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See page 118



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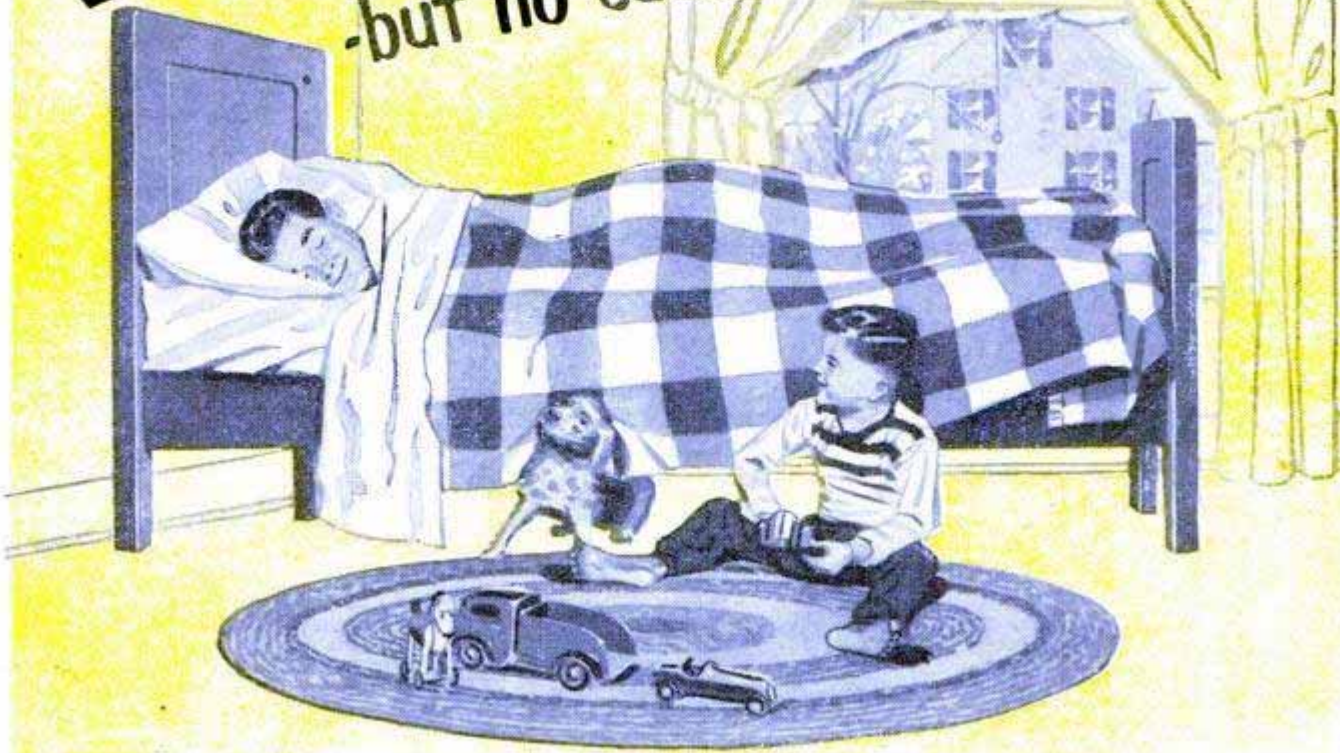
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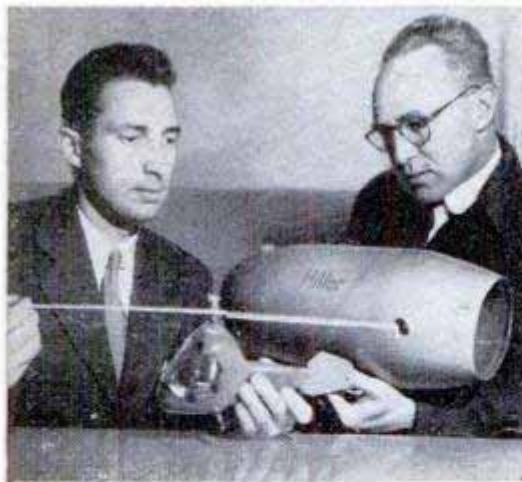
H. H. WINDSOR, Founder

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



this month's cover

ROOM IN YOUR garage for this little helicopter? It's the new Hiller "Hornet," a two-place, inexpensive fly-bug. Western Editor Tom Stimson was the first man, except for designers, to see and cruise in the craft. It's powered by watermelon-size ramjets. His flight begins on page 118



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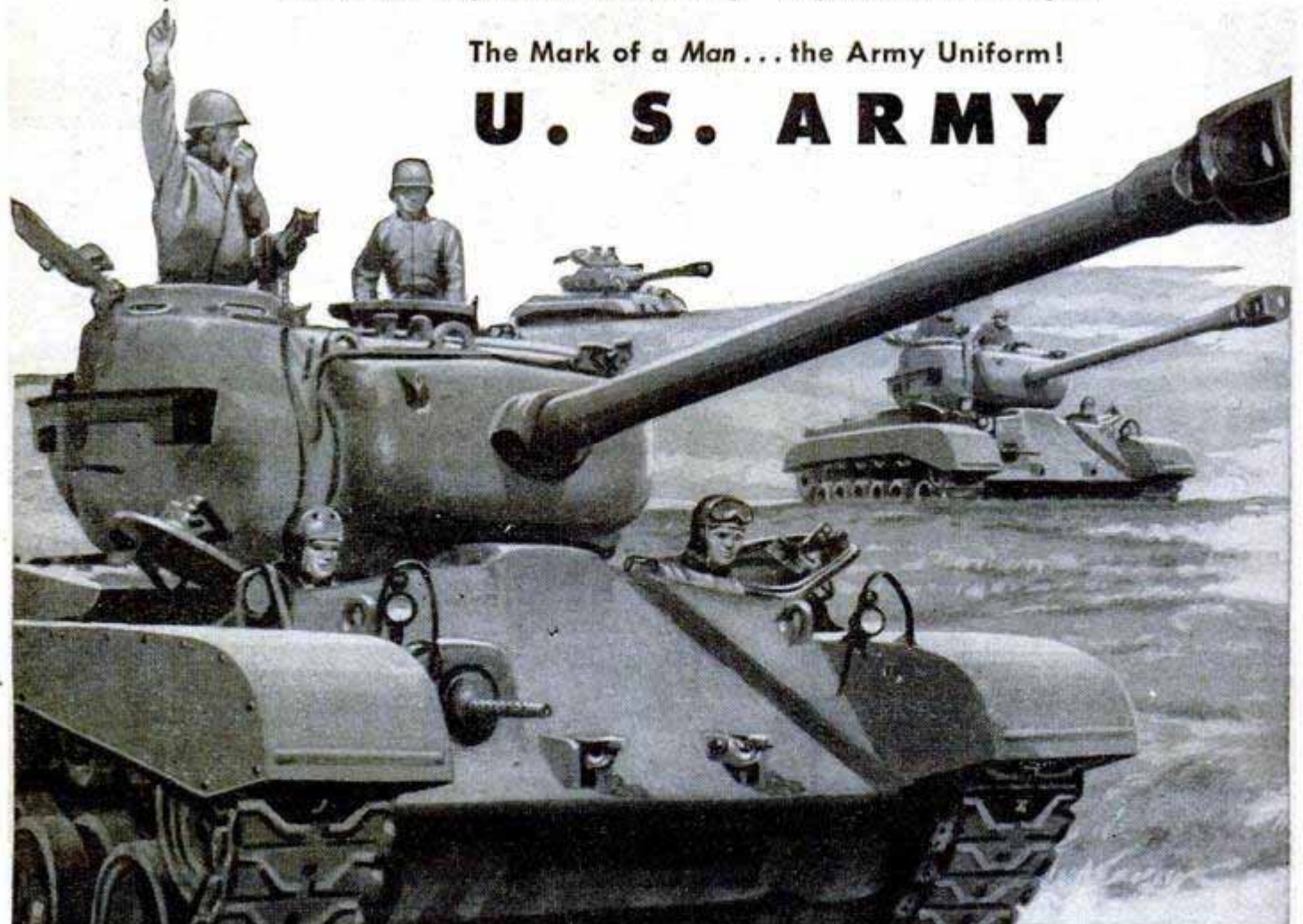
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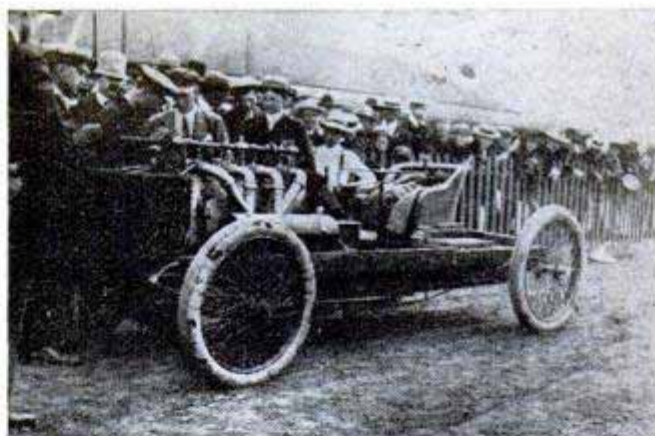
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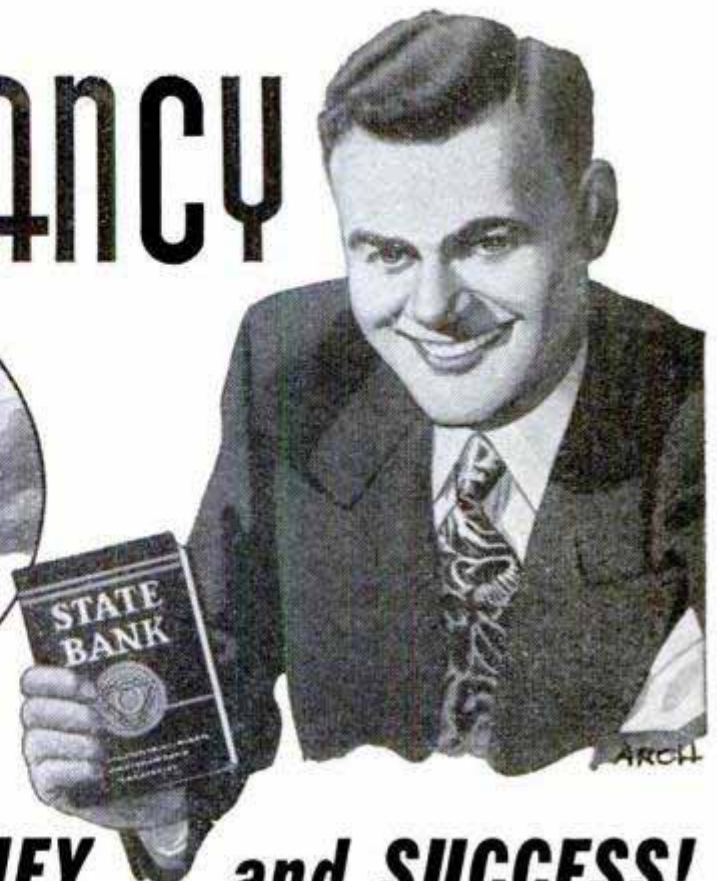
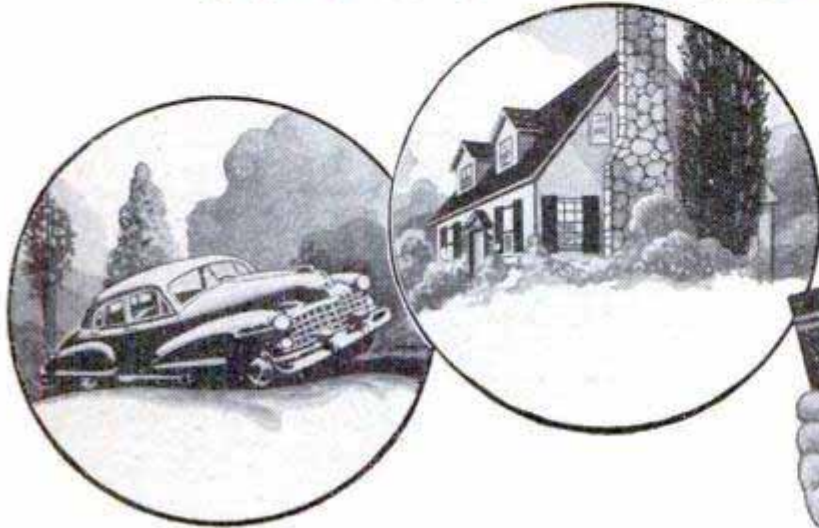


Letter to the Editor

Re your article on page 131 of the September issue of PM wherein you state that the two keel beams of fir 18" x 20" x 97'-0" were the longest timbers ever handled by an old-time Washington mill, may I inform you that a Washington mill in 1903 furnished six timbers 24" x 24" x 100'-0" that were shipped to St. Louis and used in the construction of the Washington State building at the Louisiana Purchase Exposition in 1904? As proof I am inclosing herewith a picture of this building taken while I was a Jefferson Guard (Badge #375) at this, the greatest of all "World's Fairs." Your publication of this would be very

(Continued to page 8)

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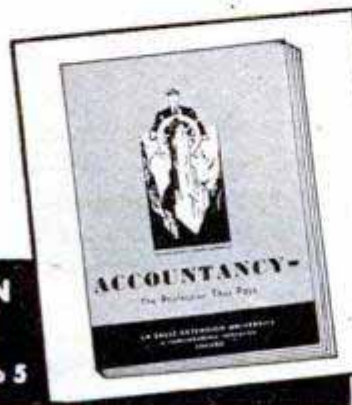
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TRAIN IN MIAMI--AIR CAPITAL OF THE WORLD

(Continued from page 6)

much appreciated as it might enable me to get in touch with some of the few surviving guards. Thanking you, I am

Owen Hawkins,
2623 White Oak Dr.,
Houston 9, Tex.

P. S. You might also be interested in the other picture I am inclosing which was taken at the Lexington, Ky., race track in 1903 and shows Barney Oldfield (with cap) standing immediately behind the radiator and tinkering with some part of his car—maybe cleaning a spark plug—of his "BIG 999" built and financed—if I remember correctly—by Henry Ford.

Letter to the Editor

The picture of the Porsche car on page 163 of the October *Popular Mechanics* is of special interest.

This is the postwar version of the German Volkswagen and has been described by an English source as the one good thing that came out of the war.

It is a rear-engine car, with the engine weight over the rear wheels. This is a most important point, not incorporated as yet in our American cars.

For over a hundred years, our railroads have accepted the principle of weight over driving wheels. Shipbuilders would never think of constructing a ship that would be "down by the head." Any 10-year-old kid knows better than to try to row a boat with his weight in the bow. Yet millions of front-end-heavy passenger autos are turned out from our assembly lines year after year.

Depressing the height of today's cars to the point where one has to crawl down into them is another proof of the impossibility of stabilizing a decelerating front-end-heavy car.

It is high time that American cars be built with the engine in the rear.

Sincerely,
Arthur W. Stevens, President,
Automobile Safety Association,
Boston, Mass.

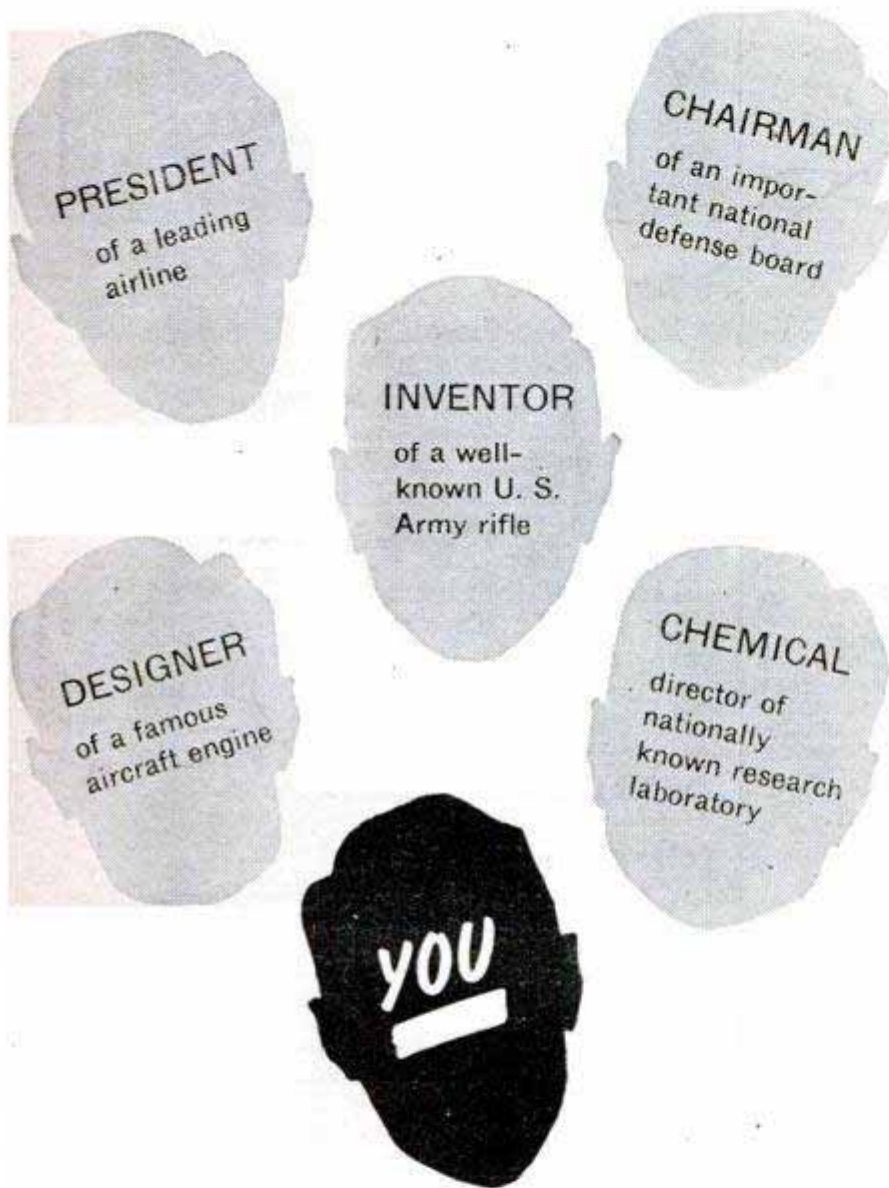
China Church Bells

Church bells made of china have been installed in a rebuilt church in Leipzig, Germany. They are small—about the size of a man's hat—and give out sweet and pure tones when lightly tapped with mechanical hammers. They are made of famed Meissen ware. The small china bells can be heard all over the city by means of an amplification system.

(Continued to page 10)

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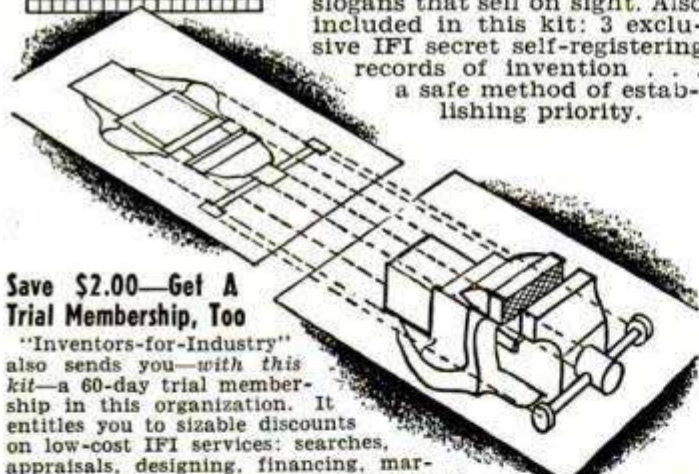
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(Continued from page 8)



What's New?

Remember the old saw "there's nothing new under the sun"? Magazine editors never get a chance to forget it. A case in point is the mechanical elephant we described on page 113 of our October issue. It looked like a novel idea to us. It did, that is, until we got a letter from L. F. Adams of Opp, Ala., describing a mechanical elephant that he saw in Hollywood, Fla., back in 1937. Two small gasoline engines powered the 11-foot beast. It could walk, run, dance, flap its ears, wave its trunk and blink its eyes! Some repertoire for a mechanical elephant. Here, 14 years late, is the Florida mechanical elephant.

Letter to the Editor

I have read with considerable interest Part I of the article concerning the Military Air Transport Service which appeared in the December 1950 issue of *Popular Mechanics Magazine* under the title "I Rode the Airlift to the Orient." It made excellent reading.

I deeply appreciate your publication's interest in MATS as evidenced by your sending Mr. Richard Dempewolff to Japan at the cost of considerable time and effort to obtain the complete factual material about our command.

On behalf of all personnel in MATS, I wish to extend my thanks to you for presenting the MATS story in such a readable, interesting and factual manner. We are all looking forward to the publication of Part II of this article.

Sincerely,
 Laurence S. Kuter,
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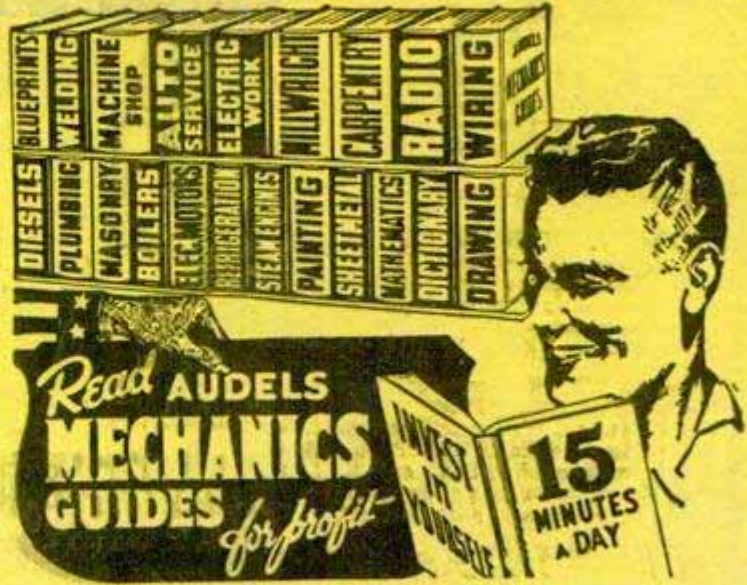
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PHILLIP G. LOUISVILLE, Louisville 8, Ky., says, "I have been operating Servicing business 3 years I did \$14,000 business; net profit \$2,000."



S. W. DINWIDDIE, Chicago, Ill., writes, "After finishing course, we started servicing shop. No. 1 Engineer of WCUN Police Radio Installation."



A. HERR, New Castle, Pa., writes, "Have doubled my salary since starting in Radio full time. Am employed by Station WKBO as transmitter operator. Future looks bright to me."



L. HAUGER, San Bruno, Calif., tells us, "I accepted a position as Radio and Television Technician . . . promoted to manager of Television Service and Installation."



LEANDER ARNOLD, Pontiac, Mich., says, "While learning, made \$5 to \$10 a week repairing Radios in my spare time. Now I have a spare time shop in my home."

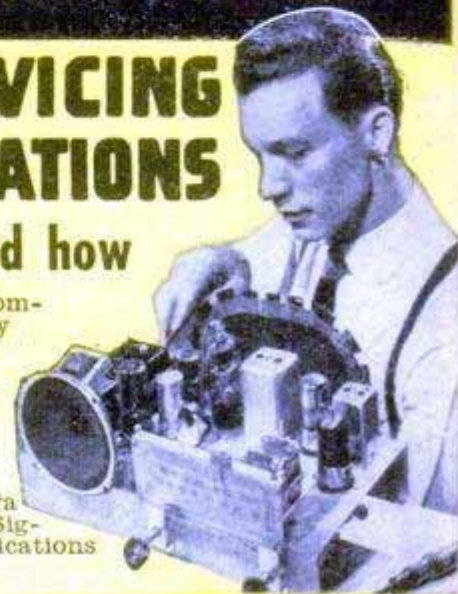


NORMAN H. WARD, Ridgefield Park, N. J., writes, "4 years ago, I was a bookkeeper with a hand-to-mouth salary. Now I am employed by a key ABC station."

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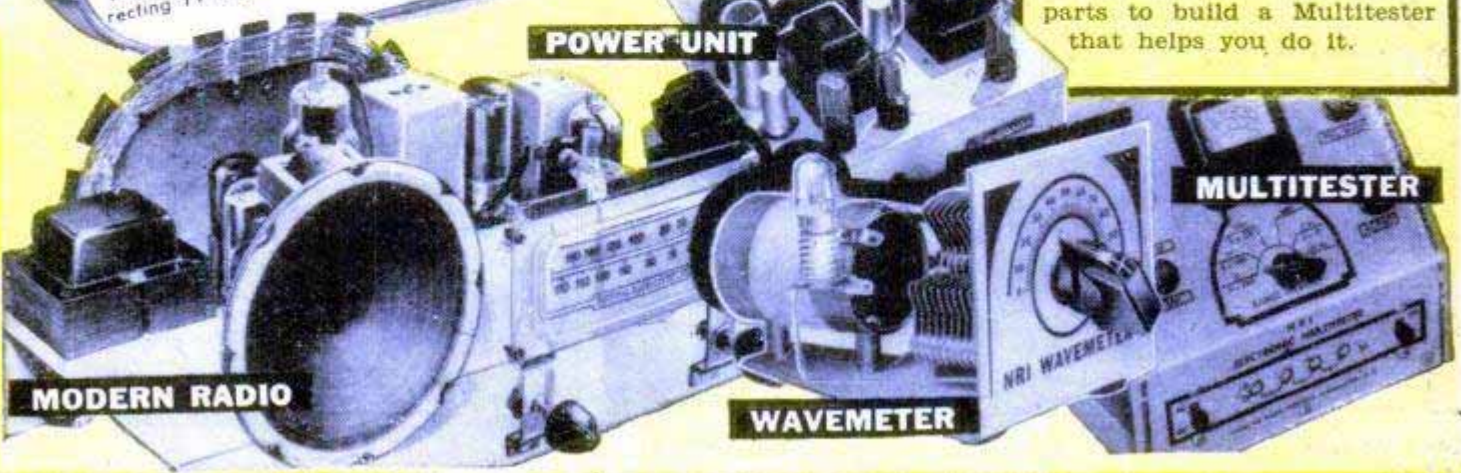


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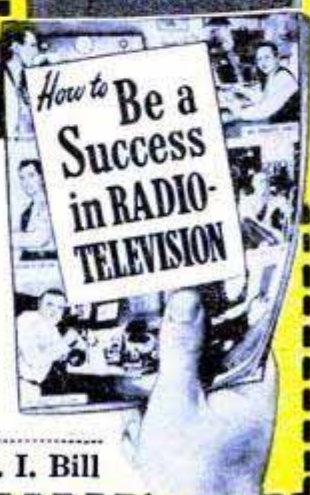
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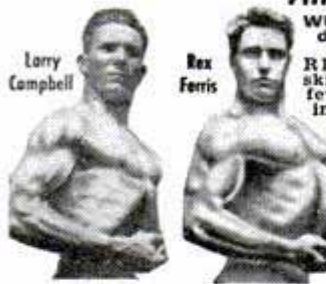
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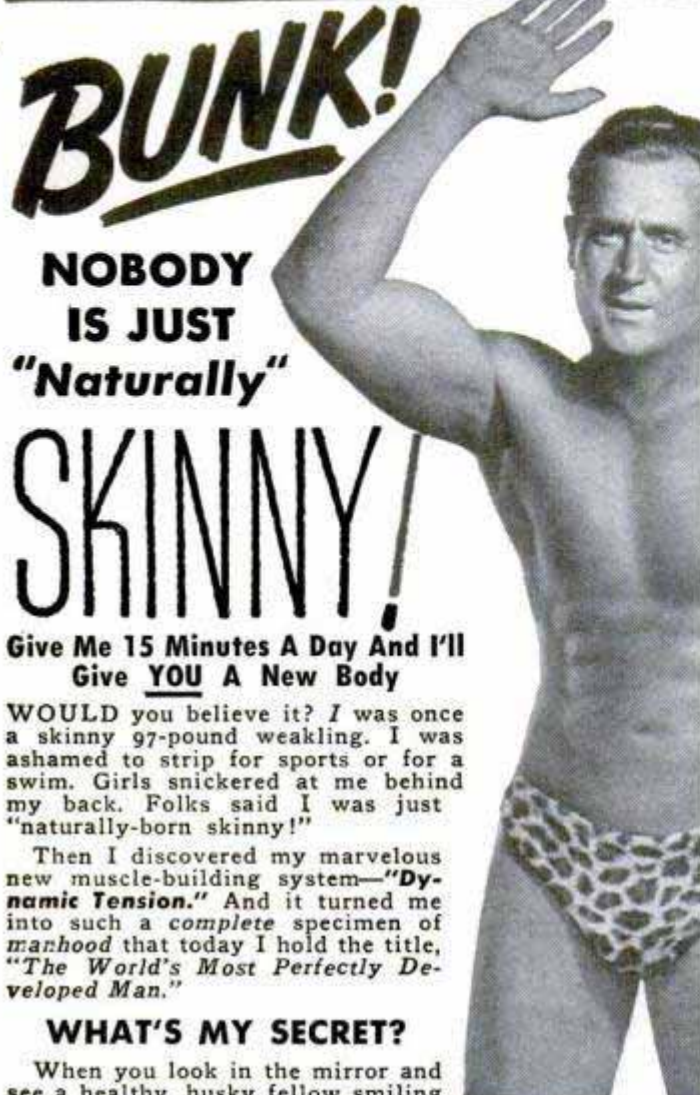
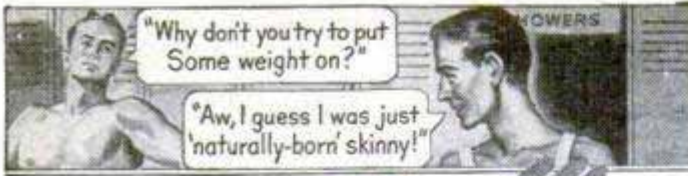
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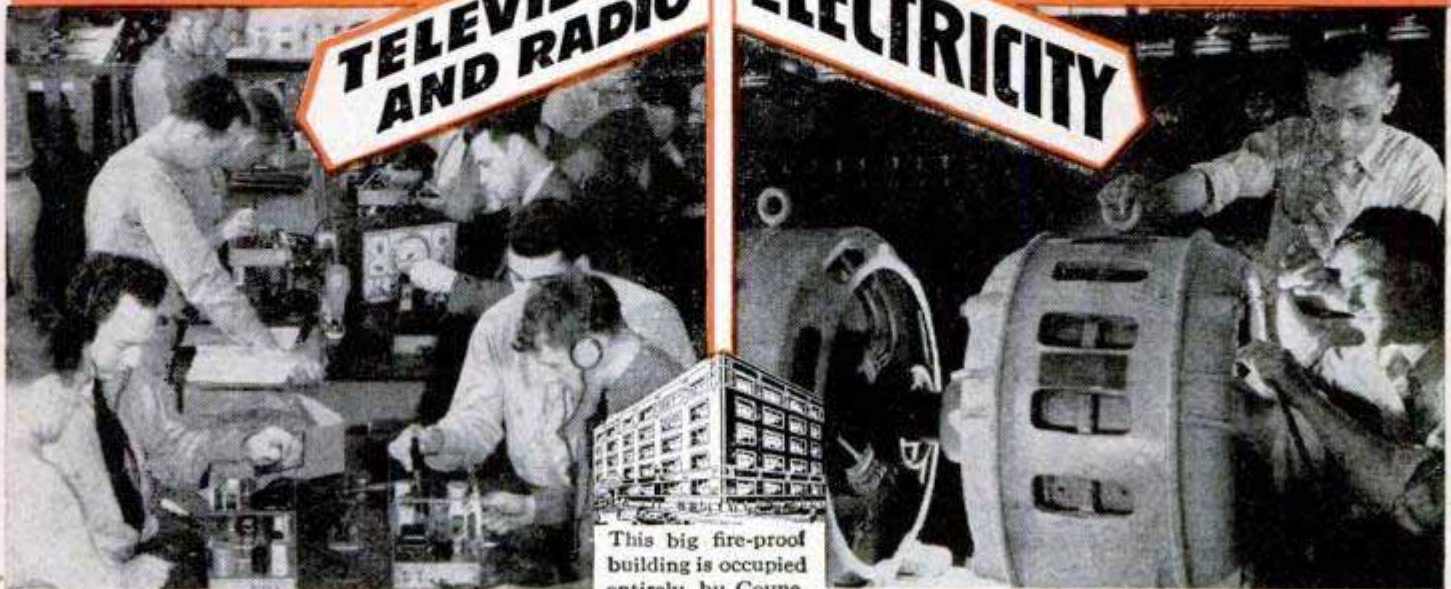


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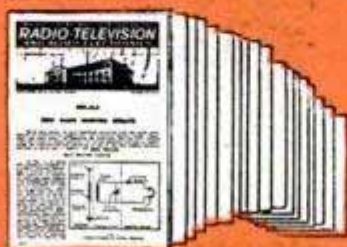
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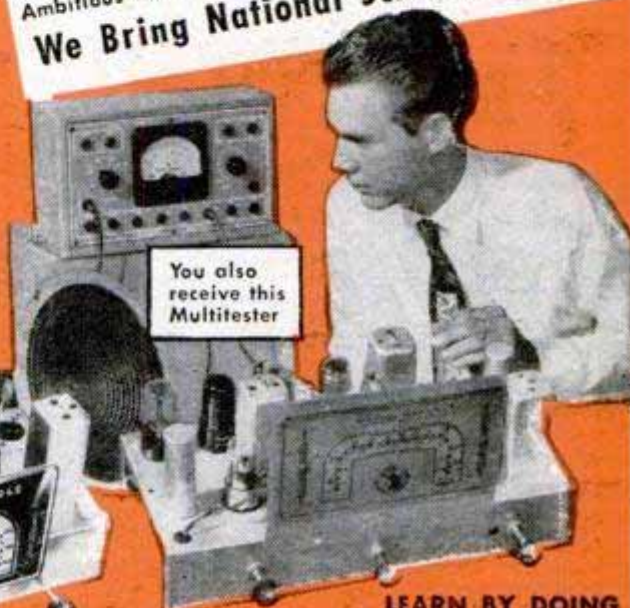
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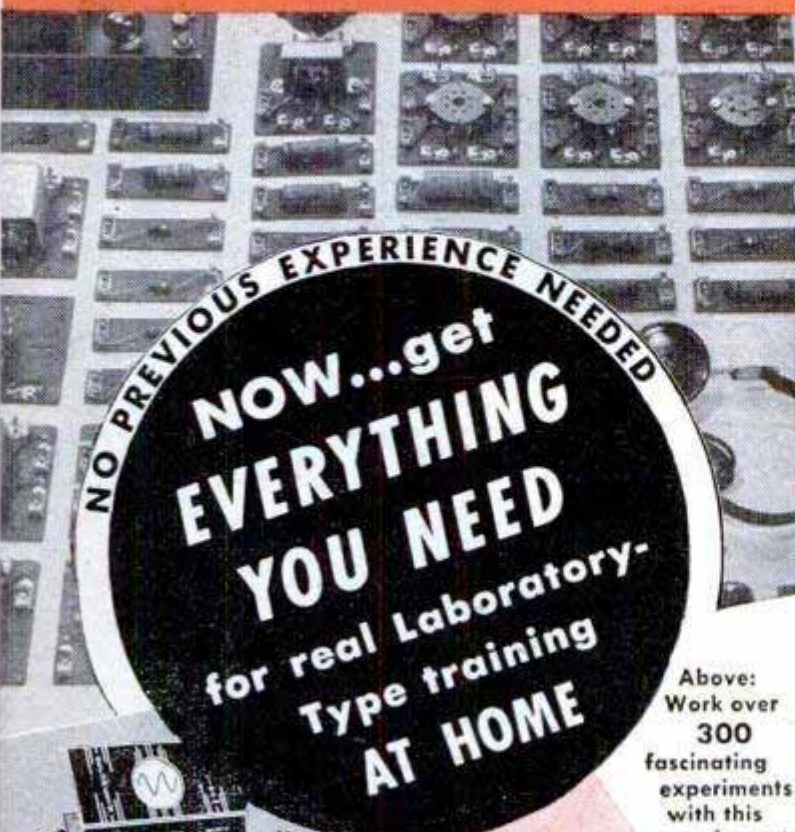
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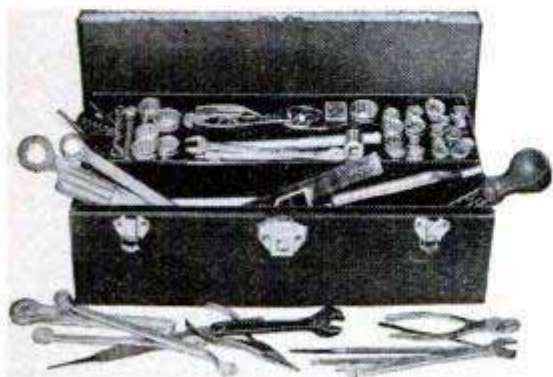
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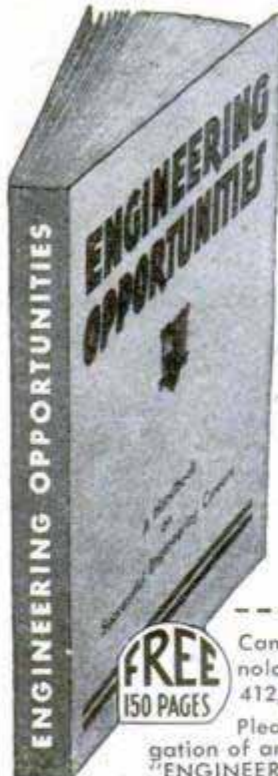


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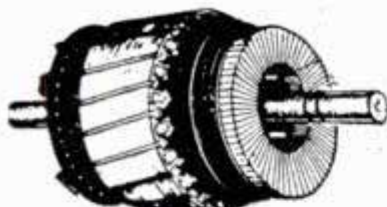
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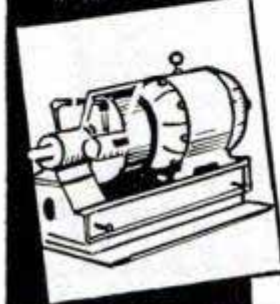
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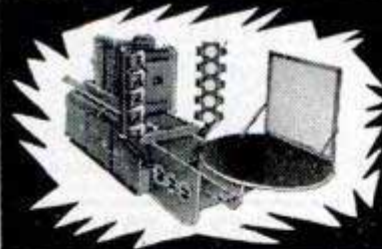
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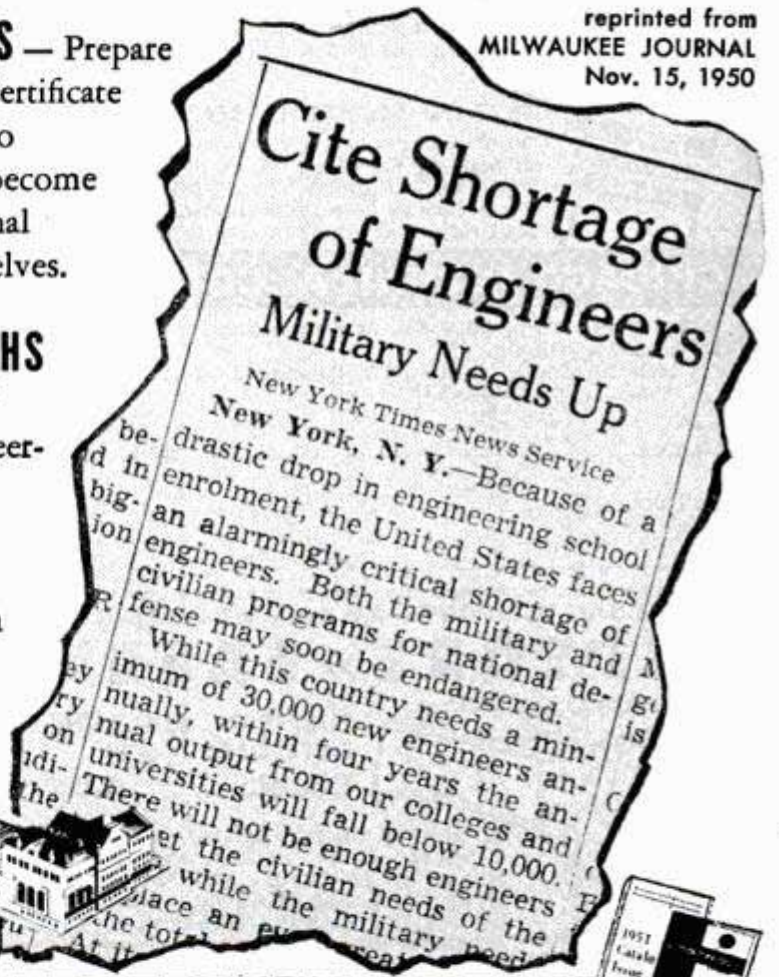
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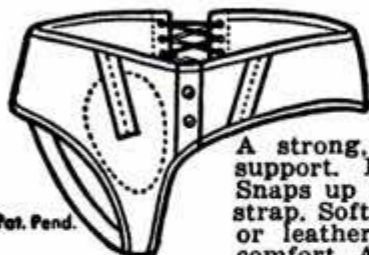
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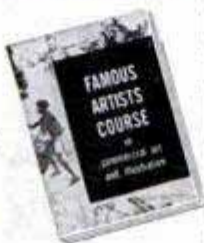
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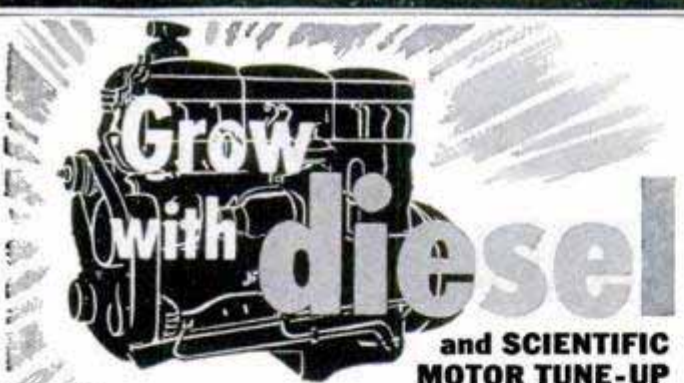
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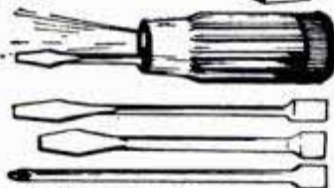
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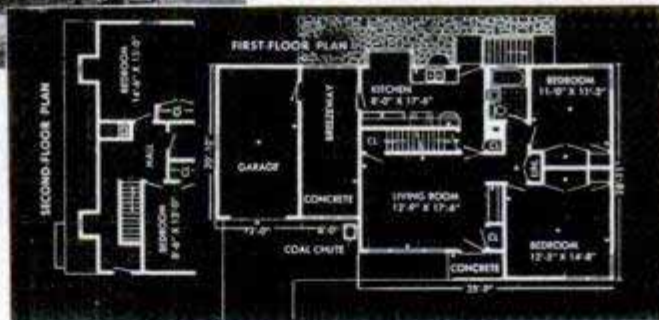
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MAKE Money making new greaseless doughnuts at home on electric machine. Wholesale to grocers, drug stores, cafes, hamburger shops. Send for free recipes and plans. M. Ray Company, 3605 South 15 Ave., Minneapolis 7, Minnesota.

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

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

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

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

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

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

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

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

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

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

MONEYMAKING OPPORTUNITIES

RESURFACE Butcher's chopping blocks with easy, fast-working, portable electric machine. Unique service in wide demand with little competition. Large steady profits from full or part-time work. Hill Machine Company, Box 677B, Rockford, Ill.

SELL! Buy! Trade! Anything! Read, Trading Post Magazine 15c. Thorne's, 525 Dewey, Jackson 30, Michigan.

ELECTROPLATE Brass, nickel, chrome, baby shoes. Free information. Electroplate, Box 293, Red Lion, Penna.

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

MAKE Silhouette portraits at home. Easily learned. Fascinating work. Offers good moneymaking opportunity. Sample, details, free. J. Odell, Route 4, Warren, Ohio.

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

WE Need more song poems. Ritas Service, Mt. Carmel, Ill.

WHAT Are your old stamps worth? Look them up in our price guide. 128 pages, 1,000 illustrations, 10,000 prices. Only 25c—satisfaction guaranteed. Harrisco, 802 Transit Bldg., Boston.

NEW—Unusual opportunities in "Backyard Profits!" Interesting booklet free. Pickett's, Florence, Kentucky.

PUBLISH Your Own Magazine. Well edited, illustrated. Brings you prestige, profits. 25c brings sample, details. Sullivan, Pub., 6168 Westminster, St. Louis 2, Missouri.

UNPAINTED Plaques, book ends, novelties free. List. Plastercraft Arts, 1611 E. Fifteenth, Cheyenne, Wyo.

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

\$25.00 PROFIT A day. Complete plan with working sample, 50c. Holmes, Kings Highway, Independence, Missouri.

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

MONEY Made easily at home. Details and free copy of trade publication, 25c. A & A Sales, 18-A City Terrace, Newburgh, N. Y.

NEW Sure fire method of making big money with small camera. Free information. Spicers, D-22, 1834 Milburn, Indianapolis 2, Indiana.

SHELLCRAFT! Make beautiful seashell jewelry and novelties, income or hobby. Supplies, instructions. Pace's, Cortez-M, Florida.

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

MAKE Seamless billfolds at home. Good income. No experience needed. Write to Max Products, HEM 805 East Walnut, Louisville 4, Ky.

CHURCHES Organizations, receive \$130. 12-Tables, sell advertisements for tops. Unique Gift Club, Pine Hill, New Jersey.

DOLLARS Three ways with "Kitty-Kat" read-cut baby shoes. Complete local and mail order plans. Write No-Co-Ro, Oakland 6-K, California.

PROFITABLE Mail order 10c. Copper Hill Sales Service, Copper Hill, Va.

BOOKKEEPERS: Earn up to \$520 month part or full time serving small firms. Simplified system; free details. Tax Saver System, Dept. B, Fort Worth 2, Texas.

MAKE Money! Raise birds in spare time. "Parakeet Breeding For Profit" and copy of cage-bird magazine, \$1.50. American Canary Magazine, 3449 N. Western Ave., Dept. PM, Chicago 18, Illinois.

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

WOULD You pay 3%—first \$350 made? Book "505 Odd Successful Businesses" free! Expect something odd! Pacific-PM, Oceanside, Calif.

QUICK Profits taking magazine subscriptions, handling greeting cards. Cassell Publishers Service, Westfield, N. J.

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

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

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

CHEMISTRY

OH Boy! New book of science. Experiments, formulas, secret processes, together with catalogue of laboratory supplies, only 25c. National Scientific Company, Dept. 16, 2204 W. North Avenue, Chicago 47, Illinois.

SAVE On chemicals, supplies. Catalog 10c. Laboratory Sales, Box 161, Brighton, Mass.

URANIUM Ore sample, weighing scale, catalog of chemicals, apparatus, kits, \$1.00. Catalog only, 10c. Rex Laboratories, 2849-A Birchwood, Chicago 45, Illinois.

LABORATORY Apparatus, chemicals, microscopes, complete chemistry sets, minerals, uranium ore. 10c brings catalog. Porter Chemical Company, Hagerstown 1, Maryland.

CHEMICALS And apparatus for industrial, analytical, and private laboratories. Catalog 15c. Dept. M-50, Biological Supply Co., 1176 Mt. Hope Ave., Rochester, 20, N. Y.

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

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

PLASTICS

NEW Liquid plastic. Clear, colors. Cast without heat. Embed flowers, insects, coins. Saw, drill, carve. Free folder. "Liquid Magic" shows fine things you can make and sell. Write today. Castolite, Dept. B-101, Woodstock, Illinois.

LUCITE Plexiglas. Any size sheets, masked. Square foot (12 x 12) cost, 1/16", \$1.20; 1/8", \$1.40; 3/16", \$1.75; 1/4", \$2.08. Colors add 10%. Include 10% postage. Almac Plastics, 230 Fifth Ave., New York 1, N. Y.

HI-PROFITS, Internally hand carved plastics. Gift jewelry. Free catalogue. Pilot Plastics, 67C Fulton St., New York City 7.

LUMINESCENT Plastics, casting liquids, rods, sheets. Send 25c for list and samples. Storn Plastics, Box 324, Niagara Falls, New York.

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

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

PLASTICS—Complete line. Wholesale, retail. We make our own full-color carving dyes. Casting plastic at quantity prices. Catalog, bargain lists, ideas, instructions, 10c. Gem-O-Lite, Box 686B, North Hollywood, Calif.

FORMULAS, PLANS, ETC.

ANTI-Freeze and nearly 500 other moneymaking formulas 50c. Nelko Chemical Service, 3462-BA Merchandise Mart Sta., Chicago 54, Ill.

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

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

MILLER'S Modern post-war formulas make products that get the business and pay. Fifty years supplying the best. Literature free! Miller, Research Chemist, Tampa, Florida.

OVER 100 Profitable formulas only \$1.00 postpaid. Charlow Company, Box 223, State Capitol, Albany, New York.

CHEAP Automobile polish. Information 10c. Write James Lamont, Beacon, New York.

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

FORMULAS, Trade secrets, for nearly everything. Catalog free. Creative Publishers, Winnetka 6, Illinois.

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

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

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

HELP WANTED

SAIL Ho! Be a merchant seaman. Enjoy good pay—world travel. Bonuses now being paid. Write for free information. Seaways, Box 47, Old Chelsea Sta., New York City 11.

\$5 HOUR Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

AGENTS WANTED

WIN Real cash. Even beginners make handsome profits selling new 21 for \$1.00, 3-dimension everyday greeting card assortments. Novelties, gift wraps, household items. Free samples imprinted stationery, napkins, notes. Deluxe all-occasion samples on approval. Bonus. Special offers. Write Pilgrim Greetings, 111 Summer, Dept. AN-7, Boston, Mass.

BUY Wholesale, earn big money selling thousands nationally advertised products at big discount. No stocks to carry. Sent free "The Wholesale Plan." American Buyers Service, 629P Linden, Buffalo, N. Y.

ABSOLUTELY Free! Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 7004, Cincinnati 25, Ohio.

SELL Razor blades. Sample 100, \$1.00 prepaid or c.o.d. Mack's Distributor, Mt. Vernon, Illinois.

NO Experience needed to make money fast for yourself or organization. Sell gorgeous new all-occasion assortments. 21 cards \$1.00. Valentines, Easter cards, religious, novelties, unusual gifts. Scented stationery, notes, wrappings. Over 100 items. "Get Started" plan. Write for samples on approval. Hedenkamp, 361 Broadway, Dept. PM-11, New York.

FREE Samples, and amazing plan, giving you gorgeous dress without penny cost. Rush name today with dress size. Harford, Dept. 335, Cincinnati 25, Ohio.

TIRE Whistle—Blows when you have a puncture; easily installed on valve stem. Agents sample set \$2.98. R. J. Hall Co., 240 E. 19th Ave., Denver 5, Colorado.

STRANGE "Dry" window cleaner. Sells like wild. Replaces messy rags, liquids. Simply glide over glass. Samples sent on trial. Kristee 124, Akron, Ohio.

AGENTS Wanted. One in each larger city. Employed teachers, ministers, librarians preferred. Receive telephone inquiries for USA's oldest and largest exclusive restorers of paintings. Helzer, Box 333 GPO, New York 1, N. Y.

GREETING Card salespeople. \$50 without risk. Sell America's leading 21 card everyday boxes; samples on approval. Amazing newest gift items. Free samples 150 for \$1.00 personalized stationery. Write today. Lorain Art Studios, Dept. F-44, Vermillion, Ohio.

BRAND New! Amazingly different and smart everyday cards, 21 for \$1. Magic window designs. Take easy orders. Make up to 100% cash profit. Big line \$1 assortments, personal stationery, imprinted matches. Free imprint samples. Assortments on approval. North Star, 31 Glenwood, Dept. R-18, Minneapolis, Minn.

\$3.00 AN Hour selling cushioned shoes direct. Advance commissions. Bonus. No investment. Experience unnecessary. Free outfit. Samples. Paragon Shoes, 739 Columbus, Boston, Mass.

AMAZING New way to earn money quickly and easily with gifts, stationery, cards. No experience necessary. Send now for free home demonstrator and all else needed. 2 best sellers on approval. Terry Studios, 501 Westfield, Mass.

NEW "Sponge" wall cleaner. Erases dirt like magic. Wallpaper, painted walls, ceilings. Saves redecorating. Lightning seller. Samples sent on trial. Kristee 123, Akron, Ohio.

JUST Out! New thrilling sensation in everyday cards. Rich foils, satins, velours sell on sight, 21 for \$1. Make up to 100% profit. 50 assortments, imprint stationery and book matches, gift items. Two \$1 assortments on approval, imprints free! Joy Greetings, 507 N. Cardinal, Dept. G-60, St. Louis, Mo.

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

OUR Agents make big money selling all-occasion greeting cards. Terrific box of 21 only \$1.00. Over 75 other boxes. Profits to 100% plus bonus. Free samples. Kit on approval. Regal Greetings, Hazel Park 55, Michigan.

MAKE Perfume. Big profits. Mailorder. Expect secrets. Write Imasco, 6347 Parnell-MA-2, Chicago 21, Illinois.

DO You need money? \$40.00 is yours for selling only 50 boxes of our 200 greeting card line. And this can be done in a single day. Free samples. Other leading boxes on approval. Many surprise items. Experience unnecessary. Free samples personalized stationery, napkins. Write today. It costs nothing to try. Cheerful Card Co., 117 White Plains, N. Y.

MEXICAN Feather pictures. Sell on sight; 200% profit! Free details; sample 10c stamps. Sylvia-P1, Apartado 9036, Mexico City.

EXTRA Cash—easy! Sell friends newest design 21 for \$1.00, dark card, novelty all-occasion greeting card assortments, gift wraps, animated books. Profits to 50c per \$1.00 box. Special offers. Bonus. Prompt service. Experience unnecessary. Write today for free samples name imprinted scented stationery, napkins, book matches, feature assortments on approval, free catalog, selling plans. Elmira Greeting Card Co., 2209 Elmira, New York.

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

YOURS For free trial—everything you need to make extra money! Experience unnecessary. Big profits. Bonus. Request feature all-occasion greeting card assortments on approval, free samples name imprinted stationery, napkins, towels, free catalog, selling guide and surprise gift offer. New England Art Publishers, North Abington 418B, Mass.

NYLON Uniforms. Immediate delivery, immediate profits. Sell to doctors, dentists, nurses, waitresses, beauticians, housewives. Free sales kit. Superior Fabrics, Dept. P-2, 3936 Market, Philadelphia 4, Penna.

EASIEST Money you ever made! Big commissions selling work shoes guaranteed six months, exclusive cushioned shoes. Free outfit. Concordian Shoes, 8-A West Concord, Mass.

MAKE Money calling on friends! Show nationally advertised greeting card assortments—new all-occasion assortment and laugh-packed barrel-of-fun assortment. Sells for \$1.00—up to 50¢ profit for you! Also personal notes, gift wrappings, stationery, gift items, others! Get two assortments on approval. Write Wallace Brown, 225 Fifth Ave., Dept. S-4, New York 10.

FREE—Mexican novelty curiosities. Fast selling. Exceptional profits. Panamericana, Apartado 9318, Mexico City.

NYLONS Direct from factory to wearer. Only way you get fresh nylon, that's why can guarantee against runs. Sample free. Pay high comm. Advance cash plus 40% bonus. Sell women necessities needed all year; nylon slips, panties, gowns, robes. Also Ergim gold chains and religious medals. Become manager, have your own salesmen. We pay 40% comm. on salesmen's earnings. Ergim Co., 992 Columbus Ave., New York.

125 RAZOR Blades \$1.00 postpaid in America. Warren Wallace, Kittell Road D, Fayetteville, N. Y.

BUY Direct. Extra discount. Power mowers, 11 models. Delivered. Rotacut, R-2012, Excelsior Springs, Mo.

CASH Profits handling most attractive greeting cards. Amazing values. Complete line. Samples free. Arro, 2749 Garrison, St. Louis 6, Mo.

UP To \$50.00 in a week spare time, and tailored suit for yourself without paying one cent. Write for plan, and free sample case. Stonefield Corp., 532 S. Throop, Dept. P-817, Chicago 7, Ill.

NEED Extra cash? Take orders for personal initialed belts and buckles, cap badges, tie holders, etc. Choice of 3000 emblems. Free sales kit. Hook-Fast, Box 1425PM, Providence, R. I.

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

SELL Wood photograph albums. 50% profits. Catalog free. Wood Album Co., 54 Jefferson St., Brooklyn, N. Y.

AT Last! Something new and sensational in everyday cards, 21 for \$1. Make extra money fast! Show satin, velour, metallic cards. Get orders easy. Big line \$1 assortments, scented stationery, personal matches, kiddie books. Imprints free. Two \$1 boxes on approval. Puro Co., 2801 Locust, Dept. 140-B, St. Louis 3, Mo.

PAINTS—All kinds. 65¢ gallon up. Private label. Big profits. Certified Products, Louisville, Ky.

FAST Profits—No investment. Send for big, free catalog. Plastic aprons, tablecloths, etc. 150 sure-fire items. We guarantee sales. Write The Halliday Company, Dept. M-2, 15-19 Pennington Ave., Passaic, N. J.

POSITIVELY New—Over 100% profit. Two sided reversible neckties. Free details. Farrell Company, Dept. P-19, 1377 Van Zandt, Cincinnati 31, Ohio.

SELL Arcadian cigars. 100% imported Havana tobacco. Hand made. Steady, repeat profits. Free folder. Seco Cigars, 87 South Drive, Rochelle Park, New Jersey.

FREE Water and our concentrates make flavors, lotions, shampoos, perfumes, cleaners, polishes, 125 products, free catalog. Qualco, E-20030 Russell, Detroit 3.

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

BE A money maker. Use your home as magazine headquarters. Liberal commissions. No experience—No capital needed. Everything furnished. Write for free catalog. McGregor Magazine Agency, Dept. 500A, Mount Morris, Ill.

\$5 HOUR Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

SCHOOL Seniors! A postal will bring you our wonder, Kwick-Sell Cardalog of popular graduation name cards. Biggest profits! Only firm giving free Golden Memory Book and Souvenir Chest. Don't miss out. Hurry that postal! Craftcards, Box 235 (L), Pittsburgh 30, Penna.

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

FREE Sample nylon stocking of world's only nationally advertised hosiery line actually guaranteed against runs, snags or excessive wear, regardless of cause! It's amazing but true. Every weight from sheerest 15 denier to heavy 70 denier—all gauges to luxury 60 gauge. Amazingly low prices, starting at \$1.08 prepaid for sheerest 15 denier 51 gauge. Not sold in stores. Good Housekeeping guarantee seal. Also complete line men's hosiery guaranteed one full year or replaced free. Full variety lingerie in crepe, satin and nylon, featuring all nylon slip at \$2.95, satin slip at \$1.58, etc. Housecoats and robes. Kendex sales people will earn one million dollars this year. Get your share. No money or experience needed. Pay nothing now or later. Just show free outfits. Write orders. We deliver and collect. Advance cash plus huge bonus. Earn money spare or full time. Become manager; appoint others to sell for you; earn steady income on their sales. Man or woman—young or old, you can earn more money than you ever thought possible. Everything you need is furnished free and prepaid, including nylon stocking, samples of materials, sales books, 36-page salesmanual, color cards, etc. Simply write your name and address on postcard and mail to Kendex Corporation, Babylon 23, N. Y.

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

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

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

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

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

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

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

WHERE To buy 800,000 articles direct from manufacturers. Including hundreds of scarce items. Sent free. "Your Profits Under the Spotlight." Glass Publishing Co., Ellwood City, Penna.

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

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

HIGH-GRADE SALESMEN

EXTRA Money easy, taking orders for world-famous Stark-Brand apple, pear, peach, other fruit trees, grapes and berries. Gorgeous flowering shrubs, roses, etc. Sensational patented, hardy, quick-growing varieties. Enormous demand for yards, small plots, farms. No experience needed. Rush name for free plate book and sales kit. Stark Bro's., Dept. 961, Louisiana, Mo.

BIG Cash profits for men and women introducing Flexiclogs, sensational new flexible footwear. Experience unnecessary. Nationally advertised styles for women, children, men. Excellent sideline, no investment. Easy to average hundreds of dollars weekly. Free sales helps and sample offer. Get details now! Flexiclogs, Dept. L-2A, New Holstein, Wisconsin.

RICH Opportunity for men in their 50's. Healthful, pleasant occupation. No investment needed. 150 of our men made \$500 to \$3,000 in one month; many just beginners. Heckman made \$104 first 2 hours. Crowley made \$224 first day; exceptional earnings. Openings available. Write President, Box 711, Dept. PM, Fort Worth 1, Texas. (If you live in Canada write: President, 25 Industrial St., Dept. PM-2, Leaside [Toronto], Ontario.

FREE Sample and information: Sensational new fishermen's article. Nelson Company, Dept. F, St. Paul 2, Minnesota.

MAKE Money with Merritt. Sell Davis Air Cushioned Shoes, dress, work, heavy duty. Popular priced. Advance commissions. Cash bonuses. Experience unnecessary. Write to Geo. Merritt Shoe Co., C52, Brockton, Mass.

GET Into big profit leather jacket business. Horsehide, suede, capeskin, all fine quality leathers, low factory prices. Write Mason S100, Chippewa Falls, Wisconsin.

SALESMEN—Sell our "Leader Specials," America's finest, biggest line of advertising specialties. Sensational sellers to all types of business. Big commissions advanced. Sensational sales plan nets you top earnings. Free outfit. Charms & Cain, 407 South Dearborn, Dept. 300, Chicago.

EARN Big money fast! Sell finest-quality advertising work uniforms to garages, factories, filling stations, etc. Free selling kit. Topps, Dept. 532, Rochester, Ind.

ADVERTISING Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. M-251, 7530 Greenwood, Chicago.

AMAZING Discovery, Master Glaze, puts brilliant glass-like surface on cars. Free sample, information. Big commissions. Master Glaze, Dept. 703, 7720 Harwood, Milwaukee, Wisc.

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

EARN Spare time extra money. Show amazing cushion comfort shoes. To \$3.25 commission per pair, plus big cash bonus. Experience unnecessary. Write for free catalog, full information. Tanners Shoes, 778 Boston, Mass.

MEN 30 Or older. Top earnings. C. H. Libbey made over \$7,081.25 last year, even more this year. Call on building owners, schools, etc. with famous maintenance product. 30% commission. Write in detail. Vice President, Dept. MC, Box 789, Fort Worth 1, Texas.

AD Matches! Sell amazing designs—20, 30, 40 and 240-light book matches. Big spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. Match Corp., Dept. PM-14, Chicago 32, Illinois.

SELL Art and commercial calendars. Advertising specialties. Over 1000 good-will items. Diversified line. Highest commissions. Territorial protection. Send \$1.00 refundable deposit for prepaid initial set of samples. Standard Calendar Company, Madison, Illinois.

WANT To make real money? You can positively make \$50.00 a day and up selling a brand new item going to every type of food and beverage store, factories, laboratories, hospitals, etc. First time advertised. Write for free details today. Johnson-Hartman, 53 West Jackson Blvd., Dept. PM-2, Chicago 4, Illinois.

A Fine income, your own nylons free! Show nylons, lingerie, men's socks with amazing free replacement guarantee against runs, snags, tears. Write for free sales kit. Group organizers invited. Rosalee Hosiery Co., Clifton 58, N. J.

SELL Our waterproofings, floor mastic, cement hardener, etc. (30 items) to maintenance men, building owners, contractors. Can start part time. Commission. Territory. Write Haynes Products Co., Desk 6, Omaha 3, Nebr.

\$5 HOUR Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

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

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

BOOKS on every subject. Written in Popular Mechanics famous easy-to-understand style. Profusely illustrated. Subjects include workshop planning and practices, projects, hobbies, household repairs, motoring, outdoor sports, photography, home building and many others. Also booklets on specific topics. Illustrated catalog free. Popular Mechanics Press, 200 E. Ontario, Chicago 11, Ill.

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TEACH Yourself to play piano quickly, right at home. Professional method, easily learned. Ingeniously arranged guide for teaching children included. Amazing proof free. Write today. Music Teachers' Associates, 26 Potters Lane, Great Neck, N. Y.

ANNOUNCING Home study course in commercial baking. Practical basic training. Good field for those with aptitude. Nearly depression proof. Send for free booklet, "Opportunities in the Baking Industry." National Baking School, 835 Diversey Parkway, Dept. 3431, Chicago 14, Ill.

YOU For president of your own credit-collection business. Many who answered our ads now have their names on office doors. Franklin Credit, Roanoke 7, Va.

BOOKKEEPER, Male or female. Study practical credit management with an experienced credit man. J. Cooke, 116 St. Stephens Street, Boston, Massachusetts.

HAWAII, Lava specimens, appr. 4"x4"x2", from Mauna Loa 1950 eruption, world's largest active volcano, amazing, educational, useful. Post paid \$1.00. Volcanic Curio Service, P.O. Box 854, Honolulu, Hawaii.

PHOTOGRAPHY For pleasure or profit. Learn at home. Practical basic training. Long established school. Write for free booklet. American School of Photography, 835 Diversey Parkway, Dept. 3431, Chicago 14.

FREE Bible correspondence courses—Adult, junior, offered by world-wide radio Bible broadcasters. Write: Voice of Prophecy, Box 55, Los Angeles 53, California.

ACHIEVE Business and financial success in your own collection-credit agency business. Home or office. Quickly learned. Free folder. Write Cole & Associates, Syracuse 2, N. Y.

LEATHER Carving, Fascinating, highly-paid art; age-old secrets now taught for first time in home study course. For hobby, profession or profitable business, write: Baird School of Leather Carving, Box 1367-M, Dept. 12, Manitou Springs, Colo.

"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. 1102-C, Pleasant Hill, Ohio.

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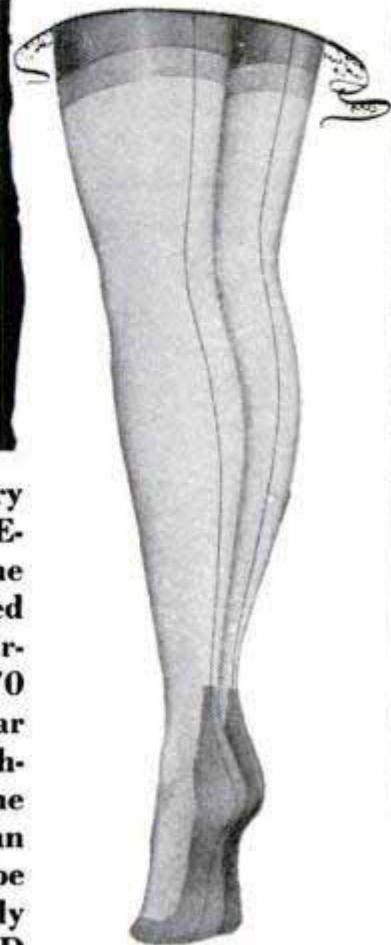
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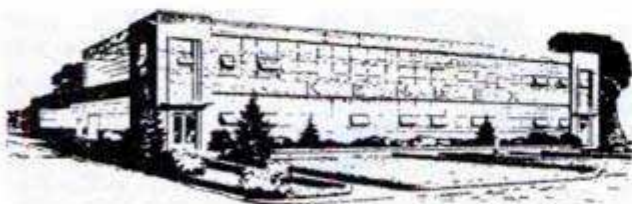
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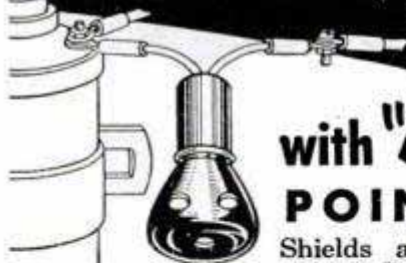
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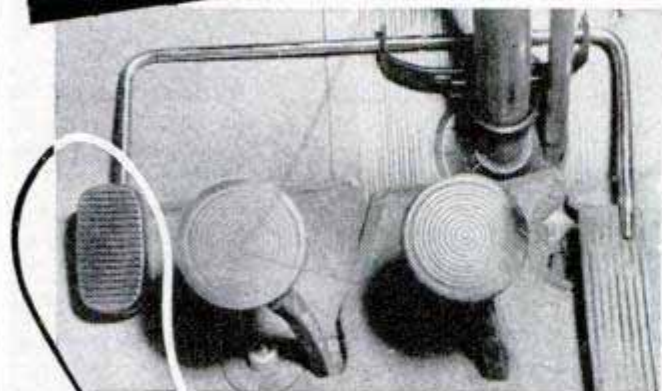


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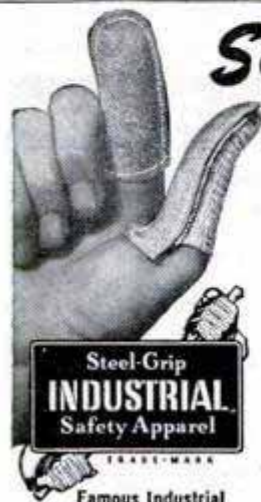
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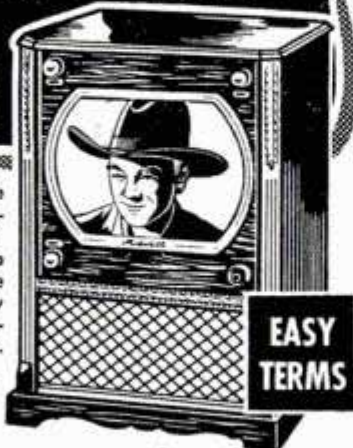
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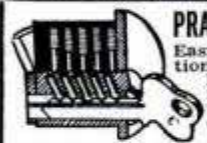
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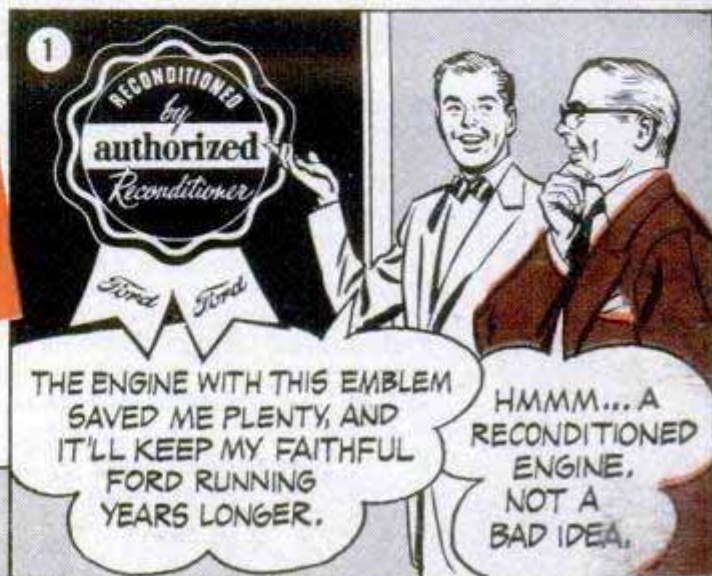
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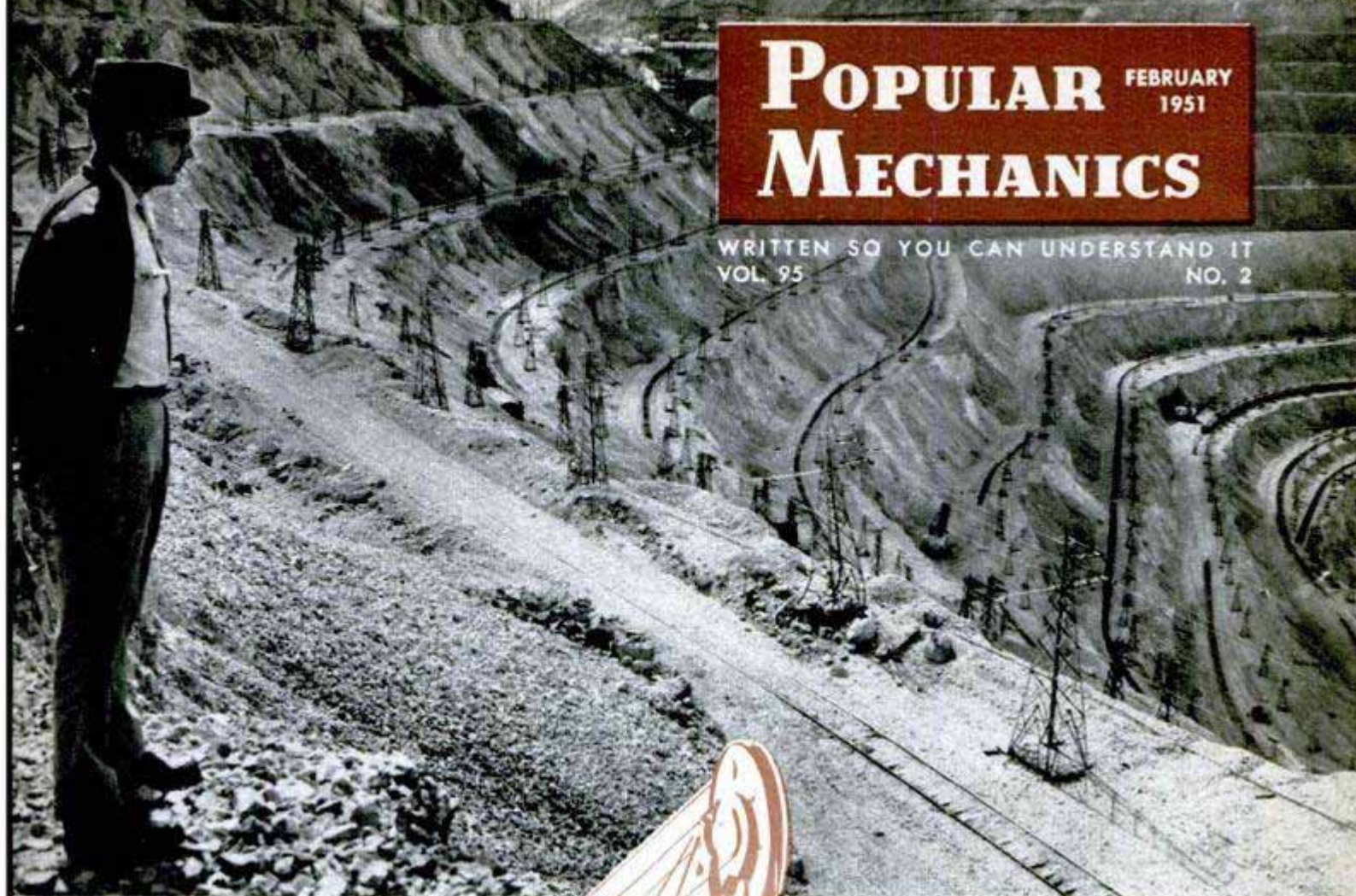


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So vast that its ore trains look like scale models, Bingham Canyon produces nearly one third of our copper

By Thomas E. Stimson, Jr.

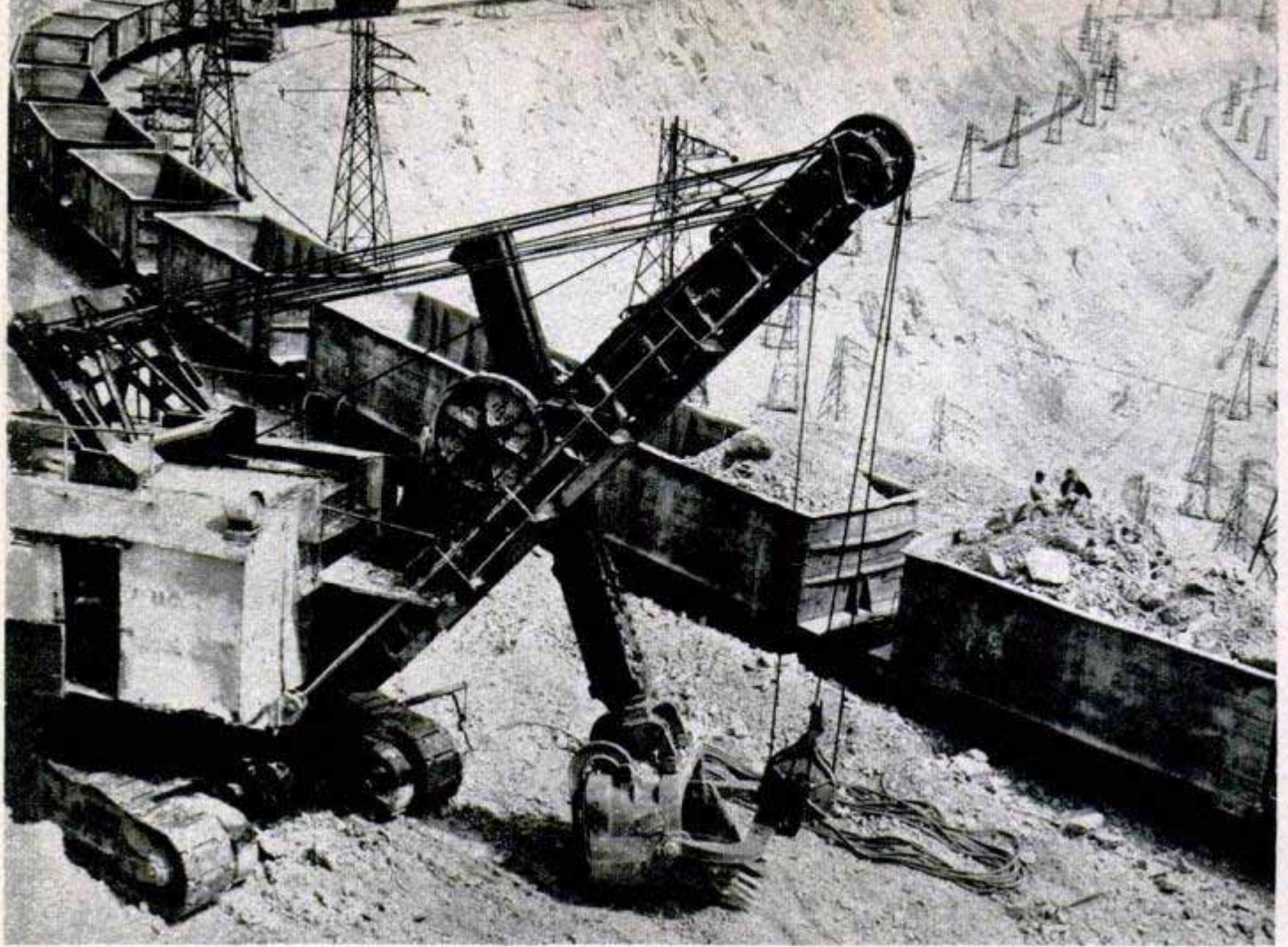
Digging Deeper For RED METAL

ALMOST LIKE the cut-rate merchant who claims that he loses money on every sale but makes it up by the volume of business, mining engineers can make a profit from virtually worthless copper ore if there is enough of it.

You'd starve to death if you tried all by yourself to extract the copper from a low-grade deposit that ran, say, one percent in metal. After a full day of treating 10 pounds of rock you'd get about an ounce of copper, worth less than two cents.

But when you put 4500 skilled men on the job and give them plenty of heavy equipment, including a full-size railroad, a miracle occurs. Instead of one ounce per man, production jumps to almost 250 pounds per man per day. Working together, the men can produce some 200,000 tons of copper per year.

That's what happened at the largest open-pit copper mine in the world, the Bingham Canyon



Each electric shovel takes a five-cubic-yard bite. Multiply that by 45 terraces and you've got Bingham Canyon

operation of the Kennecott Copper Corporation near Salt Lake City.

Pound by pound the Bingham Canyon ore isn't worth the trouble of stooping over to pick up, and yet this one mine produces nearly a third of all the newly mined copper that the United States produces, a twelfth of the entire world's production.

More than a billion tons of ore and waste have been removed from Bingham in the last 45 years and today it's hard to tell where the original canyon used to be. An

entire mountain that overlooked one side has completely vanished and even its roots have disappeared. The enormous pit where the mountain once stood measures 1960 feet from top to bottom.

This amphitheater is one of the man-made wonders of the world. It is so big that some of the shovel operators, powder men and other miners ride passenger trains to work; so vast that, from a public observation point, the numerous ore trains on the different working levels seem as tiny as the cars of a model railroad.

As canyon walls are gnawed away, this machine shifts the rails with them



Every year thousands of tourists from all parts of the country drive the 19 miles from Salt Lake City to have a look at the big hole. The tourists steer their cars up the narrow, twisting road to Bingham, negotiate a 6988-foot curved tunnel that pierces one wall of the amphitheater, and drive out onto an observation area.

Above their heads the walls of the pit slope back in a series of terraces or

steps. There are 45 levels on the walls of the pit, approximately 70 feet apart, and each is from 70 to 250 feet wide. Each level is widened by blasting the cliff that forms its wall. The loosened ore is loaded by electric power shovels onto the ore cars that are spotted on temporary trackage. The level is subsequently narrowed again by the blasting that takes place on the level below it. By this process the ore is mined in an economical manner and the amphitheater continues to widen.

The thing that impresses most visitors is the ore trains, constantly on the move. There are approximately 140 miles of trackage in the mine area and the transportation equipment includes sixty-seven 750-volt electric locomotives. The mine trains consist of 12 to 20 ore cars. A loaded train moves downhill out of the mining area to the near-by town of Copperton, where the cars are joined with others into 70 to 90-car trains for the 15-mile trip to the mills at Arthur and Magna on the shores of the Great Salt Lake. Two 125-ton electric locomotives handle the cars on this run. Traffic is heavy. In the mine area, there are flagmen in watch towers at the numerous curves to signal a clear track to the oncoming trains. On another part of the system, the operation of the trains is controlled by the same kind of centralized traffic control that is used by the major railroads.

At the mills the ore cars are turned up-

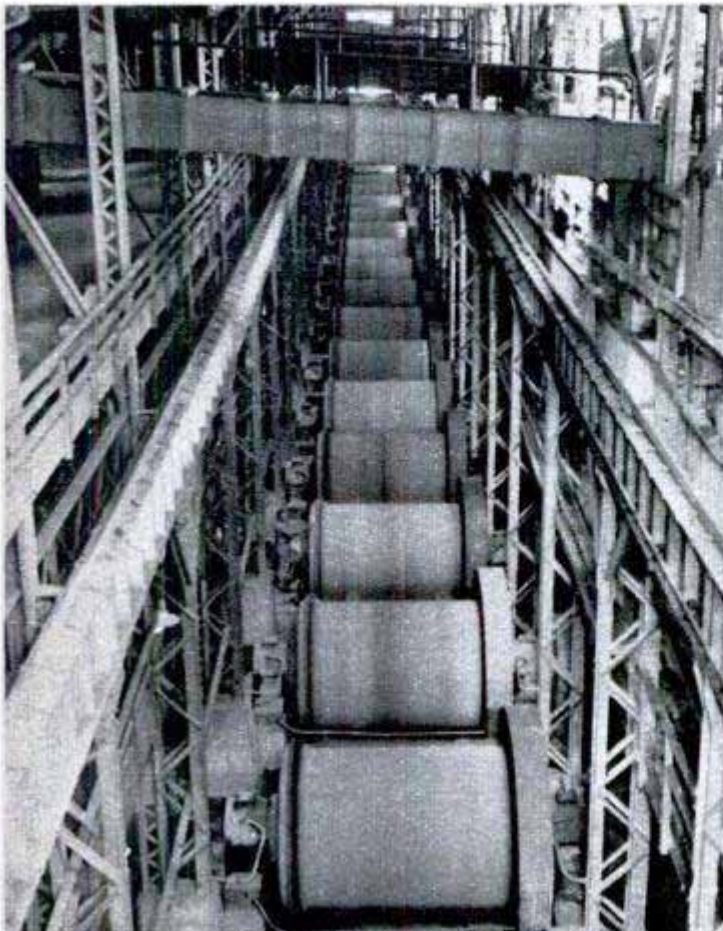
side down and dumped, and the ore then travels through a series of grinding and crushing machines. Water, lime and reagents are added to the pulverized material and a copper concentrate is extracted by the standard flotation process. At a near-by reduction plant this concentrate is smelted and cast into anode shapes of better than 98-percent-pure copper.

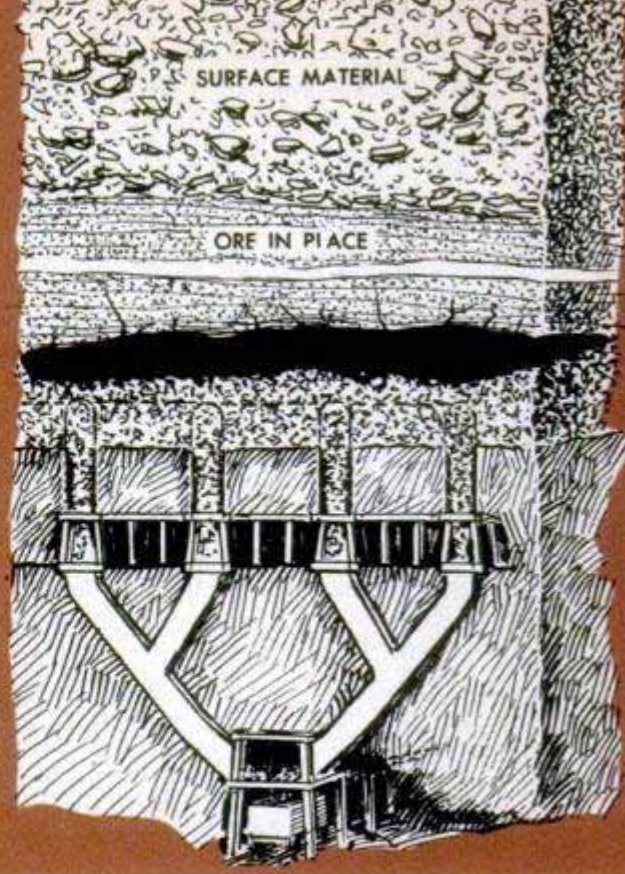
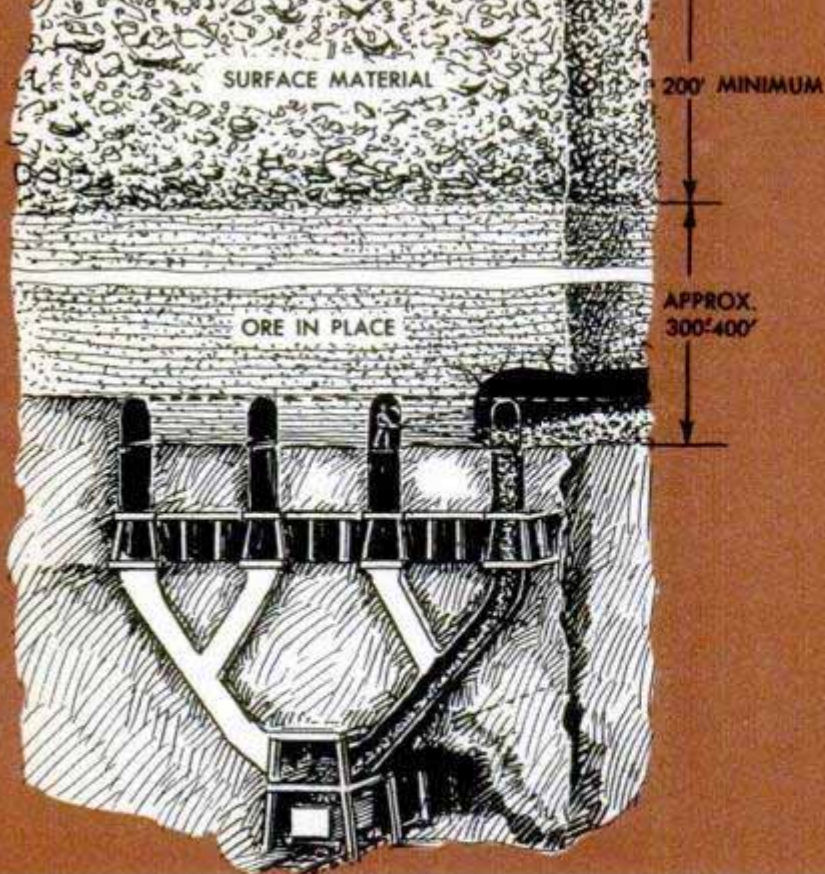
The milling and refining operations are so huge that it's difficult to appreciate the tonnages involved, but a single fact gives you an idea of the work that is done: 50 tons of two-inch iron balls are worn out every day in the ball mills that help grind the ore. A special foundry is always busy casting more balls for tomorrow's use.

Bingham's ore averages less than one percent copper, with traces of molybdenum, silver and gold. There's enough of it left for many more years of mining, even though tremendous quantities of waste overburden must be shoveled into the ore cars and hauled away from the mine area and dumped.

The Bingham ore body was first explored during the last century but no one could figure out a break-even way of extracting its copper until Daniel C. Jackling, a Missouri farm boy who was schooled and trained as a mining engineer, proposed the bulk handling of the material with heavy equipment. His idea sounded like a wildcat scheme but it worked and the method has since been applied to other huge low-grade

Below, left, a battery of ball mills, rotating at high speed, grinds the ore to a powder. Right, electric locomotives draw their current from an overhead wire hung at one side of the track to avoid shovel booms





Block-caving mining of underground ore at Butte uses finger chutes. One is being drilled by a miner here

When support pillars are blasted away, roof of ore caves in, falling through chutes to mine cars below

copper bodies that lie at or close to the surface.

feet long, located from 700 feet below the surface to 3400 feet below, possibly deeper. One shallower zone is only 200 feet below the surface.

One of these is the Morenci open-pit mine of Phelps Dodge in Arizona. Here 200,000,000 tons of waste capping are being removed so that an equal amount of ore that contains only a fraction more than one percent of copper can be worked. Even so, estimates are that 2,500,000 tons of pure copper will be extracted before the deposit is worked out. Like the Kennecott operation at Bingham Canyon, Morenci uses huge electric shovels on a series of terraces for lifting ore into railroad cars. Electric and diesel-electric locomotives haul the ore trains to the near-by mill. Train movements are controlled by a central dispatching office.

In the past, the poor ore wasn't consid-

Up in Butte, Mont., the Anaconda Copper Mining Company likewise has blocked out a tremendous body of low-grade ore, fabulously rich in the aggregate but worth only a cent or two per pound.

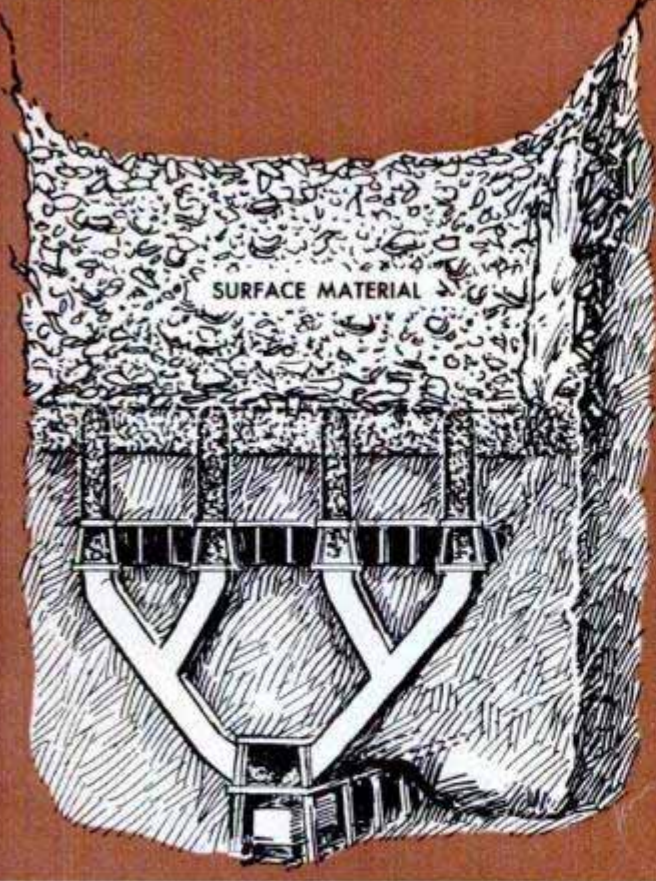
This miner fuses the explosive charges in a vein of Butte ore so they'll go off in rapid-fire succession

Butte's low grade can't be handled by the open-pit method because it lies far underground, deep inside the "richest hill on earth" that has already yielded millions of tons of copper, zinc and manganese.

Most of the rich veins in the hill already have been worked out. Since 1910, in fact, more than 2200 miles of shafts, drifts and crosscuts have been dug to mine the high-grade material.

The low-grade ore that remains occurs in several zones about 400 feet wide by 2000

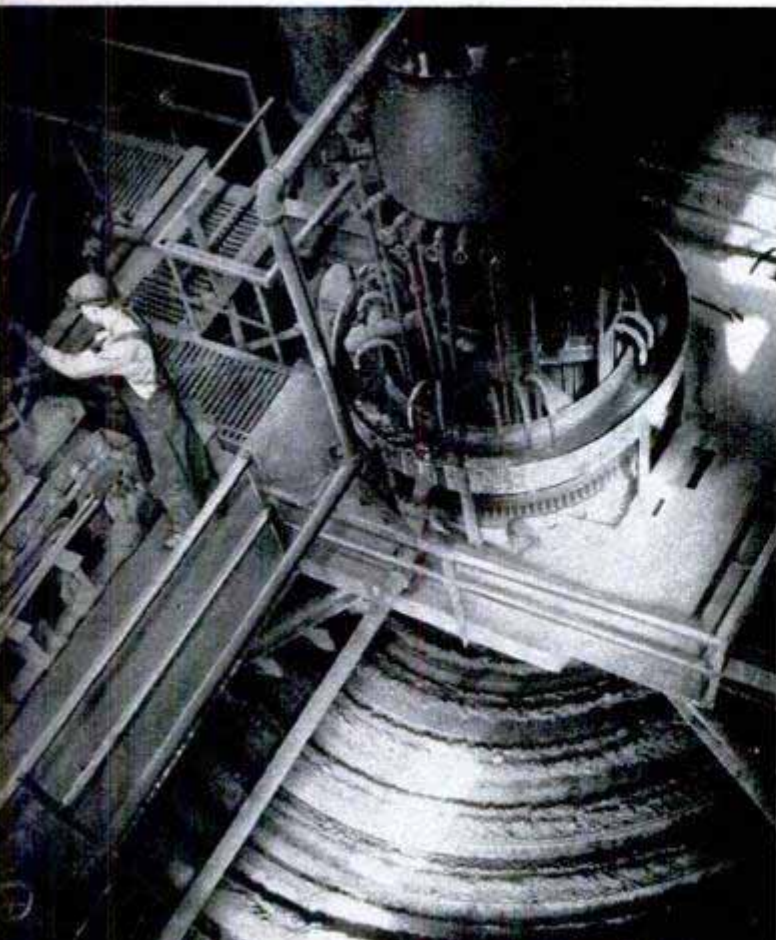




With the ore almost all removed through the chutes, surface material above it has settled to fill hole

ered worth the trouble of working; now the Anaconda engineers have developed a "block caving" method of mining it that appears to be sound. More than \$20,000,000 are being spent in preparation. This Greater

Looking down on roaster furnace at Anaconda where the ore from the Butte mines is refined into copper



Butte Project is expected to maintain Butte as a major copper producer for decades to come. At maximum production, about 15,000 tons of ore will be raised to the surface every day.

The engineers are going to attack the ore zones from below. They will excavate a void deep in the earth and let the ore cave down and fall into strings of empty ore cars. That's a simple way of describing a very exacting operation.

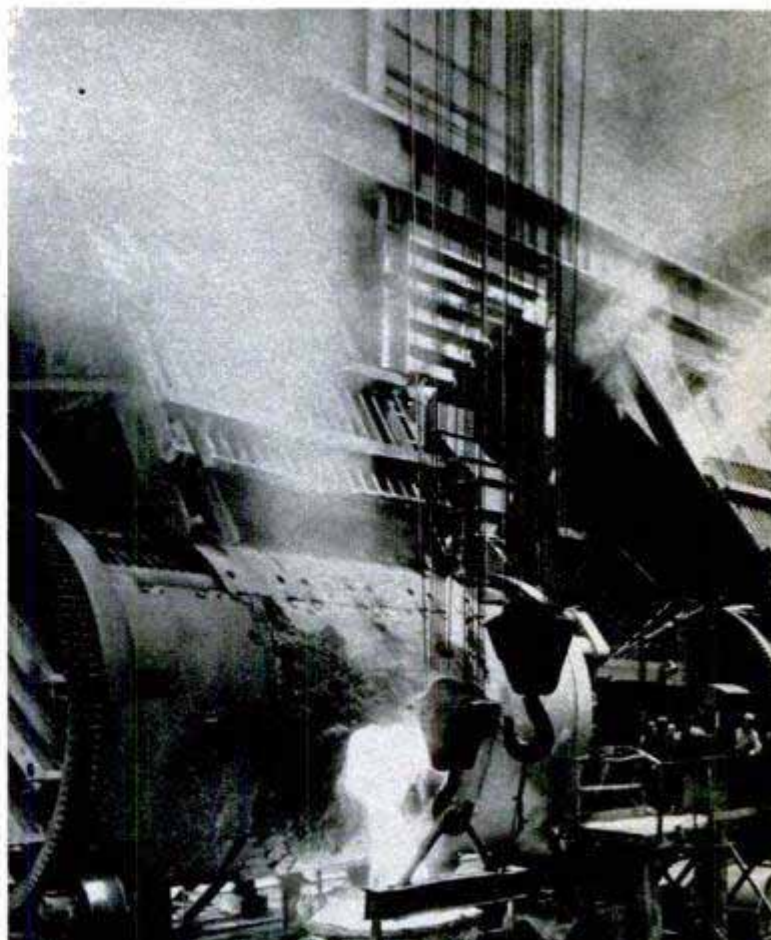
The first step, almost finished, has been to excavate a deep shaft some distance away from the deposit. Named the Kelley Shaft, this bore is being excavated to 2200 feet and eventually will be deepened to 4200 feet. The shaft will be 9 by 38 feet in cross section and will contain several compartments, one of which will be occupied by a cage for raising or lowering men and supplies, and two of which will be occupied by ore skips of 12 tons capacity each. When hauled up into the headframe, each skip will discharge its load through a bottom dump into a hopper, which in turn will discharge into railroad cars that will haul the material to the mill at Anaconda, Mont.

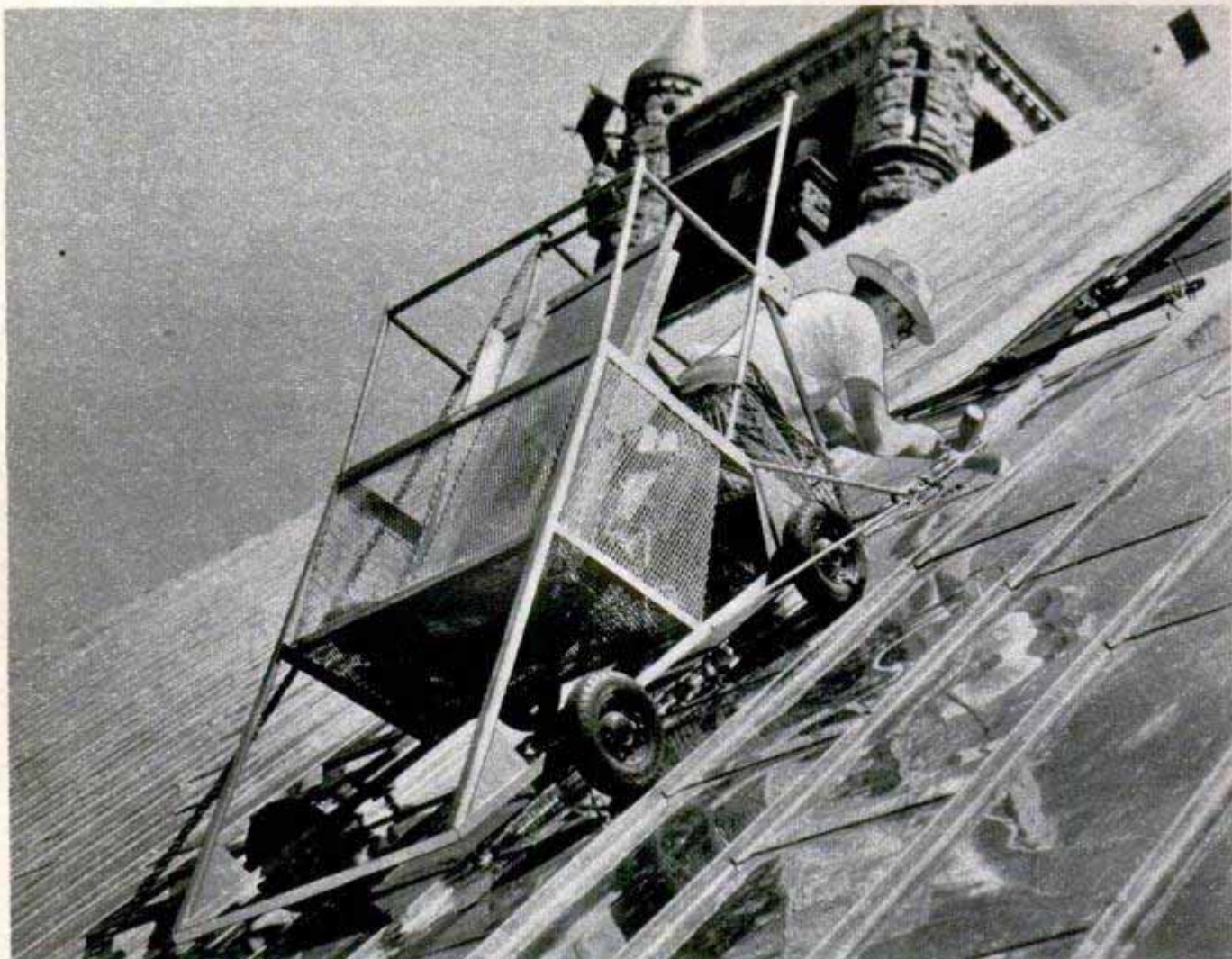
The ore skips will travel up and down the shaft at a speed approaching 30 miles per hour.

Haulage drifts that will accommodate trains of five-ton capacity side-dump ore cars are to be blasted through the rock at various levels from the shaft. From these

(Continued to page 242)

Refined copper is discharged from an Anaconda converter furnace to be poured into molds to form bars





"Spider" Cart for Roofers

Roofers working on the Hennepin County courthouse at Minneapolis, Minn., pooled their ideas and built a "spider" cart to solve a knotty problem. The courthouse has a high-pitched roof which was to be covered with 120,000 square feet of cold-rolled copper. Hauling the copper sheets into place and then installing them was a difficult and

dangerous job until the workers developed their cart. It is built to the pitch of the roof, giving the operator a level platform on which to stand. Four rubber-tired wheels provide good traction without damaging the soft metal. A "caboose" on the cart hauls the roofing materials. The workman moves the cart up and down the roof by operating block pulleys and ropes secured to the roof peaks.

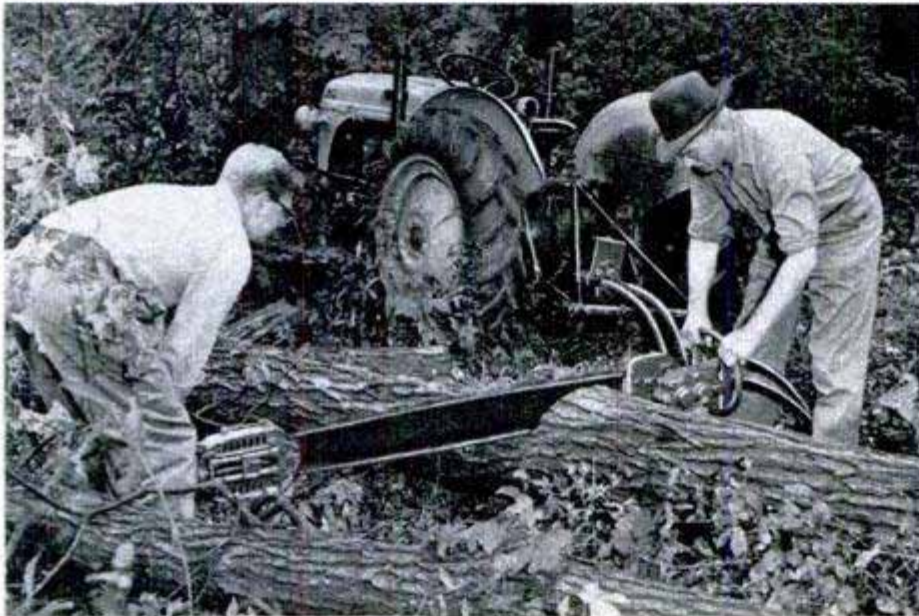
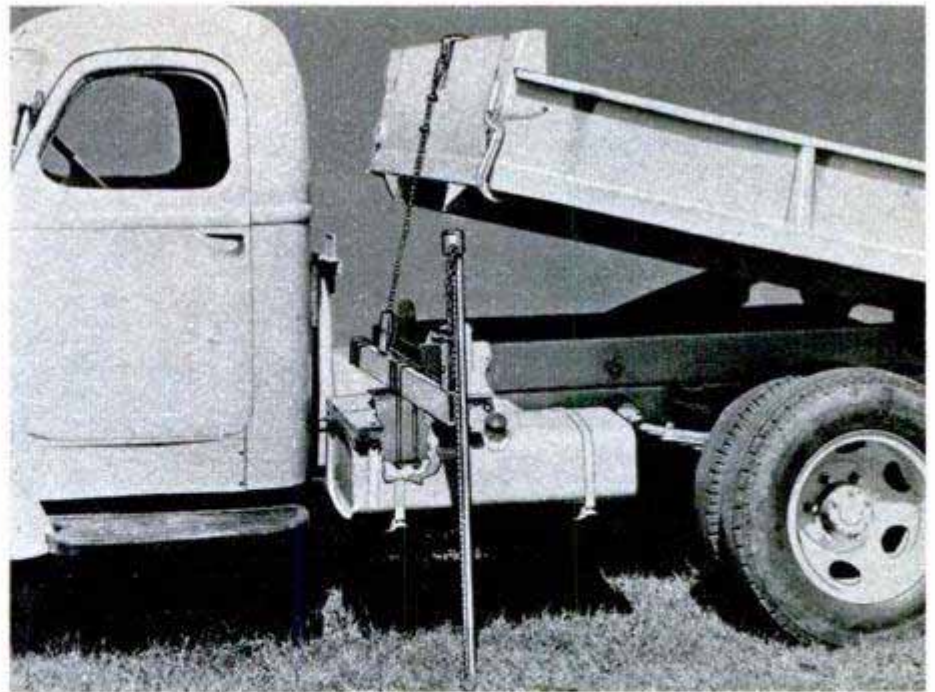


Cable-Operated Dump Truck

Through a block-and-tackle arrangement, a single cable elevates a new truck trailer, thereby dumping the load. The winch-operated cable eliminates the need for a heavy understructure. The new trailers are operated with standard traction units and the driver handles all controls from the cab. Two lift arms are pivoted to a "fifth wheel" and to the trailer chassis. When the winch is operated, the cable draws the trailer toward the truck, elevating the front end to dump the load. Spot-dumping is accomplished by locking the trailer wheels, which causes the mechanism to draw the tractor unit backward.

Dump-Truck Post Driver

Fence posts are driven at a rate of 100 an hour by a driver that uses the hydraulic lift of a dump truck to force the post into the ground. The driver mechanism bolts to the frame of the truck between the cab and body. The drive cable hooks to the front edge of the truck body. A cap at the end of the cable slips over the top of the fence post. As the dump body is raised, the cable is pulled up, driving the post into the ground.



Hydraulic Chain Saw Powered by Tractor

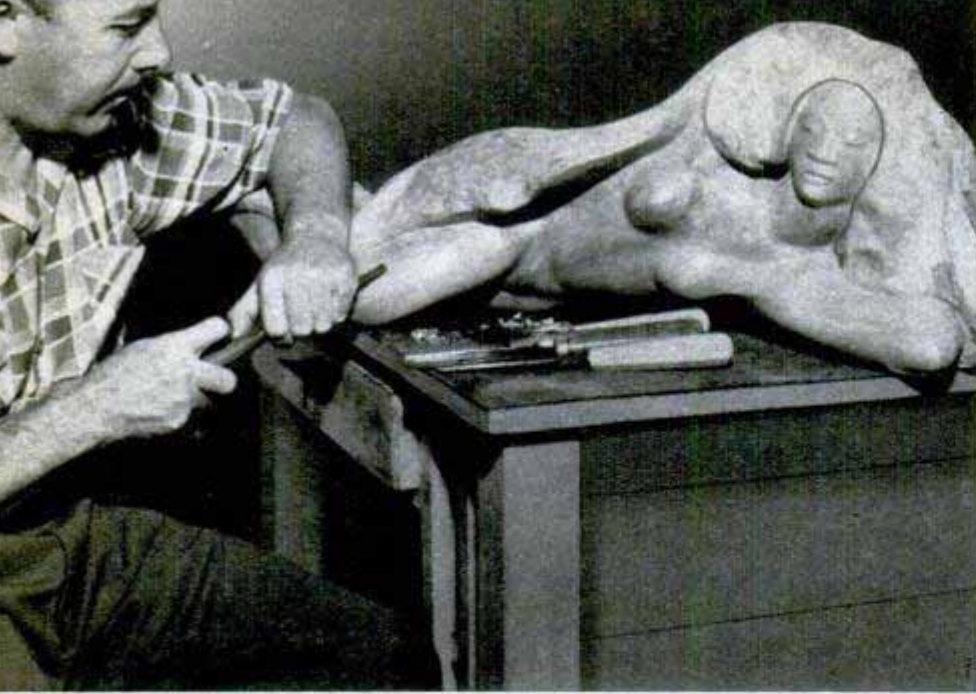
Hydraulically operated, a fast-cutting chain saw is light in weight because it is driven by the power take-off of a tractor or truck. Long hoses allow the operators to work at a considerable radius from the tractor. The saw can be started or stopped, by a control lever convenient to the operator, without stopping the tractor engine and it cuts equally well at any angle and in any position.

Flying Chuck Wagon

Meals for Northwest Airlines passengers are being speedily hoisted up into the planes by a hydraulic-lift chuck wagon. The steel truck body is 6 feet high, 8 feet wide and 12 feet long. Carrying enough food to load several planes, it can be elevated to the level of the galley door for any of the several sizes of planes being serviced.

☐ There are more than two billion tons of high-grade iron ore in the Quebec-Labrador area, according to the most recent conservative estimate.





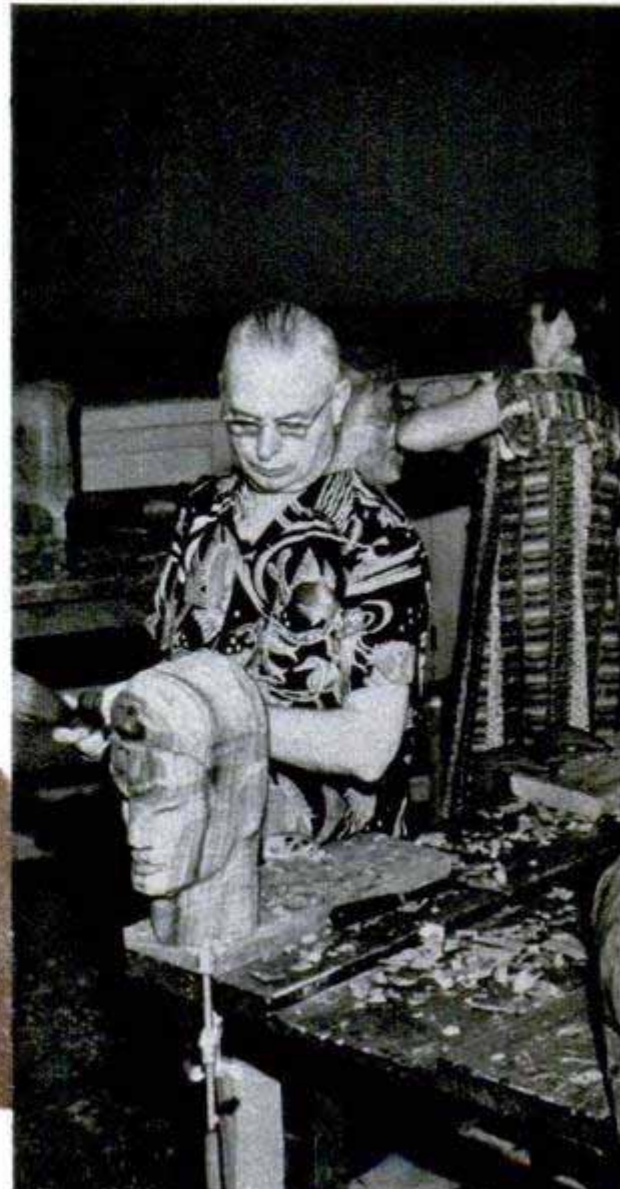
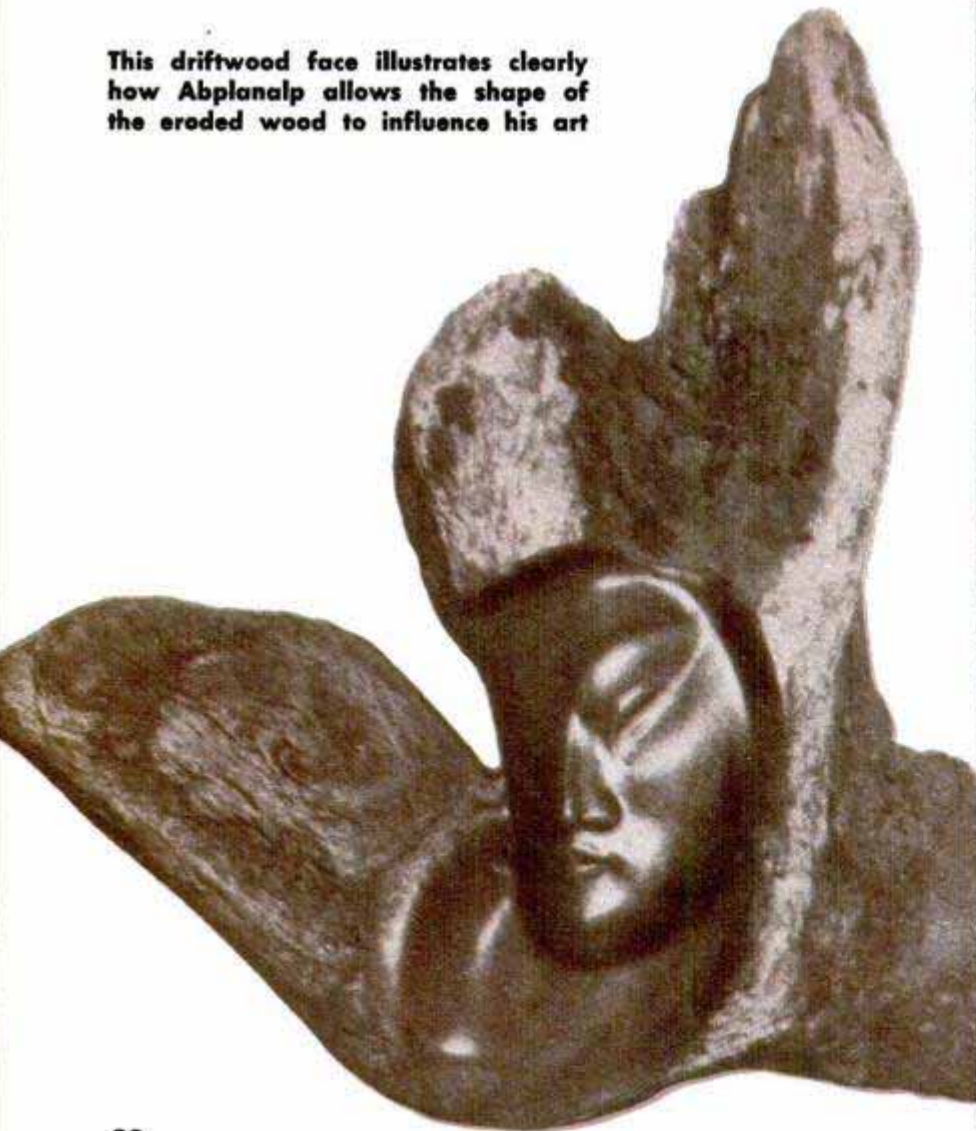
Here's the Swiss wood carver with an example of his work on driftwood, a specialized type of wood carving for which he is best known in Hawaii

Once essential to the Polynesians, the art of wood carving had almost vanished in Hawaii until a man from far-away Switzerland revived it

By Richard M. Botts

A Swiss Wood Carver Brings Back Hawaii's Lost Art

This driftwood face illustrates clearly how Abplanalp allows the shape of the eroded wood to influence his art



TAP ALMOST ANY Honolulu on the shoulder and you're apt to find a wood carver!

"The wood-carvingest place I ever saw," declares Aubrey Price, one of Hawaii's many wood-carving instructors. "Why, tots in grade school as well as their grandparents think nothing of carving salad bowls, coffee tables, lamps, plates, cigarette boxes or even sculpture in half a dozen rare Hawaiian woods."

The roots to this popular Island hobby can be traced back to a Swiss wood-carving genius who landed on these Pacific shores about 15 years ago and liked it well enough to stay.

Fritz Abplanalp is his name and wood carving's been his game ever since he was old enough to swing a mallet. In that time, he's carved everything from tropically designed wooden perfume containers to the interior of an Ohio church.

The Ohio church took him six years of constant work and is to date his most ambitious project. But he's still very proud of a life-size nude he carved from a two-ton Hawaiian monkeypod log that was nine feet long and three feet in diameter. This piece of sculpturing took three years to complete and required 283 hours of work.

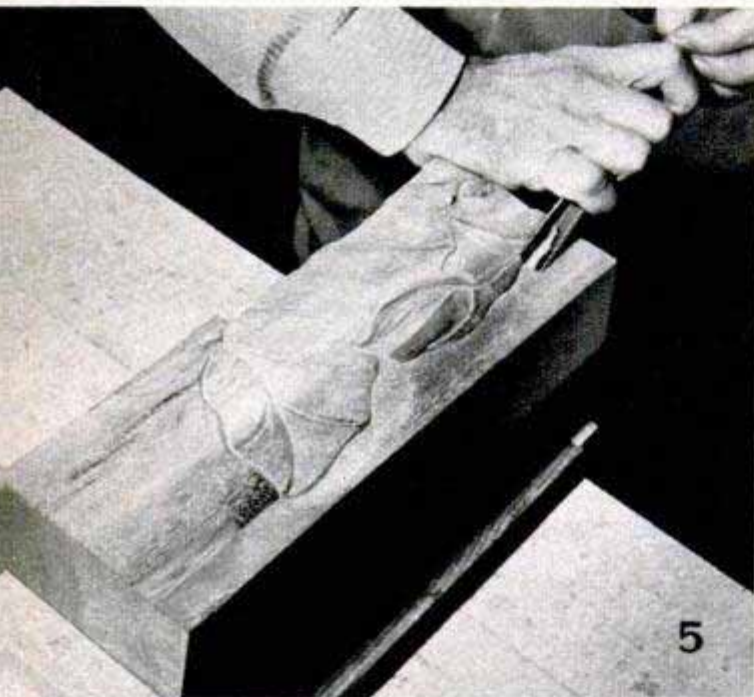
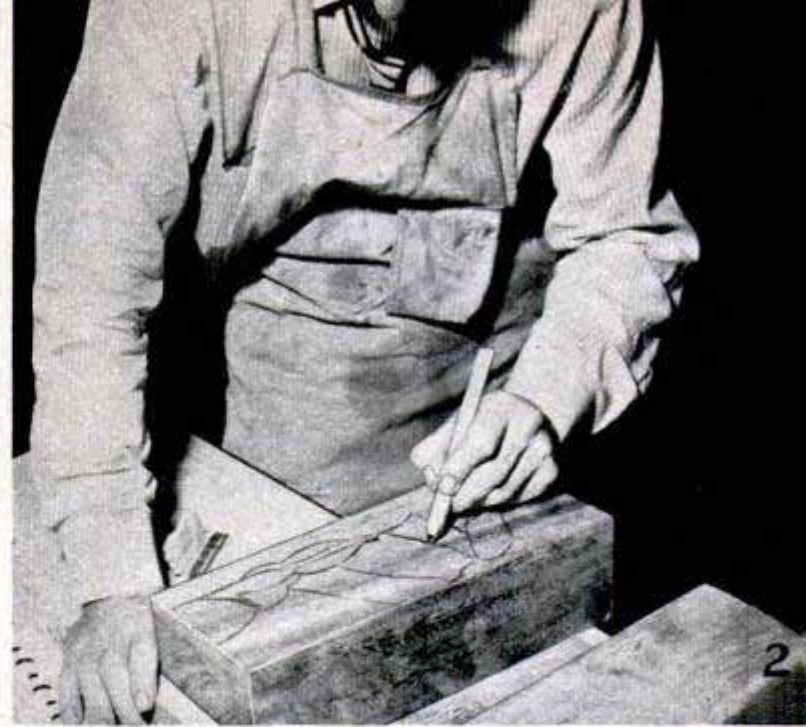
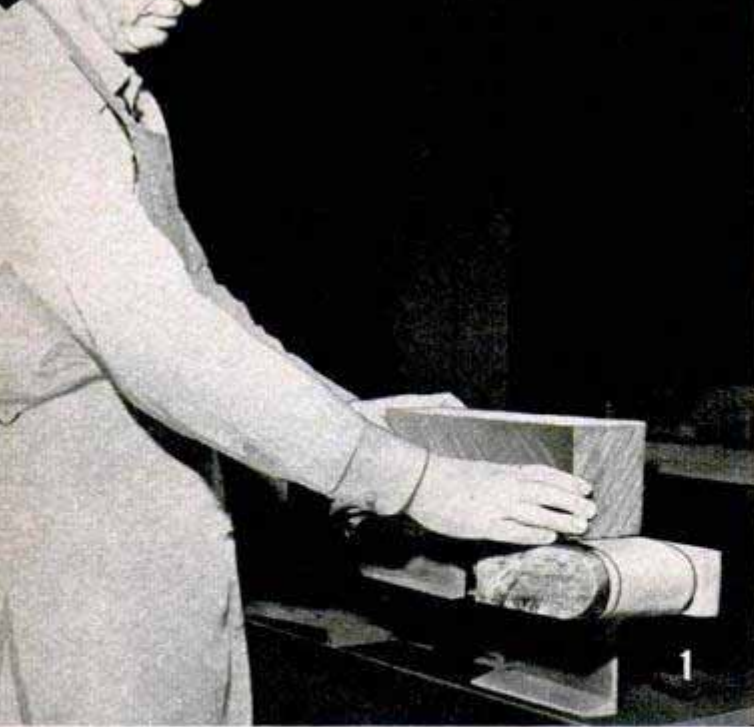
Fritz was born in the Swiss Oberland, which is known for its fine wood carvers who've handed down the art for centuries. He received a "formal" education in wood carving from one of the Swiss masters and had advanced to such a point at the age of 18 that he was picked from over 50 veteran wood carvers to



Above, another fine driftwood specimen. Most carvers have their own secrets for finishing wood, but basically they use a sealer, oil or wax, and lots of rubbing



Left, here are just a few of the hundreds who have studied wood carving with Fritz Abplanalp. This is the advanced section where students carve figures and heads



1. First step in carving a block of wood is sanding it. Aubrey Price uses a power sander on block of monkeypod

2. Next, Price, who is an artist, quickly sketches the design on the wood. Many carvers resort to tracing here

3. The first tool the wood carver uses is the narrow V-tool. With it he carves along the lines he has sketched

4. As soon as he has entirely outlined the pattern with the V-tool, the carver uses a gouge to deepen the design

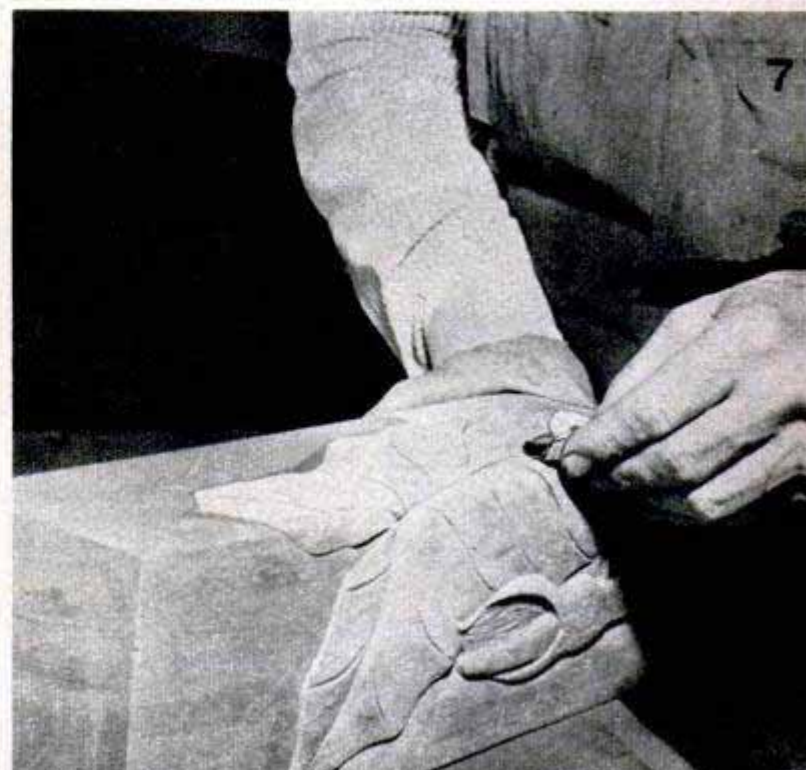
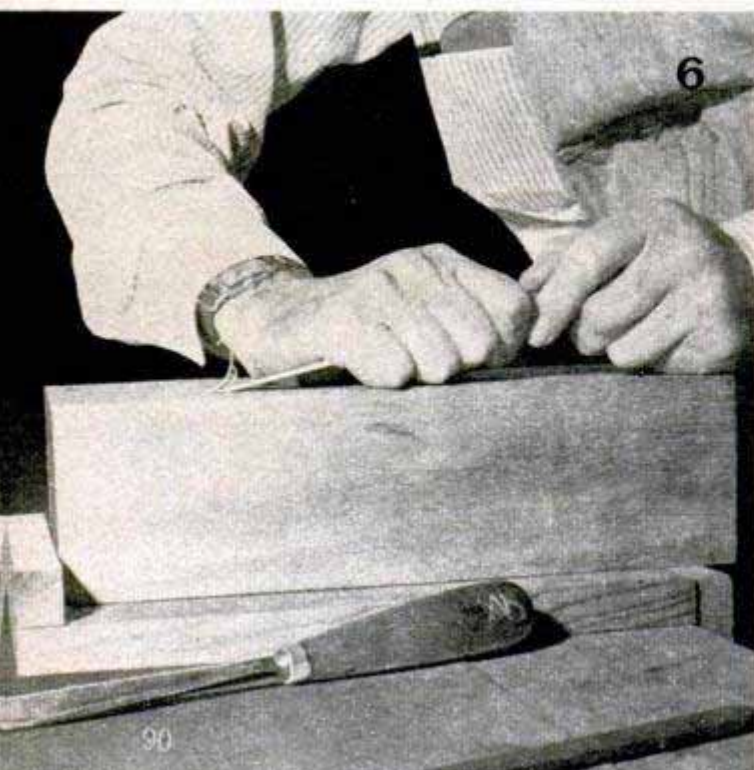
5. Now a larger V-tool is used to cut the design deeper into the wood. Note the L-shaped stop holding the block

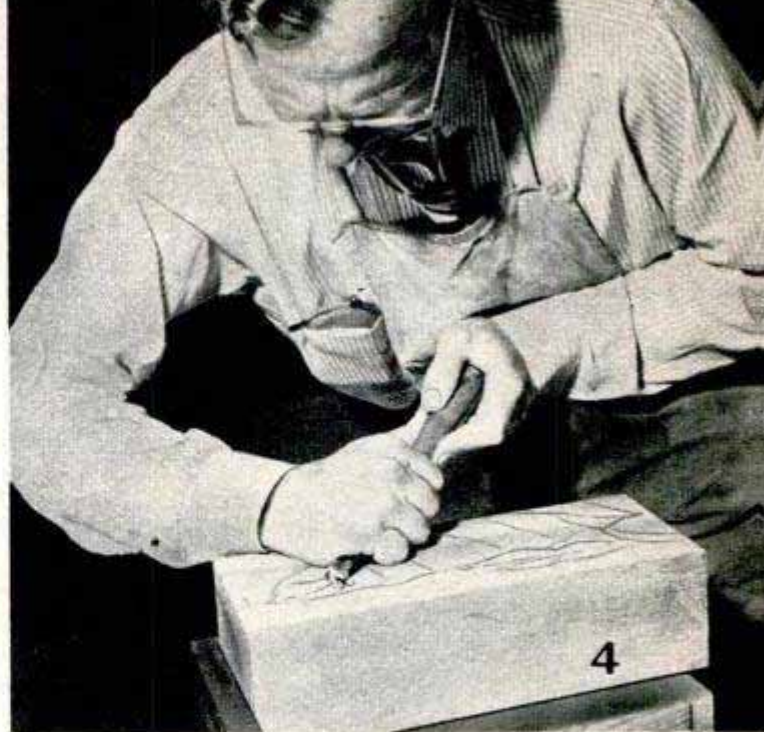
6. When the design has been cut down to the right depth, the carver removes the adjacent wood with a flat chisel

7. When finished carving, Price uses fine sandpaper to smooth rough edges of the design and remove tool marks

8. After adding lamp attachments, Price applies a sealer to the carved block of monkeypod wood, then waxes it

9. Mounted on a dark wood base and topped with a shade, the attractive carved block becomes this lamp





carve a church located in Glendale, Ohio.

In 1935, when his Ohio contract was finished, Fritz leaped across the Pacific to take a "special order" wood-carving job with Gump's in Honolulu. "I saw at once that Hawaii was a natural for wood carvers," Fritz said. "It has over 32 different types of wood—some extremely rare and found nowhere else in the world—and it has hundreds of typically Polynesian objects such as flowers, tropical fish and Hawaiian gods that could be used as subjects. But it had no wood carvers."

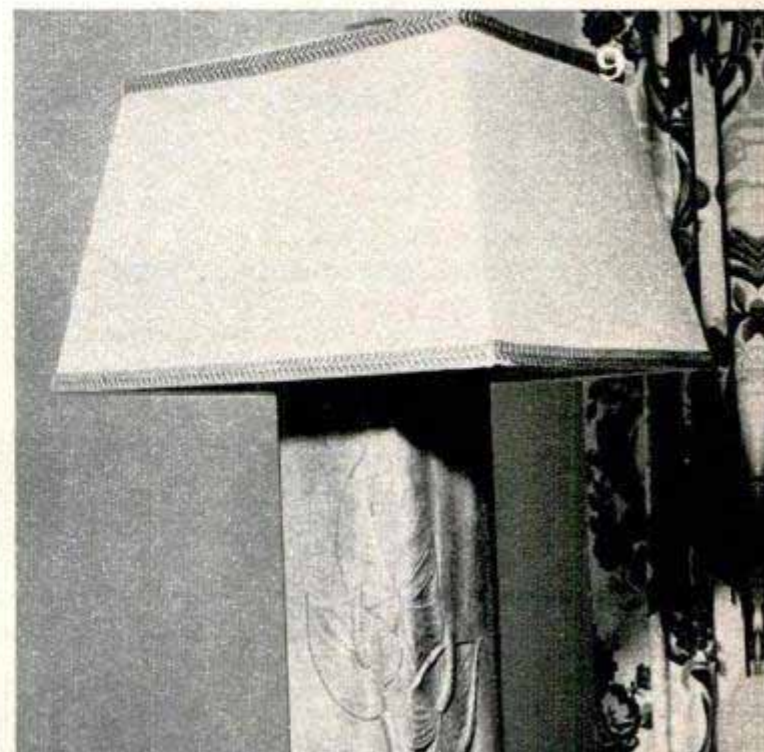
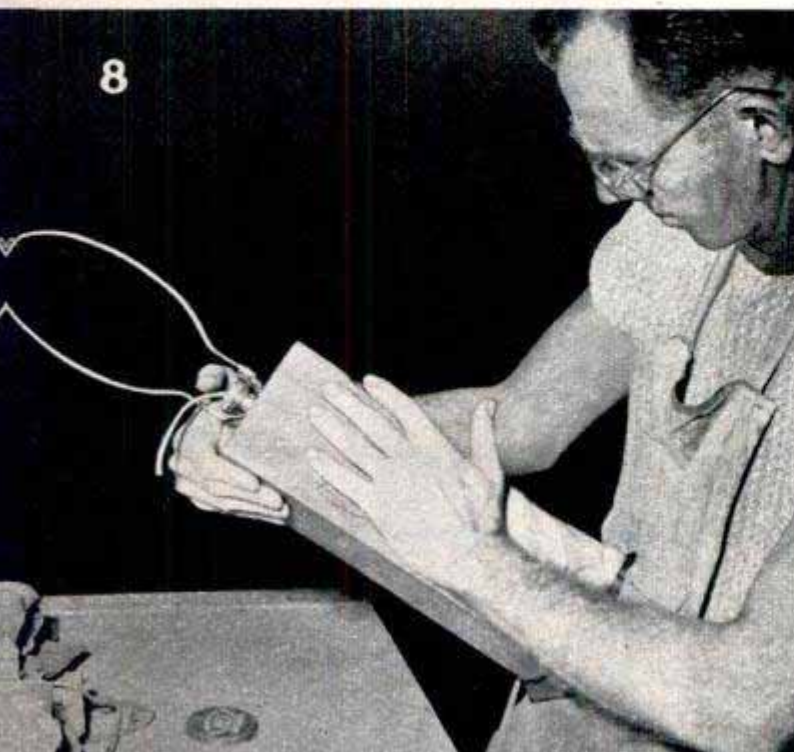
This may surprise those who know that the ancient Polynesians were excellent wood carvers. Wood carving, however, became a lost art after Western civilization was introduced to the Islands. The natives found the Western world's pottery and steel far superior. Prior to that time, however, the Polynesians made everything—

bowls, utensils, spears and idols—of wood. They had to as the volcanic soil did not produce suitable clay or metal.

"The Polynesians were real craftsmen," Fritz says. "They did beautiful wood carving with extremely crude stone tools. Some of their idols were 10 feet high and their bowls and spears show marks of real artistry."

Fritz decided to bridge this gap between the ancient Polynesian wood carvers and the present day. He began teaching classes in wood carving; he preached the use of Hawaiian woods and Hawaiian motif. His classes grew until today he estimates he's taught over 600 pupils since arriving in Hawaii.

From his classes other teachers developed. They are among the 10 percent who Fritz believes have enough manual dexterity and creative ability to go far in wood





Left, Ian Cameron, one of Hawaii's wood carvers, is holding monkeypod hors d'oeuvre dish that he made. Above, a matching set that includes a canape tray and salad bowl in leaf pattern. Below, a statuette in its early stage. The worker has just completed roughing out the design with his chisel and mallet

carving. They taught beginner classes themselves and added to the growing popularity of wood carving.

Hawaiian wood carvers are unique in many ways from their brother carvers around the world. They have a myriad of excellent instructors; an abundance of beautiful and unusual tropical designs, and fine Hawaiian woods.

The rarest wood which is indigenous to Hawaii is koa. Some call it "Hawaiian mahogany." It is a hard wood, polishes to a dark, rich color and is very popular with wood carvers.

Milo is another rare wood. It is found only in volcanic soils and generally on inaccessible beaches. It is a small tree about 12 inches in diameter. Only the center portion of the log is used and the wood must be aged for at least two years. Milo has a beautiful grain, polishes to an ebony and retains a satinlike sheen. It is used mostly for dining tables and perfume containers.

Fritz, along with many of his students, likes monkeypod as the best all-purpose wood. It is not only indigenous to Hawaii but may be found in other parts of the world. Monkeypod is easily obtainable and does not take long to season. Monkeypod comes in a wide variety of colors which range all the way from the dark brown of the male tree to the tawny shade of the female tree. In the young wood, the color is a golden yellow.

Other Hawaiian woods are coffeewood and sandalwood, which is now extremely rare but at one time flourished in great



quantity throughout the Islands. The Chinese liked it so well that Hawaii over the years has been almost depleted of this wood.

Another popular wood is hau, which comes in many shades. Those who do sculpturing like the grayish-blue tone of some hau wood.

Finding pieces of rare wood takes on the semblance of a treasure hunt at times. Most wood carvers in the islands are secretive about their source of supply. Some scour the beaches—especially after a heavy storm. Others obtain their wood from an

old prison up on the slopes of the active volcano, Mauna Loa. Lumber dealers sell a few types of wood. Still others find their wood in the heavy mountain forests of the Islands. Most of this forest area is under protection of the Forest Rangers and woodworkers keep mum on this source of supply. When you question them too closely, they'll drift onto another subject.

Whatever the source of supply, the wood must be well seasoned before carving. Generally, wood is aged a year for each inch of thickness. Aging may be quickened by boring a hole in the bottom of the block, thus giving the inside a better chance to age. Fritz has so many pieces of wood aging in his garage there is hardly room for his car. The fireplace is stuffed with wood and every spare corner has a favorite piece or two aging.

Fritz teaches advanced as well as beginners' classes in wood carving. The beginners start out by carving simple trays in some Polynesian leaf form.

"It's not so important what a student attempts as his first project," Fritz says. "It's learning the use of the tools that counts. Too many try to use force. That's tough on them as well as the tools."

Most instructors in beginners' classes supply their own tools. It takes almost as much skill to sharpen these tools as it does to do a neat piece of wood carving.

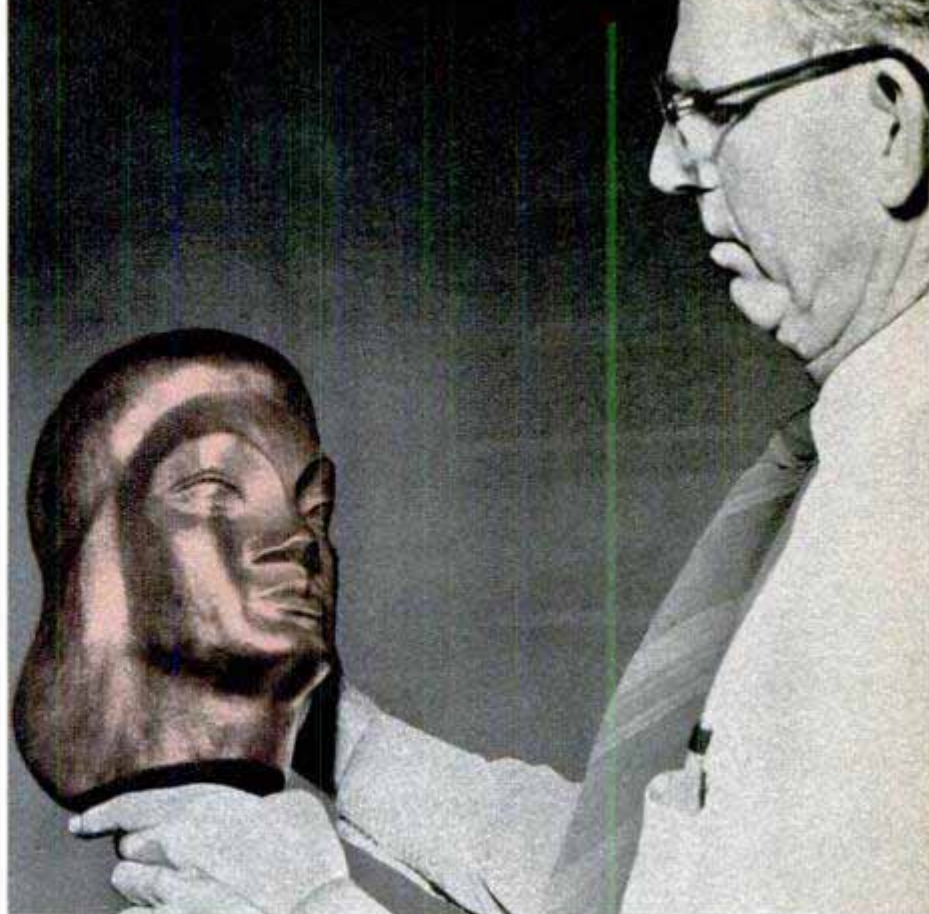
Students decide what they will carve and Fritz helps them with the design. Sometimes they design directly on the block of wood; at other times they will trace a suitable drawing on thin tracing paper and then transfer the tracing to the block. The light lines are darkened with a carpenter's pencil and the student is ready to go to work.

The instructor sees that the student chooses the right tools. For lamp bases, for instance, the beginner starts off with a V-tool. The V-tool is used to make outline cuts around the sketch on the block and then other tools are brought in as needed.

Most wood carvers use a carver's vise. A great many students, however, just use a regular bench vise to keep the block of wood steady.

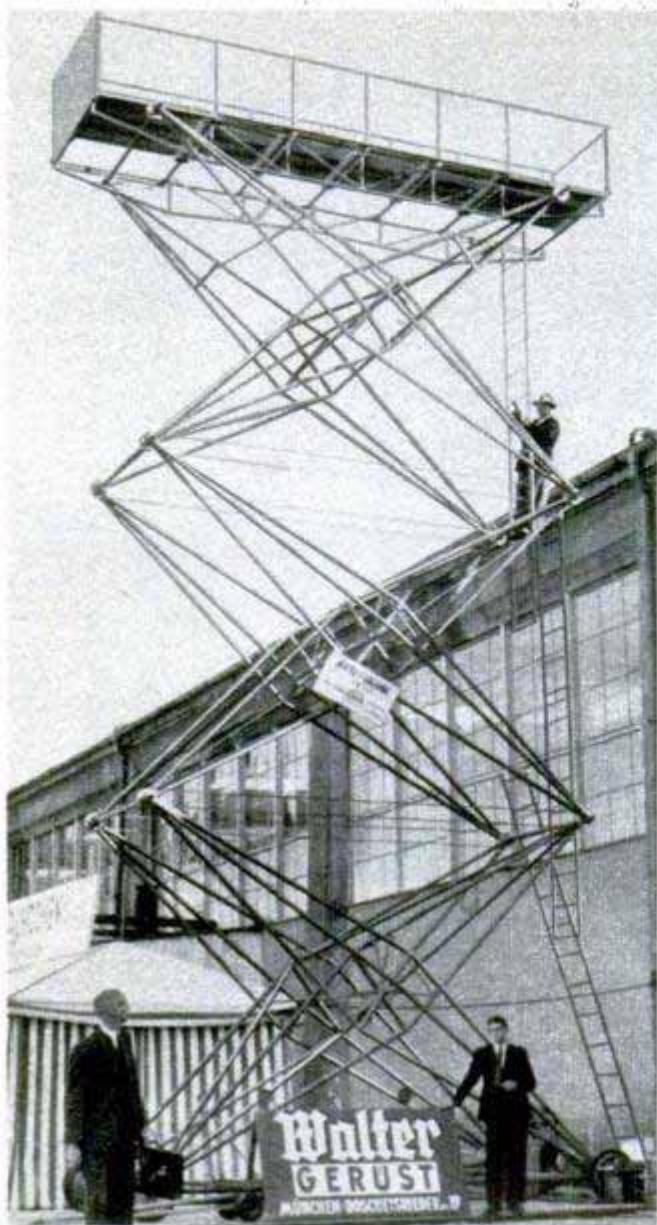
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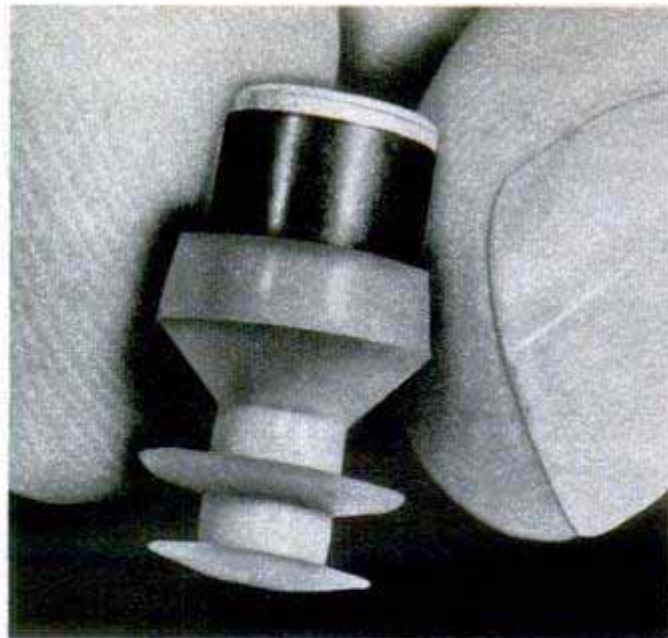
Above, Price holds a female Polynesian head he carved from a koa block and rubbed to a deep mahogany. Below, a typical set of advanced wood-carver's tools. From top to bottom: V-tools, deep gouges, shallow gouges, straight chisels and skew chisels





Scissors Scaffold

Weighing little more than a ton, a German scaffold can be set up at any height from 10 feet to 46 feet. The tubular-steel framework, which pivots like a lazy tongs, is raised and lowered by an electric motor. It is mounted on wheels so it can be moved easily into any position.



Noise Stopper

Intended for use in boiler factories, on firing ranges and in other noisy places, a new ear valve shuts out all dangerously loud noises and yet allows its wearer to hear ordinary speech and other sounds. It is a rubber plug with a tiny aluminum cylinder and plastic valve that is held open by a weak spring. Any sound of 80 decibels or greater closes the valve momentarily. The valve is also said to be effective in reducing the discomforts caused by abrupt changes in altitude while flying.

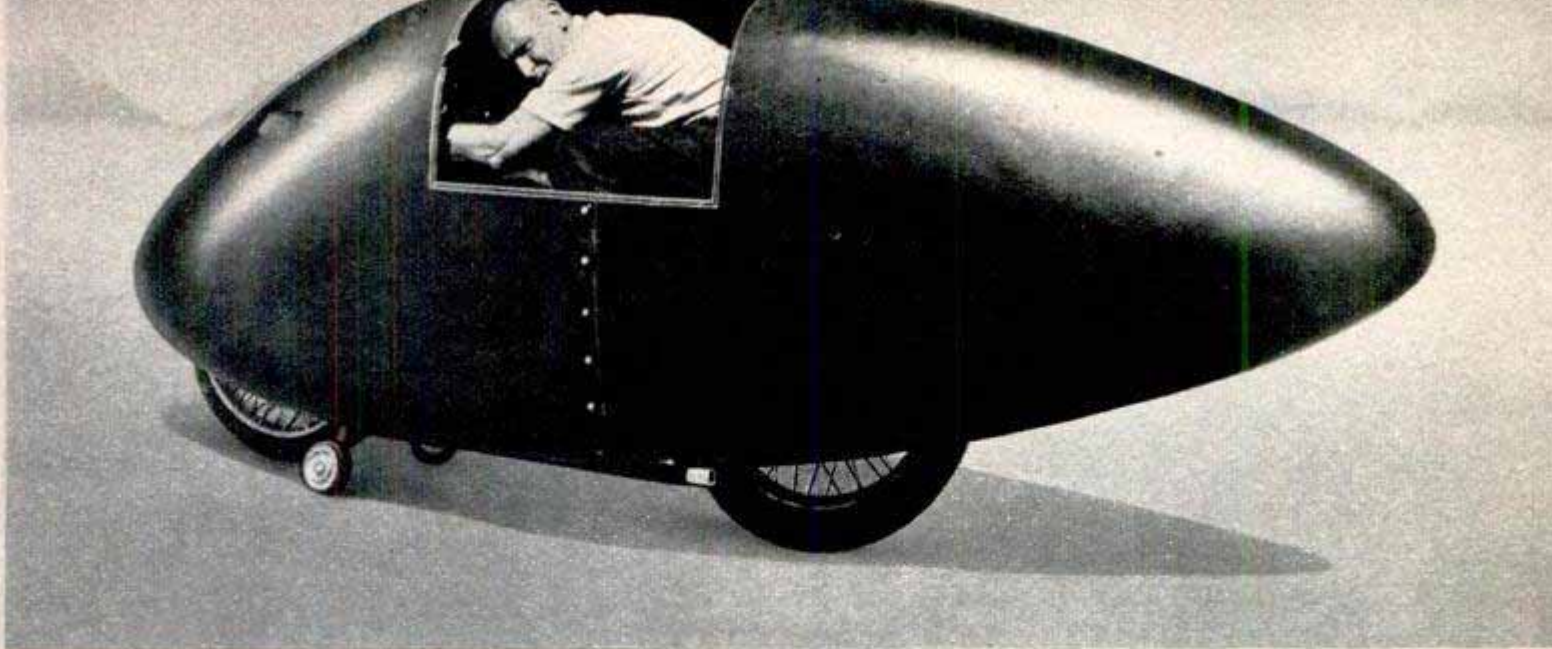
Cream Repels Land Leech

One of jungle warfare's most serious plagues, the land leech, will find the soldier of the future a less tempting victim. A light covering of a creamy chemical substance, dimethyl phthalate, on footwear and the lower leg is offensive enough to discourage the parasite. The cream, which also repels mosquitoes, was compounded by a British scientist, Dr. F. M. G. Stammers, and tested in Ceylon's jungles.



Sea Scooter

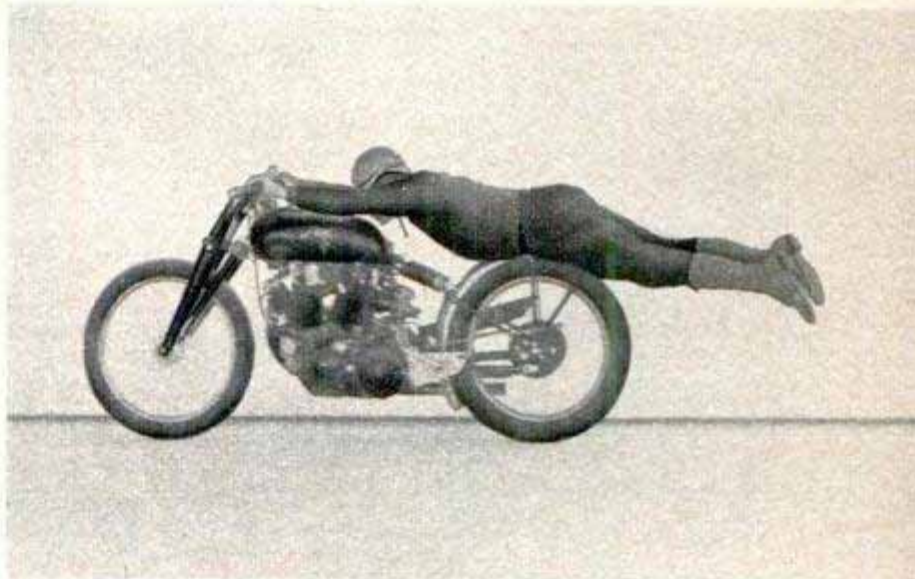
Motor-scooter fans in Italy now are amphibious—a "sea scooter" boat with its trailer is available as a companion piece to the little land vehicle. The trailer, which carries the boat, is towed to the water's edge. There the craft can be lifted by two men, as it weighs only 220 pounds. The tiny boat travels eight miles an hour and will run five hours on a tank of fuel.



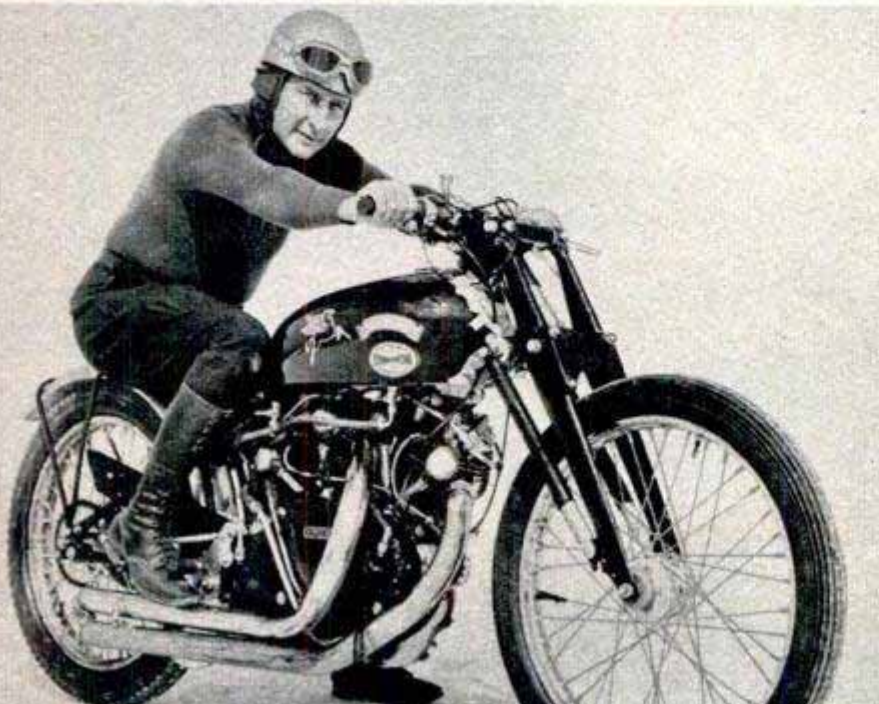
There's so little room inside the shell that Free has to look under the handle bars to see where he's going

"Eggshell" on Wheels Challenges Motorcycle Speed Mark

CROUCHED inside a plastic "eggshell," 50-year-old Roland Free of Los Angeles hopes to zoom to a new speed record for motorcycles over a mile course. He'll have to beat the 172-mile-an-hour mark set in 1937 by Ernest Henne of Germany. Free plans to make the bid on the Bonneville Salt Flats this summer, using his British Vincent racer that develops more than 80 horsepower. The eggshell cuts air resistance and holds the machine on the ground at high speeds. Last year, Free set the American record for the mile (156 miles an hour), using the same machine minus the shell.



Center, Free set the American record last year in this position! Below, left, with the shell removed, Free and cycle look like this. Right, head-on view shows air slots, windshield and retractable "landing gear"





Left, the ball stays in a wire pocket at the base of the racket until it's thrown. Right, a short handle on the racket helps snare the high ones

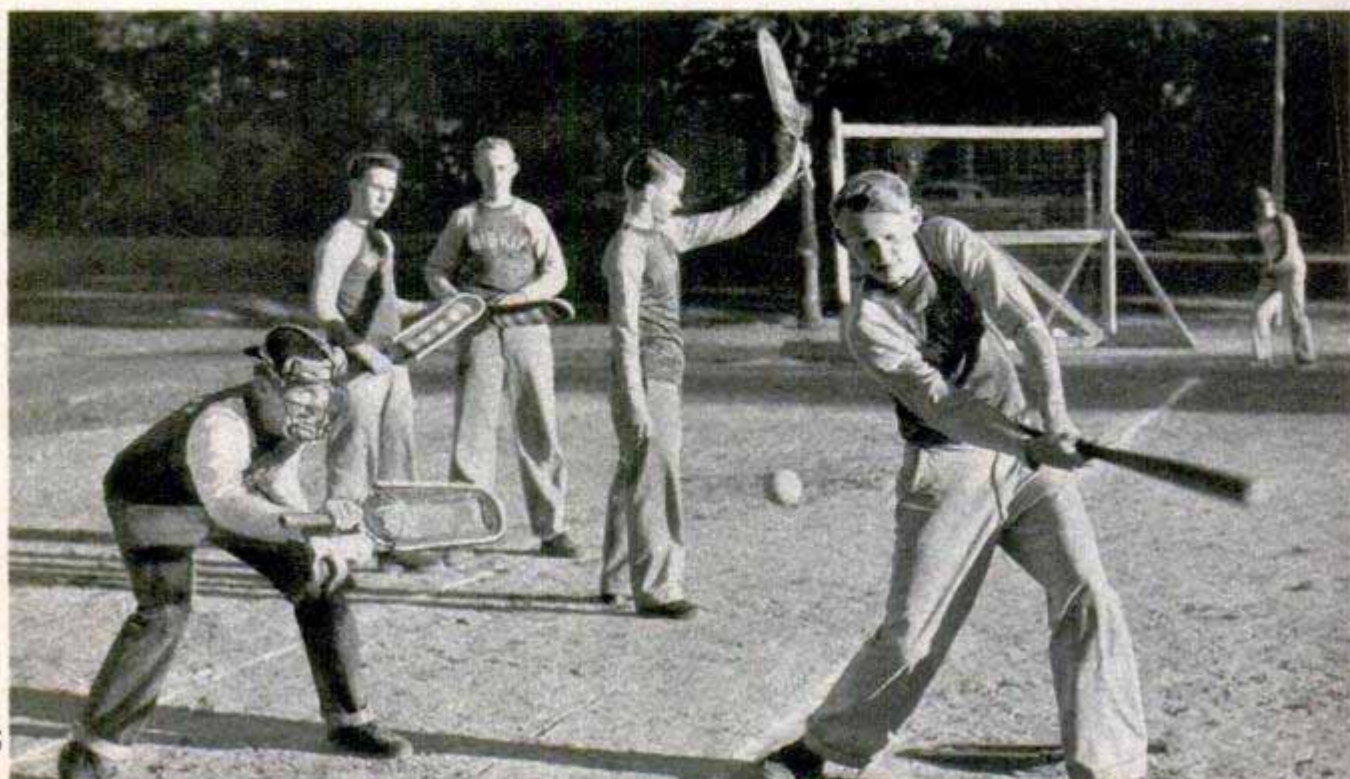


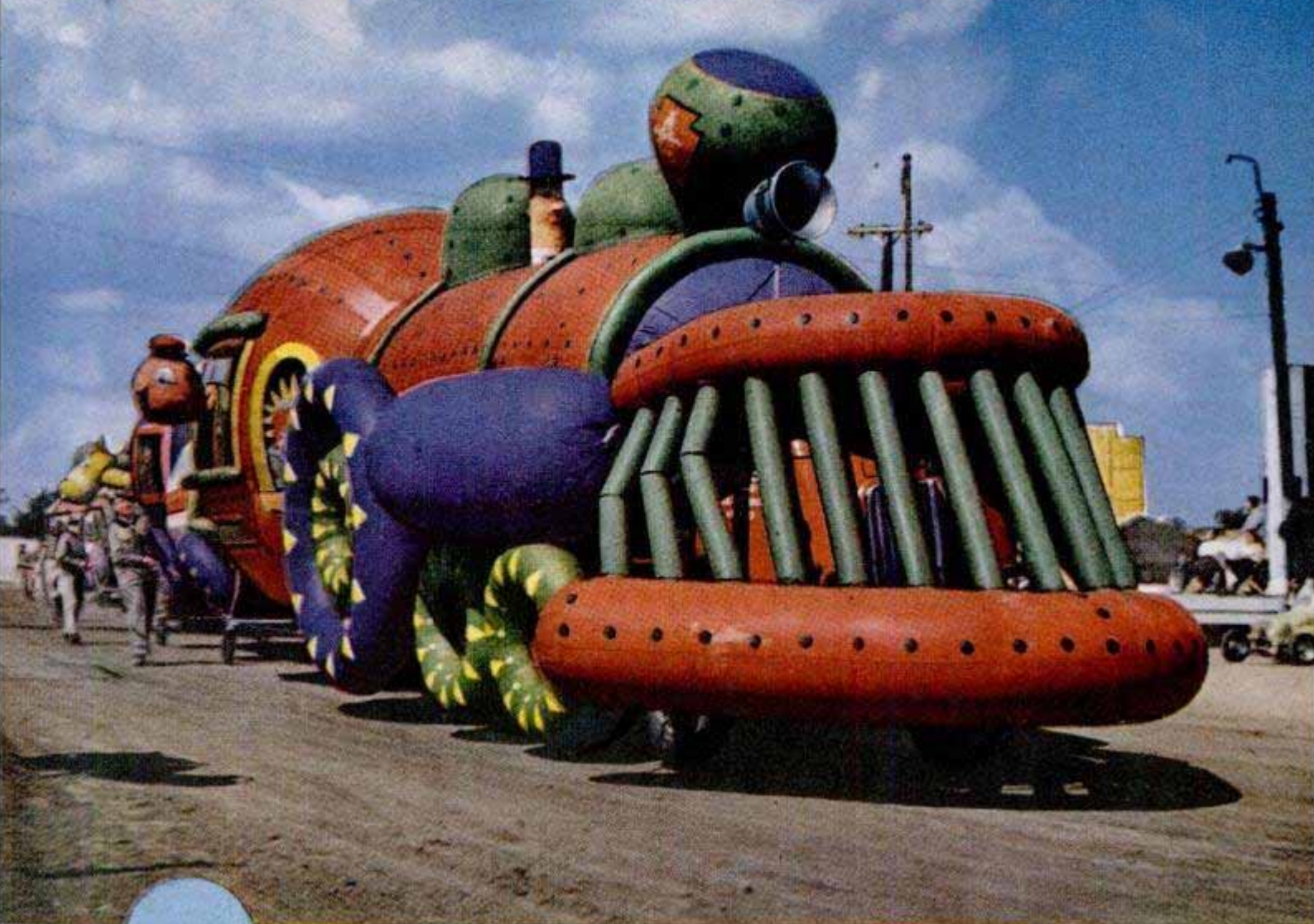
Baseball With Rackets! It's Called "Wiskit"

BASEBALL seasoned with tennis, lacrosse and softball—that's the new sport of the Northwest. Called "Wiskit," it is played on a baseball diamond, according to baseball rules, except that: 1. the ball is han-

dled only by a lacrosse-type racket; 2. the ball is larger than a baseball, smaller than a softball; 3. a softball bat is used; 4. base runners are tagged out with the free hand, not the ball.

Wiskit looks like baseball except that catching and throwing are done with a racket. You can't use your hands





(M) Jean Gros Inc.
4614 Forbes St., Pittsburgh, Pa

BALLOON MAN

By Marjorie and Grant Hellman

JEAN GROS doesn't believe in nightmares. Not even when he sees 50-foot dachshunds, gigantic prehistoric animals, 25-foot kangaroos, or bright green dragons with 100-foot bodies which writhe and twist.

To Gros these creatures and scores of others are no figment of an overworked imagination, for he is a builder and exhibitor of giant balloon figures. The balloons have delighted youngsters in cities throughout the country, from El Paso to Boston.

Gros' balloon figures are certainly one of the country's oddest industries and their design and building has called for a spectacular amount of artistic imagination and engineering ingenuity.

Although Gros has spent most of his life in the United States, he is of French origin and was very early impressed with the

pageantry of European mummers' parades. He wondered whether something similar wouldn't be popular in the United States. But the usual papier-mache figures of the mummers, Gros realized, were much too fragile and unwieldy to be carried from one city to another.

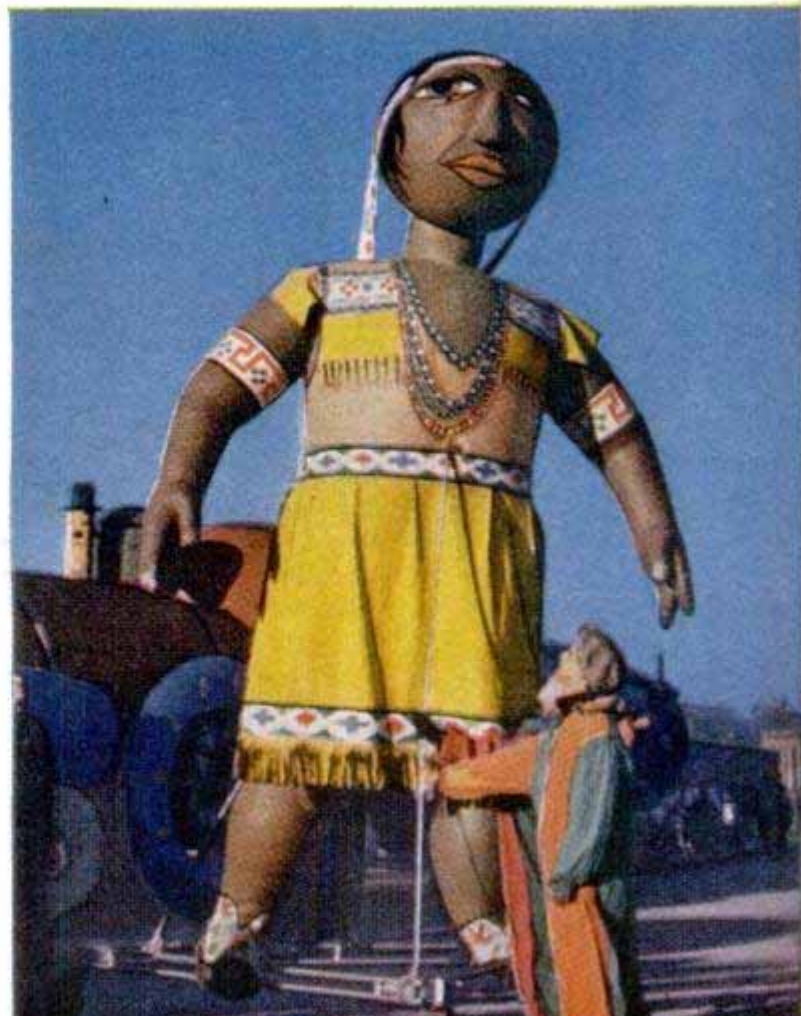
Inflated figures made of rubberized fabric seemed the answer, and Gros studied the famous Macy parades in New York City. His balloons, he discovered, would have to be considerably different. First, they would often be used in cities which had overhead wires—the balloons therefore couldn't be more than 15 feet high and would have to stay on the ground. Second, they must be air inflated because helium was far too expensive when the balloons were being used every day. And third, the balloons had to be designed to be easily



Once in Minnesota bitter cold contracted air inside horse and refill was in order before parade could go on

It took many gallons of paint to decorate the popular pig of the Gros parade. Appendages, such as the forelegs, are made separately and then zipped on

The Indian lady is mounted on an aluminum frame and small wheels on base help trundle her through the streets. She supports a papoose on her ample back



inflatable, quickly packed and simply transported.

That Gros has succeeded in meeting these requirements and has produced an exciting show is quite evident to the many millions of people who have jammed the streets in any of the hundreds of towns in which Gros' characters have strutted their stuff. The parades, usually sponsored by chambers of commerce or other local promotional groups, have on occasion attracted as many as half a million people to a single outing.

Building the balloons has been a large-scale undertaking, and is a continuing process, for Gros is always adding new figures to his stock. The Oomph Express has been his most ambitious single project to date. It took 10 men more than six months to design and build the 300-foot train, and during the building they used more than 4000 square yards of rubberized fabric and about 18 miles of tape. The original paint job required almost a thousand gallons of paint, and the figures must continually be returned to the Gros shop in Pittsburgh for refurbishing and repainting.

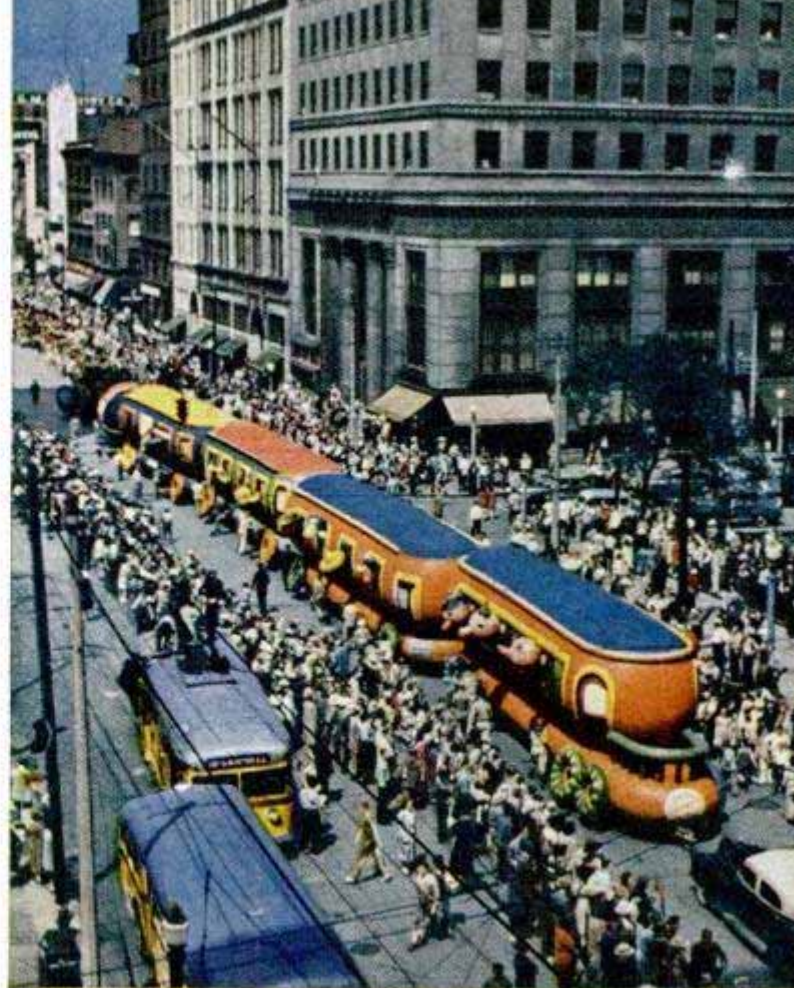
The train is made of so many separate balloon pieces zipped or tied together that no one has actually counted them all. And yet the train can be deflated, packed and transported on a 2½-ton truck. The train reputedly cost \$50,000.

When Gros gets an idea for a balloon, or for a series of balloons, he and his assistants make up rough sketches. Then a designer begins to translate the sketches into more definite plans. The engineering problems are surprising.

The entire secret of balloon construction, Gros explains, lies in what he calls "roundness." The air pressure which inflates the balloons causes trouble when it is forced into corners. So the balloons are designed with as few corners as possible. This means that the basic shapes Gros uses most are combinations of cylinders and spheres, or parts of spheres. By cleverly combining these simple shapes, Gros produces his complicated balloon figures. Individuality and variety are increased by adding appendages in odd shapes.

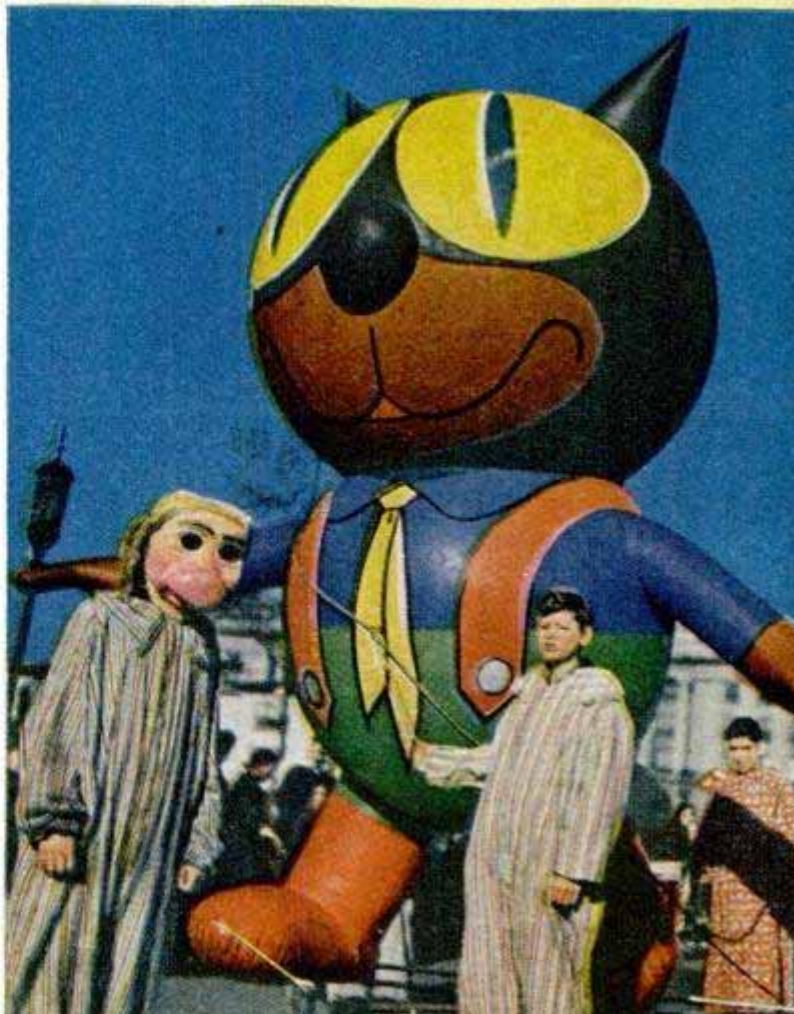
The question of pressure again accounts for the use of several separately inflated balloons or sections in a single figure. When Gros designed a 14-foot ice-cream cone, the cherry on top, being only about a foot in diameter, was constructed as a separate balloon. It is permanently cemented to the rest of the cone, but is inflated separately. Many of these smaller appendages are zipped on and off the larger balloons to make packing simpler and safer.

Once the designers feel all of the kinks have been worked out of the engineering



Three-hundred-foot train attracts a large crowd as it moves through downtown Youngstown, Ohio. It took over six months to build; cost about \$50,000

Krazy Kat sports a gaudy paint job—and not just for show. The paint on all the Gros balloon figures is rubberized and adds strength to basic fabric





problems in any particular piece, cardboard templates are made up for each of the sections of the figure and the rubberized fabric is marked out.

The fabric having been cut either by scissors or by a standard cloth-cutting machine, the workmen begin assembly. The fabric is cemented with regular rubber cement, the pieces having about an inch overlap. And to make the seams doubly secure, latex tape is added after the pieces have been cemented. The final paint job of rubberized paint also adds a strengthening skin to the figure.

Although the cement is ordinarily almost impossible to loosen once it has set, Gros has discovered that it is readily soluble in benzol. When the construction men make errors, therefore, they can easily loosen the cement by squirting a few drops of benzol onto the seam from an oilcan.

The air intakes on the balloons are sleeves of fabric attached to a fabric base cemented to the balloon. The sleeve, after the balloon has been inflated, is tied off to prevent air escape. A clever zipper cover goes over the intake valve, protects it and helps preserve the balloon shape.

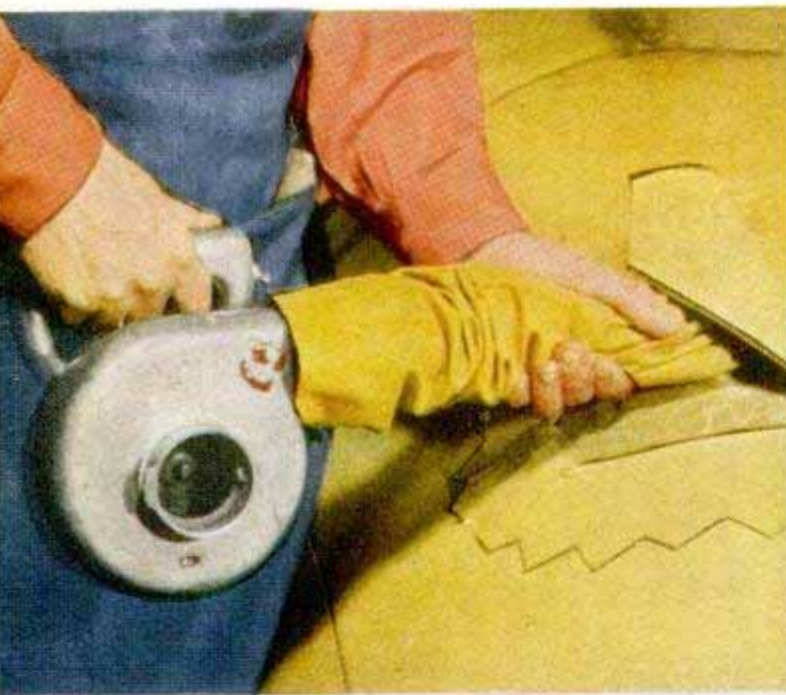
The average Gros parade has 50 to 60 pieces in it, and getting the show under way is a matter of hard work and careful timing. Gros usually has about six of his own experts in a crew, and recruits the same number of local laborers. Seventy-five to a hundred local youngsters handle the balloons during a parade.

If the Gros crew arrives in a city early in the morning, it can have a parade inflated and ready to go by noon. Vacuum-cleaner blowers inflate the figures in a matter of minutes. The same blowers, incidentally, are used to deflate the figures after a parade. Deflation without the help of the blowers would take many hours.

Some of the larger balloons are mounted on aluminum frames which have small wheels and are trundled along the streets. Others are light enough to be carried. The 100-foot dragon is carried by 10 to 20 boys dressed in clown costumes and can be made to writhe and swing back and forth along the street.

The largest pieces are pulled by truck. The engine of the train, for example, conceals a 2½-ton truck which pulls the 300-foot train. In the truck, Gros has built an amplifier and a tape-recording unit which

(Continued to page 234)



Top, templates are used to outline balloon pieces on rubberized fabric used in all Gros masterpieces

Middle, the balloons are inflated through a fabric sleeve which is tied and hidden with zipper cover

With a long-handled brush "portrait artist" strives for realism on biggest grinning whale in captivity



Detroit Listening Post

By Siler Freeman

THE CHRYSLER CORP., long noted for its engineering contributions to better and safer automobiles, has incorporated two outstanding improvements in its 1951 cars. One has been made available to all its divisions; the other is an exclusive feature of its two highest-priced cars in the Chrysler line. The first is a new hydraulic shock absorber, which smooths out the roughest roads and permits speeds at 50 miles an hour on surfaces which would throw other cars out of control. The other is a hydraulic steering aid called Hydroguide which takes the effort out of driving a modern car.

The auto industry is walking a tightrope. It is trying to balance itself between civilian production of 1951-model cars and trucks and an increasing volume of defense orders that may change into strategic war orders at a moment's notice. Meantime it is proceeding with its 1951-model production and has a good start on its 1952 planning.

If 1952 models are to be brought out according to schedule, most of the planning must be translated into machine-tool requirements very soon. A lot of the ordering on such far-off items as new engines and transmissions was done last year but the machine-tool industry is hopelessly behind in its schedules.

One of the big programs that hangs in the balance is Ford's new engine to be built in the new plant near Cleveland. This overhead-valve, high-compression V-8 is being planned for the 1952 Ford, Mercury and Lincoln models. All will use the same engine block. The big difference among the three engines for the divisions will be bore and stroke. It will make for much better interchangeability of parts.

Many car builders have additions to their lines which they deferred until this year and about which there is some doubt. For instance, Packard's 1951 line was brought out last September but, while it showed a convertible, it did not plan to bring it out until this year. Its hard-top coupe was slated for production this spring.

The 100-inch wheelbase car may be another casualty of present-day conditions. Both Nash, with its small Rambler line,

and Kaiser-Frazer with its Henry J, had planned to extend them into varied body styles. Another manufacturer was about to venture into the 100-inch wheelbase class. But materials are scarce and all are inclined to sit tight.

But outside of the individual companies, the picture which is emerging promises to take in everyone. For instance, the chrome that has been sprinkled so liberally on 1951 models may be slated for a dim out. Tires will be more and more synthetic.

The rubber situation makes it extremely doubtful that the fifth tire will continue as part of a new car's equipment.

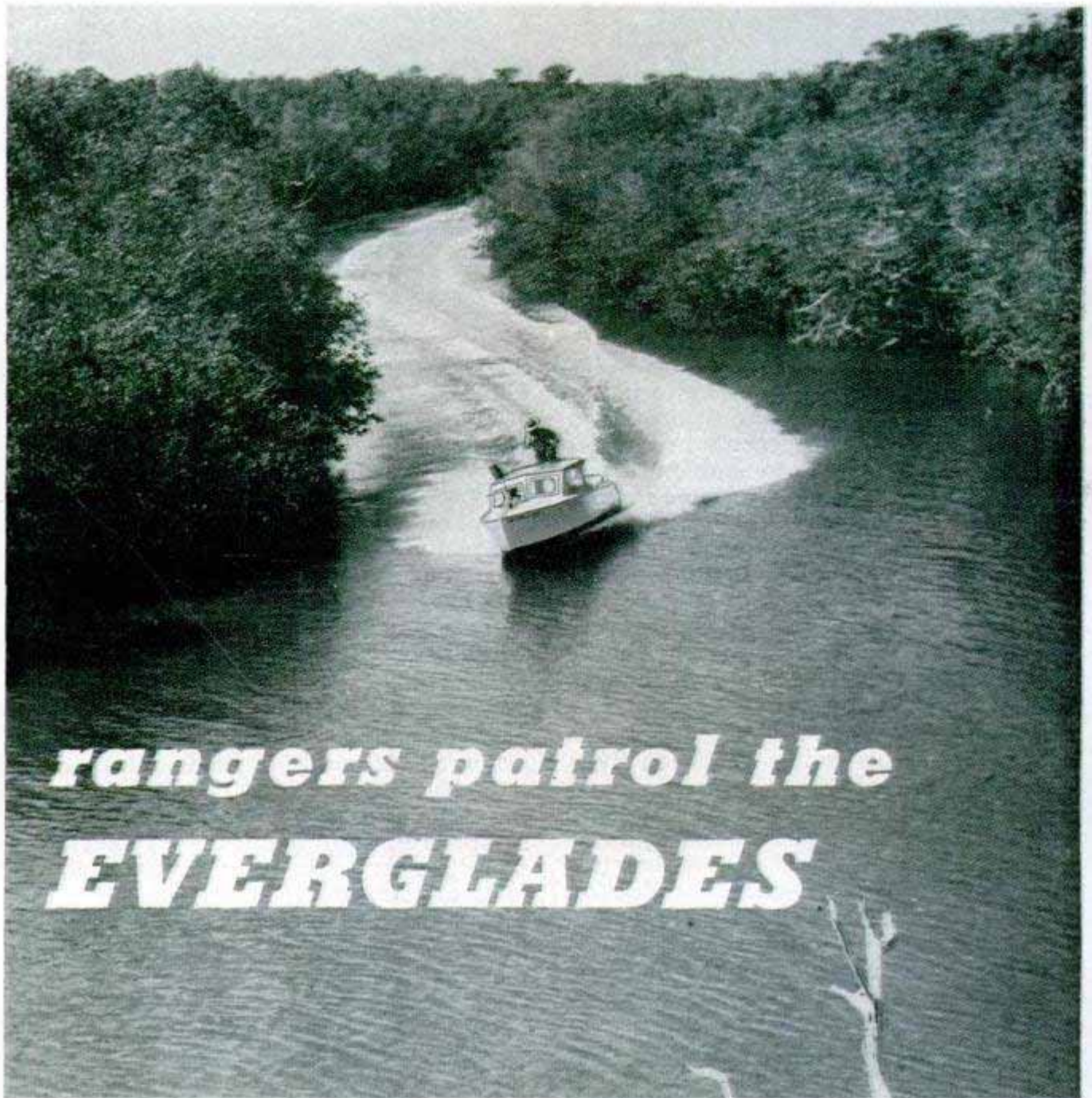
Scarcity of materials has emphasized the industry's salvage job. The material-saving techniques go beyond just collection of scrap. Full-time staffs of engineers, researchers and specialists devote their efforts to counteract shortages.

The program received its early emphasis in the postwar era when materials were almost as tight as they promise to be now. Costs were also spiraling as they have been doing ever since, and price increases weren't balancing them. One company found that in making a hood, the metal sheared off could be put to good use in stamping out washers, caps, flanges, brackets, cover plates and other small parts.

Now the program has become so important that one firm even installed two-way television equipment so that one man could load the freight cars better. But it is not entirely reclamation of scrap which the technicians seek. Materials are saved at the outset by new methods.

For instance, Buick found a way to save 90 percent of its chromic-acid consumption in its chrome-plating process. Another firm which used a special stone for deburring now uses ordinary gravel, saving the company a half-million dollars a year.

Even designs must yield in the efforts to save materials and money. One car builder changed an exhaust-pipe flange so he could use a thinner gauge of steel without sacrificing strength. As the pinch gets tighter on materials, the salvage program becomes more important.



rangers patrol the **EVERGLADES**

By Verne O. Williams

A NEWLY TRANSFERRED RANGER, fresh from service in a northern park, was spending his first night in a lonesome patrol cabin built over the mangrove roots at Coot Bay in Florida's Everglades National Park. About midnight he awoke to hear the crunching of bones under the cabin.

"Hey," he whispered, shaking the old-timer who shared the cabin. "I think a panther has dragged a deer or something under the floor."

The old hand listened a moment, then snorted and told him to go back to sleep. "It's just our old pet 'gator having his nightly snack of crabs," he said.

The ways of alligators, the labyrinth of mangrove-lined waterways on the coast, and the vast prairies of sawgrass and water, dotted with junglelike hammocks, come as a surprise to rangers transferred to the

Everglades from other U. S. national parks.

Veterans of snowy mountain rescues find themselves sweating through a jungle of mangroves to catch alligator poachers. Experts in battling forest fires in the Rockies are soon standing in ankle-deep water to fight strange wind-driven flame-storms that sweep the sawgrass land in the dry season.

The Everglades are like nothing else. That's why, of course, this "last frontier" of subtropical wilderness was selected for preservation. Its backers waged a 20-year battle with hostile hunters, jealous politicians and oil interests before President Truman, in 1947, dedicated it as the twenty-eighth in our system of national parks.

That fall, rangers setting up patrol stations in the new park received a boisterous initiation into Florida weather. "Prepare for tropical disturbance with winds over



Above, busy rangers putting up one of the boundary signs around 100-mile perimeter of park to protect wildlife



Top, right, rangers prepare to fight sawgrass prairie fires with back-pack pumps which are trucked to the scene

Right, ranger Ed Stephanic is pointing out alligators to tourists near the Royal Palm ranger station in park



Below, right, ranger David E. Bogart uses an FM walkie-talkie to send in report on wood ibis to district chief

100 miles an hour," warned the Miami weather bureau. The park area was smack in the path of a howling hurricane.

Park-service men who knew how to take shelter from a mountain blizzard were happy to take hurricane cues from the fishermen who lived in isolated shacks on stilts along the shores of Florida Bay. The fishermen ran their boats far up the narrow canals between the mangroves. Then they piled their most valued possessions in their fish trucks and headed up the one narrow road for towns on the mainland.

While the gusts ripped into the lower Florida peninsula





Ranger Ralph Maxwell and mechanic Jim Parker attach rudder of airboat after overhaul job. The boat has a sledlike hull with airplane engine and propeller

Boats for rangers are kept in station at Coot Bay and include cruisers, skiffs and airboats. Radio tower in background is for the park's FM network

like the teeth of a great circular saw, the rangers worried about the dock piling stacked at Coot Bay; even worried about the birds and animals huddling helpless in the mangroves or sawgrass.

When the winds subsided, the rangers hopped aboard their neat green pickups and started back. They found a literal convention of wildlife assembled on the marl-clay road, the only high spot in the flooded marshes. Rabbits and raccoons walked warily around moccasins. Deer splashed away at the trucks' approach. A wet wildcat, drying his fur in the sun, waited unhappily until a truck almost touched him before jumping off into the canal.

Lower down, sections of the road were under water and alligators waddled hastily away across the shallows. Finally, the rangers had to take to skiffs to reach the station at Coot Bay.

There, district ranger Paul Barnes found that the high waters, driven up from Florida Bay by the wind, had floated off many of his construction materials. The next several days he spent in the park speedboat picking up his planks and creosoted piling, scattered far up the flooded road.

The need for a speedboat, even without a hurricane, is a good example of the new means of transportation the rangers from "dry" northern parks had to master. A man who had saddled horses all his life found himself learning how to dock a motor cruiser instead.

(Continued to page 252)



Scoop Dumps Load Over Its Shoulder

Large quantities of material are loaded rapidly by an overshot loader for crawler-type tractors that makes it unnecessary to turn the tractor around to unload its scoop. Instead, the loader simply swings the scoop up and to the rear, dumping the load behind it. The scoop can be dumped either forward or backward and dumping clearance is standard. In operation, the tractor operator simply runs the scoop into the material, raises it and backs up to the truck or unload pile. The scoop is then swung up and over, dumping the load. The tractor is then driven forward for the next load.



Multicolor Paint

That age-old trick of magicians — spreading polka-dot paint in one coat — now is virtually possible for everyone. A new multicolor paint applies two or more colors in one coat. On walls and furniture it produces a speckled surface that appears to be a base coat sprayed with another color. The paint is available in 16 color combinations and requires no primer except when used on

metal. It can be applied with either a brush or a spray gun. Costing slightly more than conventional enamels, the paint may be obtained for flat, semigloss or gloss finish.

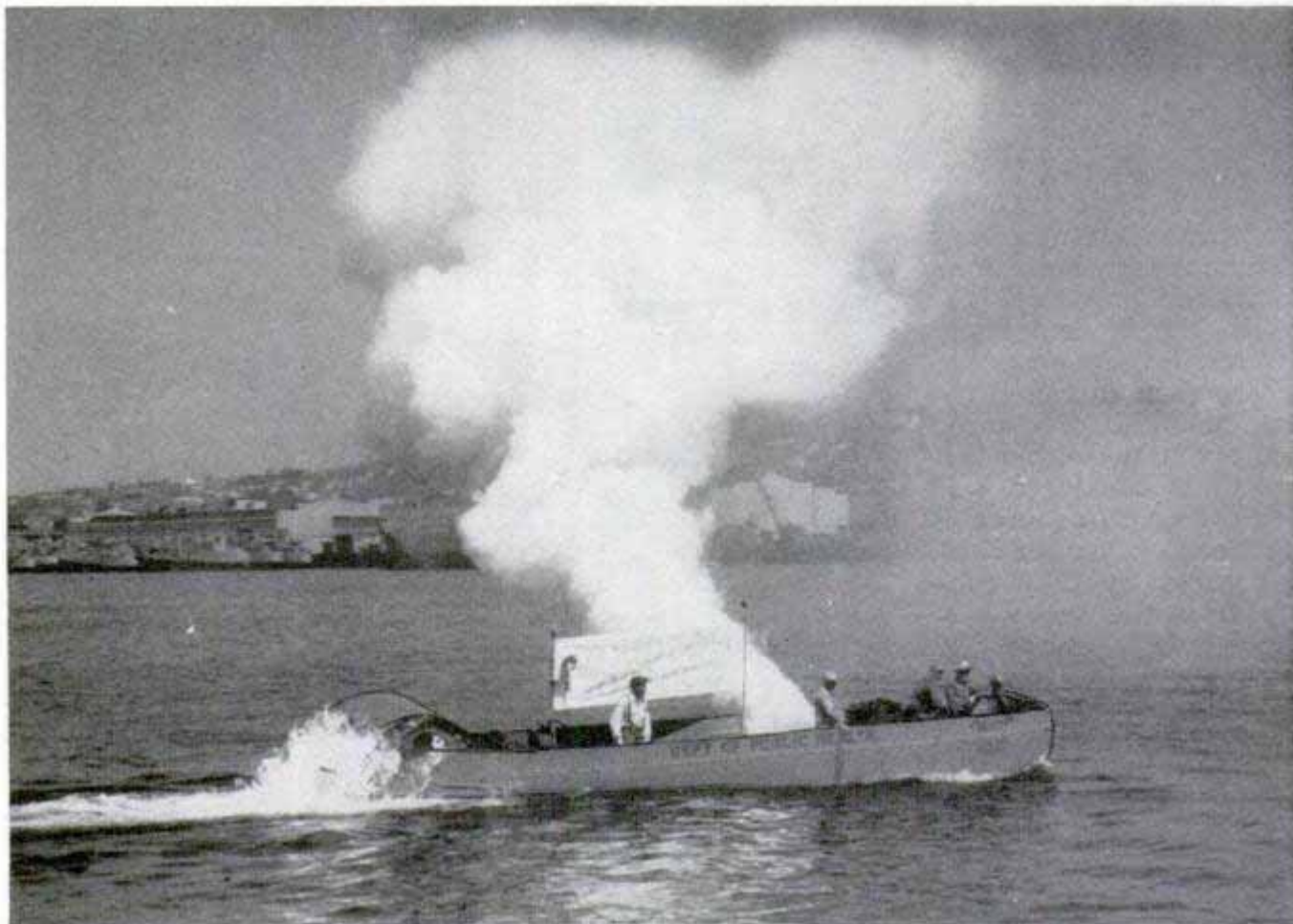


Automobile Water Filter

Scale deposits inside an automobile radiator are retarded by a new water-cleaning unit. The cleaner softens the water, inhibits corrosion and filters rust and foreign particles from the cooling system. Water, drawn into the unit, contacts chemicals which soften it. The water then passes through a filter where solids are eliminated and re-enters the cooling system. The cleaning unit is harmless to antifreeze.

Canadian Mine 7850 Feet Down

Gold is where you find it and up in Canada miners are finding it 7850 feet below the surface in the Lake Shore mine, the deepest mine working in North America. This is an extension of 500 feet below the previous working levels.



Mosquito Nemesis— Paddle-Wheel Style

Plying the harbor and marshes around Seattle, Wash., is a strange craft that spells death to mosquitoes. The boat, powered by two stern paddle wheels, is owned by the city's Department of Public Health and carries equipment to spray insecticide over mosquito-breeding areas. Made of a 10-ton aluminum bridge pontoon, the boat draws but 12 inches of water when fully loaded. It is steered by changing the drive of the two paddle wheels.

"Tracer" Splits Petroleum In Pipe Line

Radioactive material supplied by the Atomic Energy Commission now serves to divide and trace petroleum materials through a pipe line. Various petroleum products are pumped down the pipe line one after the other, and it is essential for men at the delivery point to know the "interface" or dividing point between the materials. Now, each time the pumping station changes products, a fraction of an ounce of diluted tracer liquid is added to the oil stream be-

Insecticide fog billows out across the harbor to cover mosquito-breeding areas. Below, two stern paddle wheels propel the craft



tween the products. Sensitive instruments respond to the arrival of this liquid. The amount of radiation present is less than that emitted by a luminous watch dial.



Lens turret and side-mounted adjustable view finder give the professional touch to a war-surplus camera



Also available is this plastic pistol grip with its built-in trigger for quick filming of action shots

"Extras" Give Surplus Camera That Professional Touch

Motion-picture photographers who use war-surplus 16-mm. movie cameras of the GSAP type can now increase the versatility of their equipment with a professional-type lens turret. Four lenses of different focal lengths and a side-mounted optical view finder are used with the turret. The view finder adjusts to the focal length of the lens being used. Another accessory is a pocket view finder which enables the photographer to select and compose his shots without moving the camera. It is available for 16 and 35-mm. cameras and is adjustable for various focal lengths.

Photographers plan their shots without having to set up their cameras when they use a pocket view finder



Wind-Tunnel Simulator Uses Water Instead of Air



Wind-tunnel tests are accurately demonstrated for students and workers on a training device developed by the Navy that uses fast-moving water instead of air. The water is pumped continuously in a closed system and flows past a stationary object at a controlled speed. The water forms waves which correspond approximately to those created in air by an object flying at supersonic speeds. Although it is not accurate enough for precise testing, the machine is compact and does show the student air-flow principles.

☐ With the 21,116 gallons of gasoline in a big bomber's wing tanks, an automobile could travel a distance equal to 16 times around the earth and still have enough fuel left to tour the United States.

RESULTS OF THE POPULAR MECHANICS SURVEY OF 1951 KAISER OWNERS

(Percentages from Poll)

Owners who bought overdrive.....	63%
Average gasoline mileage (in country)	21.9 m.p.g.
Average gasoline mileage (in city).....	18.5 m.p.g.
Owners using regular gas.....	79%
Owners who change oil.....	73%
Average mileage for change of oil.....	1180
Owners who add oil.....	39%
Average mileage for adding oil.....	1070
Owners who liked length of wheelbase.....	92%
Owners satisfied with road and curb clearance	92%

BEST-LIKED FEATURES

Style, appearance, roominess.....	65%
Visibility, window area.....	61%
Maneuverability, handling	48%
Seating, riding qualities.....	48%
Interior details, dash, etc.....	35%
Gas and oil economy.....	31%
Acceleration, pickup	18%

(These percentages are based on the fact that some owners commented on more than one feature)

RATINGS OF CAR

Excellent	58%
Good	33%
Average	8%
Poor	1%

GENERAL INFORMATION

Prefer in-line engine.....	68%
Prefer V-type engine.....	32%
Prefer six cylinders	68%
Prefer eight cylinders.....	32%
Prefer four cylinders.....	0%
Prefer automatic transmission	45%
Prefer Hydra-Matic	68%
(The above figures mean 68% of the 45% preferring automatic transmission)	
Prefer makes other than Hydra-Matic.....	22%
Undecided about automatic transmission.....	10%
Owners who like low-pressure tires.....	79%
Previous Kaiser owners.....	44%
Will buy another Kaiser.....	80%
Might buy another Kaiser.....	13%
Will not buy another Kaiser.....	7%
Dealer service good.....	63%
Dealer service average.....	24%
Dealer service poor.....	13%

Most disliked features—Body and window leakage. Rattles.

THE OWNERS

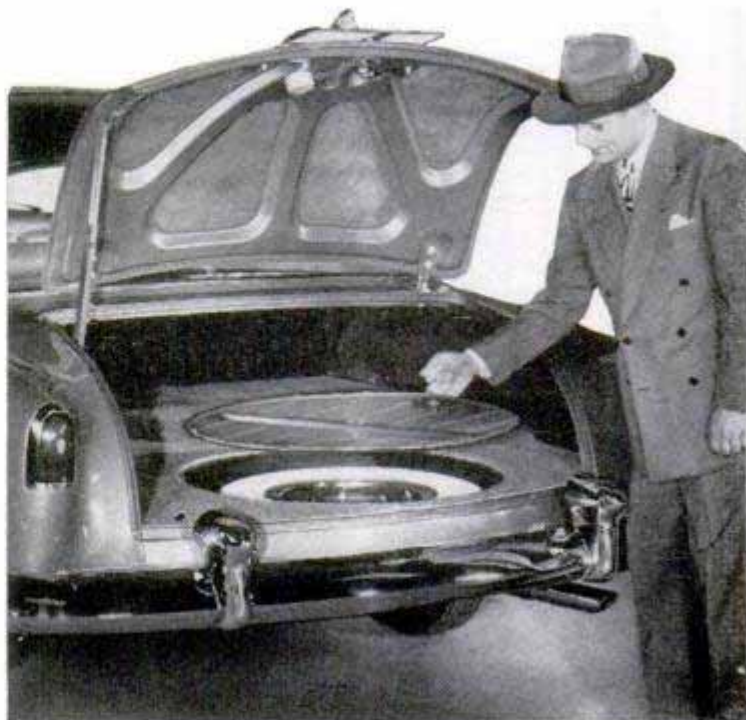
This is the second report from the owners of 1951 cars based on a detailed questionnaire sent by PM to 1000 Kaiser drivers. The survey is conducted by Floyd Clymer and the percentages both for and against give the reactions of the man who drives one

THE ENTHUSIASTIC response to our first owners' report published last month proves that if there is anything in the world a man likes to talk about it's his car. As one man said, "Buying a car is like getting married and you take what you drive away with for better or worse. You never really know 'til the honeymoon is over what you've got."

Many state frankly that never before have they filled out a questionnaire, but when it comes to reporting on their cars—well, that's different. One man from Wheelersburg, Ohio, wrote: "As a rule I never fill out any of these forms, just ignore them, so if this information is of any benefit just feel grateful." His favorite adjectives for his four-door Kaiser sedan which he has driven 2400 miles were "wonderful" and "just right." He did complain, though, about "loose bolts, screws and leaks around the front and back glass."

For many owners the questionnaire is

Kaiser owners in the survey failed to comment on new recessed tire well in trunk floor. Many complained of lack of space and leaks in compartment



REPORT on the '51 KAISER



not nearly long enough and they turn it over and write their own detailed report on the back, filling it with much interesting and valuable data. They tell about trips they have taken, accidents they have survived and many quirks in their car experiences that could never be covered in a questionnaire. A man from Villa Park, Ill., wrote: "Last month's Motor Trend listed the top speed of the '51 Kaiser at 84 miles per hour. Time and again I have walked around my buddy's new '50 _____ when his speedometer read close to 95. I've never yet read an article that gave Kaiser an even break. It seems they only knock him as much as possible. Here's hoping the *Popular Mechanics* article gives Kaiser just a bit of credit where it's due." (Any credit in this series is not the voice of the magazine but the reaction of an owner.)

This month's Kaiser survey pretty generally covered the nation, city owners, farmers, doctors, mountain drivers, night drivers, day drivers, owners from the Deep South to northern Minnesota and from coast to coast. Their story is told in

The '51 Kaiser De Luxe shows here what owners go all out in approving —good style and appearance. Eighty percent will buy another Kaiser

Below, a typical questionnaire received in the survey of 1000 Kaiser '51 owners. Many turned over sheet and filled back with information

THE POPULAR MECHANICS MOTOR SURVEY
as conducted by Floyd Clymer

I am the owner of a 1951 Kaiser. Model De Luxe Body Style 4 door
Hydra-Matic Overdrive? No Yes Have owned it about 4 months Mileage is now 5035 miles.

My approximate gas mileage in the city is 18 MPG. Country driving 22 MPG.

Do you have to use premium gasoline to eliminate knocking? Yes Do you change or add oil? Yes
If you add oil, about how many miles do you drive before adding one quart? Do not add any

How does the car handle on the road? It holly the road better than any other car I have driven.

What about maneuverability? It is of the best, according to American standards.

What is your opinion of the wheelbase? I like it about where it is now.

Do you have good passing pickup at cruising speed? Very good (not like '47)

Do you have sufficient curb and road clearance? yes

What features about the car do you like? The body styling, that is low hood, better visibility etc. Also its handling ability that is holding the road at high speeds.

What do you dislike about the car? I would like more powerful engine with greater torque.

Have you ever owned a Kaiser car before? Yes If so, how many? 1 (1947)

Would you buy another Kaiser car? Yes Do you secure good dealer service? Yes

How would you rate the Kaiser car? Excellent Good Average Poor

GENERAL INFORMATION

What type of engine would you prefer in your car of the future? In-line V-type

Cylinders: 4, 6 or 8 8 Valves: Side Overhead

Automatic Transmission? Yes If so, what type do you prefer? Hydra-Matic

Do you like the new low pressure super-cushion tires? Yes

Do you carry recommended pressure? Yes If more pressure, how much more lbs.

You are under no obligation and your reply will be held in strict confidence

My name is [Redacted]
Address [Redacted]
City and State New Orleans La

PLEASE MAIL PROMPTLY TO:
FLOYD CLYMER
1268 So. Alvarado Street
Los Angeles 6, California

(Use other side for additional remarks if you wish)



Turns on a dime? That is, if you can find a 36-footer. Owners like the '51 Kaiser's fine maneuverability

the percentages from the poll listed on these pages. Perhaps the most glowing compliment to Mr. Kaiser & Co. is the fact that 80 percent of 1951 Kaiser owners would like to buy another Kaiser. Not quite half of those who reported were previous Kaiser owners. Also, only two persons expressed any concern about trade-in value when buying from an "independent." This is, indeed, a tribute and obviously based on faith in the car's future.

1951 KAISER (Special and De Luxe)

Condensed Specifications

ENGINE

6-cyl. L-head. Bore—3-5/16 in. Stroke—4 3/8 in. Displacement—226.2 cu. in. Brake hp.—115. Compression ratio—7.3 to 1. Transmission—3-speed conventional. Optional: Overdrive or Hydra-Matic.

GENERAL

Weight—Special, 3126 lbs.; De Luxe, 3171 lbs. Wheelbase—118 1/2 in. Tread—front, 58 in.; rear, 58 3/4 in. Height—60 1/2 in. Over-all width—74 in. Length—Special, 208 1/2 in.; De Luxe, 210 3/8 in. Tires—6.70 x 15. Recommended pressure—24 lbs. Road clearance—7 1/2 in. Turning radius—18 ft. Steering wheel, lock-to-lock—4 3/4 turns. Steering ratio—18.2 to 1.

CAPACITIES

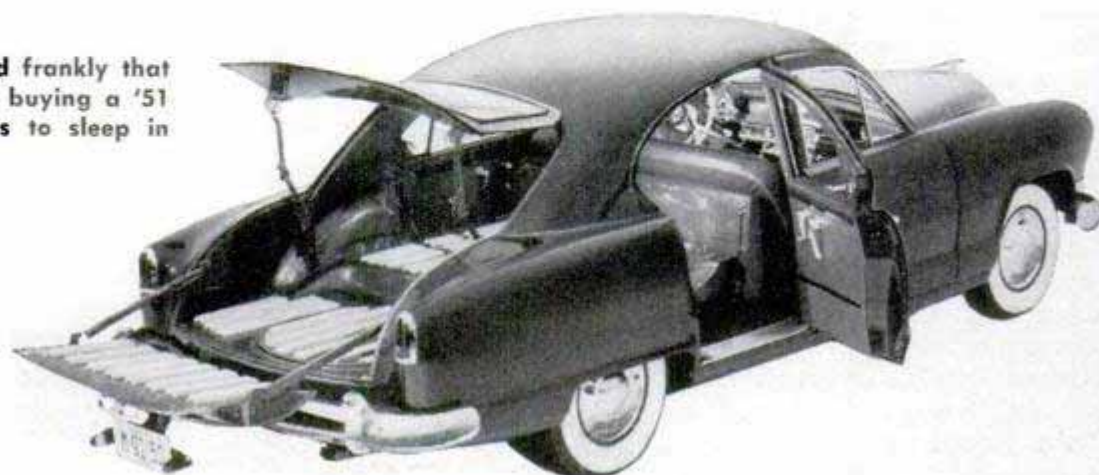
Oil—5 qts. Water—13 qts. Gasoline—17 gallons.

The best-liked features of the car—style, appearance and roominess — show the things people look for first and appreciate most in a car. Many seem to take for granted that the average American-built car will provide them with a good engine. Maneuverability also got a good bill of health in the Kaiser survey, and the owner of a two-door Special sedan in New Orleans credited that factor with possibly saving his life and that of his family. He reported that "coming back through Mississippi on our return from a vacation trip to Illinois, the driver of an old car pulled onto the pavement and was crossing it without looking in either direction. I was doing 50 miles per hour. I slammed on my brakes and turned the wheel to the right. The car skidded and bounced when the front wheels hit the shoulder. Immediately, I spun the wheel in the direction of the skid and on the first bounce the car swung into line, missing the other car by a hair. My two boys in the back were thrown to the floor but not hurt and my wife and small baby in front were just scared, as I was. We feel mighty thankful for a SAFE automobile."

By far the most complaints against the Kaiser were directed at rattles and body

(Continued to page 270)

One owner reported frankly that his only reason for buying a '51 Kaiser Traveler was to sleep in



CLYMER TESTS the HENRY J

By Floyd Clymer

HERE IS A REPORT on another 100-inch-wheelbase car—Kaiser's new Henry J, which I drove from Detroit to Los Angeles and many miles around southern California in a 4500-mile test under every conceivable driving condition. It was the six-cylinder job, equipped with overdrive, which I highly recommend in a light car such as the Henry J.

Unlike the Nash Rambler, in which all accessories are included in the price of the car, the Henry J is at the opposite extreme, with nearly every possible gadget or accessory eliminated.

To cut first costs, the Henry J is built with no window vent panes, no lock on the left door or glove compartment (which is actually a pouch on the side), an unglamorous interior finish including plain fabric seat cushions, and a plain but practical instrument panel. The rear-deck space cannot be reached from the back of the car, as there is no trunk lid, but one may be ordered as special equipment, as may the extra locks and vent panes.

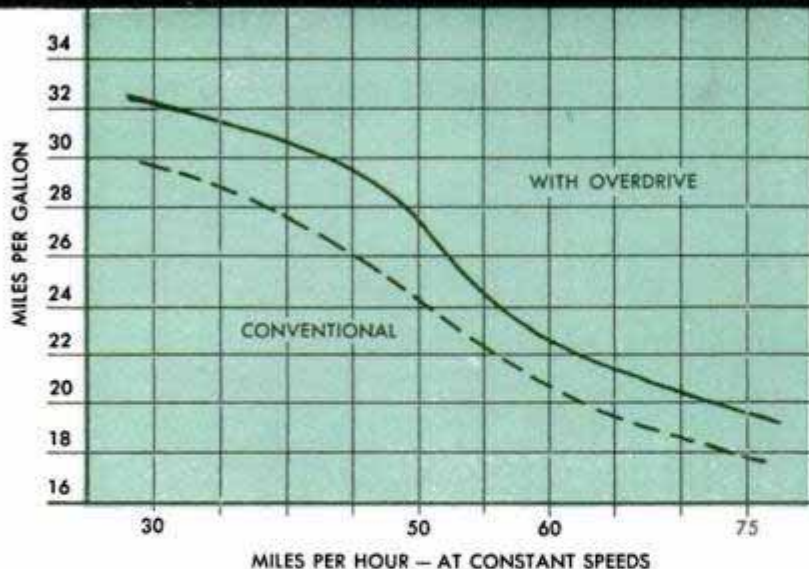
The Henry J is not revolutionary in any sense: engine by Willys, differential by Spicer, a Borg & Beck



The Henry J's six-cylinder engine built by Willys is only an 80-horsepower job but plenty powerful for weight of car. Below, this high power-to-weight ratio gives the car good maneuverability, especially on rough and winding highways



CLYMER'S ECONOMY TEST OF THE HENRY J



clutch, Young radiator, Auto-Lite electrical system and Warner transmission and overdrive units are used. All are names famous for their quality products.

I beat the Henry J over all kinds of roads, through rain and mud, and over rough detours and winding back trails, seriously trying to find the "bugs." After completing the test, I have a high respect for this new Kaiser model.

The car will take punishment mile after mile with no sign of overheating. In overdrive, 80 miles an hour is a cinch. On long, level stretches, the speedometer several times showed 85, 90, 95 and even 100 miles per hour, but like most speedometers the speeds are from two to six percent fast as compared with stop-watch timing.

The Henry J's acceleration is terrific. Performance of the Henry J can be at-

tributed to a very high horse-power-to-weight ratio . . . it might well be called a "hard-top hot rod"!

Like the Nash Rambler, this car has a wide hood in front, offering the driver a sense of security and no feeling of being in a small car. The 100-inch wheelbase proves handy in parking and cornering, and the front suspension is as soft and easy riding as in several higher-priced cars; in fact, it was a little too soft to suit me, in fast and hard cornering. I liked the easy steering and the soft

yet effective brakes which don't seem to "fade" or lose their braking effect when used often at high speeds. Gas mileage is excellent, as shown on my test chart.

On the other hand, the car does have some things that could be improved. During a severe rainstorm, water leaked in around the windshield and one window. The plastic knob on the gearshift lever is pushed on, and tends to work loose quickly; it should be threaded. Although it wasn't serious, I noticed a steering-column vibration between 65 and 70 miles per hour, apparently due to the method of anchoring the steering column to the cowl. Vibration is not noticeable at any other speed. In fact, the engine is unusually smooth.

A few rattles and squeaks were evident; the body could stand a bit more sound-proofing. Generally, the body is light, the doors operate easily and the car "turns on a dime." Visibility is excellent. The instrument panel is neat and attractive, although I prefer an ammeter and oil gauge instead of the simple red warning lights for generator and oil pressure, as used in the Henry J.

In my personal survey on the Henry J, I talked to a number of owners. About a third had overdrive, and all were pleased with OD for use in the light car. Average gas mileage reported in the city was 24.1 miles per gallon, and in the country, 27.3 miles per gallon. Nearly all of them liked the size of the car and found it ideal for their particular use. Most owners praised the visibility, the riding qualities in so light a car (2448 pounds), the performance and the fuel economy.

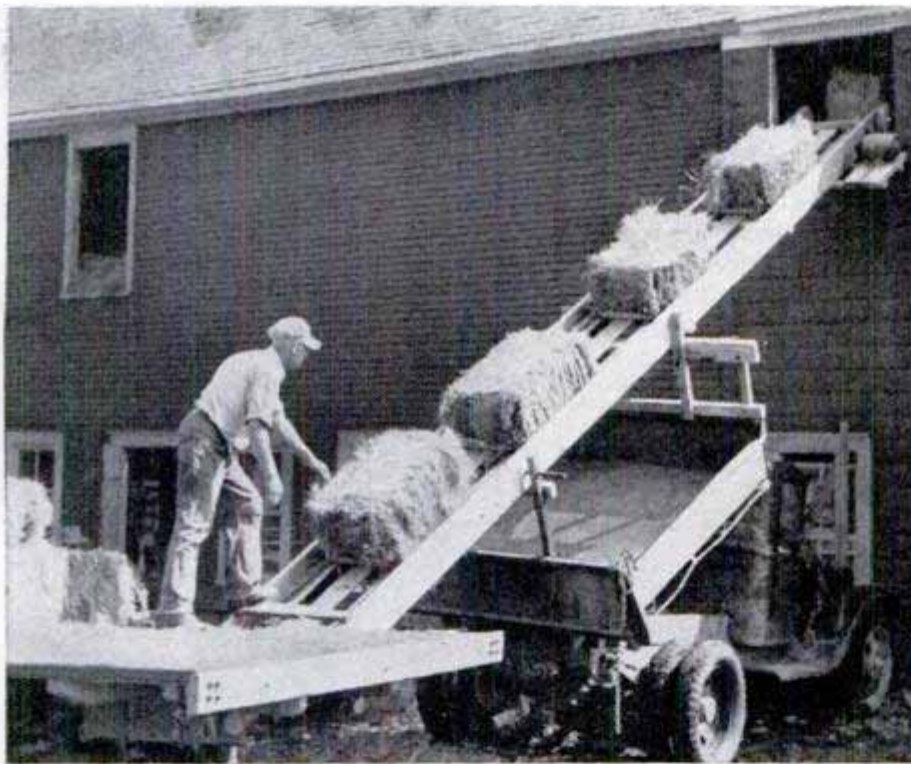
(Continued to page 274)

Luggage compartment of standard Henry J is reached by folding rear seat down, but rear deck that can be opened is optional



Automatic Juicer Counts Oranges

Oranges are automatically counted, cut and squeezed by a push-button juicer designed for restaurants and juice bars. Sixty large oranges can be stored in a bin at the top of the machine. The waitress pushes a button to denote how many oranges she wants juiced, and that number rolls down a wire ramp into the squeezing chamber. Here the oranges are cut and lowered into position to be squeezed. The fresh juice flows through a strainer and out into a container. The juicer can squeeze oranges at the rate of one every three seconds.

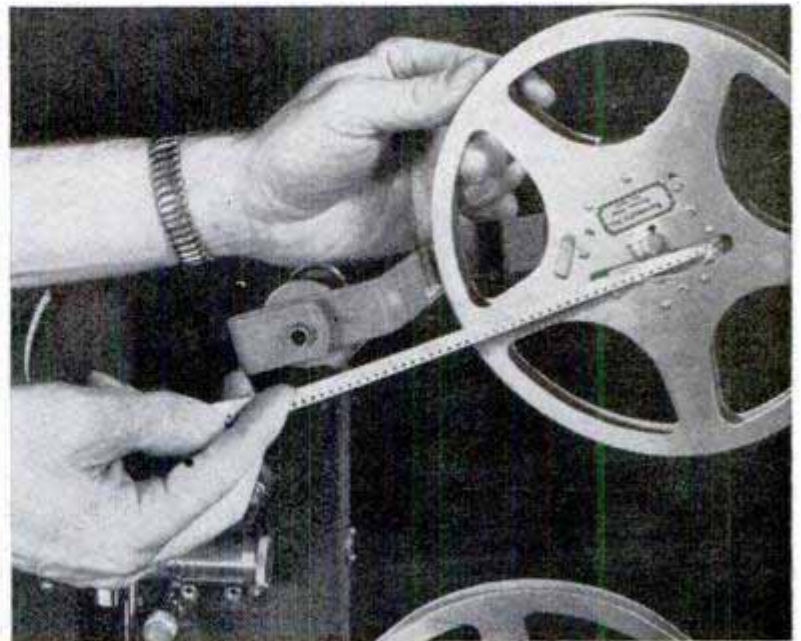


Homemade Elevator For Baled Hay

Several feet of implement chain and some spruce lumber cut from the farm wood lot have been fashioned into an elevator for hoisting baled hay into the barn. James Leach, Jr., of Pawlet, Vt., who built the elevator, mounted it on an old dump truck which carries it from farm to farm and supports it at work. The conveyor is 27½ feet long and is powered by a ¾-horsepower motor. The angle of elevation can be adjusted by raising or lowering the dump-truck body.

Nonrewind Reel For Movie Fans

Movie fans don't have to take time out to rewind film after each showing when they use nonrewind reels that make it possible to remove the film from the center. The reels act in the usual manner on the takeup side, but when mounted on the supply spindle they do not revolve. Instead, rollers in the reel hub allow the film to revolve within the reel as it is withdrawn through the center slot. An adapter holds the supply reel at the correct angle to feed the film in a straight line to the film-feed mechanism of the projector.



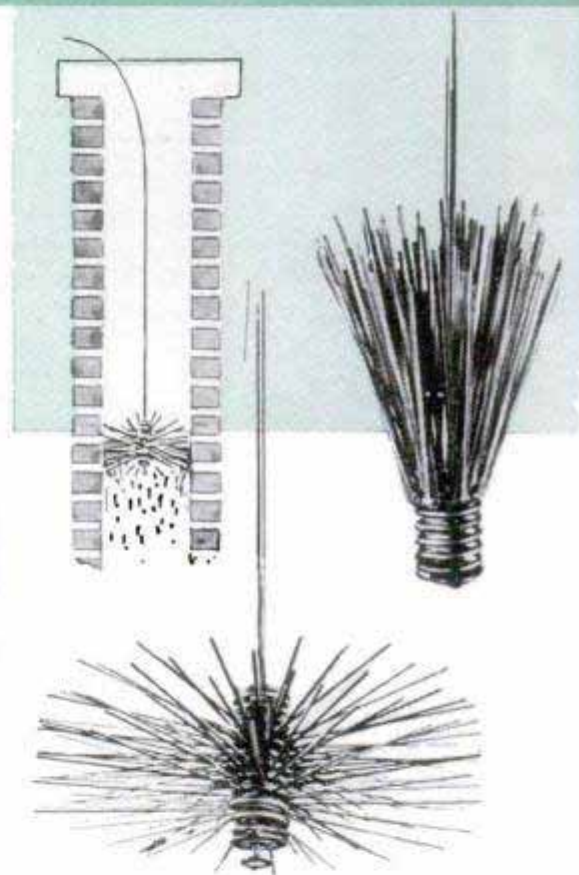
WHAT'S NEW

For Your Home



BATH SPRAY, above, has a two-way nozzle. It delivers a nonsplashing stream of aerated water or, if you like, it's a stimulating needle spray when the aerator cap is removed. It is attached to a rubber hose and can be used with any faucet

SPRINGLESS MATTRESS, below, has a permanently sealed pneumatic core, formed by 136 air-filled cubes. Each plastic cube is individually sealed. The mattress has only half the weight of the standard innerspring type



WIRE "PORCUPINE," above, is a chimney brush that can be used from the top or bottom. You can force it down from the top or, if you prefer, you can fold it and push it up from any flue opening. When it reaches the top, it opens up like an umbrella to scrape off soot as it is pulled down



CONVECTOR for the picture-window living room is a long, low model that hides as it heats the room

STRIP OPENER, below, for vacuum cans removes the metal strip neatly and ejects it when finished

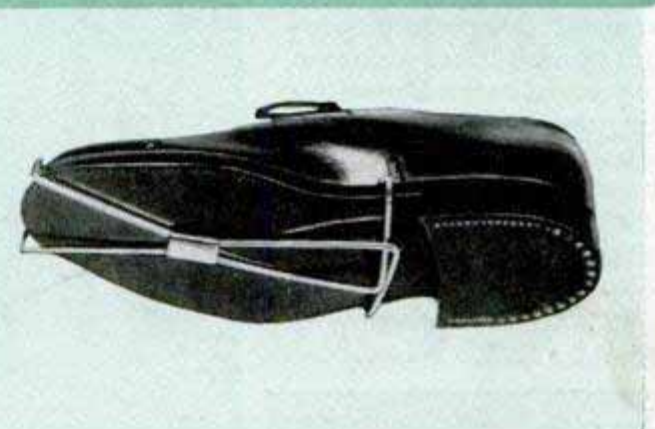


SHIRT CADDY, above, hangs on a door and holds six shirts. It is transparent for quick selection

SHOE TREE, below, keeps the shoe in shape by hooking on sole. It doesn't stop air circulation



POISON LOCK, below, prevents accidents. Cap can't be removed until the combination is dialed



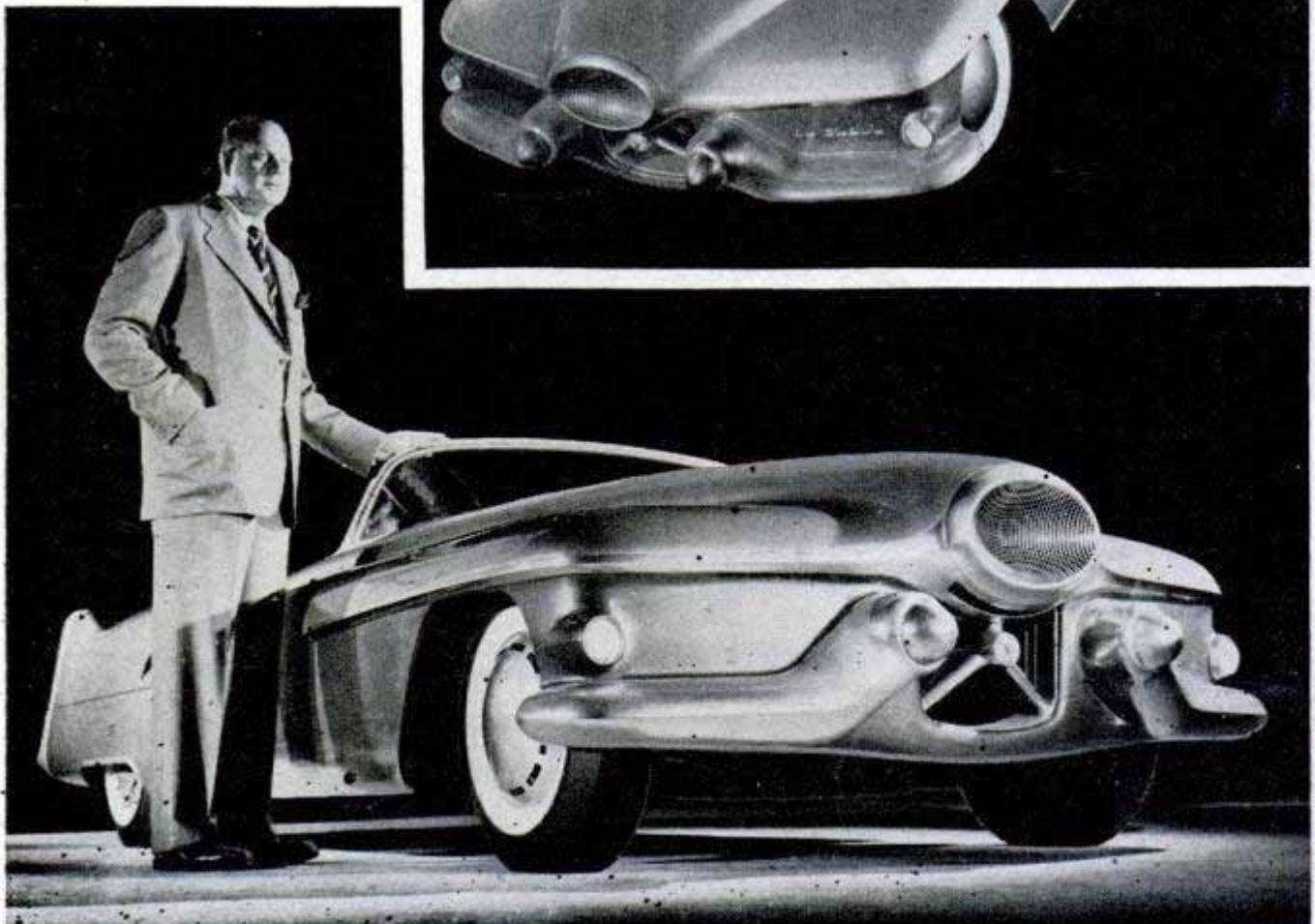
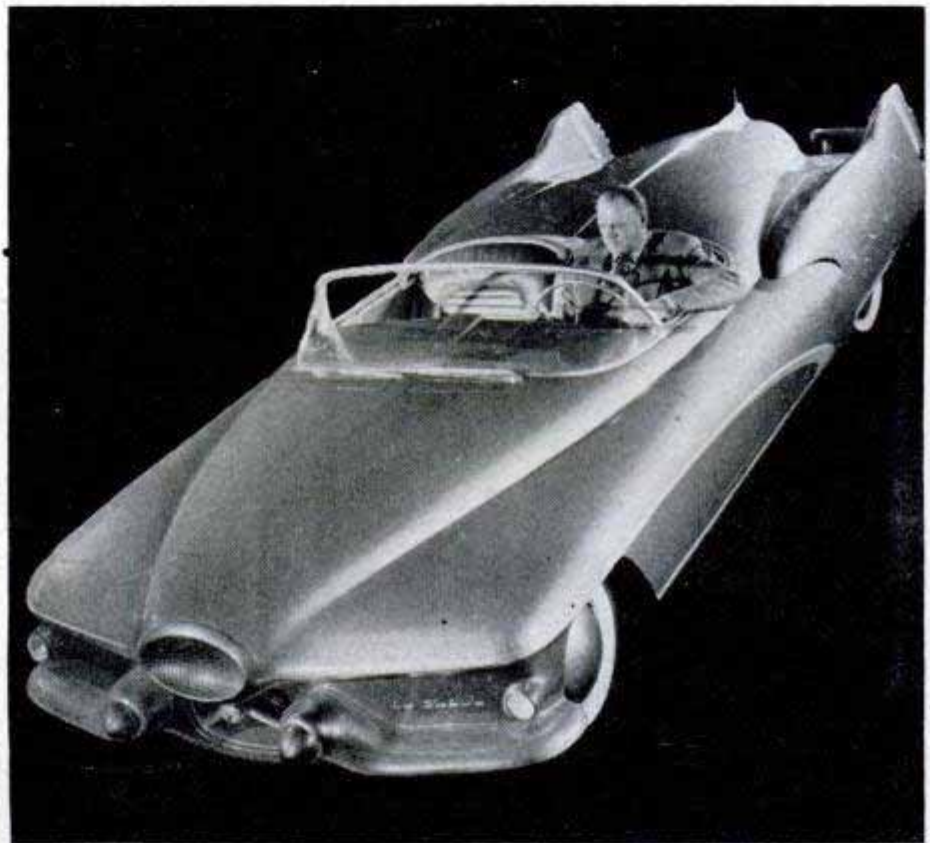
STATIONARY IRON, below, is simple to use. You merely slide the material across the egg-shaped hot surface. It's designed for fancy ironing on ruffles, shirring or pleats. It has a thermostatic control



Style Czar of GM Gets Custom-Built Car

WHEN Harley J. Earl, General Motors vice-president in charge of styling, steps out in a new experimental car the automotive industry pricks up its ears. His last experimental job was the "proving ground" for such innovations as electrically controlled convertible top and windows, curved-glass windshield and push-button door latches. His newest experimental model, called Le Sabre, is now under construction and will be powered by a high-compression (10 to 1) V-8 engine plus supercharger. Its dual fuel system will use current premium fuels and methyl alcohol, the latter to be injected into combustion chambers through the carburetor for extra power boost. The engine will develop 300 horsepower. The engine weight is expected to be about 500 pounds, providing a high horsepower-to-weight ratio. Dynaflo transmission will be housed near the rear of the stationary drive shaft, just ahead of the differential. The body is only 36 $\frac{1}{4}$ inches high at the cowl and 50 inches with the top raised. Wheelbase

is 115 inches and over-all 200. Ground clearance is six inches. The top section of the front grille is part of the lighting system and when the front lamps are turned on the grille moves out of sight. Two sets of three tail lamps are mounted on the trailing edge of the rear fins. These also operate as directional signals. Housed in the twin fins are aircraft-type 20-gallon rubberized fuel cells, one for gasoline and the other for methyl alcohol. Hydraulic jacks operate from the instrument panel. If rain falls on sensitized spots between the seats, the top and windows automatically go up.





Four-door '51 Buick Special has new chassis and body including the Roadmaster's distinguishing "sweepspear"

BUICK FEATURES SPECIAL SERIES FOR '51

BUICK for 1951 is emphasizing its Special series. It has the distinction of being one of the two General Motors divisions to bring out an entirely new body and has given it to the Special to enlarge the choice of styles in that series. Buick is also introducing a Custom Special with which it will challenge its lower-medium priced competitors. The '51 Special series has the new F-263 engine which was introduced last year in the Super. The engine develops 128 horsepower with Dynaflow and 120 with

the synchromesh. The Special has a 121½-inch wheelbase with 204.8 inches over-all. Riviera styling has been extended to both the Special and Custom Special in both two and four-door models. A convertible is also available in this line for the first time, as well as a low-priced three-passenger coupe. An outstanding mechanical change on the Roadmaster is new brakes. Linings are segmented and cemented to the drum. The Roadmaster's distinguishing "sweepspear" is available on all '51 models.

Buick's sleek '51 convertible displays new grille and chrome trim with flowing restyled fender lines



Stanley Hiller, Jr., its designer, enters the two-place, jet-powered helicopter. It weighs 340 pounds empty, has a maximum speed of 85 miles an hour and a ceiling of 12,000 feet

Here's Your HELICOPTER COUPE

By Thomas E. Stimson, Jr.

DO YOU WANT a helicopter that's small enough to land on your lawn and big enough to carry two people? A simple, practical, foolproof machine?

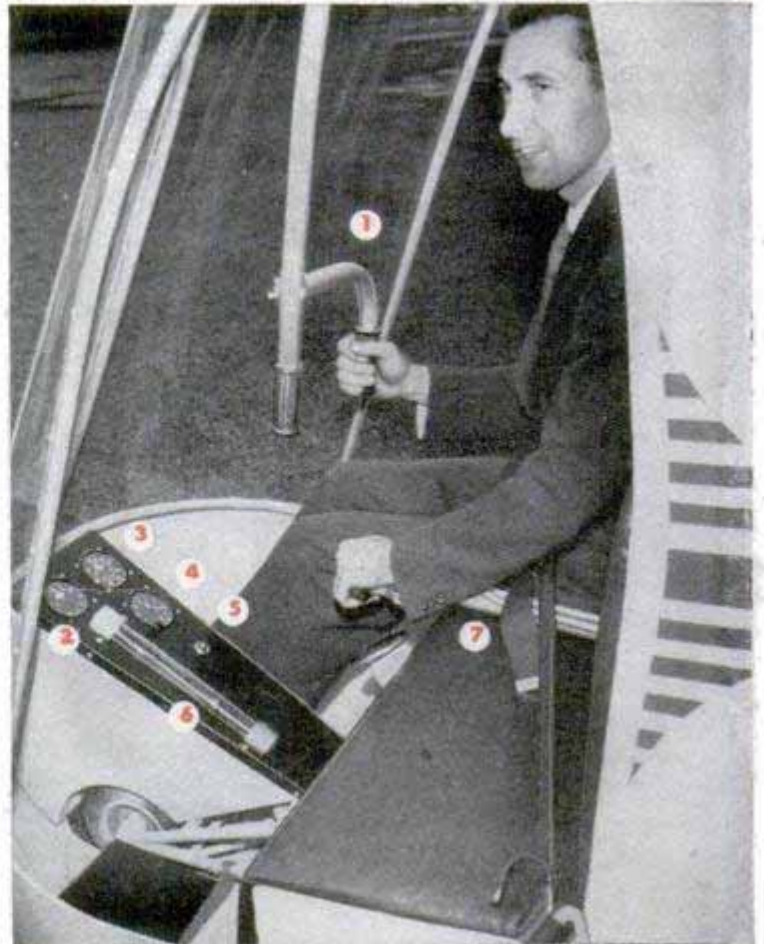
It's in production.

Stanley Hiller took me for a ride in one just in time to beat the presses for this issue of *Popular Mechanics*. Hiller is the 26-year-old president of Hiller Helicopters, the Palo Alto concern that in the last year has out-sold commercially all other helicopter manufacturers combined. His big "Hiller 360" is a weight carrier, a workhorse that dusts crops, flies the power lines and helps fight forest fires.

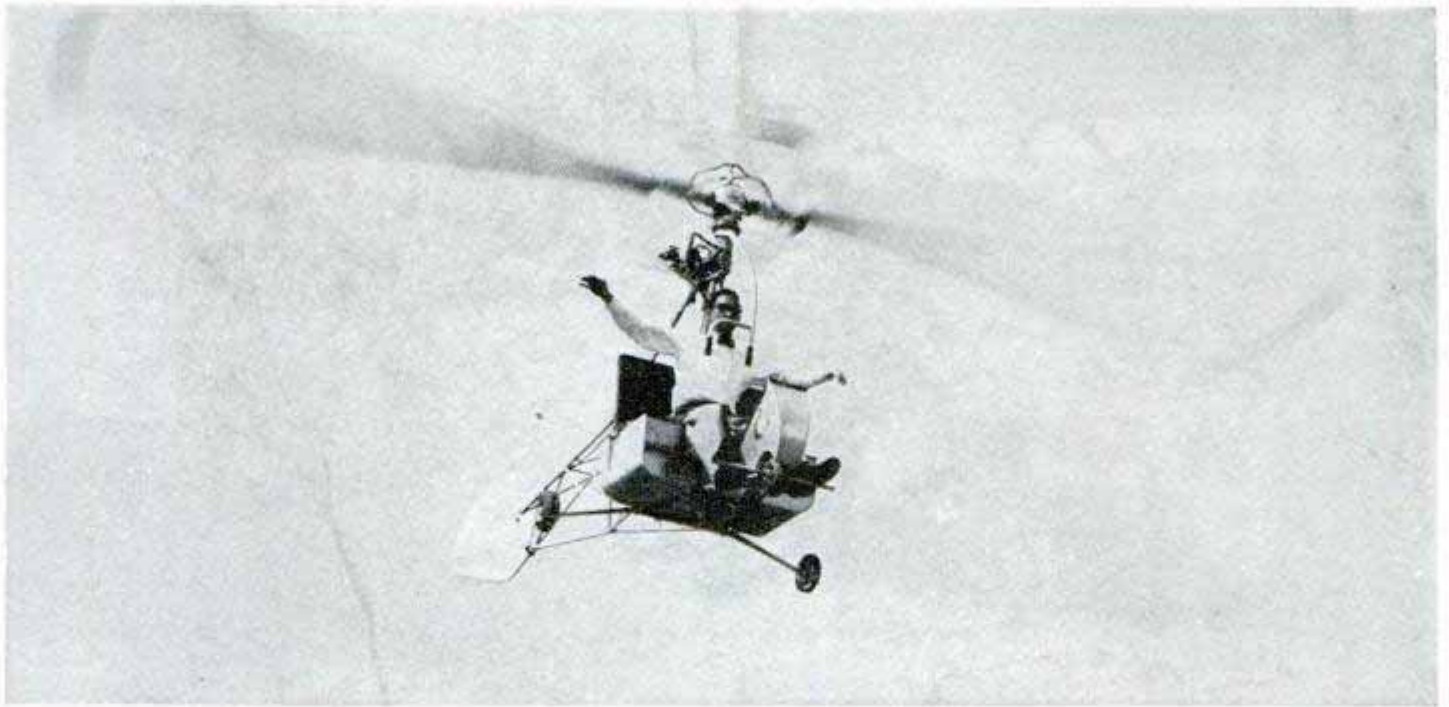
The new "Hiller Hornet" is a small, personal vehicle. It's priced under \$5000, one fifth the cost of an ordinary helicopter. Eventually, that price can be cut in half, at least. Except for Korea it would be ready for the civilian market this month. Right now military orders alone are being filled.

Hiller drove me from his modern factory to an old, ramshackle farmhouse to see the new vehicle. The farm looks like it has been abandoned for years and here, away from prying eyes, he conducts secret tests on advanced designs.

"You are the first person beside my own



Pilot and passenger sit on a seat above fuel tank. (1) Cyclic control stick guides direction of travel, (2) rotor r.p.m. register, (3) air speed, (4) altimeter, (5) starter button, (6) fuel-flow gauge and (7) is the throttle and "up and down" collective pitch control



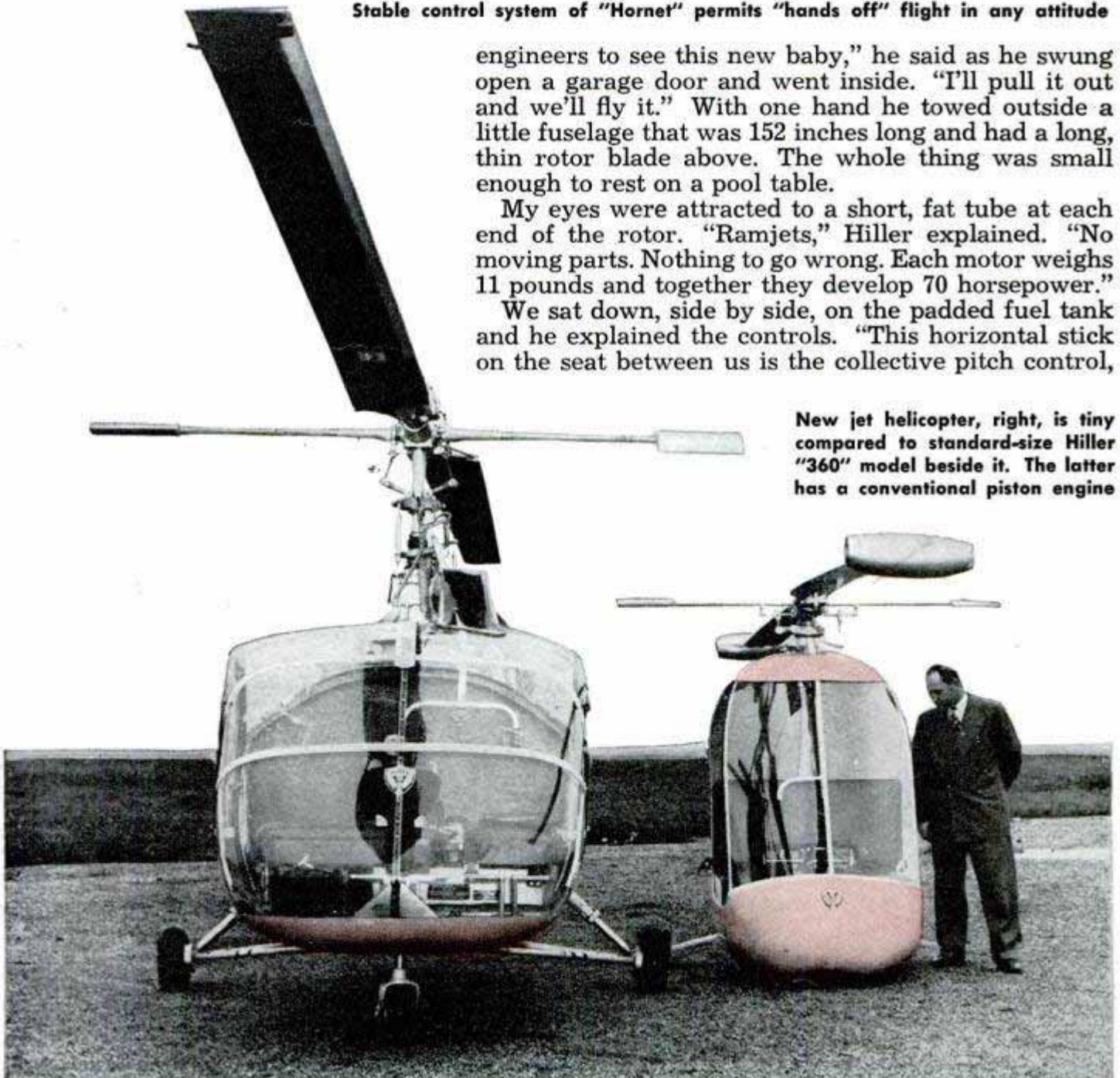
Stable control system of "Hornet" permits "hands off" flight in any attitude

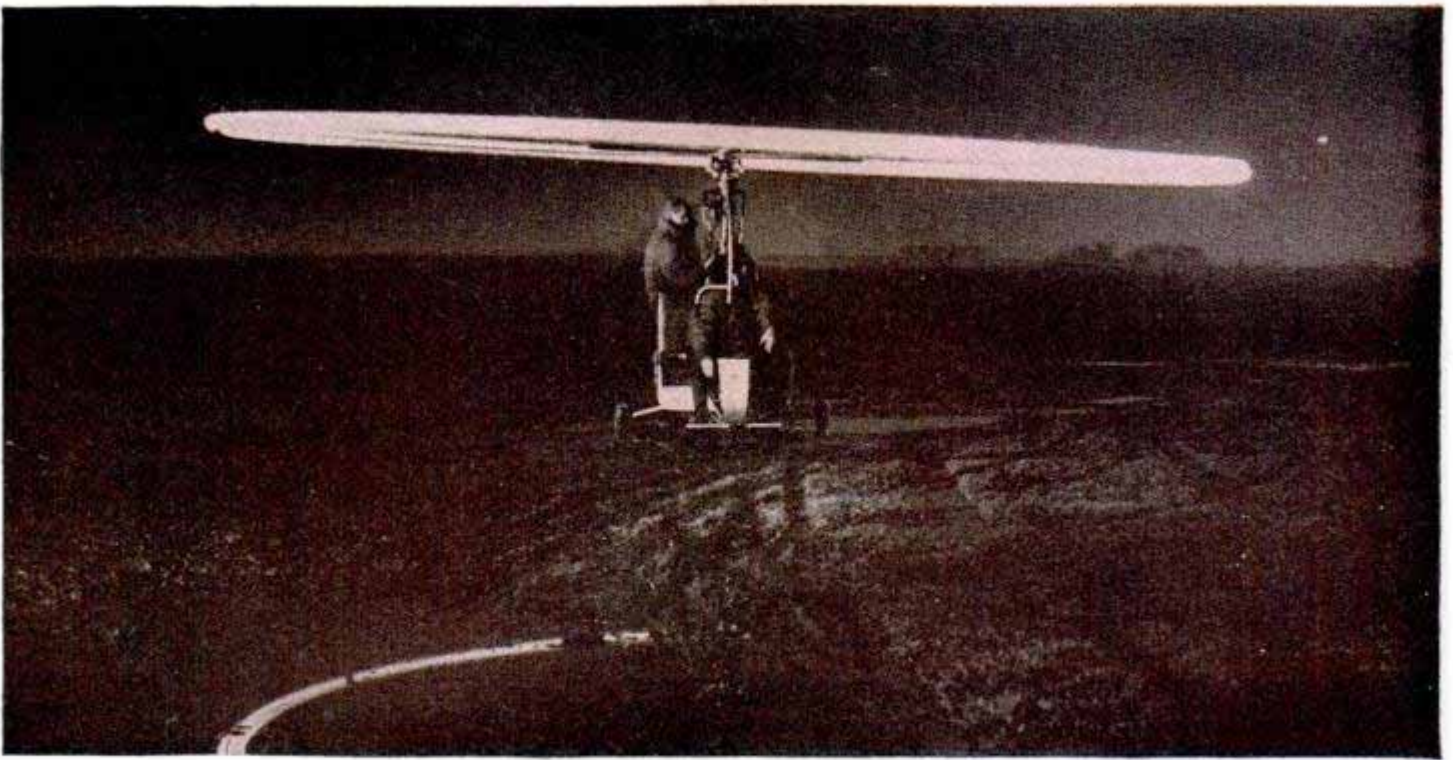
engineers to see this new baby," he said as he swung open a garage door and went inside. "I'll pull it out and we'll fly it." With one hand he towed outside a little fuselage that was 152 inches long and had a long, thin rotor blade above. The whole thing was small enough to rest on a pool table.

My eyes were attracted to a short, fat tube at each end of the rotor. "Ramjets," Hiller explained. "No moving parts. Nothing to go wrong. Each motor weighs 11 pounds and together they develop 70 horsepower."

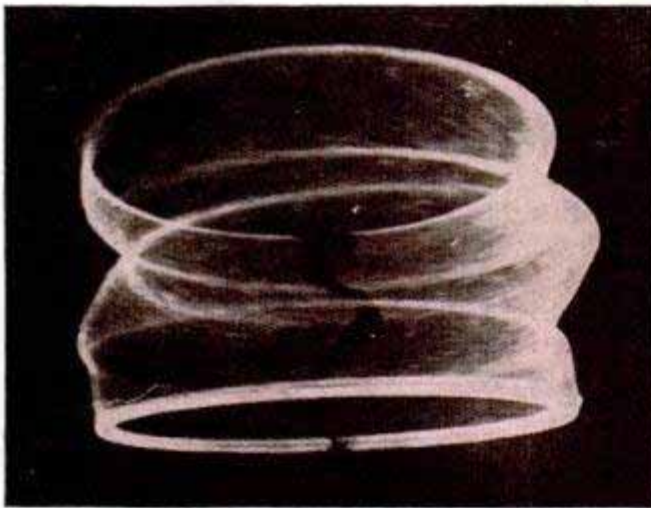
We sat down, side by side, on the padded fuel tank and he explained the controls. "This horizontal stick on the seat between us is the collective pitch control,

New jet helicopter, right, is tiny compared to standard-size Hiller "360" model beside it. The latter has a conventional piston engine





Running smoothly, the ramjets at a tip speed of 450 miles an hour produce a halo like this after dark



Night photograph by the author shows pattern of fire created by short, slow climb of jet helicopter

the up-and-down stick. Pull it up and we climb, push it down and we descend. Push it to one side and you rotate the fuselage. That's for lining up in the direction you are traveling. You'll notice that there are no foot pedals.

"This cyclic pitch control, the bar that curves down from overhead, governs the direction of flight. Push it forward to move ahead, pull it back to fly in that direction. If you want to turn, push to the left or right. That's all there is to it."

Between our feet was a small instrument pedestal on which were mounted a rotor tachometer, air-speed indicator, altimeter and fuel-flow gauge. There was an ignition button as well, and the handle of a wobble pump for starting the flow of fuel to the motors. Hiller pumped up the fuel and then twisted around to turn a hand-crank that was geared to the rotor.

In production, he explained, three kinds of starters will be optional equipment; the hand crank, an electric motor



Facilitating storage, tail can be taken off in three minutes



In one of the versions now being built, the jet rotary-wing craft carries a pilot and one litter patient

connected to a battery, or a tiny air-cooled gasoline engine that you'll start by pulling a cord. They get the rotor sweeping around at a speed of 50 revolutions per minute, after which the ramjets can be fired.

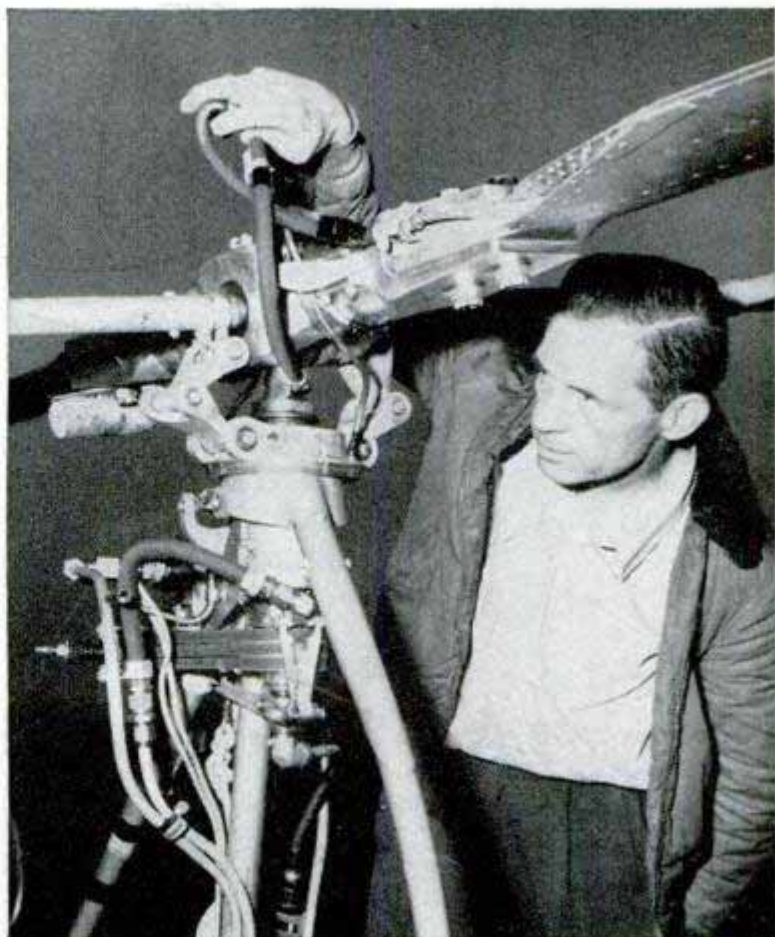
Hiller pressed the ignition button and immediately a gob of flame shot out from the tip motors, then died away as the excess fuel was consumed. In the daylight the engines were running without any visible fire

or smoke. After-dark photographs, however, reveal that the engines create a thin blue halo of exhaust flames when operating at peak efficiency. Surprisingly, the roar of the jets was not as loud as I'd expected. We could talk without too much trouble.

There was no warm-up delay. Hiller simply pulled up on the collective pitch stick and we rose straight up. There was

(Continued to page 266)

Rudder, below, is sloped so as to be affected by downdraft from the rotor blades. Fuel for the jets flows up mast, right, and into pipes contained inside the rotating blades





'51 Plymouth Improves Visibility

Wider windshield and rear window with narrower side pillars and a sloping hood on the '51 Plymouth provide greater visibility. A new grille and smooth lines give the car a lower streamlined appearance. Mechanical improvements include new shock ab-

sorbers featured throughout the Chrysler line, electrically operated windshield wipers and a pressure-vent radiator cap. The car is powered with the same 97-horsepower engine and the transmission is conventional. On the inside, Plymouth has a new instrument grouping and other refinements of interior design.



'51 Cadillac

Cadillac stylists have concentrated on the interior in the 1951 model. The instrument panel has been redesigned and the fittings and upholstery made more luxurious, especially in the 61 series. The Hydra-Matic transmission has a new "finger tip" control for reverse, which makes it

possible to rock the car. On the outside the front bumper has a new flare design and the rear fenders are more sweeping than ever. There is a new modified circle headlamp ring and a broader V-emblem on the hood. The Cadillac engine is said to be smoother than ever and more economical on gasoline. One new model for '51 was added in the 75 series, a business sedan.



The 1951 Dodge Coronet four-door sedan has a wider windshield and massive bumper. Wide rear window (below) affords driver excellent visibility



'51 Dodge Hugs Ground

Styling in the 1951 Dodge line shows a trend toward modern contours in grille, hood and front fenders with an over-all streamlined and ground-hugging appearance. Larger windshields and rear windows provide better driver vision. Mechanical improvements are topped by the new, more comfortable riding Oriflow shock absorbers. The cooling system has a six-blade pump impeller for greater efficiency.

Bricklayer's Mobile Shop

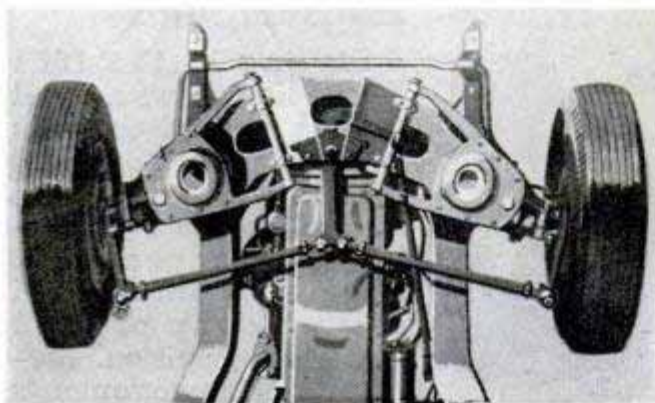
All the tools he requires for bricklaying are stored in a mobile workshop built by Malcolm Dinsmore, a mason contractor of Hebron, Ind. Just above a platform on one end is mounted an electrical brick-cutting machine. Other tools are stored on racks and in drawers inside the shop, which is mounted on auto tires. When Dinsmore leaves a job, he folds up the platform and padlocks it.





'51 DeSoto four-door sedan presents changed appearance with new body lines, grille and bigger windows

Oriflow shock absorbers on '51 Chrysler line operate with fluid-filled tubes instead of shock valves



'51 DeSoto Gets New Look

Streamlined fenders, sloping hood and a new grille give the 1951 DeSoto a lower and racier look. Length is emphasized by a fender line which extends back onto the front-door panel. Visibility has been improved with a wider windshield and rear window. While the wheelbase remains the same, the over-all is two inches longer due to an increase in the front overhang. The power rating of the DeSoto engine has been boosted from 112 to 116 horsepower and a new carburetor-choke unit makes starting easier. Comfort has been improved with the new Oriflow shock absorbers. The instrument panel has been redesigned.

Basketball Referee Goes Aloft To Get Bird's-Eye View of Game

Perched above each basket, officials at basketball games will be able to do a better job, according to Sax Elliott, coach of Los Angeles State College. Elliott says that 90 percent of the fouls are committed in the zone around the basket and from the elevated perch the referee will see every movement as the players move in for shots at the hoop. A third official will be on the floor to handle jump balls and out-of-bound plays, but fouls will be called by the officials above the backboards.

Synthetic Pepper

Chemists at the Army Quartermaster General Laboratories in Philadelphia have made a synthetic pepper that goes under the chemical name of piperazonium salts. These salts dissolve in water and their pungent taste is like that of the piperine of black pepper.





Underwater Swimmer's Lung

Swimmers can now descend to depths of more than 100 feet with a breathing apparatus that does not hinder movements. There is no heavy suit or air tube, the swimmer breathing compressed air that equalizes his internal pressure with the pressure of the water. One or two cylinders are strapped to his back, providing enough air for one hour per cylinder at 75-foot

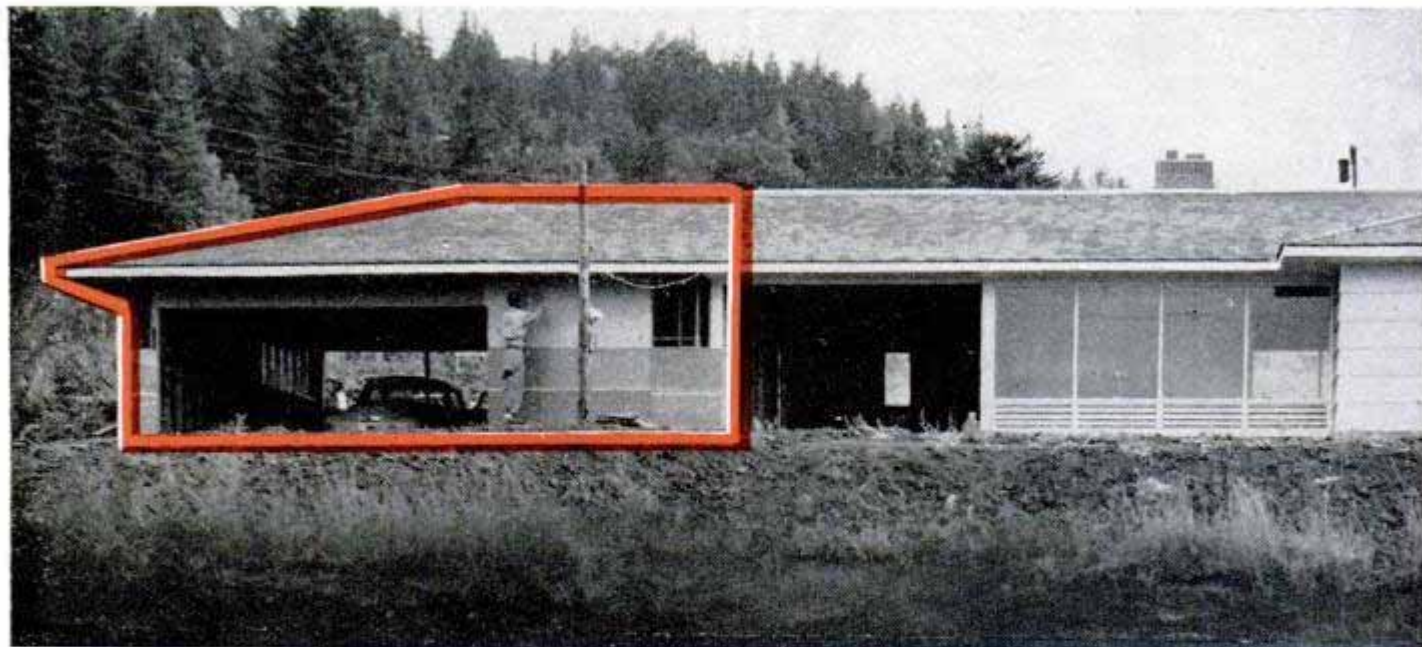
depth. Also designed for the well-dressed underwater swimmer are a pair of trunks and sweater over which a thin rubber suit is worn for retaining body temperature. A lead-weighted belt, swimming fins, a faceplate with attached flashlights and a depth gauge that straps on the wrist are also recommended. For sportsmen who like to hunt their fish, a harpoon gun that is actuated by rubber cords can hit an underwater target 75 feet away.



Reflective License Plates

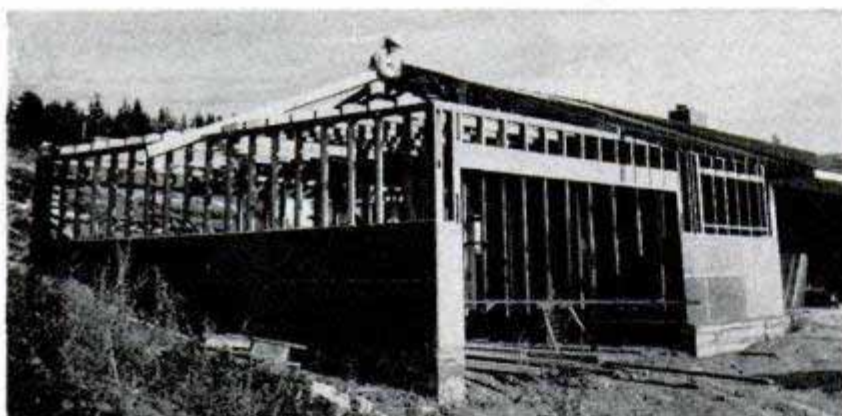
Delaware license plates for 1951 have reflective numerals which pick up the rays of approaching headlights more than a quarter of a mile away. Not only will the plates provide additional protection from collisions, but they will also be easier to read at night. Another safety aid is a pair of reflective driving gloves which make hand signals easier to see.

Sources of available products described in this issue are listed in the index, starting on page 14. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available from Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11



Red outline shows new addition. Original carport, center, will be closed in with more full-length windows

I'm Building the Popular Mechanics



Above, setting end rafters for the two-car garage. To the right of the garage, the enclosed breezeway can be seen. Below, Riley uses a power saw to cut the plywood sheets into lengths of lapped siding



OUR DREAM home, the model of the *Popular Mechanics* ranch house, is now well past its basic stage.

As you may remember from the November issue, this modern house can be built in two stages. First, the basic house, then, at a later date, the breezeway-garage addition makes it a full-sized home. Or, it can be built all at once. Or, if you prefer, it can be left in the small stage and it's still a good home. What we are doing in the scenic Bridlemile area of Portland, Ore., is building the exterior of the basic house and then going right on, immediately expanding it into the larger version to discover any problems that may be involved in the expansion.

One of the requirements that the editors made of architect John Whelan was that this house be expandable without any complications. You asked for that—probably because you've seen homes that were expanded by tearing out walls or moving kitchens and bathrooms elsewhere—with all the problems of carpentry, plumbing, wiring and heating that crop up. Such complications are not only expensive but



Vinita Riley helps with shingling—a big job on the long house

Plywood Ranch House

By Tom Riley
Part IV

often result in your never having the time to complete your expanded home. There's no such problem with the P.M. house.

Frankly, this amateur builder didn't realize the simplicity of the expansion of the ranch house until he tried it. Even with all the advance planning, I thought it was inevitably somewhat difficult to add to a house. But, Whelan proved me wrong! Here we tear down and rebuild nothing in the basic house. Best of all, if you build this home in two stages, it will be completely livable before and while the expansion is being done.

The key to the simplicity is the carport of the basic house and the fact that a breezeway is attached to it in the larger version. The roof merely continues on. The carport, being open on the front of the house, is simply studded in to form a wall of the larger home. The exterior siding of the utility room (that siding is already in place) is not removed; it forms one wall of the enclosed breezeway. The carport becomes your den or third bedroom and also has ample space for a half-bath, storage room or whatever you wish.

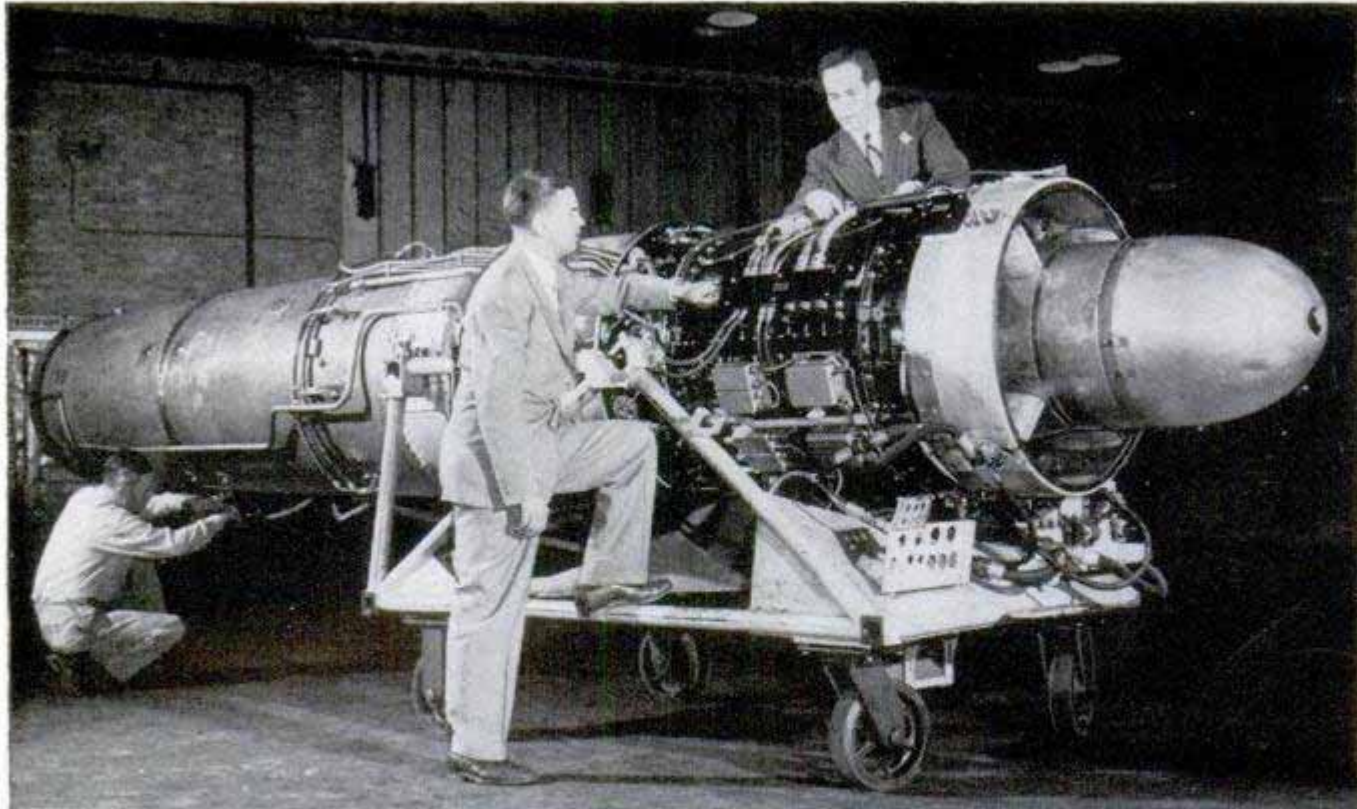
Many of us desire to make some special room arrangements in our home and here, in the enclosing of the carport, is the easiest place to do that. Of course, with the modern construction of the *Popular Mechanics* ranch house you can change any room willy-nilly because of its engineering (no interior walls support the roof). But by putting your special ideas to work in the carport area you will not lose the traffic

pattern, the open living area, the savings in hall space, plumbing and the like that Jim Ward and John Whelan have so carefully planned into the basic house. This amateur builder, most of the time, claims to be a writer and has always wanted a study or den with an adjacent photographic darkroom. So I am placing one in the carport

(Continued to page 256)

Plywood strips overlap to form siding. The wooden shingles beneath siding provide the correct slant

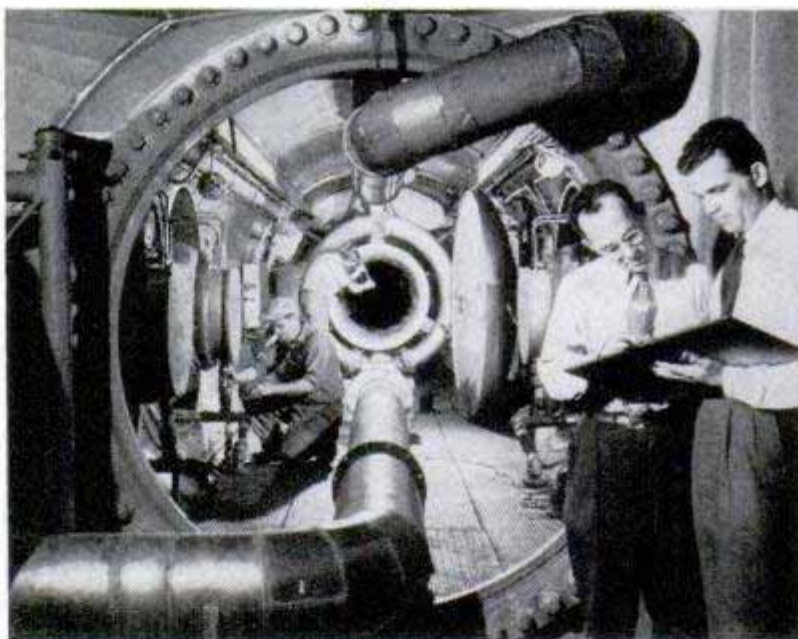




Jet Engines Rely on "Hot Noses" to Halt Icing

"Hot noses" enable two of the new Air Force jet engines to avoid icing, one of their knottiest operational problems. Super-cooled water droplets, striking the air inlet, form into ice crystals that within seconds block air entering the engine. On the General Electric units, the most powerful the company has built, hot air from the compressor is bled to hollow parts of the nose to prevent ice forming. Both engines also have special ignition systems that make starts possible at altitudes up to 50,000 feet.

In steel cylinder, right, jet compressors are tested at a simulated 70,000 feet



Rain Shield for Windshield

Patrons of drive-in theaters now can see the show even during a rainstorm without turning on their windshield wipers. A new plastic hood stretches across the windshield to prevent rain from striking the glass. The car doors are closed on the ends of the hood to hold it in place. A wire runs from the front of the shield to the car ornament to hold the hood in the open position. A stiffening hem along the front edge forms a trough which carries the water to the sides of the car.

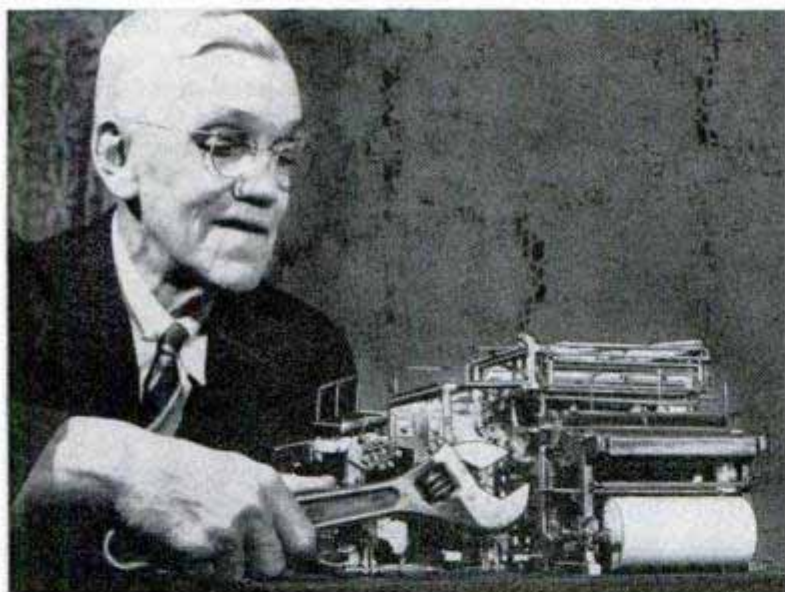
☐ A motor road crosses the main range of the Andes at 15,889 feet near Lima, Peru.



Jeep-Mounted Rifle Can Knock Out Biggest Tank

According to the Army, its new Jeep-mounted rifle is capable of knocking out the biggest foreign tank known today. The

105-mm. weapon has no recoil. One man in the Jeep sights the rifle while another loads it from behind.



Model Newspaper Press Built From Memory

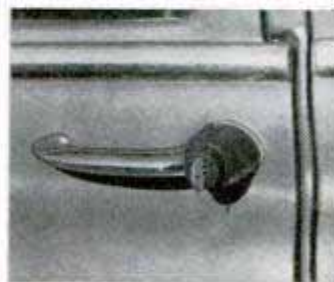
When Henry Showers became a pressman for the Portland "Oregonian" more than 50 years ago he took a fancy to the newspaper's big press. Now Showers has completed a foot-long model of that press, built entirely from memory. Most of the parts are small pieces of brass, held together with more than a thousand tiny watch and clock screws. Although the press is not a working model, it can be completely taken apart. Showers spent more than six years of spare-time work on it.

"Deep" Photo Film Resists Heat

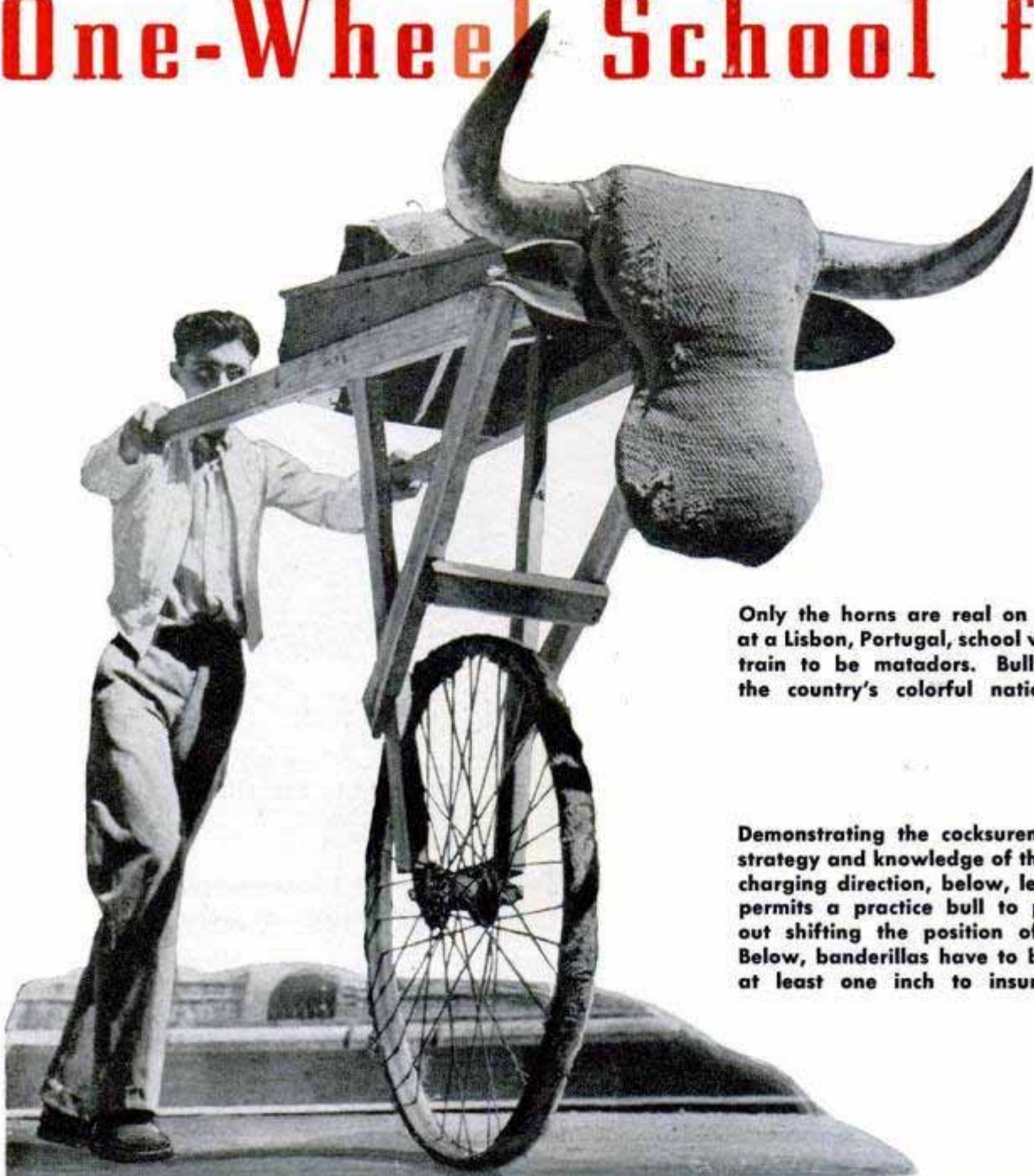
Photographic film is normally supersensitive to heat, but Eastman Kodak has developed a new film that will take pictures three miles beneath the earth's surface where temperatures reach 325 degrees. Oil-well drillers need such a film so they can photograph instrument readings at the drill point far underground. From this photographic record, technicians determine the angle and direction that the drill is taking. The film comes in 16 and 35-mm. widths.

Antifreeze "Boot"

Easily installed on any late-model General Motors automobile, a new synthetic-rubber "boot" prevents frozen locks and door handles. The boot covers the entire push-button assembly, preventing water from entering. Four of the boots can be installed in five minutes.



One-Wheel School for

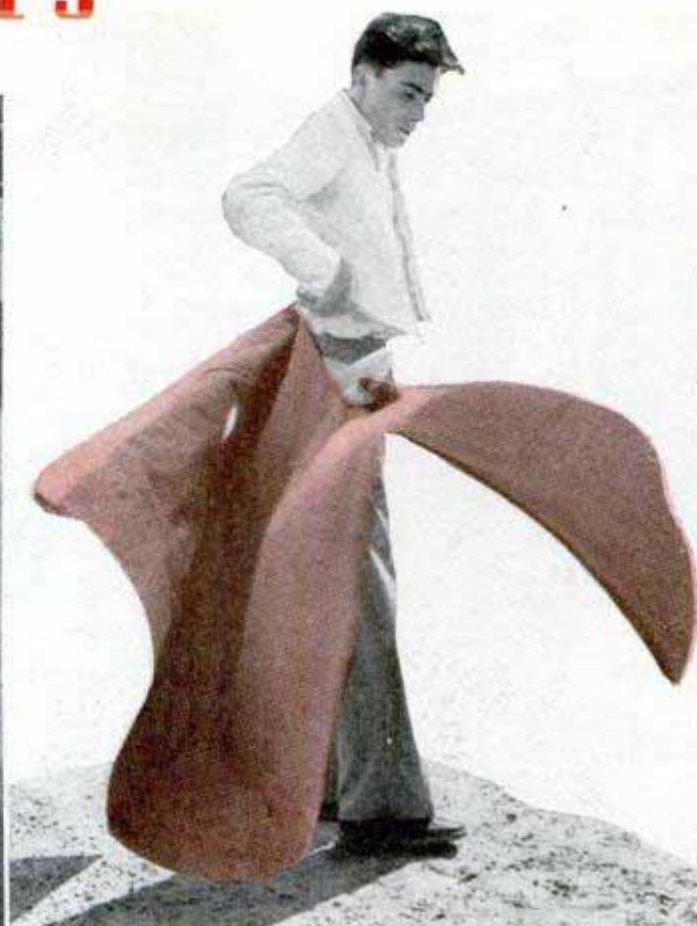
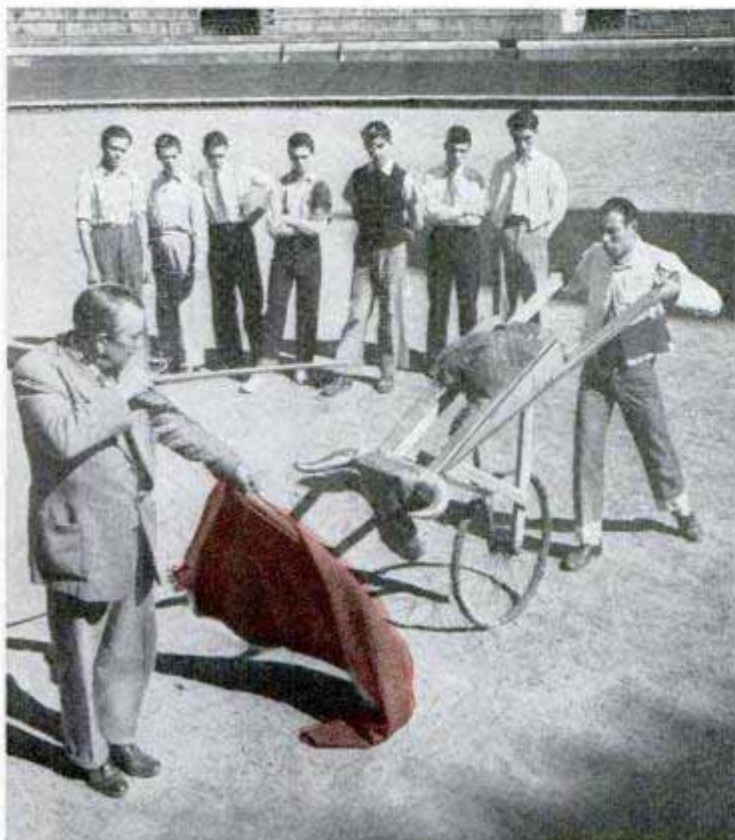


Only the horns are real on the "bull" at a Lisbon, Portugal, school where boys train to be matadors. Bullfighting is the country's colorful national sport

Demonstrating the cocksureness of his strategy and knowledge of the animal's charging direction, below, left, student permits a practice bull to pass without shifting the position of his feet. Below, banderillas have to be inserted at least one inch to insure sticking



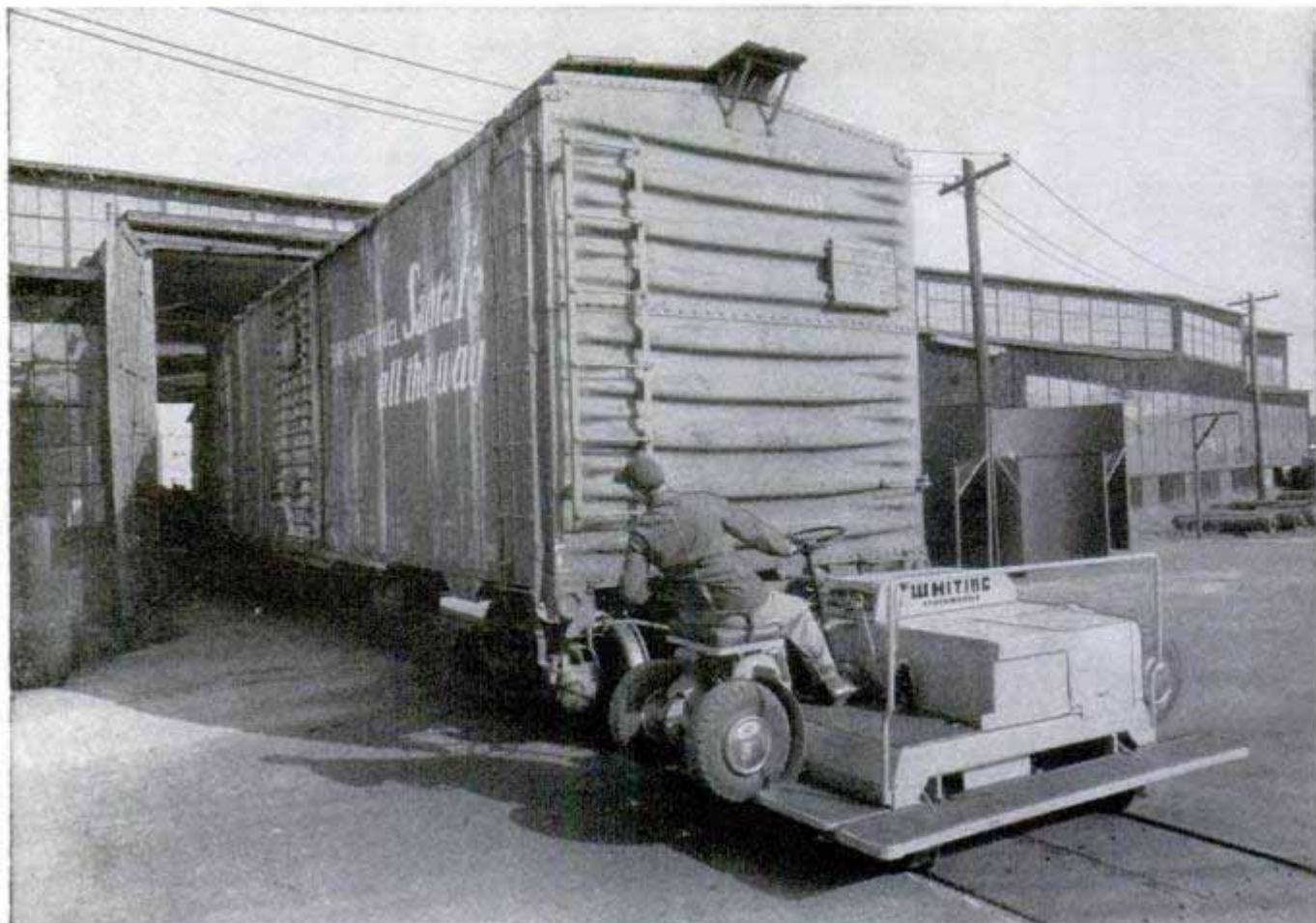
Bullfighters



While the class watches, above, left, the instructor demonstrates the correct stance and method for killing a bull or planting a banderilla. An advanced student, above, right, illustrates difficult butterfly figure with a cape. If the bull gets control of the situation, below, it is well to know the quickest way to leave the ring

THERE is no gore or death in the ring in Lisbon, Portugal, when the bullfighting class is in session. Instead, empty stands look down upon a group of serious teen-agers training to become heroes of their native land, the matadors of tomorrow. Many are from the finest families in Portugal. Their practice "bull" is a high, one-wheel cart, with a pair of bull's horns extending from the front end. Between demonstrations and lectures, while a classmate pushes the cart at them in imitation of an angry bull's charges, the students rehearse fighting maneuvers. They learn the elaborate processional and pageantry connected with the fights, techniques of inciting the bull to charge with flourishes of a bright-colored cape, and the correct stance and method of killing the animal. Padding on top of the cart, where the bull's shoulders would be located, serves as a "pincushion" into which they can practice thrusting banderillas, 18-inch darts used to madden the bull.

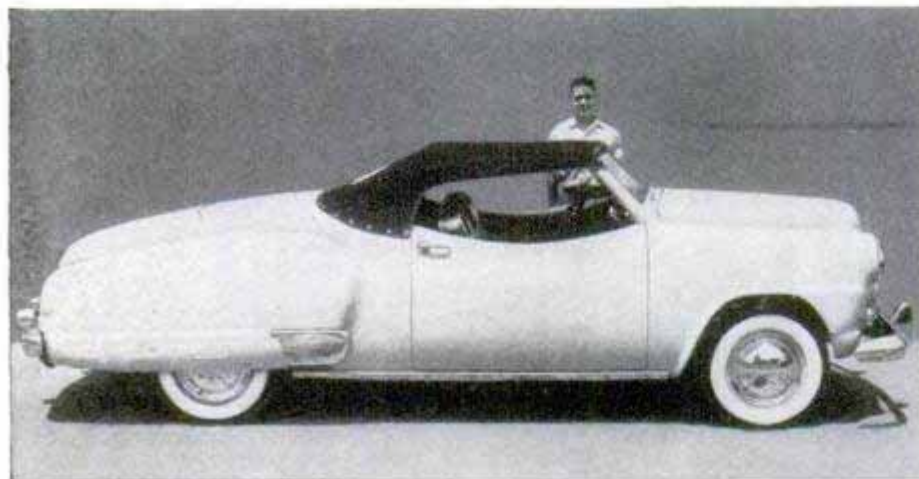




Road-or-Rail Switcher

At home on rails or road, a tiny "locomotive" switches freight cars without becoming "bottled up" on the track. The vehicle is gas-driven and has two sets of wheels—four steel wheels for track travel and four rubber-tired wheels for ground travel. The road wheels are retracted by a hydraulic jack when the switcher is operated on the tracks. The operator drives onto the tracks at right angles and then moves down the track sideways. When coupled to a freight car, the jack raises a special coupler, transferring part of the car's weight onto the switcher and thus increasing the adhesive force against the track. The vehicle can attain a drawbar pull of 7350 pounds and can pull or push four loaded freight cars.

Vehicle moves down the track sideways, pushing or pulling freight cars into position. Below, job on tracks done, the operator swings down the rubber wheels with hydraulic jack and drives to another job



Custom Sportster

If you're an expert on motorcars, you will recognize the ancestry of a custom-made sport car. It was originally a 1947 Studebaker Champion coupe. In five months of spare-time work, Harold Boardman, Jr., of Augusta, Ga., and several friends rebuilt the car into a sporty runabout with a high-compression engine.



In the movie "Sunset Boulevard" Gloria Swanson rides in a 1930 Isotta Fraschini from Pacific Auto Rentals

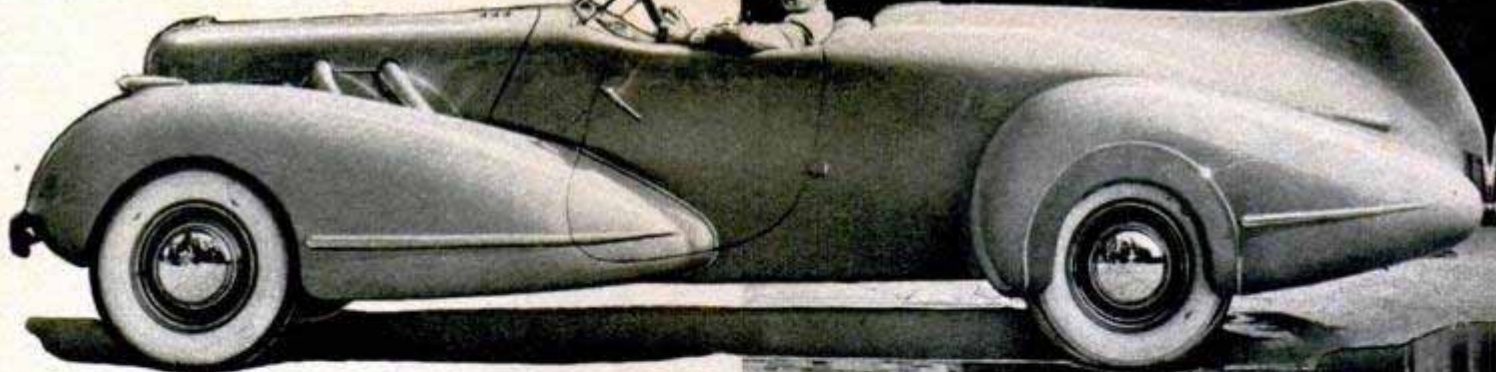
HOLLYWOOD'S ANTIQUE AUTO LIVERY

By George Finneran

BACK IN 1926, John W. DeNoria came down to Hollywood from Portland, Ore., to open a car-rental business which would cater to people who would rather rent than buy a car. After the first few months in business as Pacific Auto Rentals, Inc., he found that the black Dodge sedans and gray Chevrolet coupes would sit in the garage with their original 00000 mileage, while a Stutz Bearcat or an Isotta Fraschini phaeton hardly ever got a minute to itself. He also discovered a demand for liveried chauffeurs behind the wheels of wickerwork-body Duesenberg town cars or Minerva landaulets. So Mr. DeNoria began to stock up on these items even though the initial cost and upkeep were terrifically high on this stuff in the rental business.

Brush Surrey with the fringe on top is one of rarest cars in collection. A cord belt drives the wheels

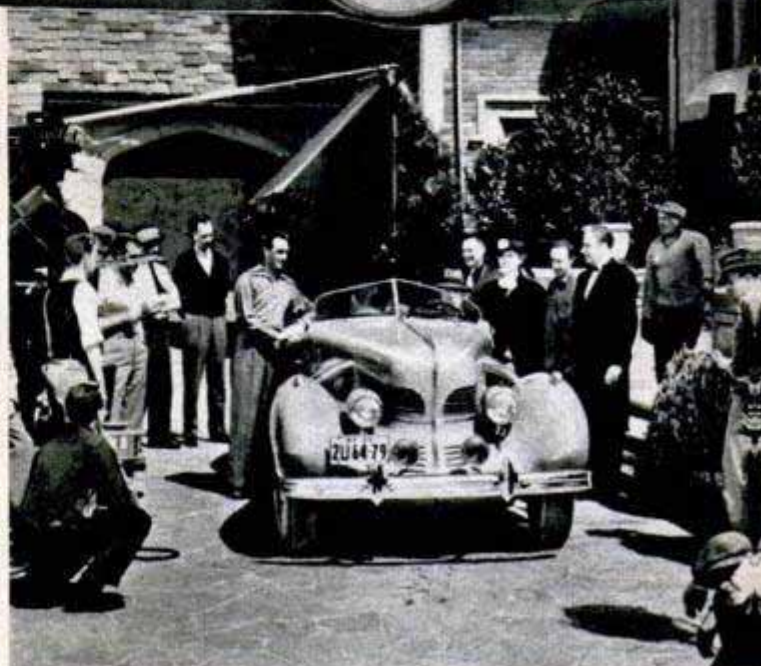




"Topper" car (above and at right) was made for the movie of that name and was built on a Buick chassis

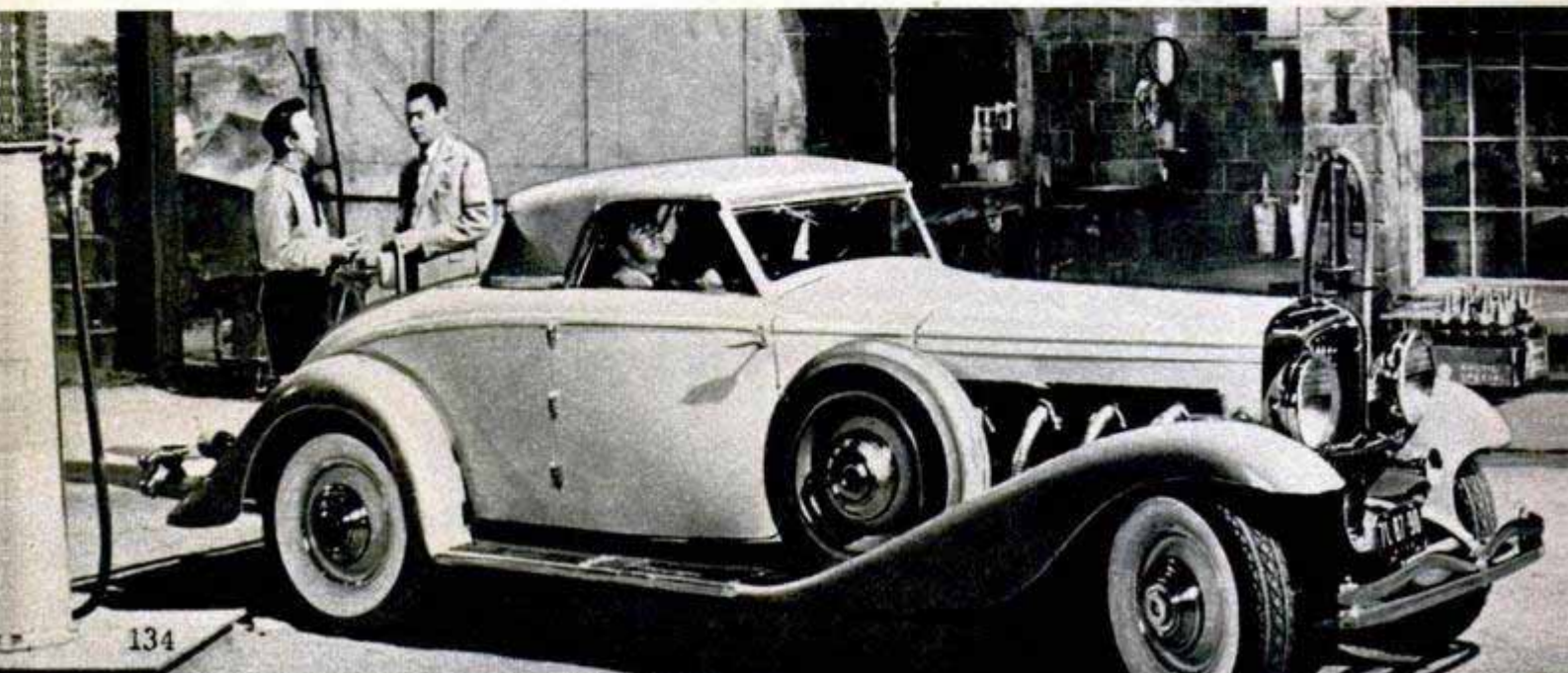
In 1928, one of the major studios heard of DeNoria's automobile stock pile, and began renting movie cars from Pacific Auto. By 1938, the firm had expanded to such an extent that Dr. George Schweiger was able to purchase a half-interest in the business. When John DeNoria died in 1943, his capable, auto-expert widow (Dorothy Forster) and Dr. Schweiger's son, George Schweiger, Jr., continued the management of the company.

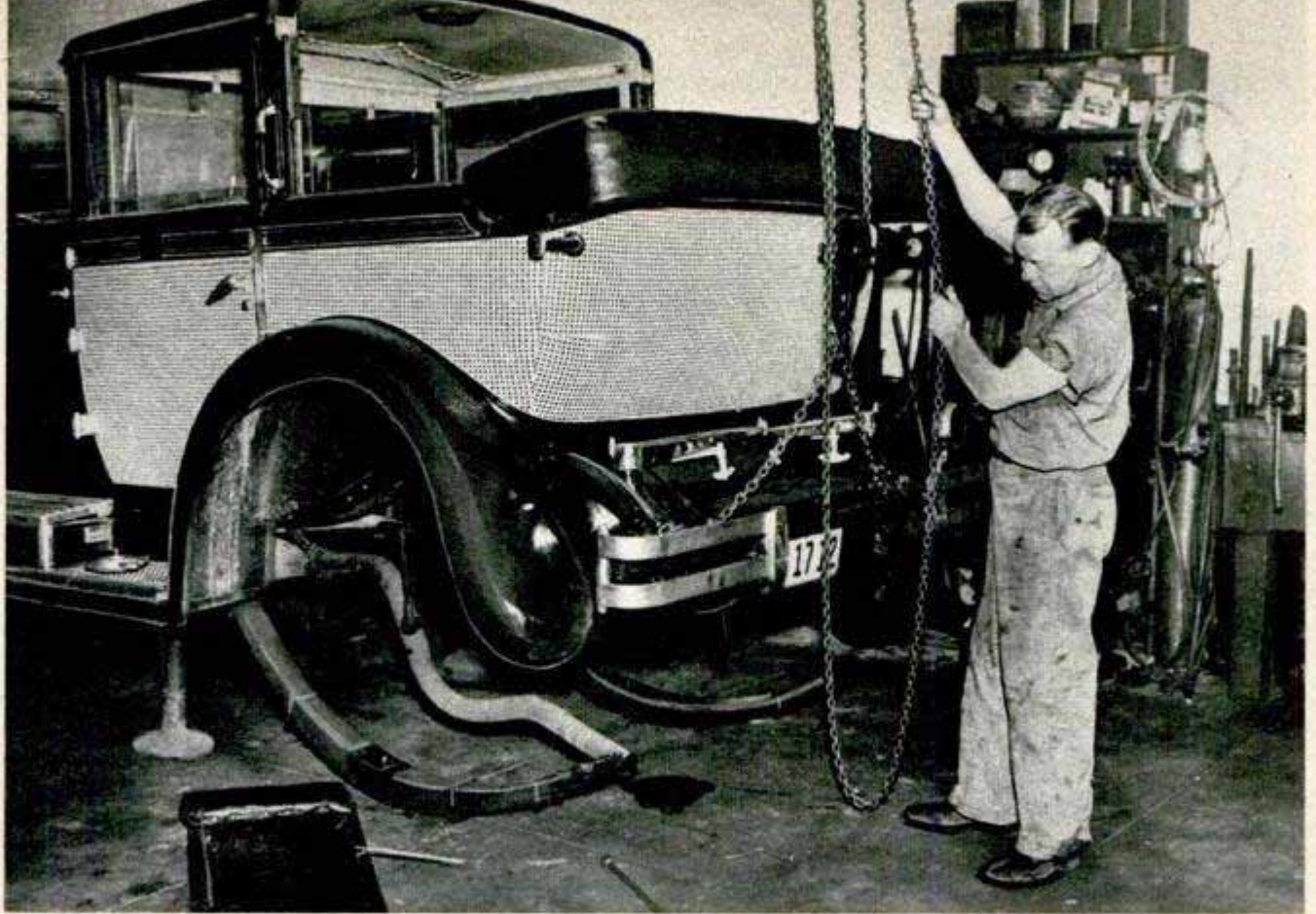
You have to know your cars to be able to rent them to the studios. For instance, some cars bought by Pacific Auto Rental haven't been in a picture in over five years. When you consider that the purchase price of the 167 cars in the collection ranged from \$10 to almost \$10,000 (in one case), you can see that a bad investment can tie up quite a lot of capital. This seems to be particularly true of antique cars, as movies based on the early 1900s are few and far between. The Pacific Auto collection is based, therefore, on what the studios have needed in the past and what they probably will need in the future. Right now the collection represents autos from every country including taxis, military vehicles, race-track jobs, delivery trucks and even "hopped up" cars commonly known as hot rods.



Let's follow a rental through from start to finish and see how the business operates. In 1946 Pacific Auto bought a 1935 Packard V-12 convertible for \$400. The car was in fair shape—good tires, leather upholstery not torn or badly worn, paint and top not too good, and the engine not too bad. The car was brought into the garage, the engine tuned and worked over, a new top and paint job given it, and the car stored in one of the two large storage garages. Along about 1947, a studio decides that it needs an impressive-looking convertible to be

In "The Great Gatsby," Alan Ladd drives this 1933 Duesenberg coupe (325 horsepower) supplied by the agency





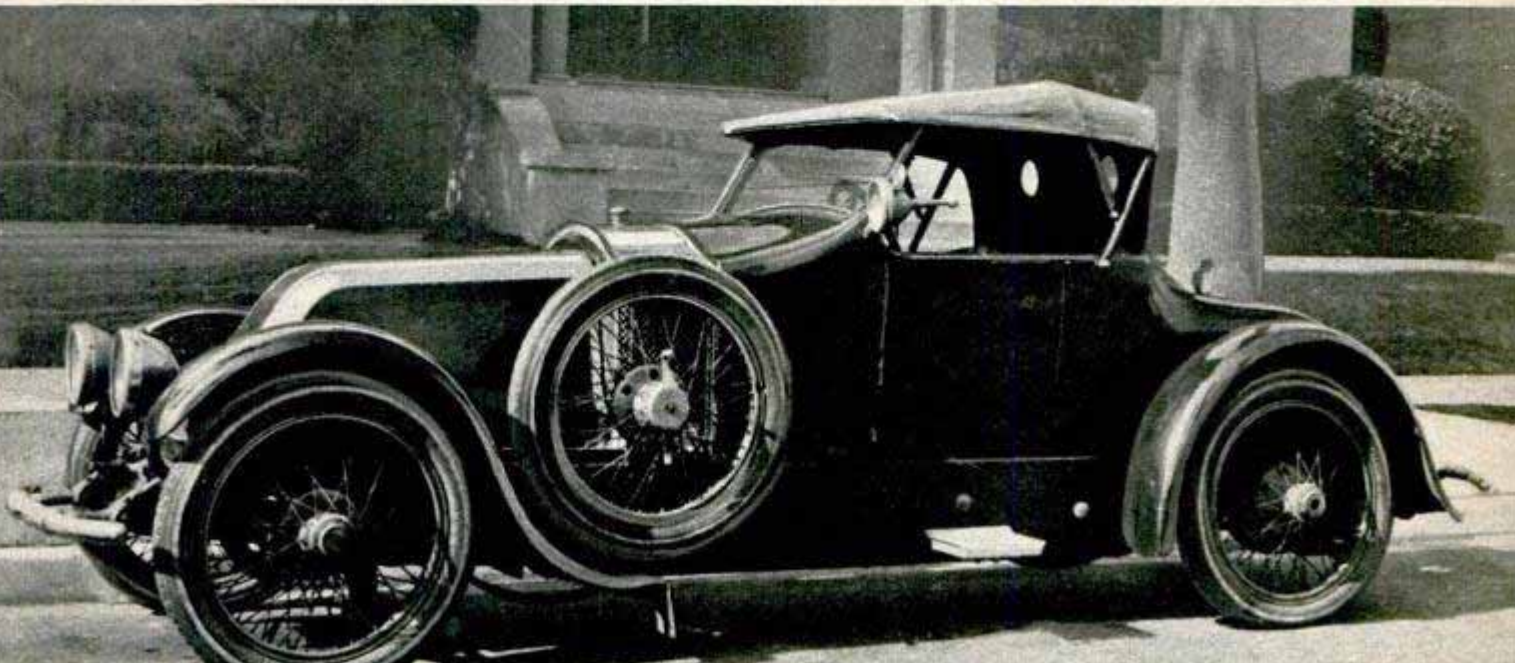
Jack Booth, master mechanic, at work on rear-end assembly of Isotta Fraschini used in "Sunset Boulevard"

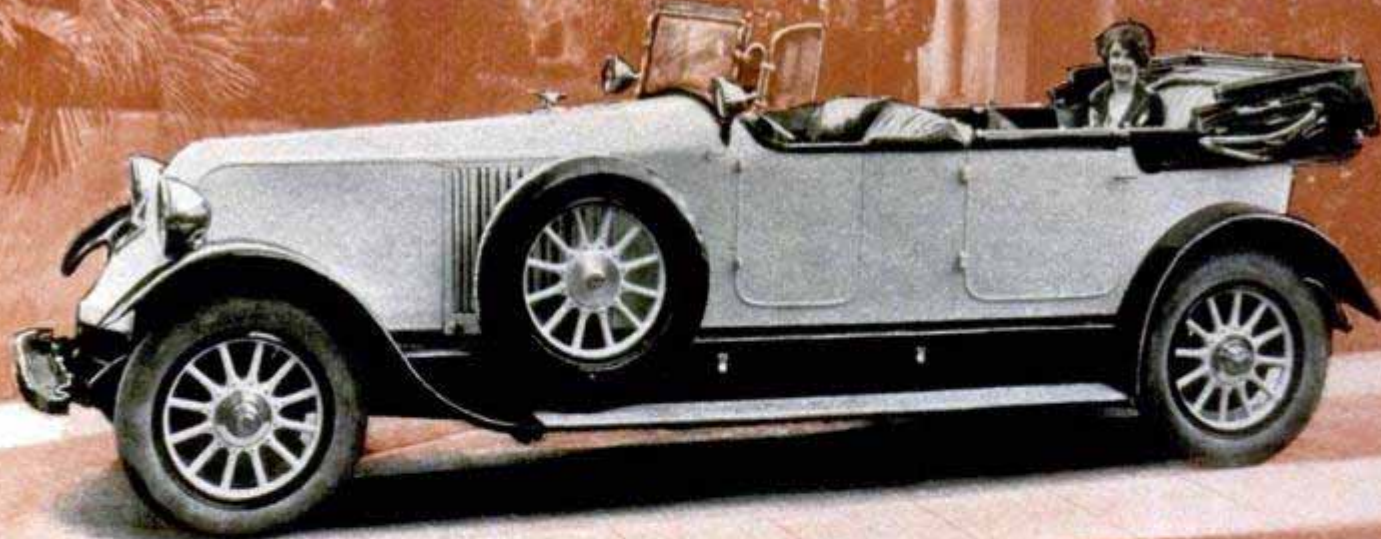
used as a government official's car in a picture about prewar Washington. Pacific sends the studio several pictures of cars that would be suitable because of year and model. The Packard gets the job. By now, it is in the back row of the garage in which it was stored, so 10 cars must be moved in order to get it out. Then a charged battery must be installed, the gas tank filled, the oil replaced, the interior and exterior cleaned and polished and the engine tuned. The car was painted a light gray, but the studio wants a sleek black job so the car must be sent out and repainted (expense

of repainting to be paid by the studio).

In perfect shape and ready to go on the lot or on location, the car is loaded on a trailer and taken to its destination. Pacific Auto's insurance must cover the car up to the moment of delivery; then it goes under a studio policy. A man from Pacific stands by all the time the car is on the lot to give driving instructions to the actors (also necessary where some foreign jobs are concerned), replenish the gas and oil, or to make repairs and adjustments (this is necessary on many of the antique cars). When the car is finished on the lot, it is

This 1917 Renault roadster is in good condition and is in demand for pictures with a European background





Largest machine in Pacific Auto collection is this French Renault touring car used in European scenes, 1922

loaded on the trailer and brought home. But—its job is not over yet. The car cannot be rented out on another job until the studio, under the rental contract, releases its "retake rights"; in other words, the car must be held available for retaking any shots in which it may have been used. When this period has expired, the car is either restored to its original color, at studio expense, or left as is, the oil and gas drained, battery dismounted and the car returned to its storage place.

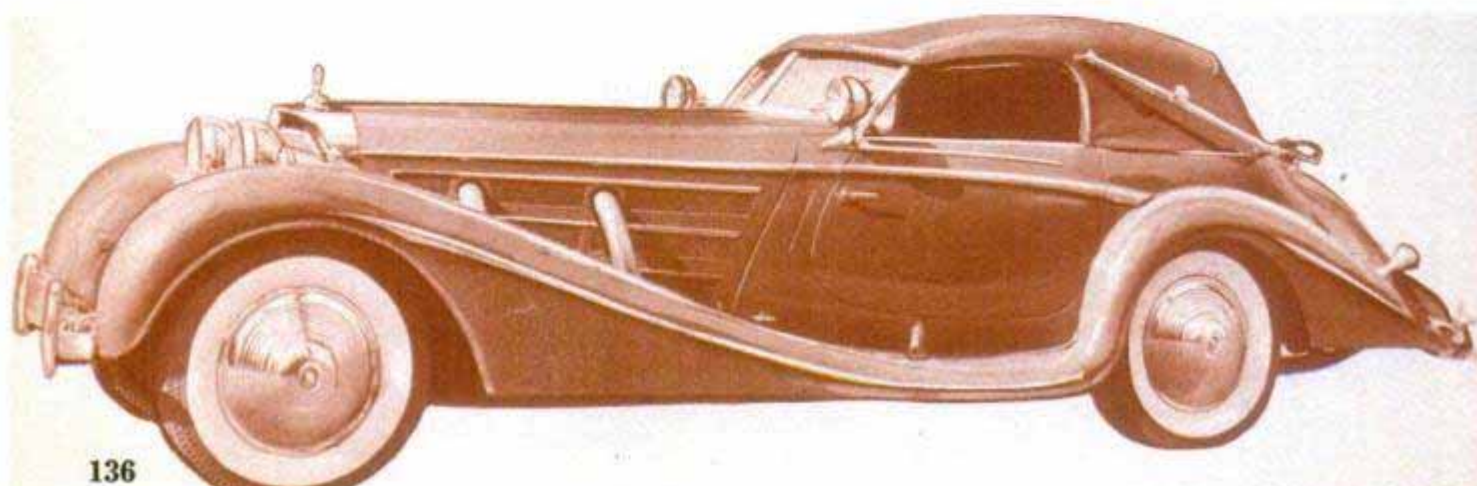
Still using the Packard as an example, let's say the total rental on the car for a period of five days was \$250—it actually might be quite a bit lower on this type of car. This is applied against the original cost of the car, storage for two years, gas, oil, labor on moving, cleaning, repairing, transporting to location, services of attendant on the lot, insurance and restoring. Some cars are in almost continual demand and have paid off their own mortgage and carried a few of the wallflowers.

Besides the cars owned outright by Pacific Auto, there are approximately two or three hundred others for which the firm acts as agent. Let's suppose that you own a snazzy looking Duesenberg roadster, vin-

tage 1934. Like any proud parent, you're not against the idea of the car getting into pictures. So you send Pacific Auto a photo of your baby, and include the following data: year, model, color, general condition, special features and anything else that's applicable. This photo and the information are filed by the firm. If your Duesenberg is chosen for a picture by a studio, Pacific Auto will pick up your car, get it ready for production, deliver and return it, take care of all the details, and then pay you 20 percent of the rental fee. They can use listings even now, but only of extraordinary looking cars or first-class antique cars in top shape—no 1938 Ford business coupes or 1941 Olds sedans, thank you.

Don't worry too much if your Duesenberg is rented for a Dillinger-type movie and used in a cops-and-robbers chase sequence. Every skidding turn, screeching stop and supposedly flat-out straightaway race is carefully laid out by the studio engineers and the stunt drivers who will drive the cars. Then, the camera speed is set down a notch, the scenes filmed, and your precious Duesenberg has probably never registered over 35 to 40 miles per hour on its speedometer while on the lot.

Swanky 1938 Mercedes Benz is typical of the cars listed by owners with the agency for rental to the movies



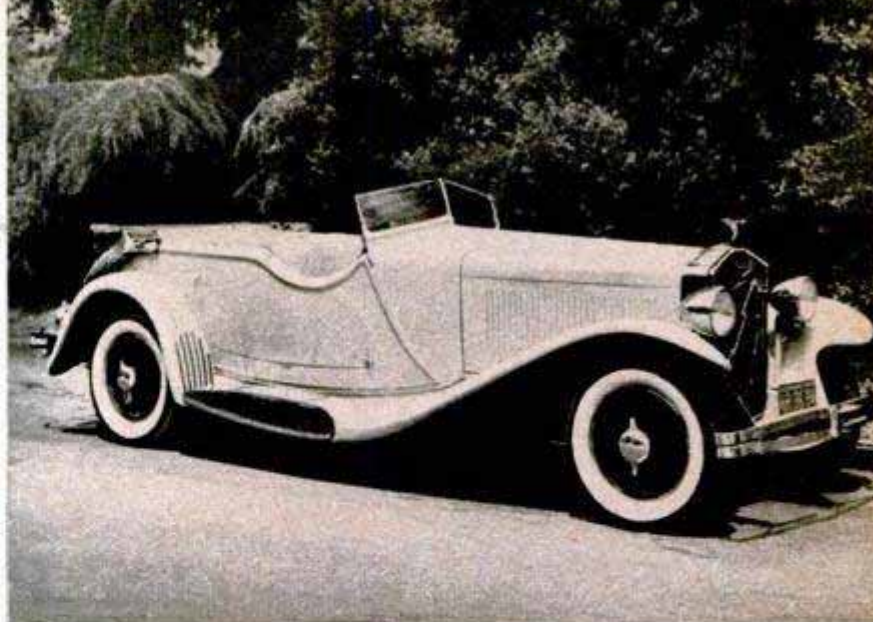
If your car is supposed to end up in the ditch, or over a cliff, a scale model or a wooden mockup will go through the actual crackup and your car will be carefully laid on its side, the wheels set spinning, the scene shot and the car righted without a scratch on its shiny surface.

One versatile mechanic does all the maintenance and repair work on the 167 cars in Pacific's collection. His name is Jack Booth, and a day's work might include an engine job on a 1910 Cadillac town car, a tune-up on a 1939 Lagonda Rapide, or a brake job on a 1948 Ford. Locating tires for the cars in his care is an important part of his job—and you should see what some of these wagons use for rolling rubber! A 1910 Baker Electric is a problem child de luxe because of the age and precarious condition of its many batteries. Recently, a very fine Duesenberg convertible coupe became "camera shy" and was sadly sold down the river to a Duesenberg enthusiast. Camera-shy cars, because of their good looks or uniqueness, have been in a great many pictures and are rejected by the studios because they are too familiar to many moviegoers. Pacific Auto now has about five cars for sale because of this and other reasons, including two 1914 Renaults, two 1929 touring cars (a Buick and a Packard), and a rakish 1916 Mercedes Benz touring car, all in excellent shape.

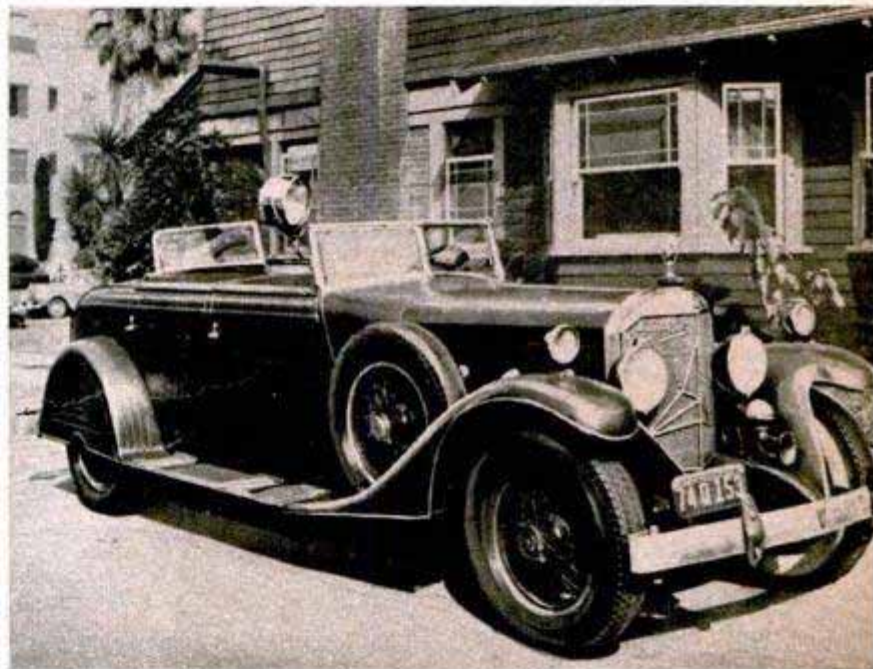
Pacific Auto cars used in recent movies are a leopard-skin upholstered Isotta Fraschini town car carrying Gloria Swanson in "Sunset Boulevard"; the twin Duesenbergs in "The Great Gatsby"; a 1906 Mitchell 8 used in "I Remember Mama"; and a very famous job, the 1932 Chrysler LeBaron Imperial phaeton with a Mercedes Benz grille, appearing as Hitler's car in Charlie Chaplin's "The Great Dictator." In regard to this last item, Miss Forster wants it plainly understood that this rarely indulged in piece of chicanery was not the work of Pacific Auto. The car belonged to a competitor at the time of its rental, and it was not acquired by Pacific until after this film was completed.

Some of the more intriguing cars in the collection beside those already mentioned include a 1934

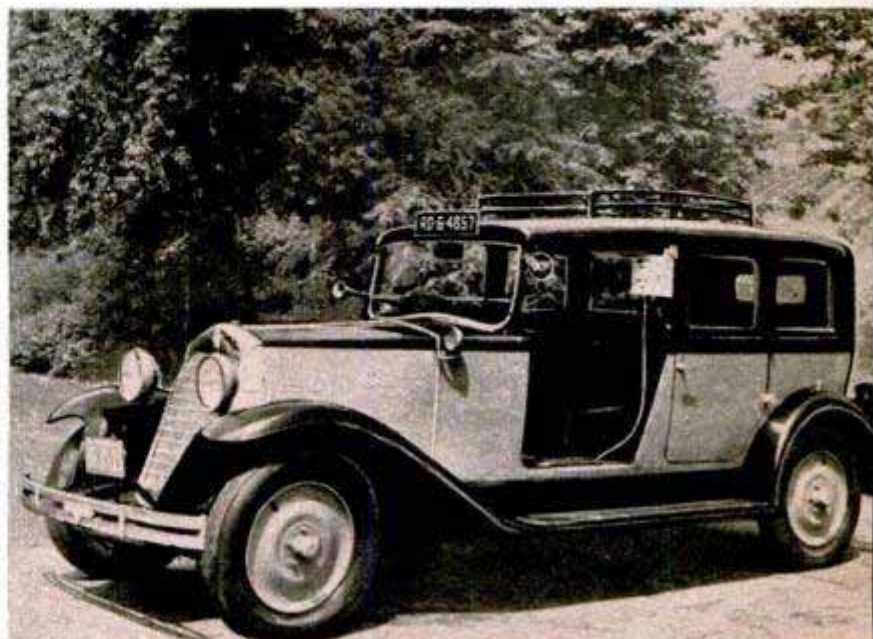
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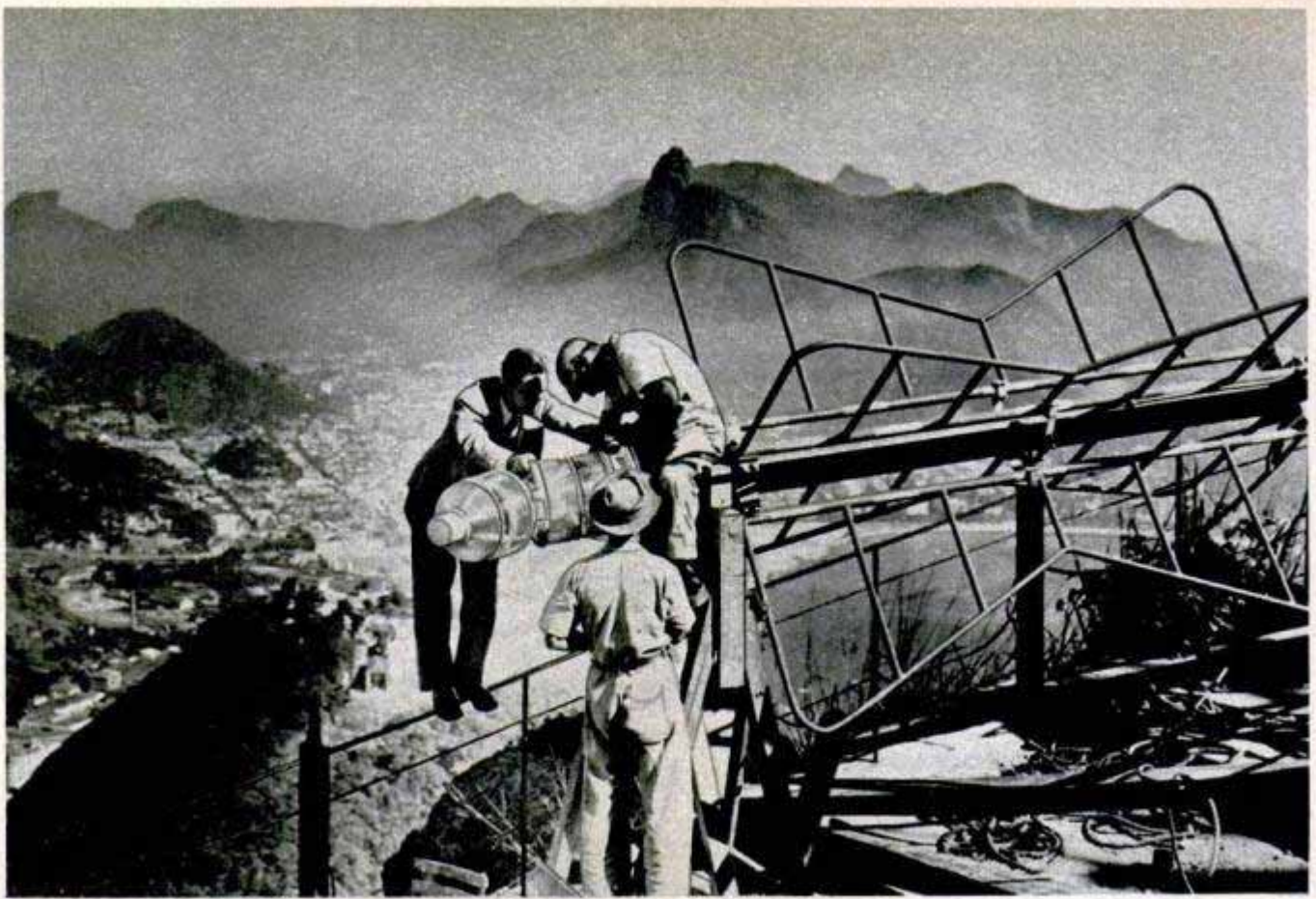


The 1937 Isotta Fraschini phaeton is in demand for movies with foreign setting. Pontoon-shaped running boards are not wing stubs but provide storage space for tools and odd items



Makers of movie thrillers like to use this Mercedes Benz as a Gestapo chase car. It was built during World War I. Below, Aston-Martin English taxi is handy in London street scenes and has been used in many pictures to lend foreign atmosphere

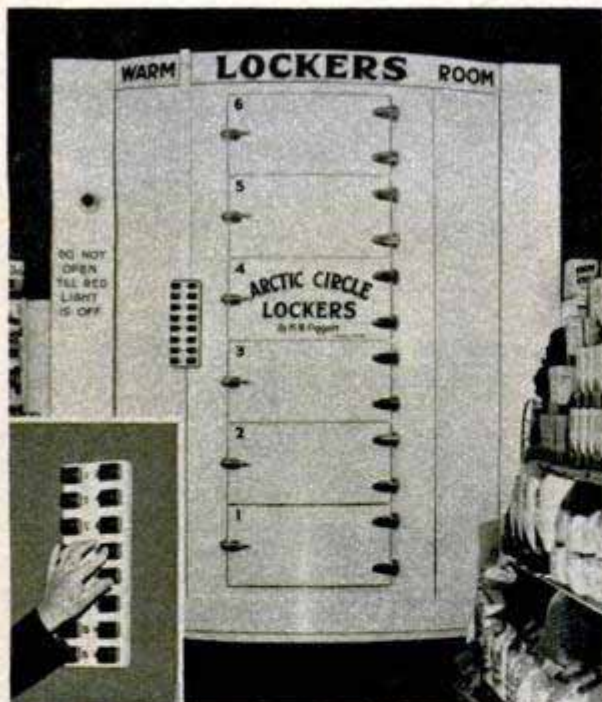




Mountain "Mast" for TV Antenna

Rio de Janeiro's television station has a ready-made "mast" to support its antenna—famed Sugar Loaf Mountain that towers 1300 feet above the city. The several tons

of transmitting equipment, including the 150-foot antenna, had to be hauled by cable car, mule and hand to the lofty summit. Brazil is the first South American country to have regularly scheduled commercial television programs.



Frigid Cylinder Is Food Locker

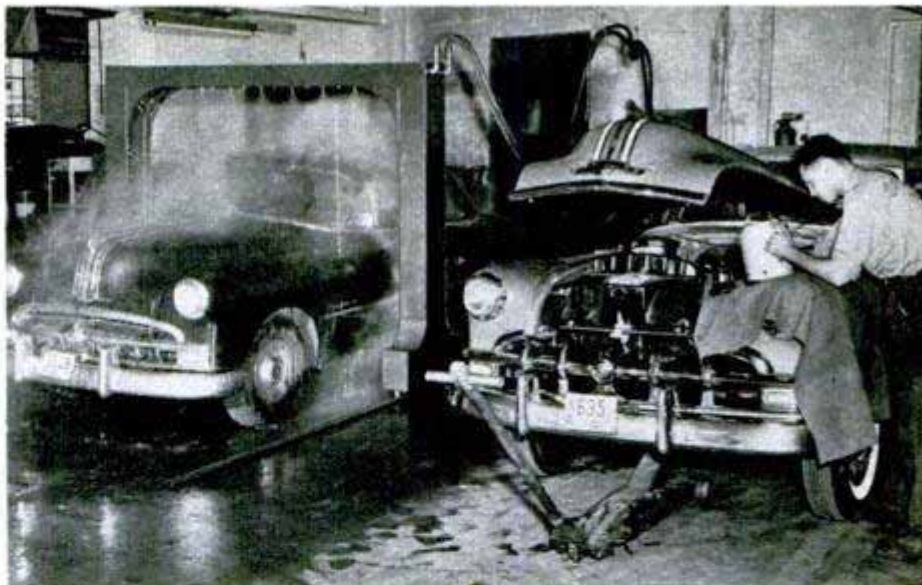
Occupying six square feet inside the store, a round cold-storage locker enables a store to install 96 rental lockers without loss of valuable counter space. The cylinder is 9 feet tall and 11½ feet in diameter.



The only part of the locker unit that extends into the store is the door panel, the rest being located behind the wall. Locker baskets, stacked six high, are mounted on a rotating core. The customer presses a button and the core rotates until his locker is behind the door.

Automatic Car Laundry

All it takes to wash a car with an automatic washer is the flip of a switch. The car is parked between two parallel tracks and the U-shaped spray rack makes three passes over the car, first spraying it with water, then with soap and finally with a clear rinse under high pressure. Because of its automatic operation, the machine enables the station attendant to make oil changes, pump gasoline or perform other duties while the car is being washed. It takes only about five minutes to wash a car. The machine has a



turbine-type pump that produces the pressure required for thorough cleaning of passenger cars and trucks.



Helicopter "Wind" Shakes Fig Trees

Helicopters, already widely used for seeding and spraying, now complete the growing cycle by helping with the harvest. Robert Forkner of Fresno, Calif., has a low, slow-flying helicopter "wind shake" for fruit from fig trees on his 56-acre fig farm. Though slightly more expensive than hand-knocking fruit from the trees, wind from the machine helps clear away leaves, which aids in picking up the figs.

Soil Pulverizer

Mounted on rubber tires so it can be hauled to the field, a soil pulverizer built by a Minneapolis nurseryman handles five cubic yards in less than 10 minutes. The nurseryman built the machine when the housing boom brought tremendous demands for pulverized soil. The only equipment available was too small to turn it out in quantity, so he built his own machine. The hopper is filled by a tractor with a front-mounted shovel.



A high-angle photograph of a person in a metal cage ziplining over a deep, rocky canyon. The canyon walls are rugged and layered, with a river visible in the distance. The text "HIGH RIDE" is overlaid on the right side of the image.

HIGH RIDE



Hanging in the vastness of the canyon is the longest unsupported cable in the world. Arrow indicates terminal

ON A CABLE

By Joyce R. Muench

Photos by Josef Muench

UNCLE SAM has another tool to help him in his job of taming the cantankerous old Colorado River. It's a slender steel cable that looks like a spider strand sloping down the vast side of the river canyon. As a matter of fact, it's the longest unsupported cable in the world, located at the proposed Marble Gorge Dam site in northern Arizona.

The Bureau of Reclamation, in its long-range program for development of water resources and power in the Southwest, has been surveying the old Colorado for possible future dam sites. This spot, about 30 miles below

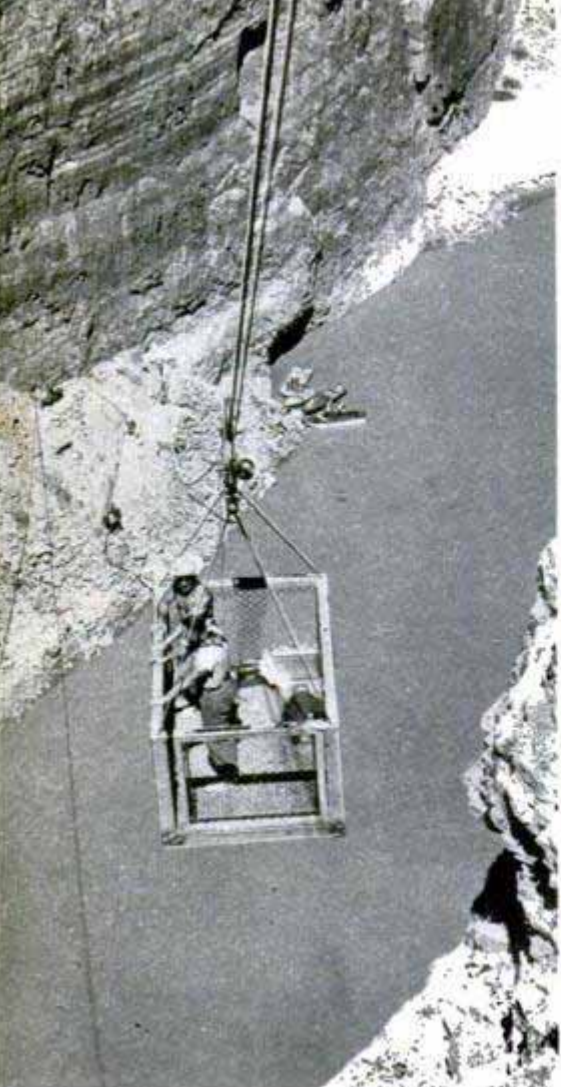
↓ Cable takes men and supplies down a 2200-foot vertical drop. It ends on a ledge 350 feet above the Colorado

Right, terminal on the rim of the canyon is a steel tower, here viewed from cable car. The trip takes 15 minutes

Lees Ferry, in the middle of the Colorado's steepest canyon, was nominated for further study.

Engineers who are scrutinizing the site first built a narrow trail from the rim of the canyon down to the water's edge. It took them eight hours to hike the trail, even after it was built. So they set to work





Here's the final drop—350 feet from the tent camp on the ledge to the river channel in Marble Gorge

rigging a temporary cable to span the dizzying drop.

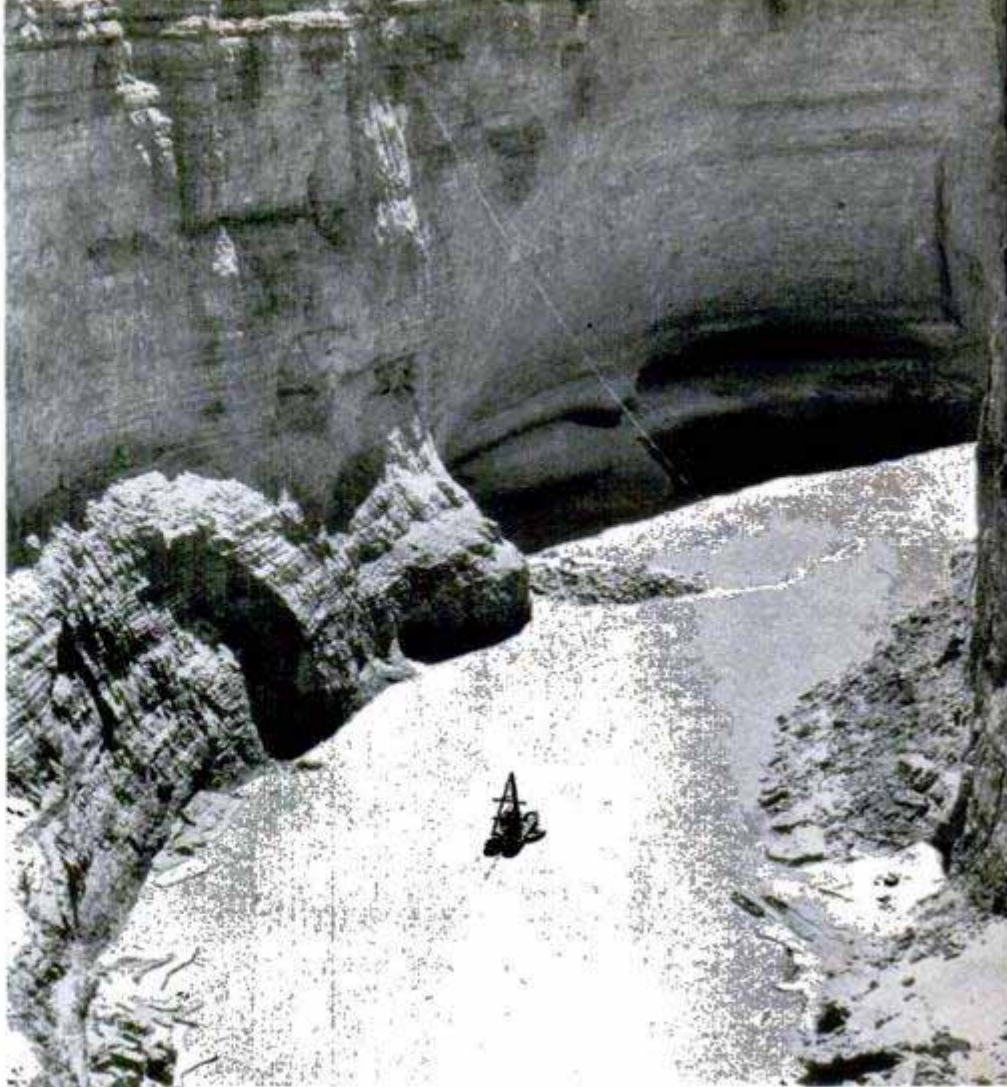
Climbing down ropes, hanging over precipices, drilling at strange angles they finally drew a thin wire over the distance. Then they fastened the heavy cable to the wire and drew it down the face of the canyon to terminal towers set in concrete.

The result is a 3700-foot thread of steel that curves down into the canyon, making a vertical drop of 2200 feet. It ends on a ledge at the front door of the tent camp where the engineers live. Another cable, 800 feet long, finishes the drop from the ledge down to the water's edge.

Now, when an engineer wants to climb out of the prehistoric canyon, he telephones the hoist man up on the rim. The hoist man switches on a compression engine and up the steel strand climbs a cage with the engineer inside. It's a 15-minute ride.

At one point in their work the research men needed two big steel pontoons down on the river. The pontoons were negotiated over the rough edge of the cliff and dropped down the cable to the water. They were anchored by guy wires in the middle of the 380-foot-wide stream.

No one is sure that a dam will ever be



Drilling rig is mounted on pontoons anchored in the river. Shorter cable seen here is 800 feet long

built here. Reclamation Bureau crewmen merely are gathering data which Congress will need to decide whether a birth certificate should be issued for Marble Gorge Dam. The crewmen dig out cores of rock which are sent to the Denver office of the bureau for study. Such cores indicate whether the rock formation of the mighty canyon will support a dam. Fossils tell the age of the formation and numerous chemical and mechanical tests indicate its condition and strength.

Hoist man operates levers to control the engine. He's connected by telephone with the engineers far below





Coming or Going? Train's Not Sure

On a stretch of railroad in Texas there's a horseshoe curve so severe that when the locomotive of a freight train is heading north, the caboose is still going south!

Nearly a mile long, the curve is a few miles west of Sierra Blanca. Southern Pacific Railroad officials say the curve was laid back in 1881.

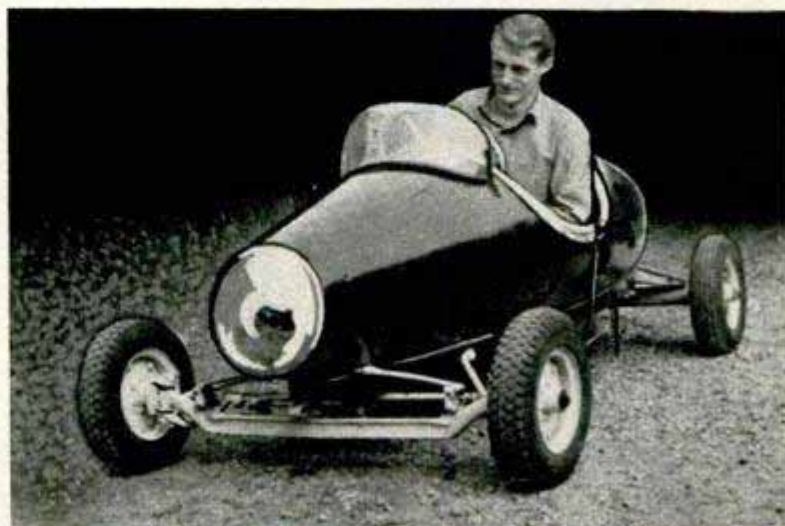


Corrugated Carport

If you're looking for an inexpensive method of protecting your car, you will do well to copy James J. Moore of Logansport, Ind. His carport cost him only \$35. A framework of piping is set in concrete. Bolted to the piping are strips of corrugated metal roofing. An old canvas protects the front end of the car.

Midget Racer

About \$250 and 500 hours of skillful work combined to produce a torpedo-shaped midget racer that is driven by a motorcycle engine. Built by John W. Ladd of Williams Bay, Wis., the car combines parts of a P-38 airplane (body), a 1938 Willys (front axle), a motorcycle (engine and front spring), a Model-T Ford (steering mechanism) and a V-8 Ford (driveshaft). It weighs 550 pounds and has a 72-inch wheelbase. The engine, mounted in the rear, drives the car at 55 miles an hour.





FIRST AID

IF THE A-BOMBS BURST--

By Clifford B. Hicks

Part II

THIS MINUTE, in New York, the shriek of a siren means an air raid—no fooling.

Sirens on squad cars, ambulances and fire engines have been silenced, with no exceptions. If the New Yorker hears a wail, he knows instantly that the Air Force has alerted the city for a genuine enemy raid. No one is crying "wolf" in Manhattan.

Plans already have been drawn up to mobilize the city's 11,800 taxicabs and 35,700 drivers to furnish emergency transportation if an attack comes. And initial steps have been taken toward construction

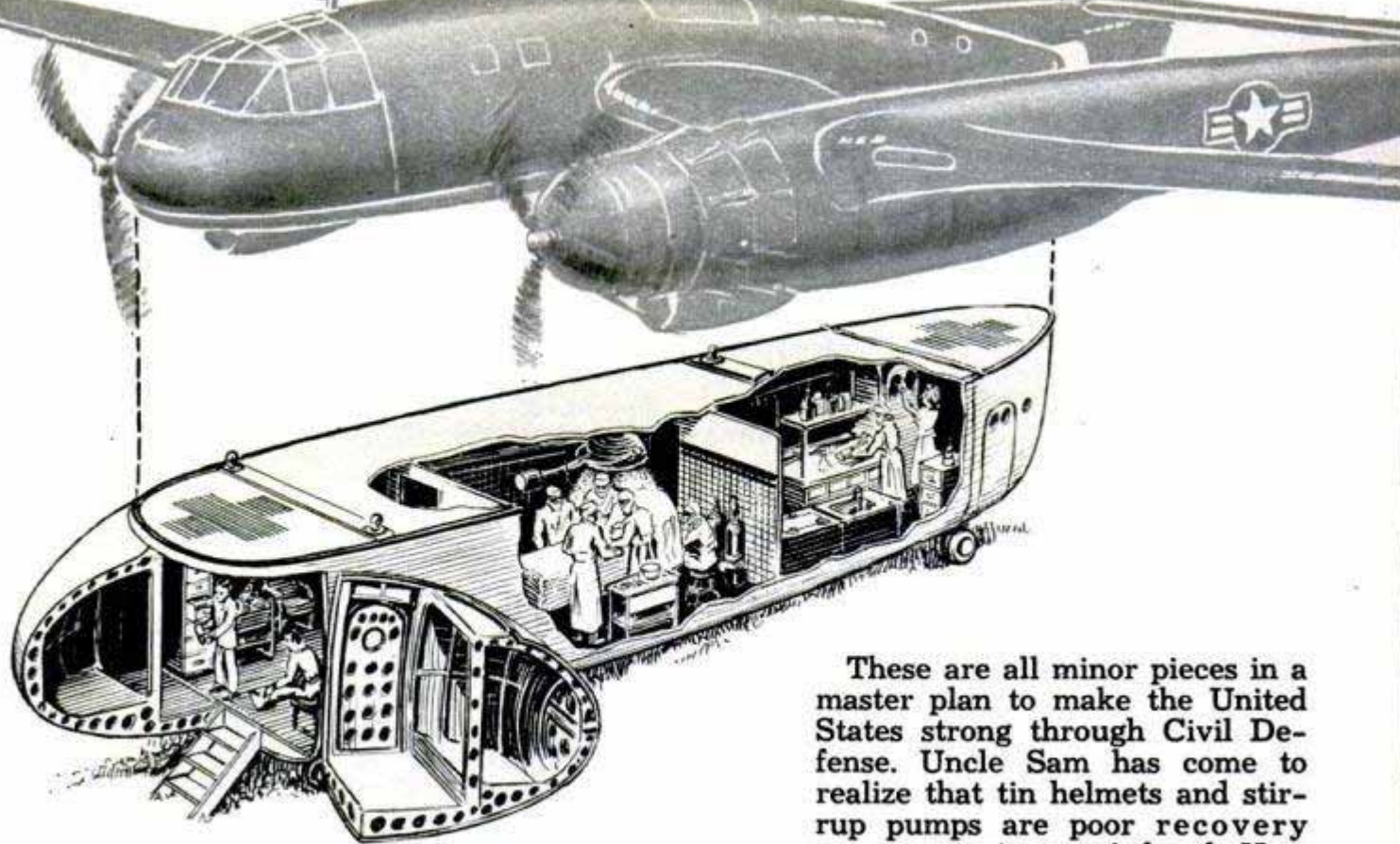
of a walloping \$450,000,000 worth of dual-purpose atom-bomb shelters and underground parking areas.

New York just isn't kidding itself about A-bombs.

In San Francisco more than 100,000 school children probably will be issued military-type dog tags.

In Chicago there's a plan afoot to make every resident a walking blood bank; each person's blood type would be tattooed in small letters in an inconspicuous spot beneath his arm.





"Pod" units of the new Fairchild Packplane may be available as emergency hospitals for Civil Defense. Pod attaches under belly of the plane, can be flown anywhere and disengaged for use

Civil Defense volunteers already are manning air-raid filter centers. This one is at Pasadena, Calif. On the plotting board, civilians coordinate reports from air observers for Air Force use



These are all minor pieces in a master plan to make the United States strong through Civil Defense. Uncle Sam has come to realize that tin helmets and stirrup pumps are poor recovery weapons against an A-bomb. Now he's trying to replace them with 15,000,000 alert citizens trained in Civil Defense.

The federal government hopes to enlist, in the United States Civil Defense Corps, all types of people from clubwomen driving cars to Boy Scouts serving as runners.

CD is no longer a stepchild. The government recently distributed "United States Civil Defense," an over-all plan which spells out the role the national government, the states and the cities will play in this home-front army.

The number of volunteers needed is virtually a roll-call of able-bodied, nonmilitary Americans. Each will serve according to his particular abilities. How can 50,000 wardens be trained? In Chicago, many of the 14,000 school-teachers will be trained first; they in turn, will help teach the wardens how to handle the job.

The Chicago postmaster has announced a plan to deposit first-aid supplies in the city's 5000 storage mailboxes. If the plan is carried through, 22,000 mailmen will be trained in first aid. A thousand postal vehicles will become an emergency-ambulance fleet.

Ham-radio operators will weave a communications network. Civil aviation, with its 500,000 private pilots and 90,000 aircraft, will air-lift supplies and men.



Right, British workmen repair telephone cables damaged during past war. Quick recovery is major job of CD

Center below, photo taken in England shows a worker tucking children into hammocks. Just another job for CD

According to the national plan, the federal government will establish a staff college of CD. Uncle Sam will pump out informational material, will donate part of the essential equipment and will stock-pile medical and other supplies.

States, in turn, become the "field armies" of CD. They'll have to allocate as much money as necessary to keep alert teams—hundreds of thousands of workers—on split-second disaster notice. The state will help its cities through "mobile support."

Mobile support means just that—aid which can be dispatched on a moment's notice to any point in the state, or outside of it if necessary. Citizens of the state will be enrolled in many types of units from field hospitals to troop and engineering battalions. And here the small towns and villages must play their part. A medical unit, for example, might be organized in a small town under the supervision of local doctors.

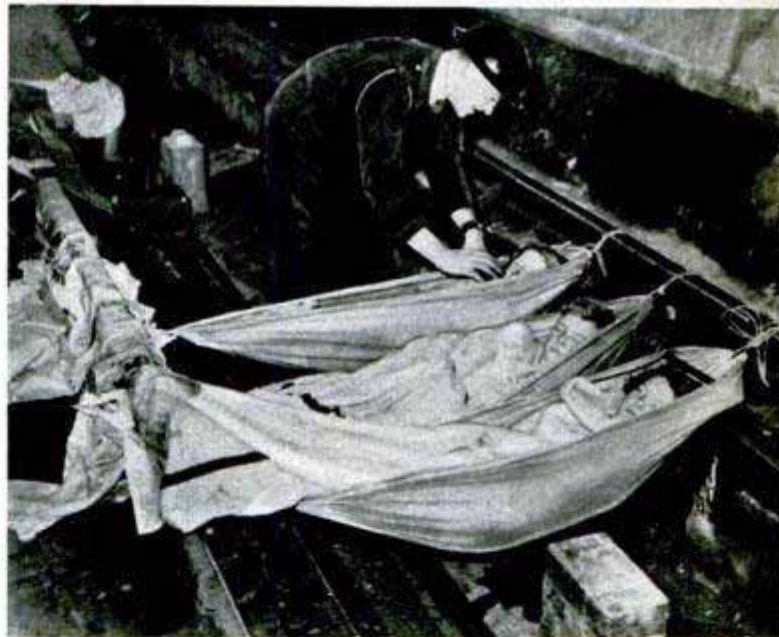
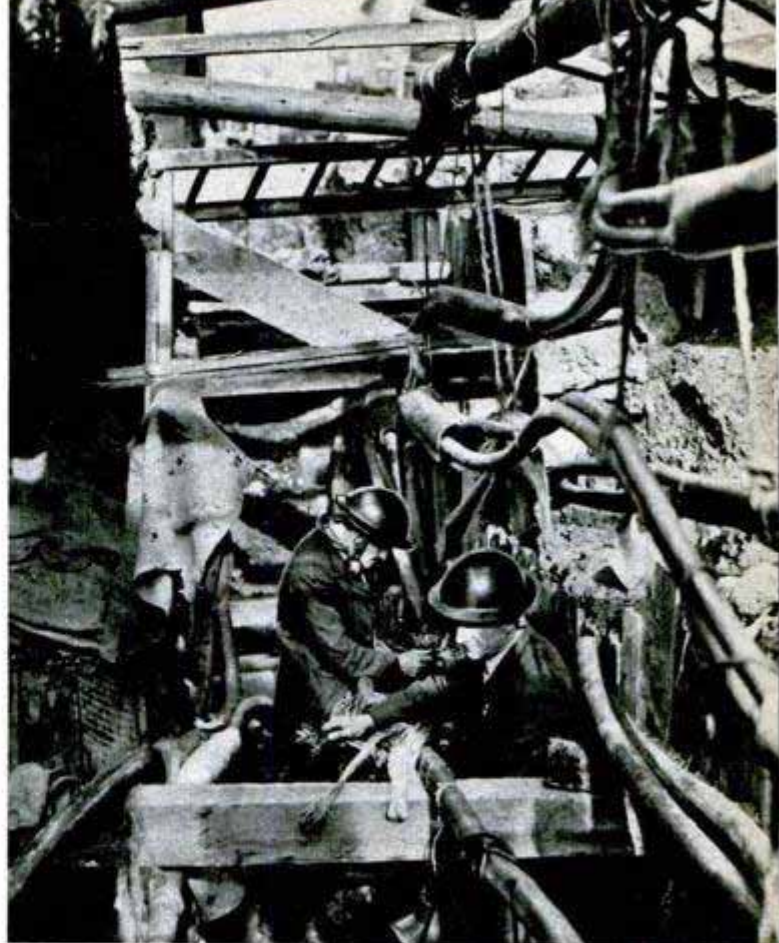
From the target city itself must come the thousands of volunteers needed as wardens and rescue teams, auxiliary firemen and police guards, first-aid teams and monitoring crews, decontamination men and aircraft spotters.

Only two things can save a bombed city. The first is its own CD preparations and the other is the help that will arrive from the outside. Mobile support from the state is one type of outside help. Another—and just as important—is "mutual aid." Each critical target area will become the bull's-eye of a mutual-aid circle.

Mutual aid means that neighboring communities help each other. If a conflagration sweeps Chicago after an air raid, all suburbs and near-by cities, possibly as far away as Gary, Ind., will send firemen and equipment. Conversely, if the Gary steel mills are hit, Chicago manpower and equipment will race to Gary's rescue.

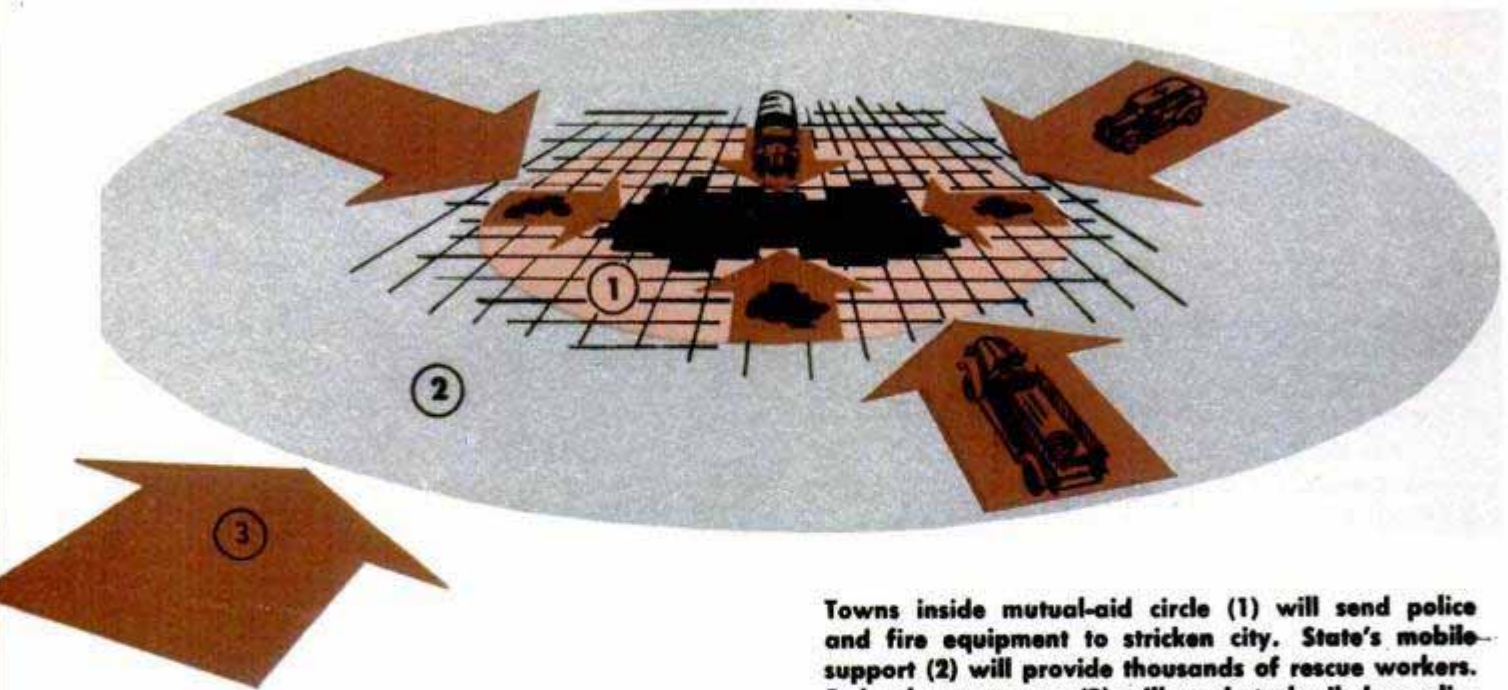
Simple? Yes, on paper. But mutual aid, unless backed by legislation, could tie communities into controversial knots. Suppose Gary sends equipment to help Chicago. Who pays the Gary fireman's wages while he works in the Windy City? And suppose a Gary fireman is killed and an engine destroyed. Is the fireman's insurance still in effect? Which city pays for the engine?

When the United States is completely organized—when all volunteers are trained



New type Geiger counter, not much larger than a hearing-aid case, is designed expressly for civilian use





Towns inside mutual-aid circle (1) will send police and fire equipment to stricken city. State's mobile support (2) will provide thousands of rescue workers. Federal government (3) will send stock-piled supplies

—an air raid or disaster anywhere in the country will throw the switch to start the huge CD machine into operation. To be sure, there'll be a grinding of gears here and there, for some key cogs in the machinery will disappear in the atomic cloud. But the civil strength of the whole nation will move to the aid of the stricken city.

The National Civil Defense Office has dropped hypothetical bombs on three cities—Washington, D. C., Seattle and Chicago—to test local civil defenses. Each “bombing” was a pencil-and-paper test. Local officials merely were handed a narrative which told them the events leading up to the raid, where the bombs exploded and what damage was done. Then they were asked, “How will you save your city?”

If the Chicago test had been a terrible reality instead of a fiction, and if the Windy City, the State of Illinois and the federal government had been fully organized in line with the national plan, here's what might have happened:

AT MIDNIGHT the phone rang. Martin H. Kennelly, Mayor of Chicago, sleepily picked up the receiver.
“Yes?”

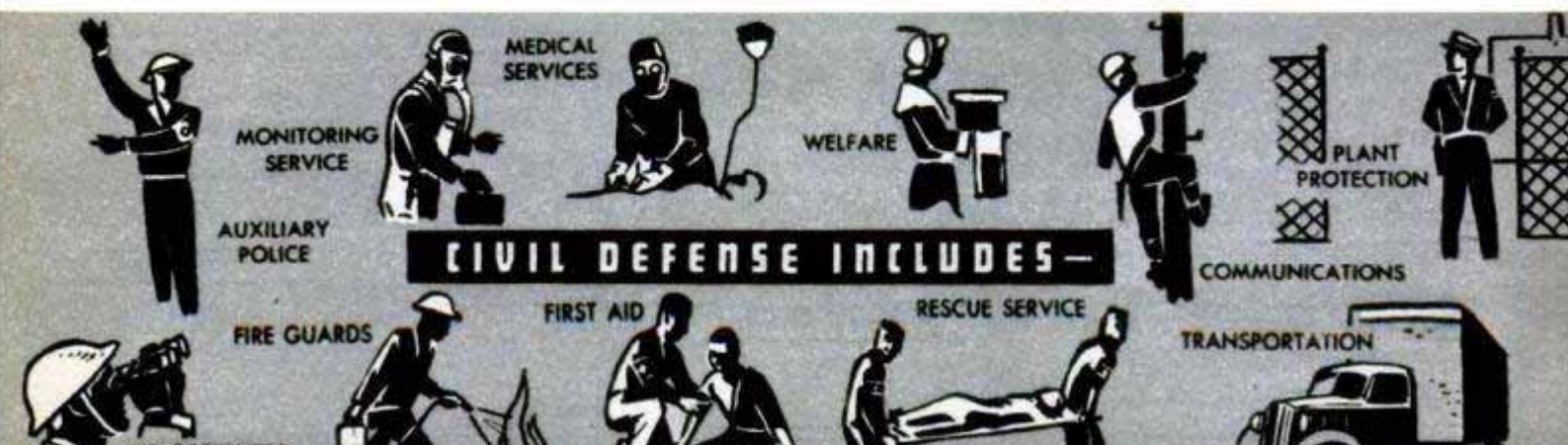
“The Governor calling, sir. One moment please.”

Ten seconds later the Mayor was standing wide awake beside the bed. Governor Adlai Stevenson's voice was crackling out the most important—and most frightening—message the Mayor had ever received. The Governor had just been informed that northern cities could expect enemy air attacks that night.

It was a sleepless night for Mayor Kennelly and for Anthony J. Mullaney, the city's director of Civil Defense. The two men set to work arousing key personnel. Fire engines rumbled through the streets, their sirens silent as they relocated.

Early in the morning the Air Force transmitted a “Yellow” alert to key city and CD officials. Chicago could expect an attack within an hour. CD teams began assembling at designated points.

Several minutes later an air observer at one of the 330 civilian observation posts in northern Illinois heard the sound of planes overhead. Immediately he reported by phone to the Filter Center, which relayed the information to the Air Force. His call, plus calls from other observers, enabled the Air Force to keep track of the invaders





In a recent Chicago demonstration, 100 auto trailers were assembled in 11 minutes to provide emergency housing

even when planes evaded the radar "fence."

No identification of the planes ever was made, so the Air Force alerted the Air Raid Warning Service in Chicago, which instantly transmitted the signal to buildings with sirens. The alert wailed across the city at 6:10 a.m. It was the first public warning. Chicago's 3,600,000 sleepy citizens started scurrying for their shelters.

At 6:26 an atom bomb exploded high above the North Side. Apartment buildings and stores, railroad tracks and sidewalks boiled upward in a geyser of rubble.

Millions of tons of debris were still mushrooming toward the sky when another A-bomb lashed out above the South Side.

Between 45,000 and 55,000 Chicagoans were killed within a few seconds.

Minutes after the second explosion, the "All Clear" sounded. In one rubble-strewn block along Western Avenue, $\frac{3}{4}$ mile from ground zero, there was no movement except the swirling dust. A weakened wall suddenly collapsed. Then a man crawled slowly up what remained of the basement steps in an apartment building. Choking

and gasping through the dust cloud, Al White, the Block Warden, heaved a timber out of the way and stood up.

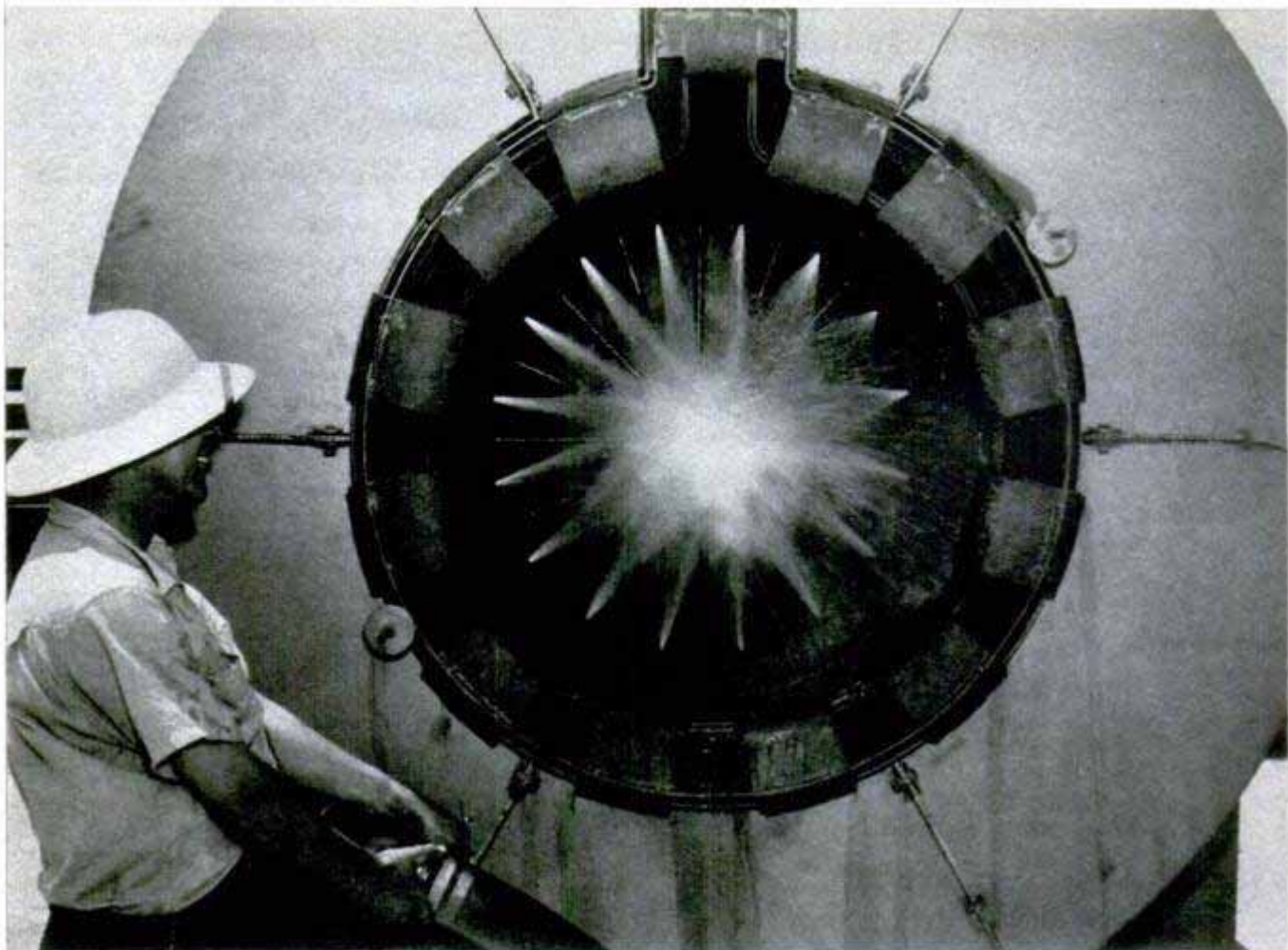
White coughed until he vomited, steadied himself and then clawed his way to the top of a mound of brick and steel beams. From here he surveyed what remained of

(Continued to page 246)

Battered buildings have become classrooms for the British Civil Defense School. In this country, federal government will form a staff college for CD

British Information Service photo





Water spraying from ring of nozzles cools jet-plane exhaust blast from 3500 down to a few hundred degrees

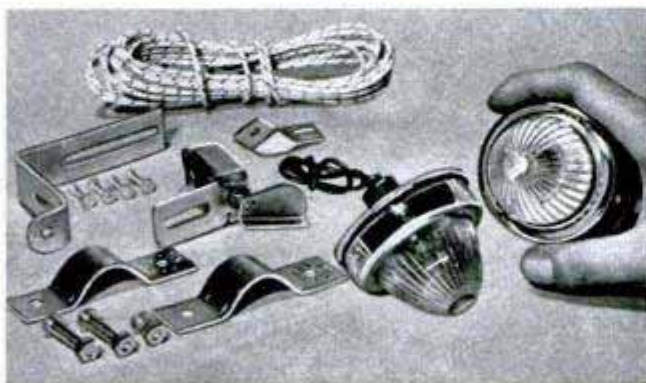
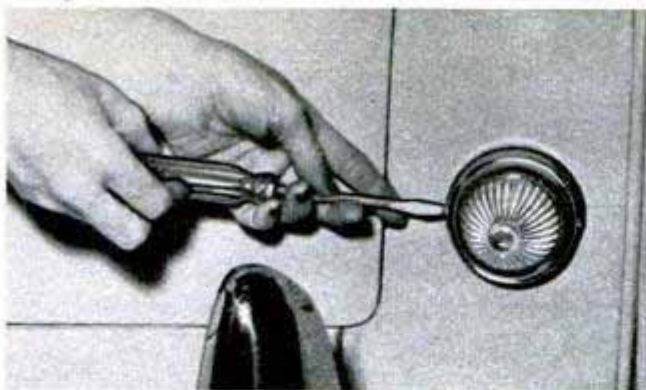
MUFFLER FOR JETS

ENGINEERS at Lockheed Aircraft soon hope to have jet-engine "warm up" noise down to a growl, if not a purr. Within 100 feet of an F-94, when its afterburner roars at full blast, the sound approaches 150 decibels, about 100 times louder than inside a boiler factory. To quiet it, they are using a Maxim Silencer, a giant muffler 7 feet wide and 23 feet long, and a specially designed adapter that connects to the plane's

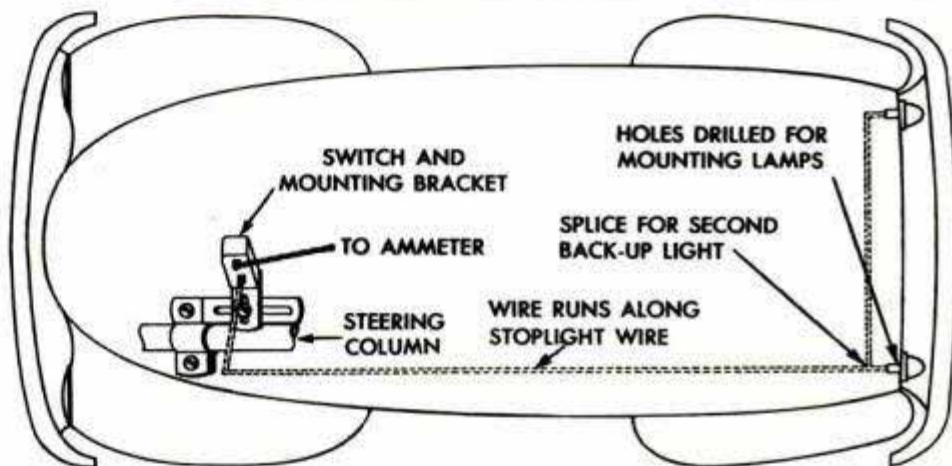
tail pipe. In the adapter, a ring of nozzles fed from a six-inch water main literally floods the 3500-degree exhaust blast, slowing it and cutting the temperature to only a few hundred degrees. The passage through the adapter being larger than the tail pipe lessens the pressure. In the silencer itself, where an eight-inch copper-wool lining and baffles help dissipate the sound, the exhaust roar is lowered 30 to 40 decibels. With adjustments, the engineers expect to get it down to a sound level scarcely above that of a loud radio.

Front section of installation behind F-94 is the Lockheed-designed adapter. Silencer, at rear, is longer





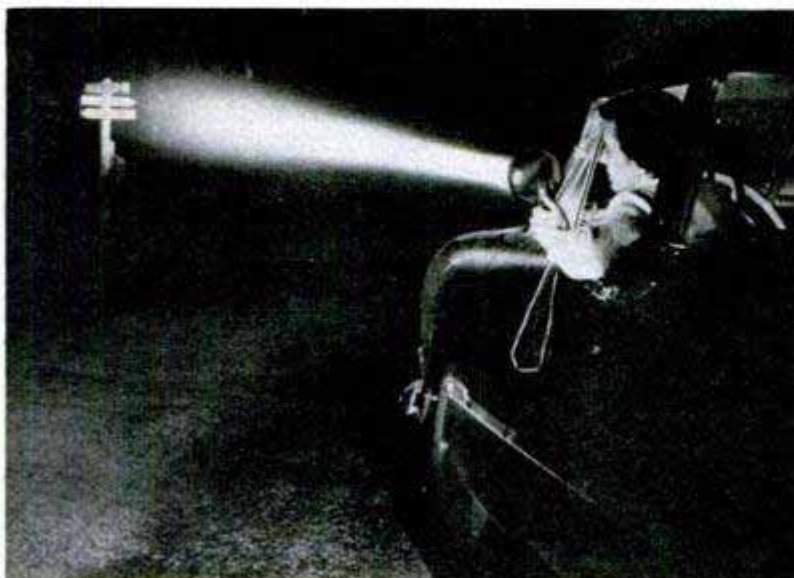
Everything needed to install a pair of flush-mounted back-up lights is provided in the kit, above. You just drill several holes in the body, upper, right, and screw the lamps in place, top. Right, the wiring diagram



ADD YOUR OWN BACK-UP LIGHTS

You can install a pair of back-up lights on your car in a few hours and the finished job will look like a factory installation. The lights are set in neat flush mountings, protected against water and dirt by rubber gaskets, and look like original equipment.

An automatic switch fastens to the steering column to turn the lights on and off, the action of the shift lever operating the switch. The pair of lights can be mounted on almost any make of car produced from 1939 to date.



Portable Spotlight Throws 1000-Foot Beam

Small enough to slip into the glove compartment of your car, a baby spotlight throws a 1000-foot beam. It comes with 14 feet of wire so you can use it as a trouble light as well. You simply plug it into the cigarette-lighter socket. There are no holes to drill or installation costs to pay.

☐ An antibiotic called Netropsin, which shows promise as a weapon against clothes moths and carpet beetles, has been reported by the American Chemical Society.



Walnut Pickup

Walnut gathering is made faster and easier on the back by a pickup devised by Wally Buckingham of Reseda, Calif. It consists of a short handle attached to an aluminum cone with two taut coil springs across the bottom. When pressed down on a walnut, the springs spread and the nut pops into the container. The pickup is lightweight and fills to the top.

Unique Bikini Fish

Scientists at the Smithsonian Institution are still finding new species of fish in a collection made at Bikini atoll during the 1946 atom-bomb tests. Seventy-nine of the 481 forms already identified at the National Museum are being described for the first time. One is only 15 millimeters long. Another, a shallow-water oddity, is a flathead the exact color of the sand that covers all but its mouth.

Car Exhaust Kills Rats

Attached to the exhaust pipe of a passenger car, truck or tractor, a handy fumigator kills rats and delouses chickens or animals. The exhaust gas goes through a condenser, where excess moisture is removed, then flows through a generator where it combines with a powder that converts into a lethal chemical gas. The gas is then driven into rat holes and corn or grain cribs for instant killing of rodents. One hundred cubic feet of space can be treated for five cents.



Road Runt

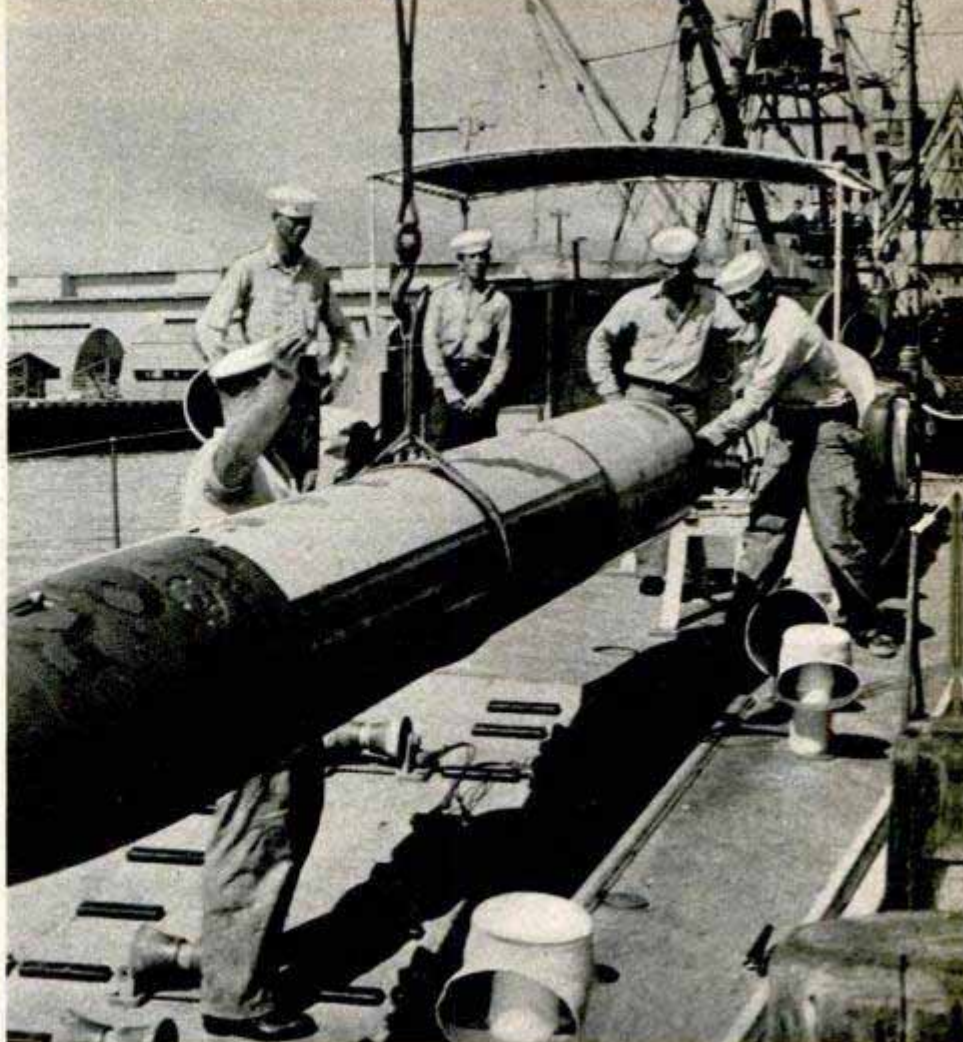
European motorists who like small cars for their economy and maneuverability have a new model to look over—a tiny two-seater Rolux. This baby roadster has a top speed of about 50 miles an hour and its gas tank holds only seven pints! The Rolux weighs 300 pounds and that's usually less than the combined weight of its two passengers.

Information not listed on articles in the index, starting on page 14, frequently is listed in the WHERE-TO-FIND-IT LIST, available to readers without charge from Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois



With recovered torpedoes strapped in its skids, a retriever ship heads home

TORPEDO RETRIEVER

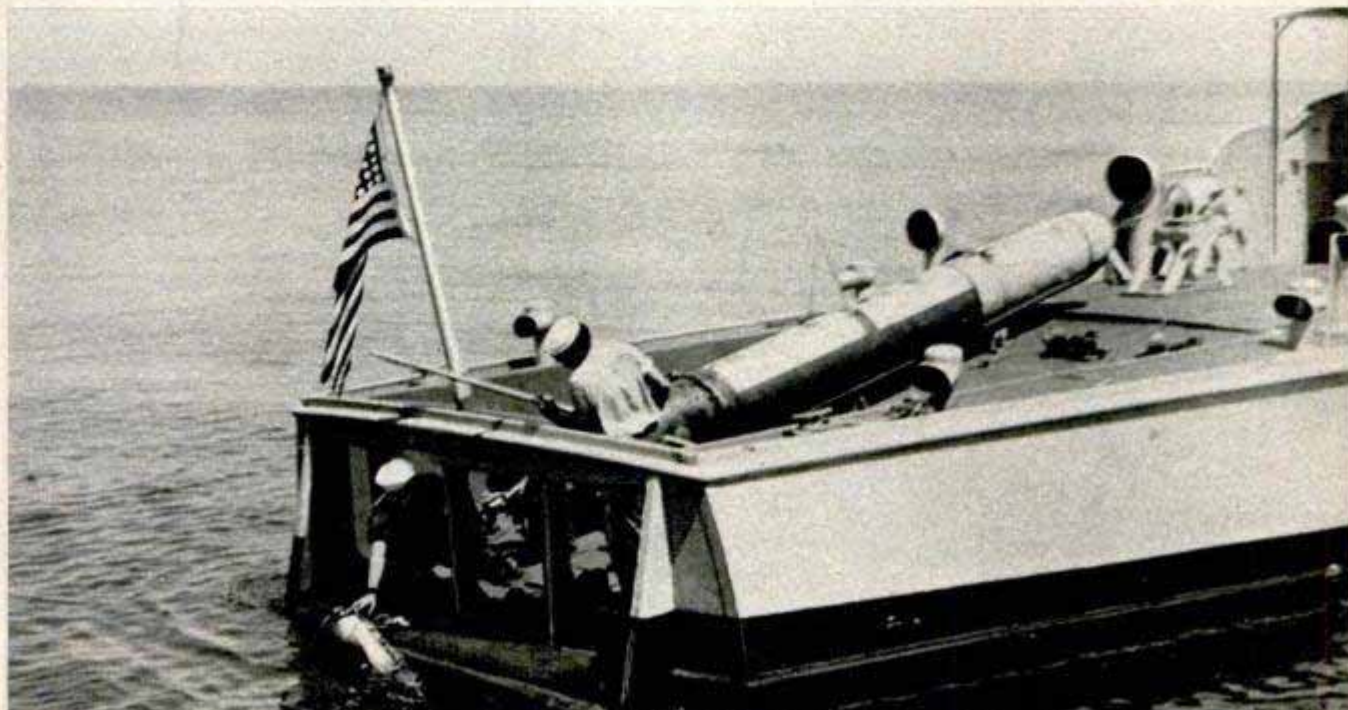


Unloading the day's "catch" of practice missiles at Pearl Harbor

TWO OCEAN-GOING oddities have been added to the U. S. Navy. For the difficult job of retrieving practice torpedoes fired by submarines off Pearl Harbor, the Navy redesigned two crash boats into the most unusual craft in the Pacific. These torpedo retrievers had their aft ends cut away and are open to the sea. An inclined deck replaced the former deck from about the pilot

house to the stern. On it the Navy constructed a series of torpedo skids and set up four hand-operated winches. The retrievers jump into action whenever a submarine has firing practice. They chase a torpedo as it nears the end of its run, toss a lasso over it and wiggle the missile aboard. Two sailors can haul in a 3000-pound torpedo with the winches.

While aft end is cut away, the retriever's downward-sloping deck won't ship water in even a heavy sea





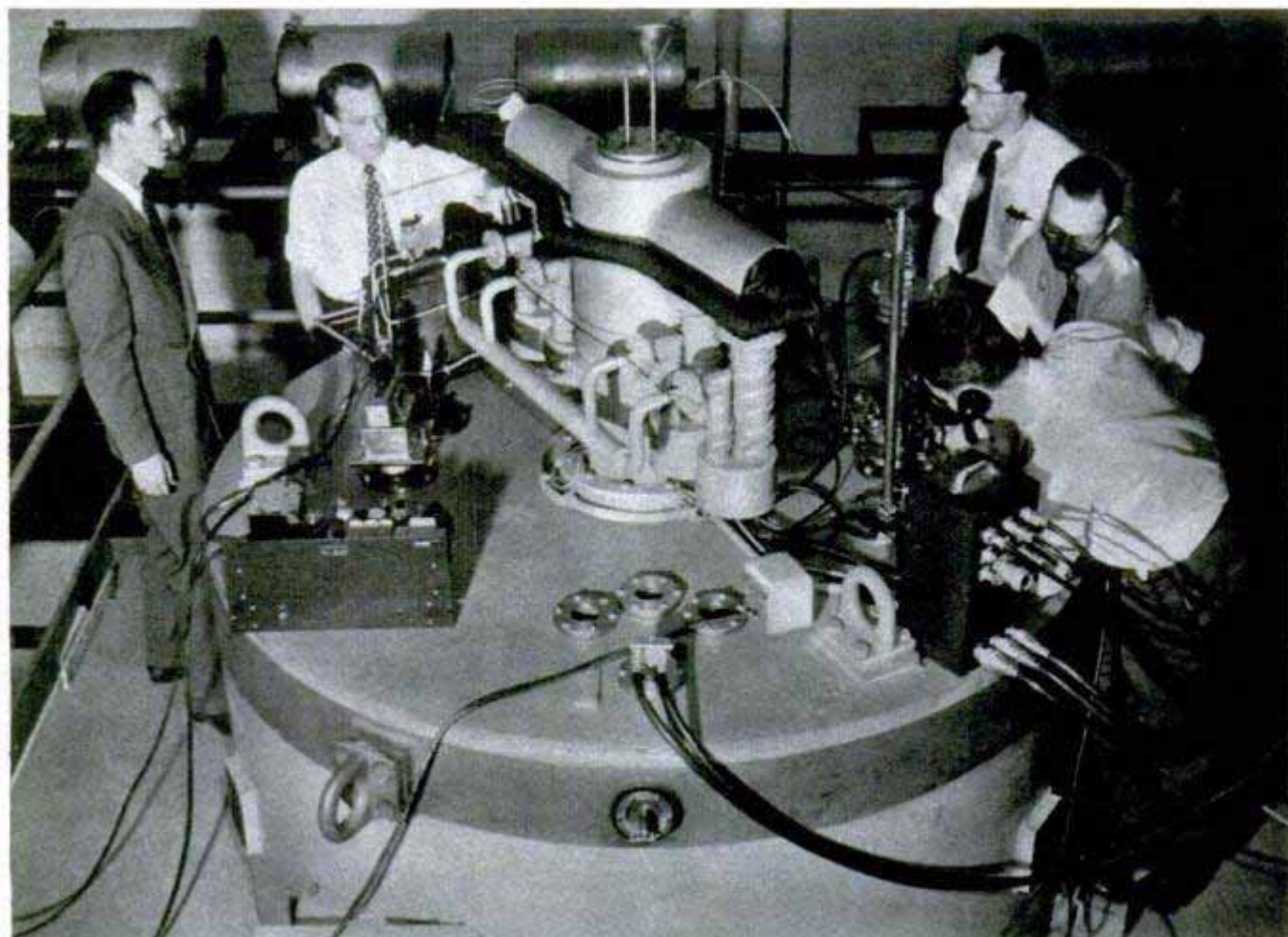
Left, a scientist studies crystal structure. Right, weather experts create a "snowstorm" inside a freezer

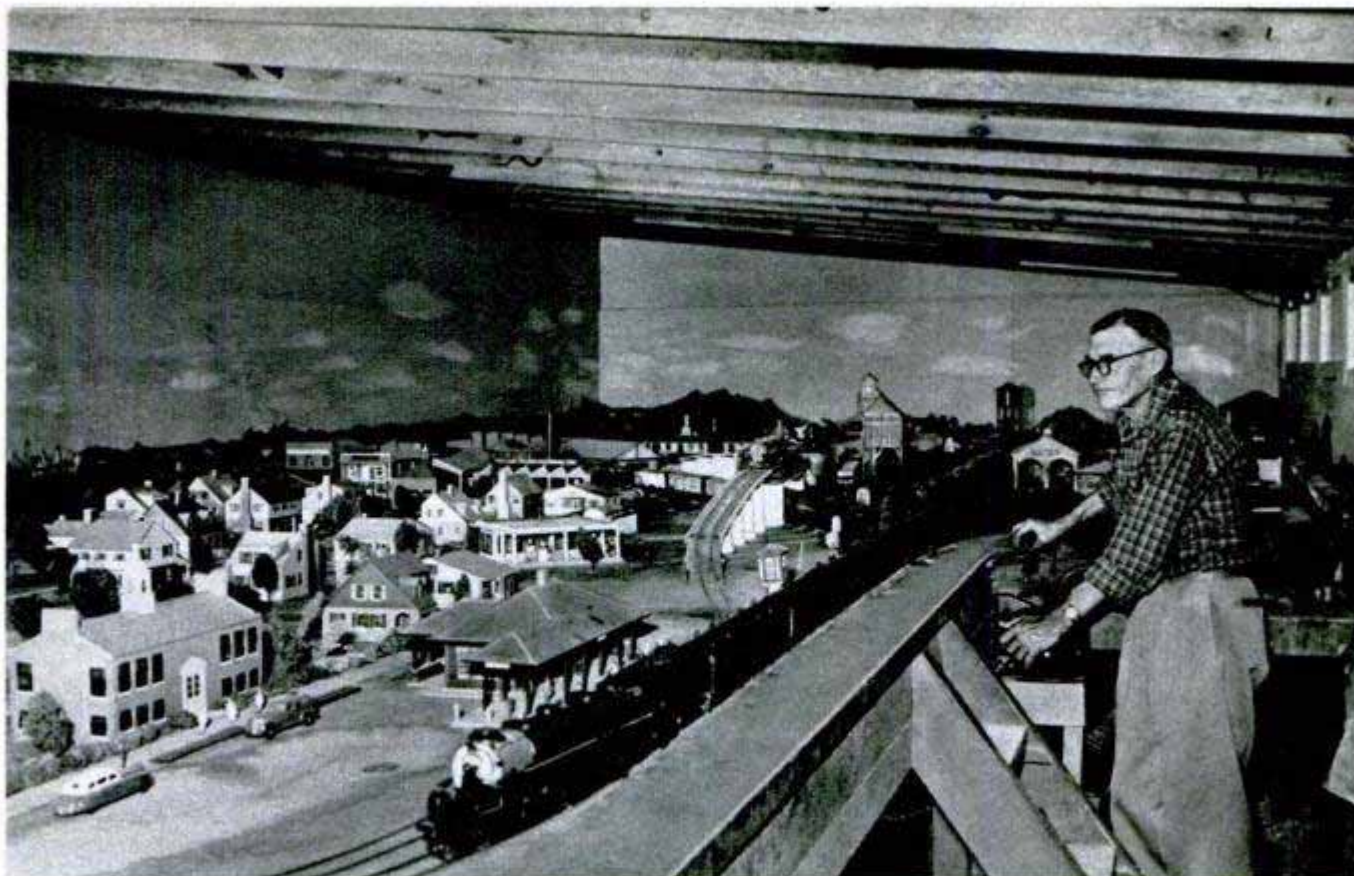
G. E.'s HALL OF KNOWLEDGE

General Electric and research are old friends — they've been together for years. Since 1900, in fact, when G. E. set up the nation's first industrial research laboratory

in a Schenectady, N. Y., barn. In less than a year, the lab had outgrown the barn stage and it's still growing. It has just moved into a new five-story, 107-room laboratory where top-flight scientists do basic research in metallurgy, chemistry, electronics and mechanics.

G.E. also conducts atomic research. These scientists are working on the lab's 300-million-volt synchrotron





Hottest Railroad

How hot is too hot to operate a model railroad? When the temperature reaches 160 degrees it's time to close down even the hottest line, according to T. R. Goodwin, superintendent of Death Valley National Monument. Goodwin is a model-railroad fan who keeps his rail line running in a

low-ceiling shed even when the temperature edges up to 130 degrees. But at 160 degrees Goodwin closes down the 16 by 34-foot layout and heads for the cooler area on the western boundary of Death Valley. The layout includes six steam locomotives, one diesel, passenger and freight cars and 40 electrically lighted houses and factories.



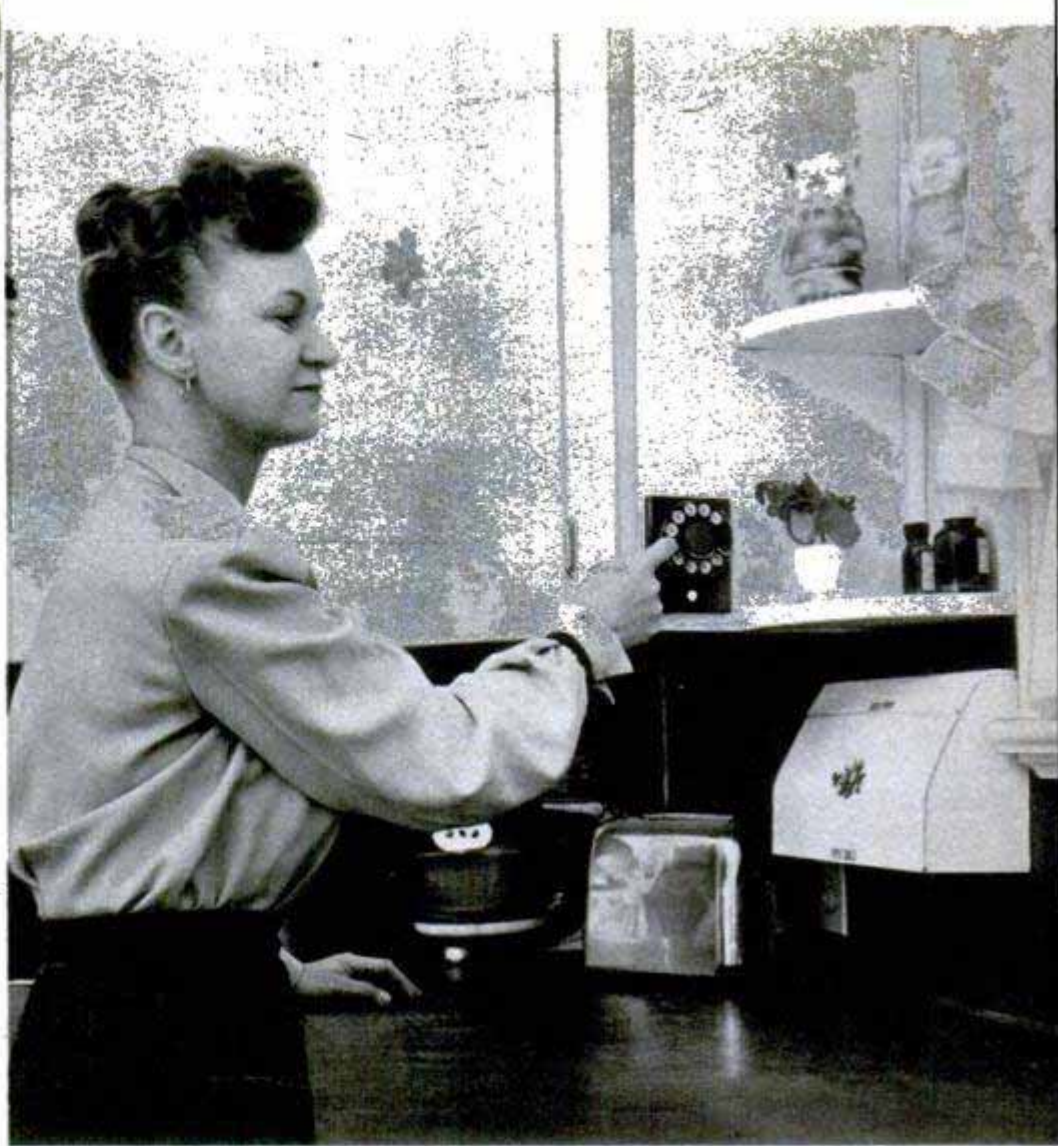
Concrete Roadway Laid on Swamp

Poured directly on the surface of a swampy bog, a cellular-concrete roadway supported a 5750-pound truck only six hours after pouring was completed. The bog was soft enough so that it could not be walked on without sinking to the waist. No attempt was made to drain the land under



the roadway or to build it up with fill. Wire mesh was laid over the marsh and two rows of logs served as forms for the shoulders. The cellular concrete, which expands $2\frac{1}{2}$ times as it sets, was mixed and pumped into the form through a hose to make a slab about eight inches thick. The roadway was poured as an experiment by Higgins Resources, Inc., developers of the lightweight cellular concrete.

the HOUSE that WORKS on a DIAL SYSTEM



By
Richard Dempewolff

There's one of the "magical" dials in the kitchen. When Mrs. Bassett sees her husband swing his car into the driveway, she dials a number and . . .

WHEN Merton Bassett returns to his Schenectady house late at night, he doesn't fumble around for light switches like the average man groping his way along dark halls and stairways. Instead, he reaches for what looks like a telephone dial fastened to the entry wall, dials two or three numbers and starts walking. One by one lights flick on ahead of him in the house—first in the hall, then on the stairway, then upstairs.

Bassett, control engineer for General Electric, has rigged the dials all over his house, and once you sit in a Bassett chair, there's seldom any need to get out of it for minor chores. Just pick up the nearest dial and start flipping numbers as you would on a telephone. If the family car is coming in the driveway, dial 8106 and the garage door opens; 8107 closes it. Another number turns the radio on; buttons at the base of each dial raise or lower the volume. A total of 14 lights in every room in the house can be turned on and off individually from any of the dials. Special numbers work various combinations.

You dial 9 and every light in the house

comes on. Dial 0, and they all go out. At bedtime, the engineer dials 8192 on the night-table dial. The radio stops playing and the furnace shuts down for the night.

The secret of Bassett's remote-control house is a 24-volt wiring system. Its beauty lies in the fact that it does not require heavy cable for the switch circuits. Wiring to control operation of lights and appliances throughout the house is thin, lightly insulated, single strand. It's threadlike, and hides easily. It carries the low voltage which operates relays, turning on the 110-volt current.

In Bassett's house, the 24-volt current, controlled by dials, activates a selector switch in the basement. If you were dialing 16, for instance—which would turn on the kitchen light—the "1" would bring the selector switch up one notch. The "6" would send it scuttling across six notches sideways. At that point it would make its contact with the proper relay, the current would be carried to a magnetic switch installed in the outlet of the kitchen light, the switch would make contact and the light would go on.

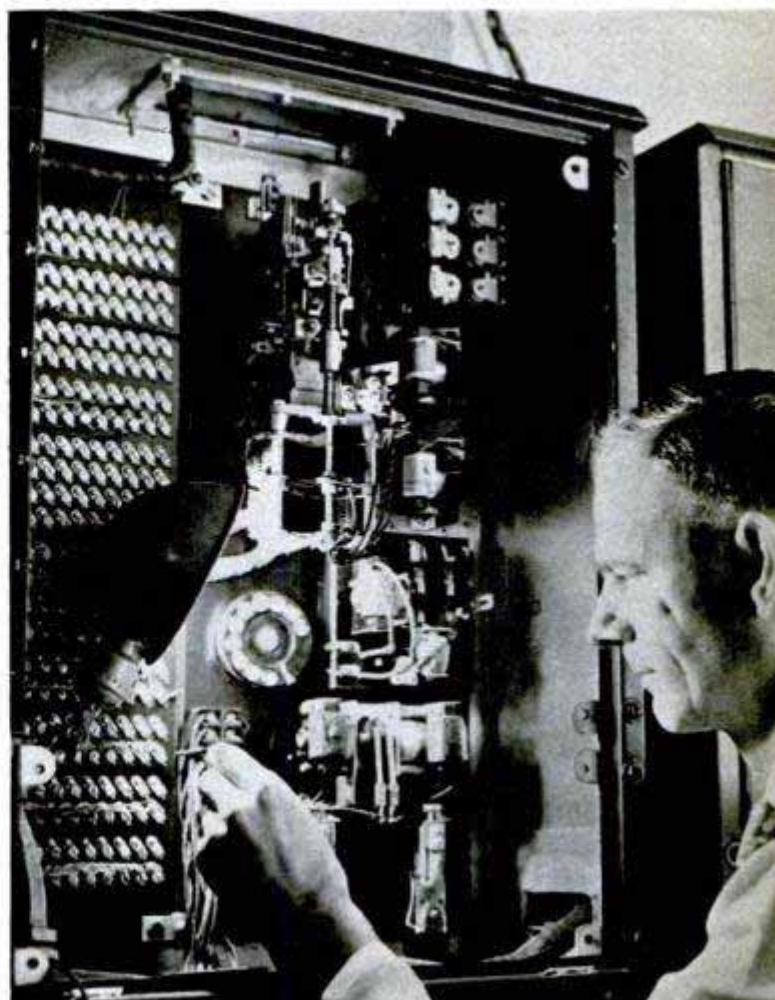


... presto, the garage door opens! Bassett is now working on a radio control so he can dial in the car

Below, the system's "brain" is the selector switch. It's the switch used in many dial-telephone systems

Besides the dials, Bassett is also experimenting with push buttons which do the same thing but are smaller and less noticeable. Instead of turning a dial, you simply press a tiny button set in a neat plastic case. The button is pushed the proper number of times, with a pause between digits. Down in the cellar the selector switch clucks away like an old mother hen, stops at the right contact, and bingo—something happens two rooms away.

The G.E. engineer is building up his circuits gradually. Right now he can turn lights on and off in any room from any one of four dials and two push buttons spotted at strategic places around the house. Besides those already mentioned, he has numbers that will turn on or shut off one, two or all three of the loudspeakers of his central radio set. Number 51 will turn off the overhead lights in the living room and turn on two small table lamps instead. The garage door can be opened, closed or stopped in the middle of its ascent or descent by numbers that control a $\frac{1}{8}$ -horsepower electric motor with a magnetic clutch.





When Bassett leaves the house at night, he doesn't have to check each room for burning lights. He just dials "0" at the door and all lights are turned off

Convenient push buttons do the same thing dials do. Just tap out the number and the system goes to work



"I'm busy rigging a radio receiver that will be hooked to the system," says Bassett. "The sending set will be installed in the car. There will be a dial on the car dashboard and I'll be able to broadcast a dialed number from about three blocks away. The receiver will pick up the impulses, transfer them to the selector switch and by the time I roll into the driveway the garage door will be open and any light that I need in the house will have been turned on and waiting for me."

Probably the most startling thing about Bassett's dial-system house is the effect it produces on neighbors. When combination numbers are dialed, for all lights off, for instance, the house doesn't plunge into instantaneous darkness. The lamps plink off one at a time until all the relays have done their duty. This can look mighty queer from across the street. "We get lots of odd looks from the neighbors," smiles Mr. Bassett. They've seen my wife and me leave the house with all the lights going. They know no one's home, but they see those lights click off one at a time until we're halfway down the block. They probably think we're haunted. But if I told them I did it by dialing '0,' they'd think I was crazy as well."

Midget Road Marker

So versatile it can be used equally well on long stretches of open highway or short crosswalks in town, a compact road-marking machine is ridden and operated by one man. The paint is sprayed on the road for greatest economy. Five gallons of paint will mark up to a mile of roadway. The machine rolls along at about six miles an hour.

Radioactive Cortisone

Cortisone, the powerful drug which provides relief in some cases of arthritis, leukemia and other diseases, now has been made radioactive. Scientists expect that the radioactive drug will help them determine just how cortisone acts inside the body. The new form of cortisone contains tritium, an isotope of hydrogen which is so radioactive that it can be traced in extremely small amounts through the body, according to the



Sloan-Kettering Institute for Cancer Research, which first synthesized radioactive cortisone.



Tiny Telescopic Gun Sight Mounted in Two Seconds

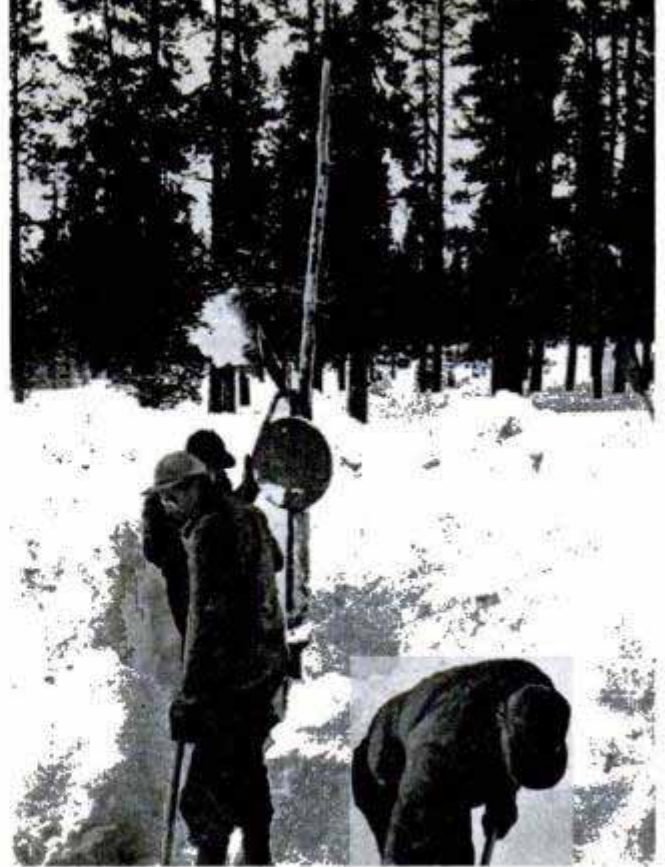
Hardly a handful, a tiny rifle telescope designed around ground front-surface mirrors provides more accurate shooting even during early morning and twilight. The new optical system loses no light and permits accurate aiming against the sharply defined crossed hairlines. It easily fits in a hunter's inside pocket and can be mounted in two seconds. A coin turns the one screw holding it in place.

Pocket-Size Sun Lamp

So compact it takes up little space in a suitcase, a small sun lamp is ideal for travelers who don't want to miss their daily session under the ultraviolet. The lamp combines both ultraviolet and infrared rays and can be used without goggles because harmful radiations are screened out. The lamp plugs into any 110-volt a.c. outlet and weighs 1½ pounds.

☐ Montana's 222 billion tons of easy-to-mine coal reserves, though generally below good industrial quality, hold great promise for synthetic liquid fuel.





Top, left, water tanks along the railroad are empty so tank cars that feed water to the locomotives are filled from mountain streams along the right of way

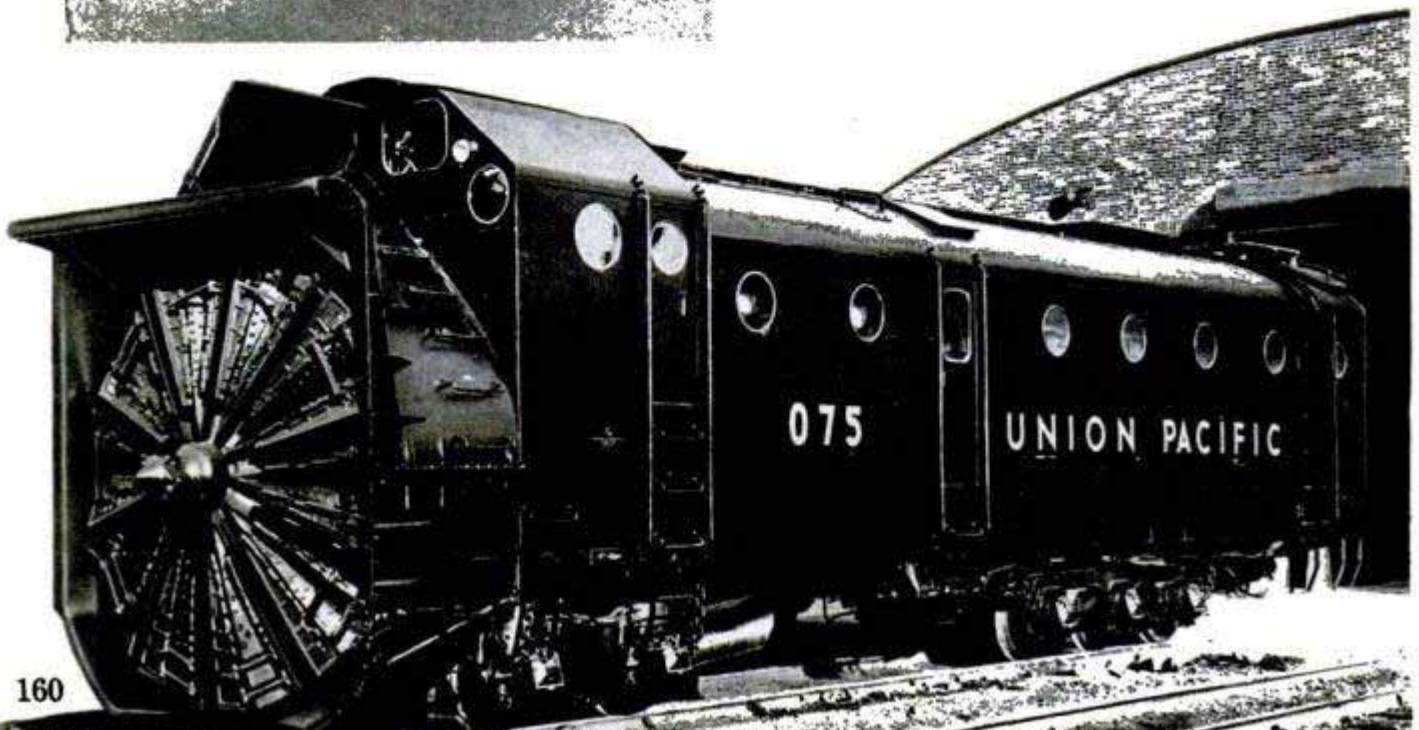


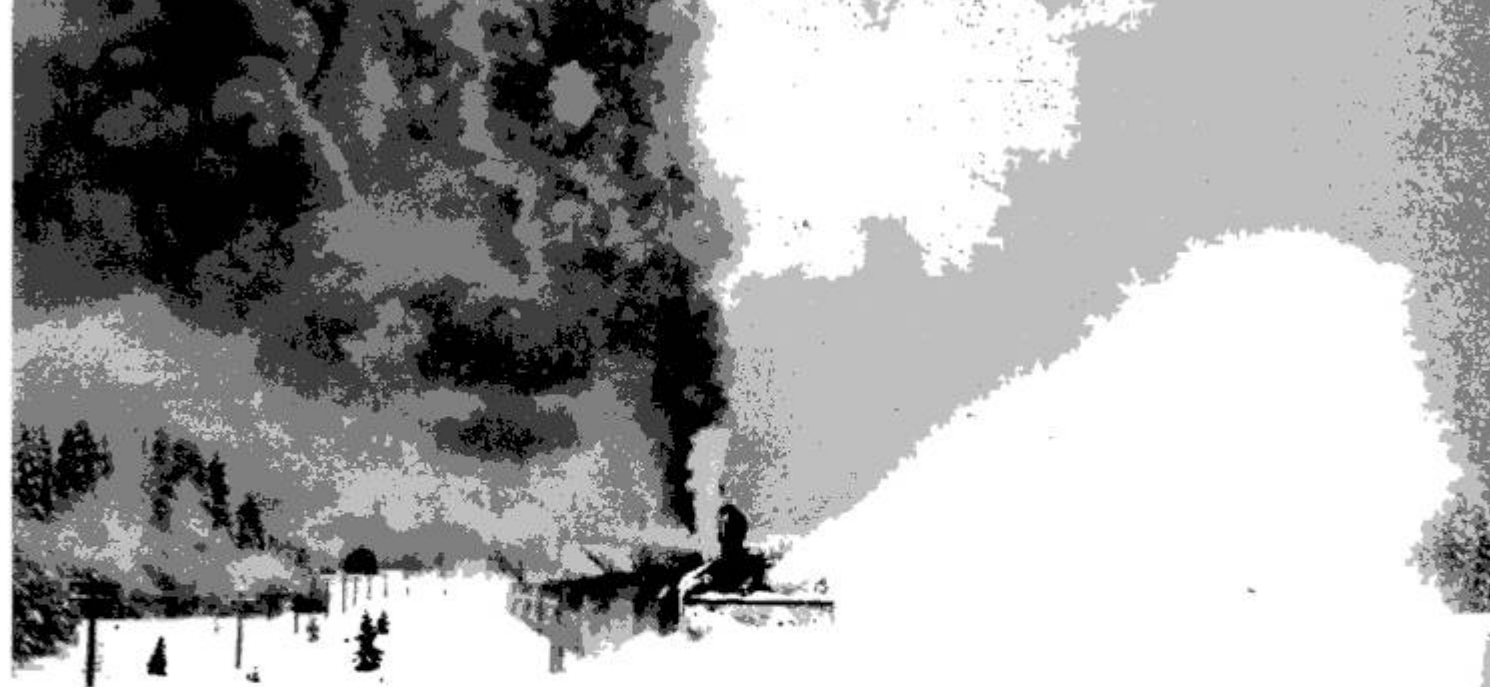
Above, switches have to be dug out by hand when the railroad shakes loose from winter's grip. Note that the switch stand was marked by lashing a tree trunk to it so that it could be located beneath deep snow



Left, your eyes are not deceiving you! That is the top of a crossing sign that can be seen sticking up through eight feet of snow as the plow moves along

Below, here's the new Lima-Hamilton diesel rotary snowplow that will get its final test this spring over the track between Ashton and West Yellowstone





Pushed by two steam locomotives, the diesel snowplow tosses the snow off the track during its initial tests

A Railroad Comes Out of Hibernation

By Ewart Thomas

A RAILROAD that hauls 25,000 passengers each summer and then hibernates through the winter provides a natural testing ground for snowplows every spring when it shakes off its thick coat of snow.

The line is Union Pacific's 56-mile branch between Ashton, Idaho, and West Yellowstone, Mont., gateway to Yellowstone Park. The winding single track crosses the continental divide at 6934 feet above sea level and has an average grade of two percent. Tourists grow scarce come mid-September and the railroad shuts down tight.

Plowing the road open again in March or April before the winter snows have melted is one of the toughest assignments that a plow can be given. It would be no chore with fresh snow, but this snow has been settling and consolidating for months. In addition to buried crusts there are considerable ice and layers of dirt and gravel that drifted in with the wind. Railroaders expect to find five feet of packed snow over the rails in the open stretches in the spring, and as much as 20 feet in the drifts and cuts.

The opening requires a special task force of men, plows and motive power. The expedition may consist of four steam locomotives, three rotary plows that will be tested on different parts of the line, 20 other units of rolling stock and as many

as 75 men including engine crews, track workers, observers from other railroads and observers from the plow manufacturers. Years ago a whole week was needed to clear the line; today almost any modern rotary plow can do the job in two or three days.

This coming spring a new Lima-Hamilton oil-burning diesel rotary plow will lead the parade for its final tests after having been tried out for the first time last year. The big plow is rated at 1500 horsepower, a third more than older steam rotaries, and it weighs 303,000 pounds. All of its power is used to spin its 12-foot-bladed head-end rotor and to toss the snow as far as 150 feet to one side of the tracks. The unit is pushed from one to six miles per hour by a pair of coal-burning Consolidation locomotives. Its operator can spin the rotor up to 150 revolutions a minute and he uses a throttle control to keep the blades whirling at the right speed in varying depths of the drifts.

As the expedition slowly moves along, track walkers inspect the cleared track and the bridges behind the train, and electricians check the telegraph lines. Extra water for the locomotives is carried in tank cars, but at least once each day additional water must be pumped into the tank cars from a stream. Not until warm weather



It may not look like it to you, but when this snowplow breaks through, spring has come to West Yellowstone

are the water towers filled with water.

Clearing the snow from America's rail lines actually takes several kinds of special equipment, depending on the conditions that exist. An ordinary locomotive with no extra equipment except a small flanger mounted in front can break through drifts of fresh snow five or six feet high without danger of derailing. Wedge plows that split the snow and toss it 25 feet away are ideal in open country where a speed of 25 miles

an hour can be maintained, if the snow isn't too deep. The big rotaries rarely move faster than six miles an hour but they can handle snow of any depth and they can clear the snow from lines on which high speeds are impossible. They are ideal for mountain country. And, the railroaders remark, if a rotary proves its worth in cleaning the snow from Union Pacific's West Yellowstone branch, it can handle any fall of snow, anywhere.

When there are only three or four feet of fresh snow, a flanger blade on the locomotive handles it easily

Even when the summer tourist season starts, there is still snow at the West Yellowstone railroad station





Brake for Accelerator

Through a brake mechanism which fits on the accelerator, a motorist can use the same pedal for speeding up or stopping his car. The mechanism eliminates the need for a brake pedal, though it does not affect the operation of the standard brake pedal in any way. It is activated by a slight pressure of the driver's heel—when he wants to speed up he presses with his toe and when he desires to stop he pushes with his heel. The attachment, which fits any car equipped with hydraulic brakes, is installed under the hood and connected to the brake system between the master cylinder and wheels. The mechanism can be installed by any mechanically inclined person in a few hours.

Push-Button Shave Cream

Now the man of the house can push a button and get a handful of creamy shaving lather. The new form of shaving soap is pressure-packed inside a can. When the shaver pushes a button, the lather flows out a nozzle. There's enough lather for about 50 shaves inside the small container.



Official MATS photo

"Bucket of Bolts" Car

For only \$36.80, M/Sgt. Murray Miller, Jr., of the Air Force built himself a three-wheel car, bought a license and insured the vehicle. Stationed in Hawaii, Sergeant Miller invested his money in surplus parts and a "bucket of bolts" which he fashioned into a small auto. He spent about 50 hours of off-duty time in joining the parts with the bolts. The resulting auto has front-wheel coil springs, a two-speed gear system and travels 65 miles on a gallon of gasoline. Furthermore, there's room for his baby daughter in a special compartment up front.

Fold-Down Metal Edging

All the fastenings of a new type metal edging for table or sink tops are concealed by the covering material. When the material is in place, the molding's lip is folded down with a hammer handle or a wood block to make a waterproof joint.

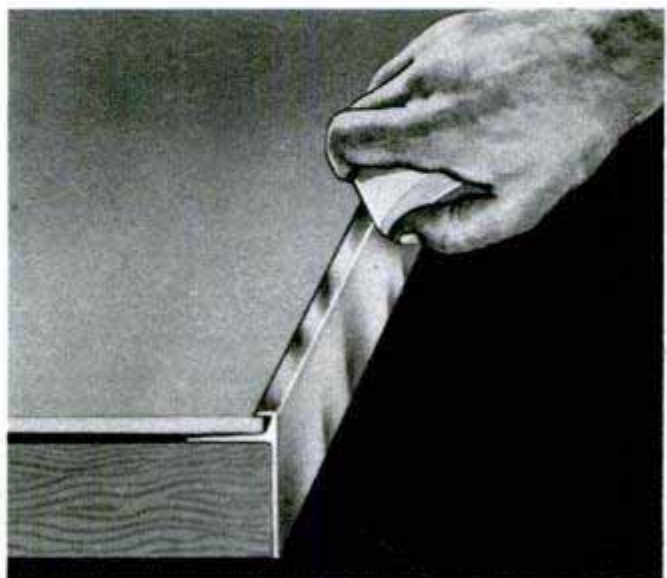




Photo Cart

Press photographers of the Chicago Tribune, determined to catch all the excitement of a night football game, have developed a special cart which holds a bank of speedlamps. The cart makes it possible to wheel all lamps up and down the side lines to follow the action. The photographers wanted to portray the crowd in the background as well as the action on the field. Ordinary lights will not carry far enough to illuminate such a background. The speedlamps are mounted on the wheeled cart along with their power packs. A special support makes it possible to swivel all lamps in the same direction simultaneously.

Silting of Western Reservoirs Is Groundless Fear

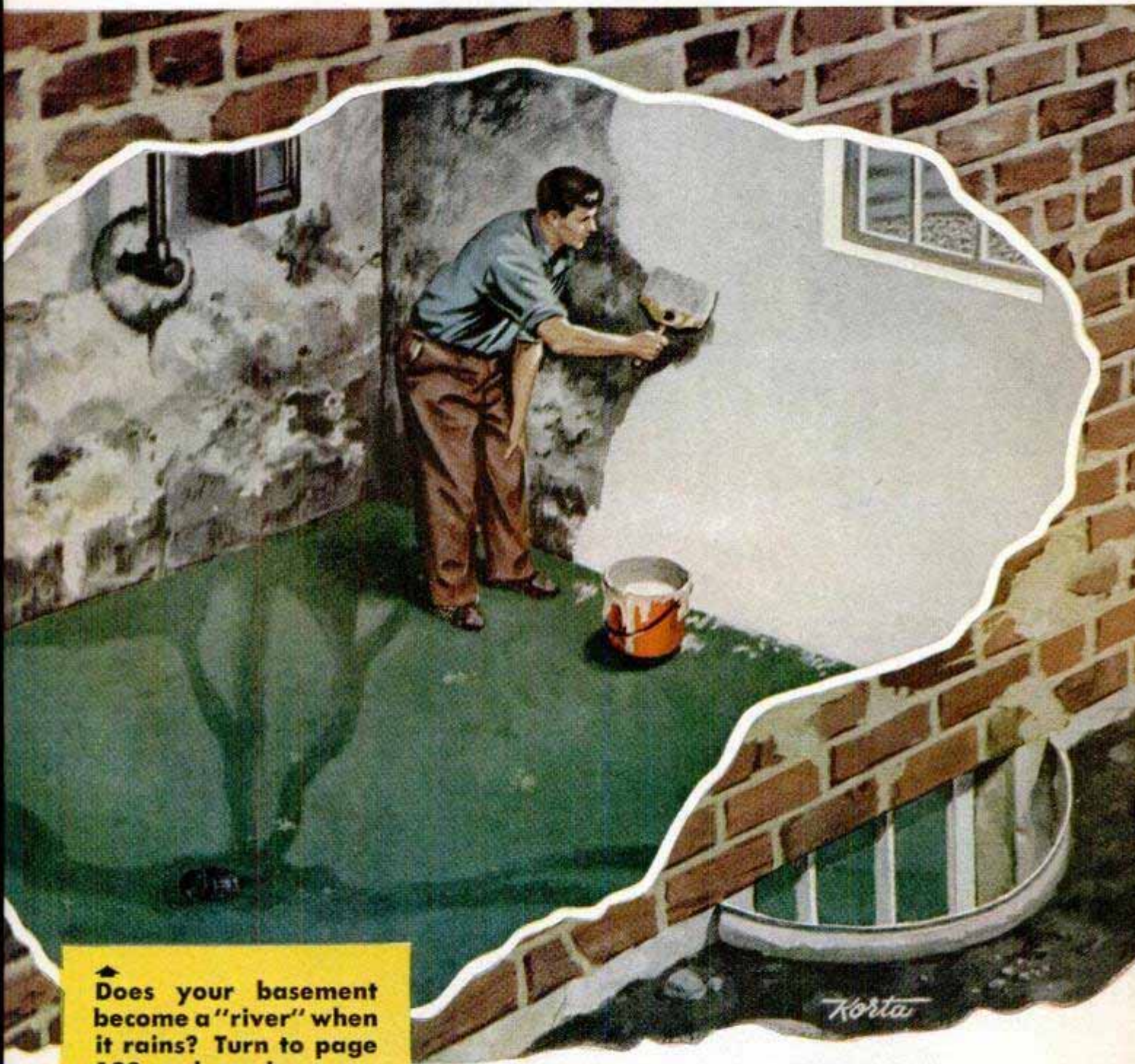
Fears that our Western reservoirs will become filled with silt in a comparatively short time have been determined groundless, according to Oscar L. Chapman, Secretary of the Interior. Lake Mead won't become completely filled with material carried by the Colorado River for another 275 years even if no upstream dams are

built meanwhile. Studies reveal that Hoover Dam has trapped about 105,500 acre-feet of silt each year since it was built in 1935. This is just 500 acre-feet more than was predicted before the dam was built. Taking all factors into consideration, engineers say Lake Mead will be useful for water storage until the year 2380.

the

POPULAR
MECHANICS

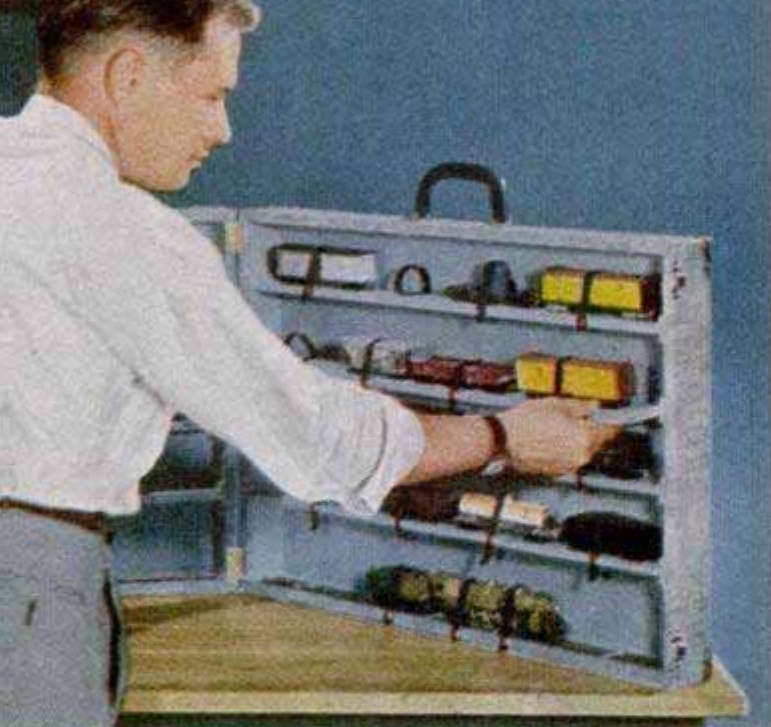
CRAFTSMAN



↑ Does your basement become a "river" when it rains? Turn to page 188 and see how you can keep the water out and make the basement really "belong" —not a damp, musty hole under your house

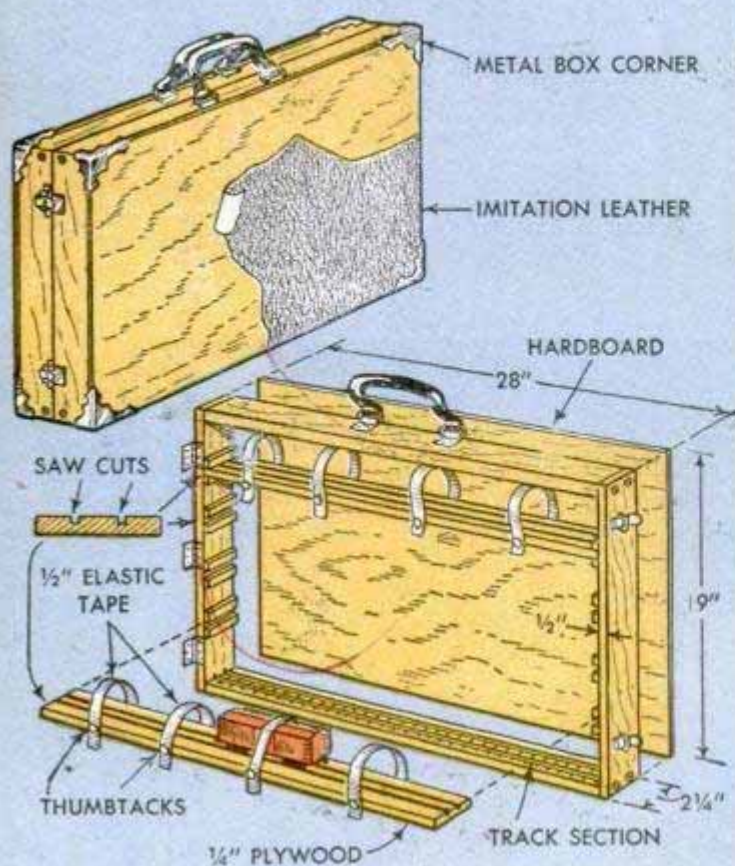
♦ Farmers will welcome this tractor-mounted mower. See page 214





HO TRAIN CASE

MODEL RAILROADERS of the HO class who visit and operate their rolling stock on the track systems of fellow enthusiasts will go for this neat carrying case. Built by Frank Beatty, art director of Popular Mechanics and himself an avid HO fan, the case is designed to hold up to 36 cars and as many as 4 locomotives. Consisting of two parts hinged at one end, the case opens wide to reveal two storage compartments, each one being fitted with four removable shelves. Bands of elastic tape held with thumbtacks anchor the cars to the shelves. The case is made as a single box, complete with top and bottom, and then sawed in half edgewise. Both sections are covered with imitation leather, after which suitable suitcase fittings, handles and metal corners are attached to complete the case



Beautiful Finishes with
PLASTIC



PM color photos by Paul T. Hutchinson

The two companion pieces pictured here, step table and commode, and also the desk on the opposite page, show how veneers of contrasting wood grains can be combined effectively to relieve plainness



VENEER

By Wayne C. Leckey

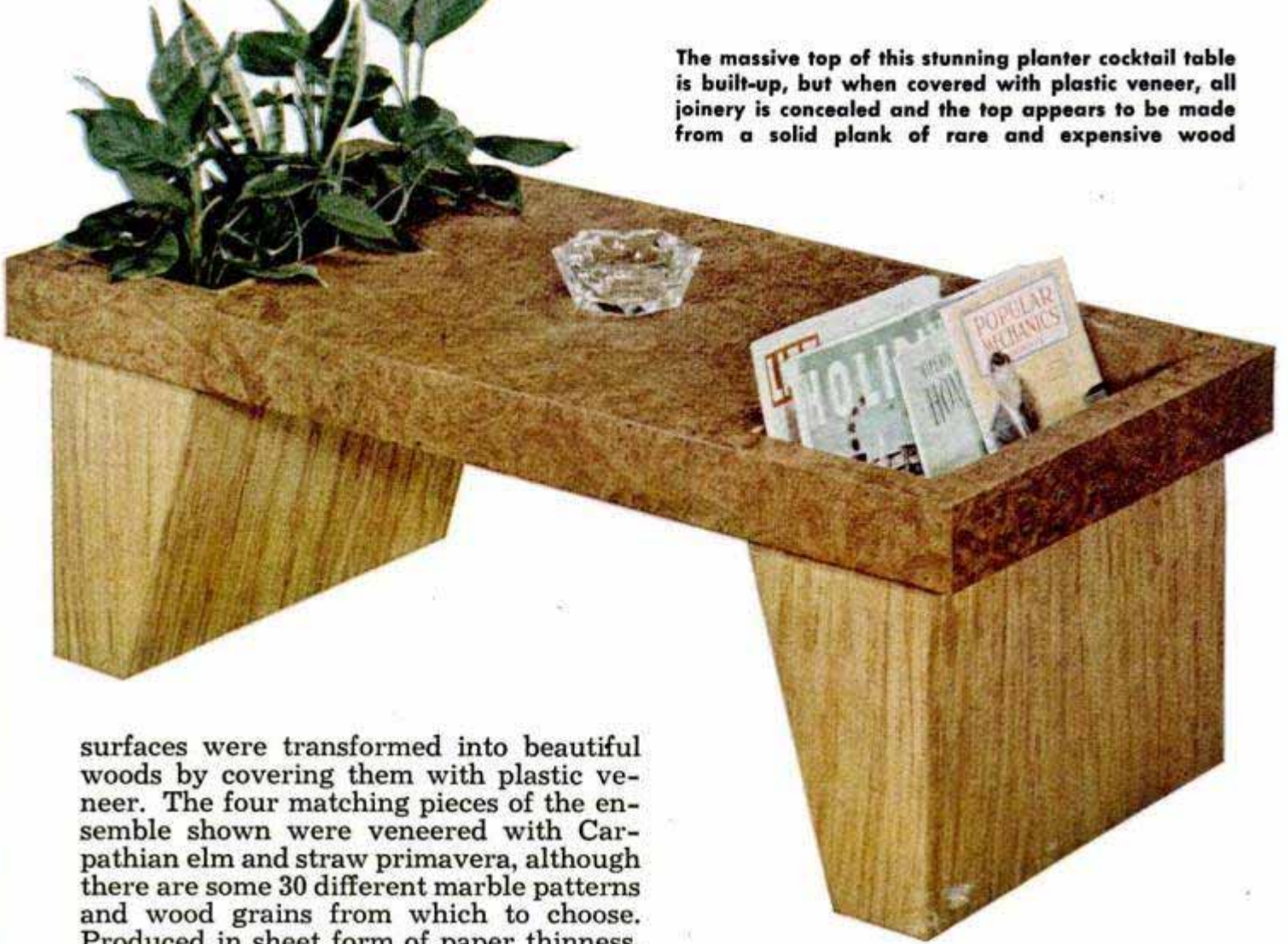
NOW THAT you, perhaps, have had opportunity to become acquainted with the application of plastic veneer—the new marble and wood-grain material described last month—several additional pieces together with constructional details are presented here to show further possibilities of this amazing material. Like the others presented in Part I, these pieces were designed and built exclusively for *Popular Mechanics* from inexpensive poplar plywood. Then, with the cooperation of The Meyercord Co., one of the manufacturers of plastic veneer, the plain poplar

Part II



If made of the rare woods represented, this beautiful desk would cost a fortune and, yet, when covered with inexpensive plastic veneer, it's difficult to tell it from the real thing

The massive top of this stunning planter cocktail table is built-up, but when covered with plastic veneer, all joinery is concealed and the top appears to be made from a solid plank of rare and expensive wood

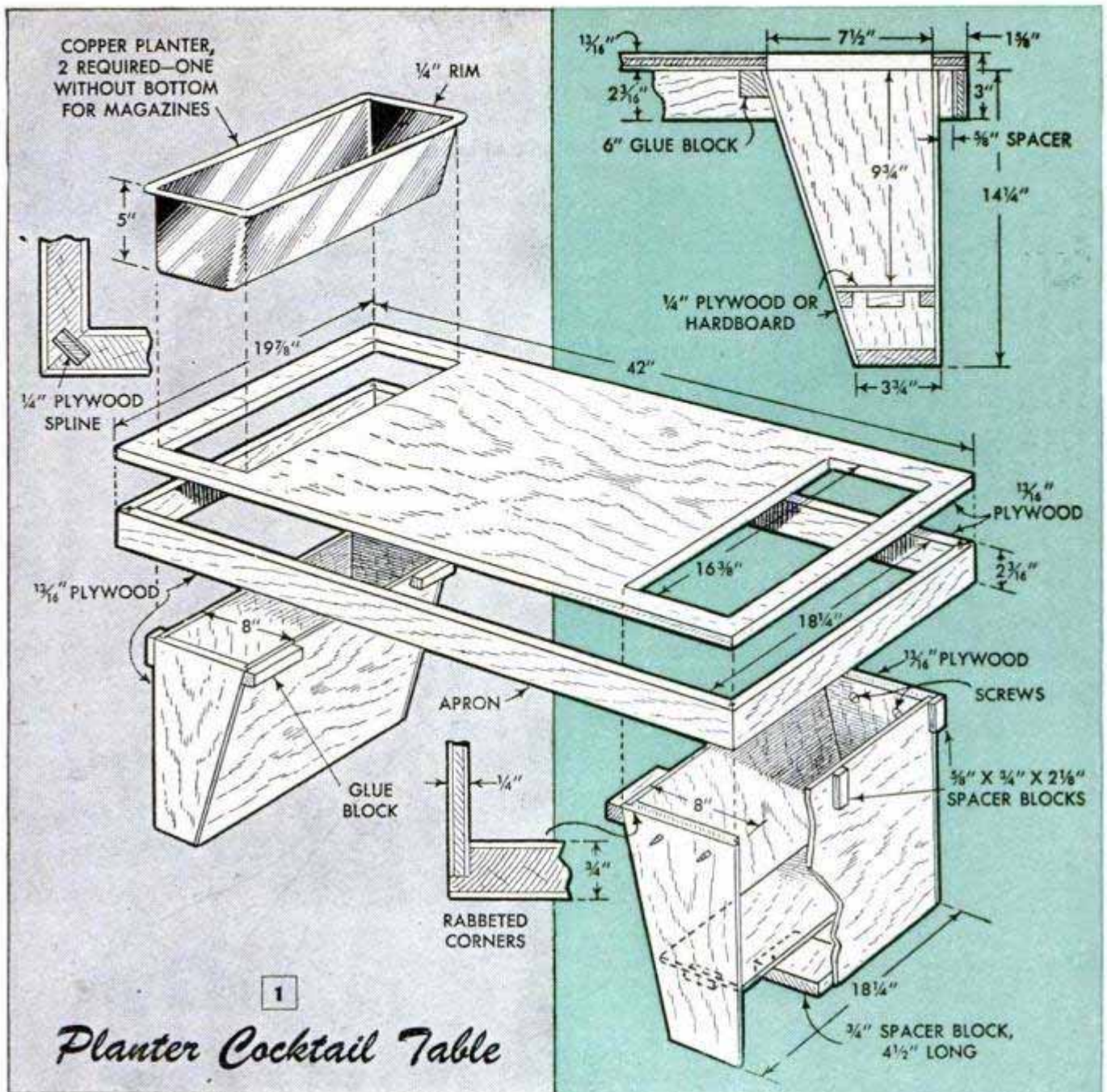


surfaces were transformed into beautiful woods by covering them with plastic veneer. The four matching pieces of the ensemble shown were veneered with Carpathian elm and straw primavera, although there are some 30 different marble patterns and wood grains from which to choose. Produced in sheet form of paper thinness, the veneer resembles a decal in some respects in that it has a paper carrier that is removed by soaking. But, unlike a decal, it is cemented to the surface with a special slow-drying adhesive. The examples at the bottom of the page picture two excellent uses for black-and-gold marble veneer; one simulates a real marble top on

a wall console table, while the other example shows how the veneer can be used to form marbleized mats for wall prints. Here, the veneer, when cut, is merely cemented to the back side of a piece of plate glass and, of course, requires no finishing whatever. Normally, the veneer,

Like the cocktail table above, the top of the console table below, when covered with black-and-gold marble veneer, appears to be cut from a solid slab of marble, when actually it's merely wood. The plate-glass wall picture, below right, shows how marble veneer can be applied to form unusual mats for the prints





1
Planter Cocktail Table

after application, is either sprayed with a protective finish of satin or flat-drying lacquer, or finished with several coats of varnish—no staining, sealing or filling being necessary. However, whether varnish or lacquer is used, each coat should be rubbed smooth with No. 10/0 waterproof sandpaper before applying the next coat.

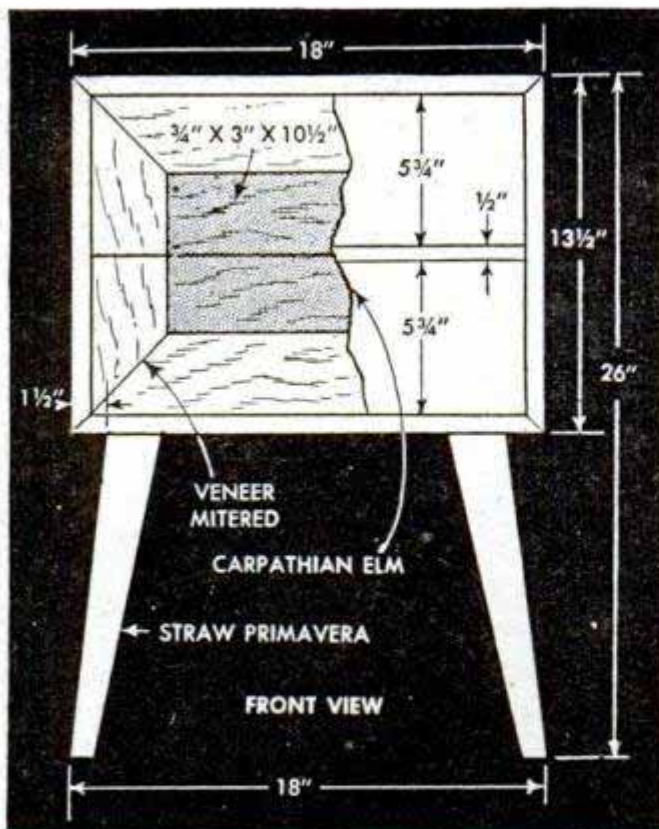
In addition to covering new work, plastic veneer offers great possibilities in the transformation of old furniture and, once you have worked with this amazing material, other applications will suggest themselves. Part I described how easy it is to apply plastic veneer, and the results of your first job are sure to surprise you.

Concealing the laminations of plywood has always presented a problem. While the only practical solution has been to cover the plies with wood veneer, this requires a clamping job often difficult for the average craftsman. However, as plastic veneer requires no clamping, it truly provides the

answer to finishing plywood furniture, for it not only hides the plies but also the joints.

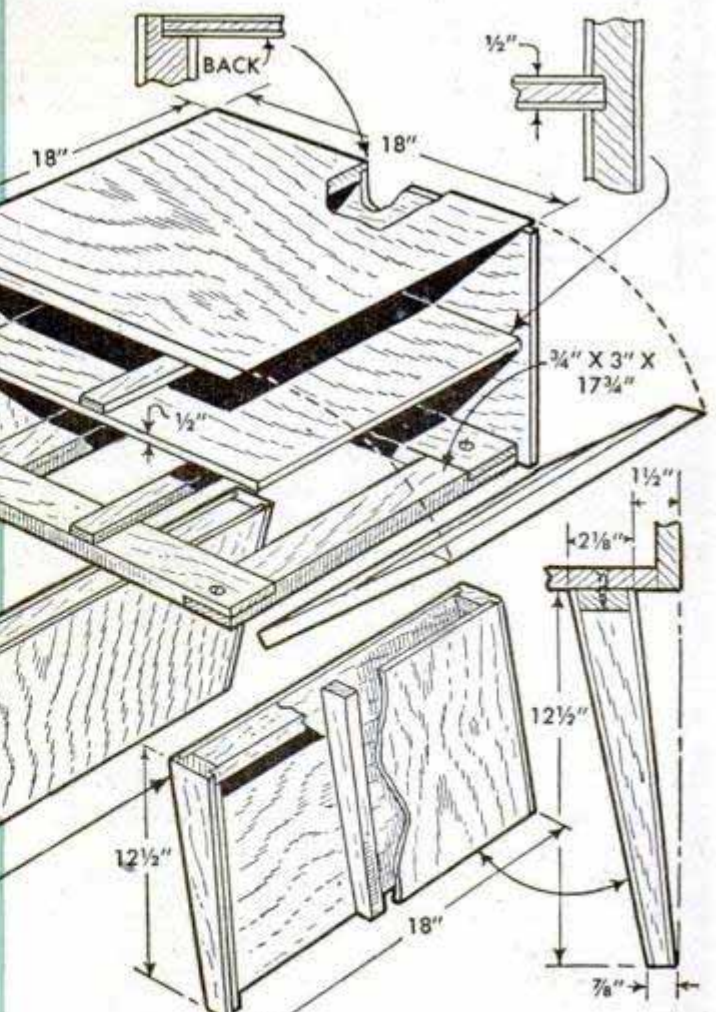
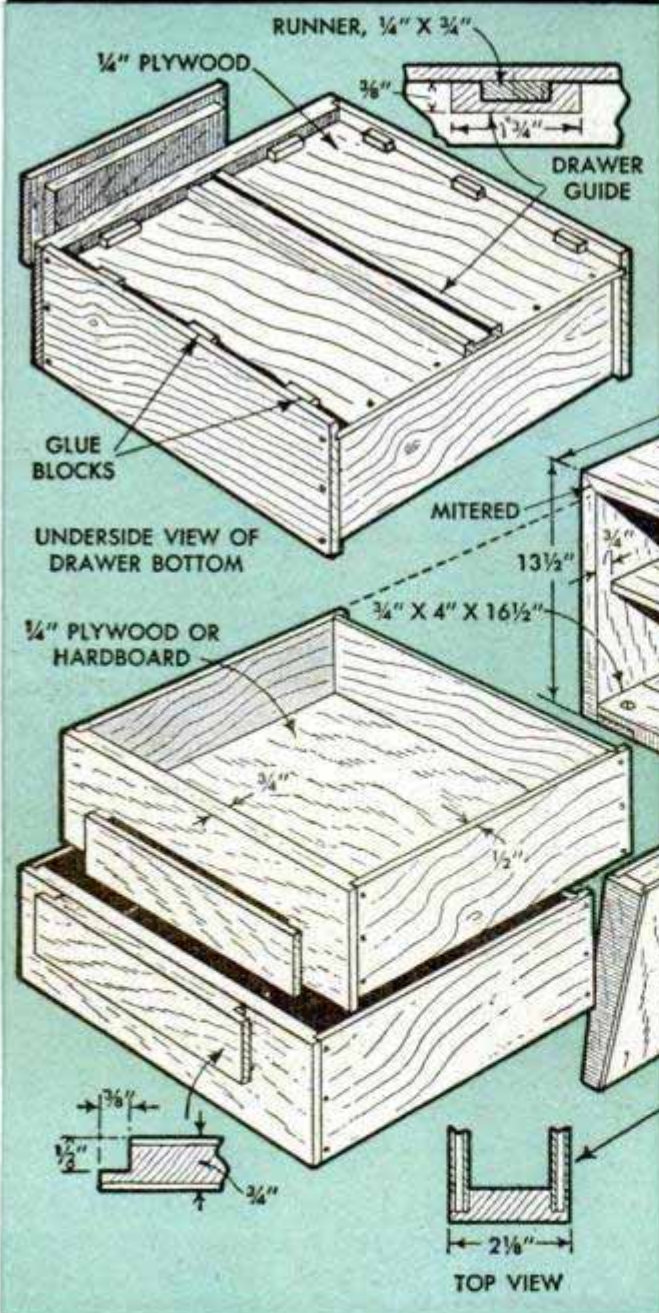
Planter cocktail table: If you are interested in duplicating any of the original samples, Fig. 1 details the construction of the smart-looking planter cocktail table. Either lumber-core ($1\frac{3}{16}$ -in.) or seven-ply ($\frac{3}{4}$ -in.) plywood may be used. The "plank" top is formed by gluing an apron around the edge of the top board, mitering the corners and grooving the ends for $\frac{1}{4}$ -in. plywood splines. A fast way to cut the openings in the top for the copper planters is to set the saw fence in position and then lower the work carefully down over the rotating saw blade. The fact that the cuts will run past the corners of the openings on the underside is unimportant as the planters will hide the cuts.

Plywood, $\frac{1}{4}$ and $\frac{3}{4}$ in. thick, is combined to make the legs for the table. These are made hollow, fitted with bottoms and then attached to the table top with screws and

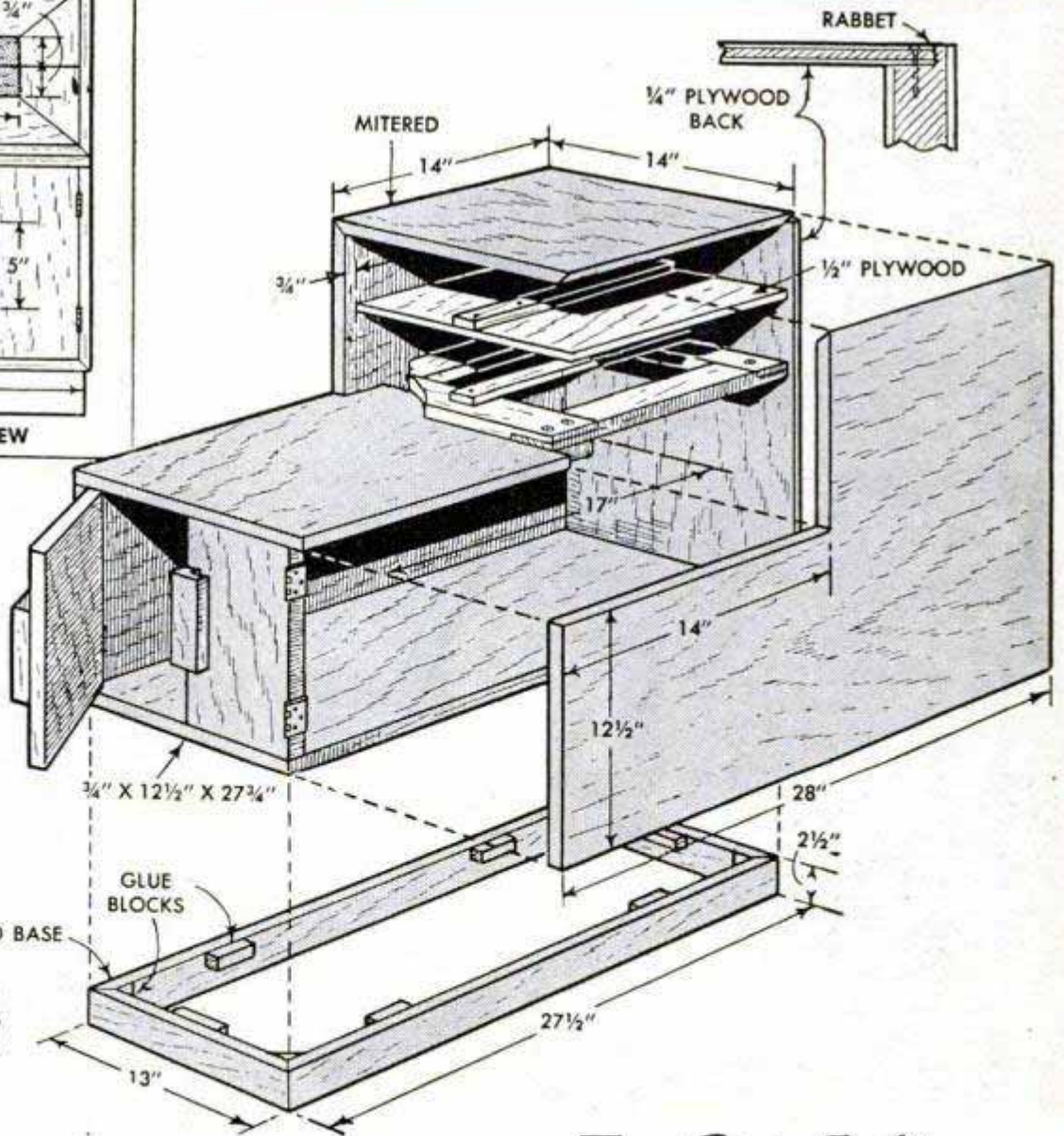
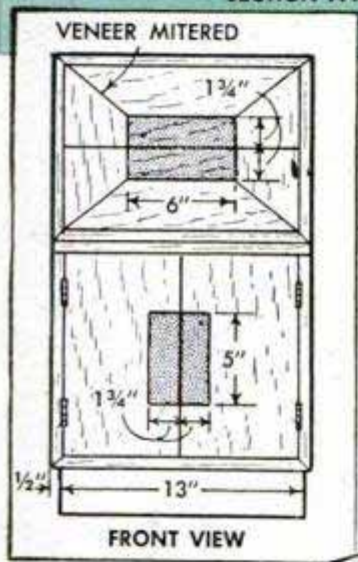
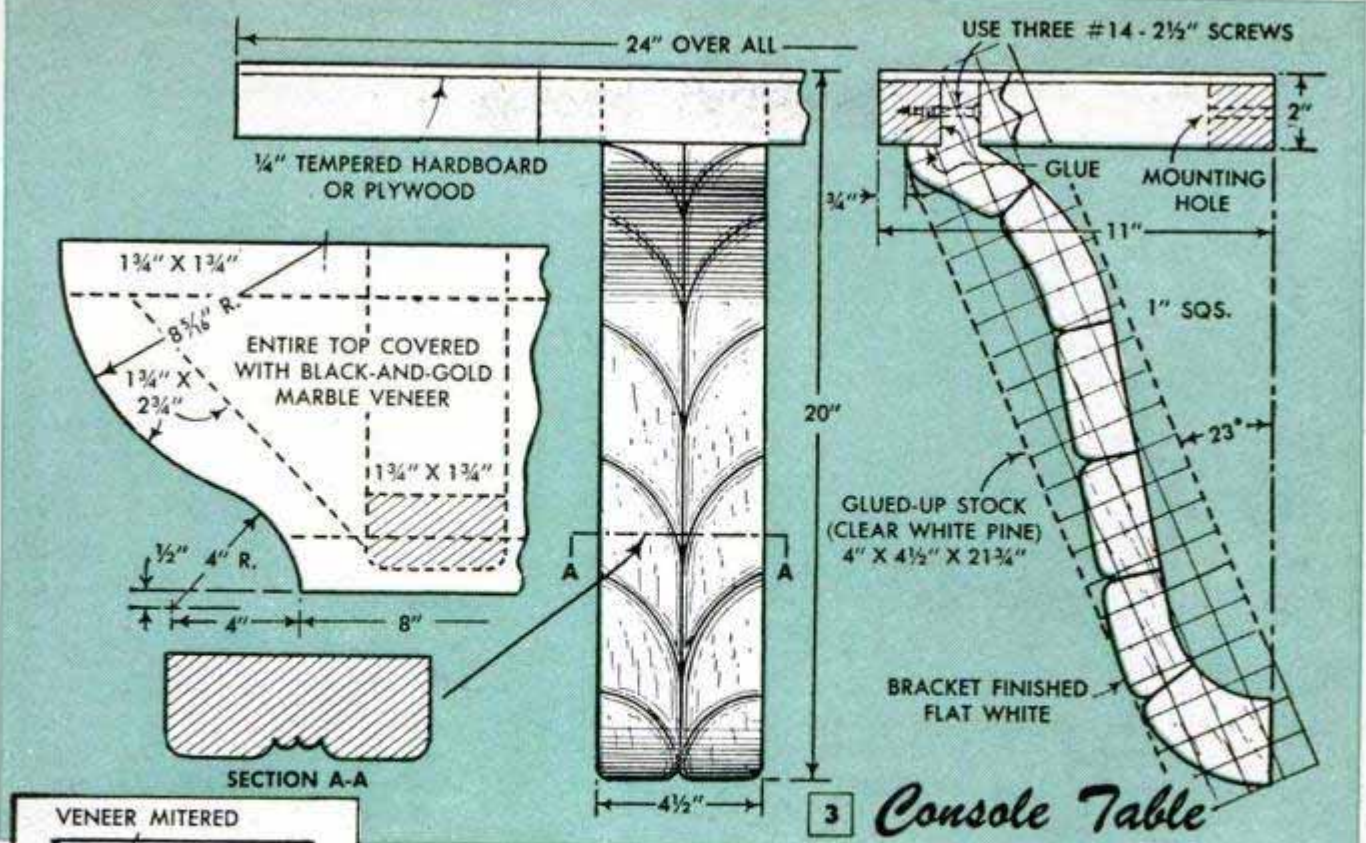


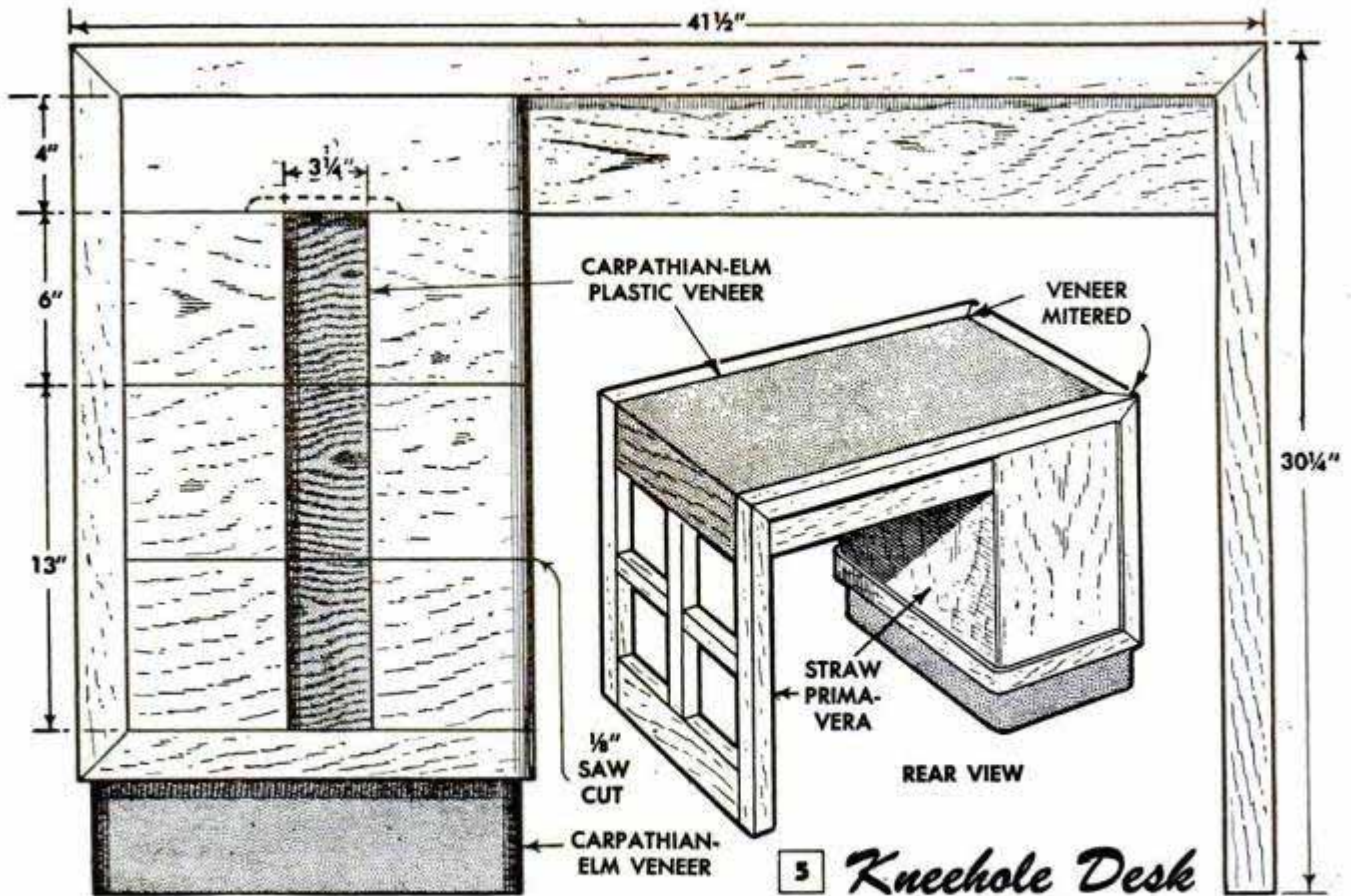
glue blocks. If one opening is to serve as a magazine compartment, one of the copper planters should be made without a bottom. In covering the top of the table with plastic veneer, the veneer is brought down over the edges to create the illusion of a 3-in.-thick slab, as shown in the color photo. In the case of the legs, the grain of the veneer is applied vertically, covering each face with a separate piece of veneer.

Two-drawer commode: Construction of this piece is apparent from the drawings in Fig. 2. Half-lapped members form the bottom frame of the drawer compartment, and the sides and top are built around it. Note that just the upper corners are actually mitered and that only the veneer is mitered at the lower corners. If you find it particularly difficult to saw the upper corners on a miter, butt joints can be used here also. The legs, which are built up similarly to those of the cocktail table, are glued and screwed to the half-lapped frame before adding the upper assembly. The drawer fronts are lipped (the bottom of one and the top of the other) so that they lap the center plywood frame. In applying the veneer, cover the laminated edges of the plywood separately. Note that the edging strips are mitered at the corners. Run the veneer vertically on the legs and in the same direction



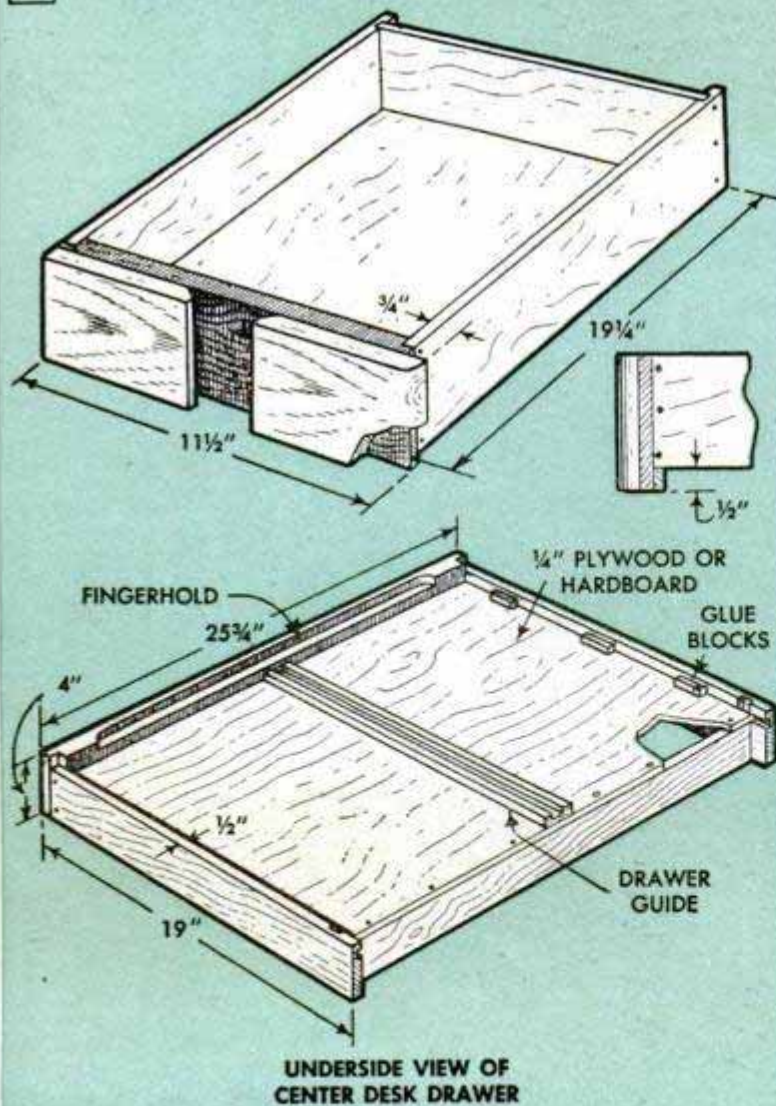
2 Two-Drawer Commode





3 *Kneehole Desk*

6 **TYPICAL DRAWER CONSTRUCTION**

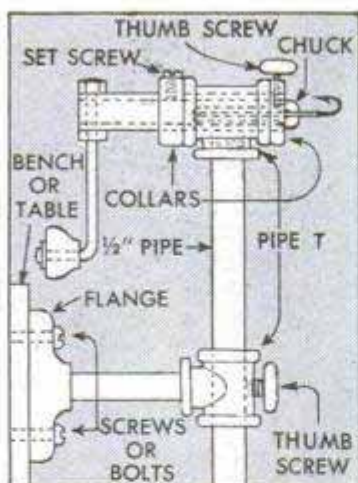


on the sides and top of the cabinet. The veneer on the drawer fronts is mitered according to the front-view detail, and a contrasting veneer is used on the handles.

Console table: Only the top of this smart wall table is covered with veneer (black-and-gold marble), the rest being painted flat white. Fig. 3 shows how the top is built up of 1 3/4-in. stock and then covered with hardboard or plywood. Pieces of ponderosa pine are glued up to form the block for the carved bracket. This is band-sawed, following a pattern made from the squared drawing. The spray design on the bracket is carved 1/4 in. deep with a veining tool or V-chisel and the edges of the cuts are rounded both on the face and edges of the work. Obviously, gloss lacquer or varnish should be applied in finishing marble veneer, rather than satin or flat coats to obtain the luster of the real thing.

Step table: Construction of this piece needs little explanation, the pull-apart drawing in Fig. 4 showing clearly how it goes together. In referring to the color photo of the original table, you'll notice that the top surfaces have a border of veneer around a contrasting center veneer, although this is optional. The drawer fronts are

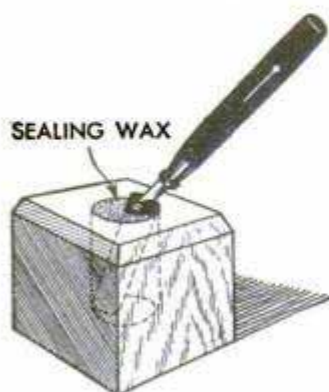
Fly-Tying Vise From Pipe Fittings Mounted on Workbench



Assembled from pipe fittings and mounted on a table or workbench, this fly-tying vise holds the hook at a convenient position for tying and allows the hook to be rotated or held stationary as desired. The vertical member of the vise is adjusted for height with a thumb screw turned in a tapped hole in the side of a pipe "T." The short length of pipe which forms the chuck spindle is held in the top pipe "T" by two collars cut from pipe or made from pipe couplings. The spindle is turned with a handle bent from a length of rod. The end of the rod is threaded and passed through a hole drilled in the pipe, the rod being held in place with a nut tightened against both sides of the pipe. The collar at the chuck end of the spindle is drilled and tapped for a thumb screw which passes through both collar and spindle to close the jaws of the chuck. The latter is a piece of steel bar which is slotted lengthwise to receive the fishhook and slipped inside the spindle.

Harlan Houk, Lamoni, Iowa.

Fountain Pen Set in Wooden Base Is Converted to Desk Model



An extra fountain pen is easily converted for use as a desk pen by mounting the cap permanently in a wooden base. The pen is held simply by setting it in the cap which seals the point sufficiently to keep the ink from evaporating. First, a 1¼-in. hole is drilled in a 2½-in. cube of softwood, making the hole deep enough so that the open end of the

cap will project slightly when it is placed in the hole at an angle as shown. After inserting the cap in the hole, fill the hole with plaster of paris or sealing wax. If desired to conceal the wax, cover the top of the block with opaque plastic. This is drilled for the pen cap and cemented to the block. Finish the sides of the block in the natural color of the wood or paint it to suit. The edges of the plastic may be beveled and the corners of the block chamfered.

W. H. McClay, Pasadena, Calif.

Slitting Pencil-Eraser Edge Increases Efficiency

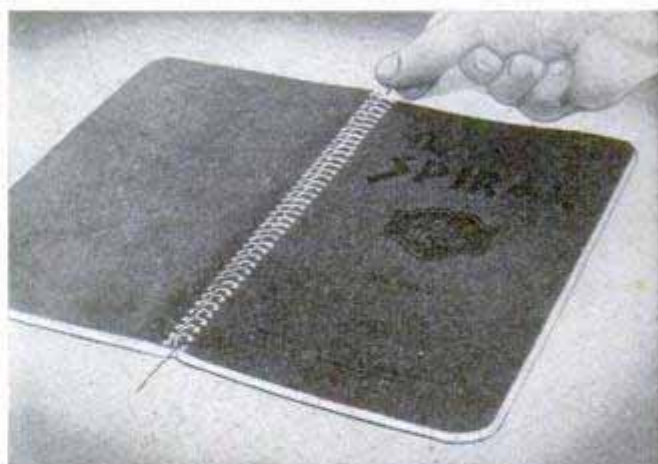
Erasers will remove pencil marks and smudges faster without increasing rubbing pressure if a series of slits has been cut in the edge being used. On soft erasers, cut the slits about ⅜ in. deep and space them about ⅜ in. apart. On harder ones, cut the slits closer together.



Edward A. Lasko, Glendale, Calif.

Two Notebooks Fastened Together With Length of Stiff Wire

Two spiral-bound notebooks which contain related information can be bound together for future reference with a length of fine, stiff wire. Place the notebooks



back to back so that the spirals interlock and then slip the wire through both spirals. Simply bend over the projecting ends of the wire to hold it in place.

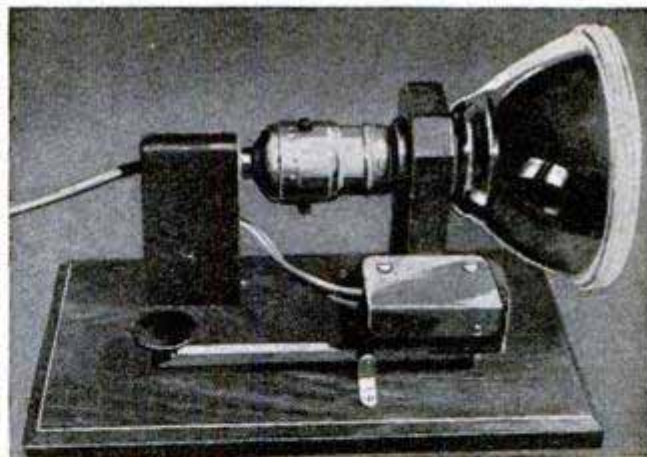
John J. Rea, Urbana, Ill.

Galoshes and rubber floor mats will last longer and look better if they are coated with liquid floor wax.

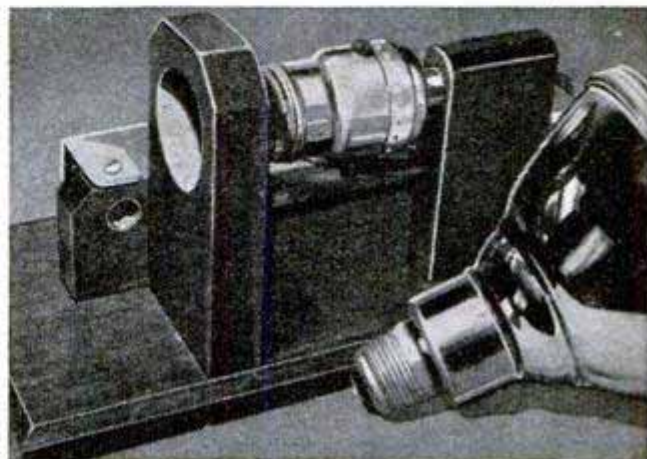
SIMPLE BLINKER LIGHT

By John M. Avery

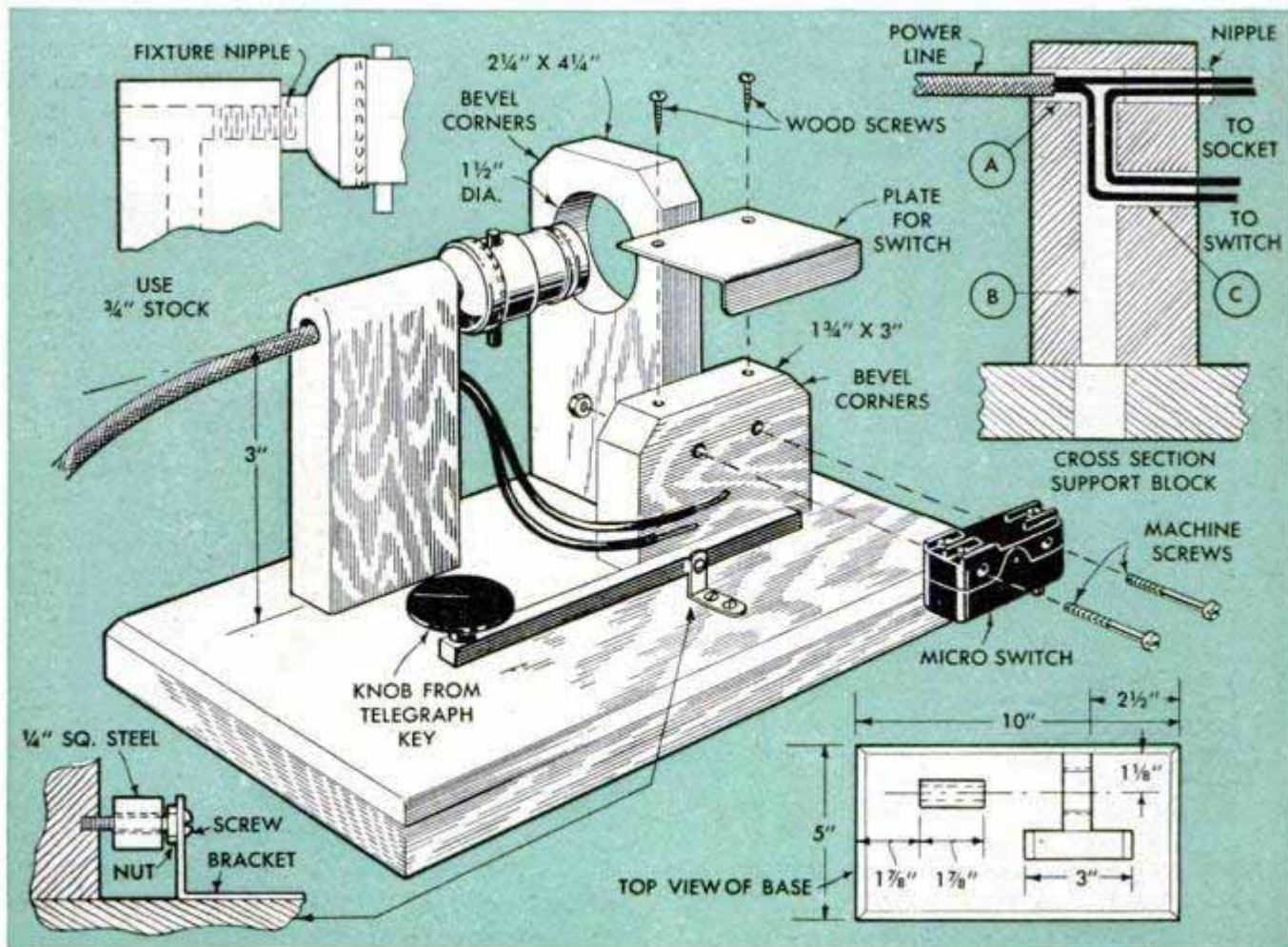
YOUNGSTERS engaged in back-yard war games will enjoy using this safe blinker light to work out a winning strategy. A floodlight bulb of the reflector type used in lighting show windows serves as a light source. A normally open microswitch is actuated by an improvised telegraph key to control the light, making it easy to transmit messages in blinker code. Details below show how to mount the light socket and connect the wiring from the power source to the socket and switch. Note that the switch is shielded so there is no possibility of a finger coming in contact with the open terminals on the switch. The wooden block that supports the socket is drilled at A, and hole B is drilled through the bottom, meeting hole A. Finally, hole C is drilled through into hole B. This makes it possible to fish the wiring through the block to the socket and switch. For easy operation the distance from the key knob to the pivot should be about twice that from pivot to switch button.



This safe blinker light utilizes a floodlight bulb of the reflector type used in show-window lighting



The socket and bulb are supported at a uniform height in separate wooden blocks attached to base





HALF OF A RUBBER BALL serves as handy patching-plaster container which is cleaned simply by bending rubber to free sections of dried plaster. This is especially useful when several evenings are needed to finish a wall

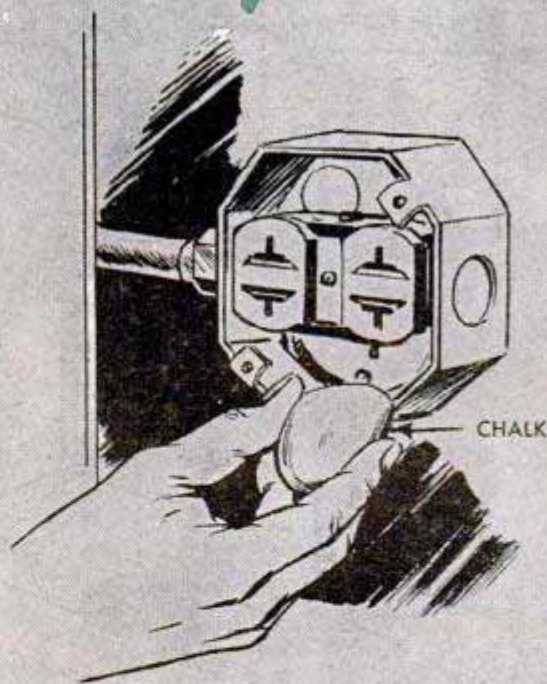


OLD TRUNK OR FOOT LOCKER makes an inexpensive toy chest that will hold many of the youngster's playthings. Cover inside of trunk with wallpaper in a nursery design and paint the outside with bold, colorful stripes

NOVEL PHOTO FRAMES can be improvised from clear-glass dinner plates and hung from the wall with plate hooks. The photograph is carefully cut to fit the bottom of the plate and fastened face down on the inside of the plate with cellulose tape

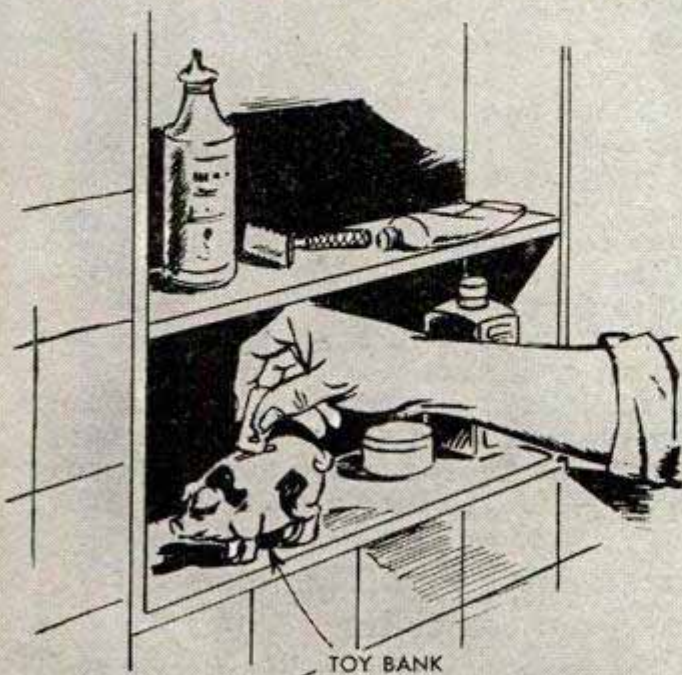


Solving HOME



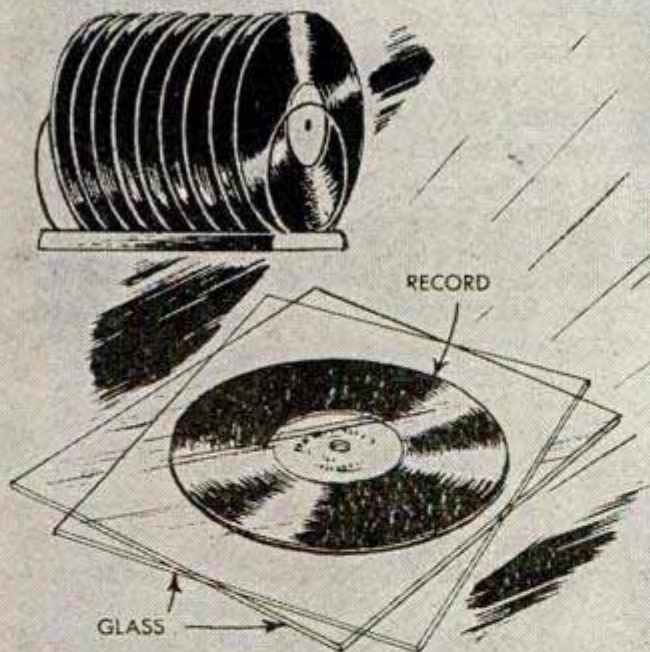
WHEN PANELING A WALL, openings for outlet boxes are laid out quickly with the aid of a piece of chalk. Just rub the chalk on the edges of the box, set panel in position and press it against the box. This leaves an outline of the box on the panel

A **TOY BANK** set on a medicine-cabinet shelf provides a safe and handy receptacle for used razor blades, which are simply dropped in the coin slot. Some banks lend themselves to mounting on the inside of cabinet door where they are out of the way



TOY BANK

PROBLEMS



WARPED PHONOGRAPH RECORD is straightened without endangering the tone quality by sandwiching it between two sheets of glass and setting in the sun. Heat from the sun will soften the record and the weight of the glass will flatten it

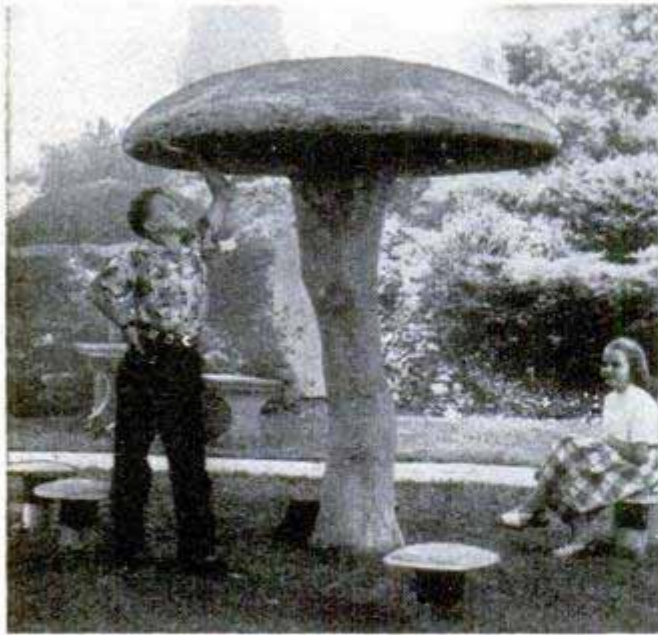


BATHROOM CLOTHESLINE suspended over the bathtub is out of the way and easy to remove when tub is to be used. Just string line from screw hooks turned into two wooden strips which are held to the walls with suction cups



NEWLY DUG GARDEN VEGETABLES, such as carrots, beets and potatoes, are washed quickly and thoroughly by placing them in a wire egg-gathering basket and spraying with hose. Basket holds generous quantity of vegetables

"Toadstool" Yard Umbrella Supported by Tree Trunk



A novel lawn ornament which affords a welcome spot of shade can be achieved by disguising the trunk of a dead tree to look like a giant toadstool. The trunk is cut off straight across at a height of about 5 or 6 feet from the ground and stripped of its bark. Then a bandsawed wooden framework for the toadstool-shaped umbrella is nailed to the top of the trunk and covered with wire mesh. Both the trunk and the wire-mesh top are coated with a mortar-like cement mixture to give a stucco effect.

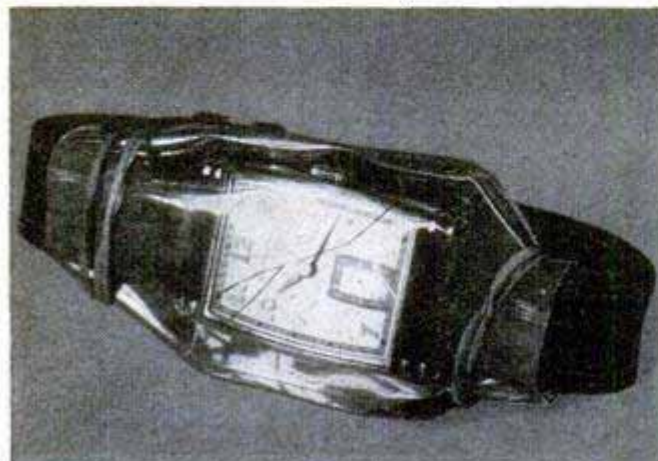
Grover Brinkman, Okawville, Ill.

Wooden Toy Wheels Made Quickly

Wooden wheels for toy cars and trains can be made in a jiffy by cutting them out of plywood with a hole saw. Select a twist drill of the same diameter as the axle to be used on the toy. Then insert the drill through the hole saw and chuck it in the drill press. In this way, the disk is cut out and the hub drilled simultaneously.

William Bernard, Cincinnati, Ohio.

Wrist Watch Works Kept Clean After Breaking Crystal



Wire Wrapped Around Ink Dropper Reduces Formation of Bubbles

Using the dropper from a bottle of drawing ink to fill a ruling pen or compass often results in transferring ink bubbles from the dropper to the pen where they burst and sometimes splatter the drawing with ink. These bubbles can be eliminated entirely or at least reduced in size by wrapping the end of the dropper with a short length of No. 23 bare copper wire. Insert about $\frac{1}{8}$ in. of the wire into the tip of the dropper and wind the rest of the wire around the tapered end of the dropper as shown.—Herb L. Brown, Columbus, Ohio.



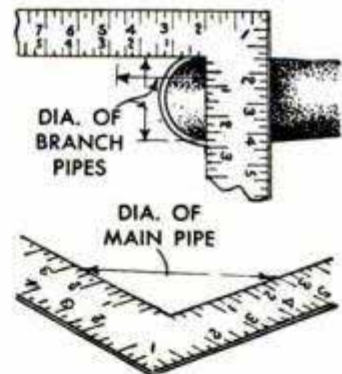
Insert about $\frac{1}{8}$ in. of the wire into the tip of the dropper and wind the rest of the wire around the tapered end of the dropper as shown.—Herb L. Brown, Columbus, Ohio.

Determining Pipe Diameter For Main Water Line

The size of pipe required for a main water line which is to handle the flow from two branch lines is easily determined by means of a steel framing square. As indicated in the upper

detail, measure the inside diameters of both branch pipes and then mark the diameter of one pipe on one arm of the square and the diameter of the other pipe on the other arm, using the graduations on the inner edge. Then, carefully measure

between the two marks, as in the lower detail, to determine the inside diameter of the pipe which is needed for the main line.



Whenever the crystal of a wrist watch is broken there is danger of dust entering the case and damaging the delicate mechanism before the crystal can be replaced. To be sure that the works will stay clean until you can get the watch repaired, wrap the watch with cellophane removed from a package of cigarettes. Sealing the ends of the wrapper with rubber bands as shown allows you to continue wearing the watch.

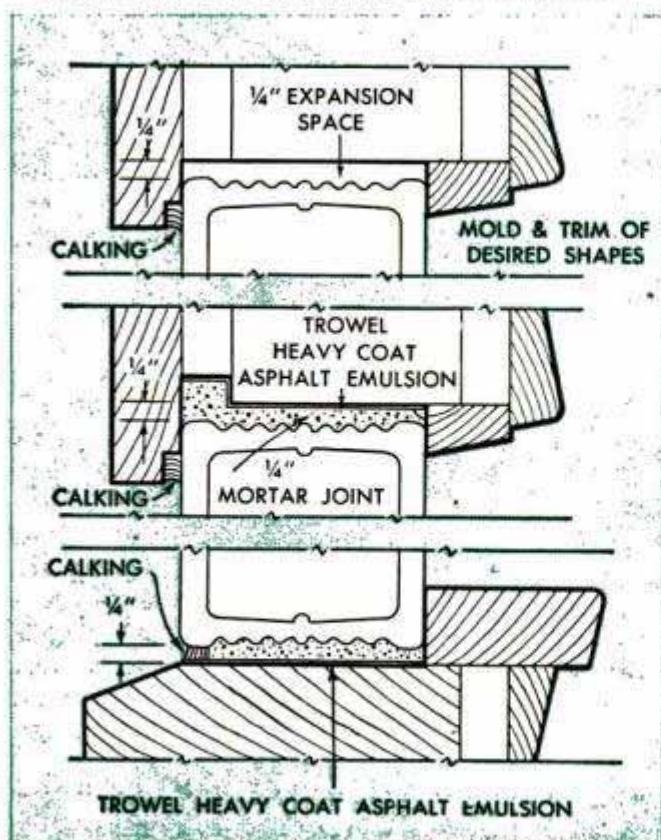
Ed Packer, Chicago.

☐ Rinsing in an alum-and-water solution restores stiffness to hairbrush bristles.

Easier Way To Install GLASS-BLOCK "WINDOWS"

HOMEOWNERS planning to install small decorative glass-block panels in an exterior wall will be happy to know that the manufacturers of structural glass block have developed a simplified method of installation which eliminates the need of expansion strips and wall ties. Instead, an asphalt emulsion is used, and an expansion space is allowed above the top row of blocks as in the upper detail. The opening must be framed in the same way as for a double-hung window, with adequate lintel support at the head, and it should be not more than 5 ft. wide or 7 ft. high, including a maximum of 25 sq. ft. The first step is to brush a heavy coat of asphalt emulsion onto the wooden frame, applying it in a strip about 3½ in. wide across the sill, lower detail, and up the jambs, center detail. The blocks are laid up in ¼-in.-thick mortar joints consisting of portland cement, 1 part, hydrated lime (high-calcium type), 1 part, and graded plastering sand, 4 to 6 parts. Trowel the joints neatly and, when finished, scrub the panel to remove all excess mortar. Scrape out any loose mortar from the expansion space at the head and finally run a line of calking completely around the opening.

CROSS SECTION OF GLASS-BLOCK WINDOW



Apply a heavy coating of asphalt emulsion to the sills and jambs. The coating should be at least 3½ in. wide



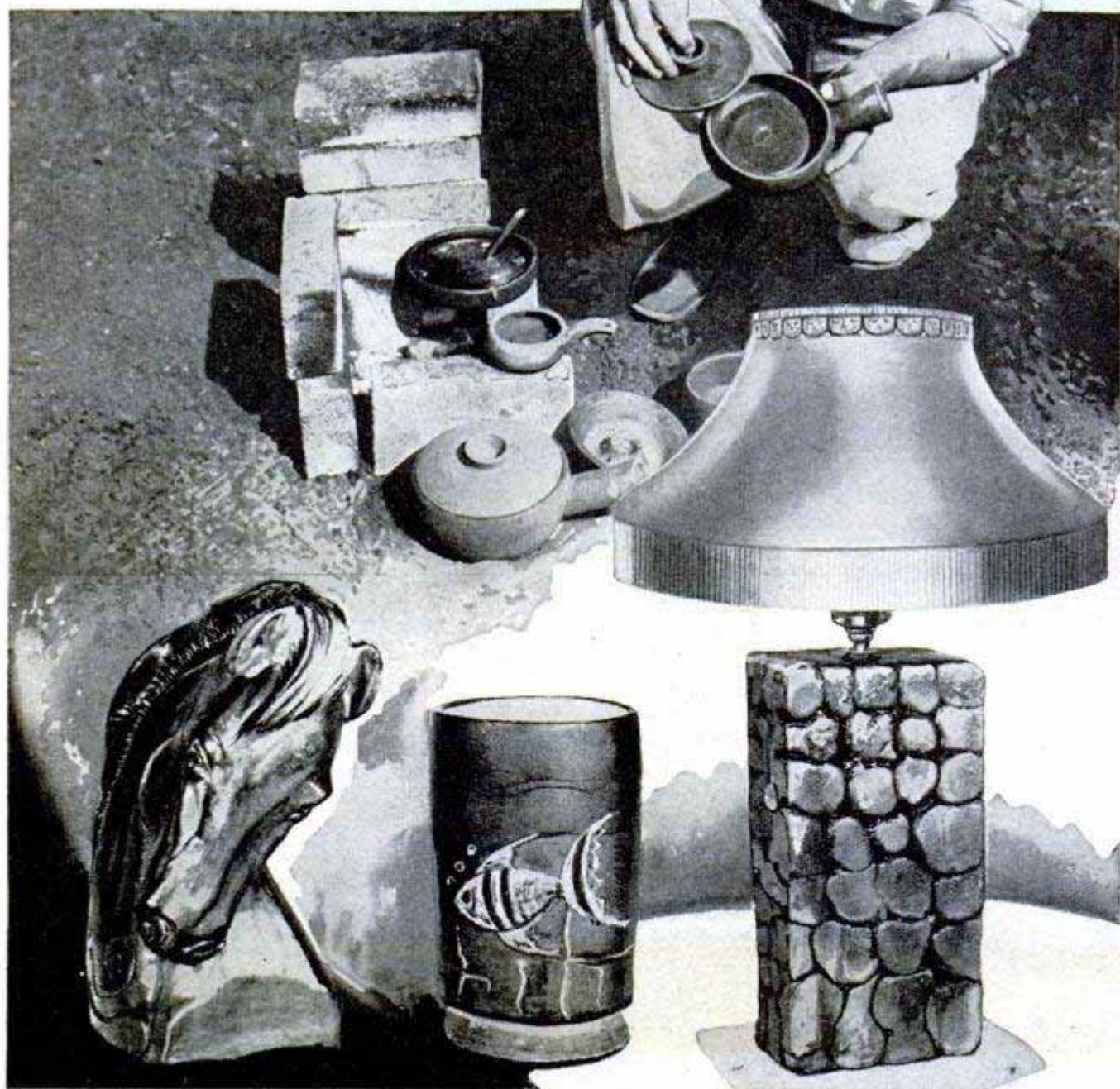
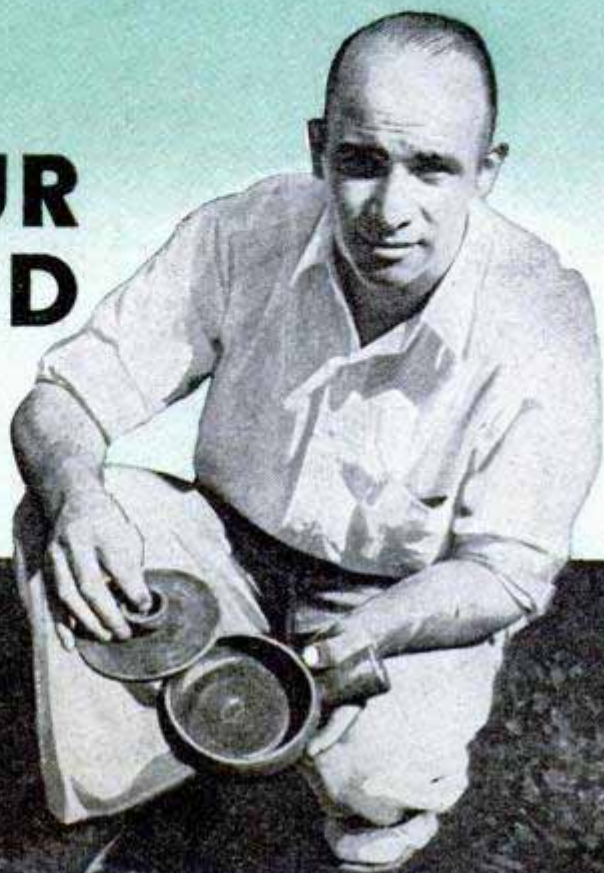
Above, lay the blocks in mortar joints troweled to a uniform thickness of ¼ in. Below, run a line of calking compound all around the completed panel



Pottery

FROM YOUR BACK YARD

By Betty Thompson



DID YOU KNOW that you can make fine clay pottery at practically no cost for materials or equipment? The clay usually can be had for the digging, right in your own back yard, and a quart or two of fresh milk will produce that soft, velvety glaze you've admired on fine pottery. There's no need to worry about intricate glazing processes or critical firing temperatures in ovens or kilns. The sun will take care of the drying process and firing is done in a charcoal fire built in an outdoor kiln made from a few loose bricks. Suitable clays are almost universally available. In its natural state, common clay will be found in a variety of colors ranging through shades of tan, green, blue and even black. However, as a rule, all ordinary clays turn a reddish brown when fired because of the presence of iron.

Art objects in clay, such as lamp bases, figurines, ash trays and vases are formed in various ways. Some can be thrown on a potter's wheel, while others, like the horse's head illustrated, must be modeled free-hand. The straight-sided vase, pictured on the opposite page, was made by simply pressing clay inside a cardboard carton. The base was added later. The rectangular lamp base was formed in a similar fashion, except that the clay was first worked into balls of a fairly uniform size and then pressed against the sides and ends of a cardboard shoe box.

Now, to carry out the simple process from the beginning, first locate the clay and test it by moistening a small amount with water, working until pliable. Then rub be-

tween the palms until it forms a long roll about $\frac{1}{2}$ in. in diameter. Coil the clay around the index finger. If the clay will roll easily around your finger without breaking, it is suitable for pottery making. Next, dig a pailful, or so, and place in a container, leveling off the top of the clay. Pour in an equal quantity of water, by measure, and allow to stand overnight. Then pour off the water slowly and skim off the soupy mass which has formed. Strain this through a fine-mesh screen to remove any foreign matter and allow to dry until it is once more cohesive. Now the clay is put through the kneading process known to potters as wedging. The purpose of this is to remove all the air bubbles and reduce the clay to a tight, compact mass that is neither so wet that it sticks to the fingers, nor so dry that it tends to crack while being kneaded or wedged. To get a good modeling clay of the proper working consistency, it is necessary to do a thorough job of wedging. After a period of wedging, slice the clay into thin strips with a fine wire held taut, then press the strips together again and repeat. In each wedging stroke, use the palms of both hands side by side, and apply sufficient pressure to flatten the mass of clay. After flattening in this manner, some potters pound the clay mass alternately with the palms. In reforming the clay mass after each stroke, care should be taken not to fold it so as to entrap air. After a thorough wedging, the clay is ready for immediate use.

To further illustrate the process, a simple "one egg" skillet has been selected.



First step in making a pottery skillet is to mold the clay in a small pie tin as shown above

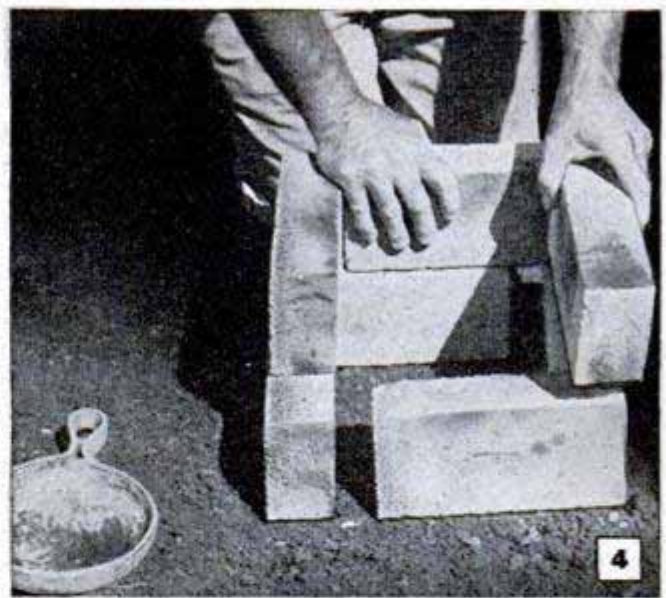


Roll the clay to a uniform thickness and then cut and bend a strip to form the skillet handle



Skilled potters would either pat the clay mass into the shape required, or throw it on a wheel, but a simpler method is to mold the clay in a small pie tin into which a soft paper napkin has been pressed, Fig. 1. Build up the thickness in the tin to about $\frac{1}{2}$ in. and then smooth with the fingers and the back of a large spoon until the surface comes to the shape and degree of smoothness desired. Dry in the sun until the clay is sufficiently stiff to hold its shape. Then carefully tip it out onto a board, upside down. Smooth the bottom and flared edge with the back of a spoon. If the surface is too dry to smooth easily, just wet the spoon slightly to soften the surface of the clay.

Now, to make a handle, roll a small quantity of the clay to a uniform thickness. This can be done by placing the clay between two wooden strips of uniform thickness and rolling with a short length of 1-in. dowel, the ends of the dowel bearing on the



strips. Then cut a strip from the clay 2 in. wide and fold it to form the handle as in Fig. 2. Joining the handle to the body of any piece of pottery calls for special care. The body still should be moist on the surface but, as potters describe it, "leather hard." The handle should be of a somewhat softer consistency as it will dry more quickly. Place the handle on the body of the skillet in the required position, press it firmly in place and smooth the joint with the tips of the fingers until you form a uniform fillet at the joint, Fig. 3. Again set the work in the sun to dry.

Now, build a simple furnace, or kiln, for firing, using several bricks placed loosely on edge as in Fig. 4. Or, if you have one, an outdoor fireplace is just the thing. Use wood and charcoal for fuel. Before placing the work in the kiln, however, make sure that it is thoroughly dry, as otherwise it may crack during the warming-up pe-



The work to be fired should be placed inside the improvised kiln, partly in the red-hot coals



Fill the skillet with fresh milk and simmer for eight hours to form a glaze on all the surfaces

riod. In any case, place the work in the improvised kiln before kindling the charcoal so that it will warm gradually to the maximum temperature. The time of firing averages about six hours, and it is necessary to keep the coals red hot during this period of time. The work should be directly in or on the bed of coals, Fig. 5, not above it. At the end of six hours of maximum heat, the work is removed and allowed to cool.

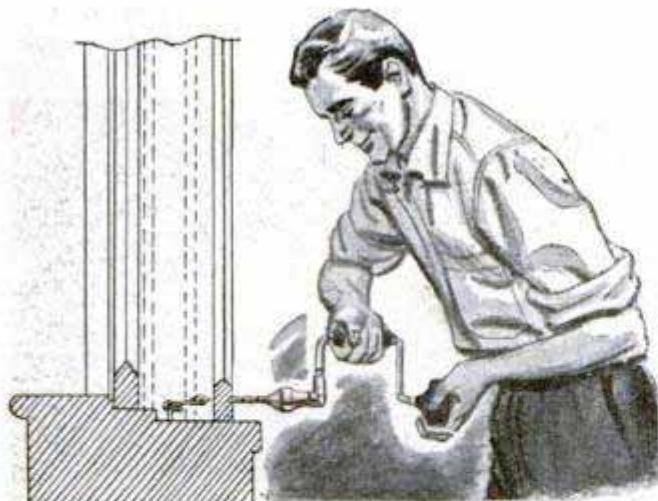
Now comes the glazing process and that's simplicity itself. Just fill the skillet brimful of fresh milk and let it simmer on the kitchen stove, or on the fireplace, for about eight hours. Then immerse the work in boiling milk for about 30 minutes, and there you are, ready for frying an egg as in Fig. 7. For art pottery, a novel color variation can be produced by using sweetened condensed milk instead of fresh milk. Coat the surface of the fired object with condensed milk and bake for an hour in an oven at 550-deg. temperature. This process results in an unusual bronze-black finish, very similar to the most costly art glazing. Not only art pieces can be finished in this latter type of glaze, but nearly all ornamental pieces are good subjects. The fresh-milk glaze does not color the clay, nor does it change the reflective properties of the surface appreciably.



If you purchase clay from dealers in art supplies be sure to get genuine clay, and not the product manufactured especially for low firing temperatures. Three to five pounds of clay should be ample for experiments. Keep the clay wrapped in a damp cloth until ready for use. If it hardens when unused over long periods, moisten with warm water and don't neglect to do a thorough job of wedging before using. This is the most important step to success in this process of pottery making.

Storm Sash Opened From Outside to Free Sticking Window

Regardless of how fast a lower window sash seems to be stuck it usually can be freed quickly by driving a small wooden wedge between the bottom sash rail and



the window sill from the outside of the house. However, as this cannot be done until the storm sash is removed, a hinged storm sash fastened with hooks and eyes from the inside complicates the problem. To remove this type of storm sash from the outside with a minimum of damage, use a $\frac{1}{8}$ -in. bit to drill straight into the end of the screw hook. The bit will glance off the tip of the hook and bore through the wood to one side of it. Repeat this procedure all the way around the hook (or hooks) until it is cut from the sash. Then screw a sash lift to the lower rail of the storm sash to permit pulling it outward in order to gain access to the window sash. The screw hook, of course, is installed in a new location on the sash rail, and the hole formed by removing the hook is either drilled out and plugged or filled with wood putty.

Solution of DDT and Fuel Oil Keeps Termites Away From Wooden Posts

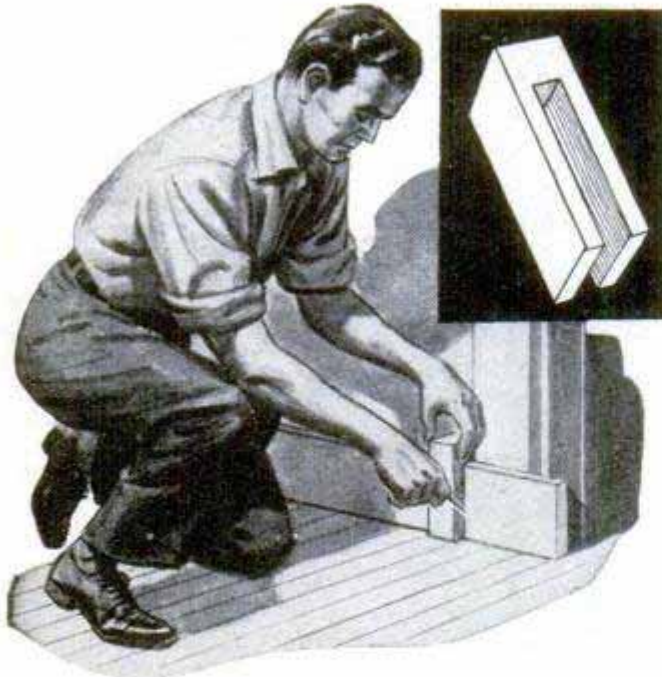
Applied to the soil surrounding posts, pillars and foundations, a fuel-oil solution containing 5 percent DDT discourages infestation of termites for at least five years. About 1 qt. of the solution should be added to each cubic foot of soil. This solution can also be used to control termites after they

are in the structure; however, it is more effective when applied to new construction.

J. F. Carter, Pearlinton, Miss.

☞ To remove hot pies from an oven, use a small coal shovel, the turned-up edges of which have been hammered flat.

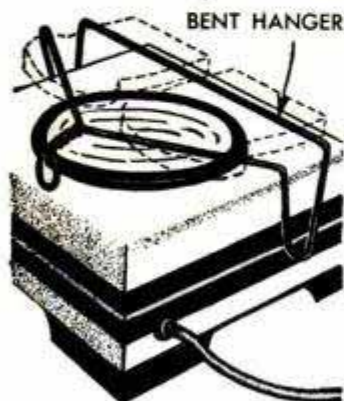
Scribing Guide for Wood Trim Assures Close-Fitting Joints



Baseboard, window trim and other woodwork where the over-all appearance of the job depends upon accurate joinery, are fitted easily by using this scribing guide to mark the work for cutting. The guide shown was made by cutting a 1 x 5-in. notch in a 2 x 2 x 6-in. wooden block, thus producing a U-shaped jig which fits over the edge of most standard stock. Instead of being built up of three pieces, the jig is cut from a solid block to insure that the faces of both arms are in perfect alignment. This is essential to the accuracy of the guide. The illustration pictures the guide being used to mark a length of baseboard for cutting the joint at a door casing. The baseboard is set in place temporarily and the guide is slipped over the top edge. Then, with the guide held firmly against the edge of the door casing, the saw cut is scribed on the outer face of the baseboard.

Roland H. Moore, Akron, Ohio.

Toaster Improved From Hot Plate



to rest on the top. Then lay the pieces of bread on the wire rack and turn them over after they have browned on one side. Be

sure, however, to burn the paint from the coat hanger before using it. This method also can be used to hold the toast over the coil of an electric range.

Ray M. VanHook, Chicago.

Rubber Tip on Screwdriver Handle Increases Gripping Surface

If it is difficult to get sufficient grip on a screwdriver handle when driving large screws into hardwood, try fitting the handle with a rubber tip of the type used



on the ends of metal chair legs, canes and crutches. The tip increases the size of the handle and thereby affords additional gripping surface. If the tip does not fit the handle tightly enough to prevent slipping, it can be cemented in place.

R. K. Beal, Independence, Kans.

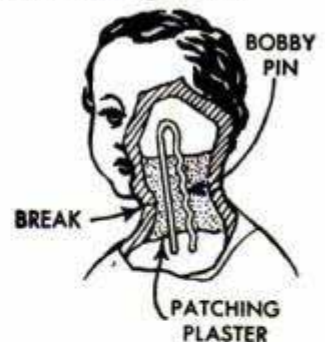
Adding Life to Electric Clock

Sometimes an electric household clock stops running because the gears are worn and do not mesh properly. If this is the case, the clock can be restored for many more years of service simply by turning the works upside down and replacing them in the case in this inverted position.

George C. Updegraff, Arlington, Va.

Broken Figurine Repaired Quickly By Reinforcing With Bobby Pin

When the head has been broken from a ceramic figurine, a lasting repair can be made quickly with a bobby pin and some plaster. After mixing a small quantity of patching plaster to the consistency of heavy syrup, pour a little of the mixture into the neck of the figurine.



Then spread the arms of the bobby pin slightly and insert them into the plaster, allowing about $\frac{1}{4}$ in. of the pin to project above the neckline. Next, place some plaster in the head of the figurine and press the two parts together, positioning them carefully so that the broken edges match. Finally, wipe off any excess plaster squeezed out of the joint and set the figurine aside to dry. If the line of the joint is still apparent, touch it up with paint.

Charles F. Patrick, Philadelphia, Pa.

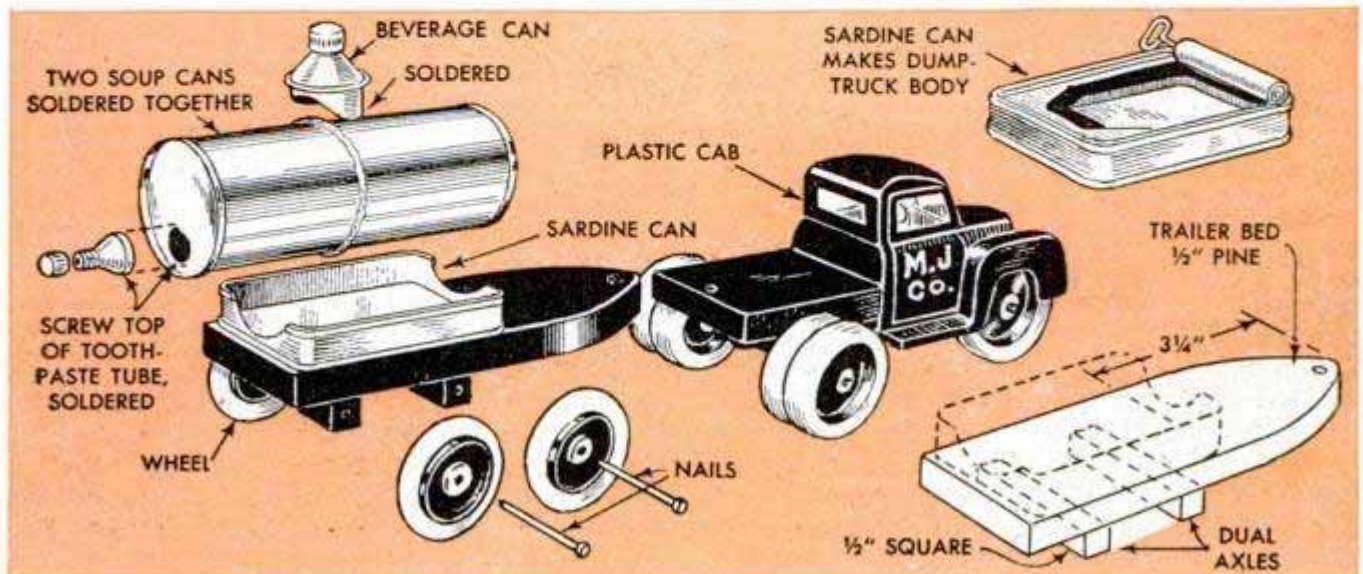
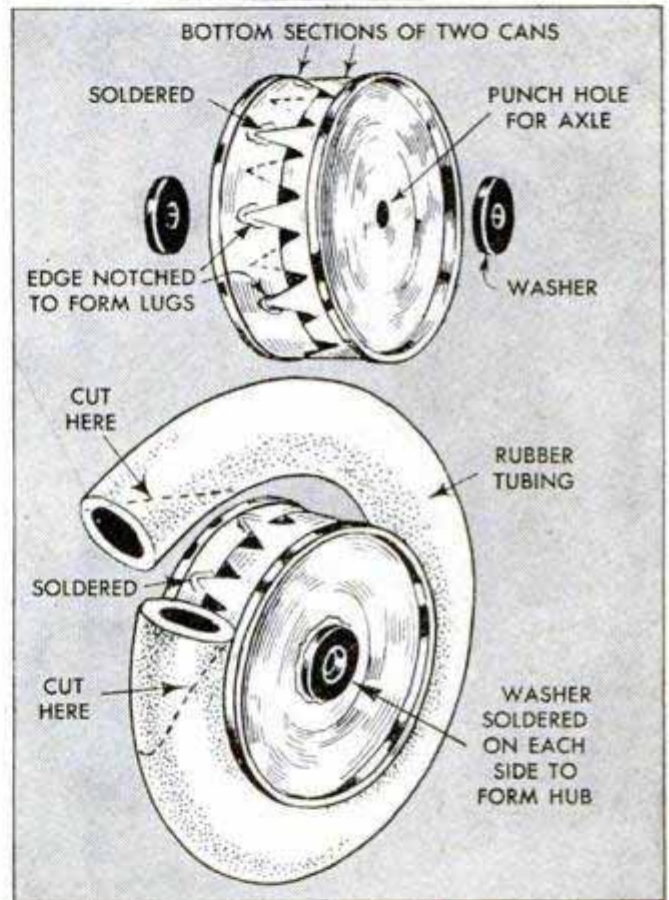
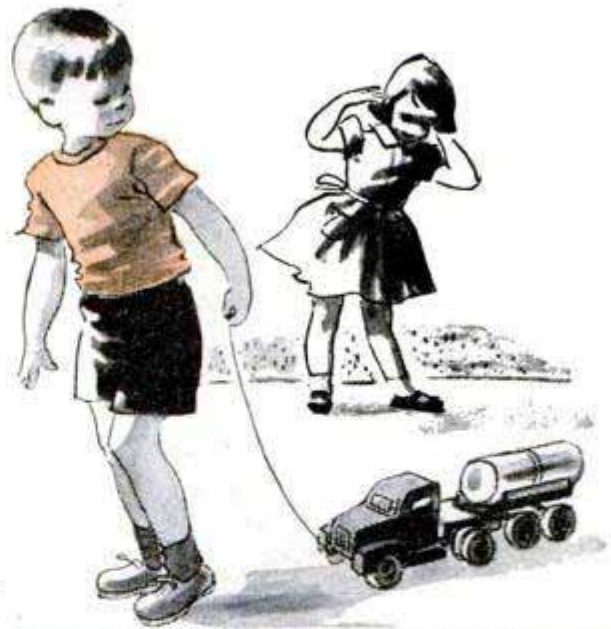
TOY WHEELS from tin cans

By Al Stephenson

BUILDING or repairing pull toys for the children can be simplified greatly by using these easily constructed tin-can wheels. They may be made in practically any size, complete with rims and tires. From two cans of the desired diameter, cut off the lower sections approximately $\frac{1}{2}$ in. from the bottoms. The exact size will depend on the desired width of the rim. Next, accurately locate and punch the axle holes. Then serrate (cut a series of notches) the edge of one section and join the two sections as shown in the center detail. Alternate the serrations inside and outside over the edge of the plain section and solder for added strength. Also solder a washer on each side of the wheel to form a hub.

A piece of rubber tubing of the desired diameter can be made into a serviceable tire. The ends are cut at an angle, as in the drawings, and joined with rubber cement. The tires also can be cemented to the rims with rubber cement. Painting the wheels and hubs with colorful enamels adds a gay touch to the completed toy.

The realistic milk trailer, shown below, was made with a block of wood, a sardine can, two soup cans, a toothpaste cap and the top section of a beverage can. The wheels were made up as described above, enameled and fastened to the trailer body with finishing nails for axles. Tin cans and their various parts were soldered together and mounted on the trailer. The entire toy was then painted in bright colors to harmonize with a ready-made toy tractor. Note that the sardine can also may be made into a realistic dump-truck body.



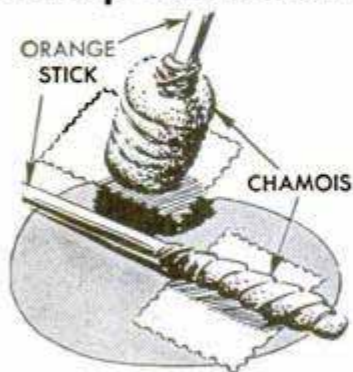
Toy Drum Made From Coffee Can Has Drafting-Paper Heads



By utilizing a 1-lb. coffee can for a shell and vellum drafting paper for the heads, it is easy to make a sturdy toy drum for the little soldier. The can is opened with the key in the usual way and the bottom is removed with a rotary-type can opener. Then two disks are cut from the drafting paper, their diameter being about an inch greater than that of the coffee can. To stretch each disk over the shell rim, dampen the paper with water, position the disk over the shell while still wet and slip a rubber band over the rim to hold the paper in place. Then pull the edge of the paper downward all around the shell to remove the wrinkles, and immediately wrap two turns of string around the paper overhang just under the can bead, tying the string tightly. The paper will become taut upon drying. After both heads are in place trim the edge of the paper to the rubber bands with a sharp knife and tie a length of string around the shell for a neck loop. Two eraser-tipped pencils will provide suitable drumsticks.

Elmer O. Spargo, Santa Ana, Calif.

Stamp Moisteners of Chamois



If you don't like the taste of the mucilage on postage stamps and envelope flaps, here are two moisteners that will do the job and can be stored neatly in the corner of a desk drawer. Both moisteners are

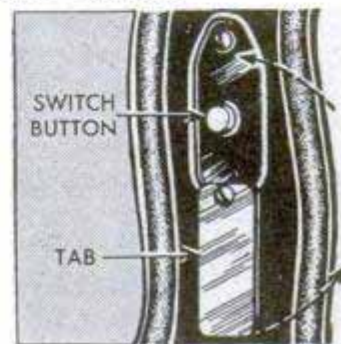
made from chamois and orange sticks, the difference being that one can be used vertically, moistening the stamp with the end, and the other horizontally. The moistener shown at the top of the drawing utilizes a 5 x 5-in. piece of chamois. This is folded

lengthwise so that one layer is about $\frac{3}{8}$ in. wider than the other, thus allowing a single thickness for tying to the orange stick. The latter is inserted between folds of the chamois to cover the tip and then the chamois is wrapped tightly around the stick. Colored string or a rubber band is wrapped around the chamois and also is used to tie the single layer at the top of the chamois to the orange stick. The moistener pictured at the bottom of the drawing is made similarly from a $\frac{3}{4}$ x 6-in. strip of chamois. However, this is wrapped spirally and tied to the stick only at the top. If desired, pieces of dowel or pencils can be used instead of the orange sticks.

Helen Lemberger, Chicago.

Tab Depresses Car-Door Switch To Turn Off Interior Lights

Having a car equipped with door switches for automatically turning on the interior lights when the doors are opened, one car owner fitted each switch with a

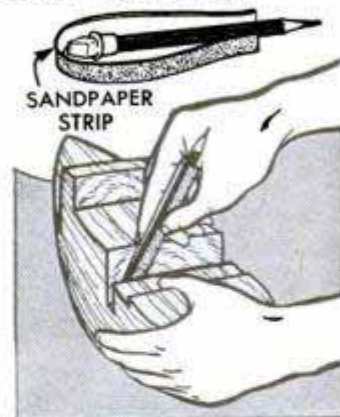


sheet-metal tab which can be swung upward to keep the switch depressed. This allows the interior lights to be turned off while the doors are kept open when working on the car, thus saving drain on the battery over a prolonged period of time.

R. C. Schneelock, Tulsa, Okla.

Pencil Holds Sandpaper Strip For Finishing Narrow Grooves

Modelmakers who are confronted with the problem of sanding the bottoms of narrow grooves and small recesses will find that an eraser-tipped pencil provides a handy tool for inserting the sandpaper into



hard-to-reach places. A narrow strip of sandpaper or abrasive cloth is drawn over the eraser and held against the sides of the pencil with the fingers.—A. H. Waychoff, Phoenix, Ariz.

☐ Absorbent cleaners such as fuller's earth, powdered magnesia, cornmeal and cornstarch are safe and easy to handle and do not injure the fabric.

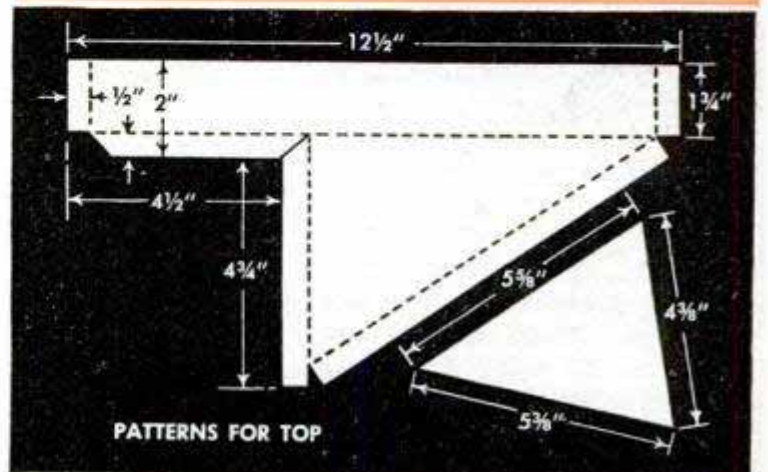
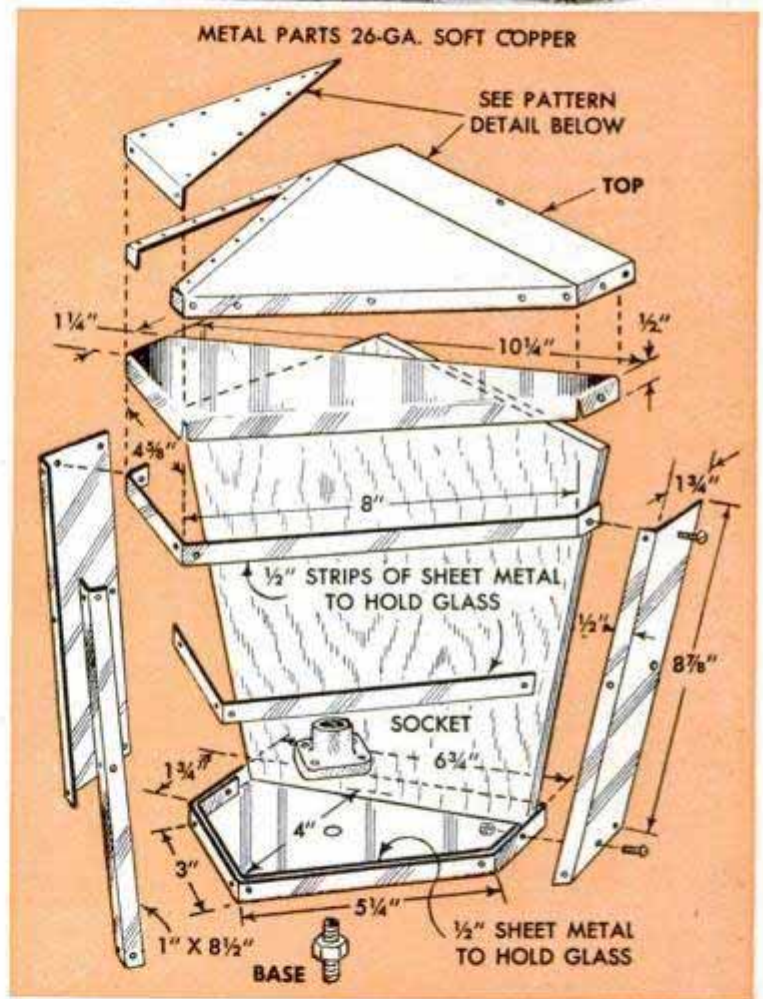
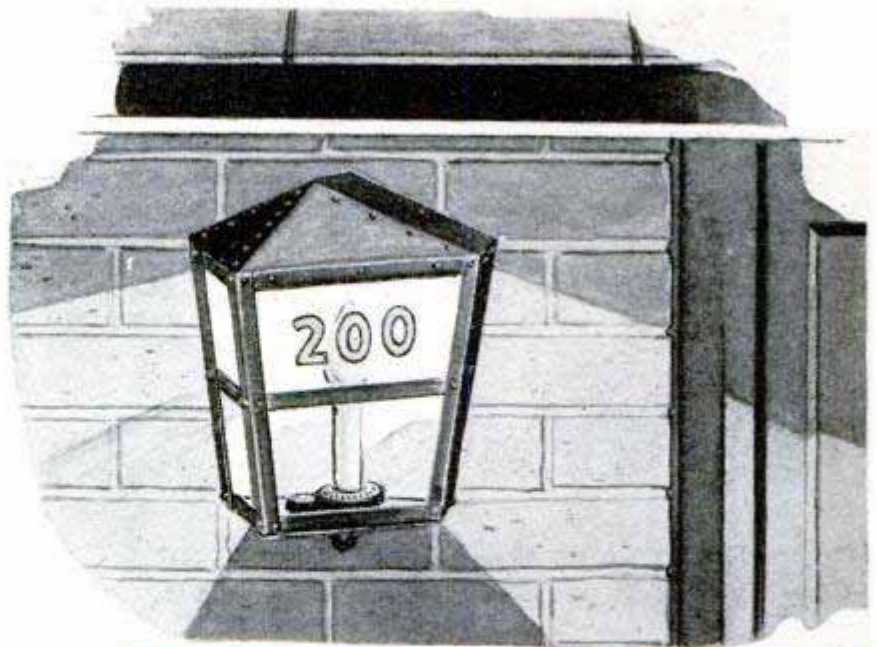
PORCH LAMP IN COPPER

By Marvin Hartley

ATTACHED to the house wall under a porch roof or a door canopy, this lamp will make the house number easy to read and add individuality to your home. As the lamp is not weatherproof, it is necessary to mount it under a roof to keep out the rain. However, it can be made weatherproof if desired by installing suitable electrical fixtures and sealing the glass panes and metal joints with putty or other waterproof compound. The metal parts are copper, but brass, aluminum or even galvanized sheet iron may be used. If the latter is used, it should be protected with two coats of metal enamel or lacquer. The rear panel of the lamp is of $\frac{3}{4}$ -in. waterproof plywood or solid stock, this thickness being necessary to permit driving screws into the end grain for attaching some of the metal members.

The center detail shows the assembly. As the sheet metal is soft, the various parts can be bent to shape in a vise or between two hardwood strips clamped tightly over the metal. Roundheaded rivets or self-tapping metal screws can be used for assembling the lamp, or the parts may be soldered together. If screws or rivets are used, false rivetheads are soldered along the simulated seam in the top. Patterns for the two-part top section are shown in the lower detail, the parts being bent as indicated by the dotted lines. Sheet-metal strips are used to hold the glass panes in place. The upper and lower strips are mounted inside the panes to form channels between the top and bottom lamp sections, while the center strips are fastened to the upright members on the outside of the panes.

In wiring the original lamp, a candle-type socket from an old ceiling chandelier was used. However, you can use any suitable socket, being sure that it is installed safely to prevent short circuits. Weatherproof fixtures should be purchased at your local electrical store if the lamp cannot be protected from the rain.





If your basement is leaky or so damp and musty that you cannot get the benefit of this desirable space for recreation or other purposes, it is not too difficult to eliminate these conditions by waterproofing

A WET BASEMENT IS LOST SPACE

IS YOUR HOUSE one of many in which valuable basement space—often equal to almost 100 percent of the living area upstairs—is practically unused and wasted because of water leaks and dampness? All of this space can be used by applying preventive or corrective measures to keep it dry. Preventive measures, which should be taken at the time a house is built, are much less expensive than corrective measures taken later. If you are planning to build where there is any possibility of water leakage through basement walls and floors, insist on having waterproof concrete. Also be sure to have waterproof cement-plaster coatings over walls of concrete, concrete blocks, brick, tile or stone. In prepared waterproof cement mixtures a waterproofing agent is added in correct proportions and interground with the cement. If the ready-made product is not

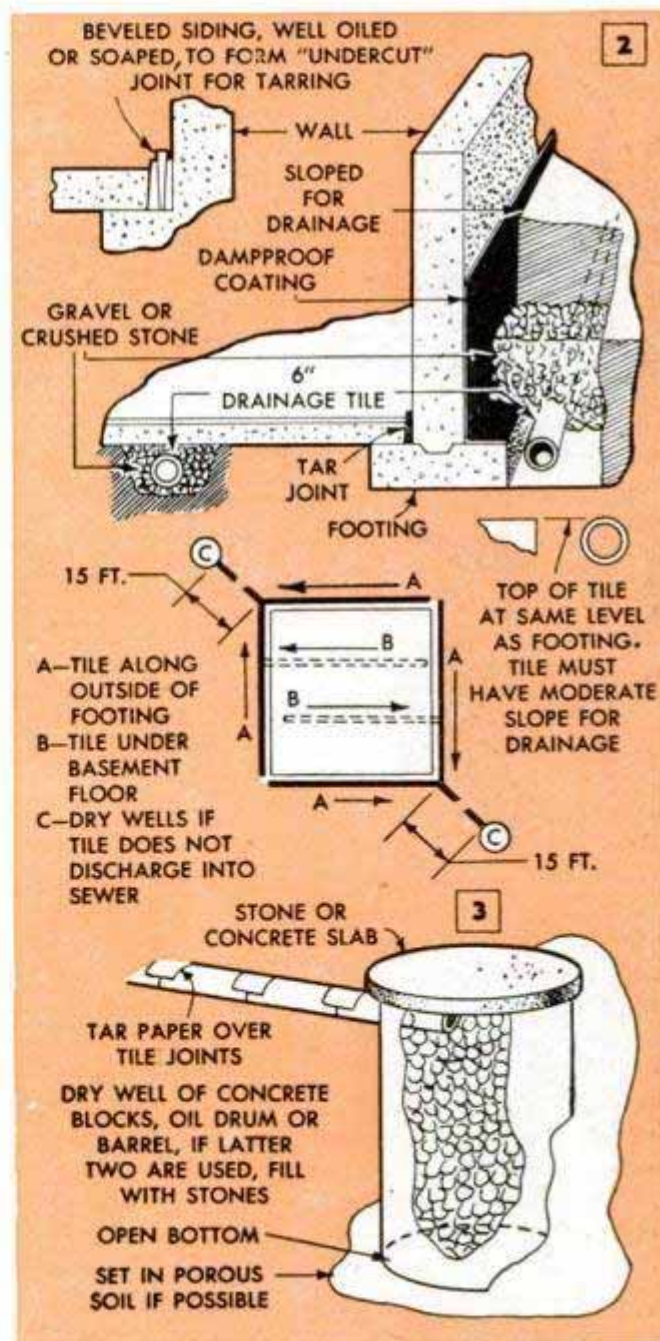
available, good results can be had by adding waterproofing powder to regular cement. Concrete walls should be no less than 8 in. thick and basement floors no less than 4 in. thick. Concrete in wall forms should be tamped or spaded next to the forms immediately after pouring in order to release entrapped air and prevent porous honeycomb spots that are particularly vulnerable to leakage. Where floors meet walls, a continuous tar joint is recommended. To provide an “undercut” keyway to retain the tar, three thicknesses of beveled siding, well-oiled or soaped, are placed next to the wall, as shown in the upper detail of Fig. 2, before the floor is poured. Many contractors apply a coating of hot tar or asphalt cement to the outside surface of foundation walls, as in Fig. 1, to seal the pores against water entrance. This is put on in one or more applications after the concrete

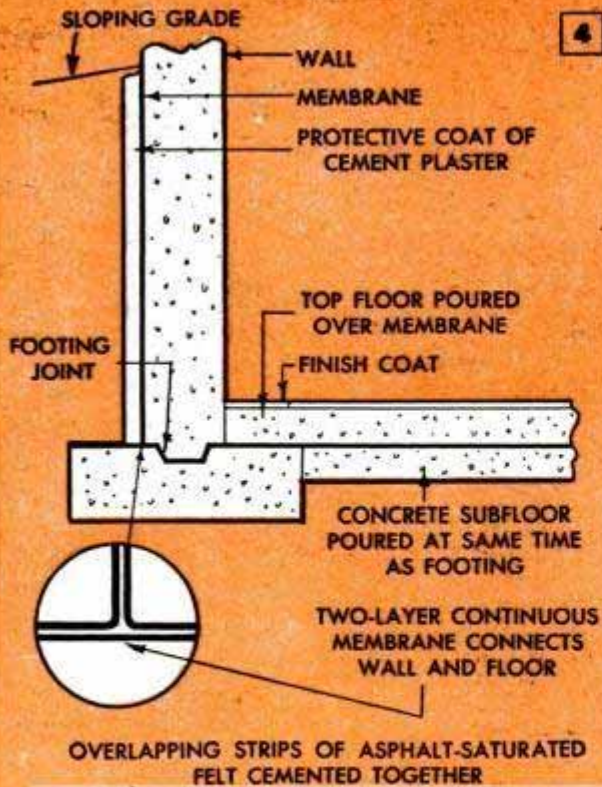
is thoroughly dry. Other contractors apply a $\frac{3}{4}$ -in. coat of waterproof cement plaster to the outside of foundation walls—sometimes also to the inside surface—to assure resistance to dampness. Such coatings are put on in two $\frac{3}{8}$ -in. layers.

Although a building site may be dry during summer months, it can be very wet during spring and also after severe and prolonged rainstorms. When the water table—height of standing underground water—is high, there is often considerable pressure which forces water through cracks and imperfections in basement walls and floors. Before building, you can determine the extent of the water table from the experience of others in the neighborhood. If the building site is on a hillside or slope, water may run against the foundation. Or, the grade may be flat and the soil so compact that the water seeping down from the surface does not drain away quickly. In any case where water tends to collect under and around foundation walls, and natural drainage is insufficient, artificial drainage by tiling is advisable, in addition to waterproofing the walls and floor.

Installing drainage tile: To carry away water, 6-in. drainage tile should be laid entirely around the foundation. The method of installation is shown in Fig. 2. The tile is laid at a slight slope— $\frac{1}{8}$ to $\frac{1}{4}$ in. per ft. is sufficient—with the high point at the top of the footing. Pieces of tar paper are laid over the joints of the tile as shown in Fig. 3 to prevent soil from getting inside, and the tile then is covered with an 18 to 24-in. layer of crushed stone or gravel. Often it is advisable to lay drainage tile under the basement also, which is a simple matter if done before the floor is poured. The sub-floor lines connect with those around the walls as shown in the lower detail of Fig. 2. Then the outside line is brought at a slight but constant slope to the discharge points at opposite corners of the building. In many localities it is permissible to make connections to the sewer. If this is not possible, you can provide one or two dry wells, as shown in Fig. 3, which should be located at least 15 ft. from the house.

Sealing basement with membrane: If water cannot be drained away quickly or completely with tile, a membrane waterproofing job may be necessary. This consists of two or more layers of asphalt-saturated felt, overlapped at the edges and cemented together with hot tar or cutback asphalt cement, placing the strips in the lower layer at right angles to those in the upper layer. The membrane is located between a two-layer concrete floor, and it should continue unbroken up the outside of the wall as shown in Fig. 4. Note how





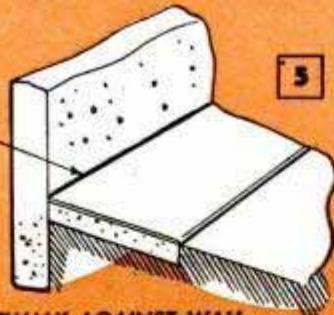
OVERLAPPING STRIPS OF ASPHALT-SATURATED FELT CEMENTED TOGETHER



HOT TAR OR ASPHALT ON CONCRETE

SECOND LAYER OF FELT CEMENTED TO FIRST AT RIGHT ANGLES, THEN COATED WITH CEMENT

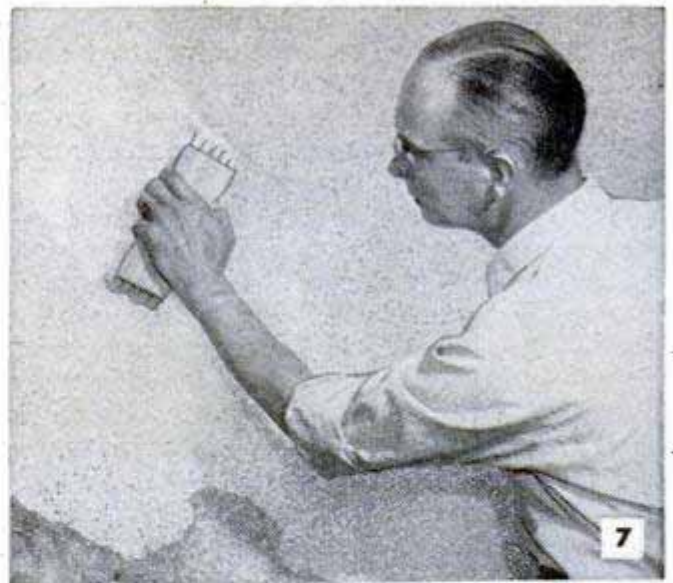
HOT TAR OR ASPHALT-MASTIC SEAL



SIDEWALK AGAINST WALL SHOULD BE SEALED AT JOINT AND HAVE A DRAINAGE SLOPE

DENSE TURF HELPS TO SHED WATER ON SLOPING GRADE

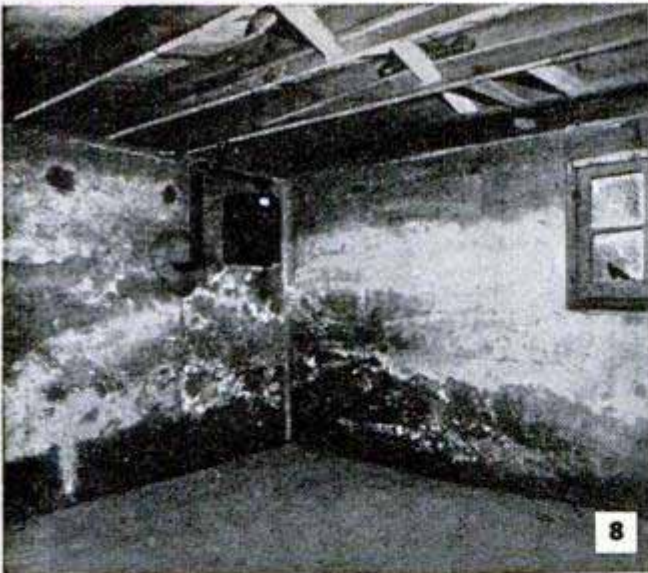
SLIGHTLY SLOPING GRADE SHOULD EXTEND ABOUT 10 FT.



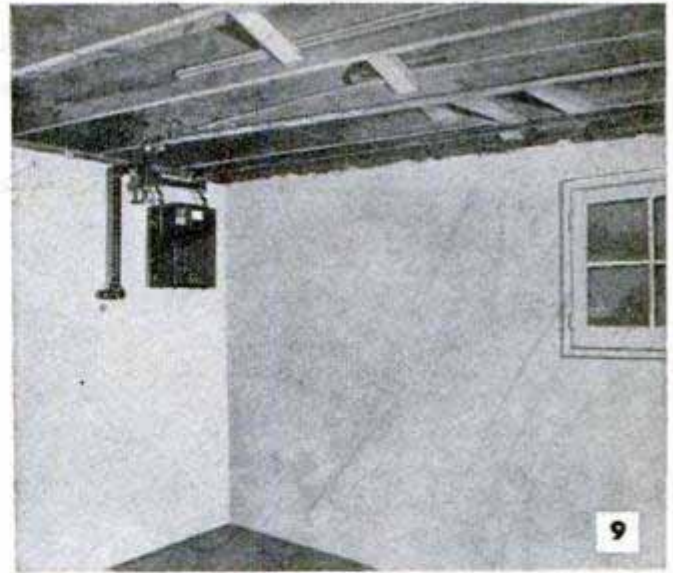
the membrane seals the joint between wall and footing. To protect it against mechanical injury on the outside of the wall, a $\frac{3}{4}$ -in. coat of cement plaster can be applied in two $\frac{3}{8}$ -in. layers.

General precautions: If roof drainage water cannot be directed into a sewer system, it should be led away from the house as indicated in Fig. 6. When filling in around an excavation, waste lumber, mortar and rubbish should be removed in order to avoid water pockets. The earth fill should be rammed down tightly after soaking it to minimize further settling. For drainage purposes, it is best to have the ground around a house slope slightly away from it, preferably for a distance of about 10 ft. Good, thick turf on this slope will also help shed water. A sidewalk that butts against a house wall and slopes away from it slightly as in Fig. 5 aids in keeping the wall dry. Too dense a planting of shrubs along foundation walls tends to retain moisture in the soil.

Waterproofing from the inside: Until recently, waterproof coatings applied to the inside surface of basement walls were not generally successful. However, a relatively new waterproofing powder, which will effectively stop seepage, is now available. The powder is dissolved in water to form a solution which is scrubbed onto clean, uncoated masonry as in Fig. 7. After filling the pores it expands upon curing to form a firm bond with the masonry, completely sealing it against the passage of water. The masonry surface must be saturated with water before the waterproofing solution is applied. As soon as the solution has hardened—6 to 12 hrs. after application—it is kept moist by repeated applications of a fine spray for at least 48 hrs. Generally, only a single coat is required. Besides stopping water seepage, it produces a snow-white surface which can be painted when dry. Figs. 8 and 9 show a corner of a basement before and after such waterproofing



8



9

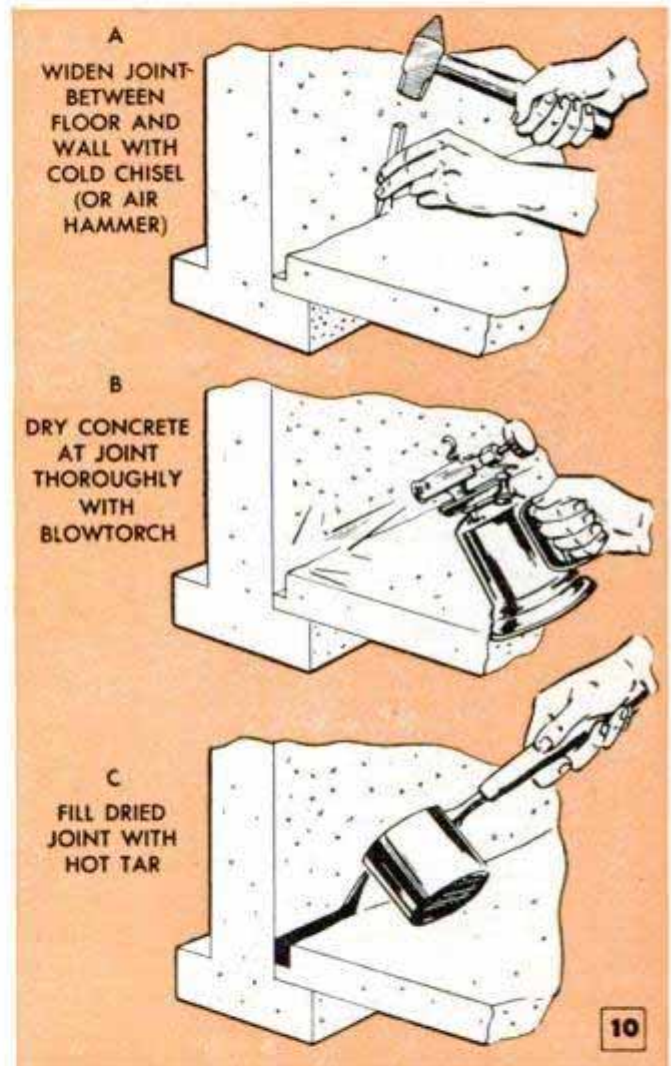
These photos courtesy Aquella

treatment. Note the improved appearance.

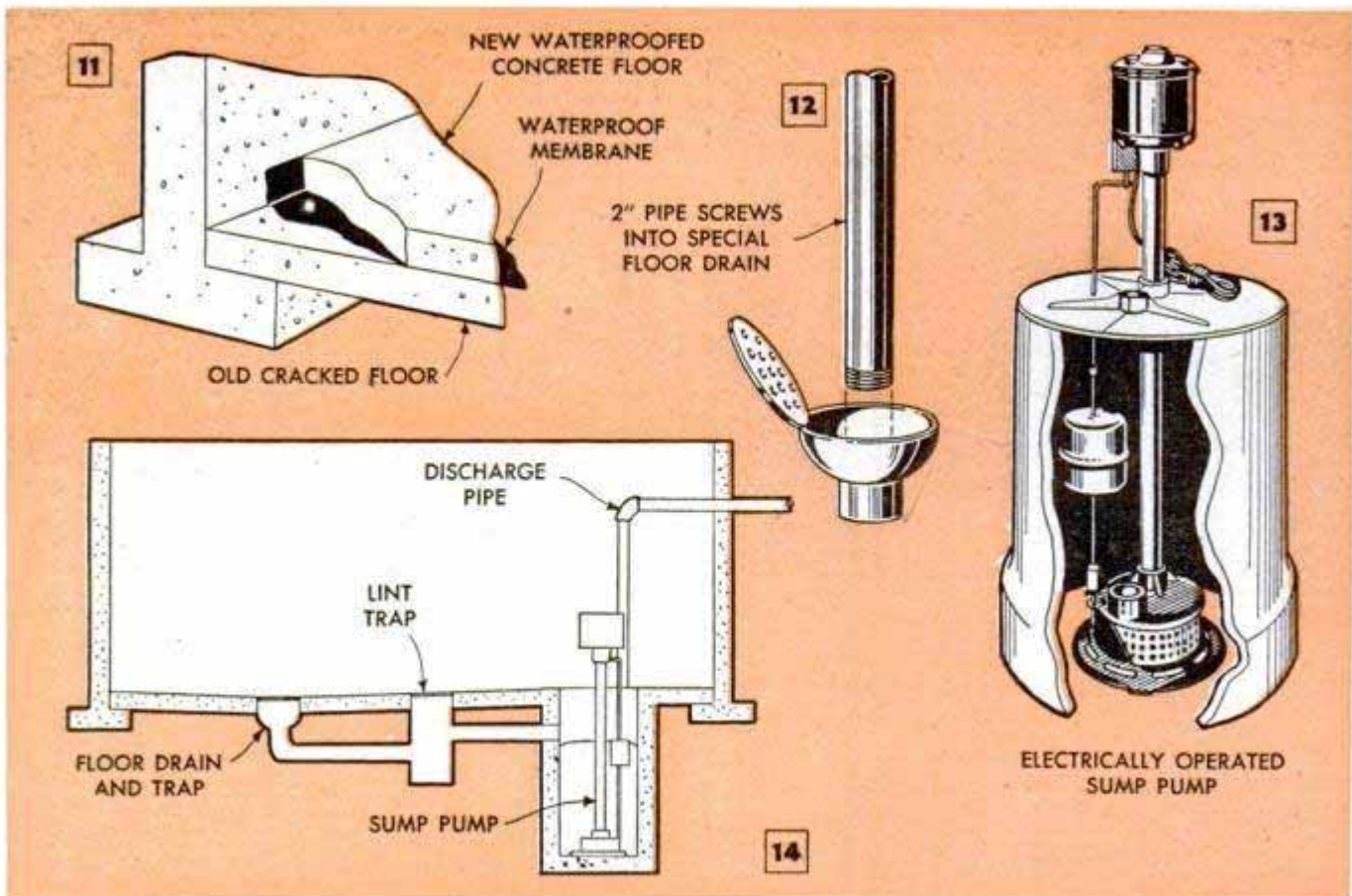
Small cracks and holes in masonry can be sealed watertight by filling them with a putty made from this powder and a small amount of water. For large cracks, equal amounts of fine, sharp sand and portland cement are added in the same volume as the powder, with enough water to form a heavier putty.

When floors are to be treated with this waterproofing solution, they must first be tested for porosity. This is done by pouring a small amount of water on the floor and observing whether the water is absorbed within a few minutes. If not, the floor is etched with a solution of muriatic acid, 1 part, to 5 parts of water, mixed by slowly adding the acid to the water. *Caution:* Avoid getting the acid or solution on flesh or clothes. The etching solution is applied to the floor with a fiber or rubber brush. After half an hour, the floor is hosed off with water and the waterproofing solution is applied. Floors thus treated should be painted or otherwise covered to protect them from abrasion. Special attention should be given to the joint where the floor meets the walls since this is the place where leakage is most likely to occur. Force the waterproofing solution well into minute cracks; if they are wide enough, force the putty into them. Leakage at joints between floor and walls also can be stopped by having a narrow groove cut in the floor (this can be done quickly with an air hammer) and filling the space with hot tar after the concrete has been dried thoroughly with a blowtorch, Fig. 10.

Keeping water away: Where there is considerable hydrostatic pressure because of a high water table, water may still enter if any cracks develop after a waterproofing job of the kind just described. Also, water may enter through imperfect joints at floor drains, or defective joints in the soil pipe. Waterproofing the inside surface of a basement wall does not prevent the wall from



retaining moisture, which may evaporate continuously under the sill causing it to rot. The moisture then may also get into the house walls causing paint peeling and other troubles. Excessive water around foundation walls may be responsible for an unstable condition that is conducive to continued settling of a building. Because of these conditions excessive water should always be drained away from a foundation. With old buildings this involves digging a trench alongside the walls and installing drainage tile as explained and illustrated



in Fig. 2, which details correct procedure.

In cases where floors are badly cracked and there is considerable leakage, a new floor of waterproof concrete can be laid over the old one, with a watertight membrane between them as shown in Fig. 11. This is easier, quicker and more positive than attempting to fill the cracks. The membrane consists of two or more layers of asphalt-saturated felt overlapped at right angles and cemented together.

Sewer-backup control: When sewers are overloaded, as when carrying away storm water, the water often backs up into basements, which makes them unsanitary as well as unfit for storage. Even if the flooding is of short duration and the water level does not rise over a few inches, a deposit of silt and dirt is left. To stop sewer water from getting into basements, backwater traps and valves can be installed, or drain caps or plugs used. If either of the latter are used, joints in the sewer under the floor must be tight and strong, otherwise pressure of the restricted water will cause leaks at the joints. Caps or plugs are applied manually when trouble is expected, and removed later.

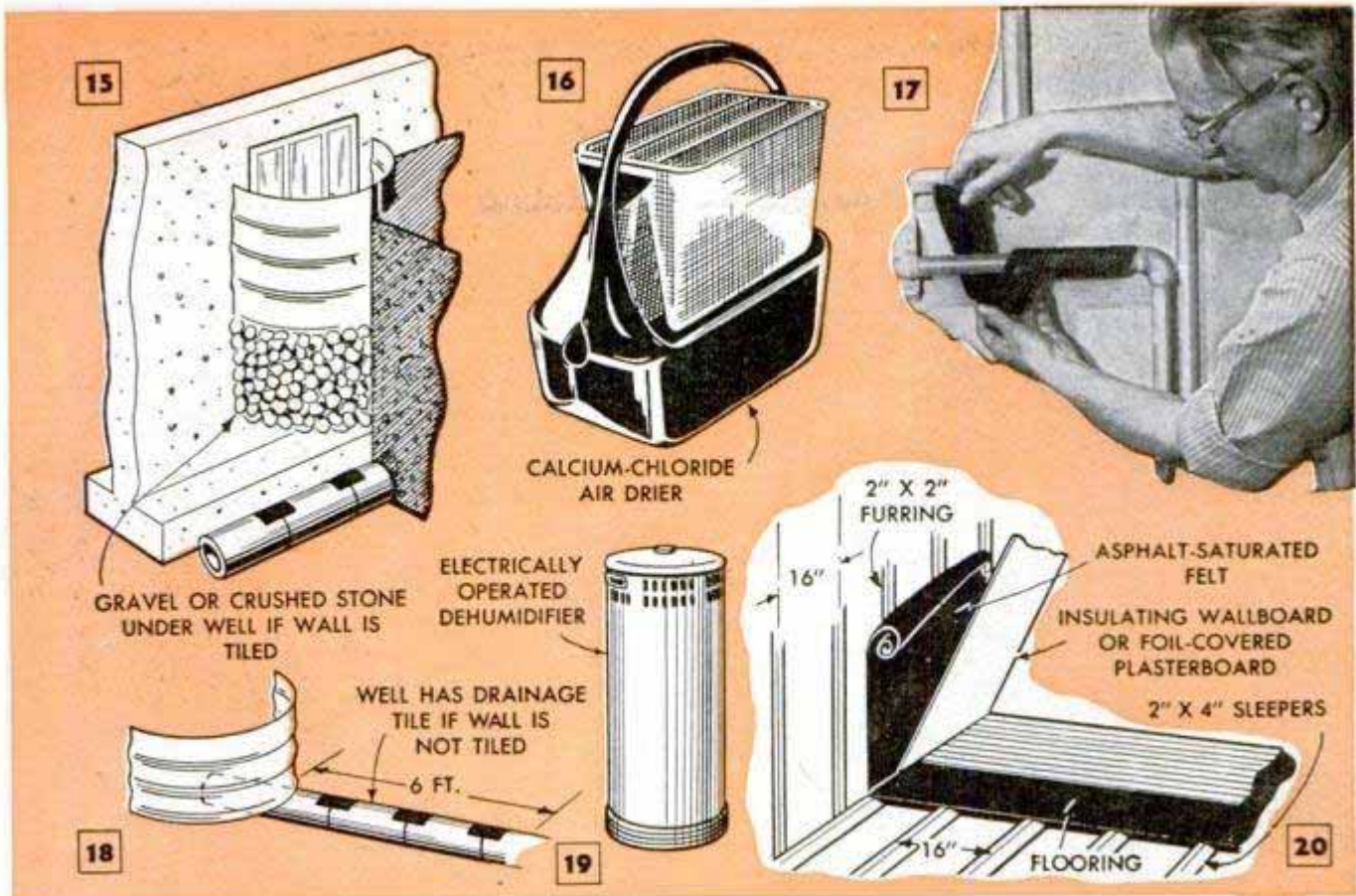
A better and simpler method of preventing sewer-backup water from spreading over a floor is to use a standpipe. Floor drains, threaded for attachment of pipe, Fig. 12, are available. The height that the water will rise will seldom be over 2 or 3 ft. In case there is a toilet in the basement, the bowl can be plugged securely against backup water with a sack of sand, if the

water is likely to rise above the rim of the bowl.

Sump pumps: In some cases where basements are located below the sewer level and natural drainage is impossible, a sump pump, Fig. 13, is required to raise the water out of the basement to discharge it. Such a pump is used also to remove water from old cellars that are leaky and which would have to be rebuilt completely to make them watertight. A sump pump is installed in a small pit, as in Fig. 14, to which drain water from tubs and floor drains is directed. Most sump pumps are electrically operated, being controlled by a float-operated switch which makes operation entirely automatic.

Window-well drainage: Wells around basement windows often become filled with snow and sometimes accumulate water during heavy rainstorms, with the result that water gets into the basement through the window. Usually the reason for this is heavy, compact soil under the well, which does not absorb water quickly, or the well may not have a good drainage outlet. The quickest remedy is to dig out the compact earth about 18 to 24 in. below the well and substitute gravel or sand as in Fig. 15 if the basement gravel wall is tiled. But if the wall is not tiled, it is better to dig a trench 4 to 6 ft. long from the well, as shown in Fig. 18, and install a few lengths of tile to lead the water away from the house.

Moisture condensation: When warm, humid air gets into a cool basement, moisture is deposited on cool surfaces such as walls, floors and especially cold-water



pipes. Often this condition is mistaken for water leakage through walls. The simplest way to prevent condensation in basements is to prevent the entrance of air that is warmer than the basement air, allowing outside air to enter only when it is cooler and drier than the basement air. Cool night air could sometimes be admitted to freshen the basement air, but warm day air should be kept out. However, because of the constant air leakage through windows and doors as well as through the floor and ceiling over the basement, such control is seldom possible.

In closed basements where air change can be held to a minimum, moisture may be extracted from the air by means of calcium-chloride driers. Those with a large area of absorption, as the one in Fig. 16, are best. Using a fan to direct air against them permits them to function faster. Also there are electrically operated dehumidifiers as shown in Fig. 19. However, neither device can perform at its best when the air in a room is constantly being replaced with humid air. Sometimes a hot-water heater is sufficient to raise basement temperature above the dew point where condensation occurs.

If, after waterproofing basement walls and floor, it is desired to minimize condensation, the cold-water pipes should be covered with insulating material designed for this purpose, Fig. 17. Even the valves in the water line can be partly covered. Cool concrete walls that sweat when exposed to warm, humid air can be covered with in-

insulating type of wallboard over a layer of asphalt-saturated felt, which serves as a vapor barrier. Or, the covering can be plasterboard coated on the inside with metal foil. In either case, the wall covering is applied to wooden furring strips as shown in Fig. 20, and special care must be taken to make all joints at the floor, corners and ceiling practically airtight in order to retard air change in the space between the covering and the concrete-wall surface. Similar treatment for sweating floors consists of flooring and asphalt-saturated felt nailed to 2 x 4-in. sleepers also shown in Fig. 20. These may be tapered on one edge to produce a level wood floor over the concrete floor.

Wrench Doubles as Screwdriver

A small screwdriver for mounting accessories on the spindle of a hand grinder is always at hand if a screwdriver blade is filed or ground on the handle of the spanner chuck wrench which is furnished with the unit. Grind off the end of the handle



as indicated by the dotted lines and taper the metal to fit the slot of the spindle screw.

Andrew Vena, Philadelphia, Pa.

Screen Wire Stretched Taut On Simple Table-Top Jig



Merely replacing the wire of a window screen is simple enough, but stretching it evenly to eliminate unsightly bulges is another story. One homeowner, who had a single screen to re-cover, found that this table-top jig would do a neat job of holding the wire taut while it is tacked to the frame. The jig consists of two cleats and a wooden turnbutton nailed to the top of an old table or workbench. After one of the cleats has been nailed in place several inches from the edge of the table top, the screen frame is placed against the cleat to locate the wooden turnbutton. Next the wire is tacked securely to the frame member nearest the turnbutton and pulled toward the cleat to raise the end of the frame an inch or two. With the frame propped up with a block, a second cleat is nailed or clamped to the table top and over the wire. Then the raised end of the frame is pressed downward and held flat against the table top with the turnbutton while tacking the wire to the frame is completed. The excess wire is trimmed off after nailing.

Herbert E. Fey, New Braunfels, Tex.

Eaves-Trough Howling Reduced By Metal Wind Deflectors



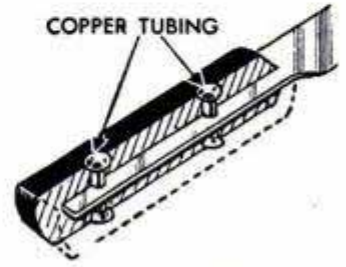
High winds whipping across the eaves trough at the corners of the house frequently cause an annoying howling sound. In most cases, this noise can be eliminated

by installing sheet-metal wind deflectors at the corners of the eaves trough. Make the deflector for each corner in two 18-in. pieces, 3 or 4 in. wide. These are fastened to the eaves trough with sheet-metal screws and bent to deflect the wind upward. Note that the corner is mitered so the two pieces fit together tightly.

Frank M. Butrick, Jr., Alma, Mich.

Copper Tubing Provides Rivets For Assembling Knife Handle

Substituting short lengths of copper tubing for rivets results in a fast, neat job of assembling a knife blade and handle. Position the handle over the blade and drill two or three holes through the assembly, using a bit of the same size as the outside diameter of the tubing. Countersink



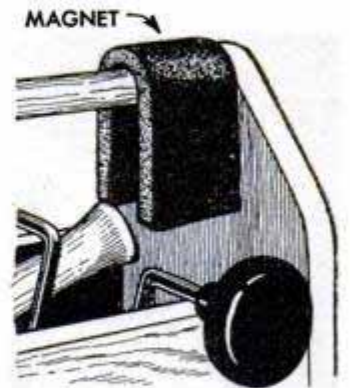
both ends of the holes, slip the tubing in place and then swage the ends of the tubing with a center punch to lock the handle to the tang of the blade.

Cleaning Yellowed Piano Keys

Ivory piano keys which have yellowed with age can be restored to their original finish by scrubbing them with a mixture of hydrogen peroxide and very fine pumice. Depending on the depth of the discoloration, the operation may have to be repeated several times to restore the color. However, if the keys are of plastic and the discoloration extends completely through them, it cannot be removed in this way.

Magnet Kept With Toolbox Picks Up Scattered Nails

After finishing a carpentry job, scattered nails, tacks and brads can be retrieved in a fraction of the usual time if they are picked up with a magnet. A horseshoe magnet of the type used on radio speakers or one taken from an old magneto is excellent for this purpose as it can be hung over the handle of the toolbox, where it is always handy.



☐ Candy stains are removed by scrubbing with strong laundry soap and hot water.

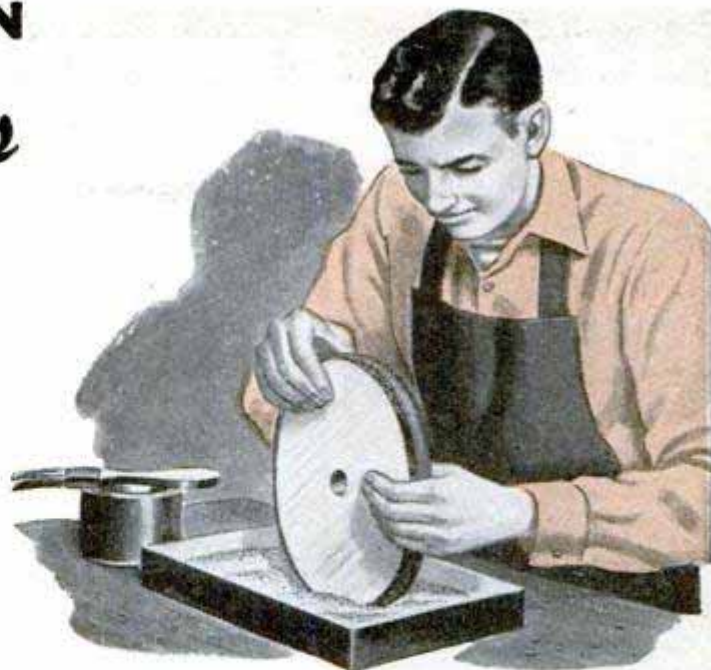
DO YOUR SHAPING ON

Contour Wheels

By Dick Hutchinson

FOR OCCASIONAL jobs of sanding moldings in the home workshop these abrasive contour wheels eliminate a lot of tedious handwork and produce as good a job as a ribbon sander on moldings of average size. Also, it is possible to rough the molding to shape and finish it on a contour wheel made especially for the purpose.

The wheel is turned from hardwood on a lathe to a square-edged disk about 7 or 8 in. in diameter. Then the edge is shaped in the reverse, or negative, of the molding shape desired. Of course, for each molding shape a disk must be selected of a thickness equal to the width of the molding. Coat the contoured edge of the disk with liquid glue and allow the glue to set to the tacky stage. Next, roll the disk over a layer of loose abrasive grains spread in the bottom of a shallow box or tray. Tap the wheel lightly with a mallet to knock off excess abrasive and hang on a wire or hook until the glue is dry. For sanding wood, use garnet abrasive grains in the fine, medium or coarse grade, depending on the type of finish desired. For grinding or polishing



metal, coat the wheel with aluminum-oxide grains. For finishing straight moldings, the contour wheel is mounted on the circular-saw arbor. Thus you have the advantage of the ripping fence in guiding the stock. For freehand operations, such as rounding curved edges, make a small wheel with a concave edge contoured to suit the work and mount it in a lathe chuck. As you can see, in addition to making and finishing moldings, it is possible to make wheels for almost any ordinary job in contouring. The wheels will polish or grind irregular shapes in metals as well as wood.

TURNUED WOODEN SANDING WHEELS

PICTURE MOLDING

Profiles shown at left are suggested shapes of contour wheels. Photo below shows samples of the work produced. The hardwood wheels are turned, contoured and coated with abrasive grains to suit the job. They finish stock to almost any shape

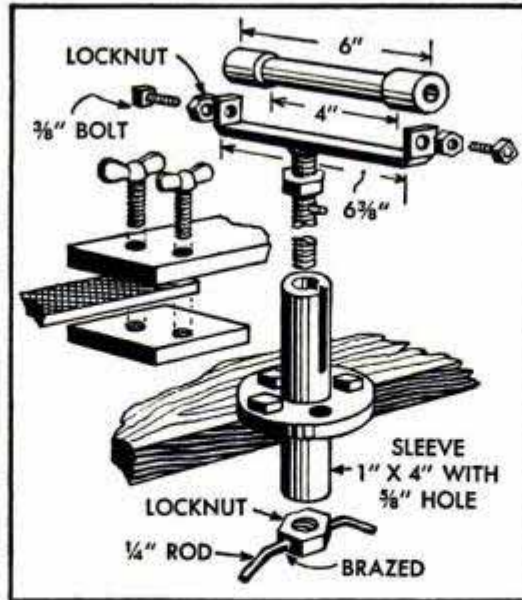
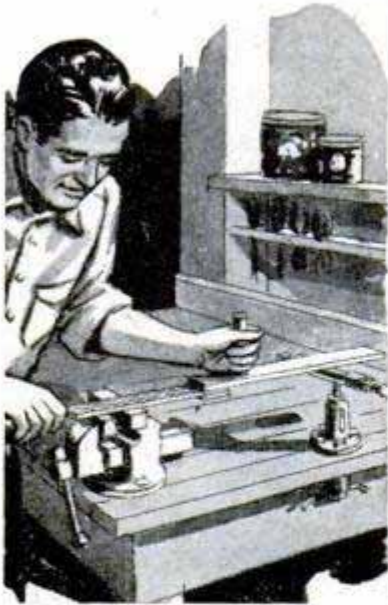
MOLDINGS SHAPED WITH SANDING WHEELS

EDGE MOLDING

MOLDING ROUGHED OUT ON CIRCULAR SAW

The complex block contains several diagrams and a photograph. At the top left, there are two diagrams of turned wooden sanding wheels with different profiles. To the right of these is a diagram of a 'PICTURE MOLDING' profile. Below the top diagrams is a photograph showing several finished moldings of various shapes. To the right of the photograph is a diagram of an 'EDGE MOLDING' profile. At the bottom left is a diagram of a 'MOLDING ROUGHED OUT ON CIRCULAR SAW'. At the bottom right is a photograph of two circular sanding wheels mounted on a lathe arbor, with a wooden tray containing abrasive grains in front of them.

Precision Filing Done in Home Workshop With Roller Guide Mounted on Bench Top

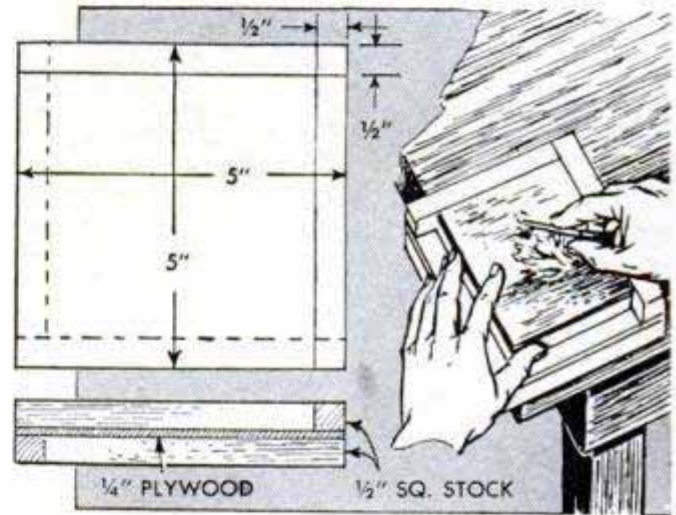


Using this roller guide permits accurate filing of flat surfaces by hand. A flat-iron extension clamped to the file rides on a roller consisting of a length of rod which is turned as shown or fitted with a sleeve at each end. A short handle of pipe is welded to the extension. The threaded shaft is adjusted with the top nut and clamped with a locknut at the lower end. A pin driven into the side of the shaft drops into a slot in the pipe sleeve to keep the roller from turning.—Walter G. Fisher, New Haven, Conn.

Corner Hook for Wood Carving Has Right-Angle Stop

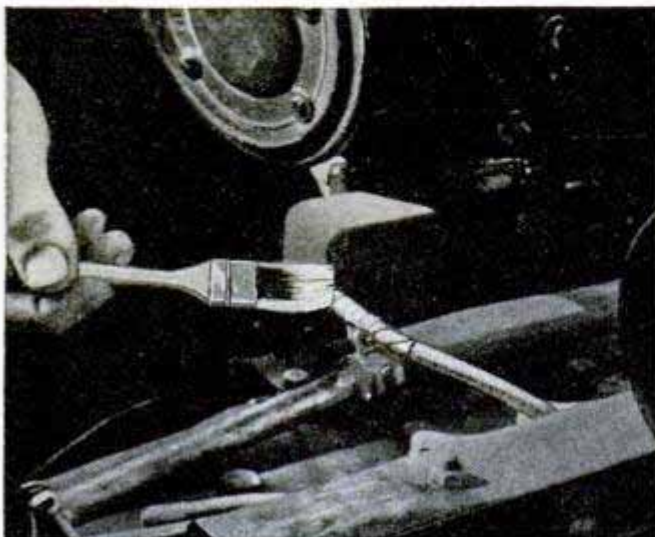
Handy for low-relief carving and making linoleum-block cuts as well as assembling small parts that are easier to handle if they can be crowded into a corner, this small-size bench hook fits over any square corner of a table or bench top. The hook consists of a 5 x 5-in. piece of 1/4-in. plywood and four 1/2-in.-sq. cleats. Two of the cleats are nailed along adjacent edges on one face of the plywood and two are nailed along opposite edges on the other face. In this way, either side can be hooked over the bench corner. When assembling, be sure that the cleats on one side square with each other and with those on the opposite side.

Harry H. McIntyre, Midland, Mich.



Auto-Wiring Insulation Renewed by Using Friction Tape and Lacquer

In older cars where the insulation on the wiring has become worn and frayed, grounds and short circuits are likely to occur along with the ever-present possi-

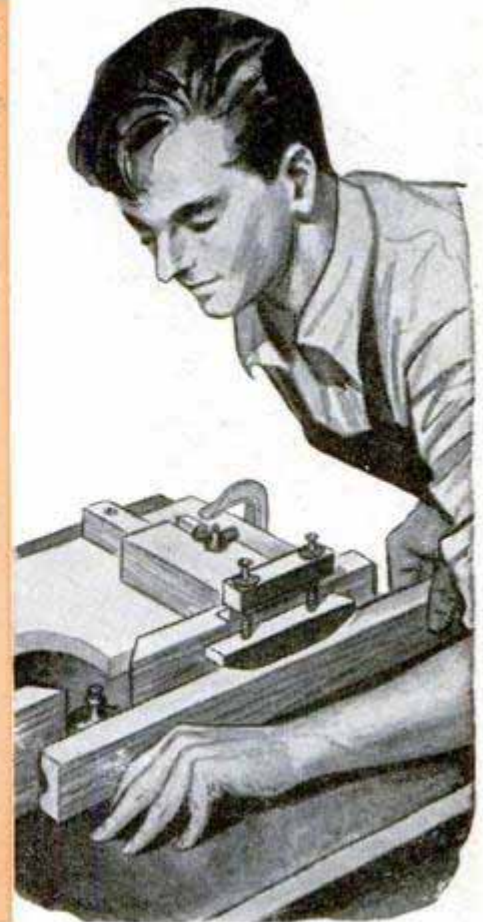
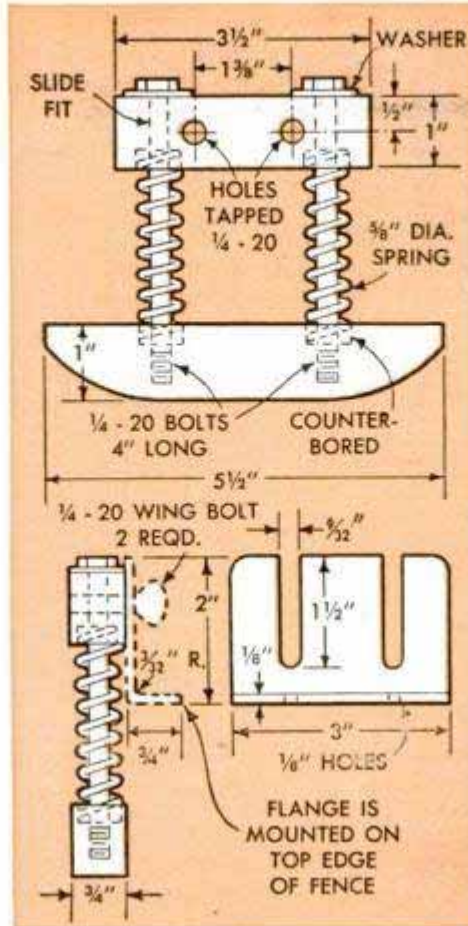


bility of fire. Low-voltage wires leading to the lights, horns and other accessories can be reinsulated with friction tape and lacquer. Trace each wire individually from the accessory to the point where it enters a sheathed cable, or loom, inspecting the wire with special care under the metal clips which fasten it to the car body. If the insulation at the cable is doubtful, remove as much of the sheathing as necessary. Then, tape the wire tightly, using a long spiral and overlapping each turn about one third its width. When all the leads have been taped, coat them with clear lacquer. Tape the opened end of the cable, secure loose wires to other leads or a firm support and tape them together. Finally, apply lacquer to all taped joints to seal the tape from dust and moisture and prevent its coming loose.

☐ Replacing a broken window pane usually is easier if the sash is first removed.

Spring Hold-Down Fits Wooden Shaper Fence

This spring-loaded hold-down can be used on either a homemade or commercial shaper, or it can be used in connection with a drill-press shaper attachment. The top block of the hold-down is mounted on the fence by means of an L-shaped bracket bent from sheet metal. This bracket is slotted so the hold-down can be raised or lowered for different sizes of work, final adjustment being made automatically by two compression springs which "float" the pressure foot on the top surface of the work. The foot, which is rounded at both ends, is connected to the top block with two bolts. These are a sliding fit in holes drilled through the block and are turned into tapped holes in the foot. Note



that the holes in both the block and foot are counterbored to provide seats for the coil springs. The hold-down can be made of aluminum, as shown in the details, or hardwood can be used for the top block and foot. In the latter case, the mounting holes for the top block are not tapped, and

bolts and wing nuts are used instead of wing bolts. Also, the bolt holes are drilled completely through the foot and counterbored on the underside so the nuts which hold them in place will not come in contact with the work.—John Kenneth Kapus, East Hempstead, N. Y.

Turntable Pivoted on Caster Speeds Painting Figurines

If your hobby is figurine painting or shell crafting, you will find this miniature turntable just the thing to permit quick



and easy manipulation of the small pieces for fine work. Obtain a ball-bearing plate caster of the type that is fastened with screws and remove the wheel from the caster. Next cut a block of wood to fit in the caster yoke (the one used in the original was $\frac{3}{4} \times 1 \times 2$ in.) and glue this to the face of a piece of $\frac{1}{4} \times 2\frac{1}{2} \times 2\frac{1}{2}$ -in. stock. Then set the block in the caster yoke and fasten in place with two wood screws which are driven through the wheel-mounting holes. The caster plate can be screwed to the top of your worktable or mounted on a wooden base as desired. A 6-in. disk of $\frac{1}{4}$ -in. wood, covered with felt, provides a base for painting figurines, and a square of sheet glass cemented to the top of the $2\frac{1}{2}$ -in. turntable base forms an excellent surface for shell crafting. When you intend to work on figurines, simply set the felt-covered disk loosely on top of the glass.

R. E. Hancock, Portsmouth, Va.

Two UNUSUAL

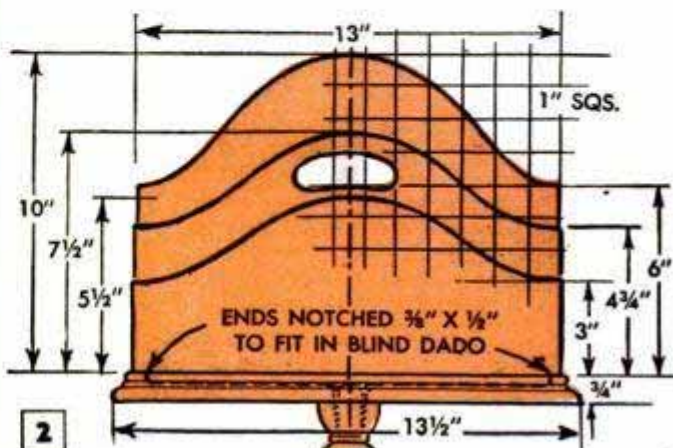
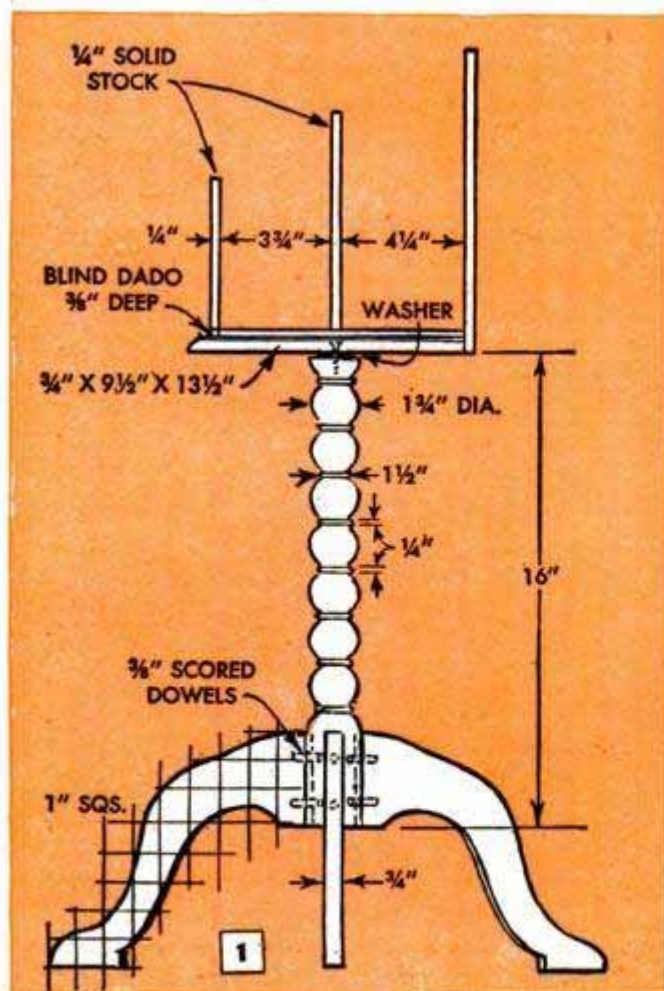
By Norbert Engels



IF YOU have a flair for Early American furniture, you'll surely find a place among your furnishings for at least one of these charming little magazine tables. Embodying characteristic spool-turning in their design, both tables provide opportunity to try your hand at lathe work. Although the magazine compartment of only one of the tables is designed to rotate, both can be made to feature this point or the tops can be made stationary. In either case, it is important to true up the top end of the column in the lathe so that the compartment will be square with the column when assembled.

Walnut, birch, maple or cherry are appropriate woods to use. The method of doweling the three legs to the turned column is the same for both tables, the legs being spaced 120 deg. apart. Figs. 1, 2 and 3 detail the table with the rotating top. The bottom of the magazine rack is cut to size, the edge molded on three sides and the blind dadoes are cut for the scrolled front-piece and the center divider. One simple way to form the blind dadoes on a small piece, such as the bottom of the rack, is to run the grooves clear through, then rip a strip from the same wood as the bottom to the sectional size of the groove. Cut off two short lengths and glue these into the ends of each groove. Sand flush after the glue is dry.

Fig. 3, left-hand sectional detail, shows how the pivot is assembled. A tap hole for a No. 5 wood screw is drilled in the top end of the column and filled half full of glue. Then a hole is drilled through the bottom of the rack, centered in the groove. After inserting the screw, a large 1/8-in.

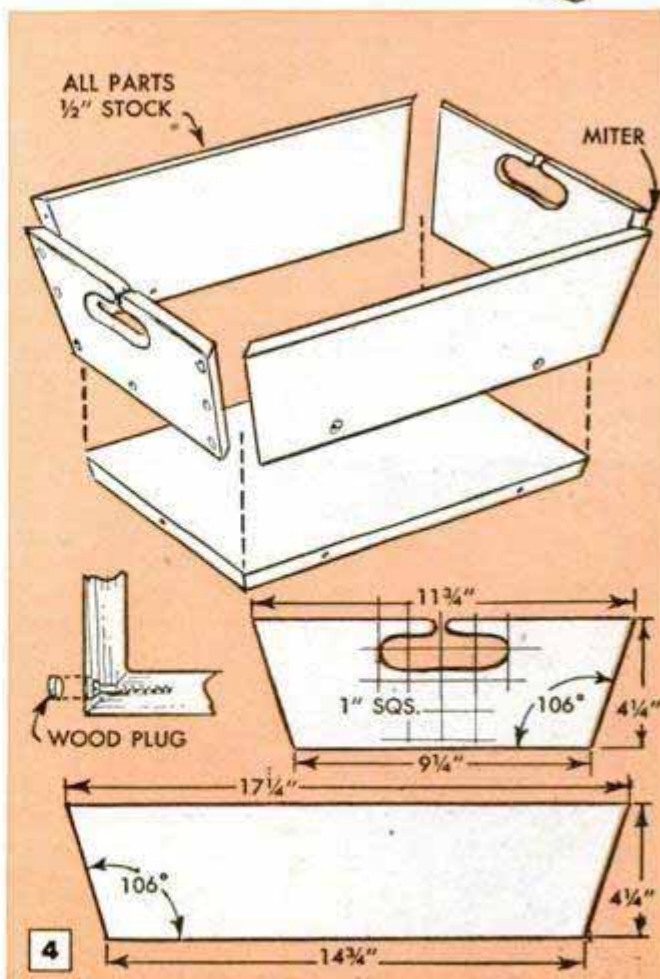
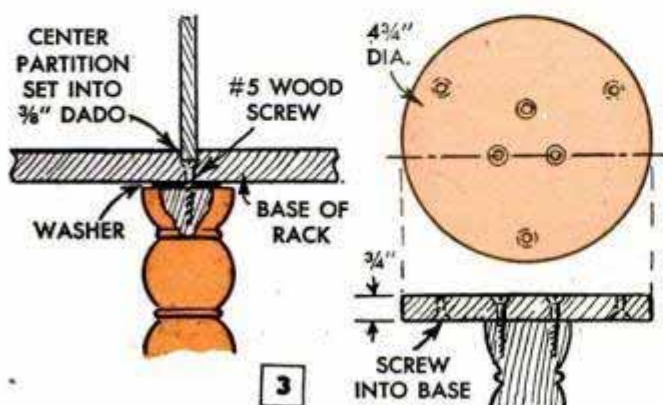


TABLES for Magazines

fiber washer is placed between the bottom and the top of the column. Draw the screw up fairly tight. Notch the lower corners of the center partition to fit in the blind dado and glue in place. In fitting the curved legs, the ends are sanded or filed to a concavity with a radius equal to that of the lower end of the column. This permits them to fit snugly against the curved surface. After bandsawing the legs, smooth the sawed edges and round the top edges to a radius by sanding. Do the same with the top edges of the front and back pieces as well as the center partition of the magazine rack. This done, the assembly is ready for finishing.

The hopper-type rack, pictured at the right and detailed in Fig. 4, is simply a tray with a handhole in each end. The sloping sides and ends are assembled with compound miters, or "hopper" joints, at the four corners. A special feature of the handholes is that they are bandsawed from the edge, that is, you simply saw in and saw out. After the miter cuts have been made on all the pieces, the corners are joined, one at a time, with screws and glue. The screw holes are countersunk and fitted with wooden plugs cut from the same wood as that from which the tray is made. Then the edges of the bottom are beveled and the sides joined with screws and glue. Sand all parts smooth and round the corners slightly. Then join to the column as in the right-hand detail in Fig. 3.

Methods of applying a finish depend on the kind of wood used and the type of finish desired. If an open-grained wood, such as walnut is used, then a filler must be applied. After staining and filling the grain, apply a sealer and follow this with shellac or two coats of varnish or lacquer. Maple and birch do not require a filler, but many craftsmen apply a filler to cherry as it helps to bring out the beauty of the grain.



Canvas Shield Protects House While Near-By Shrubs Are Sprayed



Chemicals used to spray shrubs frequently blow against a near-by house where they stain the windows and sometimes leave hard-to-remove discolorations on the walls. This can be avoided simply by having one man hold a 6-ft.-square section of waterproof canvas between the shrub and the house. The canvas is moved along with the sprayer in order to deflect the spray being blown toward the house.

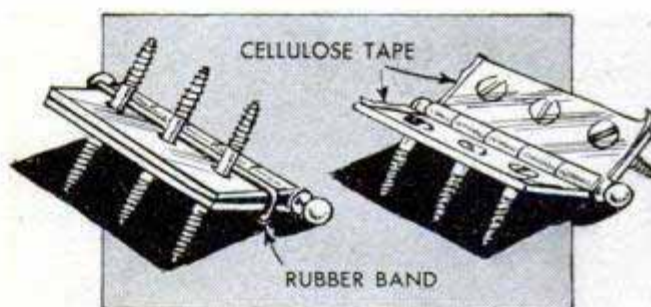
Removing Shoe-Polish Stains

Clothing stained with black shoe polish can be cleaned by washing the stained portion in soap and water or by applying turpentine directly to the stain. Alcohol or vinegar can be used to remove stains caused by tan or brown shoe polish.

Screws Stored With Extra Hinges Cannot Be Misaid

When extra hinges are kept in the home workshop for future use, often the screws are mislaid if they are stored loosely in a drawer or on a shelf. To be sure that there will be a complete set of screws for each hinge when it is needed, here are two ways of storing the screws right with the hinge so that there is no chance of their being lost. One way is to insert the screws in the holes in the hinge leaves, close the leaves fully, as shown, and then slip a rubber band over them to hold them together. The other way is to place the screws in the holes and

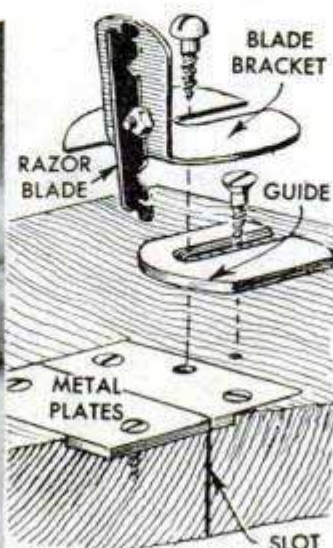
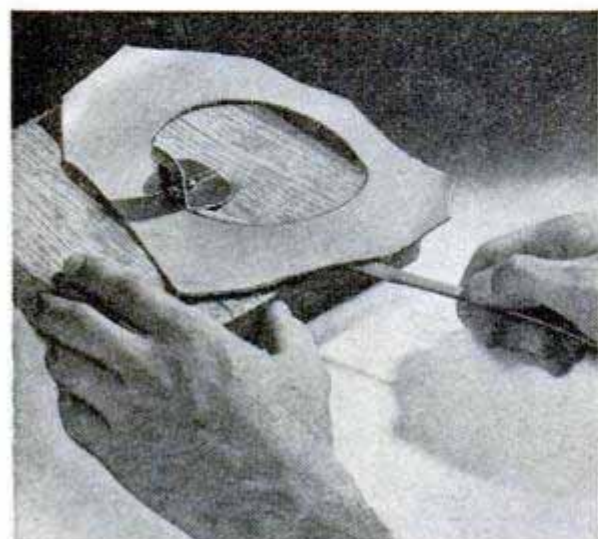
merely stick a strip of cellulose tape over the heads to keep them from falling out of the hinge leaves.



Scrap Leather Pulled Through Cutter to Produce Lacing

Lacing of almost any desired length and reasonable width can be made quickly by rotating a piece of scrap leather on this easy-to-make cutter. A razor blade held at a slight rake by a sheet-metal bracket provides the cutter, and a slotted wooden base receives the lower end of the blade. Note that the metal guide, which controls the

width of the lacing, is inserted between the mounting bracket and metal base plates. The latter are set flush with the surface of the wood. The guide is adjusted by loosening the blade-bracket screw and the guide screw, and the blade is moved to renew the cutting edge simply by loosening the machine screw which holds it to the bracket.

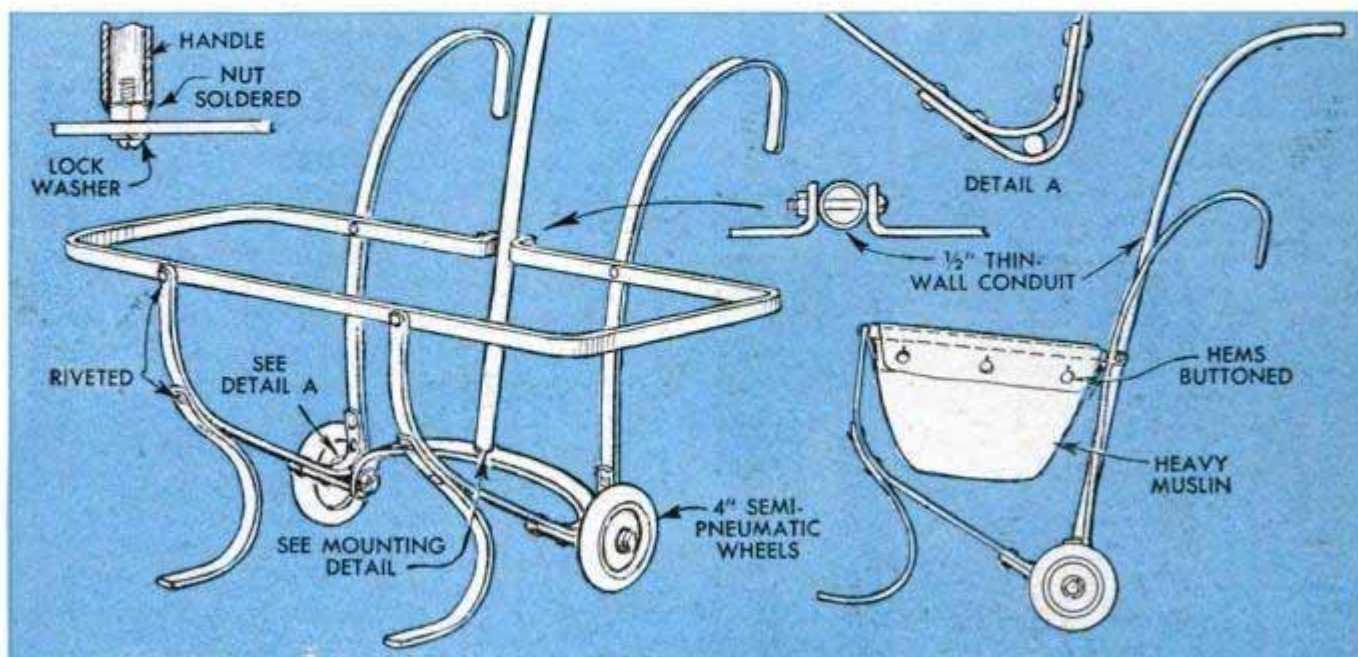
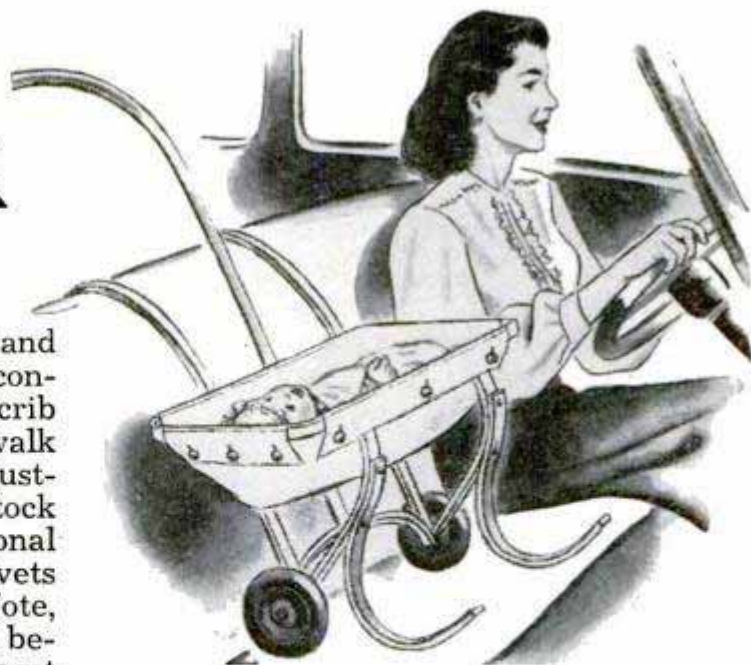


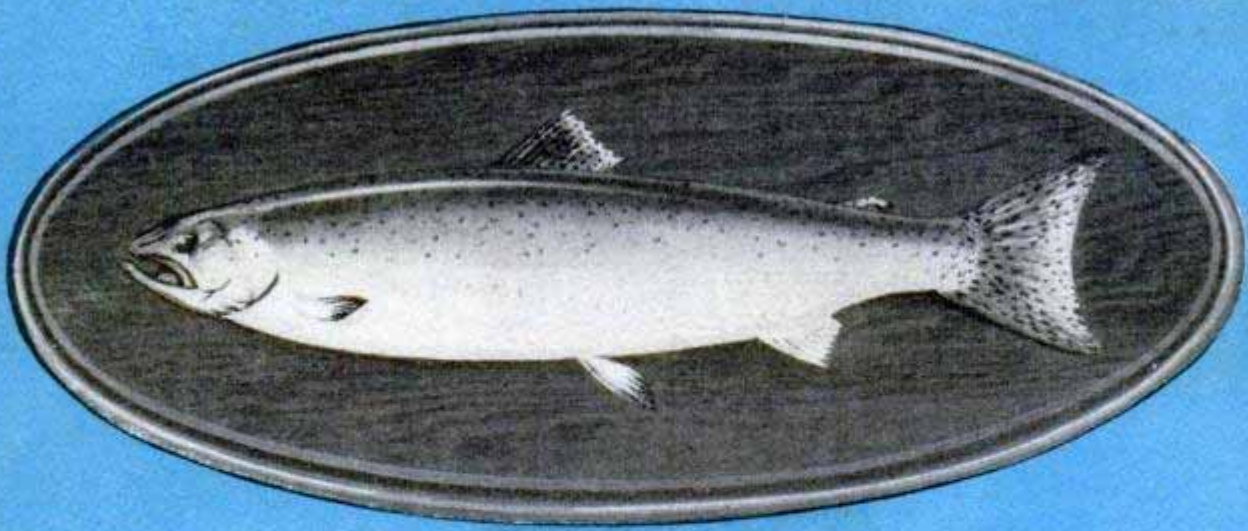
To cut the lacing, first cut a small disk from the center of the leather scrap and place the scrap over the blade bracket. Then insert the edge of the leather under the lip of the blade bracket, bring it in contact with the blade and slowly rotate the leather counterclockwise. When the lacing projects from under the leather, grasp the end and pull until the desired length is attained. —C. Mendendorp, Grand Rapids, Mich.

CAR-CRIB STROLLER

By Orwin Westwick

BUSY MOTHERS with daily shopping and visiting schedules will appreciate the convenience of this dual-purpose car crib because it doubles as crib and sidewalk stroller without any alteration or adjustment. The sturdy frame is made from stock sizes of aluminum, $\frac{1}{4}$ x $\frac{3}{4}$ in. in sectional size, and is joined with aluminum rivets where indicated in the details below. Note, in detail A, that an opening is allowed between the frame members to take short axles, which can be lengths of threaded $\frac{3}{8}$ -in. rod or common machine bolts. Two nuts, one on each side of the frame, lock the axles in place. If bolts are used as axles, the wheels are mounted beforehand. After riveting together the parts which form the basket frame, seat hooks and front rests, the handle is bent from thin-walled conduit and attached to the spacer and to the basket frame as in the assembly details. Although not shown, a rubber handle-bar grip of the type used on bicycles can be fitted over the upper end of the handle. The semi-pneumatic wheels are held on the axles with cotter pins and washers. Care should be taken in the assembly to make sure that the wheels track straight ahead, as otherwise the cart may not roll freely. The basket is made from heavy muslin or light canvas with four buttoned flaps which loop over the basket frame as shown. Note that the flaps are cut away and hemmed separately to clear the corners and handle.





FISH TROPHY

By Eric Cameron

THAT amazing fishing yarn about the big one that *didn't* get away will leave little doubt among fellow anglers when you proudly show them proof of your catch—a true-colored replica in plaster. The first step in “preserving” a fish is to jot down its natural coloring for reference when painting. Do this before the colors fade, preferably as soon as the fish is landed. Make a plaster-of-paris impression of the fish right on the spot, using a cardboard box filled with sand as a form. Level out the sand, dampen it if dry, and sponge off the fish with a solution of alum and water to remove the mucus film. After this, use petroleum jelly, cooking oil or melted lard to coat the side of the fish that is to be duplicated. This will keep the plaster from sticking. If the mouth is to be left open slightly, plug the throat with plaster of paris and oil it so that it will not interfere later with removing the plaster mold. Next, press the fish firmly into the sand until it is embedded half its thickness. Spread out the tail and fins in a lifelike manner as shown at the right, detail A, holding them in position with common pins, which are pressed in all the way. Note the oiled pieces of cardboard placed under the fins.

The first coating of plaster of paris is made thin, about the consistency of thick cream, and is poured over the fish as soon as mixed, detail B. This is followed with a second coating of a slightly heavier consistency and is reinforced by embedding tow, fibers or fine excelsior in the wet plaster. Thickness of the plaster impression mold depends on the size of the fish, but it is best to make it extra heavy to prevent cracking.

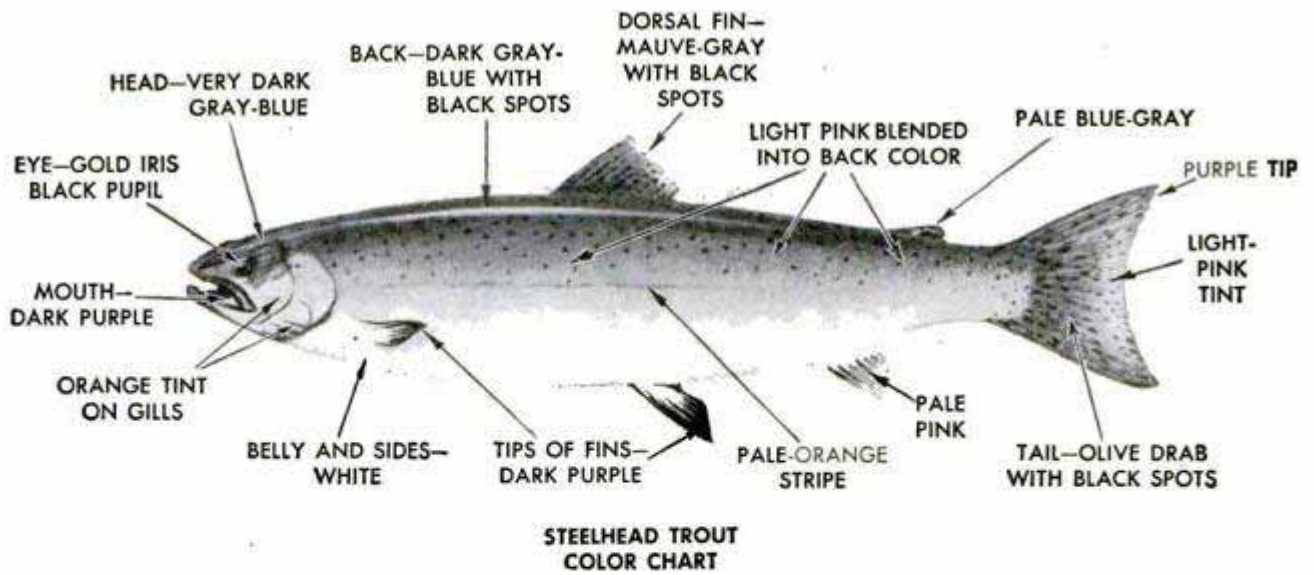


First step in making a plaster mold is to coat one side of the fish with oil to keep the plaster from sticking and then press the fish into bed of sand



Plaster of paris is poured over the fish to make an impression mold as shown above. Below, the impression mold is oiled before the plaster casting is poured



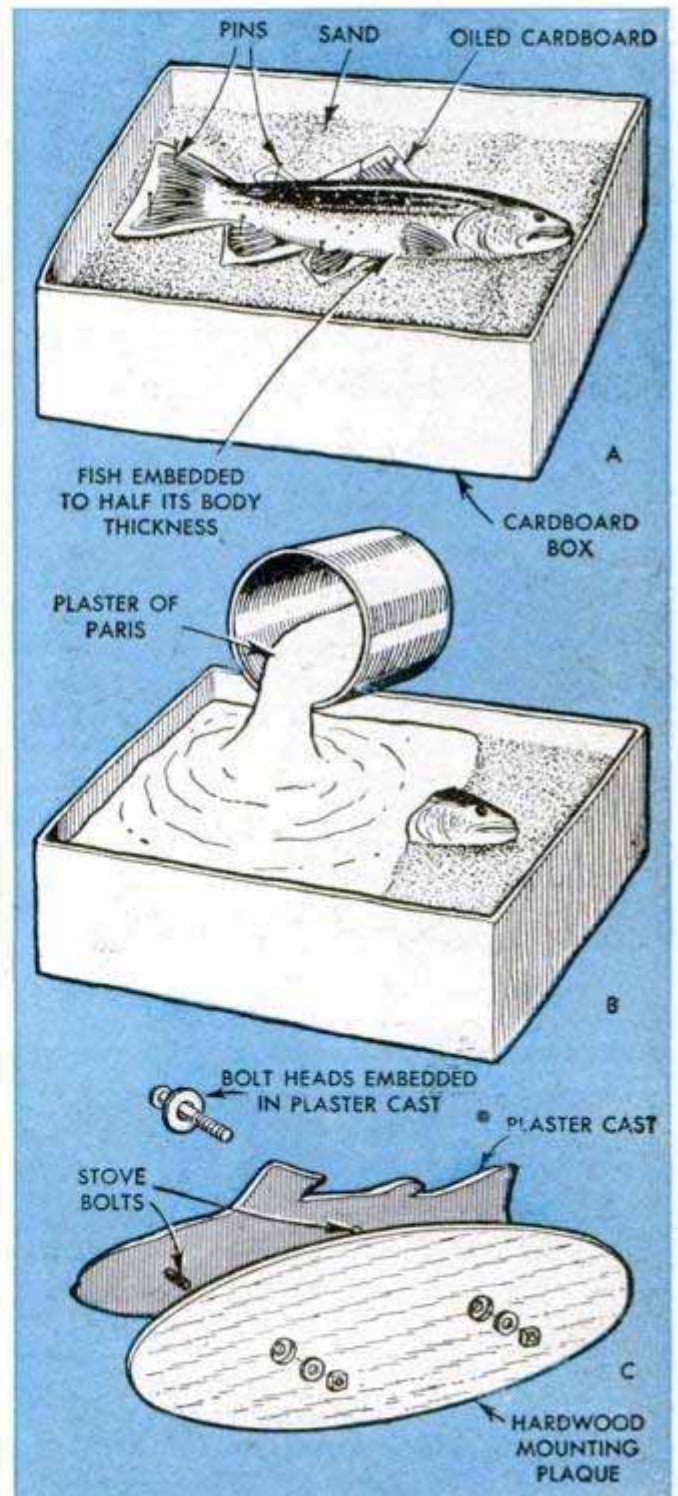


IN PLASTER

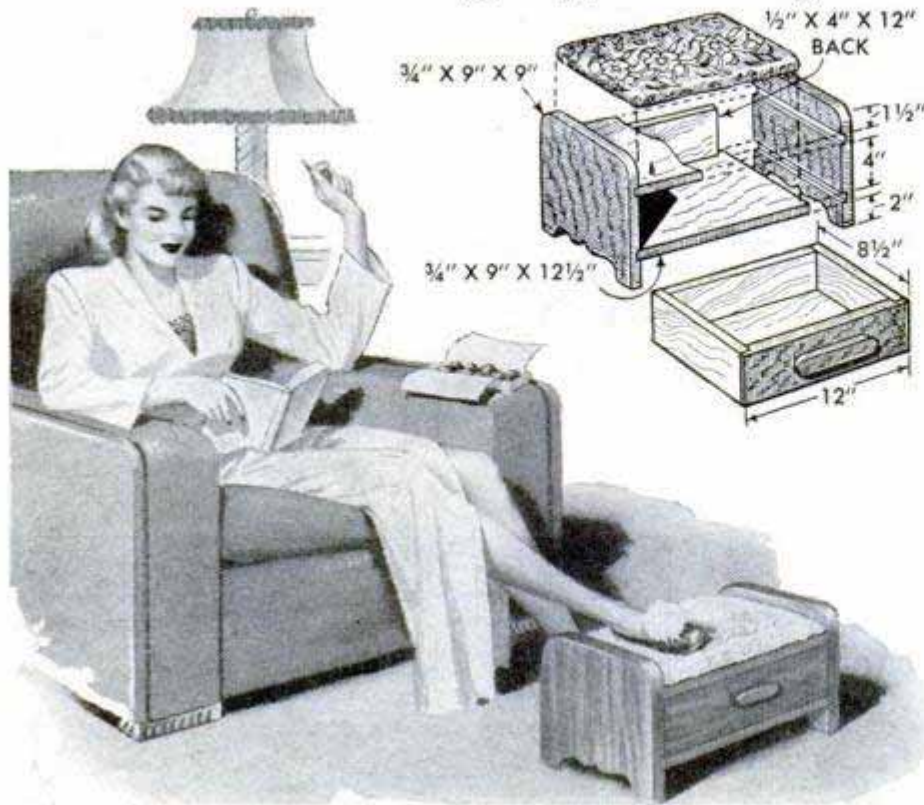
After the mold is thoroughly dry, the fish is removed and the inside of the mold is wiped with benzine or alcohol. If you find that the impressions of the tail and fins are not clear-cut, these can be deepened with the point of a knife.

The plaster mixture used in making a casting from the master mold must be uniform in texture and it is therefore best to sift the plaster to remove any lumps before mixing it. Oil the inside of the mold and then fill it with plaster, patting it into all depressions and smoothing off excess plaster, flush with the top of the mold. Before the plaster has time to set, stove bolts are embedded in the soft plaster, head downward, to provide a means of attaching the casting to a wooden plaque, detail C. After the casting is thoroughly hard and removed from the mold, wipe off the oil as before and give the casting two coats of clear shellac to seal the plaster. Any rough spots or pitted places, of course, should first be sanded down or filled.

Oil colors are used to paint the fish. The best and most lifelike results are obtained by using a "dry" brush. The white underparts look more natural when applied in two thin coats instead of a single thick coat. Blend the colors by deft strokes of the brush, and work the transparent colors down over the opaque ones. If desired, a coat of gold or silver-colored paint can be applied after shellacking the fish to produce an underlying sheen characteristic of fish scales. A good job of painting requires practice, and it is best to have several castings on hand with which to experiment until you have a lifelike replica of that prize catch.



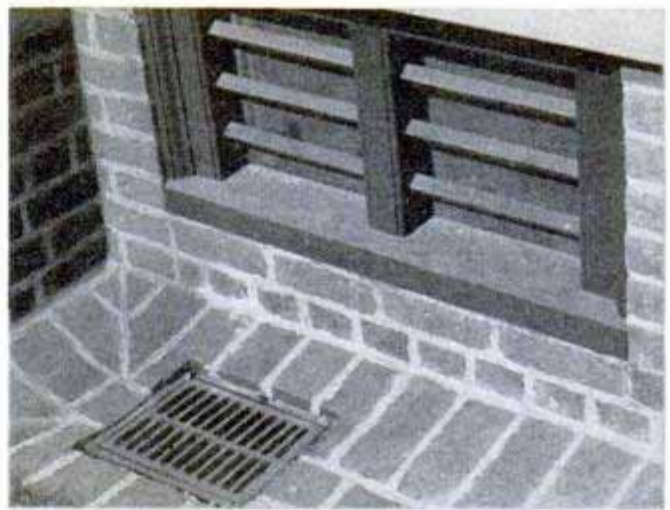
Novel Footstool Includes Utility Drawer For Mending, Slippers or Magazines



Easy to build and upholster, this attractive little footstool incorporates a convenient drawer for keeping slippers, mending, smoker's needs, etc. The stool is made from solid stock or plywood to the dimensions indicated, grooving the inside faces of the end members for the top and bottom members. The drawer bottom is a piece of $\frac{1}{8}$ -in. plywood or hardboard fitted in grooves cut in the front, sides and back. The cushion, which is screwed in place, is made by covering $\frac{1}{4}$ -in. plywood with cotton padding and sheet plastic or fabric. After completion, the footstool can be stained and waxed or painted a suitable color. —Bertram Brownold, Cedarhurst, N. Y.

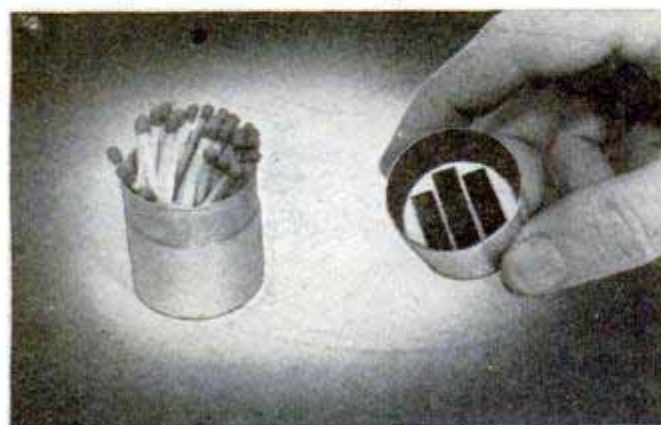
Improvements in Colonial Homes Are Applicable to Modern Construction

Two ideas taken from the restored area of Williamsburg, Va.—the barred basement window and brick-lined foundation ditch shown in the photograph—are just as applicable to new construction as they were to homes built in Colonial days. The window bars, which can be either rod or tubing of round, square or hexagonal cross section, are set in sturdy wooden frames to deter potential burglars and also to protect the window glass from accidental breakage. The shallow brick ditch, which extends completely around the outside of the foundation wall, drains water from the eaves directly into the sewer line. This type of ditch can be constructed of concrete or asphalt instead of brick. It serves to keep water from soaking into the ground adjoining the foundation of the house and,



being shallow, it also doubles as a walk. The sewer openings are covered with iron grids. Walter E. Burton, Akron, Ohio.

Waterproof Case Improvised From Film Container Holds Safety Matches



The metal container from a roll of 35-mm. film provides a handy waterproof case for carrying safety matches on hunting or fishing trips. Two or three abrasive strips removed from the sides of matchboxes are cemented inside the lid of the container and, after it is filled with matches, the container is sealed with cellulose tape.

☞ One machinist uses a single toolbox for all tools needed on the various machines he might operate. He carries this with him to the different machines.

ROLL-FILM ADAPTER *for view camera*

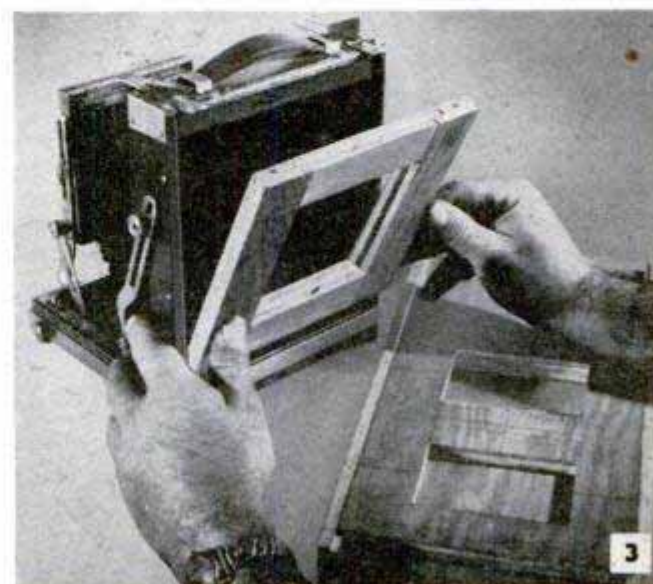
By Louis Hochman

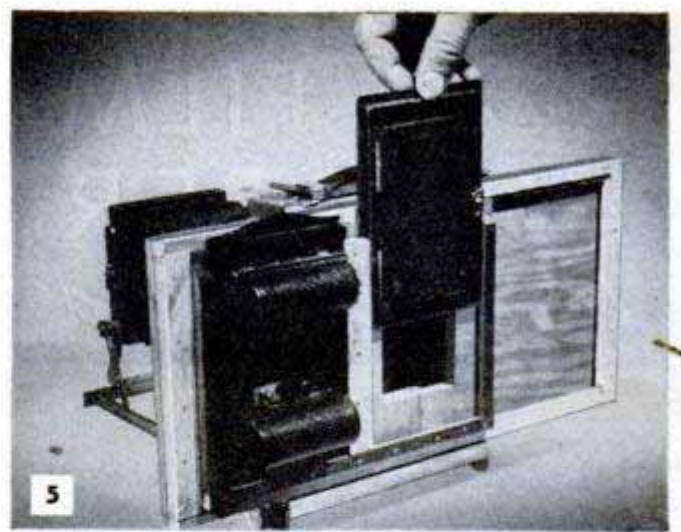
OWNERS of view cameras will be quick to appreciate the economy and convenience of this roll-film adapter with its side-by-side placement of the film holder and focusing hood on a single sliding panel. This arrangement not only keeps both units constantly in the focal plane, but provides the quickest possible means of shifting the position of the units without the necessity of removing one and inserting the other. As will be seen from Figs. 1 and 2, the unit can be placed on the camera in either the vertical or horizontal position. The dimensions of the parts adapt the unit for use on a 4 x 5-in. view camera but, of course, sizes can be varied to suit film holders and cameras of other types. The details in Fig. 6 show the construction of the three basic units, camera-back adapter, sliding-panel bed and the sliding panel, on which the film adapter and ground-glass focusing hood are mounted. The sectional views show how these various parts are grooved, rabbeted, and tongued to permit movement and to provide light traps, or baffles, where required. The camera-back adapter, Figs. 3 and 6, is simply a rectangular frame joined with open mortise-and-tenon joints and fitted to the back of the camera as shown. The sliding-panel bed is permanently attached to the camera back with the openings centered. Strips of velvet are glued into shallow recesses cut in the outer face of the panel bed on each side of the opening to provide light traps.

Now, refer to the corner detail at the lower right in Fig. 6 and note that the top and bottom edges of the bed panel are rabbeted to take the tongued guide strips, but that the vertical end, or closure, strips are fitted against the flat face of the panel. These strips are attached with screws only, so that they may be removed. Note also, in the top view of the sliding panel, lower left-hand detail in Fig. 6, that three equally spaced strips of velvet are glued into shallow recesses cut into the back face of the sliding panel. In this way, regardless of the position of the sliding panel, velvet strips on the slide will be in contact with corresponding ones on the bed panel to trap



Above, the roll-film adapter in position for taking a horizontal picture. Panel has been moved down to bring film holder in position for exposure. Below, the camera-back adapter being checked for correct fit

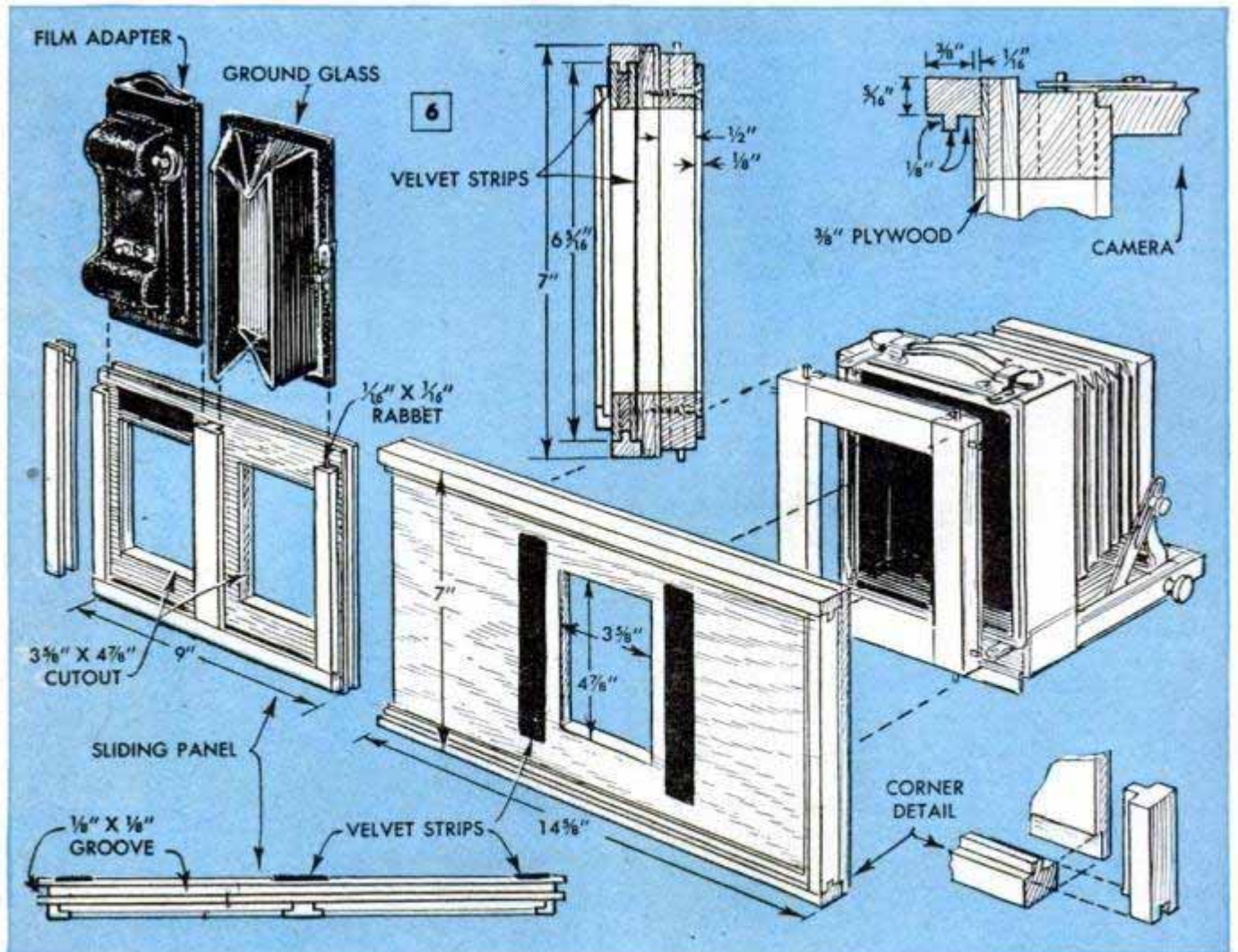




light. A single velvet strip is glued to the back face of the sliding panel above the opening over which the film holder fits. This must be positioned to register with the strip on the back of the holder, so that when the parts are in position a light trap will be formed at this point.

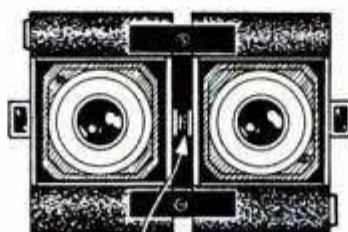
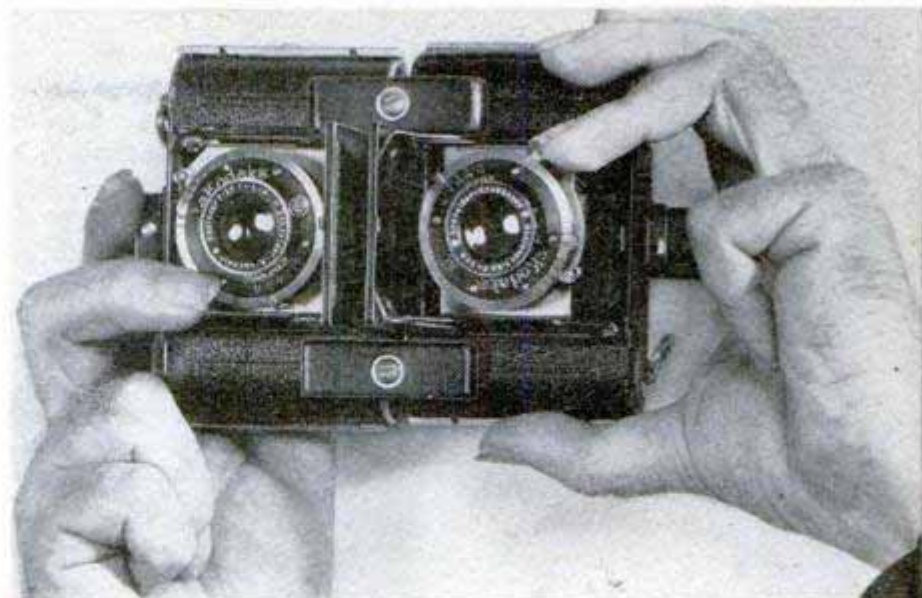
The edge of the sliding panel is grooved to take the tongues of the guide strips in a snug, sliding fit. Care should be taken in laying out and cutting the openings in the sliding panel to make sure that they register in the two positions with the opening in the bed panel. Rabbeled strips attached

to the back of the sliding panel form slides for the film holder and the focusing hood. When the rabbeled bottom strip is in place, glue a strip of velvet or felt into the bottom of the rabbet to trap extraneous light that might otherwise leak past the bottom of the film holder when it is in position. Figs. 4 and 5 picture the completed parts assembled on the camera. After the assembly has been made and checked for proper fitting of all parts, sand lightly to round the exposed corners and smooth the wood. Then apply a sealer and follow with two coats of flat-back enamel.

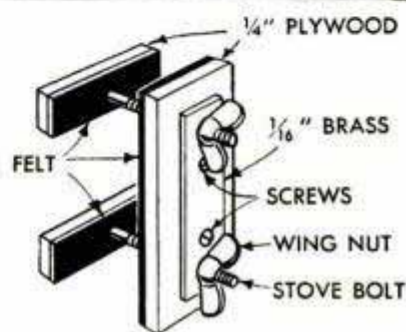


Taking your own photographs for viewing in a stereoscope can be done by using two identical cameras held in a dual mount. The important thing to remember is that the cameras must be fired simultaneously. This, of course, is somewhat tricky to do by hand, but it can be accomplished with satisfactory results. Each shutter should be rotated to position the release lever for the most convenient operation. After focusing, carefully move both levers to a point just short of actual release, as pictured. A slight resistance can be felt at this point. Then, a gentle push with both fingers will release the two shutters simultaneously. Using cable releases, if possible, simplifies synchronizing, as the ends of the cables can be taped together and both plungers depressed with the thumb. Don't shoot slower than $\frac{1}{50}$ second. The two cameras are joined with a machine screw having the head cut off and are kept from shifting by the clamp shown in the detail. Dimensions are not given as these

Identical Cameras Held by Dual Mount Take Photos for Use With Stereoscope

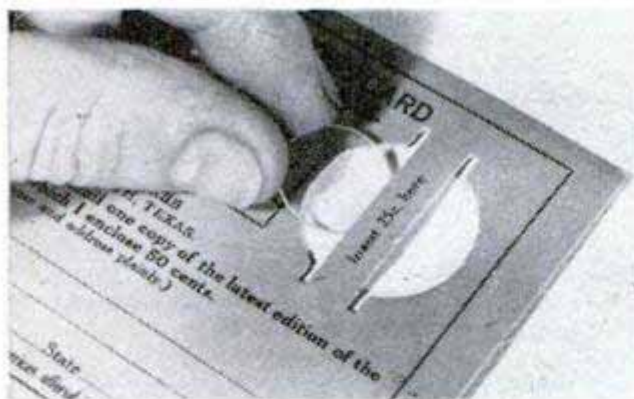


TRIPOD SOCKETS
JOINED WITH $\frac{1}{4}$ - 20
MACHINE SCREW



must be varied to suit the particular type of camera used. It takes only a few seconds to remove the cameras from the mount for individual usage or to reassemble them.

George Lauer, Chicago.



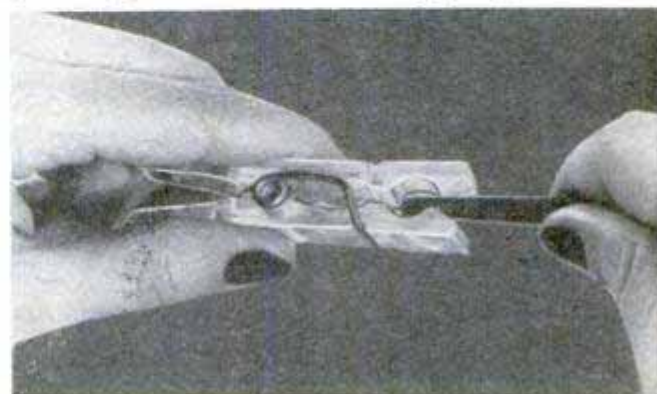
Unmounted Optical Lenses Stored in Coin Cards

Small unmounted lenses used by the hobbyist for optical experiments, or as photographic supplementary lenses, are safely and conveniently stored in 3 x 5-in. coin cards of the type used for sending money through the mail. The cards may be filed in a box or held together with a rubber band. Identification, or other pertinent data, may be written on the card.

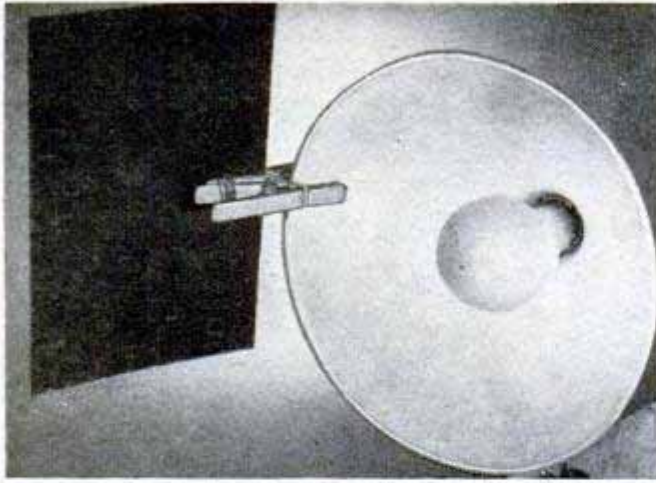
Roughening Jaws of Plastic Clips Keeps Negatives From Slipping

When plastic clips are used to hang sheets of cut film for drying, the emulsion sometimes causes the negative to slip from the jaws and fall to the floor. To keep your negatives from being damaged in this way, just roughen the faces of the clip jaws with a small file to assure a tight grip on the film. A fingernail file will do the trick.

☐ Plastic-coated window screen provides an excellent light diffuser for covering the photoflood reflector of a flash gun.



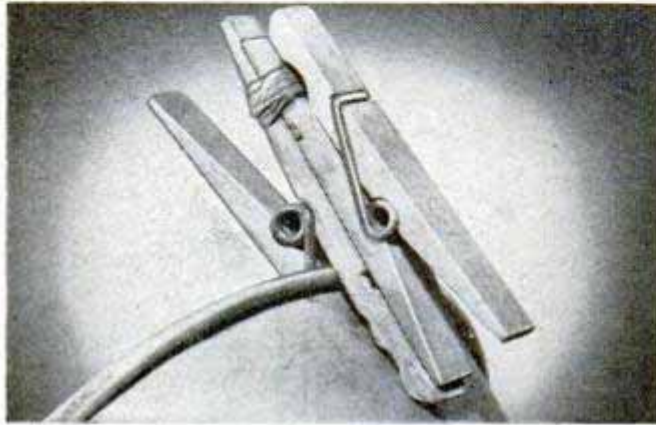
Light Shield Clamped to Reflector With Spring-Type Clothespins



Mounting a sheet of cardboard on a photoflood reflector with two spring-type clothespins provides an effective light shield to protect the camera lens from the direct glare of the lamp or to shade a particular portion of the subject. Fasten the jaw of one of the clothespins to the handle of the other with a rubber band as in the bottom photo. Then clip one pin over the rim of the reflector and clamp the cardboard in the jaws of the other pin.

Mailing Tube Flattens Prints

To flatten badly curled prints, roll them in a reverse direction to the curl and insert the rolled prints in a cardboard mailing tube. Use a 3-in.-diameter tube and leave the prints in the tube for a half hour. — Louis Hochman, Sherman Oaks, Calif.



Clipping Corners of Film Prevents Binding in Tank Reel

Feeding a roll of film into a developing tank becomes a chore that tries one's patience when the edges of the roll invariably seem to bind in the grooves of the tank reel. To lessen the chances of the film stick-

ing in the reel, clip off the front corners of the roll before starting it in the groove. An ordinary fingernail clipper is just the tool for this purpose.

John C. Malocsay, Denver, Colo.

Build Your Own Home and Save Money

The weather now may be anything but suitable for building a home, but these long February evenings can be spent to good advantage in discussing and planning so that you will be ready to start building when the weather becomes suitable. If you feel that a new home poses an insurmountable problem, *Popular Mechanics* has the answer—build the home yourself. You can save over half the cost. We have two Build-It-Yourself homes now, and a third one will be ready about September 1. One, a frame house, is described in a book called **YOUR HOME AND HOW TO BUILD IT YOURSELF**, and the other, a concrete-block house, is detailed in a book called **POPULAR MECHANICS' CONCRETE BLOCK HOUSE**. The third house is a ranch home having many unusual features.

The frame home has four rooms downstairs plus garage and breezeway in addition to space upstairs for three large rooms. Also, it can be built in four different styles. The concrete-block home is a one-story house con-

sisting of five rooms. It was built two years ago at a cost for materials of less than \$4000. Both of these houses were constructed by inexperienced persons. The frame home was built by two boys, 18 and 23 years of age. One of the artists employed by *Popular Mechanics* constructed the concrete-block house. If these inexperienced people could do it, you need not hesitate. While the houses were being constructed, books and blueprints were prepared to guide the inexperienced builder in duplicating the homes. The book on each house, by means of photos, diagrams and descriptive text, takes you through the construction step by step. Like the 52,680 other people who have purchased these books and the 2800 who have purchased blueprints, why don't you order now and get your new home started? The book on the frame house, **YOUR HOME AND HOW TO BUILD IT YOURSELF**, is \$3.00 and a set of blueprints is \$12.50. For the book on the concrete-block house, send \$2.00. Blueprints are \$12.00 a set.

Books and blueprints are available from Popular Mechanics Book Dept., 208 E. Ontario St., Chicago

SHOP NOTES

PIPE FITTING AT HOME

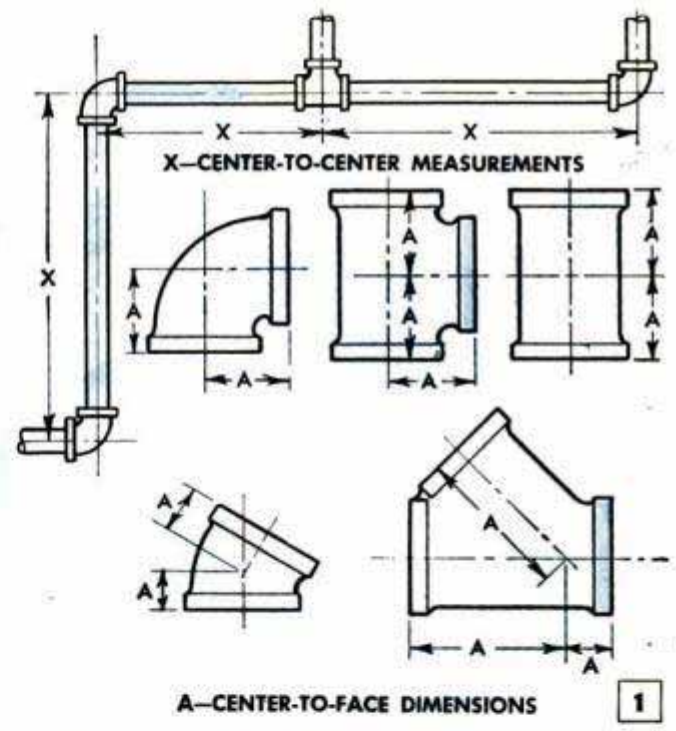
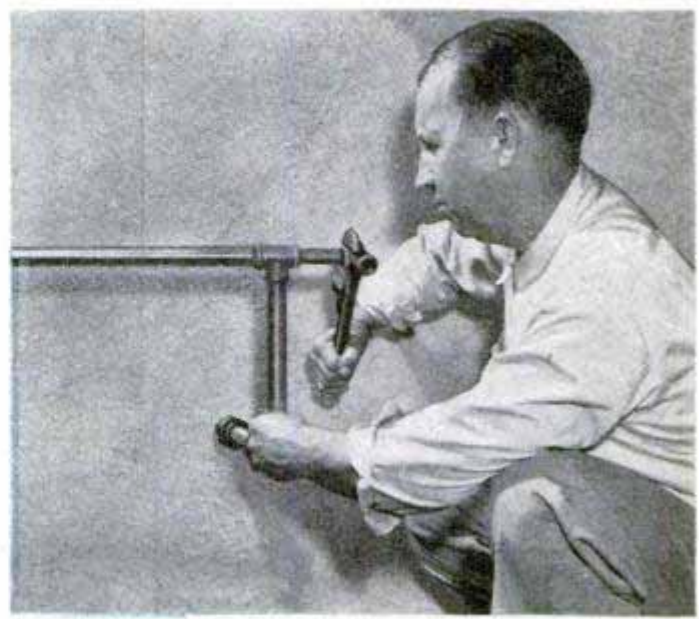
It's easy when you know the right way to measure pipe and how to cut, thread and assemble it

By E. R. Haan

DO YOU want to replace a section of water pipe, change the location of a hot-water tank, or install a new plumbing fixture? Often you can save time and money by doing these simple plumbing jobs yourself. All you need are a few inexpensive tools and a knowledge of the essentials of pipe-fitting practice.

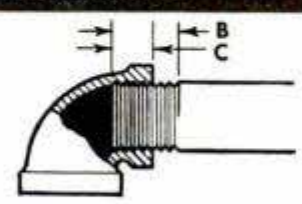
Correct measurements: Center-to-center measurements, which are necessary to lay out the job, are determined as shown in Fig. 1. The actual pipe lengths must be shorter than the center-to-center dimensions to allow for fittings and for the portion of the pipe that enters them. To determine exact lengths, subtract dimension A (center-to-face distance) of fittings from the center-to-center dimensions. Then add dimension C, Fig. 2.

Tools needed: Either of the vises shown in Fig. 6 will do, or you can use a machinist's vise fitted with detachable pipe jaws. You'll need two pipe wrenches for the average home plumbing jobs, an 8-in. and a 10-in. wrench. Using too large a wrench may result in buckling the pipe. The proper size wrenches for various pipe sizes are given in Fig. 6. You'll also need a pipe cutter, a reamer and a die stock with threading dies of the



2 CORRECT MEASUREMENTS

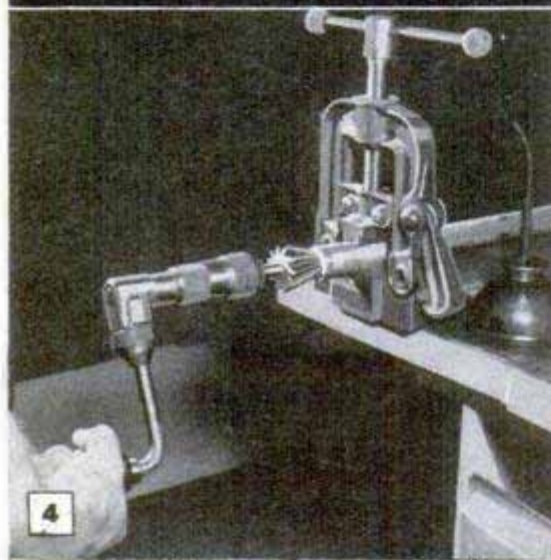
THREAD DATA FOR STANDARD-WEIGHT PIPE



Size Pipe	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
Thread Lgth. "B"	3/8"	3/8"	13/16"	13/16"	1"	1"	1"	1 1/16"
Thread Screwed Into Fitting "C"	3/8"	7/16"	5/8"	5/8"	1 1/16"	1 1/16"	3/4"	3/4"
No. of Threads Per Inch	18	18	14	14	11 1/2	11 1/2	11 1/2	11 1/2



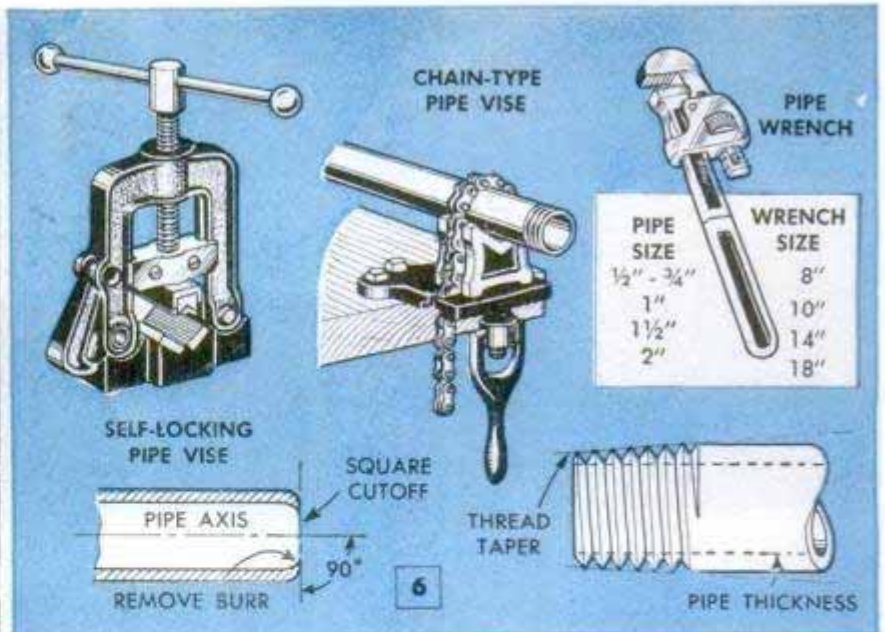
CUTTING



REAMING



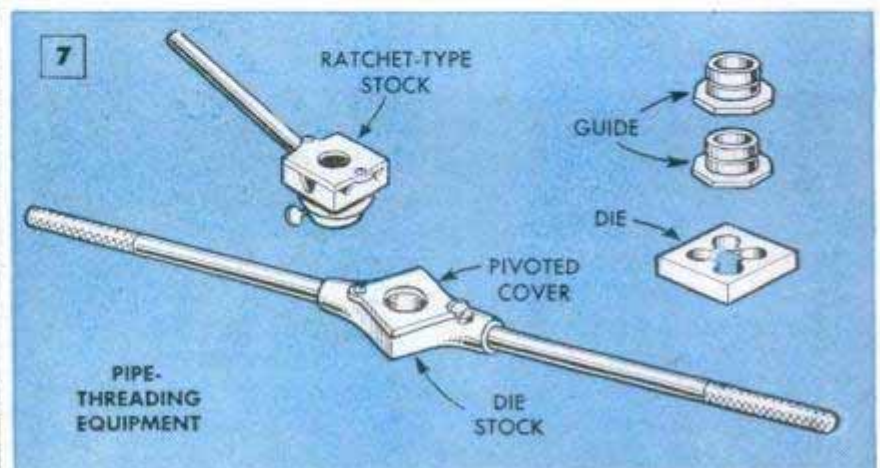
THREADING

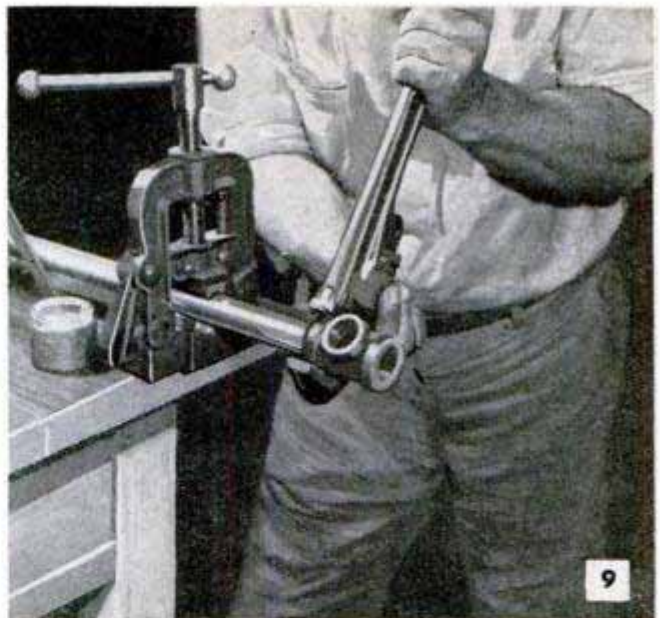
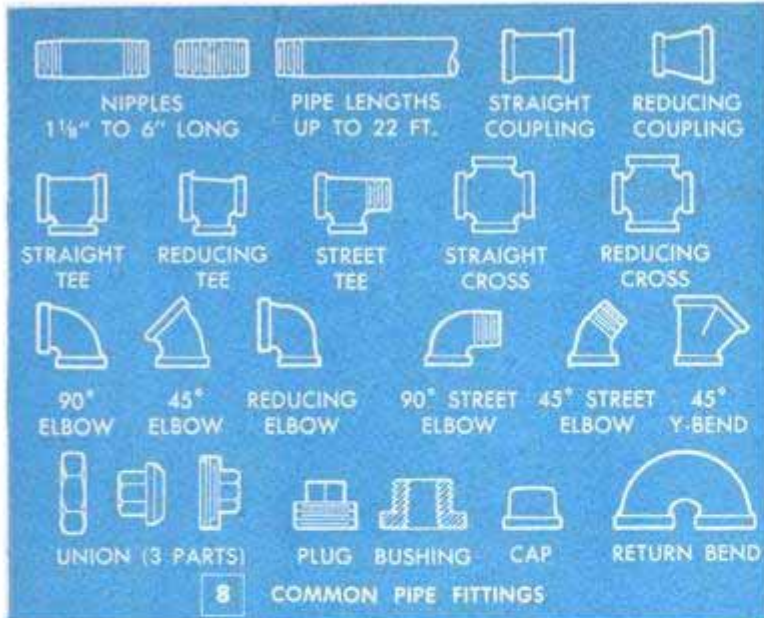


sizes required. Cutting oil is used for lubrication and also to dissipate heat caused by the cutting action of the die.

Cutting off and reaming: Good pipe joints have the ends of the pipe cut off at 90 deg. to the axis, Fig. 6. It's best to use a regular pipe cutter, Fig. 3, rather than a hacksaw. First mark the pipe for cutting, not less than 1 in. from the end. Then grip it in the vise so that the mark extends far enough to permit the cutter and threading tool to clear the bench. Set the cutting wheel on the mark and screw the handle down so that the rollers rest firmly on the pipe. Apply cutting oil and proceed, screwing down the handle a little each time the cutter is rotated. When cut, use a reamer chucked in a carpenter's brace, as in Fig. 4, to remove the burr formed inside the pipe.

Threading: Pipe dies, Figs. 5 and 7, are held in a stock, which is fitted with handles for turning. The ratchet-type stock has only one handle. Ordinary pipe stocks hold dies of several different sizes. There are two types of dies—the solid, non-adjustable type and the split die, which is adjustable for wear and cutting depth. A different die is required for each size of pipe. In a stock-and-die assembly there also is a guide bushing—one for each pipe size within the capacity of the die stock, or one that is adjustable for size. The bushing slips on the pipe first and lines up the die on the end of the pipe. Pipe dies cut tapered threads



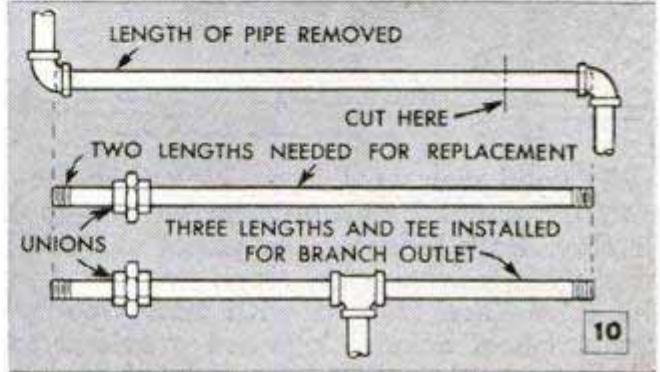


as in Fig. 6, and for this reason it is necessary to make sure that the die is placed in the stock so that the largest diameter faces the guide.

After slipping the guide bushing over the pipe, press the die teeth on the pipe slightly while turning the stock slowly to the right. Keep the handle at right angles to the pipe and apply a steady pressure until the die engages. Apply cutting oil liberally. Then start the thread by turning the stock forward a half turn and then back a quarter turn to break the chips. Now turn the stock slowly to avoid excessive heating, and apply cutting oil every two or three turns. Stop threading when the end of the pipe projects slightly beyond the small end of the die. This distance indicates that a thread of approximately standard length (dimension B of Fig. 2) has been cut.

Assembling pipe and fittings: Fig. 8 shows common pipe fittings you will use in an ordinary pipe assembly. Before assembling pipe and fittings, clean the threads with a wire brush to clear them of chips. Then spread pipe-joint compound on the threads of the pipe—never apply it to the internal threads of a fitting as it will be forced inside the pipe and may start an obstruction or taint the drinking water. Turn on a fitting by hand for three or four threads, after which a few more turns with a pipe wrench will draw it up snugly. Tighten the fitting on the pipe while it is still held in the vise, Fig. 9, and before threading the opposite end. This prevents accidental damage to threads and keeps the dirt out. It is not necessary to draw the fitting unduly tight. A moderate pressure on the wrench is sufficient. Excessive wrench pressure may distort the fitting or even strip the threads.

Replacing part of pipe: When a defective pipe is replaced, or when a new branch line is cut into an existing one, Fig. 10, it



generally is necessary to saw the latter to permit unscrewing it except, of course, when there's a union to "break" the line. First shut off the water supply and drain the system by opening a faucet. Cut the pipe about 4 in. from a joint, never less if avoidable, and unscrew both pieces. The new section is made up of two lengths and a union, the total length of which should be equal to that of the old pipe. The same method is followed in installing a branch line, three lengths of pipe, a tee and a union being required. When tightening a union, Fig. 11, you'll need two wrenches to prevent the pipe from turning.

Sidewalk Display Panel



Plywood was used in making this eye-catching panel for an outdoor garden-tool display. Both sides of the panel are covered with bright grass-green matting and the edges are framed with thin wooden strips. Short curved legs are provided to hold the panel upright. A variety of garden tools attractively arranged on both sides of the board are wired securely in place. The display is then set up on the sidewalk.

Opie Read, Jr., Chicago.

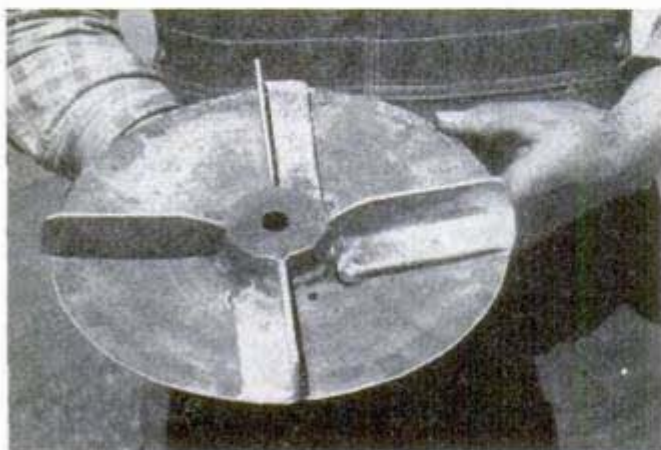
Emery Board Cleans Eraser

Your typewriter eraser can be cleaned quickly by rubbing it against an ordinary emery board. Fastened with cellulose tape to the side of the typewriter or to an out-of-the-way spot on the desk, the emery board is always at your fingertips.

I. M. Fenn, Chicago.

Increasing Throw of Seeder

By welding fins and a hub to the concave side of an 11-in. harrow disk, and substituting it for the original disk of a broadcast

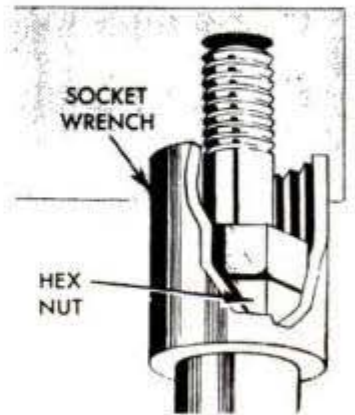


seeder, one farmer increased the throw of his seeder 15 to 25 ft. Because of the concavity of the harrow-disk slingers the seed is thrown at a higher angle than normal, which causes it to travel farther even when seeding against a side wind.

L. H. Houck, Jefferson City, Mo.

Socket Adapted for Short Bolts

It sometimes is difficult to start short bolts with a socket wrench as the depth of the socket does not allow enough of the bolt thread to be exposed. When this is the case, drop a hex nut in the bottom of the socket before inserting the bolt. This adds the thickness of the nut to the distance the bolt threads will project from the socket.



Ratchet Die Stock From Bit Brace

A ratchet die stock for threading work in hard-to-get-at places can be made from a bit brace by removing the universal jaws and welding a holder for a button die to the chuck sleeve. To make the holder, a short length of steel bar stock, slightly larger in diameter than the die to be used, is chucked in the lathe and a 1/2-in. hole is drilled clear through. This is counterbored

to an easy sliding fit for the die and is just deep enough so it sets flush with the surface. After reversing the stock in the chuck, the opposite end is counterbored and bevel-shouldered to a depth of 1/8 in. so that it fits over the tapered end of the drill-chuck sleeve. This permits the die holder to be accurately centered on the sleeve when being welded. The weld is ground to a smooth fillet and the job is finished by drilling and tapping a hole for a setscrew transversely through the rim of the holder.



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D. C. Marshall, Manhattan, Kans.

Printing can be removed from flour bags by soaking them in kerosene for 24 hrs. and then boiling them for 30 min. in a strong solution of laundry soap and water. Repeat the process if necessary.

HANDY MASH CART

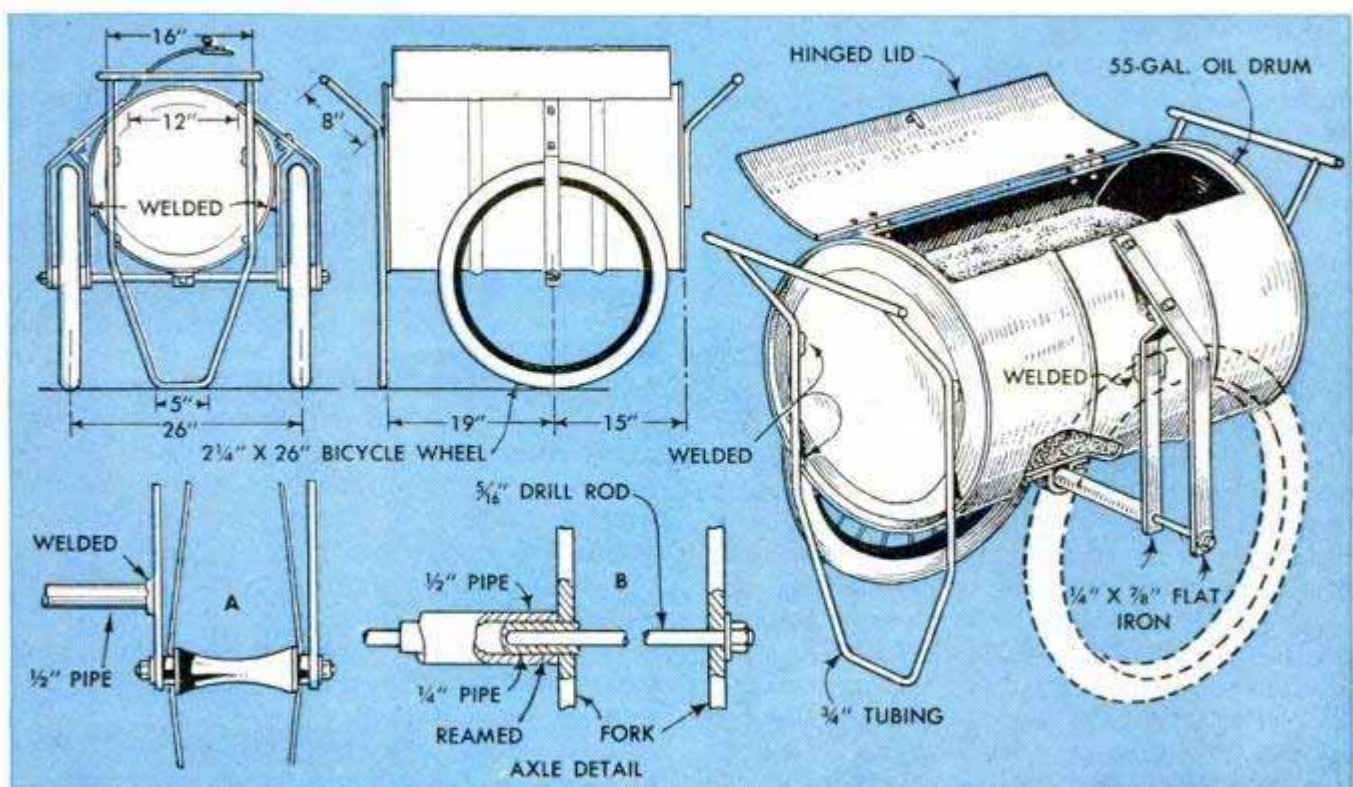
from oil drum



By Hi Sibley

ALTHOUGH designed and built especially for a poultryman's needs by Loren Salkeld of Nuevo, Calif., this cart also is well adapted for use in the dairy barn and farrowing house where it is necessary to pass through narrow feeding alleys. It consists of an oil drum mounted on a bicycle-wheeled truck having a tread width of only 26 in. Handles welded to each end of the drum make it unnecessary to turn the cart around in narrow alleys when it has been unloaded. Cut a full-length opening in the side of the oil drum and fit a hinged sheet-metal lid with a latch. *Caution:* If you use a torch for cutting the drum, be sure to steam-clean the drum first to avoid the

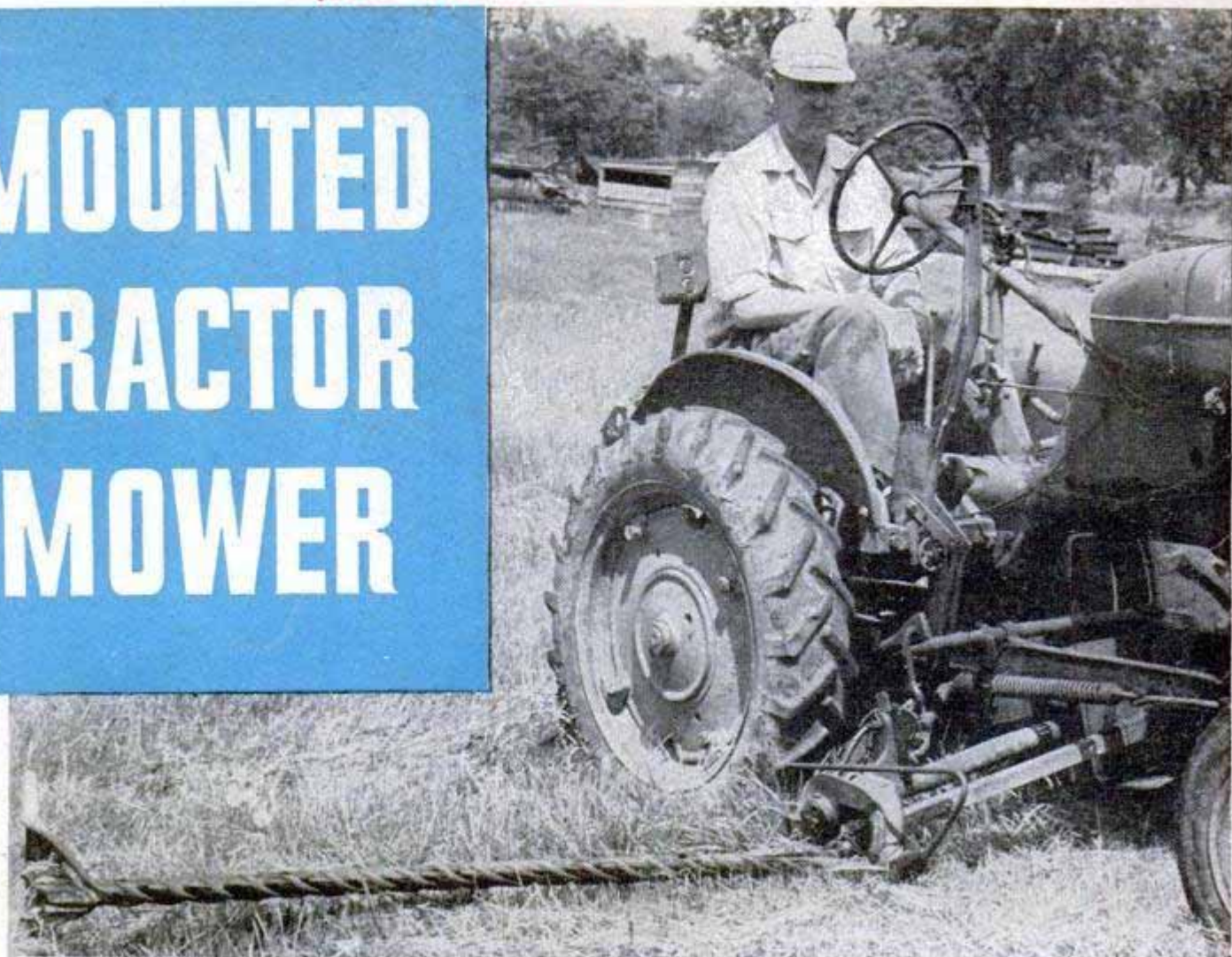
danger of an explosion. Then form handle frames from pipe, tubing or conduit and weld lengths of pipe across the free ends to provide handles. Weld the units to the ends of the drum. Note that one handle frame extends below the drum to form a foot on which the cart rests when stationary. The bicycle wheels are mounted in improvised forks, the inner member of each one being welded to the side of the drum as detailed. The outer members of the forks are held in place with bolts so that they may be removed. Details A and B show two methods of mounting wheel axles. Although most wheels can be mounted as in A, some will require the other method.



July

Farm Manual

MOUNTED TRACTOR MOWER

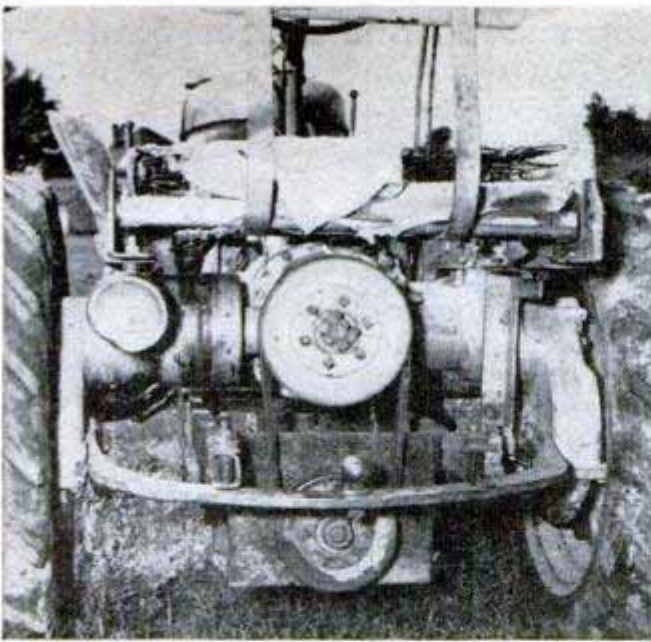


By L. H. Houck

MOST FARMERS prefer a tractor-mounted mower to a towed one because of the convenience of operation and the ability of the self-contained unit to operate over rough ground. It is especially suitable for mowing irregularly shaped fields and pastures where it is necessary to make short turns and where a clear view of the sickle is essential. The mower pictured above and on the facing page was built in the farm workshop by utilizing parts from a horse-drawn mower, the side members of a car frame, a Chevrolet drive shaft and miscellaneous pieces of flat steel and steel bar stock. As designed and detailed, it fits an Allis-Chalmers Model B tractor. Of course, some changes in the dimensions and shape of the parts will be necessary to adapt the mower unit for use on tractors of other makes, such as changing the width and perhaps the length of the underslung frame slightly, as well as relocating the mounting brackets. In some instances it also may be necessary to weld an X-brace between the side frames either at the front or back end of the frame unit. Only sections of the side members of the car frame are used and these must be cut to a length to suit the tractor. Note that a

flat steel stiffener is welded lengthwise in each car-frame channel and that four of the spacers are cut from flat steel stock. Holes are cut in the spacers with a cutting torch to provide openings through which the Chevrolet drive-shaft housing is inserted. The spacers are welded between the frames as shown but, before you weld them in place, it's a good idea to take careful measurements to see that there is plenty of clearance under the tractor. On some tractors it will be necessary to mount the drive-shaft housing somewhat higher in relation to the frame than is shown in the detail. On others it can be mounted proportionately lower with good results. The front cross member is a piece of $\frac{1}{2}$ -in. flat steel welded between the ends of the frame members. The upper end of the pitman guard is welded to the lower edge of this cross member, and the lower end of the guard is welded to the forward spacer directly under the pitman eccentric. The guard should be cut from heavy, flat steel, not less than $\frac{1}{4}$ in. thick and at least 12 in. wide.

Some machining may be necessary in fitting the V-pulley and the pitman eccentric on the Chevrolet drive shaft. As the drive-shaft housing is slid into place before welding, telescoping rings are slipped over



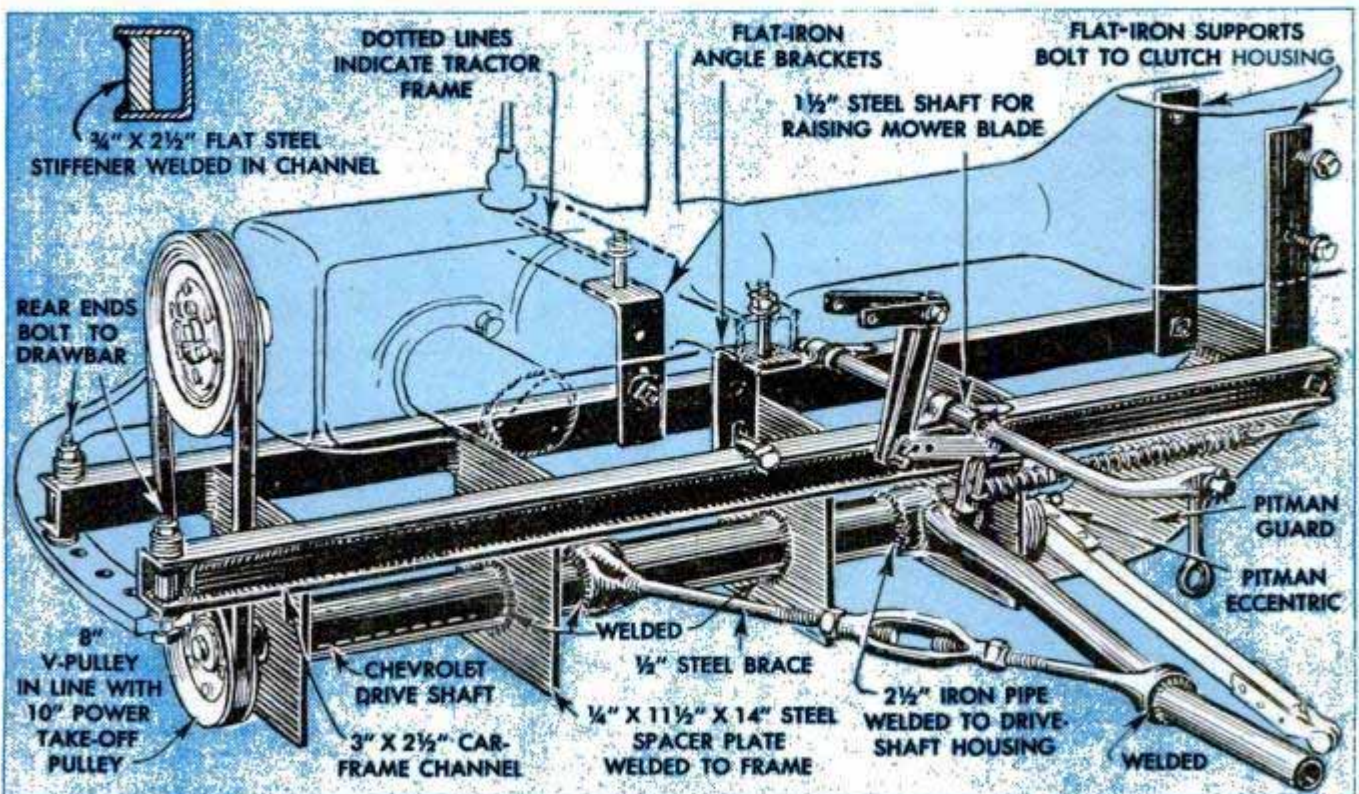
This rear view of the tractor mower shows the power take-off drive and how rear end of the mower frame is bolted to the tractor drawbar. Note V-belt drive

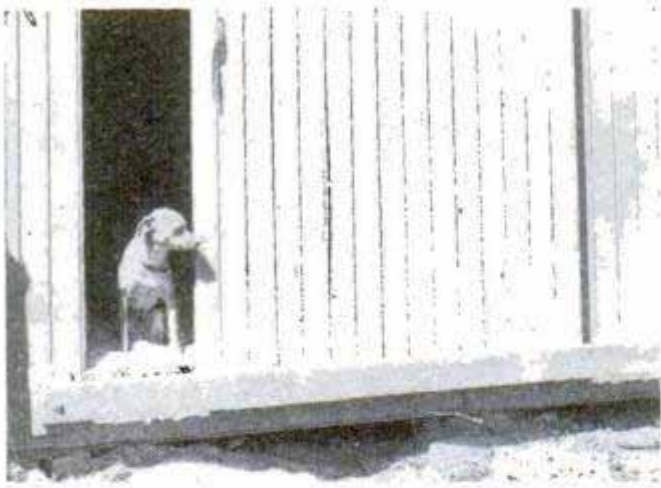
the end as it passes through the space between the second and third, and the third and fourth spacers. The end of the sickle support arm and the support brace are welded to these rings, which are then welded to the drive-shaft housing. Note that the brace is in two parts and that it is fitted with a heavy turnbuckle. A lifting linkage, consisting of a ratchet-type implement lever mounted on the tractor frame and connected to the sickle head through a series of flat-iron links, is easily worked out to suit the tractor on which the mower is mounted. The lower links are connected to an arm welded to the shaft which supports the sickle head. This shaft turns in



Spring-loaded raising and lowering linkage is operated by a ratchet-type implement lever mounted on tractor frame. Parts are connected by flat-iron links

bearings mounted on the mower frame and the outer end is flattened, bent and drilled to take an eyebolt which is attached to the sickle head. A tension spring, attached with eyebolts to the forward end of the frame and to a short arm on the raising shaft, "floats" the sickle, and aids in raising it to clear an obstruction. Note that the bolts holding the center L-brackets are welded on top of the frame. This method of assembly was found to be easier than drilling the holes through the frame and heavy stiffeners. The diameter of the drive pulley on the power take-off must be worked out in accordance with the normal speed of the power take-off shaft.





Guide Protects Sliding Door

A 2 x 4 bolted to the granary wall just outside and slightly above the lower edge of the door will keep the latter from blowing outward in the wind and prevent livestock from working the door open.

A. M. Wettach, Mt. Pleasant, Iowa.

Stopping Water Hammer

The annoying hammer in water pipes can be eliminated by fitting a 1-ft. length of pipe vertically in the line to provide an air cushion. Use a tee to install the air cushion in the line at any connection of two lengths of pipe, making sure that the 1-ft. length is vertical and tightly capped.

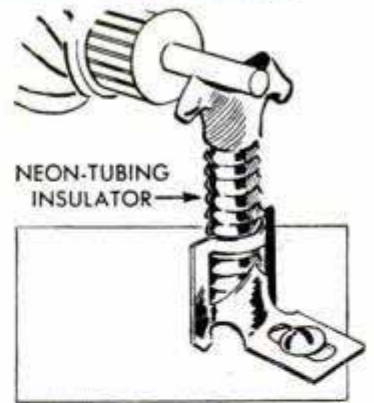
Truck Body Fitted With Rain Shields

Rainwater running down the sides of a closed body mounted on the bed of a pickup truck sometimes accumulates on the floor of the truck bed. This can be prevented by installing rain shields on each side of the closed body as pictured. The shields are cut and bent from heavy galvanized sheet metal and are wide enough to extend beyond the rolled and flared edges of the pickup bed. The shields are attached to the sides of the closed body with screws and the joints are sealed with calking compound to make them watertight.



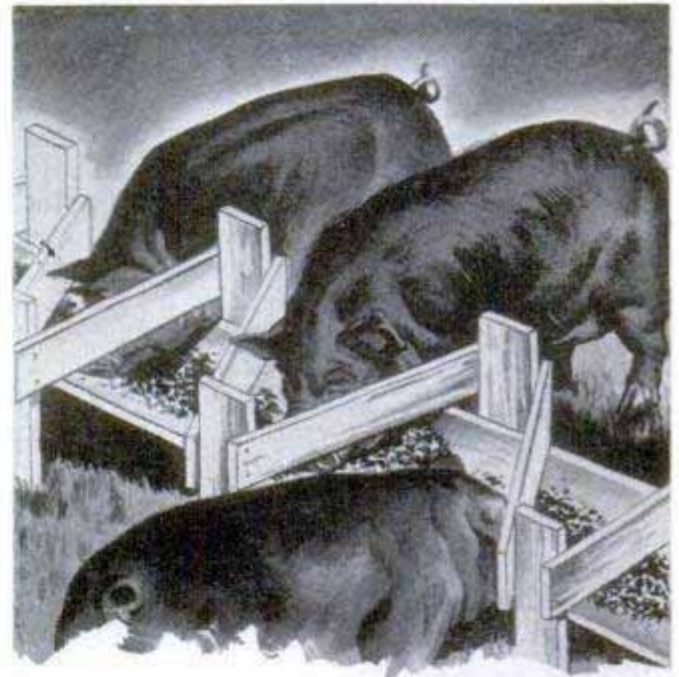
Improved Armature Test Stand

Mounting two neon-tubing insulators on a board provides an excellent test stand for small armatures. Locate the insulators in line, spacing them to take both ends of the armature shaft and blocking them up, if necessary, to gain the desired height above the board. Because complete insulation is obtained, the stand is especially suitable for using test prods on commutator segments.



C. W. Philpot, Laurens, S. C.

Wooden Partitions for Hog Troughs Prevent Crowding at Feeding Time

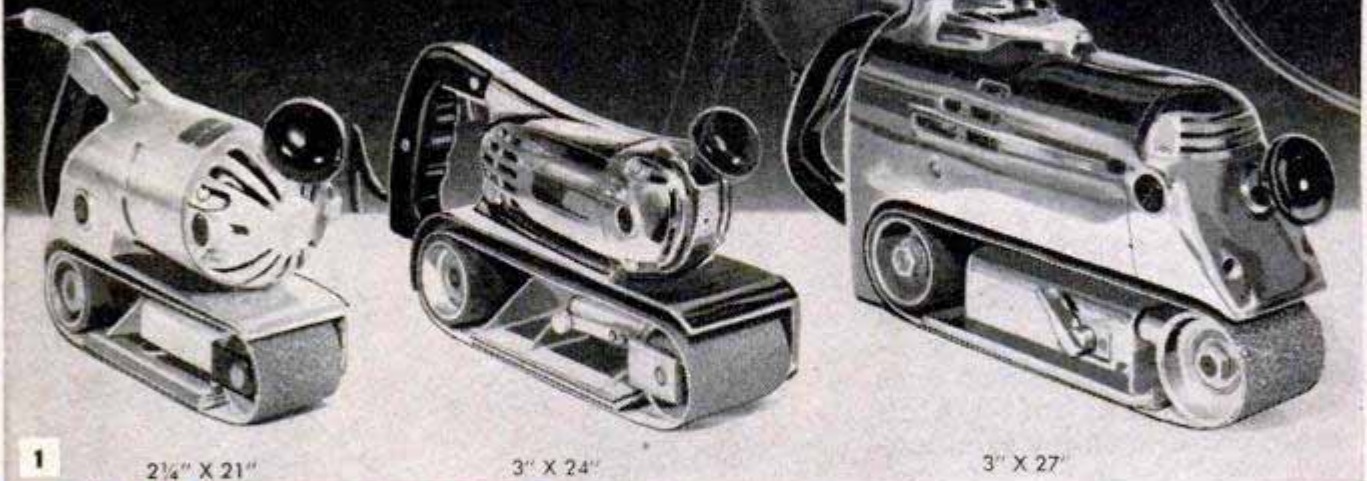


Partitioning the hog trough as pictured will assure that smaller pigs get their full share at feeding time. Built of 1 x 4-in. stock, with the uprights fitted into notches cut in the sides of the trough, the zigzag partitions are spaced 18 in. apart. This allows plenty of room for each hog and prevents crowding as milk, grain or other feed is poured into the trough.

Using Red Ocher on Chalk Line

When you wish to use a chalk line to snap several lines consecutively, use a solution of red ocher and water instead of chalk. Soak the line in the solution and use as with chalk. The easily seen mark will not rub off readily and the line can be reused without soaking until the moisture dries out.—G. L. Shahan, Santa Ysabel, Calif.

NAME SIZE OF PORTABLE BELT SANDERS IS THE WIDTH AND LENGTH OF BELT. SANDERS WEIGHING 8 TO 12 LBS. ARE BEST FOR AVERAGE LIGHT WORK. THE 3 X 27-IN. MACHINE IS FITTED WITH A DUST-COLLECTING MECHANISM



1 2 1/4" X 21"

3" X 24"

3" X 27"



SHORT, STRAIGHT STROKES OVERLAP TO COVER WHOLE SURFACE UNIFORMLY



ARM MOVEMENT IS PARALLEL WITH THE GRAIN



SANDING ACTION IS ALWAYS PARALLEL WITH BELT



CROSS SANDING IS FIRST OPERATION IN LEVELING WIDE WORK

DROP DOWN



HEEL OF SANDER TOUCHES FIRST. FRONT IS THEN LOWERED AS SANDER MOVES FORWARD ON THE SURFACE

SMOOTH IT WITH

By Sam Brown

PORTABLE belt sanders make sanding a fast, easy job on nearly all types of woodworking projects. Finishing will improve, too, because half of the work of applying a good paint or varnish job is in surface preparation of the wood. Straight-line sanding with fine abrasive belts produces a surface that is ideal for the application of the various finishing materials. Belt sanders also are used for removing paint, and for grinding and polishing metals and plastics.

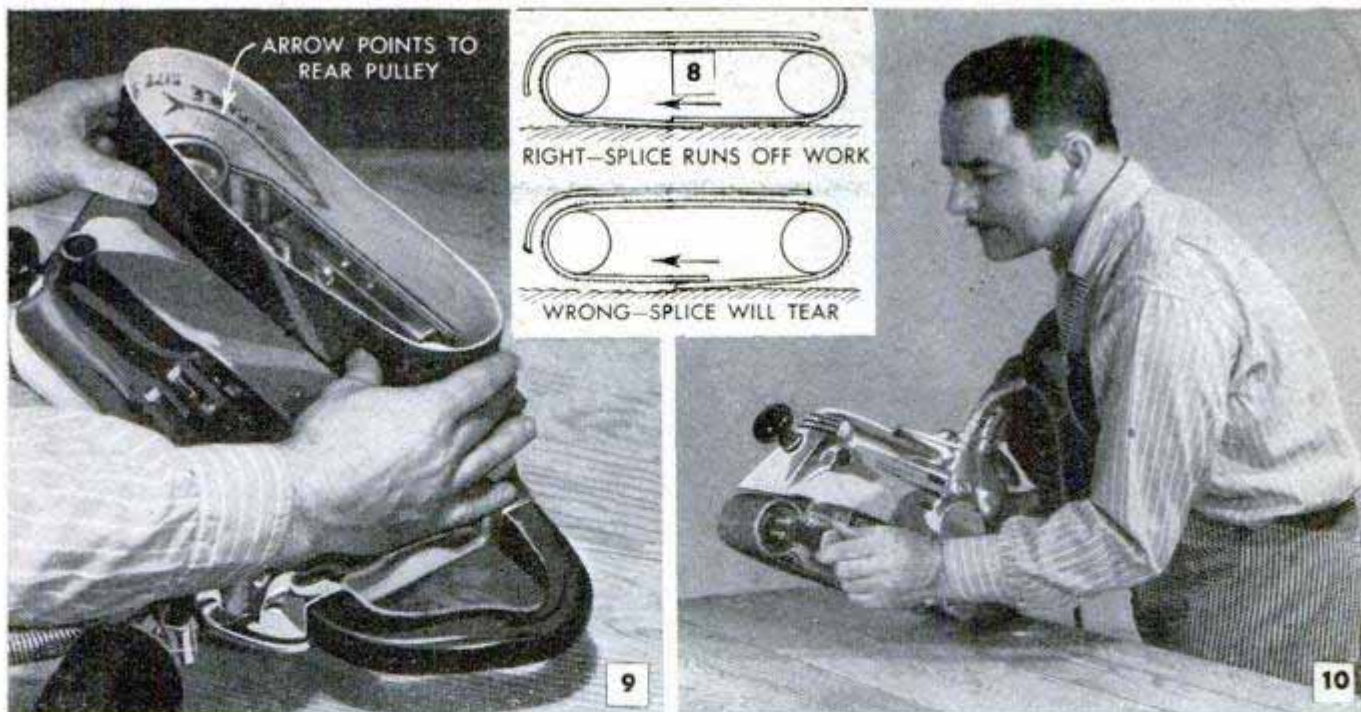
Machine sizes: The width and length of the belt in inches is the name size of the portable belt sander, Fig. 1. About the smallest practical unit has a 2 x 21-in. belt and the largest, 4 1/2 x 26 in. For surface sanding on large pieces, big machines weighing about 25 lbs. will sand much faster than the smaller, lighter machines, but either kind will produce a top-rate finish on any cabinet wood. Holding large sanding machines against the side of a boat is a difficult, tiresome job,



6 9-LB. PORTABLE SANDER IS EASY TO HANDLE ON VERTICAL WORK



7 25-POUNDER CUTS ABOUT TWICE AS FAST AS LIGHTWEIGHT UNIT



A PORTABLE BELT SANDER

but the 8 to 12-lb. machines make this work simple and fast, Fig. 12. In the home workshop, smaller machines in a size range from 2 x 21 to 3 x 24 in. probably are the best all-around choice. The dust-collector type, like the 3 x 27-in. size, Fig. 1, is often preferred, as the efficient collecting mechanism prevents fine dust from being distributed over the shop. However, on occasional sanding jobs the small amount of dust produced is not so objectionable, as most of it can be brushed onto the floor and collected with sweeping compound.

Belt adjustment: Sander belts are spliced and should be put on the machine so that the splice runs off the work as in Fig. 8. An arrow stamped on the back of each belt indicates the direction in which it should run, Fig. 9. After the belt is in place on the pulleys, it is tracked as in Fig. 10.

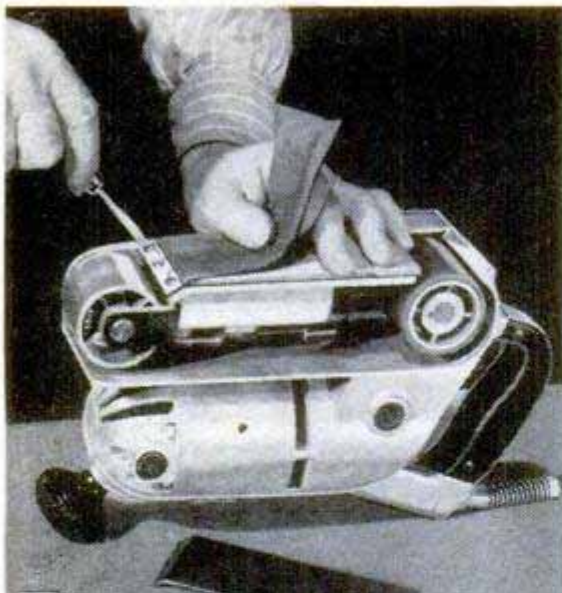
Sanding stroke: Operating a sander is very easy and Fig. 5 shows how to start the stroke. Most belt sanders have a trigger switch of the momentary-contact type, which means that you have to hold the trigger to keep the switch "on." The machine automatically stops



ALUMINUM-OXIDE BELT IS BEST FOR SANDING WOOD OR METAL



BELT SANDER IS A MUST FOR SUCH JOBS AS SANDING BOAT PLANKING



14

SOFT SHOE IS USED ON UNEVEN SURFACES SUCH AS PLASTER. ALSO FOR FINISHING

when the trigger is fully released. In starting the stroke, tilt the machine backward so that it rests on its heel plate and the belt clears the surface, and then pull the trigger switch. Lower the sander slowly to the horizontal position and immediately move it forward. After becoming familiar with starting the sander, practice the faster "airplane" stroke by merely bringing the heel of the belt in contact with the work and then leveling out in a sweeping forward motion. Ordinarily, the sanding stroke is straight back and forth, Fig. 2, gradually working the sander sidewise to cover the width of the work. In rough sanding, the sander is held at an angle, Fig. 3, while the arm movement is parallel to the grain. In the case of exceptionally wide work, the initial operation is done across the grain as in Fig. 4. When rough sanding open-grain woods with a coarse belt, never sand with the grain.

Special sander shoes: The standard backing shoe supplied with the portable belt sander is a



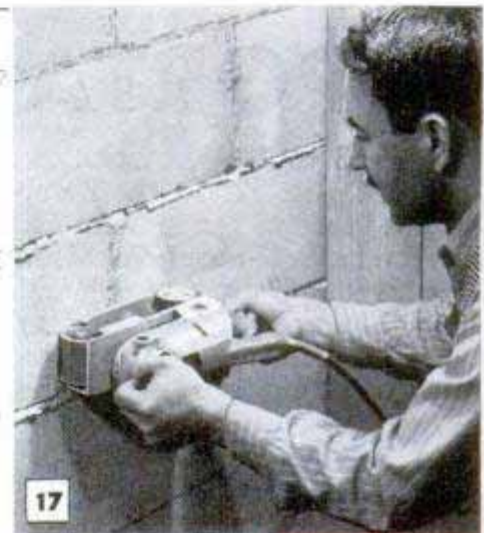
15

HUMP SHOE IS FAST FOR SPOT-SANDING JOINTS OR OTHER RAISED AREAS



16

SPOT SANDING WITH TOE



17



19

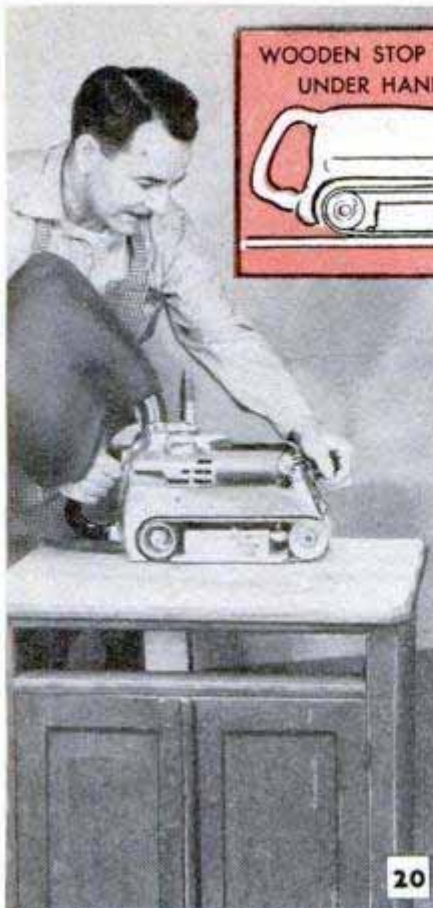
18 BELT SELECTION

Material or Job	Rough	Finish	Fine	Remarks
Hardwoods	2	1/0 (6)	3/0 (6)	Coarse Belt Electro-Coated Alum.
Softwoods	1½	1/0 (6)	2/0 (G)	Oxide, Use At Angle To Grain Of Wood
Aluminum	40	60-80	100	A.O. Open. Use Quick Short Strokes
Steel	24 - 30	50-80	100	A.O. Standard Closed Coat
Boats	2 (A.O.) (E.C.)	½ (G)	1/0 (G)	Use Soft Shoe For Finishing
Oak Floors	2	½	1/0	A.O. Or Garnet. Rough With Diag- onal Stroke
Plastic	60	120	240	Use Cloth Belt And Compound For Finishing
Plaster	½	1/0	2/0	A.O. Or S. Use Soft Shoe For Finishing
Concrete	3½ (S)	1 (S)	½ (S)	Hard Materials. Abrasives Are Not Fast Cutting
Slate Blackboard	80 (S)	120 (S)	150 (S)	
Toothing Paint			2/0 - 3/0	E.C., A.O. Use Soft Shoe
Removing Paint	2½ - 3½	1½		Open A.O. Lift Sander At End Of Each Stroke

G - Garnet E.C. - Electro Coated S - Silicon Carbide
A.O. - Aluminum Oxide Open - Open Coat

CONVERSION TABLE
"O" SERIES
TO GRAINS
PER INCH

3½ - 20
3 - 24
2½ - 30
2 - 36
1½ - 40
1 - 50
½ - 60
1/0 - 80
2/0 - 100
3/0 - 120
4/0 - 150
5/0 - 180
6/0 - 220
7/0 - 240
8/0 - 280
9/0 - 320
10/0 - 400



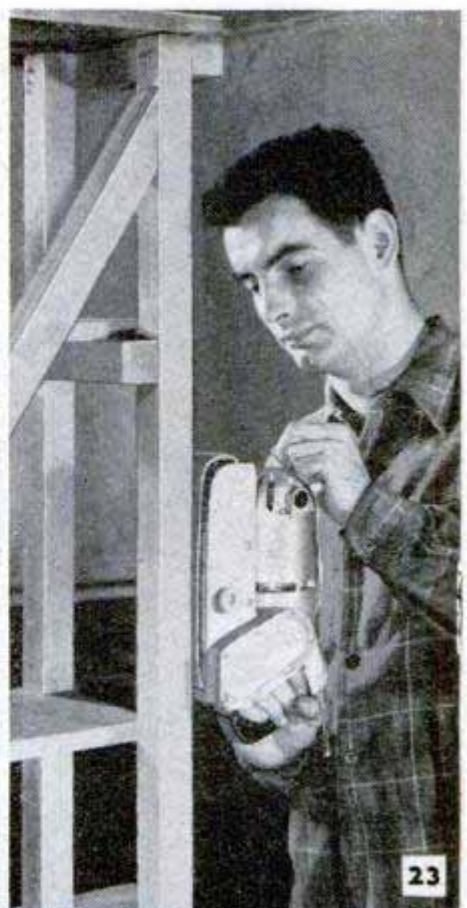
20

REMOVE PAINT WITH QUICK STROKES TO AVOID OVERHEATING



22

FLUSH RIGHT SIDE OF MACHINE PERMITS SANDING INTO CORNERS



23

VERTICAL SURFACES ARE SANDED BY STARTING STROKE AT THE TOP

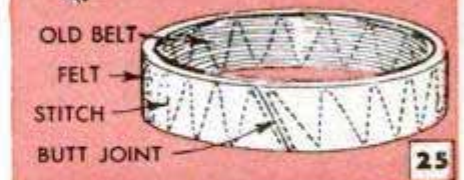
flexible sheet-metal plate cushioned with sheet cork or other soft material. This shoe is satisfactory for all common surfacing operations, but there are instances where special improvised shoes can be used to adapt the machine to a wider range of work. An example of this is the soft shoe, Fig. 14, that conforms to slight irregularities in the surface without digging in on the high spots. The hump shoe, Fig. 15, is especially useful for spot sanding on a large surface, or cutting down glue or mortar joints as in Fig. 17. Another way to cut down mortar joints is shown in Fig. 16, but the work is not as smooth as that done with a hump shoe.

Sanding vertical surfaces: Methods of sanding vertical, or near-vertical, surfaces are shown in Figs. 6, 12, 13, 17, 19, 23 and 24. Except when using a balance reel, Fig. 13, or an improvised counterbalance as in Fig. 19, the heavier machines are not satisfactory for use on vertical work. It's better to use the smaller machines weighing 10 lbs., or less, as in Figs. 6 and 23. Most of this work is done with an up-and-down stroke, which is started as in Fig. 24 by angling the machine slightly so that you can see the right edge of the belt. As the stroke is started, tilt the machine so as to bring the right edge of the belt into contact, then level the machine and simultaneously sweep the stroke to the left. This procedure will offset the tendency to dig in at the beginning of the stroke.

Removing paint: This job is done effectively with the belt sander, but you have to take special precautions to avoid gumming, or loading, of the abrasive surface of the belt. Use of an open-coated belt specially made for coarse-sanding operations and paint removal will help to prevent this trouble. Heat generated by the abrading action of the belt softens paint quickly, so the trick is



24



25

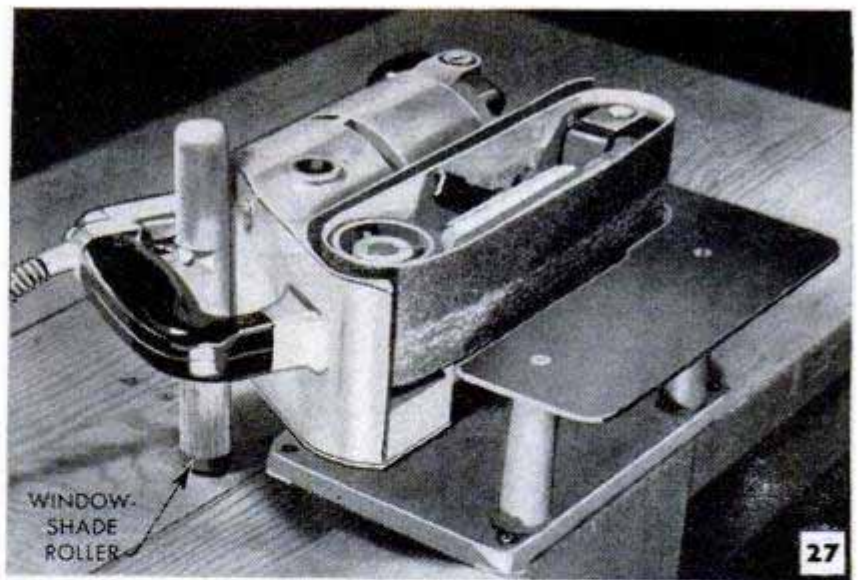


26

POLISHING BELT OF FELT CAN BE USED WITH COMPOUND ON PLASTIC



STATIONARY MOUNTING ON AUXILIARY TABLE MAKES PRACTICAL SETUP FOR EDGING WORK



to use a short, backward stroke, Fig. 20, lifting the machine at the end of each stroke. Sometimes a hump shoe works advantageously by reducing the contact area. Where the paint film is thick, consisting of several heavy coats, move the machine to a new area after each stroke to avoid heating the paint unduly.

Belt selection, special procedures: The table, Fig. 18, gives the data on belt selection for various uses. If you can't stock all the belts listed, then use No. 1 aluminum oxide for all jobs except paint removal. A No. 2/0 belt is just right for finish sanding. Finer belts tend to heat unduly on some cabinet woods. When sanding a door, as in Fig. 7, or a cabinet end as in Fig. 22, work to the edge with the right side of the machine, from which the edge of the belt is visible. In door sanding, this is especially important to avoid sanding into the cross grain where the rail meets the stile, Fig. 7. Also, the right side of the machine is flush, enabling you to work up to a baseboard, or into a corner as in Fig. 22. When working on floors or on housed panels, attach a stop to the front of the machine as in Fig. 21, to guard against overrunning and damaging the panel frame or the baseboard. In sanding floors with a portable sander, use essentially the same procedures as described for use on flat surfaces. Because of the small

contact area of the shoe, it is not practical to attempt to sand large floors with this type of sander. The regular floor-sanding machine is much faster and more satisfactory. Grinding and polishing metals and plastics are done as in Figs. 11 and 26. For finishing a wood or metal surface, use a fine aluminum-oxide belt. For polishing metals and plastics, use a felt polishing belt made as in Fig. 25. Most manufacturers of portable belt sanders also supply specially made belts for polishing operations. As a rule the belts are used with a polishing rouge or compound. Do not use oil or other liquids with a polishing belt as this may cause clogging.

Stationary sander table: Nearly all manufacturers of portable sanding machines supply a stationary sanding table as an accessory. Figs. 27 and 28 show a typical stationary table in use. The table is fitted with a special cradle in which the machine is supported on its side as shown, exposing the belt at a right angle to the table surface. This inexpensive unit adds considerably to the versatility of the machine, as a great variety of flat sanding and edging operations can be performed on small parts that must be finished to precise dimensions. Fig. 27 suggests a way of holding the switch in the "on" position by means of a short length of dowel, notched to take the switch knob.

Bags Mask Lights for Painting Cars

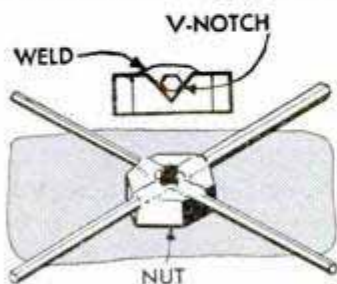
Fog lights, spotlights and other exposed accessories can be protected while spray-painting the car body if they are covered with paper bags or Manila envelopes. Small envelopes can be used to shield the outside mirrors. The bags are slipped over the accessories and secured with strips of masking tape. The coverings are easily removed when the job is finished.

Russell L. Card, Tweed, Ont., Can.

Gutter on Floor of Temporary Crib Eases Shoveling Corn

Difficulty in shoveling corn from temporary cribs was overcome by this farmer who installed a shovel gutter across the floor of the crib. The gutter, which is about 5 in. deep and 24 in. wide, projects 15 in. outside the crib. Corn is easily shoveled out of this smooth-bottomed gutter and is constantly replaced by gravity until the crib is almost empty.

Four-in-One Socket-Key Wrench



Welding the long arms of four socket-key wrenches to a V-notched nut provides a four-way speed wrench for driving socket-head screws. Select four socket

keys in the most widely used sizes and cut off the long arms just before the bend. Then clamp a 1-in. hex nut in the vise and with a hacksaw cut two vees across the face of the nut, making them at right angles to each other. Set the ends of the socket keys in the vees, tack-weld them in place and tap with a hammer to straighten them if necessary. After they are aligned, weld the keys in the V-slots, covering the vees and filling the center hole of the nut. Finish the wrench by grinding the welds flush with the face of the nut.

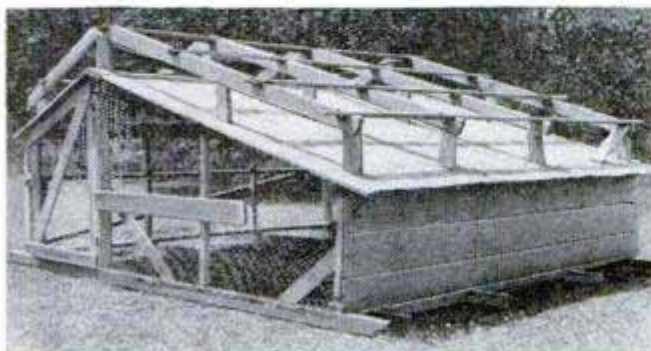
Roy Carlson, Kenosha, Wis.

Air Locates Conduit Outlet

To trace a particular conduit in the maze usually found in shop buildings, use compressed air to locate the outlet. With an air hose, blow a stream of air into the starting end of the particular conduit while a helper passes his hand over the ends of the conduits in the other part of the building. The emerging air stream will quickly identify the conduit in question.

John Krill, North Lima, Ohio.

Strips Nailed Across Range-Shelter Roof Provide Roosts



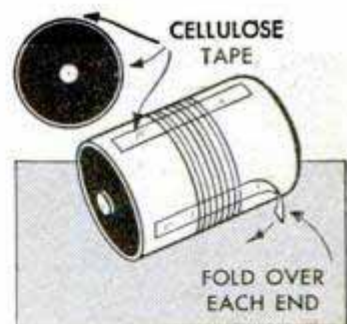
Improved Coil-Winding Form

When winding coils for radios or other apparatus, a flashlight cell with a cardboard covering can be used as a form. Space four strips of cellulose tape at regular intervals around the cell, placing them lengthwise with the adhesive side up. The length of the tape strips

should be slightly more than twice the width of the proposed coil. When the desired number of turns has been tightly wound over the tape, the loose ends of the tape are folded back over the coil and pressed firmly down to keep the winding in shape while it is being handled.

The finished coil can be removed by slipping the cardboard cover off the cell and collapsing it enough so that it may be easily withdrawn from the coil.

Warren W. Howe, Longview, Wash.

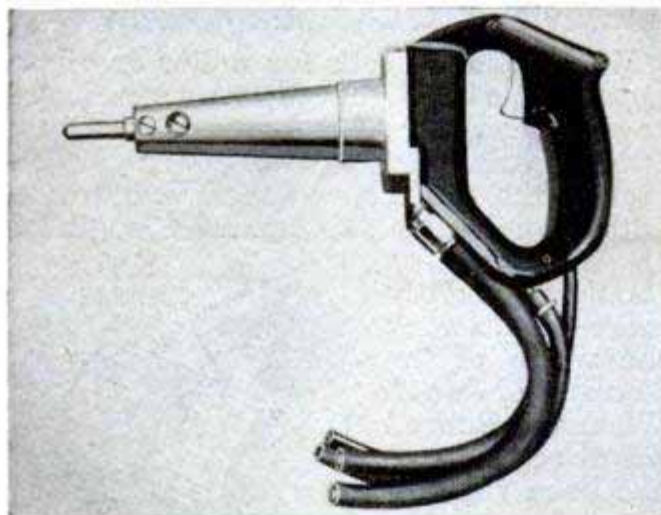


In order to provide ample roosting space for growing poults, one turkey raiser built additional roosts on the roof of each of his range shelters as shown in the photograph. The roost strips are nailed across several false rafters which are supported on posts about 18 in. above the roof surface. The same type of structure can be adapted to the use of range-grown chickens simply by spacing the roost strips somewhat closer together than those for the turkeys.

SHOPPING



TWO GIANT END WRENCHES now available are designed to take the place of as many as 29 ordinary end wrenches made for use on large nuts. These new wrenches are adjustable to nonslip positions by means of a bolt and nut rather than a screw. To change the adjustment, the user simply removes the nut and bolt and slides the movable jaw to the required position. Registering holes in the movable jaw and wrench frame are located to position the jaws for various sized nuts within the capacity of the wrench. The smaller of the pair, 24 in. long over all, adjusts from $1\frac{3}{8}$ to $2\frac{7}{8}$ in. The larger, 36 in. long, adjusts to sizes ranging from $2\text{-}15/16$ to $4\frac{3}{4}$ in.



EXPLOSIVE RIVET GUN for high-speed operation in those blind, hard-to-get-at places has recently been announced. Special design of the gun eliminates need for back-up. No hammers or bucking bars are required. The gun is always ready for instant use on blind riveting and for maintenance and repair work. One operator handles gun for average riveting operations on sheet-metal work, radios, refrigerators, etc.



IGNITION-WIRING REPAIR KIT containing everything needed to make repairs on ignition wiring of auto, aviation and marine engines, includes distributor-cap terminals, spark-plug terminals of both straight and angle types, and also plastic distributor-hood caps. A combination tool for crimping, cutting and wire stripping is included with the kit, which is packed complete in a plastic container having 11 separate compartments

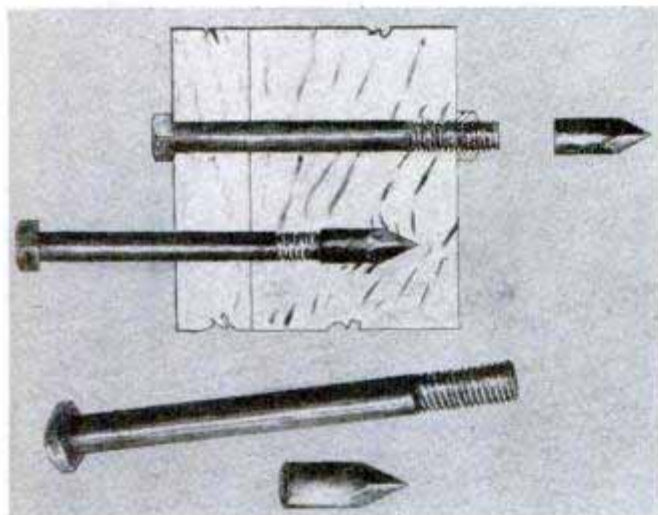


SHAPER AND DRILL-PRESS FENCE has several special features of interest to craftsmen who have small shapers, or do this work on a drill press. Big feature is the unusual combination guard and circular guide. This is adjustable in and out, and up and down, and is on the face side of the fence instead of on the back, as in the ordinary design. After the guard has been positioned as required by the work, it is locked firmly in place with two knurled spin nuts which are turned onto the threaded ends of the studs. In this position, the work passes under the guard and the shaper cutter is completely enclosed, giving maximum safety to the operator

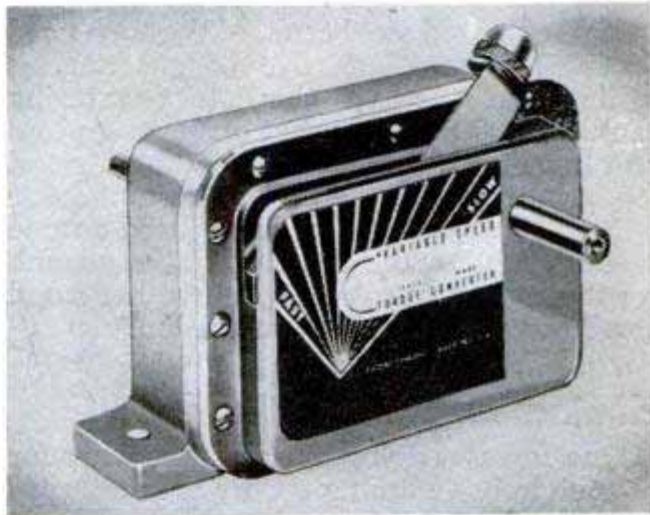
FOR TOOLS



INEXPENSIVE GRADE GAUGE attaches to a level for checking roof pitch, setting drain tile and gutters at the proper inclination, and for checking pipe pitch in plumbing installations. It consists of a short level, or "bubble," mounted on a movable arm which is laid out as a protractor having graduations from 0 to 90 deg. and also for slopes from 0 to 6 in. per ft. In addition, the end of the movable arm has an expanded scale of 0 to 2 in. per ft. for setting long slopes quickly and accurately



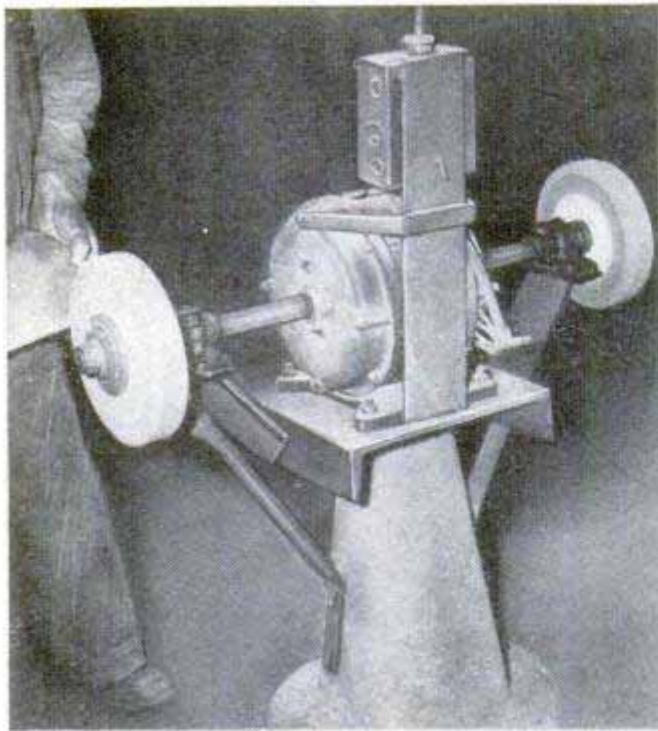
NOVEL DRIVE POINT is available for driving small bolts through two or more pieces of wood in the same manner as a large spike is driven. In use, the adapter, or drive point, is slipped over the threaded end of the bolt, which is then driven through the wooden members to be joined. After the bolt has been driven through the wood, the point is removed and the nut turned onto the threaded end. This procedure entirely eliminates the necessity for drilling clearance holes for bolt. Points are available in sizes from $3/16$ to $3/8$ in.



GEARLESS, NONHYDRAULIC SPEED CHANGER for light drives requiring torque conversion through a wide range of variable speeds gives an even flow of power and reverses without stopping, thus making it easy to incorporate the unit into the design of any product requiring this type of drive. Drive is through a cam-driven connecting rod on the input shaft. This imparts motion to a connecting link which, in turn, actuates an overriding clutch driving output shaft. No time lag occurs when increasing or decreasing speed



RATCHET-TYPE OPEN-END WRENCH having no moving parts is now available to users. Ratchet feature of this new wrench is unique in that all advantages of the conventional ratchet mechanism are gained by a simple basic design of the jaw. Lack of moving parts permits working in limited spaces where even the ordinary open or closed-end wrenches cannot be used. The conventional wrench at the right must be lifted clear of the nut at the end of each tightening or loosening stroke, while the new wrench shown at the left simply ratchets back to the original position without being lifted from the nut which is being tightened or loosened

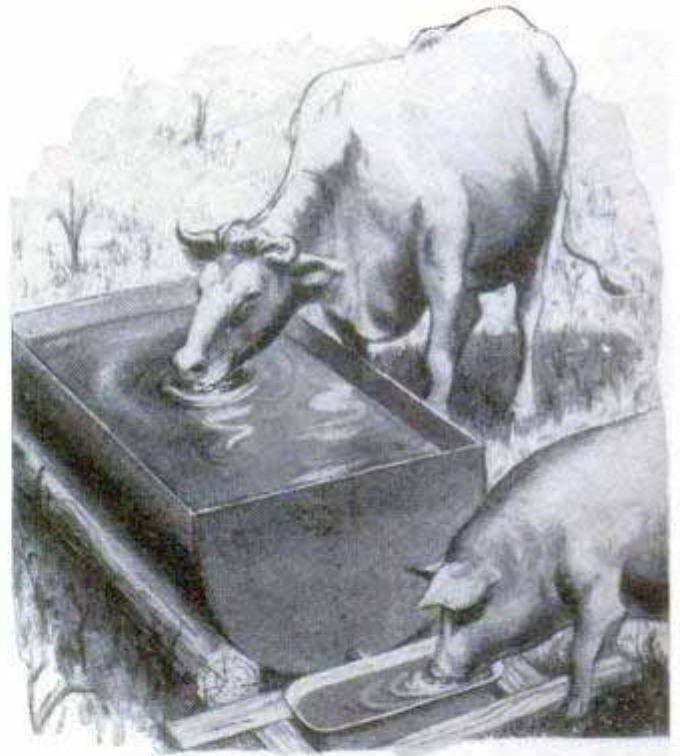


Floor-Type Grinder for Farm Shop Accommodates Heavy Work

Needing a floor-type grinder for coarse and fine grinding on large irregularly shaped parts, one farmer built a shop grinder from a double-shaft stock motor which met his requirements. First he welded 14-in. extensions to each motor shaft. The extensions are shouldered, threaded and fitted with wheel flanges, and the outer ends are carried in split pillow-block bearings supported on pads welded to angle-iron brackets. The lower ends of the brackets are welded to steel channel which forms a base for the motor. Note also that additional pipe supports extend down to the grinder pedestal from each bearing. No tool supports are used, as most of the grinding is done freehand. To eliminate vibration and inaccurate work, the wheels should be trued occasionally with a wheel dresser.

Large Stock Tank Supplies Float-Controlled Hog Waterer

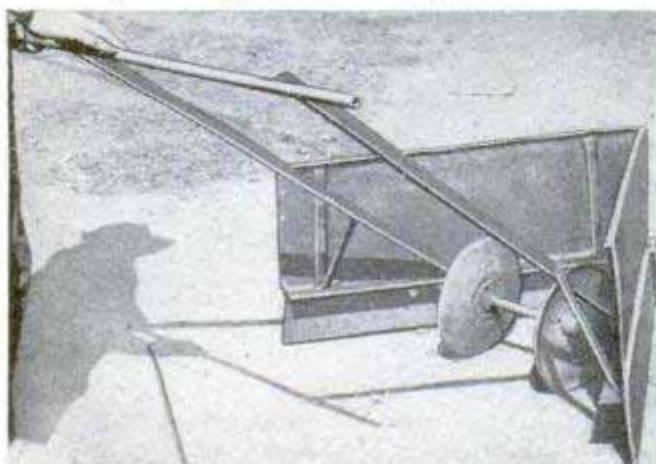
Half of an old steel tank, of the type used for underground storage of gasoline, is utilized in making this stock-watering tank. The tank half is set on level ground and kept from tipping by wedging a small log lengthwise on each side. An automatic waterer, with float control, is fitted on one end of the tank and set close to the ground for the convenience of hogs and other small stock, as shown in the illustration.



Eliminating Exhaust Sparks

One farmer, doing custom threshing for his neighbors, eliminated the spark hazard from the tractor exhaust by running a short length of copper tubing from the radiator tank to the exhaust manifold. A valve at the tank permits adjusting the flow of water to a trickle. This generates sufficient steam in the hot manifold to snuff, or deaden, any sparks originating either in the manifold or the muffler of the tractor.

Handy Barnyard Snowplow Is Assembled From Odds and Ends of Metal



This handy snowplow for clearing paths and the feeding floors in the barnyard is assembled from metal scrap found around the farm. The wheels are automobile hub caps, and the plow itself is made from two pieces of sheet metal. The frame and handle bar are built up from odds and ends of pipe, angle iron and flat steel, which are cut to length and welded together.

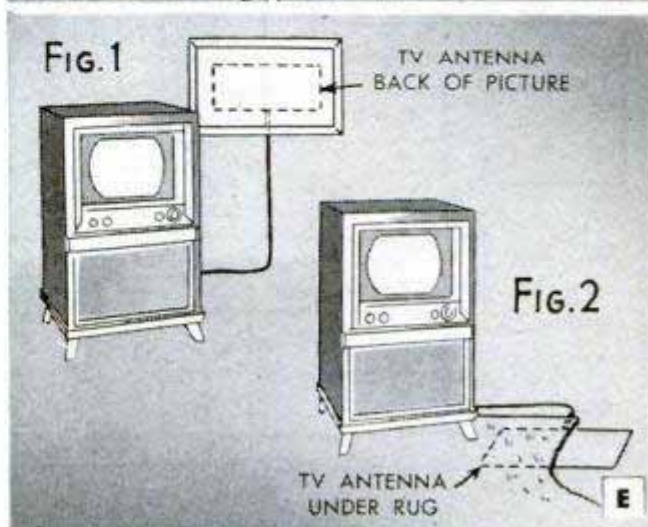
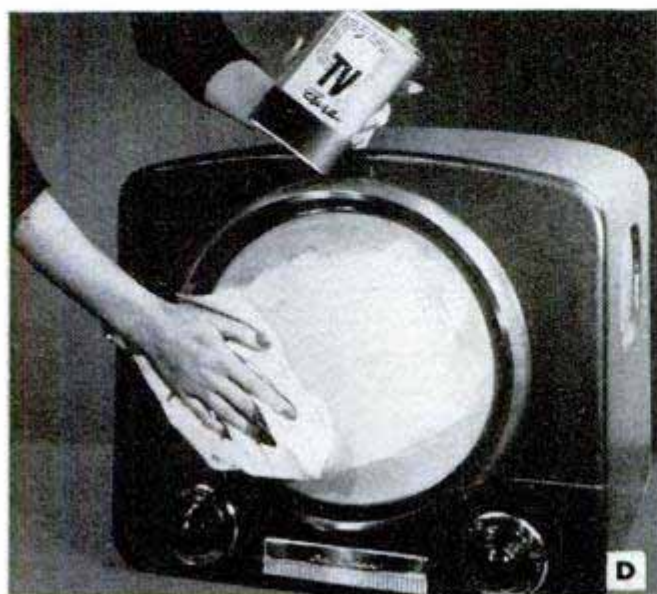
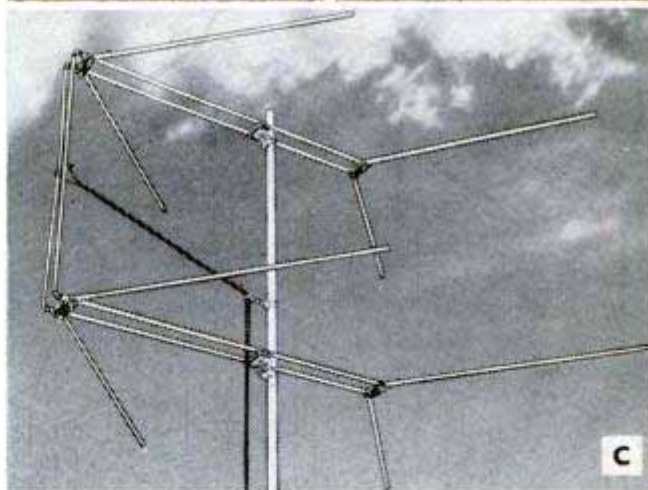
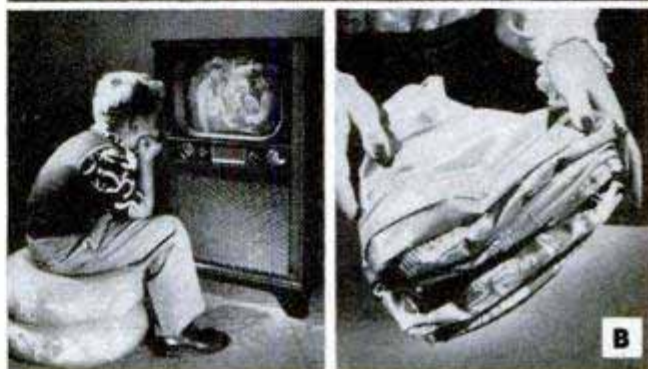
☛ To remove iron rust from pails, apply some lemon juice to the rusted portions of the metal and allow to remain for a few hours before rinsing.

TELEVISION IN THE HOME

AS TELEVISION interests all members of the family group, its enjoyment has not been an unmixed blessing in many homes. Individual choice of programs presents a problem when youngsters are in the midst of a bang-up session with "Two-Gun Pete" just when Dad wants a little peace before dinner, or when Mother is trying to carry on a phone conversation. An earphone attachment shown in photo A solves the problem by permitting the speaker to be cut out when quiet is desired. The headphone device also serves so that children can sleep while grownups enjoy their evening programs.

A television seating problem is solved with the inflatable seats made of colorful and sturdy Vinylite plastic. The seats are made for children and are decorated with cowboy, Indian and circus figures, as illustrated in photos B. They are easily inflated with a hand pump. When deflated, each one folds into a small 8 x 10-in. package. Photo C shows an improved twin-driven corner antenna for all-channel coverage that is claimed to minimize "ghosts" caused by reflected signals in critical locations.

By using a new TV polish as illustrated in photo D, Mother can now clean the plastic television outer screen without fear of scratching the soft optical surface. Figs. 1 and 2 in sketch E show two applications of an inexpensive, flat, nondirectional, indoor TV antenna that can be used in apartments.



SUPER-FIDELITY AMPLIFIER

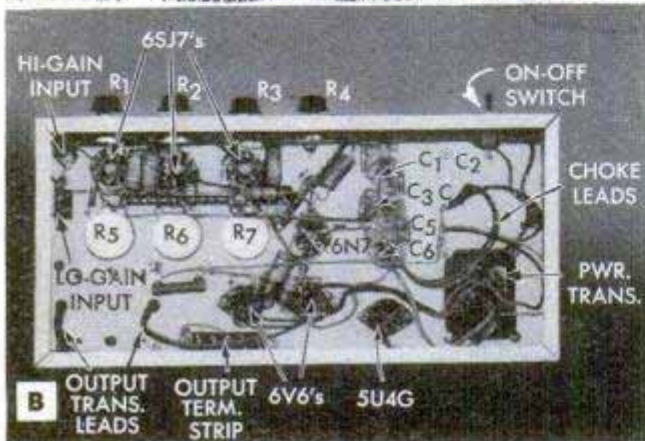
By Dr. Richard C. Hitchcock

(Eng. Westinghouse Research Laboratories)



THIS IS a highly satisfactory general-purpose audio amplifier that any radio or electronic experimenter can build. There are two high-impedance inputs, a low-gain for phonograph, and a high-gain for microphone. Output is up to 10 watts, with very little distortion.

The voltage-amplifier stages are 6SJ7 pentodes, triode-connected. A special feature is the use of grid 3 as a hum reducer for each of the three input tubes. The driver is a twin-triode 6N7 tube; the output is a twin-triode 6V6 tube; the output 6V6



RESISTOR CHART

- R1, R2, R4—.5 MEG. POTENTIOMETERS (MALLORY MR-48 #1T)
- R3=1-MEG. POTENTIOMETER (MALLORY MR-53 #1T)
- R5, R6, R7=100-OHM POTENTIOMETERS (MALLORY M100PX)
- R8=250-OHM WIRE-WOUND, 10-WATT
- R9, R10, R11, R12=5,000-OHM, 1-WATT CARBON
- R13, R14=200-OHM, 1/2-WATT CARBON
- R15=1,500-OHM, 1/2-WATT CARBON
- R16=2,200-OHM, 1/2-WATT CARBON
- R17=4,700-OHM, 1/2-WATT CARBON
- R18, R19=10,000-OHM, 1/2-WATT CARBON
- R20=22,000-OHM, 1/2-WATT CARBON
- R21, R22=56,000-OHM, 1/2-WATT CARBON
- R23, R24, R25, R26, R27=100,000-OHM, 1/2-WATT CARBON
- R28, R29=150,000-OHM, 1/2-WATT CARBON
- R30, R31=270,000-OHM, 1/2-WATT CARBON
- R32, R33, R34, R35=1-MEG., 1/2-WATT CARBON

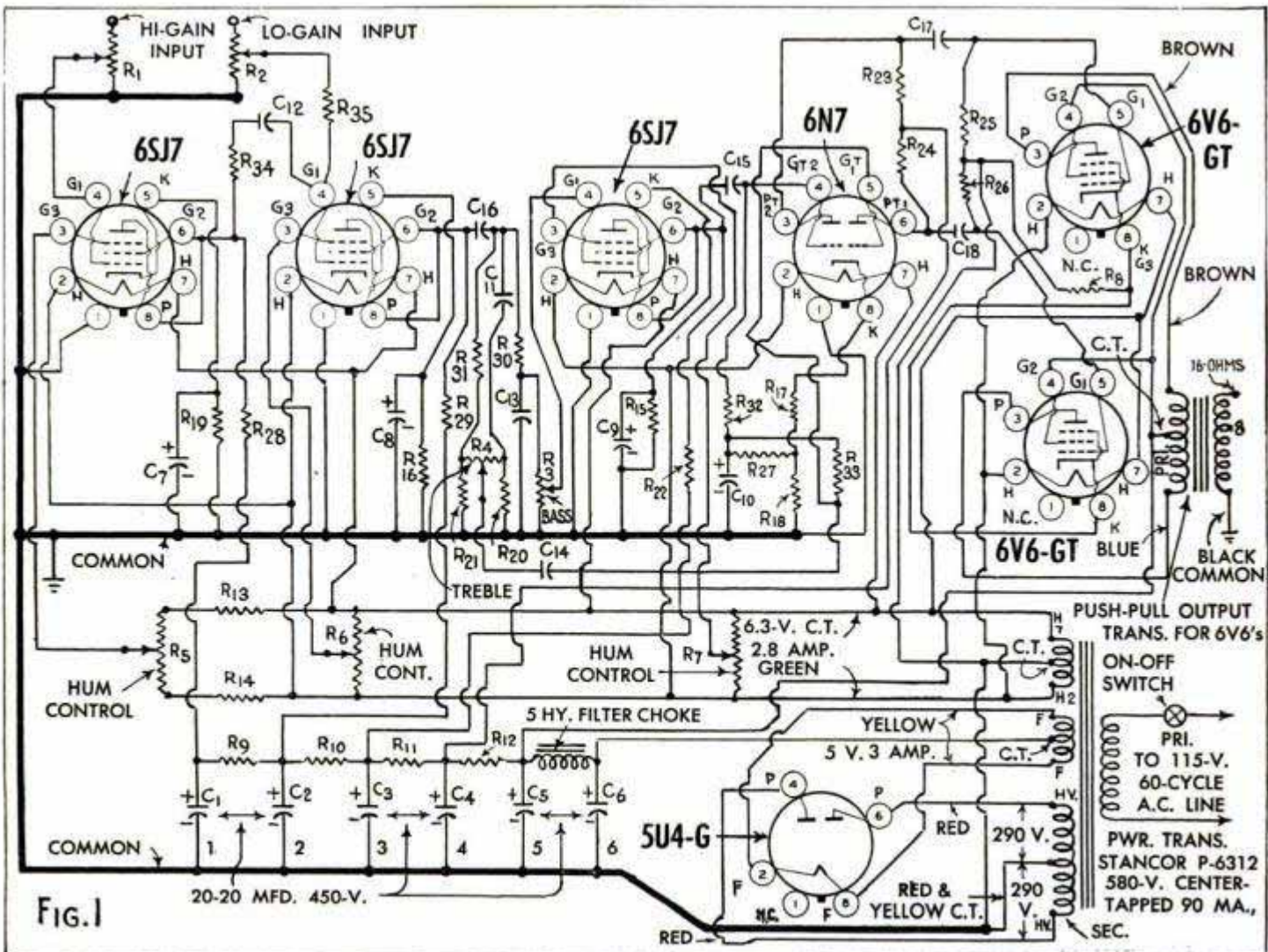
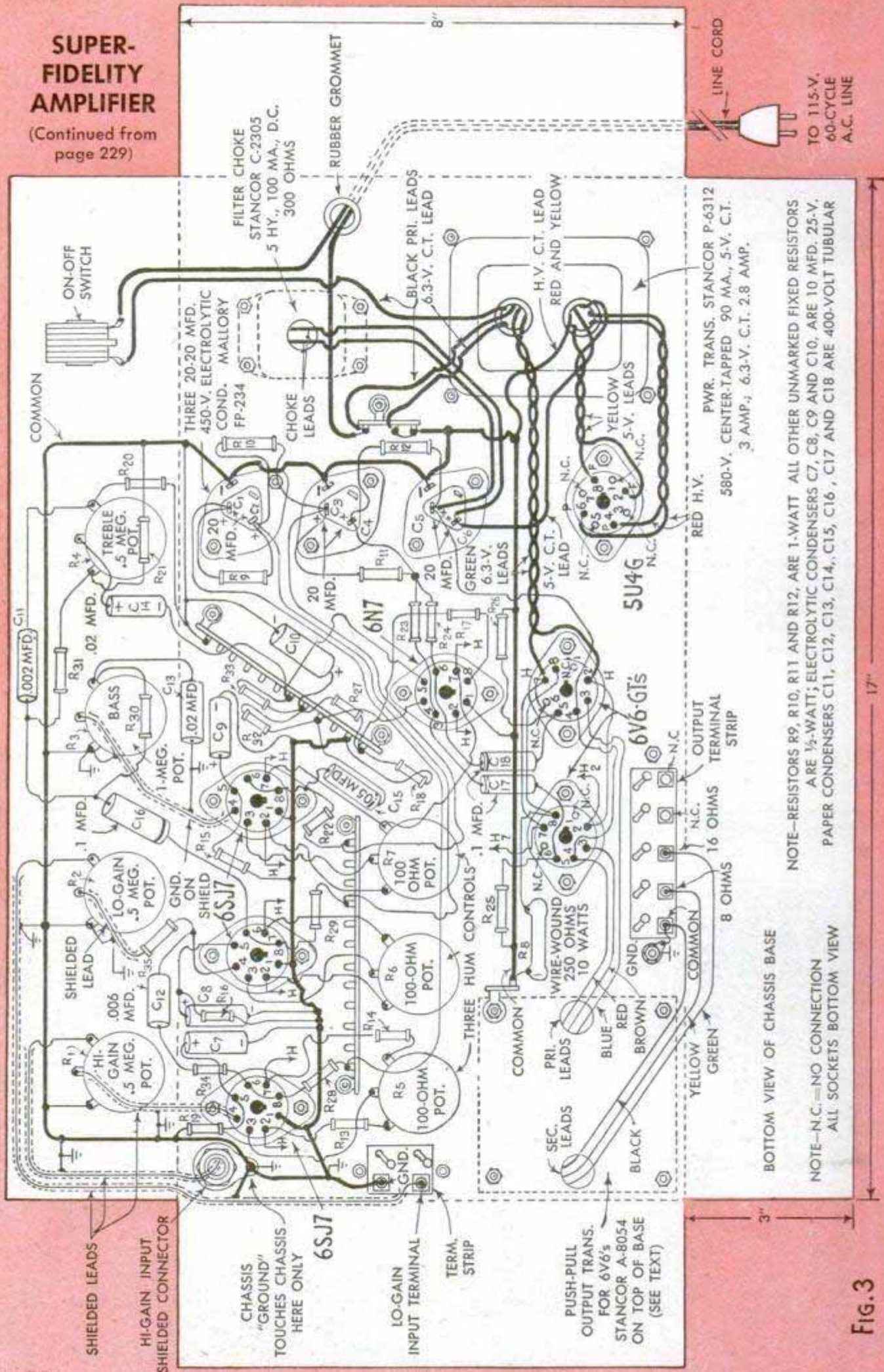


FIG. 1

SUPER-FIDELITY AMPLIFIER

(Continued from page 229)



NOTE—RESISTORS R9, R10, R11 AND R12, ARE 1-WATT ALL OTHER UNMARKED FIXED RESISTORS ARE 1/2-WATT; ELECTROLYTIC CONDENSERS C7, C8, C9 AND C10, ARE 10 MFD. 25-V. PAPER CONDENSERS C11, C12, C13, C14, C15, C16, C17 AND C18 ARE 400-VOLT TUBULAR

NOTE—N.C.—NO CONNECTION ALL SOCKETS BOTTOM VIEW

NOTE—RESISTORS R9, R10, R11 AND R12, ARE 1-WATT ALL OTHER UNMARKED FIXED RESISTORS ARE 1/2-WATT; ELECTROLYTIC CONDENSERS C7, C8, C9 AND C10, ARE 10 MFD. 25-V. PAPER CONDENSERS C11, C12, C13, C14, C15, C16, C17 AND C18 ARE 400-VOLT TUBULAR

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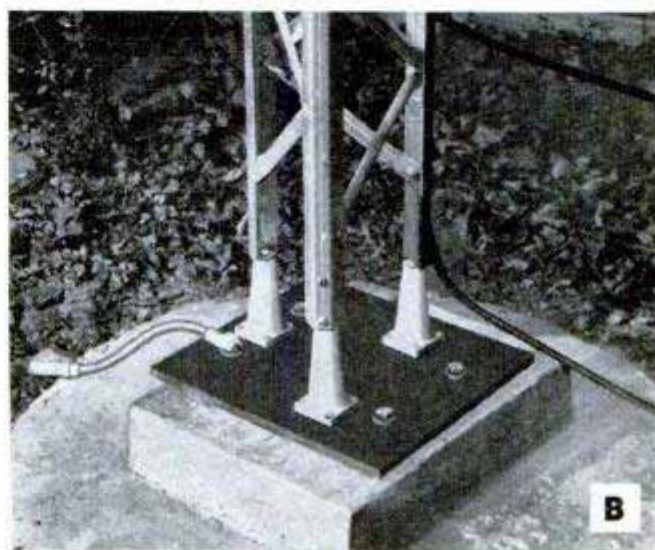
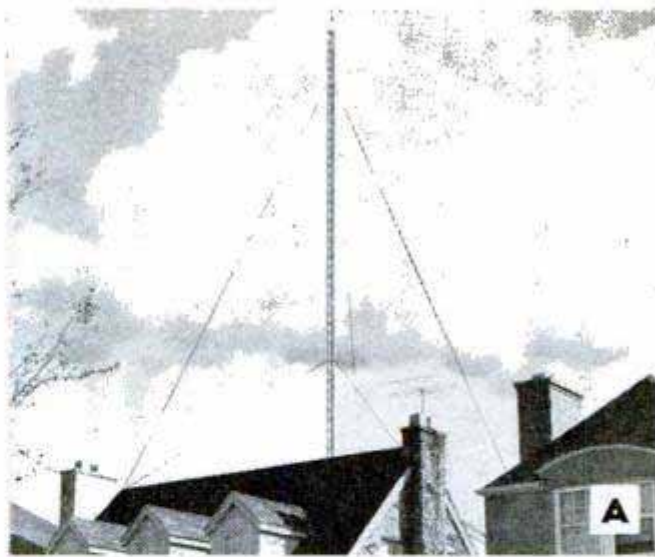
Fig. 3

Hams Ready for Emergency

NETWORKS of amateur radio stations are being formed for operation on the VHF two-meter amateur band for emergency work. A typical group can be heard testing almost nightly in the city of Chicago, covering the area between Milwaukee, Wis., and South Bend, Ind. They operate on 147.5 megacycles, using wide-band FM.

This group, which is typical of many throughout the United States and Canada, is being organized by several well-known amateurs including William E. McNatt, W9NFK, Harry Harrison, W9LLK and Charles R. Waller, W9QIO, who is operating his station and equipment shown in the accompanying photos. The aluminum antenna tower illustrated in photos A and B is 85 ft. high. The National model HFS receiver shown in photos C and D tunes the very high frequencies from 27 to 250 megacycles. W9QIO also operates a mobile Motorola FM, TRU5V rig in his car. There are several mobile units in the group; most of these use retired police equipment.

Perhaps no atomic bomb will ever fall on Chicago, or on any of our metropolitan areas. However, everybody knows that this could happen, knocking out power facilities and paralyzing immediately all ordinary means of communication. Outside help would have to be brought in at once. Following Presidential approval, the National Security Resources Board recently released its Civil Defense Plan. One separate paragraph states in part, "Amateur radio operators and networks will be used in Civil-Defense communications."



HINTS FOR RADIO SET OWNERS

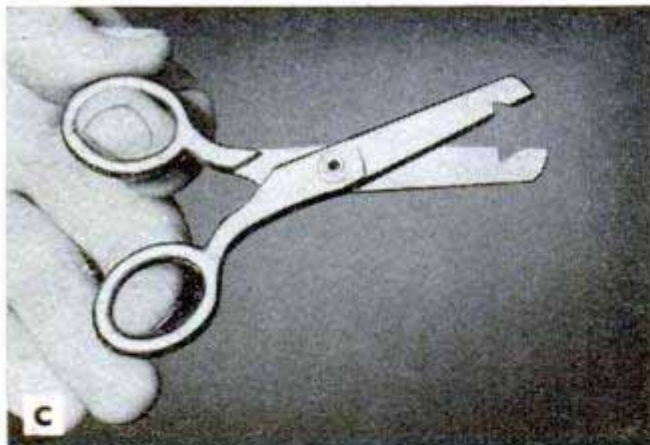
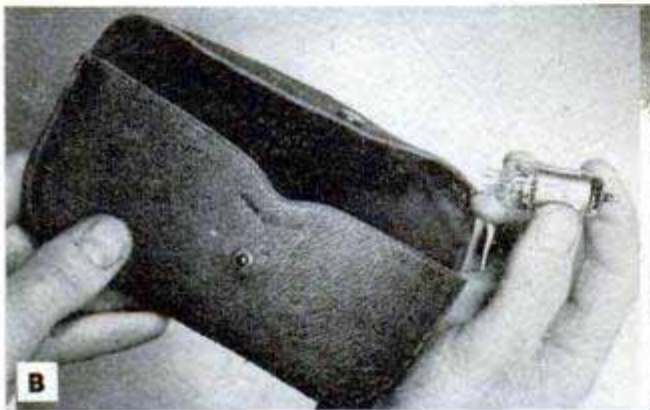
A—Wax from warm condensers and transformers often runs down into tube sockets and causes poor contact when tubes are replaced. By heating terminals and inserting pipe cleaner, wax may be removed

B—Case for sun glasses used to carry spare miniature tubes. A partition that protects the glasses from breakage also provides protection for the tubes when they are wrapped in paper for carrying

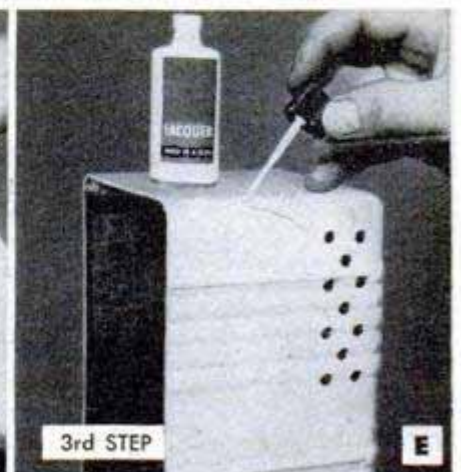
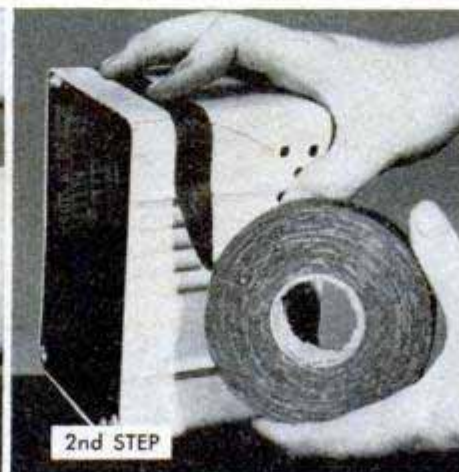
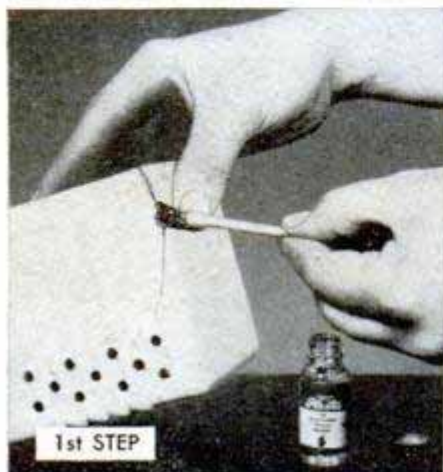
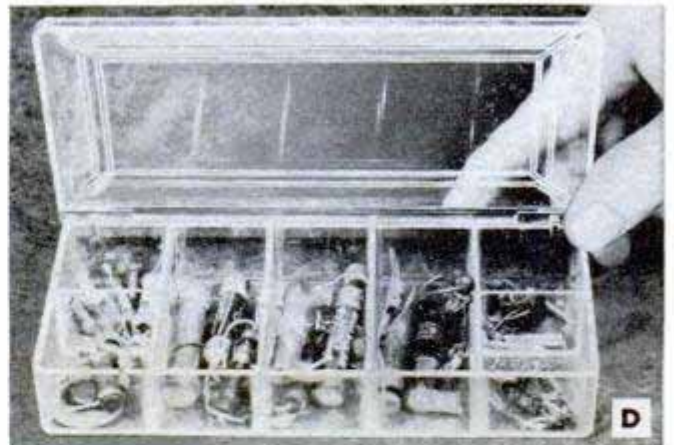
C—Plastic toy scissors, available at dime stores, can be made to serve as a handy insulated radio tool. By filing notches near the ends as shown, the suspected loose wiring can be pulled for testing

D—Clear plastic box, obtainable at hardware stores, has seven partitions convenient for spare fixed resistors, machine screws, nuts and small parts. Makes a handy transparent container for workbench

E—Breaks or cracks in white plastic radio cabinet may be repaired as shown. The first step is to apply liquid plastic cement to edges of the break; second, hold cemented edges tightly together, binding with friction tape until the cement sets, and third, paint the break line with a standard golf-ball lacquer



BLUEPRINTS covering radio and electronic construction articles in past issues are available for 25c each. Latest list can be obtained without charge from Popular Mechanics Radio and Electronics Dept. Our new **RADIO-TV and ELECTRONICS HANDBOOK**, now available at your bookstore and from Popular Mechanics Press, is today's 160-page guide for millions of radio and television set owners, students and experimenters. Price \$2.50



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"SAFETY-FLOW RIDE"

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A new driving experience

New "Safety-Flow Ride" provides extra shock-resistance when you run upon a sudden bump or hole—keeps you gliding with a steady motion. You enjoy new freedom from tension and fatigue—new comfort and steering ease. New steadiness too—an important safety feature. Learn more about this great new kind of ride at your Plymouth dealer's.

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THE CAMBRIDGE Four-door Sedan • Club Coupe

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Plus that famous all-purpose car, the "Suburban," and its still more luxurious version, the "Savoy."

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A new grille of graceful yet massive form. Heavy bumpers of sleek, wrap-around design. New-style rub rails, moulding and scuff guards. Completely new interiors with a new variety of rich fabrics. New colors. New trim. New dash. Other style improvements you'll want to see!

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Greater all-around vision with narrower front corner posts and wider rear window. Constant-speed electric windshield wipers. More headroom. New easy-action hand brake. Waterproof ignition system. New by-pass thermostat for faster warm-up, now standard on all models. Many other mechanical advances.

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INSIDE

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PLYMOUTH
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See it at your Plymouth dealer's

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Care and Feeding of Engines

BY S. P. CORP

ABOUT CYLINDER SLEEVES

When you have to repair an engine with a cracked cylinder, or with walls scored too deeply to rebore, the answer is, "Sleeve 'em and save 'em!" "Wet" or "dry" cylinder sleeves will make that engine work again. A *wet sleeve* replaces the entire cylinder wall and comes in direct contact with the cooling liquid. A *dry sleeve* is pressed into a bored-out cylinder. Fig 1 shows how a dry sleeve is fitted into a cracked cylinder to provide a new cylinder wall. Write Sealed Power, Muskegon, Mich., for complete instructions.

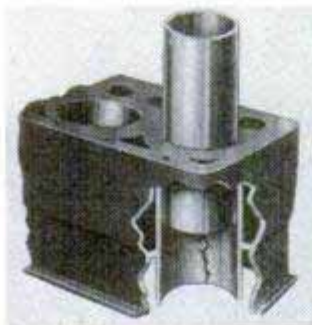


Fig. 1—Dry sleeve

WHY 3.1 TO 1 GEAR RATIO?

Ever wonder why transmission and rear axle gear ratios should be such odd figures as 3.3 to 1 or 4.1 to 1, when a straight 3 to 1 or 4 to 1 is so much easier to figure? You can discover the answer easily by taking a 2 to 1 timing gear set, marking opposite teeth, and seeing how often they meet—every second revolution. Now take a 4.1 to 1 set from a rear axle and repeat the step. The ring gear has 41 teeth, the pinion 10 teeth, and the marked teeth meet only once in 41 revolutions. If something chips a tooth, the wounded teeth won't mesh again until they have had a chance to be smoothed off by other teeth.



ALWAYS REMOVE PISTON PINS

Two shopmen were recently hurt severely while machining pistons because they didn't remove the pins. Always be sure to do this before putting a piston in a lathe or grinder. Otherwise, as heat is generated, the piston will expand and the pins will loosen. Nothing is gained by leaving the pins in, as they have to be removed later to attach the rod.

Now about rings: Always use Sealed Power Piston Rings when re-ringing. The Sealed Power MD-50 Steel Oil Ring does the world's best job of oil control, even in badly tapered and out-of-round bores. Your dealer has Sealed Power Rings or can get them for you. They save gas, save oil, restore original power to your engine and lengthen its life. A postal to "Sealed Power, Dept. G-2, Muskegon, Mich.," will bring you free a helpful book, "7 Ways to Save Oil."

Balloon Man

(Continued from page 100)

emits real locomotive sounds to heighten the realism.

The giant balloon pipe organ, which is almost a block long, also carries its own sound equipment, including two power generators. The resulting blast of music can be heard for two miles.

There are plenty of tricks to the balloon trade, Gros has learned. At one parade all the figures were lined up, ready to go, when the engine of the locomotive suddenly exploded. The balloon had been inflated too high, then had been put into the sun. As the air inside the balloon warmed, it expanded and the increased pressure finally burst the balloon. Fortunately, the crews carry complete repair gear and temporary patches can be made in a matter of minutes.

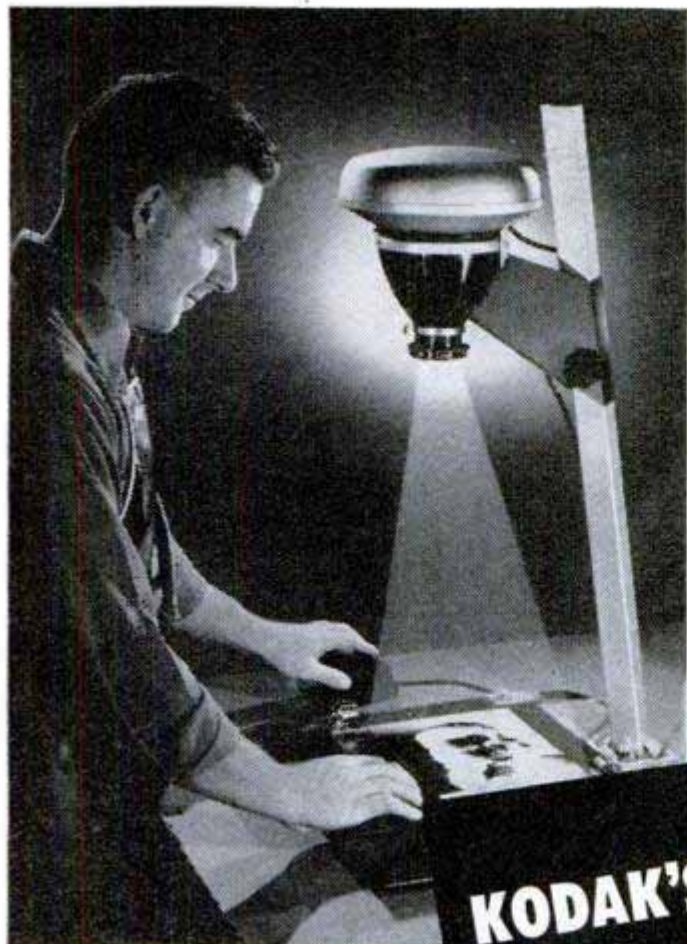
Out in Minnesota for a winter carnival, Gros encountered the opposite trouble. The balloons were inflated in a heated auditorium, then were moved outside just before the parade began. The Indian lady almost dropped her papoose, the pig staggered, the three-headed monster sagged and the horse dragged on the pavement. The bitter cold had contracted the air inside the balloons. A quick injection of additional air put them in shape again. Now the Gros crews make sure there will be no serious temperature changes, or make allowance for any changes that they know will occur.

The balloons, being the unbelievable things they are, have been the butt of enough practical jokes to make Jean Gros prematurely gray. Once a Gros elephant disappeared from a lagoon down in Georgia where it had been floated to promote a local fair. It turned up three days and many columns of newspaper publicity later, guarding a farmer's field.

And out in St. Paul the police radio cars were startled one night to hear their announcer broadcast: "Be on the lookout for a 100-foot dragon with green spiked ear and a bright red tongue. Known affectionately as Igor, the dragon is not believed to be dangerous!"

The errant dragon, worth several thousand dollars, had been kidnapped by pranksters and showed up later that night, its partially deflated figure decorating the bar of a local tavern.

Production of aluminum nails, a postwar product, reached 1400 tons in 1949 and is increasing as the nonferrous nail loses the status of a substitute and becomes a special-purpose product.



Looking for a down-to-earth price tag?

KODAK HOBBYIST ENLARGER—\$49.50

Complete with lens! New-type lamphouse designed so all light reaching negative is *reflected* light. New-type interior reflective coating gives remarkably *even* light distribution. Newly designed negative carrier for easier loading. Locking knobs for both elevation and focus. Enlarges up to 7 times. Kodak Enlarging Ektanon Lens, $f/6.3$, with click stops.

**KODAK'S MODERN
"COLD-LIGHT"
ENLARGERS**

Want magnificent enlarging PLUS?

KODAK FLUROLITE ENLARGER

Circular cold-light fluorescent lamp, integrated with a new reflector design, gives you the speed and brilliance of a condenser system. Light is instant-on, instant-off . . . negative carrier tilts and rotates for control of distortion . . . base has big (17 x 21¼ x 5-inch) light-tight paper cabinet. Assembly can be used for cine-titling, photomicrography, and as view camera. Without lens—\$112.50.

Kodak Enlarging Lenses for the Flurolite range from the Kodak Enlarging Ektanon Lens, 2-inch $f/4.5$ (for negatives up to $1\frac{3}{8}$ x $1\frac{9}{16}$ in.)—\$22.50 . . . to Kodak Enlarging Ektar Lens, 4-inch $f/4.5$ (for negatives up to $2\frac{1}{4}$ x $3\frac{1}{4}$ in.)—\$56.00.

Prices include Federal Tax

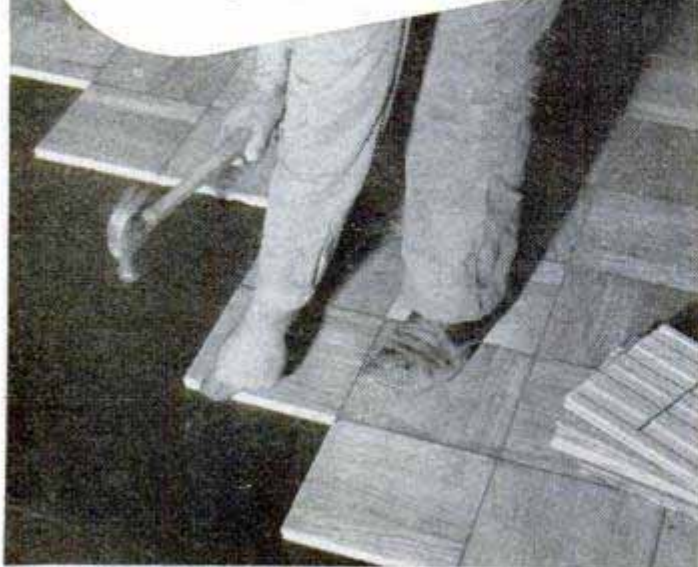
Prices subject to change without notice. Consult your dealer.

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to have modern
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You can give your home new beauty at low cost with a prefinished Bruce Hardwood Floor. Completely finished—even waxed—at the factory, this highest quality oak flooring can be nailed right over old floors. No sanding or finishing...no mess or smell. Ready for use as soon as laid. Made in strip or block (parquet) design.

"Scratch Test" Finish — The Bruce factory-applied finish is baked into the pores of the wood.



The "Scratch Test" (left) will prove to you that this durable finish does not scratch or chip or mar like an ordinary floor finish.

Moderate in cost — A new Bruce Hardwood Floor will cost you less than a good rug or carpet. Easy to keep clean and beautiful, too. It's just the thing to use in fixing up or adding a room. Let your lumber dealer give you an estimate. Mail coupon below for colorful literature.

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As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.



Spray Painting

Q — What are the advantages and disadvantages of spray painting a house as compared with brush painting? I have two painting bids and the spray-paint job is cheaper, both being estimates on two-coat work. Why is one quotation so much lower?
S.S., Ft. Smith, Ark.

A—Probably your spray-painting contractor figures that he can do the work in less time and with less help, perhaps, than doing the job by hand with a brush. The manner of applying the paint, whether by brushing or spraying, is not nearly so important as is a thoroughgoing knowledge of the techniques to be employed. If the spray painting is done in accordance with approved practices, there is no reason why the job should not prove to be as durable and attractive as a painstaking brush job. The best exterior spray-painting practice requires that windows, doors and all other areas not to be painted be masked effectively and that the paint be of the best quality and mixed according to the directions of the manufacturer for spray application. On the average outside job, spray painting is much faster than brushing.

Power-Saw Speeds

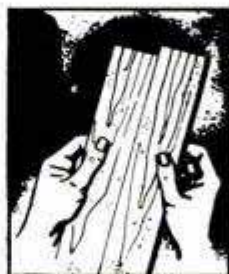
Q—I have an 8-in. circular saw of the home-shop type on which I would like to use a 6-in. cross-cut blade, but somewhere I have read that 6-in. blades should be operated at a speed of over 7000 r.p.m.; 7600 r.p.m. as I recall. This seems excessively high and to obtain it I would have to replace my present motor pulley with one of much larger diameter. Is this recommendation correct? And what about speeds of dado and molding heads?
G.T., Santa Fe, N. Mex.

A—For operation of a 6-in. circular saw blade, the speeds you give are correct, as a general recommendation, as the small-diameter blades are tensioned for these speeds. However, it is not at all necessary to drive the blade at this high speed in order to obtain satisfactory results in intermittent operation. In fact, a 6-in. crosscut blade (with crosscut teeth) will operate satisfactorily at speeds as low as 2500 r.p.m. on light work. Dado heads of the separable type consisting of two outside cutters, or saws, and several inside chipper, should never be operated on small home-shop machines at excessive speeds, as they may set up damaging vibrations as a result of the difficulty

(Continued to page 238)

TRY THIS TUBE

you'll be convinced!



It is the best glue for all fine woodwork. It makes joints so strong they cannot be opened without wood failure, yet so thin you cannot see them when grain is matched. Long lasting, hide glue was used in museum pieces centuries old. This hide glue is the easiest to use, yet the finest glue for all home craftsmen.

It's genuine HIDE glue . . . strongest known
That's the secret of Franklin popularity. Once a craftsman realizes that this is the same glue as he has used, but without any of the trouble of heating, mixing, etc., it's the only glue for him from then on.

No mixing or heating . . . ready-to-use
That means no danger of chilled joints, no waste, uniform from first drop and every drop works.

Economical—no waste
Actually costs less than any ordinary glue because it spreads so thin and goes farther.

No odor—no muss
Unbelievably pleasant to use. A favorite in furniture factories, schools and at home.

15¢ AT ALL HARDWARE STORES



SIX SIZES . . .

Available in tubes, 15c; ideal for a trial; quarter pints, 50c; half pints, 85c; pints, \$1.50; quarts, \$2.65; and gallons, \$7.50 at most good hardware stores. If your dealer cannot supply you

SEND THIS COUPON

with 20¢

Send 20c for the large tube (15c plus 5c for postage and wrapping).



THE FRANKLIN GLUE CO., 113 W. Chestnut St.
Columbus 15, Ohio

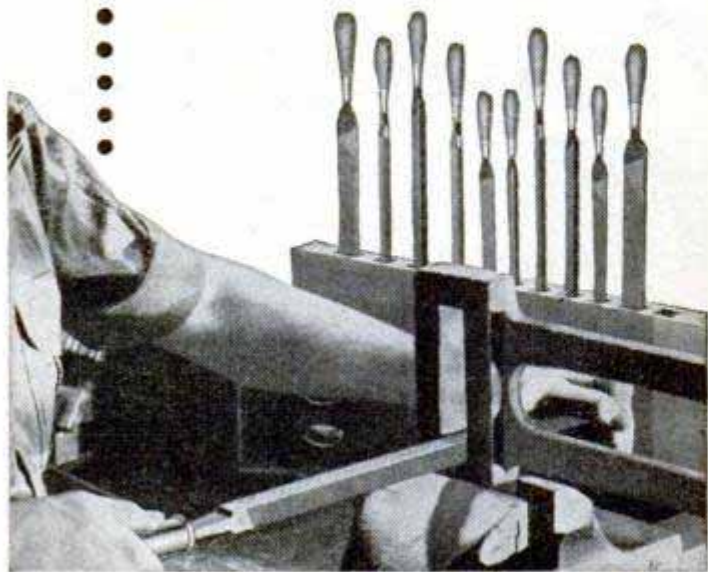
Enclosed 20c (15c plus 5c postage and wrapping charge) for a trial tube of Franklin Liquid Hide Glue.

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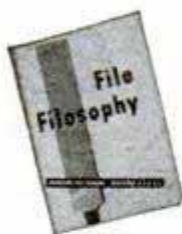
Variety is the spice of filing



A VARIED assortment of Nicholson or Black Diamond files is as much a part of the complete home workshop as a good assortment of bits, taps or chisels. For one thing, it means you always have exactly *The right file for the job*. For example: Mill (single cut) files for sharpening and smoothing. Flat files (double cut) for fast stock removal. X.F. Swiss Pattern files for precision work. Taper files for saw sharpening.

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NICHOLSON FILES

FOR EVERY PURPOSE

(Continued from page 236)

of placing the separate units on the saw arbor in such a way that the assembled head will be in perfect balance. A speed of 3600 to 4000 r.p.m. is a good, safe average for 6-in. saw blades, dado heads and molding heads of the type used on saw arbors.

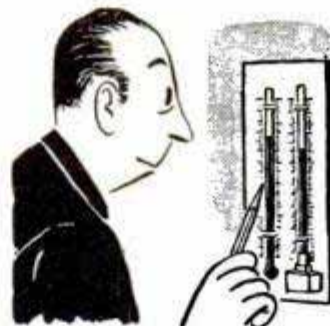
Tinting Wood Fillers

Q—I have tried tinting natural wood fillers without satisfactory results. When I try to match a stained surface it ends up either too dark or too light. What ingredients are used and what procedure is followed to produce the desired results?

B.T., Holyoke, Mass.



A—One of the simplest ways of solving your problem is to use colored fillers. These are available in standard colors for use on open-grained woods, such as oak, mahogany, and walnut. For ordinary finishing of these woods the colored fillers give excellent results. However, there are cases where shades are desired which are not available in the ready-made product. The usual practice in this work is to tint a natural filler to the shade desired with an oil stain. The trick in mixing just the shade you want is to mix a small quantity of stain with filler, then spread this thinly on a piece of cardboard and allow it to dry flat. In this way you can determine the true color. If the test shows that the filler is too light, add a little more stain and test again. If, on the other hand, the mixture is too dark, add more filler. By working and testing in this way you can produce a filler of almost any shade desired.



Humidity

Q—How can I determine accurately the amount of humidity in the air in my home at any given time? What is important for me to know in this connection—the absolute humidity, or the relative humidity? What is relative humidity, that is, how is it defined?

R.E., Green Bay, Wis.

A—One fairly accurate way of determining this is to use a comparatively inexpensive wet-dry bulb hygrometer. By comparing the reading with a chart furnished with the instrument you can obtain values for both relative and absolute humidity. One type of wet-dry hygrometer is made for wall mounting and contains two thermometers with a small water container and wick to keep the bulb of one thermometer wet. Evaporation of the water cools the wet thermometer. When readings are taken from both thermometers, reference to the chart will show the relative humidity of the air at that particular time. Absolute humidity of the air, or atmosphere, is the mass, or amount, of water contained per unit volume. Relative humidity is the ratio of the quantity of water vapor present to that which would be necessary to bring about a condition of saturation.

Loss of Heat Through Glass

Q—My question is, what is the resistance of ordinary glass to the passage of heat? D.F., Chicago.

A—We assume you are referring to a window pane. Most of the resistance to passage of heat is not in the glass itself, but rather in static air films that lie close to the two surfaces. In a recent test by a well-known glass manufacturer, it was shown that with an air temperature of 70 deg. F. on one side of a pane of glass, and -30 deg. on the other side, there was less than 3 deg. difference in the temperatures of the two surfaces. Of course, these figures are for a test made in still air. On a windy day the protective air film probably would be blown off the exposed side, resulting in a considerable loss of resistance.

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for complete 5-tool unit without motor. Includes geared Jacobs chuck, 12" sanding disc, 8" saw blade, arbors, lathe centers, etc.

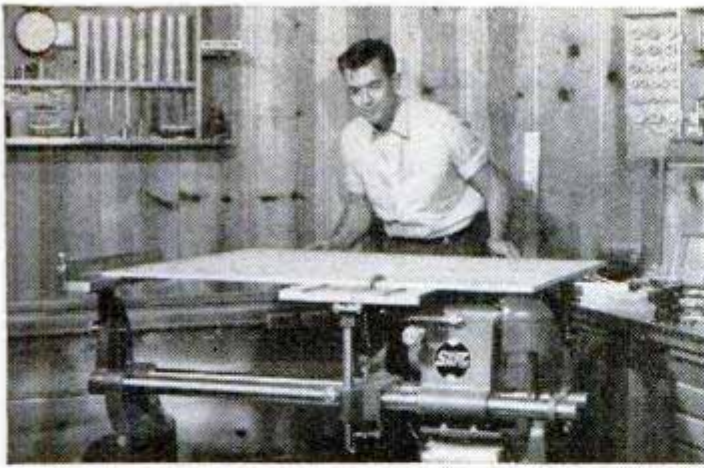
TAKE another look at the photo above. See those paper-thin strips? All four were sliced from the same piece of wood in sixty seconds *without changing the rip fence setting*. How? It's easy with SHOPSMITH. You can shift the *saw blade* as well as the fence—using SHOPSMITH's exclusive micro-feed blade adjustment.

There's not much you can do with wood strips. What's important is the speed and extreme accuracy of SHOPSMITH's fence-to-blade settings. And this is just one of SHOPSMITH's many precision features.

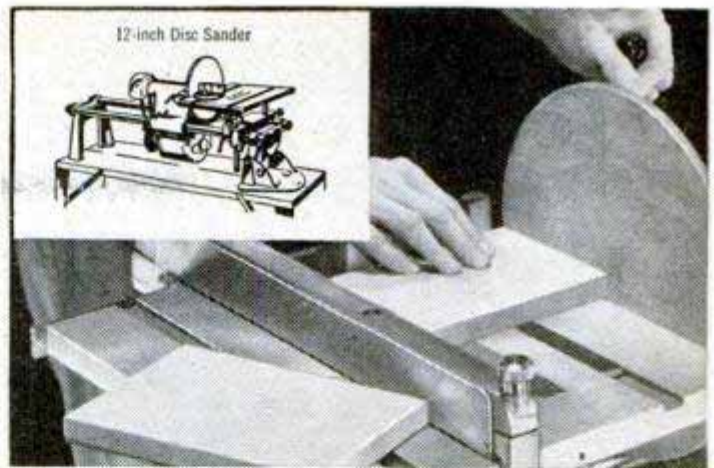
The disc sander, for example, feeds into the work, can be set to stop on a hairline.

The vertical and horizontal drill presses have built-in jigs, unique micro-settings. The centerless ground steel ways are stress-tested at over a ton, assure absolute rigidity and accuracy in lathe work as well as in other operations.

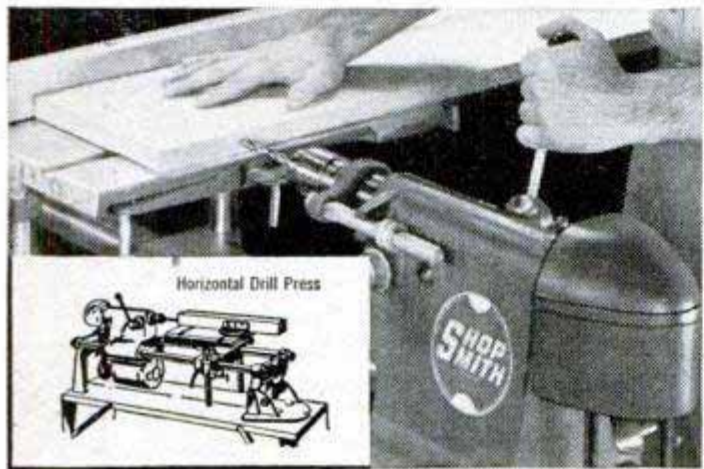
Add 'em all up—accuracy, capacity, flexibility, rugged construction and precision features—and you'll begin to see why SHOPSMITH is America's most popular power tool. See SHOPSMITH demonstrated at leading hardware and department stores or any Montgomery Ward store. And for complete details and specifications, mail the coupon.



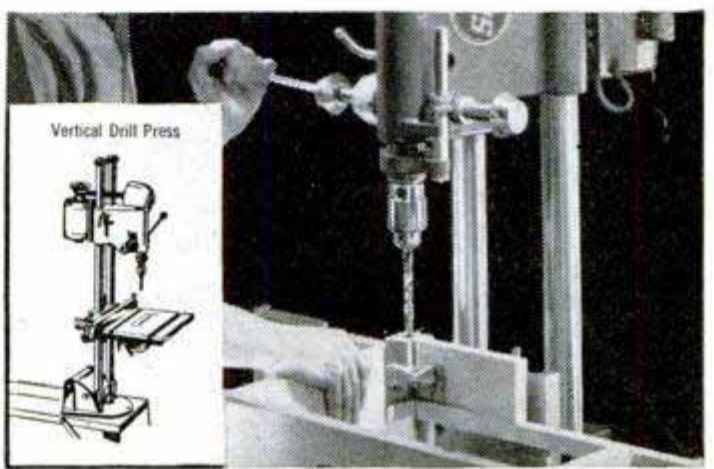
BLADE TO FENCE—48". You won't find many saws under \$200 that offer capacity like this. It means you can cut to the center of 8' plywood panels, handle extra-long boards, trim doors, screens, storm sash. Table tilts, raises, lowers. Maximum depth of cut 2¼".



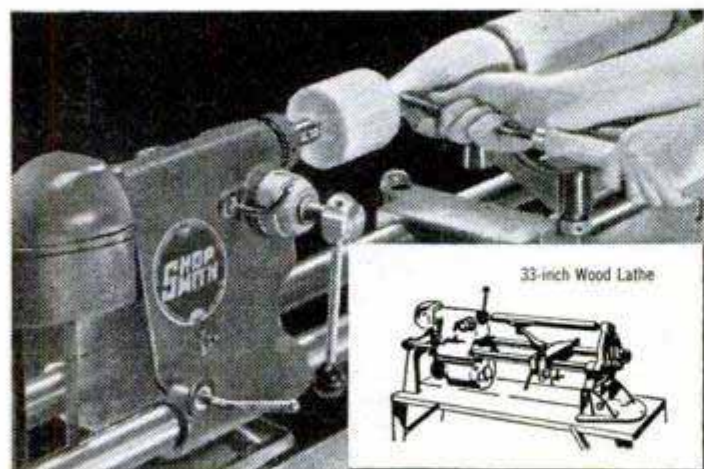
90° ON THE NOSE. SHOPSMITH as a disc sander is so accurate you can forget about your try square. Can be used as a jointer too. Work fed through at a slight angle (by cocking fence) comes out with a beautifully jointed edge. Sandpaper discs easily replaced.



PERFECT DOWELED JOINTS. No jigs required. Just lay the work flat on the table, feed drill from side. Dowel holes match perfectly. Horizontal drill is especially useful when drilling large, awkward work. Its capacity is limited only by the length of your workshop.



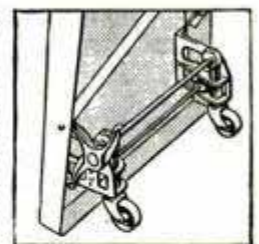
FLOOR MODEL, TABLE MODEL. SHOPSMITH as a drill press is both. Maximum clearance, table to chuck, 27", floor to chuck, 55". Jacobs key chuck takes drills up to ½" diameter. Speeds range from 875 to 3500 rpm. 4" quill feed. Easy to read, adjustable depth scale.



ROOM TO TURN IN. SHOPSMITH as a lathe has a 15" swing—4" more than most other heavy-duty lathes. It has a quick-set tool rest that always moves parallel to your work-piece. And it's the only lathe that lets you face the work while face-plate turning.

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... increase SHOPSMITH'S already great flexibility. They're easily mounted on any wood or metal bench. Easy to set, too, with three-stage foot levers that raise or lower unit. Your SHOPSMITH dealer has them. Complete set ... \$11.95.



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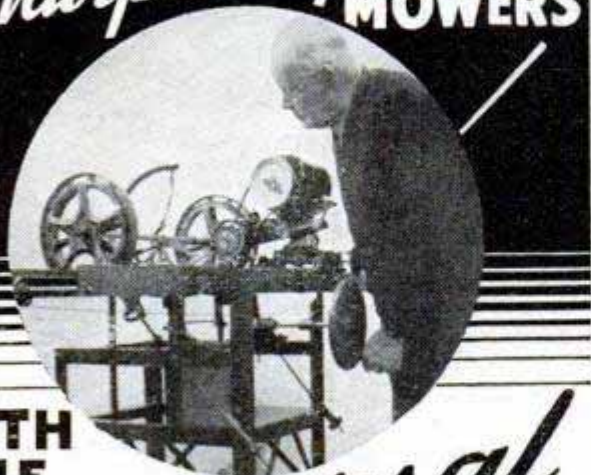
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PROOF "Thank you for getting me started in this wonderful business . . . I averaged \$100.00 a week in May, and made \$1000.00 spare time this season." —J. L. Peterman, Pa.

PROOF "I am 70 years young. I sharpened mowers all my life and have had all kinds of grinders. But the Universal tops them all." —A. J. Tuttle, N. H.

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Please send me full facts about the Universal Lawn Mower Grinder and its big money making opportunities.

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A Swiss Wood Carver Brings Back Hawaii's Lost Art

(Continued from page 93)

When the student feels he is stuck, the instructor helps him on the next step and again instructs him in the use of the right tool. A beginner may use only a few chisels and gouges, while an experienced carver may use up to 80 different tools.

"The help of competent instructor's guidance, plus the inspiration of other wood carvers, keeps the student moving along," Fritz says.

When a student completes his carving, he rubs it with steel wool or sandpaper. Luckier students use a sanding machine. When this is done, there are many ways of polishing the wood. Most popular, however, is to use a sealer base followed by a high-grade wax. The clear wax is rubbed on with a cloth and "elbow grease" is used to produce the desired polish. When using koa wood, some students pour linseed oil and white shellac on their palms and then rub the wood well. This makes koa glow with a dark mahogany sheen. Many students dislike using shellac in the finishing process as they find it gums up the fine lines in their carvings.

Fritz teaches the only advanced wood-carving class in the Islands. The better students and teachers attend these classes. Here wood carving turns from craftsmanship to art. These classes are strictly limited to 18 students who generally go in for carving figures and heads—usually having Polynesian features.

With a host of instructors, fine-grained woods and never-ending subject matter, Hawaii is fast turning out a new generation of wonder workers in wood.

Digging Deeper for Red Metal

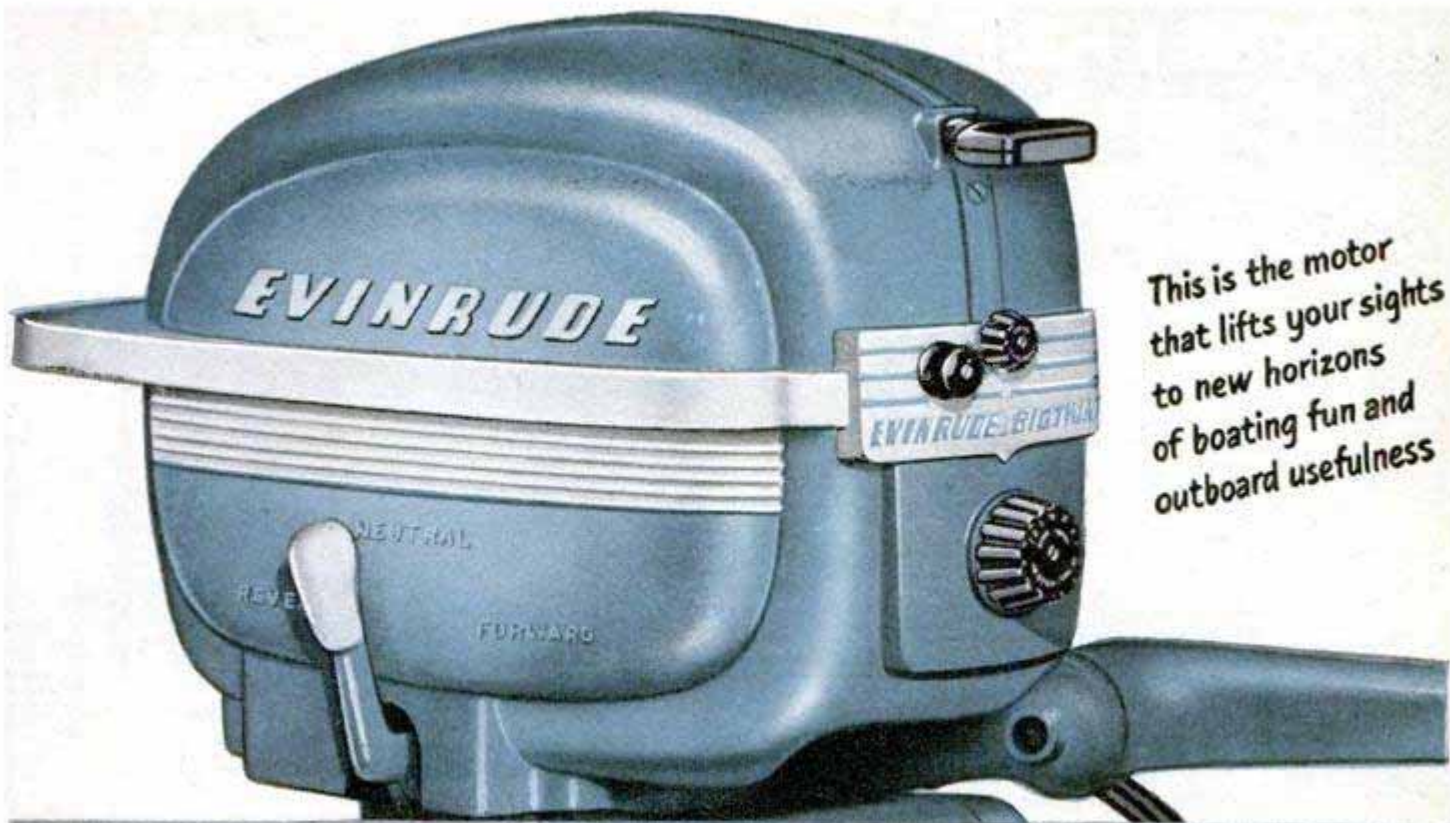
(Continued from page 85)

tunnels a system of finger chutes will be excavated upwards into the ore to the level that is to be undercut.

The miners will leave numerous pillars to support the ore while they are undercutting, then the pillars will be blasted away a few at a time. Unsupported, the roof will begin to slough and spall. Once this caving-in process has started, it is self-sustaining and the fallen ore will be drawn off through the finger chutes and dropped into the cars of the ore trains that are spotted below.

The process will continue until all the ore has fallen and is hauled away. No underground void will remain because the

(Continued to page 244)



This is the motor
that lifts your sights
to new horizons
of boating fun and
outboard usefulness



BIG TWIN
by **EVINRUDE**

25 HORSEPOWER*
only 85 POUNDS
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a great new Evinrude... a motor that packs the wallop of 25 sharp and solid horsepower *in only 85 pounds*... a motor that thrusts the thrill of exhilarating speed into big boats, heavy loads... the one that takes off like a scared cat, trolls like a sweetheart, handles like a dream... and is *excitingly priced* within the reach of all! This is the one... **BIG TWIN**... it's years ahead! **BIG TWIN** gives you Simplex Starter for starting ease—and Roto-Matic Control—every speed right in your hand! Gearshift with Neutral, Forward, Reverse! Separate, big-capacity Cruis-A-Day Fuel Tank! Full range performance—less than 2 to over 30 miles an hour on able boats! SEE THE **BIG TWIN**—see the complete 1951 line at your Evinrude dealer! Look for his name under "Outboard Motors" in the yellow pages of your phone book. **CATALOG FREE**—write for it today! Address **EVINRUDE MOTORS**, 4602 N. 27th St., Milwaukee 16, Wis. In Canada, Evinrude Motors, Peterborough, Ontario

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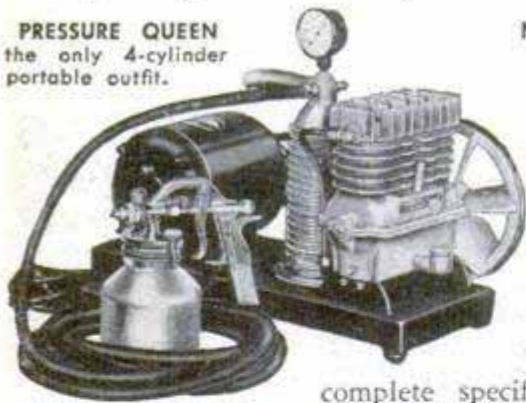
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ground above the mined area will slowly subside and fill up the hole.

The ore body is to be mined by caving one block of ore at a time, each block being a cube some 300 or 400 feet in each dimension. Ore in the top zone will be removed first, then the process will begin all over



Mine executives ride on a motor-driven rail scooter as they check various workings in the Bingham area

Below, a radio-telephone in the rail scooter keeps the executives in communication with their offices

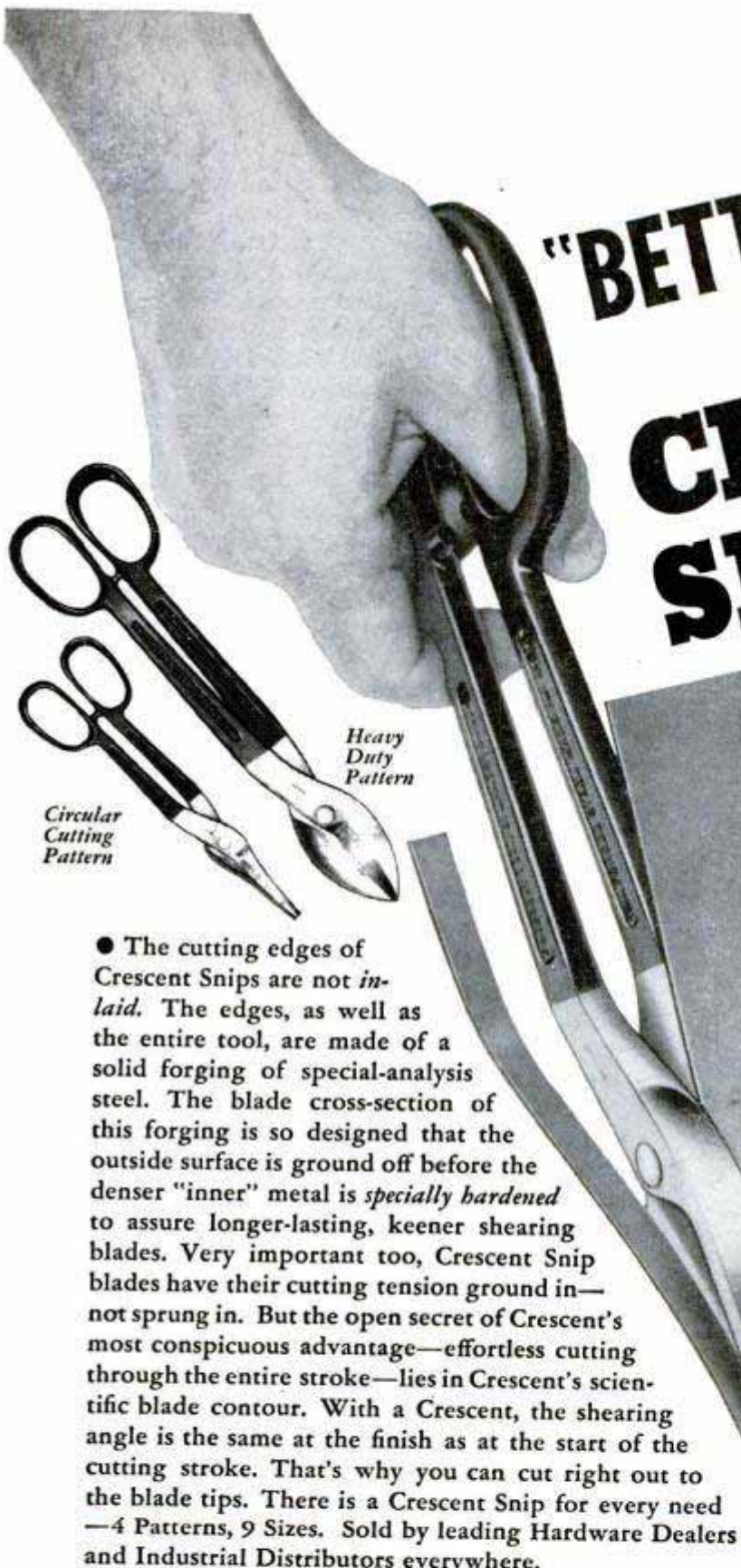


again at a lower level and will continue at increasingly deeper levels until the ore is exhausted.

The undertaking is a daring one because nothing like it has ever been attempted on so large a scale before. Yet it is the best way that has been devised so far for working buried deposits of low-grade material at a profit. It's an assurance, too, that so far as copper and some other metals are concerned, the United States is going to be self-sufficient for all of its needs for a long time to come.

☐ New strains of guayule, America's best natural - rubber - producing shrub, yield from 25 to 40 percent more rubber than those produced during World War II.

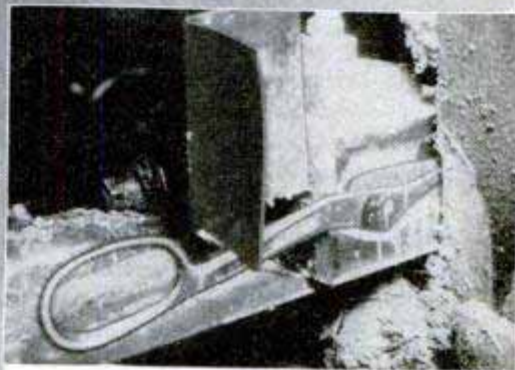
"BETTER CUTTING" BUILT INTO CRESCENT SNIPS



Heavy
Duty
Pattern

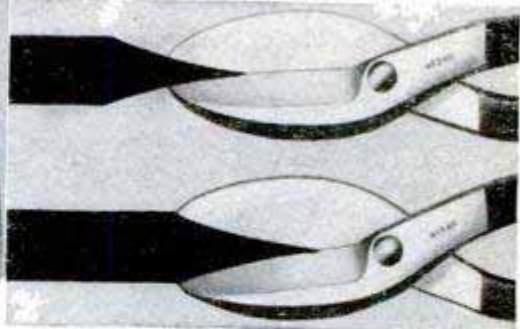
Circular
Cutting
Pattern

● The cutting edges of Crescent Snips are not *in-laid*. The edges, as well as the entire tool, are made of a solid forging of special-analysis steel. The blade cross-section of this forging is so designed that the outside surface is ground off before the denser "inner" metal is *specially hardened* to assure longer-lasting, keener shearing blades. Very important too, Crescent Snip blades have their cutting tension ground in—not sprung in. But the open secret of Crescent's most conspicuous advantage—effortless cutting through the entire stroke—lies in Crescent's scientific blade contour. With a Crescent, the shearing angle is the same at the finish as at the start of the cutting stroke. That's why you can cut right out to the blade tips. There is a Crescent Snip for every need—4 Patterns, 9 Sizes. Sold by leading Hardware Dealers and Industrial Distributors everywhere.



Above: Crescent Snips are ground on automatic machines thus assuring absolute uniformity.

Below: The Shearing angle of Crescent blades remains the same throughout the entire cutting stroke.



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X-acto Crescent Products Co., Inc.
440 Fourth Avenue, New York 16, New York

If the A-Bombs Burst—

(Continued from page 149)

his block. Somewhere beneath his feet he heard the muffled scream of a woman.

A neighborhood lad came scrambling up the pile of rubble and stood by his side. White previously had trained the boy as a messenger. Now the Block Warden told the lad precisely what to report. The boy scurried off through the rubble, reached the fringe of the blasted area and slipped past the tilted door of a store. He tried the phone inside. Luckily all the phone lines weren't out, and he gave the message to a voice at the Zone Warden's headquarters.

At the other end of the line the Zone Warden coordinated the message with other information that was coming in by phone and foot runner. Deciding that White's block needed help badly, he put in a call to the Chief Warden's office.

By this time help was already racing toward White from outer Chicago. First to arrive was a monitoring crew from the Health Services. The men climbed through the debris toward ground zero, watching the dials of instruments they carried. White moved with them across his block, and heaved a sigh of relief when they indicated that there was little lingering radiation.

Behind the monitoring crew came the first team from the Rescue Service. White told the team's chief where shelters could be found. Three men started tunneling down to the basement of an apartment shelter, cutting through steel beams with an acetylene torch. Others guided or carried the dazed and wounded residents out toward the edge of the damaged area where a team of a dozen doctors and nurses already had set up a first-aid station in a schoolhouse. Stretcher teams were fanning out from the station.

White moved off to investigate the numerous small fires which had broken out in his block. Near one blaze he spotted the man who had been trained in the Fire Guard Group. It was about this time that the first fire engine moved up behind a bulldozer, and the Fire Guard told the company officer which fires were threatening people still trapped in shelters. Behind the fire apparatus crowded a bus and two mail trucks, converted into ambulances.

The Zone Warden arrived, along with a man from the Chief Warden's office. White gave his two superiors a report of what had been done, and estimated how many people still were trapped. Many of the evacuees had been guided by police past one intersection, and beside it stood an Assistant Warden writing on a sheet of paper

(Continued to page 248)

Now
10 FEET long!



Yes, here it is—that extra length you've always wanted... 120 inches of accurate, more useful measuring ease. Jet black markings on a wear-resistant, acid-resistant snow white blade.

Carlson quality throughout with famous 10-second blade change economy and the new convenient swing-tip... a real value at YOUR HARDWARE DEALER. Just be sure it's the White Chief by Carlson.

P.S. And don't forget to get an extra blade to keep on hand as a "spare."

Blade produced under patents 2089209, 2510939

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the name of each person he spotted. Checking the list, White suddenly discovered that not one of the 25 persons in a building a half block away had been seen. CD officials quickly sent a rescue crew to the building.

The fires had become dangerous, so the Zone Warden ordered White to make his way to the evacuation station. Along the cleared road streamed thousands of people, many of them wounded.

At the evacuation station, White was told to wait for transportation. A man, still shivering in his pajamas, was issued inexpensive clothing by the Welfare Service. At a makeshift desk near by, a young woman wrote down the name of every evacuee and his probable destination. From her, White learned that he would go to a private home in a northwest suburb.

All the time he waited, a voice blared down from the sky. A small private plane, equipped with a loudspeaker, circled overhead. An observer aboard the plane droned instructions to the workers and the wounded, and guided the drivers of heavy equipment through the debris.

By now, mutual aid and mobile support had proved their worth. Converging on Chicago's two ugly scars came fire engines and policemen from the suburbs, rescue teams and medical units from the state.

At 7:30 that evening, exhausted firemen were still trying to confine the fire storms which swept through the damaged areas. Rescue crews working under portable lights were still picking the rubble clean of human beings. Suddenly, without warning, another bomb burst—this one on the ground southwest of the Loop. There wasn't even any rubble left around this explosion—just an ugly, radioactive saucer.

It was the same heartbreaking story all over again. Some CD teams were switched to the new area. Still more aid came from surrounding communities and the state. And by now an airlift, called into action by the federal government, was shuttling blood, equipment, medical supplies and men into the Chicago area.

Within one week rail lines to Chicago were restored, temporary bridges were built, main thoroughfares cleared and dangerous structures demolished. Chicagoans could stream to work once more, though their city never would be the same again. Thousands upon thousands of people owed their lives to their alert CD organization.

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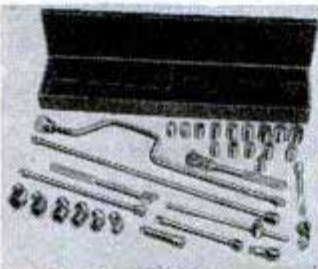
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Hollywood's Antique Auto Livery

(Continued from page 137)

Duesenberg town car, formerly the property of Dolores Del Rio; a 1930 Isotta Fraschini town car allegedly presented to Samuel Untermyer, the lawyer, by Mussolini at the cost of \$25,000; a rare Cadillac town car, vintage 1910; a 1935 Packard phaeton used by Madame Chiang Kai-shek during her visit to California; three Mercedes Benzes, three Isotta Fraschinis, two Minervas and seven Rolls Royces, in various body styles. The oldest car in the collection is the 1890 Pillion steamcar, and the newest is any one of the 1950 American or foreign stockcars—Pacific has them all. The smallest is a tiny (60-inch wheelbase) 1936 English Austin, and the largest is a monster seven-passenger Renault touring car, vintage 1922.

Sometimes actors expect too much from the old cars. Recently, a famous cowboy star was making a picture in which he was to drive Pacific Auto Rental's 1898 Holsman Surrey—a one-lunged, belt-driven job, complete with fringe on top. When a cameraman sped by in a 1949 Buick Roadmaster, the actor shouted angrily, "Whazza matter with this heap? This thing ain't got no pickup at all!"

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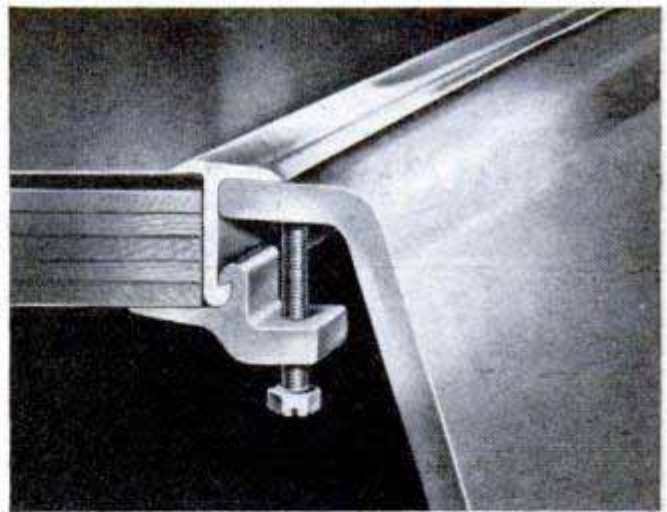
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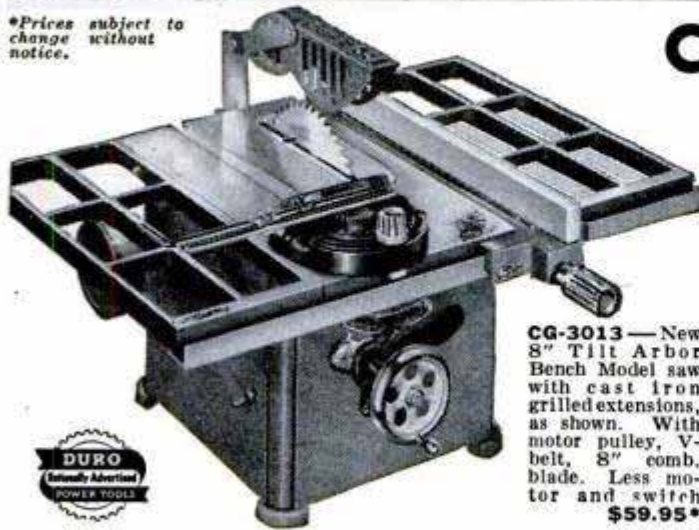
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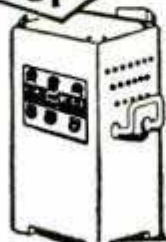
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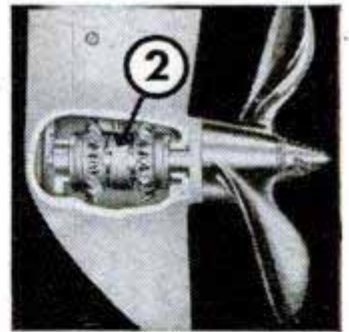
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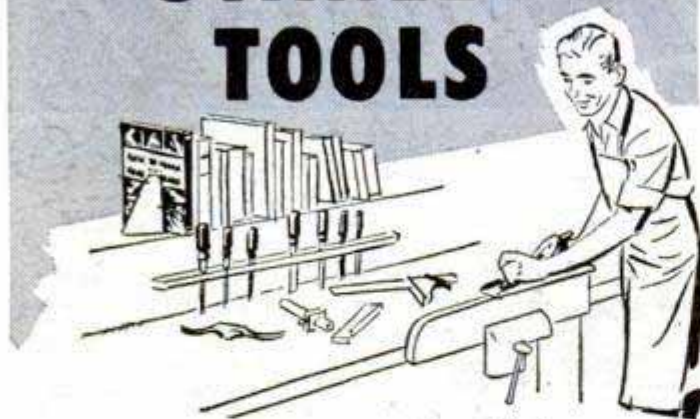
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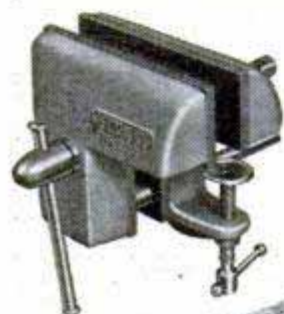
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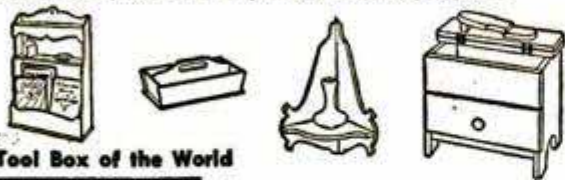
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Rangers Patrol the Everglades

(Continued from page 104)

And this was simple compared to mastering the whims of a 40-mile-per-hour airboat, which was capable of pitching out its driver in a tight turn and leaving him stranded in the Glades. These sledlike craft, powered by a small airplane engine and propeller, were developed by frog hunters for skimming over shallow sawgrass sloughs.

One crew that set to work driving posts for boundary signs across 50 miles of the wildest area in the southern United States had to use a "swamp buggy." This clanking contraption is built up either from a tractor or a stripped auto frame with huge airplane tires.

There's plenty for tourists to see in the Glades—the rare sea cow, or manatee, poking her nose up in the mangrove waterways, age-old bird rookeries with their thousands of nesting ibis or egret, Amazonian gumbo-limbo hammocks filled with wild orchids. The difficulty is getting to them in this watery wilderness.

A paved highway, the Tamiami Trail, spans the Everglades at the upper edge of the park. But most tourists drive over it and the marl road to Coot Bay, in the heart of the park, too fast to see anything.

As park superintendent Dan Beard puts it, "Going through the Everglades is not like watching a football game; it's more like listening to a symphony."

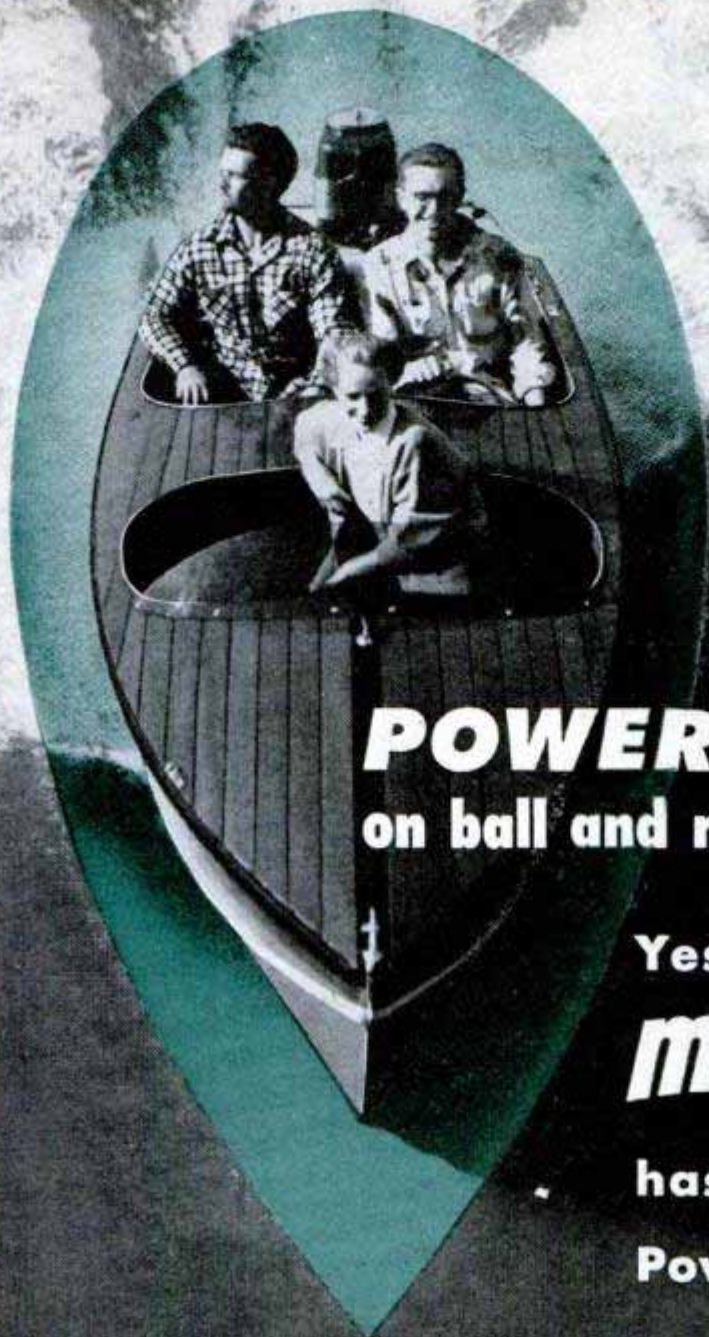
The spectacular island-bird rookeries are reached by one-day boat trips. In cooperation with the park service, the Audubon Society offers guided boat tours at a nominal cost.

The rangers find it exceedingly easy to please another class of visitors. Fishermen, who in other national parks have spent days whipping mountain streams before catching a trout over 12 inches long, are in anglers' heaven when big silver tarpon hit their flies or plugs. Other salt-water battlers, with odd names like snook, jack, chiro and redfish, lure skiffs far into the vast labyrinth of waterways.

Ever since the "opening" of Florida, a few ruthless men, some hiding out from the law in the fastnesses of the Glades, have always considered it their right to plunder the wild jewels of this land. Even today, the rangers must patrol by airboat, swamp buggy, speedboat and skiffs, linked by an FM radio system, against poachers.

Working with the old hands, the new rangers learned where alligator hunters had burned off the protective tangle around a "gator hole" in order to jacklight the

(Continued to page 254)



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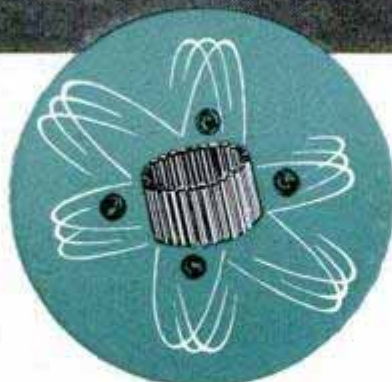
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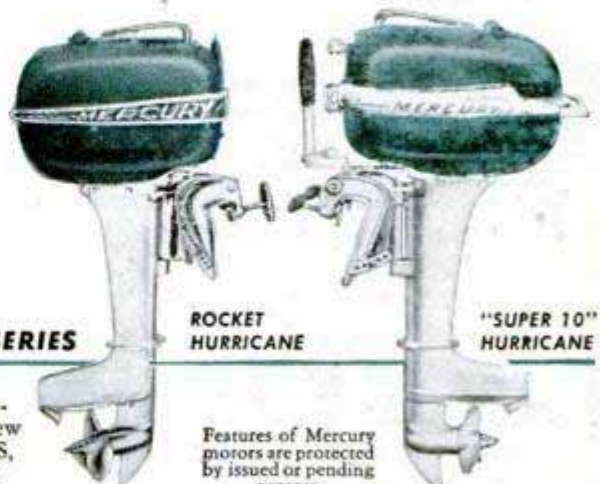


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saurians at night. Here commercial orchid hunters had once despoiled a hammock. And, as flights of snowy egret and white ibis rose from a rookery in their nuptial plumage, it was easy to picture again the ghastly slaughter that once threatened the plume birds with total extinction.

Unlike enforcement work in long-established parks, where the chief violations are keeping an undersized trout or building a campfire without a permit, an Everglades patrol can be dangerous. Every advantage is with the poacher whose boat skims in swiftly at night.

As in most parks, the rangers have to patrol the accessible borders during hunting season. Predators such as wildcat and panther get the same protection in a national park as do the birds or deer on which they feed. Making this clear to local hunters who had never heard of the idea was difficult at first.

The Glades is literally a river of grass, and yet—as new rangers soon learned—the greatest man-caused destroyer is fire. During the dry winter months weird, wind-driven flame-storms may sweep over the sawgrass prairies and consume hammocks that have been centuries in the making.

Here was a difficult teaching job for the park service, for Floridians were used to seeing the Glades burn. Hunters, farmers and cattlemen started most fires just outside the park's borders. Few appreciated the havoc visited on wildlife when feeding and nesting grounds went up in smoke.

The rangers and fire guards found Glades fire fighting a new experience. They stood in ankle-deep water and "flapped out" small sawgrass fires with a sort of giant fly swatter. But when one of these little blazes sprang before a wind into a conflagration covering thousands of acres, equipment ranging from airplanes for spotting to bulldozers for trenching was brought into play. Then, in 24 hours it might be under control. In the north a five-acre forest fire meant a week-long job.

It's been only three years since the park service took over this strange wilderness, but its "tropical rangers" are now veterans who can give a Seminole Indian a pointer or two on the Glades. And already they can see the value of their protection. The birds venture closer to the lone marl road and alligators once more sun themselves on the bank. Here, where such species as the American crocodile and the Florida panther are making their last stand, peace is returning to the wilderness.

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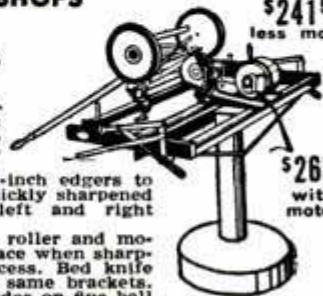
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*Pat. Applied For

MANUFACTURED BY **DU-FAST, INC.**

32 East Fourth Street

New York 3, N. Y.

I'm Building the Popular Mechanics Plywood Ranch House

(Continued from page 127)

area—there is ample room for it, even including a half-bath.

The second stage of the ranch house consists of the breezeway attached to the former carport and a double garage. The breezeway, besides simplifying the expansion and being extremely popular today, is the most inexpensive way of adding that extra living space to your home. Basically, it is just an addition to the roof, the house and garage walls forming its two sides. For outdoor living, it can be closed off at one end or left open at both. It can be glassed in to form a sunroom or part of it can be closed off to become an extra bedroom or rumpus room—it can be refitted to your family's needs at any time.

You may notice that the garage of the ranch house now extends back the full width of the house, 25 feet. As the architect has proved, this full length costs you no more and it simplifies roof construction.

My friend, Norm Chapman, and I are now completing the exterior of the garage and breezeway. Its framing and roof are the same as the rest of the house and in the garage the plywood sheathing gives another advantage—its large panels provide the inside walls of an unlined garage with a smoother finish.

The last thing we did on the exterior of the basic house was to nail on the siding. The siding can be any standard material, but that being used here on the model probably provides one of its most striking construction features.

We are using 3/8-inch exterior fir plywood in the latest method of installation, applied horizontally as wide, lapped boards. This siding application is receiving wide attention from builders as it answers many problems and is already fully approved by FHA and other agencies.

It cuts the current high cost of lapped siding to nearly one half. It gives a very strong exterior, forms an extra air space in the wall for insulation and allows "breathing" to reduce the problem of moisture condensation. Architecturally, the extra-wide, lapped boards add length and lowness to the ranch-house design.

I enjoyed the ease of making this siding. We simply set up my multipurpose shop tool as an 8-inch table saw and ripped each standard 4 by 8-foot panel of 3/8-inch plywood into three 16-inch-wide panels. These are the lapped "boards" that form the broad siding.

(Continued next month)

Here's 50% MORE POWER . . . for Dozens of those Production Jobs!



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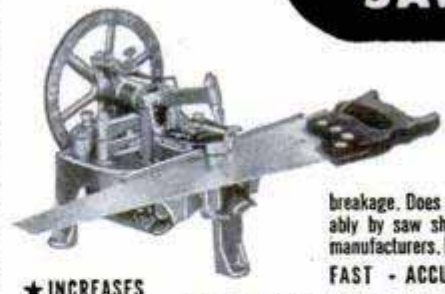
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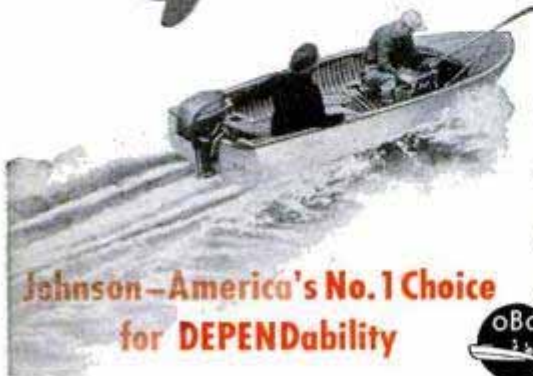
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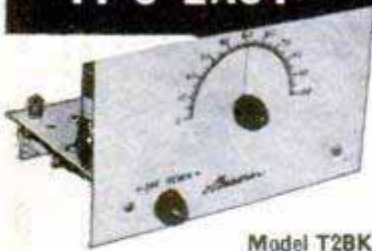
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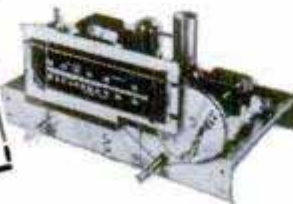
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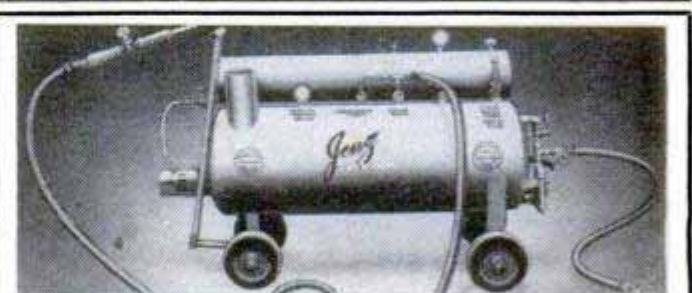
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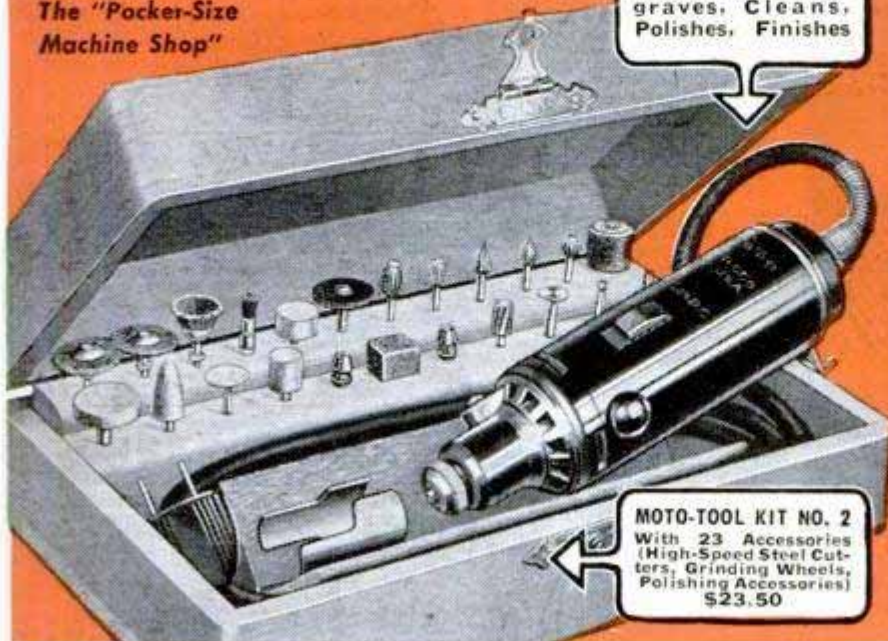
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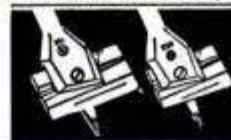
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..fast, accurately...easily

Attach it to YOUR plane quickly and easily for perfect JOINING and EDGING.
• Rugged Construction, Roller Spindle Accurately Machined. • Model 7 guide fits Block & Smooth Planes Nos. 3, 4, \$2.98 • Model 11 guide fits No. 5 Jack (14") and larger \$3.49. • Order Direct or Ask Your Dealer: Literature Available, Satisfaction Guaranteed



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EARN \$25 AND MORE A DAY!
NO SCHOOLING!

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AMERICAN FLOOR MACHINES

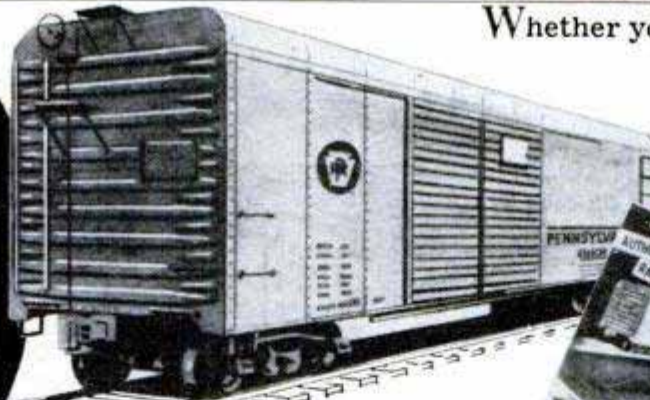


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RAILROAD
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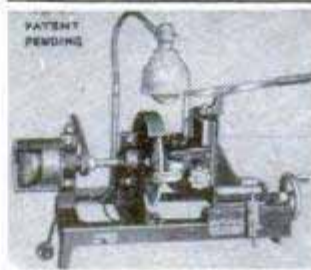
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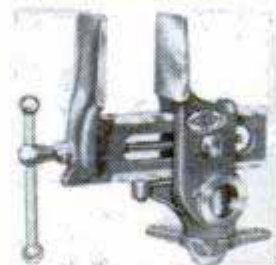
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Large supply of new labor-saving, economical hydraulic equipment in many types and sizes. Use these positive, highly efficient, smooth pressure hydraulics on presses, arbors, lifts, loaders, power control, positioning, brakes, plastic dies, auto frame alignment, etc., etc.



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ITEM #4—All steel double action hydraulic cylinder. 1 1/2" bore, 2 3/8" stroke. Clevis mounting. Will lift 1000 lbs. with 1000 P.S.I. line pressure. Perfect for positioning and feeding movements. Shpg. wt. 4 lbs. **Postpaid.... 4.95**

ITEM #33C—Double action hydraulic cylinder. 1 1/2" bore, 4 1/2" stroke. Clevis mountings at both ends. Uses 1/4" pipe fittings. **Postpaid..... 8.95**

ITEM #32—Double action, 1 1/2" bore, 9" stroke, will lift 1760 lbs. with 1000 P.S.I. line pressure. Wt. 4 lbs. A \$45.00 value. **Postpaid..... 10.95**

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ITEM #103—Double acting hydraulic cylinder. 2 1/2" bore, 17" stroke. Clevis mounting. Will lift 4900 lbs. with 1000 PSI line pressure. 1 1/4" diam. shaft. 3/8" tubing thread ports. Overall length closed 28" Shpg. wt. 11 lbs. **F.O.B. Chicago..... 21.50**

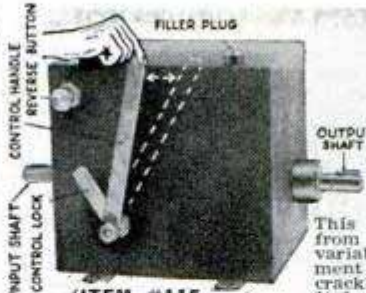
ITEM #31C—Double action hydraulic cylinder. 3 1/2" bore, 11" stroke. Aluminum alloy cylinder wall and all steel 1 1/4" piston rod. Clevis mounting at base and shaft. 19 1/2" overall length closed. Will lift 9625 lbs. using 1000 PSI from Logan Heavy Duty Hydraulic Pump. Uses 3/4" tubing fittings. Value \$102.00. Shipping wt. 11 lbs. **F.O.B. Chicago..... 22.50**

ITEM #6-A—Double action hydraulic cylinder. 3" bore, 25" stroke, will lift 7070 lbs. with 1000 PSI line pressure. Steel barrel, 1 1/2" stainless steel shaft. Gov't acq. cost \$176.00. Shpg. wt. 26 lbs. **F.O.B. Chicago..... 28.00**

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HI-PRESSURE FITTINGS for cylinders and valves available at 50c ea. for 3/8" pipe and 65c ea. for 1/2" pipe.

HYDRAULIC SPEED REDUCER with Fingertip Control



(ITEM #115) reset up to 180 inch pounds. selection in either direction of rotation. Both input and output shafts measure 5/8" diam., include keyway. Input rotation is counter-clockwise facing shaft. Recommended input speeds not to exceed 750 R.P.M. Over-all dimensions 7 1/2" x 7 1/2" x 11 1/2". Gov't acquisition cost, \$428.00. Shipping weight 26 lbs. Complete with 2 qts. of oil and full instructions **Postpaid..... 54.50**

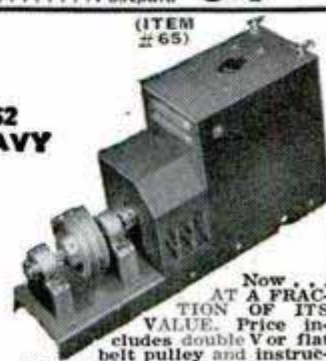
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Variable output speeds ranging from 0 to input speed now available. Merely move control handle until desired speed is attained. Then turn locking handle to maintain the setting. Internal relief valves prevent overloading. Use input power of 1/4 to 1 1/2 H.P. This Westinghouse-Oil Gear Unit converted to commercial use from 40 MM anti-aircraft traversing mechanisms consists of a variable displacement hydraulic pump feeding a fixed displacement hydraulic motor. These components are contained in a crackle-finish steel oil reservoir (capacity 2 qts.). Adjustable relief valves set at factory for 100 inch pounds of torque may be Independent reverse control allows full output power and speed

NEW! STATIONARY OR PORTABLE D. C. ARC WELDER

250 AMPS. MODEL 252 FOR ANY WELDING JOB, LIGHT OR HEAVY STOP COSTLY REPAIR BILLS, WELD IT YOURSELF AND SAVE

Only one or two jobs will pay for entire welder. Designed for many years of trouble-free service. This precision engineered Direct Current ELECTRIC ARC WELDER is offered at but a fraction of its original value. It can be mounted permanently or easily transported for portable use. Does the job instantly where and when you need it. Has dial type rheostat for easy pinpoint control and a high-low range switch. Run welder at 2500 RPM from drive pulley or power take-off of tractor, a 7 1/2 HP electric motor or a 10 HP gas engine. Use two V belts or flat belt (on pulley).



Now... AT A FRACTION OF ITS VALUE. Price includes double V or flat belt pulley and instruction book. Shpg. wt. 107 lbs. **F.O.B. Chicago..... 99.50** If more information is desired write for welder circular.

GENERAL MOTORS-ALLISON CENTRIFUGAL PUMP

200 GALLONS PER MINUTE

- For Draining Basements • Fire-Fighting • Irrigation • Fuel Transfer • Swimming Pools • Home Water Systems • Dewatering



(Item #120)

This General Motors-Allison Centrifugal Pump—designed for use on U. S. Air Force Mustang fighters, now converted for commercial, home, and industrial high volume pumping applications. Inlet, 2 1/2" standard pipe thread, twin outlets with 1/4" pipe thread, ball bearing supported 3/4" shaft. Easy, fast simple priming. Rotation, counter-clockwise facing shaft. Shipping wt. 35 lbs. Gov't acq. cost \$145.00. **F.O.B. Chicago Now Only..... 39.50**

Success Lift	Head Pressure	Gal. Per Min.	H.P.	R.P.M.
10'	65'	200	5.2	3500
10'	80'	40	1.5	2500

DIRECT CURRENT GENERATORS



For welders, plating, truck and marine use, D.C. appliances, lights, etc. Aircraft quality—lifetime grease sealed ball bearings. Heavy duty.

Item #89—Type M-2, rated 50 Amps.—24 Volts. Mfd. by Lece-Neville Co. Shpg. wt. 32 lbs. Gov't Acq. Cost \$176.00. **F.O.B. Chicago. Now Only..... 16.50**

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Each individually packed in wooden box. **Item #73**—Allis Chalmers MOTOR GENERATOR. 120 volt, 60 cycle AC, 7.82 amps. output. Input—24 volts DC, 65 amps, 3600 RPM. Ideal for marine and aircraft installations, farm and factory use where AC is desired and DC available. Run unit off DC welder for handy 120 volt AC current for emergency power for oil burners, incubators, electric motors, etc. Ship. wt. 200 lbs. **F.O.B. Chicago..... 79.50**

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IDEAL FOR:

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- Built by Pesco — Div. of Borg-Warner. Gov't acq. cost \$45.00. Shpg. wt. 12 lbs. Free! Complete instructions and performance data with each pump. **F.O.B. Chicago. NOW ONLY..... 16.50**



(ITEM #31A)

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ITEM #24. Four-way control valve with built-in relief valve, for use with one double action hydraulic cylinder, may be used with 1500 P.S.I. hydraulic system to open and close hydraulic cylinders. Ship. wt. 8 lbs. A \$38.00 val. **9.95 postpaid.....**



ITEM #26. Four-way control valve for use with two hydraulic double-action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Ship. wt. 6 lbs. A \$60 value, **postpaid..... 12.95**

LOGAN HEAVY DUTY HYDRAULIC PUMP

For operating hydraulic cylinders and hydraulic motors on tractors, bulldozers, construction machinery, lift trucks, industrial applications, etc. Delivers 10 GPM at 1200 RPM at 1000 P.S.I. using 6 HP. Has a 3/4" inlet, 1/2" outlet, 3/4" shaft with flat and keyway for direct or pulley drive. Has flange with 4 bolt holes for convenient mounting. Ship. wt. 22 lbs. Overall dimen.: 7" L. x 5 1/2" H x 5 1/2" W. A \$105.00 value **FOR ONLY..... 22.50**



(ITEM #29)

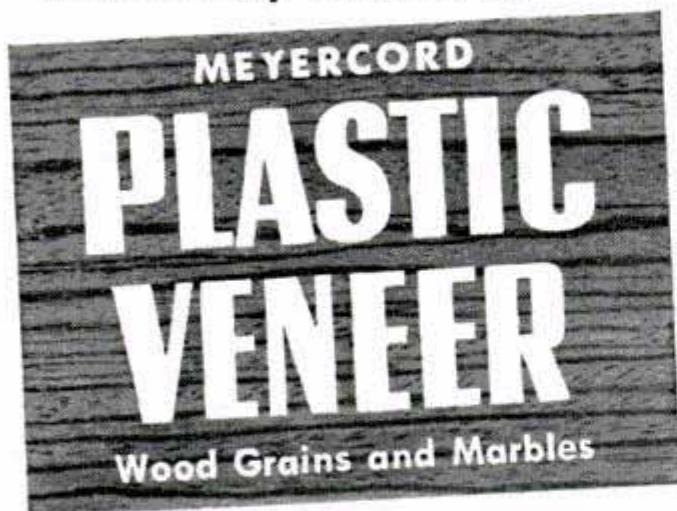
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FEATURED IN FULL COLOR
IN JANUARY POPULAR MECHANICS

Here's the Big Offer!

- 1 3 sheets of Meyercord Plastic Veneer
—Any Pattern (Check Coupon Below)
- 2 with Cement
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COMPLETE ONLY
\$5.00
POSTAGE PAID

Now—exact reproductions of rare woods and marbles are available in PLASTIC VENEER sheet form to beautify the articles you make. Easy to apply on flat or simple curved surfaces of wood, metal, glass or composition. Durable, workable. Can be rubbed, top-coated, waxed. Order the special 3-in-1 package today. Check woods or marbles desired. Sheets contain 5 to 6 sq. ft.

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| <input type="checkbox"/> Straw Zebra wood | <input type="checkbox"/> Rose de Brignole Marble |
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NAME _____

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(Offer good in continental U.S.A. only)

Here's Your Helicopter Coupe

(Continued from page 121)

no vibration, no special sense of being airborne. We sat there, six feet in the air, and a mechanic walked in under us to give one of the wheels a tug. He could move us around, but it took a hard push, demonstrating the machine's inherent stability.

Hiller pushed the cyclic control forward and we started to move, climbing slowly to rise over a brushy fence. We flew toward his factory at roof height, then descended to the ramp area where mechanics were making adjustments to some "360s."

On the way back to the experimental area I took over the controls and found that just a touch was required to guide the helicopter in changing altitude or direction. There was no sharp, rapid change of attitude; the helicopter answered the controls slowly and smoothly. "Put her on course and let go of everything," Hiller suggested, and I did. The machine moved along as steadily as if I had both hands clutched on the controls. "She'll stay in any attitude you put her, hands off!" Hiller told me.

Hiller has been trying to build a simple, cheap rotary-wing aircraft ever since he got into the business in 1939—when he was 15. The big obstacle has been that until recently the most practical engine was the conventional internal-combustion engine. This is expensive to begin with and requires expensive gears, cooling systems and auxiliaries.

The wartime development of gas turbines, pulsejets and ramjets suggested new low-cost possibilities and Hiller experimented with or studied 17 different applications of these power plants. He settled on the ramjet as offering the best possibilities and he spent a year and a half working out his own version of this "flying stovepipe" engine.

The ramjet is inefficient and gulps fuel in prodigious amounts; on the other hand it is light, cheap and foolproof. It has no carburetor to ice up, no ignition system to fall apart or misfire. It works beautifully in heavy rains that would ground a helicopter powered with an ordinary engine. Hiller's engine is the size of a small watermelon and can be bolted onto a rotor tip in a couple of minutes. It burns any kind of fuel from dime-a-gallon stove oil or kerosene up to aviation gasoline. A ramjet unit costs less than \$200 and can be thrown away at 500 hours.

Hiller spent a quarter of a million dollars reworking the basic ramjet and came up with a design that is somewhat quieter and more efficient than the original. He

(Continued to page 268)

HERE'S HOW YOU DO MORE JOBS

With a DELTA[®] DRILL PRESS

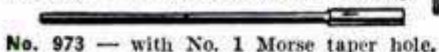
Only Delta offers so many extra-job accessories!

A SPINDLE FOR EVERY JOB

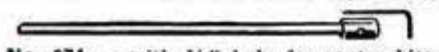
You can change the spindle on your Delta Drill Press, equip it to do more jobs.



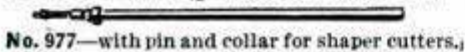
No. 972 — with Jacobs chuck and key.



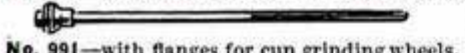
No. 973 — with No. 1 Morse taper hole.



No. 974 — with 1/2" hole for router bits.



No. 977 — with pin and collar for shaper cutters.



No. 991 — with flanges for cup grinding wheels.

DRILL IN WOOD

Delta gives you a wide variety of sizes of chisels, bits, bushings for mortising; plug cutters, for cutting dowels, etc. Do straight boring, angle boring, counter-sinking.



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Using standard holding and clamping fixtures, you can countersink, tap, drill large holes, small holes — in round stock, thin or heavy metal.



CUT THOUSANDS OF SHAPES

Delta No. 980 Three-Lip Cutter Set makes your drill press a Shaper. You can cut mouldings, picture frames, thousands of shapes.



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Using Delta No. 974 Spindle with Delta Router Bits, you can rout curved work, rout with pattern, cross-rout, rabbet, make round-end mortises, flute, cut rosettes.

SAND CURVES ACCURATELY

Delta offers a big selection of sanding drums and sleeves for pattern sanding and freehand sanding of irregular curves.



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Catalogs and bulletins on complete Delta line.

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Shown is a Delta 17" Drill Press, one of 144 different models Delta offers in 14" and 17" sizes.



MAKE MORTISE AND TENON JOINTS

Delta No. 976 Mortising Attachment converts your drill press into an accurate mortising machine that saves time and money.

"HOW-TO" BOOKS

suggest what to make, tell how to make it — in clear words and pictures. Available from your nearby Delta dealer, as part of his complete "one-stop" service on power tools and accessories. See him, to get the most out of your power tools — take on new jobs — have more fun — make new profits!



DO MANY OTHER JOBS

Drill glass, slate, marble, paper. Mill, carve, surface, spin rivets, flute and reed turnings, cut disks, cut tenons, mix paint, do engine finishing, point dowel rods, polish and buff, etc.

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B-16



AMAZING...worn Connecting Rod Bearings Fouled this Valve!

Amazing, yes—but logical when you consider it. Normally, connecting rod bearings meter oil flow for proper engine lubrication. When bearings are worn, increased clearances let excess oil reach combustion chambers. It burns to carbon, fouling spark plugs, valves, pistons and rings. Moreover, one badly worn bearing can oil-starve other bearings until they fail, too! When the complaint is oil-pumping, check for worn bearings. Replace in sets with Genuine Federal-Mogul Bearings, engineered for the job of oil-control!

FEDERAL-MOGUL SERVICE

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**Control Oil Pumping
where it starts...replace with
FEDERAL-MOGUL
OIL CONTROL BEARINGS**

plans further improvements. When better engines are available, you can unbolt the old ones, attach the new ones, and the change-over is complete.

The "Hornet" was designed around this power plant. The first machine was flown last spring and since then has piled up hundreds of flying hours. The Hiller organization tooled up for production, prepared the way for CAA licensing and was all ready to start sales this spring. Then the war postponed civilian production.

Here are the "Hornet's" specifications: fuselage length, 152 inches; tread, 60 inches; height, 80 inches; rotor blade, 23 feet long. The helicopter has an empty weight of 340 pounds, carries a pay load of two people plus 25 pounds of baggage, and has a range of 50 miles at 70 miles per hour. Its maximum speed is 85 miles per hour, it has a ceiling of 12,000 feet, and a rate of climb of 1200 feet per minute. At cruising speed its rotor makes some 520 revolutions per minute. No tail fan or other torque-compensating mechanism is required. The tail rudder is used for directional trim and is sloped so that it is affected by the rotor downdraft.

The rotor has a solid leading edge, consisting of an aluminum extrusion with a built-up magnesium trailing edge. The cockpit is walled in transparent Plexiglas and the fuselage itself is Fiberglas and plastic laminate.

I asked Stanley how long it would take for me to be checked out as a "Hornet" pilot and what troubles I could get into with the machine.

"Well," he said, with a twinkle, "it might take you, personally, a couple of years to learn how to fly this helicopter. Actually, a couple of hours instruction at most would teach the average person the rudiments of flying it. However, I don't think that the CAA will relax its present requirements for solo flight in any kind of aircraft. There's a lot more to flying than just learning to coordinate a couple of controls. You have to know flight patterns, something about weather, your responsibilities and a lot of other things.

"As for getting into trouble with the 'Hornet,' I can't see how you could hurt yourself unless you deliberately flew into a building or a power line. You can always slow down to a halt in the air and think things over. You can creep along at walking speed if you like, and you can set down on any clear patch of ground. You don't need an improved airport for this craft."

So, there's your personal helicopter. Hiller will deliver one to you just as soon as circumstances permit.

amazing new

SAFE

circular saw blade!



What the PTI "Cut Control" Blade Is:

Each PTI Saw Blade has only 8 teeth instead of the customary 100. These teeth are entirely different from the conventional saw tooth — they project only 20/1000" above the non-cutting edge. Thus the cut of each tooth is "controlled" by the non-cutting edge, in contrast to the ordinary saw blade where each tooth cuts right down to its base. This relatively simple alteration in design actually works miracles in the performance of the blade.



patent pending

CUT CONTROL

TESTED and APPROVED

The PTI Cut Control Saw Blade is the first and original blade of this type. (Patent Pending) Developed by one of the world's foremost saw makers — it has been thoroughly tested in leading laboratories and shops of both Europe and U.S.—with favorable reports in every instance. Letters from delighted users crowd our files:

O.M.W., Lima, Ohio: "Without question the finest saw blade I have ever seen! Makes sawing a pleasure. Here's my check for two more."

L.B.E., Winnipeg, Man., Canada: "Was unable to cause a kick-back with it."

R.E.O., Bainerd, Minn.: "Never saw a blade cut wood like this. Will never use any other blade."



Takes the DANGER out of circular sawing

Here is the greatest improvement in circular sawing — since the invention of the circular saw. It's the sensational new PTI Cut Control Saw Blade that brings long-needed safety and remarkable new efficiency to this important power tool. Never before has a saw blade been subjected to such gruelling, thorough tests, to such careful checking and re-checking by leading laboratories, government agencies, universities, and industrial concerns. And never before has a saw blade made such astounding records in safety and cutting efficiency. No other saw blade today can offer you so many exclusive advantages, including:

- 1 Complete Safety From Kick-backs" — Since the teeth are only 20/1000" high — they cannot grab the wood and throw it against the operator — eliminating one of the most serious causes of circular saw injuries.
- 2 Reduced Direct Injuries — Cut Control teeth do not drag the hand into the saw. The non-cutting edge acts as an effective stop to cuts and limits their depth.
- 3 Cut Chips — Not Sawdust — Unique cutting action produces chips. Easier to clean. Eliminates fire hazard of spontaneous combustion.
- 4 30% to 40% Power Saving — Fewer teeth mean fewer cuts

to achieve same results — hence less power consumption.

- 5 Longer Life Without Sharpening — When cutting off chips — the wedge action of the tooth does most of the work — which means less wear on the cutting edge of the teeth.
- 6 More Efficient Cutting — Each tooth is backed up better against body of blade. It is therefore more rigid, less likely to vibrate — and cuts more smoothly.
- 7 Quieter Running — Fewer teeth makes saw practically noiseless when running true.
- 8 Blade Does Not Crack — Blades are made of special Vanadium Steel. In addition — controlling of cut prevents overloading of teeth, a common cause of blade cracking.

ORDER TODAY

SATISFACTION GUARANTEED!
OR MONEY BACK!

Here are the prices and sizes, delivered, postpaid. All blades are combination rip and cross cut. In ordering, be sure to give the diameter and bore of the blade. Send check or money order or we will ship C.O.D.

7" diameter blade \$4.95
8" diameter blade \$5.90
10" diameter blade \$7.50
12" diameter blade \$9.40
14" diameter blade \$11.40
16" diameter blade \$14.40

(Prices on carbide tipped blades furnished on request.)



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Money order or check for \$_____ Send C.O.D.

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Address _____

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Zone _____ State _____

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The Owners Report on the '51 Kaiser

(Continued from page 110)

and window leakage. An owner in Tacoma, Wash., prefaced his critical remarks by saying that he would definitely buy another Kaiser. He has a De Luxe model four-door sedan and has driven it 8000 miles in four months. His gas mileage in the city is 14 miles per gallon and in the country 18. (Both considerably lower than the poll average which was 18.5 for city and 21.9 for country.) He likes the maneuverability and wheelbase but finds the pickup at cruising speed is "not as much as I would expect for 110 horsepower." Then he warms up to his criticism: "The brake pedal is too close to the accelerator. The overdrive cutout switch should be mounted either for the left foot or steering-wheel operation. This would give smoother operation to change and wouldn't cause motor to load up and hit the rear end so hard. Kaiser used too many metal screws. They jar loose. A bolt now and then would help. Not enough attention is paid to the weatherproofing of the cars—trunk, windshield and doors leak."

On the other side of the ledger there is the man from St. Cloud, Minn., who reported the car's "vision is the best on market, I believe," and the mechanic from Green Bay, Wis., who said: "I've been a mechanic for 30 years and owned everything that was made and a few they are not making any more. I cannot think of a thing I dislike about the Kaiser."

An interesting figure in the survey shows that 44 percent of the '51 Kaiser owners who filled out the questionnaires were previous owners. Also, despite the widespread interest in V-type engines, both in the industry and among motorists in general, the survey shows only 32 percent preferring the V engine. In regard to the number of cylinders, the preference for six cylinders was twice as great as for eight, and four cylinders drew a blank.

A Minneapolis driver told of a 3000-mile trip on which he averaged 21.2 miles per gallon and used only two quarts of oil. At 85 miles per hour, he figured he got 18.9 miles per gallon and at 35 miles per hour, 26 miles per gallon. He found the car to be excellent on the road, but was bothered by the hand brake and reported the "appointments very ordinary." Another owner from Green Bay (Somebody must be boosting Kaisers there!) says: "Wonderfully designed automobile but not tied together very well. I have driven a dozen automobiles over 500,000 miles and like this one the best. It's fun to drive." A fellow in

(Continued to page 272)

CHANNELLOCK *Belongs*

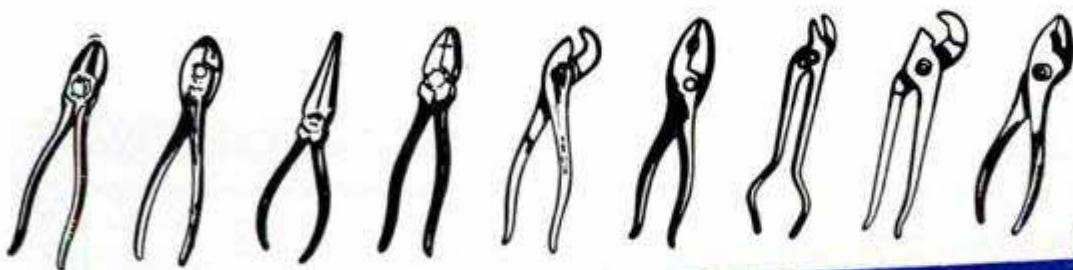


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When Mom or the kids get in a fixin' mood you can bet they'll do a better job when Channellock pliers are handy. Channellocks are easy to use, simple to adjust and—well, darn good pliers. They are made by Champion DeArment who for nearly 3/4 of a century have been making and selling highest quality tools. The next time you're shopping for tools ask to see Channellock pliers. Heft 'em, use 'em, test 'em—then buy 'em. On almost every job requiring tools, you'll find a use for Channellock. And remember, Only Champion DeArment makes Channellock. Send for Catalog D15 Today.

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Channellock pliers are listed in the Yellow Pages of most Telephone Directories under "Tools"

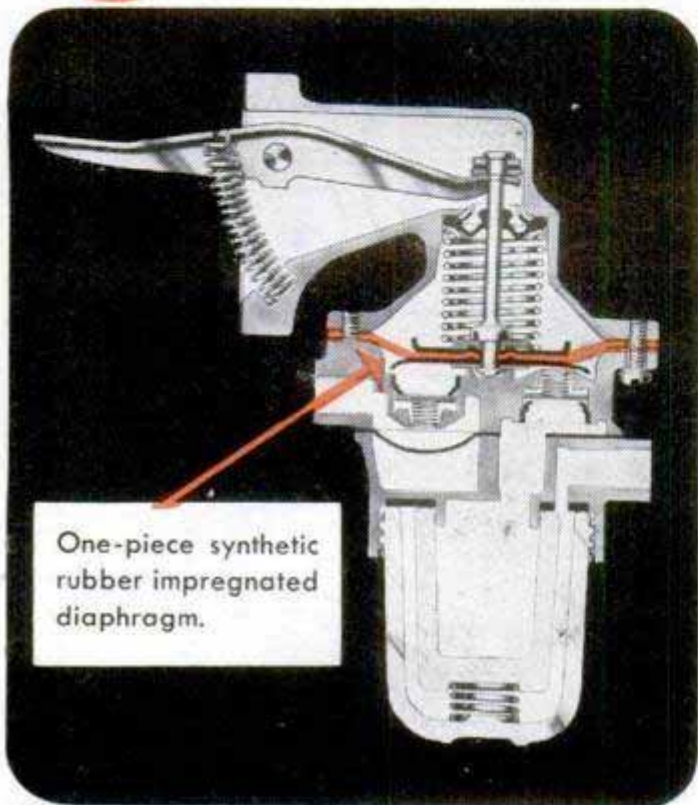


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One-piece synthetic rubber impregnated diaphragm.

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Look at the Diaphragm . . .

For a
**LIBERAL
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on your old pump,
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. . . This one-piece synthetic rubber impregnated unit is unharmed by gasoline and gasoline blends. It is built to operate under temperature extremes far in excess of those encountered in normal driving conditions.

CARTER CARBURETOR CORPORATION

St. Louis 7, Missouri

Division of American Car and Foundry Company



Fort Lewis, Wash., reports that he is proud of his '51 four-door sedan, but dislikes the glove compartment ("too many rattles") and adds that the trunk compartment is too flat to take ordinary luggage conveniently. He also found the master brake cylinder difficult to service.

A Louisiana driver with 10,000 miles on his De Luxe sedan gives one of the most glowing reports of any received. Everything about the Kaiser with him is tops and after the question in regard to dealer service he wrote: "Excellent!" In almost every case where an owner is completely sold on the car he reports good dealer service. On the other hand, a gloomy report on the car invariably includes the word "lousy" after the dealer service question. This was found not only in the Kaiser survey but also in the Nash Rambler poll taken last month. One owner who said his dealer service was "the poorest possible" wrote on the back of his questionnaire: "In all my life I have never seen such a poor excuse . . . for a dealer." He indicated that he will not buy another Kaiser. Despite the occasional loud squawks about dealers, 63 percent of the polled Kaiser owners reported service "good," 24 percent "average."

An Illinois farmer gave the car a good report and then added: "I don't want you to think that I am just putting on . . . the 1951 K is tops . . . Just take a ride and drive one." His only objection was to dust gathering in the trunk. Another man said, frankly, that he bought a Kaiser Traveler just for the bed. He sleeps there on weekend trips.

There were a few kicks about the ignition-key arrangement which makes it possible to remove the key without turning off the engine. One man left his engine running all day parked in front of his office.

Many owners commented on the car's low center of gravity and approved of the way it takes curves. One surprise of the survey was that 55 percent reported they would prefer NOT to have an automatic transmission.

Infrared Lamps Keep Chicks Warm

With infrared lamps as their only source of heat, baby chicks will thrive even in a refrigerated room 12 degrees below zero. Lamps were placed 19 inches above the ground in experiments at a new 20,000-chicken broiler house in Delaware and were raised as the baby chicks grew and required less heat. A thermostat regulated the heat. The new method eliminates firing and stoking of coal stoves, formerly needed, removes the danger of fire and insures a more consistent temperature.

The Most Practical Watch in the World!



HANDSOMELY STYLED 17 JEWELS!

WRIST ALARM

IMPORTED SWISS MOVEMENT with LUMINOUS DIAL

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ALARM ON-OFF SWITCH FINGER-TIP CONTROL



REMINDS YOU OF APPOINTMENTS



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AMAZES & SURPRISES YOUR FRIENDS

The ideal business man's watch that serves double-duty at office or home. A guaranteed accurate fine timepiece that becomes a precision ALARM Watch when you set the dial for it. Merely set the alarm indicator to ring at the time you want—that's all—no complicated extras. This exclusive Gaylord Wrist Alarm features thin, smart chrome and stainless steel case; red sweep-second hand; choice of black or white face; single winding principle for both alarm bell and watch spring; leather or metal expansion band. It's neat, smart, wonderfully-convenient—handy just when you need its help, will be a great convenience to any man in ANY work.

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Guaranteed FOR ONE YEAR

Precision movement in the best Swiss craftsmanship; moisture and shock resistant; time-tested; alarm bell integral with movement.



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Please send me.....Wrist Alarm Watches @ 19.95 + 10% Tax (2.00) with Black Dial; White Dial; Wristband in Metal or Leather. I enclose Check, Money Order, Send COD. Money-Back Guarantee! PRINT NAME & ADDRESS IN MARGIN

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For Six Hundred dollars and 30 days of your spare time you can build yourself this Beautiful Home.

Living room 10x15, Front bedroom 9x10, Back bedroom 10x11, Kitchen 8x10, Bath 5x7, Hall 3x4, Wind out steel Casement windows, Concrete block, stuccoed. \$1.00 brings you Step-by-Step Instructions, Blueprint & Material List.

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NU-WAY HEAVY DUTY CUTTING UNIT with Timken Roller Bearings

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Build your own rotary type lawn or weed cutter.

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Write for Free Circular—We Supply Cutting Unit Complete
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Get more value for less money! Make Your Choice an Empire Level

No. 151 Aluminum Level. Extremely accurate with adjustable-interchangeable vials. Has 2 levels, 2 plumbs, and a choice of 2 45° vials or 2 additional plumbs. Beautifully finished, easy to work with. A tool you can be proud to own.

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Make \$20 to
\$30 a Week
**EXTRA
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MACHINE SAW FILING PAYS UP to \$2 or \$3 an HOUR

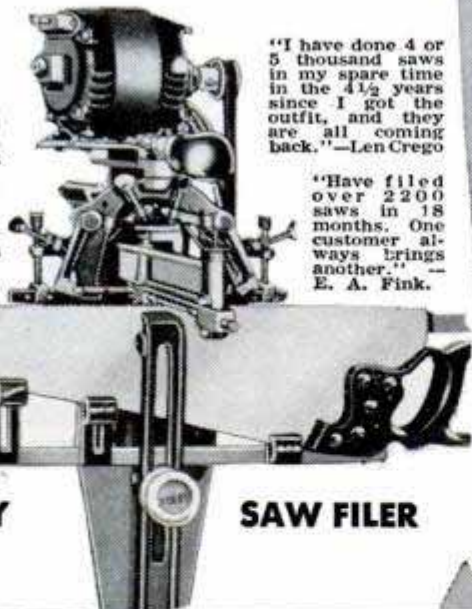
Turn your spare time into CASH—sharpening saws with a Foley Automatic Saw Filer pays up to \$2 or \$3 an hour. You will find you can make \$20 to \$30 a week in your spare time as a starter.

You can work in your basement or garage—no experience necessary. "The first saw I sharpened with my Foley Filer came out 100%"—writes Clarence E. Parsons. No canvassing—"I advertised in our local paper and got in 93 saws"—says M. L. Thompson. The Foley is the only machine with which you can file all hand saws, also band saws and cross-cut circular saws.

SEND FOR FREE BOOK "INDEPENDENCE AFTER 40!"

Shows how you can get business from home owners, farmers, carpenters, schools, factories, etc. With a small investment, no overhead, no stock of goods to carry, you can get right into a cash business—and possibly later on develop into a full-time repair shop. Send coupon today for Free Book. No salesman will call.

"Each saw I filed got me six more and business has been picking up that way since a year ago. If it keeps up I will have to buy another Foley Saw Filer." — William C. Baldwin



"I have done 4 or 5 thousand saws in my spare time in the 4½ years since I got the outfit, and they are all coming back." — Len Crego

"Have filed over 2200 saws in 18 months. One customer always brings another." — E. A. Fink.

FOLEY

SAW FILER



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Send FREE BOOK — "Independence After 40."

Name _____
Address _____

Clymer Tests the Henry J

(Continued from page 112)

Few owners were dissatisfied, but about half of them wanted a rear-deck trunk lid, side-window vent panes, locks on both doors and better interior finishing. Most owners said that even though the upholstery is very plain, the seat springing and comfort compared with that in more expensive cars. Ninety percent said they had ample head and leg room. Three fourths said they bought the Henry J because they wanted a lighter, more economical car which would be easier to park and handle in traffic. Of the owners to whom I talked, more than three fourths declared they would buy a Henry J again.

1951 HENRY J

Condensed Specifications

ENGINE

	6-Cyl.	4-Cyl.
Type.....	L-head	L-head
Bore and stroke.....	3½" x 3½"	3½" x 4¾"
Displacement.....	161 cu. in.	134 cu. in.
Brake hp.....	80	68
Compression ratio.....	7.0 to 1	7.0 to 1
Transmission.....	3-speed conv. (O.D. optional)	3-speed conv. (O.D. optional)

GENERAL

Weight—2448 lbs. Wheelbase—100 in. Tread—front, 54 in.; rear, 54 in. Height—59½ in. Overall width—70 in. Length—174½ in. Tires 5.90 x 15. Recommended pressure—24 lbs. Road clearance—7 in. Turning radius—17 ft. 6 in. Steering wheel, lock-to-lock, 4½ turns. Steering ratio—18.2 to 1.

CAPACITIES

Oil—6-cyl., 5 qts.; 4-cyl., 4 qts. Water—6-cyl., 10 qts.; 4-cyl., 11¾ qts. Gasoline—13 gallons.

Here are some favorable comments of Henry J owners:

"Handles well, easy to park, economical. It is too high priced, but I sure save on gas and oil."

"The car has amazing power and top speed. Surprises everyone who rides with me. Good in mountains and on sharp curves. Brakes are fine. I get 25 miles per gallon in mountain driving."

"I like the Henry J for its vision, steering, brakes and economy."

"The Henry J, while overpriced like most cars today, serves my needs better than any car I ever owned. As a salesman, the space for samples is very useful."

"I bought the Henry J for my wife, but now I let her drive the big car, because the Henry is so easy to park and maneuver

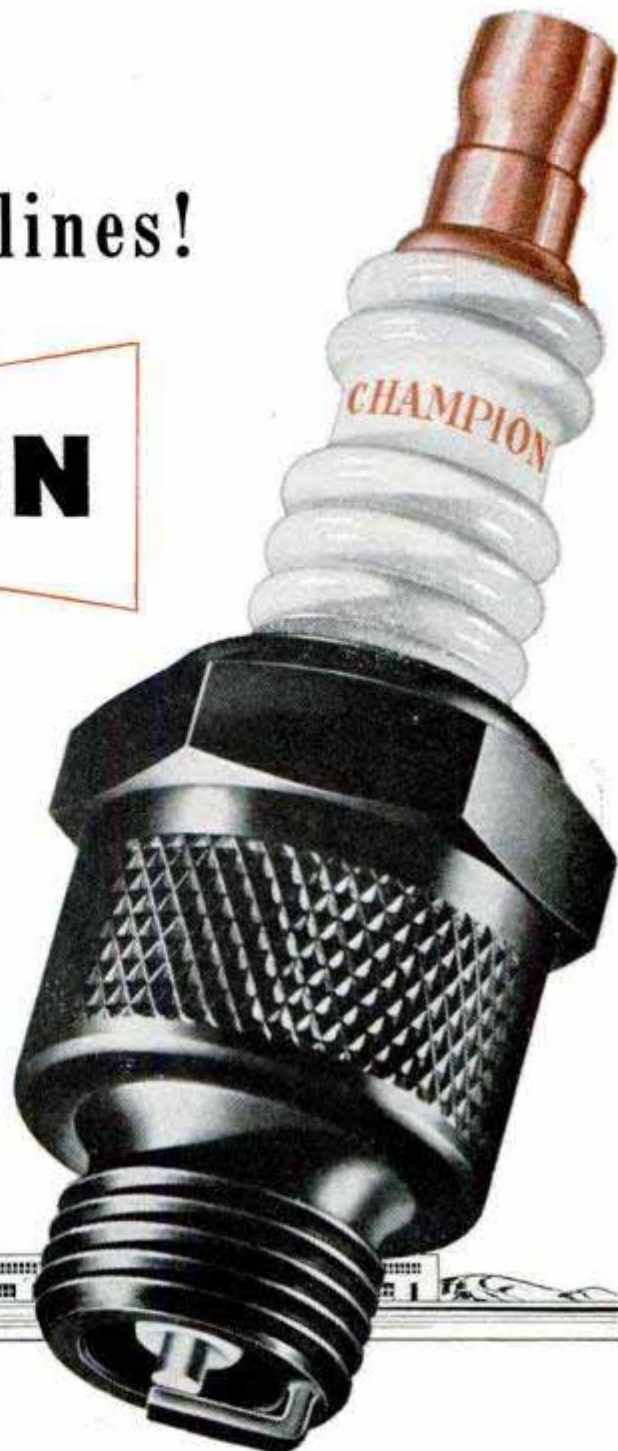
(Continued to page 276)

Take a Tip
From American Airlines!

USE DEPENDABLE

CHAMPION

Spark Plugs



BE A CHAMPION DRIVER

... Good Spark Plugs are the Key to More Power!



Airline pilots know that the ability to get maximum engine power at a given moment is the greatest single safety factor they have. That's why 95% of the airlines fly with Champions!



Maximum engine power for passing is also a safety factor in driving. If your car lacks power, take American Airlines' word for it and install new Champion Spark Plugs.



"AMERICAN AIRLINES requires spark plugs that give maximum power, economy and dependability. Naturally, then, dependable Champion Spark Plugs are the approved standard for our fleet."

(signed) M. G. BEARD
Chief Engineer
American Airlines

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

Listen to the CHAMPION ROLL CALL . . . Harry Wisner's fast sportscast every Friday night over the ABC network



Handy Hank says:

"Every man's a handyman with PLASTIC WOOD"

Reset loose drawer pulls-

Replaces splintered wood . . . makes loose screws firm!



Seal drafty cracks-

Fills openings easily . . . dries tight and hard! Resists weather!

Repair loose tiles-

Holds tiles firm on wall! Easy!



Also useful in filling cracks in floors, nail and screw holes, repairing broken toys. *Handles like putty . . . hardens into wood!*

PLASTIC WOOD
A CELLULOSE FIBRE FILLER

IN CANS OR TUBES



WEATHER RESISTANT

through traffic in downtown Los Angeles. I like it—all but the interior."

"Climbs a hill near my home in high gear faster than any car I've owned. It is like a jack rabbit. Should be better finished, but performance is wonderful!"

"Henry J is snappy, comfortable, a pleasure to drive. It deserves better appointments, for it is really a fine job."

And here are some comments not so favorable:

"Far overpriced, body too light, rattles, cheap interior."

"In spite of a few bugs such as poor assembly on the first cars, it has many good features. Tires should be popular 6.00 x 16 size, window leaks water, needs glove compartment and window vents. Needs better inside upholstery and seat material."

"Disappointed in my Henry J. Too 'cheesy' in appearance. Partially offset by its economy and performance, which are surprising for a light car."

"In spite of lightness and lack of needed essentials, the Henry J does perform and gives no trouble. Body too light, choppy rear end due to short wheelbase."

"Although many things could be improved, appearance-wise, the Henry J is O.K. I have a lot of fun beating bigger cars on the hills and on the highway. I can do 95 in overdrive."

Voice Stopper

When speaking interrupts music, a new device turns off the radio until about one minute after the voice stops. Then it turns it on again. The unit works because of a fundamental difference between music and speech. Speech is full of extremely short pauses, like the one between "s" and "t" in "stay." They are much more frequent and abrupt than they are in music. What the instrument does is to "listen" for these pauses, remember how many pauses there were during the preceding few seconds, and then make a "decision."

Garage-Door Operator

Simple to install and operate, a magnetic garage-door opener goes to work when you press a button on the dashboard of your car. The button energizes a magnetic unit underneath the car and this, in turn, actuates a magnetic switch buried in the driveway. The switch not only opens the motor-operated door, but also turns on the garage and yard lights. When the door is closed, the lights go off automatically. The actuating mechanism in the driveway uses only low-voltage wiring, thus making the installation a simple matter.

Here is something you don't know about your own automobile

Let's say you're driving your car on a level road at 40 miles per hour. Do you know that *half* the power generated by your motor never reaches the rear wheels; doesn't help your car go farther or faster or climb a steeper hill?

And do you know why? Because automotive engineers have proved that 50% of that motor's power is used to overcome *friction*.

Therefore any lubricating oil which further *reduces* this internal friction can't help but deliver the same power with *less* gasoline.

That's exactly what Macmillan Ring-Free Motor Oil does. And we don't just think it's true — we *know* it's true. Here's how we proved it beyond question:

There is a machine called the Dynamometer. It is a scientific way to measure the power an engine delivers to the rear wheels. Cars of all makes, models and ages — cars that had been using *every* nationally known brand of motor oil — were used in this nation-wide test. Hundreds and hundreds of them! And what was the result?

The same thing happened every time: When the oil in these cars was changed

to Macmillan, *the same power was developed with an average of 8% less gasoline.*

That means, at an average price of 25¢ per gallon, you can save 2¢ on every gallon of *gas* — simply by changing your motor *oil*.

What's more, 1094 certified road tests proved that, when the *oil* in an average car is changed to Macmillan, you get 1.3 more miles to the gallon of *gasoline*.

You can't laugh off proof like that — proof that makes dollars-and-sense! Especially when, on top of all this, Macmillan Oil actually *removes carbon from your motor* — cleans your motor as you drive.

Ask for this fine motor oil at any one of the more than 35,000 dealers in America where you see the sign of the big red "M." It means Money in your pocket, Mileage in your car.



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President

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BUILD YOUR OWN TILTING ARBOR SAW!

Exclusive GIL-BILT Build-It-Yourself Features

- No machining—build easily with hand tools only
- No blueprint reading—step-by-step pictorial plans, full scale patterns, actual photographs
- Sturdy wood, aluminum, and steel construction
- Capacity and performance of commercial saws selling for \$60 and up

SAVE
\$50
OR MORE

GIL-BILT 10-INCH TILTING ARBOR SAW



- 27x28 in. table, 13 1/2 in. capacity in front of blade
- 10 in. blade cuts 3 1/4 in. deep, tilts full 45 degrees
- Floor model 34" high, table always stays level

- New Departure ball bearing arbor, 3/4" precision shaft turned down for 5/8" bore blades, alum. housing, shipped ready to run
- Jackscrew and 4 1/2 in. dia. handwheel lowers and raises blade
- Cast aluminum miter gauge and self-aligning rip fence guide

GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jack screw mechanism and handwheel, and all other metal parts (less blade).....\$20.95
Same Kit with 10" Combination Blade \$24.90
Same Kit with 8" Combination Blade \$23.90

GIL-BILT 8-INCH TILTING TABLE SAW

- 21x27 in. table tilts full 45 degrees, 13 in. capacity in front of blade
- 8 in. blade cuts from 0 to 2 1/2 inches
- New Departure ball bearing arbor, 5/8" precision shaft turned down for 1/2" bore blades, alum. housing, ready to run
- Cast aluminum miter gauge and self-aligning rip fence guide (same as above)



GIL-BILT Metal Parts Kit includes Plans, Ball Bearing Arbor, Miter Gauge and Bar, Rip Fence Guide, Machined Lock Knobs, Tilt Support Segments and All Other Metal Parts (less blade).....\$15.95
Same Kit with 8" Combination Blade.....\$18.90

GIL-BILT 12-INCH BAND SAW



- Cuts to center of 24 inch circle
- Handles stock up to 6 inch thick
- 18x18 inch table tilts 45 degrees
- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two 5/8" bore Oillite Bronze bearings.

- Upper wheel tension and tilt mechanism of cast aluminum, completely assembled.
- Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
- Rigid cast aluminum wheels fully machined ready-to-install. Heavy rubber tires.
- Uses standard 78 inch blades up to 3/4 in. wide.
- Fully enclosed mechanism for utmost safety.

GIL-BILT Metal Parts Kit includes Plans, rubber tires, aluminum wheels, 1/4 in. blade, ball bearing spindle, tilt mechanism, blade guides, table tilt segments, and all other metal parts.....\$20.95

GIL-BILT BELT SANDER

- 84 sq. in. sanding surface. Over 4 times the effective area of a 10 in. disc sander.
- Belt operates in either vertical or horizontal position, does all sanding operations.
- Driver drum and pulley turn on sealed New Departure ball bearings; tension drum turns on Chrysler Oillite bronze bearings.
- Spindle and tension mechanisms of cast aluminum, completely machined and assembled.
- Belt travels 1800 ft. per min. Over a MILE of straight sanding action every three minutes. Saves more "elbow grease" than any other tool.



GIL-BILT Metal Parts Kit includes Plans, ball bearing spindle, 4 in. driver drum, 3 in. tension drum, tension mechanism, table tilt segments, rubber tires, cloth sanding belt, and all other metal parts.....\$16.95

NO DEALERS—ONE LOW FACTORY PRICE! Return in 10 days for refund of purchase price if not satisfied. Prices include postage within 600 miles. Over 600 miles add 5%. Send cash, check, or money order for parts kit, or send \$1.00 for Step-by-Step Plans and order kit later less cost of Plans. Plans sent postpaid anywhere in the world.

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PLANS
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\$1.00
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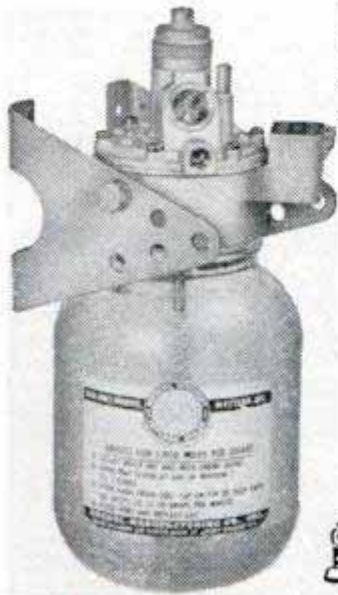
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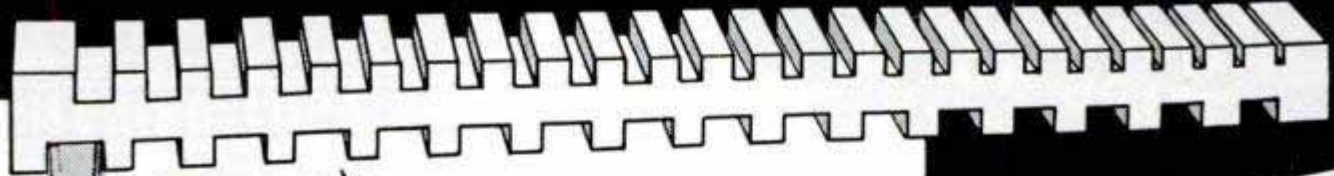
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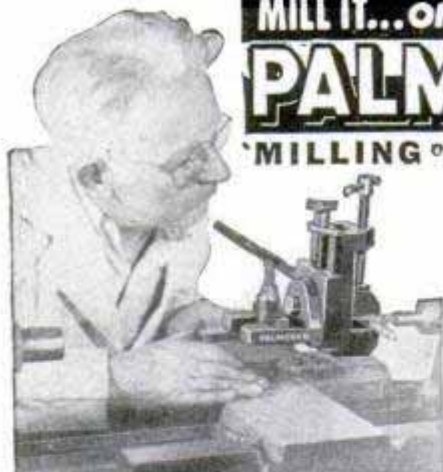
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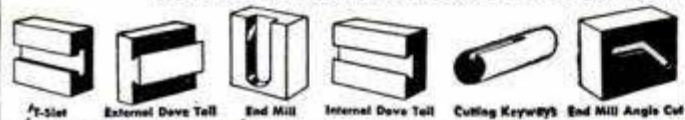
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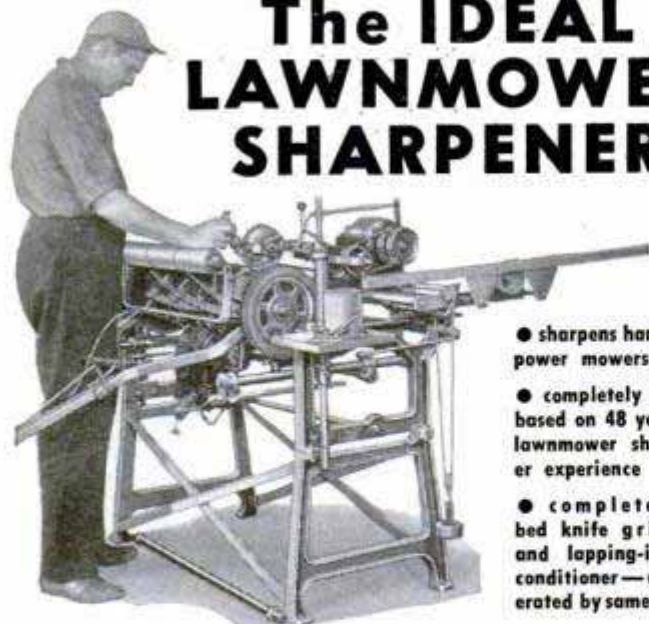
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There is no other automobile jack like it. This Saginaw super-jack literally rolls a car into the air. Ball-bearings, rolling between the raceway-shaped threads, reduce effort through increased efficiency—give you remarkable lifting power.

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See your nearest United Motors service station.

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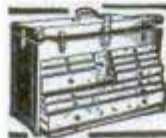
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*See article page 98 December 1950 Popular Mechanics

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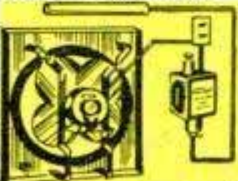
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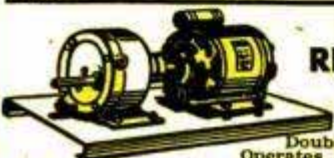
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Gas or electric. Awarded from government.

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BE PREPARED for any emergency!

Use for: Farms, cottages, stores, garages, floodlighting, drilling rigs, refineries, house trailers, fire departments, sound trucks, yachts, tugs, construction, airports, police radios, etc.



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5000 WATT, 120 volt, 60 cycle AC. HERCULES 4 cycle gas engine. Generator mfr'd by Hobart Bros. Unit includes remote control

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50,000 WATT, Cummins Diesel generator, 240 volt, 3 phase, 60 cycle, AC, 1200 RPM, 150 amps. Rating 50% continuous exciter. NEW. GUARANTEED \$5900.00.

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sturdy, 4 base mounting holes. 3/4" outlet. 5/8" shaft. Includes female Lovejoy coupling. Priced today at \$85. OUR SPECIAL SALE PRICE ONLY \$16.95

HEAVY DUTY ELECTRIC CABLE

Electric rubber cable, 16 cond., No. 18, solid, 100 feet or more, per foot \$.16
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Electric rubber cable, 4 cond., stranded, No. 18, water and oil resistant; run in parallel No. 16; 100 ft., \$6.25; 250 ft., \$12.50; 500 ft., \$25.00; 1320 ft. reel \$56.00
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Electric rubber cable, 3 wire, stranded, No. 10, submarine cable, underwater, underground, overhead—50 ft., \$15; 100 ft. \$30; 250 ft. \$75; 500 ft. \$125.00
Electric rubber cable, 3 wire, stranded, No. 8—150 ft. reels, with 1 male connector; 2 female, crutch binds connectors— \$75.00
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3/8	11/32	01301	63c Ft.	Ft. 32c
7/16	13/32	01508	70c Ft.	Ft. 35c
1/2	15/32	01205	72c Ft.	Ft. 36c
3/4	1 1/16	05001	91c Ft.	Ft. 46c
7/8	1-3/16	03125	1.01 Ft.	Ft. 50c
1	1-3/16	105	1.10 Ft.	Ft. 55c
1 1/2	1-3/8	05015	1.74 Ft.	Ft. 87c
2	1-15/16	05003	2.20 Ft.	Ft. 1.10
2 1/2	2-7/16	0500	2.74 Ft.	Ft. 1.37

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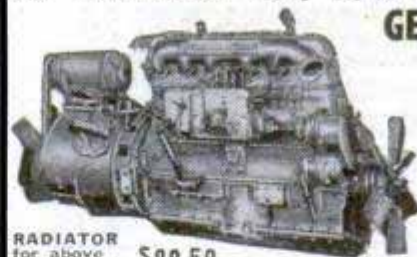
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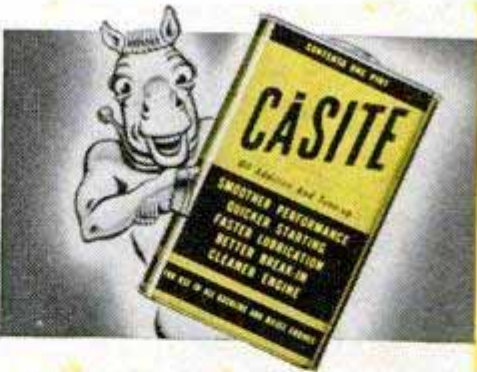
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650x16	4.54	670x15	4.74	32x6(10)	10.84
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700x15	4.64	700x20(8)	8.94	750x20(10)	9.94

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700x15	5.88	760x15	6.28	32x6(10)	12.48
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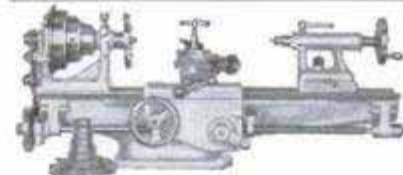
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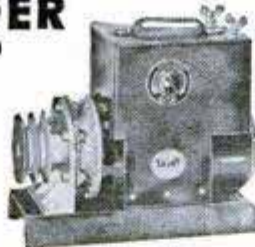
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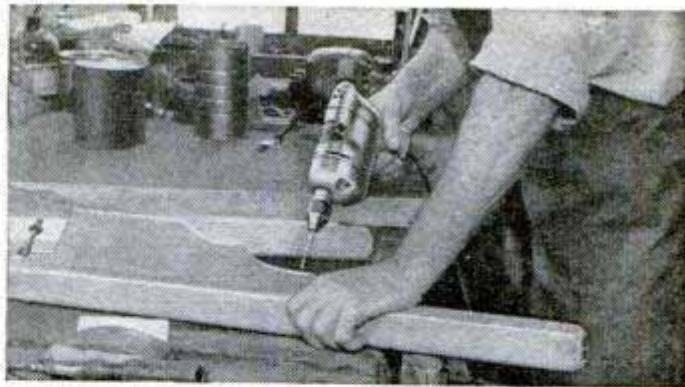
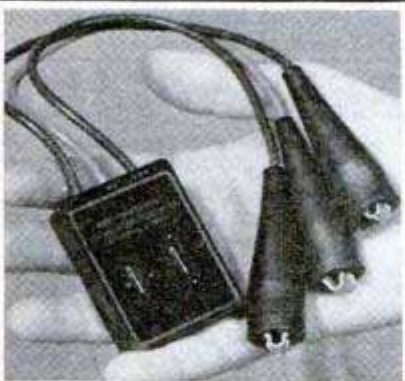
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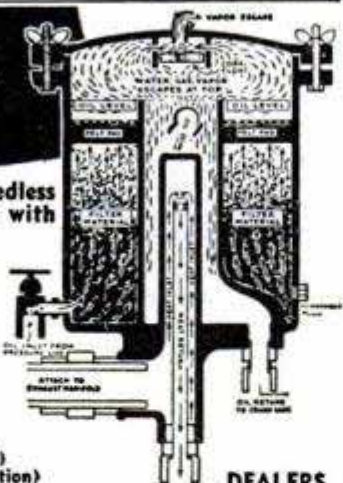
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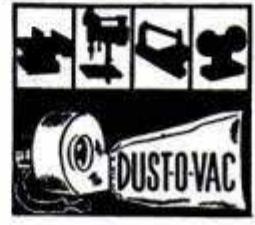
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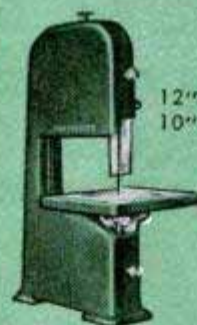
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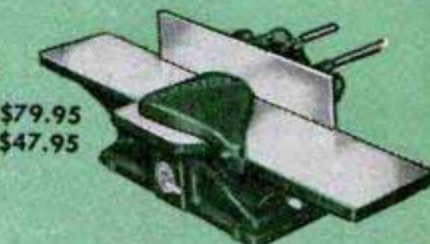


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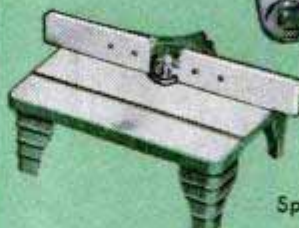


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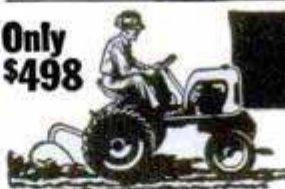


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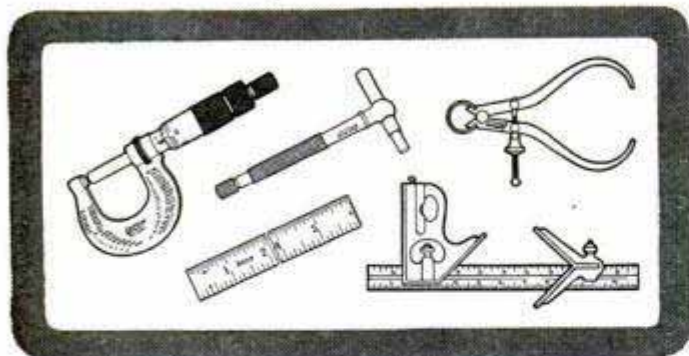
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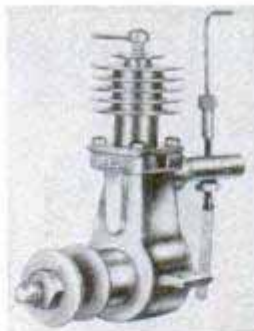
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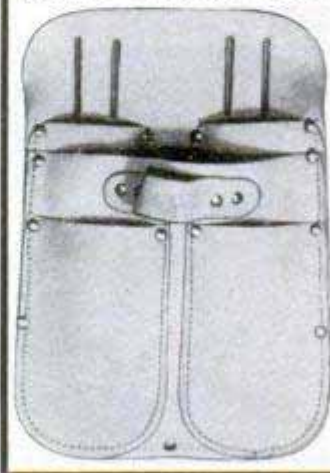
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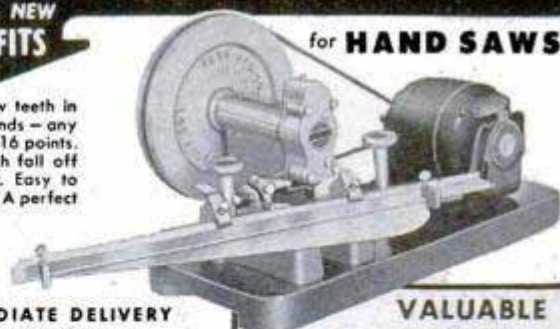
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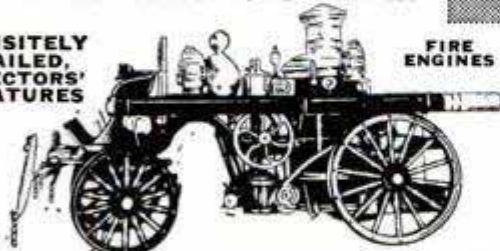
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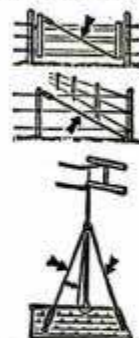
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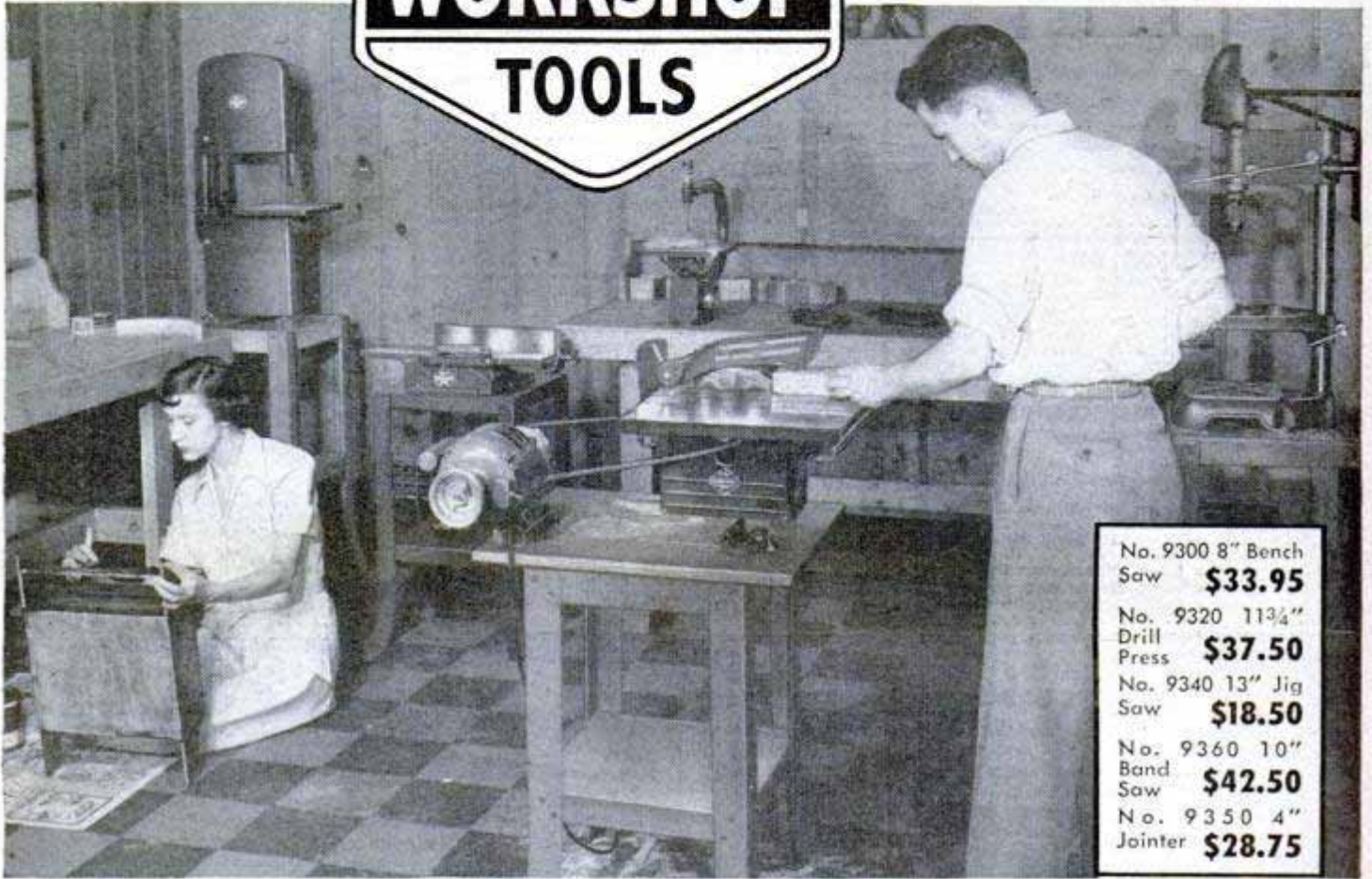
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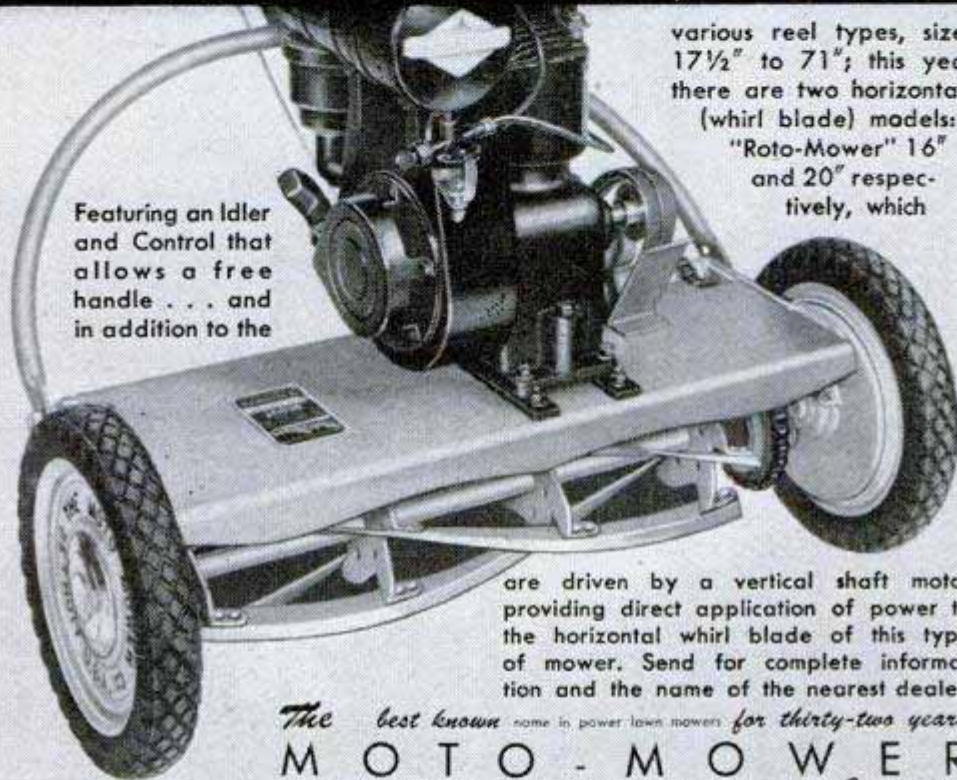
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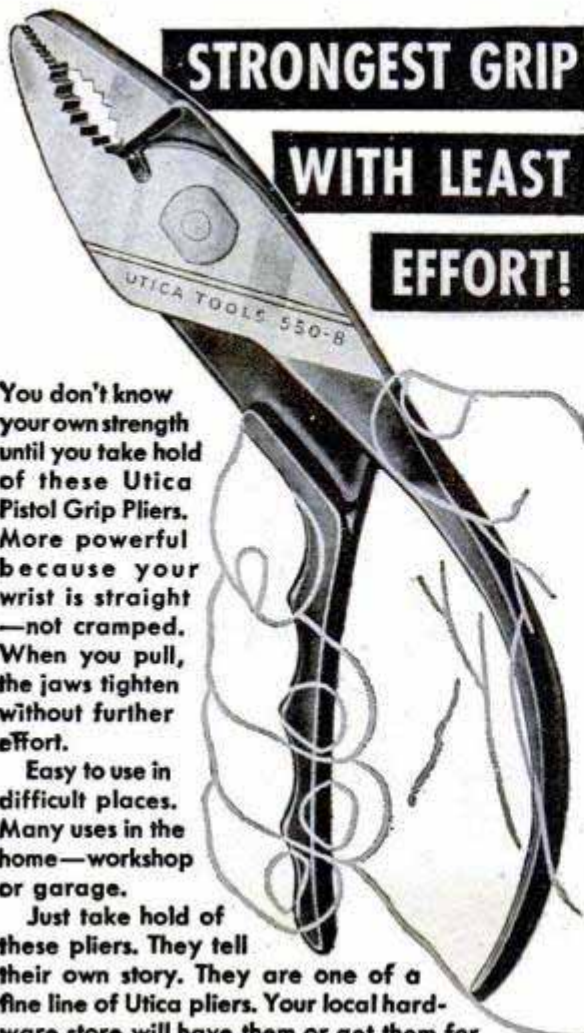
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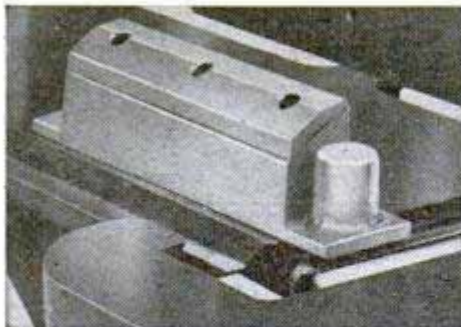
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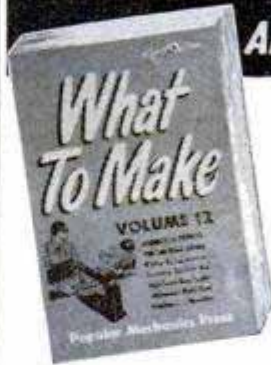
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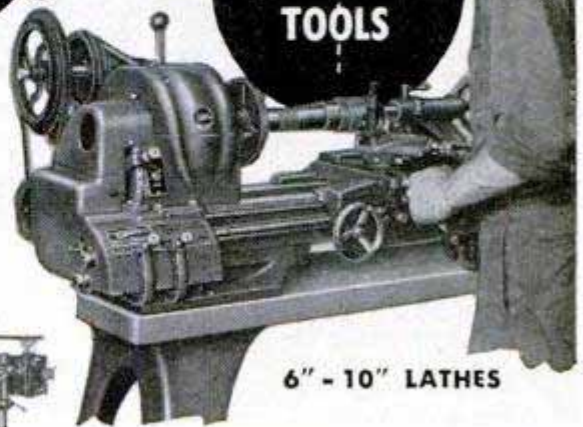


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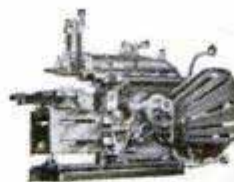
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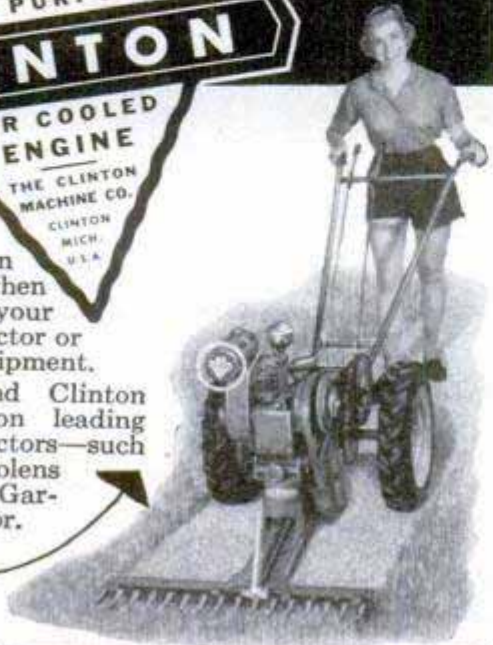
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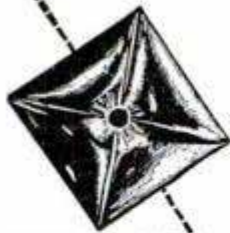
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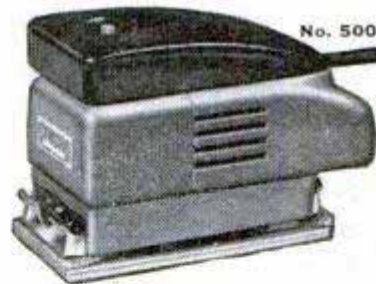
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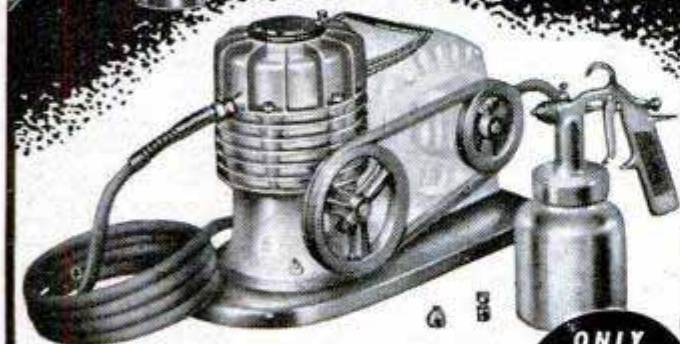
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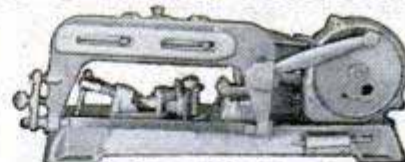
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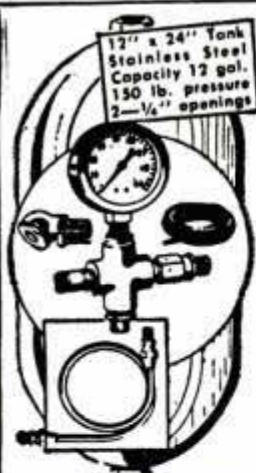
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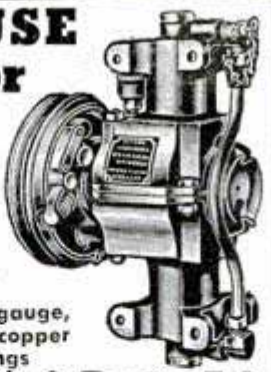
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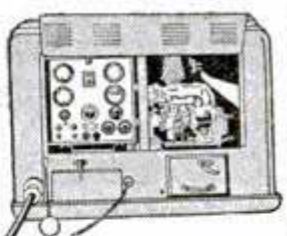
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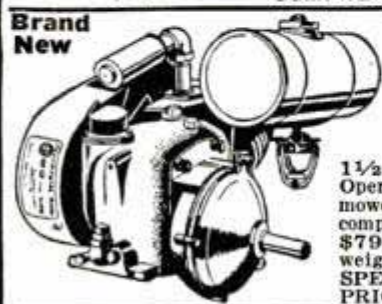
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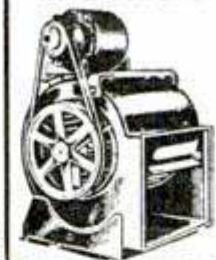
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 E-2--CLEVELAND--Pistol, \$12.95
 E-3--CLEVELAND--Pistol, \$14.50
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LINEMAN'S KIT - Type used by U.S. Army Signal Corps. Consists of pair of heavy duty lineman's pliers with pipe jaws & side cutters - a fine quality 2 bladed wire-skinning knife. In reg. Signal Corps leather pouch. **2.39**

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 This is a genuine piece of AAF equipment. Made of best grade Brown Leather in a handsome Pebble finish with a light canvas liner. Has two full length map or paper compartments and three smaller pockets. An ideal case for students, salesmen, artists, etc. Full heavy duty zipper closure. 12" x 16" Shpg. Wt. 3 lbs. **ONLY 2.95**

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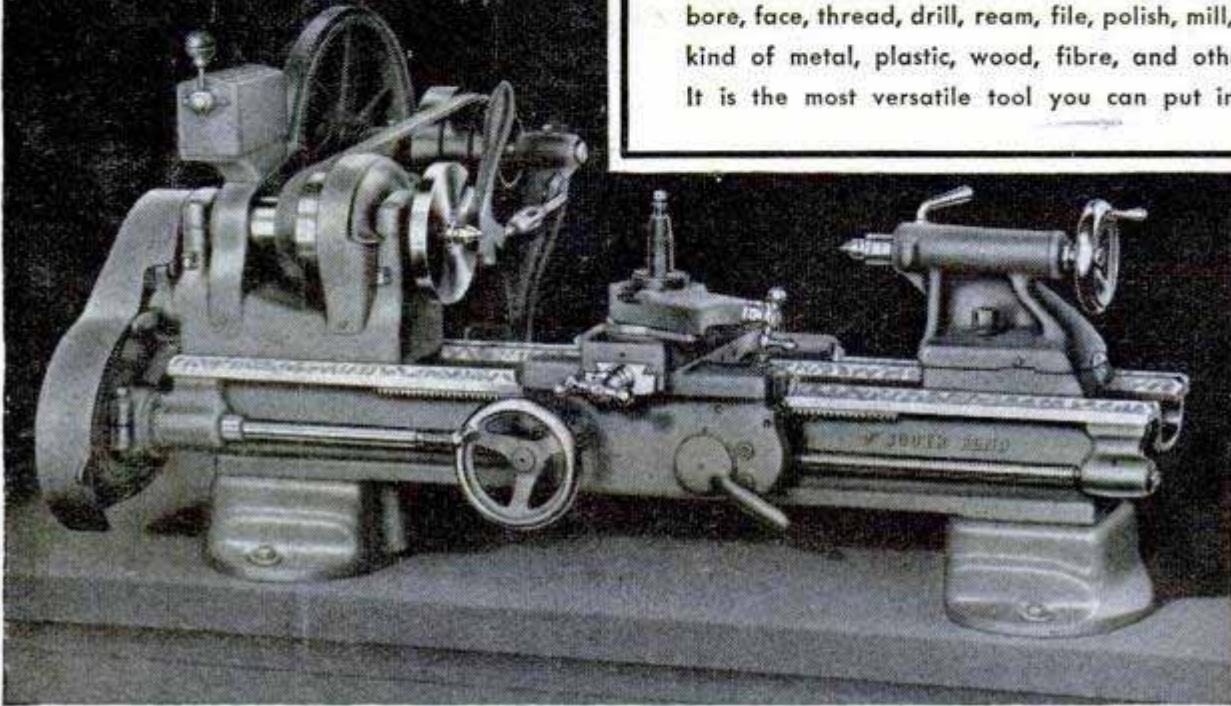
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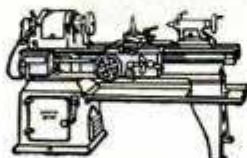
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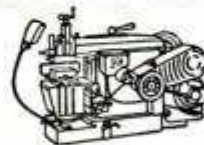
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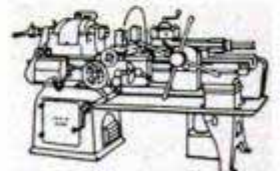
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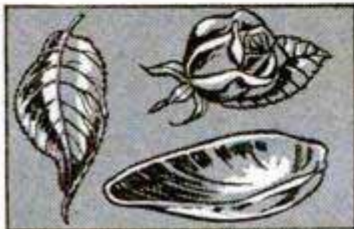
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