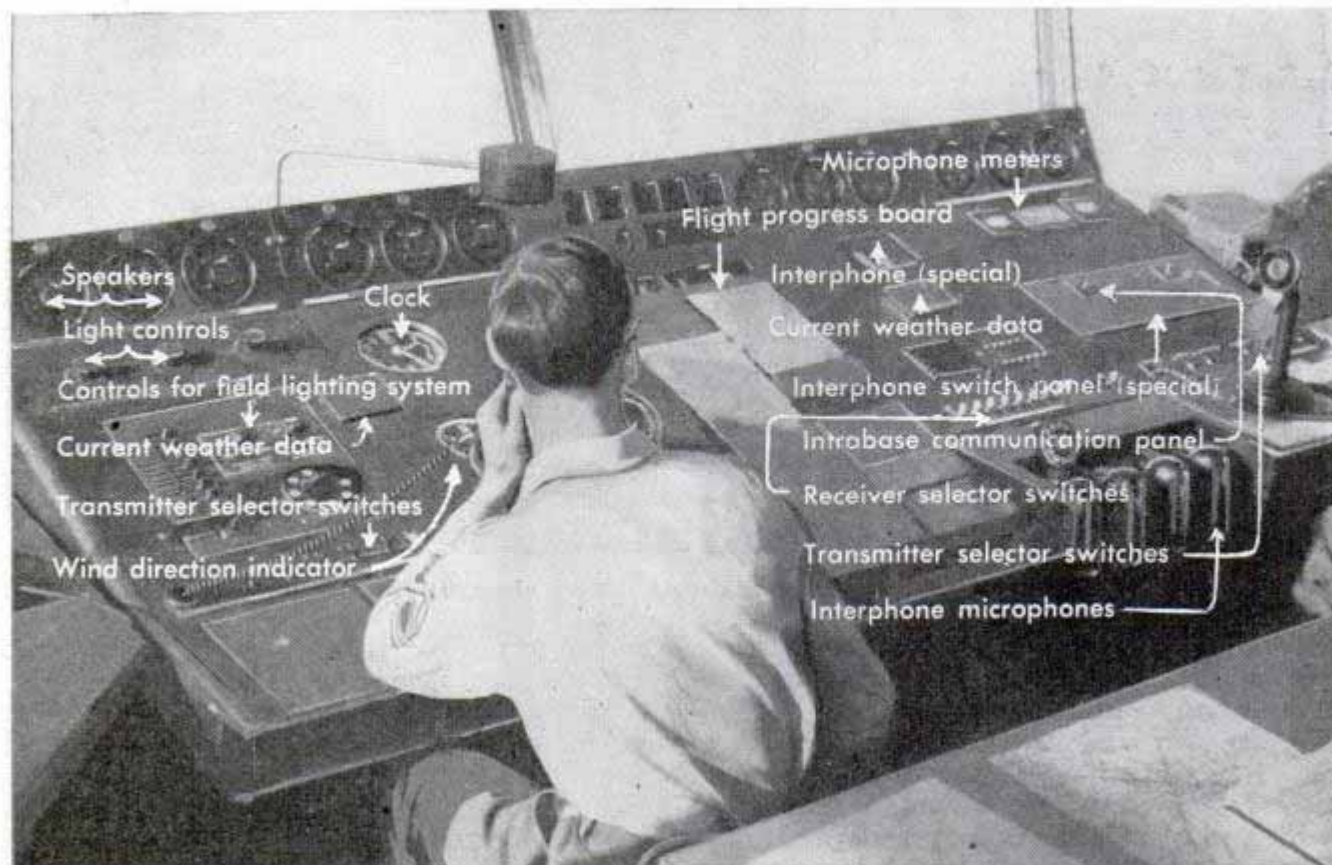
There are 21 students in Cal Tech's design class now. Director J. Paul Youtz is confident that they will come up with still more ideas valuable in modern living.



Among Petterson - designed appliances is \$80 television receiver, top left; master mixing valve for shower, right; and combination electric mixer and grinder, below, which does 19 different food-preparation jobs for a housewife



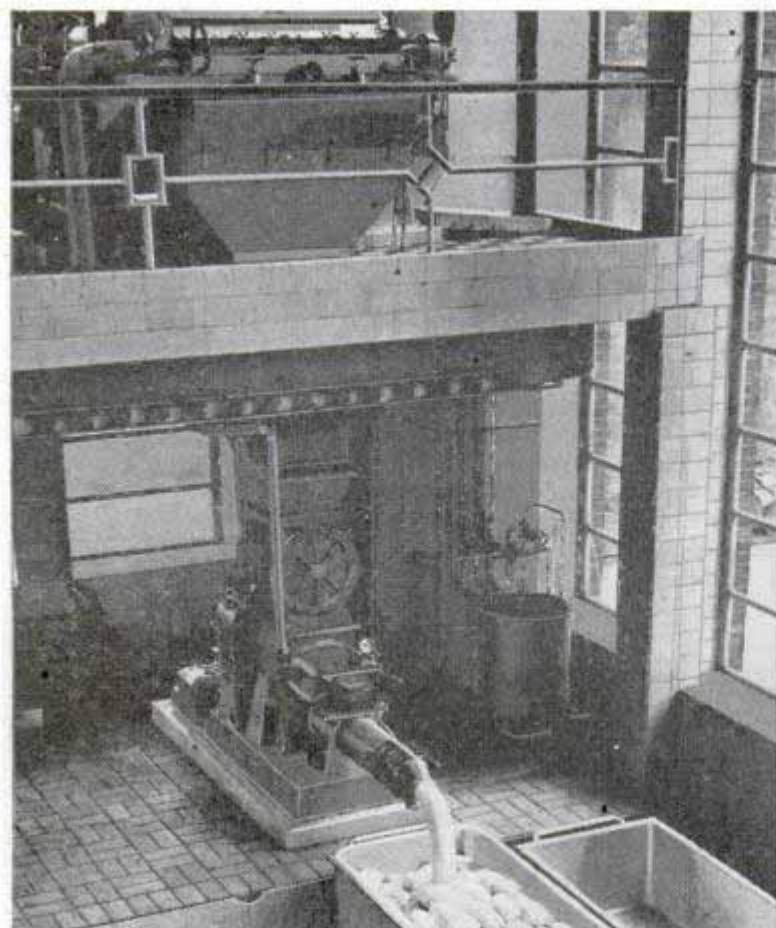
One Man Operates 'Nerve Center' to Control Air Traffic



Army Air Forces photo

All the facilities needed to control air traffic, now scattered throughout the tower, are combined in a one-man console being tested at Langley Field. It has a unit that permanently records on plastic tape

all messages sent and received. Complete flight plans, instrument and contact flight records and the latest weather information are displayed prominently in the center of the panel, readily accessible to the operator.



Ersatz Butter From Coal Helps Feed Germans

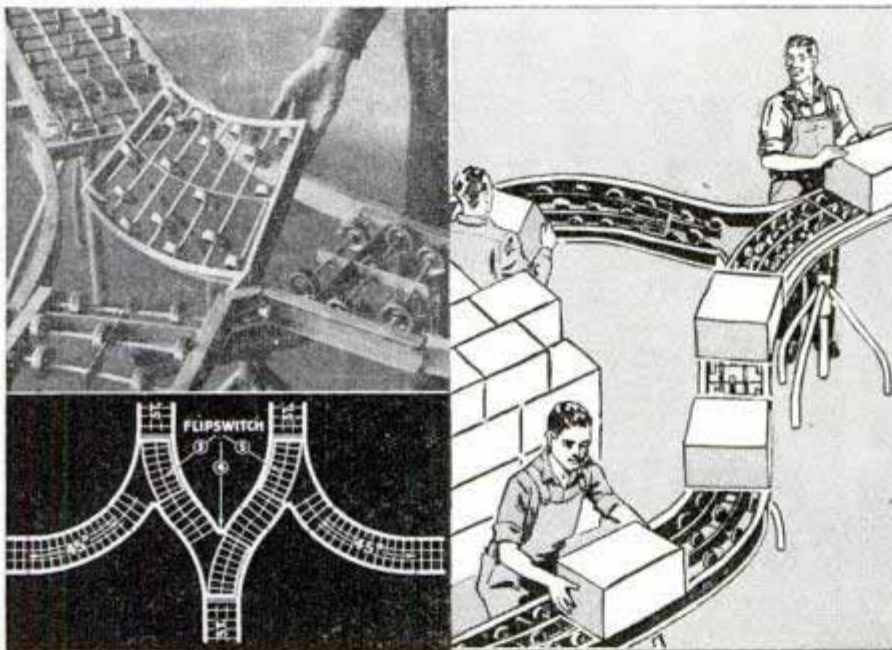
Butter can be produced from coal in a factory at Witten, Germany. In the process, developed by Dr. Arthur Imhausen, coal is transformed into coke which yields a synthetic paraffin. Edible fat produced from the paraffin is flavored and colored and vitamin A is added. The butter is squeezed out in sausage-like rolls by a machine. Capacity of the factory is 23,000 tons of butter per year.

Spray Removes 'Bad' Fruit

Undesirable fruit can be prevented from growing by a special chemical spray which takes the place of picking by hand. The spray, developed by B. F. Goodrich Chemical Company, is applied two weeks after trees are in full bloom. By removing excessive fruit before harvest, a larger and healthier crop is produced. The spray is not harmful to trees.

6500-Pound Drag 'Shaves' Steep Bank

Irrigation ditches up to 18 feet deep are cleaned by a power-controlled ditcher built by Owen L. Gregerson for use on his ranch near Gunnison, Utah. The machine weighs 6500 pounds and will function on canal banks as steep as 60 degrees or in canals up to 5½ feet deep. Pulled behind a Caterpillar Diesel tractor, it cleans up to three miles of ditch daily.



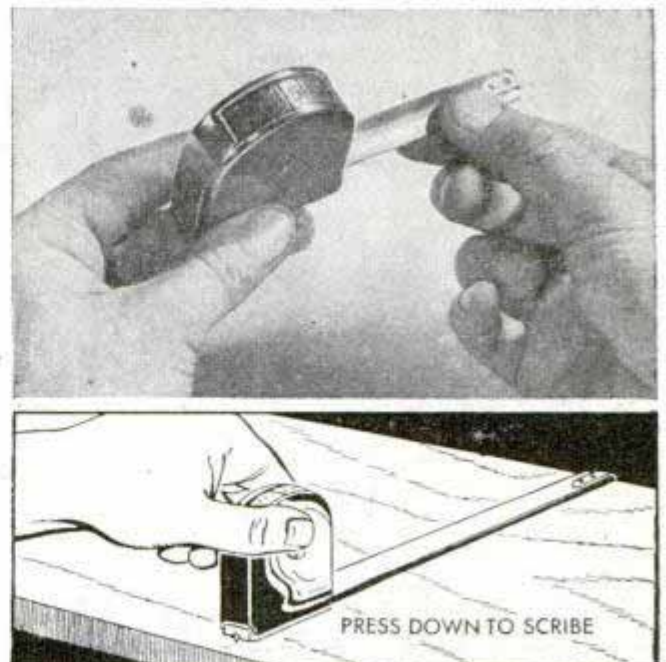
Conveyor Switch

Materials being loaded or unloaded can be shunted in either direction over a "Y" switch for conveyor systems. Mounted at the throat of the Y, the manually operated switch can be flipped over to divert goods from one direction to another. This permits loading or unloading from both sides of a freight car or a double flow of materials into warehouses. The Y branches off at 45-degree angles and, when combined with other switches, can deliver goods around corners.

Dial on Metal Tape Rule Holder Shows Accurate Measurements

Measurements are read through the plastic window of a metal tape rule that also can be used as a scribe. The measurement from the outer edge of the rule's case to the end of the tape appears beneath a hairline marked in the window. A scribe on the bottom of the instrument is housed inside the case when not in use, but will protrude when slight pressure is applied, marking the desired measurement. A felt wiping pad cleans the tape whenever it is used and the heavy case has a chrome finish both inside and out.

Ⓛ Pentolite, the superexplosive which gave the bazooka its armor-piercing power, has been applied to the oil-well-casing perforator to increase the flow of oil.

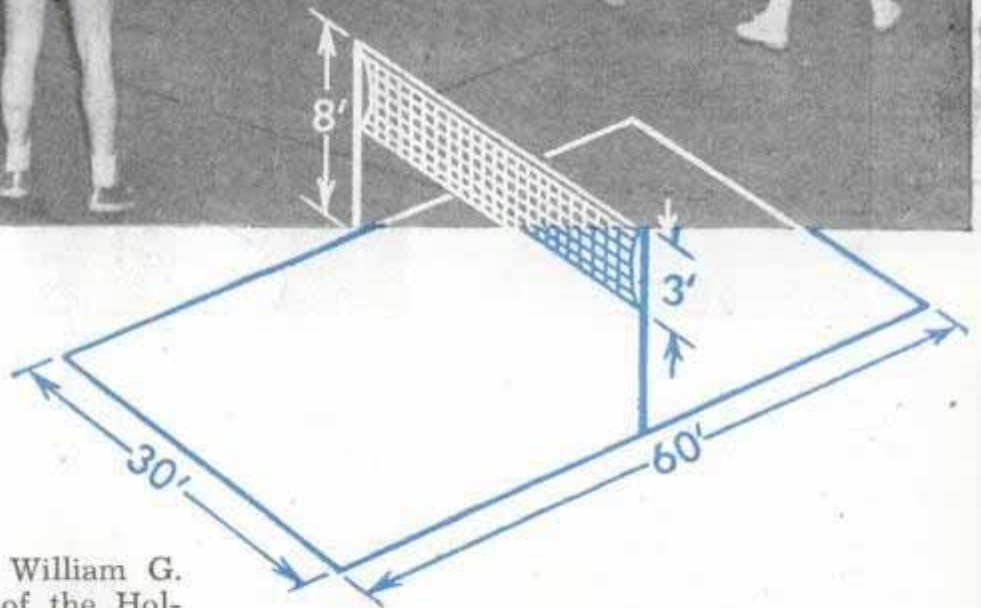


WHO SAYS IT'S A SISSY



Modern volleyball is a slam-bang game for speedy, leaping giants

By Harry Wilson
National Volleyball Referee



IN THE WINTER of 1895, William G. Morgan, physical director of the Holyoke, Mass., YMCA, invented volleyball for a group of businessmen who lacked the stamina to play basketball.

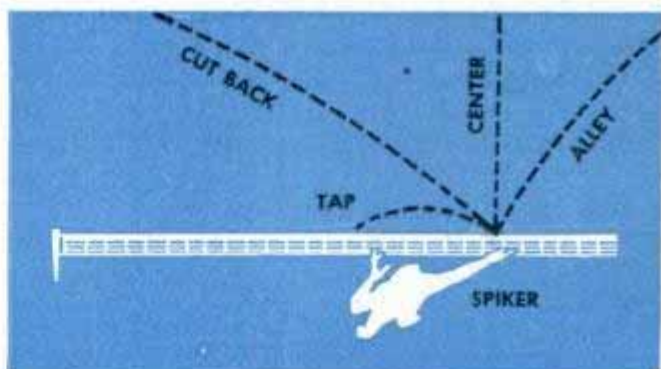
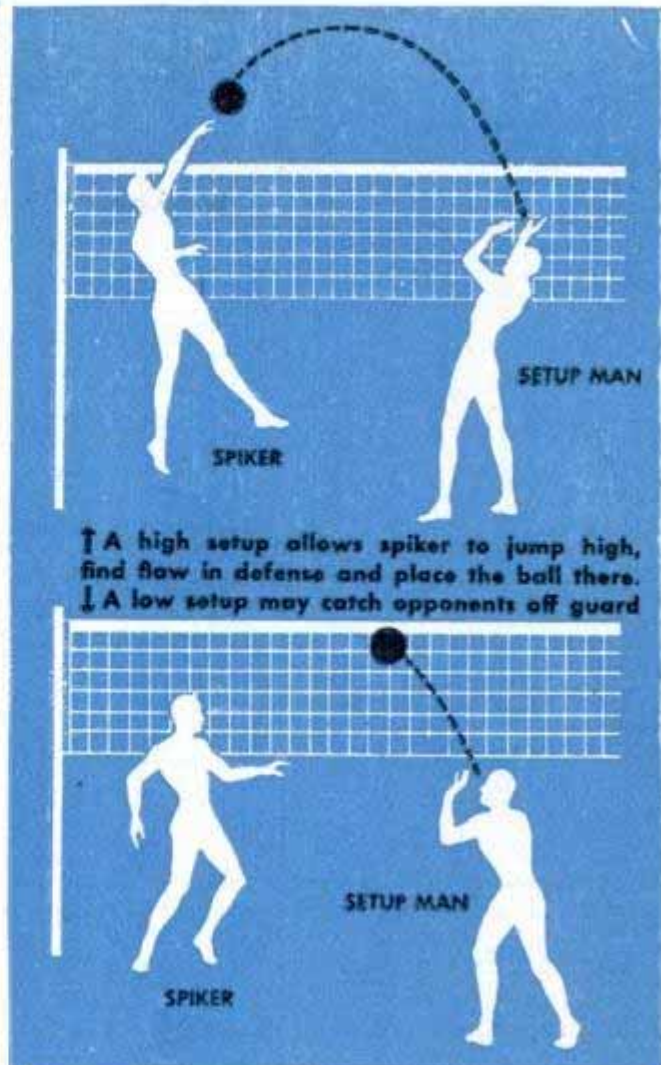
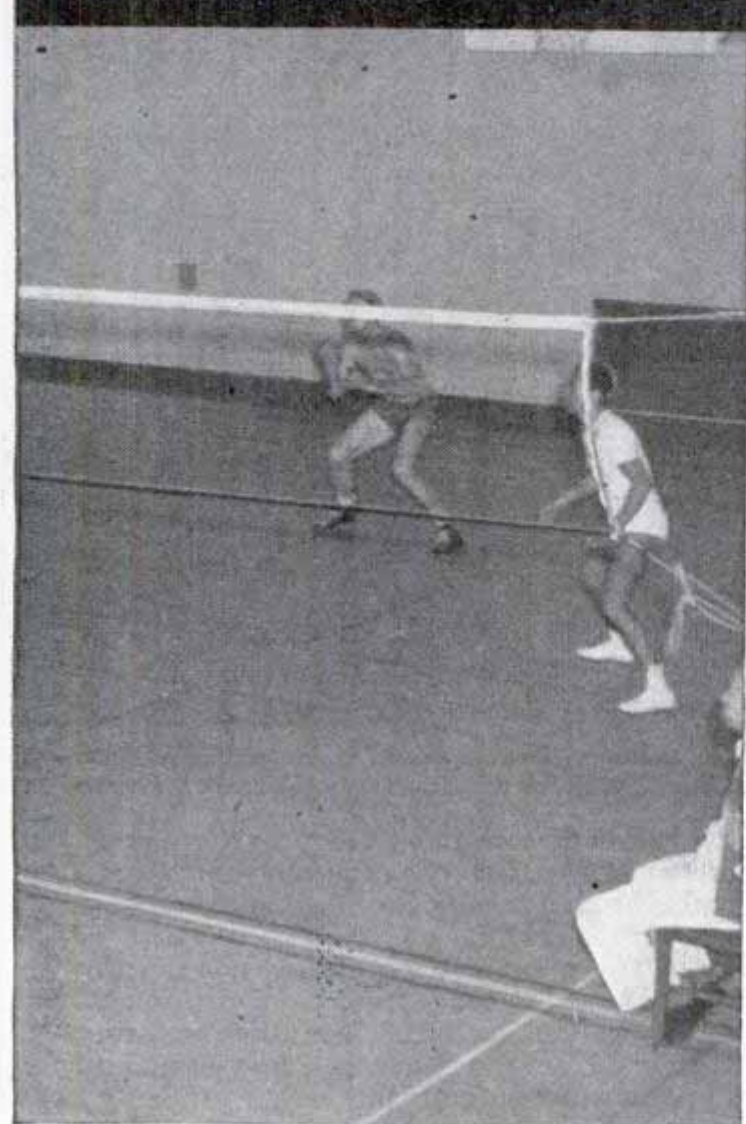
He raised a tennis net as high as a man's head and provided an old basketball bladder for the class to bat around. However, it proved too light. Morgan, therefore, asked A. G. Spalding & Brothers to design a ball especially for the new game. Spalding did—and essentially the same type is used today.

Even though the ball is similar, the game itself has undergone radical changes. It's no longer merely a refuge for tired busi-

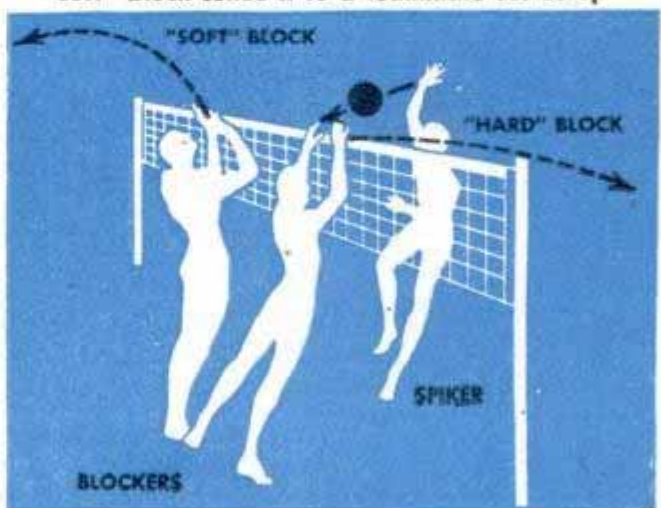
nessmen or high school girls. Volleyball today is a rough, tough game that frequently results in broken noses, black eyes, smashed collarbones, sprained ankles, twisted tendons and pulled muscles. It has been a long time since anyone who knows this sport called it a "sissy" game.

Volleyball, as played by champions, requires players in tip-top physical condition and teams with split-second coordination. The present-day game combines the teamwork of football, the jumping and ball handling of basketball, the arm movements

GAME?



↑ Spiker has choice of four shots; the alley, center, cut-back or the change-of-pace tap.
 ↓ "Hard" block sends ball back to spiker's court; "soft" block sends it to a teammate for setup

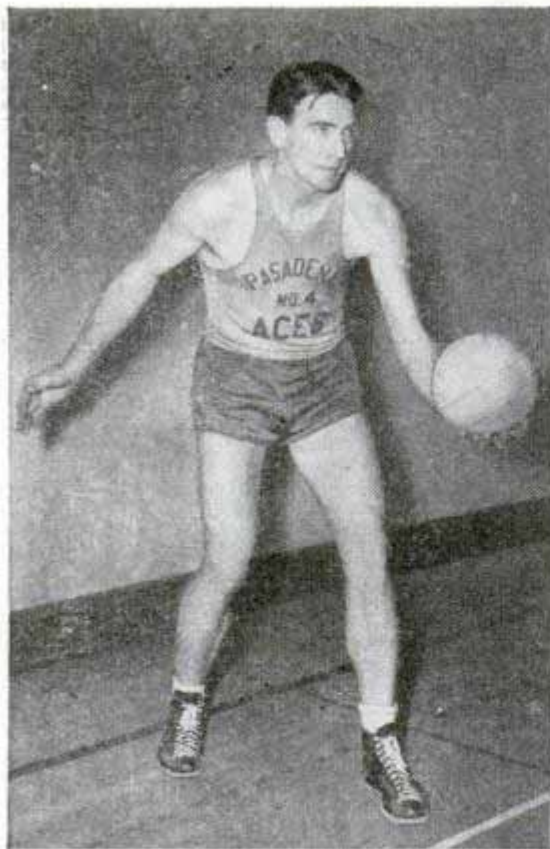


of handball and the placement of shots as in a tennis match between top-notch players.

World War II gave volleyball a shot in the arm. It was simple to toss a deflated ball and a rolled-up net in the back of a jeep or a sea bag. As a result, the game was played on the deserts of North Africa, in the bomber hangars of England and on the coral beaches of Guam and Okinawa.

Volleyball is a fast-growing sport, played by an estimated 4,000,000 players and finding favor with college, athletic club and commercial teams. It is most popular in California, Illinois, Michigan, Pennsylvania and Texas. Tournaments were in progress all winter and will be climaxed by the United States Volleyball Association Open Tournament at Houston, Tex., next month.

The national champions who will defend their title are the Pasadena, Calif., YMCA team. Members are Webb Caldwell, former All-American basketball center; Jim Ward, former college track star; Everett and Glen Keller, Bernard Holtzman and Paul Siano. This sextet is coached by Ira "Red" Swett.



Underhand serve (left) and overhand serve (center) are demonstrated by Webb Caldwell of the Pasadena Aces. At right, Manuel Saenz, setup man for the Los Angeles Athletic Club, shows the correct way to receive the ball

Let's see how the experts play volleyball. The standard pattern of play is (1) serve, (2) pass, (3) setup, (4) kill, and (5) block. This has developed from a gentle, ping-pong style of play to a highly skilled, closely coordinated, smashing game.

(1) The serve: As in tennis, the serve puts the ball in play. For many years the object was merely to swat the ball across the net. But today expert teams give consideration to placement of the ball and to making it curve or drop.

The first type of serve is the underhand. This service is usually taught beginners. The ball is held in the left hand, waist high, and batted with the right in a sweeping, underhand motion as if you were pitching a softball. It may be hit either with the open palm or the fist.

Among certain players, however, the "roundhouse" serve is more popular. The server tosses the ball over his head (as in tennis) and strikes it hard with a sweeping overhand motion. This serve is more difficult than the underhand, but a skillful player uses it for speed and deception.

The third, or overhand, serve is a collection of baffling serves. These include a "floater" in which the ball does not spin; a side-arm swipe; a push-ball serve in which

the ball is thrown in a shot-put action, and the Statue of Liberty serve in which the ball is held high with the left hand and batted with the right.

(2) The pass: You bat the ball or tap it. If you hold it even a fraction of a second, the referee calls a foul. The ball, therefore, is played from the finger tips. As you make 10-point contact with the ball, your body acts as a huge shock absorber and you take

Harry Wilson, the author, uses these signals to "call" volleyball



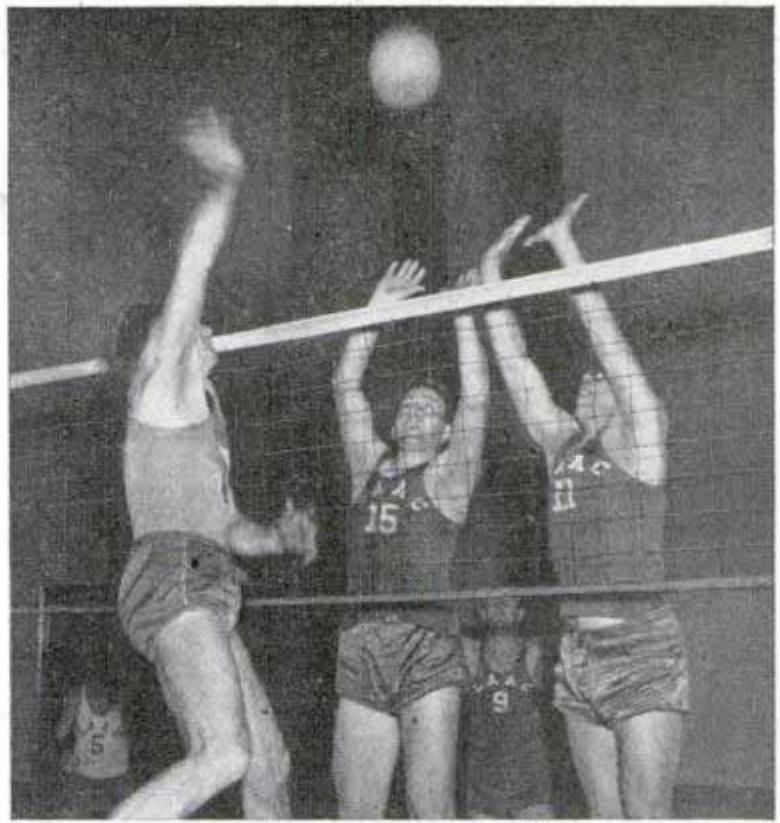
the impact with fingers, wrists, arms, shoulders and knees. But immediately you apply power in the opposite direction and pass the ball to a teammate.

When handling the ball, your thumbs should be several inches apart, elbows out and fingers spread. In passing to a fellow player, it is preferable to feed him a high, looping pass. It is easier to handle than a low ball.

(3) The setup: Closely allied with the pass is the setup. Each team possesses three setup players; their job is to put the ball into position for the three "spikers." The setup man receives the ball from the back court and tosses it high alongside the net so that one of the spikers can smash it into the opposing court.

There are two main types of setups. A high setup is one in which the ball is placed about 15 feet above the court and falls to within 6 to 24 inches of the net. A low setup is where the ball is placed only a few feet above the net, giving the opposition less time to get set before the spike.

(4) The spike: The spike, or kill, is the most spectacular part of volleyball. One of the spikers—usually a tall man—leaps high into the air at the net and with a powerful overhand sweep tries to smash the ball into the opponent's court. Getting hit by a hard spiked ball often causes broken noses or black eyes.

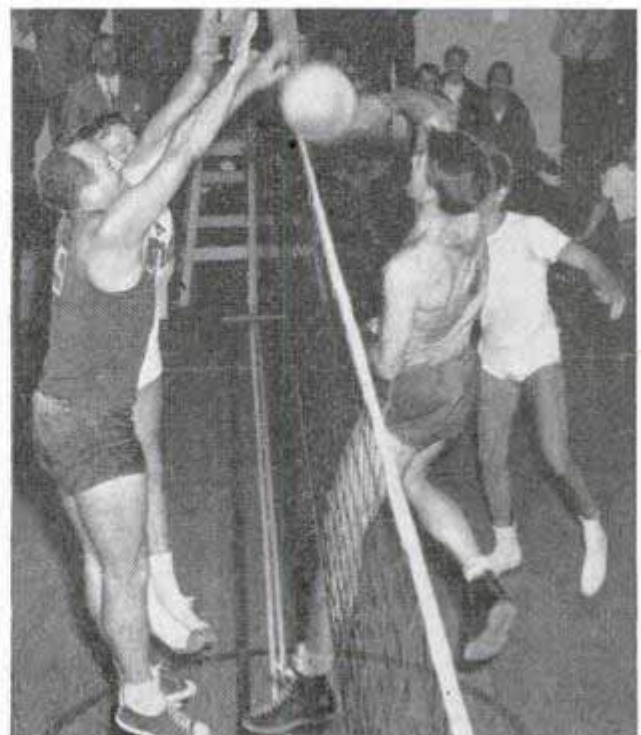


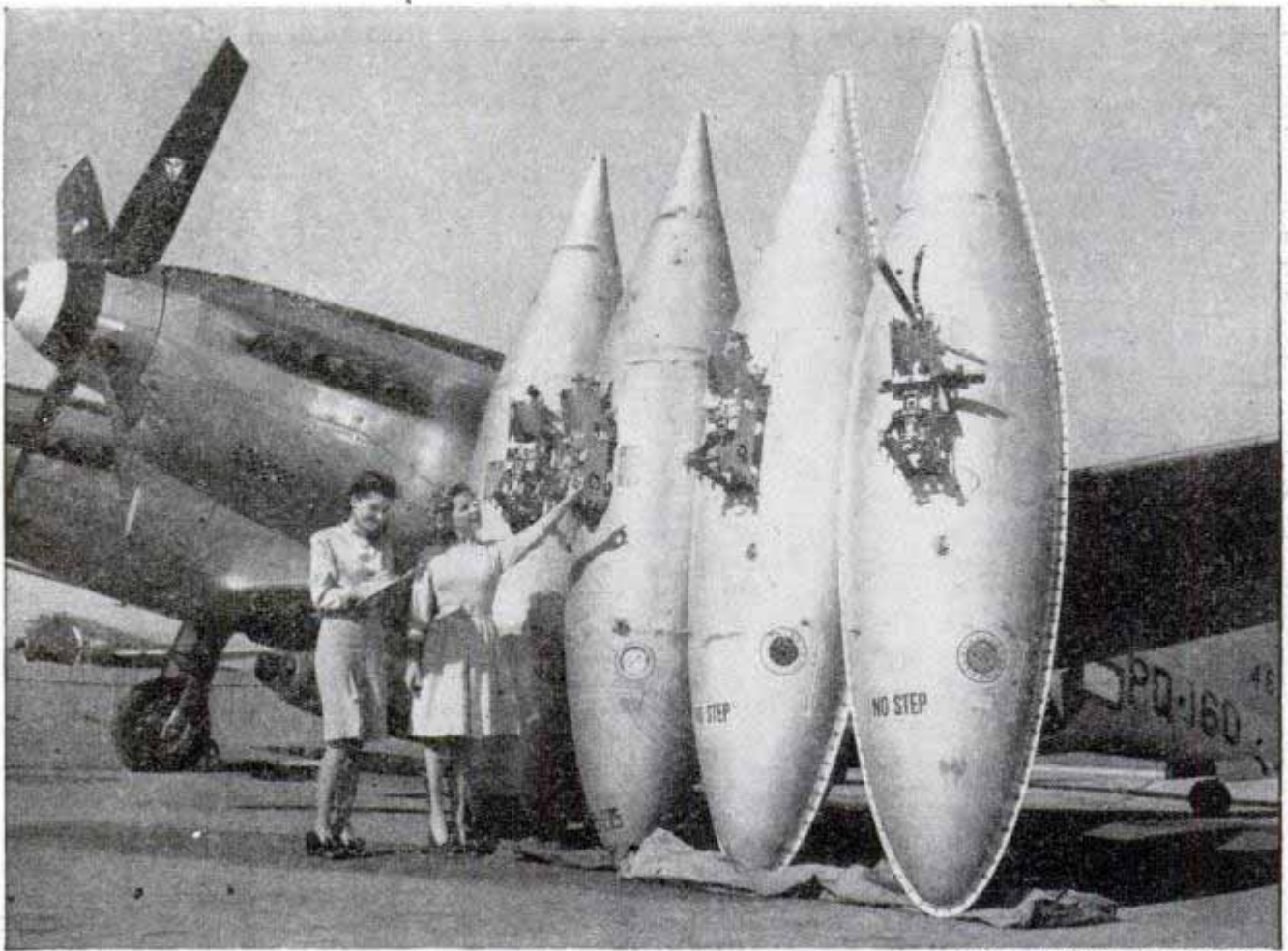
Players at right put up a "block" defense to return sizzling smash

Spikers use different techniques, but the two important factors are placement and power. The ball is hit with the arm slightly bent at the elbow. The whiplike motion of the hand and wrist gives the ball a powerful impetus. Some players hit with the open hand for better control; others hit with the heel of the hand and wrist for greater power. The spiker has four possible shots—an alley shot into the far right-hand court, a

(Continued to page 272)

Player at right (in left photo) delivers a smashing "spike." If the spiker's foot goes across the white line (right), or if blocker touches the net, the referee calls a foul. Volleyball players call fouls on themselves also





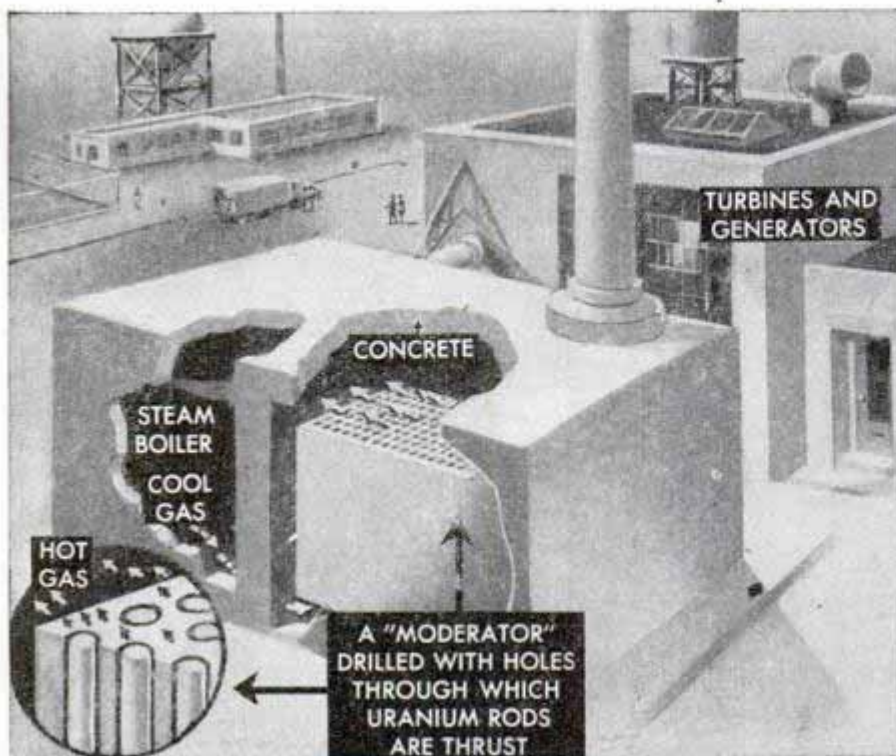
North American Aviation photo

5000-Mile Fighter Carries Largest Droppable Tanks

Four extra 310-gallon droppable gas tanks, largest ever carried by a fighter, made possible the record nonstop flight of an Army P-82 from Honolulu to New York.

It covered the 5051 miles in 14 hours and 33 minutes. The plane was built by joining two P-51 Mustangs, each with a pilot and separate controls, by a single wing section.

Uranium Rods Will Feed Rayproof Atomic Power Plant at Oak Ridge

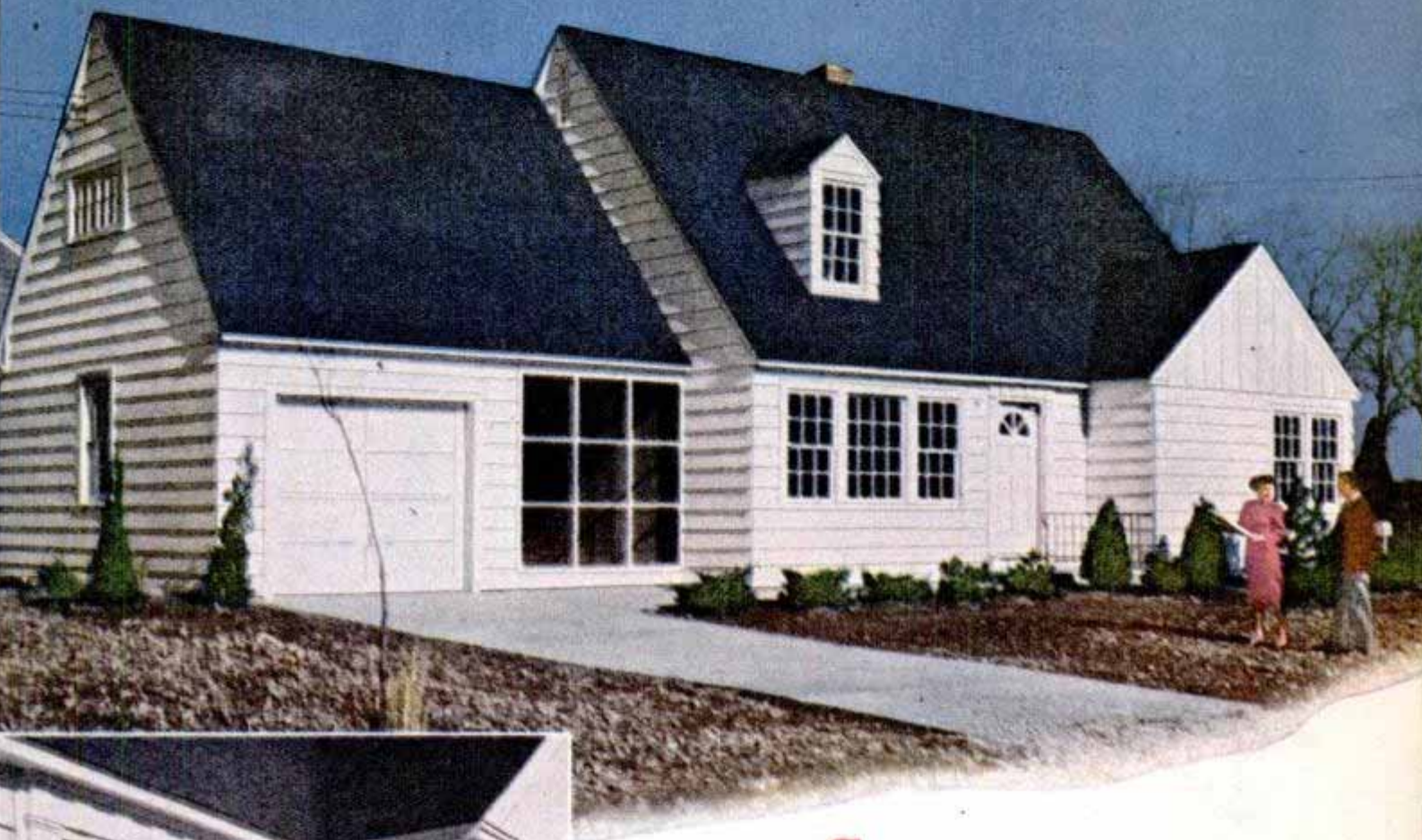


In the atomic power plant under construction at Oak Ridge, Tenn., uranium rods will feed the atomic fires in a thick-walled rayproof building. The erection of this plant, designed by Monsanto Chemical Company scientists, will mark man's first direct move to harness atomic energy as an aid to mankind.

Popular Mechanics is always ready to supply further information to readers about various products described in any issue. Just write to the Bureau of Information, Popular Mechanics, 200 East Ontario Street, Chicago 11, Illinois, for a prompt reply

Here Is the Home That Millions Want . . .

The POPULAR MECHANICS Build-It-Yourself House



Can any man who can handle a hammer and saw build his own home? The editors of Popular Mechanics asked and answered this question. Here is the home that resulted—one of the most significant editorial projects we have ever undertaken. Turn the page and begin the story of The House That Jacques Built.

Right, the Brownsons study plans with (left) James R. Ward, Crafts Editor, and Wayne C. Leckey (right)





Meet Mr. and Mrs. Jacques Brownson

SOMEWHERE along the China coast a young carpenter's apprentice of the U. S. Army Corps of Engineers was bossing a gang of coolies building a home for his general.

With the humming of saws, the thud of hammers, the babble of coolies for orchestral background he let himself dream a little. Some day he would build a home for himself and The Girl. A small white house—the practical, expansible sort of house

As framework of house gets under way, Jacques proves to his wife, Doris, that he can saw board straight

most young Americans dream of building.

Pretentious? No—but it would be comfortable: with a yard, maybe a garden; room for a home workshop in the basement—or it could be a recreation room. If the stories of shortages and high prices back home were true, he'd build it himself. It'd be nice to have a gang of coolies to help—but he could do the whole job himself, if the war ever ended. From China it looked like a faraway dream.

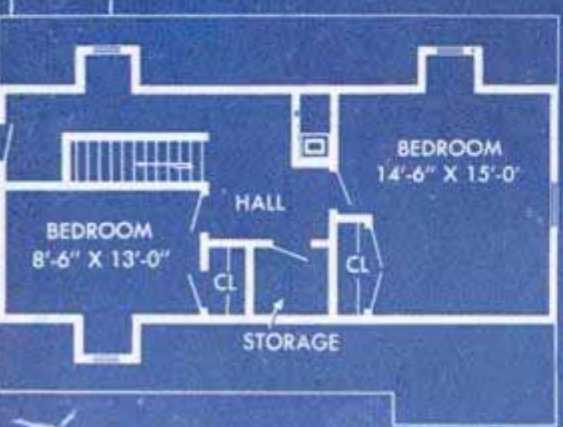
"Look busy; that photographer is here again," Doris warns Jacques as he attaches handle to garage door



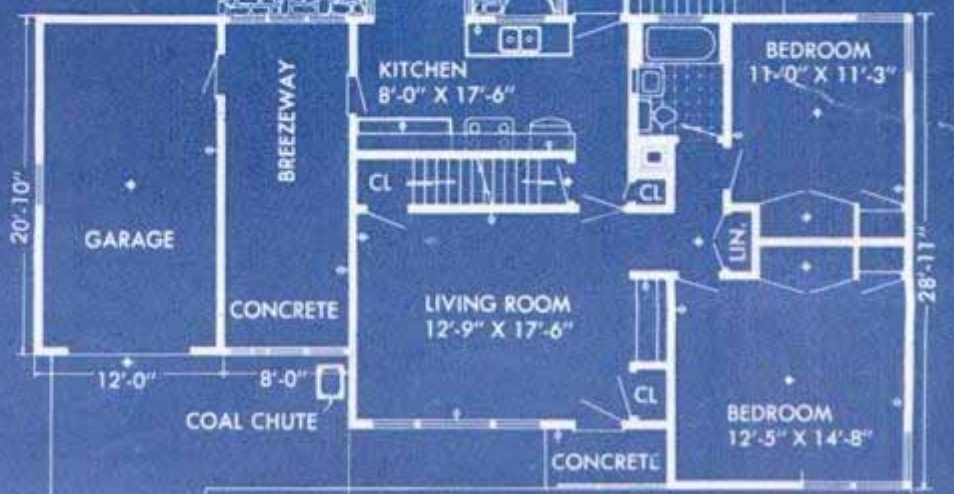
There's a lot of living space on the first floor; breezeway actually adds another room



PROPOSED SECOND-FLOOR PLAN



FIRST-FLOOR PLAN





Jacques adds finishing touch to the plastering, one of the few jobs requiring expert assistance



One of chest units which Jacques built for bedrooms is set into wall. Below, applying sheathing



Halfway around the world some serious thinking was paralleling Jacques Brownson's wishful dreaming. The wartime holiday in home building, the postwar shortages of materials and labor and the high costs of both had provoked the most serious housing crisis ever experienced in America. Over their coffee cups the editors of *Popular Mechanics* wondered out loud what could be their best contribution to a home-hungry nation.

James R. Ward, Craftsman Editor, came up with an idea.

"Let's plan a house," he said. "A house for the average American family, give 'em blueprints and all, show 'em what it will look like furnished."

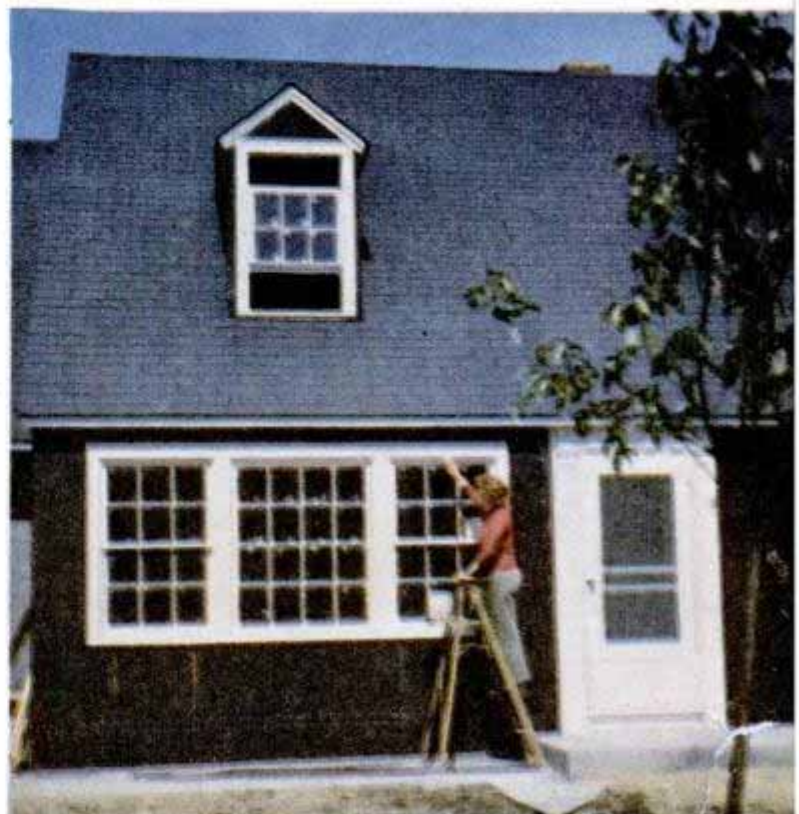
"Why not build it?" interrupted the Managing Editor, Roderick M. Grant. "That's the only way to prove a house. When you print plans for a sailboat or a photo enlarger or a home freezer you build it to prove it's right. Let's build the house and tell how to do it."

The staff began passing the objections around the table. Sounded like a pretty big project. We'd never done anything like that before. Doubt if any magazine ever actually built a house just to prove it up. Who could do it? Building a house was not for ordinary people, so why tell them how to build one?

"Anyone who can saw a board straight and hammer a nail can build a house," said Mr. Ward. "It takes more skilled workmanship to build a desk than a house. Sure, it takes more man-hours to build your own home, and maybe more headaches; but with the blueprints and step-by-step instructions that we could print, any man could build a home for himself. Particularly the men who read our magazine."

So the *Popular Mechanics* BUILD-IT-YOUR-

After the stock windows and doors were installed, Doris got busy on the stepladder with a brush and a can of paint



I hope you like my house: I sure do. It measures up to the dreams I had overseas a year and a half ago. Frankly, building this house is the biggest thing that has ever happened to Doris and to me. It was a challenge from beginning to end, but I assure you that no man could have greater pride than we have in having constructed our own home with our own hands. We had plenty of tough moments—you can't build any house without them. But the result is just about as satisfying as we could ask. I strongly urge others who need a house to do what I did—build their own. Jim Ward and Wayne Leckey and the other editors of *Popular Mechanics* have made it easy for anybody who can saw a board straight and drive a nail to build a house. If you do it, I'm sure you will agree with me that it is a thrill that comes only once in a lifetime.



SELF HOUSE began to take form. The editors of the Craftsman Section brought in plans and kicked them around. Surveys were made to determine the type most appealing to the average American. It couldn't be extreme, or prohibitive in cost, and it must not be a shanty. Folks have had enough of makeshift homes, and this was to be a house for a lasting appetite. It must be attractive, and a home that will adjust to a growing family. Probably an unfinished upstairs space that can be made into extra rooms as the youngsters come along. It ought to be adaptable to a variety of tastes in external architecture, a basic plan that will take dormers and gables and picture windows here and there if you like them. It should be efficient in its interior arrangement for housekeeping, and also in offering the most value for the money invested.

Along with the story in the magazine, we'd get out a book packed with every detail of instruction any man would need to build the house—"written so you can understand it." If he

preferred to hire a contractor or an ordinary carpenter to do the job, the book would help him to see that the workmen followed every specification of plans and materials.

Early in the spring of 1946 the editors commissioned one of Chicago's leading architectural firms to present its sketches of the home that millions of Americans would want. Meanwhile a search for the right man to build it was started. The dreams of Jacques Brownson and *Popular Mechanics* began to mesh.

During an editorial conference, Wayne C. Leckey, Assistant Editor of the Craftsman Section, came up with the answer.

"I think I've found just the fellow. He's an ex-GI named Jacques Brownson, living out in Aurora. He's just been married and he and his bride can't find a place to live—but he owns a slick lot on a corner at the

edge of town and he's toying with the idea of building his own home. He can handle tools; in fact, he's taking an architectural course at

The Popular Mechanics Build-It-Yourself House at 972 Sixth Ave., Aurora, Ill., is open to the public March 29 to April 13



MAY 29—"Big day for us. Ground broken for house and excavation well under way. Removed 200 yards fill dirt. Trucking cost \$30"



JUNE 24—"Bud helped set forms for the foundation. Also laid some sewer tile"

Illinois Tech. And as an exserviceman he should stand as good a chance as any at getting materials."

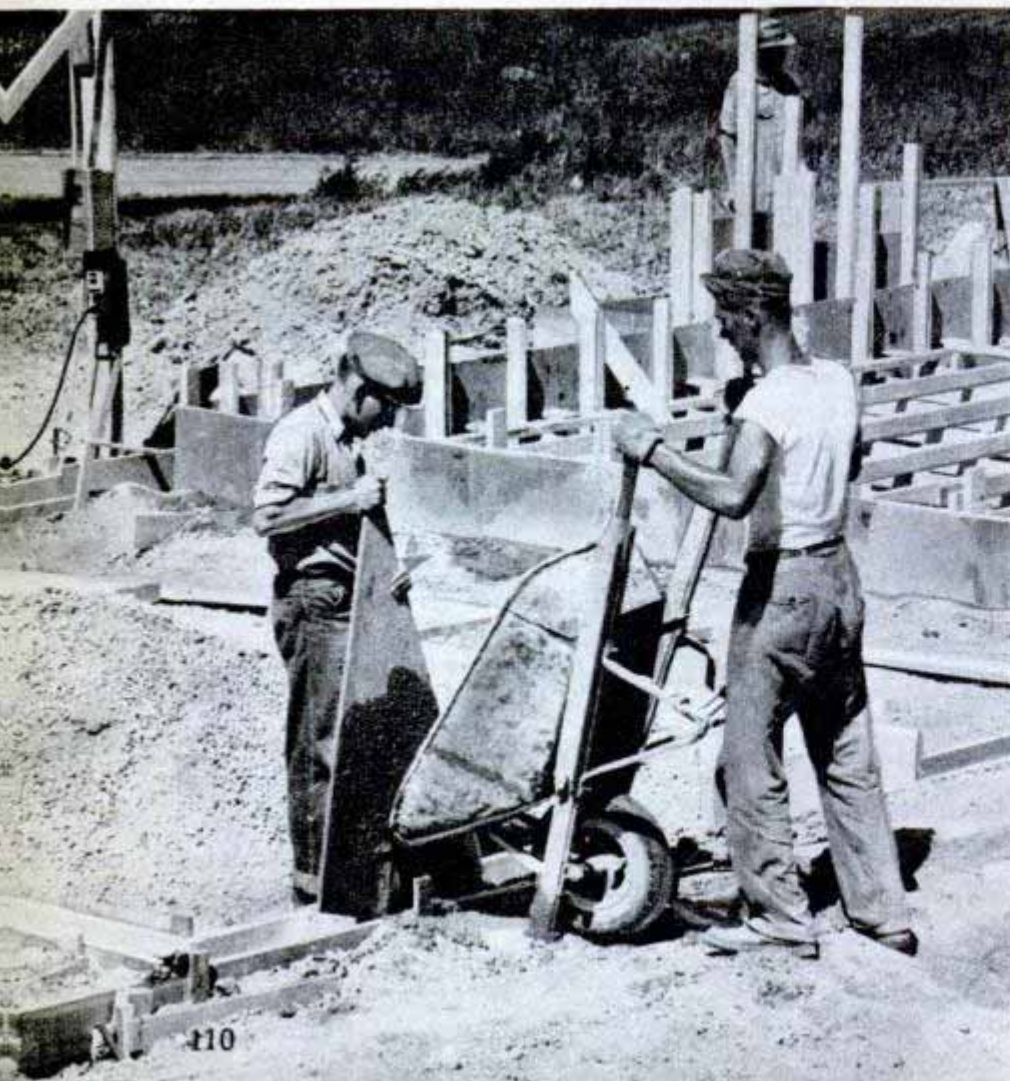
Brownson turned out to be a good gamble. It was a gamble, for *Popular Mechanics* was betting a vast amount of staff time and the cost of all materials going into the house—to be presented to Jacques when he completed it—that any man like 23-year-old Brownson, with mechanical aptitude, could build a lovely home from the plans and instructions prepared by the magazine editors.

But Brownson was a little let down when

he was called in to see the first sketches offered by the architects. They were of the "modern" matchbox type, flat roofed, no basement. The gleam went out of his eye.

"I suppose," Jacques said slowly, "these houses would be attractive to some people, but they don't look like the place I have in mind. It's not that I am opposed to modern improvements; I like those big windows and the general functional design, but couldn't you incorporate some of those features in, say, a modified Cape Cod house? For one thing, I want a basement. Where am I going to have my workshop?"

Feeling much the same way about it, the editors were secretly pleased. Tossing the problem back to the architects for more ideas, they began asking questions all around, surveying the average man's desires for his home, and started putting the Craftsman staff's



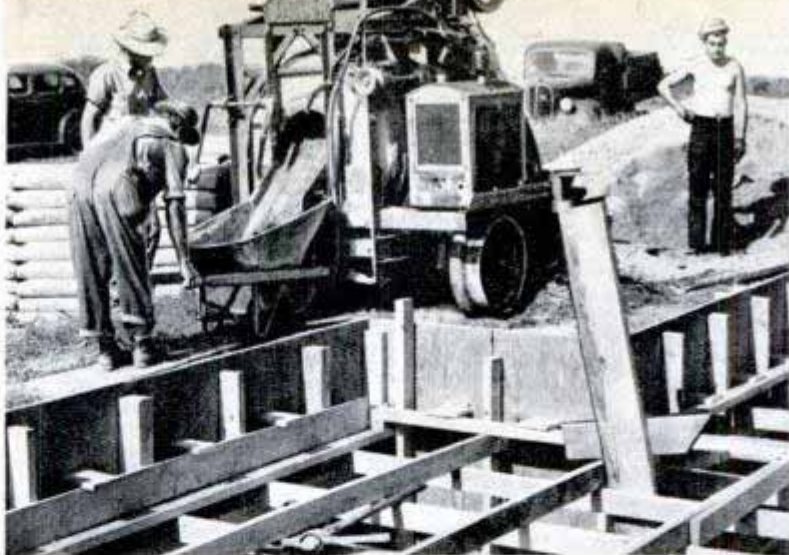
← **JULY 1**—"Had to hire some extra help to pour the foundation all in one day"

↓ **JULY 12**—"Bud and I put in eight hours each raising framework. Is my arm sore!"





JUNE 27—"Finished foundation forms for house and started forms for porch"



JULY 1—"Poured foundation for house, porch and garage; set in basement windows and anchor bolts. We used 200 sacks of cement"

own ideas down on the drawing boards.

By the time the ground had started to thaw in Aurora, Ill., 38 miles west of Chicago, the plans of architects and editors and Jacques Brownson had crystallized and the BUILD-IT-YOURSELF HOUSE was ready to take shape.

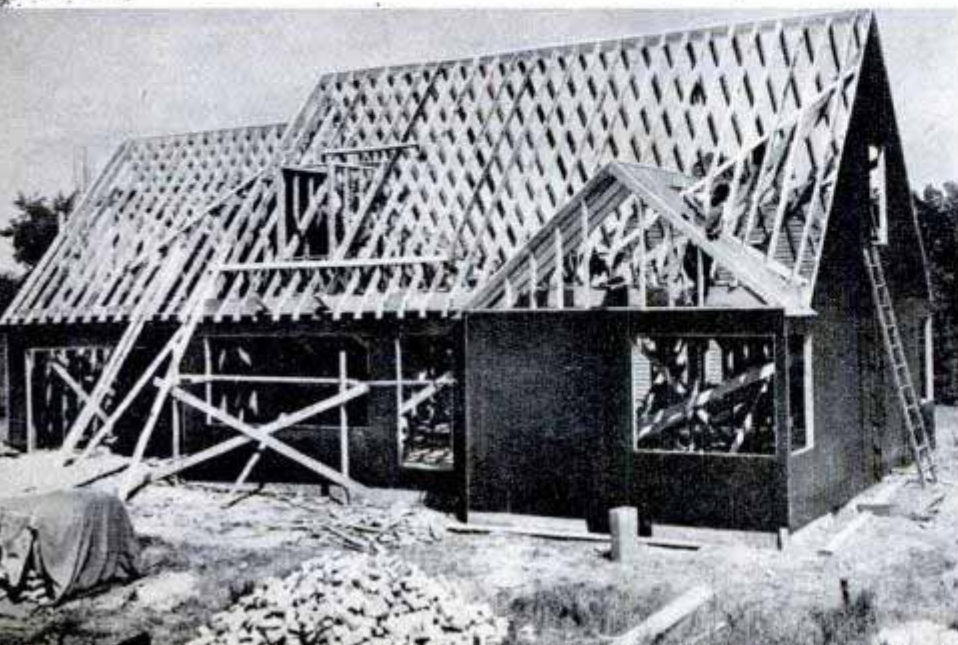
It is a 1½-story house with a heating plant and knotty-pine paneled shop or rumpus room in the basement, and complete living quarters on the first floor. There are two bedrooms and bath, living room and kitchen with dining nook. Between the house and its attached garage is a spacious breezeway, each end of which is enclosed by glass during the winter and screens during summer. The Brownsons planned to furnish this colorful, bright room with summer-type furniture as a dining room and lounge. Its high, broad window area in front, like the living room and one bedroom, overlooks a grove of oak trees and a golf course, a lovely vista in winter and summer. A stairway from the living room provides access to the second story, as yet unfinished but with ample space for

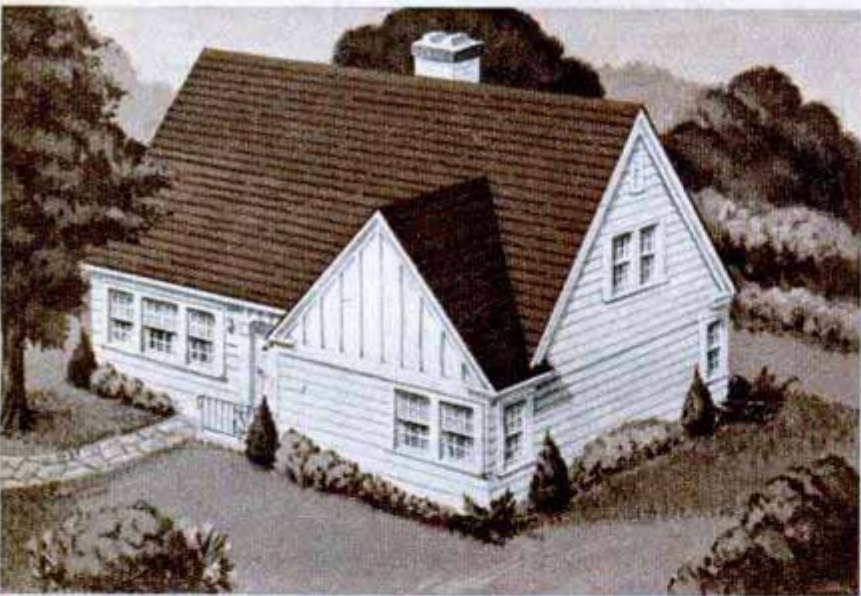
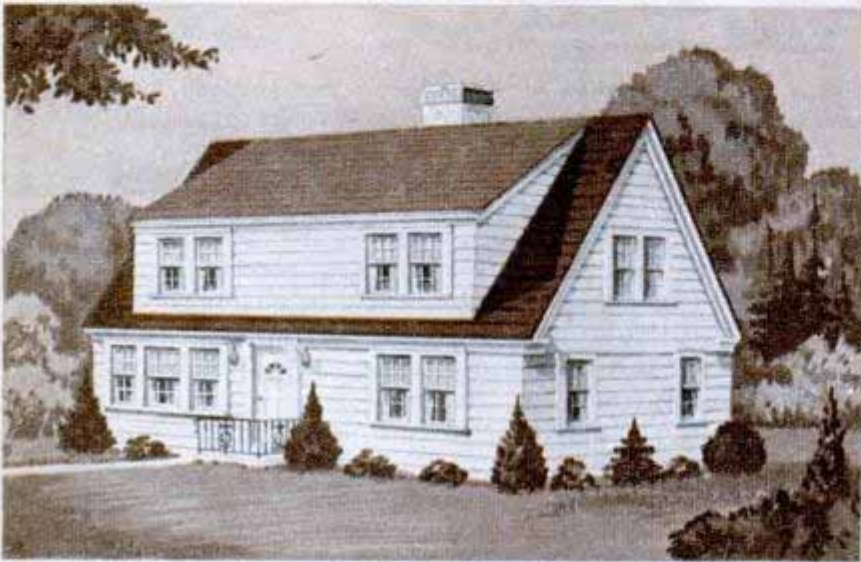
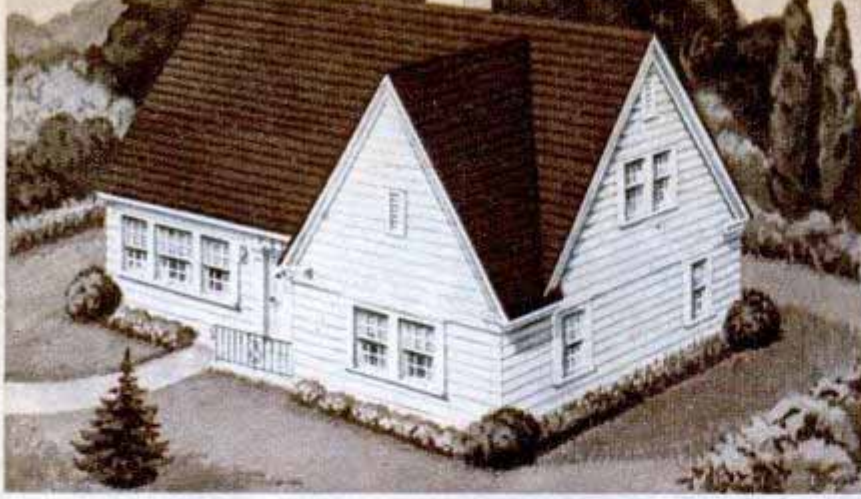
two or more additional bedrooms as the family increases.

Since the kitchen is readily accessible both to breezeway and living room, dinner can be served conveniently in either room. The Brownsons willingly sacrificed a separate dining room in order to get the most living space for the money.

Materials for the completed house and garage cost exactly \$7046.87 in the Chicago area—a relatively high-cost region, and in a high-cost year. This naturally would vary in other areas and other times, and many economies could be effected by eliminating the garage and breezeway. The house was built as the Brownsons wanted it. The basic considerations in the general plan were ease of construction, the greatest living space for the least cost without sacrificing attractiveness of design, and adaptability. The *Popular Mechanics* house can be altered easily to conform to other architectural preferences—modified Dutch Colonial, modified Cape Cod, plain gable-roof house without dormer windows, or the house as it stands but without garage or

JULY 27—"Put up the studding in front gables and built rear dormer" **AUG. 3**—"Roof covered—finally!"





breezeway. These variations, as shown by the illustrations, are accomplished chiefly by changes in roof design.

For simplicity of construction, all windows and doors are stock products; this saved about one third in milling costs. In the two bedrooms, stock windows are used to simulate the popular corner window, and the effect is pleasing. Stock windows of the multiple-light type used in the living room were also planned originally for the breezeway, but this gave the appearance of a greenhouse. Wayne Leckey, the Assistant Editor who spent most of the summer with Jacques Brownson as observer, counselor and chronicler, suggested replacing these with larger panes 30 inches square, set in a framework of 2 by 6-inch pieces which affords shelf space for potted plants or bric-a-brac. Any or all of these panes can be replaced by screens in summer.

Leckey calls the breezeway "The Topsy" because it just grew from an unimportant three-foot-wide latticed areaway, as originally conceived, to an eight-foot room that is one of the most distinctive features of the house. The extra space was possible because the Brownson lot, although only 50 feet wide, is on a corner. Built lengthwise of the lot, its over-all width including breezeway and garage is 55 feet 9 inches; the house itself is 35 feet 9 inches by 28 feet 11 inches; the breezeway, 8 feet wide by 20 feet 10 inches deep, and the one-car garage 12 feet wide by 20 feet 10 inches. The house, however, can be built on an ordinary 50-foot lot by leaving off the garage and breezeway.

The full-size basement is Brownson's particular joy. Still, he hasn't found the final answer to his original query: "Where am I going to put my workshop?" The problem is now one of choice, for he has available a wealth of space—the pine-paneled room 14 by 27

(Continued to page 252)

Here are four possible variations, minus breezeway and garage, of basic plan. From top down, larger gable gives impression of bigger home; Dutch dormer means more second-floor room; modified basic plan has corner windows and no dormer; Cape Cod adaptation has dormers at front and rear

PORTRAIT DOLL



Rag dolls that look like tiny duplicates of famous people are made by Evelyn Ware Smith, Merrick, N. Y. Plaster-of-paris head is modeled from a photo



Doll's arms and legs, with all the contours of its namesake, are cut from patterns traced on cloth. When finished, the legs are encased in silk or Nylon hose



After being sewn, limbs are stuffed with cotton batting. The same material is used to fill out the body. With the human hair wig in place, the doll's face is painted with lifelike coloring. The complexion and hair are selected to match closely those of the subject



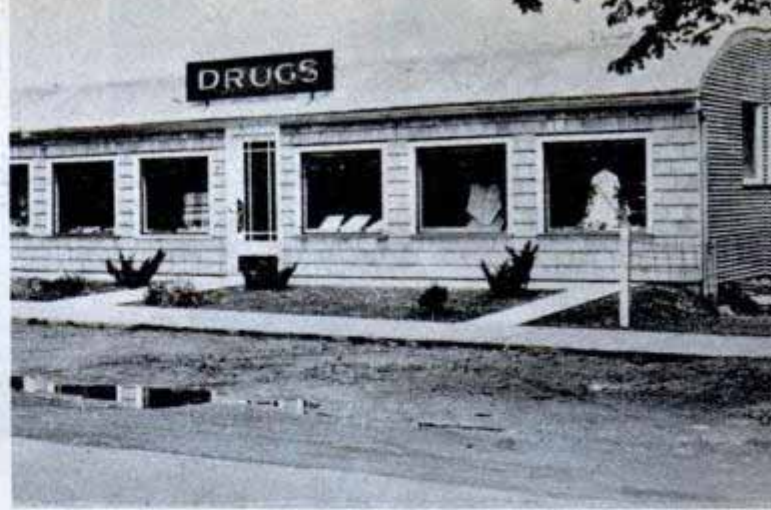
Sewing stuffed limbs to torso. Mrs. Smith exerts great care in every step, taking two weeks per doll. The finished doll sits beside a portrait of the subject, Ann Thomas, radio actress. Every detail in the doll's jacket matches the one worn by Miss Thomas



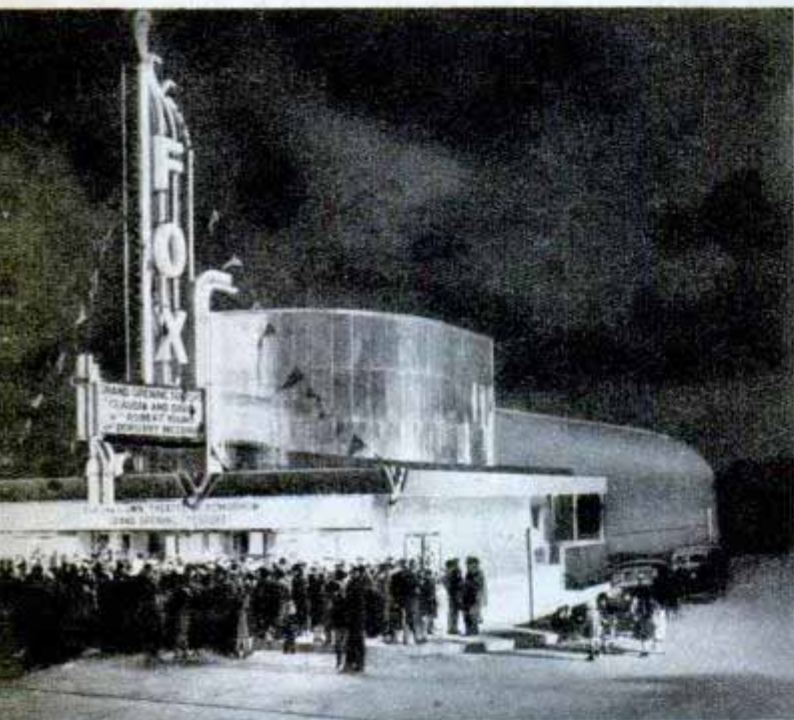
QUONSETS CONVERTED TO PEACE



To handle the overflow of children who enrolled in one Detroit school, a Quonset houses two classrooms

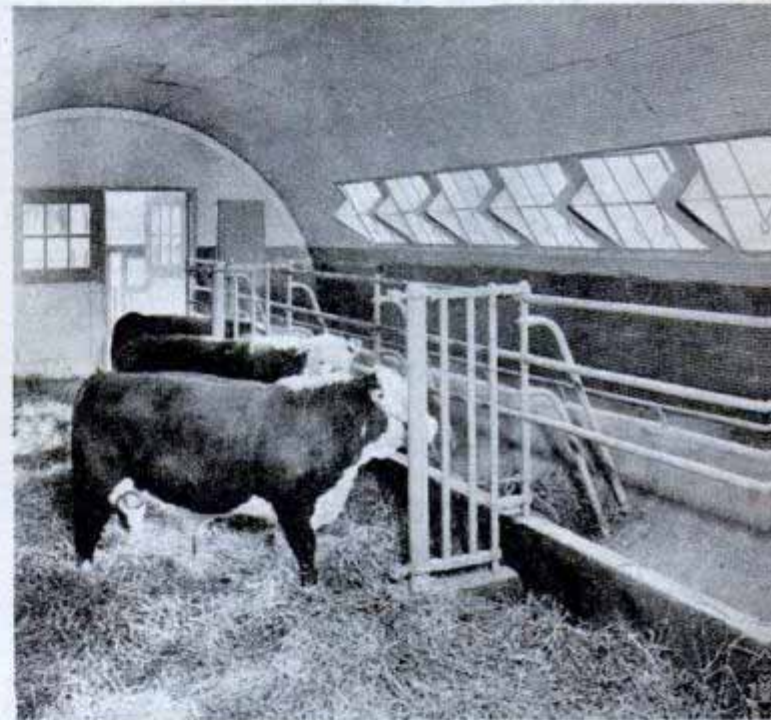


Wood shingles add a homey touch to this round-roofed steel structure at Sayre, Pa., which is occupied by a store



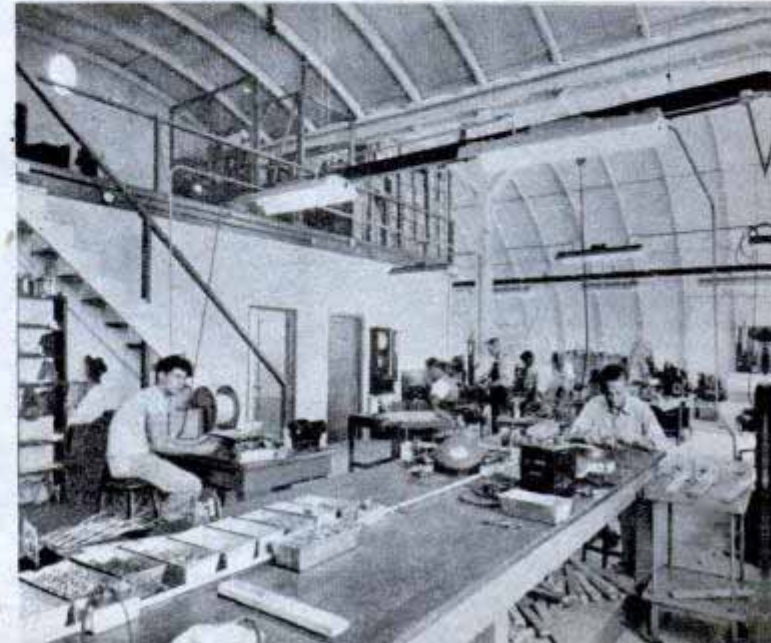
In Aurora, Colo., a builder added a special front to a 40-foot-wide Quonset and he had a movie theater

Stone applied to the exterior, plus landscaping, adds to appearance of an office building in Oklahoma City



At least 257 peacetime uses have been found for Quonsets. This dairy barn at Brighton, Mich., illustrates one

A small factory in Chula Vista, Calif., has set up shop in well lighted, surprisingly roomy, multiarch Quonset



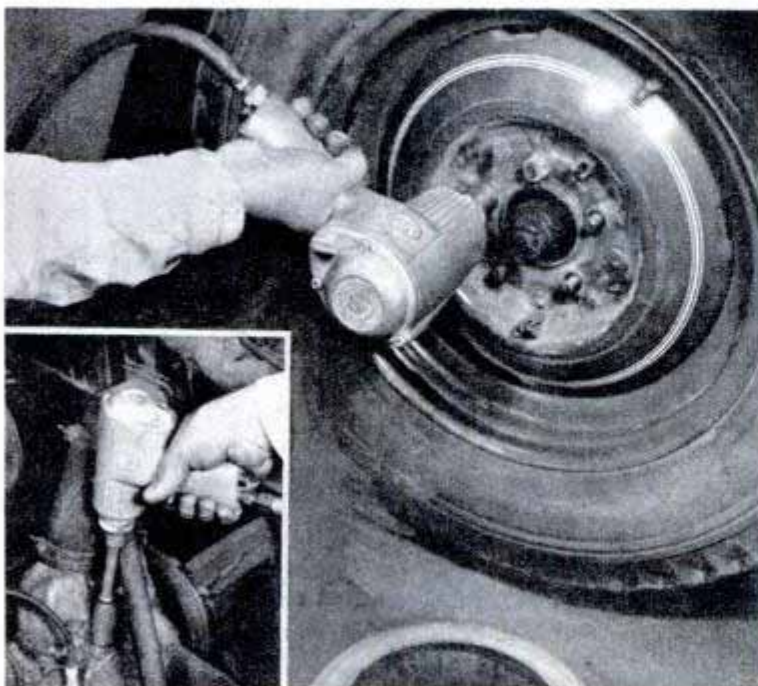
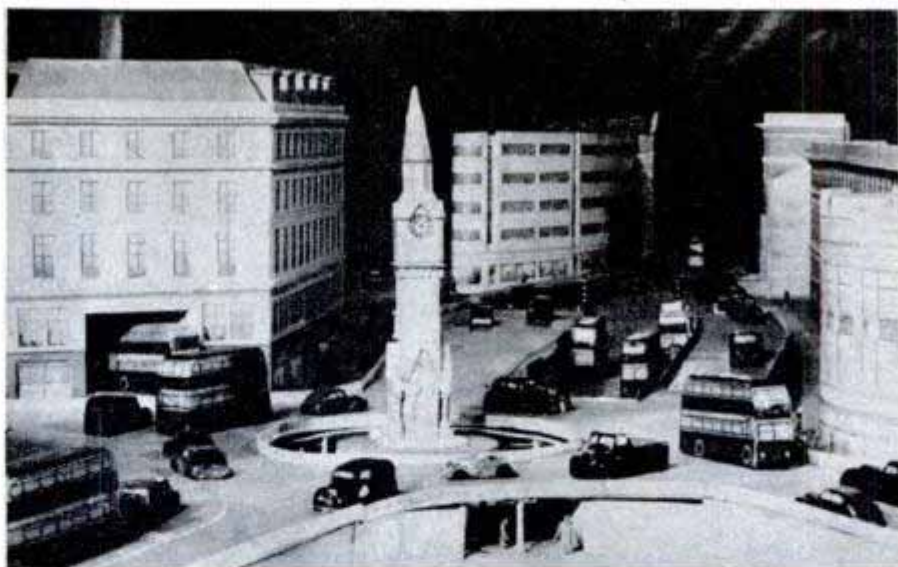
Double-Deck Streets Planned in England

Two different traffic levels may be built into the town of Hastings, England, if the borough's engineers have their way. The engineers recently exhibited a model to follow in rebuilding the town for its two-decker future. Streets will run on two levels, with stores and pedestrians on the lower level and vehicles on the top deck. Buses and delivery vehicles will move between the decks. The Battle of Britain was fought in 1940 over Hastings and other south coast towns.

Fires Halted Quickly By "Lazy" Freon Gas

Freon chemical compounds used in household refrigerators, air-cooling systems and as a DDT carrier in aerosol insect bombs have been found to be more effective in extinguishing gasoline fires than carbon dioxide. Use of the Freon gases to put out gasoline fires was recommended by the Bureau of Mines following a study of six inert gases and their effects on three different types of gasoline.

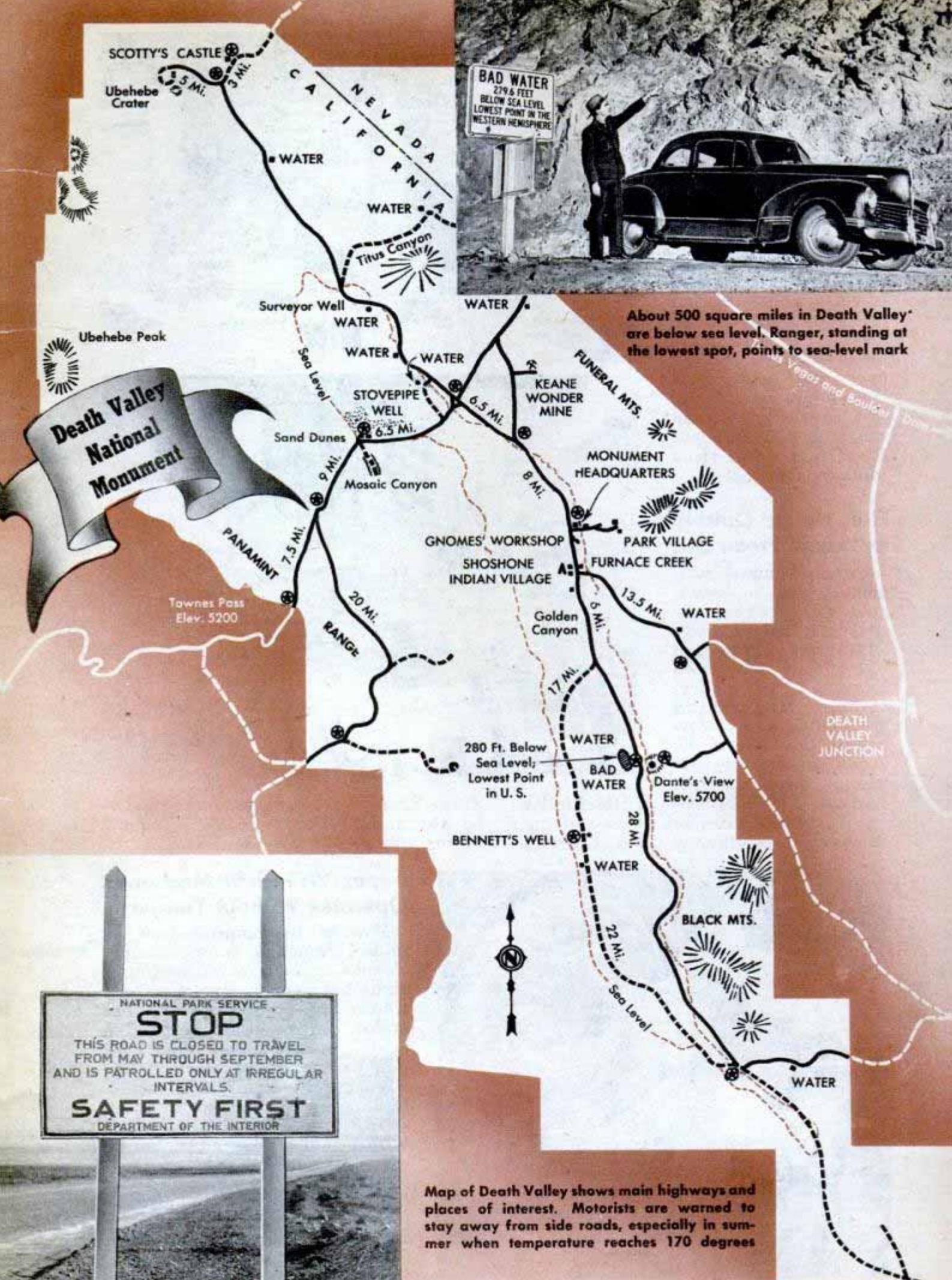
Three kinds of Freon gases were found to be the most effective flame-quenching agents with carbon dioxide next best.



Impact Wrench for Mechanics Operates Without Torque

Powered by compressed air, an impact wrench for automobile mechanics removes or replaces nuts, studs and machine screws without transmitting torque to the operator. An extension bar and a flexible socket simplify nut running in inaccessible locations. The wrench can be used on knee-action bushings, wheel nuts, engine-block studs and cylinder-head nuts. With a puller attached, it can be used to pull cylinder sleeves.

Tests of Pliofilm wrapping indicate seafood shipped to interior states may reach your table with full-flavored salt-water freshness.



SCOTTY'S CASTLE
Ubehebe Crater

BAD WATER
279.6 FEET
BELOW SEA LEVEL
LOWEST POINT IN THE
WESTERN HEMISPHERE

About 500 square miles in Death Valley are below sea level. Ranger, standing at the lowest spot, points to sea-level mark

Death Valley National Monument

Townes Pass
Elev. 5200

280 Ft. Below
Sea Level;
Lowest Point
in U. S.

NATIONAL PARK SERVICE
STOP
THIS ROAD IS CLOSED TO TRAVEL
FROM MAY THROUGH SEPTEMBER
AND IS PATROLLED ONLY AT IRREGULAR
INTERVALS.
SAFETY FIRST
DEPARTMENT OF THE INTERIOR

Map of Death Valley shows main highways and places of interest. Motorists are warned to stay away from side roads, especially in summer when temperature reaches 170 degrees

CALIFORNIA
NEVADA
WATER
WATER
Titus Canyon

Surveyor Well
WATER

WATER

Ubehebe Peak

Sea Level

Sand Dunes

Mosaic Canyon

PANAMINT

RANGE

GNOMES' WORKSHOP
SHOSHONE INDIAN VILLAGE

KEANE WONDER MINE

FUNERAL MTS.

MONUMENT HEADQUARTERS

PARK VILLAGE

FURNACE CREEK

Golden Canyon

WATER

DEATH VALLEY JUNCTION

BENNETT'S WELL

WATER

Dante's View
Elev. 5700

BLACK MTS.

WATER



17 MI.

22 MI.

Sea Level

28 MI.

13.5 MI.

6 MI.

8 MI.

6.5 MI.

6.5 MI.

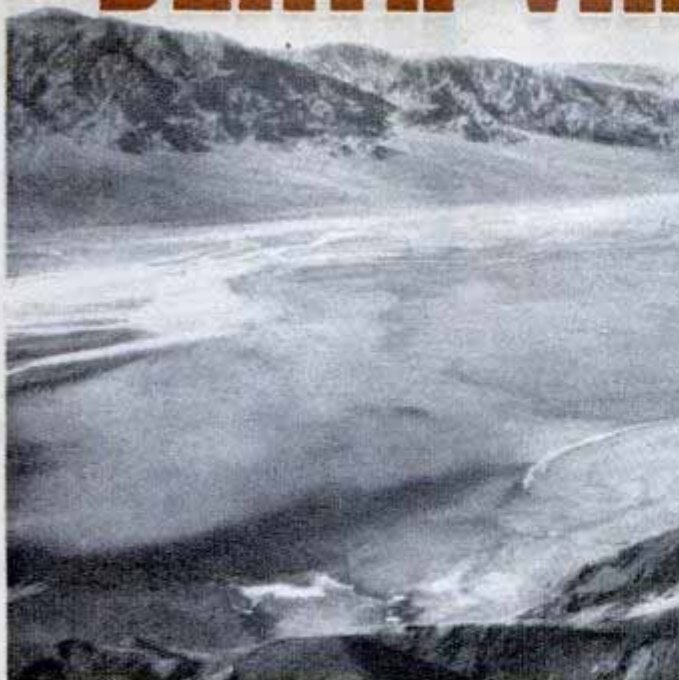
9 MI.

7.5 MI.

3 MI.

3.5 MI.

DEATH VALLEY PATROL



Looking down from Dante's View (6000 feet above Death Valley) to Bad Water, 280 feet below sea level. Waterlike areas are actually salt and alkali deposits

RIDING HERD on summer tourists sounds like a dull job but to rangers who patrol Death Valley it's a matter of life and death.

"Stay on the main paved highway," a ranger at the checking station cautions each motorist during the hot season. "The main road is patrolled every day and we can give you a hand in case you break down. If you take a side road and have trouble you'll be lucky to come out alive."

The combination of intense heat and extreme dryness that is common in the Death Valley region during the summer can practically dehydrate an unprotected person in a few hours. One man who had engine trouble on an infrequently traveled road decided to walk back 16 miles for help, but he never made it. He was found the next morning, unconscious and barely alive. He'd lost 80 pounds of weight overnight.

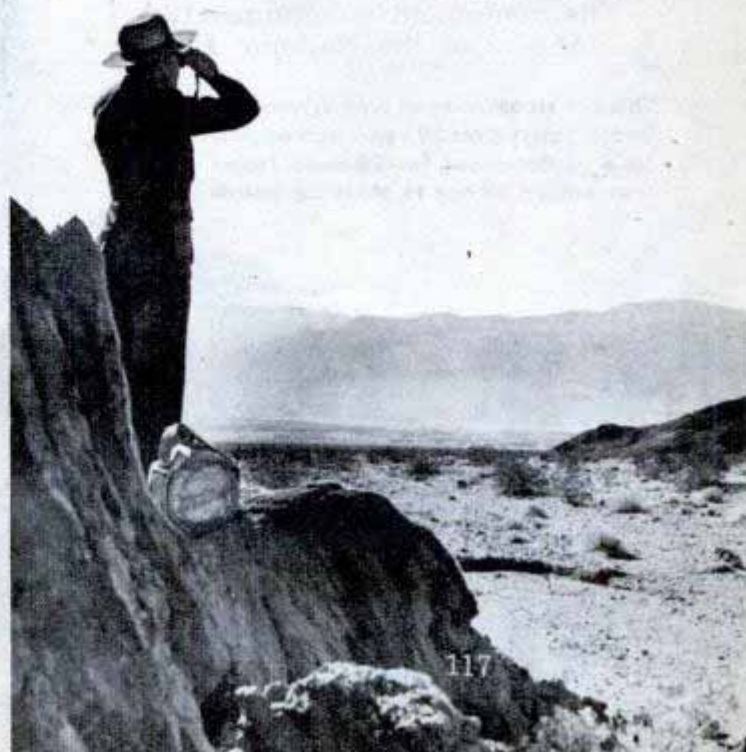
"If you have a flat tire," the ranger advises, "turn your car to provide shade while you change the flat. And don't drop your tire tools in the sun. In three or four minutes they'll be too hot to pick up."

The ranger isn't exaggerating. Summer temperature in the sun may climb to 160 or 170 degrees. The thermometer in the instrument shelter at Furnace Creek has registered 134 degrees in the shade. Some parts of the valley are believed to be hotter than Furnace Creek but no one has felt like installing thermometers and making daily trips to observe the readings.

Death Valley has a delightfully dry, warm



T. Raymond Goodwin, superintendent of Death Valley National Monument, climbs into a plane to search for lost motorist. Below, ranger scanning with field glasses





Grave of a visitor who became lost and died in terrific heat



Measuring humidity at 134-degree Furnace Creek

climate during the winter, but beginning with May it becomes a blazing, shriveling inferno. The Indians called it "Tomesha," meaning "ground afire." Residents move to the mountains when summer heat clamps down. Only emergency crews remain.

The valley and its surrounding mountain ranges were designated as a national monument in 1933. Embracing nearly 2,000,000 acres of primitive, unspoiled and spectacular desert country on the California-Nevada border, the monument is a geological and mineralogical wonderland. It contains snow-clad mountain peaks that rise to 11,000 feet. The long, narrow sink of Death Valley is 140 miles long and up to 16 miles wide. More than 500 square miles of the valley are below sea level; Bad Water, 280 feet below the level of the sea, is the lowest point in the Western Hemisphere.

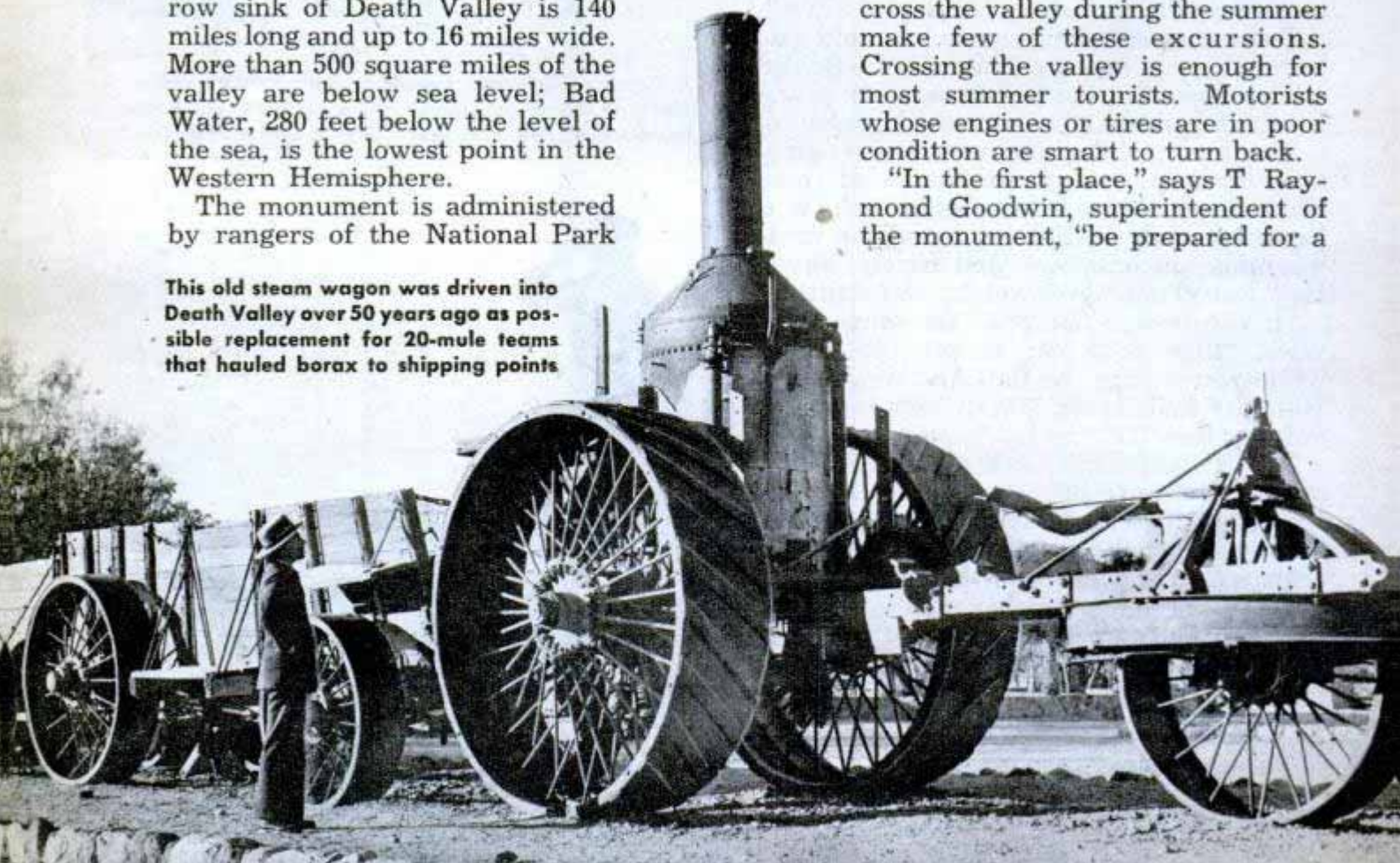
The monument is administered by rangers of the National Park

This old steam wagon was driven into Death Valley over 50 years ago as possible replacement for 20-mule teams that hauled borax to shipping points

Service. These men play host to about 100,000 visitors per year, 90 percent during the winter months. The tourists stay at resort hotels and auto courts and drive over paved highways to visit Dante's View, Furnace Creek, Devil's Golf Course, Gnomes' Workshop, Stovepipe Wells, and Ubehebe Crater. They listen to talks by Edwin Alberts, park naturalist. They inspect the tremendous stone castle where Death Valley Scotty still lives. They explore ghost towns and abandoned borax mines, and some search for Lost Gunsight, Breyfogle, and other storied lost mines.

The 3000 visitors per month who cross the valley during the summer make few of these excursions. Crossing the valley is enough for most summer tourists. Motorists whose engines or tires are in poor condition are smart to turn back.

"In the first place," says T Raymond Goodwin, superintendent of the monument, "be prepared for a





Abandoned pumping plant once was used to pump mineral-saturated water from wells drilled into "dry lake"

boiling radiator. It's easy to enter the valley but you have to climb steep grades to get out. From below sea level you climb to 5020 feet in 16 miles, traveling west. East-bound, you must climb from below sea level to a 2500-foot summit. Hot air rising from the valley during the daytime produces uphill tail winds on all these grades.

"Watch your temperature gauge and, when it approaches the boiling point, turn your car around and head it downhill into the wind, then sit there with the motor idling five or ten minutes while the temperature goes down. About halfway up each route is a water tank."

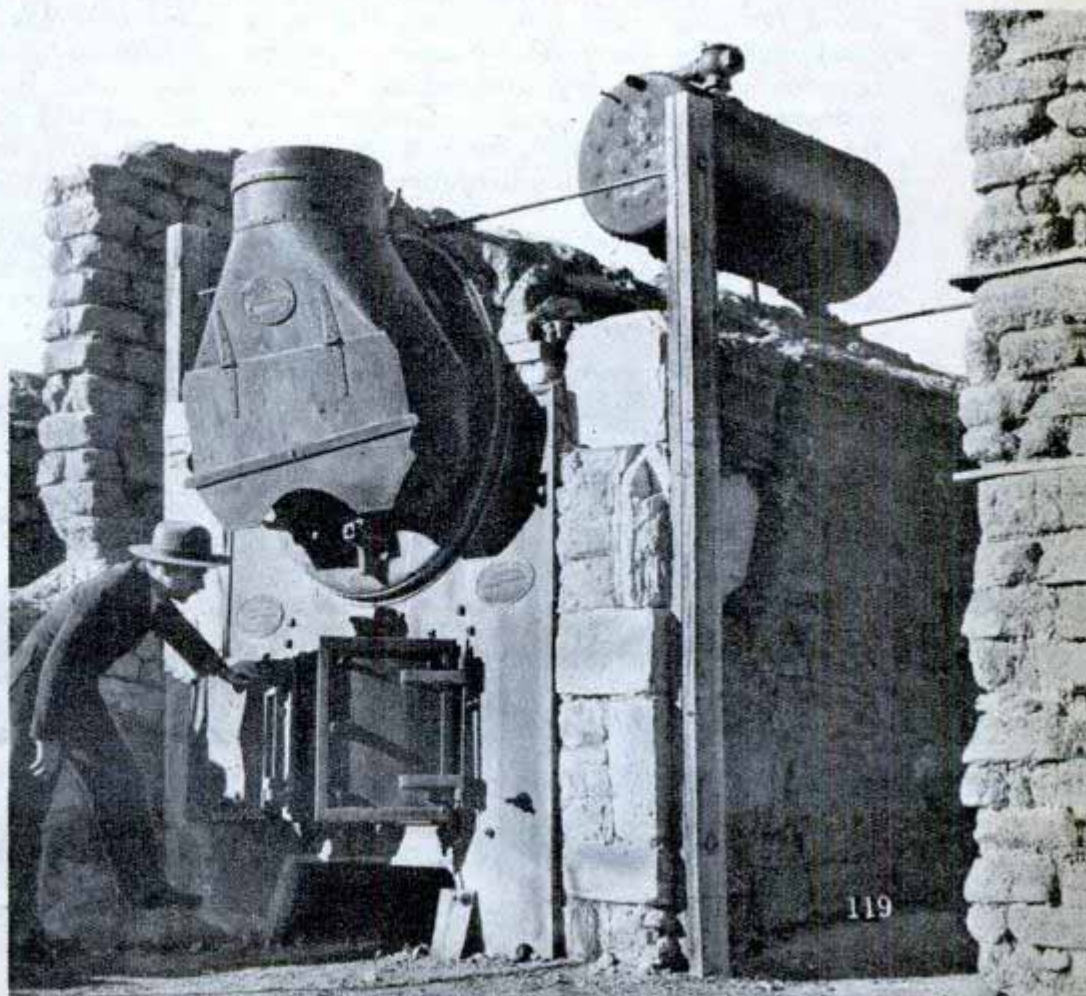
The penalty for not following this advice is a dry radiator and then a "frozen" motor. That happened to the traveler who lost 80 pounds in less than 24 hours. His radiator boiled dry on a level road because he hadn't taken the trouble to check the water at the last stop. His motor "froze" and he was stuck. This was in May when the peak temperature was only 110 degrees.

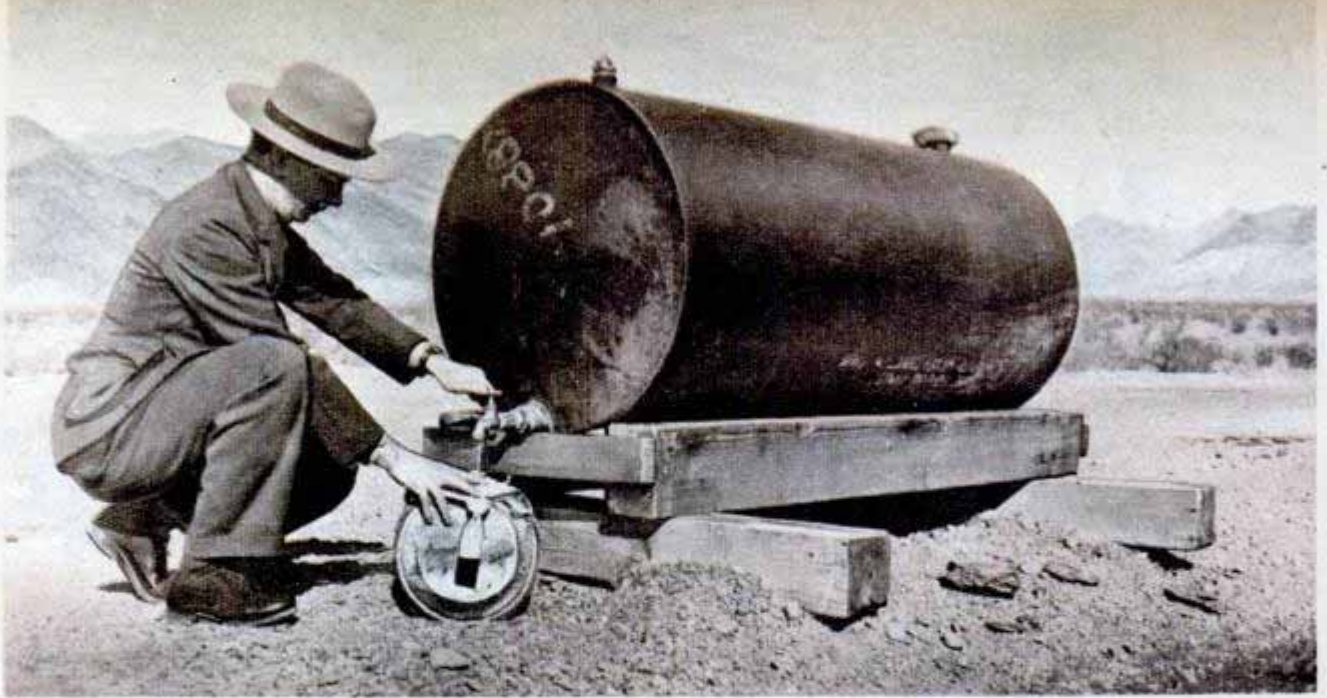
Adventurers who try to hike through the valley in summer risk their lives. Rangers find a shirt here, a wallet there, shoes abandoned half a mile apart, pants and under-

Ancient boiler works hauled into the valley in the '80s to refine borax taken from sand deposits

clothes hanging on bushes. Almost invariably a sun-crazed person strips himself while staggering around.

One August a driver on the main road found a naked man at the roadside, digging in the dry sand with his hands for water. He was out of his mind from thirst though he had walked only six miles from where his car broke down on an untraveled side road. He was taken to a ranger station, wrapped in blankets and given tiny sips of water. Then the rangers drove to his car and rescued a companion who was in pretty good shape because he stayed in the





Tanks stationed along highways are filled with highly mineralized water for radiators and emergency drinking

car's shade. The hiker's clothes were found strewn over several acres.

Near-tragedies like these are rare because most summer visitors follow the rangers' suggestions. Visitors stay on main roads where they will be spotted in case of trouble. Most drivers are confident their cars are in good condition, yet the rangers give roadside service to about 100 cars per summer.

E. E. Ogston, chief ranger, and his staff of 20 men are experienced, desert-wise outdoorsmen who know how to travel in the desert, how to protect themselves from the elements, and how much heat they can stand. On their daily rounds over the main roadways they carry field glasses to study reaches of the valley into which unwise visitors may have strayed. On occasion they use aircraft to look for lost travelers.

No tourist has lost his life since the mon-

ument was established. A few prospectors in distant sections of the area have succumbed to the heat but the rangers had no way of knowing the prospectors were in the region.

In winter the rangers rescue prospectors or miners snowed-in in the mountains. A more frequent winter chore is rescuing tourists who drive off the roadways and become stuck in the sand. Modern pleasure cars are poor desert vehicles. Their low clearance, unbalanced weight with the motor over the front wheels, and hard tires make them unsuitable for soft ground. Jeeps and four-wheel-drive trucks are the best vehicles for desert travel.

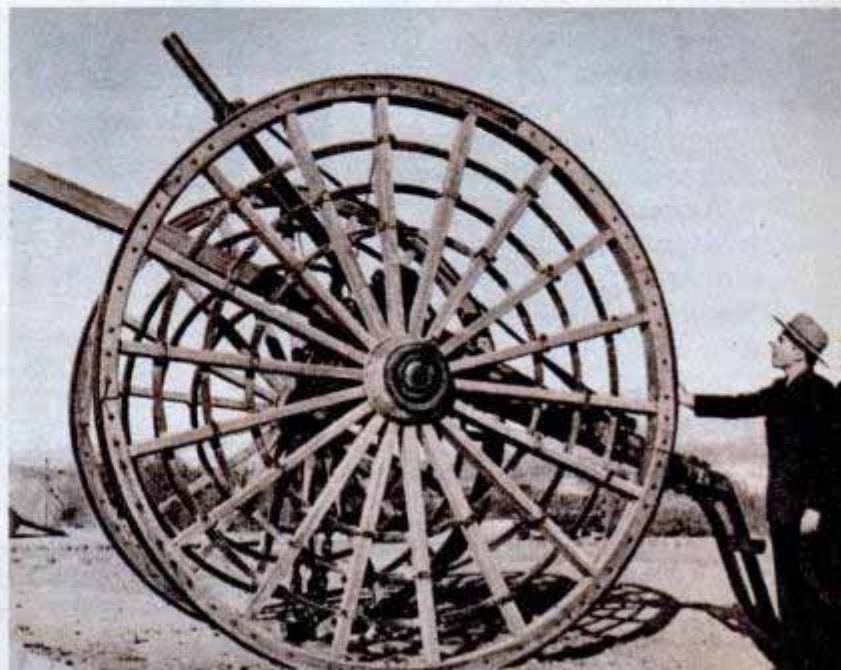
When a tenderfoot gets stuck, he usually does this: Having driven into a patch of soft ground, he races the engine and lets the clutch in slowly, hoping to pull out. The

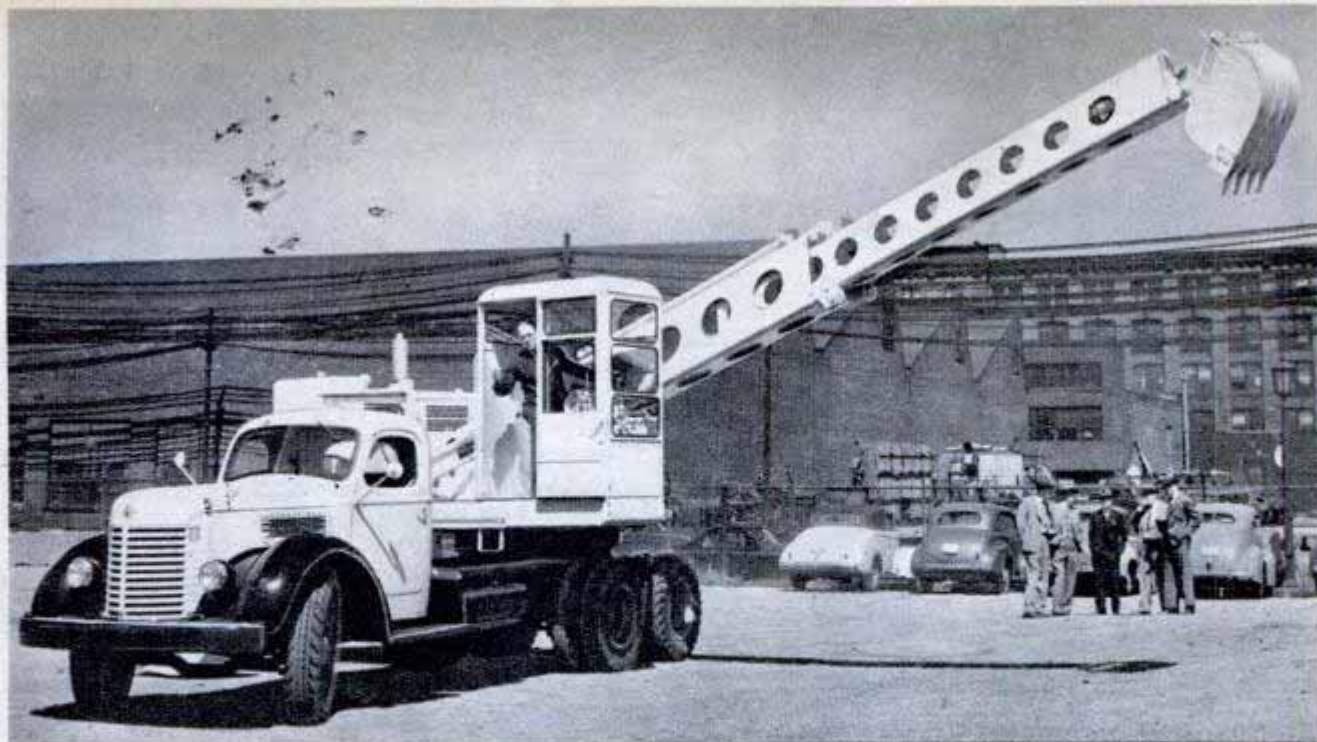
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Ranger pauses for a drink in Devil's Golf Course where wind and rain have eroded rock-salt "floor" into spongelike pinnacles



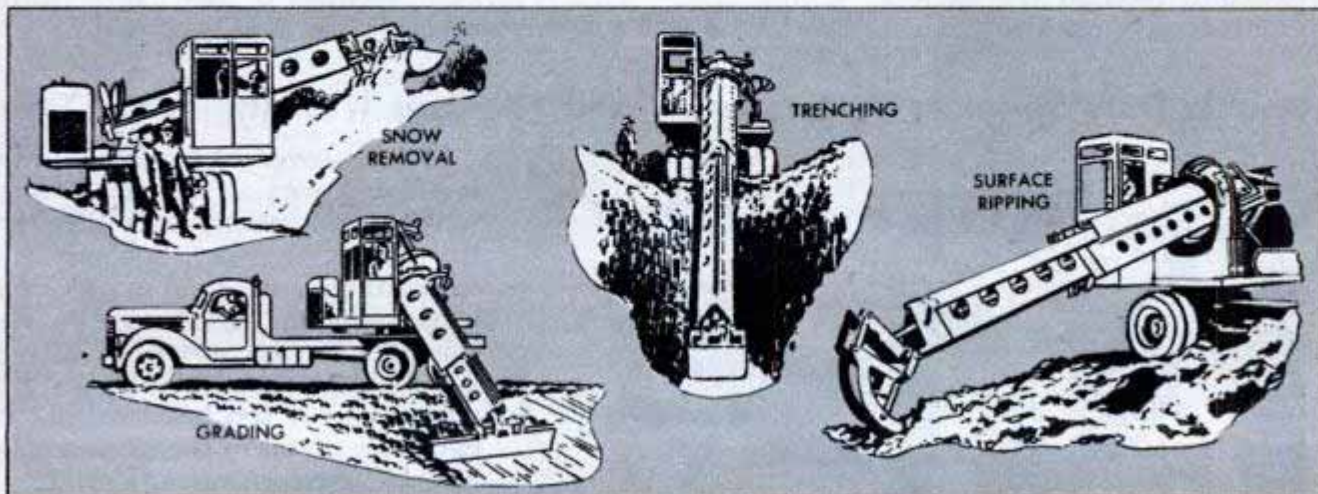
Timbers were transported on huge wide-wheeled log carrier from wooded mountains to Death Valley gold mines during the last century. About 100,000 visitors view such relics as this every year





Multipurpose Earthmover Has an Armlike Boom

Several different earthmoving operations—excavating, trenching, filling and loading—are performed by one machine. It consists of a rotating turntable with a 24-foot telescopic boom mounted on the rear of an engine-driven chassis. Hydraulic controls govern the “arm action” movements of the boom. It may be extended and retracted, lowered and raised, tilted each way from horizontal and rotated a full 360 degrees. Various earth handling tools needed for individual jobs are attached to the end of the boom. Tool controls, running through the boom, give “wrist” action, permitting the operator to move the digging bucket or other attachments through a vertical arc of 116 degrees. Individual tools can be interchanged in less than 15 minutes because of the simplicity of the locking device.





Carrying a complete line of stock, a special post exchange train rolls across Japan to serve American occupation troops and their families. The "department store on wheels" stops at points where normal post exchange facilities are not available. Most items that can be found in other post exchanges are available aboard the train. Children can

PX Train Serves GIs in Japan

shop in the toy department and for the wives there's a car filled with cosmetics. A white stripe on the side of each car distinguishes the train from all others, and a crowd of shoppers is usually on hand when the rolling post exchange arrives. Japanese girls staff some of the departments of the store, assisting the regular PX personnel.

Printed Guides for Phonograph Records Tell Story Behind Classical Music

Printed phonograph record guides are an aid to the appreciation of classical music. A guide consists of a slotted strip of cardboard and printed timetables of recorded music. By following the progress of the needle through the slot with the time indications of the guides, the listener learns from the timetables the story behind the music, the varying use of instruments and the general theme. The guide is also used to indicate the location

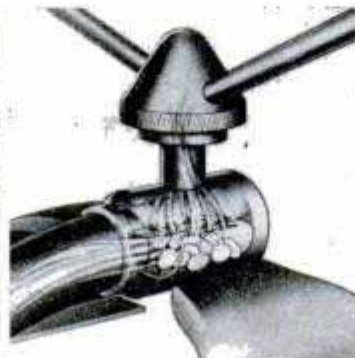
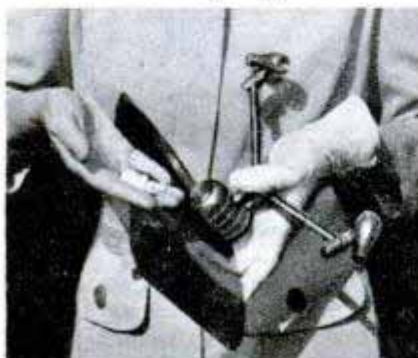


DEATH AND TRANSFIGURATION
 Composer: Richard Strauss
 Arr. New York City Symphony Orchestra
 Conductor: Leopold Stokowski
 First Group et. 0:10

10	0:13 Ten Ten. The Death Knell.
20	PART FOUR - Release of the Soul.
30	0:26 Mysterious effects in orchestra's deepest tones.
40	1:00 (16) Childhood Faith and Ideal Motives outlined.
50	1:18 (14)
10	2:00 (17) Ideals Achieved.
20	2:38 Ideals Thus Developed.
30	
40	
50	

on the record of a particular passage so that it can be replayed at any future time without replaying the whole record.

Double Duty Sprinkler Waters Lawn and Fertilizes It at the Same Time

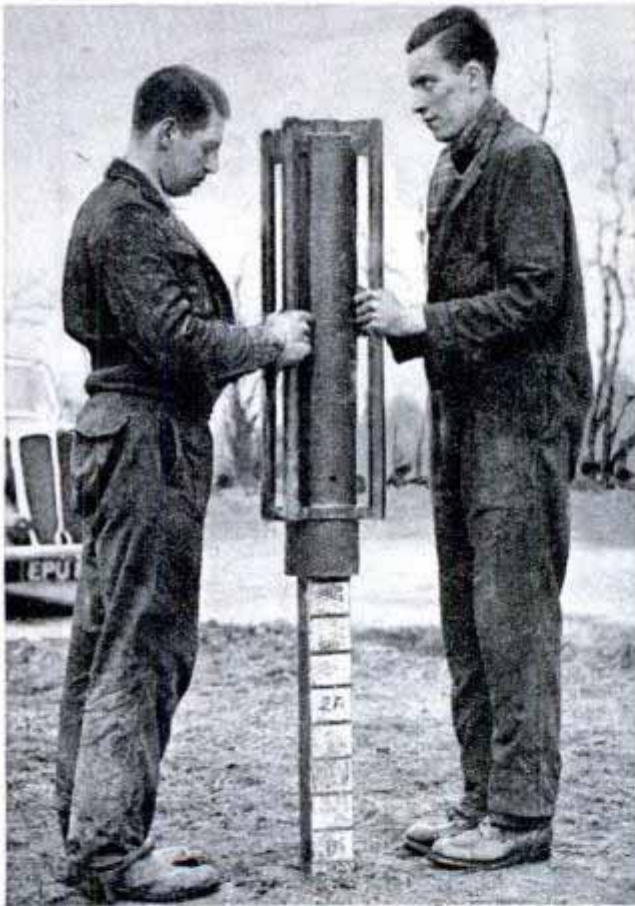


Home gardeners can water and fertilize lawns at the same time with a double-duty sprinkler. In the sprinkler head, special fertilizer tablets are held in a slotted brass chamber. The water passes through the chamber, dissolves the tablets and sprays fertilizing solution over the lawn so that it can soak down to the grass roots and be used immediately.

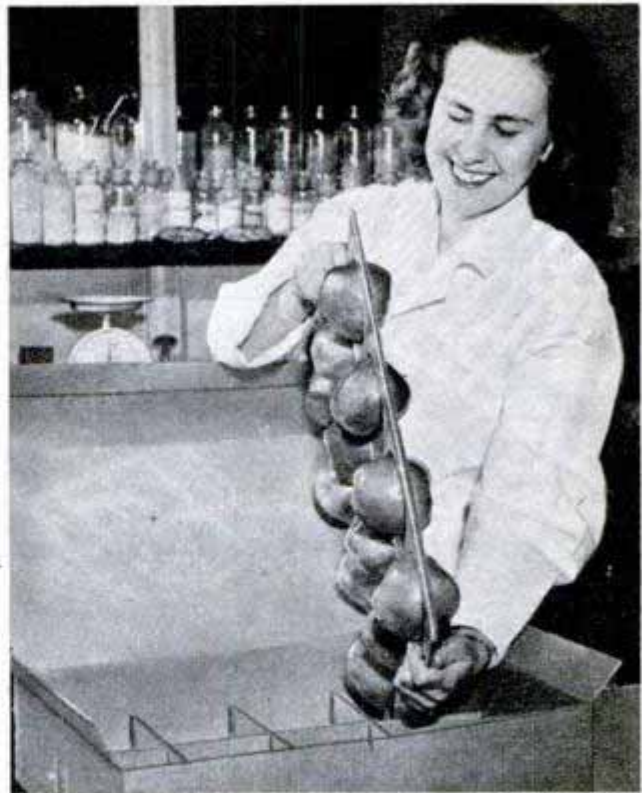
Pliofilm Cradle in Shipping Cases Protects Fruits and Vegetables

Fresh fruits and vegetables are protected against shipping damage and spoilage by a Pliofilm "hammock" which suspends them in a box, free from contact with each other or any part of the container. The foundation of the hammock pack consists of two sheets of cardboard in which holes are cut slightly larger in diameter than the fruit to be packed. Each sheet of cardboard is covered with a sheet of extremely thin Pliofilm. Then heat is applied to one sheet of Pliofilm. The fruit placed on its warm surface sinks down into the holes as the Pliofilm stretches and forms cradles. The other sheet seals in the fruit. The package is placed in a box fitted with partitions to prevent the fruit from touching top or bottom.

Iron Rammer Drives Fence Posts Into Unprepared Ground



In France, wooden or metal fence posts with square ends are driven into unprepared ground with a cast iron rammer. Each blow sinks a post about three inches. A cylindrical tube with attached hand holds fits over the top of a post. Two or more operators raise and lower the tool to ram posts into the ground. The rammer fits either rectangular or rounded posts. Although square-ended posts generally drive more true, a wedge-shaped point is an advantage in sand or gravel.

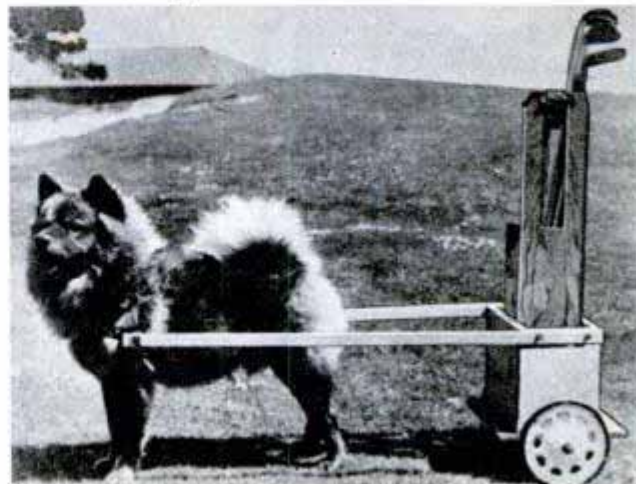


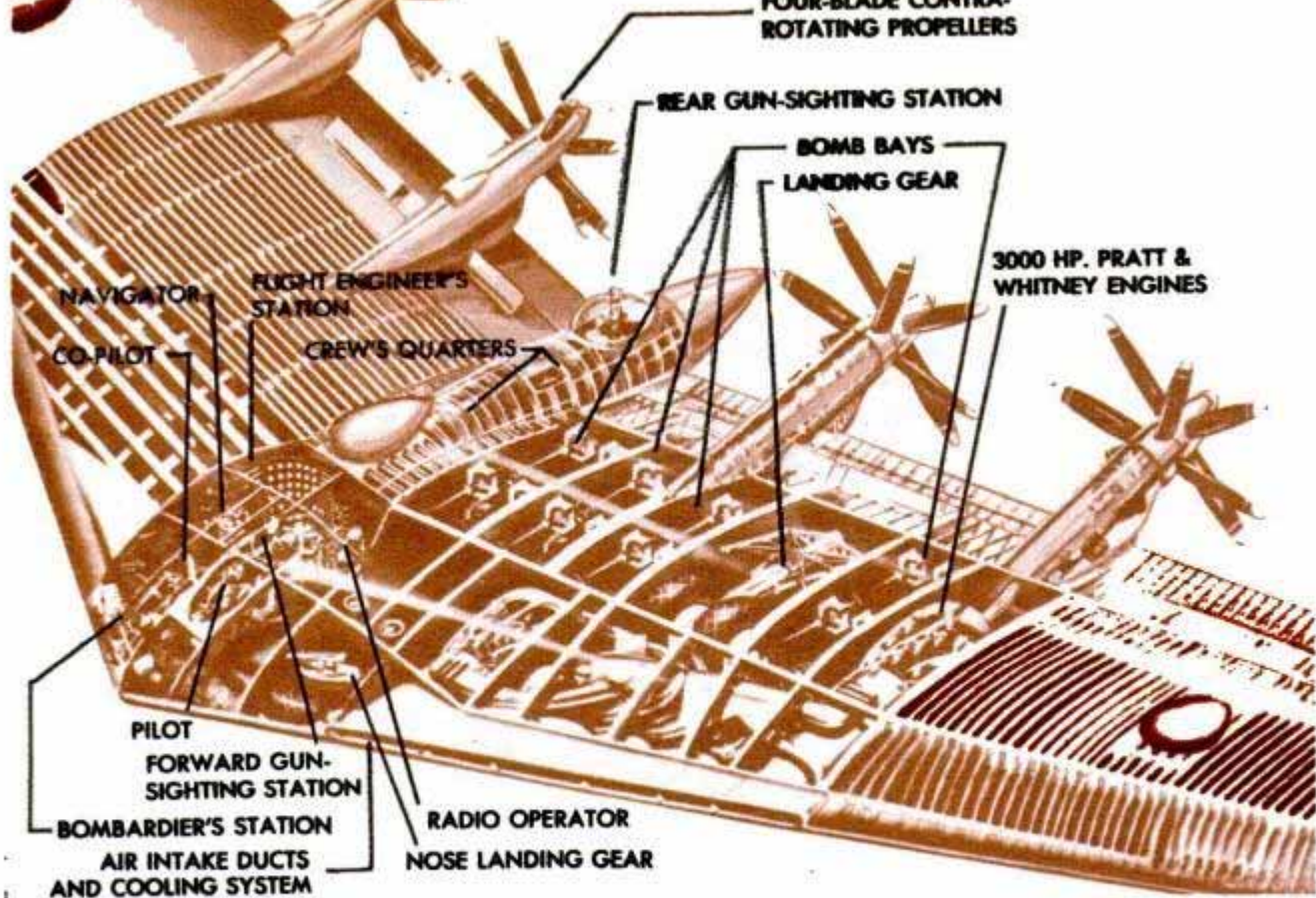
Machine Renovates Worn Asphalt

Worn-out asphalt pavement can be reprocessed in a steam machine and used again for road surfacing. The machine segregates chunks of asphalt from gravel and other broken pavement materials by re-converting the asphalt to liquid. Additional pavement material is mixed with the salvaged asphalt in accordance with the amount of resurfacing material required.

Dog Caddy Serves California Golfer

Mr. Wong, a Chow dog, recently completed his fourth year as a golf caddy. He hauls clubs at Del Monte, Calif., for Wayne Edwards, a history teacher. "Mr. Wong never barks when I'm shooting," Edwards reports, "but sometimes he gives me a smirk when I dub a shot."



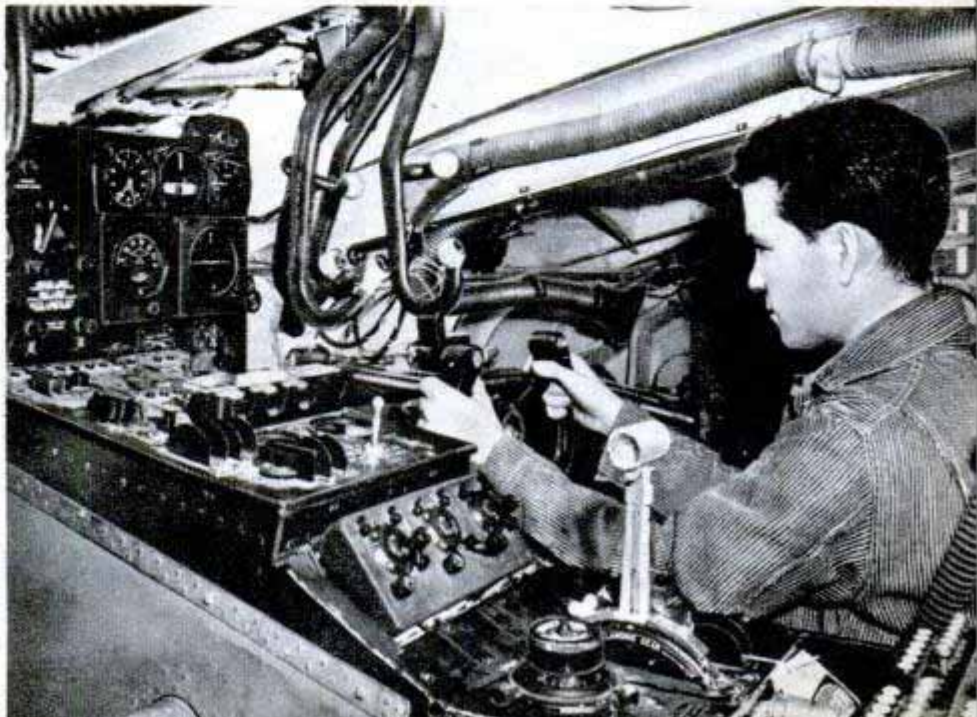


Inside the Flying Wing

Here's how crew and instruments fit inside the huge Northrop B-35, which is 39 tons heavier than the B-29 and has a range of at least 10,000 miles. The 15 men are in a pressurized center section 37½ feet long, with the pilot sitting in a raised nacelle at the extreme nose. The wing has a span of 172 feet and a gross peak load of 104 tons. Fourteen more are being built for the Army Air Forces



Without leaving his chair, the flight engineer (left below) can watch all of the instruments mounted on a curved wall. Forward vision for the copilot (right below) is through a plastic panel in the wing's leading edge



Shrinkable Plastic Provides Tight-Fitting Cover for Golf Clubs

Developed for dustproofing various manufacturing processes, a shrinkable plastic serves as a snug-fitting covering for the handles of golf clubs and tools, for bicycle handle bars and to patch garden hose. Before being applied, the plastic is immersed in a special chemical solution which expands the rubbery covering to half again its normal size. While wet, the plastic is placed over a handle. As it dries, it shrinks and forms a tight fit without losing any of its physical properties. The General Electric Plastics Division at Pittsfield, Mass., which developed the plastic, has no immediate plan to market the covering for general consumer use.



Computing Machine Figures "Outdoor" Distance of Indoor Drives



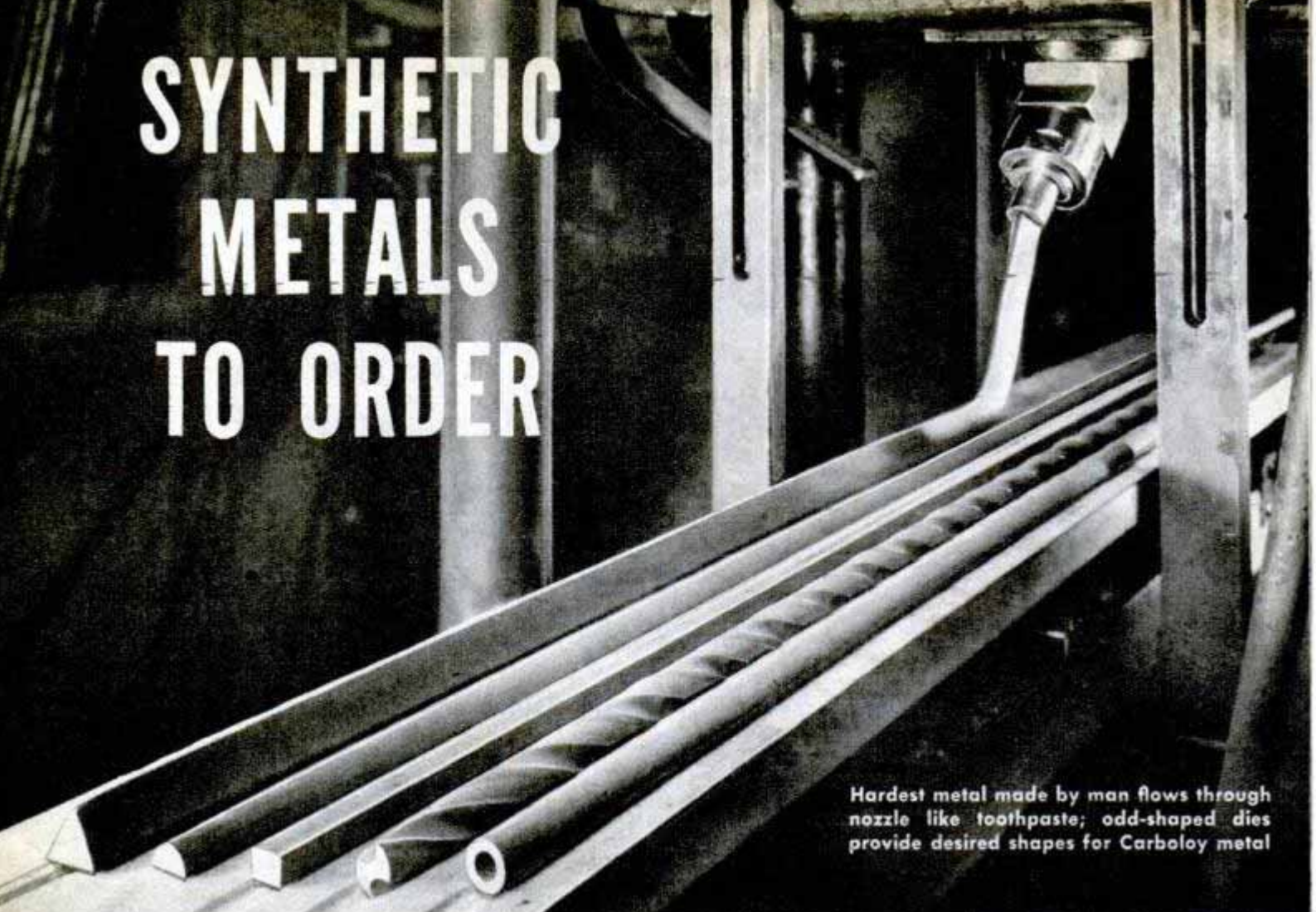
Golfers now can drive a ball indoors against canvas padding and learn immediately how far it would have gone on a golf course. An electronic device does the computing. Here's how it works: as the golfer hits a ball from a door mat, the ball breaks an electric eye beam. Breaking the beam starts an electrical circuit. The ball continues on its way and hits the canvas, 18 feet from the mat. This sound is picked up by a microphone hooked up in such a way that it stops the electrical circuit. A computing machine converts the duration of the circuit into yardage, which would have been the outdoor distance of the drive.

Roller Beneath Automobile Wheel Transmits Power to Belt-Driven Tools



Transmitting power from either of the rear wheels of a car or pickup truck, a take-off mechanism uses a roller system beneath the wheel to provide up to 10 horsepower to operate most belt-driven tools. The take-off consists of a double roller with mounting ramps and a power shaft housing. The car is driven into position so that either of the rear wheels rests between the rollers. When the engine is throttled down to idling speed, the wheel revolves the rollers, which in turn transmit the power to a pulley that can be connected by a belt to most farm tools. A special generator can be coupled to the mechanism to provide electric power. And a grinder is also available. A centrifugal pump that delivers 120 gallons a minute can be attached to the take-off.

SYNTHETIC METALS TO ORDER



Hardest metal made by man flows through nozzle like toothpaste; odd-shaped dies provide desired shapes for Carboloy metal

"TOO SOFT!" "Too weak!" "Too brittle!"
"They'll never take the place of forgings and castings!"

Those were some of the remarks that greeted powder metal products such as small gears and oilless bearings when they first appeared. But times have changed and so has the acceptance of powder metallurgy. No longer are powder metal products called "metal cookies" and dismissed as too soft, too weak, or too brittle. Powder metallurgy is as respected today as the older metal-forming methods: forging, casting and rolling. Engineers have found they can get qualities with powder metals that they can't get any other way.

One group of powder metals is helping to

"Jigsaw puzzle" pattern illustrates the many sizes and shapes into which powder metals are now being formed



hold back the rising cost of future automobiles, refrigerators, washing machines and countless other items. This group comprises the superhard "carbide metals." They are true synthetic metals. Some of them are heavier than lead. They are twice as stiff as steel, nearly as hard as the diamond; it is almost impossible to wear them out, and they retain their hardness at extreme heat.

Another important characteristic of carbide metals is that they excel both as "tool metals" and as "use metals." As tool metals, the carbides are today cutting things which all of us will be buying tomorrow. Cemented carbide cutting tools and shaping, drawing and forming dies are consid-

Carbide inserts in wire nippers eliminate resetting or sharpening; these have been in use eight years



ered essential by industry today for low cost mass production of automobiles, refrigerators, radios, pots, pans, coffee percolators, pressure cookers and a host of other necessities and luxuries.

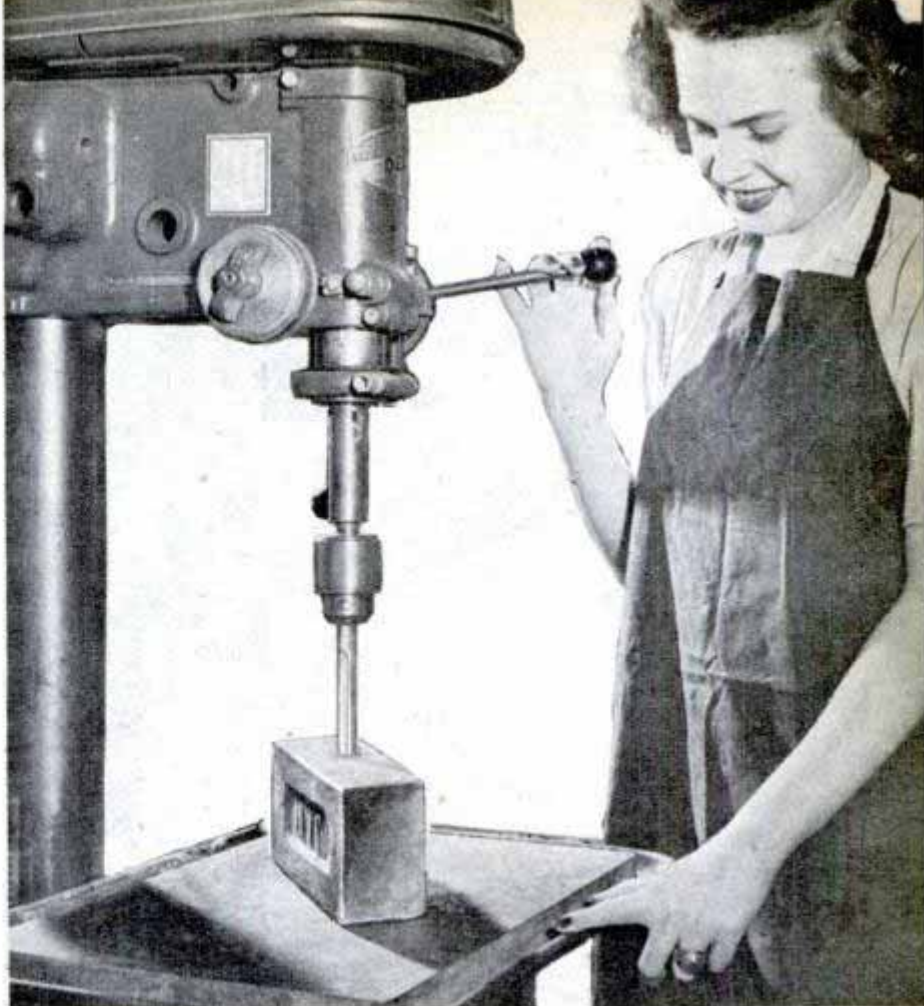
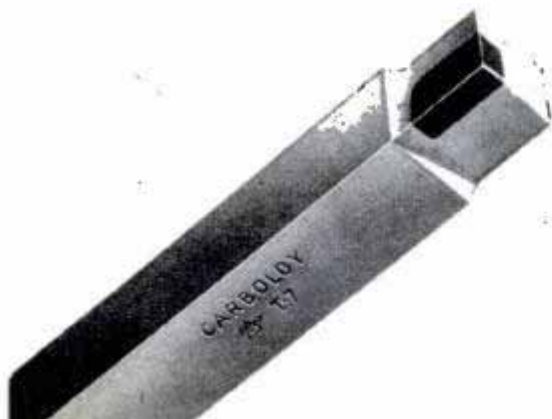
Produced only by powder metallurgy, metallic carbides are the hardest metals ever made in quantities by man. They are so hard that projectiles made of them pierced the heaviest German armor plate—armor plate from which the hardest of steel shells bounced off. Carbide tools also hewed out American guns, tanks, ships and planes at a higher speed and a lower cost than would have been possible with steel tools.

The hard carbide metals themselves are not really new, although most of their uses are. Back in 1896 a French chemist, Moissan, accidentally produced particles of tungsten carbide while he was trying to create a temperature equal to that of the sun in his newly invented electric furnace. Moissan tossed the hard carbide particles aside as worthless and grieved because he had not rivaled the sun.

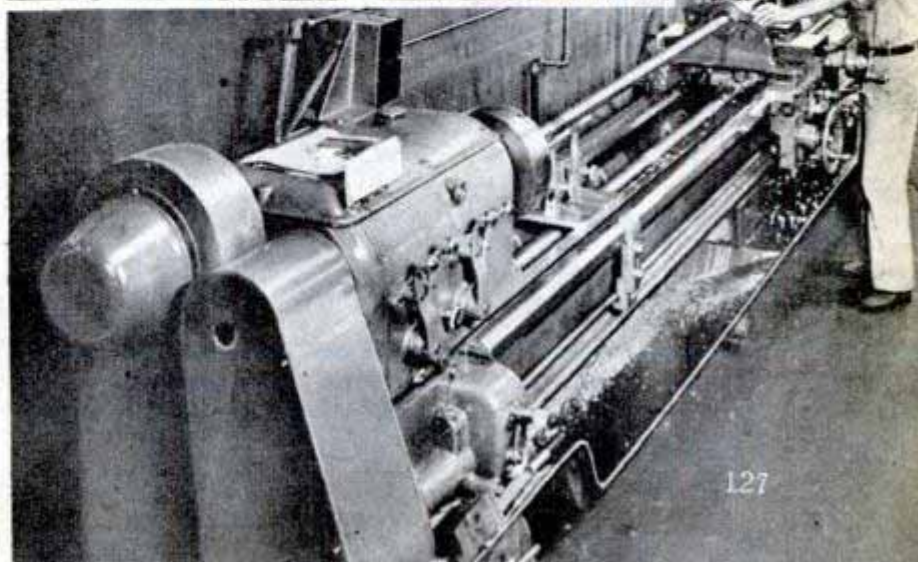
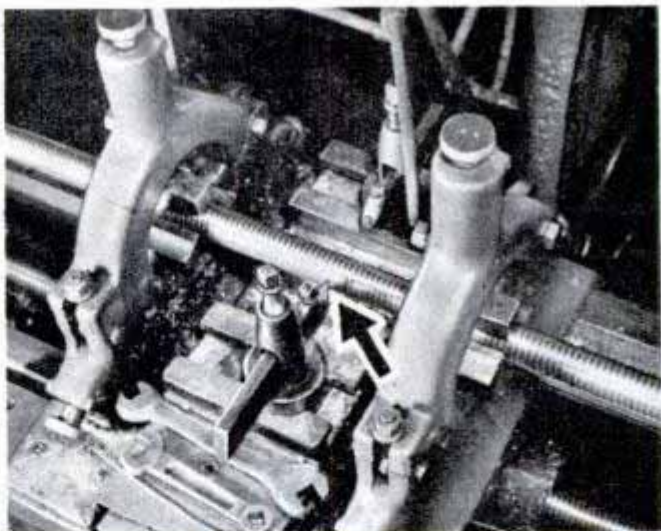
The first commercial use of tungsten carbide came during World War I when the hard-pressed German industry hit upon the idea of "cementing" together the individual hard particles. The resultant blocks of solid metal were used as substitutes for the diamond dies so badly needed at that time for drawing filament wire to be used in electric light bulbs. It was lucky for us that the Germans didn't learn at that time how to make carbide tools for cutting metals. If they had learned that trick, Armistice Day might have been postponed indefinitely.

About a decade after the end of World War I large bars of solid ce-

Dark corner of this cutting tool is the carbide tip, nearly as hard as a diamond



Carboloy masonry drill sinks quickly into ordinary firebrick—one of most highly abrasive materials. Below, this 300-foot threading operation was done with one grinding of cutting tool





Section of heavy armor plate from German tank was pierced by hard carbide projectile. Carbide shell core shown below is centered in an aluminum housing



mented carbide were imported by this country. A few manufacturers tried to make cutting tools out of the metal, but it was difficult to work because it approaches the diamond in hardness. Applications were extremely limited. Finally, in 1928, engineers of the Carboloy Company hit upon the idea of forming the metal in smaller pieces, close to the desired finished shape. This launched carbides in the cutting tool field.

The manner in which the hard metal carbides are made may be illustrated by ordinary tungsten carbide, a grade widely used for cutting tools. The base metal, tungsten, and lampblack—both powdered as fine as flour—are mixed and heated to a high temperature in an atmosphere of pure hydrogen. The material that comes from the furnace is powdered

tungsten carbide. Each particle is extremely hard but so small that if all the particles in just one pound of tungsten carbide were bricks, there would be enough to build a wall 1000 feet high and 200 feet wide across the United States.

This powdered metal is mixed with a "binder"—usually powdered cobalt or nickel. The resulting mixture is then molded into the desired shape under pressure. These shapes are "sintered," or heated, at about 2650 degrees F. The material comes out of the sintering furnace in its final hardened form—so hard it will easily scratch the hardest file.

Structurally, a piece of carbide metal might be compared to a brick wall. The bricks are the tiny pieces of hard metal carbide. The cobalt or nickel is the mortar or binding material which cements the hard particles together to form one compact piece of metal. Carbide metals can be made so dense that X-rays have trouble penetrating even relatively thin sections.

At present, the greatest single use of the hard metal carbides is still as a tool metal. However, carbide metal forms only the cutting tips of such tools. A small tip or blank of carbide is brazed or otherwise fastened onto the end of a tough, inexpensive steel shank. The retention of hardness at high temperatures has caused carbide to replace high-speed steel and other steels as

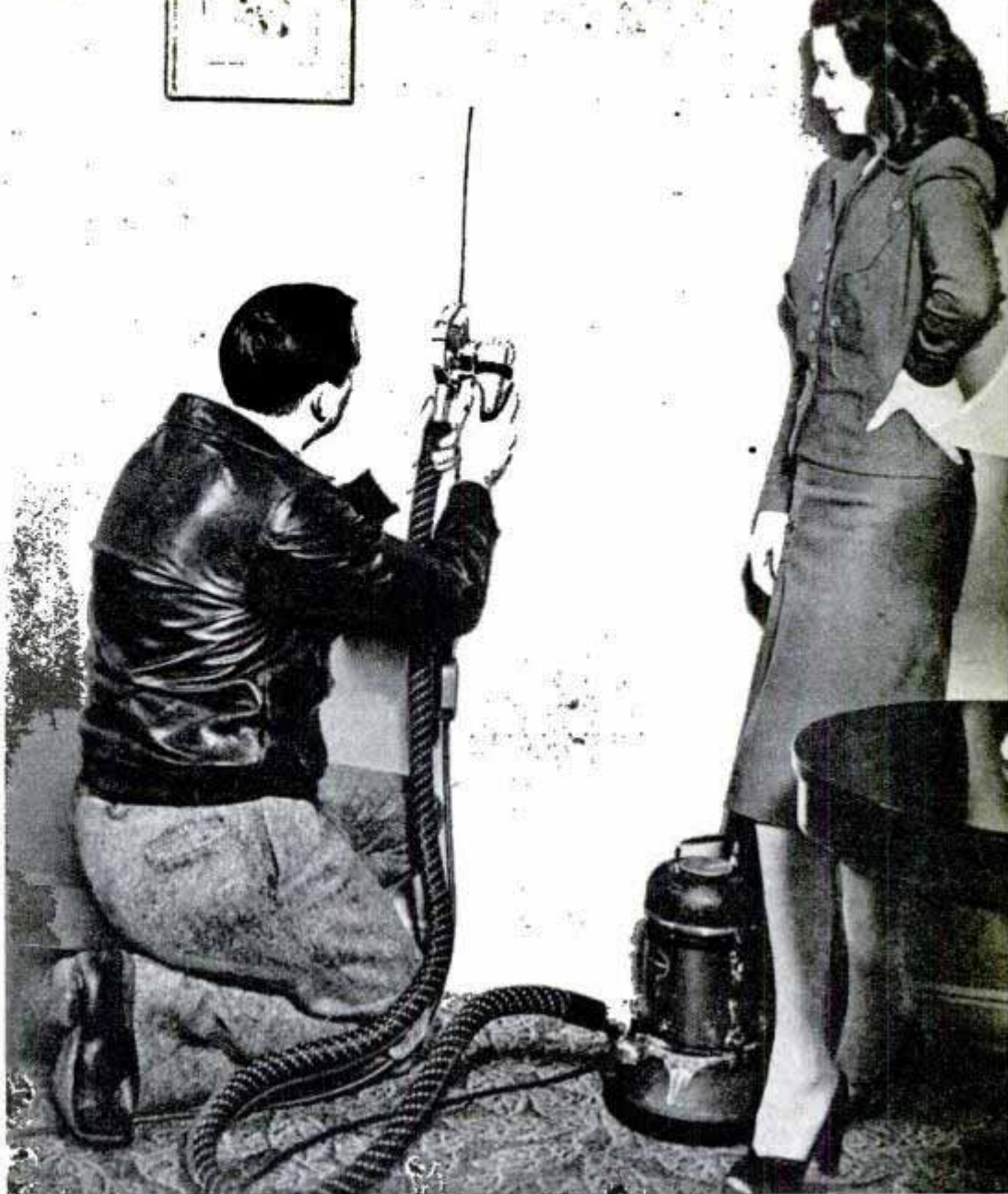
a cutting tool metal in both industry and the home workshop. In addition to metals, "nonmetals" such as glass, wood, stone, plaster and plastics are being drilled, milled and otherwise machined with these hardest of all tools.

Carbide tools not only last from four to hundreds of times as long as steel tools, but they cut many times faster. Thus carbide tools make it possible for the worker to increase his production per hour with less work, since he doesn't have to keep sharpening and resetting his tools. Also, carbides can cut materials that are tougher and stronger than ordinary steel. For instance, armor plate and even some modern automobile pistons and brake drums—which are so hard or tough that they quickly turn or dull the edges of high-speed steel tools—are easily machined with carbides. It is no exaggeration to say that America's fantastic records on the production lines during the recent war would have been impossible had it not been for this powder metal product that is nearly diamond-hard.

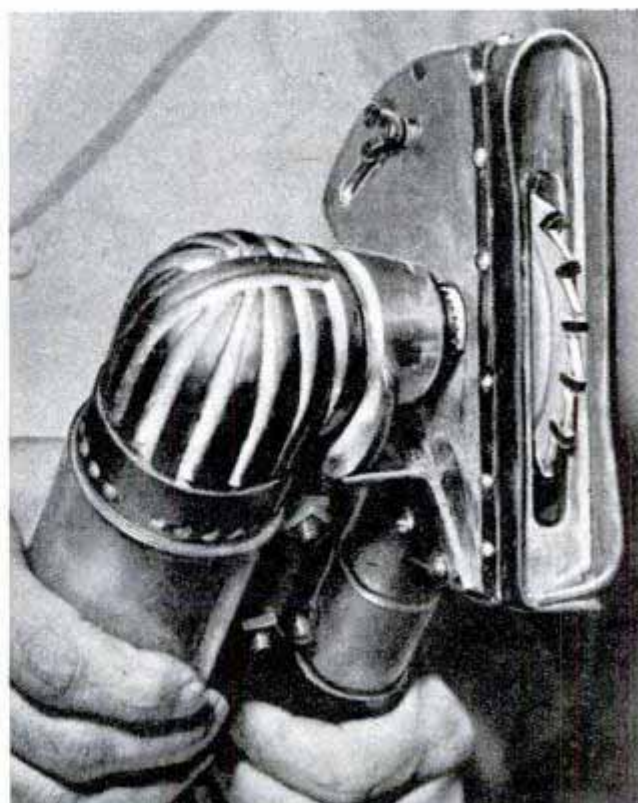
Despite the records made by cemented carbides as a cutting tool metal, future applications may involve the supplanting of steel, bronze and other common metals by carbides in all kinds of products which are exposed to rubbing and abrasion.

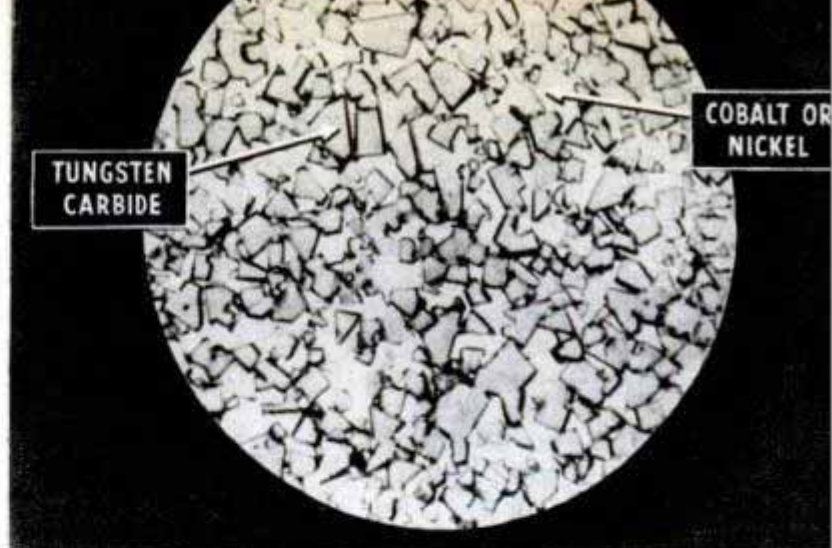
Hard metal carbides have been used for a number of years to make dies for drawing steel bars and rods into wire. In these dies, the carbide metal is used to form the inner bearing surfaces of the die—that part which bears the entire brunt of the wear caused by the drawing process. Today, carbide dies are considered standard equipment in the wire drawing industry. Their use made possible what is known as the continuous wire-drawing process—one of the major reasons why our factories were able to supply quickly the unprecedented demand for wire for war uses.

Undoubtedly, the use of carbide metals for tools and dies will continue to increase under conditions of peacetime competition.



Carboloy-tipped electric saw cuts cleanly through plaster to install new heating control equipment. Below, a close-up of hard-tooth saw used on walls





Steel chisel tipped with carbide is used in sculptor's air hammer. Right, magnified particles of Carboloy

since carbide equipment not only cuts costs of operation drastically but also helps lighten the load on the workers. Moreover, mass production of carbides has so greatly lowered their cost that today the hard metal industry seems to be standing upon a new threshold. It is a threshold which the industry is facing with restraint—for it leads into those fantastic realms of new ideas for consumer goods.

The men who make hard metal carbides are hesitant about predicting the extent to which these synthetic metals may be used in consumer items. They recognize that carbides have other exciting characteristics besides their unequalled hardness and tremendous resistance to wear. It is possible that the extreme density and weight of the carbides may suggest future uses. Or it may happen that carbide's stiffness—which is twice that of steel—together with carbide's resistance to crushing loads—which is higher than that of any other known metal—may result in uses now undreamed of. Other developments may center around the revolutionary characteristics of carbides as bearing materials.

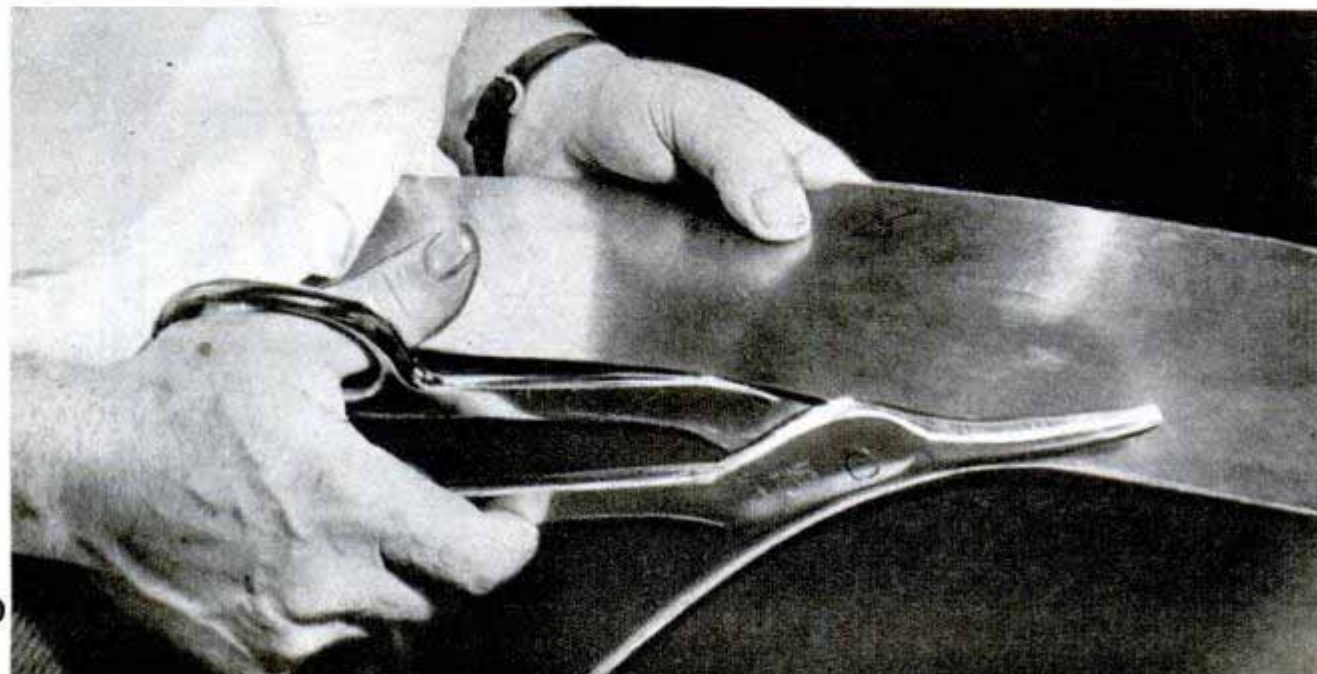
Nevertheless, the carbide men know that each new use for carbide metals requires many months and sometimes years of patient research. The minute word leaks out that some new carbide product is under development, the producers are deluged with demands from manufacturers and consumers which cannot be met. That is why carbide men are watching and working, but are not doing much talking.

However, the fabricators of consumer goods are already beginning to use the hard metal carbides. The appeal of everyday items which will last "almost forever" because of carbide's ability to withstand wear is too strong to resist.

Right now, the hard metal carbides seem to be a promise of a new climax to man's age-old hunt for "hardness." Ever since the day when man first lashed a sharp flint to a stick and used it for splitting firewood—and the skulls of his enemies—he has striven to develop harder and ever harder materials from which to fashion better things.

Copper. Bronze. Iron. Steel. To that list we can now add: hard metal carbides.

Sheet metal shears with work edges of hard cemented carbide will retain sharp edges despite constant use



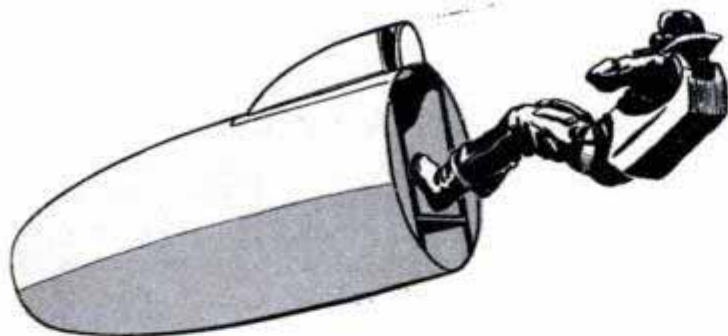
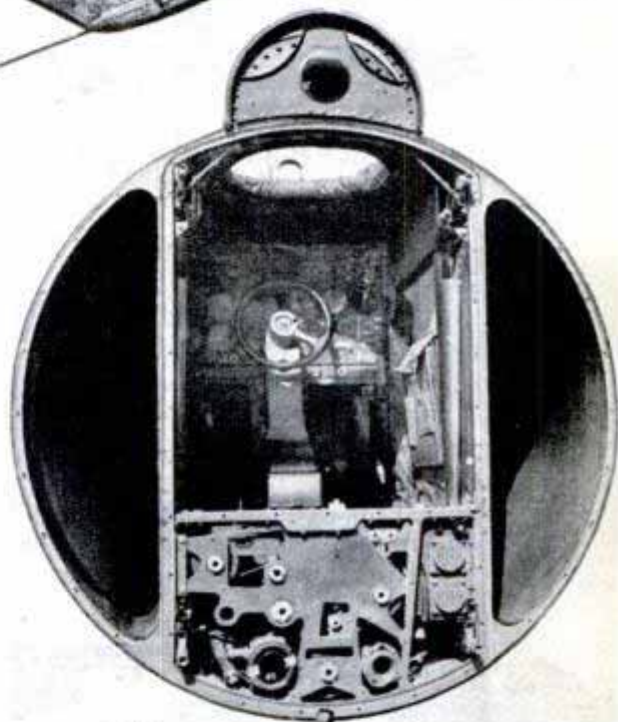
Navy's Supersonic Test Tube



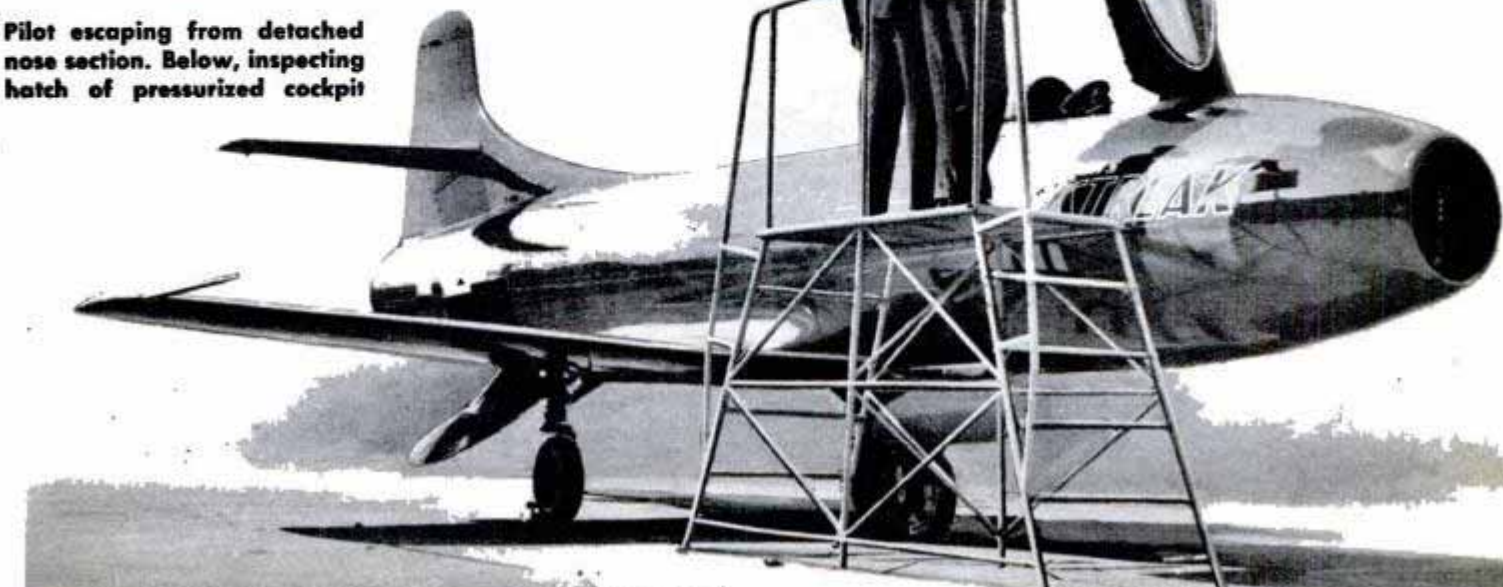
Quick release connections and pull-apart electrical plugs, below, permit pilot to break cockpit and nose section free for emergency escape at supersonic speeds

Painted bright red for visibility, a new "supersonic test tube" will make runs between 550 and 800 miles an hour at Muroc Army Air Base this summer. Built for the Navy by Douglas, the D-558 Skystreak is a long open tube of extra-thick magnesium alloy housing a General Electric turbojet engine with thrust equal to the B-29's four power plants or the equivalent of 75 automobile engines. It is said to be 60 percent stronger than current fighters. The engine and ducting occupy most of the 35-foot fuselage, which is supported by a 25-foot wing span. With wing-tip tanks the D-558 can fly for an hour and a half. To permit escape at high speeds, the entire nose, with the pilot inside, can be blasted away from the fuselage. The plane has 500 pounds of instruments to record pressures at 400 separate points.

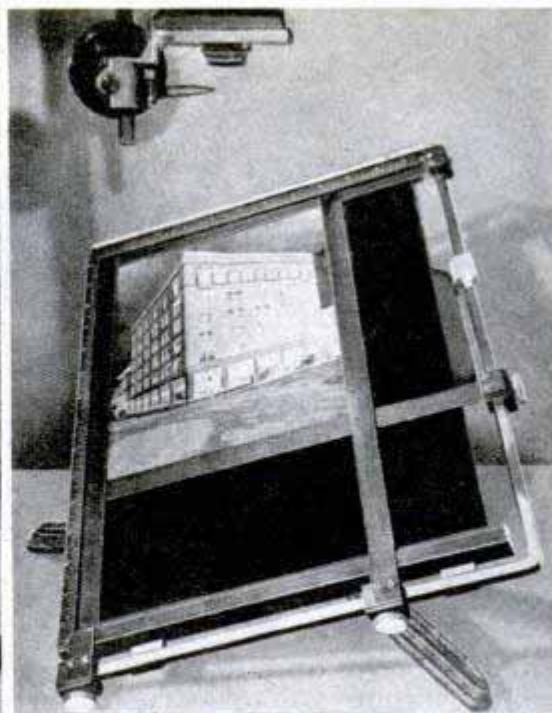
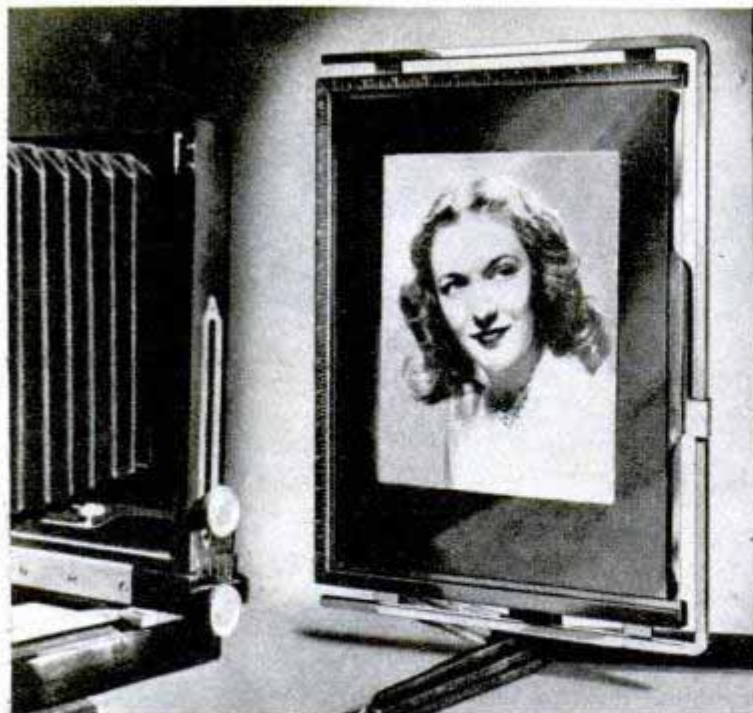
Douglas Aircraft photos



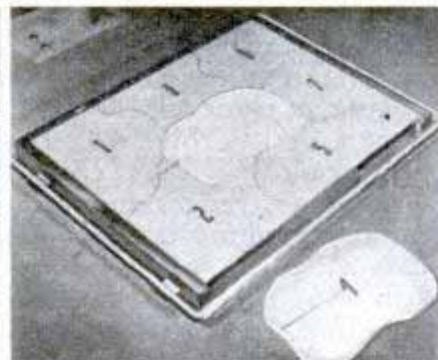
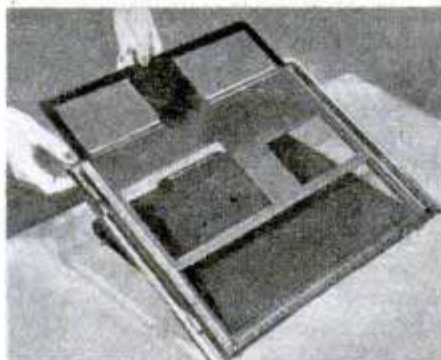
Pilot escaping from detached nose section. Below, inspecting hatch of pressurized cockpit



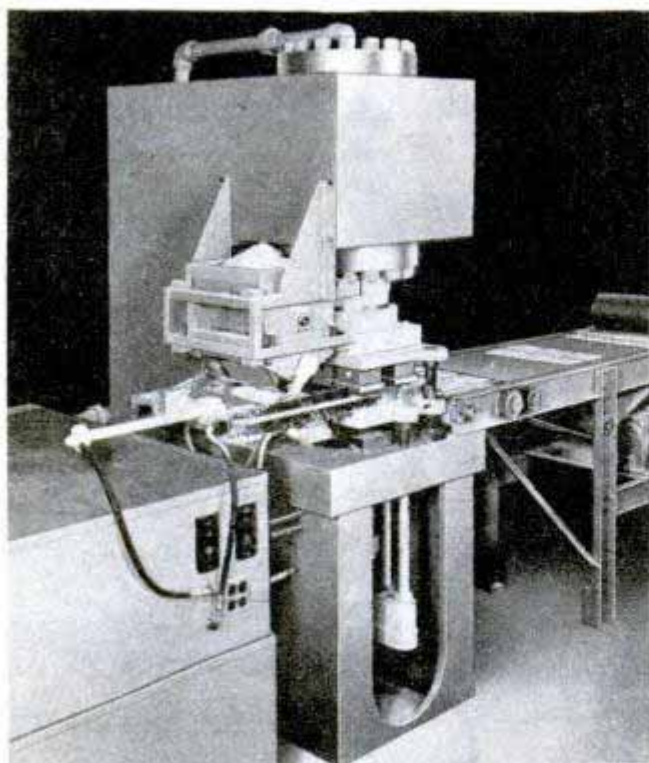
Enlarging and Copying Jobs Speeded by Quick-Centering Easel



Interchangeable for enlarging or copying, a multipurpose easel speeds darkroom work. No guide pins or slots are needed to hold the sensitized paper in position. A downward push on the mask is said to center the paper so accurately that a partly exposed print can be removed and reinserted for further exposure without blurring the image. An adjustable base for use with the easel may be tilted to



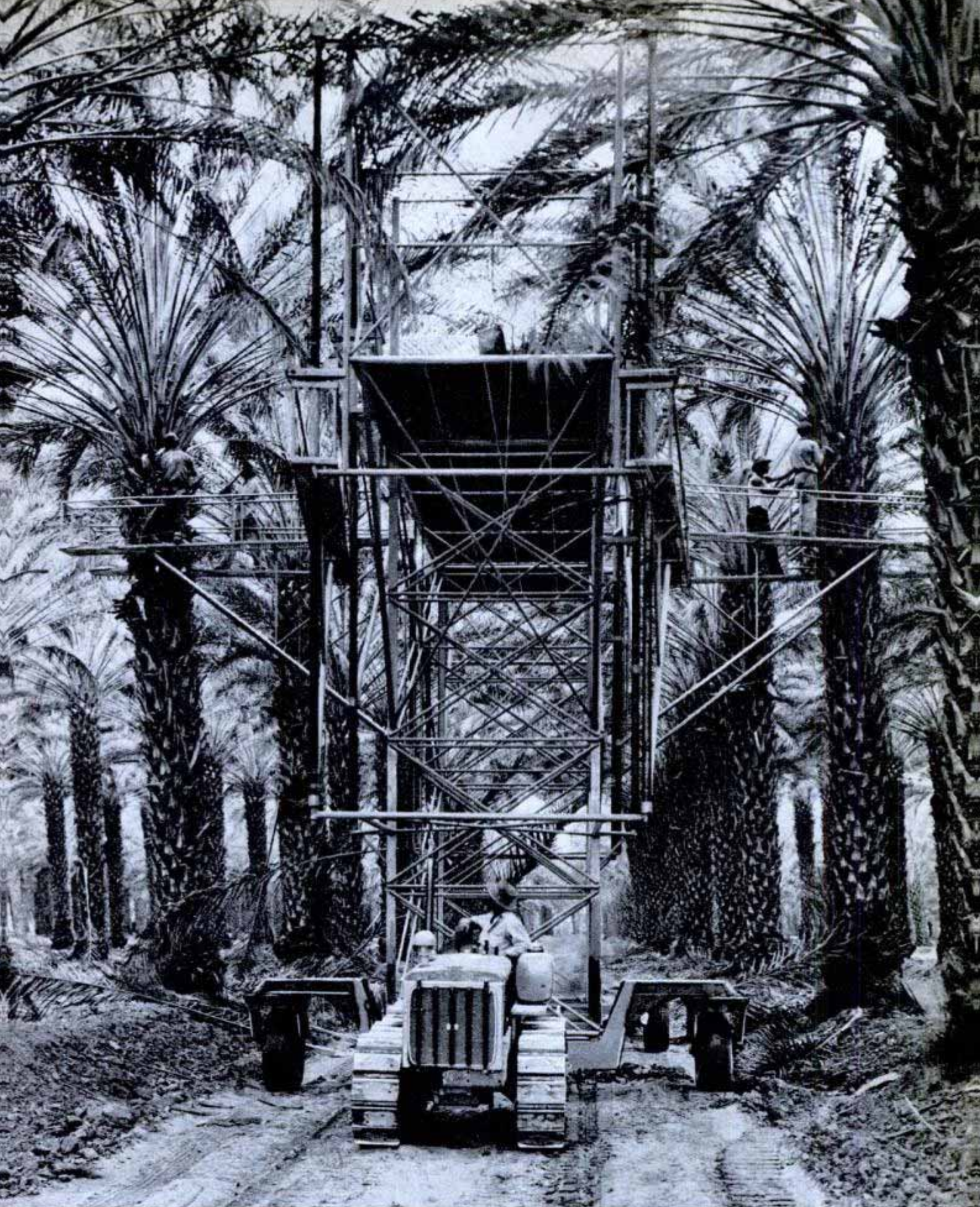
different angles for distortion control. It also can be turned in a vertical position for use as a copying easel



Hydraulic Press for Tile Making Handles Clay Automatically

Completely automatic in operation, a hydraulic tile press turns out tile under high pressure without human aid. The clay is unloaded automatically from a hopper into the shaker box where it fills each die cavity to a uniform depth. The dies are guided to positive alignment under hydraulic pressure. Because the machine utilizes high pressures, tile can be made by hitting the clay only twice instead of the three times ordinarily required. The elimination of one stroke saves wear on the die. One operator can supervise four of the machines.

You may wish to obtain additional information about the new products described each month in *Popular Mechanics*. If you want to know the name and address of the manufacturer or distributor, just write to Bureau of Information, *Popular Mechanics*, 200 East Ontario Street, Chicago 11, Ill.



Caterpillar Tractor Co. photo

Huge tractor-drawn platforms provide safe footing for workers who pick dates in the palm gardens of California's Coachella Valley. The rigs have swinging catwalks that can be

Date Workers Get a Lift

raised or lowered to any level between 18 and 45 feet above the ground. Each platform will support a crew of eight men and enables them to tend four trees at the same time.

AGE DOESN'T



Rod on rear of car is the antenna of a two-way radio. Pit crew can warn driver at the first sign of trouble

By Thomas E. Stimson, Jr.

HALF A DOZEN of the best race car pilots in the country were out to give the new driver the works.

"Good enough to race at Indianapolis, is he? Okay, let's find out!"

The test driver who had applied for an Indianapolis racing permit had been instructed to hold to an average of 110 miles per hour for 10 laps around the track. That meant speeds of around 130 miles on the straightaways, slowing down to only 90 or 100 on the turns.

Wham! With his exhaust cracking and barking one of the veterans shot by the novice on the back straightaway. Another came up from behind, passed on the inside



and drifted across his course. Coolly the new driver cocked his wheel to avoid the car.

On the stretch in front of the grandstands two cars were loafing along at 90, hugging the middle of the track. The applicant sized up the distances, passed both cars, and backed off from his throttle in plenty of time to take the next turn without sliding.

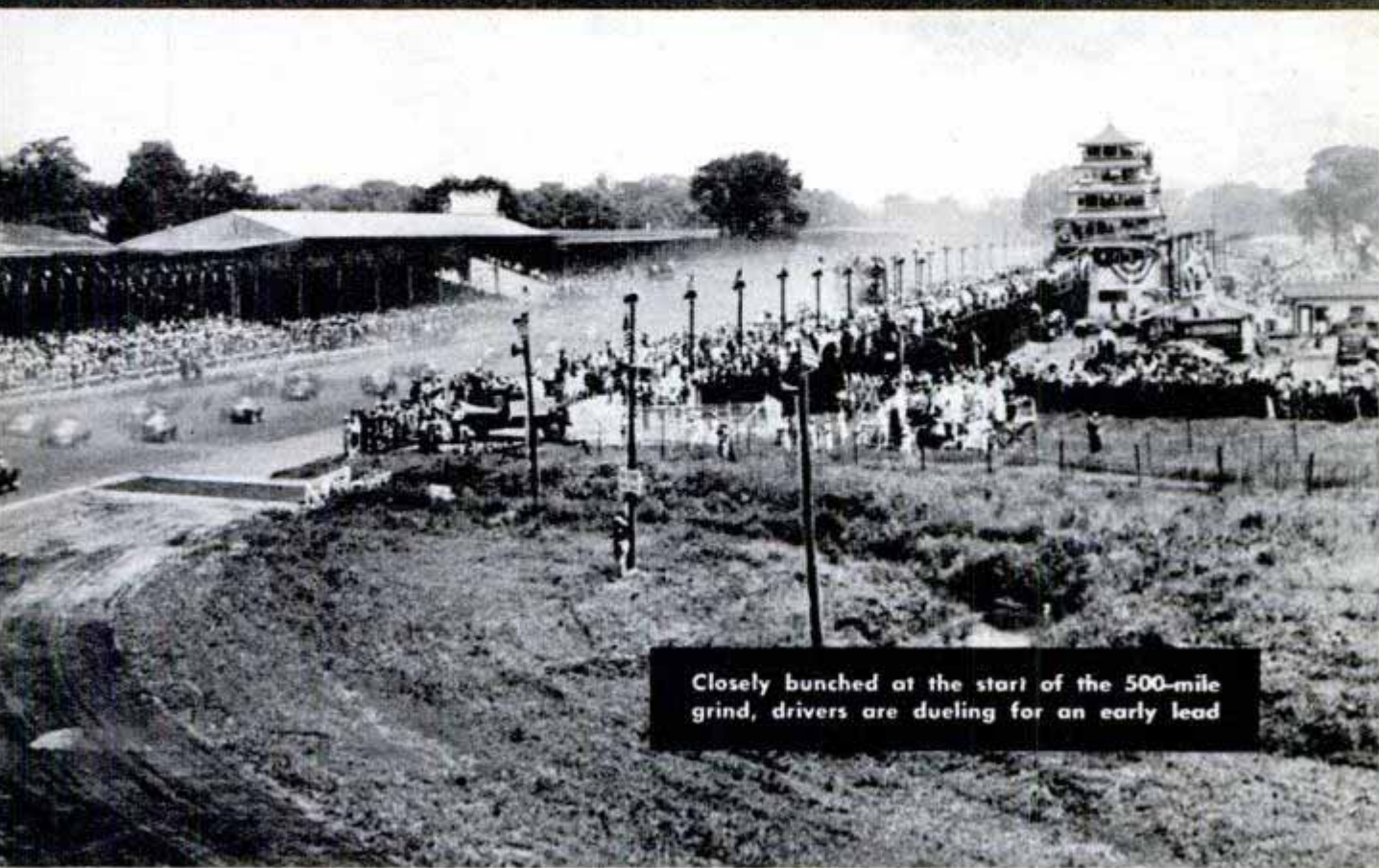
Lap after lap the other drivers deliberately gave him samples of the high-speed traffic that is part of the 500-mile Memorial Day race. Meanwhile a committee of observers stationed at the turns and other vantage points watched every move that he made. Was he driving too wide on the stretches? Was he taking the turns safely? Was he holding close to his 110-mile average? Did the traffic fluster him? Let's call him in at the end of the 10 laps and see if he's tired or nervous.

If the new driver passes all these tests he'll be allowed to compete for a place in the starting line-up of the 500-mile race on May 30.

Crew tunes up the front and rear engines of a twin-engine racer. Circulated air is exhausted through the slot in the tail



COUNT ON THE SPEEDWAY



Closely bunched at the start of the 500-mile grind, drivers are dueling for an early lead

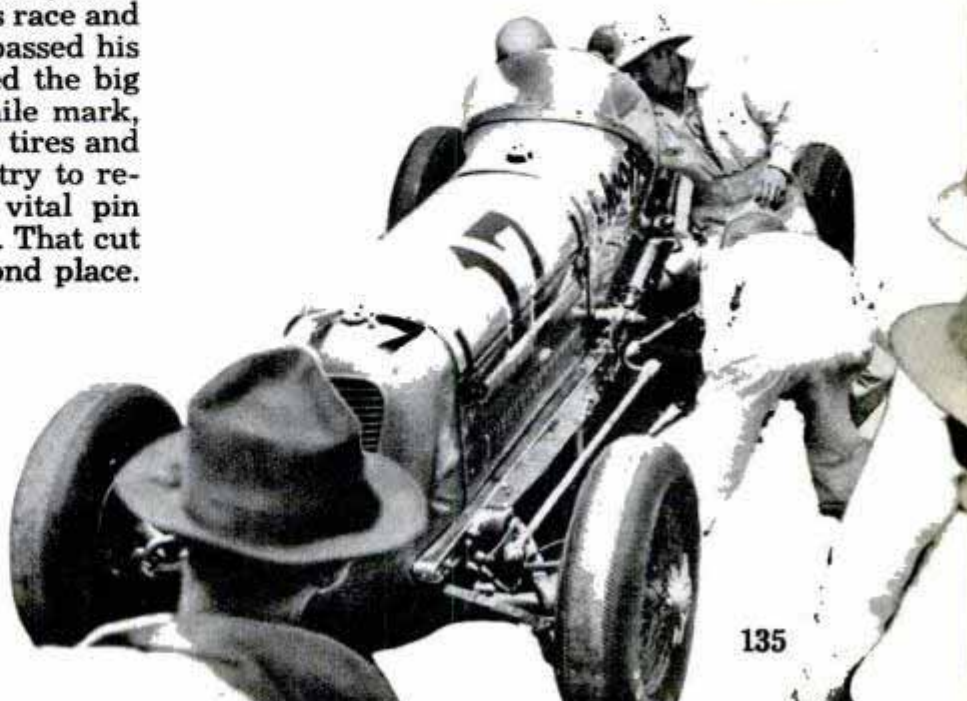
There's always a chance that one of the brand-new drivers will win the race itself. That hasn't happened in recent years, though Jimmy Jackson came close to winning the race last year, the first time he had driven on the track.

Jackson had ridden as a mechanic at Indianapolis in the past and more recently had been driving midgets. Last spring he bought a front-drive four-cylinder 258-cubic-inch racer from the Boyle team, nominated the car for the Indianapolis race and applied for the driving test. He passed his test, qualified the car and entered the big race itself. Leading at the 270-mile mark, he went into the pits for fuel and tires and was out again a minute later to try to regain his lead. At 300 miles a vital pin sheared off inside one carburetor. That cut his speed and he finished in second place. Even so, he won \$13,500 in place and lap prizes, thousands more than he had paid for his car. On his first appearance at the track as a driver Jackson made a better

When a driver slips into the pit his crew works like a well-drilled team to service, inspect and repair the car

showing than many veterans ever did.

No matter how good his past record, each new driver is required to pass special comprehensive driving tests before he enters his first race on the Indianapolis track. The purpose of this, says L. W. "Ike" Welch, chief observer, is to license only those drivers who are in good physical condition and who demonstrate safe driving habits. Those who drive dangerously or who appear to





Copyright C. J. Bell-Tower Studios

Mauri Rose crashes into the speedway's north wall in 1946. Line in the sky above the car is its rear axle

lack the stamina needed for the 200 grueling laps around the 2½-mile track are weeded out.

Half or more of the applicants usually flunk. Even a veteran of the dirt track and midget circuits may fail to show good timing at high speed. Instead of finding the speed groove for his particular car he may be all over the track, hitting his brakes as he goes into the turns and weaving across the track as he comes out of them.

Some drivers can't finish their tests because their cars won't develop the high speeds that are necessary. Last year 28 new drivers started their tests but only 13 were certified for racing on the track. The tests are held during May in the four weeks preceding the Memorial Day race.

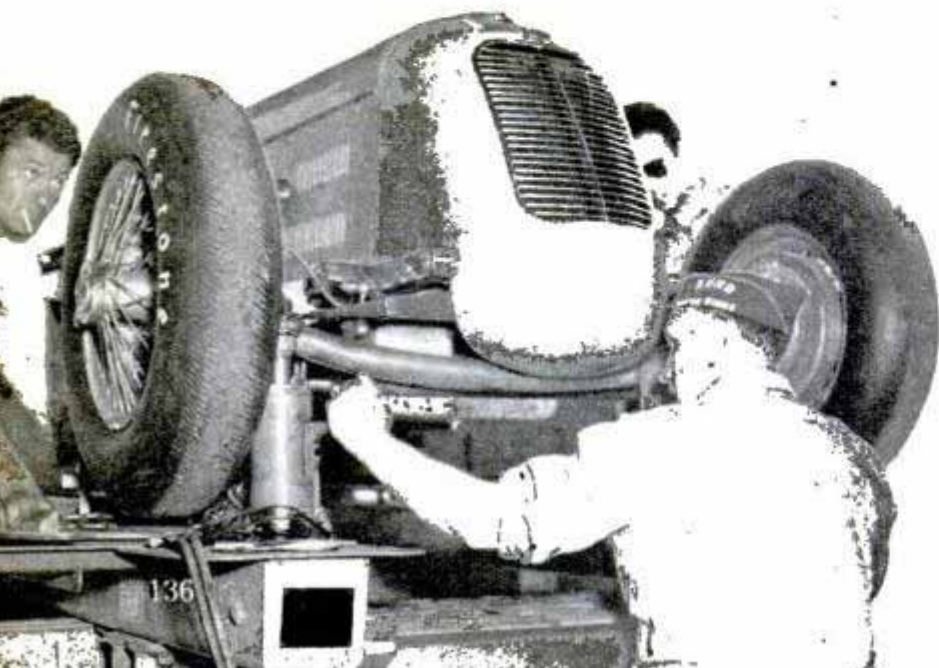
"After a new driver arranges with a car

owner for the use of his car he applies to Jack Mehan, the chief steward, or to the chief observer for permission to take the tests," Ike Welch explains. "If he is a registered AAA racing driver he gets the regular tests. If he doesn't hold a racing license he must take a special preliminary test of his ability. If he passes this test he is allowed to take the standard tests.

"In his special preliminary test he is instructed to drive 10 laps at an average speed not exceeding 95 miles per hour. A committee of car owners and others with track experience is placed around the track together with a few special observers who are connected to the chief observer by telephone. These men report any driving below the white lines on the insides of the turns, any lack of control, or any other erratic driving that they observe. Usually the driver isn't aware that he is being watched and he never knows the identity of the men who are picked to observe him. At the end of 10 laps the committee makes its report and if this is favorable the new driver is allowed to take the regular set of tests.

"The first of these is 10 laps at 85 miles per hour. This slow speed approximates the time that drivers make when the yel-

Drivers insist their cars run as smooth as a watch before race starts. Here a crew checks alignment of the front end





Pit crew observes car anxiously as it streaks past. Blackboard is used to signal driver's place and number of laps. Right, crew's electronic timer checks speed



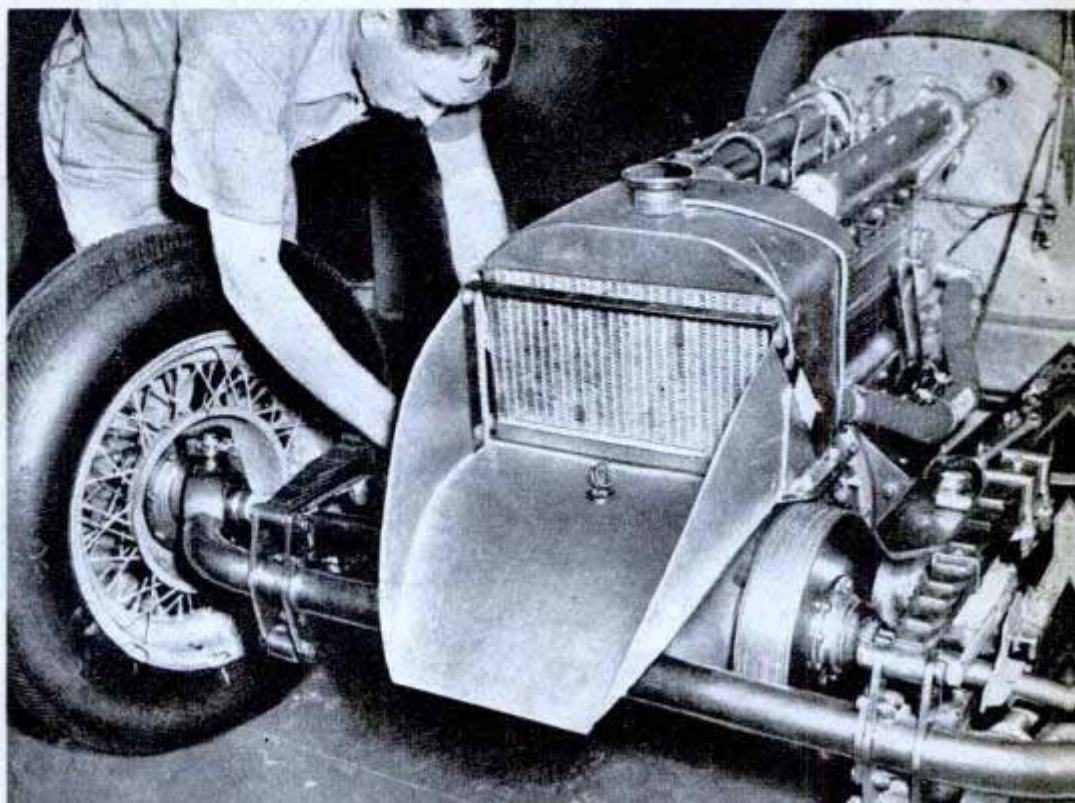
low caution flag is displayed during a race. It is purposely included in the tests to accustom the driver to handling his car at slow speed. Most drivers, of course, watch their tachometer in order to gauge their speeds. During the test a man in the pits holds up a blackboard that tells the driver the time he is making so that he may change speeds to maintain the correct average.

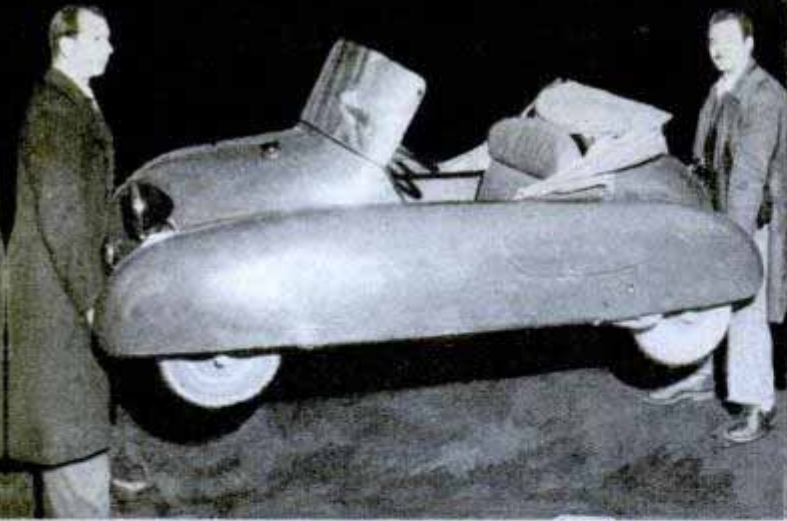
The next test, held immediately if the driver shows good control at 85 miles an hour, is 10 laps at 95 miles per hour. This is followed by 10 laps at a speed of 105 miles, then the pace is stepped up to 110 miles for 10 laps. The final test is another 10 laps during which the driver must average 115 miles per hour.

Other drivers circle the track during one of his fastest runs to give the novice a taste of traffic. This "heckling" is done prudently without any moves that might lead to an accident and simply shows the new driver what to expect when

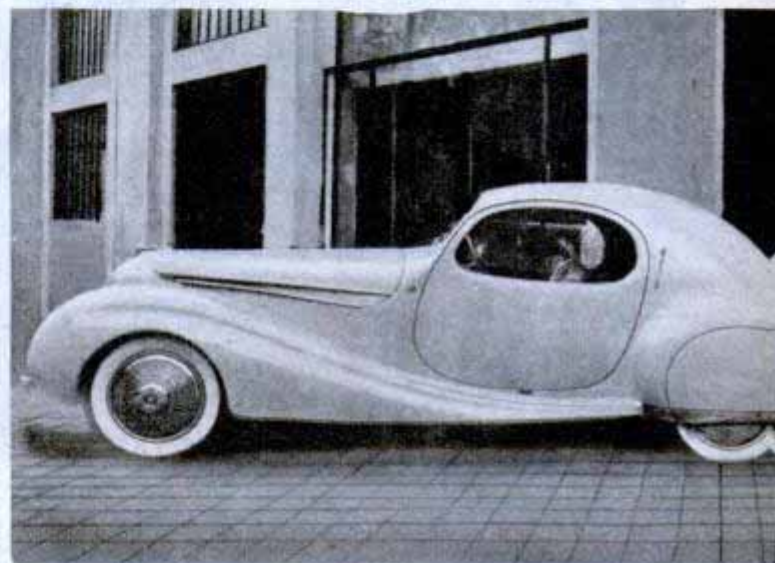
(Continued to page 264)

Forward scoop directs the flow of air through the radiator of this front-wheel-drive racing model





MIDGET VEHICLES are becoming popular in Italy because of their extremely low fuel consumption. The tiny car at the left covers 120 miles per gallon of gas under steady driving conditions and can be lifted by two men. The three-wheel dump truck at right carries as much as 1½ tons of cargo, yet goes 30 miles per gallon



SLEEK CAR for the French buyer is the Delahaye Competition, a low-slung six-cylinder auto with super streamlining. Available in the models shown above, it has built-in headlights, an electromechanical gearbox and a special oil system. Cars built by this manufacturer have won several international races in the past

TRICYCLES carrying moving picture posters are pedaled along the busiest boulevards in Rome to advertise the latest films. The posters are mounted on the two faces of a big "sandwich" type billboard which rests on a steel frame mounted over the rear wheels. An Italian advertising agency developed the unique tricycle ads

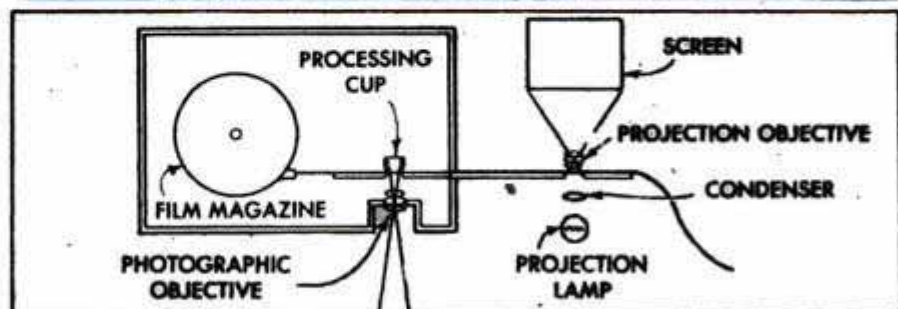
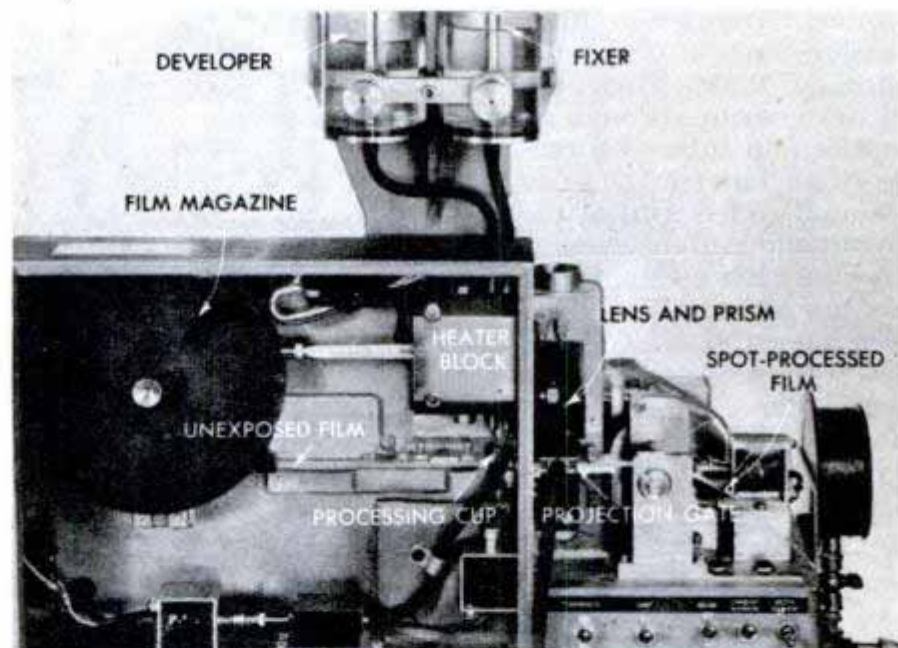


Camera Snaps, Develops and Projects Pictures Within 15 Seconds



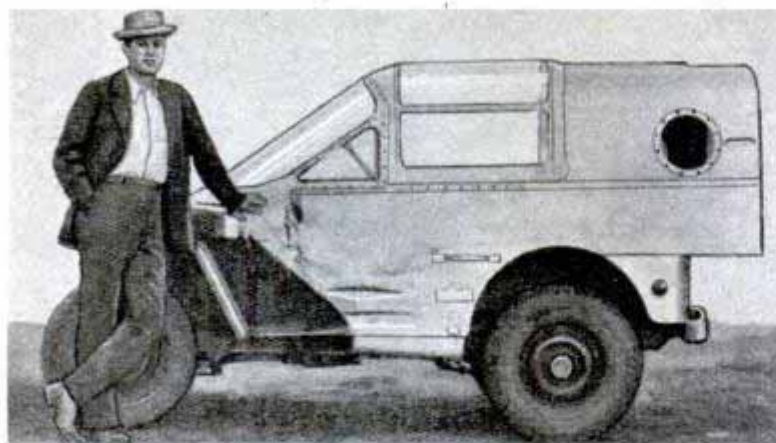
Photographs are snapped, developed and projected on a screen, all within 15 seconds, by an automatic instrument that combines a camera, processing cabinet and projector. The machine uses 16-mm. film to provide exposure-to-projection photography in a fraction of a minute. In a public demonstration recently, persons entering a room were photographed and their pictures appeared on the screen before they had reached their seats. Inside the camera a strip of film is pulled intermittently along a track and an exposure is made through the film base on every fifth frame. The exposed film moves into a processing cup where hot chemicals are squirted on to it to develop a direct positive image in about nine seconds. Excess chemicals are cleared by vacuum and the nearly dry image is pulled into a projection system where a stream of air completes the drying, cools the film and holds it flat for immediate projection. The developing and fixing solutions used are very active chem-

Camera snaps a photo every fifth frame (film strip at right) and projects it on the screen at left within 15 seconds. Below, side view shows principal parts and diagram gives exposure-developer-projector sequence



ically, especially when applied hot. The machine, developed by Eastman Kodak Company, may find use in the quick reproduction and projection of scientific data.

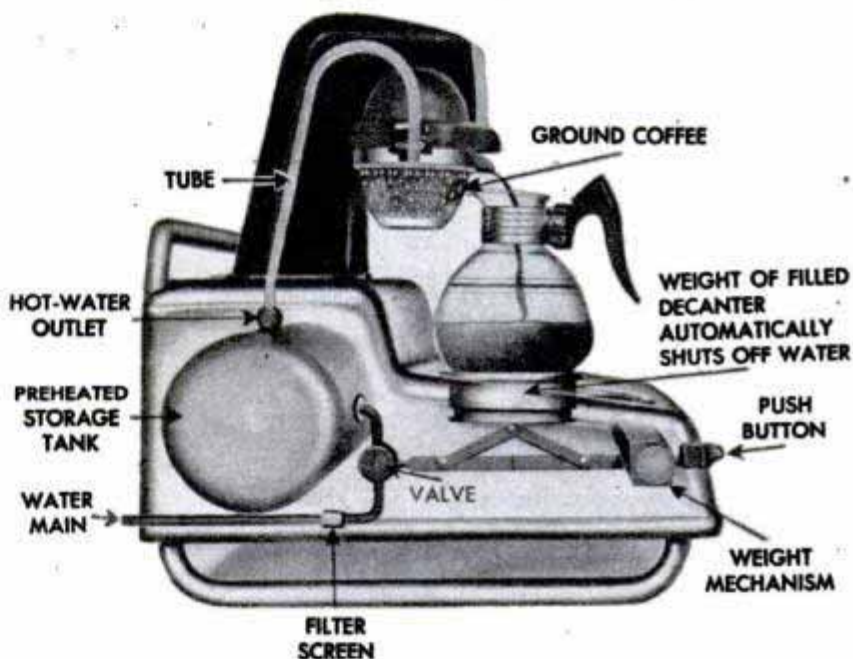
Jeep Covered With Cockpit Section of Plane Makes All-Weather Auto



By covering a jeep with a section from the fuselage of an airplane, Cecil Malone of Henderson, Tenn., has remodeled the vehicle into a streamlined all-weather automobile. He bought the fuselage of an Army advanced trainer and cut out the cockpit section to fit over the jeep. The sloping windshield streamlines the little vehicle and the driver has a clear view in all directions—even overhead—through the plastic windows. The fuselage also protects the driver in case of an accident.

Endless Fountain of Coffee Is Supplied by Automatic Brewing Robot

Fresh hot coffee flows like a fountain from a coffee brewing robot that goes into action the instant a push button is pressed. As illustrated in the cutaway drawing, pushing a button moves a weight mechanism that opens a valve and admits water through a filter screen into a preheated storage tank. Then the water goes up through an outlet and tube to a cartridge that contains ground coffee. Out of the spout and into the decanter pours hot coffee, ready to be served. When the decanter becomes filled, its weight presses down on a balance which shuts off the flow of coffee and keeps the heat on below the decanter. This ingenious coffee maker was de-



signed by the Cory Corporation for use in restaurants. The exact amount of water is supplied by attaching it to a water main.



Jack Pulls Car Off Ground

Automobiles are lifted instead of pushed off the ground by a new friction-type bumper jack. The lifting unit hangs from a suspension point above the bumper, formed by the jack's two legs which are chained together at the base and meet in an inverted V. For storage it collapses into the same space required by a standard bumper jack.

☐ Soiless gardens totaling 80 acres soon will supply American occupation troops in Japan with tomatoes, lettuce and other fresh greens fed by chemicals.

SMARTEST SHIP AFLOAT!



Science's newest navigation devices are being tested on this floating laboratory. Visible are radar antennas, bearing repeaters (left of the 20-inch searchlight and in the center of main deck), and loran antenna

By Bill Reiche

AN IDLE TOWBOAT loses from \$100 to \$200 an hour—but radar, which sees through fog and foul weather, can keep it on the job. A hand-steered fishing trawler can do six days' fishing in five after being

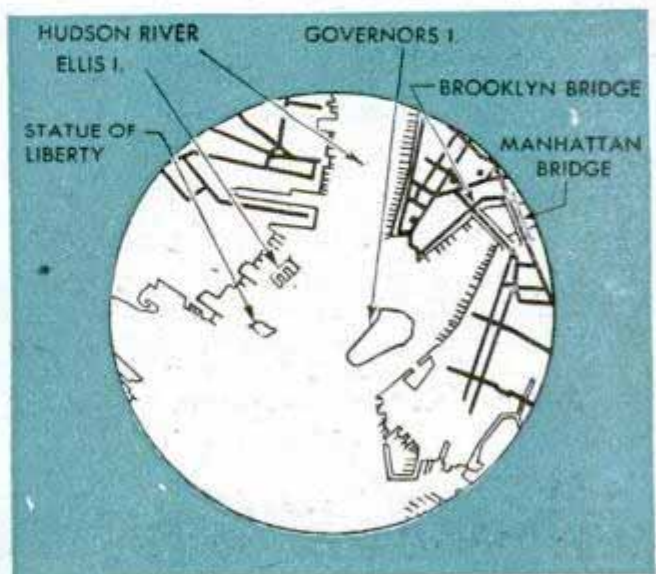
New York harbor as it appears in ship's radar scope

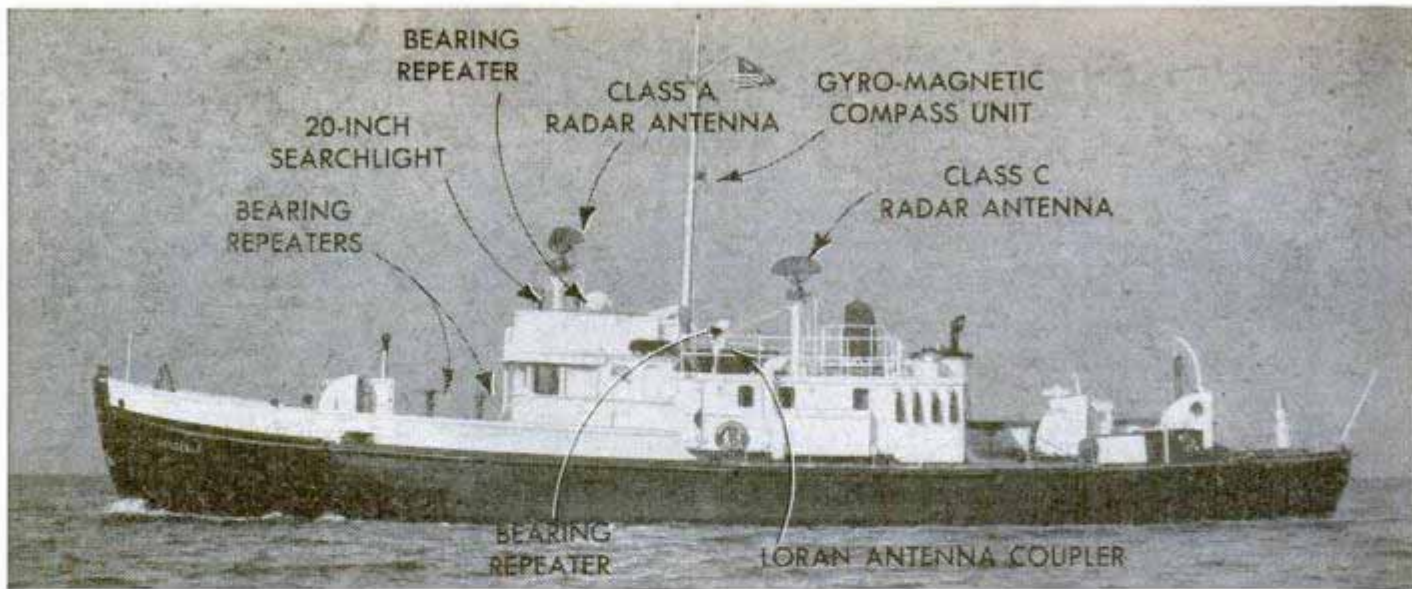


equipped with electromechanical steering. A device called loran eliminates lost time and costly errors in locating the best fishing grounds, and gyro-compasses keep 100-foot boats on courses exact enough for the Queen Elizabeth.

Used on naval ships and modern ocean

Compare radar scope (left) with this map of harbor





This view of the Wanderer, Sperry Gyroscope Company's test ship, shows location of the navigation equipment

liners, these navigation aids are being adapted for smaller craft. Soon even the sturdy fishing craft off the Grand Banks will have electronic and electric "crews" that will make the best prewar ship look like a Phoenician galley.

There is a unique "personality" behind the scenes in this drama of making small ships big-time performers—not an engineer or a scientist, but a motor yacht—the smartest ship afloat.

She is the Wanderer, a 101-foot Diesel-electric craft, termed a million-dollar floating laboratory. From her home port of Oyster Bay, Long Island, she puts out to sea or into inland waters with the most complete navigating equipment ever placed in a hull.

A long-range (she can cruise 5000 miles without refueling) seaworthy yacht, she was built for a private owner 15 years ago. During the war she served with the Coast Guard in defense of the eastern seacoast. After VJ Day she was leased by the Sperry Gyroscope Company for use as a floating test chamber of navigation aids.

Hollis Walter, Sperry engineer, explains the purpose of the tests: "Men and materials that go to sea have to be pretty rugged. We're not interested in operation or long-life duty when equipment is adjusted and cared for by a lot of lily-handed lab assistants. We want to put it out to sea and watch its operation when it's handled by a heavy-fisted bunch of salty squareheads."

Outstanding among the Wanderer's devices are the triplets of navigation: loran, which tells you where you are; the gyro-compass, which tells you where you're going, and radar, which tells you what's in your way.

Also in test service are devices for electromechanical steering, automatic steering in conjunction with the gyro-magnetic com-

pass, rudder angle indicator, marine gyro vertical and course recorder.

A recent 6000-mile cruise on the Atlantic, the Great Lakes and inland waterways provided acid tests for new and smaller models of radar, loran and the gyro-compass—the devices most in demand.

Using the new Class A radar, with the pilot house completely blacked out, blind approaches were made in the harbors of Bridgeport, Conn., Cleveland, Boston and New York. This set, about the size of a home radio-phonograph, can be set at ranges of 2, 10 or 30 miles. At its minimum

Gyro-compass steering equipment is now more compact



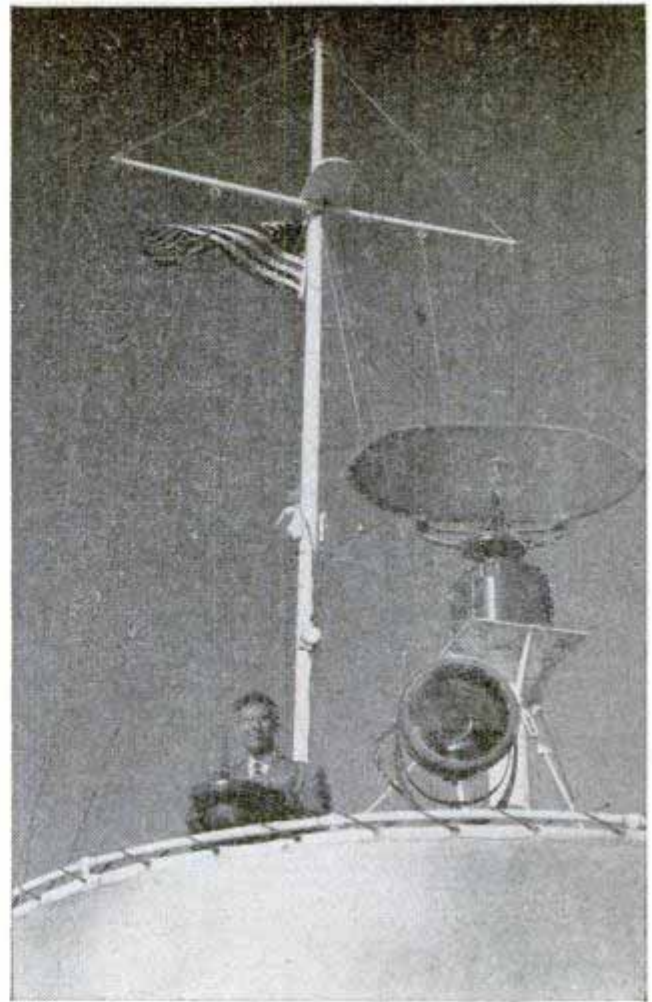
range it is guaranteed to show on its 12-inch scope a three-foot buoy at a distance of less than 100 yards from the ship.

River towboat operators and ferry companies are greatly interested in this equipment following its successful test on the towboat Tri-State between Pittsburgh and Catlettsburg, Ky., on the Ohio River. On this run the radar detected a tin can bobbing on the water less than 100 feet from the boat's bow.

Sperry engineers doubted this until the fact was confirmed by the company representative on board. They suspect, however, that the can acted as a resonator, thus returning a much stronger signal than would normally be found, and they do not wish to have this freak eagle eye performance considered as standard operating procedure.

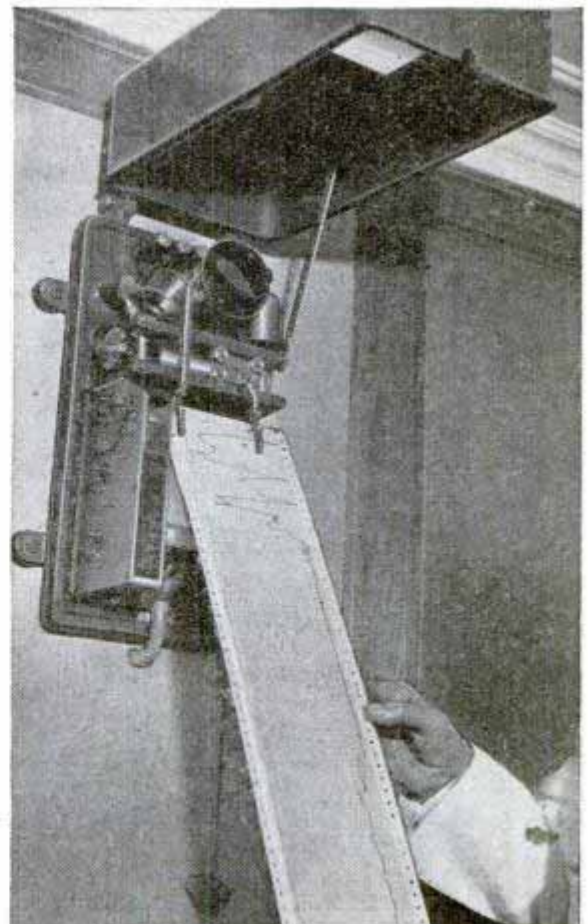
But although this device is not offered as a locator of floating junk it enabled the Wanderer—its pilot house completely shielded—to thread its way safely through the bustling Detroit River.

The navigator studied the 12-inch scope, resembling a photographic negative with the background black and the objects in range glowing with a brilliant light. The image on the scope is seen in its true-north relationship, that is, with north at the top as on a chart or map. The ship's location is indicated by a spot in the exact center of



Twenty-inch searchlight is operated from pilot house

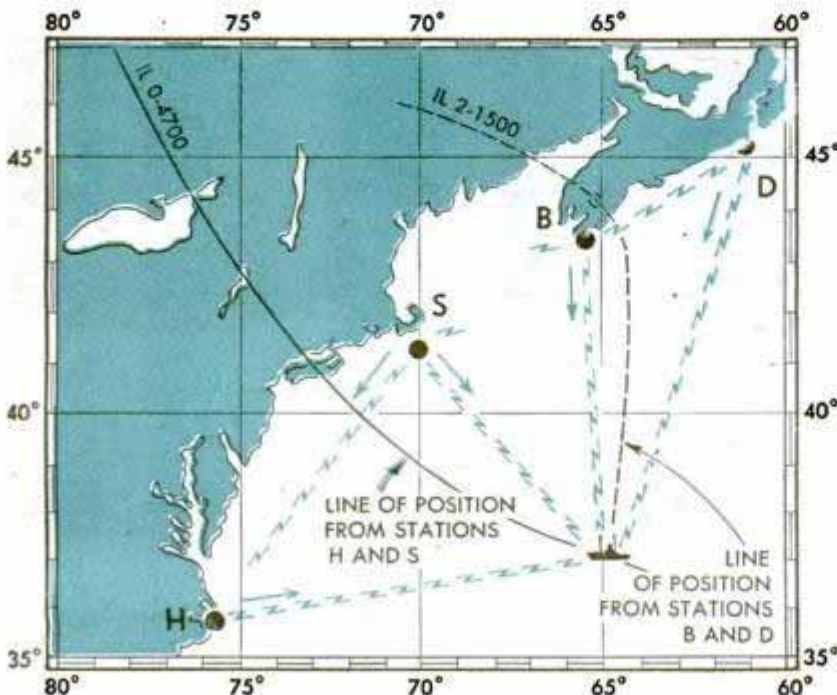
Inside the Wanderer's pilot house. Class C radar (left), loran chart on the table, gyro-magnetic compass on the wall (shown above the operator's head). Photograph at right shows a course recorder on an Italian liner





A ship's exact position is determined in two to six minutes by an electronic device called loran—an abbreviation for long range navigation

Chart shows how loran determines ship's position. It measures the difference in arrival time of radio pulses from two shore-based stations



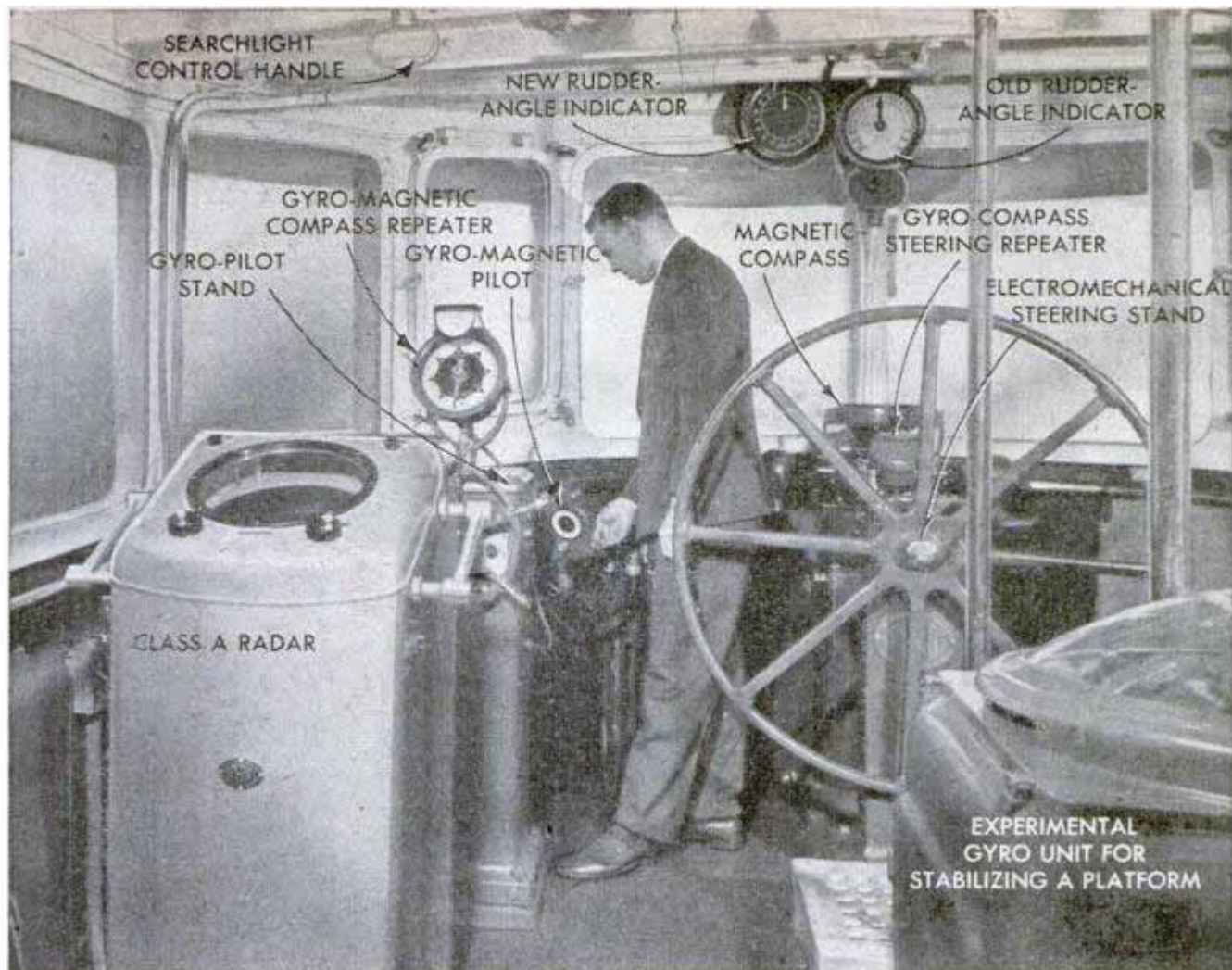
the scope, its course by a line extending from that spot almost to the perimeter of the scope. Land masses appear in their natural outlines, as seen on a map, and smaller objects, such as ships and buoys, can readily be recognized.

The true-north relationship of the scope and the relative bearing of the ship are achieved by coordinating the radar with the gyro-compass repeater system. The high-frequency impulses from the transceiver are transmitted from an automatic, rotating scanner in bursts of one quarter of a millionth of a second. They are received as they "bounce" back from objects within range and are visible immediately on the scope. This unit costs from \$13,000 to \$15,000 installed.

For craft which do not require a unit of such short-range sensitivity, but rather a set that will reliably pick up ships at sea, land masses, etc., Sperry is experimenting with a Class C radar which may have minimum range of 400 yards. The Class C installation, costing about \$5,000, is planned to protect against collisions with ships and icebergs and against going aground in fog or foul weather.

Prototypes of both these units are receiving exhaustive tests and plenty of rugged sea duty aboard the Wanderer. Test data confirm the impression of prospective users that the Class A unit will solve the problems of river and harbor boats and that the Class C set will do a job for the smaller of the ocean craft.

Loran—the war-born wizard that quickly answers the navigator's question, "Where am I?"—is a boon to the commercial fisherman, whose livelihood depends on his finding the day's best fishing spot, the location of which is known to him. In six minutes, using a newly developed loran unit, the trawler's exact position can be learned more accurately than by celestial navigation, radio direction finders or by soundings.



With its pilot house blacked out, the Wanderer relied entirely on these instruments to enter New York harbor

This conclusion is based on the experience of the Wanderer, backed up by reports of New England fishing skippers who have used loran to help them get home sooner with a bigger catch.

Loran's operation is based on the fact that radio waves travel in a straight line and at a constant speed of 186,000 miles per second at sea level. Pairs of transmitters, consisting of a "master" and "slave," at known positions constantly produce pulse signals at regular intervals. The slave retransmits the original signal of the master unit and thus there is a constant time difference between the two at a given location of the ship. Lining up the two signals on the fluorescent screen of an oscilloscope, the actual time difference is read from the dial of an indicator which is a stop watch capable of measuring microseconds.

Using this time difference and a prepared chart, the navigator can place his ship's position on one of an infinite number of lines which pass between the transmitters and extend out to sea. By repeating the process with a second pair of stations he obtains a second location line and the point of intersection indicates his exact position.

The entire procedure takes less than six minutes because the device provides the

time difference automatically on a visible dial. Until recently a loran operator had to count the hairlines separating the signals on the oscilloscope screen and compute the answer from three factors—a procedure that was slower and more liable to error.

The unit is 15 by 17½ by 43 inches in size. It operates on 60-cycle 115-volt single-phase alternating current and a converter may be used for direct current. It costs approximately \$3000. The first commercial installation was made on the Swedish liner Gripsholm last year.

Electromechanical steering substitutes electrically controlled mechanical power for muscle at the helm of a ship. To do this on a 10,000-ton vessel is simple, since weight is no great factor and expense not as important as on a fishing boat. Now years of experimentation and development work are coming to a head on the Wanderer, where a variety of lighter, less costly steering devices are undergoing final tests.

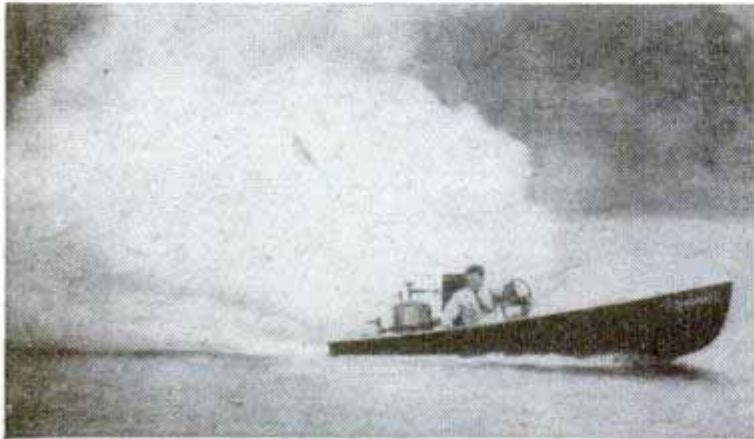
Each one of these units may put two men out of work—but just long enough for them to descend from the wheelhouse of a trawler to the deck where they will start handling net lines, thereby speeding the loading of fish by 20 percent. It takes two brawny

(Continued to page 240)

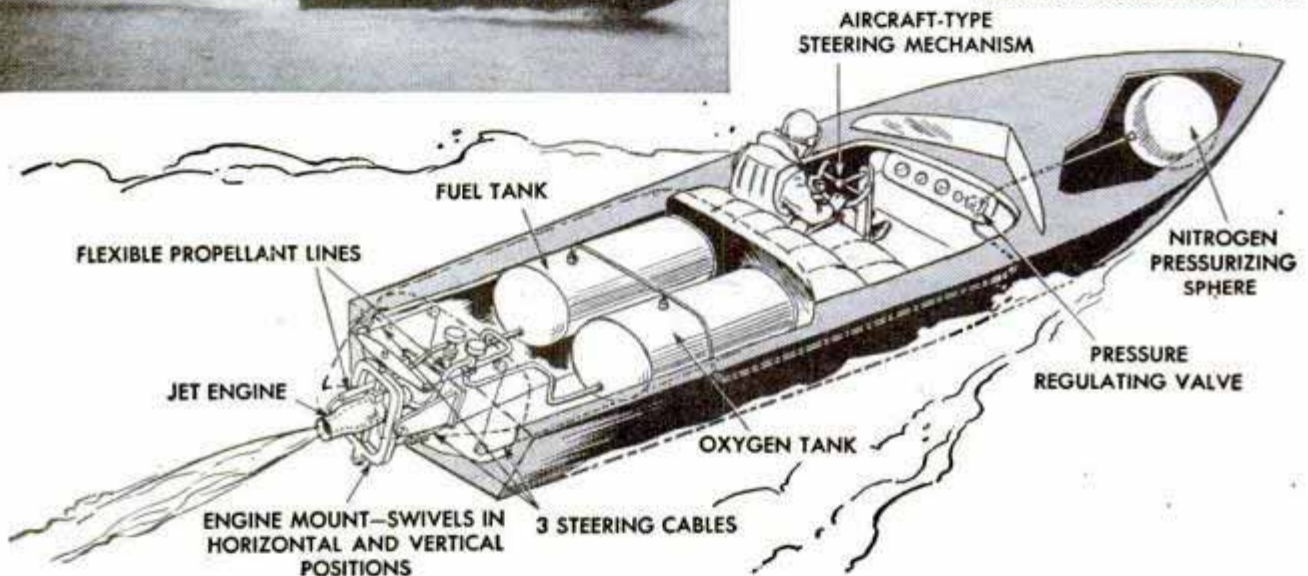


Rocket-Powered Craft Steers by Turning Jet

Speeds of nearly a mile a minute are made in a rocket-powered speedboat that has neither keel nor rudder. The engine is on swivels, turning horizontally or vertically, and the boat is steered by changing the direction of the jet. Liquid oxygen and alcohol are pressured through flexible lines to the engine's combustion chamber. The rush of hot gases from a nozzle a few inches above the water supplies the thrust that moves the boat. Another type of propellerless power for boats, hydropulsion or "water jet," involves a solid stream of water, ejected below the waterline at high velocity. Still experimental, it utilizes a marine engine.

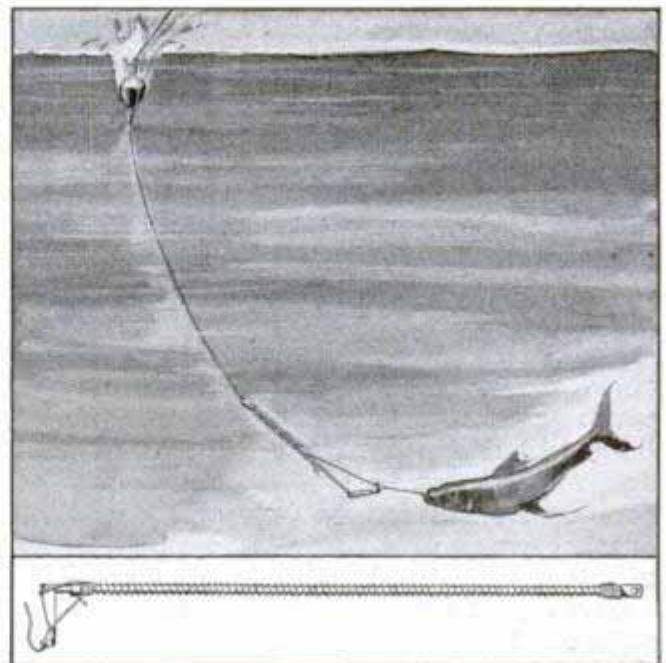


Sketch by Reaction Motors, Inc.

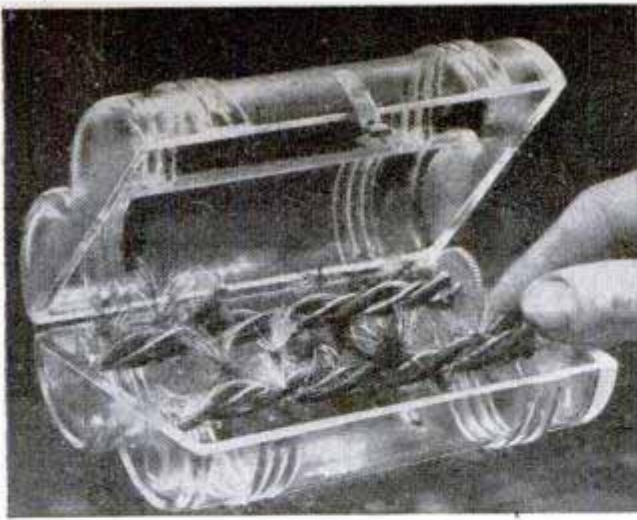


Fish Helps Catch Himself With Trip-Lever Hook

Setting a fishhook in a fish's mouth is accomplished mechanically with a new fishing accessory that is attached to the line. The device consists of a spring wound around an arm with a trip lever at one end. The hook is fastened by the line to one end of the lever. When the fish pulls slightly on the hook, a catch snaps open the lever, releasing the spring and giving a quick jerk to the line. The device is made of corrosion-resistant steel. It can be attached to a line in two minutes.



Information, including manufacturers' names, concerning products described in this issue may be obtained by writing Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11, Ill.

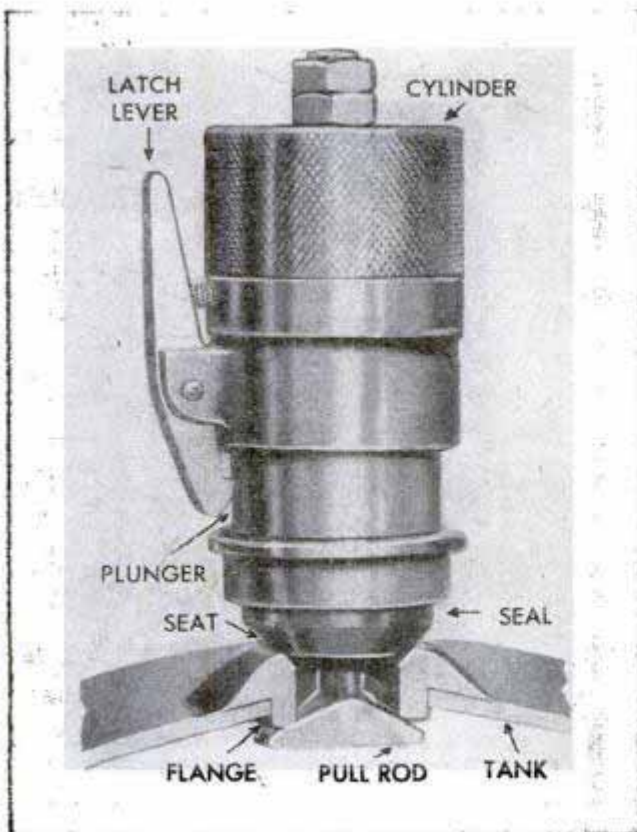


Springs Inside Plastic Fly Box Keep Lures Separated

Fishing lures are kept in good condition in a pocket-size transparent plastic fly box equipped with spiral-wrapped rustproof springs, extending lengthwise, to separate the flies and hold them in place for immediate selection. By turning a wheel attached to the springs, the fisherman quickly sees every fly and makes his choice.

Self-Sealing Test Plugs for Tanks

Self-sealing plugs are now used as substitutes for ordinary screw plugs to close openings in tanks and boilers when internal pressure tests are to be made. Available in 1/2-inch to 2-inch sizes, the plugs are so designed that test pressure within a tank hydraulically or pneumatically seals them.

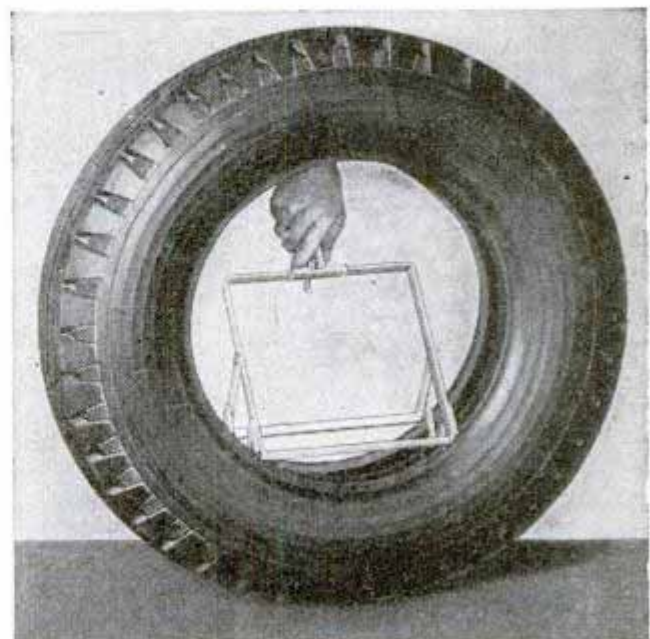


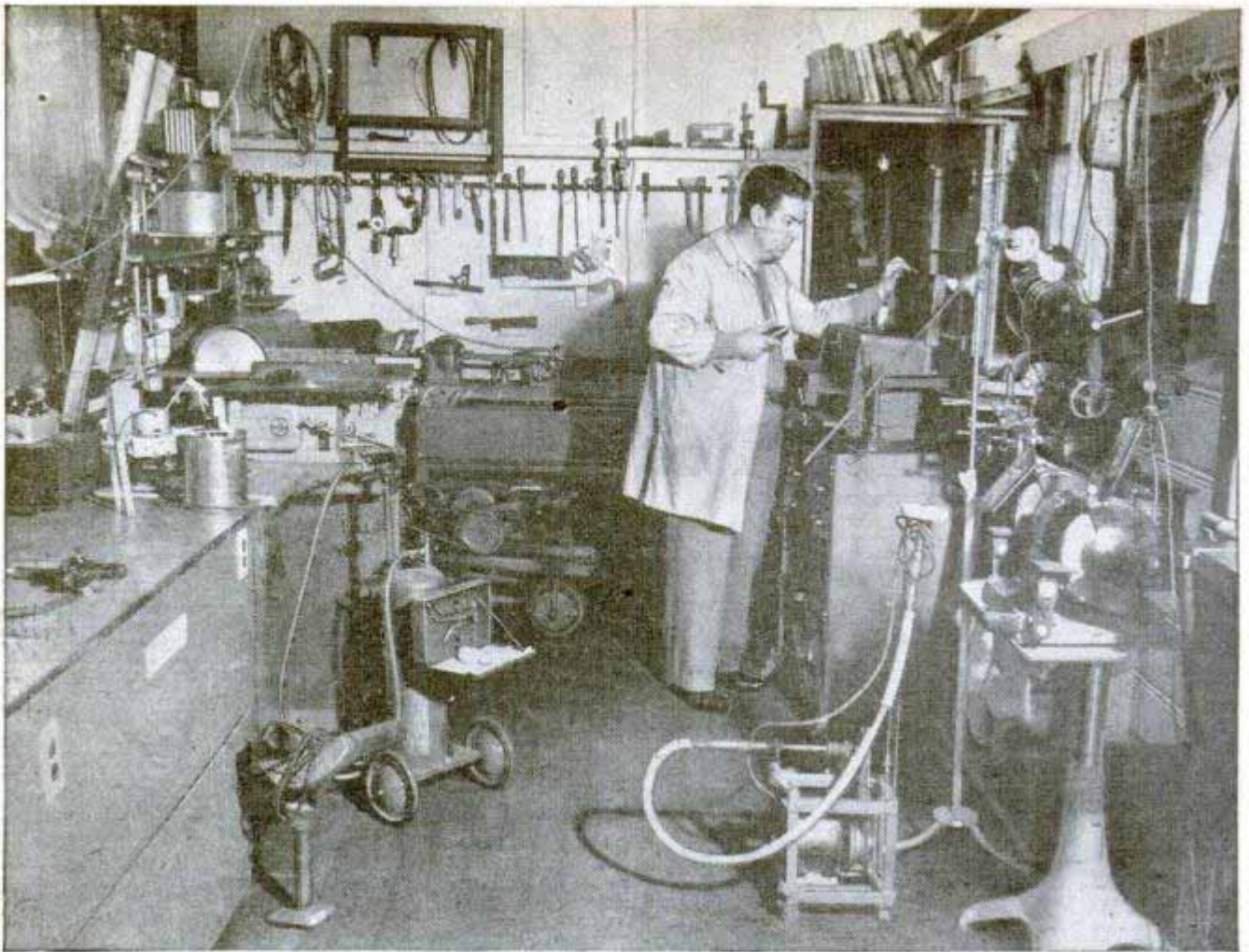
Mosquito Hood for Sportsman Has Zipper Mouth Slit

Lightweight and cool, an insectproof hood protects a sportsman's head and neck and at the same time enables him to smoke a pipe or eat by means of a zipper slit at the front. When not in use, the hood folds flat for compact carrying in a fishing kit or pocket.

Tire Spreader Speeds Inspection

To make it easy to inspect or work on the inside of tires, a self-locking spreader tool is available. To operate, the prongs of the tool are placed between the tire beads. Downward pressure on the handle spreads the tire nine inches and locks the tool in place. To release it, the locking latch is tripped. The steel tool weighs 2 1/2 pounds.





In his multiple-use workshop, the cowboy star can do everything from hand tooling leather cha' backs to repairing balky radios

HOBBYIST OF THE MONTH

Smiley Burnette

WHEN Smiley Burnette, cowboy star of Columbia Pictures, has a day off it usually turns out to be the busiest day in the week for him.

In his home workshop before dark he is apt to have repaired a neighbor's radio, spray-painted the garden furniture he built last week end, hand tooled the leather backs he designed for the furniture, and started modeling an Indian head that he will fire later in his homemade ceramic kiln. That night after dinner if he isn't enlarging photoprints the chances are he'll be tying wet flies for his next fishing trip.

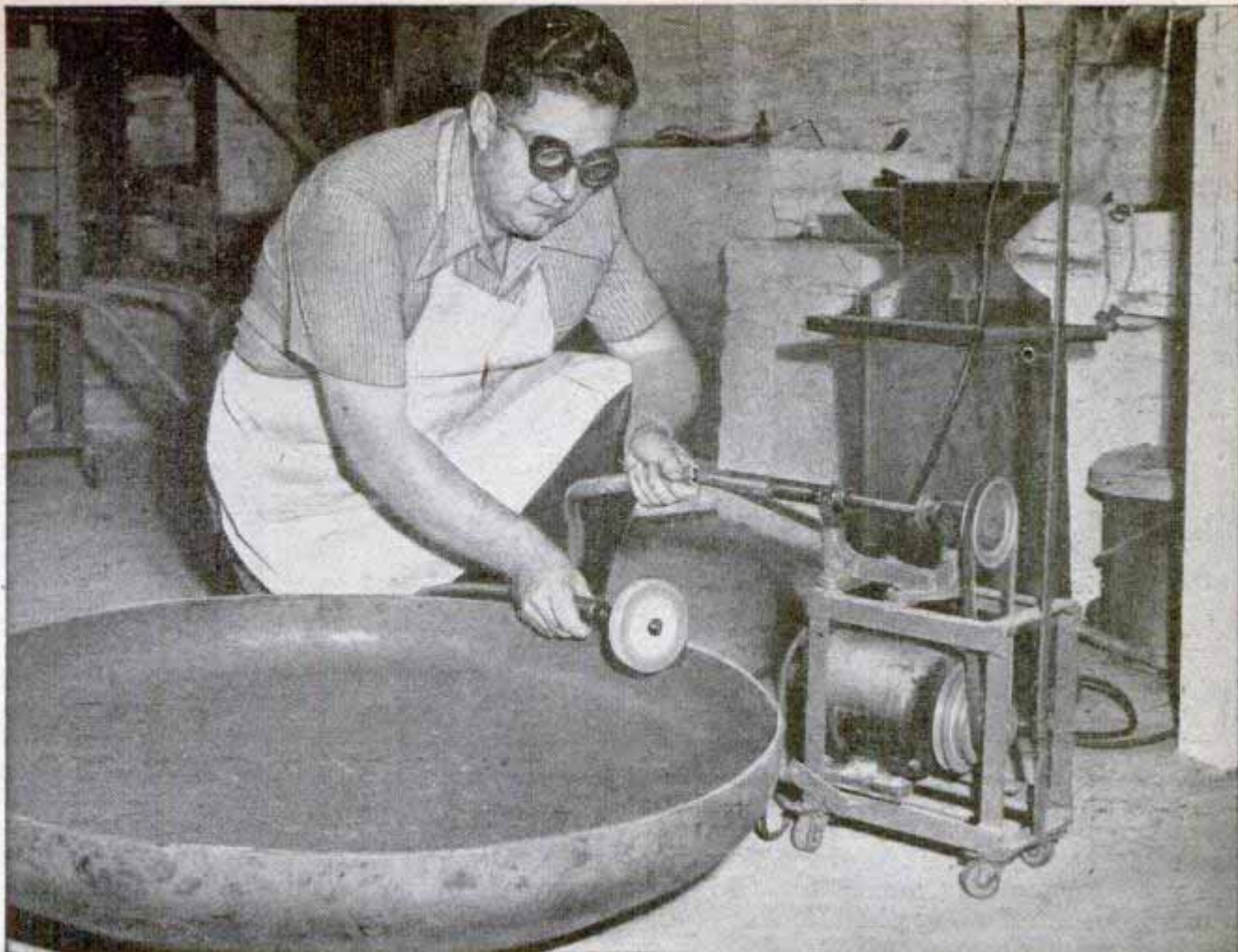
Smiley has a couple of dozen hobbies. He took up blacksmithing for fun and put together a small smithy in his back yard. He's interested in microscopy and is a com-

petent electric welder. Wood burning offered a chance to decorate some western furniture he built so he learned to handle an electric burning outfit. He's a phonograph fan and cuts his own transcriptions for broadcasts and records. He has his own homemade electroplating outfit and he does linoleum block printing.

"People who specialize in one or two hobbies would enjoy themselves even more if they branched out," Smiley contends. "Half a dozen hobbies or a score of them aren't too many. Just about all of them will turn out to be useful."

When Burnette bought a 10-inch metal lathe he studied how to run it and then practiced making simple cuts and shapes. He added milling and screw cutting attachments and kept on practicing. Now he's a competent machinist without shop training. He learned blacksmithing, air brushing and all his other crafts the same way.

Smiley started his home workshop in 1940 in a 12 by 30-foot room alongside the garage. What he planned was a metalworking shop, woodworking shop, leatherwork-



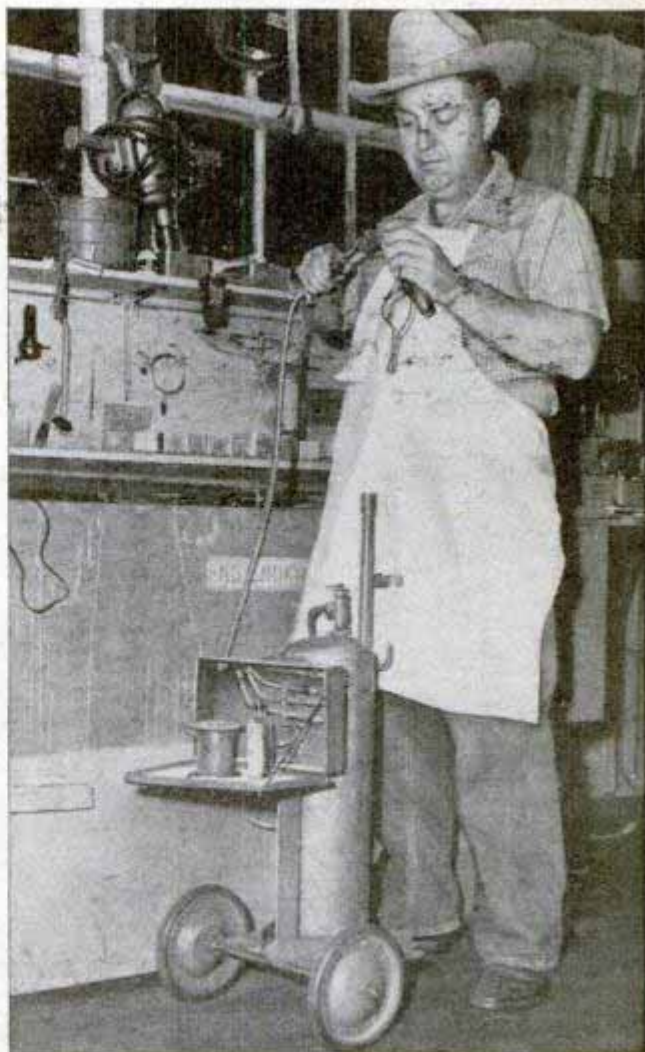
Burnette puts the finishing touches on a charcoal brazier with his homemade grinding tool and, at right, uses a gas-soldering unit he built for repair work

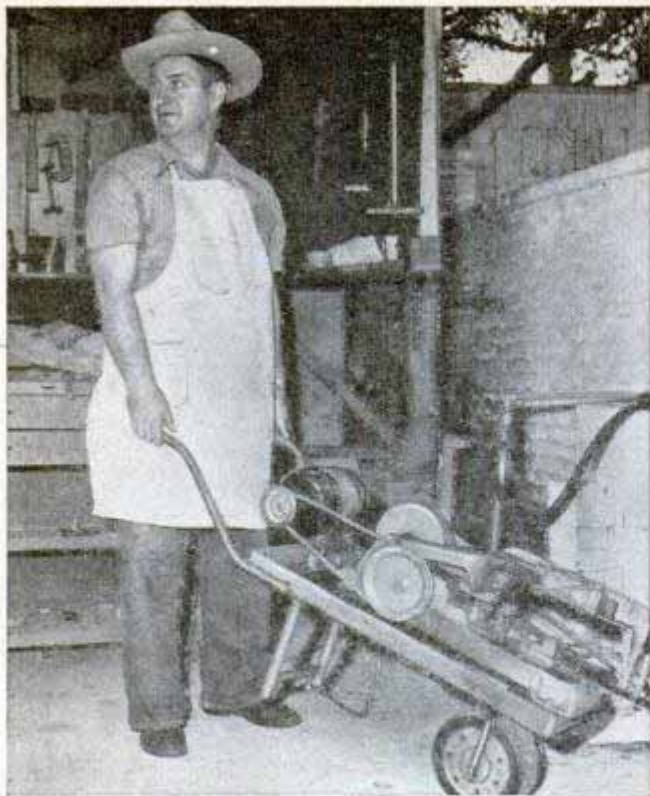
ing shop, photo gallery and darkroom, plus storage for other equipment. Visitors are surprised that he has plenty of room left for walking around and for working. This is achieved by compact storage.

All big tools except the lathes and other heavy equipment are mounted on wheeled stands that he built himself so they can be pushed out of the way into convenient niches when not in use. All the photo equipment except the enlarger is stored in one big bin mounted on roller skates. Normally it's pushed out of the way under a table.

The workshop becomes a portrait gallery by pulling down a choice of backdrops that roll down from the ceiling like window shades. Overhead photo lights are permanently in place. For eye-level lighting Burnette attaches photofloods to one or two of his specially built "robot" stands for which he has dozens of uses.

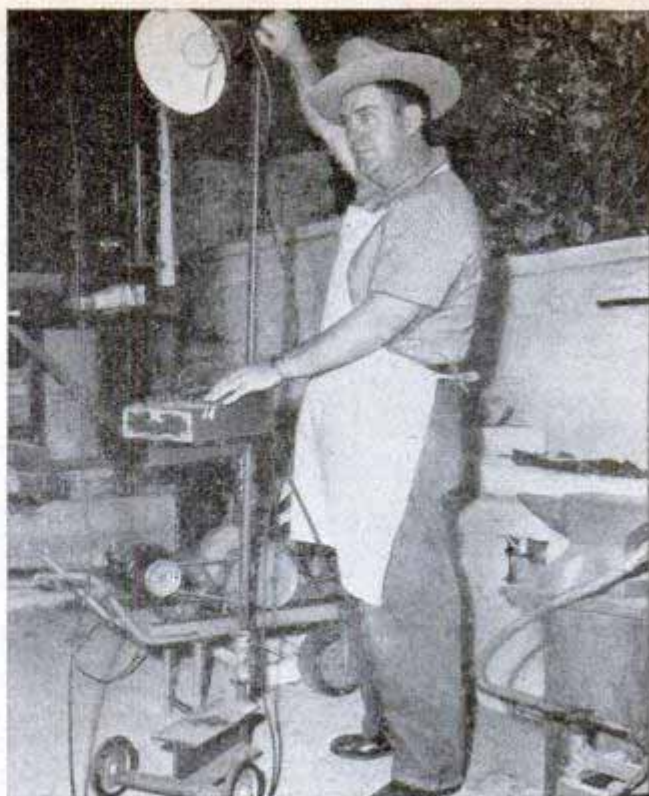
The robot is simply a sturdy photo lighting standard on wheels with a six-inch section of railroad iron fastened to the base for steadiness and to provide a place on which to pound things with a hammer. An electric junction box with several outlets is attached at hand height to the standard so that several lamps, power tools or other de-





He made this power metal saw from bits of angle iron

vices can be plugged in at once. Clamps and attachments at the top of the standard are used for holding almost anything he wants to use, including photofloods, a hair drier for drying film, a magnifying glass, a lamp for working at the lathe, and even a

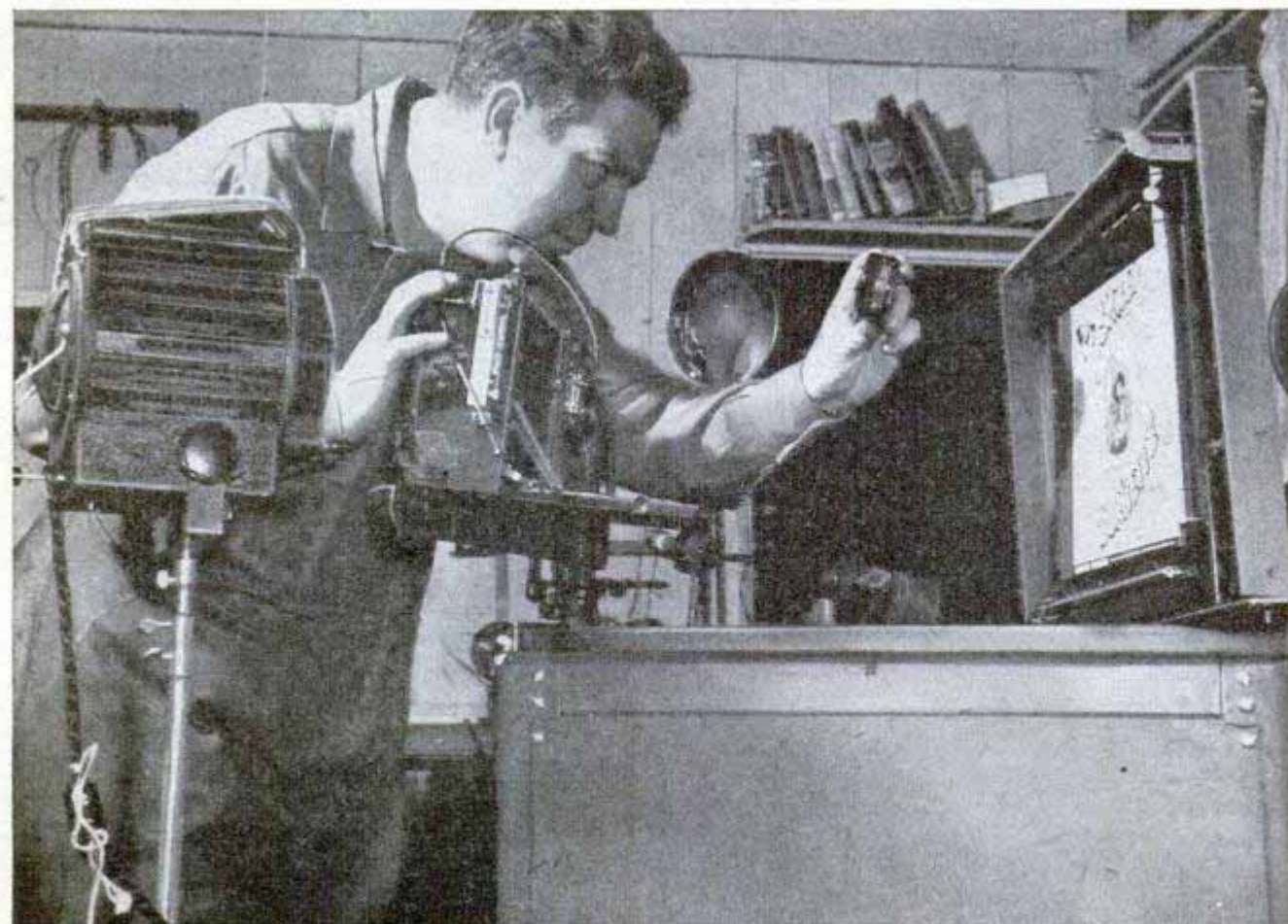


Wherever he moves, a portable light is close at hand

heat lamp for drying his pet dogs after their bath. These standards may be wheeled to any place in the shop and are as useful as a third hand.

Burnette has piped electricity, gas and compressed air to a number of handy out-

At home Burnette can turn the tables and aim the camera for a change. He built the copying easel himself





Among his inventions is an automatic brush cleaner

lets, with master switches outside the door for shutting off electricity and gas after shop hours. The air compressor builds up pressure only on demand. A six-volt relay system is used for turning it on and off.

Besides building scores of toys and pieces of furniture Burnette designed and constructed his own cement mixer. He built his own portable grinder and portable power metal saw as well as portable racks, on wheels, for transporting outboard motors and cans of fuel.

Once Smiley left a dirty paintbrush in a can of brush cleaner and next morning he found the solution had not only removed the paint but the bristles as well. That led to his inventing an automatic paintbrush cleaner, which sounds like a joke but does the job. It's a geared eccentric arm with an adjustable clamp for holding any size brush. Placed over a can of turpentine so that the brush is immersed, the arm stirs the brush back and forth and thoroughly cleans it in the safe solution in half an hour.

Before he moved to Hollywood, Smiley was announcer, chief entertainer, manager and engi-



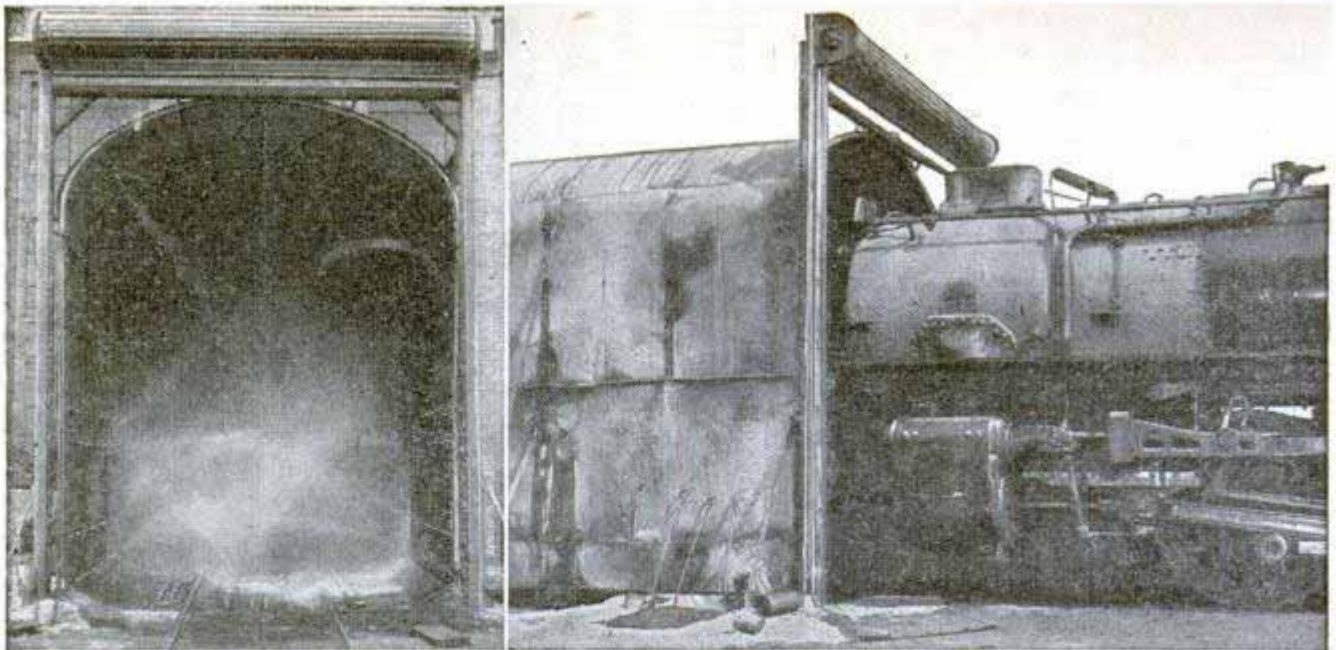
He labeled the flexible vise he built a "shop stooge"

neer of a small radio station at Tuscola, Ill., where he'd started as singer and musician. While there he met Gene Autry and played the accordion to accompany Autry's singing. Eventually the pair got into pictures. Burnette is also becoming a well-known phonograph artist. Right now he is building a special recording studio, soundproofed and air conditioned, in his back yard.

There's even a "how to do it" library in the actor-hobbyist's combined home-built recording studio and office. He started his workshop in 1940



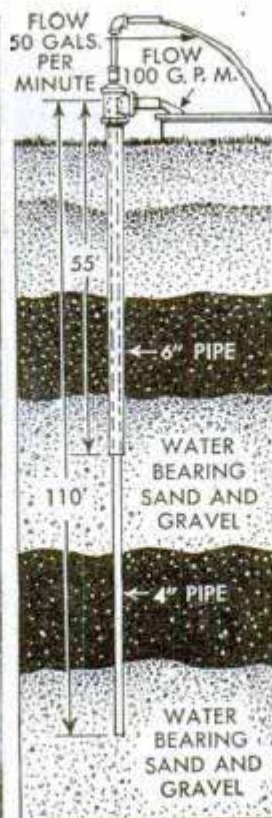
Shower Bath for "Iron Horse" Uses 2400 Gallons a Minute



In two hours one man can strip grease and scale from a dirty locomotive inside a 90-foot-long bathhouse equipped with automatic chemical spray controls. Former method of doing the job by hand took 192 man-hours

Bathing an "iron horse" used to be a long, dirty job. Now, when it is time to remove the grease and paint from a Union Pacific locomotive, workmen do the job in two hours in a chemical shower bath. The 90-foot-long bathhouse will hold any locomotive. It is lined inside with 1350 feet of pipe ranging in diameter from 1 inch to 2½ inches. The pipe system is studded with 860 nozzles pointing in every direction. Through the nozzles 2400 gallons per minute of caustic soda solution are sprayed under 50 pounds pressure against all surfaces

of the locomotive. As the solution flows off the engine it drains back into a 5000-gallon storage tank through a filter system that removes the grease and paint. After 80 minutes under the chemical shower a locomotive is generally clean and the caustic solution is rinsed off in 35 minutes with clear water. Two of the chemical shower baths are in use on the Union Pacific system, one at Denver and the other at Cheyenne, Wyo. J. R. Frohoff and K. J. Glassman designed the structures, made almost entirely of reclaimed materials.



Water From Twin Wells Flows Through One Hole

Twin artesian wells supplied by two different subterranean pools were recently drilled on the same spot at a mink ranch near Washburn, Wis. Walter Gustafson, the well driller, says it's the first time he has heard of two wells flowing from the same hole. Knowing that there were two water-bearing strata beneath the surface, the driller sank a six-inch casing to a depth of 55 feet and struck water that flows at a rate of 100 gallons per minute. He then pushed down a four-inch pipe inside the larger casing to a depth of 116 feet and found a second source that sends up water at a rate of 50 gallons per minute. Now water from the two different layers of sand and gravel gushes out of the ground through the same hole.

Telescoping Stick Hooked to Wheel Maneuvers Plane

Planes can easily be maneuvered into tight parking places with a telescoping stick that hooks onto the plane wheel. It is made of telescoping tubing and is 53 inches long when fully extended. The stick weighs only 2½ pounds and fits conveniently into the storage compartment of small planes.



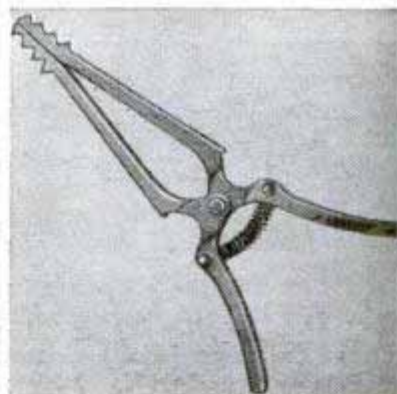
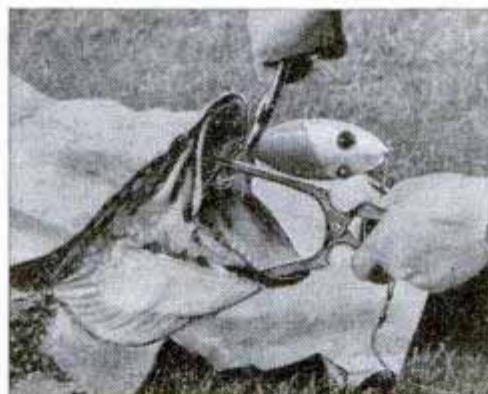
What It Will Take to Fly to Moon

If and when man flies to the moon, he will need a jet-propelled monoplane capable of speed up to three miles per second, according to Henry A. Erikson, emeritus professor of physics at the University of Minnesota. If it becomes possible to obtain atomic energy from small quantities of fissionable materials, it may be possible to vaporize water, mercury or lead, according to Dr. Erikson, and thus obtain the required speed. The proposed plane would weigh about 135 tons and have a housing of sheet aluminum alloy sufficiently strong to withstand air at atmospheric pressure inside the plane when there is a vacuum outside. The

plane would carry 5.6 tons of fuel and probably would be launched by a carrier plane at an approximate altitude of 55 miles.

Metal Spreader Holds Fish Jaws Open for Removing Hooks Easily

Jaws of big fish are held open by a metal spreader 9½ inches long, enabling fishermen to extract the lure with pliers or disgorger without getting cut by sharp teeth. A spring keeps the spreader closed when not in use, but pressure by the hand opens it to a maximum distance of six inches.



90-Mile-an-Hour Racer Made Out of Parts From Six Old Automobiles

Parts from six automobiles went into a "souped up" racer put together by Richard Bay of Arkansas City, Kan. The job re-

quired two years of spare time work. Total cost was about \$700 for a car that goes 90 miles an hour and gets 20 miles per gallon at ordinary driving speeds. Powered by a Ford V-8 60-horsepower engine, the car has a Columbia two-speed rear end, midget racer wheels and tires, grille from a 1938 Oldsmobile, bumpers from the grille of a 1942 Oldsmobile, fenders from two 1937 Ford hoods, windshield from the rear window of a 1937 Ford, doors and back part of the body from a 1928 Ford.



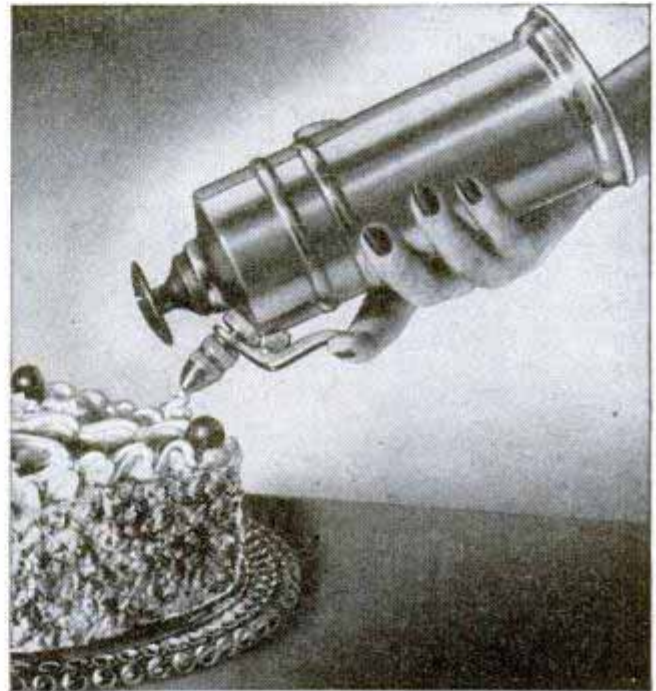
Operating troubles almost anywhere in an airplane can be quickly detected in flight by a new 90-pound "analyzer" device.



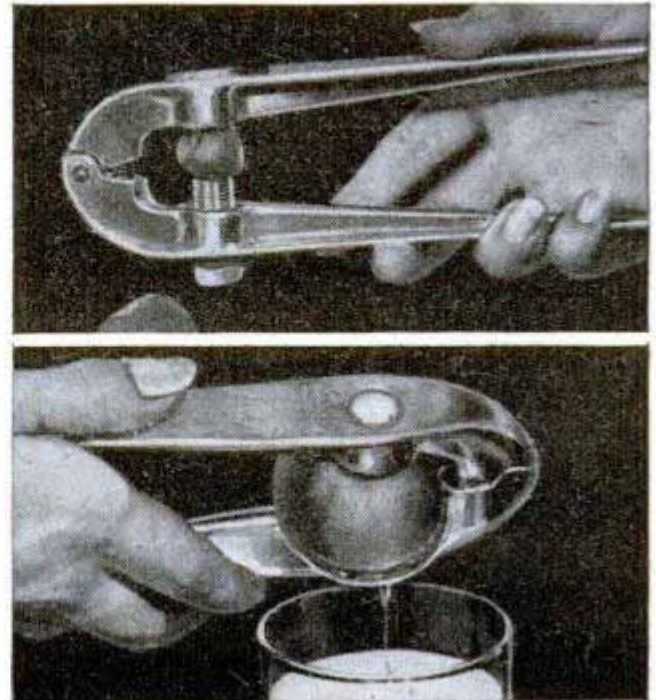
There's no need to put hands into water to wring a mop. A pull on a knob squeezes sponge head dry. Hinged covers made of transparent Plexiglas protect pictures mounted in loose-leaf type photo binder.



★
WHAT'S NEW
For Your Home
 ★



Whipped cream can be made in a jiffy by air forced into whipping chamber by this unit's built-in pump. Adjustable nutcracker takes any size nut and can be fitted with attachment for juicing lemons or limes.





Swinging arms, concealed in twin bedside tables, pull out over the bed to make a convenient bed tray, writing desk or work space. Practical as well as novel, the tables can also accommodate either radio or telephone



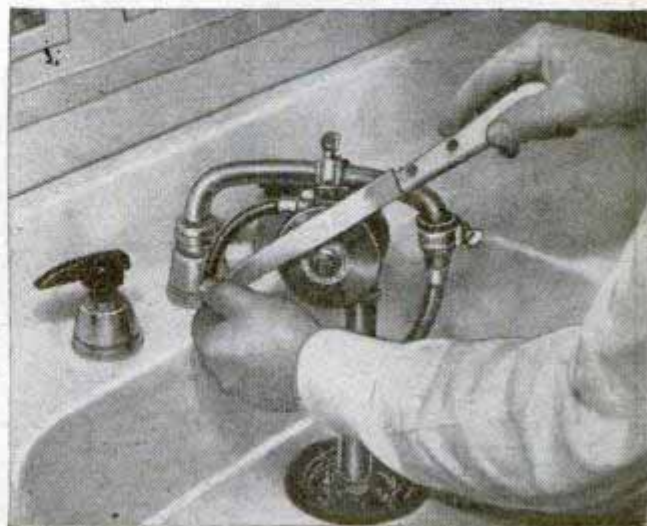
Slices of cheese, meat or bread can be cut any thickness with kitchen knife having an adjustable blade

Baking, broiling, roasting — all at the same time — can be done in electric range with handy twin ovens



Attractive game room furniture can be made from wooden casks by padding seats and adding backrests

Water power from a kitchen faucet drives a small turbogrinder for sharpening knives, scissors or tools



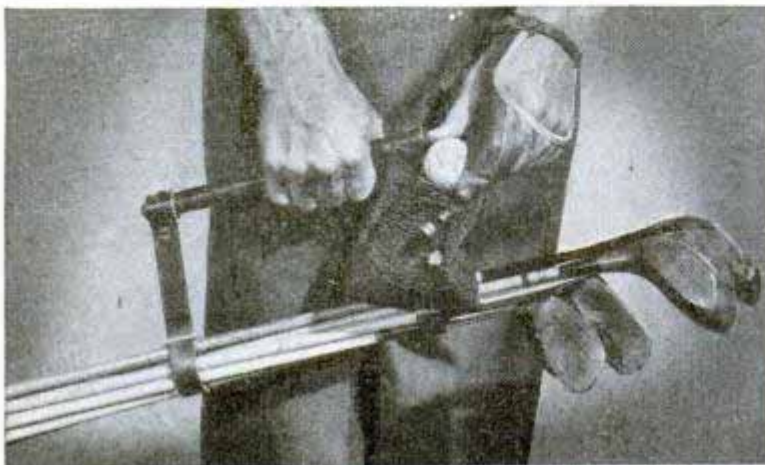


Instead of taking days of tedious shaping and fitting, a new plastic model airplane may be assembled in half an hour and flown at the end of a pair of 70-foot control wires. Equipped with a 30/100-horsepower gas engine, the plane has been clocked at 85 miles per hour. Using a larger engine it has done 120 miles per hour and may be climbed and dived at will. The model has a

Model Built in Half Hour

span of 27 inches, length of 19 inches and weighs two pounds. Fuselage is of laminated phenolic plastic, wings are of laminated veneer and elevators and stabilizer are of basswood. The plane is equipped with a drop-off landing gear. Its manufacturer has devised a model aircraft "hangar" in the form of a box that fits on the back of a truck for carrying the models.

Four-Ounce Golf Club Carrier Takes Place of Bulky Bag



Golf clubs and balls are carried easily in a compact, balanced holder that weighs only four ounces and takes the place of a bag. It consists of a handle with leather loop straps. Lifting the bar connecting the strap buckles loosens the carrying strap for quick removal of any club. Lifting the handle tightens the strap so that clubs cannot slide or rattle, and the weight of the clubs keeps the carrying loops tight. Tees and balls are stored in a leather bag attached to the handle.

More Charcoal From Wood

One ton of dry wood yields 1000 pounds of charcoal by a process which exceeds by two thirds the output of existing oven methods. The new process employs a steel chamber into which the wood is fed to emerge later as charcoal. Flue gases are circulated several times in the chamber, drying the wood and saving on the amount of heat necessary for carbonization.



Even broad wheat fields with little slope should be terraced in some areas to prevent valuable topsoil from disappearing

THE LAND COMES BACK

YOUR ATLAS doesn't show it, but a new continent is being added to the map of the world. This new land mass is a geological freak that contains no steep mountains, no swamps and no wastelands. Every inch of it is rich, productive soil.

It was discovered by American farmers 10 years ago, captured without firing a shot, explored, and put under partial cultivation at once. Today it produces millions of dollars worth of food.

That's one way of picturing the results

of the soil conservation program fostered by the U. S. Department of Agriculture under which nearly half of the farms in the country are operated. Young as it is, the soil conservation movement already has revolutionized American farm practices.

Fifteen years ago American agriculture literally was sliding downhill. Accelerated erosion had stripped the precious topsoil from a fifth of our tillable land and had damaged badly about a third of the rest. Of a total 460,000,000 acres of good cropland in

ACTION OF MOLDBOARD TYPES OF PLOWS



STUBBLE IS BURIED

Moldboard plows bury the stubble, leaving the surface unprotected. Subsurface plows leave a blanket of stubble to resist erosion

ACTION OF DUCKFOOT OR OTHER SUBSURFACE SWEEPS



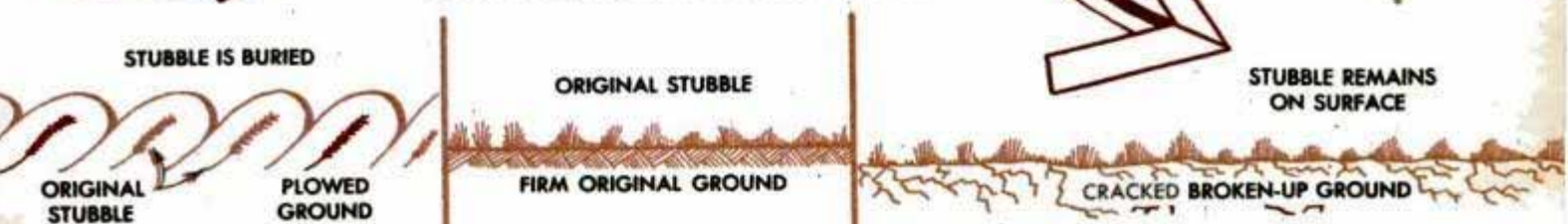
STUBBLE REMAINS ON SURFACE

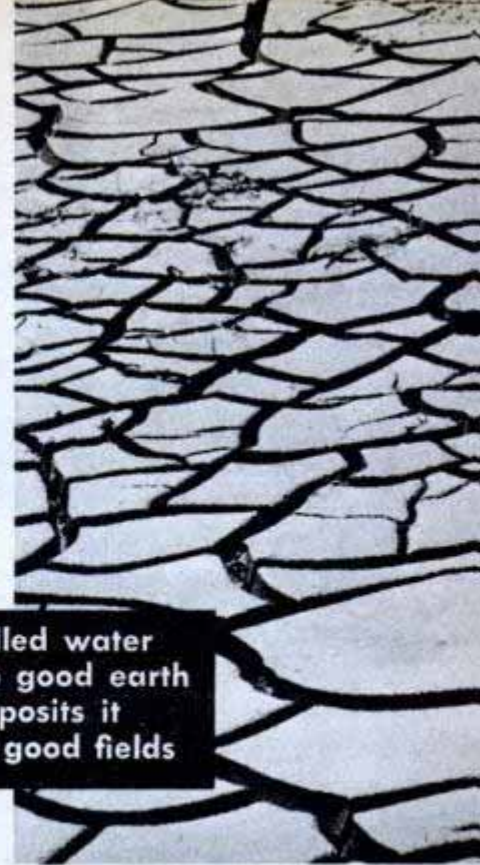
ORIGINAL STUBBLE PLOWED GROUND

ORIGINAL STUBBLE

FIRM ORIGINAL GROUND

CRACKED BROKEN-UP GROUND





**Uncontrolled water
snatches up good earth
and deposits it
atop other good fields**

the United States 1,000,000 acres were washed out every year. The average depth of the fertile topsoil had shrunk from an original nine inches to only six inches.

Crops became sparse as the topsoil disappeared and research proved that crop yields were related directly to the depth of the topsoil. Premium seed, irrigation and expensive fertilizers can't produce crops by themselves. One survey showed that, other things being equal, certain topsoil that was three inches deep would produce 17 bushels of corn per acre as against 47 bushels in the same kind of topsoil 13 inches deep. A

single heavy rain can remove an inch of topsoil from critical portions of a field.

Thousands of farmers, especially in sub-marginal areas, were confronted by production that dwindled from year to year. Hundreds of them went broke. They didn't have the scientific background to understand what was happening but they did know that some land was being eaten up by gullies, other land was just blowing away in the wind, and still other ground had turned soggy and unproductive.

Nor did they know how to get together and apply remedies. That job was under-

Curved strips replace square-cornered fields in a contour-cultivated farm



taken by the Department of Agriculture in 1935, under the terms of an act that established the Soil Conservation Service and provided a basis for state laws by which farmers could organize local cooperative soil conservation districts. Since then all the states have passed enabling legislation and 1616 conservation districts have been formed. Judging by the rate at which new districts are being established, practically all our farmland will be under soil conservation control in a few more years.

The districts are self-governing. The chief function of the soil con-



The cure: contour plowing

ervation service is to provide skilled technicians who can make broad, comprehensive surveys for a whole district and then prepare detailed conservation charts for each farm in the district.

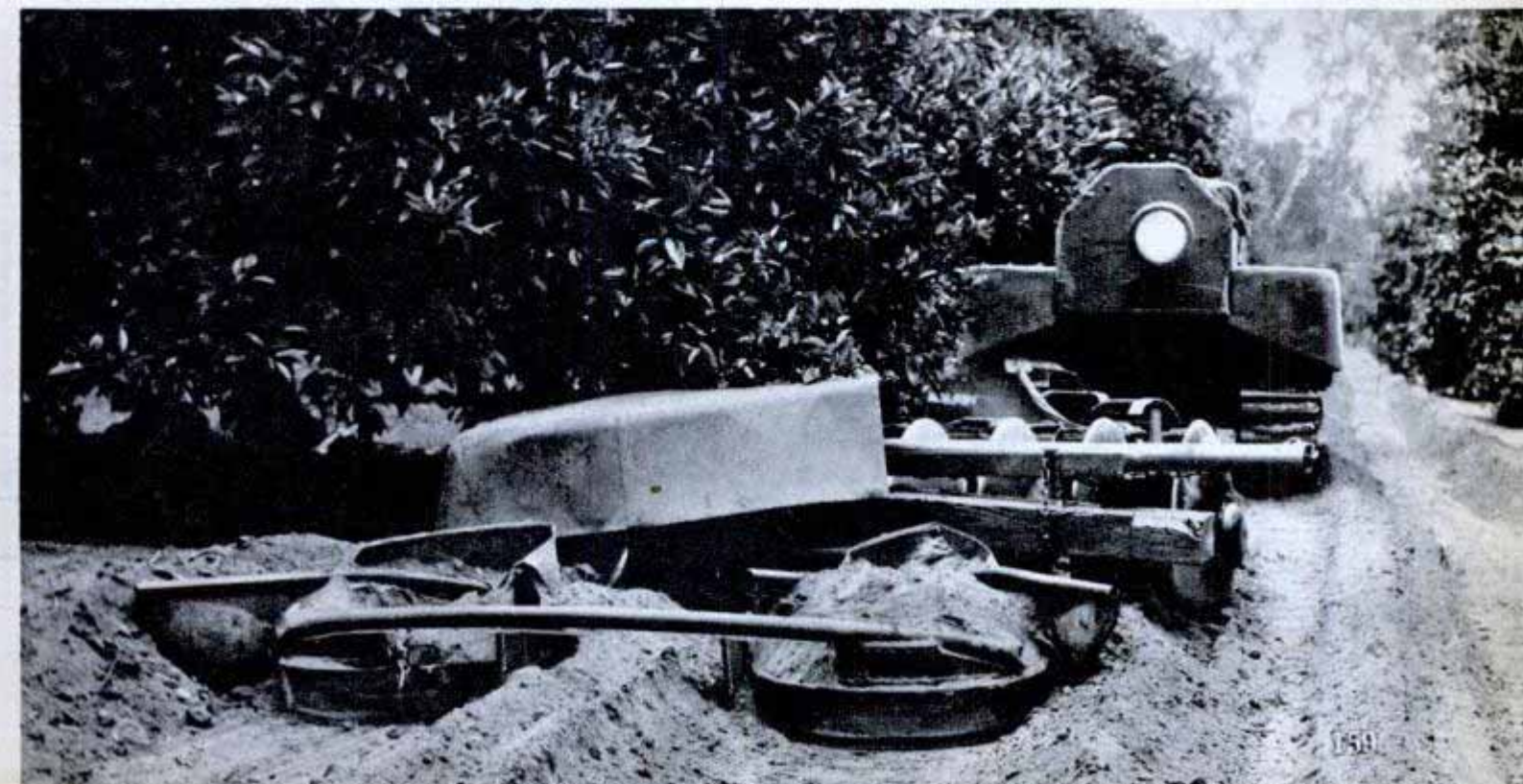
A farmer and one of the technical men make a tour of the farmer's land, looking over the ground, while the farmer describes the kind of farming he has done, what he plans for the future and what equipment he owns. From this the technician can advise him on how to stop erosion and keep his land productive. Often this includes reshaping some of the fields to fit

the terrain. Possibly the areas devoted to crops, pastures and grasslands need to be rearranged.

No two farms are exactly alike and the conservation expert makes up an individual program for each one. Then he and the farmer agree on a schedule of work for the year ahead, with most of the work to be done by the farm owner and possibly some of it to be performed by the district. Expensive terracing may be spread over five years, but a start is made at once to head off sudden soil losses.

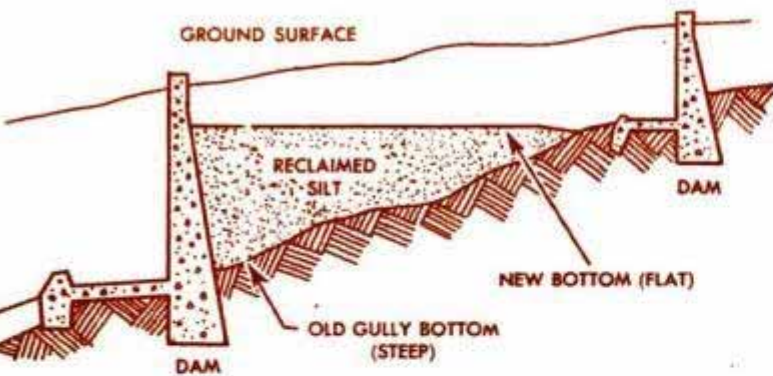
Contour planting and strip cropping, two

Old automobile wheels have been put to work in this orchard to scrape broad furrows that hold rainwater

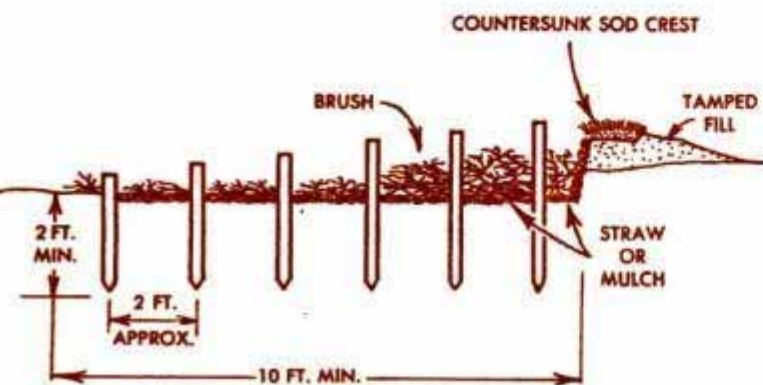




White bands are hay planted in strips between cultivated crops to keep loose soil from slipping downhill

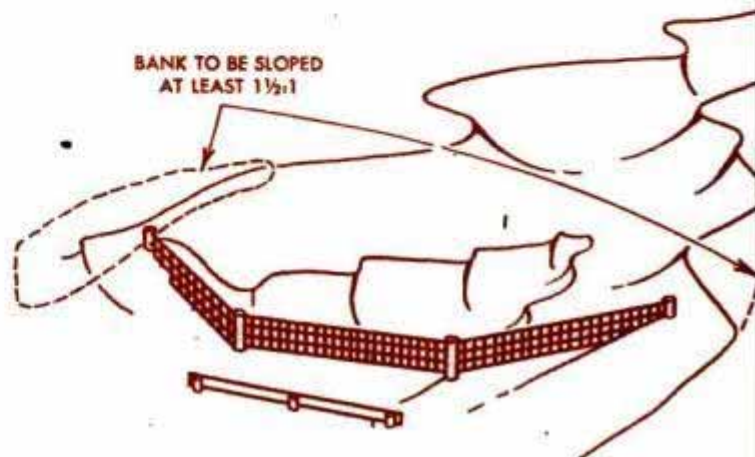


↑ Check dams recapture the silt from rapid streams
↓ Bottom of brush dam is covered with layer of straw or mulch and filled with brush which is staked down



of the easiest and most effective measures, are widely practiced today. Contour planting simply means plowing, planting and cultivating along lines of equal elevation. Instead of running the rows uphill and downhill the rows curve around the sides of the slope, level all the way. This traps rainwater and reduces runoff. Strip cropping is the planting of crops in broad strips along the contours, alternating clean-tilled row crops with strips of close-growing plants such as clover. The close-growing plants catch and hold soil from above and hold back water that could erode the cultivated strip below.

Fence dam can be constructed quickly. Fence is staked across the gully, then filled in with straw and brush





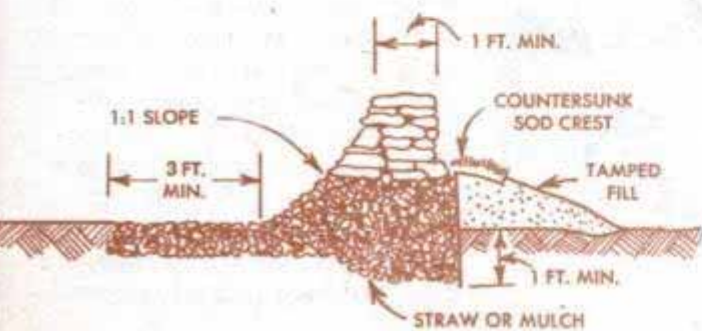
These two practices have changed the design of whole agricultural areas. Once from an airplane you looked down on checkerboard patterns of squares and oblongs, each a sharp-cornered field planted to a particular crop. Now the view has changed in conservation areas to crazy-quilt patterns of swirls and curving lines, the result of contour planting and strip cropping.

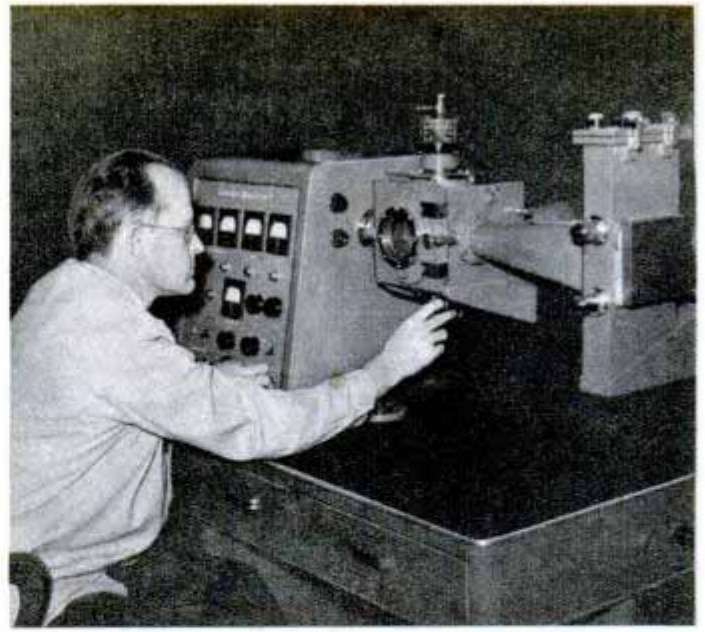
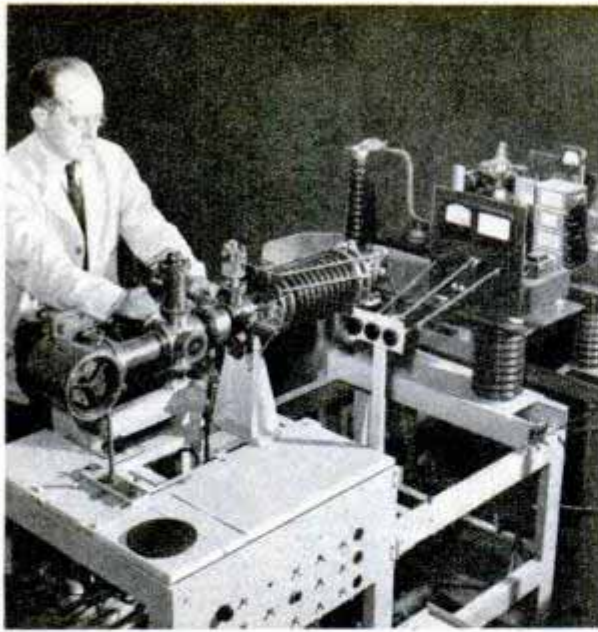
Ten years is a very short period in which to expect results in such a long-range program. But already some startling effects are apparent.

(Continued to page 244)

Loose rock dam is one of the most stable. Flat rocks are used because they bind together and won't slip

↑ Erosion has eaten a deep gully into this once rich farm land, subtracting scores of acres from the farm. Wind and rain vs. desert soil created pattern below





Streams of electrons are used to analyze metal surfaces for such processes as welding, lubricating and electroplating. Most metals are coated with a thin film of some sort, an oxide of the metal itself, oil, or some other "foreign material." Developed at the University of Michigan, the electron diffraction method employs a machine that produces a stream of 40,000-volt electrons in a vac-

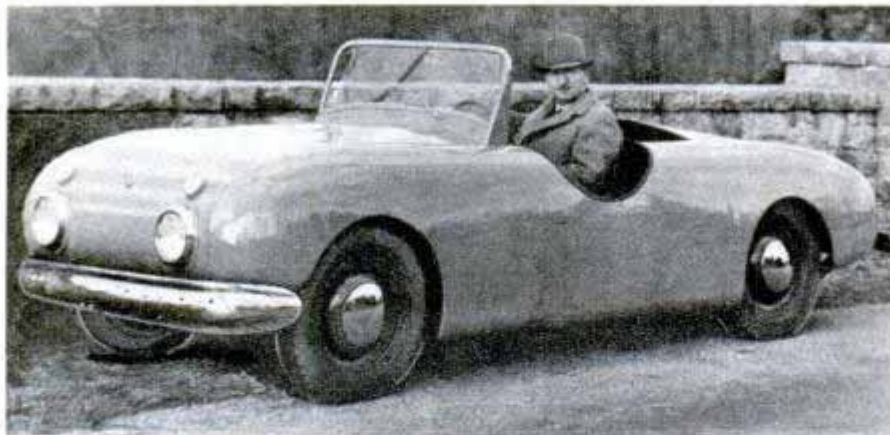
Electrons Identify Metals

uum chamber. In the center of the chamber is a holder which grips the specimen to be studied. The specimen interrupts the electron stream, causing electrons to bend or break away from their normal path and form new patterns. These patterns, captured on a photographic plate, reveal the identity of the surface being analyzed. This method can also be used to identify gases.

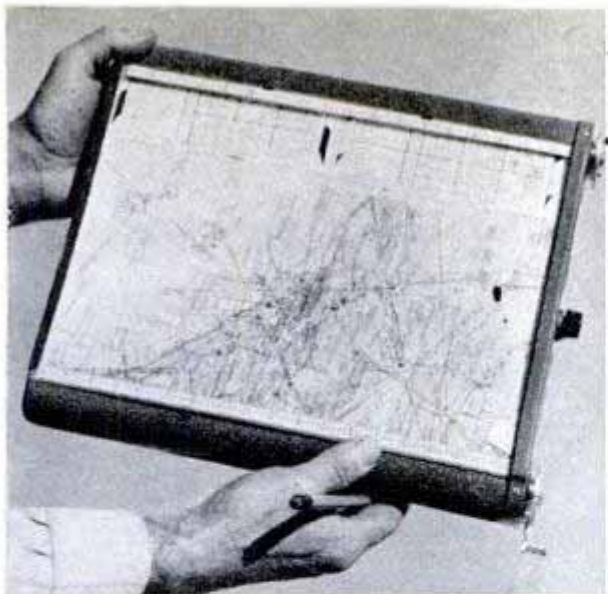
Sleek Convertible Assembled From Scrapped Car and Airplane Parts

With engine parts from German cars, body parts from American autos and a few odd airplane pieces, Bunny V. Ronco of Allentown, Pa., has created a streamlined

rear-engine roadster. In 1944 he received two Volkswagen engines and three transmissions shipped from Africa as junk and since then the engineer has invested \$700



and 2000 man-hours in his vehicle. The air-cooled car weighs 1350 pounds with 62 percent of its weight in the rear. With the drive shaft eliminated, the car's floor is only 8½ inches above the ground. All four wheels are suspended individually and have hydraulic brakes. The differential is the self-locking type — when one wheel is on ice the other will drive. The transmission has four speeds forward with an overdrive in fourth. The body, topped by a convertible hood, is made from four fenders of American cars joined together with sheets of steel. The four-cylinder car goes 36 miles per gallon at 50 miles an hour. Oil consumption is negligible as the crank-case holds only 2½ quarts.



All maps needed for a cross-country flight are contained on a roll-away map which fits a case about a foot square. Twisting a knob unrolls 22 feet of the map, visible in sections, on a plastic face of the case. The plastic is treated for pencil notations and an

Roll-Away Map Aids Flyers

internal light makes map reading easy at night. Forty-one map rolls are available for the case, each covering 4000 miles of regional or route charts. A tab at the end of each route shows distances and magnetic courses between large cities and airports.

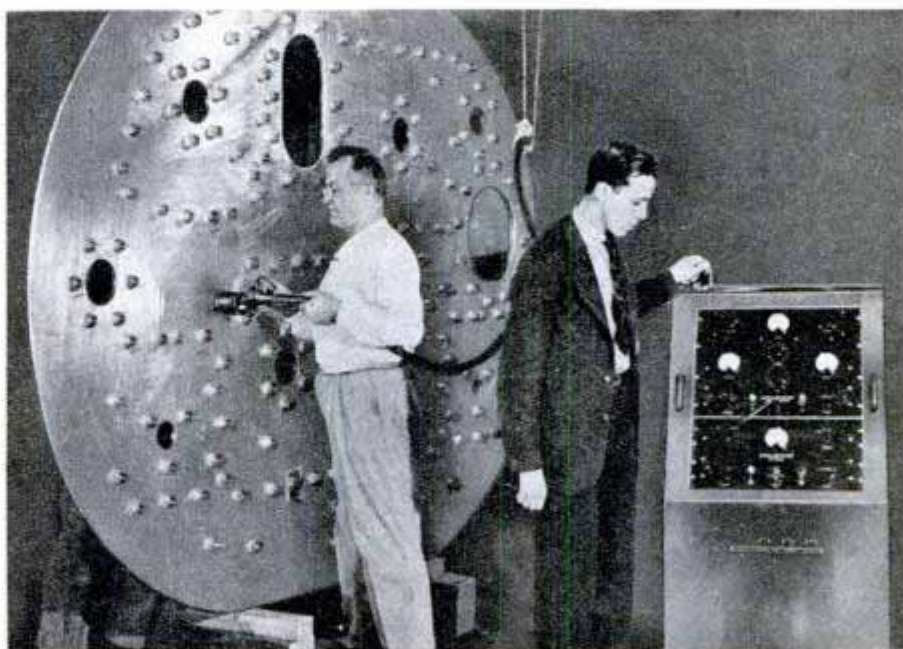


Bearings Make Unique Chessmen

Chess sets made of ball and roller bearings have been presented to high government officials by Henry A. Sherwood, a former consulting engineer for a ball and roller bearing firm. The first set, made for the King of Sweden in 1937, was put together in two weeks. A United States citizen since 1941, Sherwood made a set for President Truman to express his gratitude for relaxation of the immigration laws. Other sets have been presented to General Spaatz and Secretary of the Navy Forrestal. The chessmen, made from various parts and kinds of bearings, take a mirror-bright polish, giving them a novel appearance.

Helium Traces Leaks In Huge Transformers

Leaks in electrical transformers are detected by an instrument which uses helium as tracer gas and an electronic meter. A can of helium is attached to a stud in the cover of a transformer. To the opposite end of the stud a suction cup and the leak detector are fastened. If there is a leak, helium is sucked through the stud hole and past the gasket, reaching the meter where a recorder indicates the escaping gas.





Lofty giraffe towers above the other animals of the zoo. Prucha once saw the Washington statue of General Grant astride his horse and duplicated it in red cedar leaves



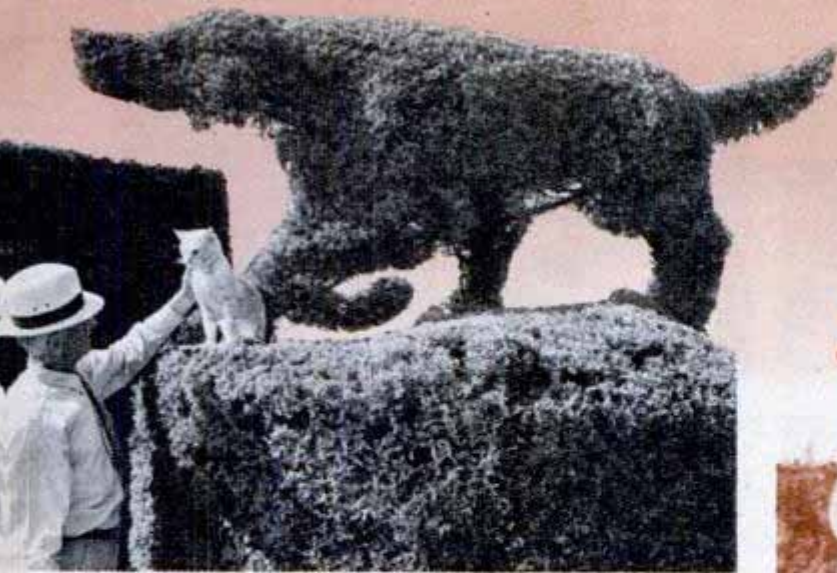
Eagle pouncing on a rabbit forms another of the tree figures. They must be trimmed each spring

GARDEN ZOO

Towering above a lawn in Crete, Nebr., are a lofty giraffe and a sober elephant—just two of the stars of H. V. Prucha's unique tree zoo. Prucha planted 30 red cedar seedlings on his lawn in 1908 but 12 years later they threatened to shut out the sunlight and breeze. Instead of cutting down the trees, he trimmed them into the shapes of animals, birds and even a statue of General Grant mounted on a horse. Long branch-

Trimming the giraffe's neck is high-altitude work so the zoo "superintendent" keeps a ladder handy





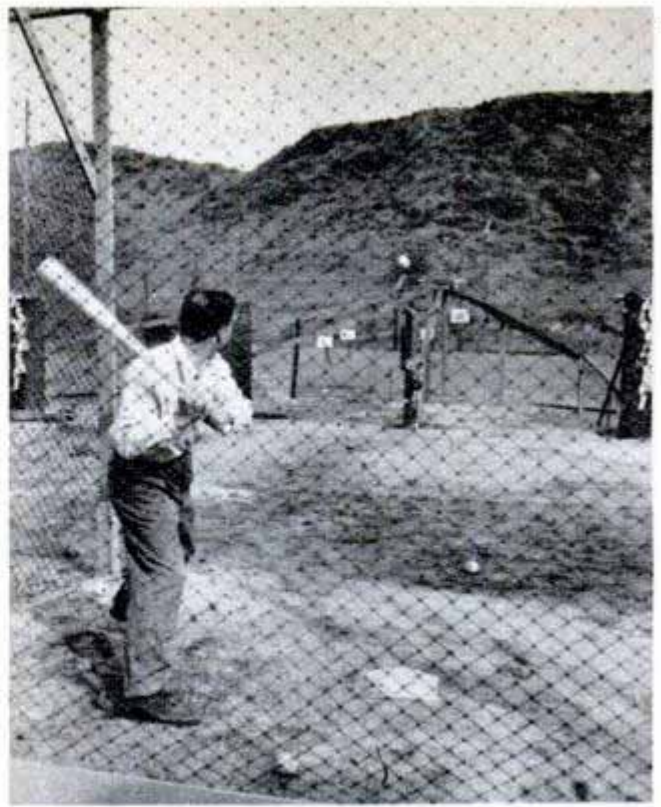
Cat isn't bothered in the least by the big hunting dog, which has been standing at point for 26 years

es were forced to grow in the proper pattern to form the elephant's trunk, the giraffe's neck and General Grant's arms. Today the zoo includes a buffalo, camel, peacock, two peahens on nests, the elephant and giraffe, an eagle sitting on a rock and another seizing a rabbit in its talons, a pointer dog, a tree house, the statue and several geometric patterns. The tree sculptor says he's worked the equivalent of a year's full time on the figures during his leisure hours. Droughts have not damaged the animals but one danger has appeared—the elephant's trunk offers a challenge to neighborhood small fry who have pulled it off several times.



"Sculptor" Prucha trims sprigs from shaggy buffalo. Neighborhood small fry are tempted to pull off elephant's trunk. Humped camel at left pays no attention





Robot Baseball Pitcher

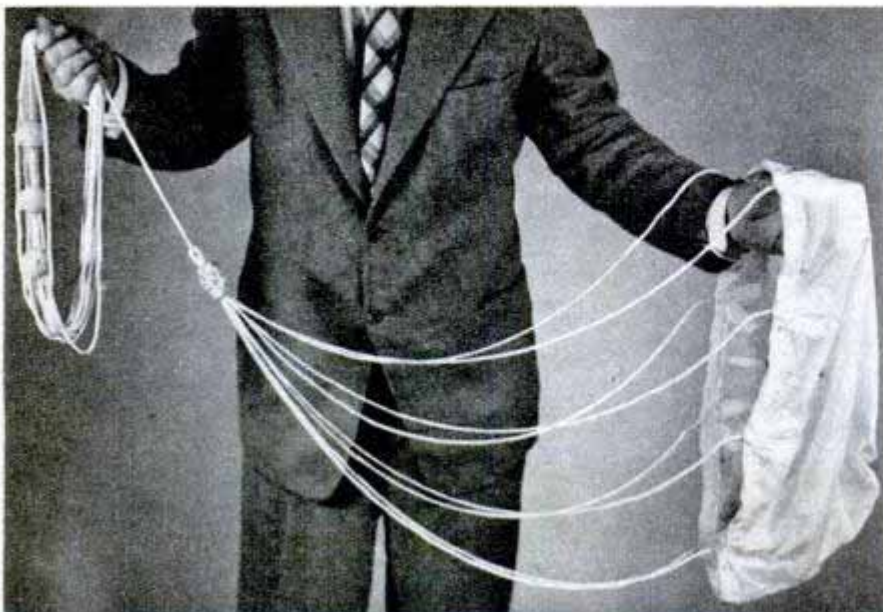
Wartime bazookas are converted into robot baseball pitchers for batting practice. A bazooka tube, filled with baseballs, feeds the balls by the action of a piston to an at-

tached metal arm. The arm, swinging clockwise and operated by a small motor, hurls the balls in the direction of the batter. Pete Wald, New York war veteran, has built 10 bazooka pitchers and set them up in Hollywood for entertainment games.



Nylon Sea Anchor

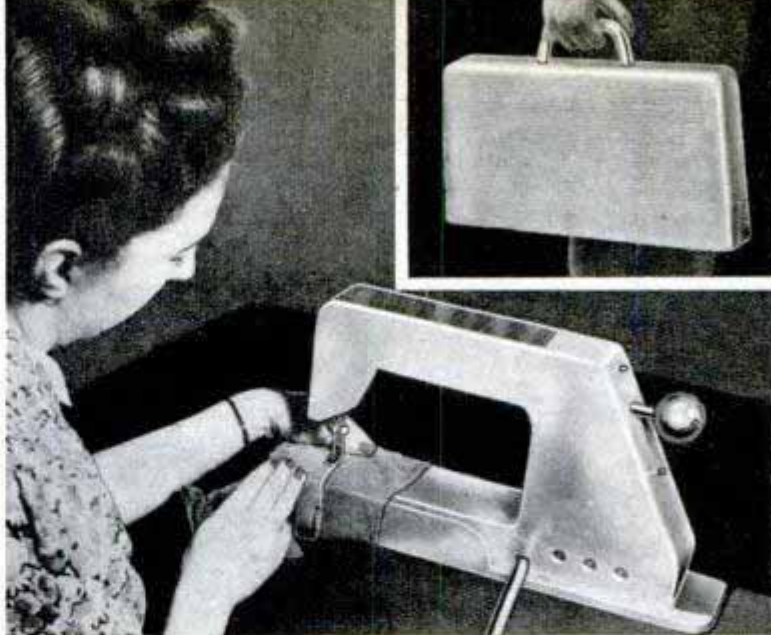
One type of sea anchor is now made of Nylon to resist rotting. It is weighted at the crown and has cork floats to keep it at the correct level below waves. Shaped like a parachute, it is tossed overboard, particularly during a storm, to serve as a float to reduce a vessel's drifting or to keep her head to the wind to prevent capsizing. Sea anchors of correct sizes and strengths are scientifically determined for all types of vessels, from AAF rubber life rafts to the largest vessel afloat. Since it has no spreaders, the anchor requires very little storage space.



☞ Rubber gloves with rough palm and finger surfaces have been designed to prevent slippery materials from skidding out of workers' hands.

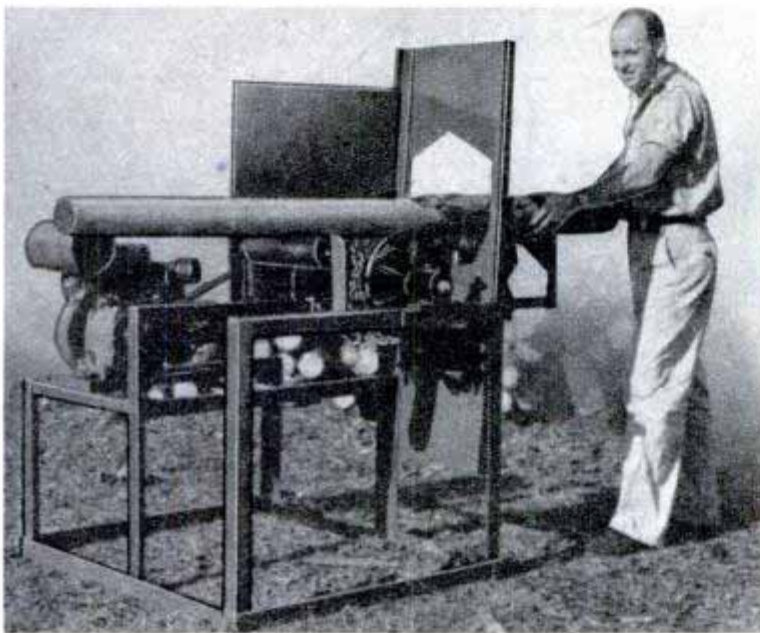
Tiny Electric Sewing Machine Carried Like Typewriter

About the size of a portable typewriter, an electric sewing machine made of aluminum has been designed in England. The miniature machine, weighing 15 pounds, has an aluminum carrying case which opens out to form the working table. A metal sphere replaces the usual flywheel. Light is thrown on the needle through a plastic tube which bends the rays to illuminate the working area. The speed of the machine is controlled by a knee lever.



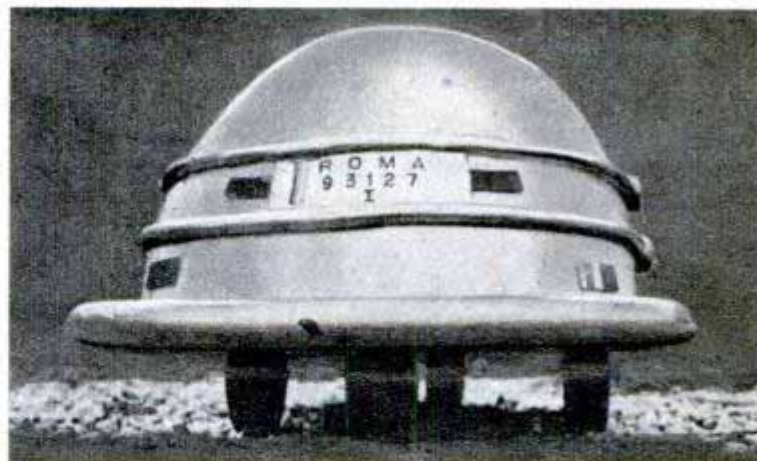
Short Chains on Pole Stripper Beat Bark From Logs

Bark is stripped from logs for fence posts by a simple machine that "beats" it away with short lengths of chain. The machine was invented by Emory Carter and Clarke Mathewson of Lake City, Fla., who decided that removing the bark with a knife or straightened hoe was too slow and expensive. They developed a simple "pole beater" consisting of two iron disks connected by an axle. Between the disks are loose chains. A one-cylinder motor rotates the disks as the operator feeds the logs across the machine. The chains literally beat the bark off the poles.



Plastic and Aluminum Auto Has Engine in Rear

Plastic, glass and aluminum are the three main materials in an ultrastreamlined car designed by Albert Gorgoni of Rome. The body is made of plastic, frame of aluminum and windows, of course, are glass. A small, high-powered motor is mounted at the back, and the wheels can be turned so far that the auto can almost make a 180-degree turn within its own length. The seats are hinged so they can be made into beds.



Popular Mechanics is always ready to supply further information to readers about various products described in any issue. Just write to Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11, Ill., for a prompt reply



Now single-cabin cruiser by Richardson sleeps four. Below, Gar Wood, Jr., boat has molded hull of Fiberglas and plastic



Smallest cruiser is 20-foot Cruisalong which sleeps two. Below, Century will do 50 m.p.h. with 50-hp. outboard .





Screened sliding windows around the cabin of Chris-Craft's 27-foot cruiser make it open sport or closed family boat. Dinette in 26-footer, below, converts into double bed, and lounge seat at right makes up into upper and lower berths

1947 BOAT SHOW

IF YOU'RE one of the outdoorsmen who've been dreaming of a fishing trip or a week-end cruise in your new motorboat, this could be your year. Production is rolling to satisfy the biggest demand in history and builders can supply almost anything you want: utility, runabout, cruiser or yacht.

Prices are considerably higher than in 1940, the last good production year. Cruisers range from the 20-foot Cruisalong which sleeps two and sells for about \$2100 to a luxurious 46-foot double-cabin \$25,000 Chris-Craft that sleeps nine.

Gar Wood, Jr., is introducing a light-weight runabout molded of Fiberglas and plastic. It is powered by a 26-hp. marine engine that delivers one mile per hour of speed for each pound of weight. Other builders have switched from mahogany planking to molded plywood. Steelcraft uses an all-steel welded hull. One 26-foot cruiser of this type costs less than \$4000.

(Additional photos on following two pages)



Interior of the main cabin of Chris-Craft's largest stock model, a 46-foot double-cabin cruiser. It has accommodations for nine. Enclosed sundeck, below, is atop main cabin





Hull of the smart Steelcraft Sedan Cruiser is welded of six sheets of alloy steel; two cabins will sleep four

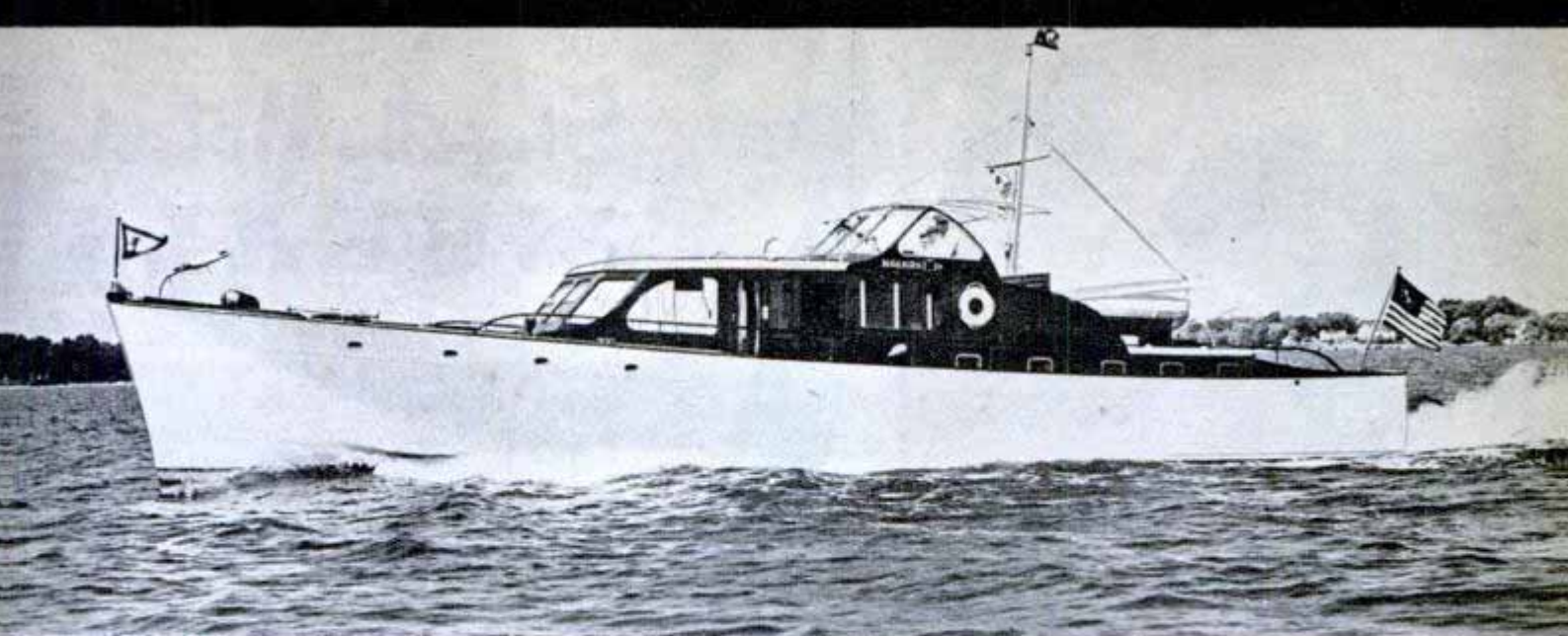
Plexiglas strip along hull of 33-foot craft provides something new in portholes. The square ports swing open on hinges to ventilate the cabin of the Sunlounge



This 20-foot Ventnor De Luxe Runabout can go 40 miles an hour; it has 150-horsepower engine

The Sport Fisherman has seats for six but bunks only two. Maximum speed is about 27 miles an hour with a choice of Chrysler, Gray or Kermath engines. Below, Elco Sports Cruiser — see plan view on opposite page





Sixty-five feet of marine beauty — palatially fitted Makaira has top speed of 18 miles an hour and is powered by two GM Diesels. It even has ship-to-shore phone

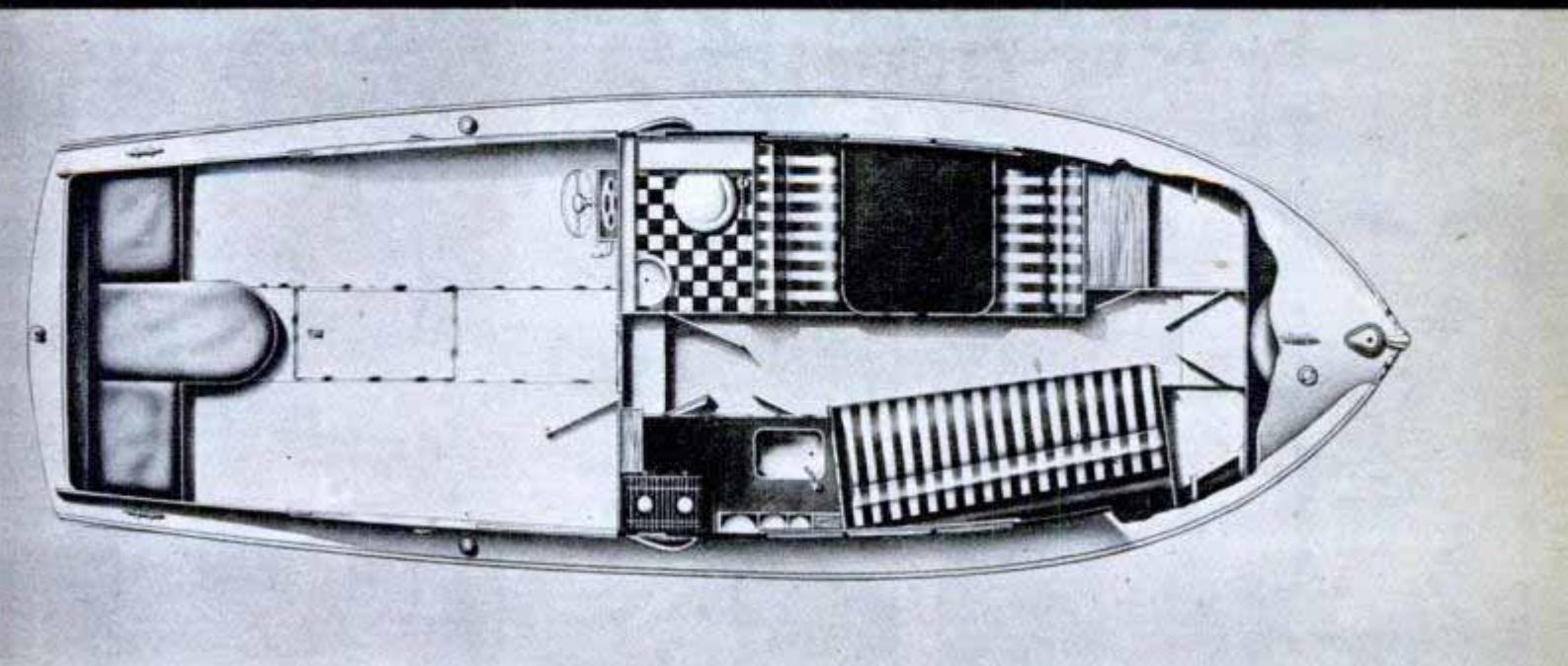
Below, controls on Chris-Craft Express Cruiser are easy to reach; some models boast dual controls



These trim 16 and 17-foot runabouts are 1947 Chris-Craft models. Speeds approach 40 miles an hour. The 16-footer is priced at \$1840, the 17-foot de luxe job costs \$2090, and a 20-foot runabout sells for \$3640



Below, plan view of Elco 27-foot Sports Cruiser. Engine is installed under the seat aft and cabin has sleeping quarters for four. This model is an adaptation of Navy's PT design. Speed, 27 m.p.h.



Sheet Metal MURALS

Harold Egan and his wife of New York make murals out of stainless steel sheets. First they make full-scale drawings (left) which are blueprinted and transferred to sheet metal. Then Mr. Egan uses a power saw to cut through the tough steel and follow the outlines. Fingers and other fine details are cut out by a pair of snippers wielded by Mrs. Egan (below). Parts of a figure are riveted together. Murals also are made of brass and copper.

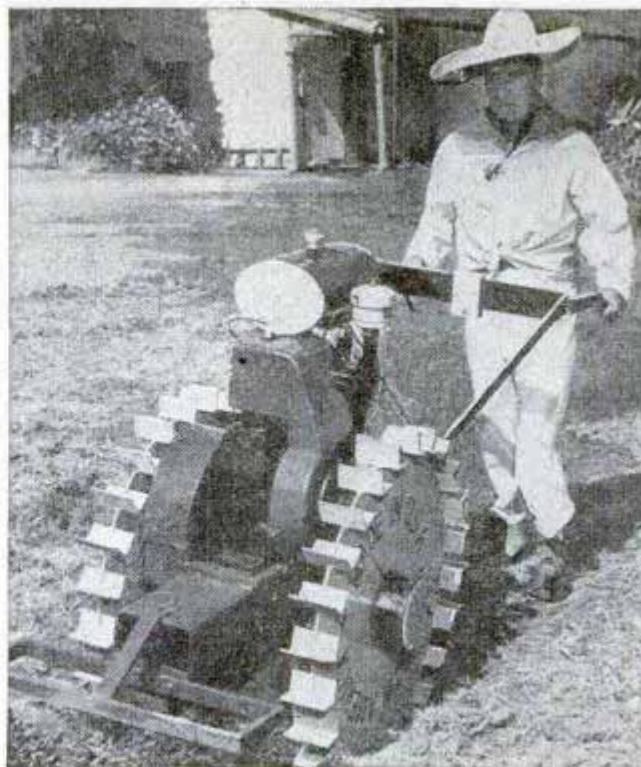


To give the appearance of hair, Mrs. Egan (below) uses an electric vibrating tool to put whorls on the stainless steel. Right, finishing modernistic mural depicting "Sea, Earth and Sky," designed for New York store



Cleaning Fluid Operates Hand-Guided Mexican Tractor

Cleaning fluid, kerosene or gasoline operates a hand-guided tractor now being manufactured in the United States by a group of Mexican industrialists. Finding it difficult to buy tractors in the U. S., the Mexicans hired American engineers to design the tractor which is being sold exclusively in Latin America. Parts are interchangeable with those in stock at Ford parts distributors located throughout Central America. The one-cylinder engine develops from 9 to 14 horsepower.



Combined Fishing Rod and Reel Hooks Onto Side of Boat



Fishing rod and reel are combined in a rustproof spring steel unit which is suitable for still and ice fishing and trolling. The spring, whose top part serves as a reel on which line can be wound, may be hooked over the side of a boat to free a fisherman's hands and yet keep the line in the water. The compact spring is handy for use by children and can be stored in a tackle box or automobile glove compartment.

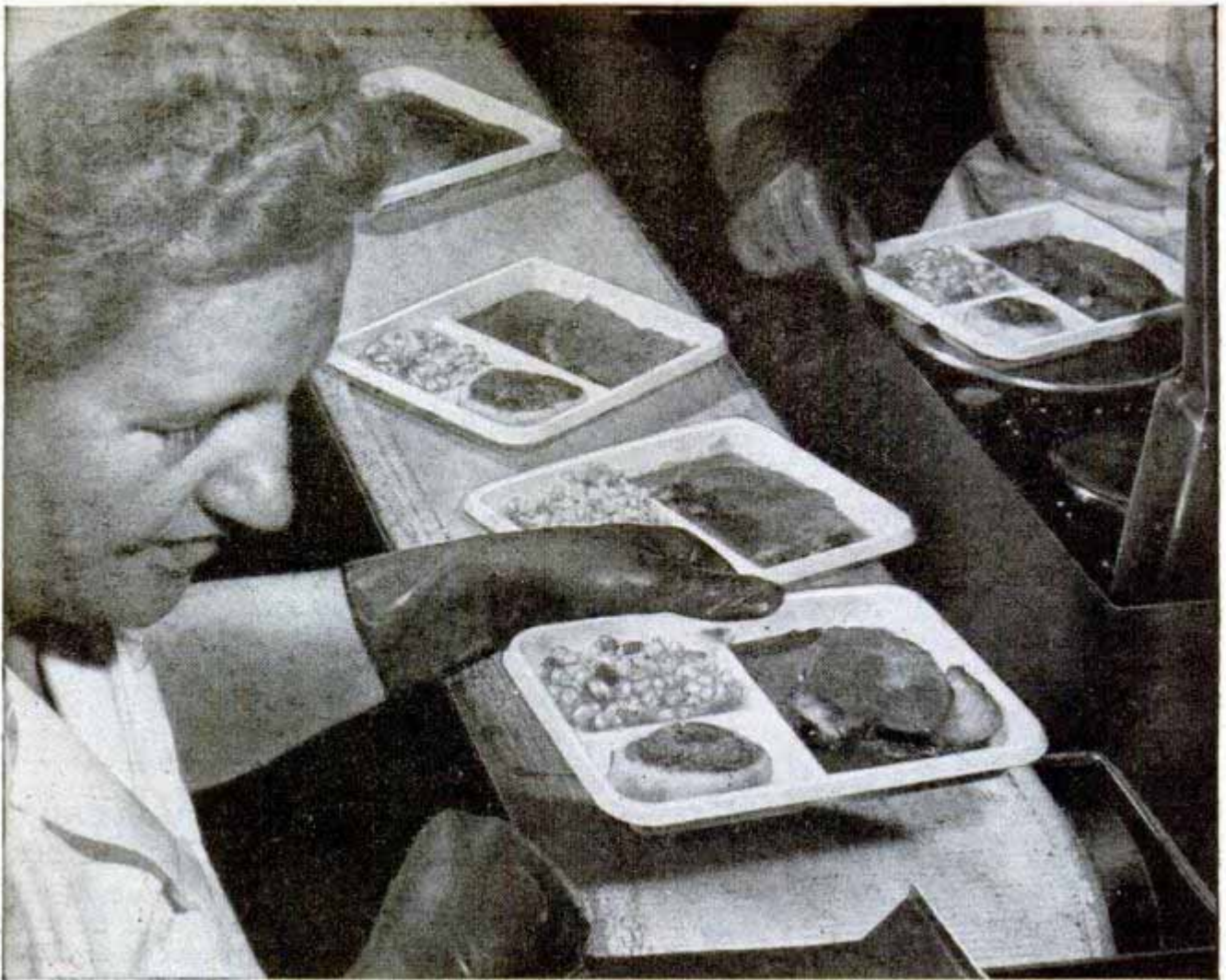
Extract Kills Cancer in Rats

Cancer in rats is destroyed and the rodents are made immune to further cancers by treatment with an extract developed by the Carnegie Institution of Washington, D. C. The extract is made by grinding up rat tumors, adding alcohol and putting the solution through a distillation process.

Automatic Fire Fighter for Range Stops Fuel and Puts Out Flames

Highly inflammable fuel automatically is cut off from kitchen ranges at the first sign of fire by a new fire protection system in a large New York kitchen. Fire is detected immediately by a device that operates a valve to close the fuel line. Meanwhile carbon dioxide rushes out of steel cylinders to smother flames in the ranges and exhaust ducts before they spread.





Precooked meals moving along an assembly line are wrapped in Cellophane jackets, then frozen and stored

DINNERS WITHOUT DRUDGERY

ON A HUNTING trip to Labrador before World

By Andrew Hamilton

War I, Clarence Birdseye observed that fish and caribou meat, chilled rapidly in the frosty air, were tender and fresh-flavored when cooked—though frozen for months. Why couldn't fruits, vegetables and other foods be preserved the same way?

Years later, William L. Maxson stood in his garden in West Orange, N. J., and wondered why someone didn't quick-freeze whole meals to save time and effort in the kitchen.

Because Birdseye and Maxson each found the answer to his question, the United States now has a fast-growing new industry. And the nation's 40,000,000 housewives can look forward to an era of dinners without drudgery.

The frozen food industry is a \$100,000,000-a-year business, compared with the nation's annual food bill of \$18,000,000,000. More than 500 companies freeze vegetables, fruits, poultry, seafoods, meats and pastries. Although Clarence Birdseye is no

longer with the company, the Birds Eye-Snyder Division

of General Foods is one of the leading producers. Others in the field are Stokely-Van Camp, Seabrook, Pratt's Fresh Foods, Courtley Frosted Foods, J. Walter Thompson and Lehman Brothers.

Because quick-frozen foods have become big business, science has taken a hand in assuring efficiency of operation and high quality of product. The 55 fruits, vegetables and meats issued under the Birds Eye label are watched as closely as the Dionne Quintuplets. Before the crop is planted, the soil is given scientific chemical tests. Seeds and plant varieties are carefully selected by agricultural experts. For example, more than 100 varieties of garden peas were examined before two sweet-flavored, tender-textured varieties were chosen. Mechanical devices for picking, shelling, sorting, washing and refrigeration take the peas from field to freezer in about two hours.

Research laboratories continually work to improve the foods. To date, 350 foods

have been frozen experimentally, including crab apple juice, persimmons, zucchini, soup, liquid coffee, squid, dry martinis, parsley, sweet potatoes, shark meat and eggs.

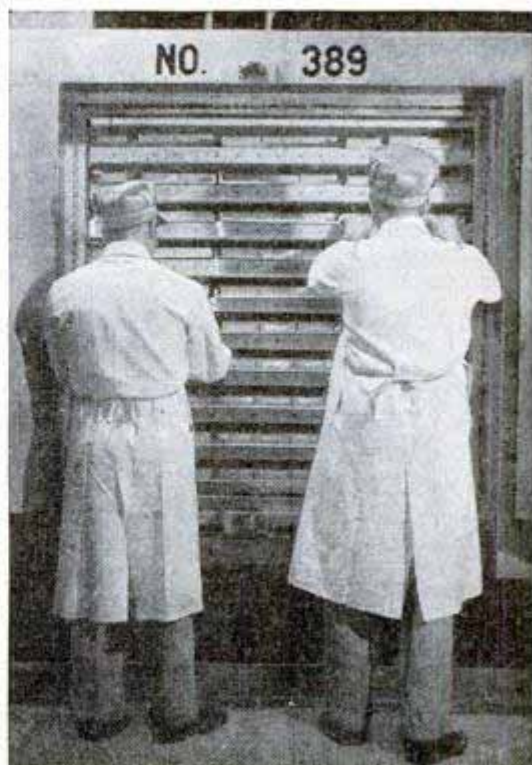
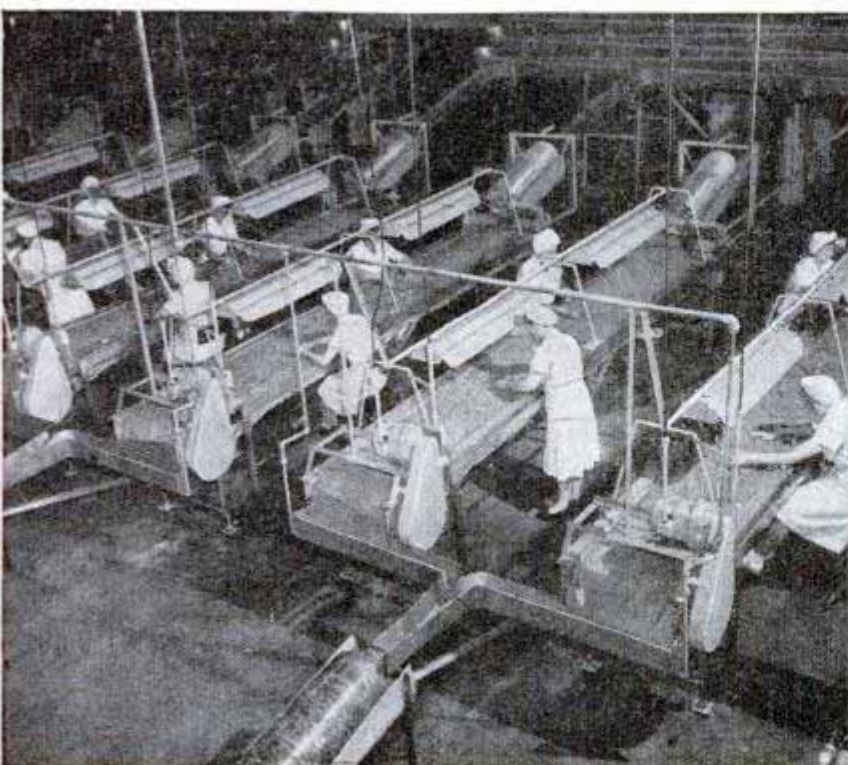
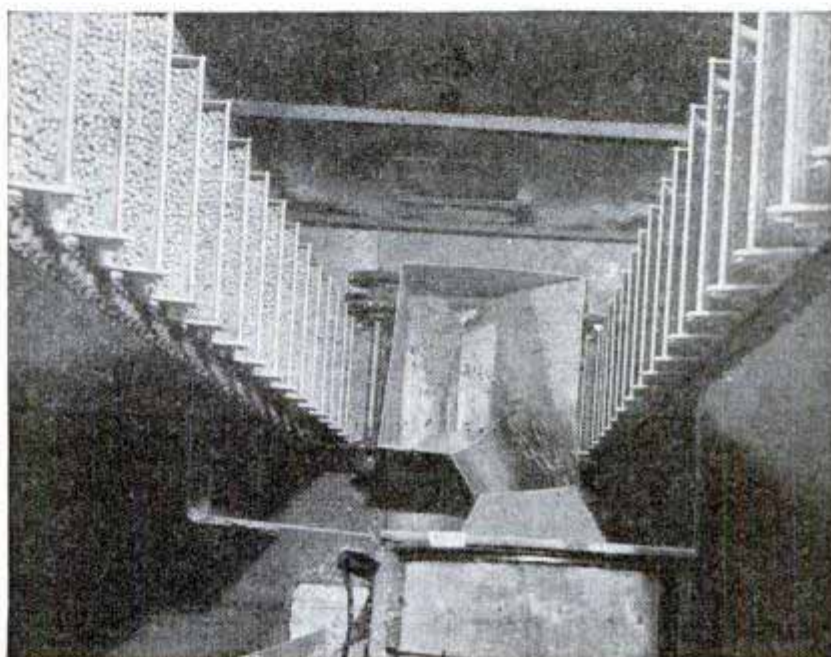
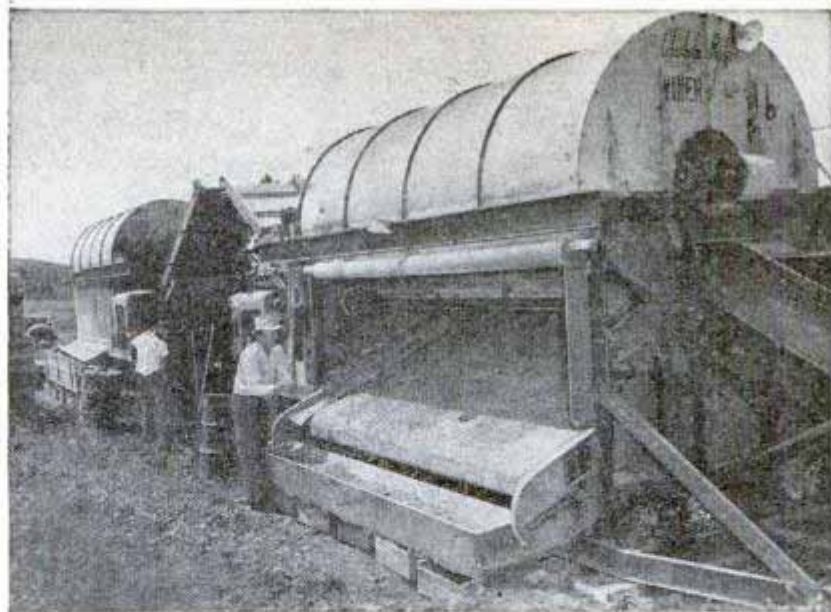
Most exciting news in the quick-frozen food industry centers around William L. Maxson, 260-pound engineer and Annapolis graduate, who thought up quick-frozen dinners. In 1944, Maxson Food Systems, Inc., contracted with the Navy to provide quick-frozen meals for the passenger-carrying planes of the Naval Air Transport Service. Until then, crew members and passengers had subsisted on cold sandwiches and K-rations. More than 500,000 "sky plates" have been served aboard NATS and Pan American planes and this experience has enabled Maxson to launch a nation-wide program.

Before long you may see frozen dinners served in hotels, trains, planes, ships, factories, offices and your own home. They probably will be sold in grocery stores and delicatessens.

The Maxson idea is simple. Why fool around with individ-

Peas shelled in field by drum (top) are cleaned (right), graded (below), and placed in quick-freezer (lower right)

Birds Eye Frosted Foods photos





Army researchers weigh and grease dough before sealing it in tin cans during canned-bread experiments. Below, canned raisin bread, white bread and fruit cake. Cut horizontally, slice is round; vertically, it's square



ual packages of frozen meats, frozen vegetables, frozen fruits, frozen pastries? Why not combine all these items on a single plate, then precook, freeze and store until ready for use?

The Maxson Food Systems, Inc., buys meats, vegetables and fruits in carload lots, taking only choice cuts and high-quality items. Each food is precooked. Then the individual portions are combined on a partitioned cardboard plate (which is covered with plastic to guard against unwanted odors), slipped into a Cellophane bag and frozen. The food is constantly inspected and checked for flavor. Chefs, home economists

and dieticians prepare the frozen meals.

A wide selection of frozen dinners is expected to be available soon in grocery and frozen food stores. Eventually, frozen meals will be delivered from house to house. Plates for children and special plates for industrial workers and hospitals also are in the future.

About 30 minutes before dinner, the housewife removes the plates from the refrigerator, takes off the Cellophane cover and pops the dinner into the oven. Shopping and preparation of food are cut to a minimum, washing and peeling of vegetables is eliminated, cooking odors are banished and kitchen storage space is saved. And there's no dish washing! After the meal, the plastic covered plate is thrown away.

Maxson has set up a pilot plant in Queen's Village, Long Island, and frozen dinners are rolling out at the rate of 35,000 a month. Future plans call for the erection of additional frozen-food factories in Chicago, Kansas City, Los Angeles and other locations.

To date, Maxson is offering 40 blue plate specials, consisting of a generous-size entree and two vegetables. Entrees include steak, baked ham, veal cutlets, roast lamb, breast of chicken, roast turkey and many other

mouth-watering main dishes. At present, frozen dinners are being sold in New York department and grocery stores at 97 cents to \$1.63; in mass production later they should be considerably cheaper.

To meet the problem of thawing and reheating his frozen dinners, Maxson has developed for airplanes the Whirlwind oven. Weighing 35 pounds and made of aluminum and steel, the compact oven heats six frozen dinners at a time. It operates on gas, kerosene or electricity. A small fan inside the oven blows hot air and heats the frozen food in about 15 minutes. A regular oven takes twice as long. The Whirlwind is ex-

pected to be on the market in a few months and will sell for about \$35.

The Maxson Food Systems, Inc., recently signed a contract to install galleys on the Boeing Stratocruisers being built for Pan American World Airways. These galleys fit into the tail end of a plane and have storage space for 196 frozen meals, to be reheated at the rate of 12 every 15 minutes.

In addition to turning out frozen dinners and Whirlwind ovens, Maxson is also producing single food items for the busy housewife. The first of these is French fried potatoes. Packed in 10-ounce containers, this precooked, frozen food is being sold all over the country. Other items to be offered in the near future are Mexican corn, carrots Vichy, Swiss steak and turkey with giblet gravy and dressing.

Most of the large food packers are working on dishes which need only to be unfrozen and reheated: baked beans, chicken a la king, corned beef hash, Irish stew, meat balls and spaghetti, etc. The New York Waldorf-Astoria is considering putting out curried chicken and lobster a la king. One baker quick-freezes 12 kinds of pies. Other precooked frozen foods coming on the market include mashed potatoes, poached egg in a nest of spinach, cream puff shells, oyster Newburg, Welsh rarebit and sirloin tips with mushrooms.

The Army and Navy are showing continued interest in frozen and precooked foods. During 1944 and 1945 the Navy used about 55,000,000 pounds of frozen fruits and vegetables in training stations and shore bases within the United States and aboard submarines and aircraft carriers. Now Navy supply officers are working on plans to ship frozen foods to overseas bases.

The Army is also busy with research along these lines. One of their particular problems is canned bread which may be frozen in storage. Dur-

(Continued to page 240)



Pan American stewardess pops a frozen meal into Whirlwind electric oven. This oven, specifically designed for thawing and recocking six frozen dinners simultaneously, has the food ready in about 15 minutes



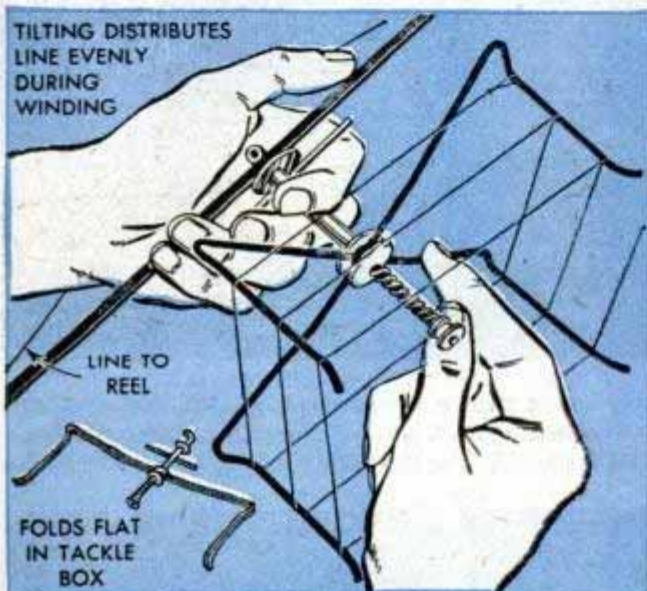
WHAT'S NEW IN TACKLE



FRICTION CLAMPS fasten the reel anywhere on the rod handle, tailoring the rod for individual use. Firm pull releases the clamps whenever reel is to be moved

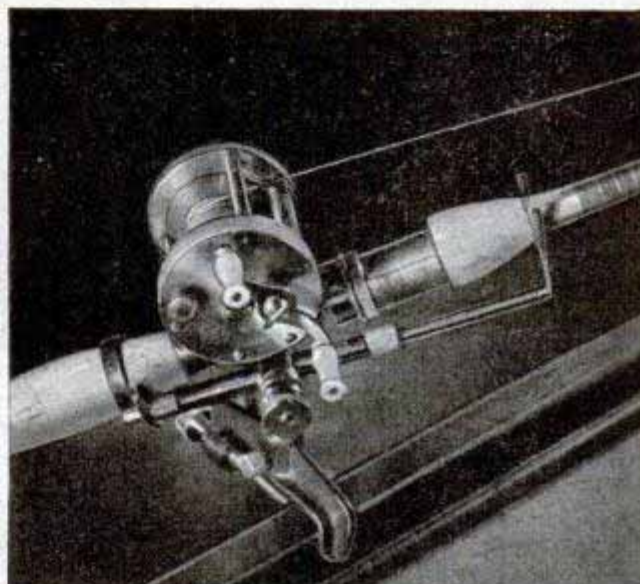


LEADER CLIP fastens leader to line without knots. Loop in line is passed through clip, the leader, the clip again and then pulled tight around clip's point



LINE DRIER with four metal arms clamps to the rod. Dried line can be wound directly from drier to reel

WORM BOX has false floor, hinged and perforated, through which worms crawl, making them easy to find



ROD HOLDER for fresh-water trolling clamps to gunwale, leaving fisherman's hands free to handle boat

TRANSPARENT BAIT BOX with compartments for flies and leaders eliminates fumbling for the correct bait



No Fumbling for Pencils—He Can Choose From 25,000

When Bill Hausman of Chicago wants to scribble a note he can choose any one of 25,000 pencils he has collected from all over the world. In his collection, valued at more than \$10,000, are pencils from kings, emperors and movie stars, some bearing tiny photographs of the former owners. The largest of his pencils is 12 feet long; the smallest is $\frac{1}{2}$ inch in length and $\frac{1}{8}$ inch in diameter. One 50-year-old pencil weighs 20 pounds and is 6 feet long.

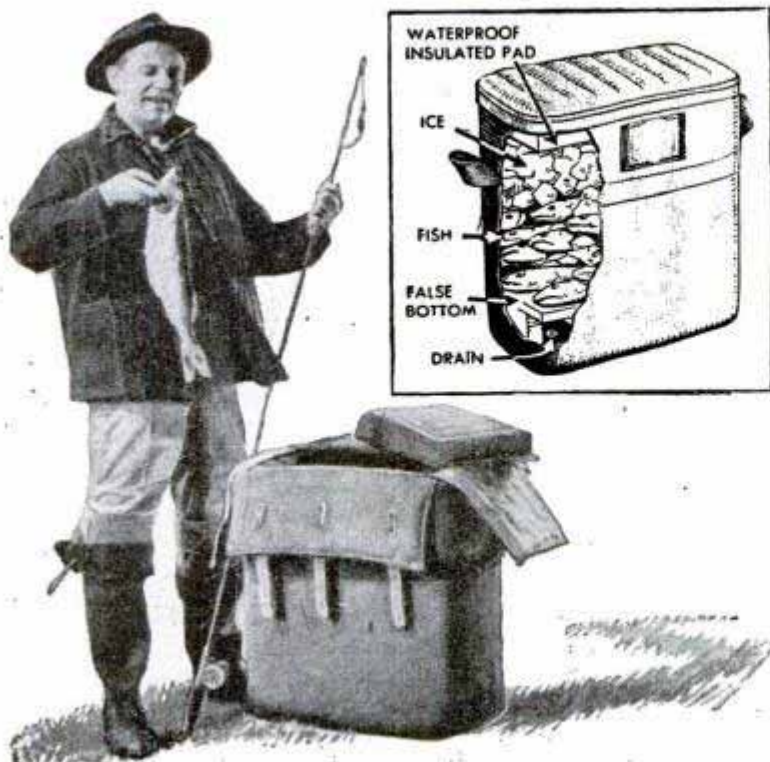
Plastic Liner in Drill Pipes Stops Oil Well Corrosion

Steel pipes used in oil well drilling are now lined with plastic to prevent corrosion. The interior surface of 4½-inch drill pipes is shot-blasted to prepare for plastic lining. Then the pipe is upended in a rack and liquid plastic is forced up the inside until it reaches the top. Next, the plastic is drained slowly so that no air bubbles or streaks are formed. After a short drying period at room temperature, the pipe is placed in an oven and the plastic coating is baked on. Four successive coatings are applied. Field tests by the Spang-Chalfant Division of the National Supply Company demonstrated that in drilling 62,181 feet, plastic-



lined pipe had no failures while uncoated pipe failed 14 times, mostly because of corrosion. A special thermosetting plastic is used for the liner.

Cork-Insulated Hamper Keeps Perishable Foods Fresh

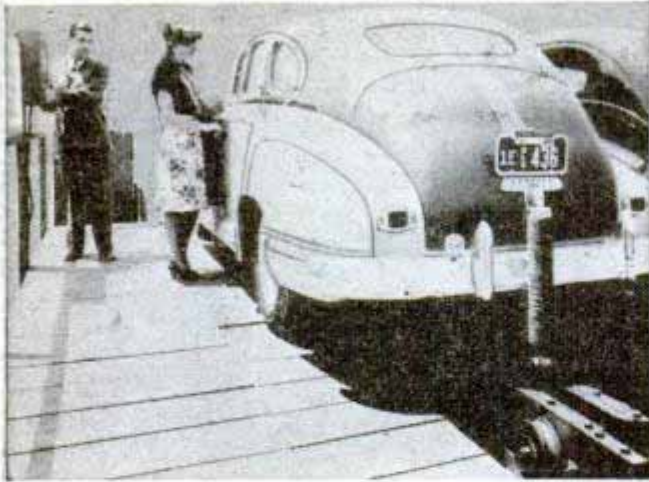


Covered with a cork-filled duck jacket and lined with a soldered and galvanized container, a lightweight food hamper serves sportsmen by keeping perishable foods fresh on the way to camp and carrying fish home on the return trip. Natural or dry ice can be used as preservative. Water from natural ice is released through a drain in the bottom of the metal liner,

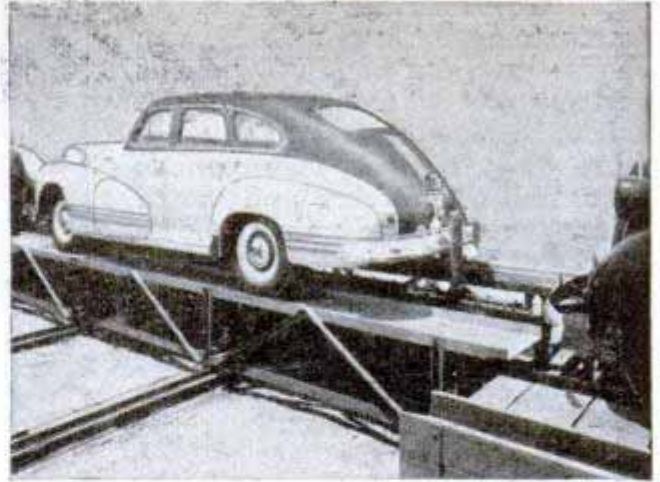
Age Limit for Inventors?

Most inventions are born when the inventors are in their thirties or forties. A study of hundreds of patentable ideas — conducted by Thomas Spooner, Westinghouse research engineer — revealed that inventors reach two creative peaks. The first comes in the middle thirties and the second at about age 43.

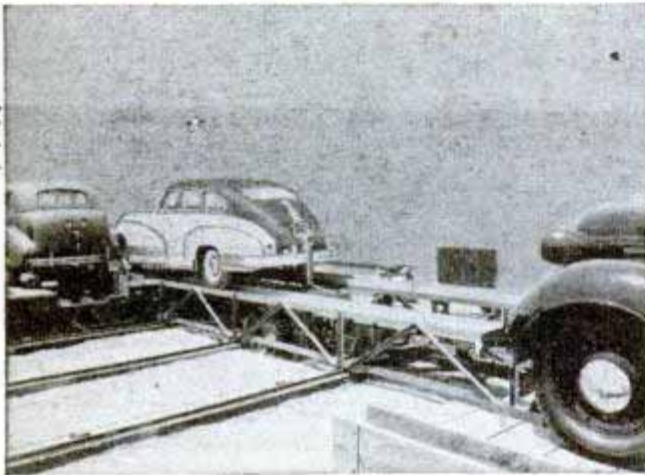
Cars Are Parked Automatically by Push-Button Elevator



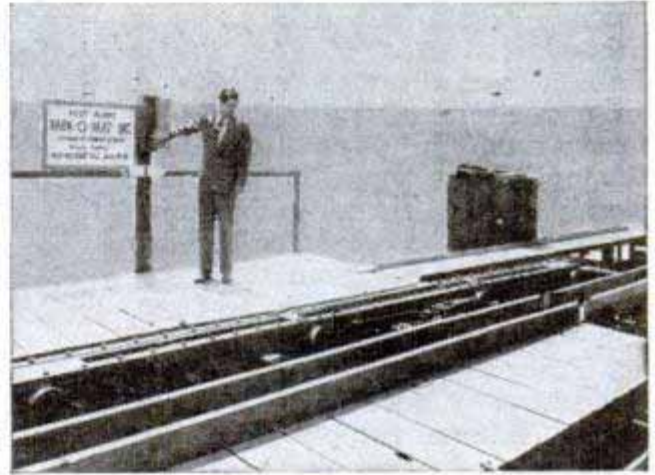
Car is driven into garage and locked. When operator pushes a button, heavy metal arms grip both bumpers. Car is pushed into a stall. The automatic parking device can be installed in buildings with several floors



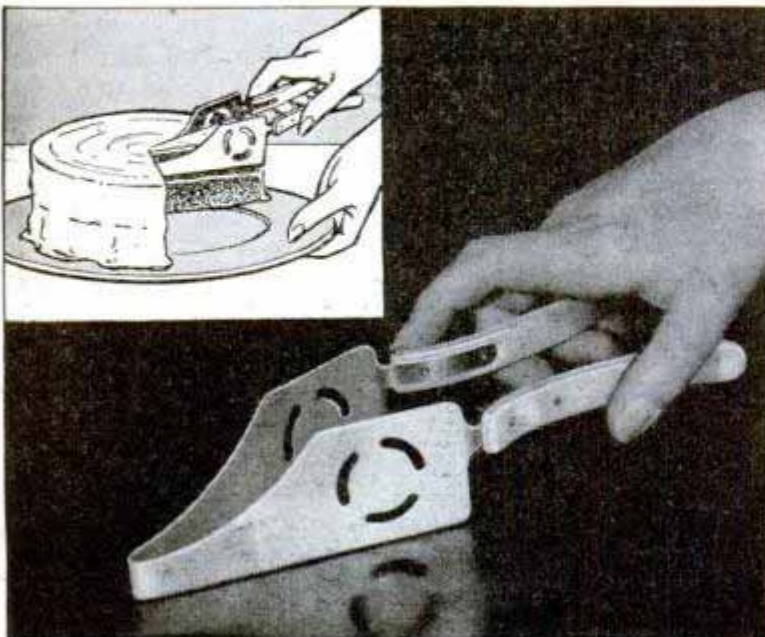
From the passenger platform the automobile is rolled onto a transfer table or elevator for the next move. Electrically operated car positioner is returned to its starting point, ready to park the next automobile



Cars can be parked automatically in public garages equipped with a newly designed push-button mechanism. A jack lifts the auto onto an elevator which carries it to the desired floor and slides it into



a stall. When the operator pushes another control board button, the elevator returns to its original position—ready for another car. The entire parking operation can be performed in approximately one minute.



Double Blade Cake Cutter Lifts Portions With Ease

Cake is cut with a minimum of crumbling by a V-shaped cutter that can be adjusted by the handles to the desired size. The handles are squeezed to make the cut smaller. After the blades are pressed through the cake, the portion can be lifted out by a slight pressure on the handles.

Information, including manufacturers' names and addresses, concerning products described in this issue may be obtained by writing to Bureau of Information, Popular Mechanics Magazine, 200 E. Ontario Street, Chicago 11, Ill.

The Craftsman



7-HP TRACTOR

★ For the many odd jobs on a farm that require only a small amount of tractor power, Farmette, a 7-hp. tractor, is ideal. It will save the big tractor on such jobs as mowing fence rows and plowing snow, and it will handle practically all of your towing jobs and do much of the belt work. It's easy on the fuel bill, too, for Farmette, shown on page 220, is one of the smallest tricycle-type tractors you ever saw wrapped up in one package.

★ For photo fans there's a story on page 211 covering reflex camera repair that makes taking a camera apart and putting it together again look easy.

★ On page 182 we offer a two-evening project for the wood turners. Get out the stock and glue up parts one evening, turn and finish the work the next.

★ A piece on page 206 tells why it's essential to do a thorough job of cleaning your car radiator and what's likely to happen if you don't.



CAMERA REPAIR



COOLING SYSTEM CHECKUP



LAMINATED BOWLS

Turning



SELECTION OF WOOD FOR COLOR			
	WOOD	COLOR	HARDNESS
LIGHT	HOLLY	VERY WHITE	MEDIUM
	BASSWOOD	VERY WHITE	VERY SOFT
	MAPLE	WHITE-PINK	HARD
	WHITE PINE	WHITE-YELLOW	SOFT
	BIRCH	WHITE-BROWN	MEDIUM
MEDIUM	GREENHEART	GREEN-YELLOW	HARD
	BUTTERNUT	LIGHT BROWN	SOFT
	MAHOOGANY	RED-BROWN	MEDIUM
	RED GUM	RED-BROWN	MEDIUM
DARK	CHERRY	RED	MEDIUM
	WALNUT	BROWN	MEDIUM
	PURPLEHEART	PURPLE	MEDIUM
	ROSEWOOD (EAST INDIAN)	PURPLE-BROWN	HARD

By Edward R. Lucas

LAMINATED turned work looks like flush inlay when finished, more especially when you use quality hardwoods of pronounced color contrasts. That's why laminated projects have always been a natural for wood-turning hobbyists. Although finished work of this kind gives the appearance of being very difficult to accomplish, in reality it is quite simple to do.

Almost any wood can be used that will turn well. A typical selection is given in Fig. 1. Two-color pattern effects usually are based on a light-colored wood, such as holly or maple, combined with dark wood, such as cherry or walnut. Best results are obtained when the woods used are approximately the same degree of hardness. Softwoods should not be combined with hardwoods except in the case of thin spacers for laminated work. If woods of equal thickness but of unequal hardness are used the work may turn out-of-round, and sanding will develop flats. The humidor shown in Fig. 2 is made by gluing laminated blocks to the eight sides of a softwood core. This assembly is glued to the unfinished base, Fig. 4. Then you bore out the core after the glue has set, cut the blocks from

the strip either directly across, Fig. 4, B, lengthwise, Fig. 4, A, or at an angle as in Fig. 4, C. A more intricate pattern will be obtained by cutting half the blocks square across and the other half through lengthwise. Then alternate the colors when gluing them to the sides of the core. With the angle blocks, a herringbone pattern can be achieved. In assembling, glue the core to the base, then glue the laminated blocks to the base and sides of the core. This leaves 45-deg. openings between the blocks, which are filled by gluing in triangular filler blocks of contrasting wood the same length as the blocks.

Turn the outside of the bowl to the rough size first, leaving enough stock so that the inside can be bored out to a minimum wall thickness of $\frac{1}{4}$ in. Finish the outside by sanding while the work is still mounted in the lathe. Finished dimensions of the humidor shown in Fig. 2 are: 6-in. base diameter, $4\frac{1}{2}$ -in. outside diameter and $3\frac{7}{8}$ -in. inside diameter on the shell or body. Of course, it is not necessary to hold these dimensions which can be varied if desired.

The cover is turned from solid wood. Mount the cover in the lathe by gluing to a

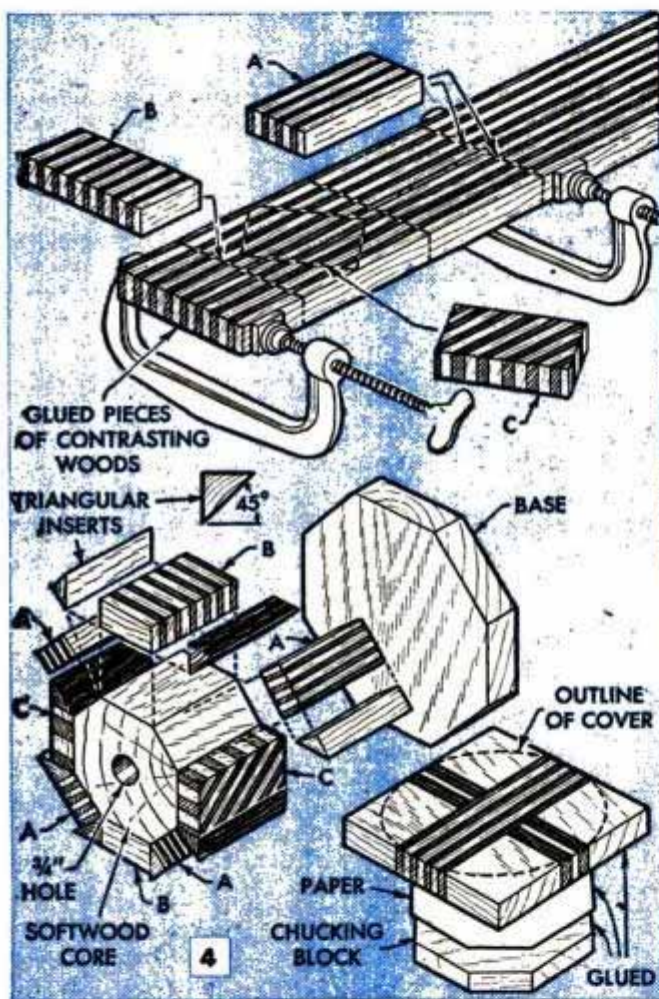
Laminated Bowls



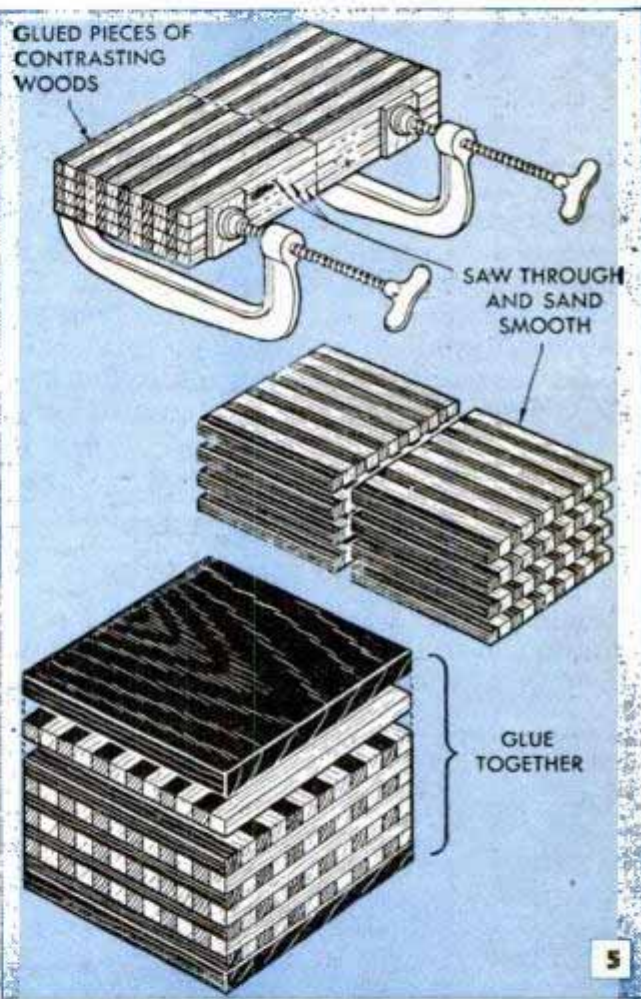
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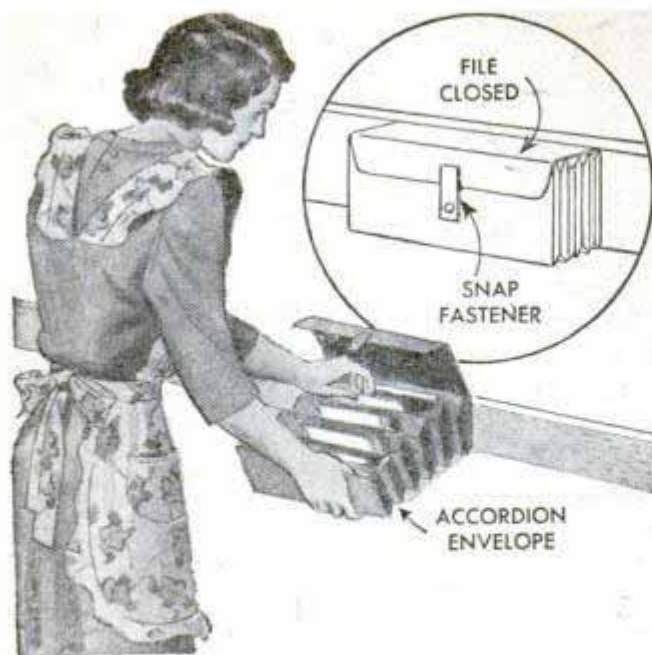
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chucking block with a piece of paper in the joint. Rabbet the edge of the cover to fit easily inside the humidor, then turn the outside to the desired contour. Finish with lacquer or varnish.

Another method of lamination which results in an unusually attractive job is detailed in Fig. 5. A turned bowl built up in this manner is shown in Fig. 3. The lamination consists of layers of $\frac{1}{4}$ by $\frac{1}{4}$ -in. strips of alternately spaced contrasting woods glued together. Alternating layers are placed at right angles and glued together between top and bottom blocks of clear wood. Size of the glued-up block must be

somewhat larger than the finished dimensions of the bowl, of course. The top and bottom blocks are one piece as in Fig. 5. Turning the inside and outside to the desired size and contour is just another simple turning job. When undercutting the inside of a bowl or humidor one has to be especially careful that the chisel does not dig in suddenly and damage the work. Keep a firm grip on the chisel handle to prevent the tool from turning and thus presenting the cutting edge to the work at a new angle. Usually this is the cause of the cutting edge digging deeply into the wood and seriously damaging the work.

Folding Envelope Tacked to Wall Holds Recipes and Clippings



Recipes and clippings usually find their way into odd corners and finally are lost if there's no regular file to hold them. To make a convenient storage place, tack an accordion-type folding envelope to a chair rail on the wall and use it as a file. The envelope should have a snap fastener to keep it closed.

Inner-Tube "Life Preserver" Keeps Tackle Box Afloat

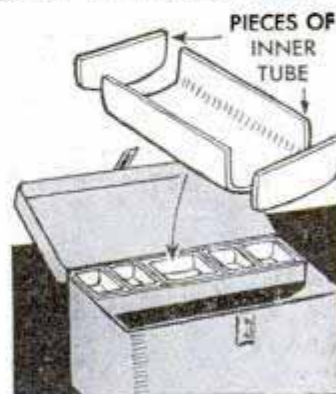
When a tackle box slides off the boat seat into the water, that doesn't mean the end of a fishing trip and the loss of tackle if the



box is equipped with a life preserver like the one shown. To make it, an inner tube is cut down so that it will fit snugly about the box when inflated. Cement rubber strips to the corners of the box to provide a grip for the tube. To make it easier to inflate the preserver, remove the valve core and use an airtight cap on the valve stem. Albert M. Lindner, Jr., Cold Spring, N. Y.

Rubber Lining in Fishing Box

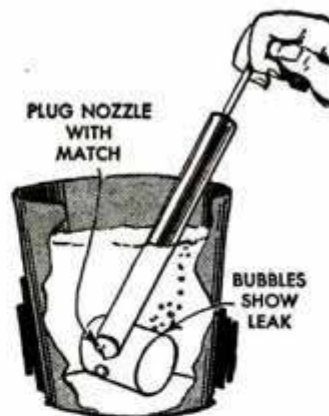
The enameled finish of casting plugs and the plated surfaces of spoons and spinners will be preserved if the compartments in your fishing-tackle box are lined with inner-tube rubber. Pieces are cut to fit the sides and bottoms of the compartments and fastened in place with tire-patching cement.



G. E. Hendrickson, Argyle, Wis.

Testing Garden Spray for Leaks

Having no convenient way to apply air pressure to the tank of a hand garden sprayer to test it for leaks, one gardener used carbide. Small, pea-sized pellets were dropped into the tank, water was added and all openings were closed. Submerged under water, the leak in the tank was located by the string of bubbles coming from it. The pressure in the tank, of course, was caused by the generation of carbide gas.—W. C. Wilhite, Carlinville, Ill.



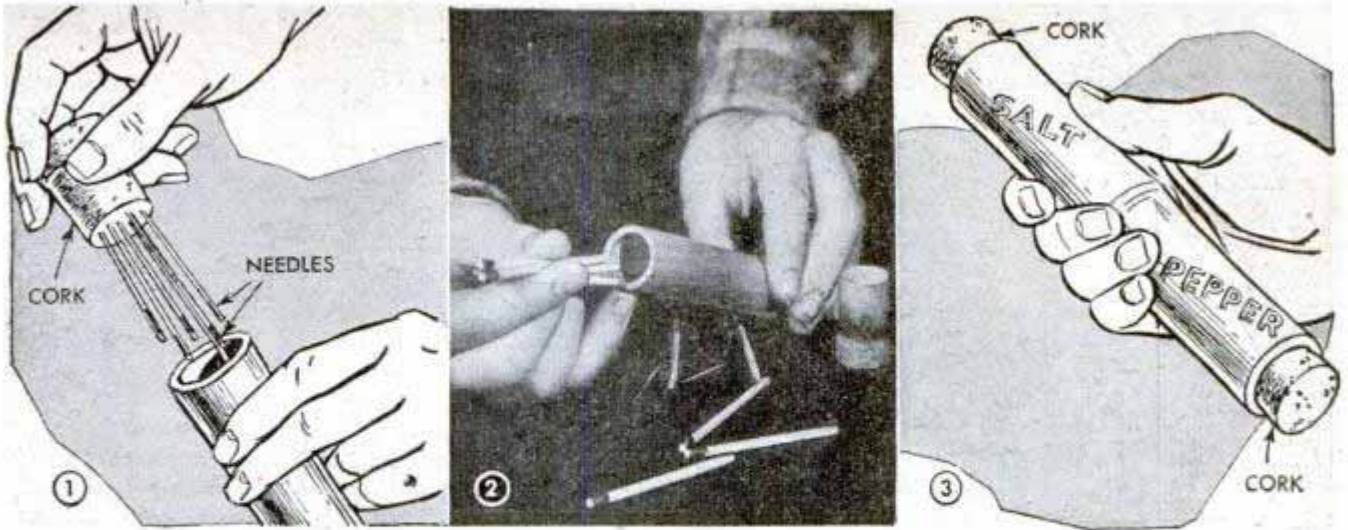
Loosening Tight Joints on Rods

If the joints on your fishing rod stick tightly together, wrap a piece of wet string or fishline around the male ferrule. Then fasten the ends of the string around a branch or the oar lock of a boat. A firm but gentle and steady pull should free the rod.

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

☐ Grease on wallpaper generally can be removed by applying a paste of cornstarch to the discolored spot, allowing it to dry and then brushing it off.

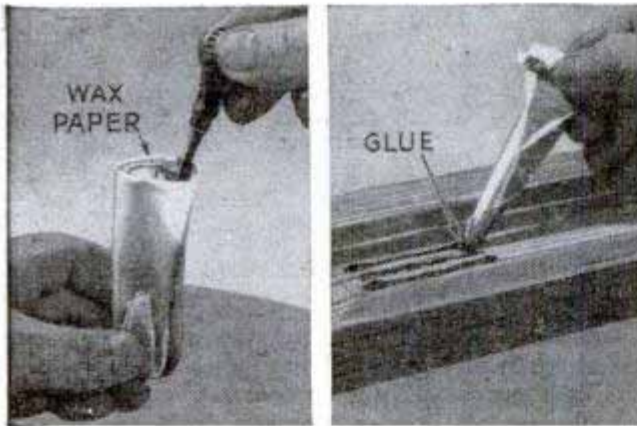
Three Useful Articles From Bamboo Sections



Matchbox, needle holder and a divided container for salt and pepper — all these items are essentials in the camp or summer home or in a trail pack on an outing. For a needle holder or matchbox, Figs. 1 and 2, cut the bamboo section about 4 in. long, making one cut just above a joint, which forms the closed bottom end. Stick needles

in a cork as in Fig. 1, slip the cork in the open end of the bamboo section and there's your needle holder. Use the same construction for the matchbox. For the salt-and-pepper container, cut the bamboo as in Fig. 3, with open sections on each side of a joint. Then fill the sections and insert tight-fitting corks.—D. E. Horn, River Forest, Ill.

Resin Glues Mixed and Applied Through Wax-Paper Cone



Resin glues that require mixing a liquid and a powder can be prepared in small quantities in the following manner: Make a cone of waxed paper and fold the tip. Then add the liquid and powder and mix thoroughly. Next fold over the large end of the cone, unfold the tip and apply the glue by squeezing the rolled end. This type of applicator permits placing the glue exactly where it is needed. When the job is done throw the paper away; there are no containers to wash.

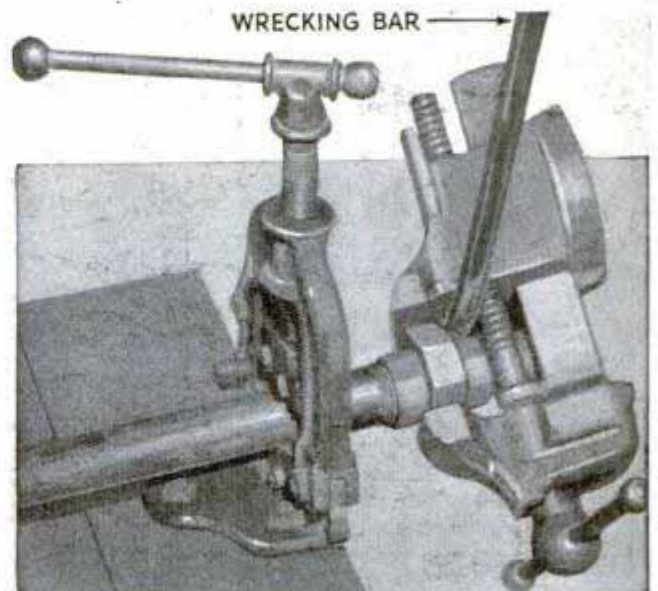
Kenneth Murray, Colon, Mich.

Bench Vise Is Used With Bar To Loosen Pipe Fitting

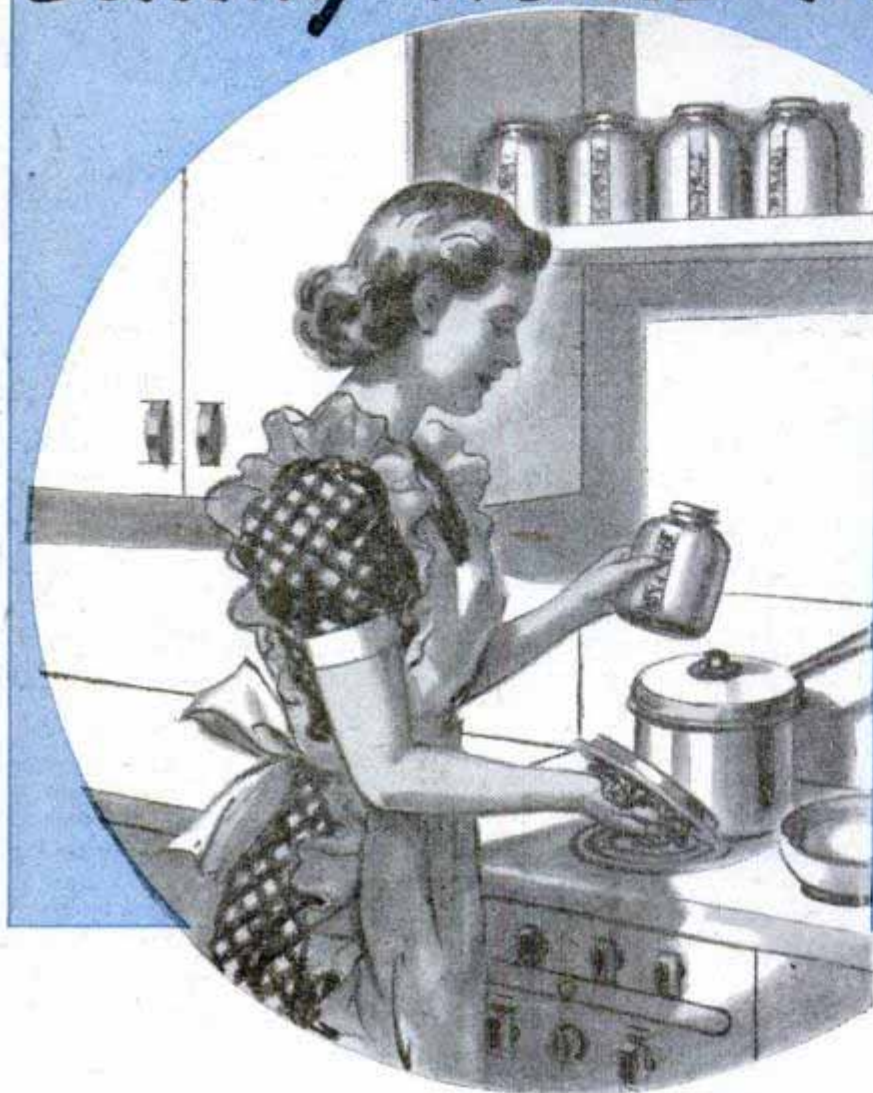
When a pipe fitting is tightly rusted and you haven't a wrench that's large enough to turn it, use a bench vise and a wrecking bar to do the job. Grip the work in a pipe vise and clamp the bench vise to the fitting. Then place the bar between the fitting and the back jaw of the vise. Use the bar as a lever to turn the vise and fitting.

Wayne A. Ward, Watertown, N. Y.

After cleaning out your stoker for the summer, internal parts can be kept from rusting by running oil-soaked sawdust or wood chips through the feed screw into the retort. The sawdust will be burned in the first fire made in the autumn.



Solving HOME PROBLEMS



Placed as flower containers at each guest's plate, brilliantly dyed eggshells make unique favors for an Easter party. After the end of the shell is broken and the contents removed, color and mount the shell on a plaster-of-paris base

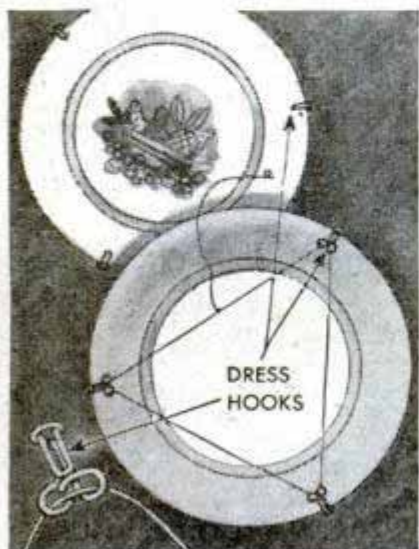


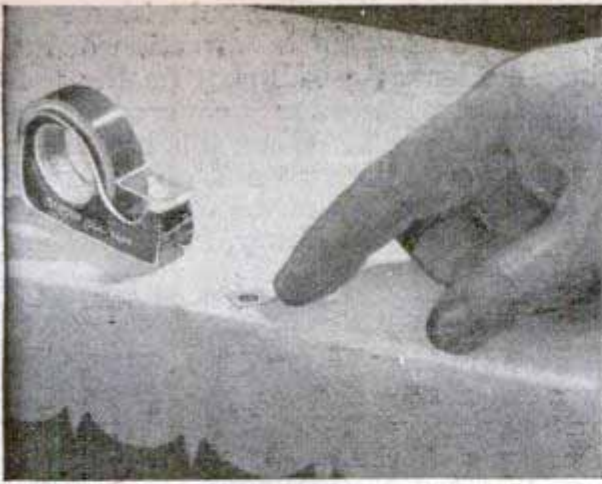
To have coffee, tea and other staples at hand, store them in painted glass coffee jars. Leave a strip of clear glass to identify the contents

You can hang decorative plates on a wall with ordinary dress hooks. Thread a stout cord through the hook eyes, which are on the back, and leave a length to hang the plate. Space the hooks equally

By installing two 3-way switches, one at the base of the porch steps and the other inside the front door, the light can be turned on at either location. This makes crossing the porch at night safe

If a caster cup sticks, trying to pry it loose may damage the finish of the linoleum. In such a case, pour hot water into the cup and let it stand a while. Usually the cup can be removed with ease



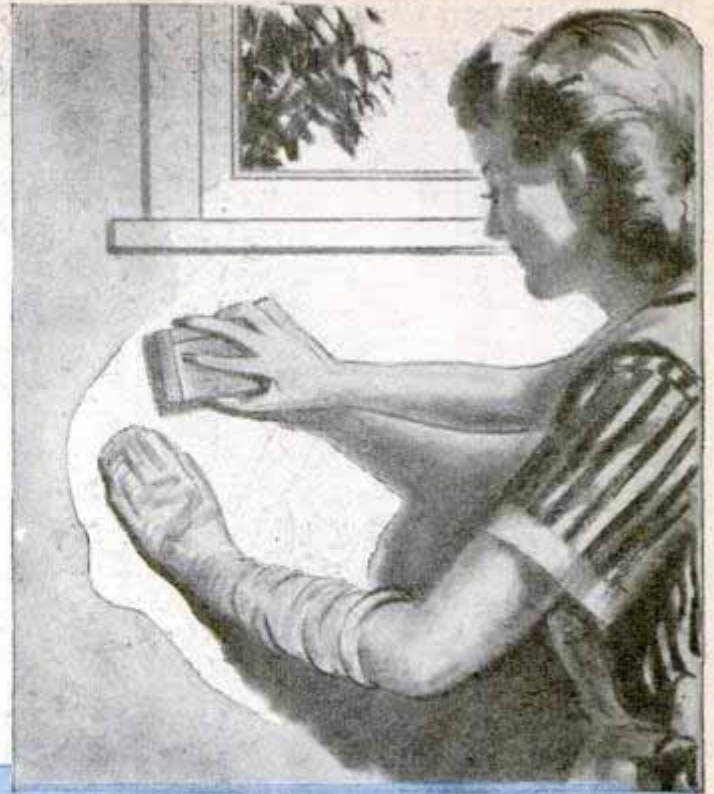


Shelf paper and decorative edging will not become wrinkled if held in place with cellulose tape placed over small holes punched in the paper

Soap shavings can be made in a hurry if there's a carpenter's plane handy. Simply hook the plane on a pail and then draw the soap over the knife

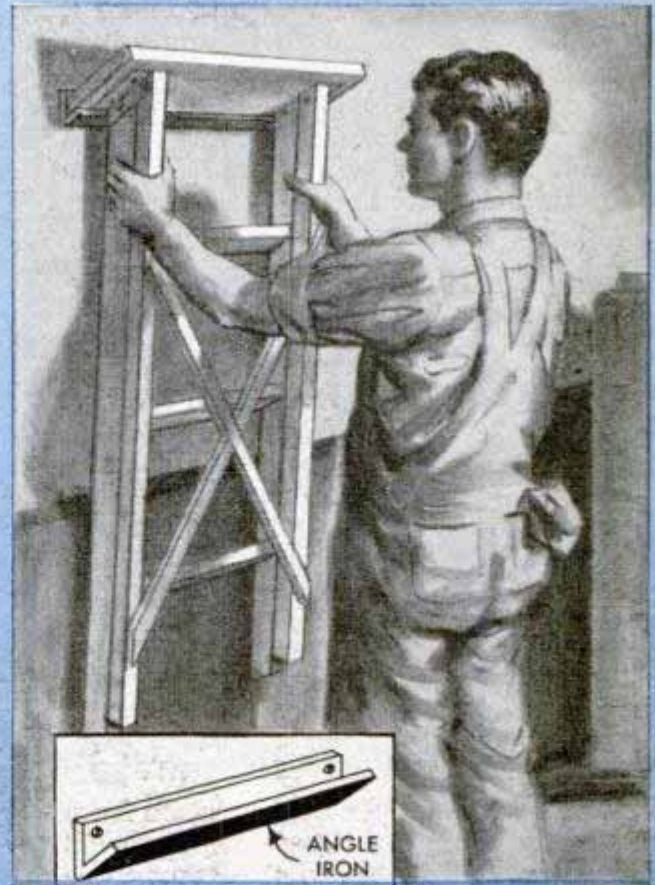


Use a china-marking pencil to write on the oven door when a dish was placed in the oven and when it should be taken out. The marks erase easily



When sanding a painted surface, such as a wall, slip an old silk hose over one hand and run it lightly over the areas that have been sanded. Any spots that are not smooth will catch and snag the hose, indicating that additional sanding with finer paper is needed

Here's a simple way to hang a stepladder on the basement wall so there will be little danger of its falling. Take a length of 2-in. angle iron equal to the width of the top step and bend it so the legs of the angle are 45 deg. apart. Then fasten to the wall

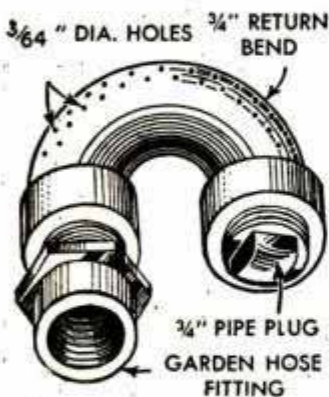


Two-Handed Operation of Pump When Footrest Is Used



Operation of a bilge pump is made easier if a footrest is provided so that both hands are free to operate the pump. This rest is made by brazing a strap hinge to the barrel of the pump. The projecting end of the hinge has a piece of flat iron welded to it to increase the area of the rest and make it more stable. A short length of angle iron provides a stop when the footrest is opened. Hold the pump against one of the seats with the end of the barrel near the bottom of the boat to determine at what height the rest should be located.

Return Bend Serves as Sprinkler



Here's a lawn sprinkler made from pipe fittings. A drilled return bend forms the sprinkler head. One end is plugged and the other is fitted with an attachment for a hose. — R. M. Anthis, Twin Falls, Idaho.

Water Marks Easily Removed

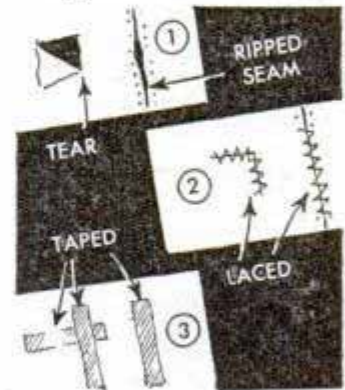
Water and dish marks are removed from furniture by using a mixture of powdered pumice stone and any kind of oil furniture polish. Make a puttylike paste of the stone

and oil and apply it to the spot with a very soft cloth, rubbing in the direction of the grain. This leaves a dull spot on the polished surface which then is covered with a coat of white shellac. When this has dried, rub lightly with pumice and oil until the spot matches the rest of the finish.

Francis W. Henry, Pottsville, Pa.

Adhesive-Tape Repair for Tent

That camping trip needn't be spoiled because you find a tear in the tent and suddenly hit a spell of rainy weather. Many outdoorsmen carry a roll of adhesive tape for just such an emergency. To repair the tent, punch a



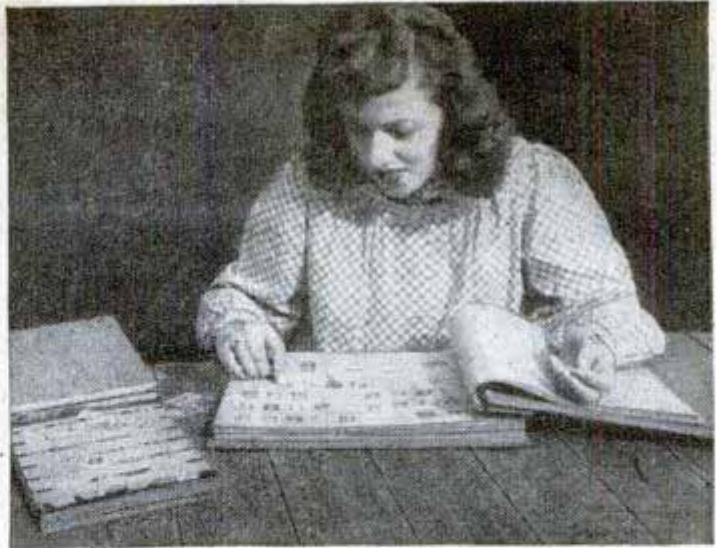
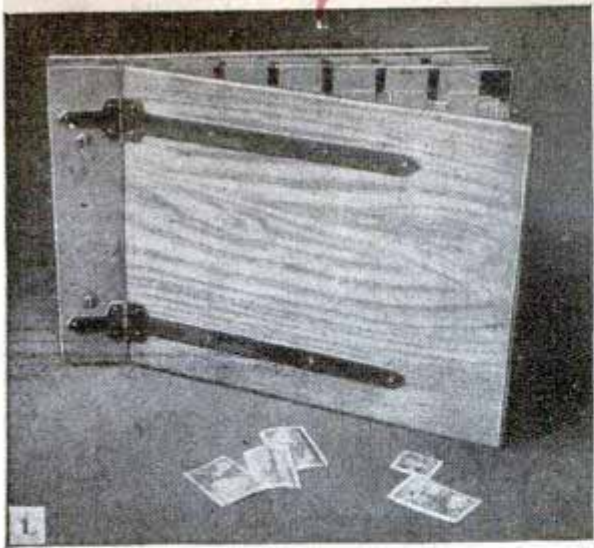
series of holes on both sides of the tear or rip, detail 1, and sew it with fish line or string, detail 2. Finally, cover the seam with adhesive tape, as in detail 3, and you have a patch that will stay put.

Tobacco Can Keeps Grasshoppers Fresh on Fishing Trips

A tobacco can makes a handy container to carry live grasshoppers used for fishing bait. An oblong hole is cut in the top which is closed by means of a slide cover. The guides in which the slide works are soldered to the top of the can, which can be carried in a jacket pocket.



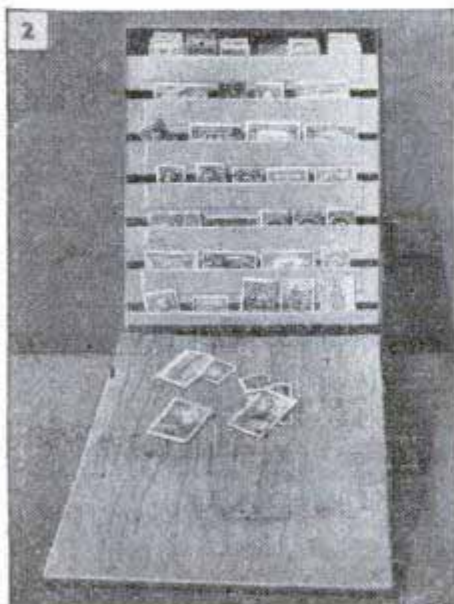
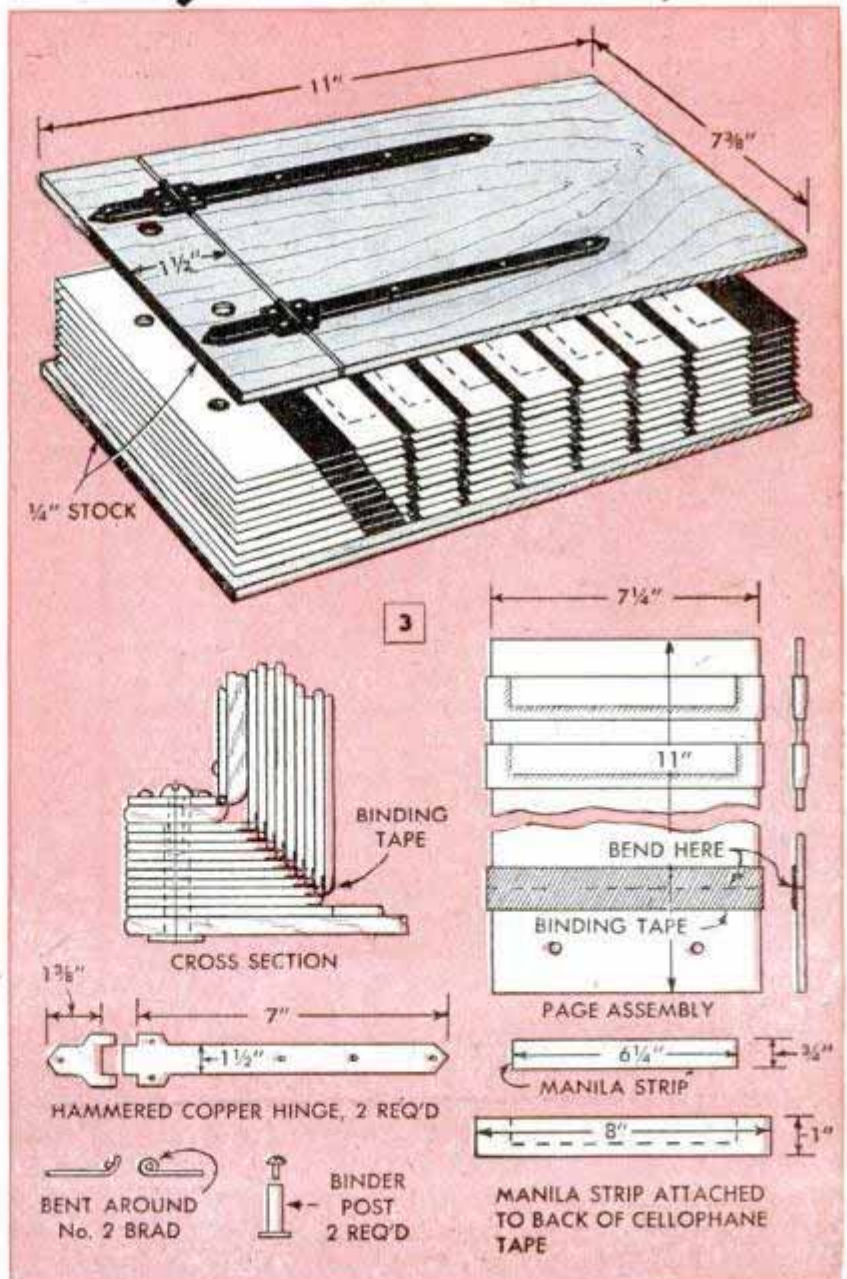
Exp. W. L. H. 77

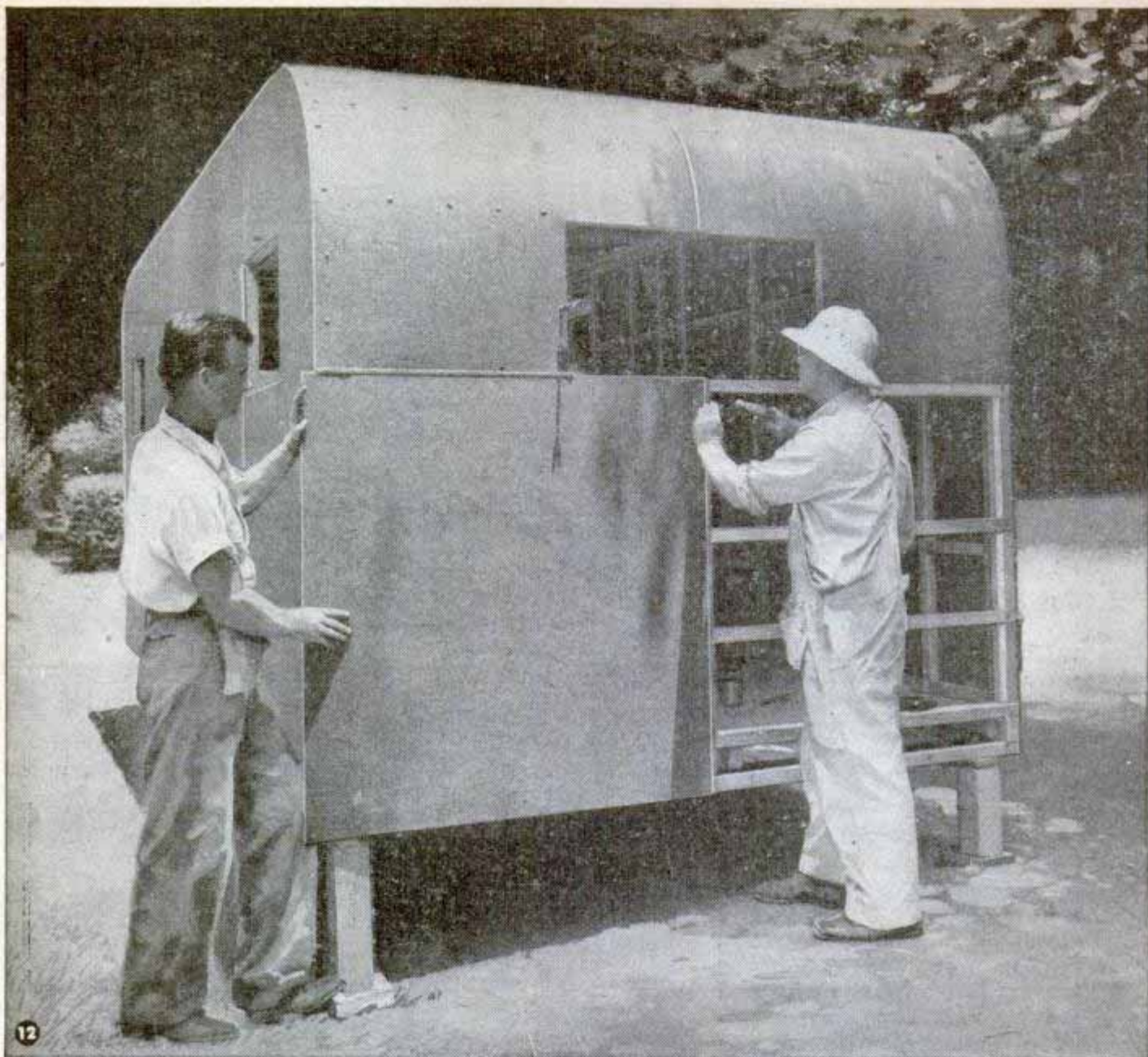


By Dick Hutchinson

STAMP collectors who find it hard to keep surplus and duplicate stamps filed in an orderly manner will welcome this book, Figs. 1 and 2, which provides plenty of space to keep the spare issues. The cover for the book is made from $\frac{1}{4}$ -in. chestnut, but any wood with an attractive grain will do equally well. Dimensions for the covers are given in the upper detail of Fig. 3. No. 22-ga. soft copper is used for the hinges, lower left-hand detail, which are hammered on the face side. The bends for the hinge pins are formed around a No. 20 brad. A method of page assembly for the pockets and hinges is shown in the lower right-hand detail. Note how the page hinges are spaced, center left-hand detail, so the pages will fold over.

A Book for Your Surplus Stamps





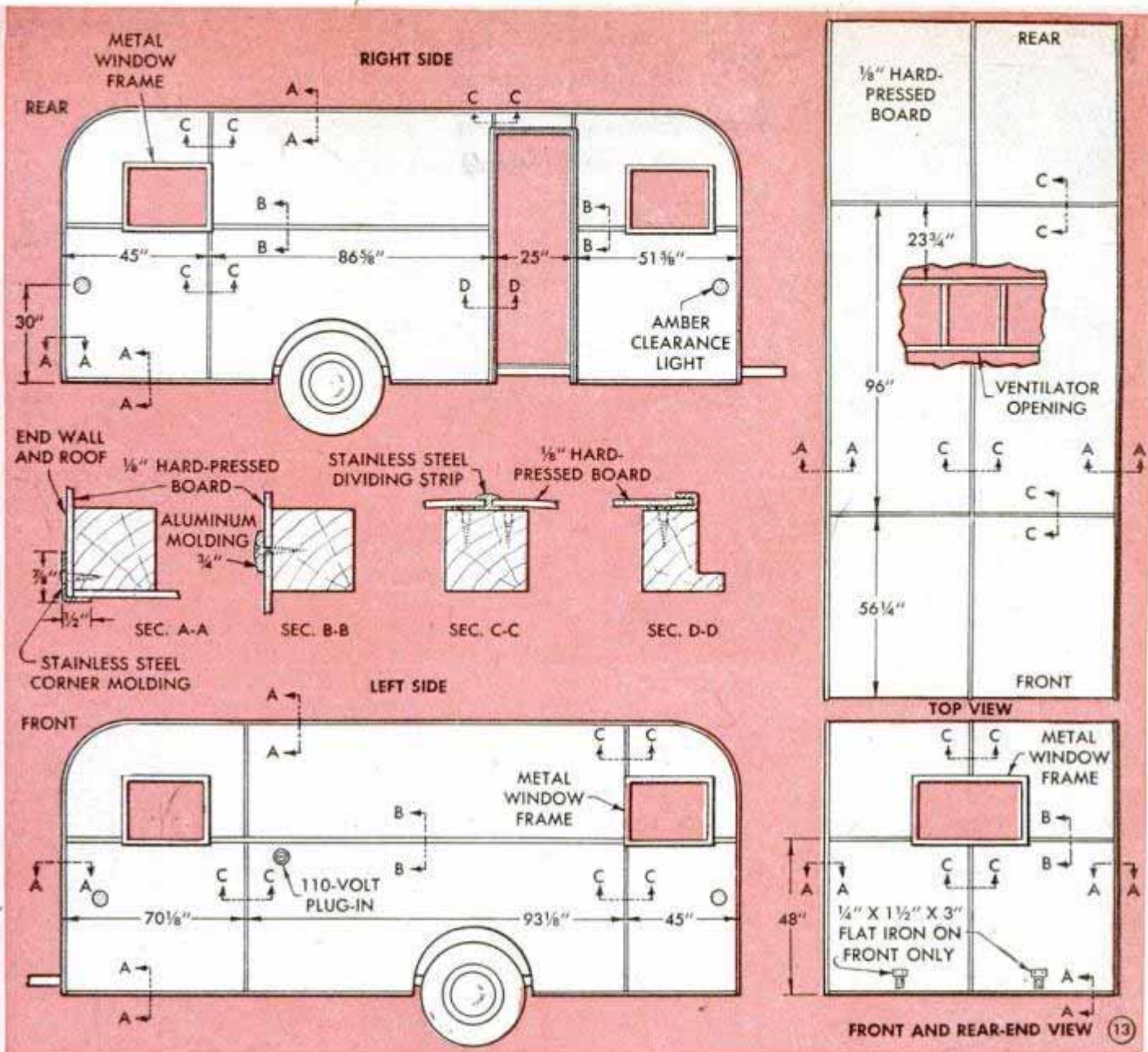
A Home of 1000

FROM now on, with the trailer framing done, construction begins to go along much faster. For outside sheathing $\frac{1}{8}$ -in. hard-pressed board was used on the original trailer, but, if this is not available, $\frac{1}{4}$ -in. waterproof plywood is a satisfactory substitute. Stainless-steel dividing strips first are installed on the studs where the panels will join, also at the roof joints, Figs. 12 and 13. Install moldings as in the sectional views, Fig. 13. Apply casein glue to all contacting surfaces of the wood framing and begin installation with the bottom panels, fastening with 1-in. No. 7 nickel-plated oval-head screws run down over flush-faced washers. Screws should be spaced 6 to 8 in. apart, depending on the location. Both ends of the trailer are paneled alike

except that on the forward end the material is cut away to admit the steel drawbar frame. Metal bearing plates are attached over the frame members with heavy screws as shown in the front view, Fig. 13.

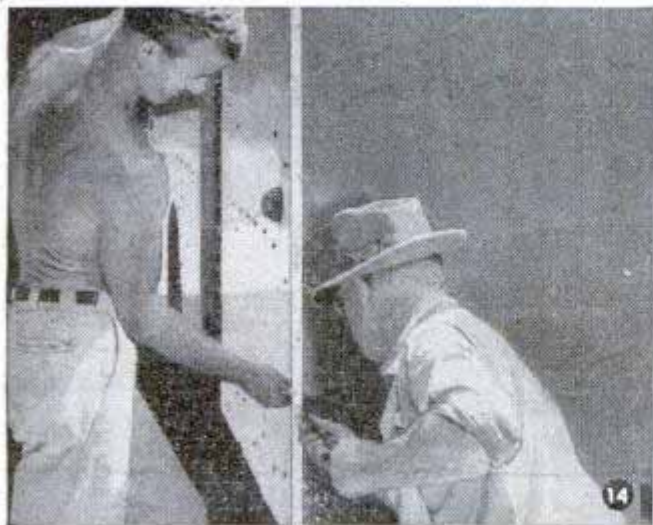
On the roof, calking compound is applied liberally to the dividing strips as well as over the oval-head screws and washers. Panels are cut and fitted as in the top view, Fig. 13. At the curved ends the material should be bent down gradually, screws being driven in on both sides as the bending proceeds. After the roof has been applied, stainless-steel corner strips are installed as in Fig. 14.

All-metal sash and frames fitted with screens are used. This type of window is shown in Fig. 15. Side windows are the



Addresses

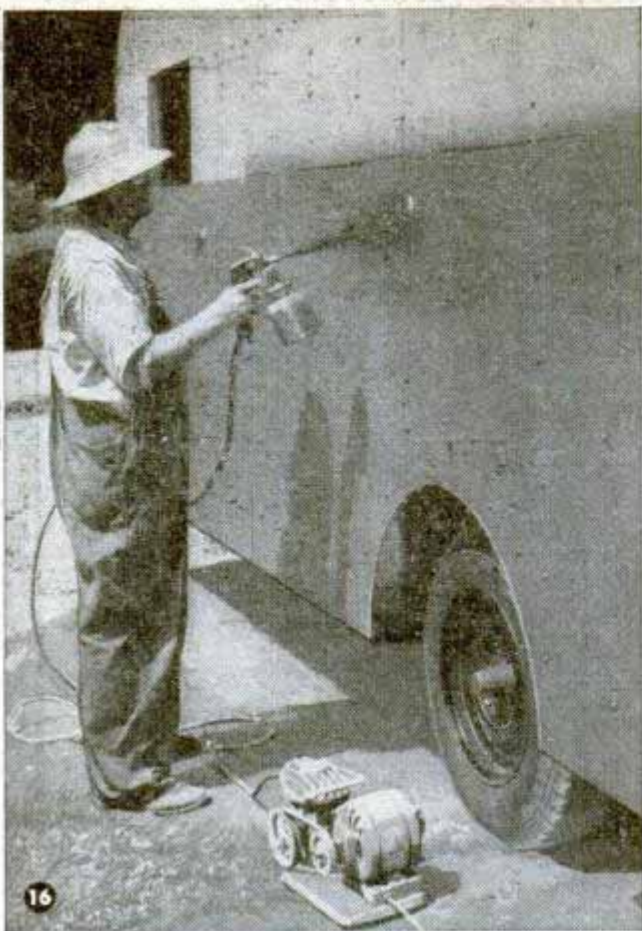
PART II By Hi Sibley



Stainless-steel corner molding is attached with nickel-plated oval-head screws. When driving screws be sure to seat them uniformly. Note clearance light



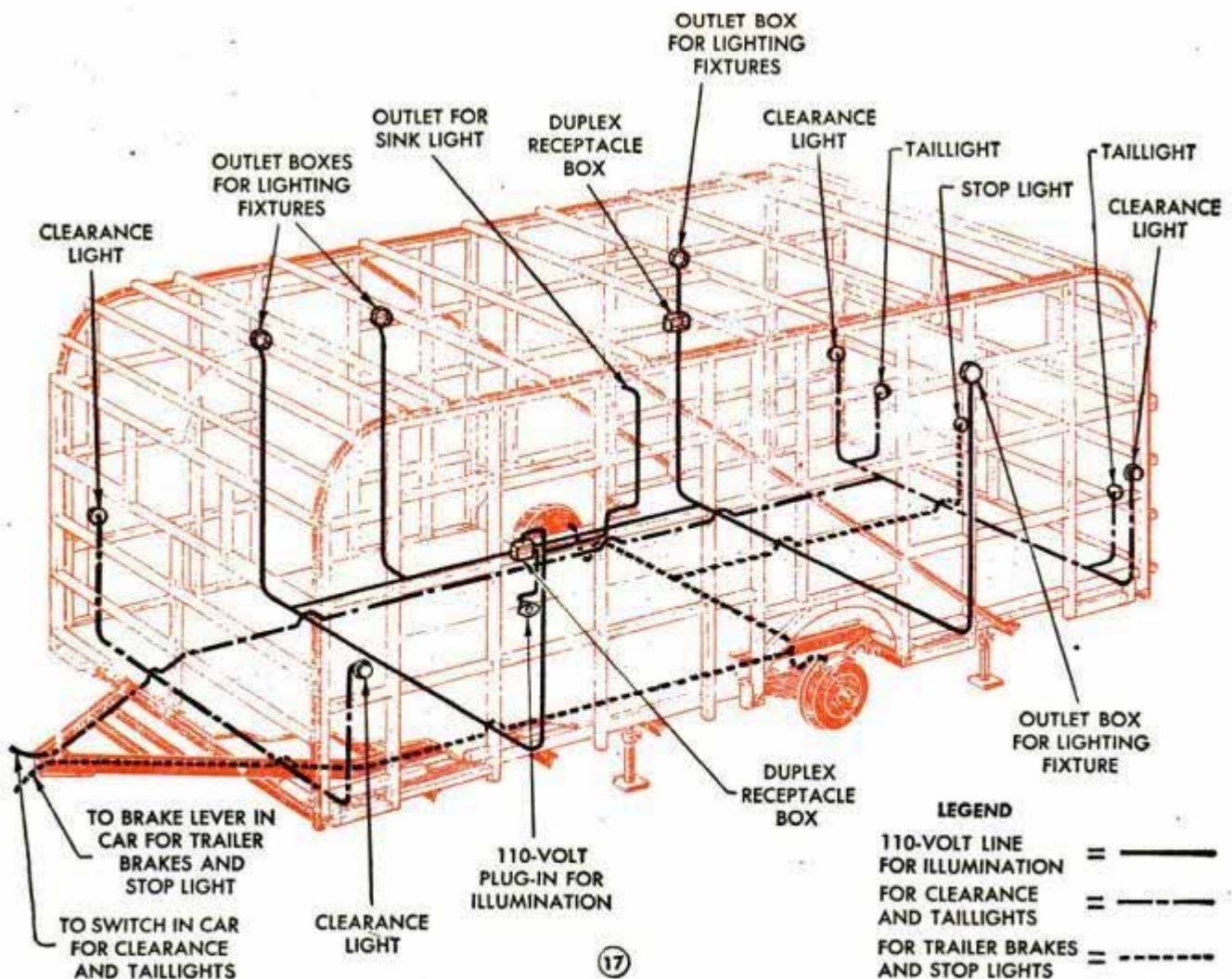
Rather than bother to make them yourself, buy the sash ready-made. These are all metal and come with the frame and sash in one unit. Fasten with screws



Blue, combined with a light gray above, makes a good two-tone paint job. Spray on the light color first

same size, 18 by 24 in., but those on the ends are 18 by 33 in. Before the windows are permanently installed it's a good idea to do the paint job. Color combinations are a matter of choice, of course, but blue and light gray make a pleasing two-tone job. On the original trailer body the blue was masked at the window sills all around and the balance, including the roof, was made a light gray. Use a top-grade outdoor enamel and apply with a spray gun as in Fig. 16. Wheel disks, chassis and the sash and frames are black.

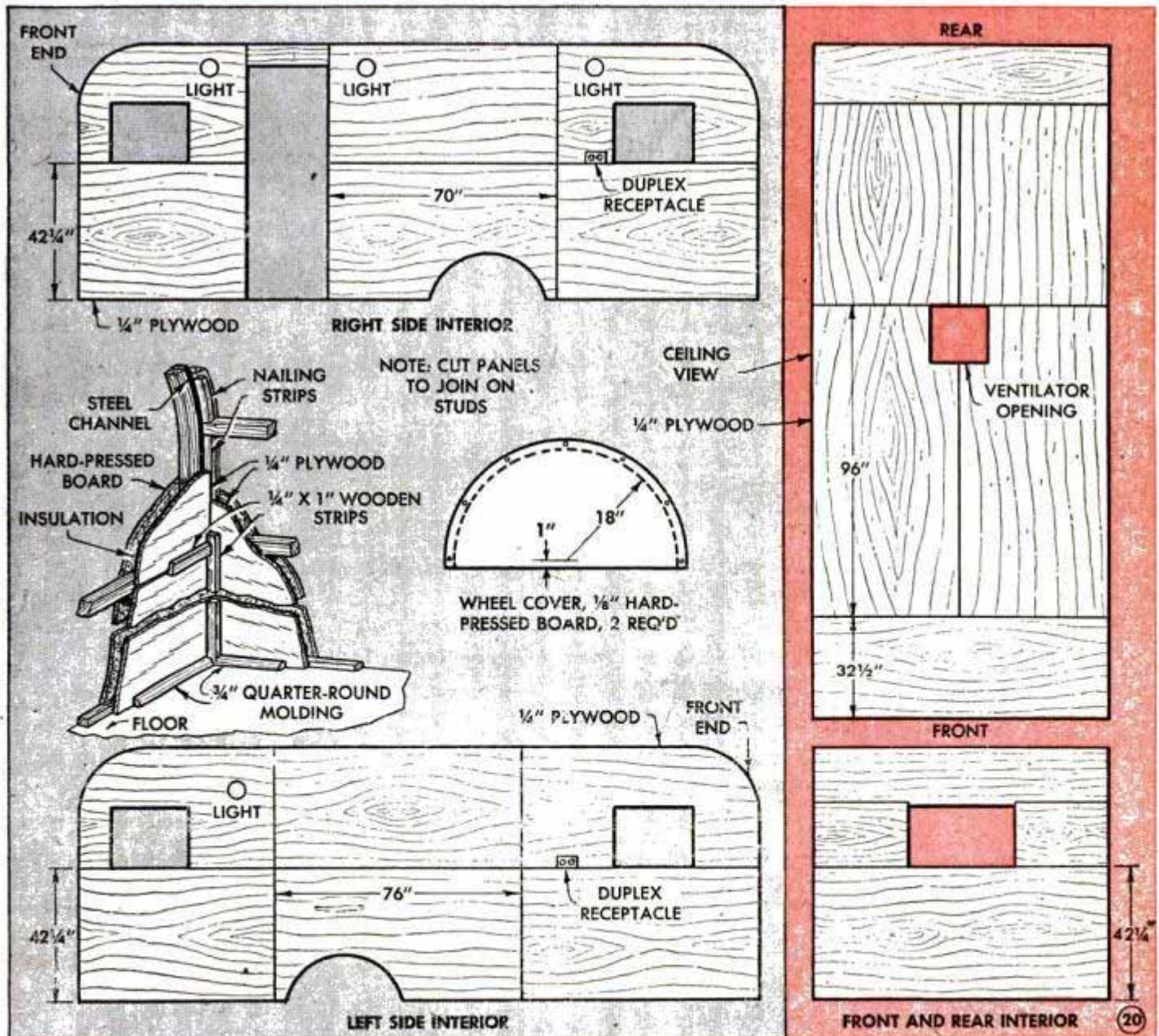
Before installing inside paneling, the trailer should be wired as in Fig. 18. If you are not experienced in this work have it done by a licensed electrician. Wiring diagram is given in Fig. 17. Note that all cables are carried under the floor, as the channel frame does not permit going over the ceiling. When 110-volt current is unavailable for illumination, it is possible to use 6-volt current from the car battery. To do this, substitute 6-volt bulbs for the 110-volt ones. These are available with bases that will fit the regular 110-volt sockets. Then provide some means of connecting an extension cord to the car battery or circuit and plug it into the 110-volt circuit. Don't forget to change bulbs before using 110-volt current. If an electric stove, heater and

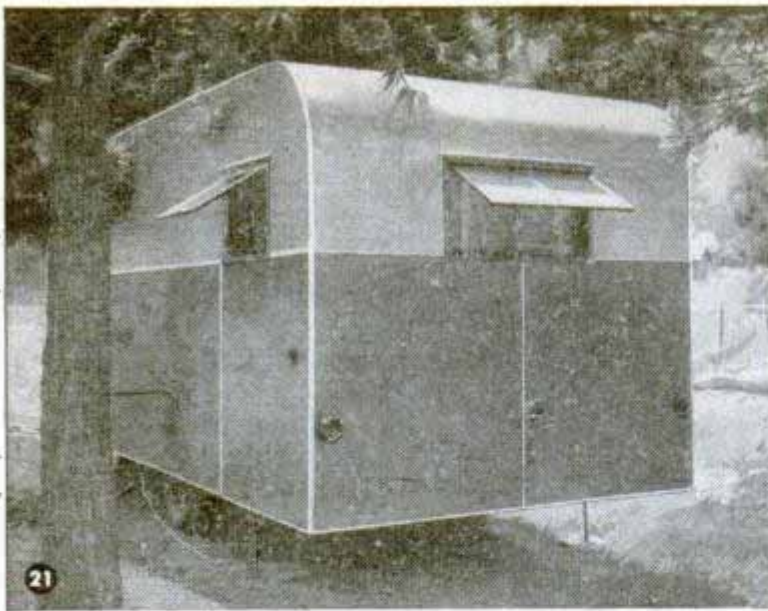




Wiring is carried through holes bored in the studs and frame members. Long runs should be stapled

After wiring is installed, auto-body insulation in quilted form is pressed into place between the studs and roof members





21 Rear view showing taillight, clearance light and reflectors. Copper tube on ground connects with camp water supply

refrigerator are to be used, wiring must be calculated accordingly.

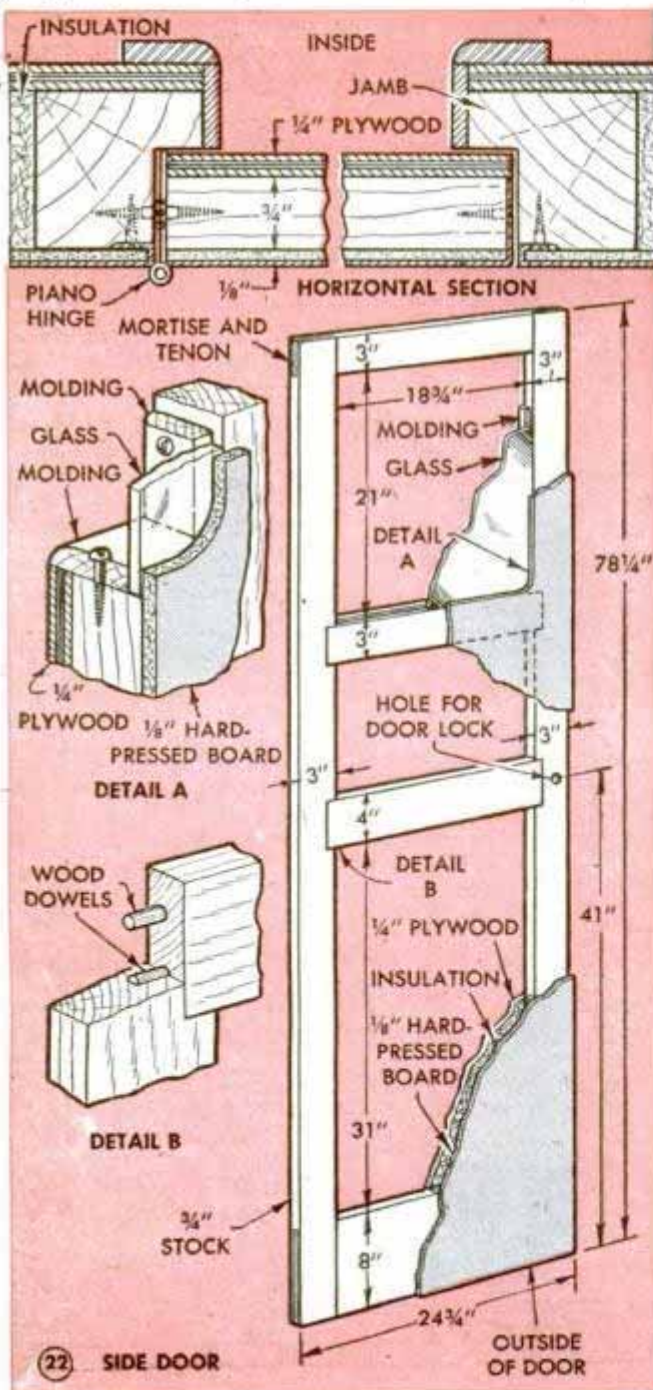
After the wiring is completed and tested, the job is ready for the insulation of walls and ceiling. Automotive insulating material of the quilted type is cut to fit snugly in the spaces between framing, Fig. 19. Tacks hold the edges in place so that they do not lap over the frame pieces.

A ready-made ventilator is reasonable in cost and easy to install. Simply spread calking compound around the edges of the opening and screw the flanges of the frame down on top of the roof. Edges of the lid or cover come well down over the frame to prevent rain or dust from being blown in. The ventilator is fitted with a copper screen and an operating mechanism consisting of a worm gear and crank.

Birch plywood, $\frac{1}{4}$ in. thick, makes the finest interior paneling, but fir plywood of the same thickness can be used. Before installing, locate nailing strips on the ceiling and walls as shown in Fig. 9 of Part I. These are especially important in the curved sections of the ceiling. Begin with the ceiling paneling first, the panels being cut as in Fig. 20. Note that the curved panels come down to the top of the windows and are notched at the ends to allow the center to come down flush with the sides of the windows as in the end view, Fig. 20. The grain should run horizontally on these pieces. Layout of panels for the left wall is shown in Fig. 20. On this side cut out for the electric outlets and the cable which comes through the wall over the sink. On the right wall cut out the paneling for two lights flanking the door and one light and an outlet near the rear window. Joints on the interior walls and ceiling are covered with $\frac{1}{4}$ by 1-in. hardwood strips.

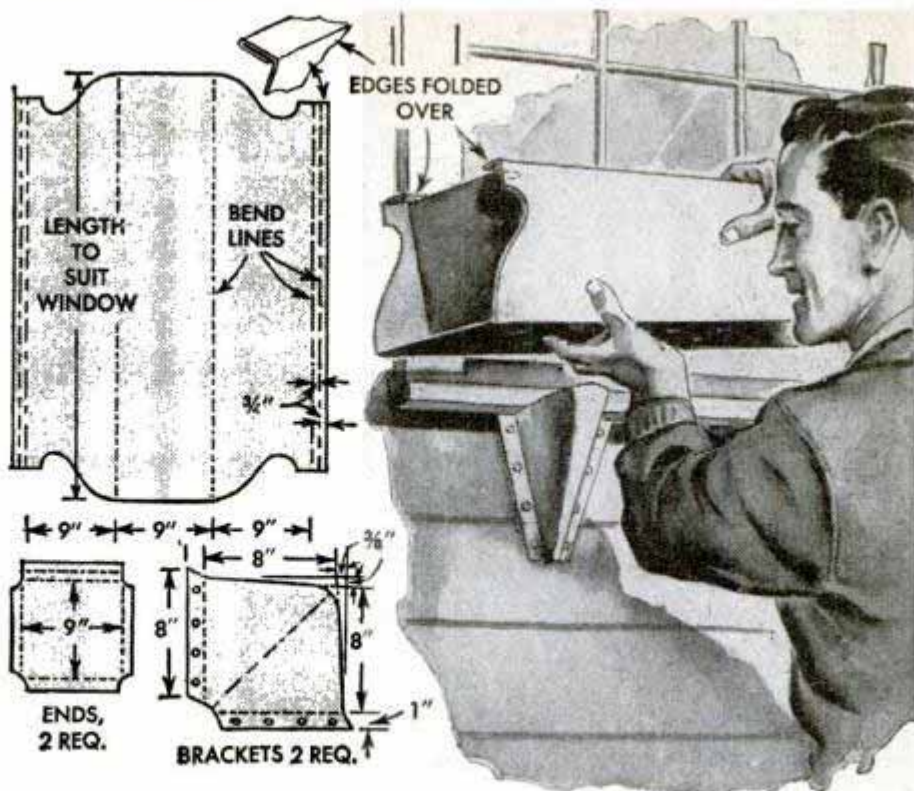
The door is of double-wall construction with insulation between as in Fig. 22. The inside is covered with $\frac{1}{4}$ -in. plywood and the outside with $\frac{1}{8}$ -in. hard-pressed board edged with a molding to match the wall. An auto-type door catch and handle is installed on the center cross member. The glass panel is set between the outside paneling and the inside molding and the joint is filled with calking compound. A drip molding is installed above the door and molding is nailed to the jamb on the inside as in the horizontal cross section. To finish up, semicircular pieces of hard-pressed board, Fig. 20, are screwed over the wheel wells. Fig. 21 shows a rear view of the finished trailer with lights, windows and wheel covers in place.

(To be continued)

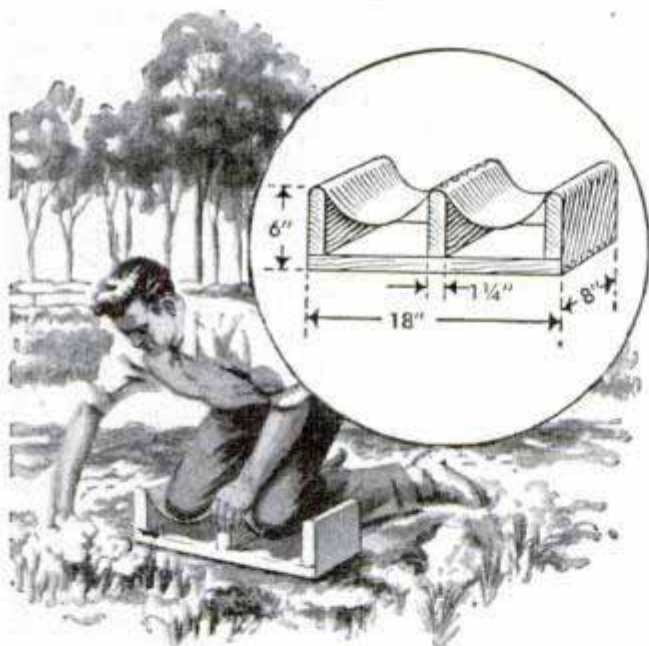


Flower Box Is Cut From Standard Width Metal

Cut from a standard width of 30-in. sheet metal, this flower box and brackets are an interesting project for the craftsman who enjoys working with metal. The proportions of the box are such that it can be made to fit almost any length window and still look well. After the box is cut and formed, drain holes should be punched in the bottom. Before painting, wash the metal with vinegar and then finish the inside of the box with liquid asphalt and the outside and brackets with a paint that matches the trim.—John C. Sommer, Saginaw, Mich.



Rest Eases Strain for Gardener When Working on Knees



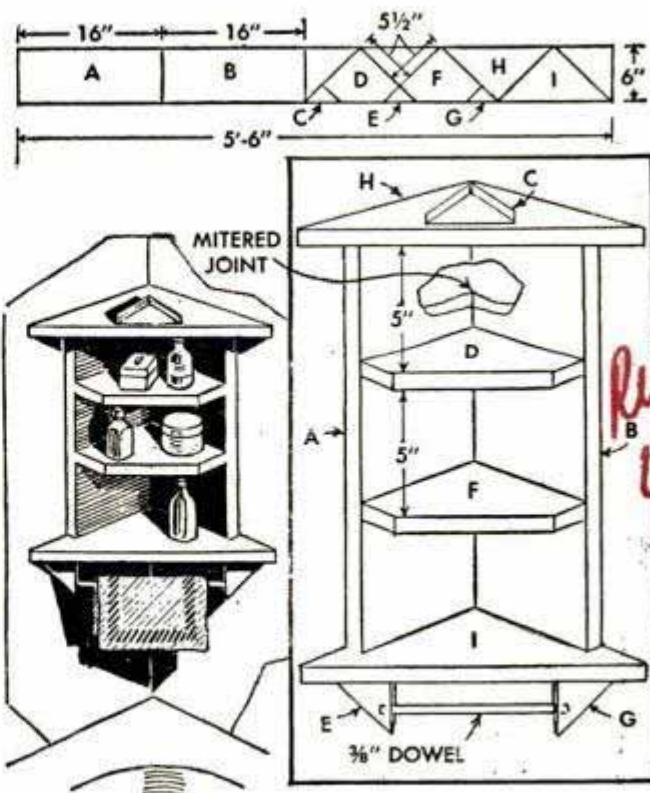
This knee rest will take the strain out of gardening when weeding or performing some similar operation where it's necessary to work on your knees. The base is large enough so that it won't sink into soft ground. The edges of the three vertical pieces should be rounded. Sufficient slack is left in the canvas cover to provide comfortable rests for the knees.

☐ A piece of adhesive plaster put on the inside of a thimble that is too large will make it fit your finger.

Single-Board Bathroom Cabinet

Here's an attractive corner cabinet that is cut from a single board 6 in. wide and 5 ft. 6 in. long. The upper detail shows the manner in which the board is cut, and the right-hand detail indicates the method of assembly. The only other wood required is a 3/8-in. dowel that is used for the towel bar. The cabinet is an ideal one for the bathroom because medicine chests are usually too small and extra shelf space is needed.

Peter B. Horsley, Calgary, Alta., Can.



Uses for Bricks



Even a dozen jars of pickles can pose a major storage problem, that is, until you think of stacking bricks and boards like this



If you have leaves, rubbish or garbage to burn, stack the bricks in a circle, with broken joints, and there's your burner



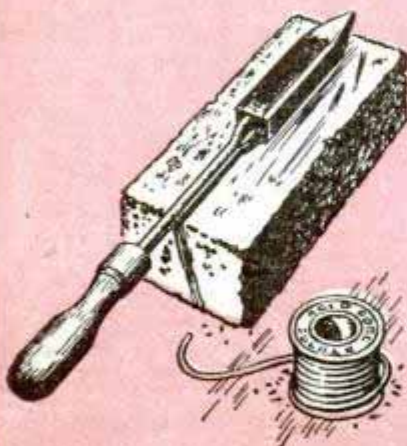
Sixteen bricks and asbestos paper make a good gas-welding table—easy to work on and no danger of starting a fire



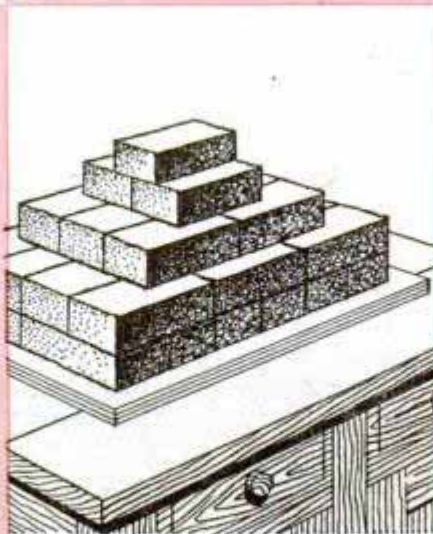
Old-timers on the farm will remember this one. A brick coated with oil makes a good polisher for plow moldboards



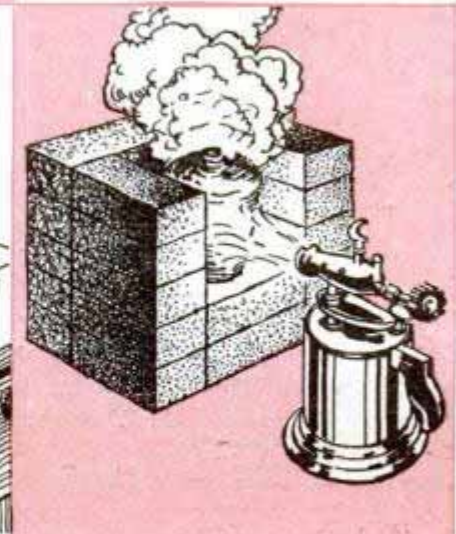
The weight of a brick inside a polishing cloth saves a lot of tiring muscle work when waxing and polishing your floors



Partial refractory properties of an ordinary brick make it a safe place to lay the heated soldering iron when not in use



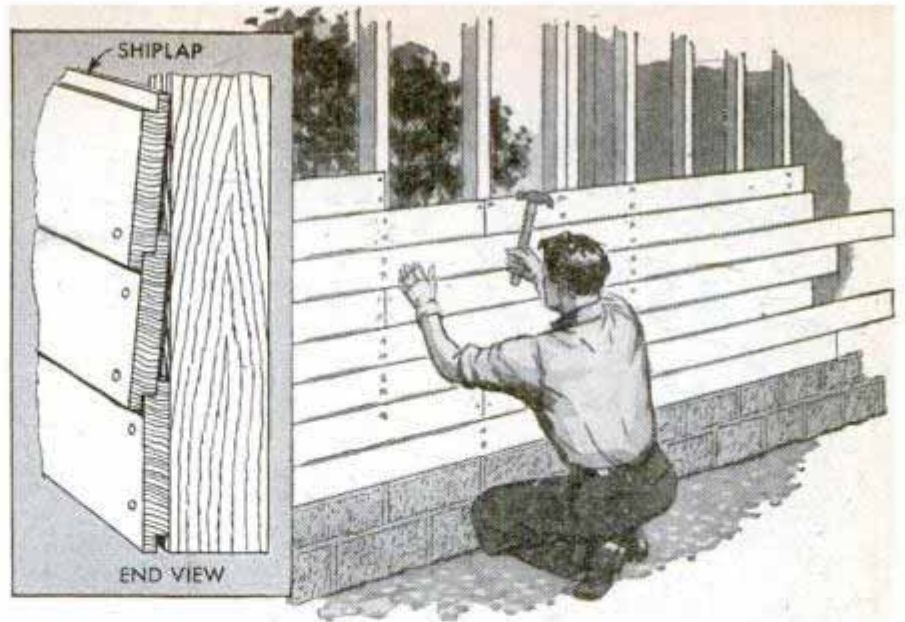
They make a good glue press for veneering, too. You can put a hundred pounds of uniform pressure where needed



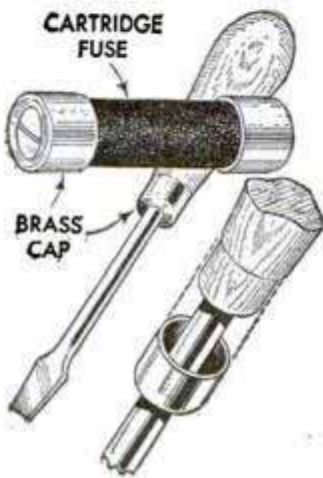
Or stack 'em up like this to make a furnace for soft metals. Arrangement is safe and bricks concentrate heat on crucible

Shiplap Is Used For Siding

If bevel siding isn't available when you want to make a garage or small service building, shiplap can be used as a substitute. The method of nailing it to the studding is indicated in the left-hand detail, one nail being driven through half the lap in each board. When shiplap is to be used as siding for a house, it must be nailed over sheathing.—Ray Harrison, Ft. Qu'Appelle, Sask., Can.



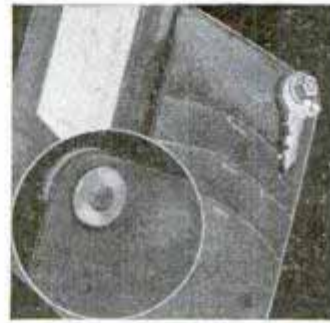
Burned-Out Cartridge Fuses Furnish Handle Ferrules



Ferrules for hand tools may be made from the end caps of cartridge fuses by cutting holes large enough to fit over the tool shanks. Since these fuses come in a variety of sizes, it is possible to fit many sizes of handles. Ferrules should always fit snugly.

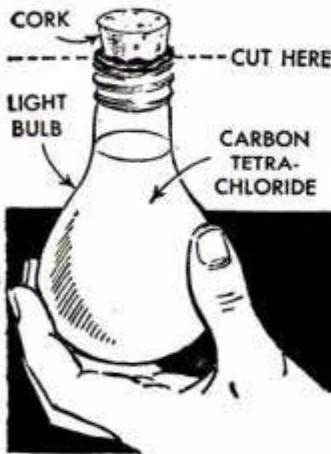
Spare Key Fastened to Wallet

An important spare key can be carried in your wallet or billfold, ready for emergency use. It is bolted to an inside corner with washers on each side to prevent the bolt from pulling through. Although a standard-size nut is shown, a machine screw and thin nut would be less bulky.—Vernon Gzowski, Halifax, N. S., Can.



Light Bulb Used as Fire "Bomb"

Those burned-out light bulbs around the home aren't as useless as they seem. To make them serve as fire extinguishers or "bombs," saw off part of the base and break out the filament with an ice pick, cleaning out any irregularities. Fill the bulbs with carbon tetrachloride and cork the opening. The bombs can be left in various strategic spots in the house. When throwing them at a fire, direct the bombs toward the base of the flames.—A. J. Post, Whittier, Calif.



Sealing Holes in Can of Milk To Keep It From Spoiling

After holes have been punched in a can of condensed milk and some of it has been used, the milk will keep better if the can is tipped so that a film seals each hole. In a short time the liquid will harden and keep the air out. A toothpick or table-fork tine will break the seal when it is desired to use the milk again.

Jack Dempsey, Seattle, Wash.



White blotters, kept in a sideboard drawer, are useful in soaking up liquids spilled on the table.

DYE YOUR PLASTICS ANY COLOR

DYES for plastics can be obtained in all colors and are a useful aid to the craftsman seeking decorative effects. The actual job of dyeing is simple—just dip the plastic, let it soak from 1 to 5 minutes, depending on depth of color desired, and then rinse in running water. Although the dye is a surface coat, it bonds perfectly.

The dye vat can be any kind of tall can or a glass tumbler. A metal tube, flattened as in Fig. 2, is useful for dipping long strips. A coarse metal screen, Fig. 1, keeps the plastic clear of the container bottom. Dyes can be rebottled and used repeatedly. However, the dye evaporates very quickly in an open dish. Keep it away from an open flame when using.

Although over-all colors are the most practical, it is possible to obtain two-tone effects by masking. Fig. 3 shows a plastic square masked by dragging liquid glue across it to form a pattern. After dyeing, the glue

FLATTENED TUBE FOR DIPPING STRIPS



washes off in the water rinse, exposing the pattern as in Fig. 4. Silhouettes and straight lines can be similarly worked, thinning the glue as needed. Paper masking tapes are not suitable as the dye seeps under the edges. A special masking tape is available which is designed to avoid this fault.

Dyes are easily made as in Figs. 5, 6 and 7. Just use a dry-powder stain soluble in oil, the same product that is used in making wood stains. Mahogany makes a nice red; walnut a clear yellow. If prepared plastic dyes are used, they should be straight colors: oil red, oil blue, oil green, etc. Excess stain and impurities are fil-



MIX ACETONE AND WATER



ADD POWDER-FORM OIL STAIN

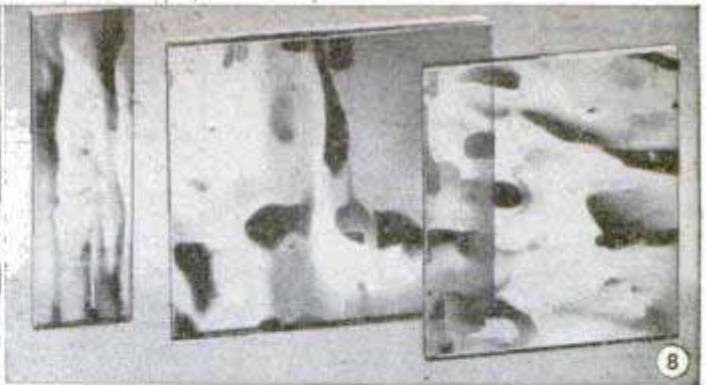


FILTER THE MIXTURE

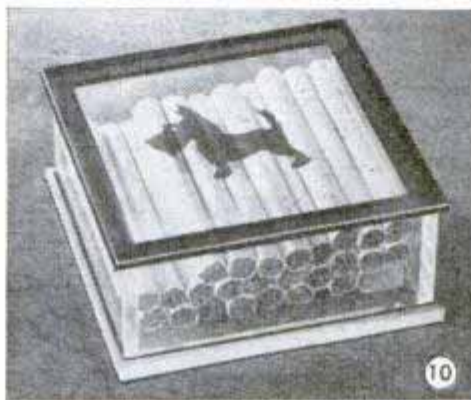
*Laminating dyes
make colorful mattles*

tered out, Fig. 7. Most drugstores carry filter paper and acetone.

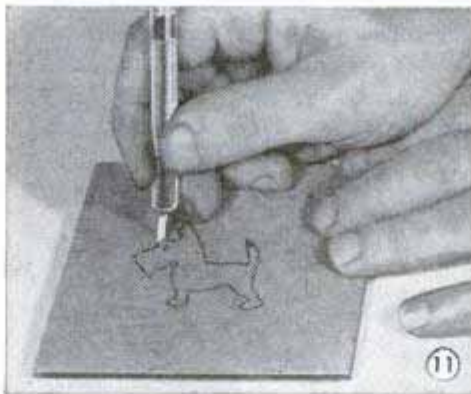
Laminating dyes are made by dissolving a few shavings of thermoplastic in 1C cement which is used in cementing this "glass" product. Then add oil stain for color. This product cements and dyes in one operation and is particularly good for mattles as shown in Fig. 8. The various colors should be streaked on with a matchstick, Fig. 9. They probably will dry before the job is complete, but are redissolved by quickly applying a generous portion of clear cement—



9



10



11

added—to the center of the work, after which the top piece is pressed in place. Squeeze gently to spread the cement and force out air bubbles. If clamping pressure is used it should be very light.

Dye inlays can be worked with plain dye by using a glue mask as already described, or by using the laminating dye. The latter can be masked off to a sharp, clean edge. Finished inlay, Fig. 10, is perfectly bonded. The original paper cover on plastic can be used as a mask, cutting out the desired figure with a stencil knife, Fig. 11. Colored dye-cement must be applied by flow-coating, as shown in Fig. 12. It is impossible to spray or brush the material because of rapid drying. Thus applied, the design will be translucent and will have a gloss equal to the plastic.

Concentrated dyes which can be mixed with 8 to 12 parts of water are available and are useful for certain types of work. Application requires heating the dye bath to about 190 deg. and then immersing the work for 1 to 5 min., depending on depth of color desired. However, heat of the dye bath tends to warp the plastic. For most craftwork the chemical dyes are preferable.

In general, work to be dyed can be colored before or after assembly. If dyed before assembly, the pieces should be cut to net size. If any color effect is unsatisfactory, remove it by using a clear dip of acetone and water. Similarly, if a two-tone effect is wanted, the piece can be dyed one color all over, then dipped in a second color which will strip the first coat and deposit the second on exposed areas. An instant dip and rinse will color sanded edges.

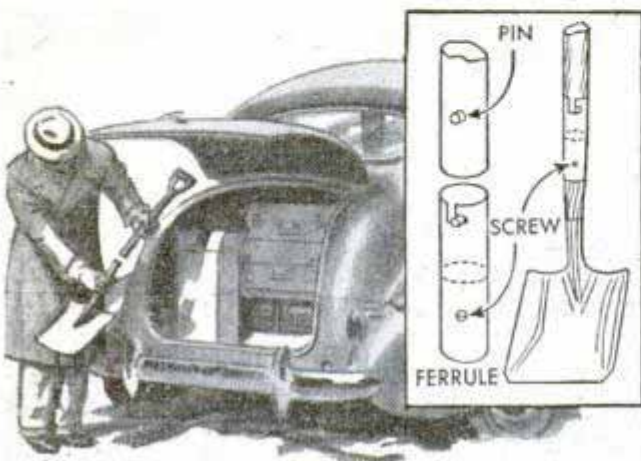
Varied Sizes of Soldering Irons Made From Welding Tips



Soldering irons of many sizes to fit almost any type of work can be made from discarded acetylene welding-torch tips. A suitable point is ground on one end and the other is drilled and tapped for an iron shank that serves as a handle. Also drill a small hole at right angles to the center hole near the tip. Solder is fed through the small hole and flows out the center one.

Shovel With Detachable Handle Can Be Carried in Car

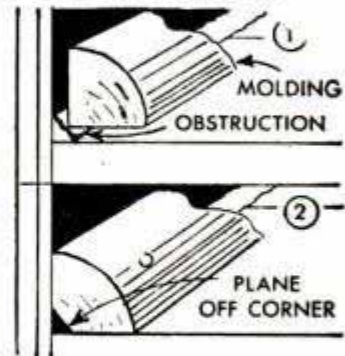
Although you may not need it very often, having a shovel in a car may save a tow bill when mired in mud or stuck in snow. This shovel, which has a detachable handle, will take little space in your luggage compartment. The handle is sawed so the shovel is divided into two equal lengths. Then a short length of tubing that will



just slip over the handle is screwed to the lower half. A locking pin is fastened in the upper half. A slot is cut as indicated in the upper half. A pin to fit this is fastened to the shovel handle.

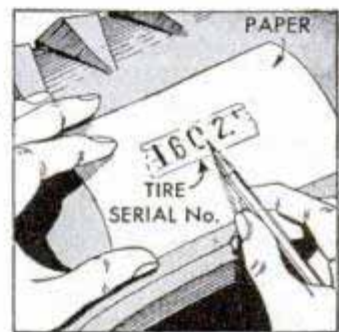
Quarter-Round Molding To Fit Over Obstruction

When applying quarter-round molding in old buildings, frequently the corners are caked with paint and the molding cannot be made to fit tightly, detail 1. In such a case, if the corner of the molding is planed off as in detail 2, a tight fit will result.—Arthur L. Dufour, Newcastle Bridge, New Brunswick, Can.



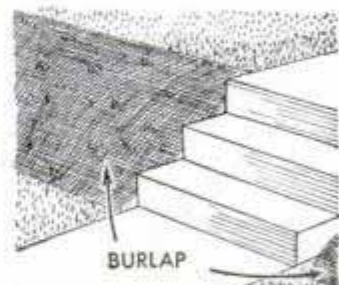
Reading Worn Numbers on Tires

Sometime, when you wish to read the serial number on the sidewall of a tire, you may find the figures so worn that they are illegible. To read the number, hold a piece of tracing paper over the spot and shade lightly with a pencil. After rubbing over the area, the numerals will become visible.



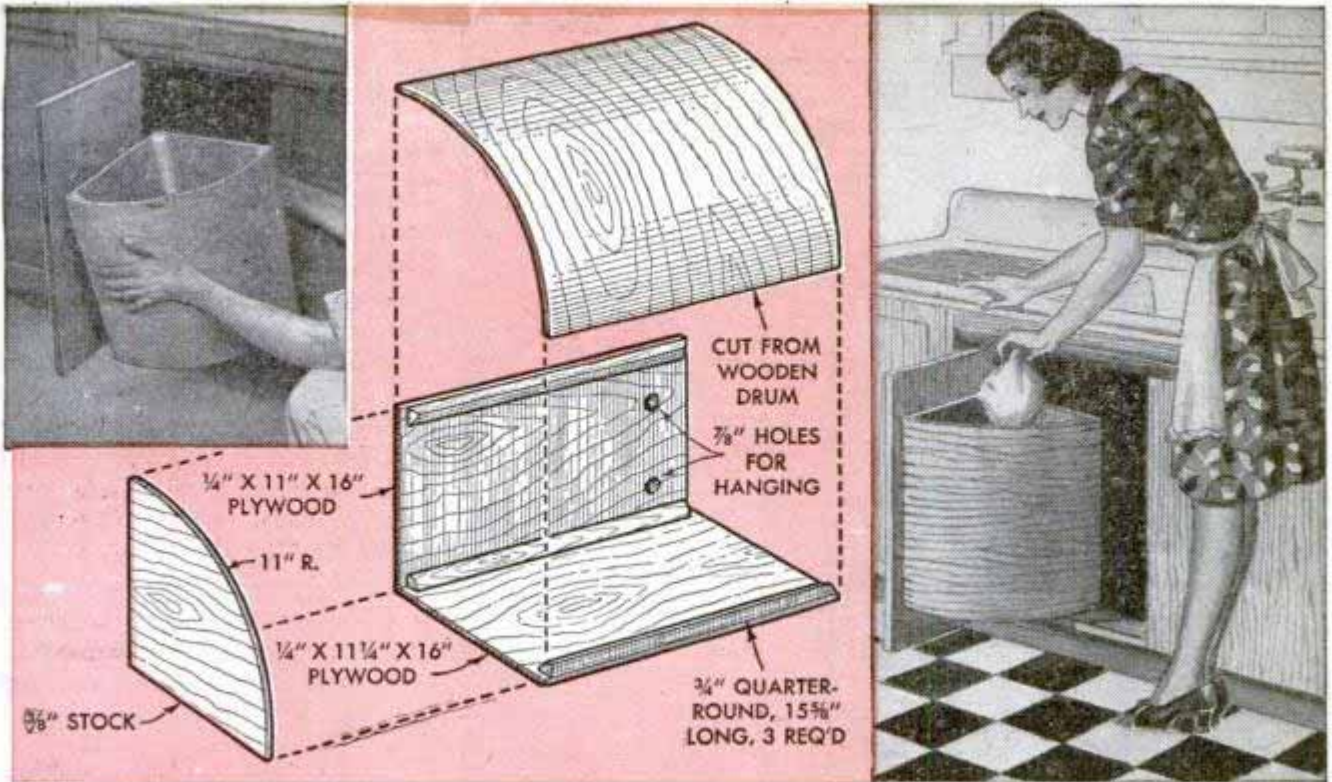
Burlap Holds Newly Seeded Lawn

To keep the rain from washing away newly seeded lawn on slopes and terraces, press sections of burlap bags into the earth. It is not necessary to remove the cloth as in time the grass will grow through the burlap and the fibers of the bag will rot. With this treatment, the lawn becomes well set.



Owners of metal boats will find that a painting job will last longer if applied during cool weather, as in the spring. Paint that has been put on during hot weather when the metal is heated is more likely to blister and peel off, exposing the surface underneath.

Kitchen Wastebasket Swings Underneath Sink



Hung inside the door of a cabinet sink, this handy kitchen wastebasket may be lifted off the supporting hooks, carried out for disposal and replaced in a jiffy. The flat sides are made from pieces of $\frac{1}{4}$ -in. plywood, the bottom from $\frac{3}{8}$ -in. stock and the curved side is cut from a wooden drum.

The three quarter-round strips to which the sides are nailed can be found in most workshop scrap piles. Dimensions for the parts and the method of assembly are shown in the center detail. Two coats of paint or varnish make it easy to keep the basket clean.—Benj. Nielsen, Aurora, Nebr.

Cork Holder for Fishing Flies Is Slipped Over Hatband

With a wire hairpin and a round piece of cork you can make a holder that will keep three or four of your favorite fishing flies in your hatband where they can be reached easily. Select a cork from a wide-mouth bottle—the larger the diameter of the cork the more flies it will hold—and cut a section about $\frac{3}{8}$ in. thick to form the body of the holder. Then bend an ordinary wire hairpin so the ends can be slipped into the cork and use the pin as a clip to hold the cork on the hatband. The flies fit into the edge of the cork.



Separating Fishing-Rod Ferrules

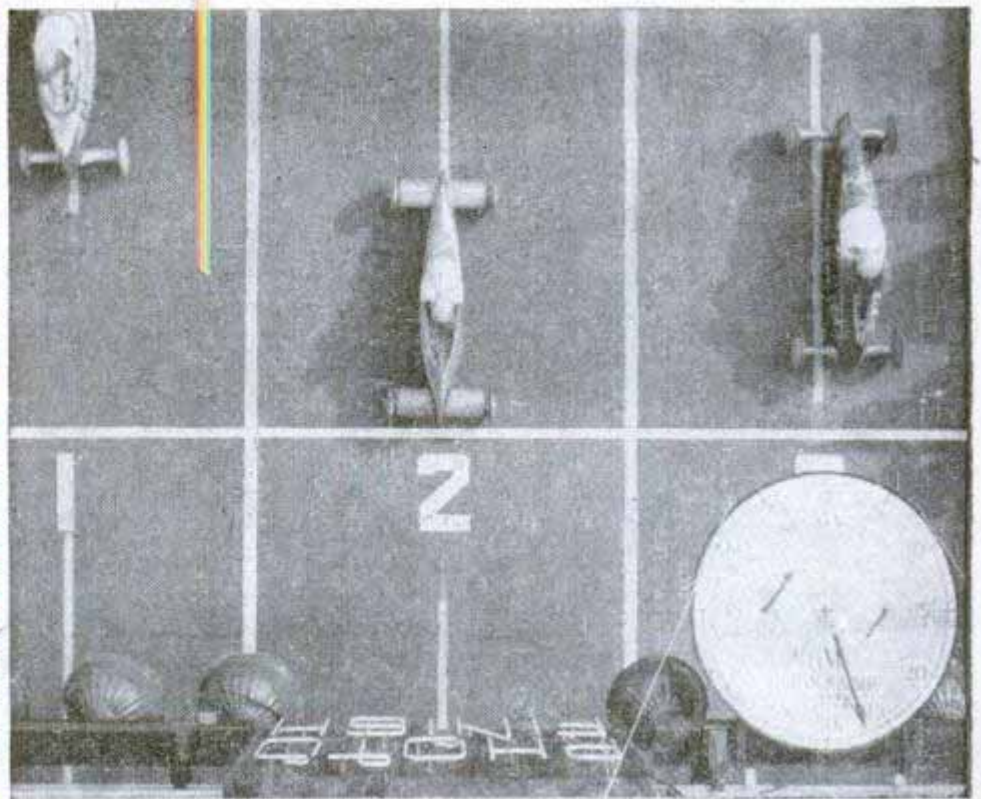
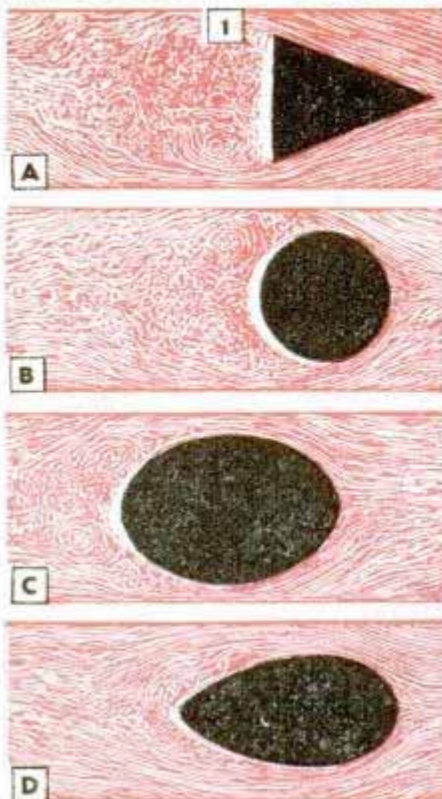
The ferrules of fishing rods that have not been taken apart when stored sometimes corrode so that the rod cannot be disassembled without damaging it. To separate the ferrules, apply a few drops of carbon tetrachloride to the joint and let it penetrate and dissolve the corrosion. After half an hour or so the rod can be taken apart. Then polish the corroded spots with a fine grade of emery cloth and apply light oil.

Pointers on SOAP-BOX

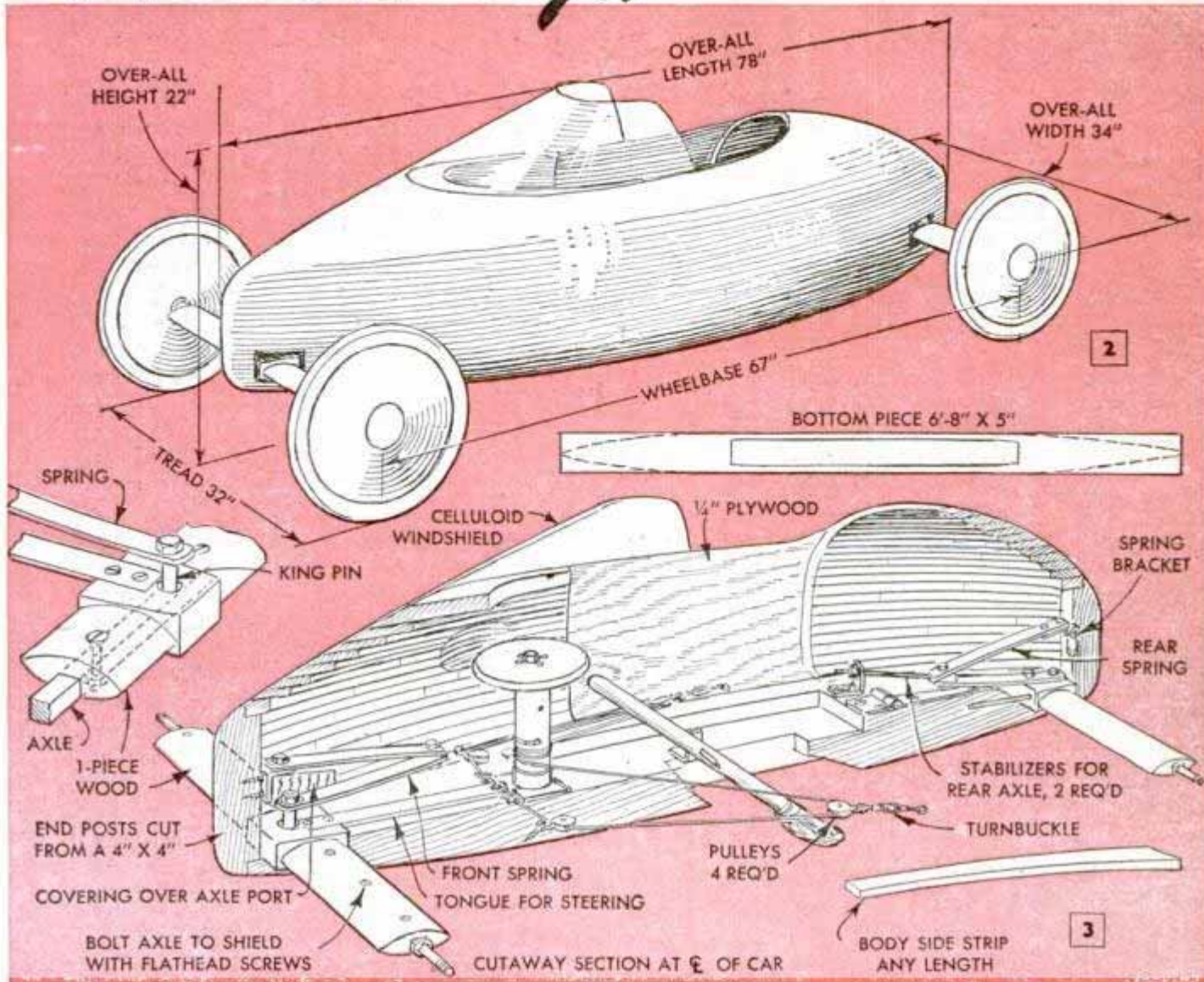


Above, Gilbert Klecan of San Diego, Calif., winner of the final heat of the 1946 All-American Soap Box Derby. Below, Klecan's car nosing over the finish line

WINNING the 1947 All-American Soap-Box Derby is not just something to dream about—it's going to be done by some boy with ingenuity, initiative, skill, designing ability and a willingness to compete with the best the field has to offer in a spirit of four-square sportsmanship and fair play. But to enter this great event you have to build and drive your own racer. The first rule is, know the rules. These have been carefully thought out and are designed to give everybody an equal chance. That means you get a 1947 copy and study every page — thoroughly — until you know every detail of the entry requirements. Then remember this: Both the speedy little racer that won the top honors last year and the boy who drove it to victory over the field were better than just good. All of them were good but one was a little better than the rest. This year it's your job to be a still better driver with a better, faster car.



Racer Design

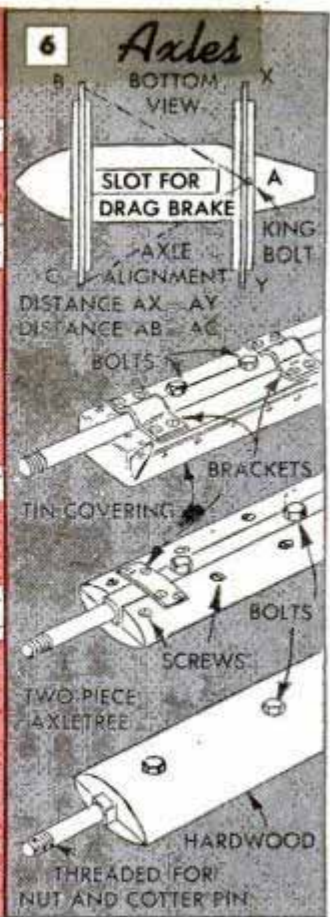
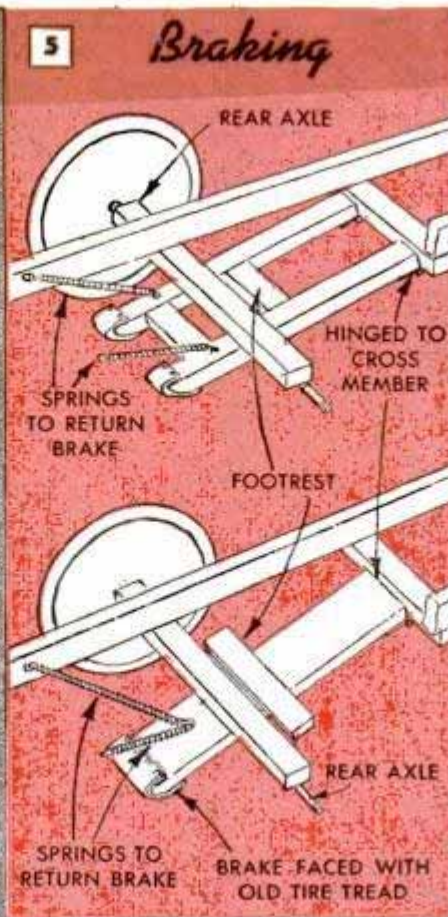
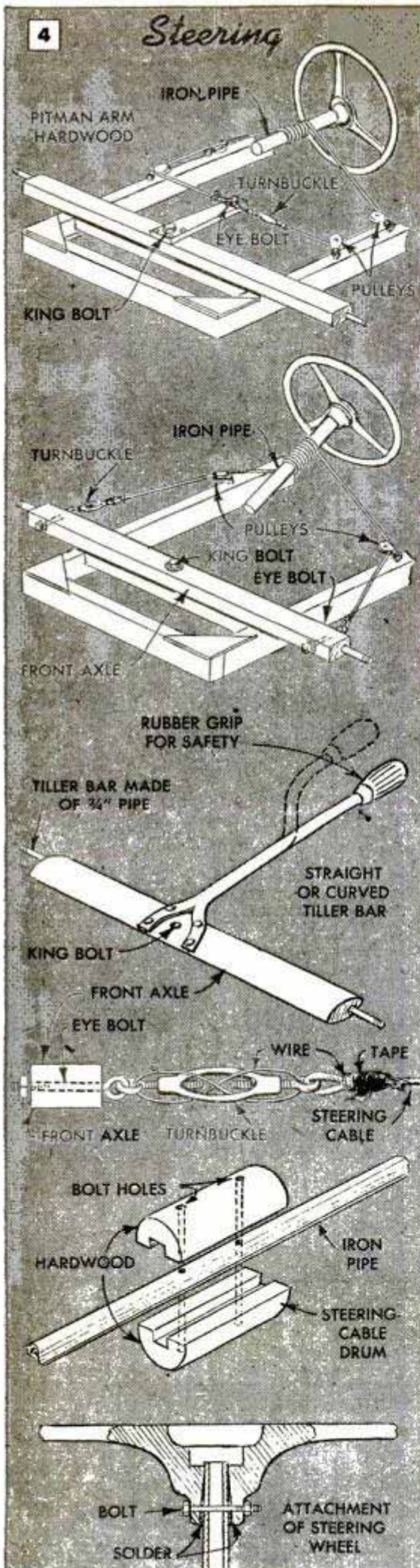


One of the rules says that "the car must be boy-built" and that's exactly what it means. But, you'll notice, it distinguishes clearly between advice and actual help. That's important, too. However, before you go searching for verbal help and suggestions from friends, think of this maxim: It obviously would be impossible to incorporate the ideas of these good people, all anxious to help you, into one racer. After you've thought about this angle you're sure to decide that it's better to consult with the best authorities you know, absorb their ideas and then combine such of these as you can use with your own. Your own ideas are of the greatest importance for with them you're going to build your racer—you have just as good a chance as anyone else of coming up with the winning car.

A study of the details in Figs. 2 and 3 will give you a good idea of the important points of soap-box-racer design. This little job is tops, too. Built and driven by Claude Smith of Akron, Ohio, it took both National

and International Championships in the 1941 finals at Akron. When you compare construction details with your 1947 rule book you'll see that two features of the Smith racer are no longer allowed. One is the hand-operated drag brake. That's out now. The drag brake must be foot operated. Also, the nose, or body, of your 1947 model racer must project beyond the front wheels. No tow hook is permitted. The body of the Smith car is sprung to the axles in a skillful and unusual manner. Springing still is permissible, but is not necessary in the simple designs now being approved. Although springs add legitimate weight, they are rather difficult to calibrate accurately. If springing is too "soft" the car is very likely to sway or roll, faults which can easily lose a race.

Figs. 4, 5 and 6 suggest methods of making steering gear, brakes and axles. Although these are officially approved methods you do not have to follow the suggestions in every detail. But be very sure that you



stick to the rules when making changes or using original ideas, otherwise you take the chance of having your racer disqualified. You'll note from the rule book that there's considerable latitude permitted in the construction of the steering gear. But however you design it—in accordance with the rules—test the gear by trial until you are absolutely sure of its performance. A gear that permits the front wheels to "wander" ever so slightly is almost sure to lose you a close race. A reliable steering gear also contributes to the safety of both yourself and others on the track and along the sidelines. Safety is being continually stressed by race officials, so keep it always in mind when building your car. For all practical purposes streamlining a slow-moving object or vehicle is of little importance. But as speed increases the value of a shape that will slip through the air with a minimum of resistance will be apparent from Fig. 1. Here the black shapes A, B, C and D represent bodies moving to the right through air. The red lines indicate the behavior of the air as the various shapes pass through it. Parting causes comparatively little disturbance but the turbulence and eddying of the air stream just back of the first two shapes indicate a heavy drag which would tend to retard forward motion. Now notice the three cars in the photo at the right of Fig. 1 and compare the body contour of all three with that of the "raindrop" shape, D, in Fig. 1. A modification of the raindrop shape, or as nearly as you can approach it with the materials and type of construction allowed by the official rules, is the ideal racer-body type. As you can see from Figs. 2 and

3 it is possible to achieve a practical job of streamlining with very simple body construction. Finally:

Don't start off wrong by buying just any kind of wheels. If possible, use only official Soap Box Derby wheel sets that comply with the strict rules. Official wheel sets have the official Soap Box Derby emblem.

Don't repaint the official wheel sets or remove the official emblem.

Don't forget about the over-all measurements of the car as specified in the rules.

Don't forget the entire weight of the car must be made up of parts and materials actually used, and necessary, in construction of the chassis and body.

Don't forget that the frame of the chassis must be made of wood and the entire body must be constructed by the boy who drives the car.

Don't forget that two or three boys cannot get together and build a car. The boy who drives the car in the race must be the boy who built the car.

Don't forget that the body of the car cannot be constructed with plaster or concrete. Both are prohibited. So is metal lath. But sheet metal, aluminum, paper, fiber wall-board, papier mache, plywood, linoleum, wire or cardboard may be used as a body covering.

Don't forget that the body must be so built as to permit easy inspection of all parts. The seat-back must be removable.

Don't forget that your car must have a road clearance of at least 3 in. with you in the car.

Don't forget that steering must be by hand.

Don't forget that steering connections of rope, chain or clothesline cable are barred. Steering may be by flexible connections which must be of woven wire cable, fitted with 2 turnbuckles, one on each side, that must be wired for safety.

Don't forget that suggested steering devices are: wheel, half-wheel, airplane-type wheel and tiller.

Don't forget that the nose must be the foremost part of the car. The nose must extend beyond the tires of the front wheels.

Don't forget that every car must be equipped with a drag brake.

Don't forget that glass is not permitted anywhere on the car.

Don't overlook the rule about total cost. No car may cost more than \$6.00 over and above the cost of the wheels and axles. Any steering device or steering shaft permitted by the official rules may be used regardless of the original purchase price, and need not be included in figuring the total cost of the car. Taxes and freight, express or postage charges are not considered as part of the total cost.

Spring Lug on Dome-Light Switch Holds It in "Off" Position

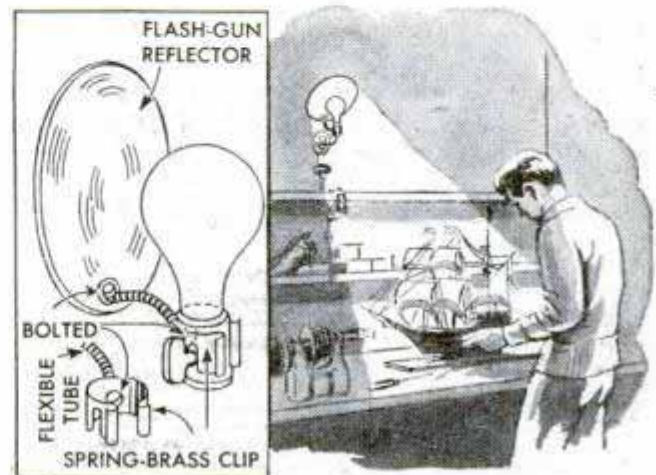


On some cars the dome-light switch is mounted on a side post where it can be turned on accidentally by anyone getting in or out of the car, or by a child climbing from one seat to another. And if the light is turned on during the daytime it is seldom noticed. To prevent this, fasten a lug made of spring steel to the switch plate, as indicated in the upper left-hand detail. This makes it necessary to lift the lug to turn on the light.

Herbert E. Fey, New Braunfels, Tex.

Snap-On Reflector Directs Light Where Needed Most

Adapted from a discarded flash gun, this reflector can be adjusted to direct light where it is needed most. The clip that snaps over the lamp socket is made of spring brass bent and cut to fit around the light switch. A short length of flexible tube connects the clip to the reflector, which can be adjusted to almost any desired position.



GET RID OF WINTER'S RUST AND SCALE

- ✓ CHEMICAL FLUSH THE RADIATOR
- ✓ REVERSE FLUSH RADIATOR CORE
- ✓ REVERSE FLUSH ENGINE JACKET
- ✓ CHECK THERMOSTAT OPERATION
- ✓ EXAMINE WATER HOSE FOR DEFECTS
- ✓ INSPECT THE FAN BELT FOR PLAY
- ✓ BLOW OUT THE RADIATOR CORE
- ✓ LOOK FOR WATER-PUMP LEAKAGE

Check ✓

SPRING means cooling system time—time to “clean house” on rust and scale and to take this eight-point precaution against **overheating**—the costly penalty of engine neglect. It’s corrosion—rust, lime and grease left by hard winter driving—that retards heat dissipation and becomes the unsuspected cause of scored pistons, bearings and cylinder walls, burned valves and warped and cracked engine blocks. So play safe and guard the motor against these costly repairs by cleaning the cooling system regularly.

Chemical flushing: Draining the radiator of antifreeze and then simply flushing with water is not enough. A good cleaner is needed first to loosen the rust and scale. Such deposits act as an insulator and, if allowed to build up, may in time clog the fine water passages of the radiator. There are a number of efficient cleaning compounds on the market. Alkali-type cleaners, such as washing soda, are not entirely effective. They cut grease and sludge but have no solvent action on hard rust. Be cautious and select one that does not contain strong

By Wayne C. Leckey

acids or caustics which might be harmful to the radiator core, and be especially careful if your motor is fitted with aluminum cylinder heads. Some chemicals used in cleaning preparations to loosen scale will also attack aluminum and damage the heads severely in a short time. After the cooling system has been drained, close both drain cocks and add the cleaner as in Fig. 1. Then refill and clean according to the directions.

Reverse-flushing core: The loosened particles are removed from the radiator most effectively by reverse flushing, that is, flushing in the direction opposite to that of the normal flow of water through the cooling system. This is done by first replacing the radiator cap, opening both drain cocks and disconnecting the lower and upper hoses. As shown in Fig. 5, the flushing is done from below and a drain hose is attached to the top. A satisfactory job of flushing can be done with a garden hose as shown in Fig. 2, although a more thorough cleaning is assured with a flushing gun which combines air pressure with water to



Don't be a Mr. Put-it-off. Make this eight-point inspection now and be ready for hot months ahead with a "cool" cooling system

increase the scouring action and send the water through the system in forceful spurts. If such a gun is not available, a garageman will do the flushing job for you. However, be sure that you remove the thermostat beforehand, as cold water will cause it to close and build up harmful pressure. Flush until the water runs clear.

Reverse-flushing jacket: The same thing is done now to the water jacket, Fig. 3, which flushes the particles out through the water pump in the manner shown in Fig. 5. Attach a drain hose to the water-pump inlet, insert the gun at the top and flush as before. Some cars require removal of the water pump before pressure flushing to avoid unseating the pump sealing washer and forcing water into the pump bearings. If the car has a water heater, it should be flushed out too, as rust particles will form in the heater core as they do in the radiator.

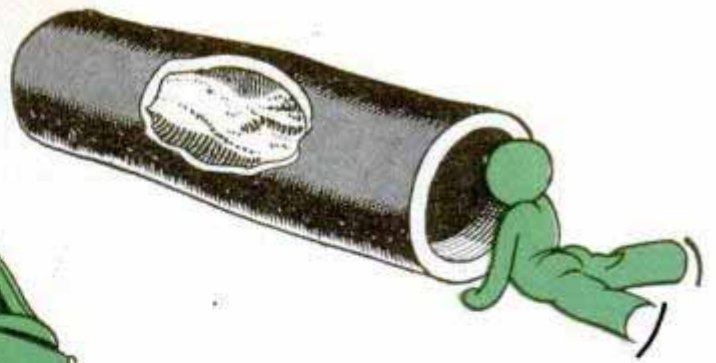
Thermostat test: After flushing, make sure that the thermostat is functioning properly. Normally, this can be checked by the gauge, but an accurate test can be performed by suspending the thermostat in water heated somewhat above the rated temperature, which is usually



Here's how rust, boiled out of water jacket, can build up to obstruct the radiator tubes



Test thermostat's working order. Gummy one that fails to open causes overheating



Radiator hose wears out too. Gradual deterioration loosens lining which may retard the flow of water, and particles of rotted rubber can be carried into radiator water passages

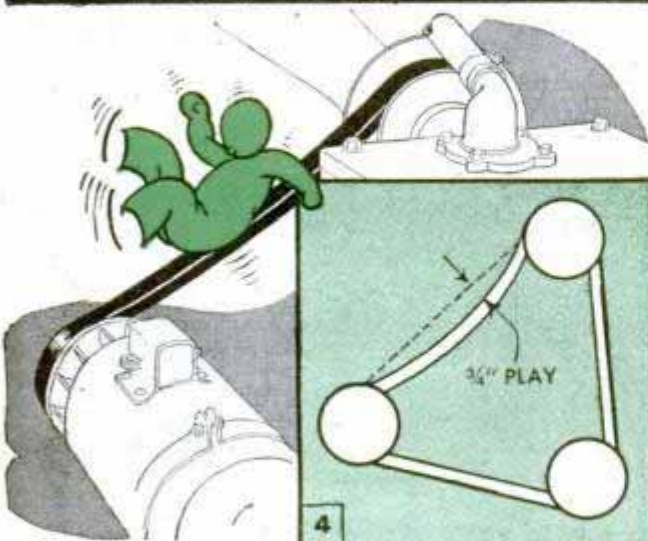
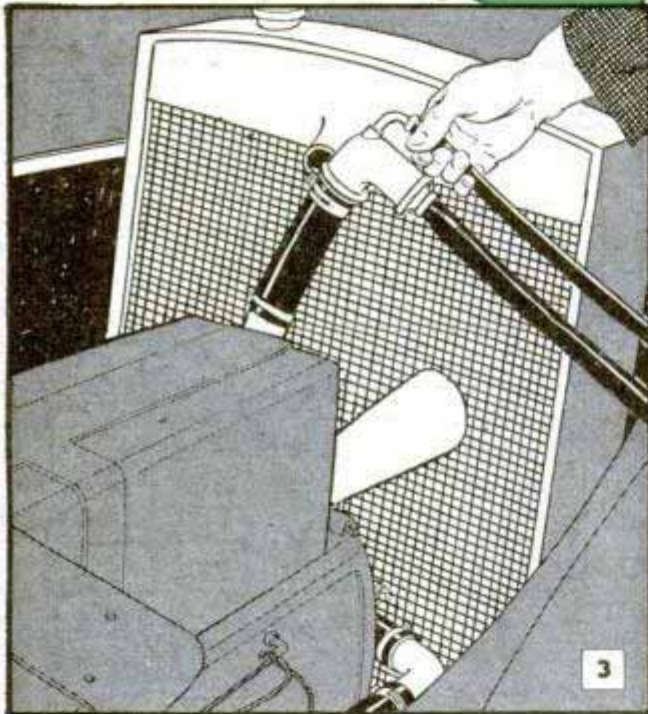
marked on the thermostat. If you find that the valve fails to open within 10 or 15 degrees of the rated temperature, it should be cleaned, if gummy, or replaced, as a faulty thermostat will cause the engine to overheat.

Water-hose checkup: Don't replace the radiator hoses without first examining them carefully, especially on the inside, for deterioration. If there are signs of rotting, replace them, as loose particles of rubber may clog the water passages of the radiator. Also, too soft tubing may collapse from suction. When replacing either the old or new hose, use gasket shellac on the metal parts over which the hose slips to assure an airtight seal at this point, and draw up the hose clamps tightly. Now, refill the radiator, preferably with soft or rain water. Lime in hard water causes scale to form in water passages much the same as it does in a teakettle. Bring the water level to about $\frac{1}{2}$ in. above the top of the tubes in the radiator. Avoid "filling" either summer or winter. Be sure to add a can of rust inhibitor, too. With a good active inhibitor in the water, rust can be kept to a minimum.

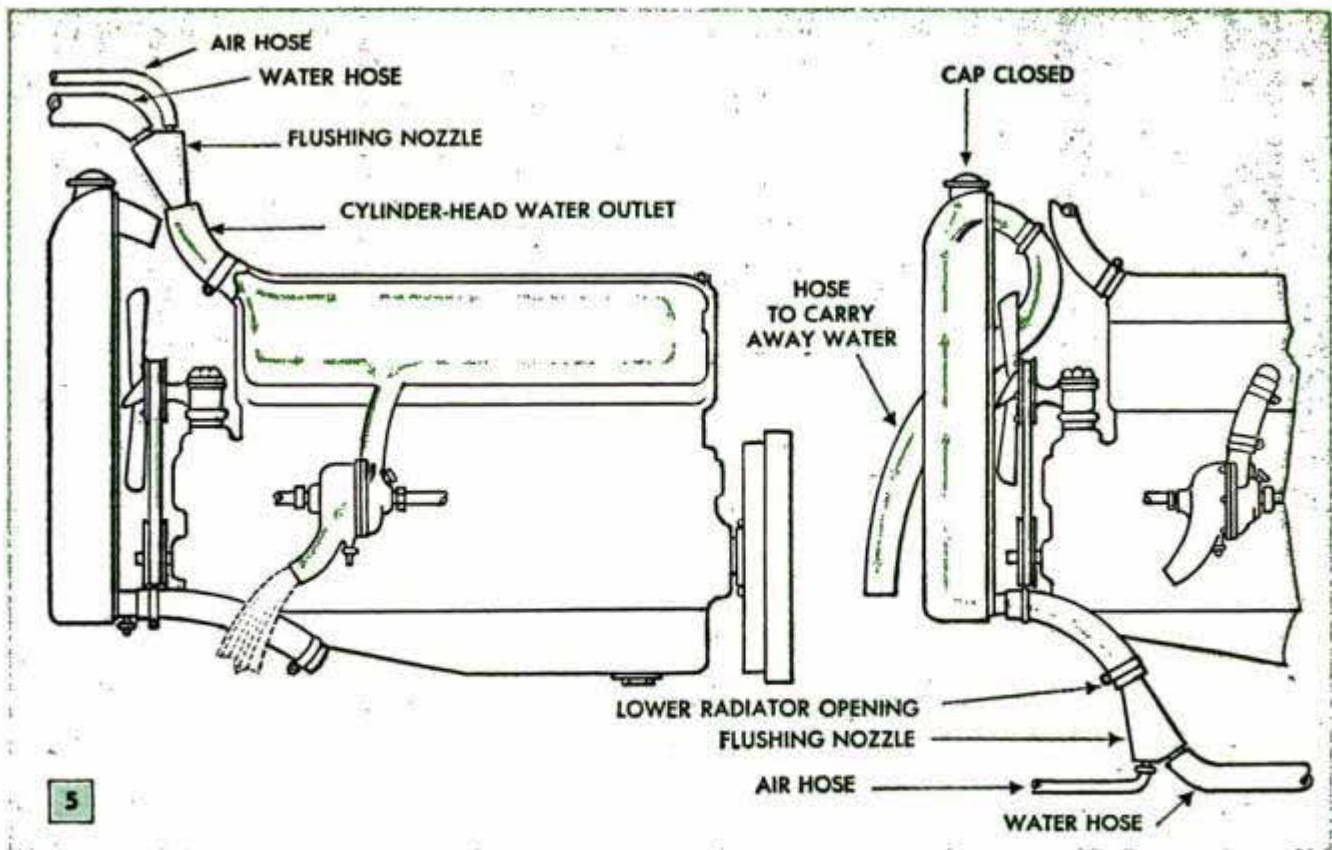
Fan-belt play: A loose fan belt is another source of overheating. If it slips, the fan speed is reduced. If it is too tight, there is excessive wear on the bearings. Adjust the fan pulley so that the belt can be depressed only about $\frac{3}{4}$ in. as in Fig. 4, and wipe off any grease that would cause the belt to slip.

Blowing out radiator: With dirt, insects and other foreign deposits clogging the air passages in the radiator core, heat dissipation is greatly reduced. Force out such deposits by directing a strong stream of water from a garden hose through the core from the rear. A bug screen is a good investment to keep these passages open.

Water-pump leakage: The water pump can be guilty of rust formation, too, by allowing air to enter the cooling system through a leaking packing gland. Oxygen in the air mixing with the cooling water in-

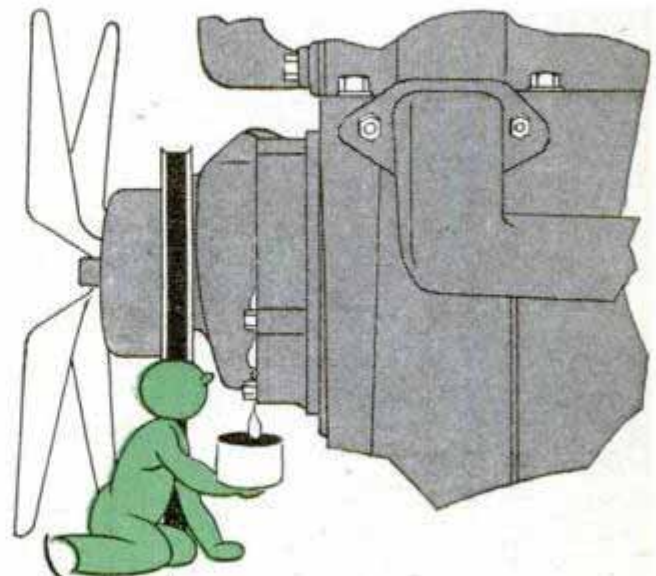
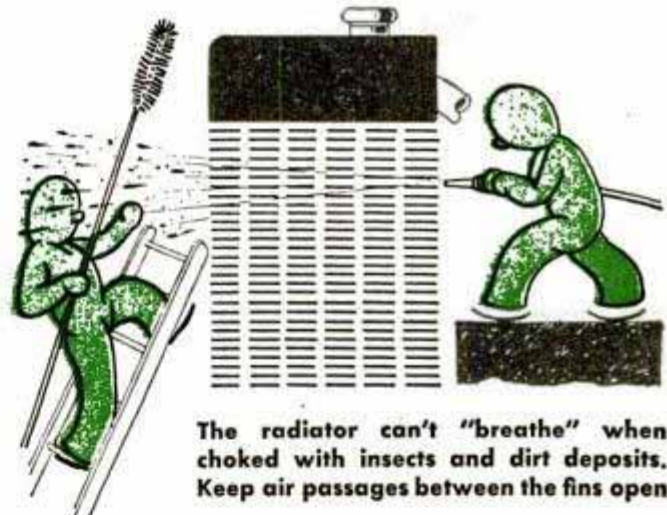


Cooling system suffers when fan belt is too loose. Both fan and water pump do their best when belt has $\frac{3}{4}$ -in. play. Tight belt wears bearings prematurely



5

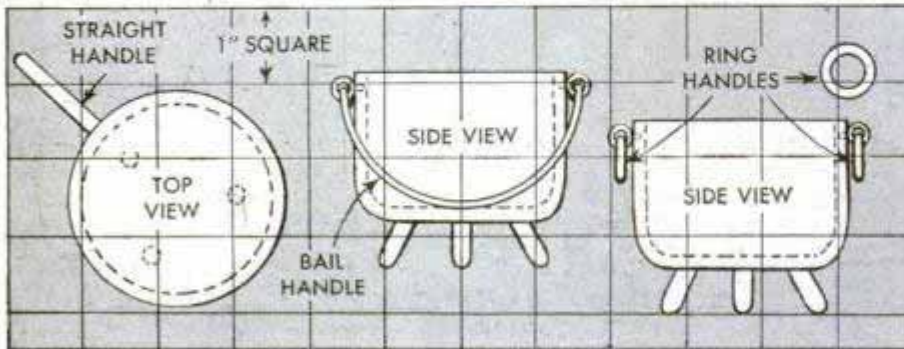
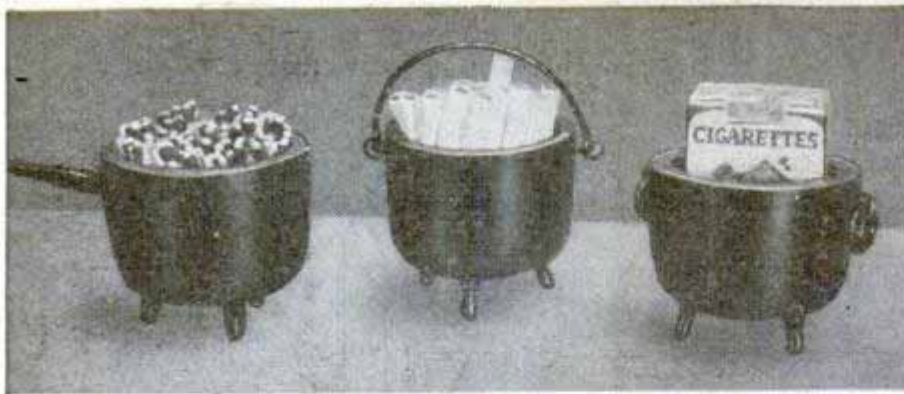
creases rusting of the metal parts. Also, besides losing water along the pump shaft, air sucked in at this point causes a turbulent bubbling action of the water which results in loss through the overflow pipe and consequent overheating. Check for leakage while the engine is running, and repack the gland if necessary. Don't overlook grease and dirt on the engine. Even a thin accumulation acts as insulation and reduces heat radiation. Use a good grease remover, but avoid inflammable solutions and do the job outdoors. Don't start the engine before it has dried thoroughly. A loose cylinder head or a damaged gasket will allow gases, which contain strong corrosive acids, to enter the cooling system and speed the formation of rust. A telltale indication that leaks have developed is the presence of a rusty stain along the seam. Tightening the cylinder-head bolts sometimes will stop such a leak. However, if the gasket is actually broken, it should be replaced. In taking up on the bolts, care should be used to avoid cracking the head by tightening it unevenly. Check the front and rear of the engine water jacket and cylinder-head joint, and also the underside of the bottom tank of the radiator. Internal leaks may not be serious enough to cause loss of liquid into the cylinder or crankcase, but they may allow loss of gas from the combustion chamber into the water jacket. While this is not too serious, it's the gas bubbles in the water jacket that displace liquid and consequently raise the water level above the overflow.



Watch for possible leaks at the water-pump packing gland. Air sucked in at this point causes water to foam excessively, resulting in loss through overflow

Antique Utensil Smoking Set

Best made as a lathe faceplate project, these antique cooking utensils are turned in miniature to serve as receptacles for matches, loose cigarettes and packs of cigarettes. First rough-cut three blocks of white pine about 3 in. thick and 3 in. in dia. Then turn the inside and outside, and sand to a fine finish. The legs for all three pots, as well as the handle for the left-hand one, are turned on the lathe also. Rings and bail are made of wire.—Wm. H. Freeman, Baldwin, N. Y.



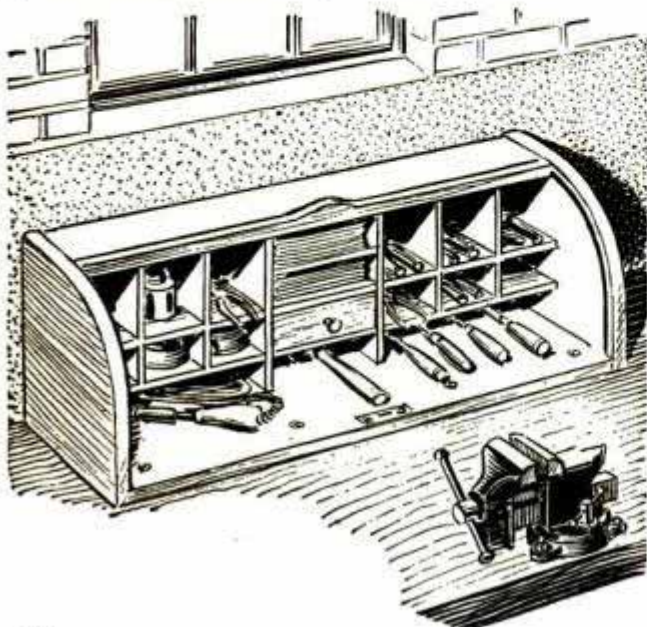
Unusual Timepiece for Playroom

To add a touch of the unusual to a playroom, you can make a novel timepiece that has a phonograph record for a face. Take the works from an old mechanical alarm clock and substitute the record for the regular face. Instead of numbers, paste on small pictures of your favorite recording artists to represent the hour numerals.

Robert S. Martin, Iowa City, Iowa.

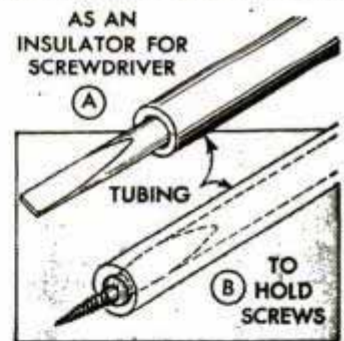
Roll Top From Discarded Desk Handy on Workbench

If you have the upper half of a small roll-top desk, it will be handy as a container for tools, blueprints and other odds and ends in the workshop. One advantage is that you can pull the top down and lock it when you're not in the shop.



Screwdriver Shank Is Insulated With Rubber Tubing

When working around "hot" wires with a screwdriver, there's always a chance of getting a shock. To minimize this, slip a length of rubber tubing over the shank, detail A. Detail B shows another use for the tubing. It is slipped over the head of a screw to aid in starting it. — Roy G. Loughary, Portland, Ore.



Emergency Washboard at Camp

About 25 or 30 ft. of sash cord or clothesline and a board about 10 or 12 in. wide of a suitable length, can be made to serve as a washboard. Wrap the cord around the board and knot the ends after passing them through holes drilled for that purpose. After the washing is done, the cord is removed to do double duty as a clothesline. — Jack Bronte, Colfax, Calif.



❏ Don't discard worn full-length bed sheets. Cut them into four equal squares, hem the edges and use them for crib sheets.

How's Your Reflex?

Long a favorite among many, a reflex camera, like any other type, sometimes develops ailments that must be corrected to get best results. Here's how you can keep this camera in tip-top condition

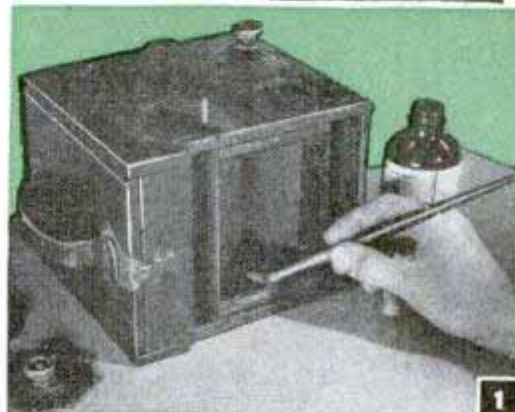
By Walter E. Burton

There are two general types of reflex cameras; one has a single lens that directs the image to a ground-glass focusing screen, with the mirror swinging out of the way just before the shutter operates. The other, the twin-lens reflex, has a fixed mirror behind a viewing lens and a second lens for taking the picture. In the latter type, the two lenses move simultaneously and are matched so the image on the ground glass is the same as that which appears in the picture. The single-lens reflex has a focal-plane shutter, while the twin-lens type usually has a between-the-lens shutter.

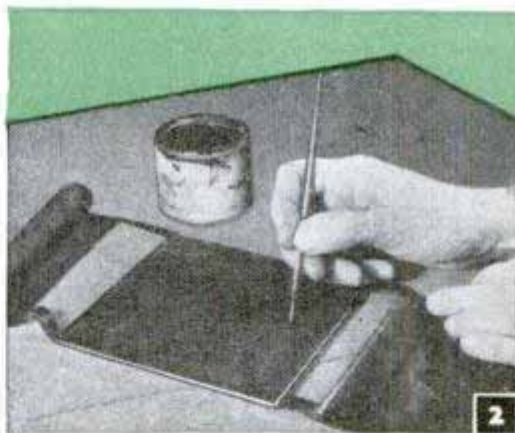
As far as the finish of the camera is concerned, a little attention with some shoe polish, touch-up lacquer, leather and glue will remove a shabby appearance. Areas that are finished with baked enamel are a little more difficult to restore, but the application of ordinary brushing lacquer will help. Never apply a glossy finish to the inside of a camera. There are special dull finishes for the interior that can be applied as in Fig. 1. Blackboard paint is another material that some photographers find satisfactory for this purpose.

One of the first points to check for repair in a single-lens reflex camera is the focal-plane shutter, removing it if necessary. The shutter curtain should be examined for tears, breaks and pinholes. Pinholes that are revealed by holding the cloth in front of a strong light are covered with black lacquer, Fig. 2. An opaque cloth sewed with black silk thread is necessary for larger patches. Use cellulose cement to further secure the patch, and paint needle holes with black lacquer.

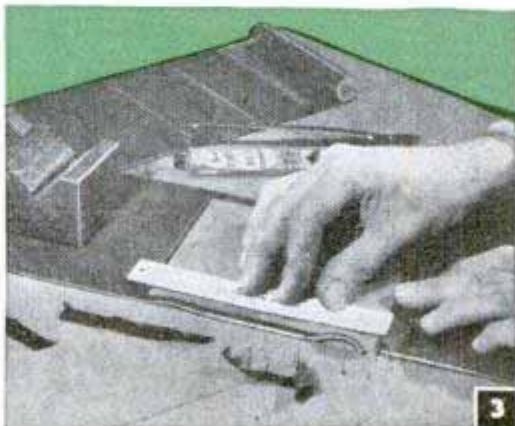
When assembling a focal-plane shutter, be sure that the control-knob gears for slot opening and tension mesh so that the dial reading for the opening corresponds with the correct curtain position, and the tension click control is in step with its dial. The tension spring is wound to exert a definite pull that determines the speed of the curtain movement. One way to position the curtain on some focal-plane shutters is to center the fullest opening over the film aperture at the back of the camera while the plate covering the shutter control is removed. Turn the knob or key for this plate until the letter "O" is in position and bring the teeth of the gear and the shaft pinion into mesh. When adjusting the shutter, the tension spring must be wound and held until the tension-control plate is installed. With the tension at "1" and the shutter control at "O", the curtain tension for this type of camera should be just



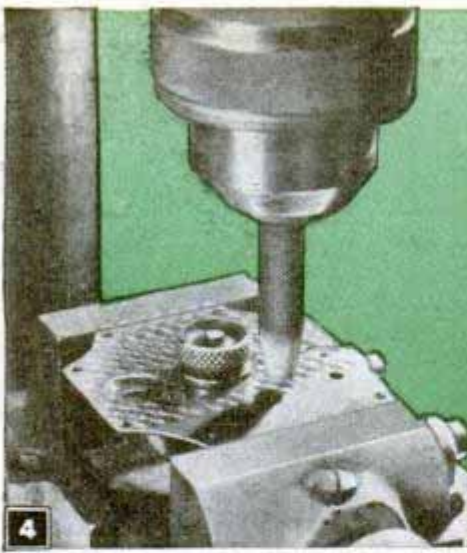
When touching up the inside of a camera, always use a dull, light-absorbing paint



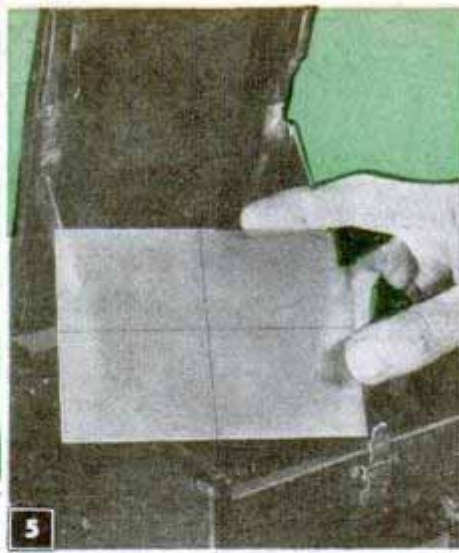
Pinhole light leaks in a curtain shutter are covered with a black, opaque lacquer



After repairing a break in a shutter opening, be sure that all edges are parallel



Exposed metal parts can be finished by spot polishing in a drill press



Cross lines ruled on a ground glass will aid in composing the picture



Shoe polish or leather dye is used to touch up the bellows

enough to move the curtain to the closed position. When repairing a curtain shutter, and a break affects the horizontal spacing of a slot, use a scale to make certain that the edges are parallel, Fig. 3. One way to test shutter speeds after replacing the curtain is given at the end of this article. Other methods are found in reference books.

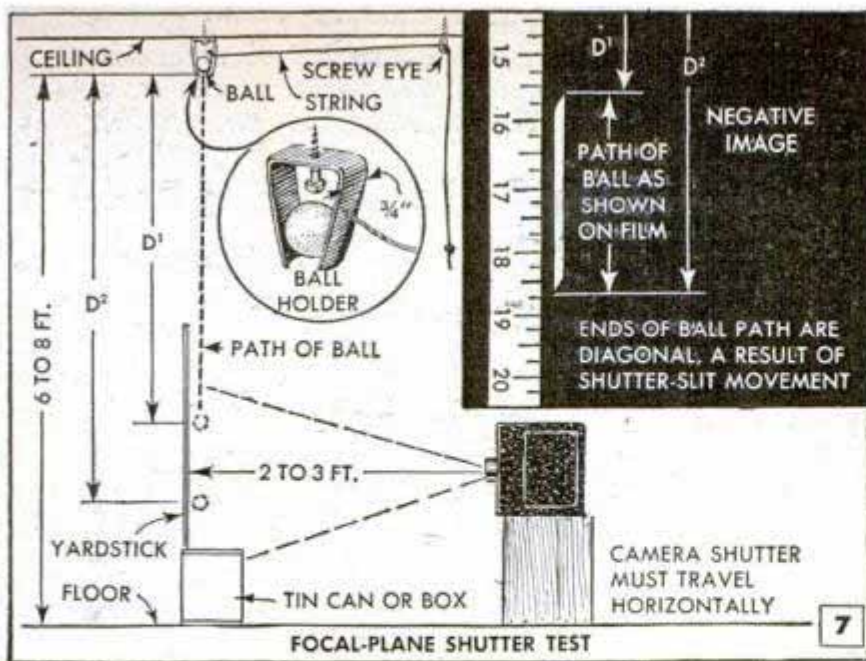
Exposed metal parts that are worn may be covered with paint or lacquer. Or such parts may be removed, polished and then treated chemically to restore the "oxidized" finish. Also, the parts may be polished and chrome plated, or cleaned with fine abrasive cloth and then spot polished. This is done with a polishing stick made by gluing a small disk of abrasive cloth on one end and then using it like a bit in a drill press as in Fig. 4. Finish with a coat of clear lacquer. Leather bellows may be repaired by cementing kid-glove material over the break and covering with leather-shoe polish or dye, Fig. 6, followed with a coat of wax shoe polish. The fabric or leather hood is repaired in the same manner.

Movement in a rack-and-pinion focusing mechanism may be rough and stiff, or too free. In the former case, roughness may be caused by damaged teeth on the rack-and-pinion gears which can be touched up with a file. Often stiffness is eliminated by cleaning the gears and racks with a solvent, using a stiff wire brush. Excessive play may be due to worn pinion-shaft bearings or loose screws. Sometimes play can be removed by installing strips of bronze shim metal in the bearings or between sliding surfaces, or by shifting the bearings toward the racks. If the camera front is at an angle, with one side moving ahead of the other, one of the pinion gears is probably a tooth or so ahead. In this case, remove the pinion, straighten the front and re-install the shaft.

If it's necessary to remove the ground-glass focusing screen, always note whether its rough surface is toward or away from the lens and replace it in the same position. Clean the glass with soap and water. For composing a picture, it is helpful to mark the center of the focusing area with cross lines, Fig. 5. India ink applied with a ruling pen is used. Cleaning the mirror is a delicate operation since such mirrors usually have the coating on the front surface, protected by a thin layer of lacquer. When replacing a mirror, have the silvered surface in the same plane as that occupied by the original one. If the aperture marks and index lines are hard to see, clean them and refill with porcelain retouching enamel as in Fig. 8, wiping off the excess paint.

The lens on a single-lens reflex may be mounted in such a way that it has to be racked out a considerable distance before objects at infinity are in focus. This limits distance for close-up work because of the lessened amount of available travel. If space in front of the lens permits, an extension ring, Fig. 9, may be installed between the lens and lens board. Many twin-lens reflexes have metal hoods that become loose and will not stay in the fully opened position. In some cases, this is remedied by inserting a rivet that will act as a stop for the overlapping parts, Fig. 10.

To test a single-lens reflex for focus, use a regular focusing panel on the back, or fasten a piece of ground-glass screen so the rough surface is in the same plane as the film. Focus on a near-by object, viewing it through the top reflex screen; then check this against the ground glass at the back of the camera. If both images are sharp, the focus is correct. When the back image is not sharp, add or remove shims under the back glass or under the reflex screen (always adjusting the lens) until the image

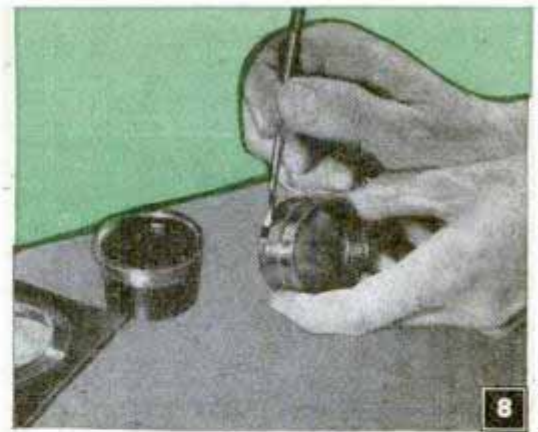


is in focus on both screens. Sometimes reversing the reflex screen will correct the condition. Strips of black velvet may be used as shims. In the twin-lens reflex, failure of images to be in focus simultaneously may indicate that the camera front is sprung, a lens is loose, dirty or partly unscrewed, or the mirror is not in its proper position.

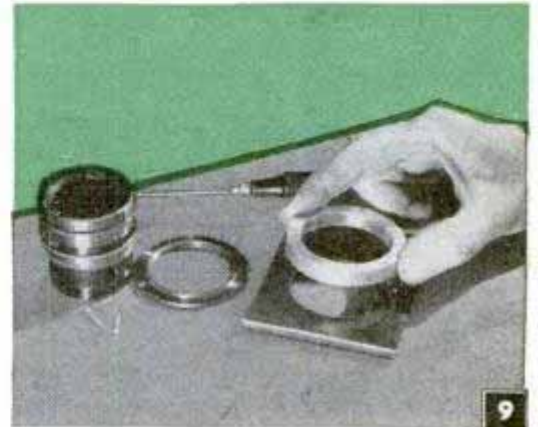
When making close-up pictures with a two-lens reflex, the taking and viewing lenses do not always cover the same field and correction must be made for parallax. Arrange the camera as when checking focus, with a screen in place of the film, and focus on an object at the distance for which you desire to correct. Usually this is done with copying attachments over each lens. At the bottom edge of the back ground glass, note the top boundary of the image (which is inverted). Then draw a line on the regular focusing screen to indicate the same boundary, Fig. 11; this will be a short distance from the forward edge. Repeat for other close-up distances.

To test the speed of a focal-plane shutter, you will need a polished ball bearing $\frac{3}{8}$ in. or so in dia., a yardstick and a large tin can containing cloth or waste to catch the ball. Make a setup to hold and release the ball like that in Fig. 7, being sure to position the yardstick, tin can and camera correctly. The ball, when released, should travel close to the yardstick. Set the camera so the curtain of the shutter moves in a direction parallel with the floor. Use high-speed film and expose at $\frac{1}{50}$ to $\frac{1}{100}$ of a second with the lens almost wide open. If done correctly, the negative will show a streak beside the yardstick, upper right-hand detail of Fig. 7, which is the ball in motion. Then calculate the exposure:

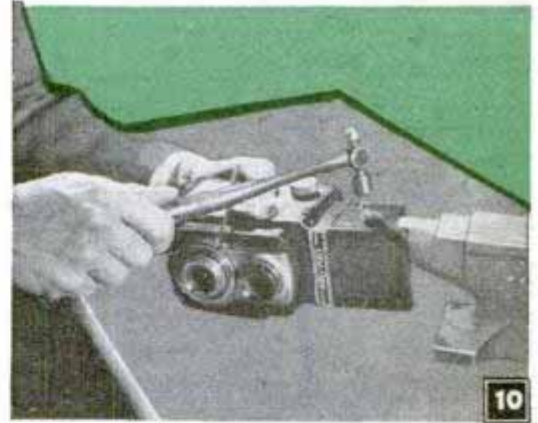
Let D^1 —distance the ball fell to the beginning of the streak on the negative; D^2 —distance the ball fell to the end of the streak and G —acceleration of gravity, 386.4 in. per sec. per sec. (1) Multiply D^1 by 2, divide by G and extract the square root (or obtain it from a table). (2) Multiply D^2 by 2, divide by G and extract the square root. (3) Subtract (1) from (2). This difference is the exposure time in fractions of a second.



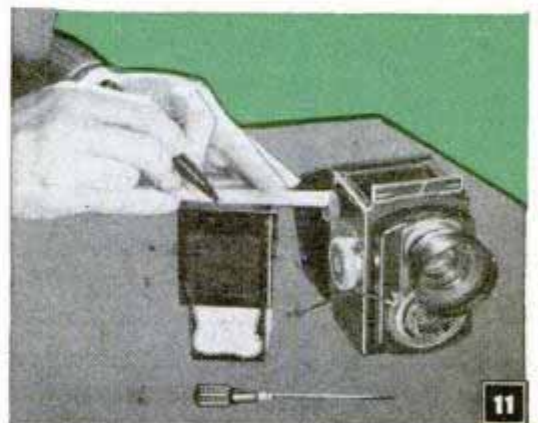
If aperture numerals and index marks are not legible, restore them with white paint



A ring between lens and lens board will permit more latitude in close-up pictures



On cameras with a metal hood, a rivet will act as a stop to keep the leaves wide open



Lines ruled on the reflex screen indicate the corrections that are made for parallax

GLYCERIN AND WATER SOLUTION

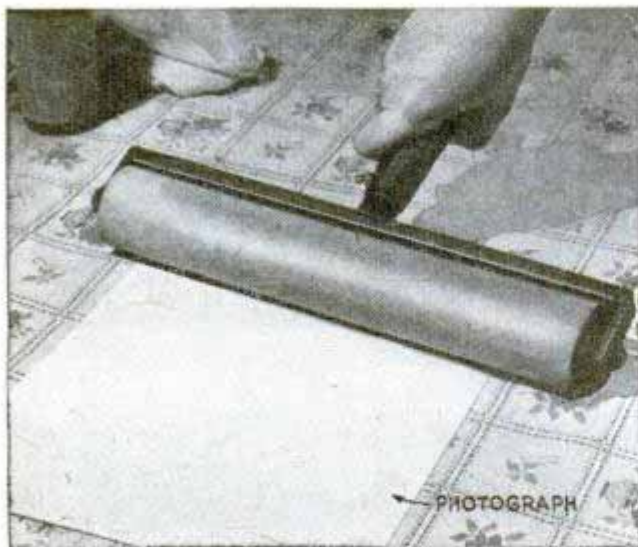


Solution Improves Photographs

Glossy prints that are soaked in a glycerin solution will be more pliable, less likely to curl and not so inclined to stick to the ferrotype tins. A suitable solution may be made by mixing glycerin, 1 part, and water, 9 parts. After thorough washing, the prints are soaked for 10 or 15 min. in the solution. Then they are removed and squeegeed onto clean, wet ferrotype tins.—R. F. Donavan, Jersey City, N. J.

Pictures Have Canvas Finish

To make your prints a little different, give them a canvas-texture finish. Spread oilcloth smoothly on a table top. Squeegee the prints onto it in the usual manner and cover with a towel until dry. A little ferrotype waxing solution can be applied to the oilcloth if the prints seem inclined to stick.



Protecting Often-Handled Prints

Photographic prints that are handled frequently will soon become soiled if the surface is not protected. To make a mixture that will preserve the print, mix clear plastic cement and lacquer thinner to the con-

sistency of thin cream and apply to the prints with a soft brush or an airbrush. Treat both sides of the print if necessary.

Will Thomas, Kenmore, N. Y.

Knitting Needle as Stirring Rod

If you need a stirring rod for your photo laboratory, an old knitting needle will serve the purpose. Cut off the point and use the ball end. Select a needle that has a ball at least 1/4 in. in diameter.



Diffuser for Reflector Photoflood

Sometimes it's advisable to diffuse the light to obtain the desired effect when taking portraits. Here's one way to attach a diffusing screen to a reflector photoflood. A shade holder is screwed to the socket and a 10-in. strip of flat iron is bolted to it and bent to allow for the curvature of the flood. The diffuser, which is an embroidery hoop fitted with tracing cloth, is fastened to the end of the flat iron. A knob should also be attached to the flat iron to prevent burned fingers.—Max Navis, New York.



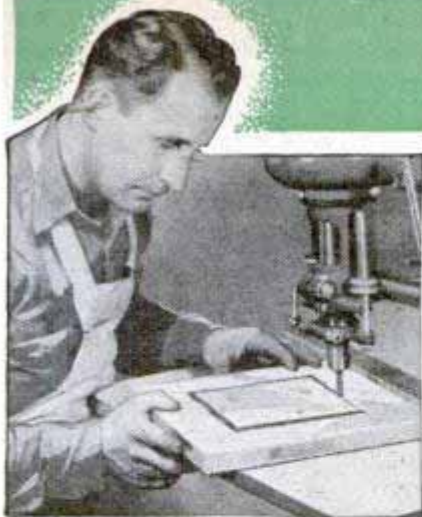
Color Developing Data on Trays

When processing color transparencies in trays, it is convenient to identify each tray with the name of the solution and time required for development. Then, before you start, you can have your trays arranged in the proper order for all stages of development. The data can be printed directly on the bottom of the tray with colored fingernail polish.

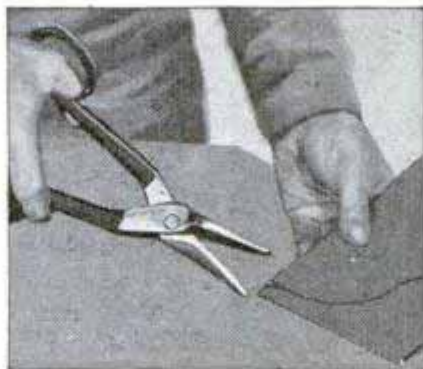


Deposits that form on the inside of glass graduates can be removed by cleaning them with hot vinegar, which is allowed to stand in the glass for about an hour.

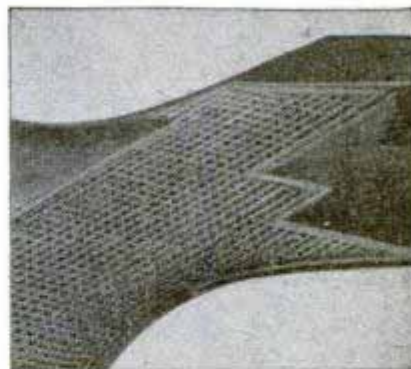
CRAFT QUIZ



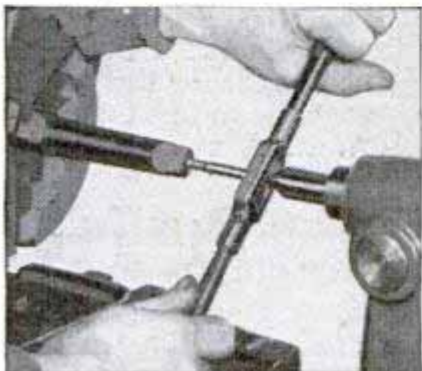
1. Cutting tool used here has—
 (a) 59° point (c) Extension spurs
 (b) Brad point (d) Double flutes



2. Tin snips shown are—
 (a) Straight blade (c) Hawk-billed
 (b) Pivoter (d) Double cutting



3. This work is called—
 (a) Squaring (c) Hatching
 (b) Pointing (d) Checkering



4. National coarse tap used here is—
 (a) 1/4" No. 20 (c) No. 6-40
 (b) 5/16" No. 24 (d) 3/8" No. 24



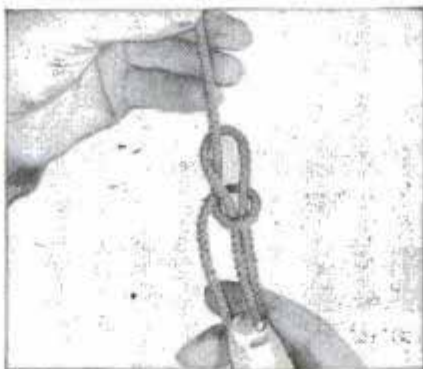
5. Placing roofing in the—
 (a) Gutter (c) Comb line
 (b) Verge-edge (d) Valley



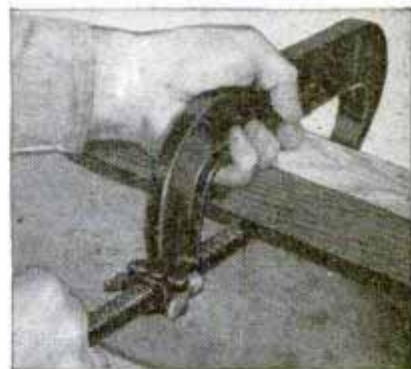
6. Countersink for screws is—
 (a) 60 degrees (c) 72 degrees
 (b) 20 degrees (d) 82 degrees



7. This "two-by-four" has—
 (a) Edge grain (c) Banks
 (b) Star shakes (d) Checks



8. This knot is—
 (a) Half hitch (c) Blackwall hitch
 (b) Sheepshank (d) Single bowline

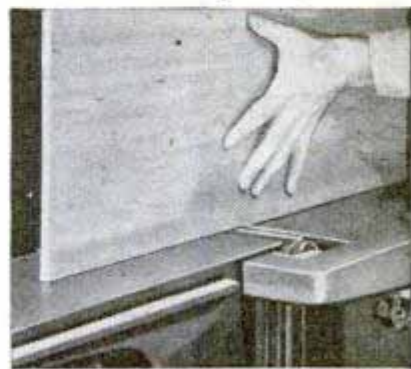


9. Ears on this clamp are for—
 (a) Better grip (c) Identification
 (b) Speed (d) Easy turning

ANSWERS: 1—d (operation is routing and tool is double-flute router bit); 2—c, 3—d, 4—at others are National Fine Thread); 5—d; 6—d; 7—d; 8—d; 9—b (ears are split nut which can be opened for rapid setting); 10—d; 11—c

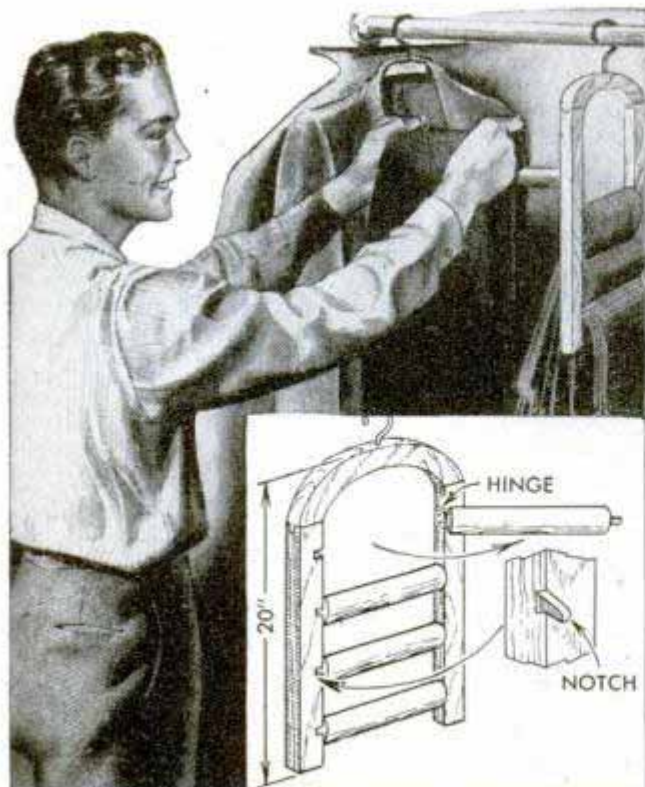


10. This type of table is—
 (a) Extension (c) Pie plate
 (b) Kettle (d) Drum



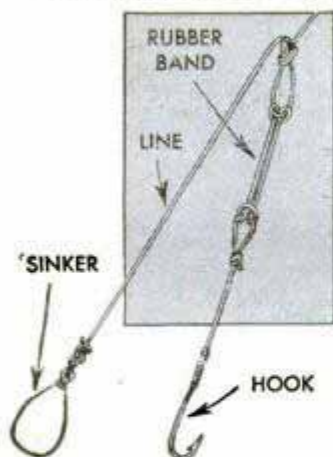
11. Jointers have a—
 (a) Splitter (c) Rabbeting ledge
 (b) Dado head (d) Depth stop

Multiple Hanger for Trousers Requires Little Room



For the small-apartment dweller or the person whose home has small closets, this multiple hanger will permit many pairs of trousers to hang in the space taken by one pair before. The frame is U-shaped and should be wide enough for the trouser legs. The crossbars are fairly large dowels that are hinged to one side of the frame and have a pin in the other end that fits into a notch in the other side member. The hinge is loose so the pin will slide in the notch.

"Shock Absorber" on Fishline Breaks Impact of Hard Strike



Fish with tender mouths often tear out the hook under the impact of a sudden strike or when making a run. To prevent this, a rubber band can be installed between the leader and line to absorb the shock. — Maj. R. S. Hudgins, Washington, D. C.

Soy-Bean Fence Protects Garden

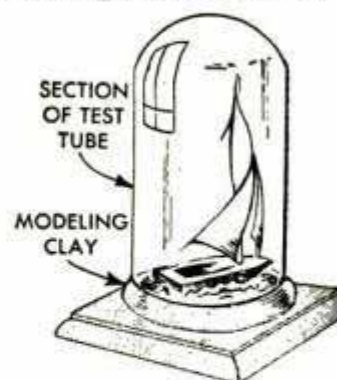
Instead of using a wire fence to protect your garden from rabbits and other animals, grow a row of soy beans around the outside of the plot. One gardener found

that when he did this, the animals would feed on the soy beans but leave the vegetables inside the garden alone.

David B. Clapp, Livingston, N. J.

Glass Case for Fragile Models

To protect small, fragile models and delicate pieces of whittling, keep them under glass. Purchase a test tube that is large enough to fit over the object you wish to cover and cut the tube to the right height, using a triangular file. Make a wooden base and then set the model and the tube in modeling clay. Shape the clay inside the tube so that it forms a pleasing rest for the model and mold it on the outside to form a quarter round.—A. A. Wells, Verdun, Can.



Drawers in Closet-Step Unit Provide Storage Space

If drawer space is at a premium, here's a unit that will serve as a stepladder and do double duty as a chest of drawers as well. It will fit neatly into the closet and shorter persons will find it handy to get at articles that are on the top shelves of the closet. If desired, the tops of the steps can be carpeted or covered with some composition material to save wear on the wood.





SHOP NOTES



FRICITION SAWING-10 Times Faster

METAL UP TO 14 GAUGE IS CUT AS FAST AS HAND CAN PUSH THE WORK

By Sam Brown

TEN times faster than hacksawing—that's what you can expect when you switch to friction cutting on the bandsaw. Three feet per minute in 1/8-in. steel is not a "souped-up" test figure obtained under ideal conditions, but exactly what you can expect with your 12 to 16-in. woodworking bandsaw.

Simply increase the saw speed to about 2800 f.p.m. and then change to a standard metal-cutting blade and you are all set to friction-saw sheet metal and angle iron up to about 1/8 in. thick. Friction sawing works by heating the metal red hot at the point of contact so that the saw teeth can strip it away. If you want to cut stock over 1/8 in., you will need more speed. For average work, the single speed setup of about 2800 to 3000 f.p.m. has the advantage of simplicity and is excellent for either wood or metal with nothing more than a change of blade. An ideal setup is a step-pulley drive, one step giving a 3000-f.p.m. speed for wood

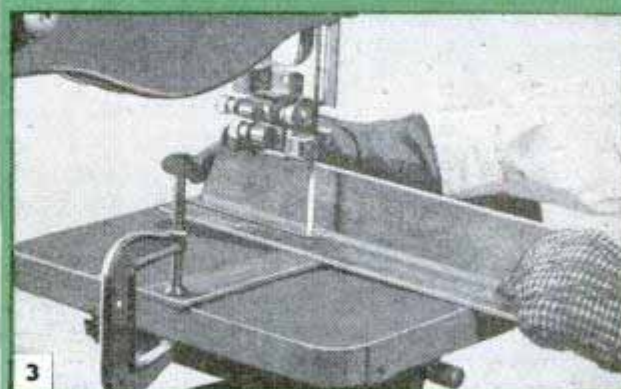
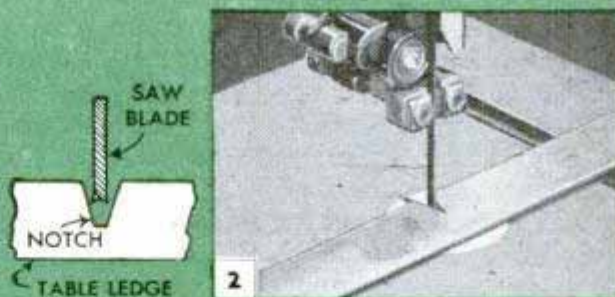
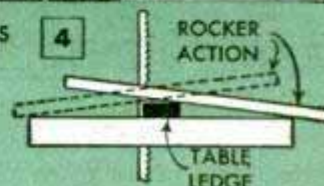
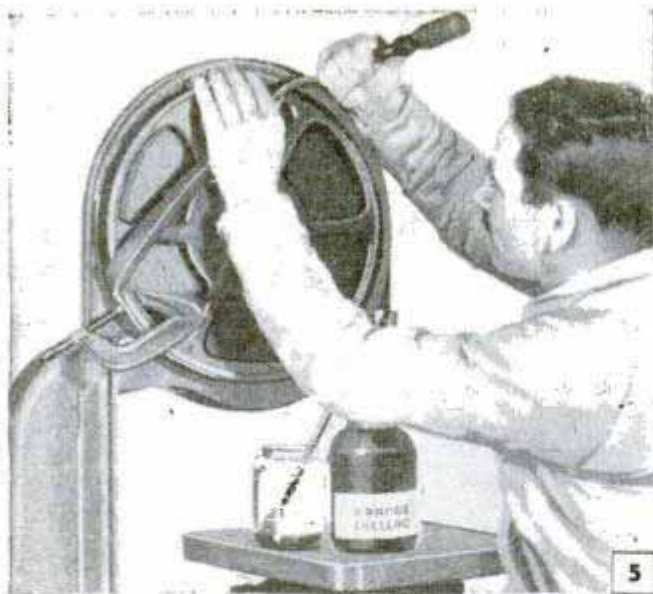


TABLE LEDGE PREVENTS BURRED EDGE FROM CATCHING IN TABLE INSERT . . . ALSO PERMITS ROCKING ON HEAVY CUTS





GLUE TIRES ON FOR SPEEDS OVER 4000 F.P.M.

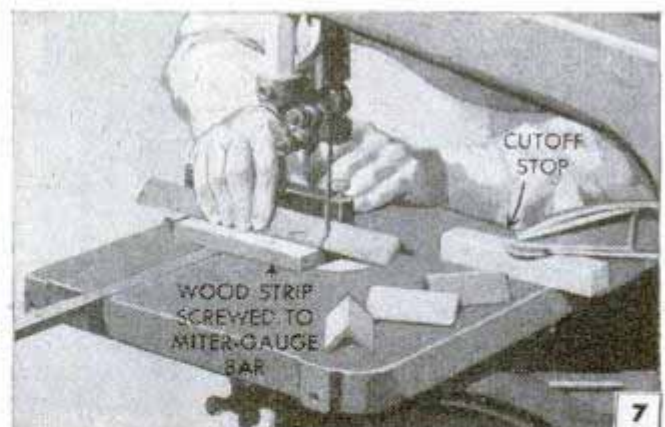
sawing and sheet-metal cutting, and the second step a speed of about 4000 f.p.m. for friction-sawing metal up to about $\frac{3}{16}$ in. thick. The table, Fig. 6, will help you select a suitable pulley drive. Table, Fig. 8, shows thickness limitations and other factors.

Cutting technique is standard except that for work over $\frac{1}{8}$ in. thick use a strip of metal clamped across the saw table, as in Figs. 2, 3 and 4. Prime purpose of this is to prevent the burr, which forms on the underside of work, from catching in the slot in the table insert. A similar fixture is used for cutoff work, Fig. 7. Regarding the speed increase, any fair quality bandsaw will go up to about 3800 f.p.m. quite smoothly. At about 4000, the wheels will probably throw the tires; cement them to the wheel rims as in Fig. 5. It's also a good idea to drive with a $\frac{1}{2}$ -hp. motor. Be sure the V-belt is fairly tight and that the machine stands firmly on the floor or bench. If the blade should break, stop the machine as soon as possible.

Blade life is very good, averaging 28 to 30 hours, or an equivalent of about 5000 linear feet in $\frac{1}{8}$ -in. steel. The blade wears out by blunting of the teeth until the blunted area in contact with the work becomes too great for cutting clearance. The blade does not lose its temper because the red-hot cutting contact is only momentary—any one tooth has a cooling cycle several hundred times longer than its contact cycle. Blade life depends to a certain extent on the uniformity of feeding the work to the blade. Burring is the worst fault. It is negligible in thin stock, Fig. 1, but increases rapidly with work thickness. The cut itself is fairly smooth with but slight "wash-boarding." It is advisable to wear gloves—small work gets uncomfortably hot and all cuts have a raw, burred edge that can inflict a painful injury if you risk handling the work with bare hands.

6 BANDSAW SPEEDS* IN FEET PER MINUTE							
Motor Pulley	Dia. of Bandsaw Wheels	Machine Pulley Diameter					
		5"	5½"	6"	6½"	7"	8"
2¾"	10"	2418	2210	2028	1872	1742	1508
	12"	2883	2635	2418	2232	2077	1798
	14"	3441	3145	2886	2664	2479	2145
	15"	3627	3315	3042	2808	2613	2262
	16"	3906	3570	3276	3024	2814	2436
3"	10"	2652	2418	2210	2028	1898	1664
	12"	3162	2883	2635	2418	2263	1984
	14"	3774	3441	3145	2886	2701	2368
	15"	3938	3627	3315	3042	2847	2496
	16"	4284	3906	3570	3276	3066	2688
3½"	10"	3094	2808	2574	2340	2210	1924
	12"	3689	3348	3069	2790	2635	2294
	14"	4403	3996	3663	3330	3145	2738
	15"	4641	4212	3861	3510	3315	2886
	16"	4998	4536	4158	3780	3570	3108
4"	10"	3536	3224	2938	2730	2522	2210
	12"	4216	3844	3503	3255	3007	2635
	14"	5032	4588	4181	3885	3589	3145
	15"	5304	4836	4407	4095	3783	3315
	16"	5712	5208	4746	4410	4074	3570
4½"	10"	3978	3614	3302	3042	2834	2470
	12"	4743	4309	3937	3627	3379	2945
	14"	5661	5143	4699	4329	4033	3515
	15"	5967	5421	4953	4563	4251	3705
	16"	6426	5838	5334	4914	4578	3990
5"	10"	4420	4030	3692	3406	3146	2756
	12"	5270	4805	4402	4061	3751	3286
	14"	6290	5735	5254	4847	4477	3922
	15"	6630	6045	5538	5109	4719	4134
	16"	7140	6510	5964	5502	5082	4452

*With Standard 1725 R.P.M. Motor



THIS $\frac{1}{8}$ " X 1" ANGLE WAS CUT OFF IN 7 SECONDS

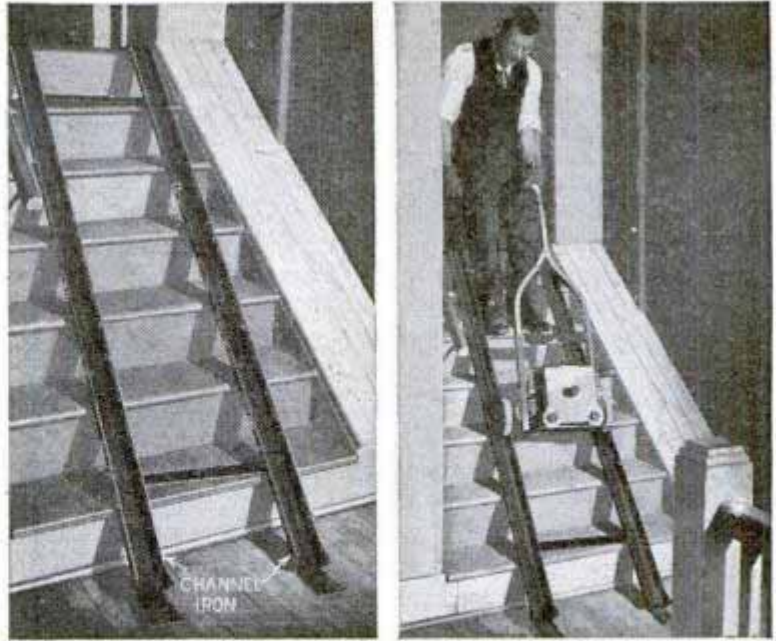
8 BLADE SELECTOR AND DATA						
Material Thickness*	Blade Speed	Min. Blade Width	Teeth Per Inch	Min. Cutting Radius	Hp. Req'd	Feed Pressure
Up to $\frac{3}{32}$ " or 13 Gauge	2800	$\frac{1}{4}$ "	18-24	$\frac{5}{16}$ "-1"	$\frac{1}{4}$	Light
$\frac{1}{8}$ " to $\frac{3}{16}$ "	3600	$\frac{1}{4}$ "	14-18	1"-1½"	$\frac{1}{3}$ or $\frac{1}{2}$	Mod.
$\frac{3}{16}$ " to $\frac{1}{4}$ "	4400	$\frac{3}{8}$ "	14	1½"-3"	$\frac{1}{2}$	Fairly Heavy

*For iron and steel only—friction cutting cannot be done on nonferrous metals

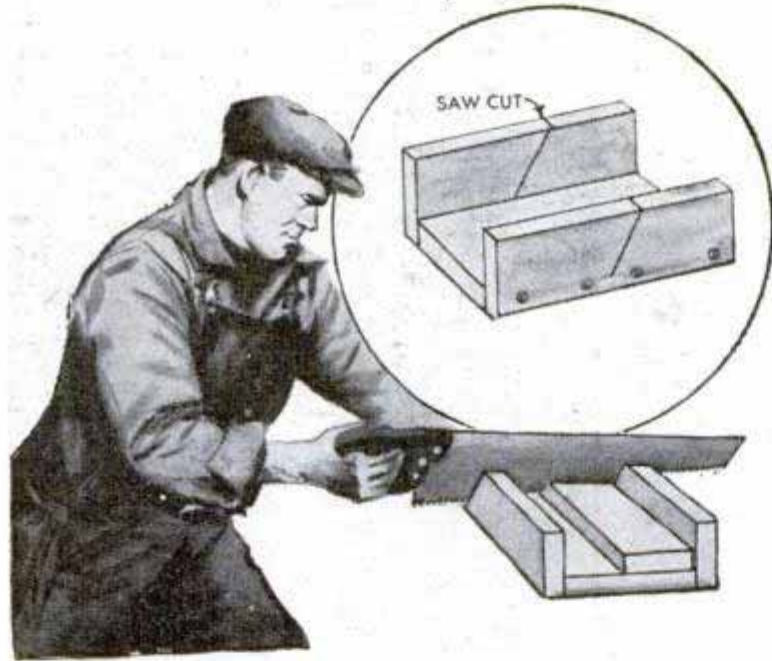
Moving Materials Is Simplified by Using Stairway Ramp

Consisting of two lengths of channel iron suitably spaced and braced, this stairway ramp will simplify the moving of materials from one floor to another. The size of the channels and the intervals at which they are braced will depend to a large extent upon the bearing load. However, for average conditions, No. 18 ga. will serve if braced with 1-in. bars. The braces should be about 4 ft. apart and welded to fit snugly against the front of the step to minimize any danger of tripping when moving the truck up and down the stairs. The ramp may be made in sections so it can be removed and put away when not in use.

Mark Q. Mau, St. Paul, Minn.



Wide Boards Beveled Accurately in Special Miter Box



Sometimes difficulty is encountered in beveling the ends of wide stock accurately. If a box with a wide bottom is built for just this purpose, it will be easy to saw boards of almost any width.

R. E. Deering, Wichita, Kans.

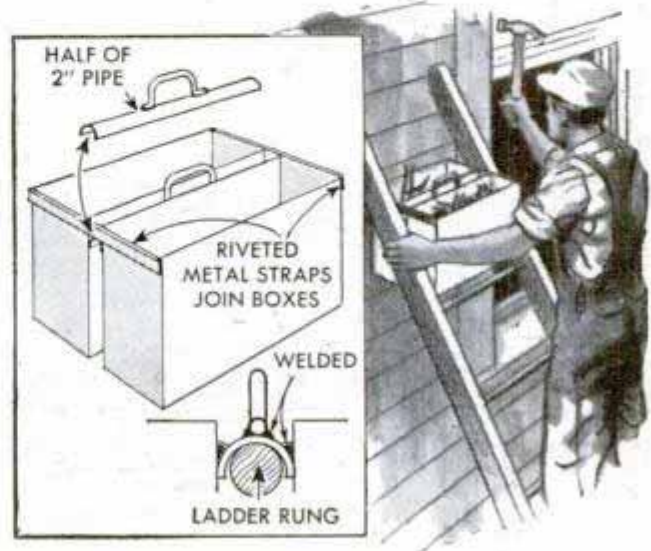
Shield Over Auto Exhaust Protects Showroom Walls

To prevent smudging the lower parts of the showroom walls with smoke from the exhaust when demonstrating cars, one dealer hung a metal shield from the rear bumper directly behind the exhaust pipe. This served as a baffle which dissipated the smoke and kept the walls clean.

"Saddle-Bag" Box Keeps Tools at Hand on Rung of Ladder

This toolbox is one carpenter's solution to the problem of always having at hand all the tools and nails he wanted. The boxes are made of metal, being any convenient size, and are joined by a metal strap. Sufficient space is left between the boxes to weld a length of 2-in. pipe that has been cut in half lengthwise. For convenience in carrying, a handle is welded to the pipe. The latter fits over the rung of a ladder.

☐ If your windshield wiper does not clean effectively because of a worn edge, you can restore the edge with No. 280 or 320 silicon-carbide paper. Wet the paper with gasoline, fold it and insert the wiper, smoothing with a sawing motion.



77
- from 11 articles
(47 + 55 eds)

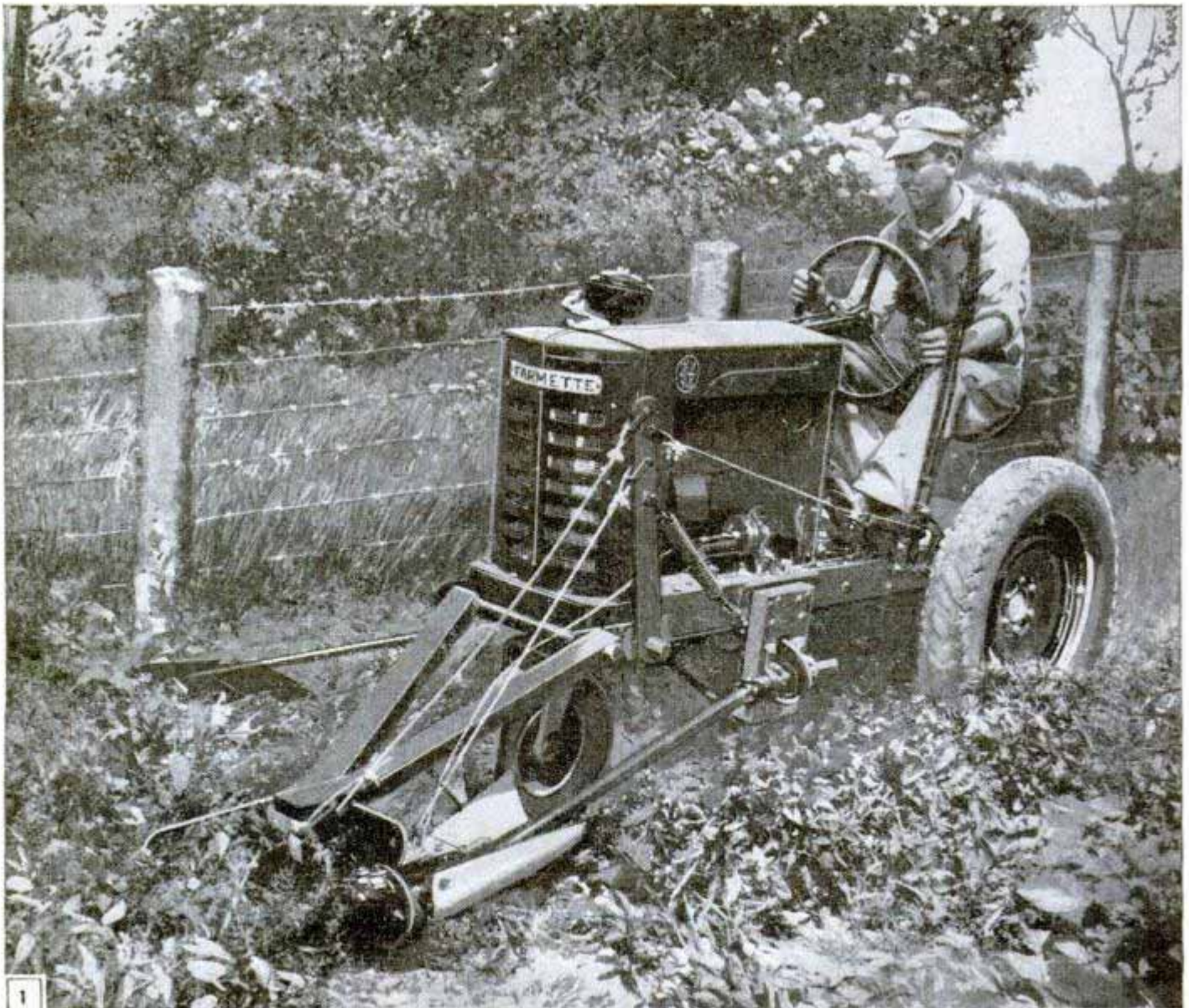
THE ODD-JOB

IT WON'T take long to figure the needs for this tractor on your farm. That problem will immediately take care of itself when you get the tractor built, for Farmette is just chore-boy size and it's faster than any team of horses. So far as its uses are concerned you can take it from there.

Power from Farmette's 7-hp. air-cooled engine is taken off the engine crankshaft by flat belt to a 4-speed truck transmission and through this to a cut-down rear axle taken from a 1934 Chevrolet car. Of course, any suitable rear axle can be used, including a light truck axle. Positive clutching action is obtained by an idler pulley running on

the slack side of the flat-belt drive from engine to transmission. The idler pulley is actuated by a pedal, the arrangement giving smooth foot-clutch control of the tractor. The pedal works against tension springs attached to the frame and to the idler-pulley yoke as in Fig. 3. Provision is made for adjusting the spring tension, which determines the tension on the belt when the clutch is engaged. In Fig. 3 notice also that essentially the same clutching arrangement is used in controlling the power take-off. This consists of a short shaft with V-pulley mounted between bearings. The whole assembly is bolted to a hinged bracket. Movement is controlled by a rod carrying a compression spring, one end of which bears against an adjustable collar. The free

Here's Farmette mowing a fence row and making a good job of it, too. One can easily put together a small mower with a 3½ or 4-ft. cutter bar from stock parts. It's also possible to adapt some small tractor mowers to this type of mounting with very little alteration. A rigid, welded frame is essential for front mounting

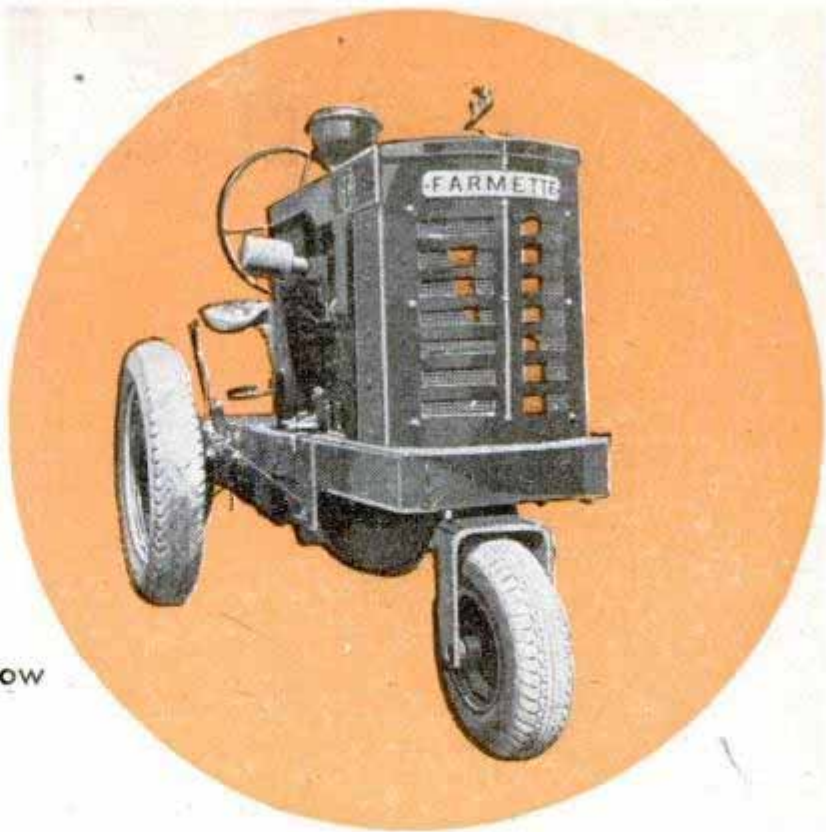


1

TRACTOR

Small jobs that tie up big tractors at busy times cost money for extra fuel and extra man-hours. That's where a nimble, pint-sized riding tractor like Farmette comes in. Farmette is narrow enough to slip between rows of standing corn or pass through a footpath gate, and it's ideal for mowing fence rows and plowing snow

By Marvin and Charles Neese



end of the rod passes through a hole drilled in a bracket piece as shown. A wire cable, passing through an awning pulley on the bracket, is attached to the adjustable collar. The free end of the cable is hooked to a control lever near the driver's seat. Moving the lever swings the power take-off assembly inward toward the tractor frame, slackening the V-belt. This whole driving assembly and clutch mechanism is shown clearly in the perspective view, Fig. 4. Speed range is from 1 to about 20 miles per hour.

Before cutting the parts it's a good idea to have all the necessary materials at hand, including the engine, such pulleys as are specified, belts, frame members, steel plates and the rear axle, wheel disks and tires. Looking over the cutaway view, Fig. 2, you get a good idea of what is needed. One of the first questions that comes up is the rear-wheel tread. By using "dished" truck-type wheel disks the tread can be varied by simply reversing the wheels and, if you expect to use Farmette as a cultivating tractor in narrow-rowed truck crops, this also must be taken into account in figuring the wheel tread. The axle can be any length up to the full tread width but of course the narrower tread is handier in close quarters. Where the axle housing is cut down it will be necessary to turn new axles. This is better than cutting and welding the original axles. With the axle cut down to the tread width you require, weld lengths of angle iron to the axle housing. These form mounting brackets for the longitudinal frame members, Fig. 2. The latter should be cut from seasoned oak, $2\frac{1}{4}$ by $3\frac{1}{4}$ in. sectional size. These frame members in the original

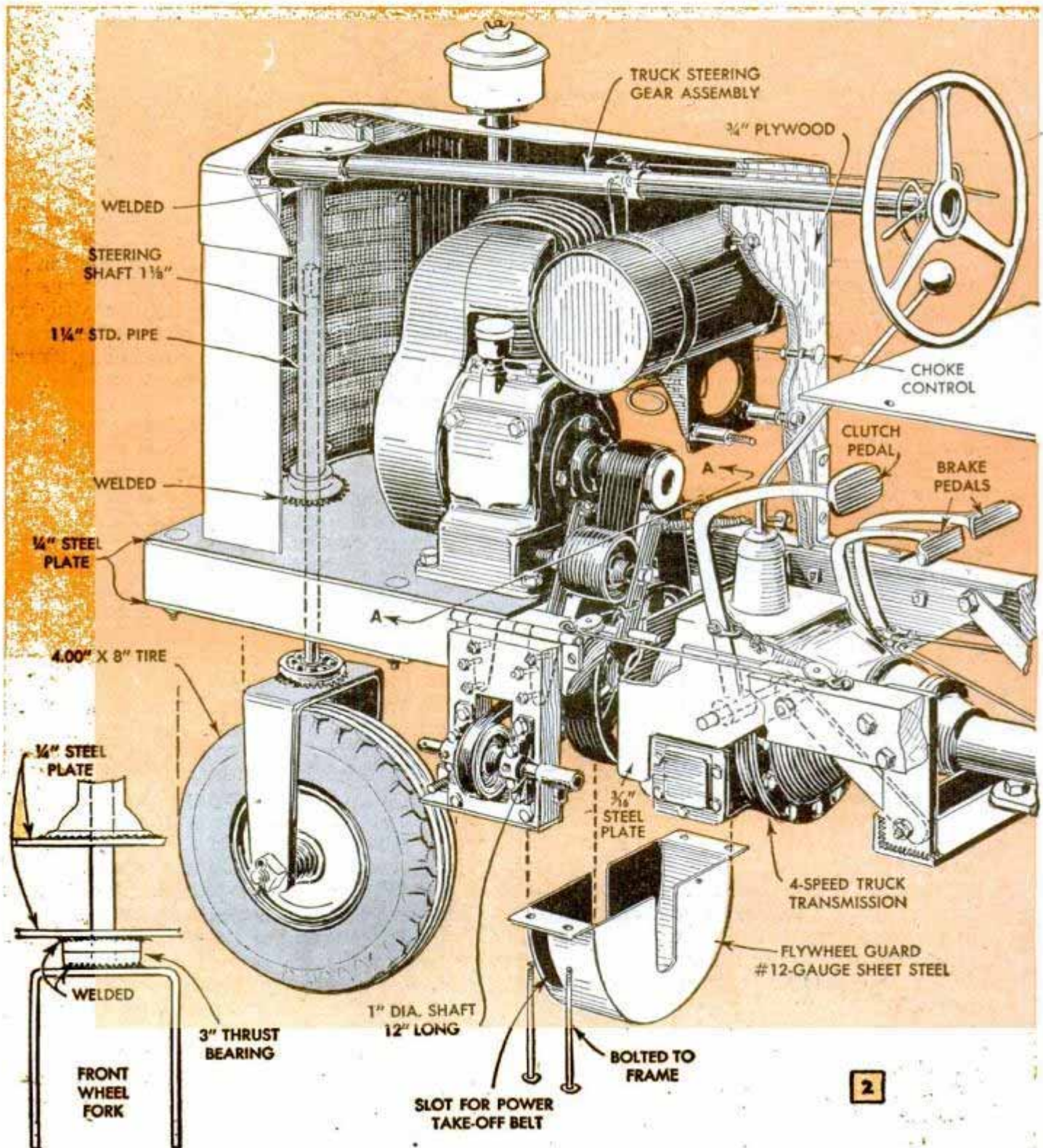
tractor are 78 in. long but some variation in length is possible. Don't attach frame members to the rear-axle brackets until you are sure of the exact location of the axle.

Next, assemble the frame as in Fig. 2 and the down view in Fig. 7. Then assemble the steering gear and front-wheel fork. The complete gear from a 1928 Chevrolet truck, including the wheel, spark and gas control levers, steering-wheel column and the stub shaft, are used. The steering-gear housing is supported on a length of $1\frac{1}{4}$ -in. pipe which screws into a pipe flange welded to the steel plate as indicated. The steering shaft, which is welded to the wheel fork, passes through this column. A ball thrust bearing carries the front end of the frame. One bearing race is welded to the wheel fork, the other to the bottom of the steel plate which forms the lower front cross member of the tractor frame.

Now comes the transmission-to-rear-axle hookup. Block the frame level and clamp the frame side members to the rear-axle brackets. Then the splined shaft projecting from the front end of the transmission is turned down to 1 in. in diameter, and a $\frac{1}{4}$ -in. keyway is cut to a length that will take two separate keys, one for each pulley. The front end of the shaft is carried on a self-aligning ball-bearing pillow block as in Fig. 4. Put on the 12-in. cast-iron drive pulley first and key in place, then the $4\frac{1}{2}$ -in. V-pulley which drives the power take-off. This means a careful job of machining. Locate the transmission between the frame members, blocking it in position if necessary, and hook up to the rear axle. Make a careful adjustment for alignment. When

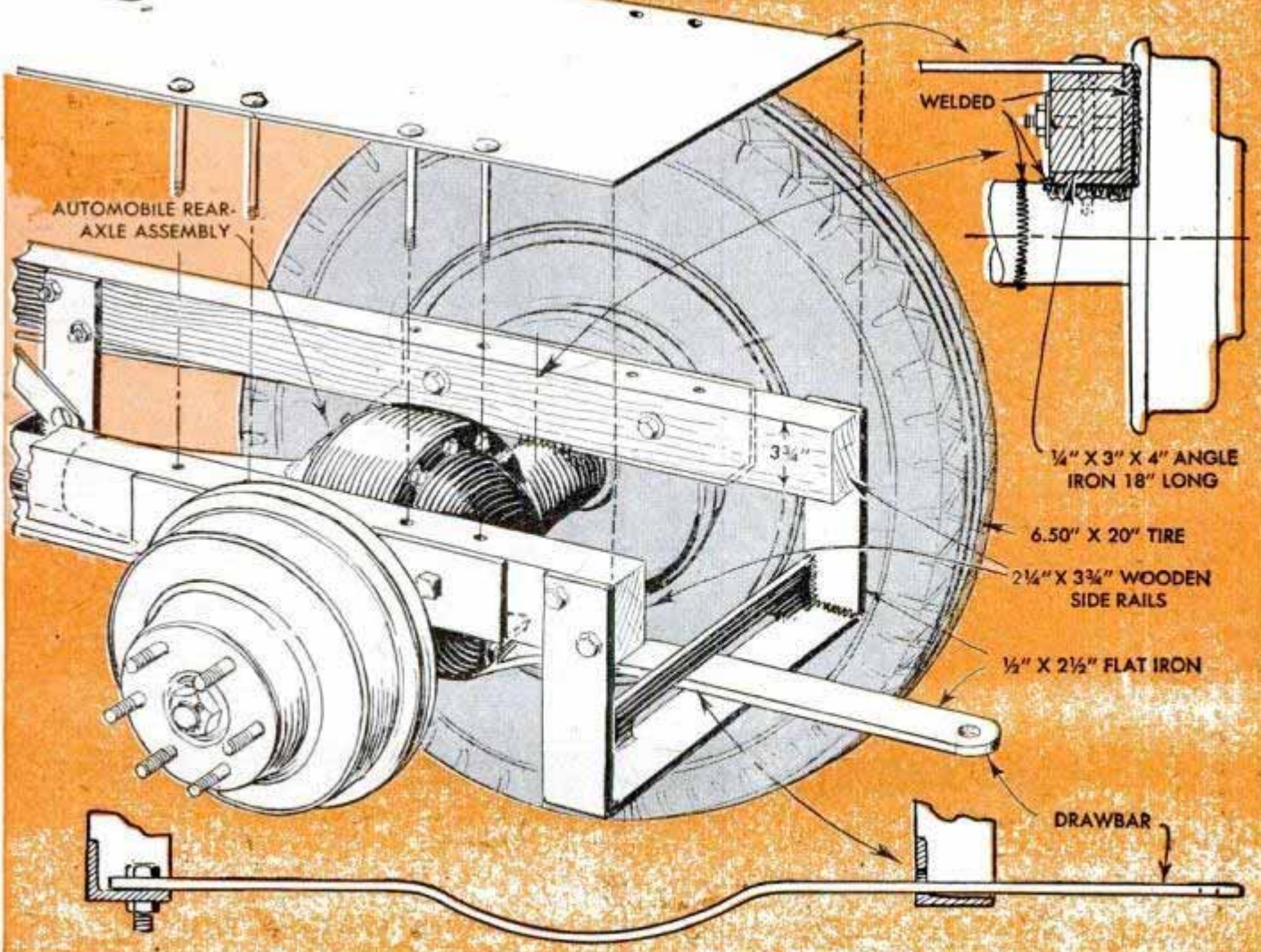
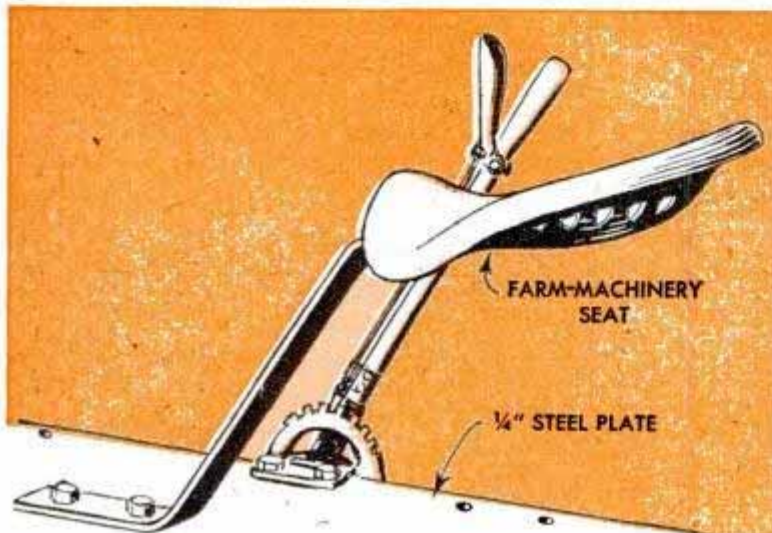
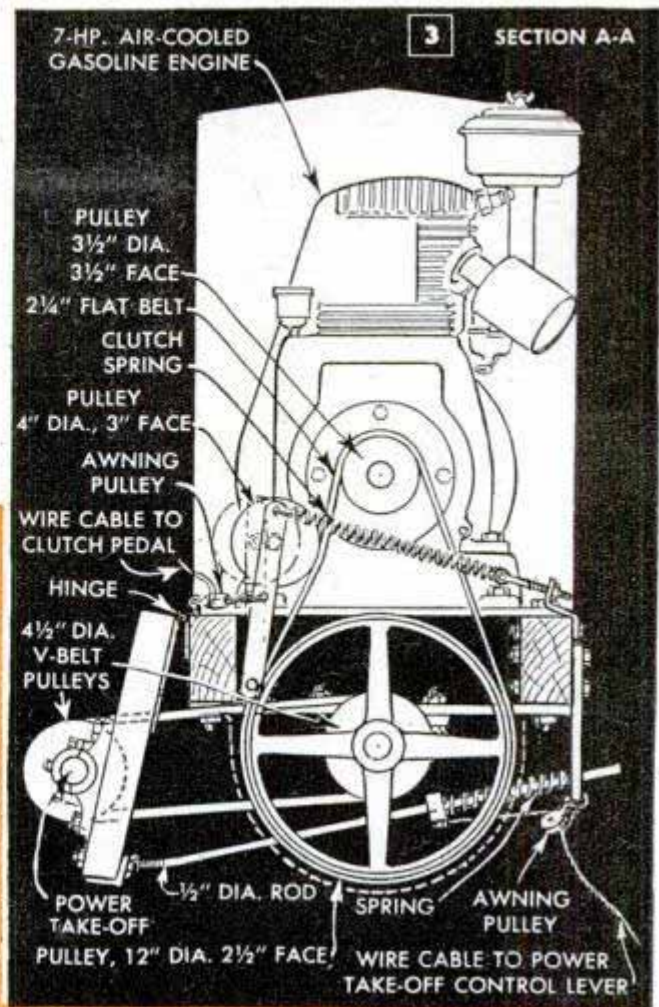
you're sure of this, mark the location of bolt holes for brackets supporting the transmission, the pillow-block bearing at the front of the transmission, and also the bolt holes through the rear-axle brackets and side-frame members. One thing to look out for here is the alignment of the rear axle with the transmission. This is especially important because the axle is not sprung to the frame in the regular way, hence the transmission and drive-shaft housing are rigid when assembled. When you locate holes for bolts through the platform plate, side frames and axle brackets be sure that the

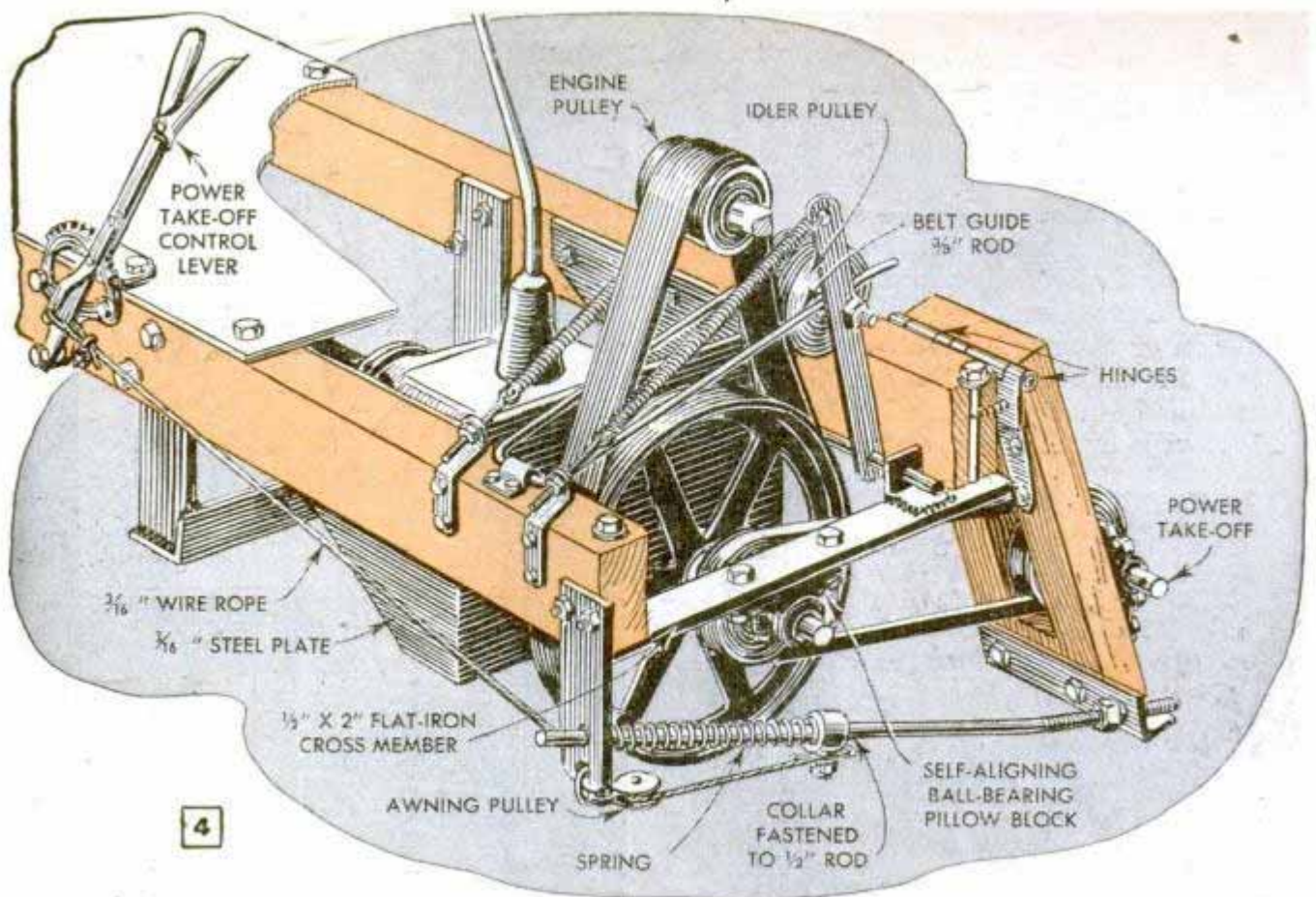
parts fit snugly together so that when these parts are bolted in place there will be no strain or twist on the axle housing. It may be necessary to shim slightly under one or the other of the side frames. Care in welding to make sure that the brackets are exactly in line will generally make shimming unnecessary. After bending the front wheel fork to shape as in Fig. 8, the next step is locating the holes for the wheel spindle. On the original tractor the rear tires are 6.50 by 20 in. and the front tire 4.00 by 8 in., as given in Fig. 2. These sizes stand the tractor level. When you know the tire size



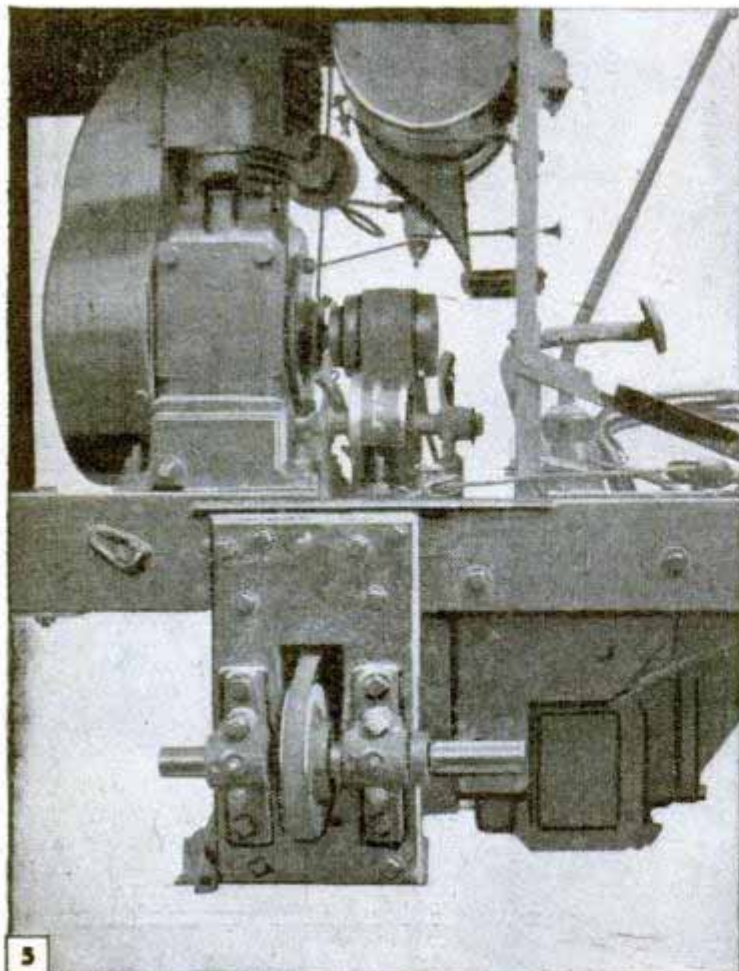
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measure and drill holes in the front-wheel fork for the wheel spindle. The nut on the spindle should be cotter-pinned as shown. This last step puts the frame on wheels and leaves the engine mounting, hood and grille and other small parts yet to be made and assembled. High-speed air-cooled engines of the type used on the original tractor generally are self-contained units with fuel tank, air cleaner and other parts either built in or attached directly to the engine itself. In order to get the engine properly positioned over the transmission drive pulley it will be necessary, on most engines of

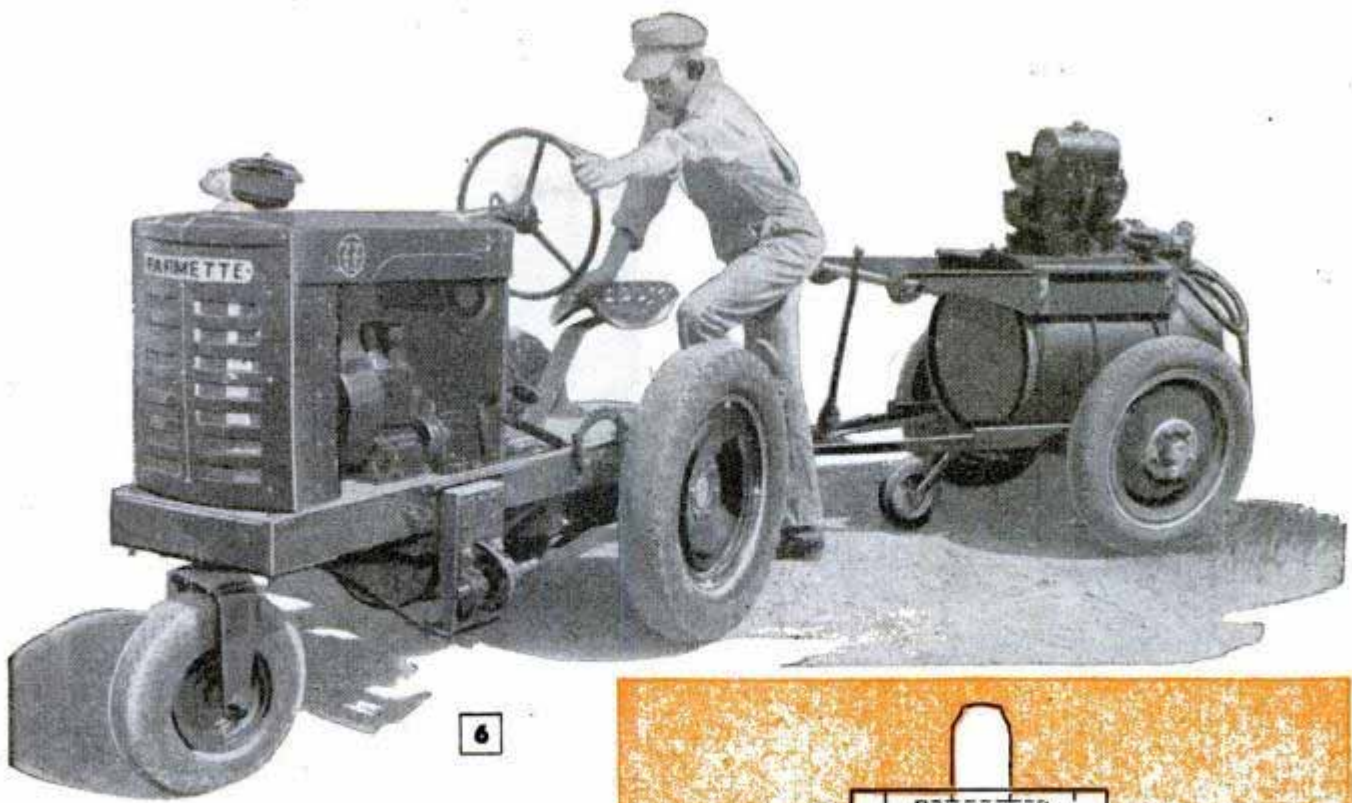




Above and below are views of the simple clutch assembly and power take-off drive. Clutch is pedal operated and is nothing more than an idler pulley which serves the dual purpose of belt tightener and clutch. Releasing pressure of the idler allows the flat belt to slip, thus stopping the tractor



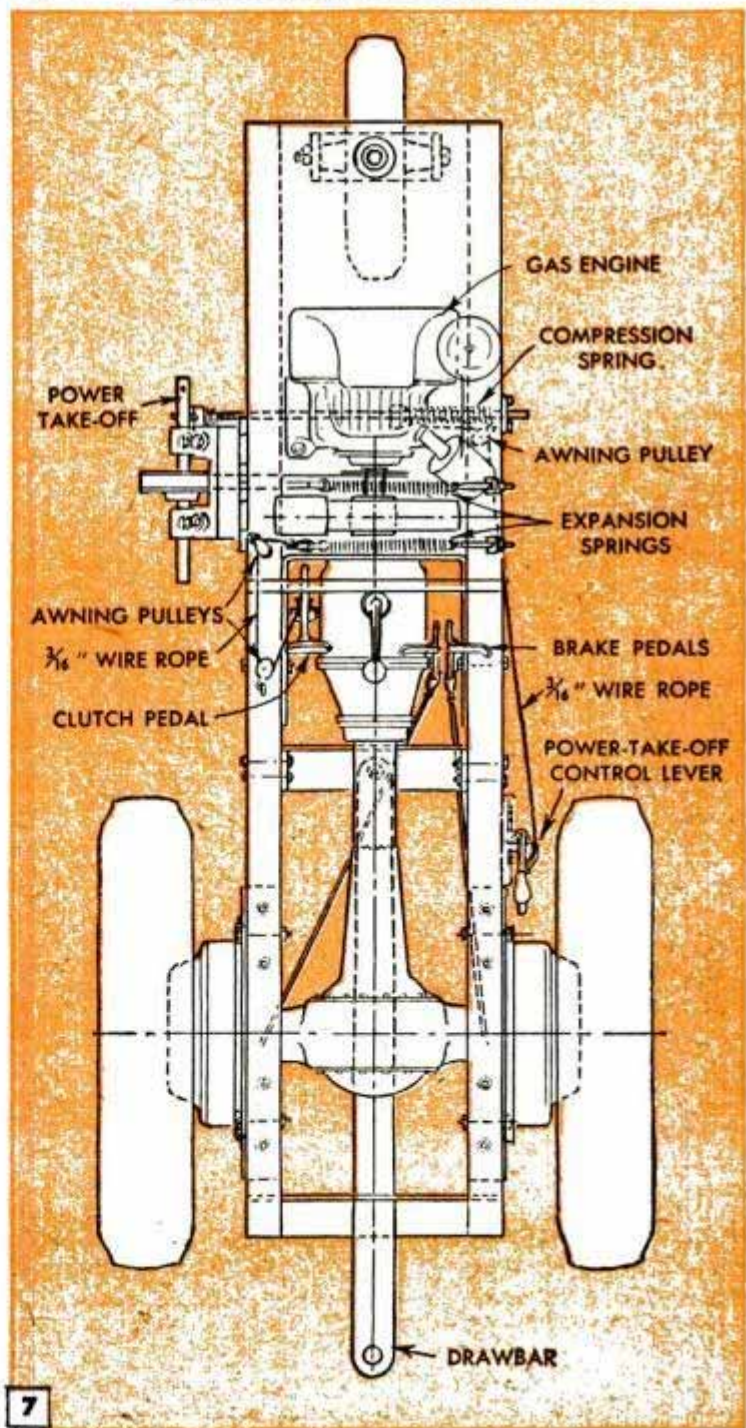
this type, to remove the fuel tank and mount it on the dash as in Figs. 2 and 5. But before the fuel tank is placed get the engine in position. Be sure that the pulleys line up properly, then locate and drill holes for the mounting bolts. Bolt the engine in place. It may be necessary to provide an extension for the air cleaner as it should be located above the hood as in Fig. 2. The extension should be a tight fit on the original tube so that there are no air leaks between the cleaner and carburetor. The dash, Fig. 2, is cut from $\frac{3}{4}$ -in. waterproof plywood and is attached to the frame with angle brackets as shown. The steering column is supported in a U-shaped notch cut in the dash. The fuel tank is mounted on the dash as in Fig. 2. Probably you can make use of the original brackets in mounting the tank but it may be necessary to use spacers. These can be cut from $\frac{3}{8}$ or $\frac{1}{2}$ -in. pipe to whatever length is required. The fuel tank should be located at about the same height in relation to the engine as it was on the original engine mountings. It also may be necessary to install new copper tubing from the tank to the carburetor. Fig. 8 gives general dimensions of the hood frame, which is made of hardwood. The parts are held in place with metal angle brack-



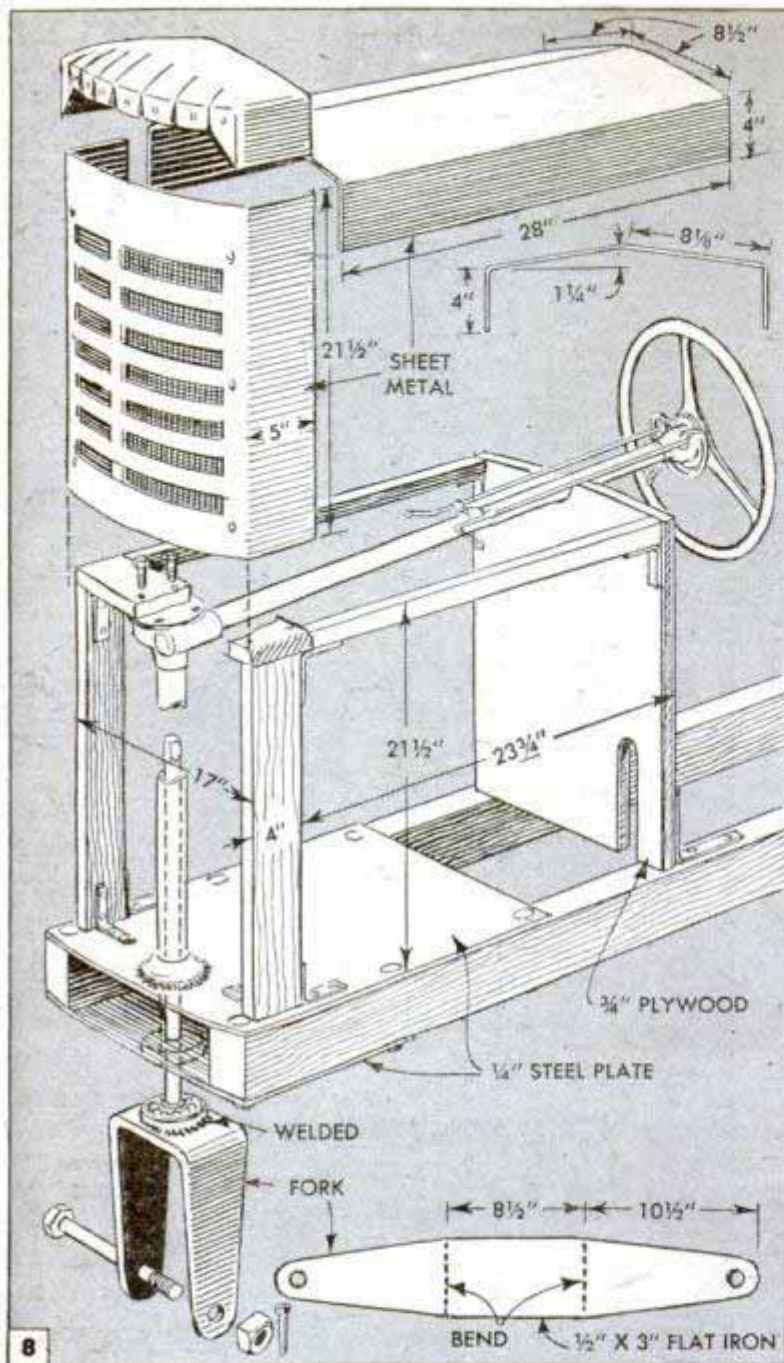
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ets as shown. Hood and grille are of sheet metal and a clean, neat job of forming these parts adds much to the appearance of the tractor. Unless, of course, you have facilities for working sheet metal you'll want to take this job to your local tinsmith.

The idler pulley which runs on the drive belt serves the two-fold purpose of maintaining the proper tension on the belt and providing the clutching action when starting the tractor under load. Use a pulley fitted with oilless bushings. The pulley should run on a hollow shaft provided with a pressure grease fitting. The drive belt should be of full-grain leather running with the hair side next to the drive pulleys. To avoid pounding of the idler pulley the lacing should be made carefully so that it will be flat. After the new belt has been in use a few hours it will be necessary to adjust the idler-pulley tension springs to compensate for stretch of the belt. The idler support arms are mounted on a short cross shaft, one end of which is inserted in a hole drilled in the transmission support as in Fig. 2. The other end of the shaft is carried in an angle bracket welded to the pillow-block bearing support as in Fig. 4. Collars hold both shaft and arms in position. Note the belt guide in Fig. 4. Next comes the pulley, or flywheel guard, Fig. 2. This is made from 12-gauge sheet steel, welded, and it is bolted directly to the tractor frame. Be sure the



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slot for the power take-off drive belt is large enough to clear the belt. The power take-off assembly as you see it in Figs. 2, 4 and 5 is optional equipment, but of course is essential for driving any mounted machine such as the front-mounted mower in Fig. 1. The swinging drawbar enables you to make short turns with pulled equipment, Fig. 6.

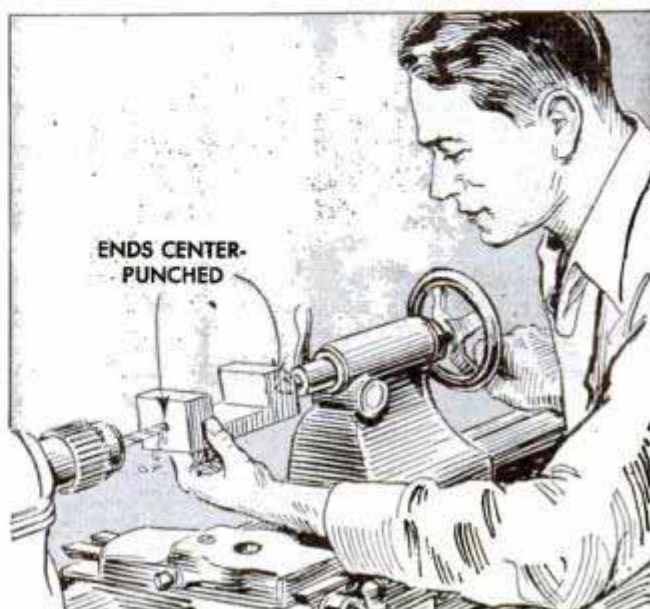
To finish up, there remains the installation of the clutch pedal, brake pedals, linkage and driver's seat, connecting a control lever on the steering column to the throttle and installing a choke control on the dash. Installation of the clutch pedal is very simple, as you can see from Fig. 2. Adjust the brakes so that they apply equally on both rear wheels. Install an implement seat as in Fig. 2. Then fit the drawbar as detailed in Fig. 2 and there you are, ready for work. Two coats of outdoor enamel applied with a spray gun make a fine-appearing job and help to prevent rusting of bare metal. And if you want the maximum in tractive effort the rear tires should be of the cleated tread type supplied for farm tractors. On some jobs dual tires on the rear wheels and an oversize balloon tire on the front wheel make the best combination, especially where light-footedness and easy maneuverability are the first requirement. Also, weight can be added by filling the tires with a nonfreezing solution.

Drilling Irregular Shaped Work in a Metalworking Lathe

When holes in small parts must be drilled in line, or when such parts are awkward to set up on a drill press, the work can often be done easier in a lathe by using a center support and driving the drill from the headstock. The holes are marked with a center punch. Then the piece is held firmly against the dead center while being fed into the drill with the tailstock handwheel.

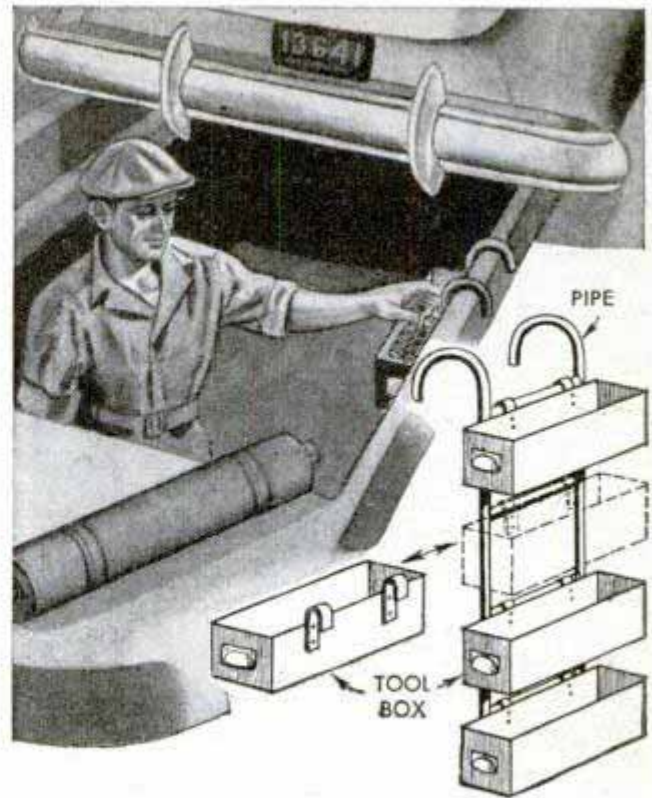
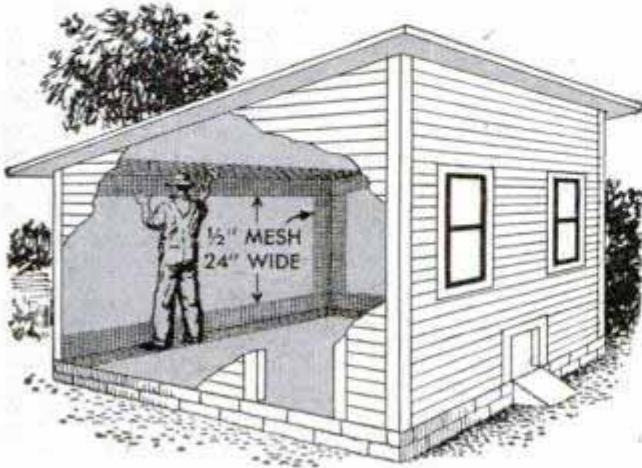
Tape Prevents Smudged Tracing

Pencil tracings which are revised or handled frequently will smudge so that prints, or the tracing itself, becomes illegible. To protect important parts of the drawing such as the title, bill of materials, etc., paste cellulose tape over them. This keeps the printing clear and at the same time will produce good blueprints.



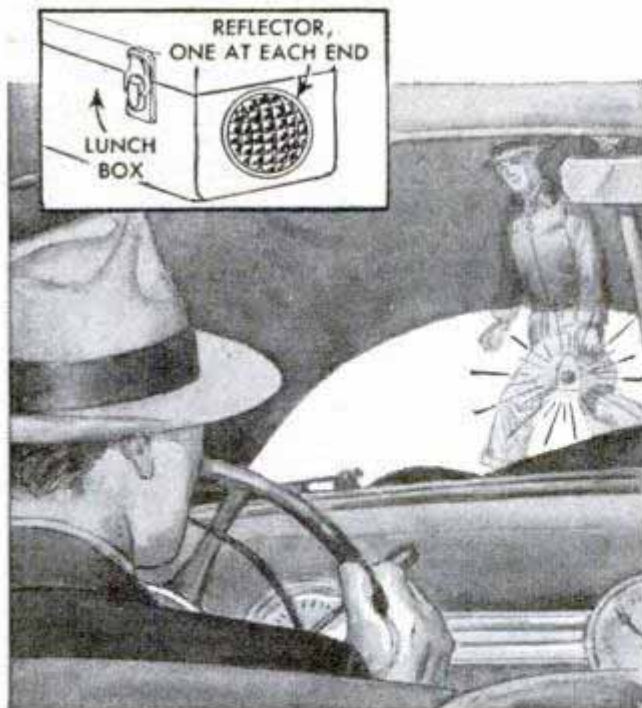
Wire Mesh Applied at Corners Rodent-Proofs Poultry House

If wire mesh is applied to joining sections of a poultry house, it will help keep the building free of rodents. The mesh is applied at the floor and ceiling line as well as the corners. The mesh should be about 24 in. wide and bent down the center. It should be well nailed.



Reflectors on Ends of Lunch Box Help Night Worker in Traffic

For those who work at night and must pass through dimly lit areas when going to and from the job, red reflectors on the ends of a lunch box will serve to warn motorists of the worker's presence. The reflectors



should be fairly large, about 2 or 3 in. in diameter, so that they will be picked up easily by the headlights of an approaching car. Reflectors of the type used on trucks are suitable.

Francis Thomas, South Paris, Maine.

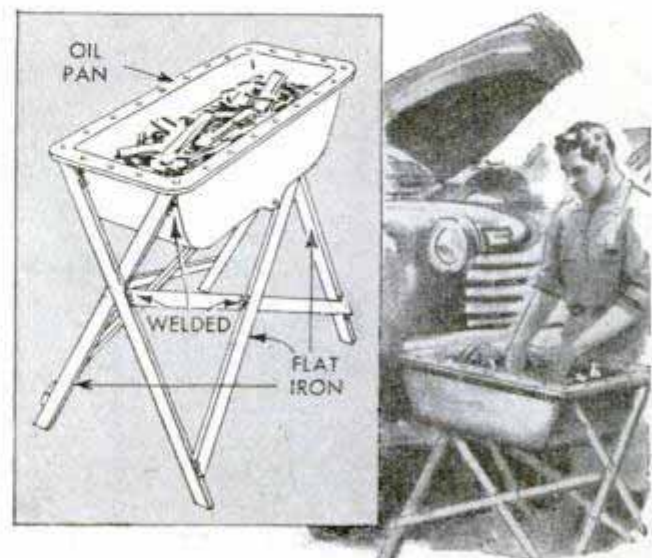
Multiple Tool Rack Hangs Down From Edge of Greasing Pit

Here's a simple device that can do a big job around the filling station or garage greasing pit. Flat-iron hooks are bolted to three or four tool boxes which hang on the frame of the unit. The latter is of welded construction with curved ends to hook over the edge of the pit.

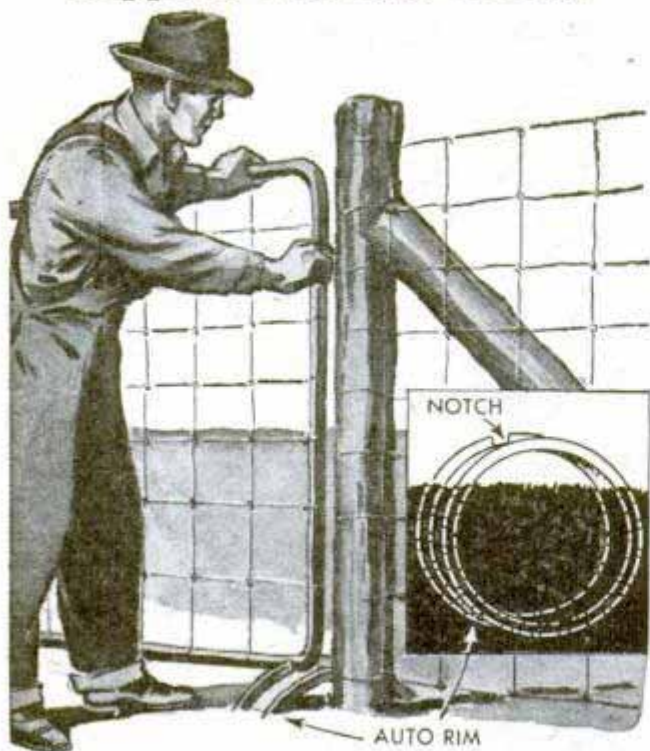
Small-Parts Washer for Garage

Using only an oil pan discarded from a car and some short lengths of flat iron, one mechanic made a handy washer for small parts. The legs, which are X-shaped, are welded to the pan and also at the point where they cross. Crosspieces are welded to the legs to strengthen them.

Elmer Vandrey, Truman, Minn.



Auto-Tire Rim Buried in Ground Supports Free End of Gate

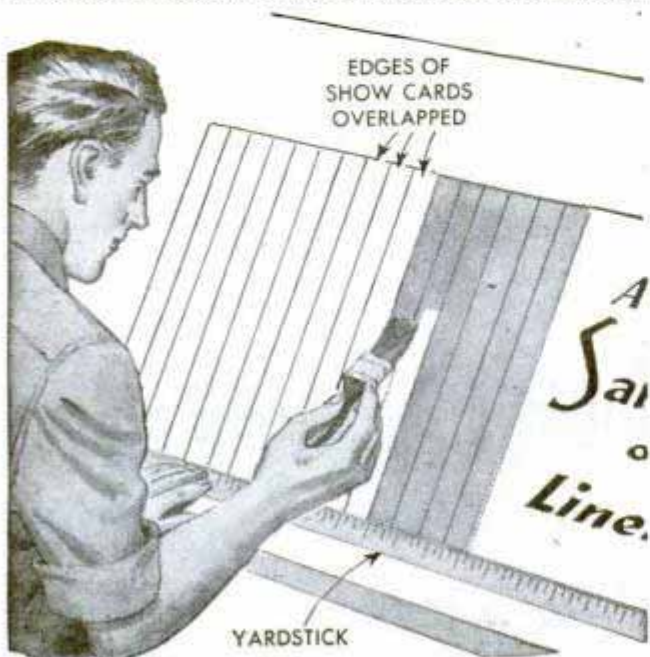


To keep a wide gate from sagging, use an auto-tire rim as a support when the gate is closed. Cut a notch in the rim large enough to engage the bottom bar of the gate. Then bury the rim so the gate will slide into the notch and be at the right height. Ordinarily no other fastener need be used.

Wm. P. Houser, Organ, N. Mex.

Quick Method of Painting Border For Signs and Show Cards

Instead of going through the slow process of putting the border on show cards one at a time, one show-card painter who had a number of duplicate signs to do used another method. The cards were laid out in



a row with each card overlapping the next one the exact width of the border. It was then a simple matter to paint the borders since each sign acted as a mask for the one preceding it. The process was repeated for all four sides.

Paper Scraps Keep Chickens From Eating Eggs

One man found that if small scraps of paper are sprinkled in front of the nest, chickens will be discouraged from eating eggs. The paper should be approximately the color of an egg so the chicken will think it is eating eggshell. After this, the chicken is no longer interested in eggs.—Opie Read, Jr., Chicago.



Tires Inspected With Mirror

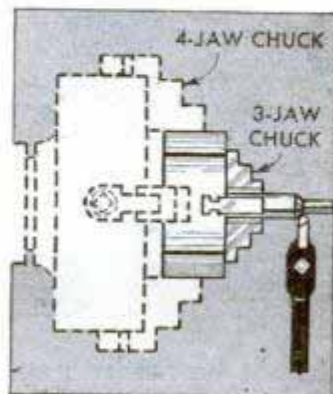
One service man uses a mirror cold-soldered to a wire handle to locate defects on the inside walls of tires. The mirror is held inside the tire, which is rotated slowly. If any defects show, spreaders are put on the tire for a closer examination, but if there are no breaks, then the slower task of using spreaders is not necessary. The mirror can be polished steel or metal-backed glass.

John Krill, Youngstown, Ohio.



Small Chuck Used on Large Lathe

On a large lathe, which was fitted only with a 4-jaw chuck, a production job called for the use of a universal 3-jaw chuck to save time when setting up and removing the work. To use the smaller chuck, it was simply clamped and centered in the larger one, after which it was operated as though screwed onto the lathe spindle and the job was completed in short order.



ZINC ELECTROPLATING

for the home workshop

Tools, metal parts and some appliances can be improved in appearance and protected against rust and corrosion by plating them with zinc. The equipment and chemicals required are easy to obtain and the process itself is fairly simple

By Nathan Bogoch



ZINC PLATING of small parts by the electrolytic process is not only a simple and effective method of rustproofing finished surfaces of steel, but also makes an attractive finish on brass and bronze. The zinc coating is especially effective on an assembly of small parts requiring the same finish. Use zinc coating to brighten up model work and protect tools and metal fittings of various kinds which are exposed to the weather.

The value of zinc coating lies in its resistance to atmospheric agents which induce corrosion. When exposed to severe outdoor conditions, the zinc plating turns white or gray in time but this oxidation forms an additional protective covering, serving to shield the zinc plate itself and, of course,

any underlying metal from undue corrosion.

The electrode-position method deposits a coating of zinc on the metal surface which is proof against the entry of moisture. Zinc coating applied to fittings or parts to be used indoors may be very thin and light.

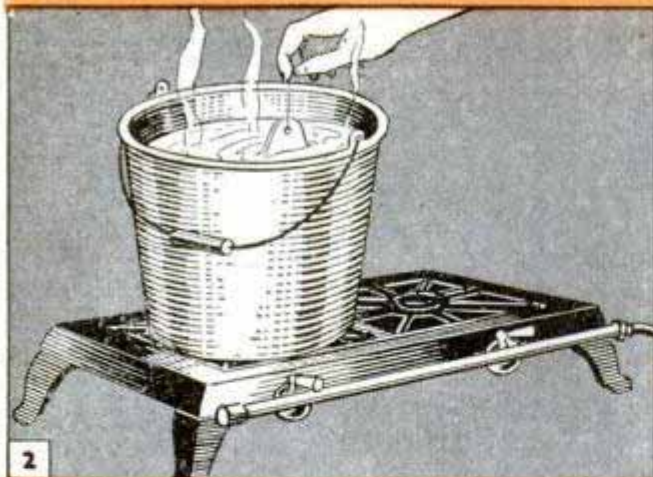
The thickness of the coating deposited on the metal is roughly proportional to the plating time, that is, doubling the time will give approximately twice the thickness.

Thorough cleansing and preparation of the surfaces of the object to be plated are just as important as the plating operation. Dirt, oil and grease may be removed by boiling the objects in a strong alkali bath. A good cleansing solution may be made in accordance with the formula given in Fig. 2. Immersion in

1 CAUTION

Although poisonous chemicals used in electroplating are handled every day in large quantities in schools and industry without mishap, great caution should be exercised to prevent accidents. Handle the chemicals so that the solutions will not spatter and always add the acid slowly to the water while stirring. Never pour the water into the acid.

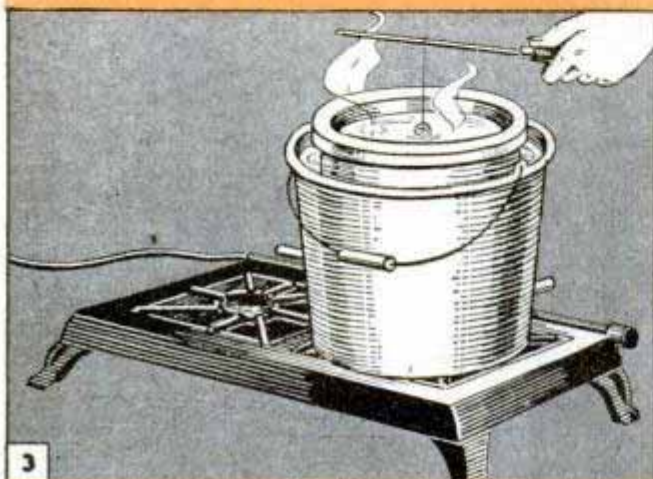
Cyanides can enter the body through the eyes, skin abrasions and perhaps through the pores of the skin after a period of time. When cyanide comes in contact with acids, deadly hydrocyanic acid fumes are generated. Do the work where a draft will carry all fumes outdoors from the plating bath or hot cyanide solutions. To dispose of the solutions, pour them into a floor drain into which a quantity of lye water has just previously been poured. Gloves used while plating with cyanide solutions should be rinsed thoroughly. To make sure that all cyanide has been removed, put the rinsed gloves in a pan of diluted vinegar outdoors. This will decompose any small amount of cyanide that may remain. Plating tanks should be rinsed thoroughly with several changes of clean water to remove the cyanide. As a final precaution, rinse the cleaned tanks with vinegar. Do this outdoors where the wind will blow fumes away from you.



CLEANING

CAUSTIC SODA	3 OZ.
SODA ASH	3 OZ.
TRISODIUM PHOSPHATE	2 OZ.
WATER TO MAKE.....	1 GAL.

Heat to a boiling temperature and immerse object 10 to 15 minutes

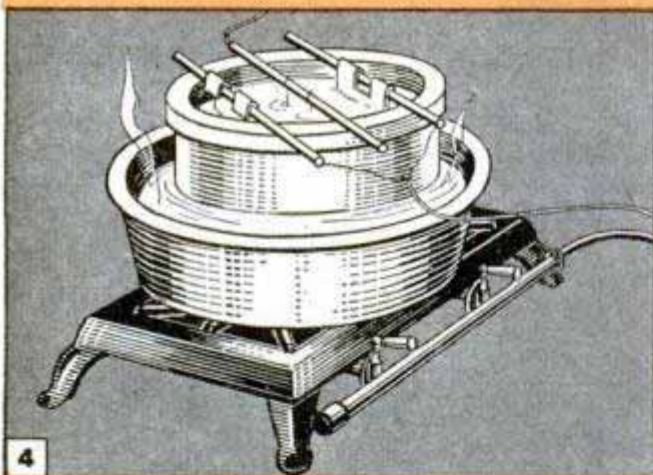


PICKLING

SULPHURIC ACID (78%).....	1 LB.
SODIUM CHLORIDE	3 OZ.
WATER TO MAKE.....	1 GAL.

Heat to 120° F.

CAUTION—Always add the acid to the water, in small amounts, while stirring slowly



PLATING

SODIUM CYANIDE (96-98%).....	4 OZ.
ZINC CYANIDE	6 OZ.
CAUSTIC SODA	6 OZ.
CORN SUGAR	½ OZ.
DISTILLED WATER TO MAKE.....	1 GAL.

Heat from 90° to 105° F.

See caution note, Fig. 1, before mixing

this boiling solution will remove all dirt and grease. Scrape or wire-brush the surface to remove all loose material before placing in the bath. After immersing 10 to 15 minutes in the alkali solution the work is removed and rinsed in hot water, then in cold water. Next, it is placed in an acid bath, or pickle, to remove rust and scale. It should be remembered that it is essential to remove the grease or oil film first before placing the object in the acid bath; the solution cannot attack rust or scale unless the oil has been removed. The acid bath, or pickle, should be made according to the formula given in Fig. 3 and kept in a

stoneware vessel. Do not leave steel in the acid bath too long as the surface will become pitted. Remove it when the surface appears clean and bright. Immediately upon removal from the acid bath rinse the work in cold running water.

Most objects have one or more holes or projections by which they may be attached to a piece of No. 16-ga. copper wire. The long "pigtail" of wire offers a means of moving the object easily from one bath to another. One very important point: After the work is strung on a piece of bare copper wire and is ready for processing, do not allow it to be touched by the fingers or

to come into contact with any object. If you touch the surface a bare spot in the plating is likely to result. The vessel used for the plating solution must be non-metallic, such as a glass or earthenware jar. Before mixing any chemicals read the caution note, Fig. 1. To prepare electrolyte to the formula given in Fig. 4, take three quarters of the volume of water and heat to approximately 105 deg. F. Then add the sodium cyanide. When dissolved, add zinc cyanide and stir until dissolved. The caustic soda and corn sugar may then be added, and stirred until dissolved. Water is finally added to make up the required volume. It should be kept in mind that the formula calls for a prescribed volume. Don't use a full gallon, or four-liter, measure of water, plus the bulk of the added ingredients.

If you are using metric weights, substitute 30 grams for each ounce in the formulas and use $3\frac{3}{4}$ liters, or 3750 cubic centimeters for a gallon, these figures being sufficiently close approximations.

The wiring diagram is shown in Fig. 5. Almost any rheostat will do. It can be made of wire, or a substitute may be made as in Fig. 7. This consists of an old storage-battery box. Fill with a solution made by dissolving as much ordinary salt as possible in cold water. A pair of metal plates is inserted in the salt solution. The closer together the plates are, the higher the voltage.

For anodes, strips of pure sheet zinc, Fig. 6, are hung in the acid bath. If a quantity of work is to be done, use the cast zinc slabs. The ratio of anode surface to that of the cathode, which is the object being plated, should be about 1.5 to 1. Operating temperature should be from 90 to 105 deg. F. Four volts should be available at the bus

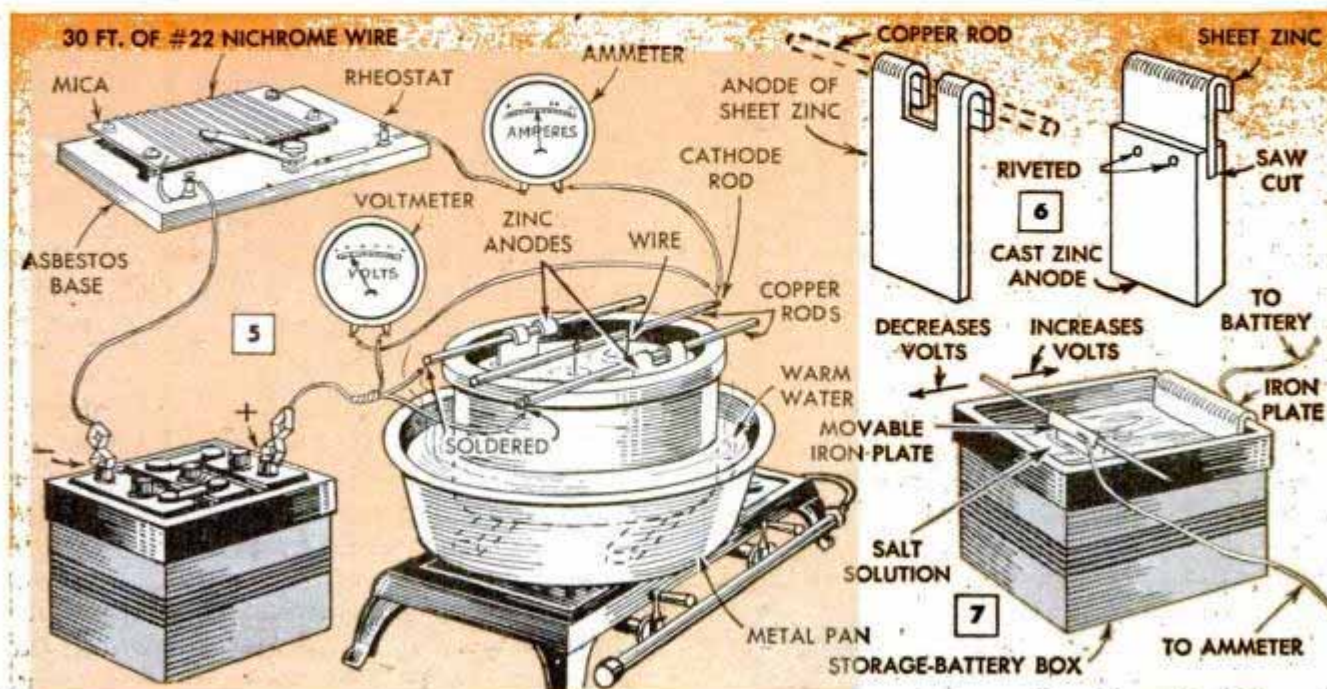


bars, while the current density should be from 40 to 60 amperes per square foot of cathode surface.

After the cold-water rinsing bath, the object is immediately hung on the cathode bar of the plating tank, the current being on, and the rheostat is manipulated until the proper voltage and amperage are reached.

For heavy plating a half hour is about the right time, while for thin plating a five-minute immersion will be sufficient. If the deposit is not thick enough, dip into the alkaline bath, rinse in hot water, then in cold water, and replat.

In any case, after removal from the plating bath rinse well in water and dry to prevent staining and spotting.



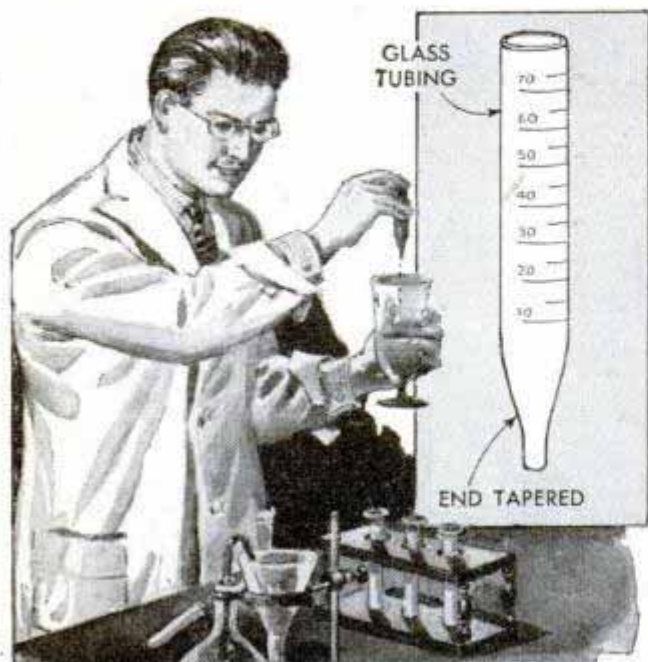
Pen Flashlight Illuminates Level In Hard-to-See Corners



If you're working in a dim light and it's hard to read a level, this flashlight will be an aid. A groove is cut in the side of the level at such an angle that the beam from the light is directed on the spirit glass. The flashlight is held in place with a rubber strip and is removed easily when not in use.—F. Hall, Maywood, Ill.

Pipette Made From Glass Tubing Helps Laboratory Workers

Any graduations you want—ounces, fractions of an ounce, tablespoons or other units—can be marked on this pipette that is made from a length of ordinary glass tubing. One end of the tubing is drawn to a

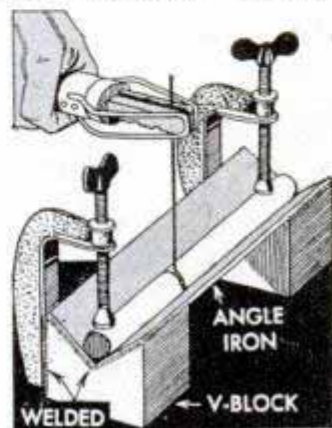


point over an open flame. Then the point is broken off so there is a small hole in this end. To mark the pipette, stop the tapered end and pour in one unit of the measure you are using. Mark this level with a file and continue pouring and marking until there are sufficient graduations to suit your purpose. In use, liquid is drawn in the tube to the desired level and held there by stopping the top of the tube with a finger. The fluid will be released when the finger is removed.

Walter E. Klein, Mansfield, Ohio.

Welding Jig Holds Round Work

This jig will serve to align the parts properly and hold them in position when welding rods, large bolts and lengths of pipe. It consists of a length of angle iron that is mounted on two V-shaped metal blocks. The upper half of a C-clamp is fastened to each block and used to hold the work in place while the weld is being made. The work can be turned easily.



Sign Indicates Lack of Vacancies

To save time for himself and disappointment for travelers, one tourist camp proprietor had a sign made which would indicate whether he had any vacancies. The sign read, "No Cabins for Rent" with a pivoted cover placed over the word "No." When cabins were available, the cover was over the word "No" so the sign would inform travelers that there was space, but when all cabins were taken, the cover was swung down.

Gregor H. Glitzke, Kansas City, Mo.



Metal Stakes for Building Lines

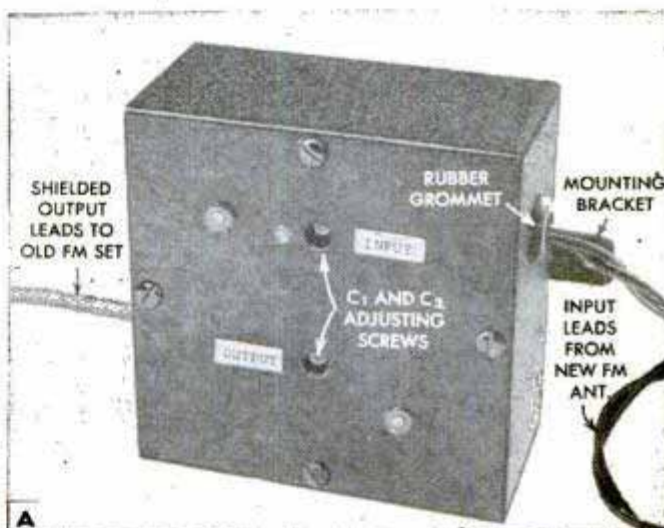
When laying out lines for an excavation, instead of using wooden stakes, one builder found that 1-in. angle iron served the purpose better. The stakes should be long enough so that they remain driven in about 6 to 8 in. below the surface as the work progresses.—J. Issel, Petaluma, Calif.

Converter Unit for the New FM Band

THIS tubeless converter unit was built from a circuit designed by Henry R. Kaiser, chief engineer for FM station WMOT in Pittsburgh. When station WMOT switched over to the new higher frequency FM band approximately 6000 owners of prewar FM receivers in the Pittsburgh area obviously could no longer receive their FM programs.

To solve the problem Mr. Kaiser and his associates experimented with several converters using a crystal-multiplier for mixing with the FM signal to provide an IF frequency which would fall on the old band. They finally developed a single-tube quartz-crystal-controlled converter using a type 6SH7 oscillator-multiplier and a Sylvania 1N34 germanium detector crystal as a mixer. While experimenting with this unit, the oscillator in the converter accidentally failed. Much to the operator's surprise he could pick up the station on 94.5 megacycles at another spot on the old receiver dial. As the crystal oscillator was no longer working, the part of the circuit remaining consisted merely of two tuned circuits and the 1N34 detector crystal. This became the converter.

All construction details are given in diagrams Figs. 1 and 2 and photos A and B. The input frequency is tuned to the transmitter frequency and the output is tuned to a frequency in the old band. The coil dimensions given are for the low end of the new band. Merely spreading the turns on coil L2 should raise the frequency if required for your local FM stations.



COIL WINDING CHART

- L1—2 turns of No. 18 insulated hookup wire (interwound with coil L2)
- L2—4 turns of No. 12 enameled copper wire (space-wound and supported on C1)
- L3—10 turns of No. 12 enameled copper wire (space wound and supported on C2)
- L4—3 turns of No. 18 insulated hookup wire (interwound with coil L3)

Note—Coils L2 and L3 are space-wound about the diameter of the wire. All coils are wound on a $\frac{3}{8}$ -in. form.

2—"air trimmer" midjet variable condensers (Hammarlund APC-25) or similar 7 or 8-plate "air trimmer" condensers C1 and C2

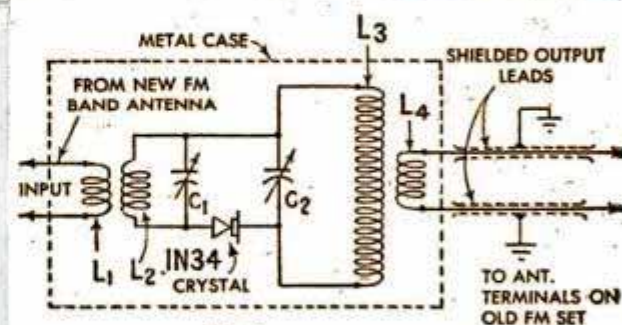
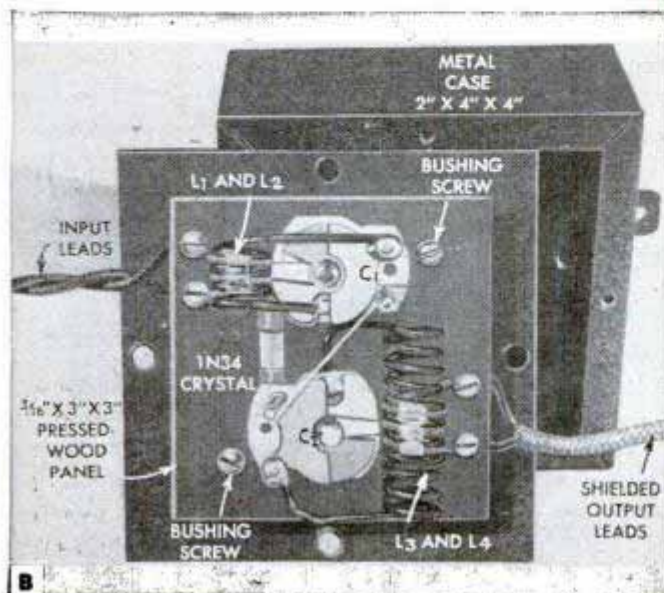


FIG. 1

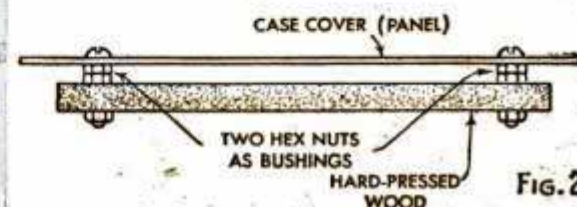
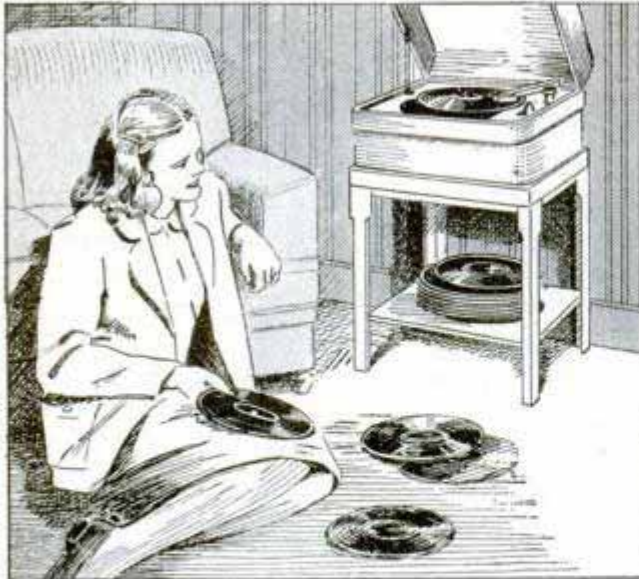


FIG. 2

HOW TO CARE FOR YOUR RECORD PLAYER

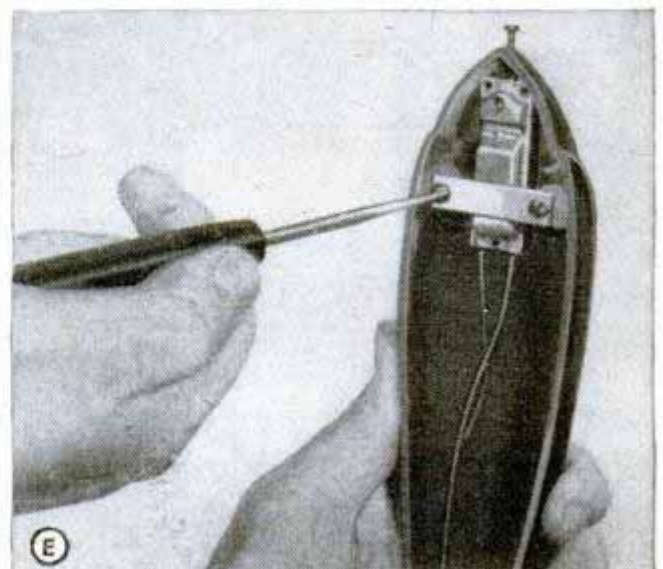
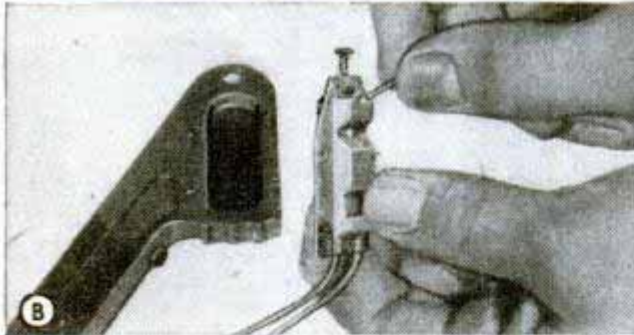


ALTHOUGH usually built to withstand rough handling, your record player, like any other precision instrument, must have occasional attention if maximum service is to be maintained. Separate record players designed to play through the audio stages of your regular broadcast receiver require more attention than those built into combination phono-radio consoles or table-top cabinets. However, the following service hints apply to all types.

When the wires under the pickup arm leading to the crystal cartridge become loose, as illustrated in photo A, they will drag on the record and cause noise. In the case of a separate record player, the bottom plate may be removed and the slack pulled out, after which the wires may be secured with a piece of adhesive tape. In combination phono-radio sets these wires may be reached, in most cases, from the rear of the cabinet.

If the record player does not operate, the pickup cartridge may be defective. Check the cartridge by grasping the needle as shown in photo B; if the needle holder may be moved back and forth to any extent, it usually means that the pickup has been damaged and a new cartridge is necessary.

Dust particles scratch records on the side in contact with the cloth covering on top of the turntable. A small brush should be used at regular intervals as indicated in photo C. The bearing of phonograph turntables in constant use may require an occasional oiling. Where the motor has a felt packing as in photo D apply a light application of oil with an eyedropper; in some motors it may be necessary to use a drop of oil on a wire to reach the bearing. Crystal pickups are fragile and should be kept tightened in their arm mounting bracket as illustrated in photo E.



New Lightweight Tripod



... makes your camera steady and light on its feet

Kodak Eye-Level Tripod is light in weight, quick to set up . . . and built to last for years. It gives rigid, dependable support to movie and still cameras and helps you get pictures free from accidental camera movement. Extends from 22½ inches to 60 inches. \$16.75 plus tax.



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Kodak Miniature Enlarging Easel for 2¼x3¼ album prints (with ⅛-inch white margins) from miniature negatives. Makes a

rapid succession of record prints from which choice shots may be selected for further enlargement. With its white Tenite base insert, there's no need to use photographic paper while focusing. Two built-in bins hold your papers. It rests on the baseboard of your enlarger. \$6 plus tax.



Optipod
\$1.50 plus
tax



Kodapod
\$2 plus
tax

These clamp-on "tripods" are convenient and steady

Optipod (left) and *Kodapod* (right) are pocket-size and easy to carry—yet give you tripod steadiness. *Optipod* is felt-lined, fastens to chairs, tables, desks—*Kodapod's* teeth bite firmly into fences, tree branches, etc.

Eastman Kodak Company
Rochester 4, N. Y.

Kodak

"HULA DANCER DANCER Fools the Big Ones!"

*Writes C. W. "Duke" Mead,
Memphis Angler*



"Dear Fred:

"Have discovered it takes a Hula Dancer with your invisible bait casting leader to fool the big ones, especially in the colder months when they are down deep. I caught this 9-lb. bass and several others from Storm Creek Lake near Helena, Ark. — which isn't virgin waters.

"I have used your Hawaiian Wigglers and Jitterbugs for years. They have proved their worth time and again on numerous fishing trips. Previous to this 9-lb. bass, the largest I had ever caught was a 6½-lb. largemouth on a No. 2 Hawaiian Wiggler. If the boys want action and bass, I recommend that they try your lures." — C. H. "Duke" Mead, Memphis, Tenn.

Write for Free Catalog

Beautifully illustrated in colors, it tells all about Hawaiian Wigglers, Jitterbug, my famous surface bait, and Hula Dancers. Copy free on request.

Colored Movies Available

We have 8 reels of colored movies taken of bass fishing in Canada, Michigan and Florida. These are available without cost for showing to clubs. Advise what club and when you would like to use them.

FRED ARBOGAST & CO., 1604 North St., Akron 3, Ohio



\$1.21 ea.

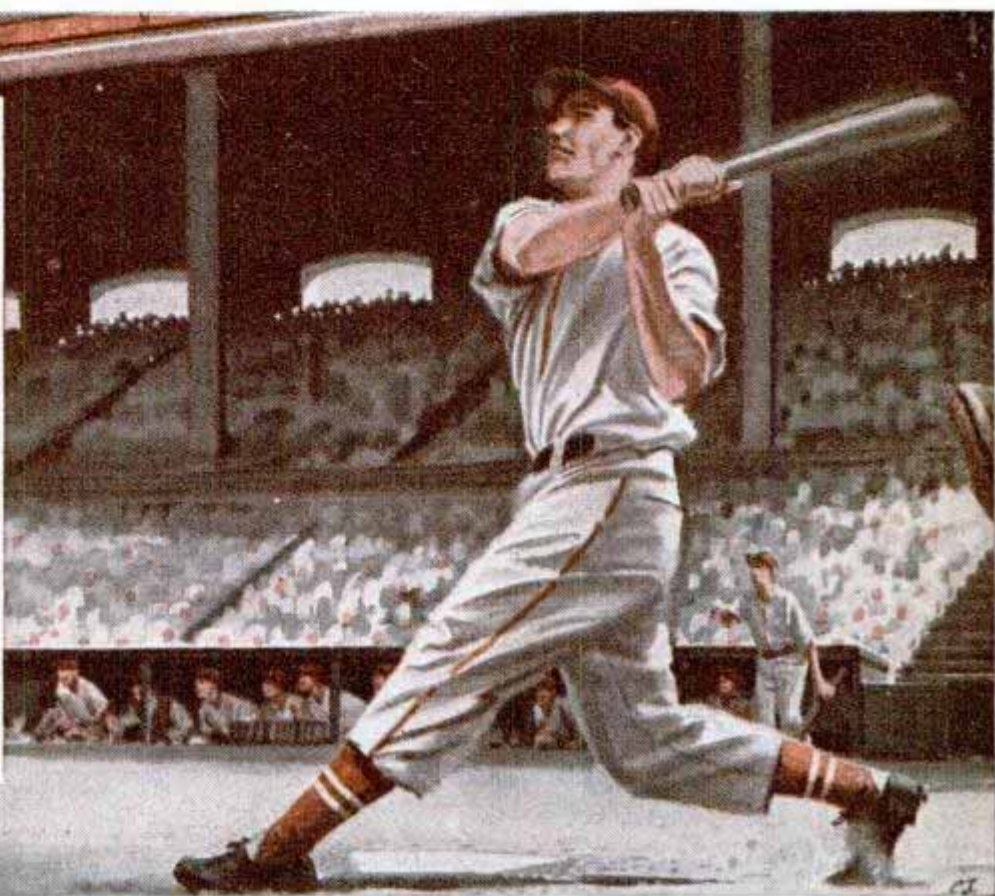
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NEW

"EVEREADY" FLASHLIGHT BATTERY LASTS 93% LONGER!

Tiny Cell Packs Enough ENERGY to Hit 200 Home Runs!

Like baseball? Like to raise the roof when your favorite slugger blasts one out of the park? Then here's news: The amazing new "Eveready" flashlight cell contains energy equal to the amount needed to smash out 200 major league homers! Extra power makes "Eveready" batteries the season's champion for brilliant, lasting, low-cost light!



WHAT a supercharger is to a racing car—the new "Eveready" battery is to your flashlight. It "packs in the energy"—93% more of it than even the great pre-war "Eveready" cells gave you! You get nearly *double* the life... maximum light for nearly *twice* as long. For good service...better light...best quality... get these new "Eveready" brand flashlight batteries!

The registered trade-mark "Eveready" distinguishes products of
NATIONAL CARBON COMPANY, INC.
30 East 42nd Street, New York 17, N. Y.
Unit of Union Carbide  and Carbon Corporation

Nearly *twice* the electric energy... almost *two times longer life* of brilliant white light than even famous pre-war "Eveready" flashlight batteries. That's today's *high-energy* "Eveready" battery, as proved by the "Light Industrial Flashlight" test devised by the American Standards Association.

**93% MORE ENERGY
NOW**

1941



High Energy

MEANS

BRIGHTER LIGHT, LONGER LIFE

EVEREADY

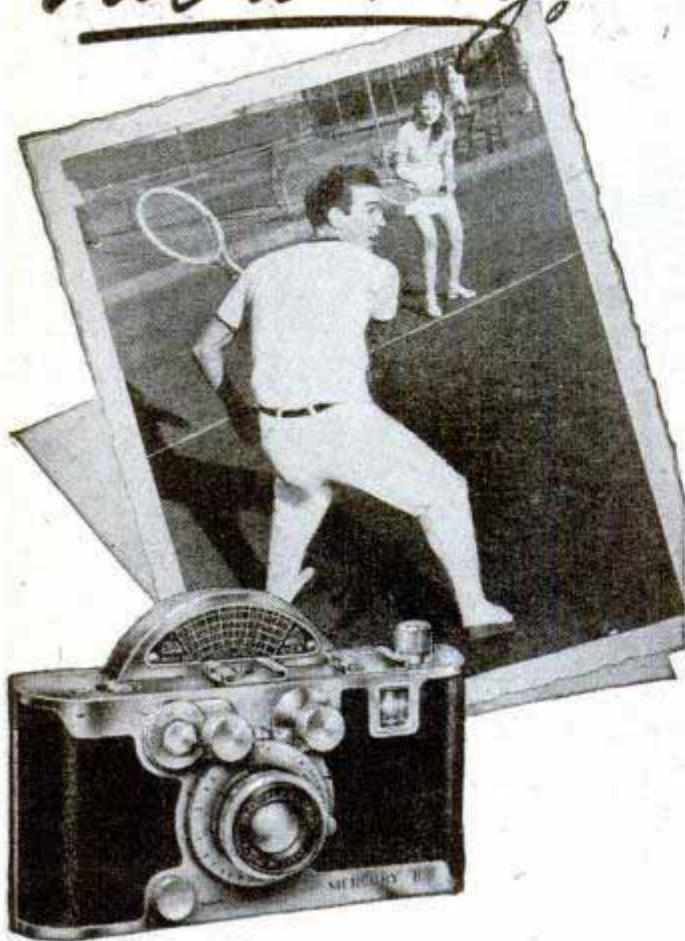
TRADE-MARK

FLASHLIGHT BATTERIES



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COLOR! The only minicamera especially designed for color, gets pictures as fresh and vivid as new paint.

ACTION! Lightning-like shutter freezes rapid action.

LOOK-ALIVE DEPTH! Three-dimensional depth of focus guarantees clear focus even when you misjudge distances up to 50%.

FUSSPROOF SIMPLICITY! Extreme ease-of-operation leaves you free to concentrate on your subject.

FILM ECONOMY! Shoots *more* pictures — 36 exposures on a standard 20-exposure cartridge.

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Shoot Pictures like the "Pros" with Mercury II

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NEW YORK

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HOLLYWOOD

Manufacturers of Cinémaster and Mercury Cameras
and other Photographic Equipment

Smartest Ship Afloat!

(Continued from page 145)

men to handle the wheel of a stout fishing boat in the rugged seas off New England while the skipper gives the orders. With electromechanical steering the captain can maneuver the boat with his little finger.

Completely automatic steering can be had, of course, by coordinating this installation with a gyro-pilot.

Gyro-magnetic compasses and gyro-compasses in all stages of development get their seagoing "once-over" from the salty scientists. The gyro-compass, in particular, has undergone drastic modifications since before the war, when, because of its size, weight and cost, this vital navigational aid was found on few ships under 150 feet except luxury yachts.

The standard gyro-compass, five feet high, three feet across and weighing 600 pounds, was not suited for use on PT boats and small invasion craft. Since it was essential that patrol and invasion craft know exactly where they were going, the "impossible" was attempted and achieved in the production of an "invasion compass" only 20 inches wide and 20 inches deep which could be stowed under the bunk of a PT skipper.

While reduction in size and weight are the chief considerations to small boat owners and skippers, the fact that the small Mark 18 unit cost \$5000 against \$6500 for the smallest earlier model is increasing inquiries and the list of orders received from owners of fishing and pleasure boats.

Ten small boats on the Pacific Coast have been equipped with Sperry navigational equipment since the war, including the tuna clipper *Espirito Santo*, which holds the world record for the largest catch on a single trip—475 tons. Another ultra-modern clipper boasting "big ship" equipment is the *Chicken of the Sea*.

Dinners Without Drudgery

(Continued from page 177)

ing the war GIs griped so much about the crackers in K-rations that the Army developed a canned bread—fresher and tastier. Some 5,000,000 cans of it will be tested in 1947. It will be issued in a four-ounce can for E-rations (successor to K-rations) and a 10½-ounce can for the new 5-in-1 ration.

Machinery and transportation manufacturers are also getting on the frozen-food bandwagon. Harvesting, freezing and storage maintenance equipment in large quantities is needed. Airplanes, trains, trucks

(Continued to page 244)

Dependable

CHAMPION

AMERICA'S FAVORITE SPARK PLUG



Outstanding example of the dependability of Champions is the recent world's record, non-stop, non-refueled flight of the Navy Airship XM-1. Champion equipped engines kept her in sustained flight for over 170 hours, a record for any type of aircraft. Such dependability is inherent in every Champion Spark Plug for every engine and operating condition. Champion Spark Plug Company, Toledo 1, Ohio.



FOLLOW THE EXPERTS

DEMAND DEPENDABLE CHAMPIONS FOR YOUR CAR

Listen to the CHAMPION ROLL CALL,
Harry Wismer's fast sportscast every Friday night,
9:55 EST over the ABC network.



A full day's hunting on one loading with Marlin's dependable tubular magazine .22

● Shooting efficiency, with the least fuss and bother, is what you get in the 81-DL. Tubular magazine holds a load for a full day's hunting of small game. And this man-sized Marlin is light enough to carry all day without tiring.

CHECK THESE SPECIFICATIONS —FOR VALUE AND FOR SPORT!

One-piece buttstock, with fluted comb and semi-beavertail forearm.

Quick-release trigger; self-cocking action; side ejection; On and Off safety.

24" tapered blued steel barrel; Ballard type rifling; crowned muzzle.

Unique, patented feeding mechanism; magazine capacity 25 - .22 short, 18 long rifle cartridges.

Shoots .22 short, long and long rifle—regular and high speed—without adjustment.

Removable, plated bolt assembly; flush takedown screw.

Equipped with peep sight, ramp front sight and hood; sling strap swivels. Also available with open rear sights, bead front sights, no swivels.

Outstanding for rugged construction, reliability and accuracy.

Marlin 81-DL

25-Shot Tubular Magazine .22 Cal. Repeating Rifle

\$25.55. Price Slightly Higher West of the Rockies.



Unbeatable for pests and vermin...owls, rats, hawks and crows, the 81-DL carries up to 25 shots.



Marlin's 81-DL is a sure getter of woodchuck, raccoons, rabbits and other fur-bearing small game.



Finely balanced for plinking and general target work, the 81-DL is also an ideal "learning gun."

SEE THE MARLIN 81-DL AT YOUR DEALER'S TODAY.

THE MARLIN FIREARMS CO., NEW HAVEN, CONN. • Fine Guns Since 1870

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THE COMPLETE HOBBYCRAFT ASSORTMENT THAT FILLS EVERY NEED

Whether your favorite hobby is model building, wood carving, leather working, linoleum cutting, you'll find in the new King Kut knives, tools and blades such standards of design, workmanship and PERFORMANCE that will gladden your craftsman's heart—at prices you're happy to pay! The delicately balanced, polished aluminum handle...all-purpose knurled handle...the chuck with the vise-like grip...22 blades, carvers, routers and punches...smooth-cutting spoke shaves and planes constitute King Kut's Regal Treasure Chest. Each King Kut blade is sized and shaped to do its specific job, is made of the finest steel...hardened throughout for money saving resharpening.

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KING KUT HOBBY TOOL SET No. 120

...contains one each of 22 cutting edges, the knife handle and plastic knob. Compactness and easy accessibility to the cutting edges...a place for each tool in its 3-color carton. For discriminating buyers \$5.00



KING KUT REGAL TREASURE CHEST No. 130

...contains entire line of 22 blades, carvers, punches, routers, the all-purpose handle with removable plastic knob, plane, flat and curved spoke shaves and a clear plastic parts box. Chest is beautiful in its select wood, nail-free natural finish...a chest every hobby crafter will truly treasure . . . \$10.00

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ONE HANDLE SERVES ALL CUTTING EDGES

At last—an exclusive chuck with a vise-like grip that tells the blade to stay put...and means it! No wiggling or working loose to ruin a bit of fine detail. Holds firmly all 22 cutting edges. Locks and unlocks with one turn.

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Manufacturers of the famous AP "Mileage Getting" Mufflers and Pipes for Automotive Vehicles.



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with beauty...
that never ends...

How thrilling to own a new car. Can you imagine the finish even more beautiful? It will be if you SIMONIZ now. SIMONIZ adds to the richness of color . . . increases the natural brilliance. And as the years roll by, applying SIMONIZ "builds up" this beauty. Makes it permanent and more glamorous than ever. Stops ultra violet rays from fading colors . . . gritty dirt from scratching . . . corrosive airborne chemicals from dulling and destroying the finish. Always insist on SIMONIZ. Nothing takes its place. That's why . . .

Motorists Wise Simoniz

TO RESTORE NEW BEAUTY to dull finishes . . . use the Simoniz Kleeners—liquid when it's in average condition . . . paste when the finish is exceptionally dull. Then apply SIMONIZ to make that sparkling finish last years longer. Sold everywhere.

The Simoniz Co., Chicago 16, Ill.



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and trailers are undergoing alterations.

Douglas Aircraft Company recognized the need for a cargo plane to carry frozen products and redesigned a DC-4 for the job. It will carry 22,700 pounds for 1500 miles—two hops will cross the continent. Heretofore, perishables were carried in a restricted space in small racks chilled with dry ice. Temperature and humidity were uncontrolled. Flowers and meat, for example, require high humidity and moderate cold; frozen fruits and vegetables a dry cold. Ripe fruits need a temperature of about 45 degrees Fahrenheit to maintain peak freshness. The Douglas "flying refrigerator" will provide all types of freezing.

The Association of American Railroads is spending \$100,000 in a two-year program to improve railroad refrigeration cars. Consolidated Steel Corporation recently developed a stainless steel refrigerator car for transporting frozen foods. It has a new type of sliding door and a circulation system for cold air to keep frozen food products at required low temperatures.

Trucks also are being redesigned. Fruehauf has manufactured more than 600 refrigerator units for installing on truck and trailer chassis, to cost around \$2000 each.

New methods of packaging are emerging. The Pacific Grape Products Company of Modesto, Cal., is putting premium quality frozen fruits and vegetables in tin cans instead of the familiar cardboard carton. The square cans are vacuum sealed to provide absolute protection against oxidation and flavor changes.

One man who is betting on the future of frozen and ready-cooked food products is Laurence L. Graham of Ridgefield, Conn., who has organized Meals on Wheels. A nation-wide fleet of delivery trucks, supplied by independent, self-supporting restaurants, will bring sandwiches, bakery goods, soup, casserole items, hot plate meals, ice cream, milk and coffee to your door. These rolling restaurants will also serve outdoor sporting events and industrial plants.

The Land Comes Back

(Continued from page 161)

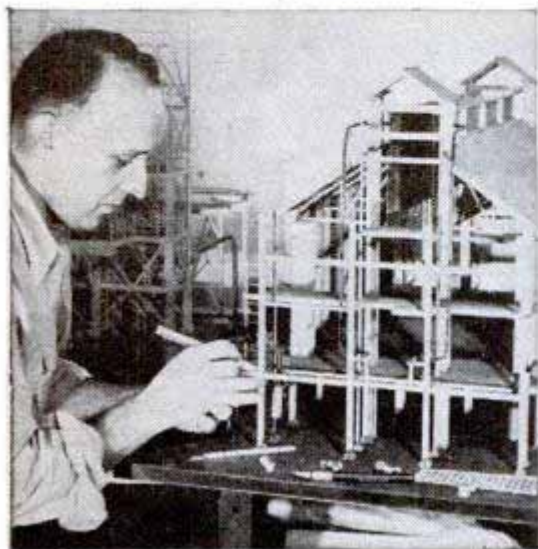
Soil losses from 30,000,000 acres alone have been reduced by more than 1,000,000,000 tons over a seven-year period, soil that would have started downhill toward the oceans. Already the annual loss of 1,000,000 acres of ground from the useful agricultural total has been cut in half.

Just as amazing is the increase in farm productivity that results almost immediately from soil conservation practices. Dr.

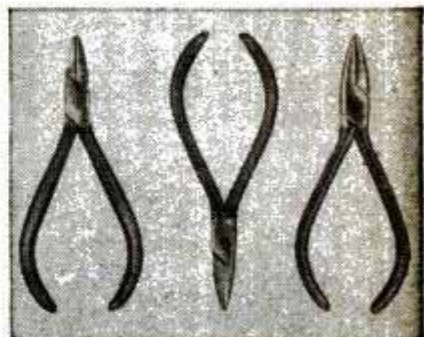
(Continued to page 248)

New X-acto Tools

Scientifically designed to fit those small, exacting jobs



No. 50 X-ACTO HAMMER SET — 6 heads: 2 ball; 3 flat (steel, brass, plastic); 1 tinner's hammer with angle-locking set screw. Set, \$1.50.

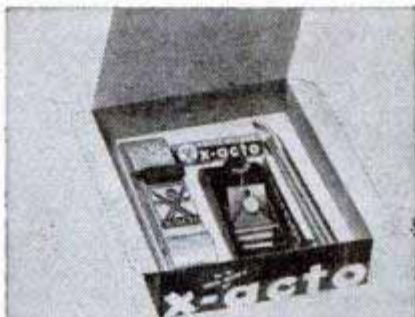


PLIERS — Case hardened. For wire-forming, etc. No. 58, combination round and flat, \$1.85. No. 56, flat nose, \$1.75. No. 57, point nose, \$1.75.

Makes Super-Furnace With Super-Knife

Wherever there's oil in the world, you'll find refineries designed by The M. W. Kellogg Company of New York. Here, Edmund Serafin, of the Kellogg Model Department, works on a model of a cracking furnace embodying new developments in engineering and design.

Naturally, Mr. Serafin is using the knife that embodies the newest developments in model-building tools . . . X-acto! He likes its scalpel-sharpness, its wide variety of blades. But especially he likes the way this long-handled knife reaches 'way inside the model to otherwise inaccessible parts.



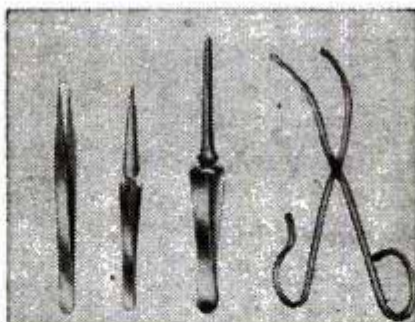
"BEGINNERS' LUCK" — No. 81 X-acto Modelbuilder's Basic Kit: No. 2 Knife; 5 regular, 2 3" blades; planer; sander. Complete, \$2.50.



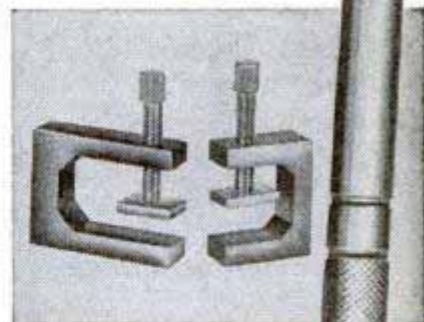
No. 47 HAND DRILL — Double pinion action, spring steel chuck. Takes drills up to 3/16". \$2.75.



New No. 77 X-acto Woodcarving Set. Perfect tool for wood, plastics, linoleum, etc. Includes 6 different chisel and gouge blades, 4 assorted regular blades, 2 3-inch blades, 1 handle designed to take all blades. Complete with hardwood block, transparent cover, \$3. Other Knives, Tools, Chests, 25c to \$49.50. (Prices slightly higher in Canada.)



TWEEZERS — Steel, with plated finish. No. 36, plain, 35c. No. 38, cross-action self-locking, pointed, 50c. No. 37, cross-action self-locking, blunt, 45c. No. 39, cross-action, 60c.



C-CLAMPS — Magnesium, high rigidity, steel screw, aluminum locking plate. No. 51, 30c. Nos. 52 & 53, 40c. No. 54, 50c.

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At hobby, gift and hardware shops

X-acto Crescent Products Co., Inc. 440 Fourth Ave., New York 16, N. Y. In Canada: Handicraft Tools, Ltd., Hermant Bldg., Toronto. *Reg. U.S. Pat. Off.

"Fred made this? Not really!"



JANE: That's right, Joan. Good job, don't you think?

JOAN: Why, it's—it's beautiful! How does he do it?

JANE: Fred says it's easy. Just takes good tools and a little patience. It's a grand hobby for him.

JOAN: You know... Jerry's always said *he'd* like a home workshop, but he just never gets around to starting. Maybe if we got the two of them together...

JANE: Let's try it this evening. Fred can give Jerry a lot of good tips. Like buying only branded tools, for instance.

JOAN: Branded tools?

JANE: Yes, tools with well-known brand names. Fred says anybody who buys "no-name" tools at bargain counters is just spending good money for junk. He does all his buying at the hardware store, where the tools and hardware have brand names he can depend on.

*Your HARDWARE DEALER
sells QUALITY tools and
hardware. Buy from HIM.*



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Motorcycling is **TOPS**
for **FUN** and **THRILLS!**



Own a **HARLEY- DAVIDSON**

No wonder motorcycling is the favorite sport of so many fun-loving, vigorous, red-blooded young men and women! There's a thrill to riding a new 1947 Harley-Davidson that beats anything else on wheels. Owners have grand times — they belong to clubs—make new friends — compete in endurance runs, race meets and hillclimbs. They get out on the open road and tour the country — even tour other lands. Don't merely *wish* for good times — when you can roll up so many pleasure-filled miles on your own Harley-Davidson! Get set for the happiest evenings, weekends and vacations of your life — see your Harley-Davidson dealer **NOW** — and mail the coupon today.



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DAVIDSON**
Motorcycles

HARLEY-DAVIDSON MOTOR CO.
Department P, Milwaukee 1, Wisconsin

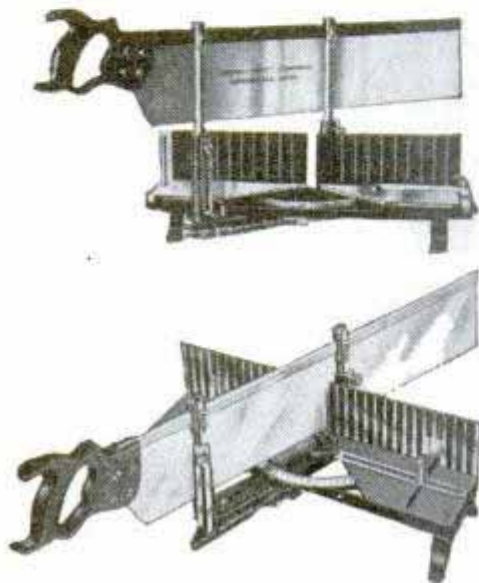
Please send free copy of 24-page "ENTHUSIAST" Magazine, filled with motorcycle action pictures and thrilling stories.

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**BALL-BEARING
ACTION *plus*
DEPENDABLE
ACCURACY**



Ball-bearing saw-guides and saw-carriages to make work easier, positive adjustment for cutting angles to eliminate errors, graduated arcs and index plates to produce near-precision cutting, all-steel construction to last a lifetime—these are but a few of the many outstanding advantages offered by Millers Falls mitre boxes.

Like all Millers Falls products, these mitre boxes are quality-constructed throughout. You'll be surprised how much more simple, how much more accurate they can make your work. See them at your dealers.

MILLERS FALLS COMPANY
Greenfield, Massachusetts

One thing in common—Quality!



Hugh H. Bennett, father of the movement and chief of the soil conservation service, states that the annual average production of major crops has been increased by 35.7 percent on land under soil conservation planning. In Kentucky 165 farmers report that their increased yields amount to 39.7 percent, well above average. Some of the overcropped and eroded Kentucky farms were incapable of supporting the owners and their families a few years ago; now the farms have been restored to where they yield 1700 pounds of tobacco or between 50 and 60 bushels of corn per acre.

These Kentucky farmers retired more than 1000 acres from cultivation and put it into hay and pasturage. And yet the acreage that was left produced 17,000 more bushels of corn, 43,000 more pounds of tobacco, and 6700 more bushels of wheat than had been harvested in previous years. Meanwhile their increased pasturage and hayfields permitted a 120 percent increase in beef cattle, hogs and other livestock.

Soil conservation also pays off in increased property values. One man in Georgia wrote to the service that the farm he bought several years before had been able to produce only 13 tons of peanuts per year. Last year the same land produced 51 tons of peanuts, 1000 bushels of wheat and 11 tons of blue lupine and crotalaria. He figures he can sell out today for several times what he paid for the place.

Another man bought a worn-out 320-acre farm in North Dakota in 1937 for a one-dollar bill and a tom turkey; today it's a valuable farm from which he earns a good living. He has restored part of his acreage to range on which he grazes 45 head of cattle. He has a two-year supply of feed on hand and a large irrigated garden. Soil conservation techniques brought about the change.

There always is a certain amount of erosion from any ground. Natural geologic erosion, however, is held to a slow pace by the natural plant cover. New topsoil is formed from the underlying subsoil at about the same speed that topsoil is lost. But when land is cleared for cultivation or is overgrazed or otherwise left unprotected, erosion speeds up. In an extreme case erosion caused by man can remove as much topsoil in a year as nature would take away in 10 centuries.

Simple erosion control is only part of the entire conservation program. That includes any and all measures that will make the land produce at its best without damaging it. Wise land management helps to prevent loss of topsoil, exhaustion of plant food in

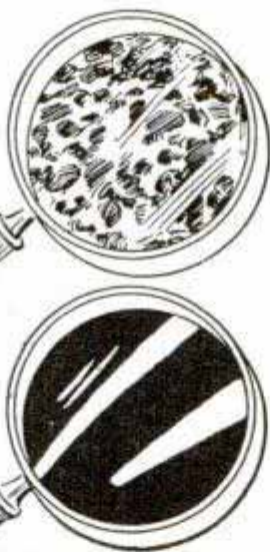
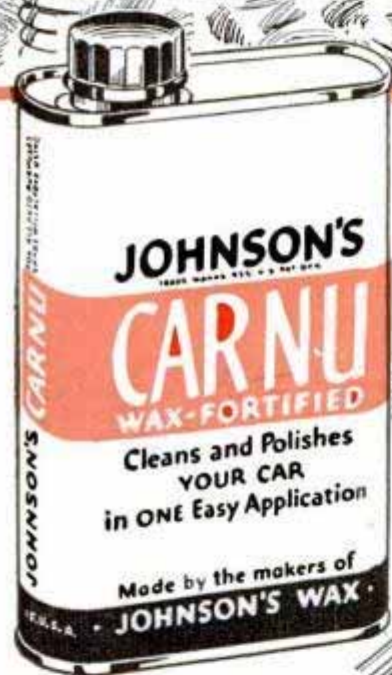
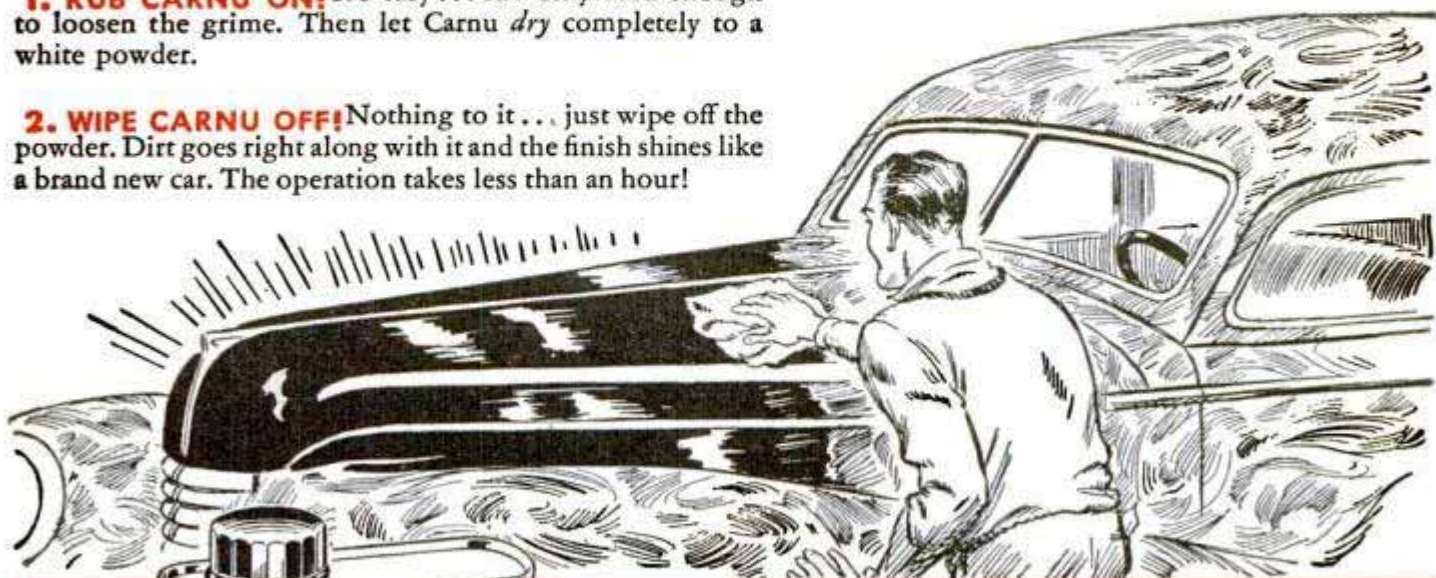
(Continued to page 252)

How to magnify the beauty of your car

This efficient liquid-type car polish makes car shining easy
... cleans and polishes in one operation

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2. Protects the finish.



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This special easy-buffing car wax gives your car a tough, protective film, protects it against sun, heat and moisture. Auto Wax also makes it easy to keep your car clean and shining because dirt can't get a foothold on the smooth, hard, waxed surface. Your auto supply store, filling station or regular Johnson's Wax dealer has Johnson's Auto Wax... Try it!



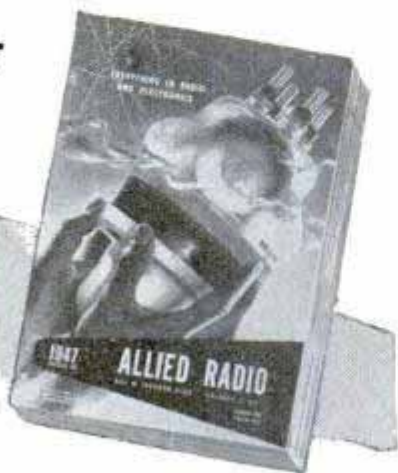
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REVERSE

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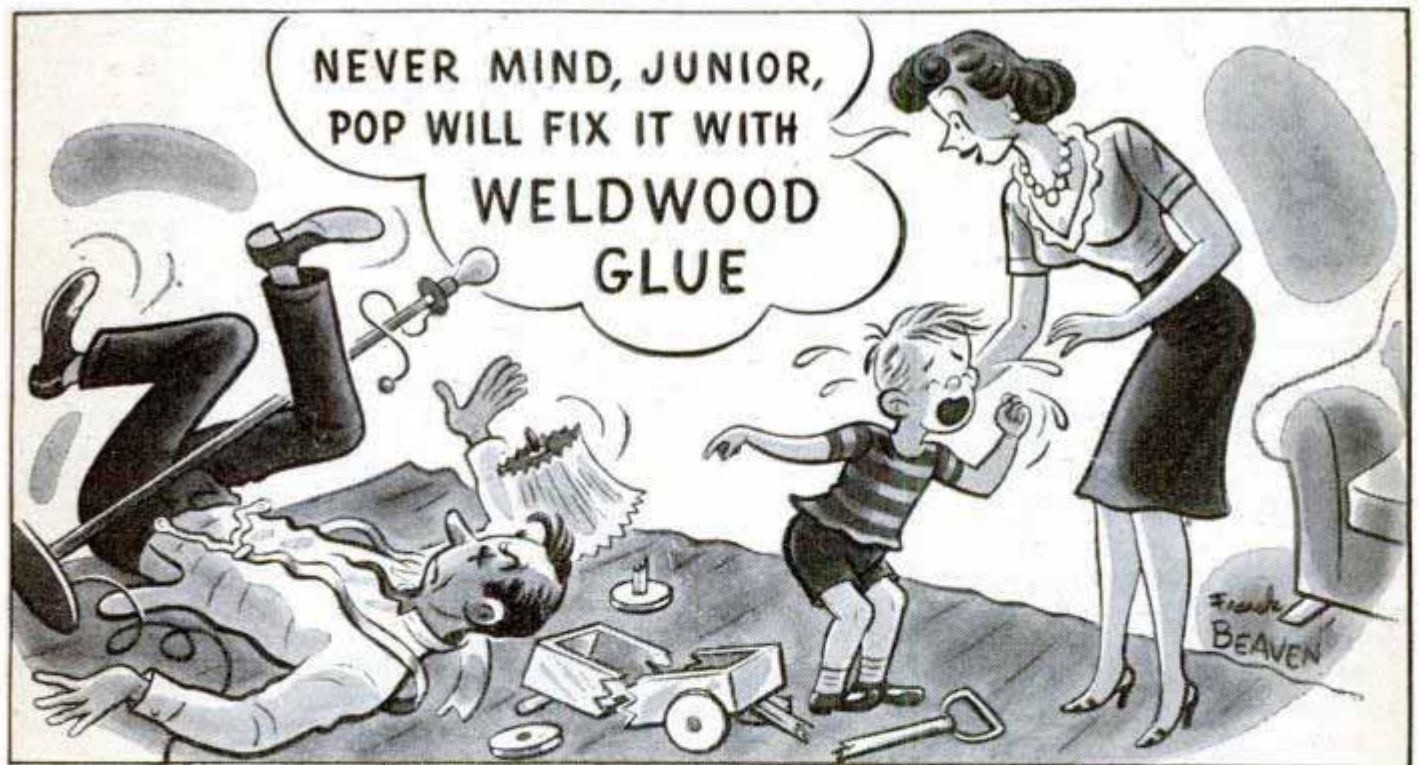
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JOHNSON MOTORS, 400 PERSHING ROAD, WAUKEGAN, ILLINOIS
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JOHNSON SEA-HORSES



When you want to fix things fast . . . be sure to get Weldwood Glue. It's tremendously strong . . . waterproof and rot-proof. Easy to apply . . . quick to dry . . . stain-free and permanent. At hardware stores, chain stores and lumber dealers!

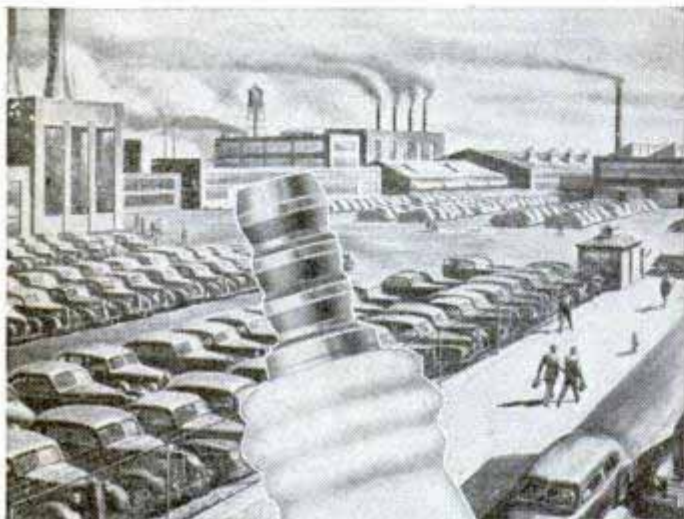


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Look for this sign



Spark Plugs cleaned and adjusted "By the AC Method" may save as much gas as 1 gallon in 10

AC SPARK PLUGS

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

the soil, accumulations of toxic salts, and prevents the covering of good soil with erosion debris. Too, it conserves water in the soil in dry areas and drains water from the soil in wet districts. In all there are between 50 and 60 major conservation practices now in use. They range from the construction of check dams and the planting of trees in gullies to the new but already widespread "stubble mulch farming."

So far, only a start has been made in permanently conserving our soil. Complete treatment of the millions of acres that remain will be a long, hard task. To give you an idea of its magnitude, a recent state-by-state survey shows that the full conservation program is going to require more than 775,000 man-years of labor, some 150 equipment-years of work with tractor-drawn equipment, and nearly 300 equipment-years with horse-drawn equipment.

Fifteen years ago statisticians could foresee the time, generations from now, when the nation would be in danger of starving to death. Now the trend has changed. So spectacularly successful has been the work of the soil conservation service that 30 other countries already have adopted our conservation program.

Popular Mechanics House

(Continued from page 112)

feet, laundry, fruit cellar and furnace room. At first he set up his workbench at one end of the small furnace room, then moved to the laundry, and now is claiming for his shop one end of the knotty pine recreation room. This idea has met some opposition from the distaff side of the household.

Closet space is an important feature of the house. The voice of Mrs. Brownson was heard clearly and distinctly when that topic came up in the planning sessions. The result is large built-in wardrobe closets in each bedroom, and adjoining these are built-in chests of drawers, constructed by Jacques himself. Both wardrobe closets and chests are concealed behind beautiful flush-type natural wood doors. The roomy linen closet is conveniently located in the small hall leading to bedrooms and bathroom. There is a broom closet in the kitchen, a guest closet just inside the front door, and additional storage space is available at the foot of the stairs until the second-story rooms are finished.

Ground was broken for the house on May 29, 1946—a memorable day for the young Brownsons and an exciting one for the *Popular Mechanics* staff. For several weeks the prospects of obtaining adequate

(Continued to page 256)

How to

catch more fish!



CATCHING FISH depends on two factors. *First*, you must know where the fish are. *Second*, you've got to get your boat to the good spots.

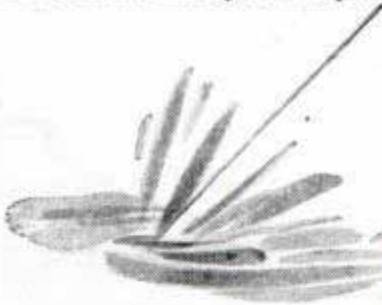
Scott-Atwater can help you do both.

With a smooth-purring Scott-Atwater motor on your boat, you are always assured of quick, trouble-free transportation to the good spots to fish.

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Backed by the long experience that made Scott-Atwater the world's second largest pre-war manufacturer of outboard motors, the new Scott-Atwater, introduced last season, is the last word in mechanical perfection.

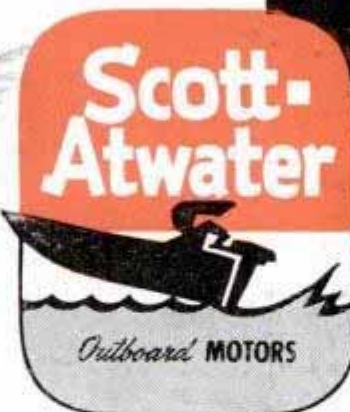
Send coupon below for the sensational new book, "How to Catch More Fish", by Frank R. Steel, which tells you how to locate fish by the temperature of the water.



FOUR MODELS

A standard and deluxe single, developing 3.5 horsepower at 4000 R.P.M. OBC certified.

A standard and deluxe alternate firing twin, developing 7.5 horsepower at 4200 R.P.M. OBC certified.



"HOW TO CATCH MORE FISH"—by Frank R. Steel, national authority on fishing. Tells you how to fish by revolutionary method of water temperatures. Specific instructions concerning at what depth fish will be according to temperature of water. 48 pages, illustrated in color, diagrams of lakes and streams. Send coupon for copy today.

Scott-Atwater Manufacturing Co., Inc.

2901 East Hennepin Avenue

Department PM47, Minneapolis, Minnesota

Enclosed find 10 cents for which please send me a copy of Frank R. Steel's new booklet "How to Catch More Fish". Booklet will be sent about May 15, 1947.

Name.....

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City.....State.....



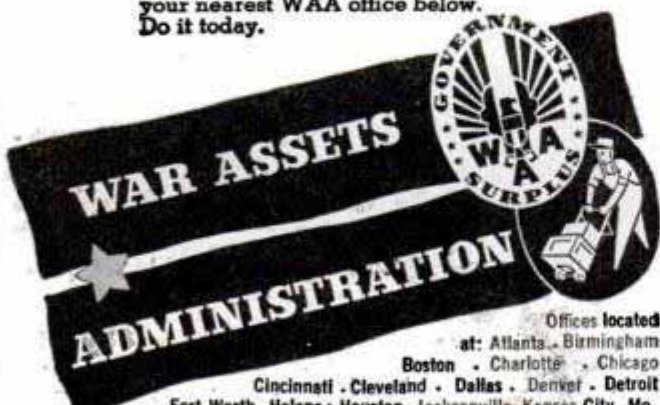
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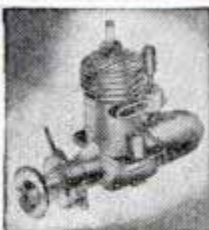
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**GIVE MORE
BRIGHT LIGHT
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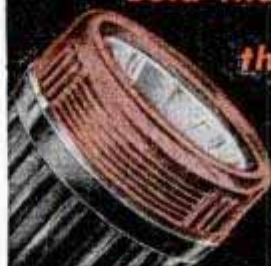
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best since 1909!*



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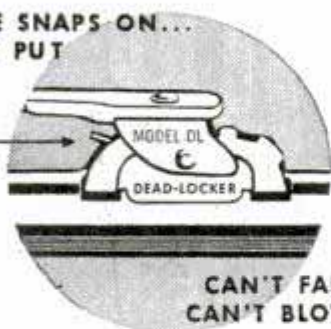
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"Dead-Locker"

WINDSHIELD WIPER
ARMS and BLADES

BLADE SNAPS ON...
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RELEASE



(A war-born invention—by ANCO—first)
for military aircraft—now for your car.)

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He's doing the best he can. Sure, he knows how dangerous it is for you to drive your car... in stormy weather... with your dull old windshield wipers that smear and smear. He'd gladly put on for you quickly a pair of keen new ANCO RAIN-MASTER Wiper Blades and Arms. He has them—Newest Models! But he forgets to remind you? Too busy? You can't shoot him for that!



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Ask for RAIN-MASTER Windshield Wiper Arms and Blades next time you buy gas.

THE ANDERSON COMPANY
Established 1918
GARY, INDIANA

building materials had looked dark. There could have been no more difficult period to launch such a project, and the editors were determined to use no plea of special interest to obtain materials. Naturally there resulted a number of compromises and adaptations which would not trouble the home builder in normal times. As an example, Brownson was unable to find siding anywhere. When time had finally run out, he located a carload of 2 by 12-inch lumber and had it cut into one-inch siding. Despite its unusual thickness, this proved highly satisfactory both from its substantial construction and its beauty of effect.

From the moment he rented a power scoop to start excavations, Jacques Brownson kept a detailed day-by-day account of progress. This record proved invaluable to the editors in preparing the articles which will appear in the Craftsman Section in the May and June issues. These articles and a book written by Wayne Leckey are concerned with details of construction. They will follow the construction step by step, with easily understood illustrations, and will answer all questions on how to build the house.

To speed the project, Brownson had as his chief helper a 23-year-old apprentice carpenter, Bud Marshall. It was Marshall's first job. Neighbors were somewhat alarmed when they learned what these two youths who had been tramping over the vacant lot were up to. They had a reasonable concern for their own property values, probably fearing an unsightly shack would be the ultimate result. Today these same neighbors are the loudest of all in their praise of the project which they watched grow through the summer into the most attractive home in the neighborhood.

Plumbing and wiring, under the law, had to be installed by licensed workmen. And from time to time Jacques had to solicit the help of friends or laborers, just as in the early days of home building a pioneer would rally his neighbors. One such job was the pouring of concrete for the foundation, which had to be done in one day. This required the mixing and pouring of 200 bags of cement. The task was performed by 57 hours of labor in addition to the 12 hours put in by Brownson himself. The date was July 1.

The balance of July was consumed in raising the framework for the entire structure. On July 30 Brownson began work on the roof boards, which were all in place by August 3. During August the cornice work was completed, the roof was covered with asphalt shingles, electrical work was done,

(Continued to page 260)

*No rust
for the
wary!*



Clean rust out of your radiator with

DU PONT Cooling System **CLEANSER**

Drain out your anti-freeze, and clean out winter's accumulation of scum, scale, and rust. Neglect now may mean trouble and costly repairs later. Just pour a can of DU PONT COOLING SYSTEM **CLEANSER** into your radiator, run the engine 30 minutes or more, and drain. It dissolves rust—cleans thoroughly—improves engine performance. It's safe, sure, and easy to use.



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Rubber motor mounts eliminate noise and chatter.



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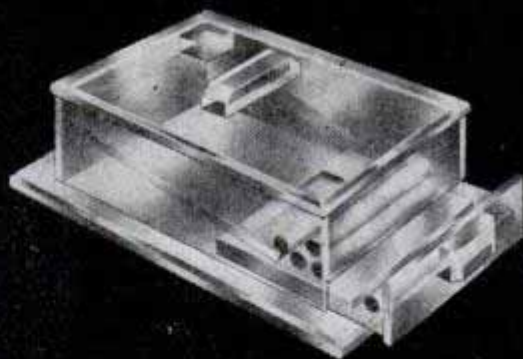
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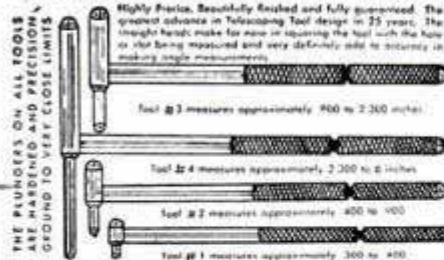
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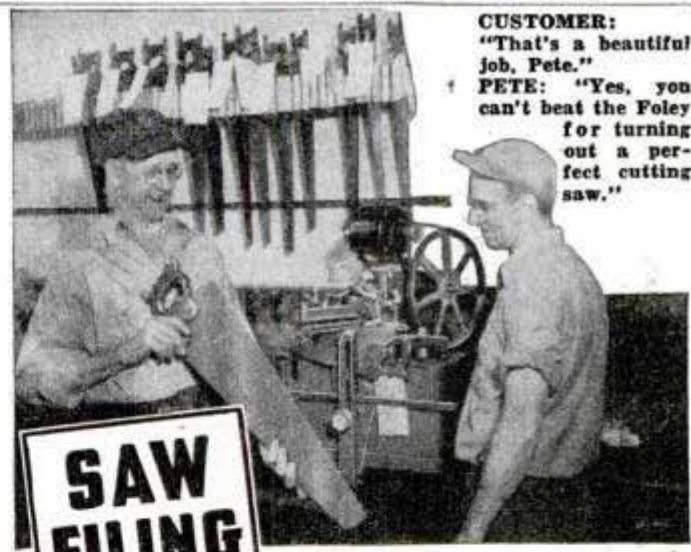
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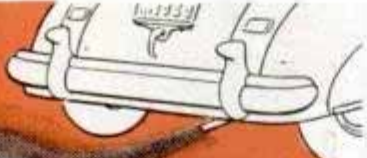
SEND FOR FREE PLAN—Shows how to start a saw repair shop. No canvassing. Send coupon today.

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Send Free Plan on Saw Filing business, no obligation

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when worn
connecting rod bearings
cause oil pumping

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COLDWATER, MICHIGAN

Replace in sets with Genuine
FEDERAL-MOGUL
Oil-Control Bearings



window frames set, the house completely lathed, and concrete poured for the basement floor, breezeway, garage, front and back steps. August also saw the basement partitions built, and toward the end of the month Brownson hired help to expedite the plastering.

September was given over to completing a multitude of odds and ends. The interior was trimmed and doors hung. The first day of October found Brownson nailing on the siding. Other October days were occupied with framing and glazing the ends of the breezeway, setting wrought-iron railings on the front and back steps, and laying floors. Mrs. Brownson helped lay the asphalt tile floors in bathroom and kitchen.

During November the maple floors were laid in the bedrooms, the kitchen cabinets were installed and the outside painting completed—not without some vicissitudes in obtaining paint! The final dab of white was laid on the siding on November 20—nine days less than six months after the breaking of ground.

In reviewing the \$7046.87 cost of materials it must be remembered that these were purchased at abnormally high prices in the Chicago area. These materials, which will be detailed in later articles, included lumber, concrete work, fixtures for bathroom and kitchen, furnace, wiring, plumbing and sewers, and can be obtained probably for 20 percent less outlay in many parts of the United States. Those who prefer to build a less expensive home could save about \$2000 by omitting the breezeway and garage as they were built in the *Popular Mechanics* house. With this deduction, and an estimated saving of 20 percent in lower-cost regions, the cost of materials for the basic home might be reduced to about \$4000.

The BUILD-IT-YOURSELF book, which will be available shortly by writing to the Book Department of *Popular Mechanics*, will tell anyone how to construct the house with a minimum of outside help. But anyone who wishes to employ a contractor can ask him to follow the plans in the book. It should be borne in mind, in this case, that Jacques Brownson's labor saved him several thousand dollars.

By far the most difficult problem in this unique enterprise was the securing of lumber, particularly siding and flooring. There were long weeks during which Editors Ward and Leckey were grim and silent and anyone who even mentioned the house was in imminent danger of being thrown from a fifth-story window. But now that the project has been completed successfully and the editors themselves are a little envious

(Continued to page 264)

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WRITE FOR THE LOGAN CATALOG... complete information on Logan Lathes, Shapers and Accessories.

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for sustained accuracy.
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within .0005" of parallelism.
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at vital points lengthen life.
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with shifter rack safely and conveniently at your finger-tips.
- 5 **RUBBER CUSHIONED COUNTERSHAFT**
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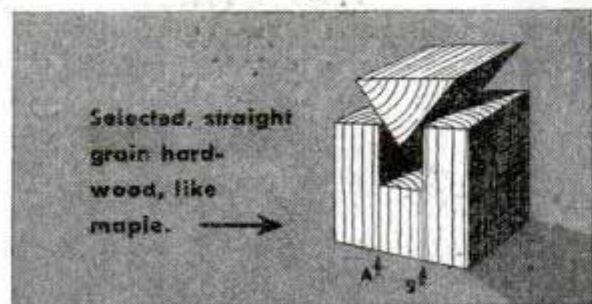
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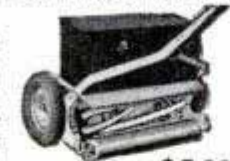
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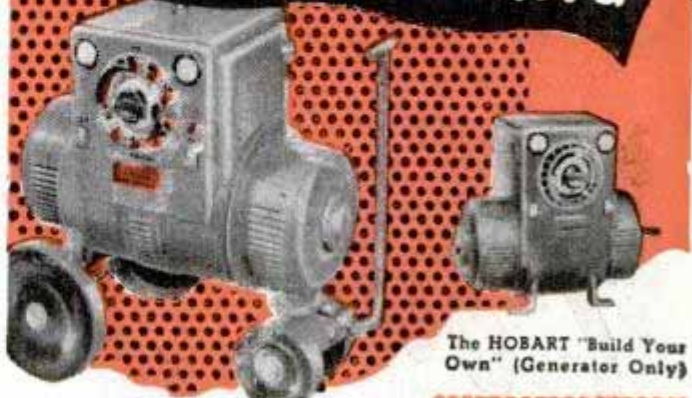
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of the Brownsons, to whom they have presented the fruit of their labors, Jim Ward admits:

"It was a lot of fun despite the headaches provoked by the present scarcity of materials. Building the *Popular Mechanics* house has been a valuable experience and has proved what I said at the beginning: Any man of average mechanical bent can build his own home. That's the biggest thing we learned in pushing the project to its happy conclusion."

This month Mr. and Mrs. Jacques Brownson are holding "open house" to show visitors their new home, decorated and furnished for inspection by Simons Furniture & Rug Company of Aurora. They are as proud as are we of the *House That Jacques Built*.

Brownson put it this way:

"I'd hate to have missed doing this job. It's a real thrill to build your own home. I have only one worry now, and that is that someone will pinch me and I'll wake up in my old bunk over in China and find the house is still a dream."

(Continued next month)

Age Doesn't Count on the Speedway

(Continued from page 137)

there are as many as 32 other cars on the track during the big race.

New drivers find big difference in the way their cars handle at 85 and at 115-mile-average speeds. At 85 most cars seem to guide themselves along the track and through the turns without help. At 115 the car may be flighty and require sure judgment and expert handling. The point at which to back off the throttle when going into a turn and the point in the turn at which it is safe to hit the throttle again, and how much and how long, must be learned almost automatically.

Experienced drivers give the beginners what advice they can, yet some new drivers who are entirely competent at the lower speeds seem to lose their touch at over 100 miles per hour. In case of doubt the chief steward or the chief observer allows them extra practice laps to develop their skill.

Other drivers who have come up from the ranks never develop a sense of speed. They drive inconsistently, one lap too fast and the next too slow. In the big race they would be pulling ahead on one lap and dropping behind the next, gaining nothing and increasing the chances of collisions. They are ruled off unless they have a satisfactory explanation.

(Continued to page 268)

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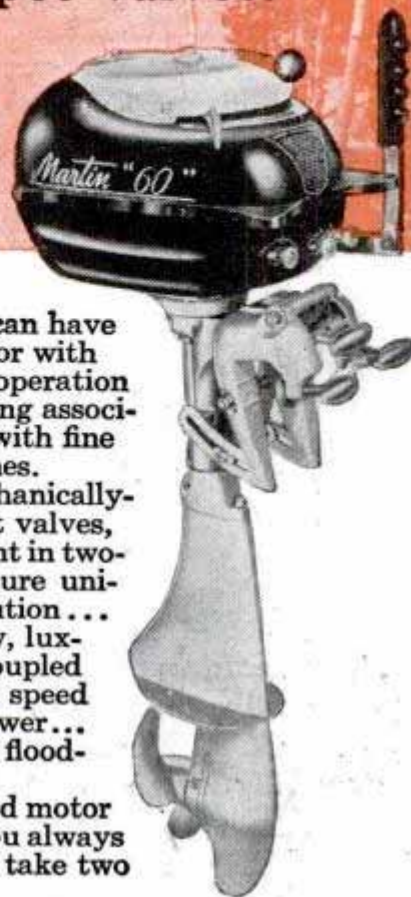
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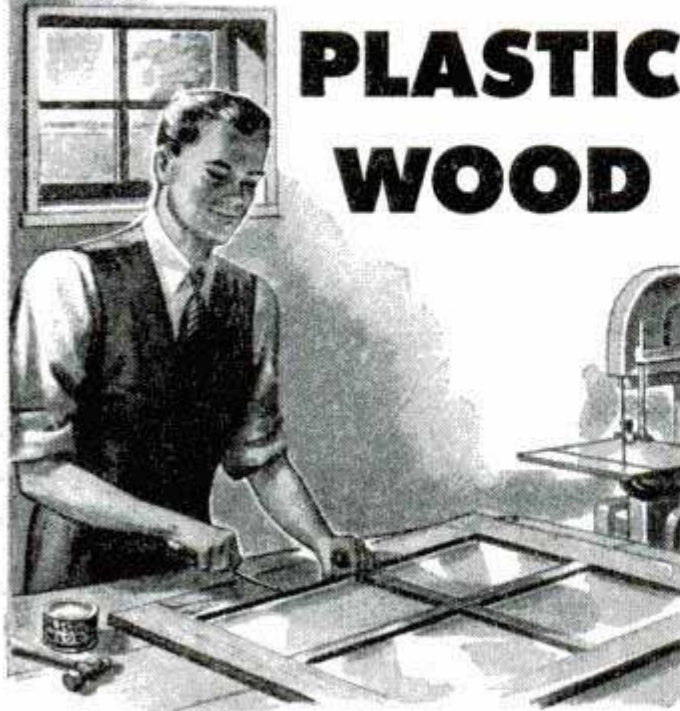
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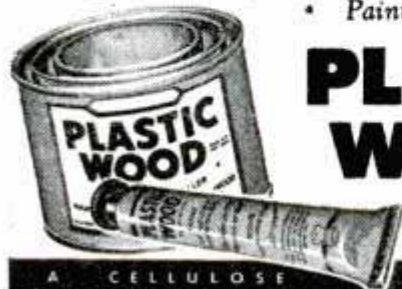
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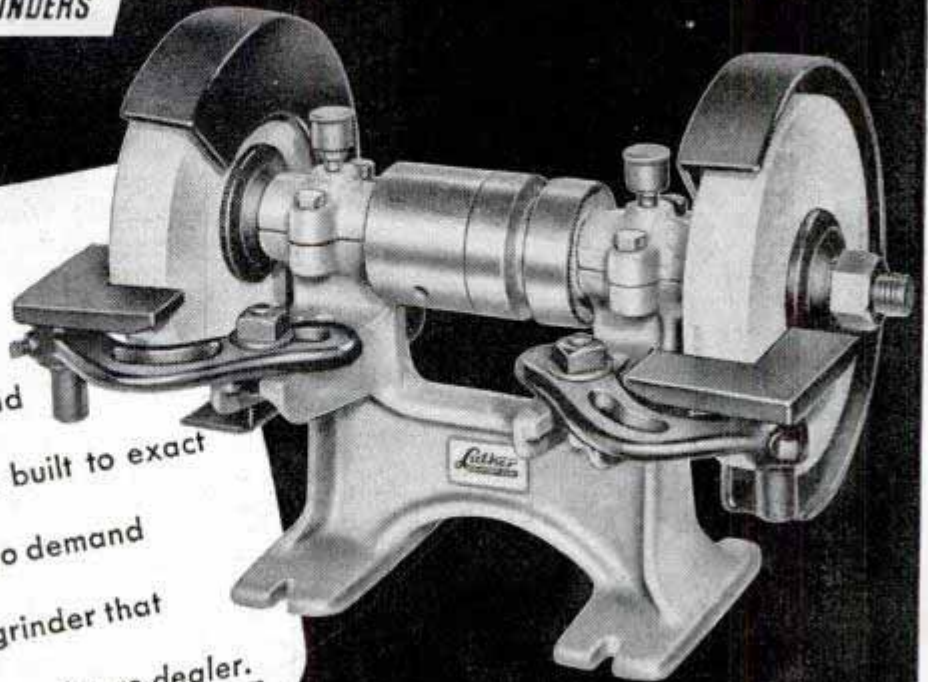
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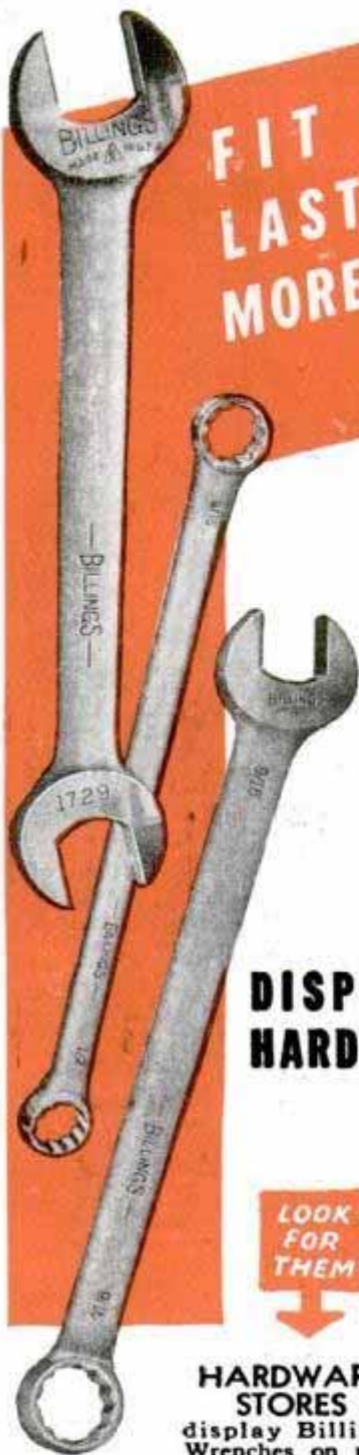
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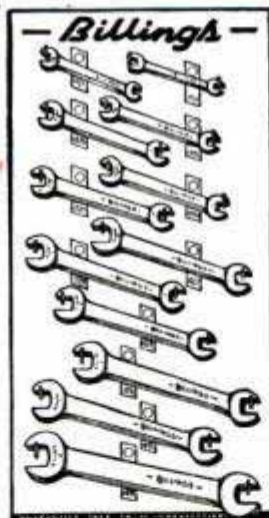
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Others are baffled by the long stretches and the sharp turns. Accustomed to shorter, more circular tracks, they can't stand the pressure of wide open throttle for long distances, followed immediately by turns so abrupt that at high speed the driver must correct for a slide most of the way.

Still others can't stand the tension of speed and they become exhausted and nervous part way through their tests. These drivers would be dangerous in the race itself. Some novices, too, are simply dare-devils who use the whole track without regard for the other cars. They could crack up or cause a multiple accident in the first few laps, so they too are ruled off.

The result of this careful weeding is that the 33 drivers who line up at the start of the big race represent the flower of American racing circles. Most of the drivers are in their thirties or late twenties. A few, skillful veterans who have competed in many races, are in their fifties. Some of the young drivers who pass their Indianapolis tests this year will be in their early twenties. Age won't count in the race. If his car stands up under the sustained beating and if the driver himself can take the punishment of lap after lap after lap of noise and snap decisions and nervous tension he'll finish in the money.

Death Valley Patrol

(Continued from page 120)

rear wheels spin, churn the sand and dig deeper. In desperation the motorist scoops some of the sand away and tries to provide traction by pushing a blanket, coat or floor mat under the wheels. This rarely succeeds. Often the ranger finds the motorist has dug in so deeply the car's rear axle is resting on the ground.

A tractor seems the only way of getting the car out of its hole but the ranger has a trick that's quick and simple. While the motorist stands by, the ranger uses the car jack to raise each rear wheel in turn. He packs sand into each hole and a little more on top. When the car is on level ground again, the ranger partially deflates both rear tires, starts the motor and backs away. The "rescue" takes less than half an hour.

Rescuing aviators has been another ranger job. During the war, student pilots from desert training fields delighted in flying through Death Valley. Some were attracted by the long flat stretches of what appeared to be hard-packed dry mud on the valley floor. Just the place to make practice landings, it appeared, but as soon as a plane settled in and lost its lift, the

(Continued to page 272)



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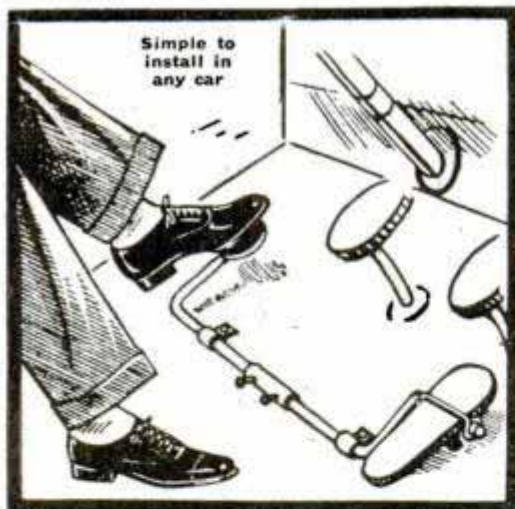
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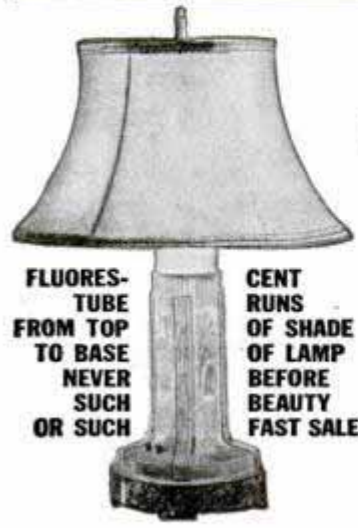
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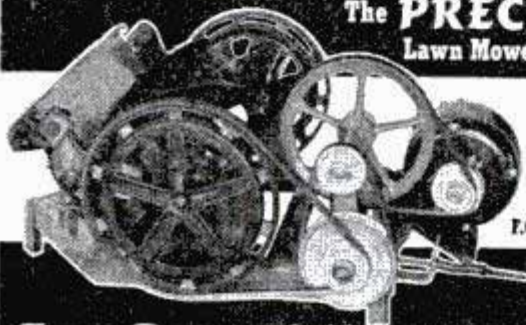
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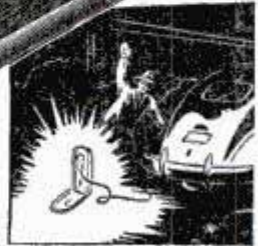
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wheels broke through the top crust and the plane upended on its nose. The rangers learned to spot a plane's tail sticking up into the air from miles away.

The rangers' oddest airplane rescue came during a vicious 50 mile-an-hour sandstorm when visibility was almost zero. Goodwin got a phone call from an air training field 200 miles away. "Superintendent," the speaker said, "one of our planes had motor trouble and had to land in the valley. Its position is 4.2 miles north-northwest of Devil's Golf Course. Two men on board. I'd appreciate it if you'd send a car down and pick them up."

"Certainly, certainly," Goodwin exclaimed. "We'll go down there at once. But how do you know the plane is down and what makes you so certain where it is?"

"Man," the voice replied, "the pilot has been broadcasting an SOS for the last 15 minutes and we have radio fixes on him from seven different stations. We know his location almost to the yard." He was right. The rangers found the plane right there.

Who Says It's a Sissy Game?

(Continued from page 103)

center shot down the middle, a cutback into the left-hand court and a "tap" shot which just dribbles over the net.

(5) **The block:** The block is a more or less recent innovation, but one which has tended to equalize the game between offense and defense. A few years ago the spikers were the key men and seemingly could not be stopped. But the Houston, Tex., team that entered the 1933 tournament in Chicago used a blocking defense that almost completely nullified the efforts of the spikers. Three men jumped on the opposite side of the net from the spiker—presenting a solid wall of hands that he found difficult to get the ball past. The Rules Committee of the National Volleyball Association later limited the blockers to two men.

Blockers leap into the air as the spiker makes his leap. The ball may hit their hands with such force that it bounds 20 to 30 feet high. There are two types of blocks. One is the "hard" block in which the ball bounces back into the opponent's court. The other is the "soft" block. The force of the ball is taken by the blockers and it is saved for their own back court men—thus gaining the offensive for that side.

Recent developments in spiking and blocking have put a premium on height. However, many medium-size men with plenty of spring in their legs play on top-notch teams. And even small men—such as

(Continued to page 276)



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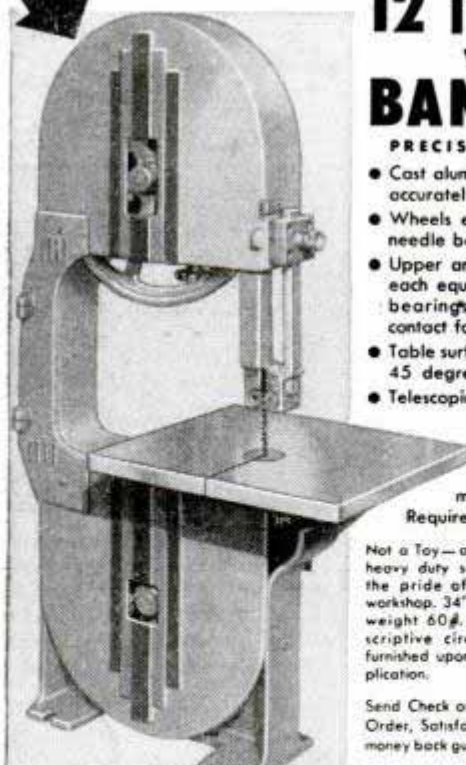
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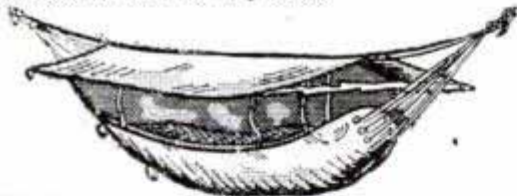
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Report From Antarctica

(Continued from page 94)

which occurs almost everywhere in sufficient amounts for detection. Since the record varies with the distance to the magnetic material, contours of the land below the ice can be plotted on the map. Two planes, outfitted with magnetometers and auxiliary instruments, have been operating on long flights inland toward the pole.

The instrument gives indications of large mineral resources besides iron. The continent is now known to contain some of the greatest coal deposits on earth, and vast oil reservoirs beneath the ice cap are almost certain. Although the precise nature of the minerals is not revealed this often can be deduced from the geological contour. With the magnetometer the ice cap disappears, since it contains no magnetic materials. Radar could give only the ice surface contours. The comparison is like that between visible light and powerful X-rays.

The only other method of determining the land contour under the ice cap is with a sonic depth apparatus similar to that used on ships to map the ocean bottom. This is slow, and requires apparatus set up on the ice surface, but would give more detailed information. Two Navy experts are determining the precise behavior of echoes through ice peculiar to polar regions, providing basic data for future surveys.

An important Navy problem is the magnetism of steel ships which changes with latitude. Variations also have been noted

(Continued to page 280)

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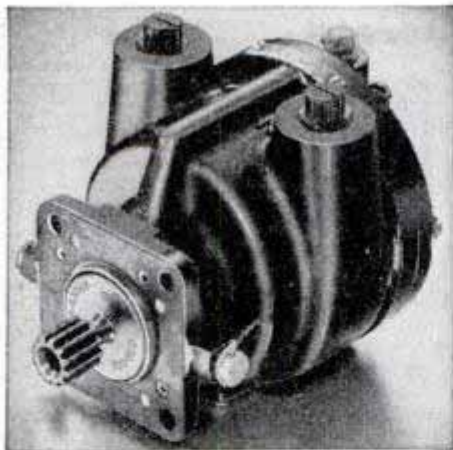
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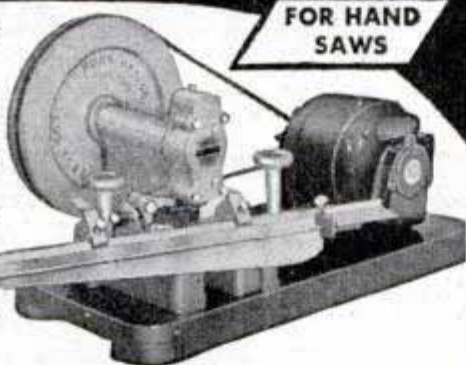
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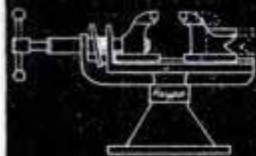
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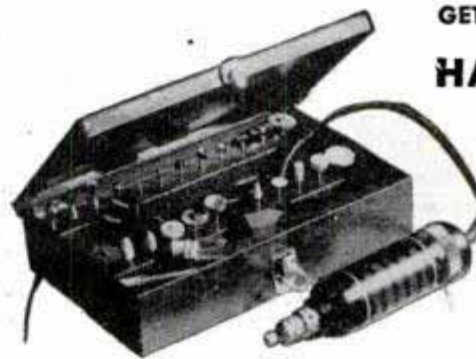
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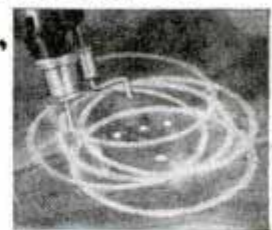
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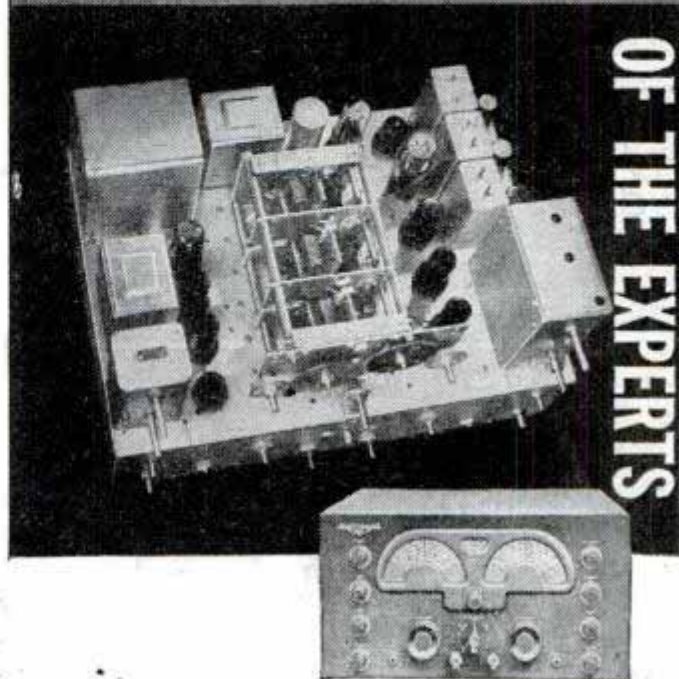
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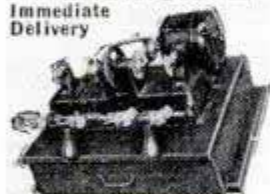
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corresponding to the amount of pounding the craft has received. Navy ordnance experts are studying the differences between antarctic and arctic with craft which approached the North Pole last summer.

Apparently the position of the South Magnetic Pole has remained fixed as established in 1941, while that of its northern counterpart has shifted about two hundred miles to the northeast, as estimated from observations this summer. The South Magnetic Pole's position in northern Victoria Land, west of the Bay of Whales, is buried most of the time in thick fog and mist, lies behind unexplored mountains, and could be reached only by nearly superhuman effort. The farthest penetration was by Australian Sir Douglas Mawson in 1913. The position can be judged with fair accuracy by the behavior of compasses in planes and by calculations based on fluctuations of the needle at various distances. The pole is the mathematical center of probably a thousand square miles where a compass needle on a horizontal axis points straight down.

In this very large elliptical area, explored by many expeditions, nothing is known of the extent or shape of the southern region. The last Byrd expedition placed the center about 200 miles from Mawson's position, showing a probable 30-year shift. The search directed by Doctor H. H. Howe of the Coast and Geodetic Survey was made difficult by the fact that the direction of the magnetic needle is always influenced by metal deposits in the immediate neighborhood. It is curious that the pole is now several thousand miles away from a point on the antarctic continent which is precisely opposite the North Magnetic Pole.

Dr. Howe also is calculating the position of the geomagnetic pole, or the point where the magnetic pole would be if the earth were a perfect magnet. This is a vitally important search for science. It is somewhere near the center of the continent and is the center of a circle around which are seen the aurora australis or southern lights. It is also the center of magnetic storms which fringe the antarctic continent.

In another magnetic project the daily time is messaged by radio from top to bottom of the world between the weather bureau staff at Thule, Greenland, and the magnetic observers of the naval ordnance laboratory at Little America. The purpose is to get precise measurements of variations in the planet's magnetic field north of the North Magnetic Pole and south of the South Magnetic Pole, and to determine if they vary in alternating phase to each other, a job requiring split-second coordination.

(Continued next month)



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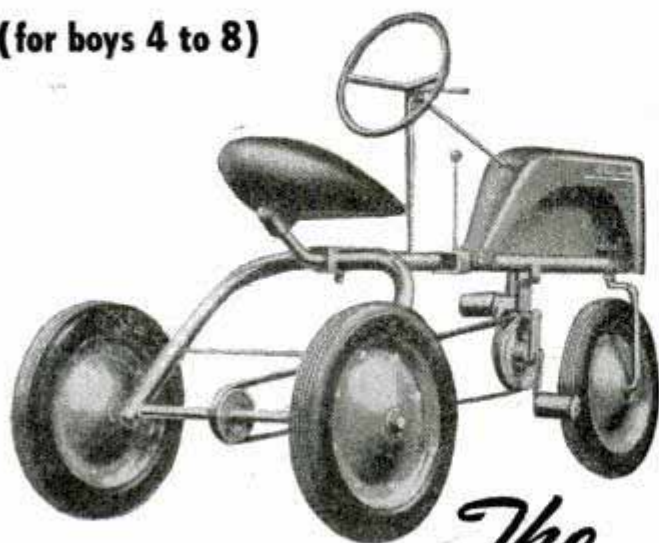
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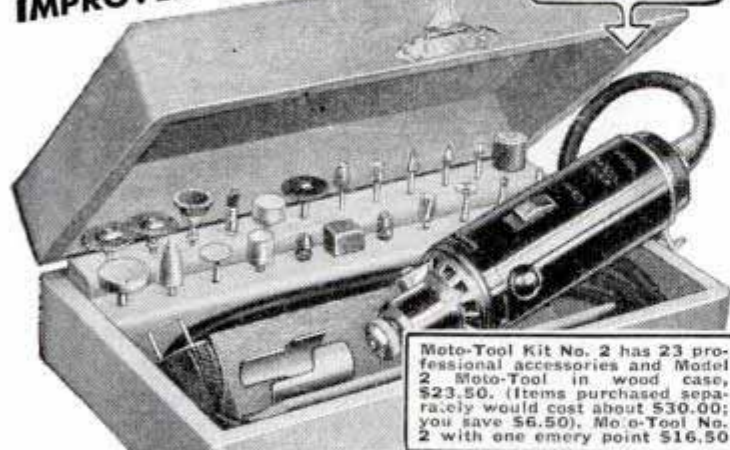
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Here's a tool to please a man's heart. A gleaming "powerhouse" that holds promise of endless creative hours. This "pocket-size machine shop" is a war veteran... used by all branches of the armed forces in far flung repair bases... and it helped set production records at General Electric, Westinghouse, Remington Arms, Ford and other plants. Hobby enthusiast or expert craftsman... first choice is Model 2 "Moto-Tool" kit, with its handsome, felt-lined, highly finished wood case... with rows of tools begging to be put to work. The usefulness of "Moto-Tool" for precision work is increased by two versatile attachments now available at slight additional cost (see below).

Look for These Features

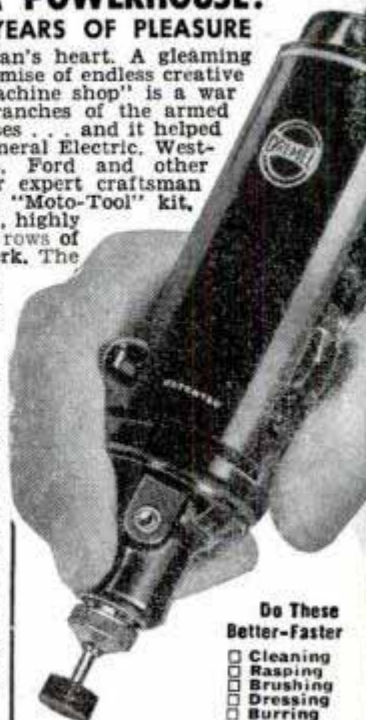
Housing has "pencil-type" finger grip; instant-action, wrenchless chuck; oil-less (sealed) bearings; patented automatic chuck-lock pin; oversize armature shaft, hardened, ground and polished; 110 volt universal type motor; easily replaced commutator brushes; sliding, snap-type switch; handy hanger hook; cord protector; sturdy, shockproof bakelite housing; dust-filtered, air-cooling system; weighs only 13 oz; shaped to fit the hand; dynamically balanced for vibrationless operation.

MONEY BACK GUARANTEE

Buy Moto-Tool and Accessories from your dealer; or order direct from factory on 10 day trial, money back guarantee.

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- Sanding
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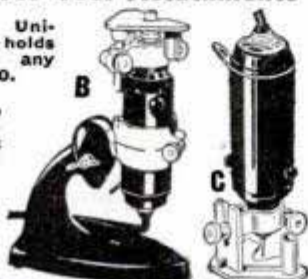
Free Both Hands with Moto-Tool Attachments



A. Moto-Tool Universal Stand holds Moto-Tool at any angle — \$4.50.

B. Shaping Table and Stand in position to grind flat pieces to any shape. Both \$7.00.

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es; sliding, snap-type switch; handy hanger hook; cord protector; sturdy, shockproof bakelite housing; dust-filtered, air-cooling system; weighs only 13 oz; shaped to fit the hand; dynamically balanced for vibrationless operation.

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APRIL 1947

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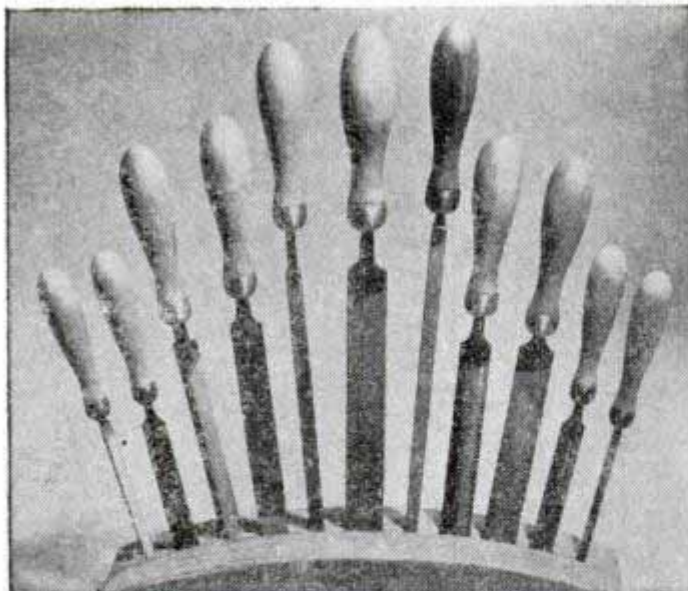


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12 for 25¢

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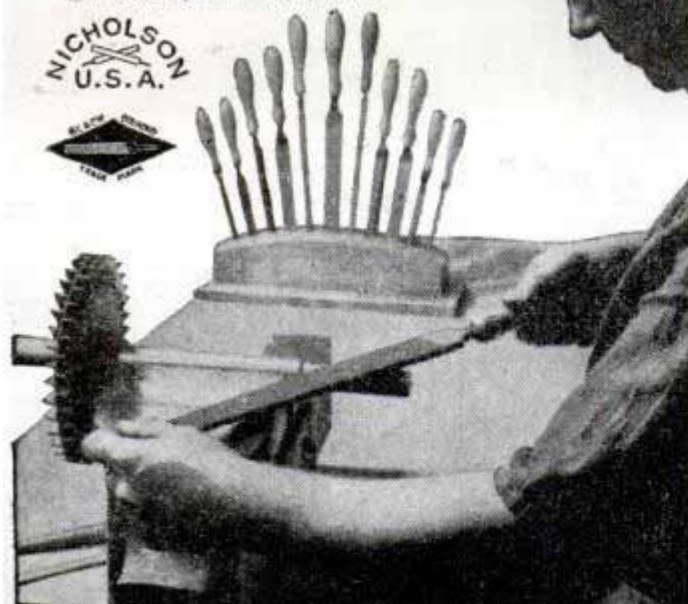
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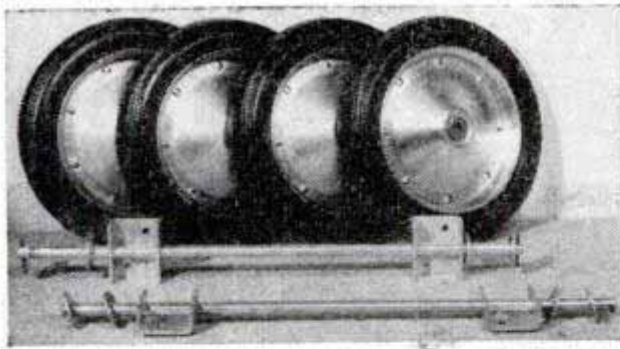
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For 1/2" or 5/8" Axles.
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One Combination Drive and 10" x 1.75 Wheel Assembled. **PRICE \$5.50**
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Combination V Pulley Drive and Brake Drum, without wheel. **PRICE \$3.50**

F.O.B. Doylestown, or, add 10% for Prepaid Shipment anywhere in U.S.A.

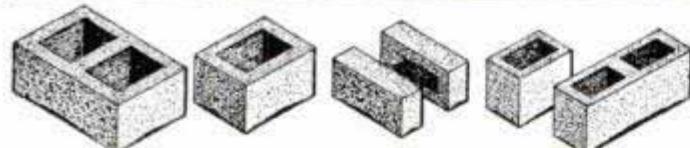
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NOTE: these ARE NOT the toy tires used by most wheel manufacturers.

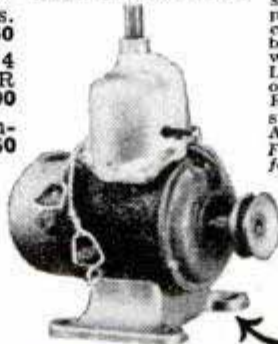
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Space does not allow to adequately describe this excellent POWER UNIT to complete the above described Model "A" RACER CHASSIS—
Write for Circular and Price on Electric Motors.



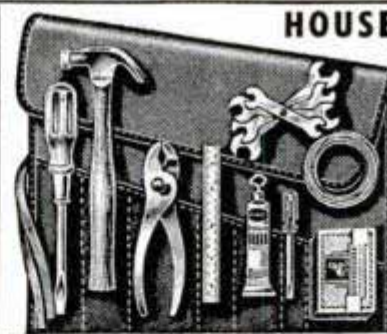
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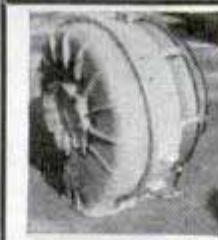
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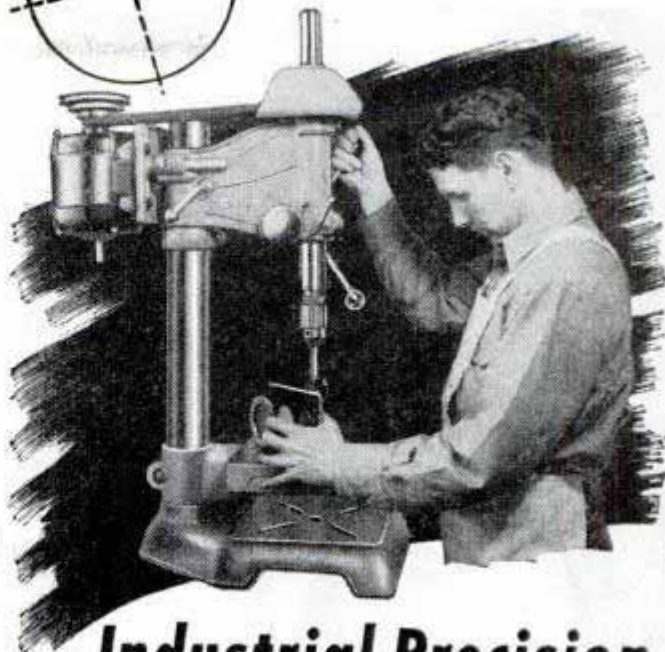


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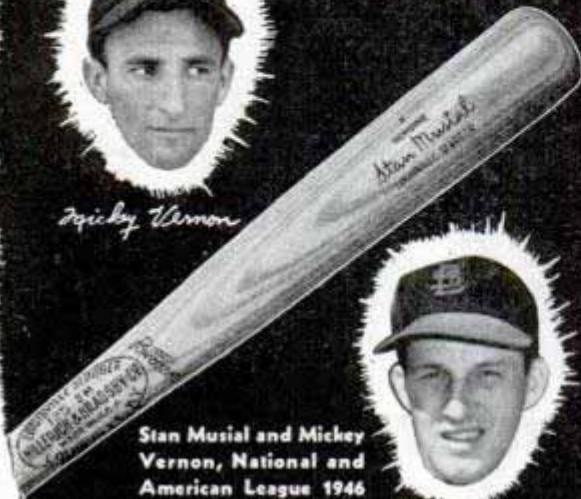
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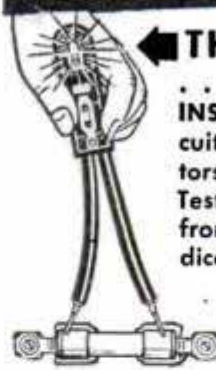
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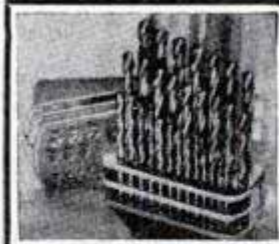


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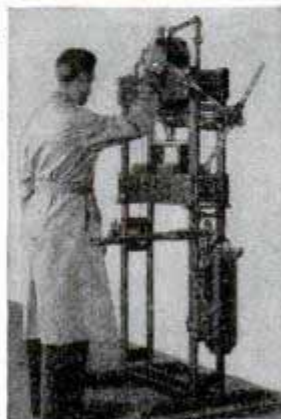
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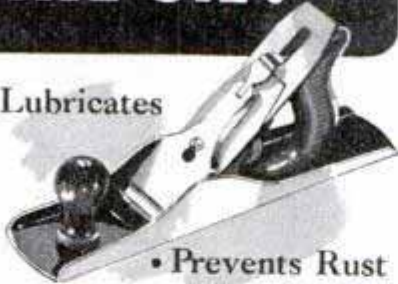


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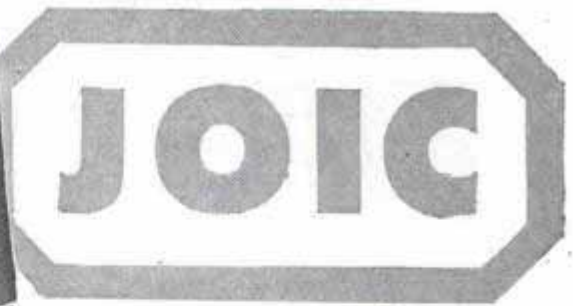
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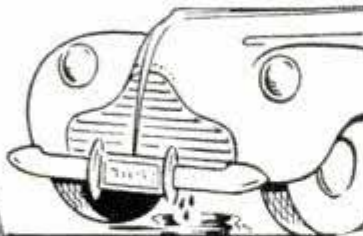


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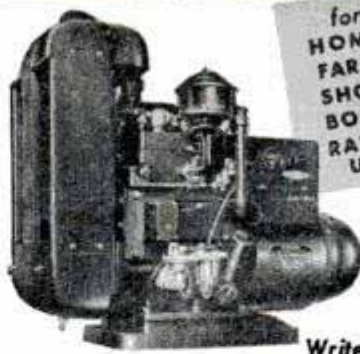


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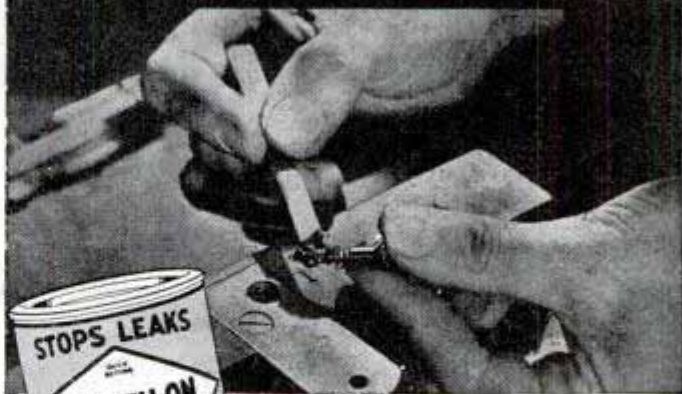
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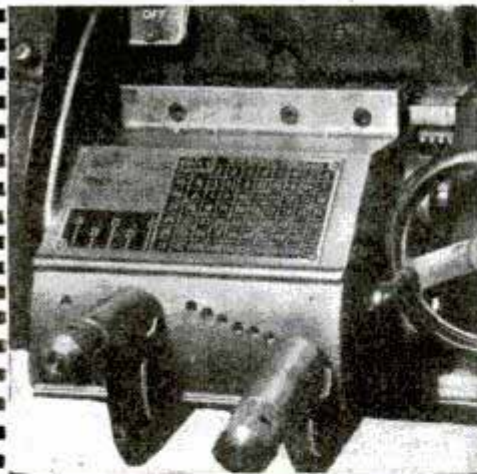
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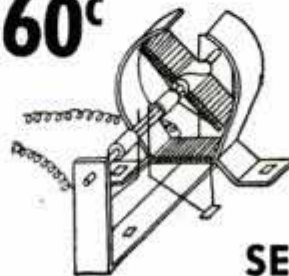
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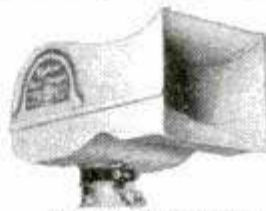
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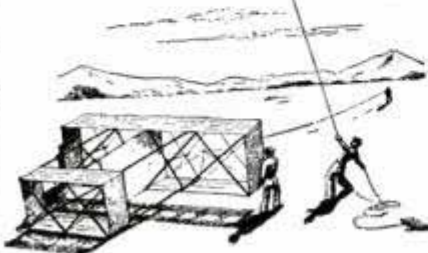
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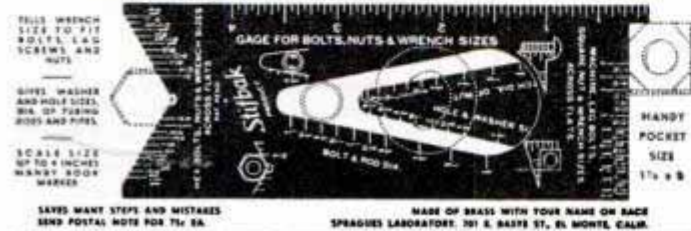
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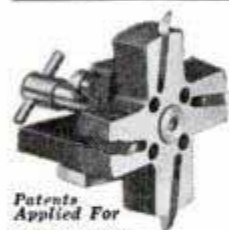


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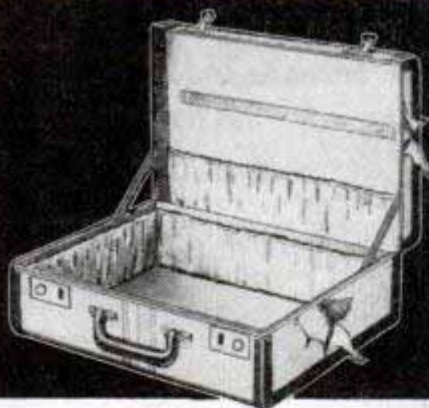
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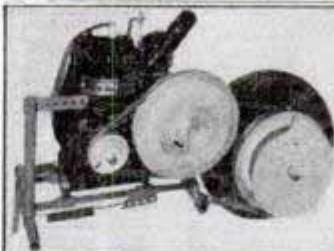


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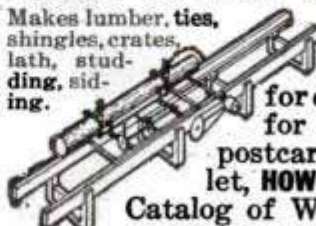
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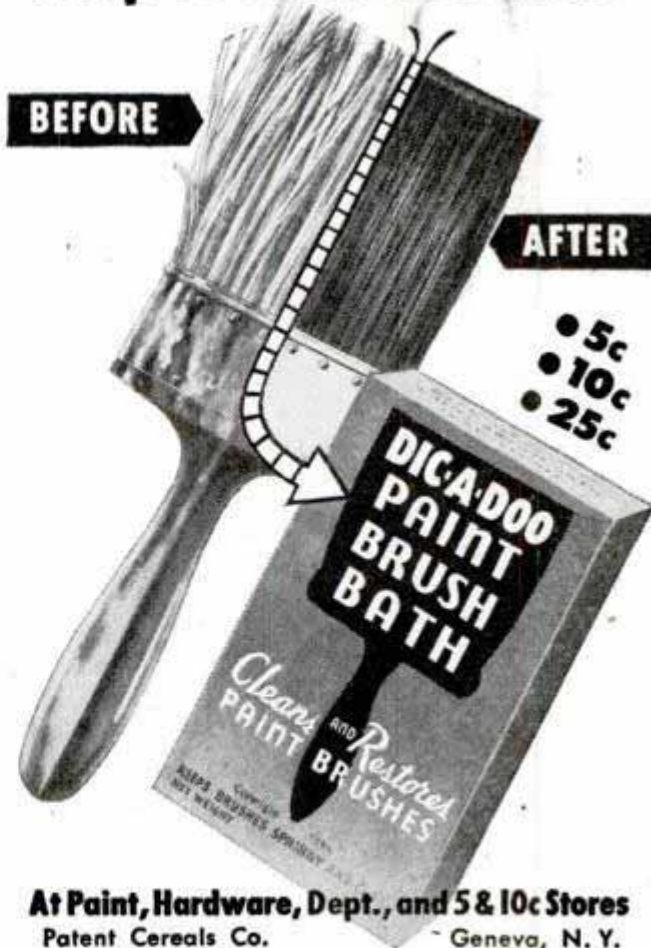
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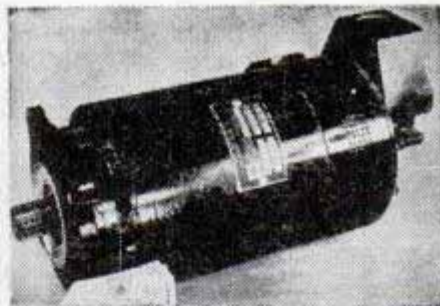
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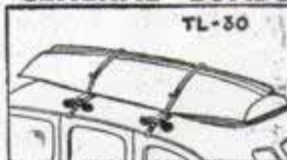


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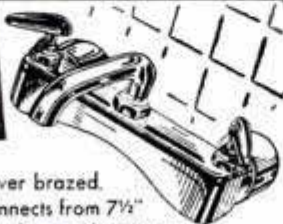
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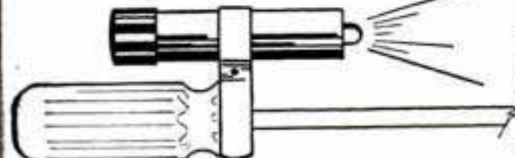
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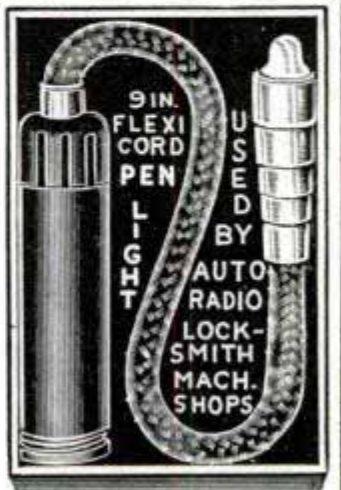
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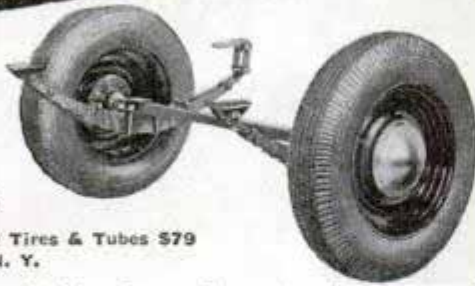
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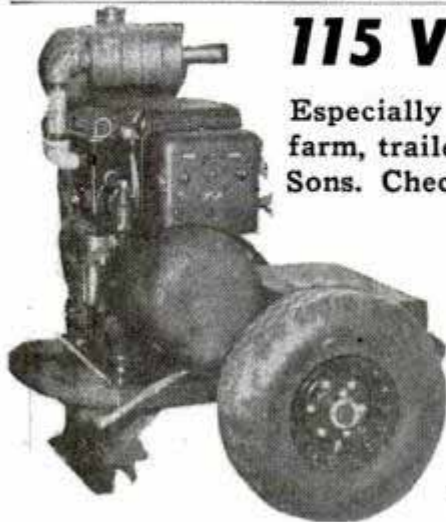
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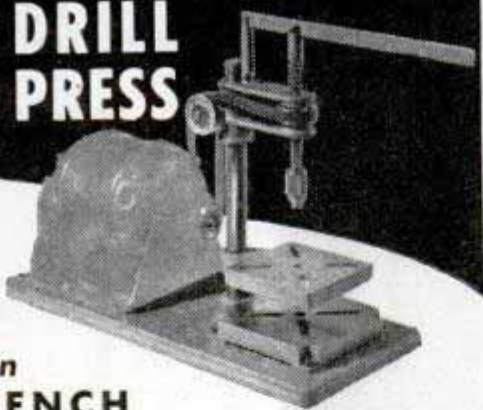
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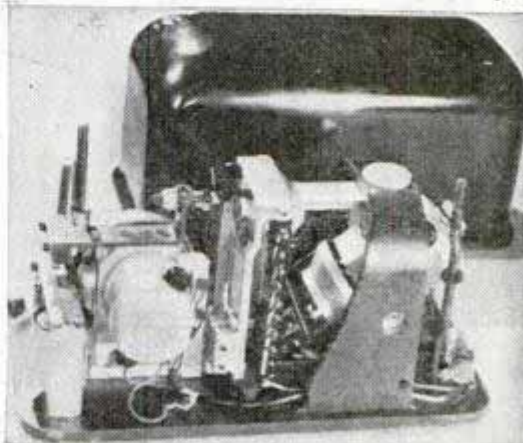


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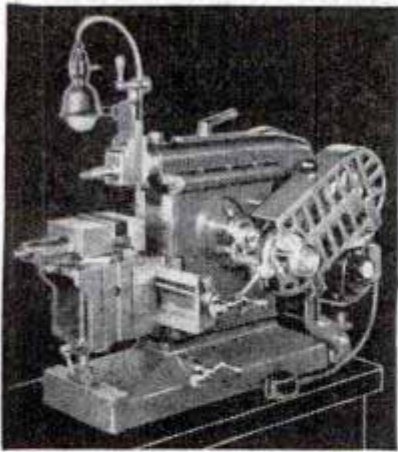
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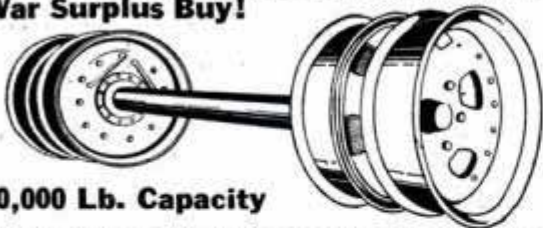
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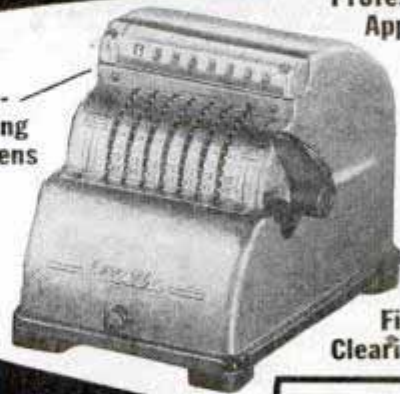


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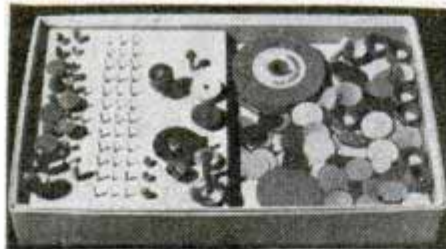
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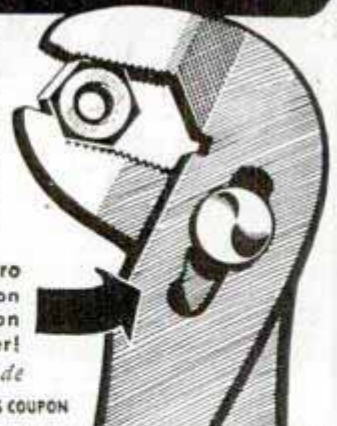
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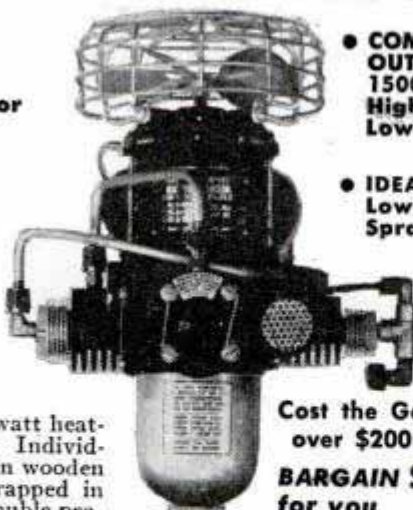
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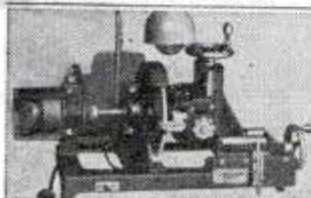
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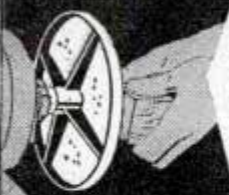
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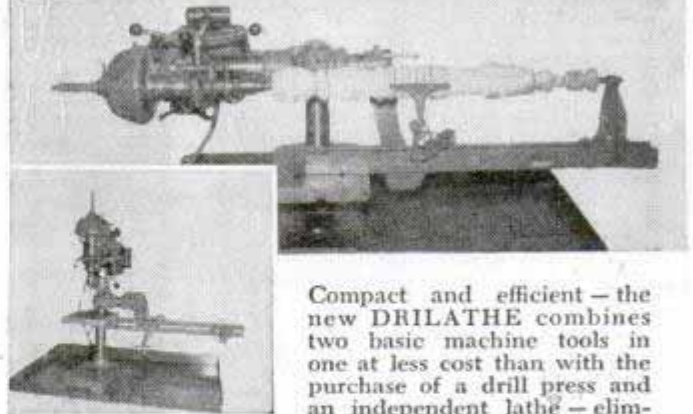
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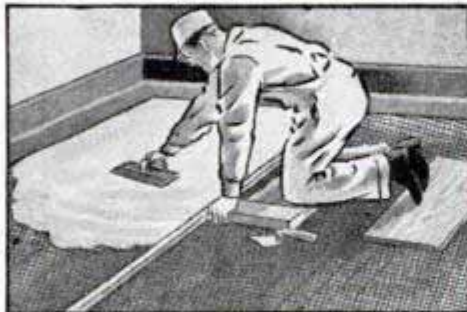
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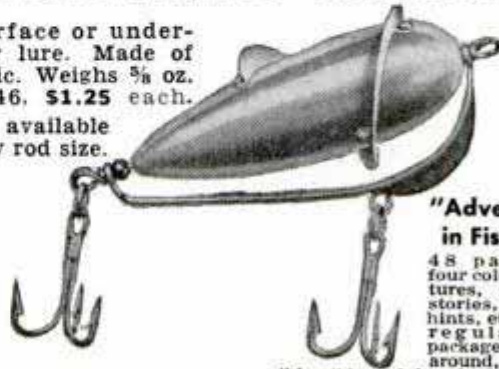
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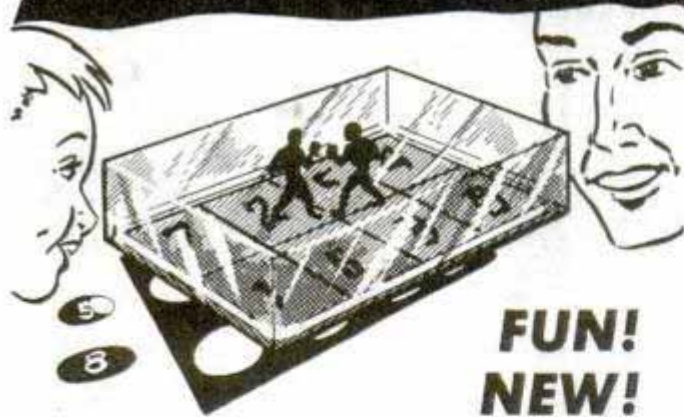
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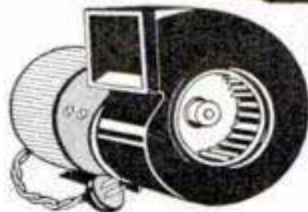
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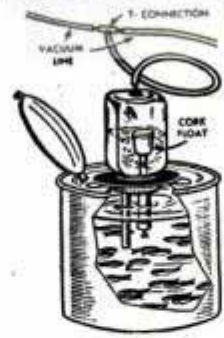

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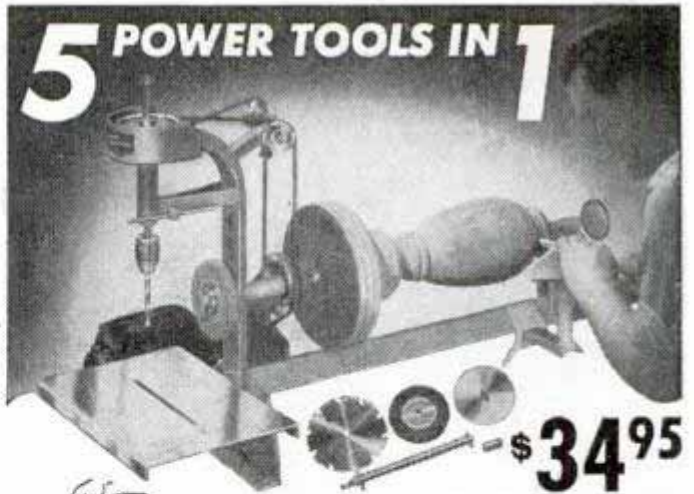


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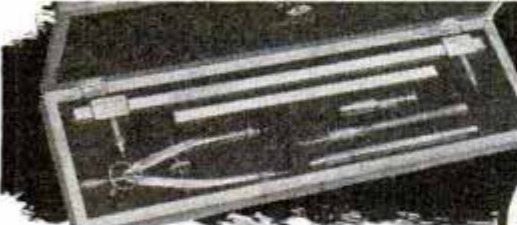
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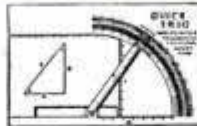
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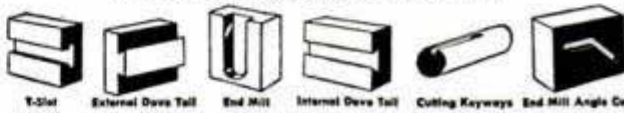
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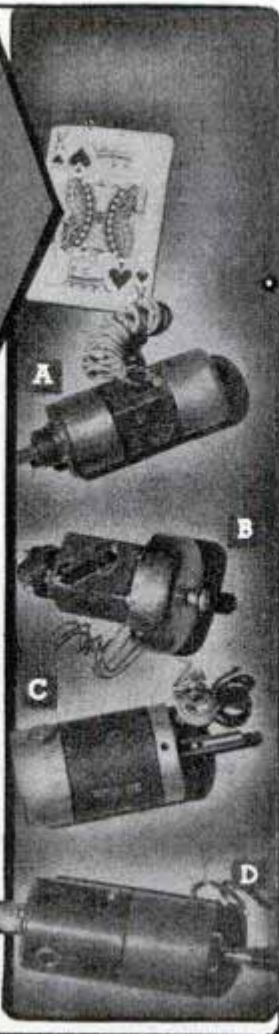
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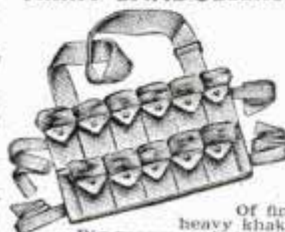
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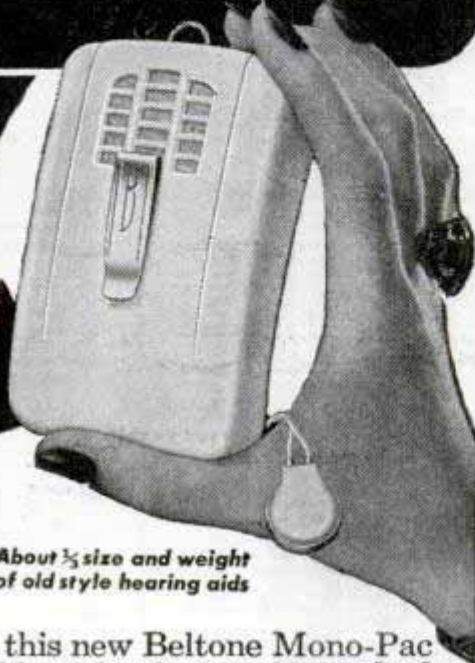
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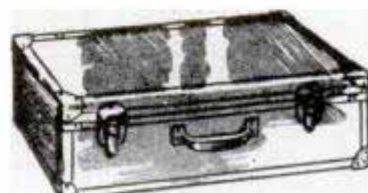
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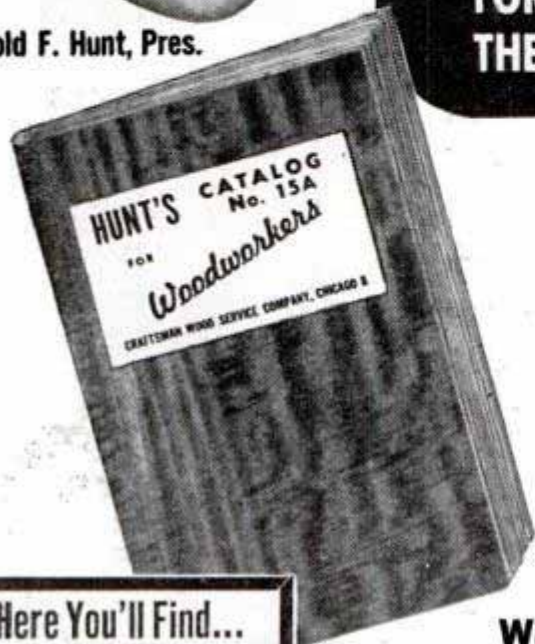
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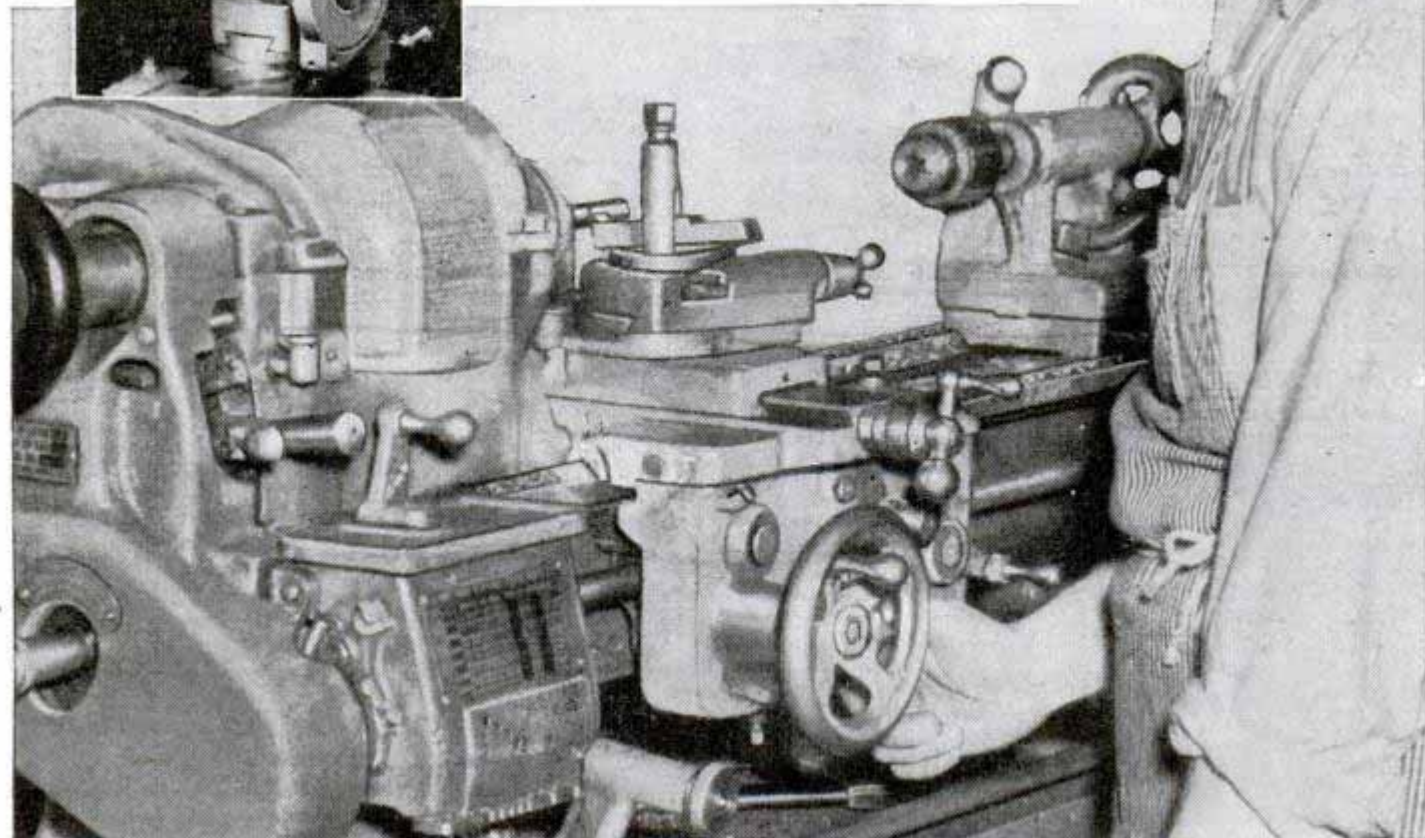
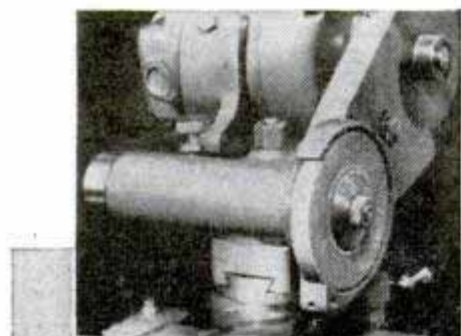
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