

DECEMBER 1948

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# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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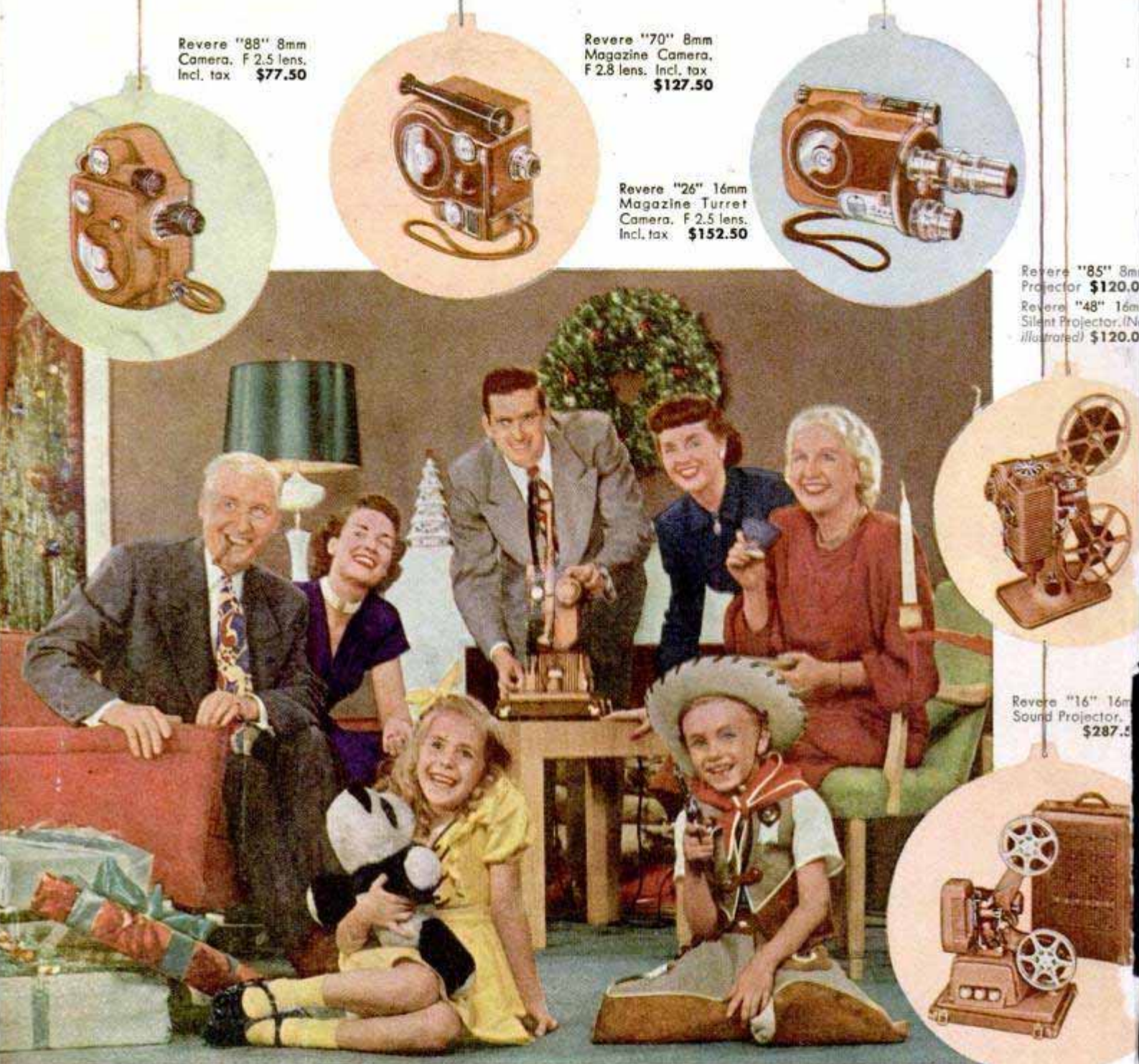
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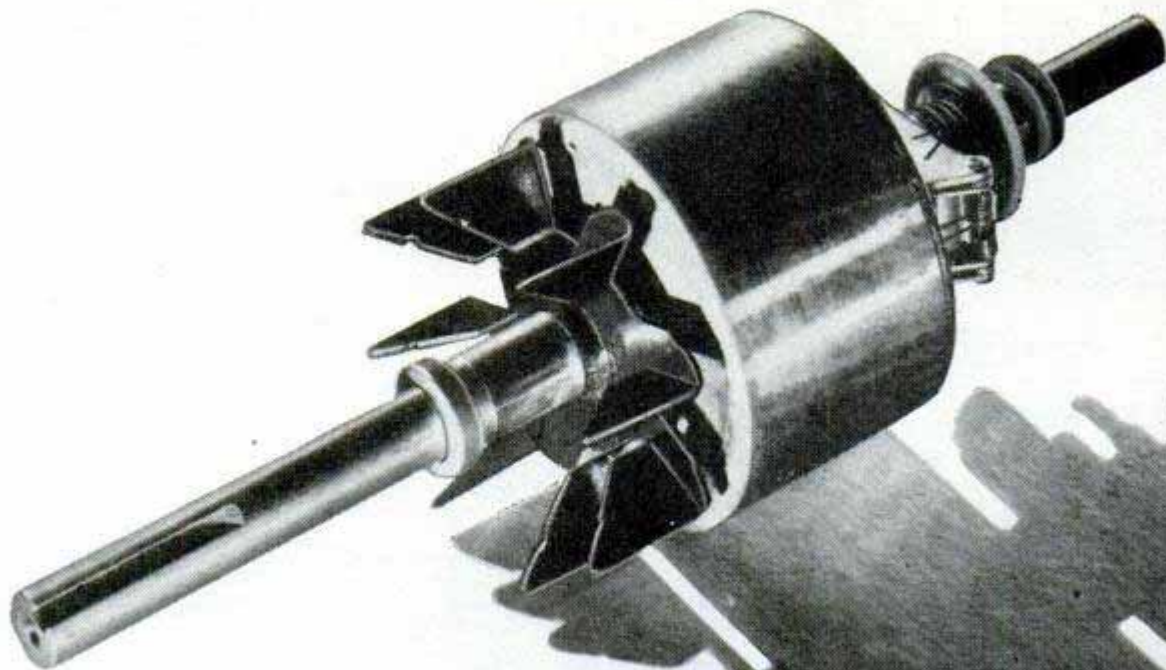
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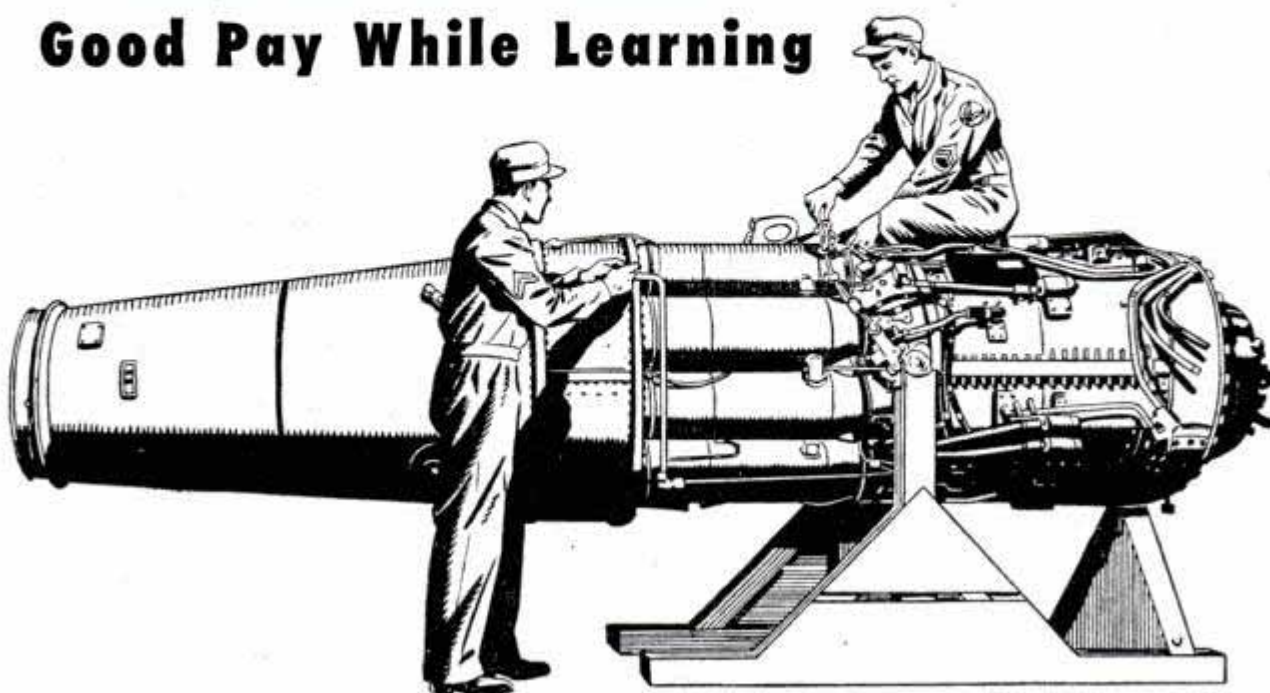




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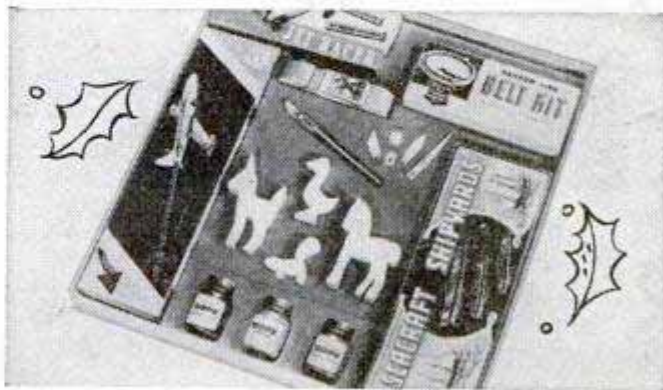
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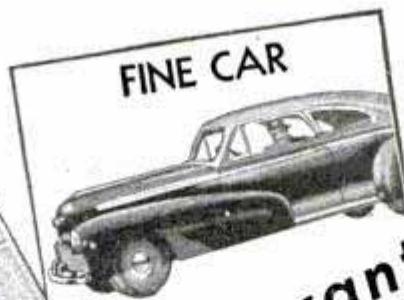
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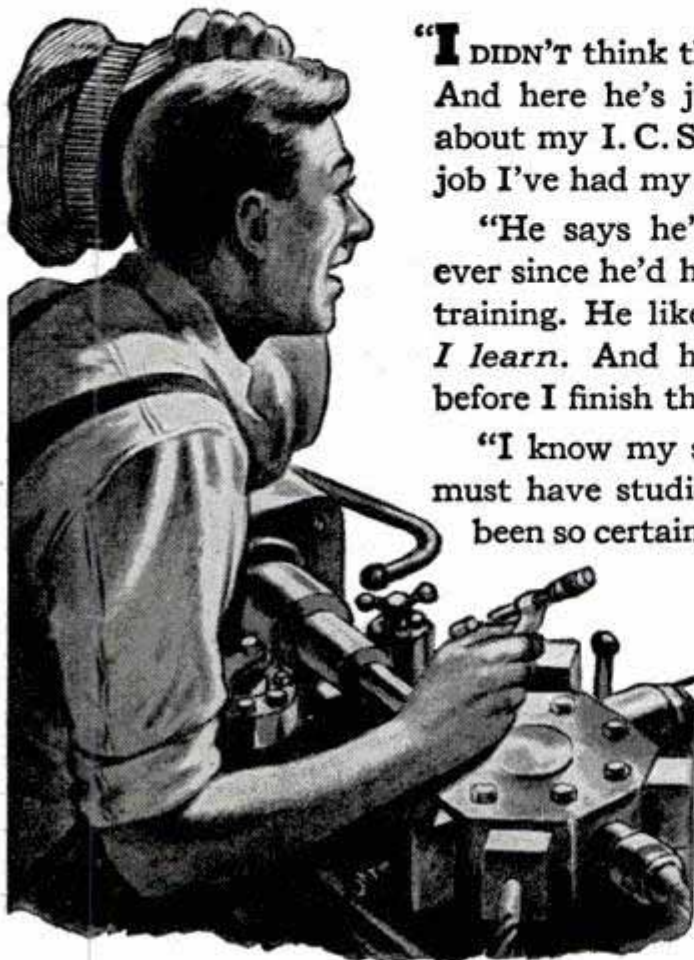
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# "Why, he knows all about me!"



"I DIDN'T think the boss knew my name. And here he's just stopped by to talk about my I. C. S. Course and the bigger job I've had my eye on.

"He says he's had *his eye on me* ever since he'd heard I was getting that training. He likes the idea of my applying what I learn as *I learn*. And he says there'll be good news for me even before I finish the course.

"I know my studies showed in my work. But I guess he must have studied with I. C. S. himself or he couldn't have been so certain about just where I was getting my training."

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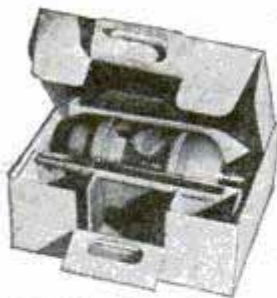
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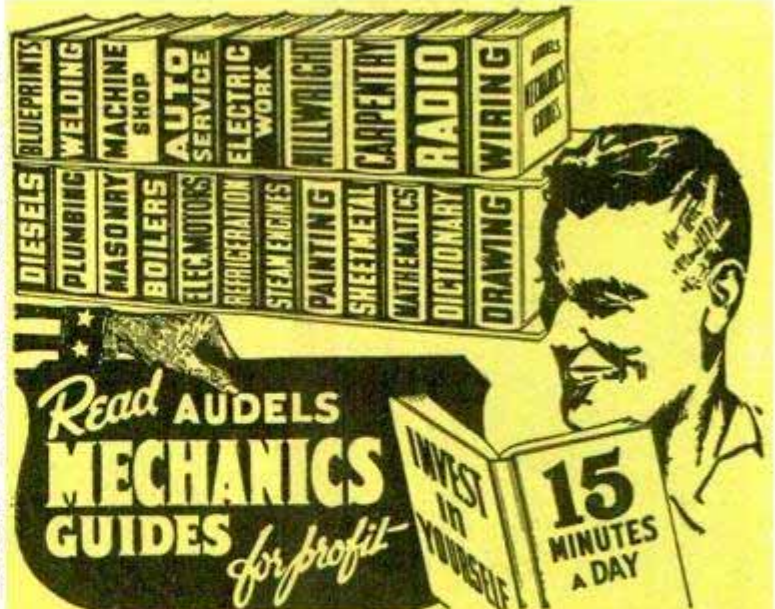
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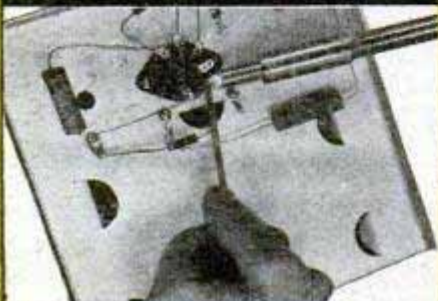




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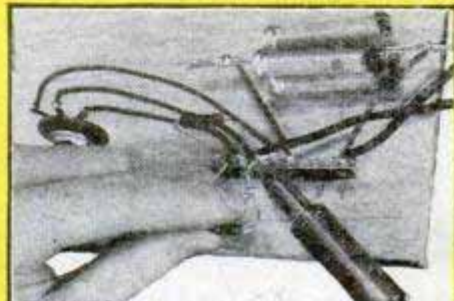
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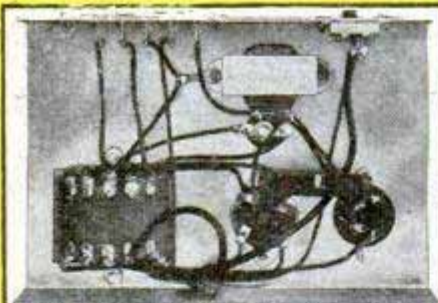
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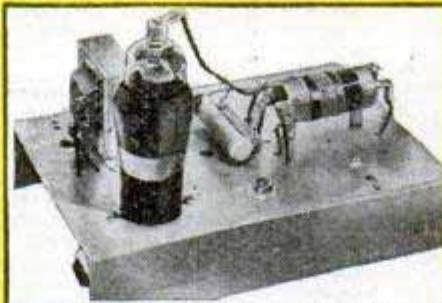
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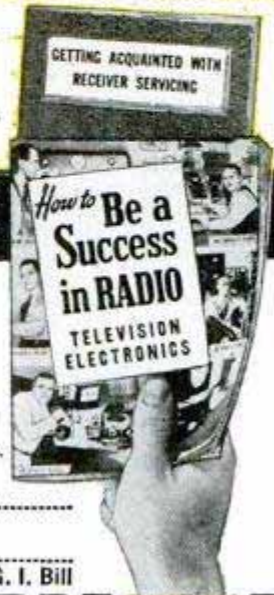
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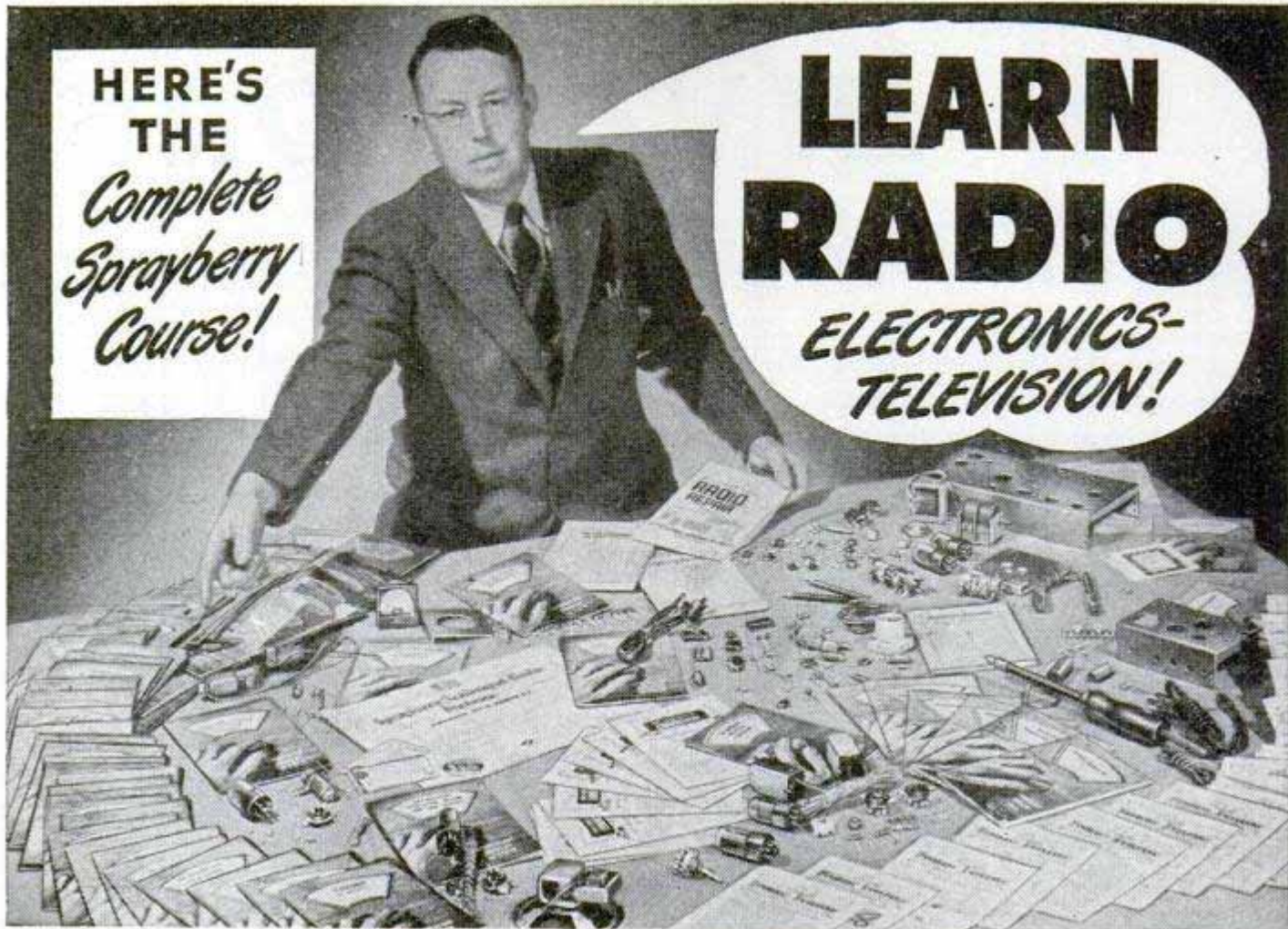
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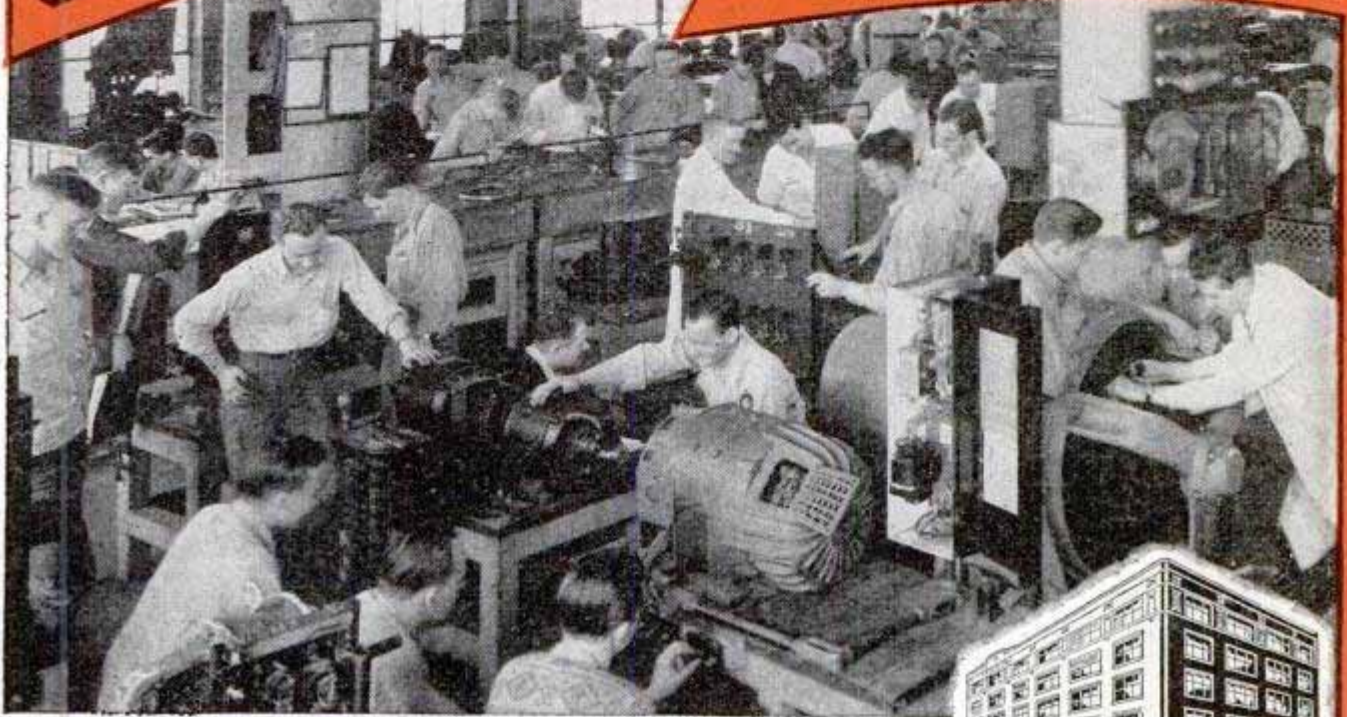
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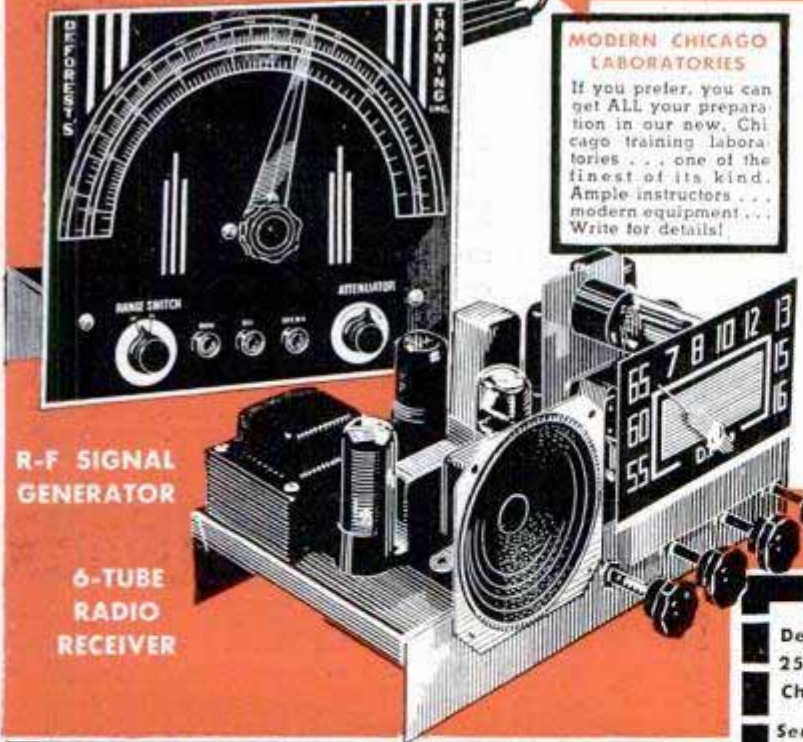
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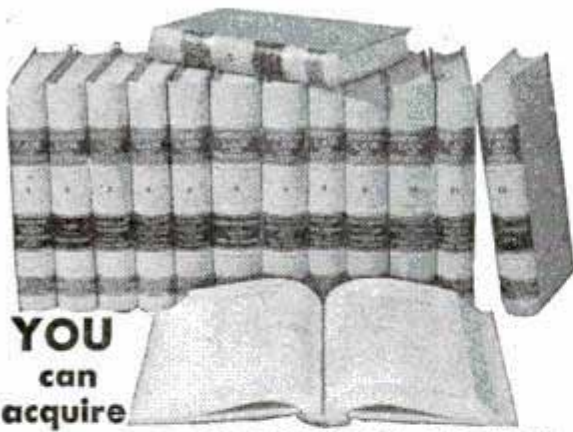
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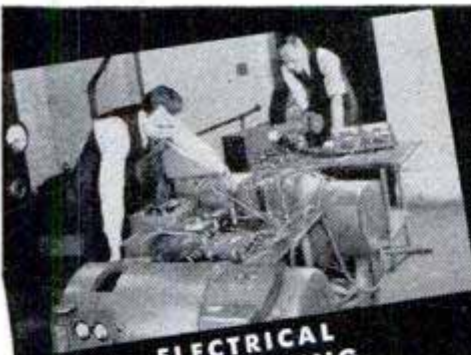
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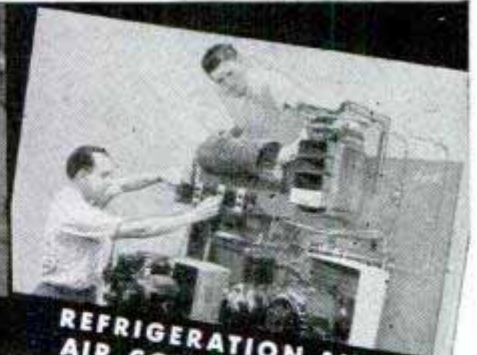
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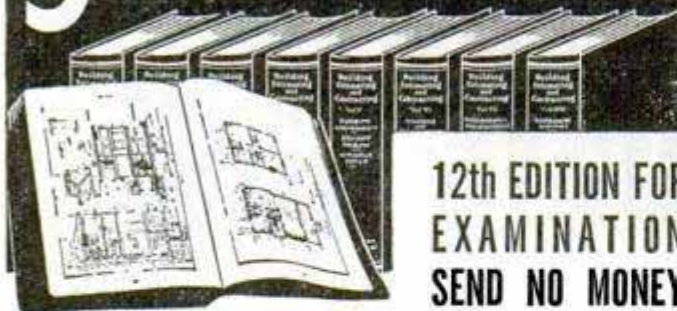
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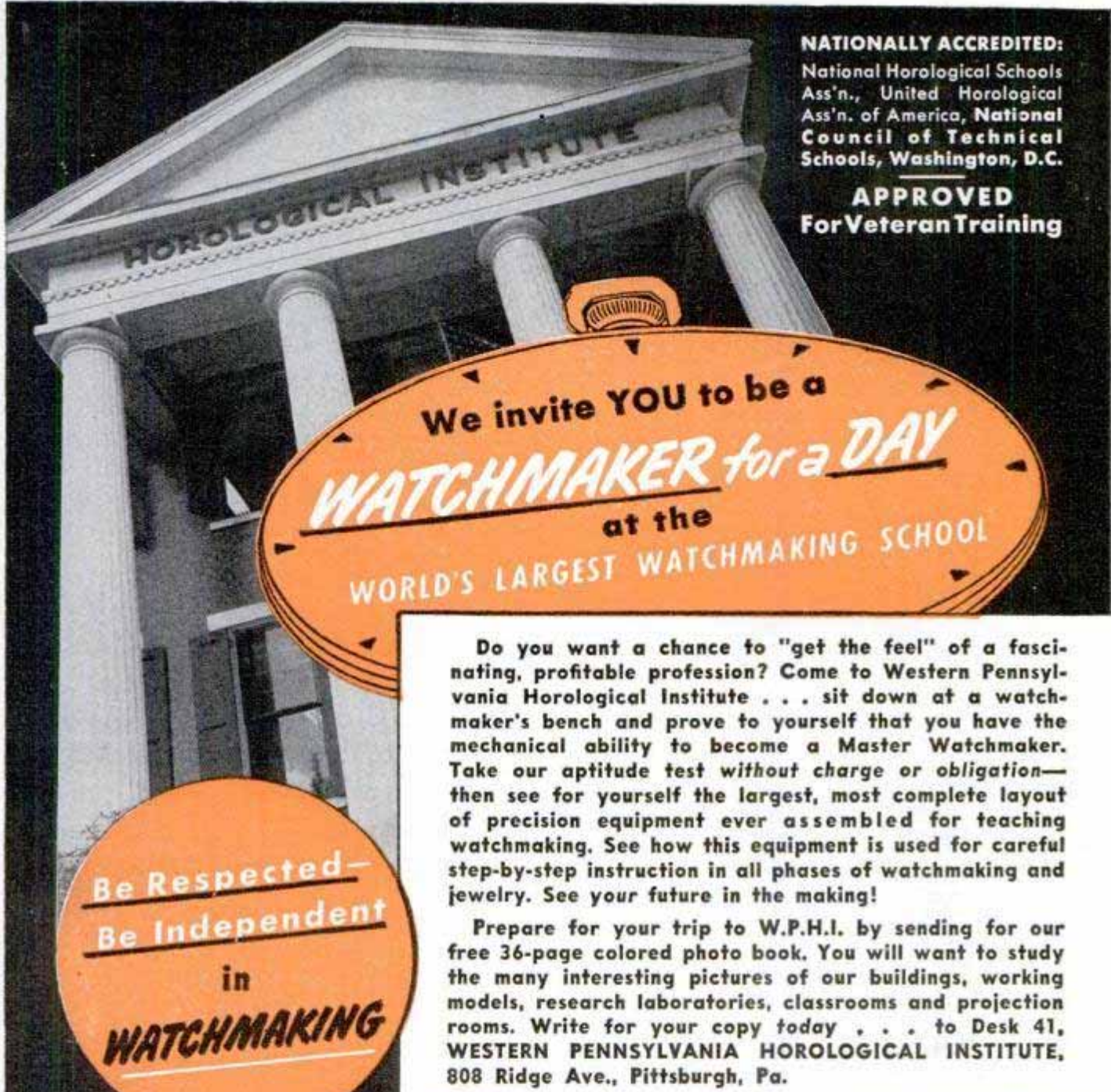
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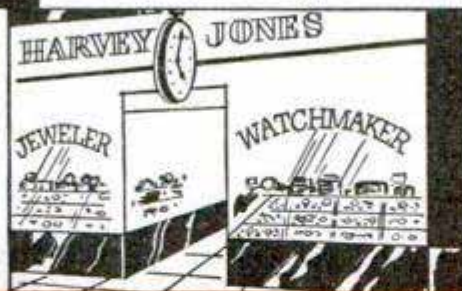
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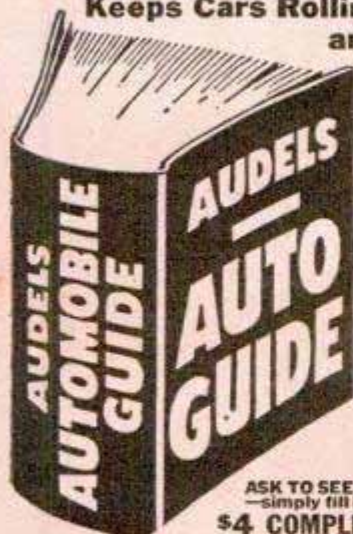
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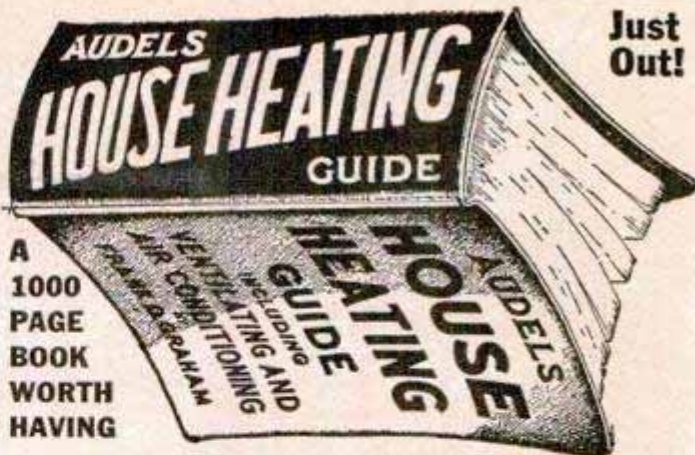
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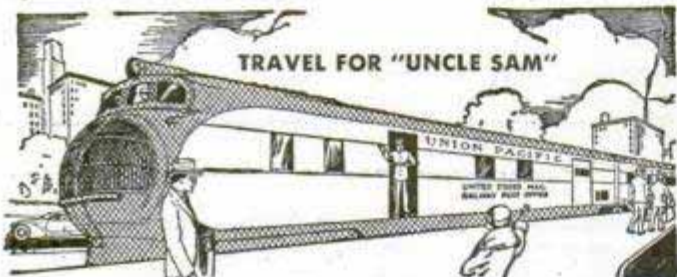




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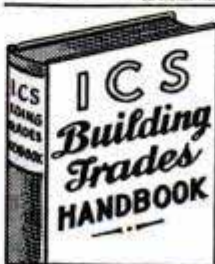
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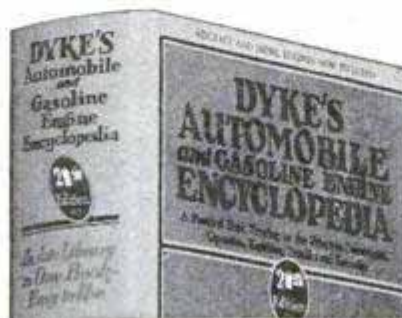


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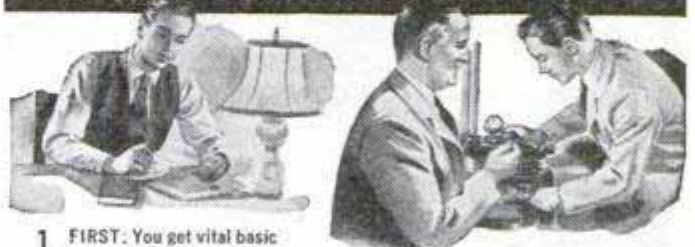
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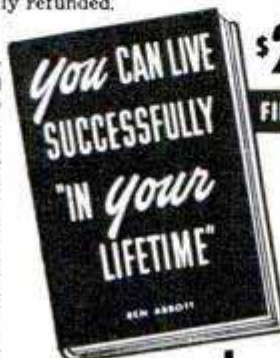
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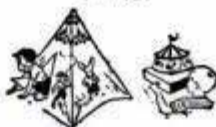
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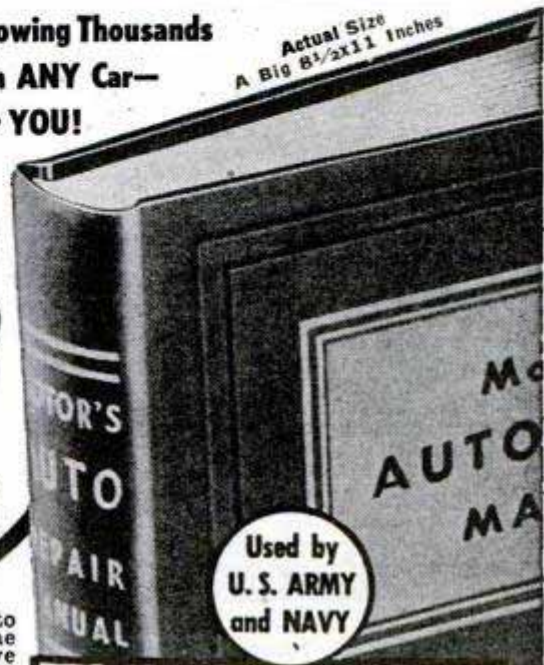
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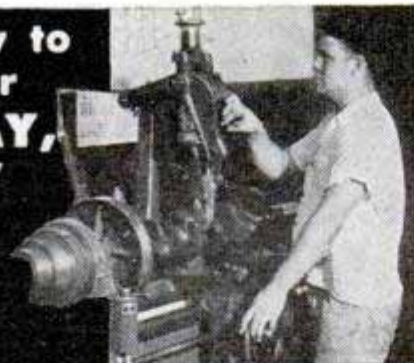
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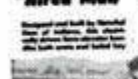
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**ORCHIDS** Metallized! Real flowers preserved! Inexpensive to start. New field. Details free. Write, R. O. Morgan, 6230 Myrtle Avenue, Long Beach 5, California.

**ENORMOUS** Opportunity developing inventive ideas. List of eleven ideas free. Jack Kester, Deckerville, Michigan.

**MAKE** Liquid marble, artificial marble flooring, flexible molds, statuary, art goods, novelties. Complete formulas, instructions \$1.00. Kemico, Park Ridge 5, Ill.

**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.

**MAKE** Tough, hard plastic 1c pound. Makes durable floors, walls, mantels, roofs. 101 uses. Build attractive home yourself. Material cost \$150 room. Bays Laboratory, Oklahoma City 9.

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**BIG Money** in vending machines. Smallest capital start brings immediate profits that build permanent profitable business. Starting instructions free. Becker Vendors, 105-A Dewey, Brillion, Wis.

**LIQUID Rubber.** Make flexible molds. Free sample. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

**NEW** Mail order manual tells how, what, where to sell. Details free. Everett, 542A Barclay, Naperville, Illinois.

**MECHANICALLY** Inclined? Resurface butcher blocks. Lifetime business. Roy Crawford, Keyport, New Jersey.

**MAKE** Money addressing envelopes. Our instructions reveal how. Glen Glenway, 5713 Euclid, Cleveland 3, Ohio.

**I** MAKE Big money in the mail-order business. You can do the same at home with copyrighted system. Write me. I'll tell you how. F. Little, R.D. #1, Glenshaw, Penna.

**ENVELOPES** Addressed accurately, reasonably. Fast service. We have capable addressers in your city. Glenway System, 5713-Y Euclid, Cleveland 3, Ohio.

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**CAST** Metal, plaster, plastic products. Pricopoulos, 761 Worthington, Springfield 5, Massachusetts.

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**CANDY** Manufacturing and marketing, complete course \$6.00, information free. Box 670, Kissimmee, Florida.

**INFORMATION**—Supply sources, trade secrets, ideas, money making facts. Be your own boss! 24 page booklet tells how. \$1.00. Tip-Top, Box 9083PM, Dallas, Texas.

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**A BUSINESS** In your own home! Our chemicals, plus free water and cheap "grocery store" materials can bring you over \$500 monthly earnings. Plans and formulas free. Chemica Division, 1269 S. Norton, Los Angeles 6.

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**HOME** Workers wanted to hand-spin Angora wool. Either sex. House of Angora, Springfield, Ill.

**BUY** The new Concession popcorn machine. Biggest low priced popper on market. \$100 puts you in business, complete. Also caramel corn, candy floss, candy pullers, kettles, heating equipment. Write for new catalog. Concession, Dept. A, Toledo 6, Ohio.

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**NEW** Method of casting metal toys and novelties opens opportunity for full or spare time business and profits. Latest 1948 scale model autos, original ashtrays, savings banks, water pistols, etc., easily cast with bronze moulds. Enormous wholesale and chain store Xmas demand keeps manufacturers busy. No experience or special place necessary. Write for details and illustrations of patterns needed. Metal Cast Products Co., Dept. A, 1696 Boston Road, New York 60, N. Y.

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

**CASH** For your idea, 280 manufacturers need inventions, patented or unpatented. List free. Invention Bureau, 208M Clinton, Oak Park, Illinois.

**MAKE** Money sharpening saws at home on electric machine. No experience necessary. Hardware dealers act as your agents to secure work. Send for free book "Independence After 40" shows complete plan for starting in spare time. Foley Mfg. Co., 47 Foley Bldg., Minneapolis 18, Minn.

**RUBBER!** White liquid rubber! America's finest flexible moulding rubber! New! Extra heavy viscosity! Quick drying! Ideal for home, classroom, or industry. Only \$7.95 per gallon, \$2.95 per quart, and \$1.00 per half-pint sample. Parcel post prepaid! Plastercraft Supply Company, 3051 St. Clair Avenue, Cleveland 14, Ohio.

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**VENDING** Machines earn big money! An investment as low as \$10.50 will start you in this fascinating, profitable business that can lead you to the road of success and independence. Routes can be established and operated in either full or spare time with no experience needed. Write for full details and our free catalog illustrating our nut, candy, gum and stamp vendors; also slot machines, amusement games, etc. Parkway Machine Corporation, 623 W. North Avenue, Dept. 7, Baltimore 17, Maryland.

**SPECIAL** Rubber for making molds. Literature and sample free. Universal, Box 1076-A, Peoria, Ill.

**HOW** And where to obtain capital. Small and large loans. Free particulars. Star Service, Wapakoneta, Ohio.

**OWN** Mirror shop. Resilver mirrors. Glass sign making. Electroplating. Supply prices. John Sprinkle, V60, Marion, Indiana.

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**QUICK** Money. "Repairing car batteries." At home! Easy too! Batteryman, Grand Junction, Colorado.

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

**RE-NEW** Leather and leatherette—Make cloth into imitation leather with plastic discovery called Leather-New. Opportunity to make real profits taking care of sales resulting from national advertising. Write for free sample of Leather-New covered material and complete deal. 4723A Troost, Kansas City, Missouri.

**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.

**SPECIALTY** Manufacturing, the big money business that can be operated anywhere, start on a very small capital; we supply dependable formulas and complete instructions; get interesting free booklet, "Money-making Opportunities in Specialty Manufacturing." Howard Robinson, Ph.G., 1300-A South Ohio Street, Sedalia, Mo.



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

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

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**WOULD** You pay 3%—first \$350 made? Color-illustrated book "505 Odd, Successful Enterprises" free! Some offer occasional "day off." Work home. Expect something odd! Pacific, Oceanside, Calif.

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**RUBBER** Molds, natural liquid rubber, flock filler (for making sectional molds), statuary plasters, felt finishes for novelties. Catalog and "Plastercraft" course free. Blue Rapids Supply, Blue Rapids, Kansas.

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

**MAIL** Order opportunities. Full or spare time. Hundreds of chances. No charge. Postmail brings copy. Blackstone Press, Somerville, New Jersey.

**START** Home plaster novelty business. Amazing course tells how. Literature free. Kemo-Courses, Dept. A, 4862 Catalpa, Chicago 30, Ill.

**MAKE** Rubber stamps. Metalize baby shoes, silver mirrors, make plaster novelties. Catalogue of "20 Ideas" free. Universal, Box 1076-A, Peoria, Ill.

**EARN** \$200 Weekly installing new amazing "Styron" plastic wall tile in homes, offices. Easily applied. Tile your own kitchen, bathroom, too. Instructions, everything furnished. Literature free. U. S. Tile Co., 30 W. Washington St., Chicago 2, Ill.

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**EARN** Up to \$520 month part or full time keeping books for small firms. Simplified system. Write Tax-Saver System, Dept. O. Ft. Worth, Texas.

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**BOOKLET** "Making Money Mailing Circulares" 25c. Artistic, 217P Longwood, Merchantville, N. J.

**MONEYMAKERS** Merchandisers, Reimer's wholesalers directory \$1.00. E-1119 Chestnut, Saginaw, Michigan.

**START** Your own business! Big money manufacturing novelties, plaques, statuary. Free catalog. Write Bing Products, 88-A12B Broad Street, Boston 10, Mass.

**THOUSANDS** Articles wholesale. "Supply Source Directory" 10c. Ideal Service, Park Ridge 40, Illinois.

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**FREE** Literature on money making ideas. Write: Lighthouse, 1023-B Hamilton Street, Lockport, Illinois.

**NO** Selling, operate coin machines, amazing profits, details free. Parkway Corporation, Dept. 5, 623 W. North Avenue, Baltimore 17, Maryland.

**FOR** Sound, sensible, proven successful mail order methods, write for details to C. Griffith, 132 Water, Fredonia, N.Y.

**LOOK** Here! Wanted—Men to start in business on our capital. Sell some 200 farm-home products. Thousands our dealers now make quick sales, big profits. For particulars write Rawleigh's, Dept. L-192A-PPM, Freeport, Ill.

**NOTARY** Public. Be one. Largest legal supply house, 22 cities, guarantees your appointment by governor if you qualify, equips you for \$16.97. Respected public office. You certify legal papers, use official seal made with your name, collect fees. Easy. Notaries needed everywhere. Write Stationers Exchange, Boerne 2, Texas.

**START** A mail order business for as low as \$15.00 investment. Free circular. George's Business Plans, Box 126, Epping, New Hampshire.

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

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**MFG.** Chemists' gold bond sales offer. Factory distributorship. Box 5903, Chicago.

**THE "How"** of mail-order. Book on setting up and running mail-order business. Lazy man's way of getting rich. \$1. Haldeman-Julius, Desk 5040, Girard, Kans.

**METALLIZE** Baby shoes. Further information 3c stamp. Metal Crafts, Box 125-Route 5, Tampa 4, Florida.

**UNPAINTED** Figurines. Illustrated list free. Oman, 642 Broadway, St. Paul 1, Minn.

**UNPAINTED** Plaster ornaments, beautiful designs, easily decorated with water colors or oil paints. Profit or hobby. Free illustrated list. Firestone product dealers wanted. Distributors: Lexite Natural Latex for molds, Midwest Novelty Mfrs., 524 E. Park, Anaconda, Montana.

**PROFITABLE** Business at home, spare time. Write Treasure-Trove Bookshop, Box 125-R5, Tampa 4, Florida.

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

**MAKE** \$100 Per week or more in a full or spare time baby shoe metalizing business of your own. Write now for free literature on this easy to learn highly profitable business. Joseph B. Kushner, Metal Finishing Engineer, Stroudsburg 23, Penna.

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**"STOP."** We will set you up in your own mail order business and make you make money. Free info. Write United Syndicate, 205 Baynes Bldg., Havre de Grace, Maryland.

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**OPERATE** Successful mail business with our tested plans. Free details. Reynolds, Box 103Y, McAlester, Penna.

**GOOD** Profits, showing fast moving items to men and women. Sells on sight. "Adams," 1143 Oley St., Reading, Penna.

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**PRIZE** Contest bulletin gives various contests now operating, and valuable hints. 3c stamp. National Contest Bulletin, Box 2685P, Miami, Florida.

**WOULD** You pay 3%—first \$350 made? Color-illustrated book "505 Odd Successful Enterprises" free! Proven! Work at home, office. Expect something odd! Pacific, Oceanside, Calif.

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

**FREE** Booklet "How To Raise Worms For Bait." Tells how to propagate, package, sell. Send postcard. El Sobrante Earthworm Farm, 749-A Rincon Road, El Sobrante, California.

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**PRODUCTS** Analyzed. Duplicated. Improved. Formulas. Consulting Scientific Company, Swarthmore, Pennsylvania.

**FORMULAS.** Ten thousand trade secrets. 900 pages. \$3.00 postpaid. Natco's, 1090 West 43rd, Norfolk 8, Va.

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**ANY** Formula \$1.00. Satisfaction or refund. Brown, 9111-D Hoyne, Chicago 20.

**CONVERT** Your toilet to prevent overflow. Instructions \$1.00. H/A Publishers, 116 North 11th Street, Allentown, Penna.

**FORMULA** Raised letter embossing ink and catalog other formulas 25c. Process Specialties, 3821 Marlmount Ave., Weirton, W. Va.

**FORMULAS.** Processes, analysis. Free literature. Pricopoulos, 761 Worthington, Springfield 5, Massachusetts.

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

**\$1.00 GETS** You 21 money-making popcorn, candy apple formulas. We supply equipment. Concession Supply Company, Dept. A, Station "B," Toledo, Ohio.

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

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**NEED** Additional income? Build your own plastics business on a solid foundation. Do highly skilled professional work at home. This is not "gadgets," your clients are in the industrial and educational fields. Short training by mail necessary. Exceptional opportunities for intelligent men and women. Write Plastics Laboratories, Dept. B, 3324 Park Blvd., Oakland 11, California.

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**PLEXIGLAS.** Lucite, acetate, sheets, rods, tubes, jewelry findings, craft supplies, over 1700 items. 25c which brings catalog internal carving folder, information on fabricating plastics, deducted from first order. Plastic Parts, Dept. H-2128, 1157 S. Kingshighway, St. Louis, Mo.

**BEAUTIFUL** Hand carved pins or earrings \$1.00. Box 661, Rochester 2, N. Y.



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**LEARN Chemistry at home, from the house of Winn.** Home of supplies for student chemists. New idea chemical and apparatus outfits for home experimenting. Photographic scales, semi-professional microscopes and accessories. Send 15c for retail catalogue. Established 1931. John H. Winn, 124A West 23 Street, New York 11, N. Y.

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**LABORATORY Chemicals, apparatus, books.** Catalog 10c. Fleischer's Laboratories, Everett 49, Mass.

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**EXCEPTIONAL Bargain:** Two magnificent Mexican handpainted pictures (10" x 12") and two ladies silver rings. \$5.00 prepaid. Duty extra. Gieda, Lucerna 63-8, Mexico City, D. F.

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**I'LL Put a "shoe store business" in your pocket!** You get everything free! We train you to pile up big profits through exclusive factory fitting service. Year 'round repeat business. You draw on 100,000 pairs for men, women. Leading line of its kind. Nationally advertised. Write today for free sample outfit! Consolidated Shoe System, Dept. S-209, Chipewa Falls, Wis.

**AGENTS Wanted for our coin operated amusement and slot machines in every town and community.** Sell, or start your own route. Big profits! Write for free wholesale catalog and deal. Aerobit Products Co., Dept. 27, 3767 Druid Station, Baltimore 17, Maryland.

**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. 4773, Cincinnati, Ohio.

**SELL Exclusive line imported pipes.** Retail \$2.50 each. Sample line of distinctive styles available now at wholesale cost. 4 for \$5.00. House of Lawrence, Dept. P., 509 Fifth Avenue, New York 17, N. Y.

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**400% PROFITS Selling genuine, guaranteed silver plating liquid (NuSilver).** Apply with cloth. Stores, offices, shops, homes. NuProcess Products, Aurora, Ill.

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**WANT Pleasant outdoor work in a business of your own?** Good profits selling over 200 widely advertised Rawleigh home/farm necessities. Pays better than most occupations. Hundreds in business 5 to 20 years or more! Products-equipment on credit. No experience needed to start—we teach you how. Write today for full particulars. Rawleigh's, Dept. L-145-PPM, Freeport, Ill.

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**SCHOOL Seniors—Earn 40% commission selling classmates America's most beautiful graduation name cards.** Largest selection. Outlets all others. Free sample kit. Printerart, Dept. M, 1425 E. Elm St., Scranton 5, Penna.

**REPRESENTATIVES Wanted to handle Ming tree line.** P.O. Box 329, Sparks, Nevada.

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

**AGENTS—Unbelievable, until you have tried this amazing foot bath powder.** Fast dollar seller. 98% people need it. 50% profits. Excellent repeater. Agents Christmas special 2 cans \$1.00. Saari, 1916 Sheffield, Chicago 14, Ill.

**FREE Nylons given if Kendex hosiery runs or snags!** World's only women's hosiery sold with written guarantee that amazes everybody. Mere words could not possibly express the unbelievable opportunity you have to make money. Fantastic and "impossible" earnings become a reality. Armstrong earned \$202 in 9 days. Watkins sent 92 orders in one day! Can you imagine replacing hosiery free even when it is wearer's fault? Here is sales dynamite to blast earnings sky high. Even if you never sold before, three magic words: "guaranteed against everything" will open doors for you—will make women listen and will pour money in your pocket. Kendex guaranteed nylons are not sold in stores—you have no competition. Complete line including extra sheer, sheer and service weight; lengths 28 to 35 inches; latest colors; seamed full fashioned and seamless. Also complete line men's guaranteed hosiery including nylon, rayon, lisle, wool, cotton, mixtures etc. Styles and prices to please all. Thousands of pairs shipped daily. 100,000 pairs in stock constantly for fast delivery. Over 30 years in business. No money or experience needed. Nothing to pay now or later. Show free outfits; write orders. We deliver and collect. Big advance cash plus huge bonus. Write orders full or spare time—exclusively or as side line. Become manager—appoint others to sell for you with steady income on their sales. Complete money-making outfits including salesbooks in color, samples cut from actual hose etc. furnished free and prepaid. Just write name and address on postcard and mail to: Kendex Company, Babylon 196, N. Y.

**MUSIC Greeting cards.** All occasions. Dorby Music Cards, P.O. Box 738, Morristown, New Jersey.

**BUY Thousands of nationally advertised products direct from manufacturers.** Write for "Buy Direct and Save." Consumers Assn., 287-A Lebanon Ave., Mt. Lebanon, Penna.

**SILVER King bottle openers, unique efficient beautiful.** Large profits. Sample \$1.00. Mac-Hill Products, Box 172, Wauwatosa, Wis.

**USE Your home as magazine subscription station.** Represent all magazines. Liberal commissions—we supply everything. Big year around business. Catalog, full details, free. McGregor Magazine Agency, Dept. 12, Mount Morris, Illinois.

**DECAL Letters and insignias.** Lowest prices. All sizes. Send quarter for personal sample initials and quick profit details. Barbarr Sales, 3828 Gresham, Chicago 24.

**MAKE Sensational profits!** New, sell-on-sight plastic line: Tablecloths, aprons; many other splendid fast-selling items, novelties. Postal brings free details, special deals. Hurry! Royalty, Box K-748, Passaic, N. J.

**MAKE Fast, easy, 100% profit sales!** Smart, new type plastic drying rack with convenient "Fold-Away" rods—your brand-new, big money-maker! Rush name for details. Hurry! Nev-Mar, 75-D Franklin Avenue, Ridgewood, N. J.

**CONSISTENT Commissions, bonuses with free sales portfolio.** Men's shirts, pajamas, Ladies' lingerie, housedresses. Jarod Manufacturing Corporation, Rockville Centre 35, New York.

**NEW Warning safety signal, fits all cars.** Sample 35c prepaid. 4-\$1.00. 10-\$2.00. Al's Radio Sales, Sioux City 7, Iowa.

**WHAT'S New?** Our "New Products Buying Guide" tells you, describing 100 to 150 newest specialty items and products; tells supply sources, prices; live selling opportunities for agents, retail stores, distributors, mail order. Issued monthly. Get sample copy offer. H. Glass Pub. Co., Ellwood City, Penna.

**AMAZING Profits selling advertising coasters.** Single order paid \$108.00 commission. Sales outfit containing pencils, plastic, leather and metal specialties postpaid \$1.10. Refundable first order. Eric Howlett, Huntington, N. Y.

**IT'S New, sample 25c (Crystal-Flex) in beautiful reflecting colors.** Store and Bible text mottoes. Also colored tinselled holiday signs. Special Kut Signs, Dept. N. Sidney, Ohio.

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

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



**BIG Profits.** Sell nationally famous guaranteed Dans wrist watches. Illustrated circular. Brooks, B120M, Arkansas, Wis.

**GUARANTEED Product** in protected territory, if you are now selling or intend to sell house-to-house. For full 1 qt. sample amazing High Shine Windsor No Rubbing Wax, send only 25c covering handling and postage. (Sells for \$1.25.) Windsor Wax Co., Inc., Dept. P.M.-2, Hoboken, N. J.

**I'LL Put a "shoe store business"** in your pocket! Nation's leader trains you to make big money! Fit men, women. Free sample outfit, write today! Consolidated Shoe System, Dept. S-139, Chippewa Falls, Wis.

**FREE Sample!** Big profit opportunity with amazing Glow-in-the-Dark house numbers, switch plates, pictures, decals, religious articles. Represent large manufacturer. Madison Mills, 303 Fourth Avenue, New York 10, N. Y.

**MAKE More money** selling personal initialed individualized belts, buckles, cap badges, tie holders, name plates, 2,000 emblems to choose. Big profits, whole or part time. Write today; special outfit offer. Hookfast Specialties, Box 1425, Dept. 6, Providence, Rhode Island.

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

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

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

**INFORMATION** — Wholesale supply sources. Moneymaking plans. Increase your income! Write Reynard Service, Smithfield 3, Ohio.

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

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

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

**GREETING Card agents!** Double your income with profitable sidelines. Write today! Mosher's, Vineyard Haven, Mass.

**\$1 STARTS You** in business. Write, Successful Income Builders, 508, Hollywood 28, California.

### HIGH-GRADE SALESMEN

**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-128, 7530 Greenwood, Chicago.

**STOP! Read carefully!** Today's rapid-fire money maker. Only complete giant volume World War II. Profits to distributors already over \$2,000,000. Surface only scratched. Sells on sight. Over 20,000,000 prospects—every home, shop, school, office. Don't miss these landslide profits. Write quick! Universal House, 1014-F Arch Street, Philadelphia, Penna.

**SHARP-N-QUICK:** For all kitchen, butcher, hunting, pocket knives. Better, faster than finest oil stone. 25c. Agents send 50c for 4 samples. Argie, 1425 N. Milwaukee, Milwaukee 2, Wis.

**LOOK Here! Wanted—Men** to start in business on our capital. Sell some 200 farm-home products. Thousands our dealers now make quick sales, big profits. For particulars write Raleigh's, Dept. L-192B-PPM, Freeport, Ill.

**MANUFACTURERS' Agents.** Hot hardware lines. Sales kit—free. Farmco, M-2002, Excelsior Springs, Mo.

**SELL Diamolite ring line** house to house on credit. Write for full information. Acme Mercantile Co., P.O. Box 726, Nashville, Tenn.

**BALLOONS, Toys, novelties, etc.,** wholesale. For full information write Dutz Enterprises, 109-A Sangamon, Lincoln, Illinois.

**QUICK Sure money.** Selling Annie Blain flavors. Highland Park 1, New Jersey.

**SALESMEN—Put yourself** in line for big money and real future. Keep stores supplied with 5c-10c counter goods. Nationally advertised merchandise. Top profits for you and merchants. Liberal deals boost sales. Sideline or full time. World's Products, Dept. 10-L, Spencer, Ind.

**ADVERTISING Specialties.** Liberal commission. Samples, catalog, 25c. Levine's, 15-X Boulevard Station, New York 59, N. Y.

**SELL 7 x 11 Signs,** no trespassing, etc., 25 different, 100-\$2.50. Postpaid. Retail \$10.00. Information write, Feld, 813 Ellison, Cincinnati, Ohio.

**LUMA-NITE Emergency light** for automobiles sells on sight. Floodlight for work.—red warning light for safety, clings magnetically to metal. Up to 100% profits. Sample \$3.50. Particulars free. Business Equipment House, 420-P So. Wells Street, Chicago 7, Illinois.

**EASY Money.** Specialty salesmen, jobbers, selling C-Rite for eye glasses, car windshields, etc. Cleans, keeps clear. No fogging. Needed by millions. No competition, whirlwind seller. Sample 25c. Write C-Rite Mfg. Co., Mt. Erie, Ill.

**INTRODUCTORY Offer:** mail \$2.00 for cologne and perfumes retailing \$6.60. Not samples! Tremendous market—Huge profits. Beau-Belle Creations, 3740M North Paulina, Chicago 13.

**BIG Money** selling tooth powder. Write today. James Walker, 633 Plymouth Ct., Chicago, Ill., Dept. 3.

**AUTOMATIC Fire extinguishers,** it really sells. Guaranteed top profits. Exclusive territory available. Red Ball Inc., Box 1552, Salt Lake City, Utah.

**BIG Money** quickly and easily taking orders for complete line personalized initialed buckles, belts, cap badges, 2,000 emblems. Fast repeats. Write today, Hook-Fast Company, Box 480-PM, Roanoke, Virginia.

**JOBS Open** in selling! Send name, address for free copy Opportunity Magazine, listing hundreds of companies who need men now, full or spare time. Experience not essential. Opportunity, 28 E. Jackson, Dept. 17, Chicago 4, Ill.

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

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**LEARN Mechanical dentistry:** World-wide opportunities. Start own business. Resident school gives practical instruction at the bench. G.I.-approved. Housing available. Write for folder PM. Franklin Schools, 719 Liberty, Pittsburgh 22, Penna.

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

**MAKE Up to \$30-\$40** week as a trained practical nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. M-12, Chicago.

**"HOW To Break and Train Horses"**—A book every farmer and horseman should have. It is free, no obligation. Simply address, Beery School of Horsemanship, Dept. 11012, Pleasant Hill, Ohio.

**LEARN Air conditioning,** refrigeration, and heating. Write today for free booklet. Detroit Air Conditioning Institute, 4125 Grand River, Detroit, Michigan.

**LOW Cost** home study courses. Over 500 subjects. Free bulletin. DeVoto Schools, 35 Vicente, San Francisco 16, Calif.

**NOW You** can have an office. Many earn up to \$5,000-\$15,000 annually in the collection business. Learn by home study course. Experience unnecessary. Write for free bulletin. No obligation. Franklin Credit School, Dept. 228-N, Roanoke 7, Virginia.

**LAW Home-study,** three-year, 150-lesson college course (LL.B. degree). First lesson \$1.00. Osborne University, 392 Court, San Bernardino, California.

**MAGICIANS School.** Licensed, first of its kind. Approved for veterans. Experience unnecessary. Free particulars. Chavez College of Magic, 729 West Ninth Street, Los Angeles 15, California.

**BE A mathematical wizard.** Add figures faster than adding machine. No special education needed. Free details. Write, Vanderdrift, 517 Lincoln Place, Orange 2, New Jersey.

**MEMORY Stunts** revealed. Actually memorize rapidly newspapers, home work, catalogs. Impress employers, teachers, customers. Practical application guaranteed. Book \$1.00. Rabinowitz, 27 E. 3rd, New York 3.

**INVESTIGATORS** Trained, men-women, learn fascinating profession. Spare time study. Big pay. Folders free. Investigator, Box 490, Times Square Station, New York 18, N. Y.

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

**DEVELOP** Photographic mind by supermemory. Write Thor Books, CM-12, Box 1210, Chicago.

**WELDING—Learn** quickly at best equipped school in U. S. A profitable trade. Demand for trained men. G.I. approved. Free catalog. Write Hobart Welding School, Box M-1288, Troy, Ohio.

**SPANISH—Learn** fast—with Speed-O-Way phonograph records and textbook, \$7.95 complete. Write for free folder. Speed-O-Way Publications, Box 2301, Houston 1, Texas.

**INVESTIGATOR** Training, other. Scientific crime detection courses. Free literature. Write today! State age. Institute of Scientific Criminology, Dept. J, 1324 West Broadway, Spokane, Washington.

**DENTAL Technician's** practice kit. Artificial teeth, plastic, etc. Free instructions with kit. Grant Laboratory, S-219 W. 7th, Los Angeles, Calif.

**LEARN Oil painting:** Simplified course. Inexpensive. Roland Prickett, Box PM, Reno, Nevada.

**3800 LATEST Used** correspondence courses cat. 50c. EG, Elmsford, N. Y.

**NEW Profession.** Pedemetry—Foot correction. Unlimited field. Learn at home. Write Registrar, American Foot Health Institute, 55 East Washington, Chicago, Ill.

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**PIANO Tuning** pays. Learn this profitable profession at home. Our Tonometer and mechanical aids make learning easy. No knowledge music necessary. Diploma granted. Largest and oldest school—50th year. G.I. approved. Write for booklet. Niles Bryant School, 78 Bryant Bldg., Washington 16, D.C.

**MEDICAL Laboratory technicians** in great demand. We train you in your own home, in your spare time. Also home study course in general chemistry. Free catalogue. Imperial Technical Institute, Box 973-J, Austin, Texas.

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

**BOOKKEEPERS!** Increase your earnings! Operate your own simplified "dollar-a-week" bookkeeping and tax service. Full or spare time. Details free. No obligation. Ellis, Box 200, Cedar Grove, North Carolina.

**USED Correspondence** courses and books bought, sold, rented and exchanged. Catalog free. Lee Mountain, Pisgah, Alabama.

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



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**I WANT** New writers to cash hundreds of checks for \$1 to \$100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for free details. No obligation. Saunders M. Cummings, 468-M Independence Bldg., Colorado Springs, Colo.

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**WE** Receive reforward letters; \$3.00 monthly or 25c each. "Hawkins," 1300 Taylors, Washington 11, D.C.

**PHOTOSTATIC** Copies. Write for prices. Hamy, 214 Robinson, Hudson, N. Y.

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**ADVERTISERS!** Reach nearly 18,000,000 readers. 25 Sunday national key newspapers, 18 words, \$49.75. "Terrific pullers," 20 popular newspapers, \$10.00. "Free booklet," Special—One inch display 2,821,198 circulation, \$48.30. Newmark's Advertising Agency, (Established 1893), 217-7th Ave., New York 11.

**COMPLETE** Service for mail advertisers. Planning, preparation, printing, placing. Write: National, Box 88A, Dorchester, Mass.

**SELL** Anything by mail. Dynamic ads, prospectus, letters written. Classified mailing lists. Millions! School teachers, students, investors stockholders, etc. Faultless Advertisers, P-3439 Michigan, Chicago 16.

**CHOICE** Mailing lists. E. J. Eller, Broker, 1000 Sutter Street, San Francisco 9, Calif.

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

**24 WORDS** In 50 weeklies, \$4.96. J. Darnell, 730 Hays, Jackson, Tennessee.

**EARN** Money in your spare time. Progressive Mail Trade tells you how. Large 64 page magazine for a dime. Progressive Mail Trade, 822 Center Ave., Sheboygan, Wisconsin.

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

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

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**FAMOUS** \$75 Lockwood art course now only \$6 postpaid. Other smashing art bargains. Catalog 10c. Art Book Shop, Arnold 5-A, Missouri.

**WE** Do silk screen process of all kinds. Kolortone Signs, Detroit Lakes, Minn.

**"HOW To Make Money With Simple Cartoons"**—a book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists' Exchange, Dept. 912-C, Pleasant Hill, Ohio.

**LEARN** Showcard writing at home in spare time. Fascinating, profitable. Free information. Sherwood Publishing Co., Irvington 11-4, New Jersey.

**CARTOONISTS'** Magazine 25c. Lessons, markets. Hartman Studios, 2776 California Ct., Lincoln 8, Nebraska.

**LEARN** Drawing at home. Sixteen easy steps. Low cost. Constructive criticism. Money-back guarantee. Pacific Art Institute, Box 1284, San Jose, California.

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

**SIGN** Painting course prepared by one of America's best sign artists. \$2.00 postpaid. Progressive Signs, 3611 Thirteenth Avenue, Chattanooga 7, Tennessee.

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

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

**FIGURE** Drawings by French artist Lalire. Over hundred female poses, body details, \$1.00. Art Headquarters, 1160 25th Avenue North, St. Petersburg, Florida.

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

### TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

**PRINT-O-MATIC** Mimeographing post card typeless stencil duplicator printer \$13.50. Office duplicators—Hilcos, Speedoprints. Typewriters, portable adding machines, addressettes, automatic envelope sealers. All office machines. Duplicator supplies. Literature free. Pittsburgh Typewriter Supply, 336-4 Fourth Avenue, Pittsburgh 22, Penna.

**STANDARD** Typewriters \$25.00; duplicators \$12.50; adders \$12.50. Ship all states. "Typewriters," 118 Spruce, Wichita, Kansas.

**REVOLUTIONARY** New addresser. No plates. \$32.50 complete. Cunningham, 1463 East 50th, Chicago.

**PHOTOCOPY** Anything—Papers, books. No darkroom. \$6.95 complete. Potoflek, 4801 Yarmouth Place, Cincinnati 29, Ohio.

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

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**3 LINES** 50c. Printing. Catalogue. Johnson Press, Box 6-A, New York City 26.

**LINE** 20c; 2-35c; 3-50c. Stamp Works, Auburn, Nebraska.

### PRINTING, MULTIGRAPHING, MIMEOGRAPHING, GUMMED LABELS

**BUSINESS.** Personal stationery. State requirements. Samples, price lists free. How Printing Company, 721-23 Eunice, Webster Groves 19, Missouri.

**8 1/2x11** LETTERHEADS; Envelopes; 100 either. printed \$1.00. Benneville, Box 1931, Pittsburgh 30, Penna.

**100 8 1/2x11** HAMMERMILL Letterheads, 100 envelopes (5 lines) \$2.00. R. Cook, (Dept. 2128), 730 West Gift, Peoria 5, Illinois.

**MIMEOGRAPHING:** 100 8 1/2x11—\$1.10. Additional hundreds 50c. Mimeographing, Madison, Tennessee.

**SAVE** Money on your printing. Write today for new, low price list and offset ordering chart PM-1 free. We photograph your copy and reproduce it on white or colored paper. Advertisers Service Litho, 161 W. Harrison, Chicago 5, Illinois.

**BUSINESS.** Personal stationery. State requirements. Samples. Mero Products, 100 Morrison, Punxsutawney, Penna.

**100 8 1/2x11** LETTERHEADS Or envelopes \$1.00. 100 each \$1.85. D'Yarmett Printing, Newark, Ohio.

**BLOTTERS.** Cards exclusively; lowest prices; samples. Box 174, Niagara Falls, New York.

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

**AUTOMATIC** Eraser holder, attach to any make typewriter. Eraser always at fingertips. New. Sensational. 50c; 3 for \$1.00. Tobe, 801 Lee Bldg., Kansas City, Mo.

**500 LETTERHEADS** And envelopes \$9.50. Sumar Press, 81 W. Van Buren Street, Chicago, Ill.

**250 LETTERHEADS** \$1.00. Envelopes, billheads, statements same. Klopffleisch, Crosby, Minnesota.

**BLOTTERS—2x4,** 1949 Calendar and your advertisement. 200 \$1.75. Samples. Blotter-Ad, 5301 Atlantic Ave., Ventnor, N. J.

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

**100 LETTERHEADS** (8 1/2x11), 100 Envelopes, beautifully printed, \$1.85. Calder's, Box 3422-MP, Philadelphia 22, Penna.

**1949 CALENDAR** Novelties. Samples for stamp. Cassel, R4, Middletown, N. Y.

**150 SHEETS,** 75 Envelopes printed \$1.75 prepaid. Miller Stamp, Highland Avenue, Malden 48, Massachusetts.

**1000 BUSINESS** Cards (embossed) \$2.95 postpaid. Zephyr Printing, Box 312pm, Venice, California.

**LETTERHEADS.** Envelopes, circulars. Small, large quantities. H.M.G. Company, Mecca, Indiana.

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

**1000 BUSINESS** Cards, \$2.50, prepaid. Samples free. Reliable Print Shop, 905 E. Jefferson, Louisville 6, Ky.

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

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

### PRINTING OUTFITS AND SUPPLIES

**REBUILT** Presses, bought, sold. List 3c. Exchange, 212 Curtis, Meriden, Conn.

**HOME**CRAFT Presses, supplies. Catalog 10c. refundable. Riegel, 1111 Harrison, Philadelphia 24, Penna.

**GOLD** Imprinter \$3.25. Samples 10c. Garza, 8 Walden, Cambridge 40, Mass.

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

**HAND** Presses, automatics, type, cutters, bulletins 3c. Requirements? Box 918, New York 8.

**BARGAINS**—Hand presses, supplies. Catalogs 10c. Customprint, 211-N, Springfield, Missouri.

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

**PRINTING** Presses, type, supplies. Send dime for complete illustrated printer's supply book, details and press samples. Kelsey, Inc., A-11, Meriden, Connecticut.

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

### PATENT ATTORNEYS

**PATENT** Protection—Unless an inventor is thoroughly familiar with such matters, he is advised to employ a competent registered Patent Attorney as the value of a patent depends largely upon the skillful preparation of the specification and claims. Send for booklet, "Patent Protection for Inventors," outlining preliminary steps to take to obtain patent protection. Victor J. Evans & Co., 331-P Merlin Building, Washington 6, D. C.

**IF** An inventor believes he has an invention, a search of the most pertinent prior U. S. patents should be made and a report obtained relative to its patentability. Write for further particulars as to patent protection and procedure and "Invention Record" form at once. No obligation. McMorrow, Berman & Davidson, Registered Patent Attorneys, 134-V Victor Building, Washington 1, D. C.

**PATENTS.** "Proof of Invention" folder mailed without obligation. E. E. Vrooman, Registered Patent Attorney, 505 McKim Building, Washington 5, D. C.

**GUSTAVE** Miller—Patents and trade marks. 128-A Warner Building, Washington 4, D. C. Registered Patent Attorney. Associate Patent Examiner, U. S. Patent Office 1922-1929.



**PATENTS, Trade marks, Sanders, 6430 Evans, Chicago, Registered U. S. Patent Office.**

**INVENTORS:** Learn how to protect your invention. Unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practise before the U.S. Patent Office and prepared to serve you in handling your patent matters. "Patent Guide for the Inventor" containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request—without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 81B-K District National Building, Washington, D. C.

**C. A. SNOW & Co.—M-427, Snow Building, Washington 1, D. C. Registered Patent Attorneys. Write for information.**

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

**INVENTORS.** For "Record of Invention" form, contact Carl Miller, Registered Patent Attorney, Woolworth Building, New York.

**INVENTORS:** Without obligation, write for information explaining the steps you should take to secure a patent. John N. Randolph, Registered Patent Attorney, 203 Columbian Bldg., Washington 1, D. C.

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

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

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

**INVENTORS:** When you are satisfied that you have invented something of value write me, without obligation, for information as to what steps you should take to secure a patent. Write Patrick D. Beavers (Formerly Randolph & Beavers) Registered Patent Atty., 935 Columbian Bldg., Washington 1, D. C.

#### FOR INVENTORS

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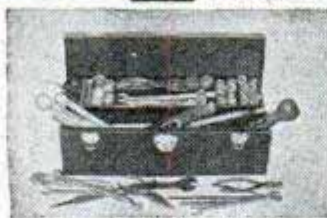
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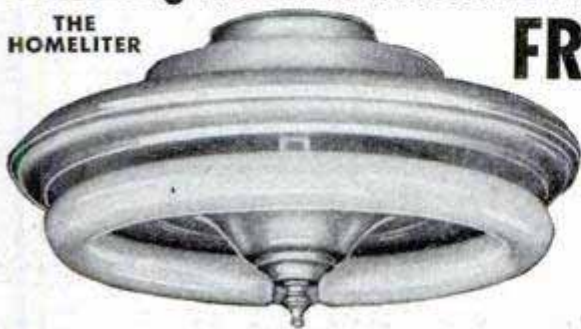
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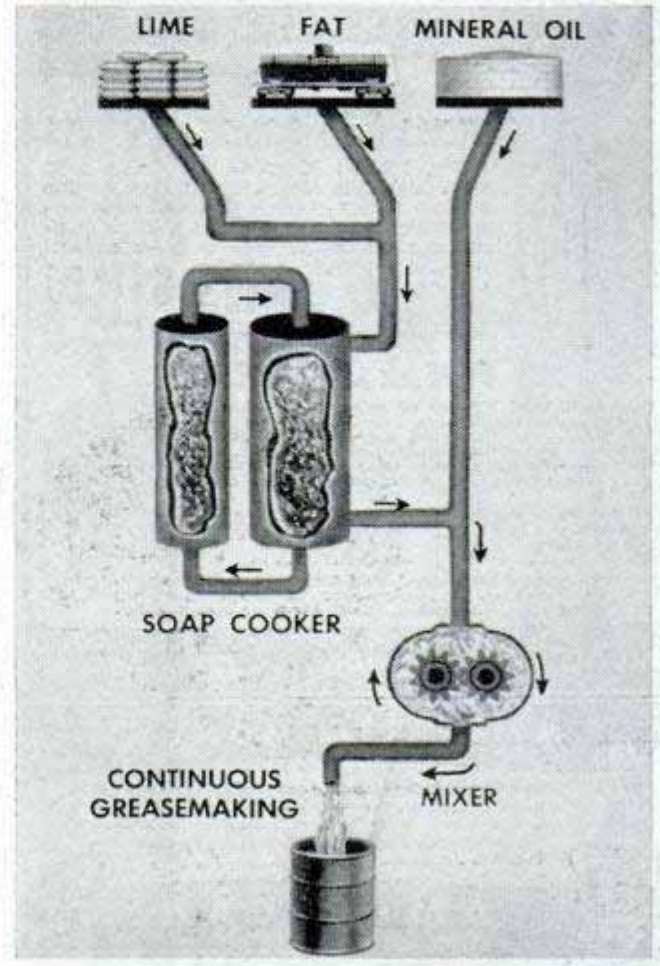
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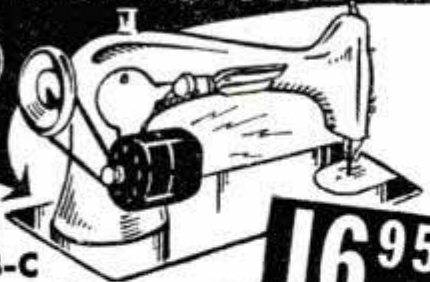
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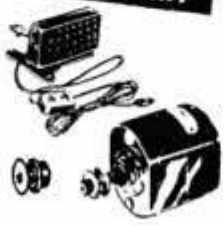
**SIMPLE AS A-B-C**

Directions are easy to follow:

**HERE'S WHAT YOU GET:**

- WESTINGHOUSE MOTOR. AC-DC fan cooled.
- FOOT CONTROL, 8 speeds
- COMBINATION SEWLIGHT, nickel plated shade and bulb.
- CORD SET, dual purpose, for light and motor.
- RUBBER BELT
- MALE PLUG
- PULLEY, Steel hubbed.

**16.95 COMPLETE MOTOR KIT**



**GIFT**  
Button Attachment. Sew's on buttons, zippers, mends, quilts, overcasts, seams. \$1 value.



**MONEY BACK GUARANTEE**

Specify Make of Your Machine. Enclose check or Money Order to Save C.O.D. Charges.

**S. REINHARD**

38 W. 32 ST., N. Y. 1, N. Y.

Dept. PM

**GRAND FOR CHRISTMAS GIVING**

**Order This Educational, Entertaining WORLD DIE CASTER today!**



More than a toy! Makes clever, colorful clay figures, plaques, party favors. Play-tested for boys, girls 5 to 12. Provides hours of entertainment. Develops creative ability. Set includes die caster, dies, 4 extrusion dies, clay, water colors, modeling tool, instruction book. Circus box package. Only \$4.95 postpaid. Send check or M.O.

TAYLOR SALES, INC., 1213 S. Akard St., Dallas, Texas

**LEARN CARPENTRY AND MASONRY**

Write for FREE Catalog  
Train in Big Shops. G.I. Approved

MIDWEST SCHOOL OF BUILDING TRADES, Dept. PM-12  
411 N. Center St. Bloomington, Ill.

# WAR SURPLUS OPTICAL BARGAINS

ASSEMBLE YOUR OWN BINOCULARS!

Save More Than 1/2 Regular Cost

## GOVERNMENT'S 7X50 BINOCULARS



**Complete Optics! Complete Metal Parts!**

We supply full instructions

**METAL PARTS**—Set includes all Metal Parts—completely finished—for assembly of 7 X 50 Binoculars. No machining required. Bodies have been factory hinged and covered. A sturdy Binocular Carrying Case is optional with each set of Metal Parts.

Stock #842-H ..... \$39.40  
Postpaid, plus \$4.80 for Case—Total..... \$44.20

**OPTICS**—Set includes all Lenses and Prisms you need for assembling 7 X 50 Binoculars. These are in excellent condition—perfect or near-perfect—and have new low reflection coating.

Stock #5102-H ..... \$25.00 Postpaid  
(These are standard American made parts . . . not Japanese, French or German.)

**NOTICE!** If you buy both Binocular Optics and Binocular Metal Parts, add 20% Federal Excise Tax to above prices.

## ARMY'S 6x30 BINOCULARS

**COMPLETE OPTICS & METAL PARTS**—Model M-13A1, 6 X 30 Binoculars. (Waterproof Model). Everything you need—ready for assembly. When finished will look like a regular factory job costing \$102. to \$120. The Optics are new, in perfect or near-perfect condition. Have new low reflection coating. Metal Parts are new and perfect, all completely finished. No machining required. Bodies factory hinged and covered. Complete assembly instructions included.

Stock #830-H ..... \$40.00 Postpaid  
plus \$8.00 tax—Total—\$48.00

**20X PRISM SPOTTING SCOPE SET**—Consists of all lenses and prisms (slightly chipped) you need to make a good, standard 20X Spotting Scope. Low reflection coated. 57 mm. dia. Achromatic objective. Some Metal Parts Included. We furnish Directions.

Stock #5145-H ..... \$22.00 Postpaid  
(Also surplus Riflescopes — Write for Bulletin 18-H)

**SLIDE PROJECTOR SETS**—Consist of all unmounted lenses you need to make the following size projectors:

Stock #4038-H—2 1/4"x2 1/4" ..... \$3.35 Postpaid  
Stock #4039-H—2 1/2"x3 1/2" ..... \$3.35 Postpaid  
Stock #4029-H—35 mm. .... \$2.85 Postpaid

**MOUNTED ANASTIGMAT LENSES**—Used for Projectors, Enlargers, Copying Cameras. Complete with Shutter and Diaphragm. Value about \$20. An excellent buy. WE WILL INCLUDE FREE ILLUSTRATED BOOKLET on HOW TO MAKE YOUR OWN ENLARGER.

Stock #8004-H Speed f/7.7, focal length approx. 127 mms. Suitable for pictures, negatives, positives up to 3 1/2"x4 1/4". \$7.50 Postpaid  
Stock #8006-H Speed of f/7.7, focal length approx. 100 mms. Suitable for pictures, etc. up to 2 1/4"x3 1/4". . . . \$8.50 Postpaid

We have literally millions of war surplus lenses and prisms for sale at bargain prices ranging 10c and up. Write for Catalog "H" — Sent Free!

Order by Stock No. Satisfaction Guaranteed

# EDMUND SALVAGE COMPANY

P. O. AUDUBON, NEW JERSEY

SAY YOU SAW IT IN POPULAR MECHANICS

New Method...



You too can make these beautiful copper pictures and plaques right in your own living room.

# BIG PROFITS!

Can be Yours... Right in Your Own Home

## No Experience Needed

At last a way to get in on the Big Money made every day in Copper Art—Plaques—Bowls—Trays—Gifts—Souvenirs of all kinds. No art talent necessary—our NEW METHOD makes it so easy, even a child can do it. Big Markets waiting. Anyone can learn quickly—you start making money right from the start. Don't miss this opportunity to cash in at once on this big-paying easy to operate business. Be your own boss. SEND NO MONEY—act NOW to get all the free details—just send your name on a penny postcard today—Do it Now! Write today—



No Selling Money-Back Guarantee

**HOLLYWOOD COPPER ART STUDIO Dept. M3**

7266 Sunset Boulevard  
Hollywood 46, California



**HERE'S A NEW AND VITAL BUSINESS!**



**LEARN ELECTRICAL EQUIPMENT SERVICING**



**OFFERS BIG MONEY — INDEPENDENCE**

Learn in spare time at home. **NEW Shop Method Training System.** Work as many hours as you wish — the Electrical Equipment Technician is his own boss. It is not unusual for a technician to charge on the basis of \$5.00 to \$6.00 an hour!

**NO PREVIOUS EXPERIENCE NEEDED**

We furnish everything! Tool kits, training kits, including the famous Christy trouble-detecting **ELECTRONIC KIT.** Plus illustrated instructions written in simple, easy-to-understand language, check full of photographs and drawings. Shows you how to repair factory and household electrical units. Power machinery, refrigerators, washing machines, vacuum cleaners, irons, etc. Gives you a working knowledge of electricity, welding, nickel plating, etc. Shows how to build power tools you need, how to solicit business and what to charge. Many report paying for their entire course, tools, etc. on earnings made at home while learning!

**FREE BOOK SENT TO YOU**

Send your name for **FREE** booklet on Electrical Equipment Servicing and instructions for paying us later from your **EARNINGS WHILE LEARNING!** **CHRISTY TRADES SCHOOL, Dept. D-6403, 2835 N. Central Ave., Chicago 34, Ill.**

**Now! Broadcast through your Radio with this New WIRELESS MICROPHONE!**



**No Connections—No Hookups of any kind—Completely Wireless BROADCAST IMMEDIATELY!**

**\$9.95 complete**

Broadcasts through any radio indoors—outdoors—anywhere. It's a completely self-contained wireless transmitter—a marvel of modern electronic engineering. Talk into it—sing into it—and without plugging in—without connecting wires your voice comes booming through any radio set within a 50-foot radius. Use it for fun at gatherings, parties, etc. *Ultra-Mike is not a toy—it's a rugged, scientifically engineered transmitter in mike form that gives high fidelity—performance.*



*Hear baby while you're in another room.*

**Loads of Fun—and Practical, Too**

Ultra-Mike is highly efficient over a full 50-foot range. It is completely self-contained, with its own tube and long life (easily replaceable) battery. No hook-up or connections are needed. Carry it with you—talk as you walk—and you'll marvel at its fine modulation—its full-bodied volume—the clearness with which your voice is reproduced.

**ORDER TODAY. SEND NO MONEY.**

Just send name and address and we'll send C.O.D. plus postage, or send \$10.00 and we ship postpaid. Don't delay.

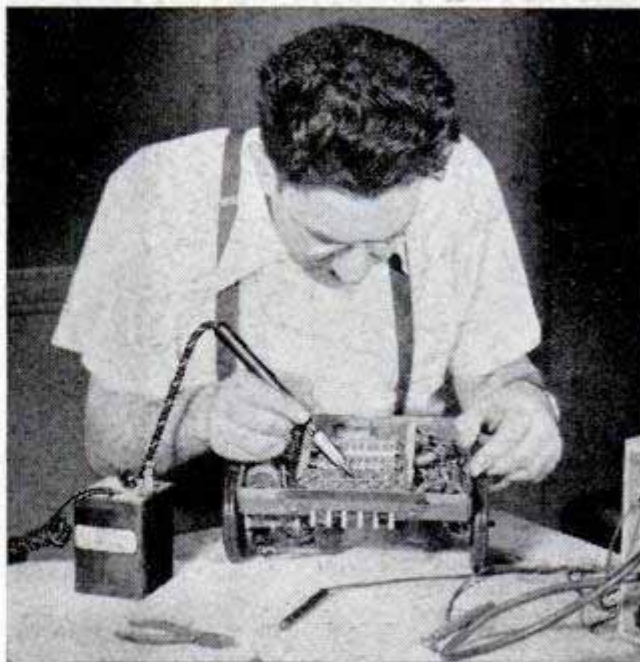
**MAIL MART INC.**

Dept. EP-72

230 Grand Street, New York 13, N. Y.



**Low-Drain Soldering Iron Converts to Any Voltage**



Consuming only 35 watts, a lightweight soldering iron designed for heavy-duty use puts out heat equivalent to that of a 100-watt iron. According to the manufacturer, the iron operates on a wattage-expanding principle that creates the maximum concentration of heat in the tip where it is needed. The iron, shaped like a long fountain pen, weighs only 3½ ounces and has a replaceable thermo cartridge for conversion to any voltage. A six-volt battery will heat it when the proper cartridge is used.

**Bazooka Driller for Oil Wells**

Shaped charges similar to those used in the war-famed bazookas now are increasing the flow of petroleum into partly exhausted oil wells within reach of pumps. The bazooka charge is lowered into the casing of the well and detonated to perforate the casing walls so the oil can flow through. Explosion direction of shaped charges can be controlled, making the force much greater than that of ordinary charges.

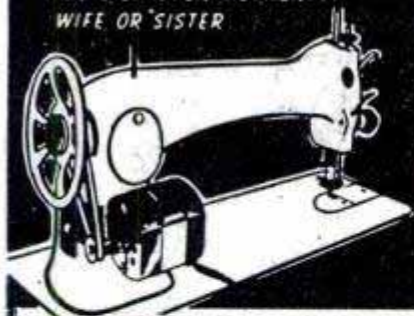
**Kit Reclaims Silver From Hypo**

Silver in exhausted hypo solutions, normally thrown away by photo fans, is reclaimed by a kit especially designed for users of small amounts of hypo. The kit consists of 50 filaments, each capable of reclaiming silver from one half to one gallon of fixing solution. One of these filaments is placed in the exhausted hypo and allowed to stand overnight. The silver-covered filaments are sent to a refining company where the silver is salvaged.



# ELECTRIFY YOUR SEWING MACHINE

IDEAL GIFT FOR MOTHER  
WIFE OR SISTER

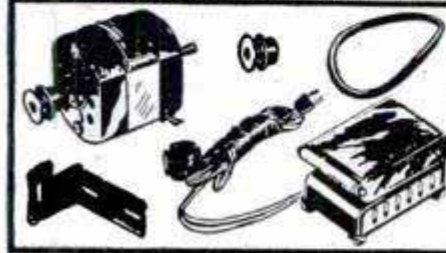


## SEWING MACHINE MOTOR KIT...

90 DAY GUARANTEE  
**\$16<sup>75</sup>**  
COMPLETE!

ANYBODY CAN INSTALL IT!  
ADJUSTABLE FOR USE WITH  
ANY TYPE OF SEWING MACHINE

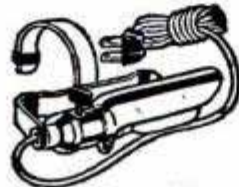
FULL SATISFACTION OR MONEY BACK



- COMPLETE SET CONSISTS OF:
- MOTOR—Fan-Cooled, Universal AC or DC, 60 cycle, 115 volts.
  - BELT—Long wearing rubber
  - PULLEY—Single grooved steel hubbed pulley.
  - BRACKET—New and improved.
  - FOOT CONTROL—7 step rheostat.
  - CORD SET—Extension cord with plug and socket.
  - Installation Instruction Sheet.

### SPECIAL OFFER!

If you send your order within a twenty day period we include a FREE Sewing Machine Light complete with attachment Socket & Light bulb (value \$2.75) with your kit.



PM 1248 **BROWNELL DISTRIBUTORS, INC.**  
308 Canal Street, New York 13, N. Y.

Please rush your kit at \$16.75. The make of my machine is ..... Handwheel turns:  towards me  away from me.

NAME.....

ADDRESS.....

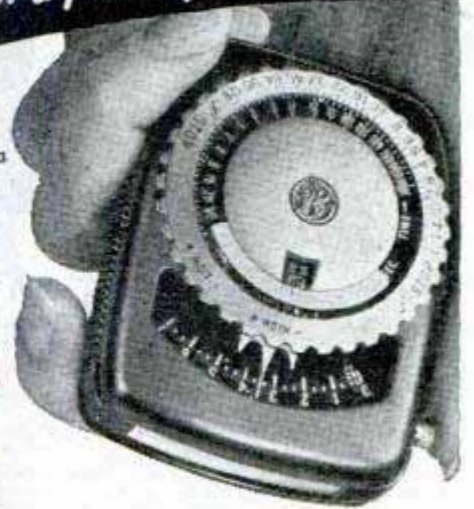
CITY..... ZONE..... STATE.....

To save postage and C.O.D. charges, I am enclosing \$16.75 , check , money order . Send C.O.D. I'll pay postman \$16.75 plus C.O.D fees

SAY YOU SAW IT IN POPULAR MECHANICS

# GIFT OF THE YEAR for a photographer

the meter with a  
MEMORY!



the new



exposure

## METER

Versatile! Complete. Good for movies and stills, incident or reflected light. And so easy to use! Give the new G-E photographic exposure meter for a thrilling Christmas! Type PR-1, \$32.50\*. General Electric, Schenectady 5, New York.



Also famous Type DW-58 . . . \$19.95\* and \$21.95\*

\*Fair Trade price. Fed. tax inc.

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606-47K



## ARC WELDER III

A sturdy, compact, metal Arc Welding Outfit. Guaranteed. Used by garages, mechanics, farmers, etc. Repairs tools, auto fenders, toys, etc. Everything you need—Welder, large Helmet, Rods, Attachments, Instructions. Only \$5.95 postpaid, or C.O.D. plus few cents postage. Ten-day Trial Offer. Money Back if not satisfied.

COMPLETE \$5.95

MINEX

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# GIVE YOUR CAR THE "WOLF CALL"

## of Deep Tone DUAL MUFFLERS

The rich, low, mellow sound of "straight thru" ADVANCE mufflers is something all your friends will admire.

Also greater power, speed, and economy result from the reduced back pressure of this scientific design. Rugged steel tube throughout (no aluminum); blowout-proof.

SIMPLE TO INSTALL. No welding, cutting, or holes to drill. Complete with rubber mounted clamps (no rattle) and all necessary fittings.

ADVANCE MUFFLERS, 6800 S. Vermont Ave., Dept. PM 12-8, Los Angeles 44, Calif.  
Send Check, Money Order, or we will mail C.O.D.  
You pay postage upon receipt.

Dual Muffler Set (Ford, Mercury only) \$20.00  Single Muffler (other makes) \$5.50   
Single Muffler (Ford, Chev., Plym.) 4.86  2 1/2" Chrome tail pipe tips 1.75

Car make..... Year..... Model.....

Name.....

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



## ADVANCE MUFFLERS

6800 S. Vermont Ave., Los Angeles 44, Cal.



It's MORE FOOD for LESS MONEY

Send

**CARE**

Food Packages Abroad... \$10.

INSURED · GUARANTEED DELIVERY  
DUTY FREE · RATION FREE  
NON-PROFIT · GOVERNMENT APPROVED



**CONTENTS:**

- 1 lb. Braised Beef
- 2-8 oz. tins of Liver Pâté
- 2-8 oz. tins of Corned Beef Loaf
- 2 lb. Shortening
- 1 lb. Chocolate
- 2-8 oz. tins of Cocoa
- 2 lb. Whole Milk Powder
- 8 oz. Egg Powder
- 1 lb. Apricots
- 1 lb. Raisins
- 7 lb. Flour
- 2 lb. Sugar
- 1 lb. Coffee (For Britain: 1/2 lb. tea)
- 2-3 oz. Bars of Soap
- 1/4 oz. Yeast

The entire cost of this advertisement has been donated.

**CARE** Cooperative for American Remittances to Europe, Inc., 50 Broad Street, New York 4, N. Y.  
CARE Food Packages may be sent to: Austria, Belgium, Bulgaria, Czechoslovakia, Eire (Ireland), Finland, France, Germany (American, British and French Zones and all of Berlin), Great Britain, Greece, Hungary, Italy, Netherlands, Poland

Your Name and Address:

\_\_\_\_\_  
\_\_\_\_\_  
(Street and Number)  
\_\_\_\_\_  
(City and State)

Prompt Delivery Depends on Clear, Correct Address.  
**PLEASE PRINT**

Enclosed is ten dollars for each CARE package  
To Be Delivered To:  Check  Money order

\_\_\_\_\_  
(Name)  
\_\_\_\_\_  
(Street and Number)  
\_\_\_\_\_  
(Town and Country)

A RECEIPT, SIGNED BY THE BENEFICIARY YOU NAME, WILL BE RETURNED TO YOU.

(signature of sender) (Date)



# WAR SURPLUS

## TERRIFIC BARGAINS

**ELECTRIC MOTOR** 1/2 H.P. 27 V.D.C. R.P.M. 4000 No. 750, FOR INTERMITTENT OR CONTINUOUS DUTY. 3/4" SHAFT. VARIABLE SPEED MOTOR. Can readily be adapted to 110 V.A.C. or R.E.A. line by simple method of rearranging armature brush leads. UNUSED. Instructions incl. Ea. **\$5.50**

**VALUABLE GEARS BARGAINS.** Selsyn Control Trans-  
Speed Reducer G.E. 10 to 1 or 5 **FORMERS** Model #231G1,  
to 1 ratio, 90 degree angle. Shaft 57.5 Volts, 400 cycle. Can be  
Driven; 1/2" Spine Shaft with used on 110 V. 60 cycles.  
3 mounting holes **\$450** ea. Instructions incl. **\$250** ea.  
5/16". New.....

**LUBE PUMP.** Brand new precision Gear Im-  
peller pump. Pumps liquid up to 3 G.P.M.  
Pressure up to 200 lbs. per sq. in. For high  
vacuum, air pressure, operating Hydraulic  
units, etc. St'd. 1/2" threaded and keyed **\$495**  
Shaft Instructions Incl.....



**PESCO GEAR TYPE UTILITY HYDRAULIC PUMP.** At 1750 exerts  
1000 P.S.I. Hydraulic pressure and pumps over 2 gal per **\$750**  
minute. Brand new. Ea.....

**VICKERS PUMP.** High Pressure Hydraulic pump. Use it  
for any type liquid pumping job. 400 gal. per hr. at **\$750**  
3750 R.P.M. rated 1000 P.S.I. Brand New. Only....

**BRAND NEW WONDERFUL ROTATOR MOTOR.**  
For rotating Ham, FM. Antennas, Turntables,  
Telescopes, etc. Operates directly on 110 V.  
A.C. 60 cycles requires only 12 MFD Con-  
denser) 3/4 H.P.M. Fine for operating Ven-  
ilating Louvers such as used with Attic Fans, Fur-  
nace Dampers or check drafts. Complete in-  
structions incl. Ea. **\$395**



**GREATEST PUMP VALUE IN YEARS. THOMPSON BOOSTER PUMP.**  
Use them for HOMES, FARMS, RANCH AND SHOPS. Motor Driven  
centrifugal pump will empty 50 gs. drum of water in ap- **\$750**  
prox. 20 min., runs on 24 V. D.C./A.C. New..... ea.

**DYN. new.** Type 8-3416. Input 9V., out-  
put 400 V., 7 Amps. and .08 Amps. Ea. **\$250**

**DYN. New Model PE-73-CM. G.E.** Input 28 V.  
A19. Output 1000 V. D.C. at 350 MA. Wt. **\$495**  
38 lbs. Ea.....

**DYN. New Model DY-22/ARC.** Input 28 V. D.C.  
Output 210 V. D.C. Cont. Duty. **\$150**  
Ea.....

**DYN. New Model #23350.** Input 27  
V. D.C. Output 285 V. D.C. **\$135**  
Ea.....

**NEW CUNO OIL FILTER** aircraft type-keeps oil clean  
without cartridge replacement. For all AUTOS,  
TRUCKS and TRACTORS. Install at home in a few  
minutes. STOP CHANGING MOTOR OIL. In- **\$495**  
structions incl. Ea.....

SEND CHECK OR MONEY ORDER. NO C.O.D.'s. PRICES F.O.B. K.C.  
**GENERAL SALVAGE COMPANY**  
Dept. 77, 2920 E. 27th St. Kansas City, Mo.

# START A BUSINESS at HOME... others make BIG MONEY

DOES THE WORK OF  
6 TOOLS IN 1  
Holds 20 times its  
weight in water



Hands  
Never  
Touch  
The  
Water  
..  
Can Be  
Put In  
Boiling  
Water

"Enclosed find 56 orders representing 9 1/2 hours work on Monday and Tuesday." "Enclosed are 12 orders secured after supper this p.m."

**Housewives Pleased**  
Everyone that sees this outstanding CELL-U-MOP immediately want one... That's the reason our distributors are so successful... For MOPPING, WAXING, WALLS, WINDOWS, AUTOS and CLEANING RUGS. Sells quick to Taverns, Clubs, Hotels, Hospitals, Stores, Restaurants, Homes, etc. Drain Bracket squeezes out water thoroughly. Write for FREE particulars

CELL-U-MOP CO., Dept. P-12 FREEPORT, ILL.

# WILL BUY ANYTHING!

(meeting my specifications)  
**A. E. BERGER - 134 N. LaSalle St.**  
CHICAGO 2, ILLINOIS

# Give yourself the Backing of a GREAT GROWING INDUSTRY



# REFRIGERATION AIR CONDITIONING

Refrigeration and Air Conditioning have leading place in fast growing fields of our time. Trained men paid well to service, install, maintain, repair, rebuild household and commercial refrigerators. Important new developments such as Frozen Foods and many new industrial uses. Demand for commercial installations in restaurants, butcher shops, taverns, florists, bakeries, etc. — air conditioning in homes, offices, shops.



## START NOW—Full and Part Time Earnings

There may never again be such opportunities for men who want better jobs or business of their own to get in on ground floor and go up fast! Many started with small investment who built good, growing business. If over 17 and under 60 learn how you can get started. **CONSULTATION AND PLACEMENT SERVICE WHETHER YOU ARE INTERESTED IN WORTHWHILE JOB OR SETTING UP YOUR OWN BUSINESS.**



### Begin Training at Home or Come Directly to Shops

Begin your training at home in spare time, finish in our big, modern shops, or come directly to shops. At home you get C.T.I.'s SHOP PROVED HOME STUDY instruction—actual shop experience has gone into the practical lesson assignments. That is why it is easy for mechanically inclined men to learn by our Home Study training and start on actual refrigeration work.



### A NATIONALLY KNOWN INSTITUTION

C.T.I. was only civilian school selected by Army to train service men for refrigeration. C.T.I. executives were active in training Auto Mechanics for U. S. Army. Same quality training available to you now. The method that has made rapid progress possible.

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CUT OUT COUPON BELOW

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FREE—Important information telling how to get started in one of these great fields.

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1400 W. Greenleaf, Chicago 26, Ill.

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- Drafting
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Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_  
 Veteran  Non-Veteran



# Don't Envy The PLUMBER-Be One

**Make \$15 to \$50 a Day**  
(and work every day)

Every skilled workman will tell you Plumbers have the best of it. WINTER and SUMMER the Plumber is busy at top wages. No skilled Plumber is ever out of a job . . . compare his opportunities with any trade, and decide where your opportunity is.



The  
Plumber  
Protects  
The  
Health  
of the  
Nation

## Own Your Own PLUMBING BUSINESS

No other business offers you the opportunity of starting in your own business, and making good profits, with little other investment than Universal's training and a kit of tools.

## JOURNEYMAN PLUMBER Gets Good Salary

Master Plumbers own their own shop. A Journeyman works for a Master. With Universal's training a journeyman can depend on high wages from the start.

## FREE DETAILS SHOW YOU HOW TO START

You can start now to success as a plumber by simply filling out the coupon and mailing it . . . or just write Universal Plumbing School, 839 Holmes, Kansas City, Mo. FREE details showing how will be sent by return mail.

Plumbing, to the man with know how, means profit. Investigate Universal's unique "Shop Method" system . . . This system, developed over a quarter century ago by a master plumber, offers you the opportunity to quickly get into the plumbing business. This is not a "war born school" . . . but a plumbing school developed and operated by plumbers since 1923.

## BE A PLUMBER In Just 32 Weeks

Now, just 32 weeks of intensive training equips you to be a plumber. No need ever serve an apprenticeship. Don't envy the plumber's big profits . . . enjoy them.

### System Shows How With Tools . . . Not Books

Universal's highly developed method makes plumbers by a special developed system showing how to use plumbing tools . . . not books. Every instructor is a Licensed Master Plumber capable of showing every trick of the trade . . . Lead Work . . . Blueprint for plan reading, etc. This offers a wonderful opportunity for the man who likes to work with tools.

### Over 7,000 Successful Plumbers Recommend This School

This system has made more than 7,000 plumbers. Each will testify it was the Universal Plumbing School that started him on the road to profits. Investigate our past performance . . . then decide. Universal is the largest and only school in America devoted exclusively to plumbing. It was established in 1923 under a system developed by a plumber and is owned and operated by licensed plumbers.

Don't waste your time looking over "war born schools" . . . investigate this system . . . then get into the profitable plumbing business.

## JUST MAIL COUPON

Send me FREE details about the plumbing business and tell me how to make profits as a plumber . . . I understand there is no obligation.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

G. I. Approved. Established 1923

**UNIVERSAL PLUMBING SCHOOL**  
815 HOLMES KANSAS CITY, MO.

## Tile-Joint Filler Applied by Fingers



Because it dries by chemical action rather than by evaporation, a grouting compound which is applied with the fingers does not draw away from the tiles as it sets. Designed for pointing up joints in ceramic, metal or plastic tiles, the white compound is water-resistant and nonporous. It is pressed into the joints with the fingers and is sufficiently resilient so that it won't crack under temperature changes.

## Acids Cause Most Engine Wear

Acids—not friction as is generally assumed—are the major cause of automobile engine wear, according to research scientists of the Shell Oil Company. The acids are caused by low operating temperatures on short trips (to the grocery store, office or bank) when the engine is run for a brief period of time. Tests show that a "cold" running engine results in incomplete combustion with partially burned fuel gases and moisture left to attack the smoothly polished metal.

## Tiny Insects Spread Elm Disease

Many western elm trees are victims of a disease carried from tree to tree by small insects known as leaf-hoppers, research workers at the Department of Agriculture have discovered. The tiny insect responsible for the transmission of the disease is called *Scaphoideus luteolus* by the scientists. The western disease is quite different from the more familiar tree malady known as Dutch elm disease which is common east of Ohio. The department is now seeking an insecticide that will protect elms from this disease.



**MENDS**  
BROKEN CHINA, TOYS, ETC.

It's transparent,  
waterproof,  
flexible and  
durable.

**DU PONT**  
REG. U. S. PAT. OFF.

**DU CO CEMENT**  
REG. U. S. PAT. OFF.

**Learn RADIO-TELEVISION  
In Your Own HOME WORKSHOP**

Build interesting Radio Circuits, acquire real experience, do scores of practical experiments—all through RTA's complete balanced training plus 10 BIG KITS of parts which RTA GIVES YOU! Get finest instruction direct from Hollywood, nerve-center of broadcasting, television and radio activities.

**FREE BOOK**  
Send postal for complete details plus **FREE BOOK** "How to Make Good in Radio-Television."

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**MAKE MONEY MAKING DOUGHNUTS**

Make new greaseless doughnuts at home on electric machine. Sell for cash to grocers, cafes, drug stores, etc. No exp. nec. Good profits. Small investment. Send for free recipes and plans.

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**MAKE YOUR OWN!**  
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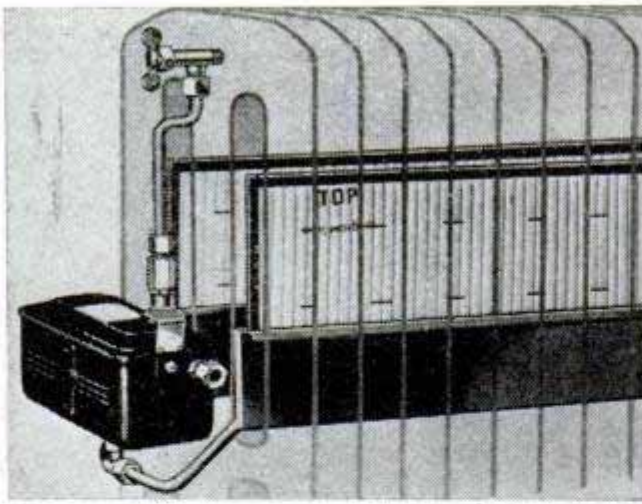
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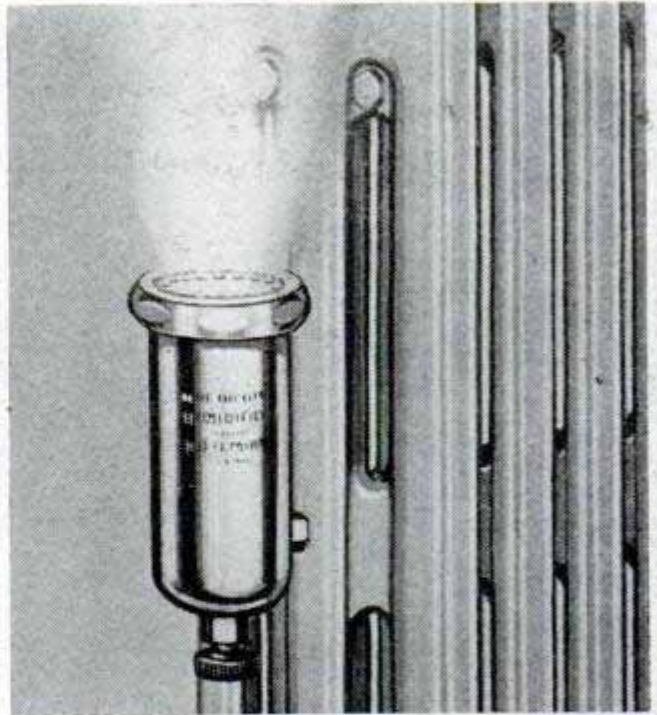
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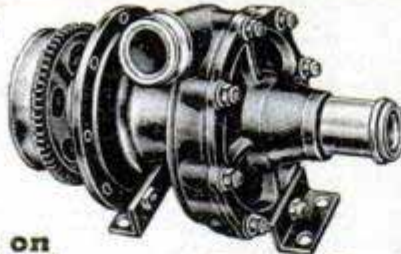
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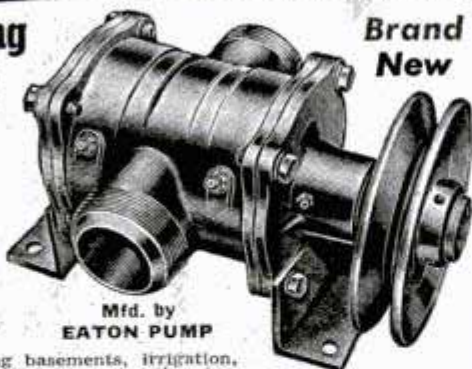


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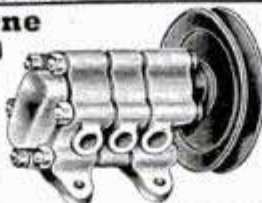
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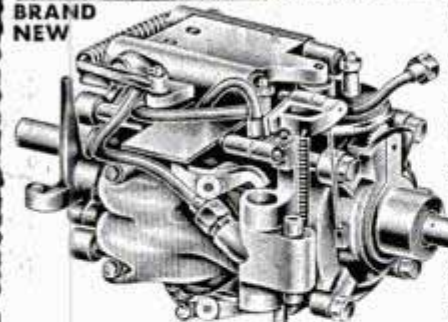
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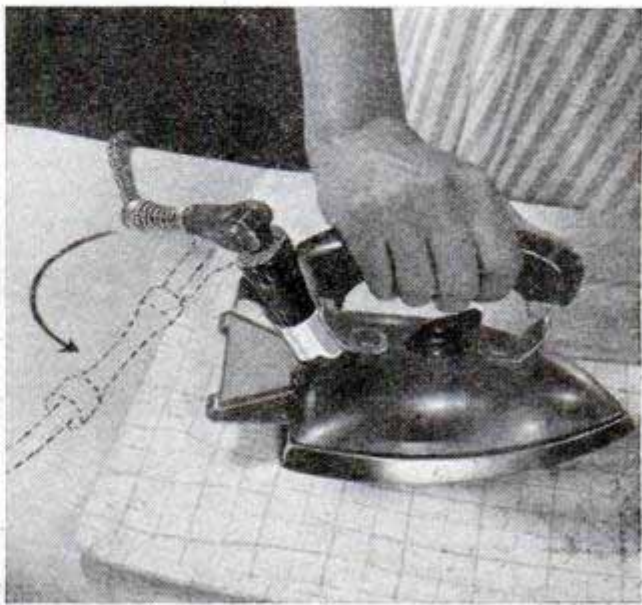
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**FRED:** That so? What kind of hammers were they? What brand, I mean.

**BILL:** Gosh, I don't know. Guess they didn't *have* any brand names. But they were good bargains.

**FRED:** That's where the trouble is, Bill. Look . . . see the name on this hammer? Whenever you see that brand name, you

*know* it's a good hammer. Stick to the well-known, advertised brands when you buy tools, and in the long run you'll save a lot of money.

**BILL:** That makes sense, Fred. I'll remember it.

**FRED:** And do your buying at the hardware store, where they don't try to sell you anything but quality tools. That way you'll always get your money's worth.

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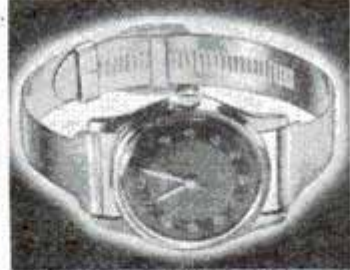
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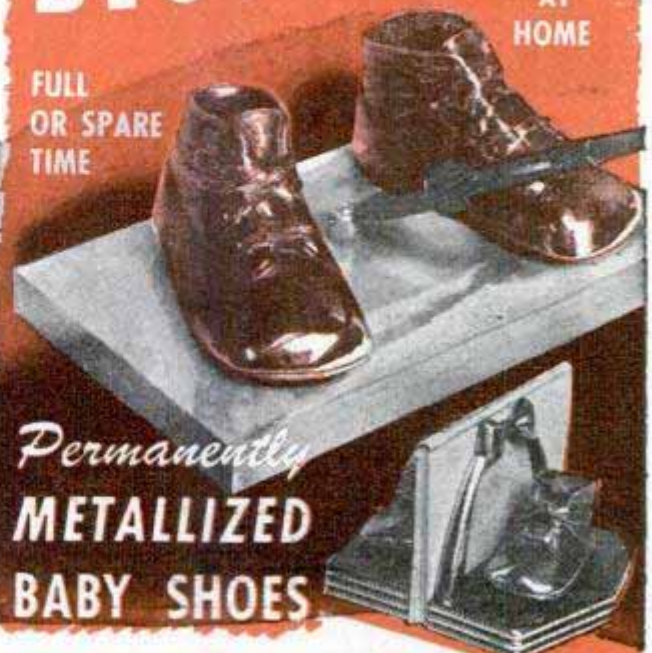
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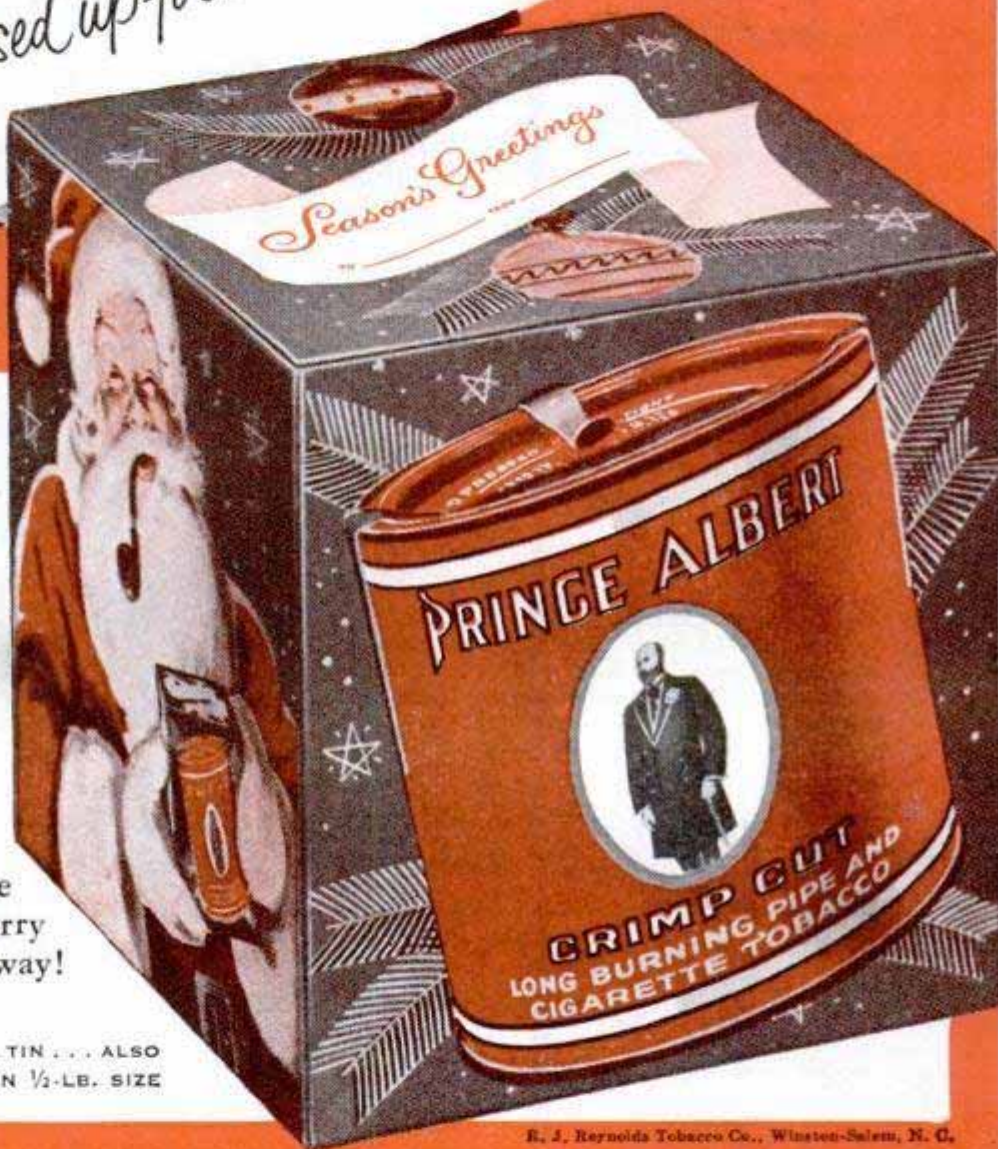


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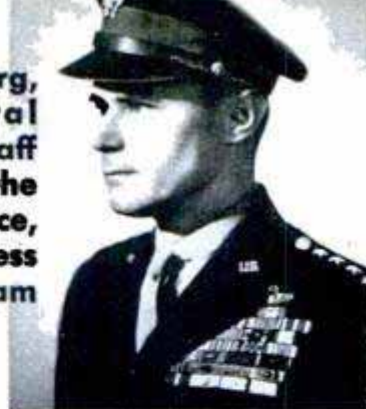
THE NATIONAL JOY SMOKE



# POPULAR DECEMBER 1948 MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 90 NO. 6

Hoyt S. Vandenberg, four-star General and Chief of Staff who is shaping the 70-Group Air Force, presents a progress report on his team



## *Our 70-Group Air Force Emerges*

**By Gen. Hoyt S. Vandenberg  
Chief of Staff, United States Air Force**

**A**IR SECURITY is synonymous with survival. No nation can hope to survive in modern war unless it is capable of defending itself from enemy air attacks and eventually commanding the enemy's airspace. The National Security Act of 1947, charging the United States Air Force with the responsibility for sustained defensive and offensive air operations, made it accountable for these missions.

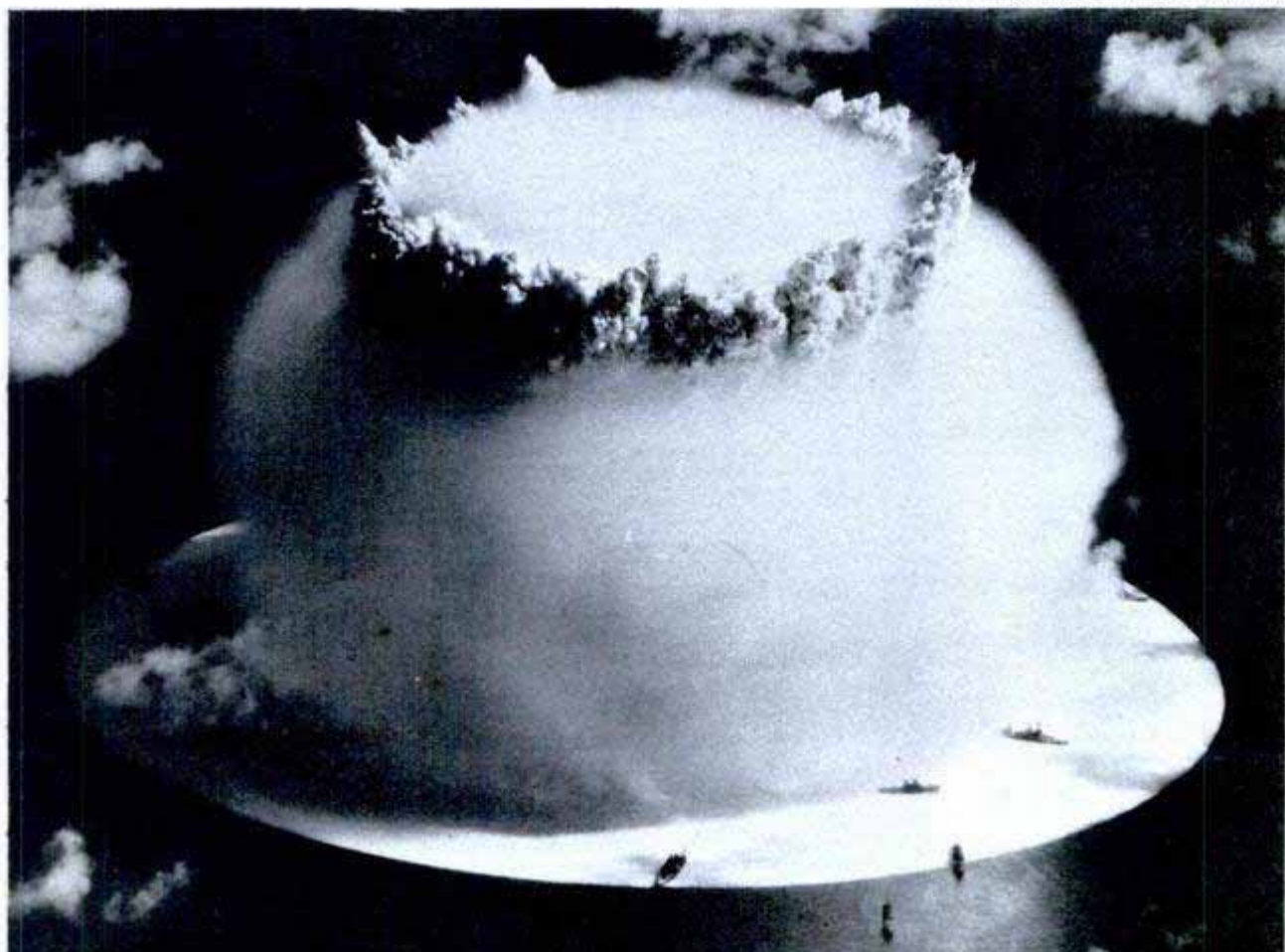
The expanded capabilities of aircraft in speed, range and bomb-carrying capacity, and the state of world affairs since V-J Day make the status of our Air Force and its immediate plans for the future of ut-

most importance to the citizens of the United States and the other democracies of the world.

The Air Force has not yet attained the minimum strength we consider necessary to provide air security for the United States, although substantial progress has been made toward that goal. That minimum is a 70-group *air-force-in-being*, fully manned and equipped with the best aircraft and weapons in the world. It is to be augmented by 22 specialized squadrons and supported by the necessary civilian components, such as, Air National Guard, Air Reserve and Air Reserve Officers Training Corps, and industrial organizations in a state of ready expansion.

A 70-group air force is not a large air

**Grim reminder of war's new-found destructiveness, the underwater atomic bomb explodes in test at Bikini**  
Joint Army-Navy Task Force One photo







U. S. Air Force photo

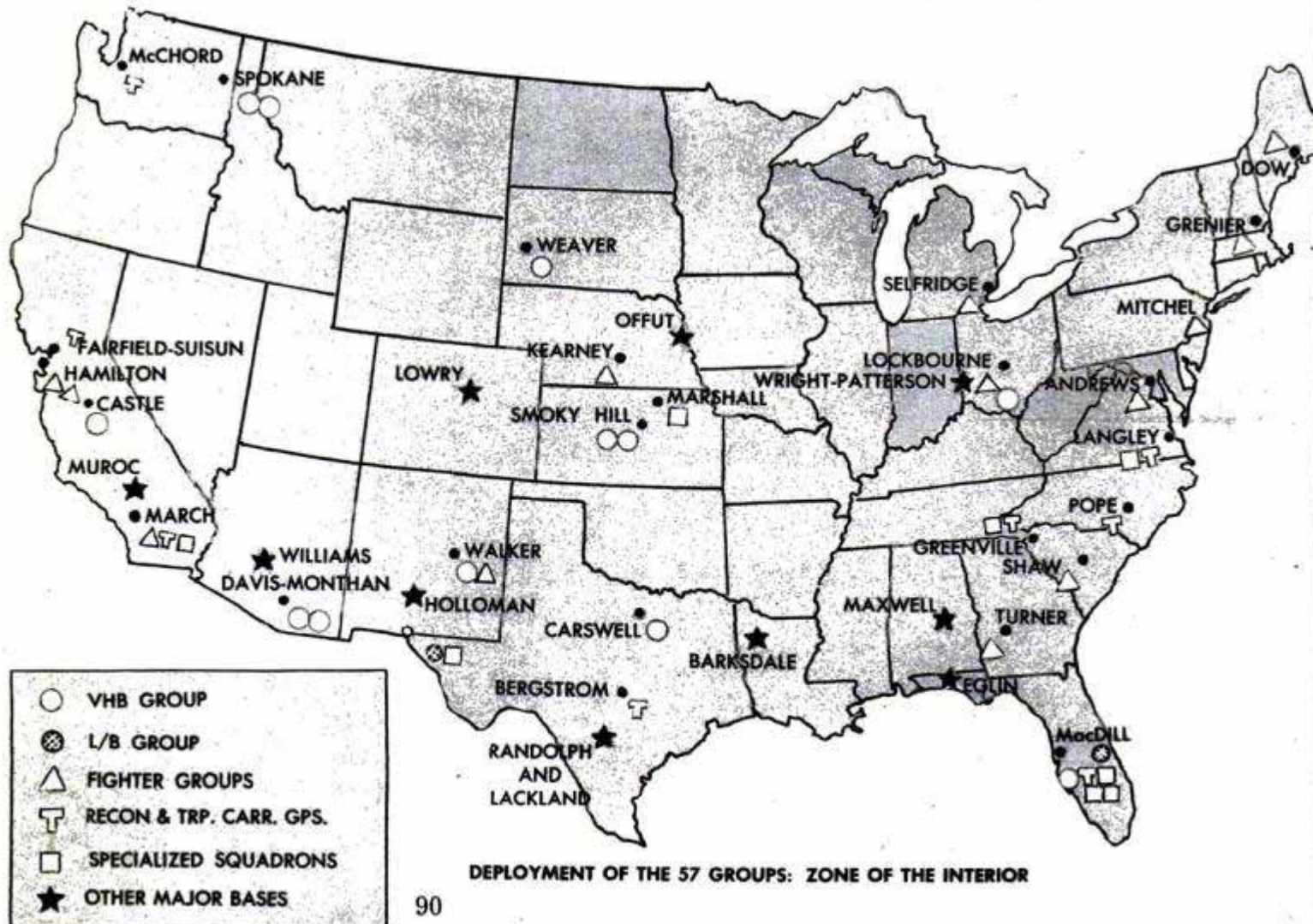
Problems of swept-wing, semi-tailless planes at extremely high speeds will be researched in the Northrop X-4. This tiny plane, powered by gas-turbine engines, can stay aloft much longer than a rocket-powered craft

force. The answer to its effectiveness lies in its composition and its readiness. If the United States had 350 groups manned by a proportionate number of men but equipped with inferior aircraft and weapons, it would neither give security nor be a force for peace. The security that lies in

the 70-group air force is in its quality—not quantity. There is no such thing in the present air age as gaining security through the mere mass of equipment and personnel. Military quality is as significant as military quantity.

An *air-force-in-being* is a total air or-

Most of the large wartime Air Force bases have been retained for combat groups, training or research work







U. S. Air Force photo

Beadlike trail behind the Bell X-1 is caused by exhaust bursts from liquid fuel in rocket engines. This plane, on Oct. 14, 1947, was first to exceed speed of sound

ganization, all the units of which, both tactical and supporting, are formed and ready to function effectively on a moment's notice.

In order to comprehend fully the Air Force program, certain terms must be understood. A *group* is the smallest tactical air organization employed as a self-contained unit; it is the combat force of a parent organization known as the Base Wing. The wing is mobile, self-supporting and able to operate in the field or at an established station.

Groups vary in numbers of aircraft and men. A typical medium bombardment group consists of three squadrons—four in wartime—of 10 aircraft each, or a total of 30 aircraft during peacetime and 1850 officers and airmen. The personnel is supplemented, when operating in the United States during peace, by additional personnel at its base which brings a group's total military and civilian strength to between 2500 and 3000 persons.

Fighter groups normally employ 75 aircraft, but when operating in the United States during peacetime, their total personnel requirement is between 1700 and 2000—two thirds that of a bombardment group. Other types of Air Force groups, such as troop-carrier and light bombardment, usually have 48 aircraft per group.

Specialized squadrons are tactical units about one third the size of a normal group. They are equipped and trained for certain specific tasks, such as reconnaissance, liaison and rescue. They are based with and use the ground facilities of one or more groups.

The Air Force now consists of 58 combat groups and 17 specialized squadrons, all operational. We have a heavy bomb group and 14 medium bomb groups, 3 light bomb groups, 8 troop-carrier groups,

## MAKEUP OF TYPICAL COMBAT GROUPS



Heavy Bomber: B-36  
18 planes



Medium Bomber: B-50  
30 planes



Light Bomber: B-45  
48 planes



Day Fighter: P-86  
75 planes



Medium Troop Carrier: C-119  
48 planes

### The 70-group air force will consist of:

2 heavy bomb groups.....	36 planes (B-36s, etc.)
18 medium bomb groups.....approx.	540 planes (B-50s, etc.)
5 light bomb groups.....approx.	240 planes (B-45s, etc.)
25 fighter groups.....approx.	1875 planes (F-86s, 84s, 80s, etc.)
10 troop-carrier groups.....approx.	480 planes (C-119s, etc.)
6 strategic reconnaissance groups.....approx.	200 planes (C-45s, B-17s, etc.)
4 tactical reconnaissance groups.....approx.	200 planes (A-26s, F-80s, 51s etc.)
22 specialized squadrons.....	? planes (mixed, probably about 1/3 size of average group)





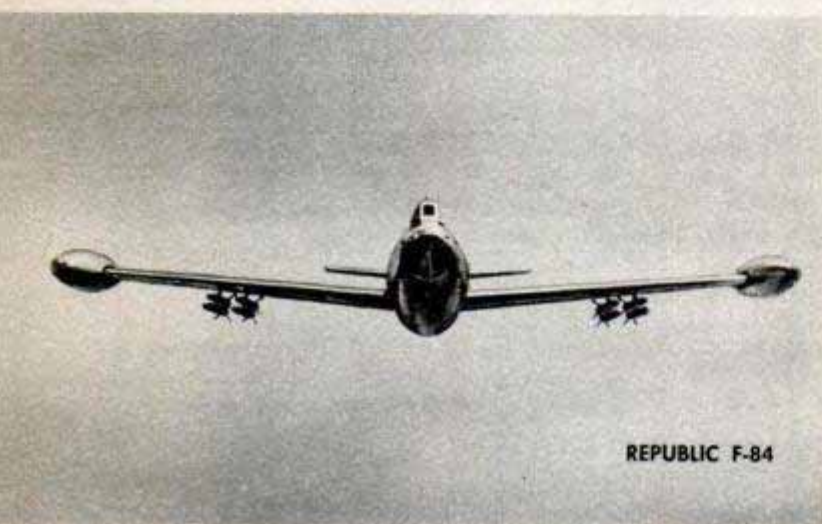
NORTH AMERICAN F-86

4 tactical reconnaissance groups, 3 strategic reconnaissance groups, 3 all-weather fighter groups, and 22 fighter groups.

Last month a program began for equipping at least one new group each month until the 66-group phase is attained, which will be by June 30, 1949. Four other groups, two light bomb groups and two troop-carrier groups, plus five additional specialized squadrons will be activated during 1950.

By June 30, 1949, we will receive approximately 1400 aircraft of the latest types to equip these new groups. Orders have been placed for over 2000 more, with deliveries to begin in 1950 and be completed in 1951.

When the 70-group air force is fully constituted, it will consist of 2 heavy and 18 medium bomb groups, 5 light bomb groups, 25 fighter groups (of which 3 will be all-weather), 4 tactical reconnaissance groups, 6 long-range or strategic reconnaissance groups (which will include 2 weather, 3 photographic and 1 mapping group), 10 troop-carrier groups, and 22 specialized squadrons—the total manned and supported by 502,000 men.



REPUBLIC F-84

**HEAVY BOMBERS**

Heavy bombers are designed to strike deep into enemy territory and to carry a sufficient bomb tonnage to damage their targets decisively. The Air Force now requires that these aircraft have a combat radius of over 2500 miles.

As an example of how size and speed requirements have changed since World War II began, we can compare our heaviest bomber then—the B-17, with a design gross weight of 44,560 pounds—with our present heavies, which have a design gross weight as high as 278,000 pounds. The largest—the Consolidated-Vultee B-36—is more than six times the weight of the once-formidable Flying Fortress.

The B-36, the only type of heavy bomber we have in production, is the largest and longest-range bomber yet built. This plane, of which 94 have been ordered, is capable of carrying 10,000 pounds of bombs 10,000 miles, or 72,000 pounds a shorter distance. Because of its size and resultant engineering and production problems, the plane required 6½ years for design and development. One group is already equipped with B-36s.

Another heavy bomber, the Northrop B-35 Flying Wing, is in the service-testing stage. It will fly in excess of 350 miles per hour and have the approximate range and bomb capacity of the B-36.

The Strategic Air Command will be partially equipped with what we now term medium bombers. One of these is the World War II B-29. The Air Force has 2600



NORTHROP XF-89



LOCKHEED F-80



of these planes, with 400 of them now active. No others are being produced, but the Boeing B-50, an improved design of the B-29 with increased range and speed, is now coming off the production line.

The only jet bomber presently in development which may join the heavy bombers is the YB-49, the largest jet plane yet built. It will have a speed greater than 500 miles per hour and will carry over 30,000 pounds of bombs.

In the meantime, we have in the drawing-board stage a six-engine, turbo-prop bomber, the Boeing XB-52, which might possibly join the heavy bombers.

## LIGHT BOMBERS

Light bombers are very fast and designed to cooperate with the surface forces. They will operate as part of the Tactical Air Command, generally at ranges much shorter than those of medium bombers.

The four new types of light bombers under development are jet-propelled—the North American B-45, Consolidated XB-46, Boeing XB-47, and the Martin XB-48. All have speeds of more than 500 miles per hour and a bomb capacity of 10 tons. Orders for B-45s have been placed, but only experimental models of the others have been ordered. The first B-45s are expected to join active units shortly.

The development of jet bombers is a new field and it was not until late in 1946 that the first one was flown. Their present range is limited by the high rate of fuel consumption, but it is adequate for tactical support and their high speed lessens the chance of interception by hostile jet fighters. Before jet aircraft suitable for long-range bombardment missions are developed, their range will have to be increased. Some satisfactory answers to this problem are being found through the refinement of engines and design and in the improvement of operating techniques.

## FIGHTERS

As in light bombardment, the fighter trend is toward jets. We have established military characteristics for four distinct categories of fighter aircraft to perform special missions.

The penetration fighter is designed for operations against aircraft and ground targets deep in enemy territory. It will be similar in function to the P-51s and P-47s of World War II.

The interceptor fighter is a local-defense plane capable of destroying enemy aircraft. It is characterized by a very high rate of climb—requiring but two to three minutes to reach an altitude of 50,000 feet. Its speed is high but its endurance short.

The all-weather fighter, known during



NORTH AMERICAN F-82



CURTISS XF-87




McDONNELL XF-88



McDONNELL XF-85





Eight jet engines, with a combined thrust of 32,000 pounds, power Northrop's Flying Wing YB-49

the war as the night fighter, operates at night or during inclement weather. Automatic gun-laying or aiming equipment, and radio and radar navigational aids will enable it to fight under adverse conditions.

The parasite fighter is a new approach to the problem of defending very long range bombers. It is designed to be carried in one of the bomb bays of heavy bombardment planes and released near the target. It has no landing gear but uses equipment on the mother plane for mid-air take-offs and landings. This type must have a high speed and an endurance of at least an hour.

The Air Force has not yet developed aircraft to fit all these categories, but it has initiated projects for planes which are the potential prototypes of production fighters designed to replace the fighters used in World War II.

Currently the Air Force has two jet fighters in operation, the Lockheed F-80 and the Republic F-84, developed during the war years but not produced for operational use. The F-80, the first American jet to fly the Atlantic, has been with operational units for some time. It has a speed in the 600-mile-per-hour class and can be armed with six .50-caliber machine guns and ten wing rockets.

The F-84 is also in the 600-mile-per-hour class and carries armament similar to the F-80. Some units of the Air Defense Command and the Tactical Air Command have been equipped with F-84s.

The North American F-86, a jet fighter with swept-back wings, has entered production, but none of the first models has as yet joined active units. On September 17, 1948, an F-86, carrying six .50-caliber machine guns, ballast equal to the weight of the ammunition, and oxygen equipment, set a new world's speed record of 670 miles per hour. This is the first time in history that a speed record has been set with a tactically equipped aircraft. It has a range of more than 1000 miles and is equipped with a pressurized cockpit and a pilot-ejection seat.

The Curtiss-Wright F-87 is an all-weather jet fighter in the 600-mile-per-hour class and has a combat radius of more than 1500 miles. All-weather groups are equipped with the North American F-82. A plane of this type, powered by two conventional engines, made the longest flight ever attempted by a fighter, flying from

Hawaii to New York—5000 miles—non-stop. It can be armed with as many as fourteen .50-caliber machine guns and 25 five-inch rockets or with 7200 pounds of bombs. A number of units are equipped with this plane.

The McDonnell F-85 is the first parasite fighter designed. It is still in the experimental stage, but it has made its first flight and pickup. Two were ordered for testing.

Our newest penetration fighter is the McDonnell XF-88, designed to operate either as a fighter-bomber deep in enemy territory or as a bomber escort. Still in the experimental stages, it is undergoing tests at Muroc Air Force Base.

The new Northrop XF-89 is a jet fighter designed for night and all-weather missions. It carries a crew of two, seated in tandem, and is powered by two turbojet engines located beneath the fuselage. The XF-89 has been successfully flown, but it will be extensively tested before quantity production is considered or undertaken.

We are developing three other new fighters also, the Lockheed XF-90, the Republic XF-91, and the Consolidated XF-92.

Strategic reconnaissance groups are now equipped with modified C-45, B-17 and B-29-type planes. B-29s have been converted into flying weather stations to enable the Air Weather Service to cover wider areas and move with heavy-bomber groups on a global basis. Tactical reconnaissance units will be equipped with converted light bombardment and fighter-type planes. The present development of jet aircraft is sufficient to provide excellent tactical reconnaissance equipment for the Tactical Air Command.

## TROOP CARRIERS

The expanding range of air operations has placed a new emphasis on troop-carrier aircraft. It is at times the only means of delivering troops or cargo to an area and it is always the fastest means.

Wartime Douglas C-47s and C-54s are currently in use, but planes with greater capacity and range are in production. The Fairchild C-119, an extensively modified version of the C-82, is in production. This plane will carry a load of 9 tons for 2000 miles, or accommodate 42 fully equipped combat troops and 20 parachute cans of supplies. It can carry heavy equipment

(Continued to page 250)





**CONSOLIDATED-VULTEE'S FOUR-JET XB-46**



**BIGGEST OF ALL, CONSOLIDATED'S B-36**



**BOEING'S FAST XB-47 STRATOJET BOMBER.  
BELOW, THE SPEEDY NORTH AMERICAN B-45**



**BOEING'S B-50, POSTWAR VERSION OF B-29.  
BELOW, GLENN L. MARTIN'S SIX-JET XB-48**





## Inhaler for Powdered Penicillin Is Used Orally or Nasally



Dry, powdered penicillin is inhaled into the upper respiratory tract and lungs by means of an inhaler that can be used for oral or nasal treatments. It consists of a discharge chamber with interchangeable mouth and nose pieces. A sifter cartridge with 100,000 units of finely powdered penicillin G sodium is inserted in the inhaler. By inhaling and exhaling, the powder is spread into the respiratory passages.

## Forced Jellied Gas Splits Open Oil-Bearing Rocks

Jellied gasoline, used in flame throwers during the war, is now cracking rock thousands of feet underground to permit oil to flow to wellholes where it is pumped to the surface. The jellied gasoline combined with sand looks like a thick mush. It is pumped into the well under high pressure and spreads through underground

rock formations, causing the rock to split open. Sand suspended in the jelly prevents the cracks from closing again. A liquid chemical then is pumped into the well; this breaks the jelly into a liquid, and the gasoline flows out with the oil. Through the new technique, many abandoned wells may be put into operation again.

## Pulse-Jet Engines on Tips of Rotors Power Helicopter

Pulse-jet engines, one on the tip of each rotor wing, power an experimental helicopter that will carry about twice the payload of conventional helicopters. The pulse-jet engine is an explosion type engine having reedlike valves in the air inlet providing power in bursts instead of continuously. Larger payload are made possible

because the jets eliminate a heavy engine. The jet-propelled rotor transmits no torque to the fuselage, eliminating the need for an auxiliary tail rotor. Fuel and ignition are provided to the wing-tip jets through lines inside the rotor blade. The experimental craft weighs 1000 pounds and has a rotor diameter of 29 feet.



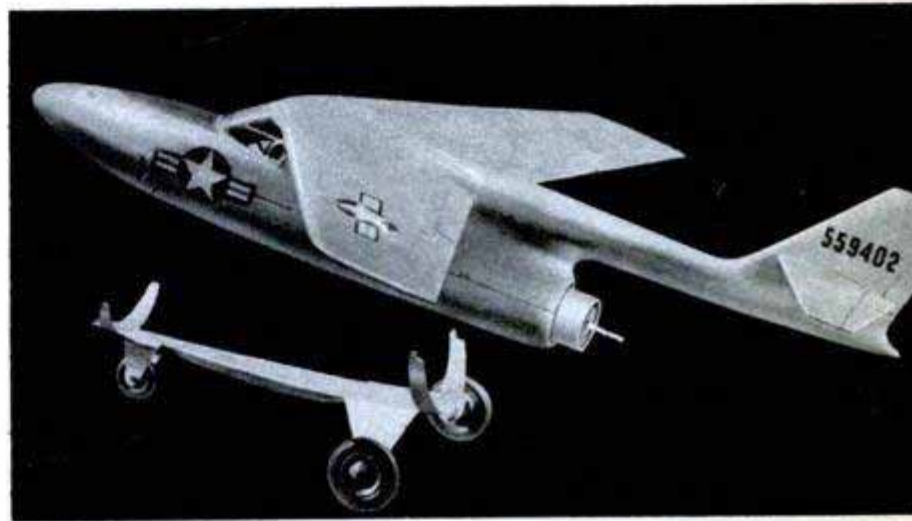


## ROCKET PLANE

Powered by a six-ounce rocket, a model plane built by a Chicago artist drops open its "bomb bay" to expel the rocket after the charge is burned. This lightens the plane and adds distance to its run before it falls in a gentle glide to the ground. The rocket model, designed and built by Roswell Brown, is still in the experimental stage. It was built around the dimensions of a six-ounce rocket which resembles the old-fashioned, tubelike Roman candle. This rocket is suspended by tiny hooks inside the plane with the fuse protruding at the rear. The forward end of the rocket is held by a string to a spring. This string is burned after the charge is spent and the spring kicks the rocket back about one eighth of an inch to free it from the hooks. The rocket then falls against the "bomb bay" doors which open at a slight touch to expel the rocket. The plane is launched from a six-foot ramp with guide rails for the three-wheel dolly which drops away as the plane soars into the air. Brown's aerodynamic problem was to design a model that would hold its course under extreme acceleration and still be a good glider.



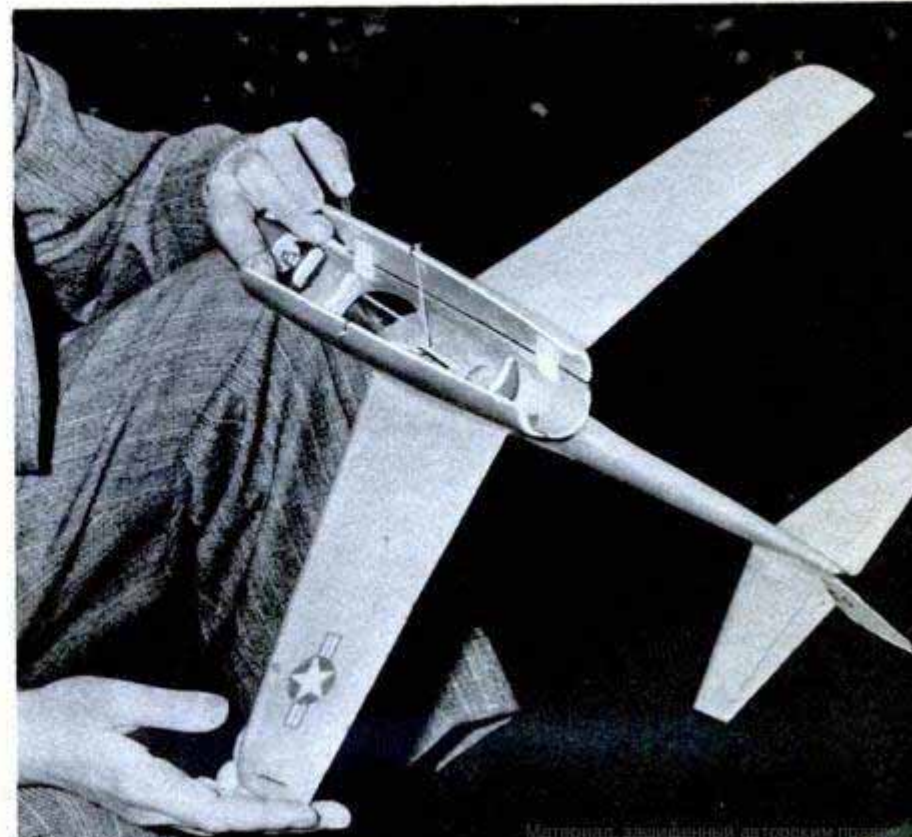
Designer and builder, Roswell Brown, lights fuse of Strato-Rocket model plane built for take-off from a launching ramp



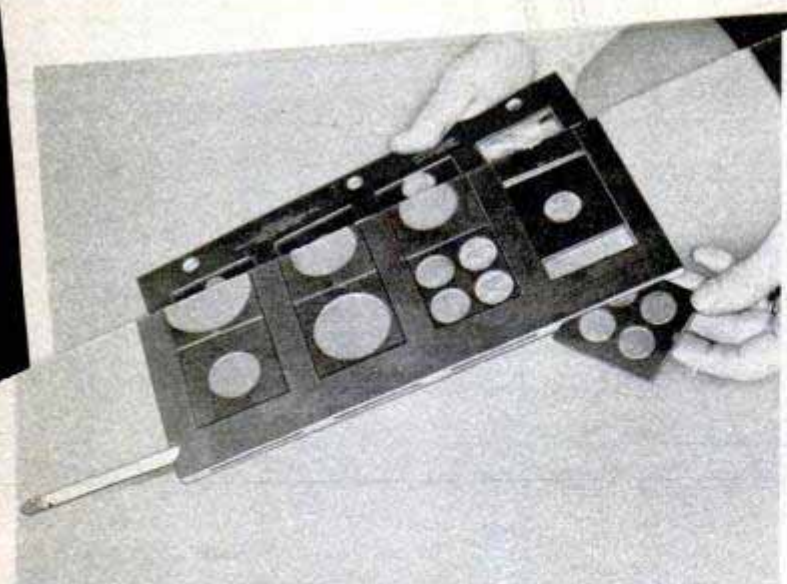
As the Strato-Rocket lifts into the air, its three-wheel dolly falls off and when the rocket is burned out it drops against the "bomb bay" doors which are opened by the weight of the rocket. This adds distance to the Strato-Rocket's glide run



Wendell Kling gives the artist's conception of take-off in this cover painting. The model is awaiting rocket-thrust tests







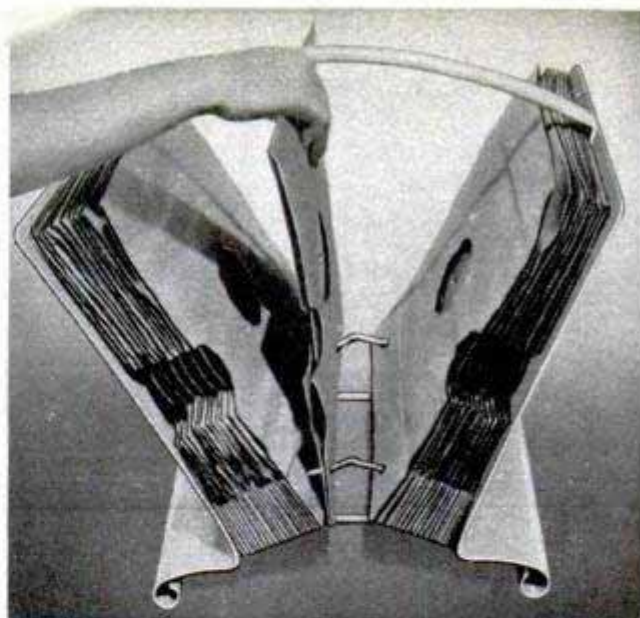
### Loose-Leaf Album for Coins

As many as 48 coins can be displayed on a single page of a coin-collector's album that features interchangeable holders punched to display coins of 55 different sizes. The coins are protected on both sides by clear plastic sheets. The various holders are easily removed for inserting new coins. A locking key that runs the length of the page prevents the inserts from dropping out. Smaller albums are also available.

### Snow-Blower Attachment

Snow is blown off sidewalks and driveways by a revolving attachment for a power mower. As the machine is guided along the sidewalk, the snow is funneled into the mechanism and then ejected through either one of two tubes. The snow falls 15 to 20 feet from the sidewalk. The attachment fits a machine that also can be used for mowing, cultivating, hauling, crop dusting and spraying.

Attached to a power mower, the blower funnels snow into mechanism and throws it 15 to 20 feet away



### Aluminum Cabinet for Records

Individual phonograph records can be found and removed quickly from a new storage album made of aluminum. The album holds the records at an angle, like the open pages of a book, so the titles can be seen easily. As a record title is read, the envelope is moved across a hump in the retaining bar until it rests on the other side of the album. Records are removed from the side of the envelopes, leaving the tops closed to keep out the dust. Similar albums are available for photographs.

### Overdrive for Chevrolet Cars Is an All-Mechanical Unit

Built by an accessory manufacturer, an overdrive is now available for Chevrolet cars. It slows the engine revolutions to 50 miles-per-hour speed when the car is traveling 70 miles-per-hour. Advantages claimed for the overdrive are quietness of operation, longer engine life, and increased oil and gasoline mileage. This overdrive, known as Tip-Toe-Matic, is an automatic all-mechanical unit and is designed for installation on the torque tube. Neither gearbox nor rear axle has to be modified. The overdrive operates in all forward speeds and "free wheeling" is eliminated in all speeds. A hill holder makes it unnecessary to use the foot brake if the car is stopped and started on a hill. For a quick pickup in passing, the accelerator pedal is pushed all the way down to shift the car back to direct drive. Partial depression of the clutch pedal has the same effect but assures return to direct drive when the car is stopped. Accelerator control permits the car to remain in the overdrive range. The automatic control is set by depressing the clutch and pulling out the overdrive knob near steering column.



football game in the Rose Bowl and draws a million and a half spectators.

This winter, the theme of the 60th annual tournament is "Childhood Memories." One float will depict a scene from Alice in Wonderland, another may represent Humpty Dumpty. The tournament is a competition and trophies are awarded for the most beautiful floats. Floats are entered by countries, states, cities, civic and fraternal organizations and by a number of business firms.

Designing and building the floats is almost a year-round task. Sketches are made in the spring, approved by midsummer, and construction starts in early fall. Today, about half the entries are built by firms that specialize in float construction, at prices that range up to \$15,000 for a single float.

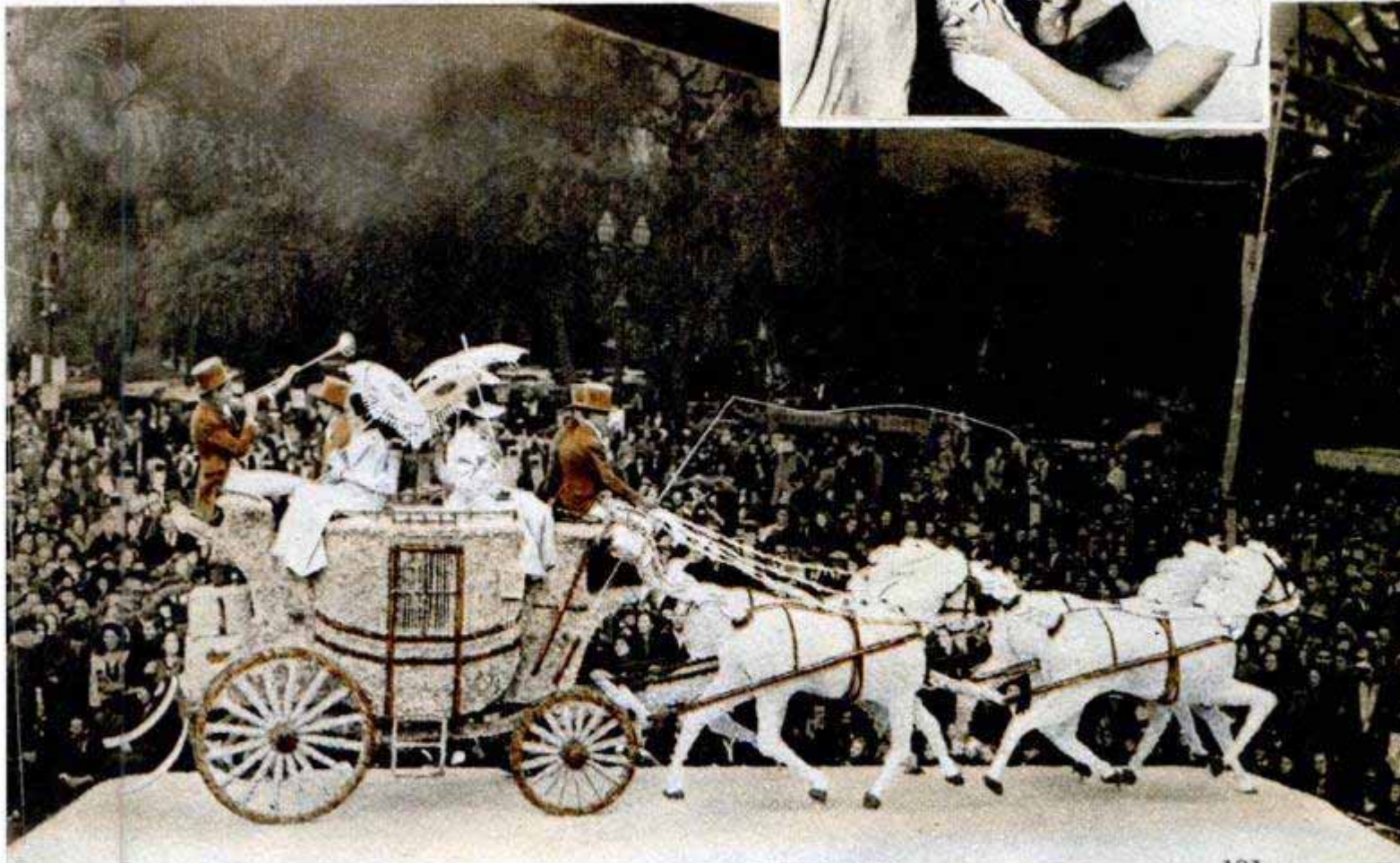
The float builder starts with a bare, stripped-down truck chassis, usually extended to a length of 25 feet. The average float is low in the front, tall in the rear, and because of this shape the truck sometimes is backed up for the entire five



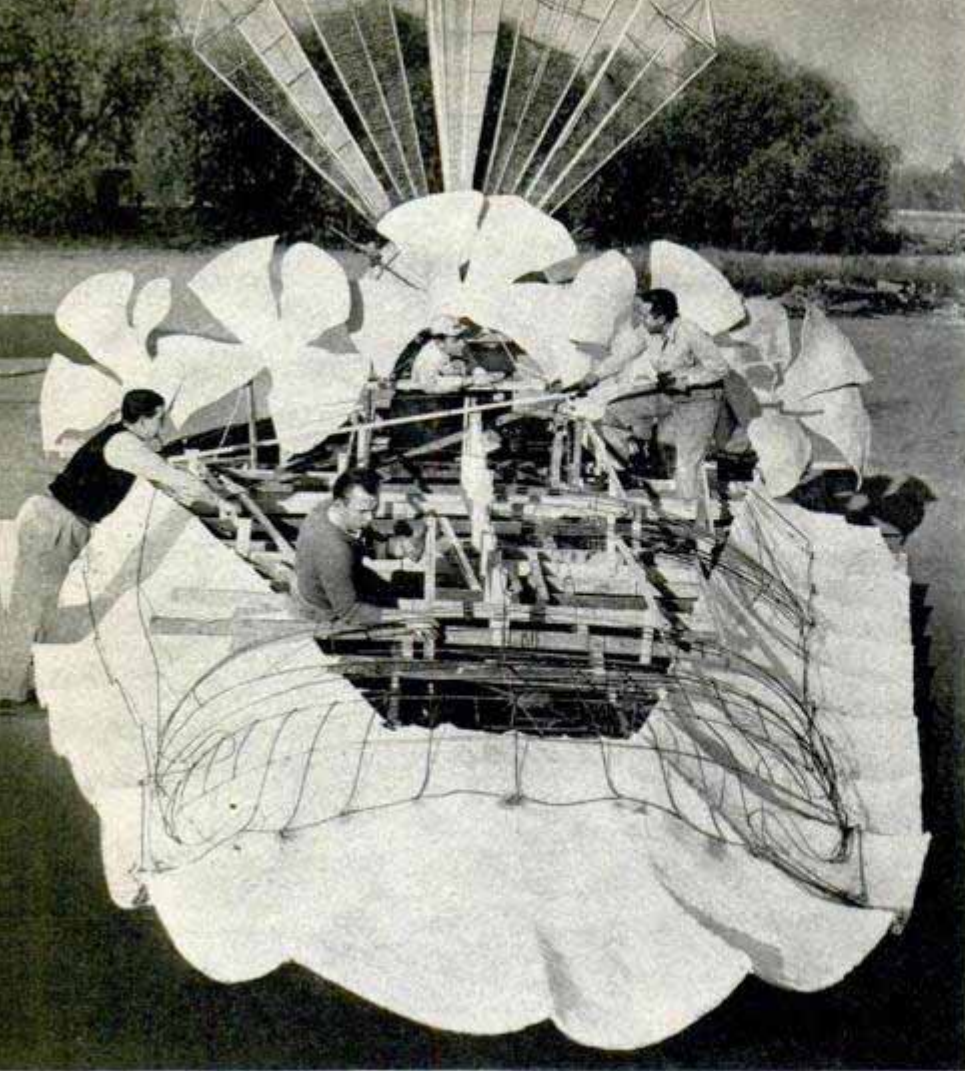
↑ High-school students try flower combinations in selecting blossoms to cover an entry

Chicken wire is → coated with plaster to form horses. Cloth may be used instead of plaster

↓ Completed float won sweepstake prize the year it paraded in Tournament of Roses





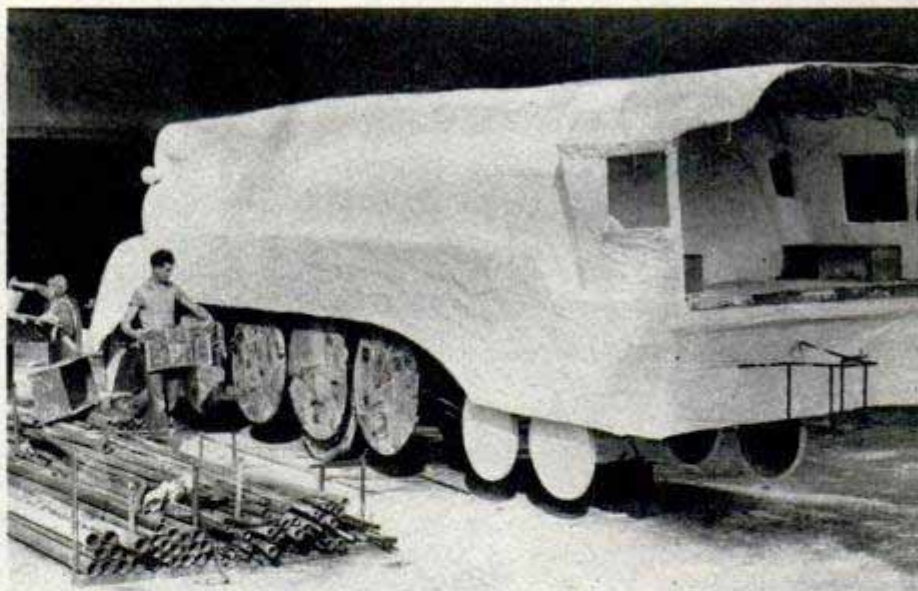


Wooden framework is covered with wire to shape the float. Then chicken wire is attached to the frame and covered with cloth, which is painted in various colors to guide the workers in gluing on the flowers. Every surface is covered with blossoms

miles of the parade. More often, however, the truck chassis is rebuilt with the engine installed at the rear. Two driver's seats are placed behind the engine and the steering rods are extended to the front wheels.

Room for two drivers is necessary because it is hot and uncomfortable under the framework of the float and a driver may faint. Steering is done through a peep-hole in the flowers and, in some cases, with the help of a steersman, concealed under the front of the float, who gives directions to the driver by telephone. The engine, too, will run hot, so it is equipped with an extra-large radiator plus a large-capacity water tank.

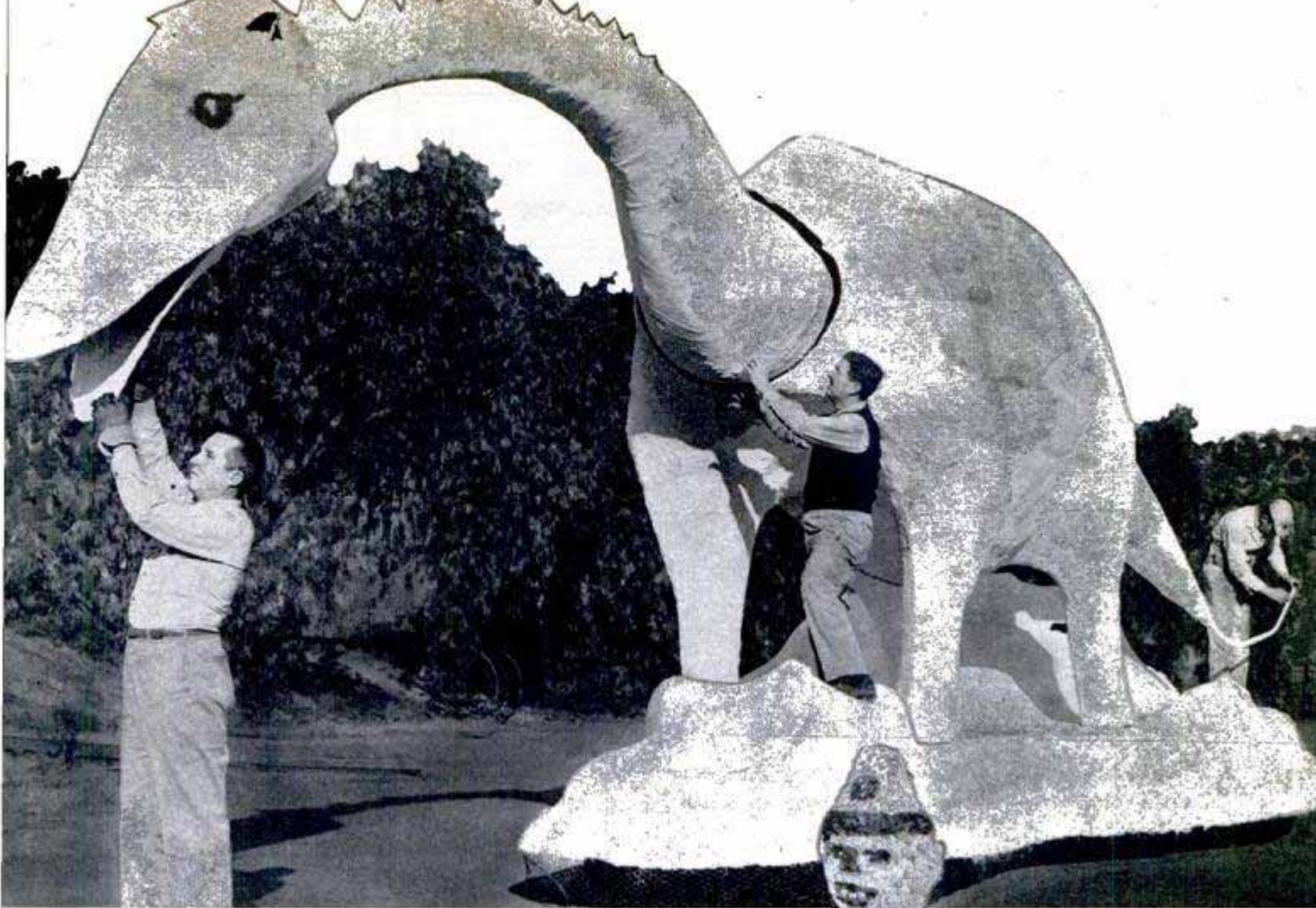
Over the chassis a wooden framework is built, shaped roughly to the dimensions of the finished float. Floats that are to be entered in the Tournament of Roses may be up to 45 feet long, 20 feet wide and 15 feet high. The final shaping is done with heavy steel wire that is attached to the wooden frame. One-inch mesh chicken wire then is stretched and fastened over the entire float, and strong cheesecloth is sewn to the chicken wire. Then the cloth is



↑ Newspapers form papier-mache cover for locomotive float built of wood and wire. Finished product was hit of recent parade

← Truck chassis is lengthened and rebuilt with engine in rear to carry a float in the famed Pasadena New Year's Day parade





doped with calcimine to tighten and stiffen it. Plaster or papier-mache may be used instead of cheesecloth for finishing the shapes.

Decorating the floats begins about 24 hours before the parade, as it is an all-day and all-night task. For a large float 700,000 blossoms may be required.

Eighty percent of the flowers used to decorate the floats are chrysanthemums because they keep well. Marigolds, calendulas, stocks, delphinium and roses also are used, as well as pansies, bird of paradise, orchids and gardenias. Special acreages of the varieties that are desired are contracted for by wholesale florists, and the flower crops are timed to bloom a day or two before the parade.

The hardy chrysanthemums are the first

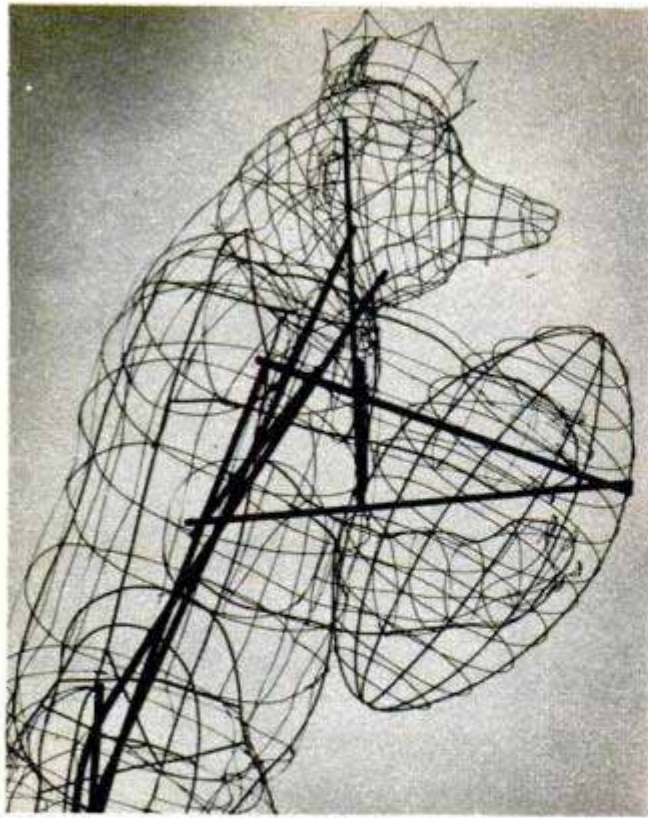
Workers touch up the framework of animated dinosaur. Head and neck moved during the parade

Flowers are stapled to a figure for an elaborate float. No artificial blossoms are permitted

Imitation fountain with trailing lines of flowers forms spectacular float







**Framework of wire forms a bear carrying a football**

flowers to be applied to a float; the most delicate blooms are put in place only an hour or two before the parade begins. Each flower must be fresh; no dyed or dead blooms are permitted. A backing of wet moss is sometimes used so that a delicate variety will retain its freshness all through the parade. Several years ago, one entrant

decided to place 3000 tulips among the other flowers that would be used, and 3000 test tubes, each filled with water, were wired into place on the float. One tulip was placed in each test tube on the morning of the parade and the display was a success.

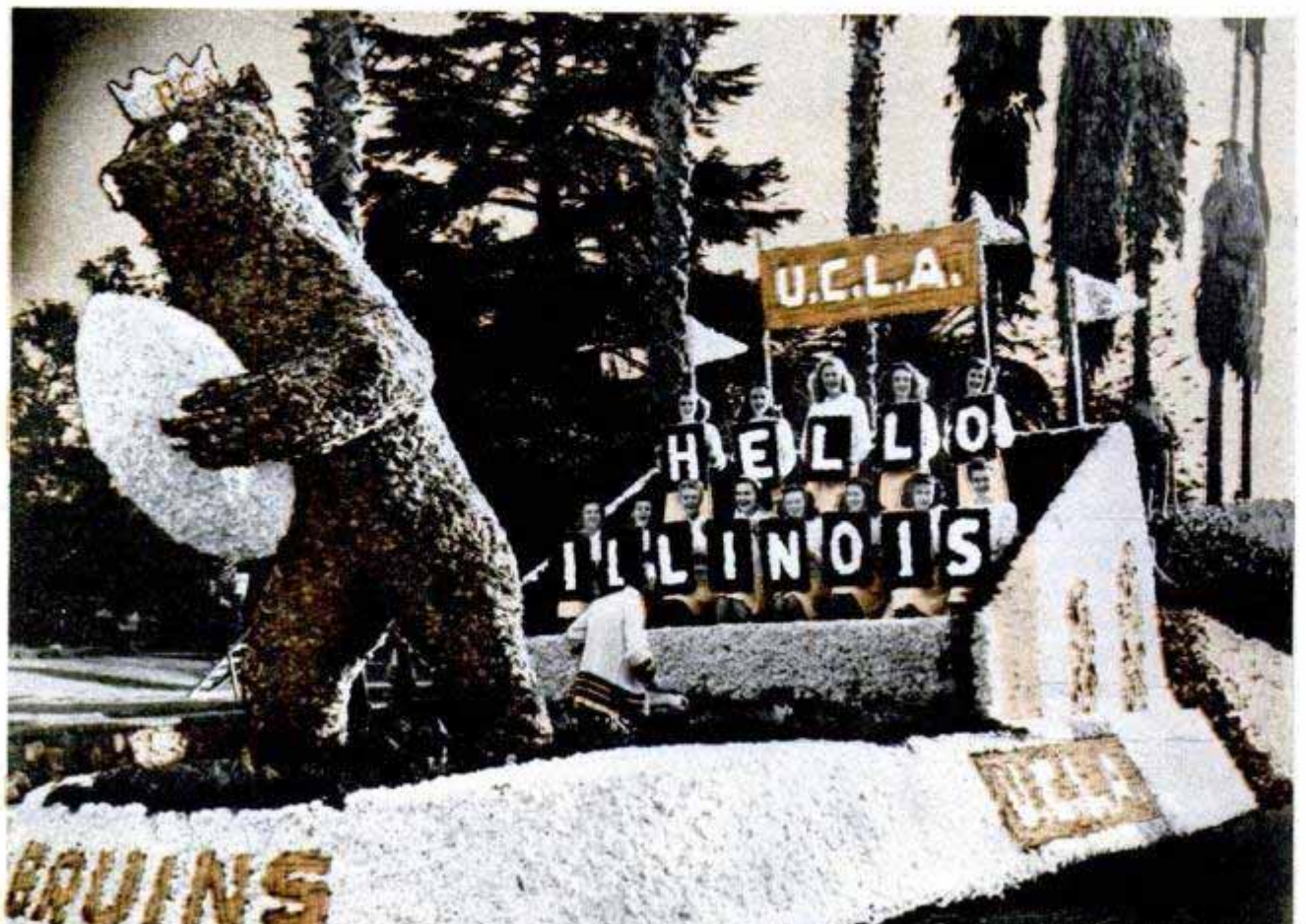
Chrysanthemums and most other flowers ordinarily are glued into place. The flowers are applied by first painting the entire float with rubber glue and then brushing some glue on the back of each flower. Then each flower is pressed into place on the surface.

Float designers have new and ingenious ideas every year and the trend, aside from the streamlined and tailored shapes that have been popular during the past few years, is toward animation. A huge flower-covered dinosaur with moving head and neck, a tandem bicycle with rotating wheels, a train with moving figures, a ferry boat with churning paddle wheels—all these have appeared in recent parades. One innovation that may be completed in time for this winter's spectacle is a float that consists of nine connected units, representing a miniature circus parade. One unit consists of a flower-decorated calliope, another carries a trained-seal act done in flowers. One hundred feet long, the train of floats would snake along from one side of the street to the other.

The tournament-float committee approved the extra length of the circus float but last year, for safety reasons, it turned

(Continued to page 246)

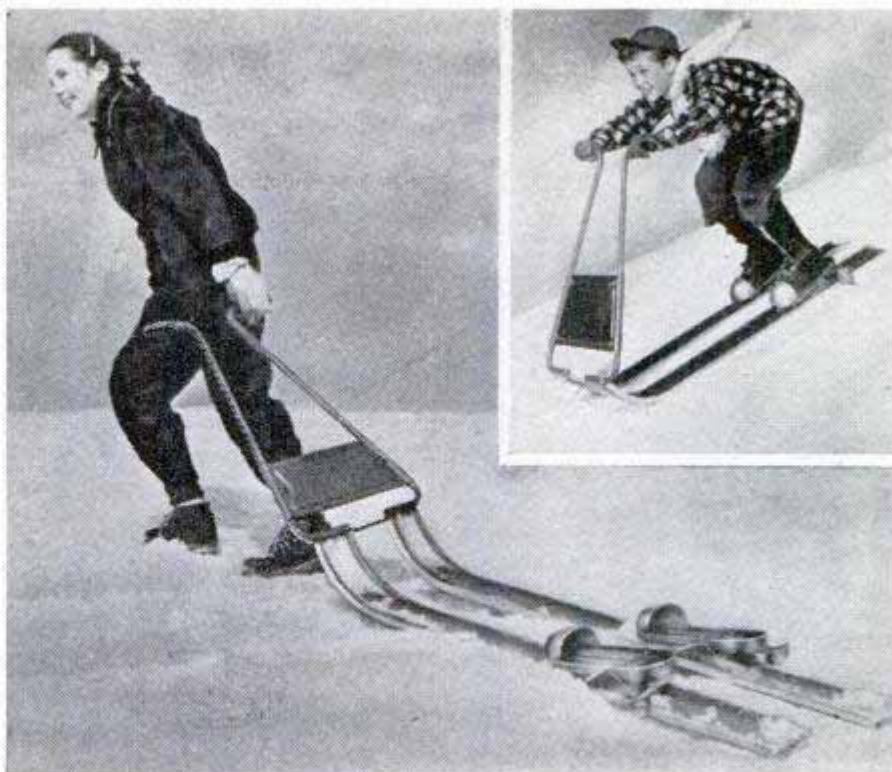
**In the completed float, which was part of the parade in 1947, a flowery King Bruin, representing UCLA, is shown welcoming the University of Illinois team to the afternoon football game in the Rose Bowl**





## Metal Ski-Coaster Has Heel Brake

Combining the thrills of skiing with the safety of coasting, a new winter sport for children uses a pair of metal skis connected by a bicycle grip handle at the front end. No straps are used for the feet. An all-metal footrest has a protective toe guard that adjusts for various foot sizes. A brake, attached to the heel of each footrest, digs into the snow when weight is shifted to the rear of the foot. The brakes are used for steering the skis as well as for stopping. The handle tilts forward for pulling.

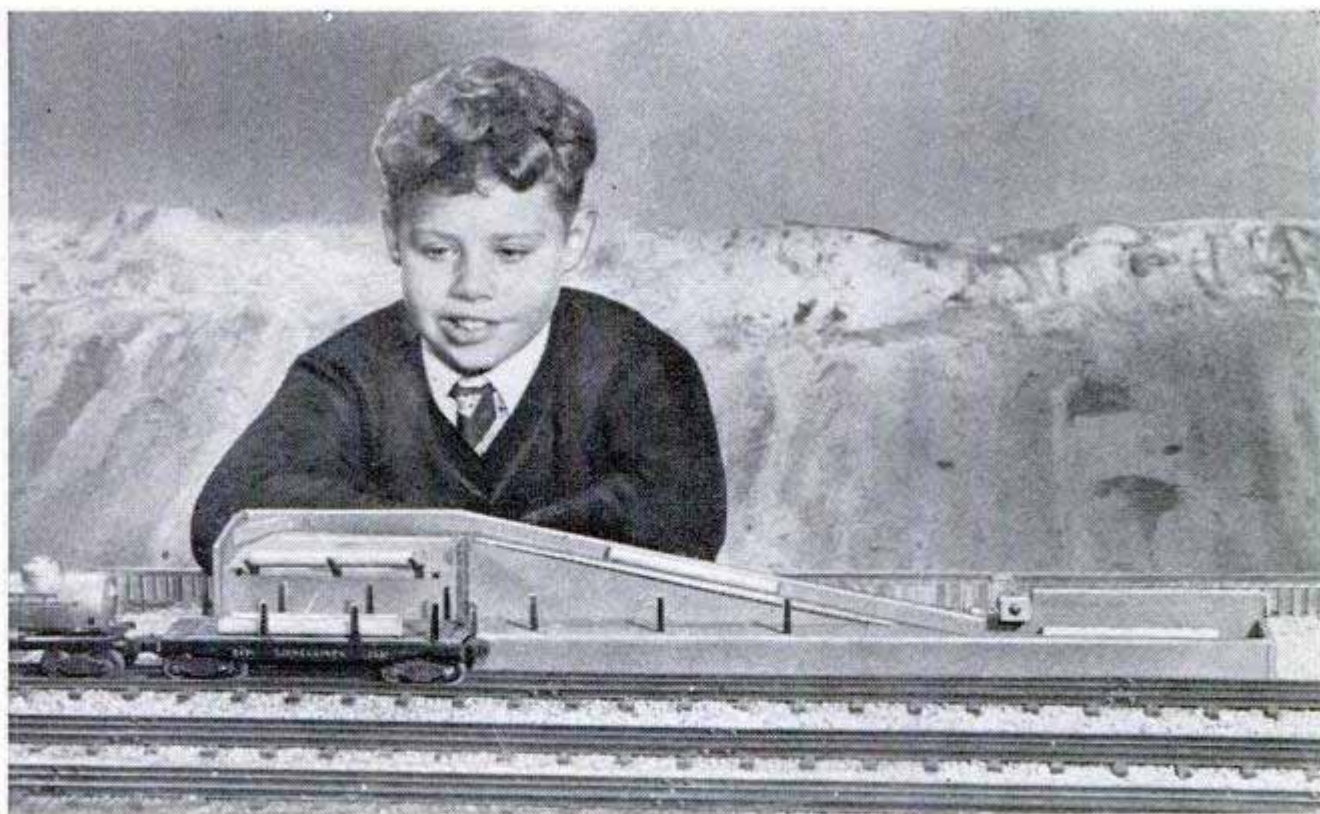


## Almost-Seedless Watermelons

Watermelon seeds, generally regarded as a nuisance, may soon be things of the past. A Japanese scientist has produced an

almost-seedless watermelon at Kyoto Imperial University. The new melons have only a few seeds compared with more than 500 in usual varieties. They also have seed-like sections similar to those in cucumbers.

## Logs Ride Conveyor Belt on Model-Train Loader



Completely automatic, a loader for model trains carries logs up a conveyor belt and rolls them on a flatcar standing on an adjacent track. The cars are automatically unloaded into a storage bin at the base of

the conveyor. The operation is started and stopped by remote control. The unit can be set up alongside one track, eliminating the need for sidings. An illuminated red-green signal lamp is built into the loader.





## Now They're Weaving HOUSES

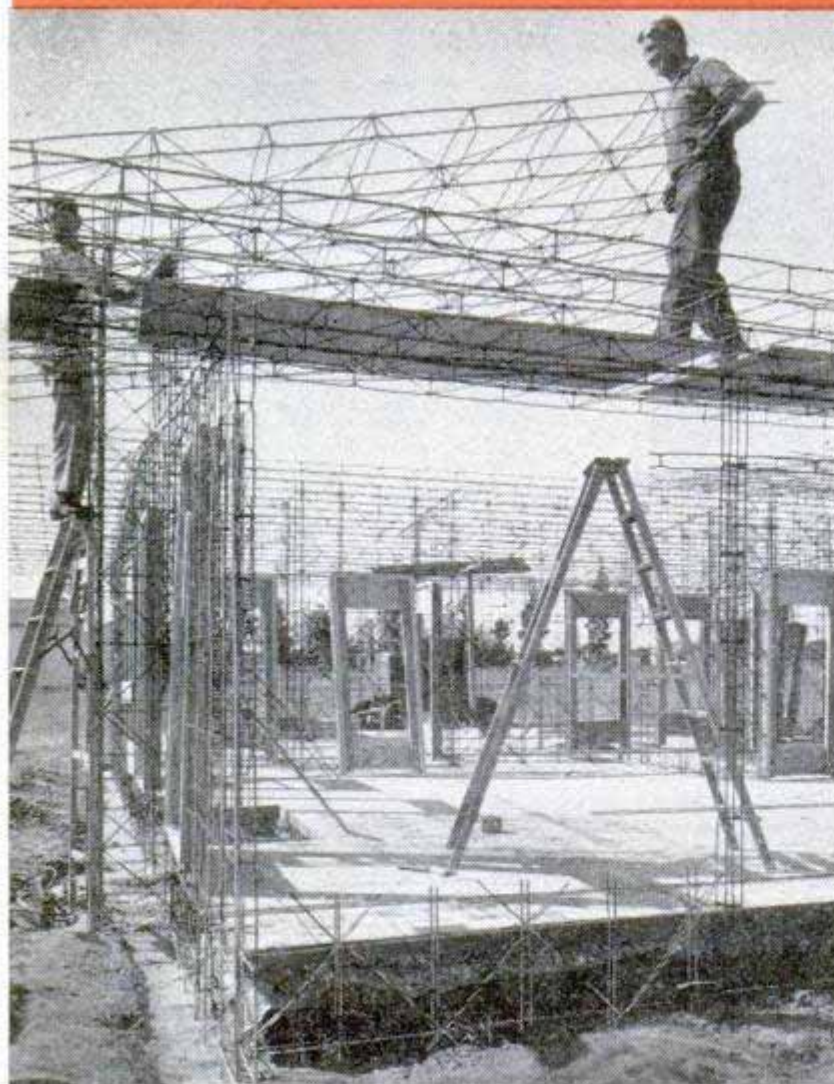
What's happening on a hundred-acre tract in California may set a new style for home builders. The pencil-steel skeletons that frame these houses resemble bedsprings

By Ina Louez Morris

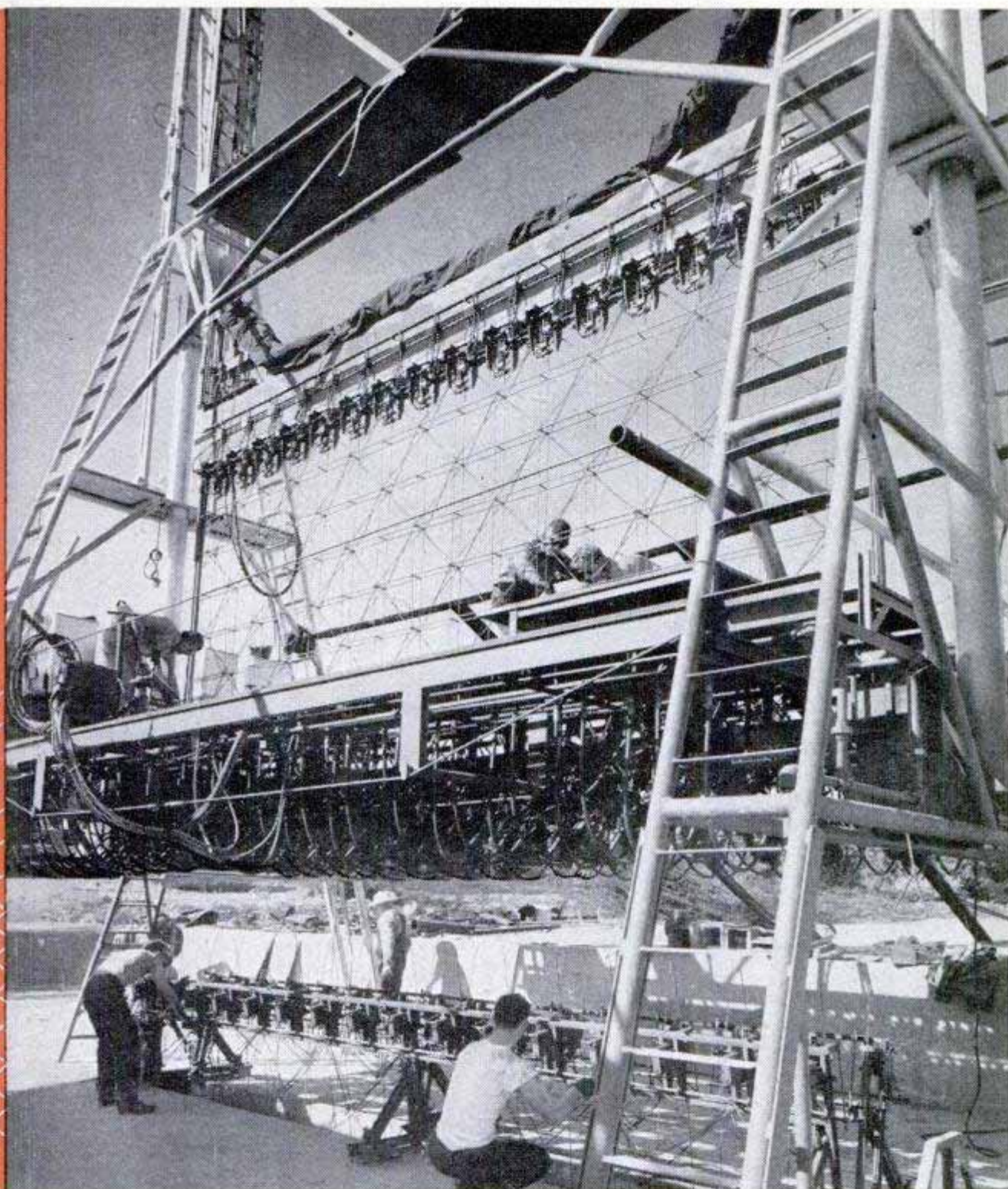
**T**HE steel panel-concrete dwellings being erected on the 100-acre subdivision known as Hughston Meadows, 15 miles east of Los Angeles, offer a new trend in home construction. Easy to construct, proof against rodents, fire, earthquake, dry rot, termites and sound, they cost no more than the conventional wood or stucco structure. Except for possible replacement of plumbing, there is nothing to wear out. Besides, the steel panel-concrete construction has the advantages of the ease in which plumbing, heating units and wiring can be installed and the availability at low cost of the light aggregates or furnace cinders which are used.

Any basic floor plan can be employed; actual building time is said to be half that of conventional construction.

The prototype house is shown at top. Two trained workers (left) set up the woven-steel framework in two days







At bottom of photo, diagonals are being looped over steel frame. Studs will be drawn through diagonals and the whole then lifted by hydraulic power to the platform, where the cross sections are welded together

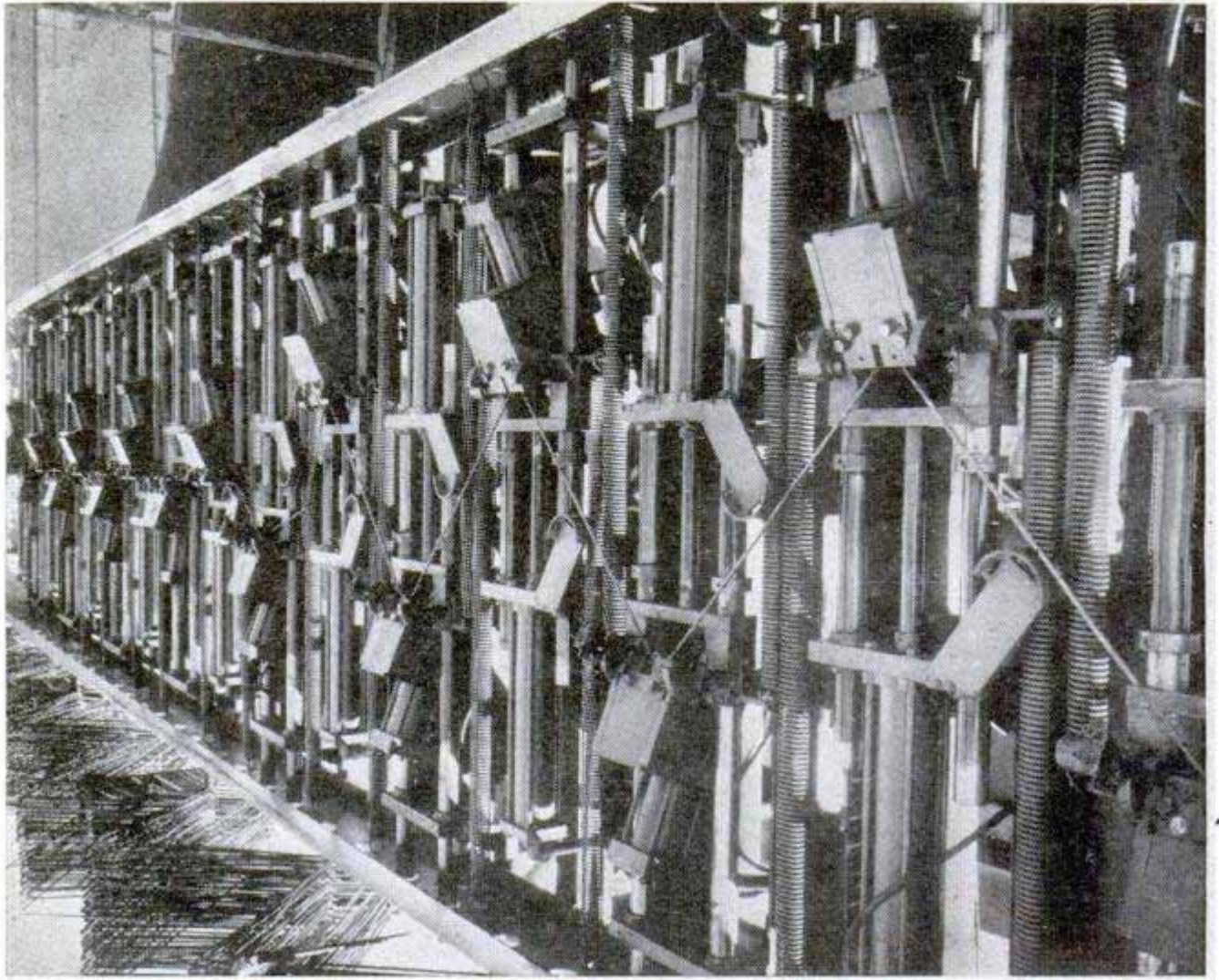
Fabricated, pre-stressed steel panels, manufactured from pencil steel, form the framework. The walls and roof of the first dwelling, shown here, are composed of a mixture of cement and light aggregate, although any lightweight material such as pumice, diatomaceous earth, desert cinders or coal-furnace cinders can be used.

The development evolved from a study of the use of pencil steel as a reinforcing agent. The Hughes brothers knew it had no equal, but how to cut, assemble and make it available to builders ready to set

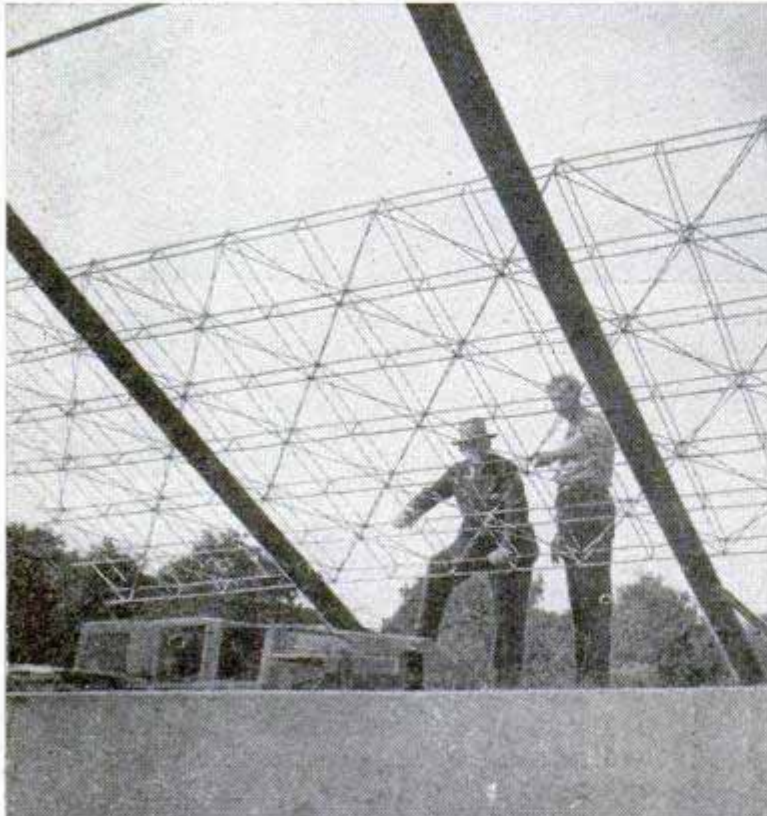
up was the problem. The woven panel was the answer. Engineers were called in, and building of machinery for manufacture of the panels got under way as soon as men could be trained to operate the machines and handle material.

When sufficient panels for an ultramodern six-room house had been completed, erection of the "test" house began. First, the ground was waterproofed. Next came a layer of gravel and installation of sewer, water and radiant-heat water pipes. Over all went a three-inch cement slab.





Rods are being formed on automatic diagonal machine from left to right, above; completed diagonals are shown stacked at left, ready for assembly. Below, the inventors, W. T. and J. N. Hughes, test rigidity of the steel panels sliding off assembling machines



Into a trench, flush with the cement slab, the steel panels were then set, locked together, and 14 inches of cement poured to form the foundation.

Next came laying of the roof, cutting out of doors and windows, and installation of conduits. When door and window frames were mounted, plywood panels, 4x8 feet by  $\frac{3}{4}$  inch thick, were "buttoned" to the inside of the steel panels with a special clamp. Since these plywood panels can be used again, cost of this item is minimized.

After moistening the plywood panels, a Guniting operator "shot" concrete against the panels and over the steel frames to a depth of about two inches, then moved to the adjoining panel.

When the second panel was covered, the first was ready for another coat. Repeated applications followed, until the steel panel was completely covered; the finishing coat, one-eighth inch thick, is hand-applied.

The roof was made in the same manner as the walls, but the pan-

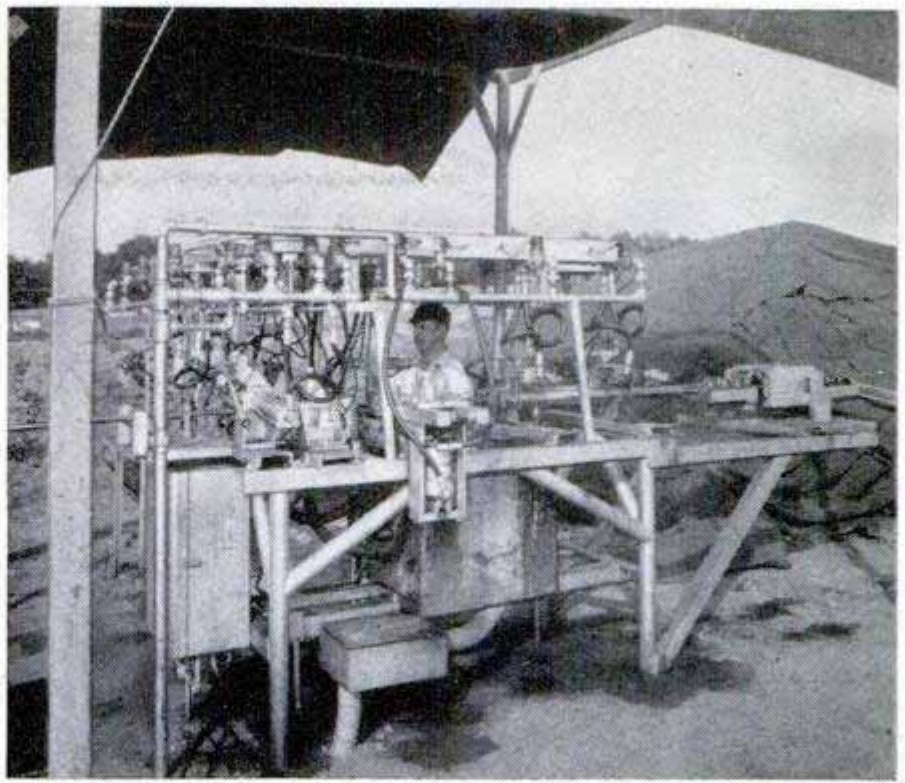


els were six inches thick, walls and partitions five. When the wood panels were removed, the inside walls, except for a light sanding, were ready for decorative finish.

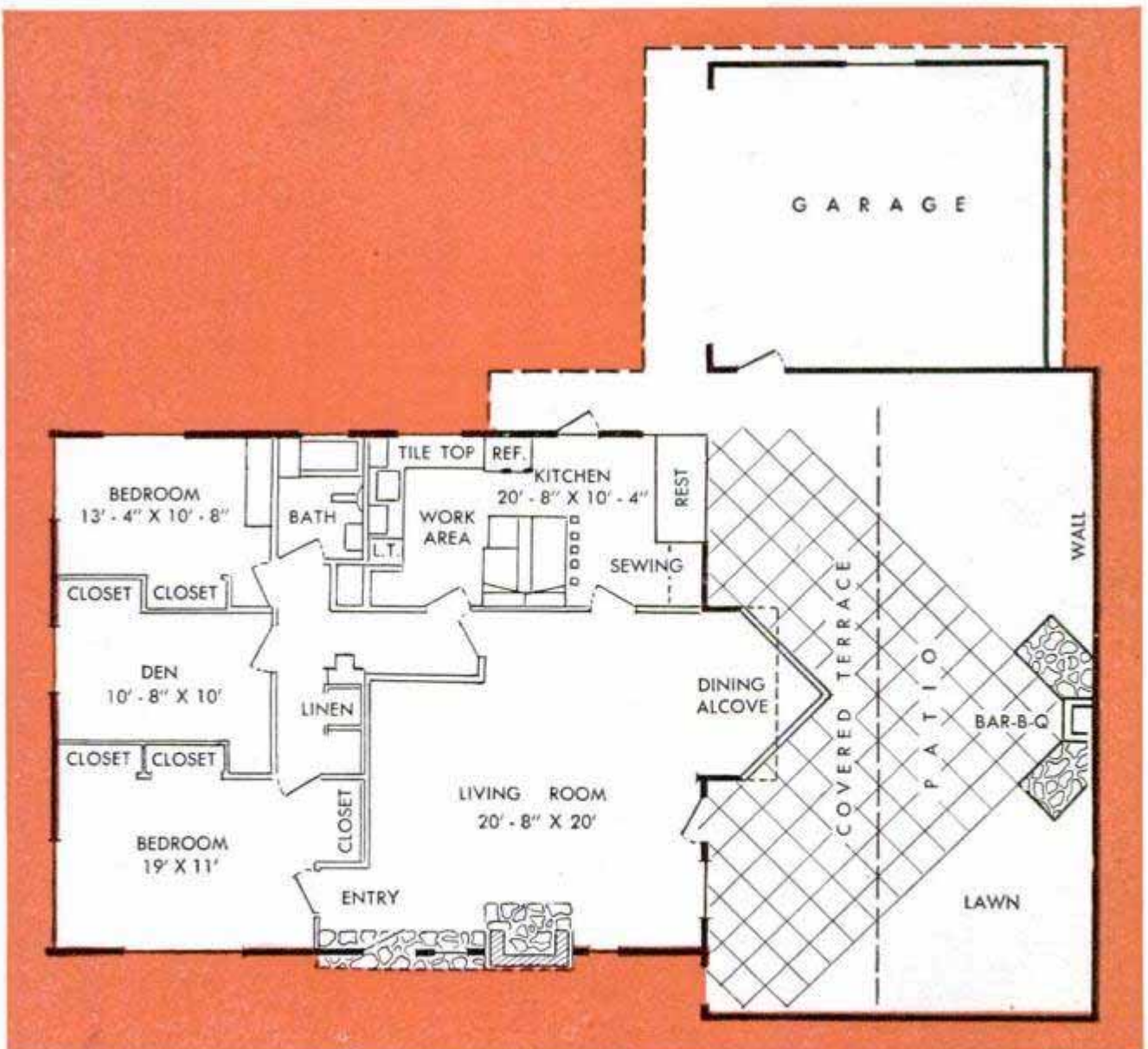
Since all houses in the tract are to be air-conditioned, windows do not open, eliminating screens.

The house illustrated, with floor coverings, draperies, two-car garage and one-third acre lot, sold for \$20,000.

At present, the Steel Building Units Corporation, of which W. T. Hughes is president, is fabricating steel panels only for a few California projects. However, they plan to install plants along the Pacific Coast and throughout the East.



Pencil steel for framework passes from spools through the straightener







# HOLLY HARVEST



Photos by Richard Harrington

Holly growers on Vancouver Island, Canada, dip their crop in a special hormone bath for one minute. They claim it delays leaf and berry drop and makes the holly last much longer. Below, after sorting and drying, the holly is made into wreaths and studded with blobs of red-berried twigs. The trees are long-lived, some in England having lasted 400 years



By Lyn Harrington

**F**FIFTY YEARS ago holly was first offered on the commercial markets of Chicago and New York. Today, it is still the most popular Christmas green, providing an income of over a quarter-million dollars to the state of Delaware, alone.

Of 290 varieties in the holly family, the native American holly, *Ilex opaca*, is claimed to be the finest by residents on the Atlantic coast. But in Oregon, Washington and southern British Columbia, they all root for the shiny, spiny English holly, *Ilex aquifolium*. English holly thrives best where summers are cool, winters mild and the humidity high. Holly trees live to a great age. Some in England have been known to last 400 years.

There's a 12 to 15-year wait for a commercial crop. After all those years of cultivating, pruning, fertilizing and spraying, the grower gets perhaps 10 pounds of berried twigs. In another 10 years, the yield





To insure new crops, only second-year growth is clipped. It is collected in baskets and crated

should be double or triple that amount.

Young trees are set out in deep soil, 70 to 100 per acre, and intercrops may be taken off while they develop. The hollies have few enemies, all of which can be controlled by proper spraying. Dust alighting on damp leaves causes black spots, another source of worry to growers, so five miles per hour is top speed around a holly farm.

Small white flowers appearing in early summer change to green berries which become scarlet early in November. The leaves of most varieties remain green all year 'round. The holly harvest starts about the middle of November and lasts until mid-December. Only second-year growth is clipped, leaving terminal growth so there will be a crop the next year. The cut twigs are dropped gently into basket or sheets, crated and trucked to a packing plant where the sprays are swiftly sorted and the inferior holly is discarded.

All holly may look alike, but growers on Vancouver Island, Canada, figure their holly lasts at least twice as long because of the one-minute hormone bath they provide. It delays leaf and berry drop. The twigs drip dry and are then sorted and conveyed into a supply loft. Boxes and holly clippings are fed down chutes to the packers below who snip off any heavy leafless twigs that remain.

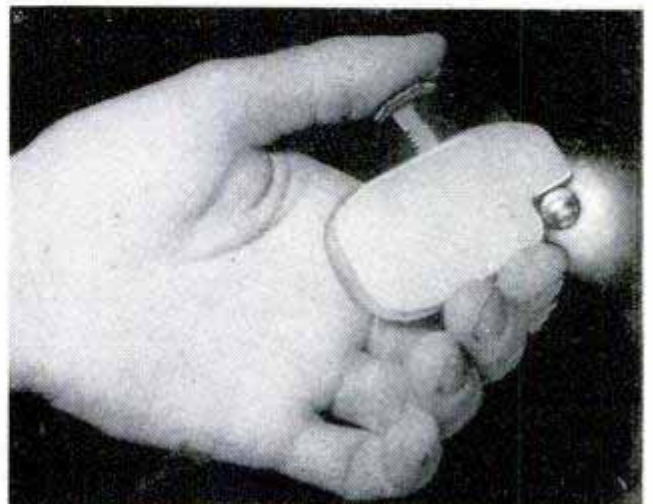
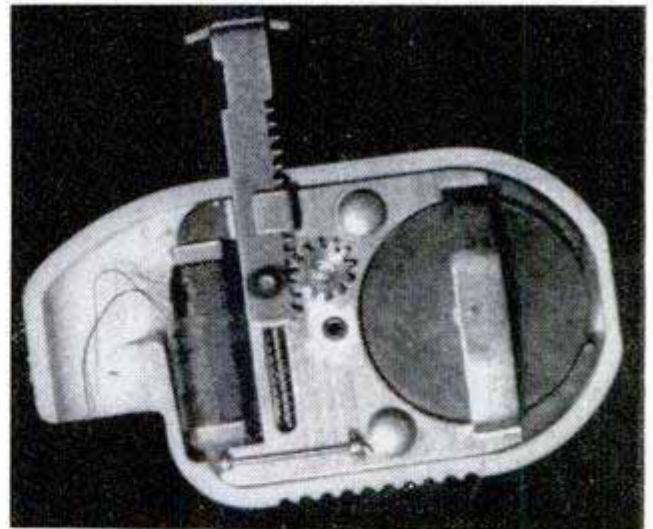
A perennial favorite is the holly wreath, studded with bright blobs of scarlet berries. Pinned and wired to a foundation of moss and cedar, the wreaths are always in great demand during the holidays.

## Photograph Cosmic-Ray Tracks

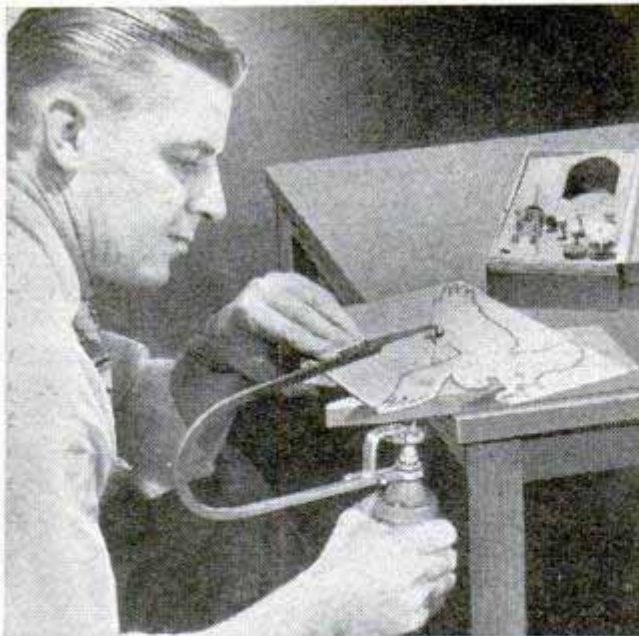
Navy researchers have made the first direct photos of cosmic-ray tracks above the earth's atmosphere. They were taken inside a V-2 rocket that climbed 98 miles at the White Sands, N. Mex., proving grounds. Every 25 seconds after the rocket left the ground, a gas-and-vapor mixture inside a glass cylinder was allowed to expand so quickly that liquid droplets condensed on any ions formed along the path of cosmic-ray particles. Twelve photographs of the droplet-traced tracks were made during the flight. The film cartridge was found six feet below ground at the bomb's impact point, 50 miles from the launching site.

## Batteryless Flashlight Weighs Only 2½ Ounces

Smaller than a pack of cigarettes, a batteryless flashlight is powered by a tiny built-in generator driven by an easy-to-operate plunger. Weighing 2½ ounces, the flashlight can be carried easily in pocket or handbag ready for use at all times. The standard bulb is not shielded, but exposed so that light rays illuminate a wide area when the light is operating.







### Grinder Motor Powers Jigsaw

Intricate designs are cut quickly with a jigsaw attachment that is powered by the small motor furnished in a grinder set. The drive shaft of the motor is set in a ball bearing and moves the saw blade up and down by means of an eccentric cam. The saw will cut wood up to three quarters of an inch thick. It takes only a few seconds to attach the motor to the saw mechanism which is covered by a housing. When the saw attachment is removed, the motor can be used for grinding, drilling, buffing or other purposes.

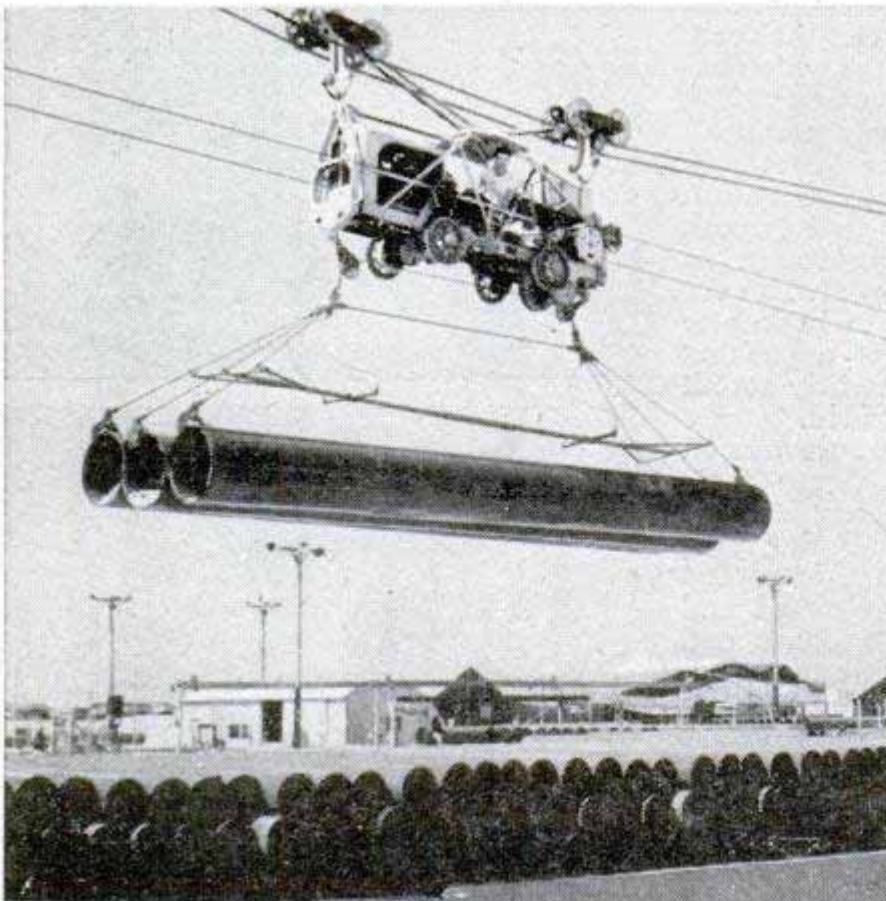
### Two Isotopes From Atomic Pile Available for Research



Chemist carefully prepares a vial of rare tritium for shipment from the Argonne National Laboratory

Two new materials produced by an atomic pile are available in limited quantities for research. They are hydrogen-3 and helium-3, isotopes of the parent elements.

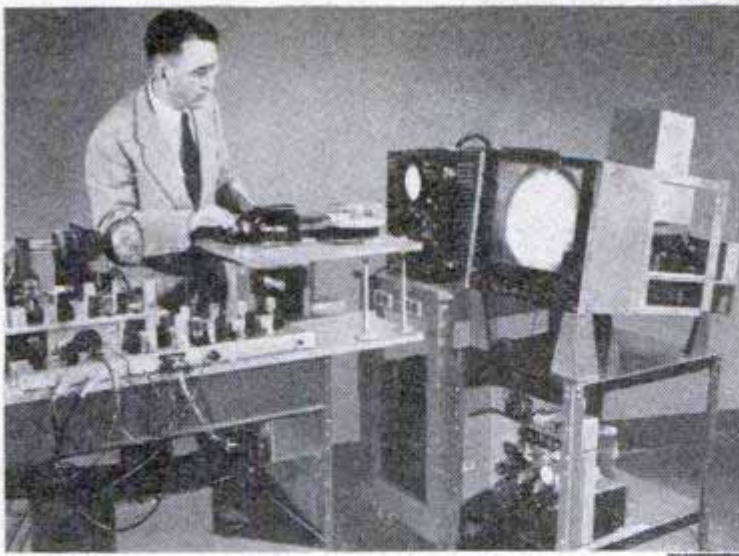
Hydrogen-3, also called tritium, is a radioactive gas with a half life of about 12 years. It is the only radio isotope of hydrogen and should be valuable as a tracer in medical and chemical research. Helium-3 may help scientists learn more about the helium nucleus.



### Skyhook

Large sections of steel pipe are carried three miles through the air on a driver-controlled skyhook to a supply base in Saudi Arabia. The sky carrier moves the pipe from vessels to the base, completing each trip in five minutes. The pipe is for use in the trans-Arabian pipe-line project, designed to supply vitally needed oil for European industry.





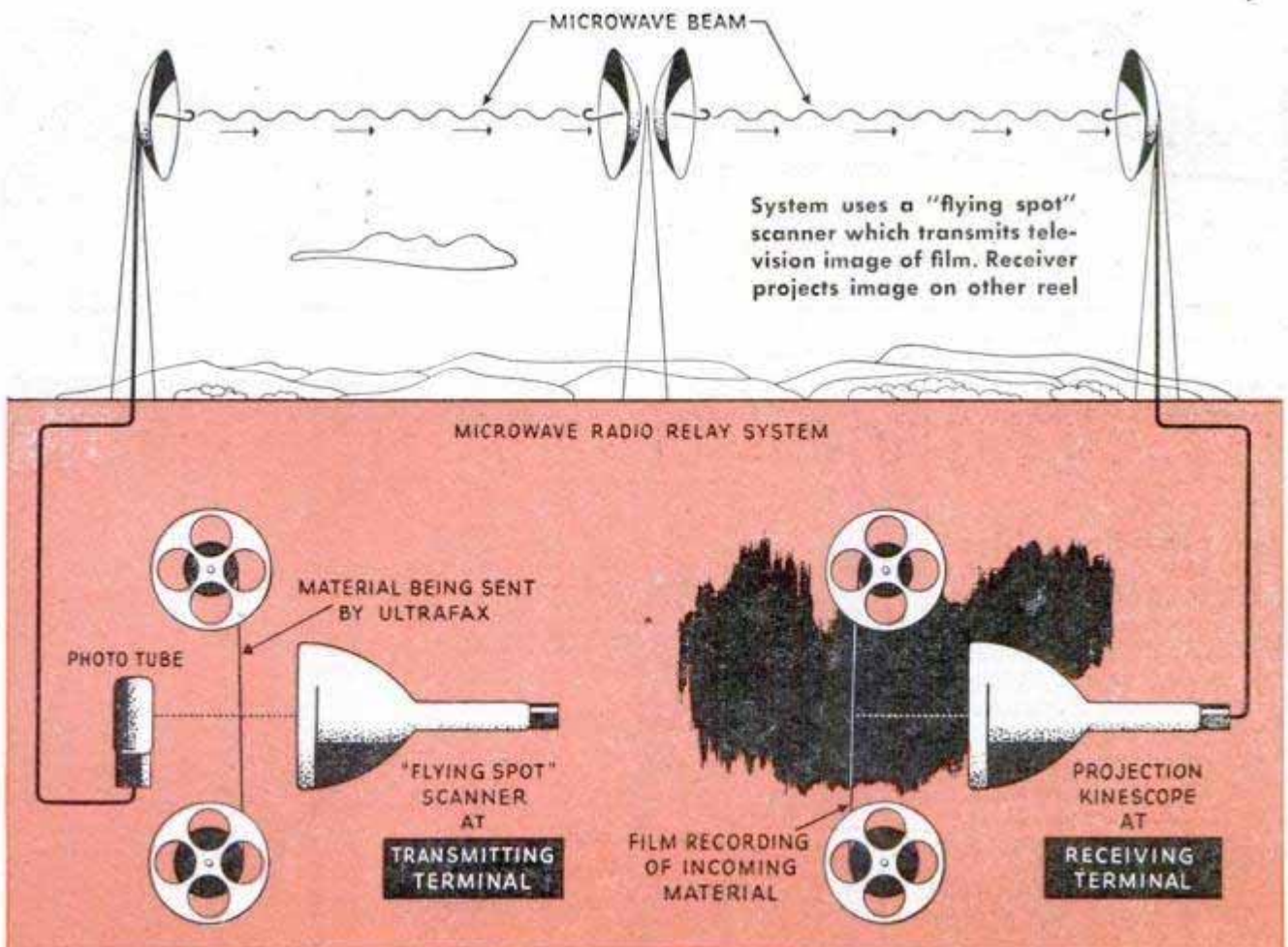
Film reel moves across table in front of scanner. Right, light from cathode-ray tube scans messages



## "ULTRAFAX" Sends a Million Words a Minute

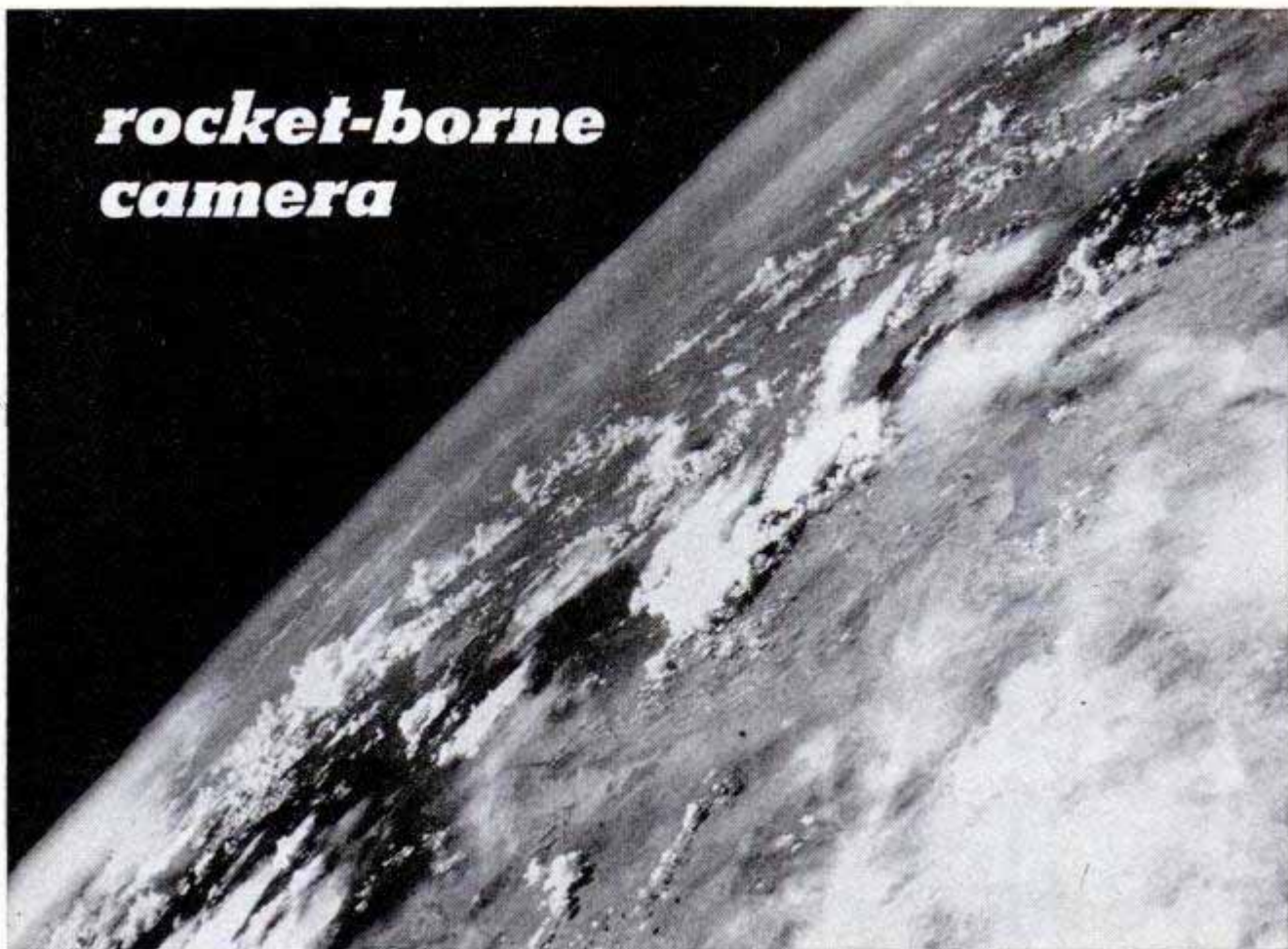
Pages of information are transmitted as television pictures at a rate of 15 to 30 each second through a new communication system called "Ultrafax." The system, developed by RCA, makes it possible to transmit a million words a minute. The information must first be recorded on a reel of microfilm. As the film passes through the transmitter, a "flying spot" scanner converts

the image into a television picture, which is sent out as a radio signal. A television receiver projects the message on motion-picture film or directly on photographic paper. The film can be developed, fixed and dried within 40 seconds in a special processing unit. Graphic material including charts, fingerprints, maps and advertising layouts can be transmitted by the system.

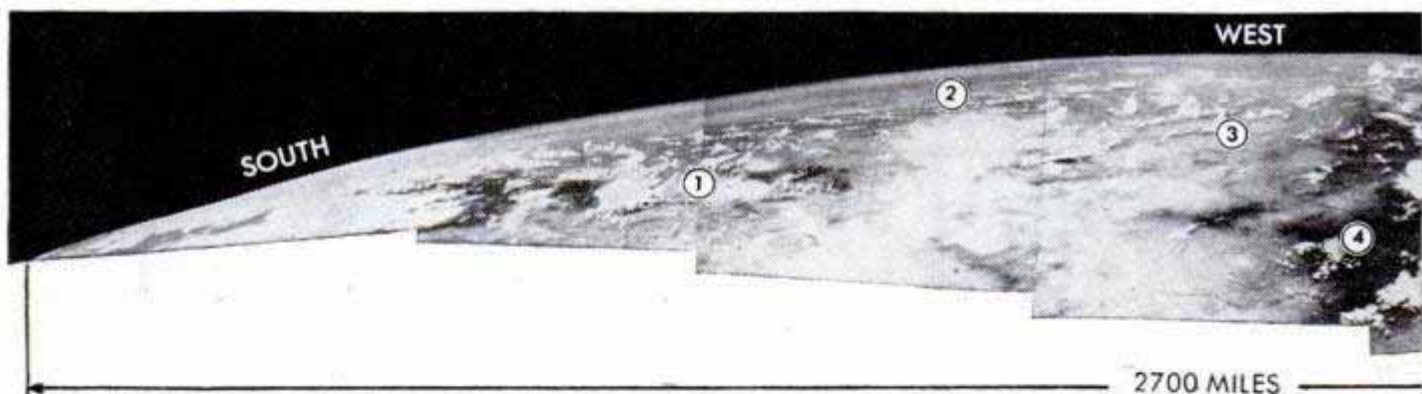




# rocket-borne camera

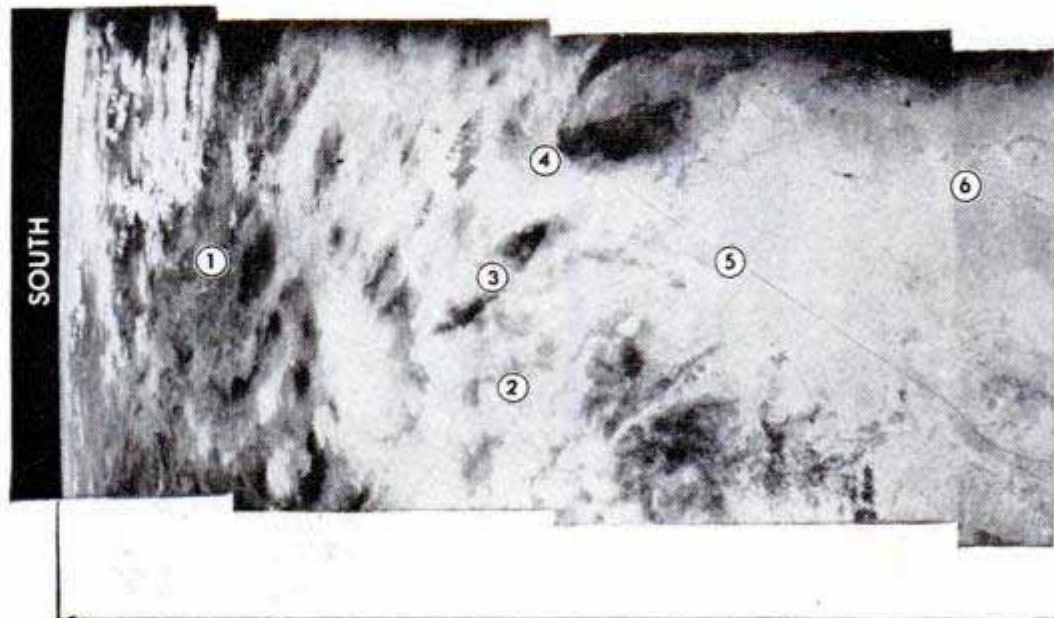


Photograph snapped from Aerobee rocket at a height of 57 miles plainly shows the curvature of the earth



U. S. Navy-Johns Hopkins (APL) photos

Right, mosaic from Aerobee rocket shows: 1, Mexico; 2, Texas; 3, Rio Grande River; 4, El Paso, Texas; 5, Southern Pacific Railroad; 6, rocket-launching site; 7, White Sands National Monument; 8, Air Force Base; 9, Sacramento Mountains; 10, lava beds; 11, first A-bomb test site; 12, Albuquerque, N. M.





**C**AMERAS installed in rockets zoomed more than 60 miles above the earth recently, clicking off a photograph every 1½ seconds to record on film huge land areas of western United States and northern Mexico. The rockets, one a Navy Aerobee and the other a German V-2, were launched within 76 minutes of each other at the White Sands Proving Grounds, N. Mex.

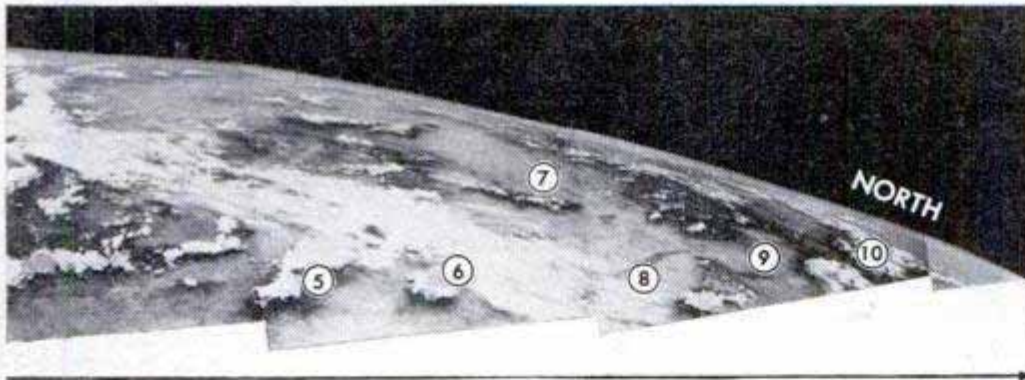
The Aerobee rocketed upward at a speed of 2700 miles an hour, reached a peak altitude of 70 miles and then dropped about 40 miles before an explosive charge was fired by radio to blow off the tail section, thereby making it possible to recover the camera. When the photographs were found, developed and mounted, the resulting mosaic showed a strip of terrain about 1400 miles in length stretching from upper Wyoming to deep into Mexico. The total area photographed was approximately 300,000 square miles.

The V-2 was spinning slowly as it reached its peak, slightly over 60 miles. The camera lens looked out at right angles to the rocket's axis, sweeping the horizon.

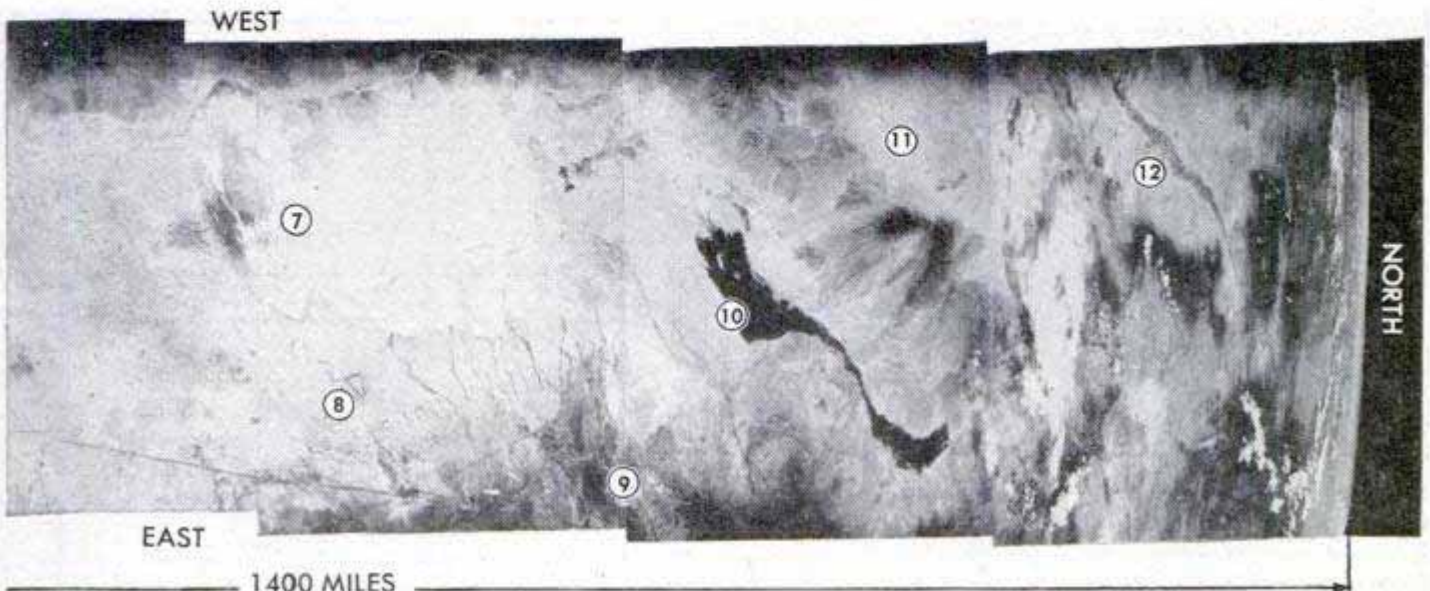


Camera at left was in the V-2, the other in the Aerobee rocket. Neither of the cameras was badly damaged in the desert crash

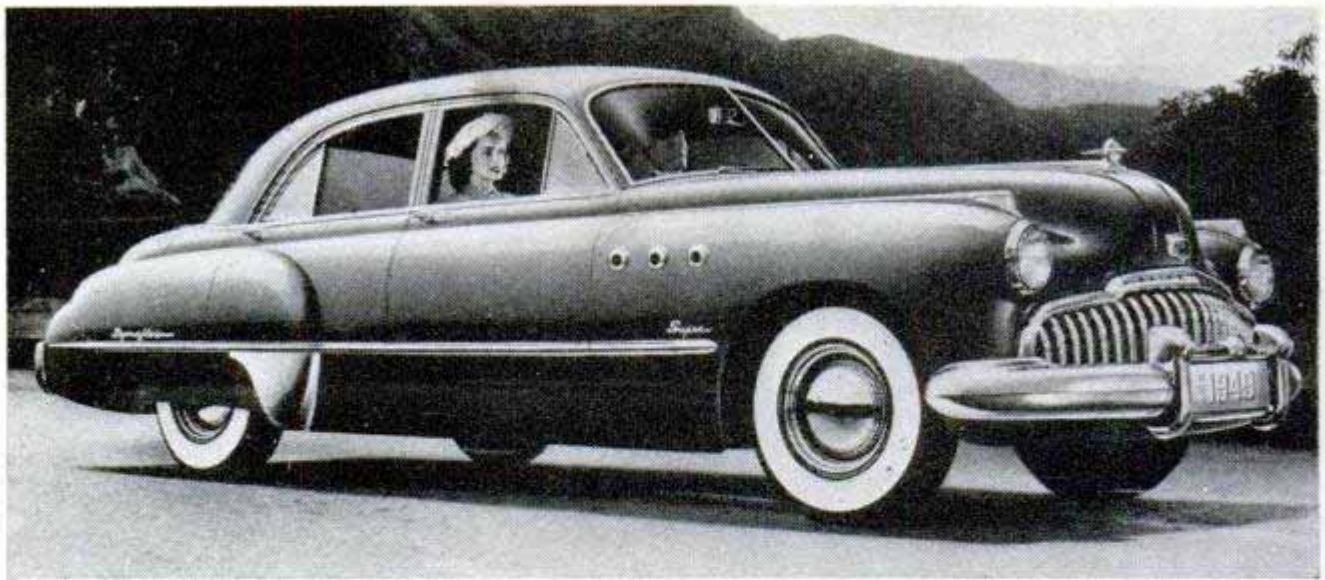
The mosaic made from these photographs shows a land area of 800,000 square miles. Shutter speeds of 1/500 second with an aperture opening of f:8 were used in taking the photographs. Despite the rocket's speed, the pictures are clear. They show the curvature of the earth, mountains, rivers, highways, railroads, airfields and cities.



← Mosaic from V-2 photos shows: 1, Mexico; 2, Gulf of California; 3, Gila River; 4, Mogollon Mountains; 5, San Mateo Mountains; 6, Magdalena Mountains; 7, Mount Taylor; 8, Albuquerque, N. Mex.; 9, Rio Grande; and 10, Sangre de Cristo Range







## Debut for the '49 Buick—Dynaflow for Supers

Complete new styling, Dynaflow torque-converter transmission for the Super as well as Roadmaster, and hydraulic valve lifts are outstanding features of the 1949 Buick line. The sedans have 22 percent greater visibility with a total of 25 square feet of glass area. The valve-in-head straight-eight engine is retained in all models with 110 horsepower in the 40 Series (Special); 115 horsepower in the conventional-transmission 50 Series (Super), and 150 in the 70 Series (Roadmaster). The

Supers with Dynaflow are upped in horsepower to 120. Front seats are wider in the Super and Roadmaster models and new footrests, incorporated into the floor instead of the back of the front seat, assure full leg room. The wheelbase of the '49 Super (121 inches) is three inches shorter than the '48 model and the '49 Roadmaster wheelbase (126 inches) is also three inches shorter than previous models. The Dynaflow transmission will be standard on the '49 Roadmasters and optional on Supers.

## Chemical Mixed With Ice-Melting Salt Reduces Corrosion of Cars



Research worker inspects the damage to a 12-year-old Akron car. Salt used to melt winter ice on city streets corroded the car's fender. After a chemical was added to the salt, 96 percent of the autos driven one winter showed no corrosion.

Corrosion of autos from the salt used to melt ice and snow on city streets can be reduced by adding sodium dichromate to the mixture, according to the results of an experiment conducted in Akron, Ohio. Salt corrodes fenders and bodies and may be trapped in body joints, resulting in summer corrosion every time the car becomes wet. About two parts of sodium dichromate are added to 100 parts of salt to make a snow-removal mixture that has little corrosive power. The mixture has no harmful effects on synthetic or natural-rubber tires according to Goodyear chemists, who made the Akron survey.

You may wish to obtain additional information about the new products described monthly in Popular Mechanics. Should you want to know the name and address of manufacturer or distributor, write Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois

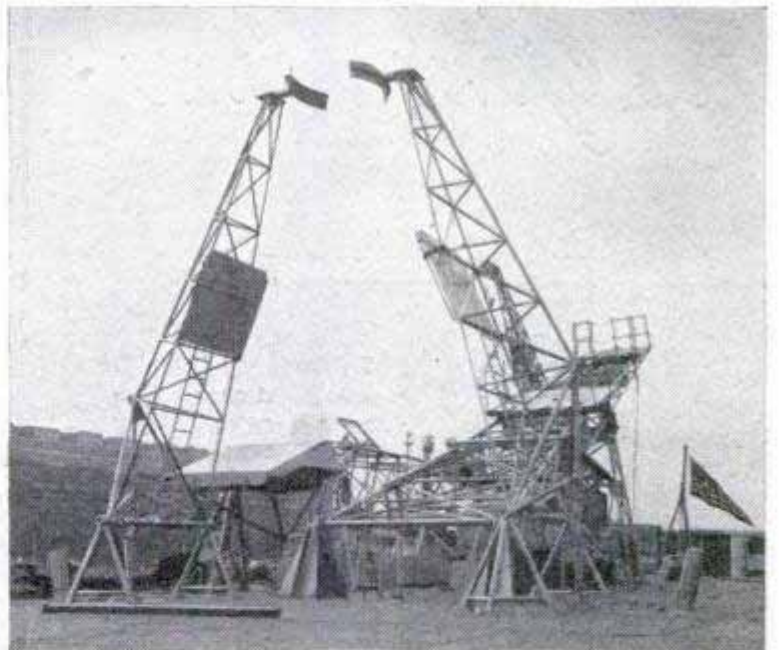


# Floating Rocket Launcher



Above, a stern view of the Norton Sound, Navy's floating rocket launcher, showing adjustable launching racks on afterdeck

Right, the rocket-launching racks. Below, forward deck of ship has a landing platform for helicopter. Ocean-going lab will be used by all branches of Armed Forces

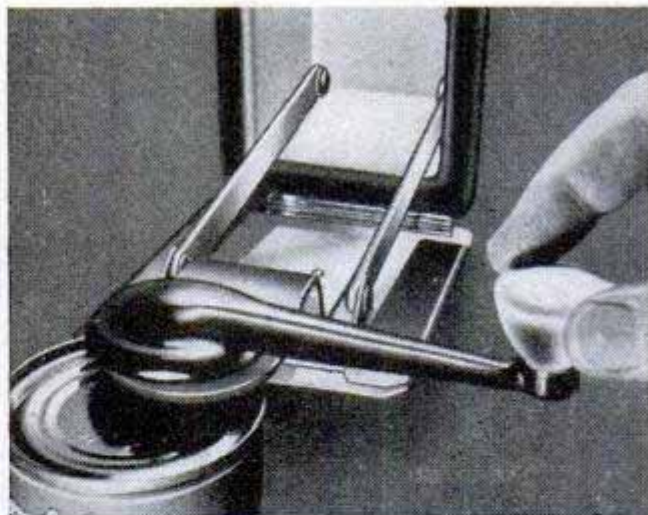


Like a colossal fireworks barge, the Navy's floating rocket laboratory, the USS Norton Sound, will launch giant rockets, including the 14-ton V-2s, into the skies over the Pacific. Once a seaplane tender, the ship was modified to withstand the hot blasts of the projectiles. Its helicopter will recover instruments from the rockets after they have fallen harmlessly into the sea. The crew will track the rockets by radar and will receive automatic broadcasts from rocket-borne radios.





**TWO-SPEED MIXER** enables you to shift into low for thick batters and into high for thin mixtures



**CAN OPENER** folds back into a wall recess when not in use, out of sight behind a flush panel. Cutter removes the lid from the side



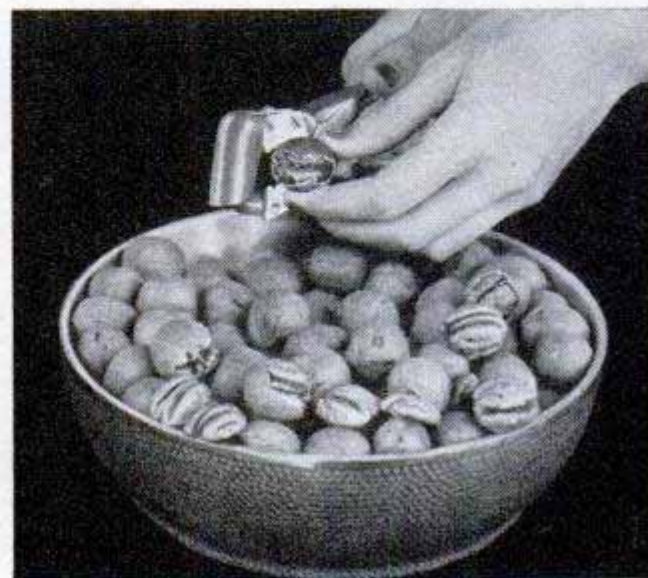
**DOUGHNUT MAKER** eliminates rolling and cutting. You pour batter in base of utensil, doughnuts are formed as you push plunger

## WHAT'S NEW *For Your Home*



**POTATO MASHER** with a double action has two sets of cross rods. They are forced together with each downstroke, squeezing "spud" thoroughly

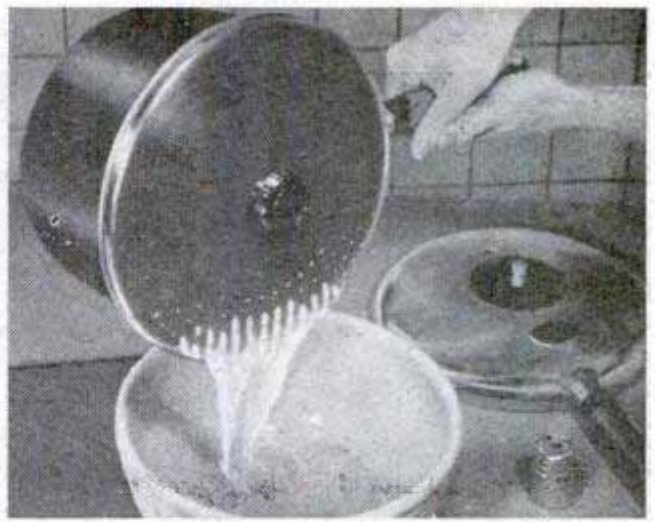
**NUT SHELLER** enables you to remove the nut meat undamaged. It "bites" off the ends and sides of the shells, releasing the meat



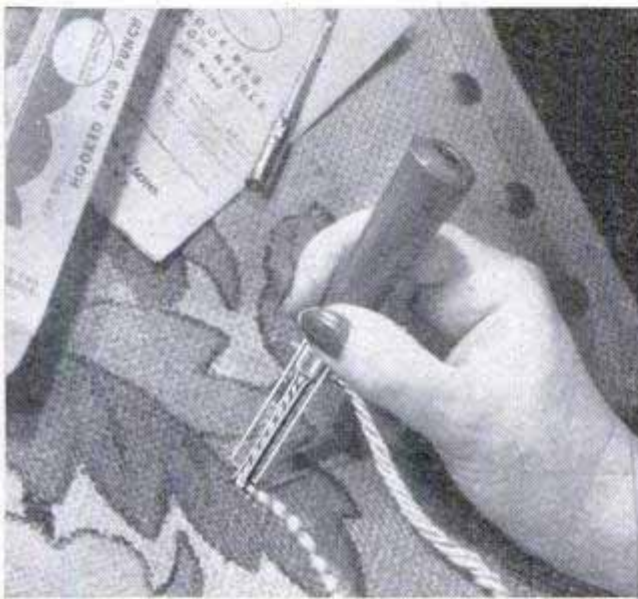




**ICE BUCKET** consists of two separate bowls with airtight covers. The Bakelite-plastic bowls nestle together, forming an insulated bucket for ice cubes

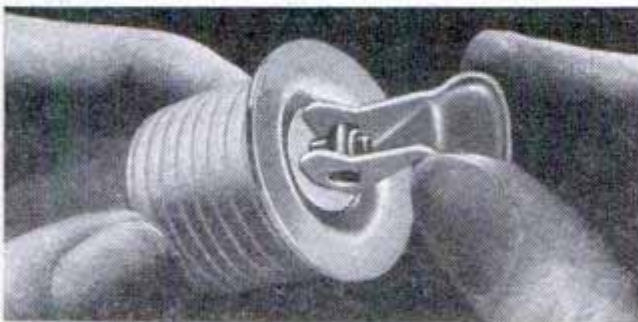


**COLANDER COVER** for pressure cookers locks in place and lets you pour off hot liquids without the danger of splashing. It's made of polished aluminum



**PUNCH NEEDLE** for making hooked rugs is as easy to use as a pencil. Punching needle through burlap forms an even half-inch pile

**ADJUSTABLE STOPPER** for bottles fits a wide variety of openings. One model is for vacuum bottles; others for various beverage bottles



**NAILLESS HANGER** holds up to 10 pounds by adhesive action of its backing material. It can be used on tile, glass, plaster or papered walls

**JUNIOR CLOTHES ROD** for children provides two levels for the tiny clothes. The lower level enables youngsters to hang up their own garments












# Navy's 65,000-Ton Carrier To Be the World's Largest Warship



Official U. S. Navy photo

Officially released artist's conception of Navy's giant plane carrier reveals a clean operating deck, minus usual "island" on starboard side. Below, comparison of \$124,000,000 supercarrier with its predecessors

	YEAR COMMISSIONED	STANDARD DISPLACEMENT TONS	OVER-ALL LENGTH FEET	BEAM WATER LINE FEET
 LANGLEY	1922	11,050	542	65
 LEXINGTON CLASS	1927	33,000	888	112
 RANGER	1934	14,500	769	80
 YORKTOWN CLASS	1937	19,900	827	95
 ESSEX CLASS	1942	27,100	872	93
 MIDWAY CLASS	1945	45,000	968	113
 LATEST CARRIER		65,000	1090	130

There'll be no "island" on the world's largest warship — a 65,000-ton aircraft carrier to be built for the U. S. Navy. Command bridges, formerly on the island, will be telescopic. In addition to allowing more space for planes, the flush deck will make the ship less easy to detect. It will be 1030 feet long, have a maximum width above the water line of 190 feet, and be capable of handling planes weighing well over 100,000 pounds. Elevators to transfer planes between the hangar and flight decks will be along the sides and there will be four plane-launching catapults. The additional catapults, one at each side and two on the bow, will shorten the plane-launching interval. The carrier's top speed will be about 33 knots. Costing \$124,000,000, the warship is expected to be completed in less than four years. The new carrier, following the trend of bigger and bigger ships, will be too wide to navigate the Panama Canal.





### Plane for Family Trips Built Like a Limousine

Newest addition in the family-plane field is the four-place, all-metal Silvaire Sedan with an interior as luxurious as a fine automobile. The new monoplane has a top speed of 140 miles an hour and a service ceiling of 17,000 feet. It has a 38-foot wingspan and weighs 1340 pounds empty. Among its accessories are landing lights, prop spinner, ash trays with individual lighters and four ventilators. Its range of 500 miles makes it ideal for taking the family on cross-country trips.

### Trailer-Tent Sleeps Four Under Double Roof

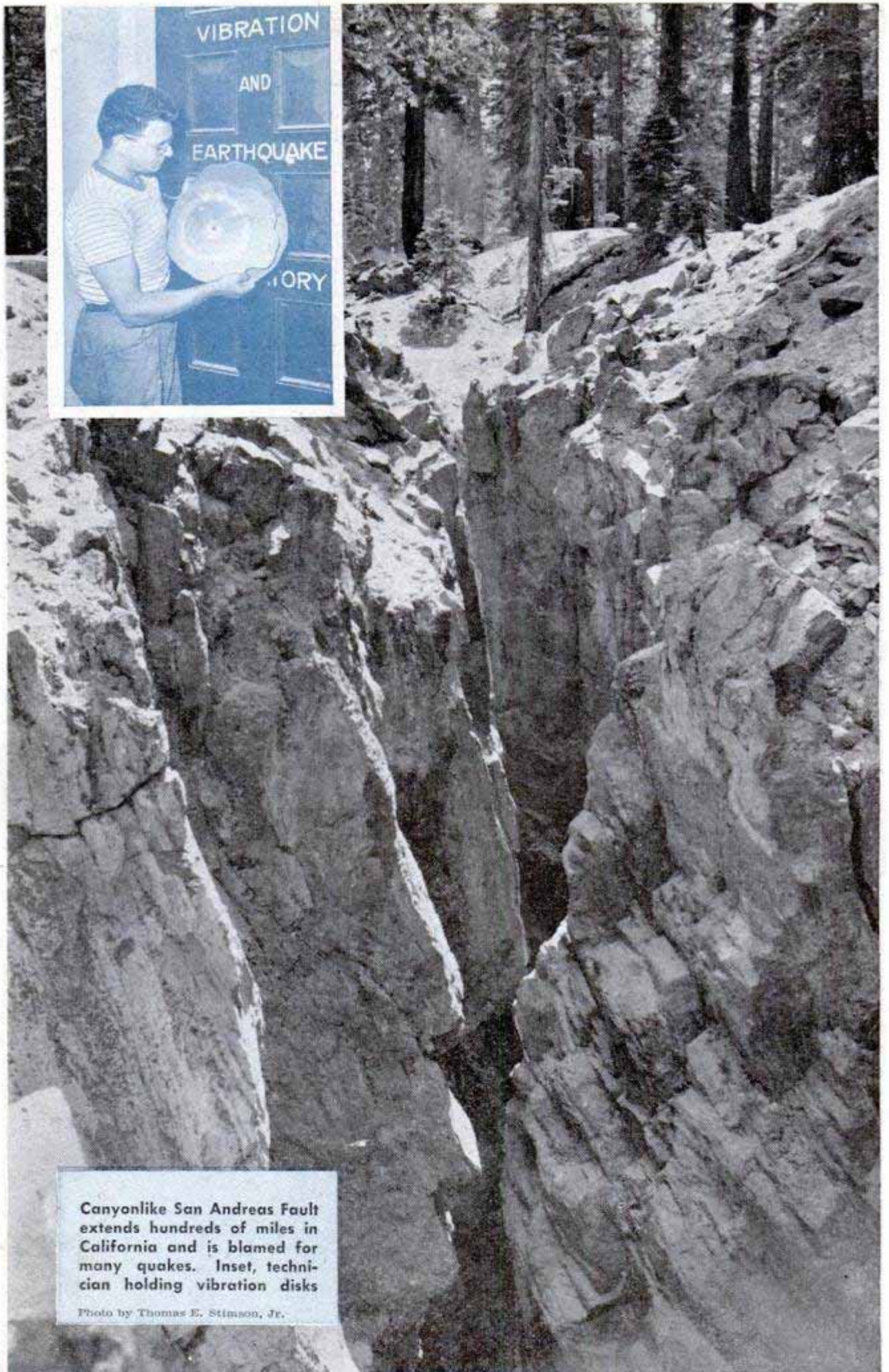
Inside a camping unit designed in Italy are sleeping accommodations for four, a table and chairs, and a double tent roof for insulation. The equipment folds into a small trailer and can be set up in less than a half hour. Hammocks are slung between uprights to form beds for two campers. The outfit sells for about \$1200.

### Table-Tennis Balls Aid Tuberculosis Patients

Lucite table-tennis balls are helping tuberculosis patients back to health and in a way far removed from their primary purpose. The balls, sometimes as many as 100 of them, are placed in the patient's chest. They hold the diseased lung collapsed and prevent the chest from caving in as it often does under usual methods.







**Canyonlike San Andreas Fault extends hundreds of miles in California and is blamed for many quakes. Inset, technician holding vibration disks**

*Photo by Thomas E. Stimson, Jr.*



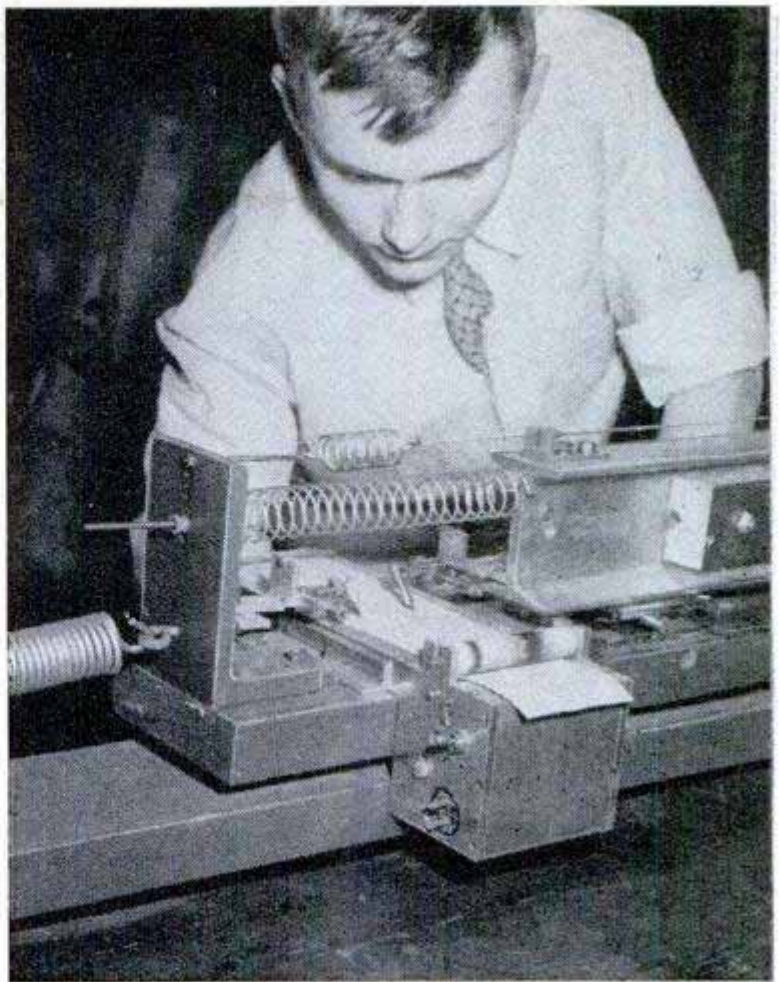
# WARNING: EARTHQUAKE AHEAD

**How soon and where will it strike? No one can forecast with certainty, but a California laboratory tells how to prepare for the next one**

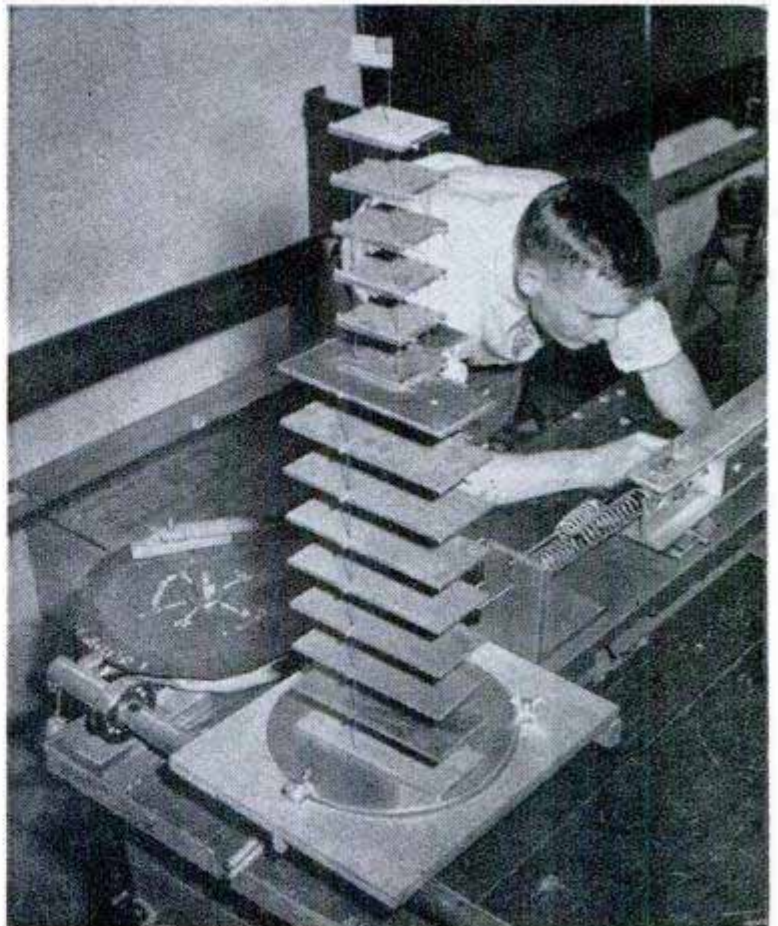
CALIFORNIA is getting ready for its next major earthquake. Millions of dollars' damage will be done if the quake occurs in a metropolitan area. Depending partly on the time of day, several persons, or several hundred, may be killed.

The disaster may strike today or tomorrow or it may not happen for decades. There is no way of predicting an earthquake, except in the words of Dr. Bailey Willis, 91-year-old earthquake expert of Stanford University. Dr. Willis says: "There is just one sure thing about earthquakes—the farther you are from the last one the nearer you are to the next one."

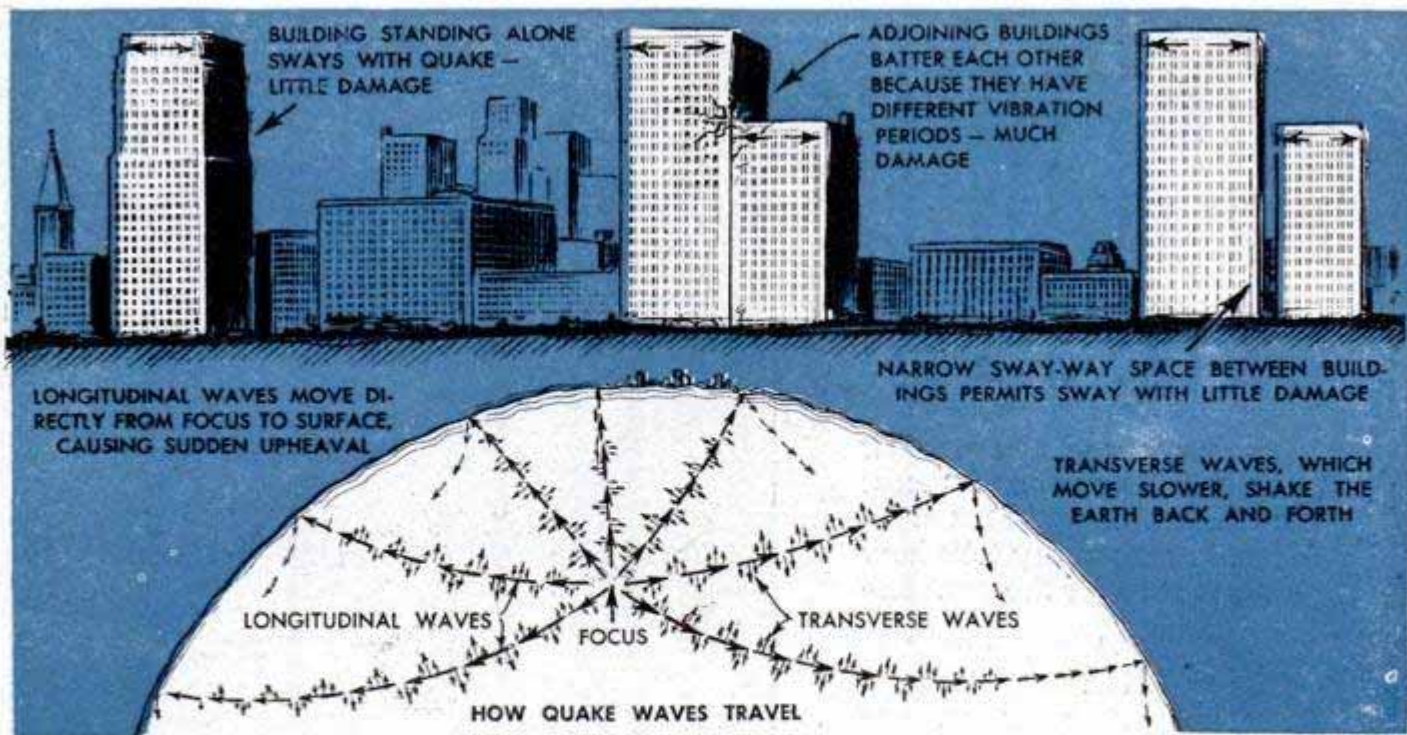
Based in part on this reasoning, at least one insurance company has drastically raised its rates for coverage against earthquake damage and has stopped soliciting new business. Earthquakes of strong or moderate intensity seem to happen along the West Coast every couple of years, usually in sparsely populated areas. Not since 1933, when Long Beach and much of Los Angeles County were shaken severely, has a strong temblor occurred in a built-up area. To keep property damage and loss of life at a minimum when a big shake comes, California towns and cities have strengthened their building codes to help make all new structures comparatively safe. Once it was thought that buildings which could withstand a strong wind were also earthquakeproof. Now it is understood that wind load is proportionate to



Above, models are tested for resistance to earthquakes with miniature seismograph in Stanford University laboratory. Below, a model is shown on platform where it is shaken by a "quake" machine. Motion is same as recorded in real quakes







the exposed area of a building, while earthquake load is proportionate to the weight of a building and building-code requirements are rewritten to comply.

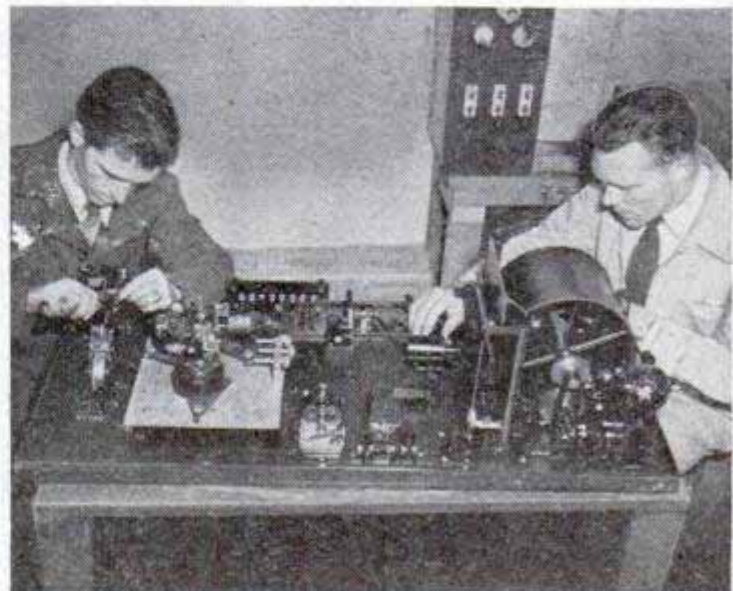
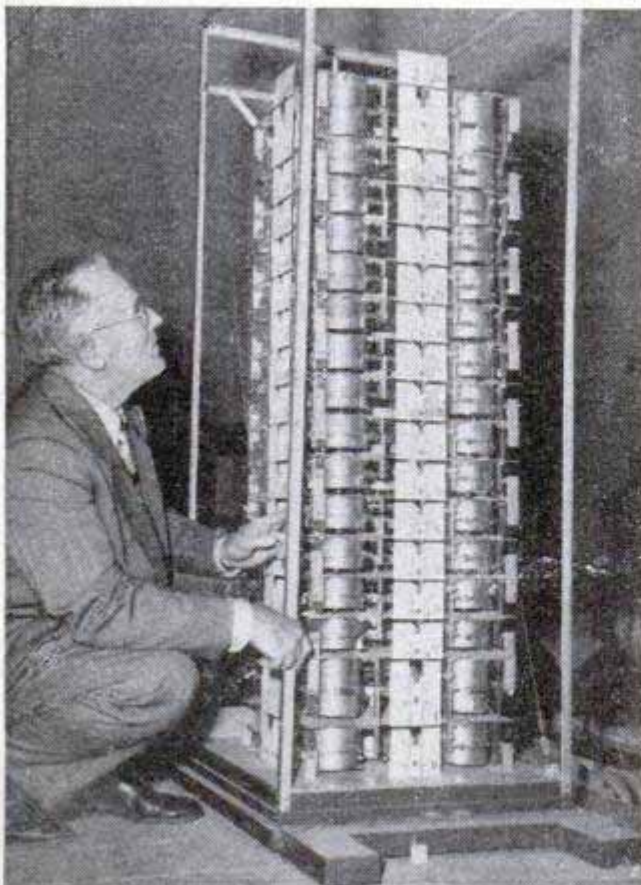
Meanwhile, numerous older buildings have been overhauled and strengthened. Cornices and parapets that might be jarred loose have been reinforced or removed. Marquees that overhang sidewalks have been strengthened. Large advertising signs on the tops of buildings have been rebuilt. Water tanks, fuel tanks and swim-

ming pools on roofs or in upper stories are provided with stronger foundations.

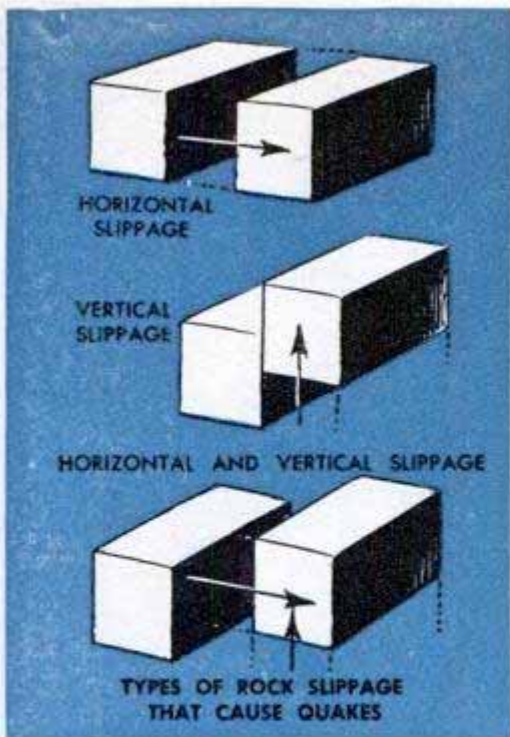
Some of these precautions have resulted from experiences in past earthquakes, some are based on research performed at such centers as the Vibration and Earthquake Laboratory operated by Stanford University.

There, under the direction of Dr. Lydik S. Jacobsen, head of the department of mechanical engineering, suitably designed scale models of buildings and other structures are shaken and vibrated to determine what happens to them when an earthquake occurs. For some types of research, a model of a multistory building is placed on a heavy metal platform and the platform is struck a powerful side blow by a weighted

Left, Dr. Lydik S. Jacobsen preparing scale model of multistory building for shaking test. Dials are at every floor level. Below, technicians assemble a "strong motion" accelerograph for heavy quakes







Left, some reasons for earthquakes. Right, Dr. Bailey Willis keeps china on swinging "quakeproof" shelves

pendulum. In other experiments a scale model is secured to a platform which then is subjected to scaled-down duplicates of the motions that were recorded by seismic instruments during actual earthquakes. Engineering data compiled from the research is made available to interested architects and engineers.

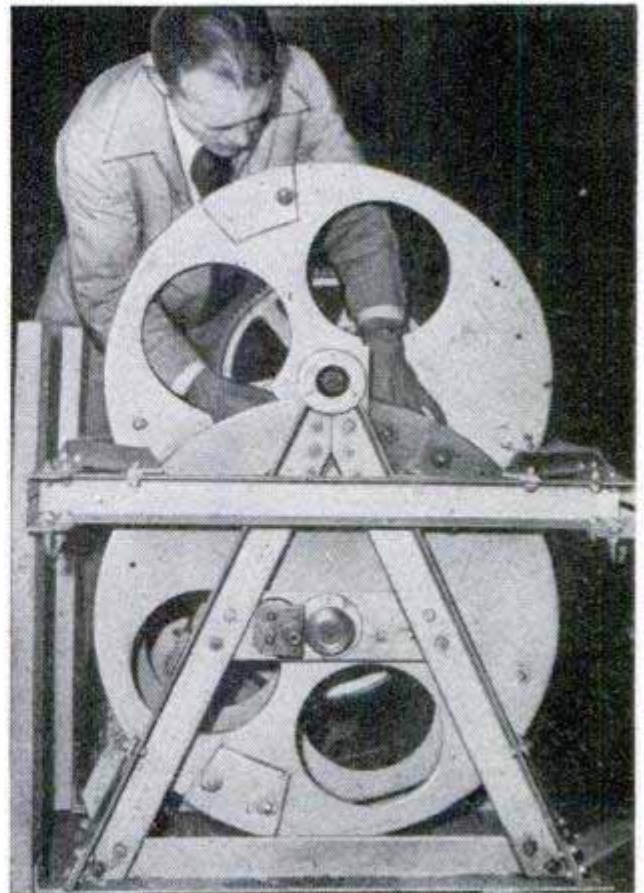
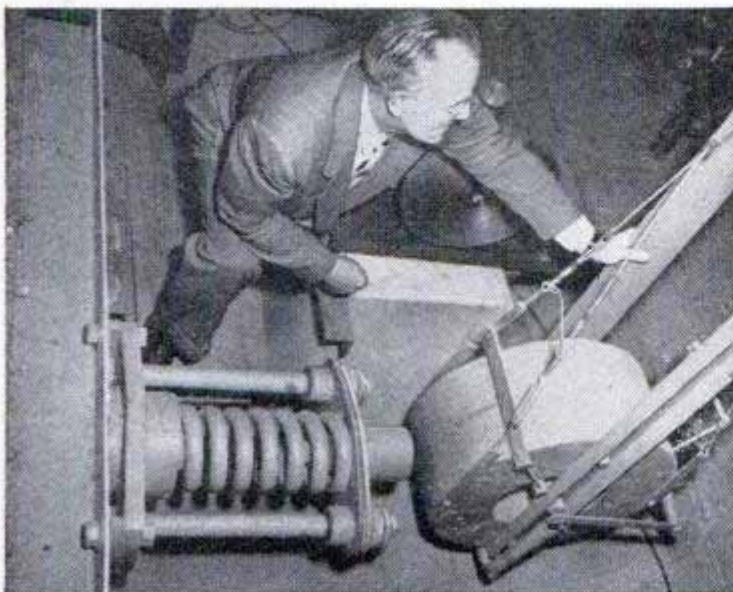
"Two types of structures are extremely resistant to earthquakes," Doctor Jacobsen says. "One is the rigid mass exemplified by the Egyptian pyramids, the other is the pliant structure of which the California redwood tree is a good example. Both pyramids and redwoods have experienced numerous heavy quakes and yet each type

has stood for thousands of years. Neither, however, is quite suitable for our needs.

"The best compromise is to construct small buildings as stiff and strong as is practicable and to construct tall buildings with a certain amount of flexibility. The lower stories in particular must be flexible so as to avoid a 'crack the whip' effect in the upper stories."

One way of avoiding earthquake damage is to mount an entire building on balls

Below, shaking machine consists of a heavy pendulum which is drawn back and crashed against spring to shake platform. Right, vibration machine has two unbalanced wheels rotated by small electric motor







Above, these photos of devastation of the recent earthquake in Japan show how poorly constructed building crumbled. Below, the sturdy structure built years ago withstood the sharp vibrations



Below, top-heavy Japanese houses were flattened by the earthquake. The cheaply constructed buildings stand little chance when a big shake occurs. Right, Japanese train was flipped over like a toy



or rollers. This has been tried in New Zealand where some buildings are placed on thick foundations of loose, spherical gravel. The idea is hardly practicable for huge structures of the office-building type. Owners of valuable and fragile heirlooms make use of the same principle when they lock their treasures inside cabinets that rest on smooth gliders. Such a cabinet can slide around safely on a floor during a quake.





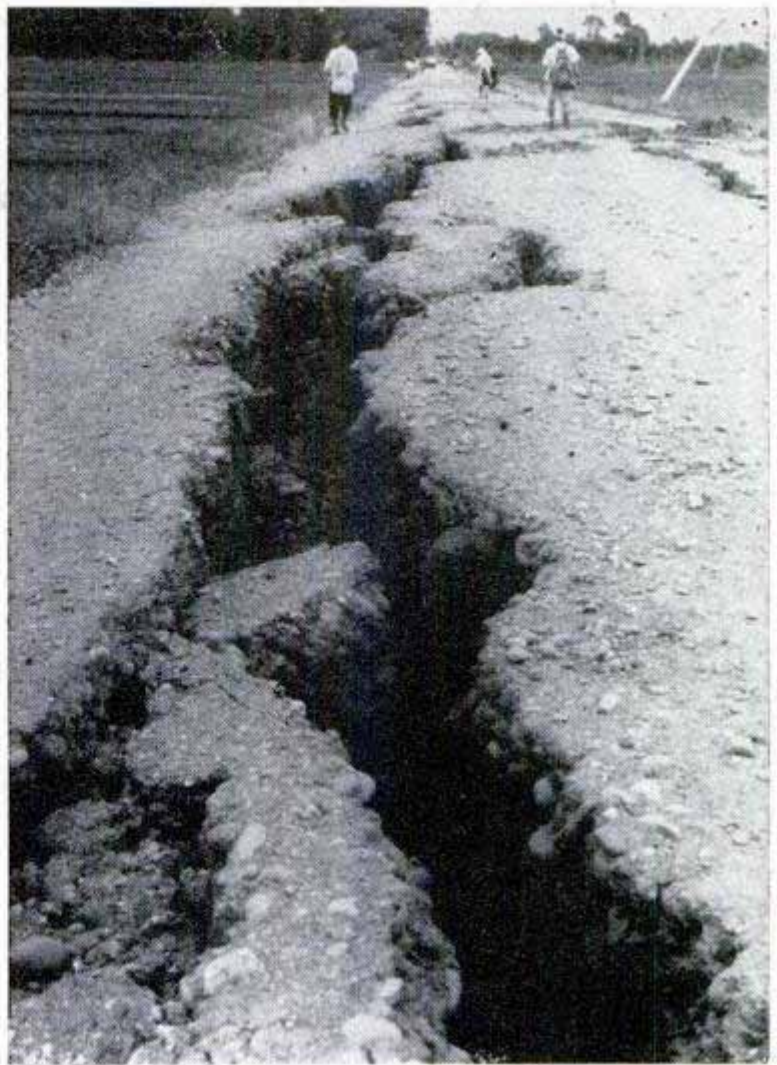
"Buildings do odd things in an earthquake," Doctor Jacobsen states. "A low building of only a few stories, located next to a taller structure, is apt to batter its tall neighbor with its roof. Even two buildings, side by side, of the same height may slam into each other like a pair of gladiators. The reason in each of these cases is that the buildings have different periods of vibration. They get out of step because of different heights or types of construction.

"The recommended procedure in active seismic regions is to provide an air space or sway-way between all large, adjoining structures, particularly for buildings in excess of 15 stories. A sway-way of six inches is usually considered sufficient to prevent one building from damaging another building adjacent to it.

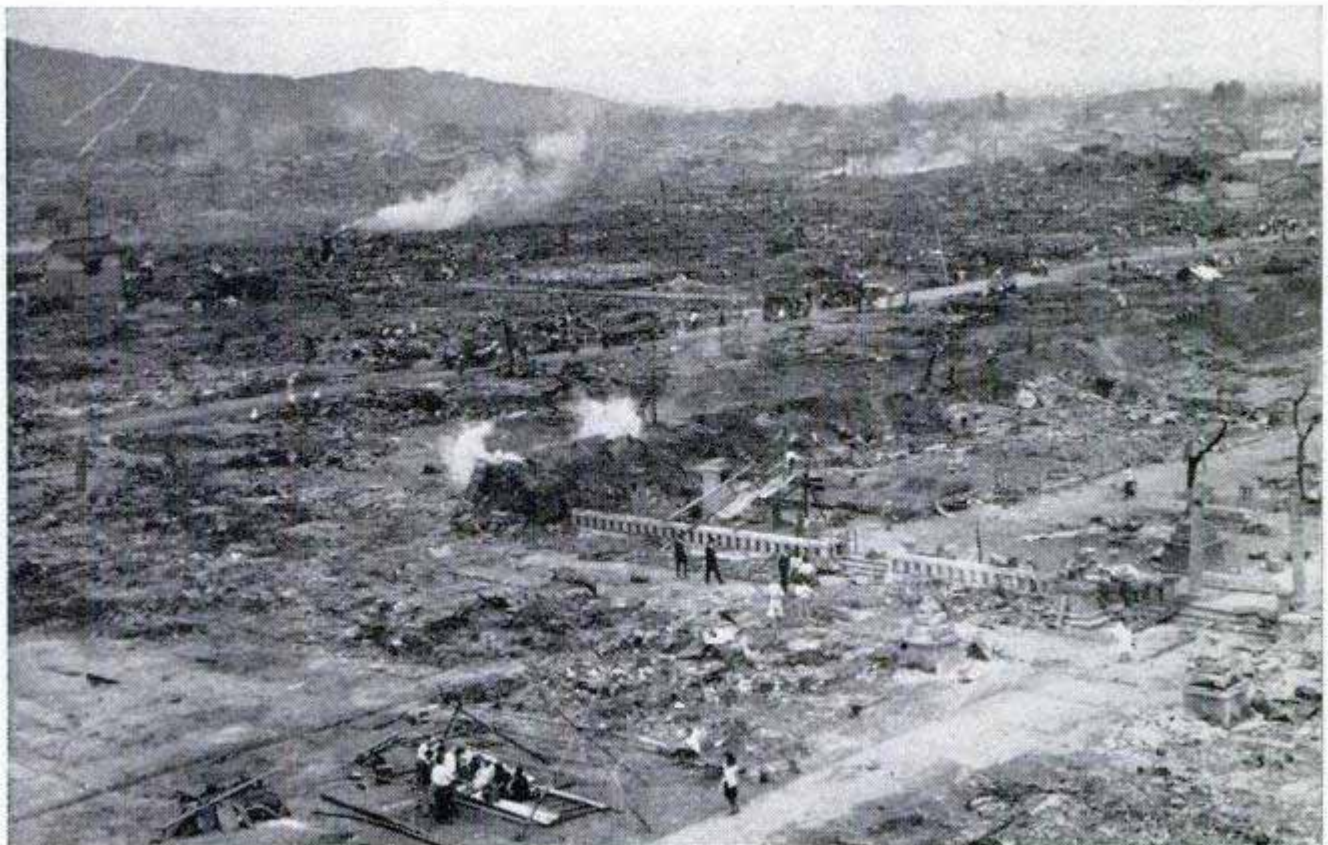
"When an open sway-way is undesirable, it is customary to provide the space and then fill it with some friable filler material that will crumble under pressure. Quite often a church tower is protected from the rest of the church structure by a wall of this type of material.

Not only do earthquake scientists use scale models of buildings in their studies but they subject

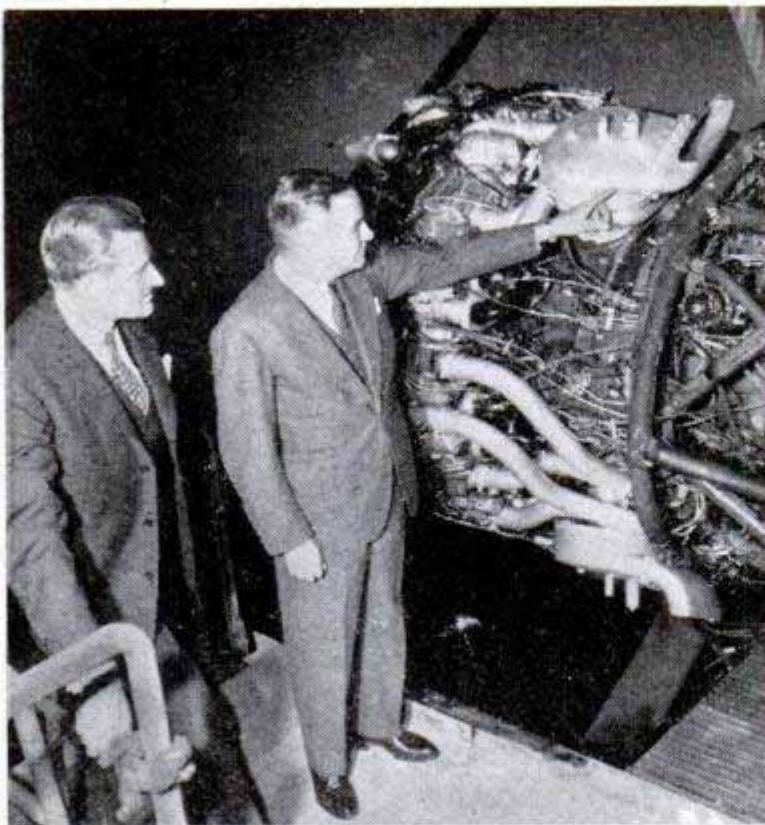
(Continued to page 256)



Above, tremendous force of recent Japanese earthquake literally pulled the earth apart, leaving deep faults. Below, an aerial view of the devastated city of Fukui. Fires burned for days after the quake. More than 30,000 persons suffered injuries







## Engine Using Exhaust Gases Boosts Range of Plane

Exhaust gases that formerly were wasted supply the added energy to a compound engine that gives planes 20 percent more range and power. Developed by the Wright Aeronautical Corporation, the power plant uses the gases to run three gas turbines in combination with a conventional air-cooled piston engine. Power that is generated by the turbines is geared directly back to the crankshaft. The engine functions efficiently from sea level to high altitude and is easily adapted to existing aircraft. As an illustration of the engine's added power, its developers say it could be installed in Lockheed Neptunes currently powered by another Wright engine, and would increase that plane's nonstop record from 11,236 to 13,483 miles.

## U. S. Navy Tests Seamless Plastic Hulls That Never Need a Coat of Paint

Seamless plastic hulls that never need painting are being tested by the U. S. Navy as a possible method for mass-producing small landing craft and boats. Molded from resins and Fiberglas, they are lighter and can be built 10 times faster than wooden hulls. Pigment mixed with the materials during molding makes painting unnecessary. Hull maintenance is practically eliminated since there are no seams to caulk, fastenings to loosen or adverse weathering effects. Trial-run comparisons with plywood boats of the same size indicate the plastic hulls ride much easier in rough water.



## "Fading" Scenes Now Possible With Small Movie Camera



Fade-out movie scenes can now be made with a home-size 8-mm. camera. Fading is accomplished on one model by pushing a lever and on another by pressing a button. The camera has six speeds instead of four, and runs 10 feet at a winding. It has single-shot control for stills, animated titling and cartoons.



## U. S. Navy Tests Danger Area Near Intake of Jet-Plane Engines



How close can a man stand to the intake of a jet aircraft without being sucked in by the powerful draft? If careful, he can stand within two or three feet without being caught. The Navy has been seeking the answer to this question since a civilian me-

chanic was killed in this manner a year ago in California. During tests at the Naval Air Test Center, Patuxent River, Maryland, a lieutenant donned safety lines and walked toward the nose of a plane as the engine turned at full power.

### Cart Kit Makes Centerpiece

Patterned after a Cuban sugarcane cart, an attractive table centerpiece is packaged in kit form. The miniature cart can be used to hold fruit or flowers. All the parts are pre-cut ready for sanding and assembly. Most of the parts are fastened with ornamental tacks and strips of leather. The completed cart can be stained or left with a natural finish.

### "Growth Resistant" Cast Iron Won't Expand Under Heat

Cast iron that has no permanent "growth" when repeatedly heated to high temperatures has been developed for use in stoves, furnaces and gas or oil burners. Ordinary cast iron, when subjected to repeated heating, becomes permanently larger, warping and opening close-fitting joints. The new iron, developed by Battelle Memorial Institute, is a high-silicon product, the silicon being the element that resists growth.



☐ The U. S. now leads the world in the number of bicycles (17,500,000) for the first time in history with Germany a close second (17,000,000). The British Isles come third with a total of 10,000,000, according to the latest registration figures compiled.



# Painting in Wood and Stone



Paper sketch of the Atlantic Charter mosaic was drawn freehand, in reverse, by Burfitt. Quarter-inch-thick blocks of stone cut on diamond saws are secured to paper sketch with wallpaper cement; special cement is then flowed over the back of the assembled mosaic. Final backing is three inches of concrete and reinforcing steel

By Tom Riley



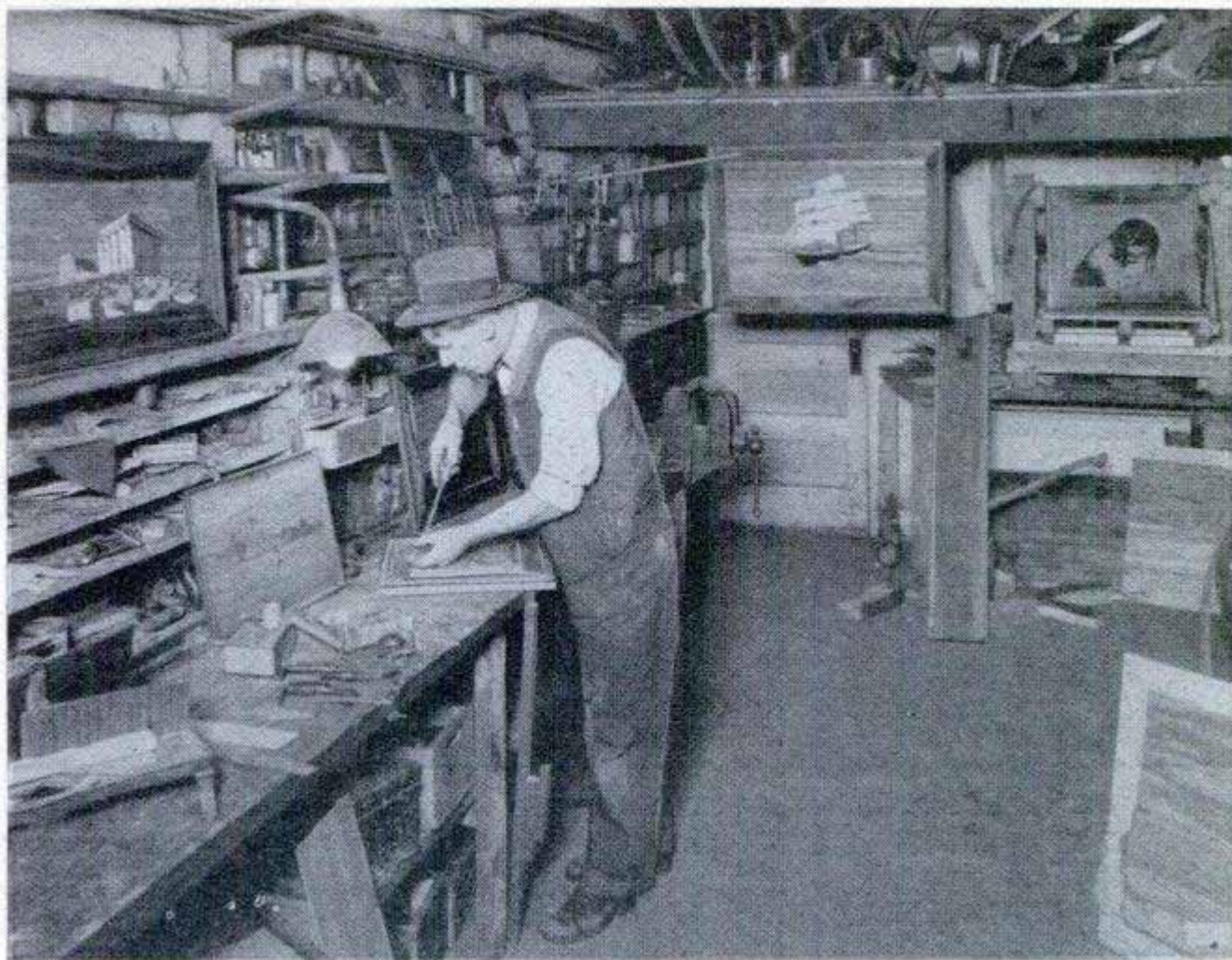
To keep honeycombed mahogany from bulging, only one square inch of mosaic is casein-glued at a time and pressed overnight. Above, Walter P. Chrysler portrait; below, details of the Eisenhower face



**I**N A ROOMY SHOP at 11626 N.E. Sandy Blvd., Portland, Ore., are displayed the beautiful examples of a craftsman's skill, masterpieces of portraiture in wood and stone. There is no sign to indicate what is going on in this shop—not even a telephone—and the front door is usually locked. The craftsman-artist, Frank F. Burfitt, is much more interested in creating another mosaic than in selling the one last completed.

Frank F. Burfitt calls himself a portrait mosaicist. His specialties are inlays in wood and mosaic portraits in both wood and stone. A plumber until his retirement four years ago, he is a hobbyist who has perfected his creations for forty-odd years. His inlays are true inlays, not pieces of thin veneer glued and pressed together but scenes with one or two carefully chosen pieces of hardwood to form the background. All the rest of the scene is carefully chiseled from the background and appropriate colors and shapes of wood are fitted into the chiseled spaces. The inlays are incredibly intricate. In one of his favorite subjects, sailing scenes, the



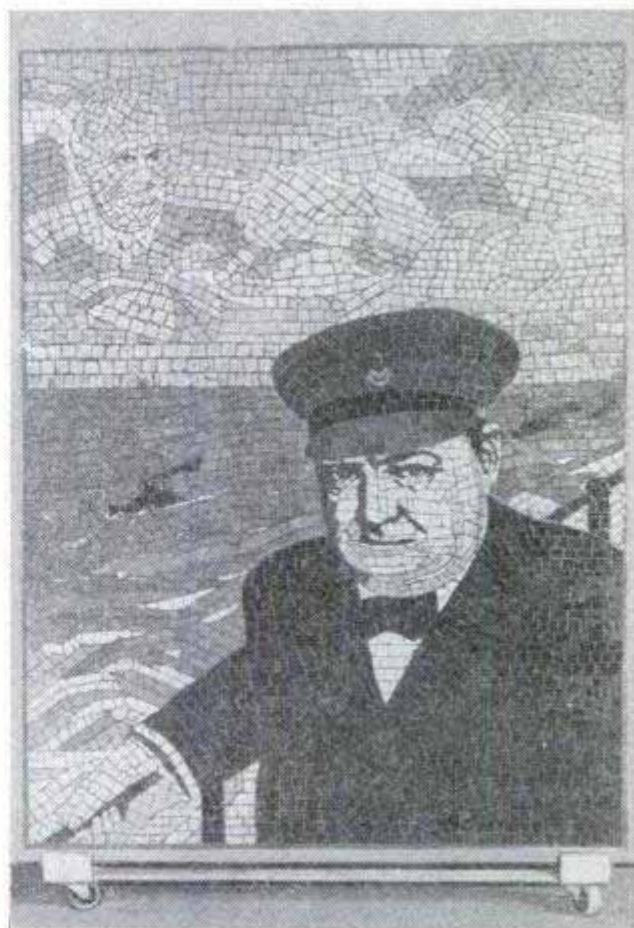


rigging of sailboats is made of pencil-line widths of ebony laid into the background.

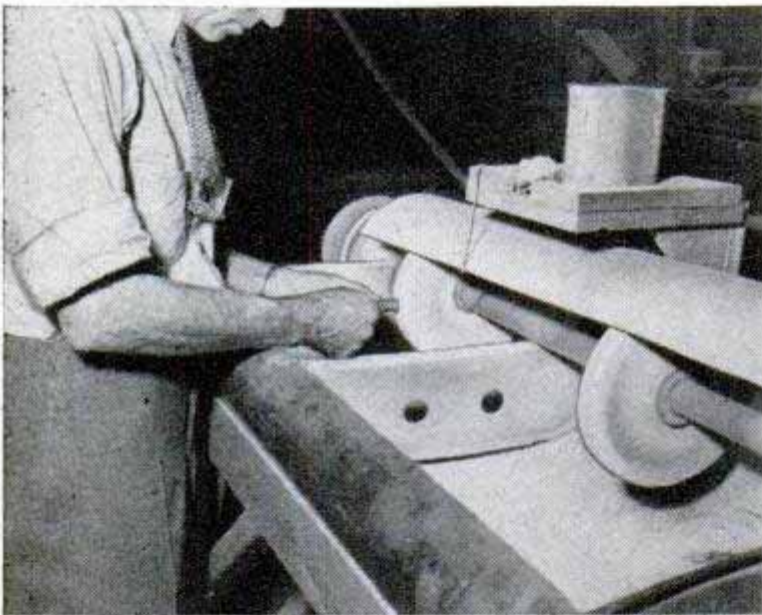
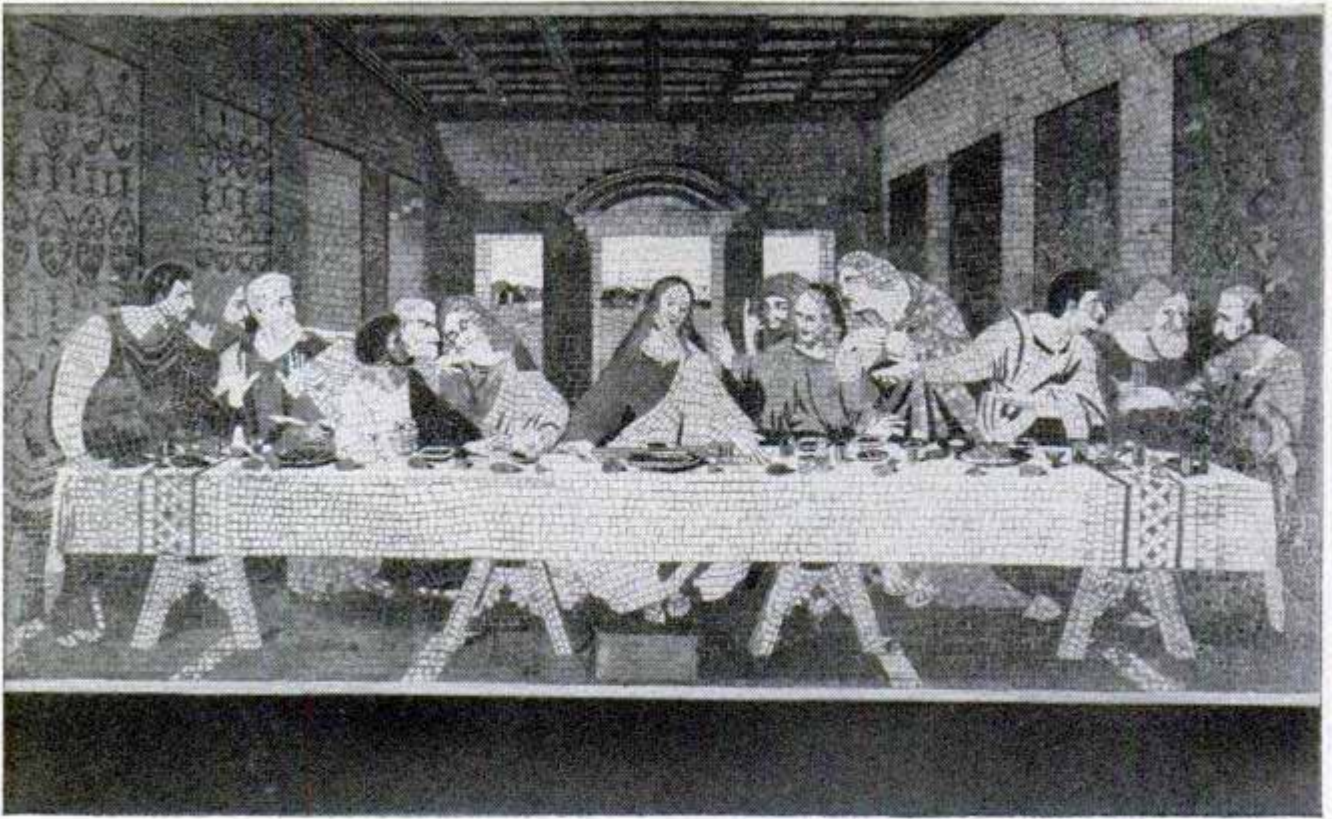
His wood mosaics are portraits of famous men. Burfitt says he started to make these mosaics simply because art critics told him it was impossible to create a mosaic portrait in wood that had "life" or realism. His results have astonished the critics. His mosaics are even more intricate than his inlays. Quarter-inch-square holes are cut in a solid mahogany board. Then tiny blocks are cut to fit into these holes, leaving only a  $\frac{1}{16}$ -in. width of the original mahogany board between the mosaic pieces. To accomplish such honeycombing of solid mahogany requires extreme patience and skill. Also needed is the ability to choose woods of the variety and color that will give "life" to the portrait. Burfitt uses 34 different kinds of wood in his mosaics, wood sent to him from all over the world, and he is always hunting for more.

"There is no blue wood," he laments and, being a true artist, he will not artificially stain any material in order to do a wood mosaic of a celebrity who has blue eyes. "And the eyes are the most difficult. In General Eisenhower's mosaic I had to use white holly, Oregon holly, mahogany, ebony, acacia, ebony root, birch, black walnut, French walnut, rhododendron and catalpa to catch the right expression."

Above, Burfitt at work in his shop. Below, the finished Churchill mosaic holds 14,000 pieces of stone







Leonardo da Vinci's "Last Supper" is reproduced by 49,000 stone blocks. At left, grinding the stones to shape on lapidary wheels; below, diamond-tooth saw cuts stones into one-fourth to one-inch slices

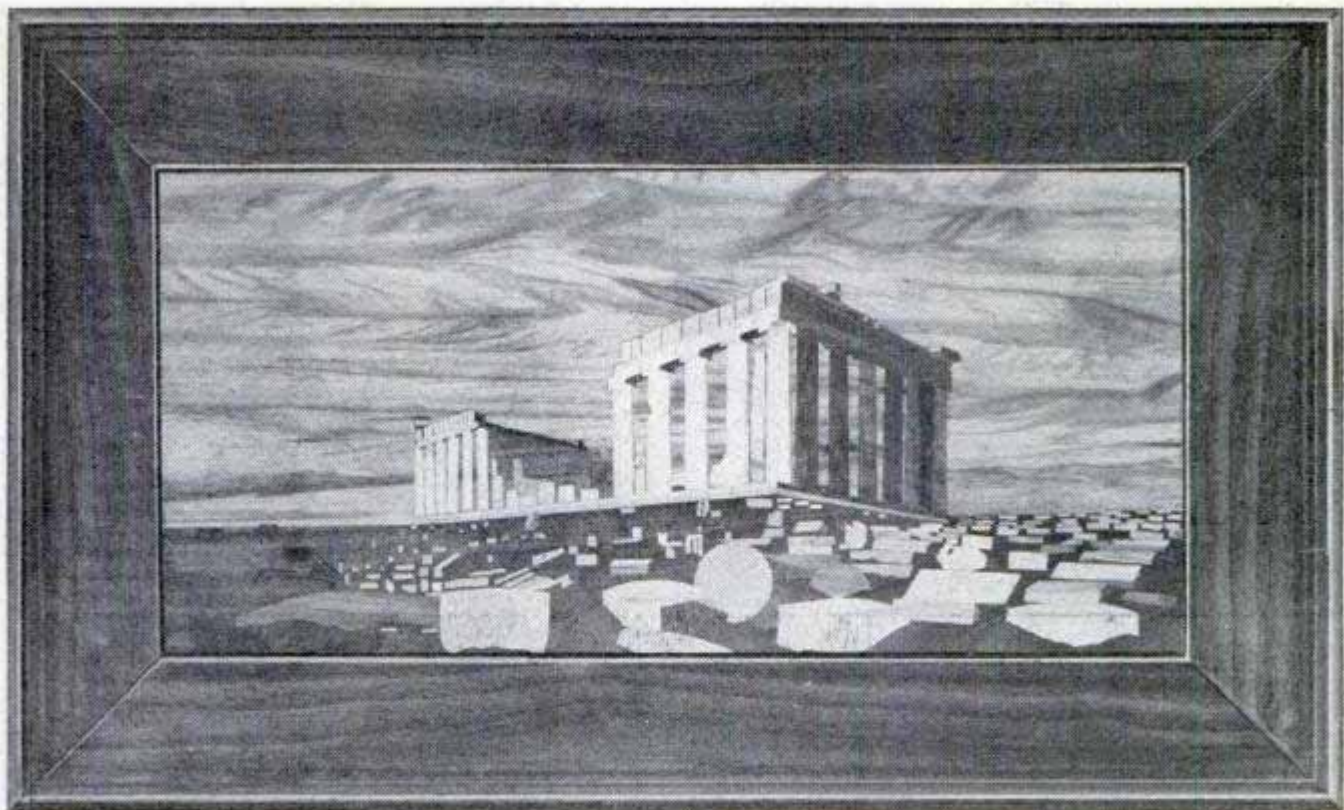


Stone is his most recent medium. During the last few years he has been experimenting with stone mosaics, personally gathering hundreds of colors and types of rock. Burfitt now has a shopful of lapidary tools. Grinding and polishing wheels line one wall. Two diamond-tooth saws are used to cut the rocks into small mosaic blocks. He has tried all types of prepared cements but has found that the best one for bonding stones is a simple cement mixed in his own shop. This is a market brand of household cement which he mixes with a fine grade of sharp-cut sand.

Burfitt has completed wood mosaics of General MacArthur, Bing Crosby, Henry Kaiser, Franklin D. Roosevelt, and General Eisenhower. He has finished two stone mosaics, "The Last Supper" and "The Atlantic Charter," the latter including a very unusual portrait of Winston Churchill.

Other celebrities need not feel slighted because they are excluded from Burfitt's collection—he chooses only those whose faces can be reproduced successfully and, in the wood mosaics, only



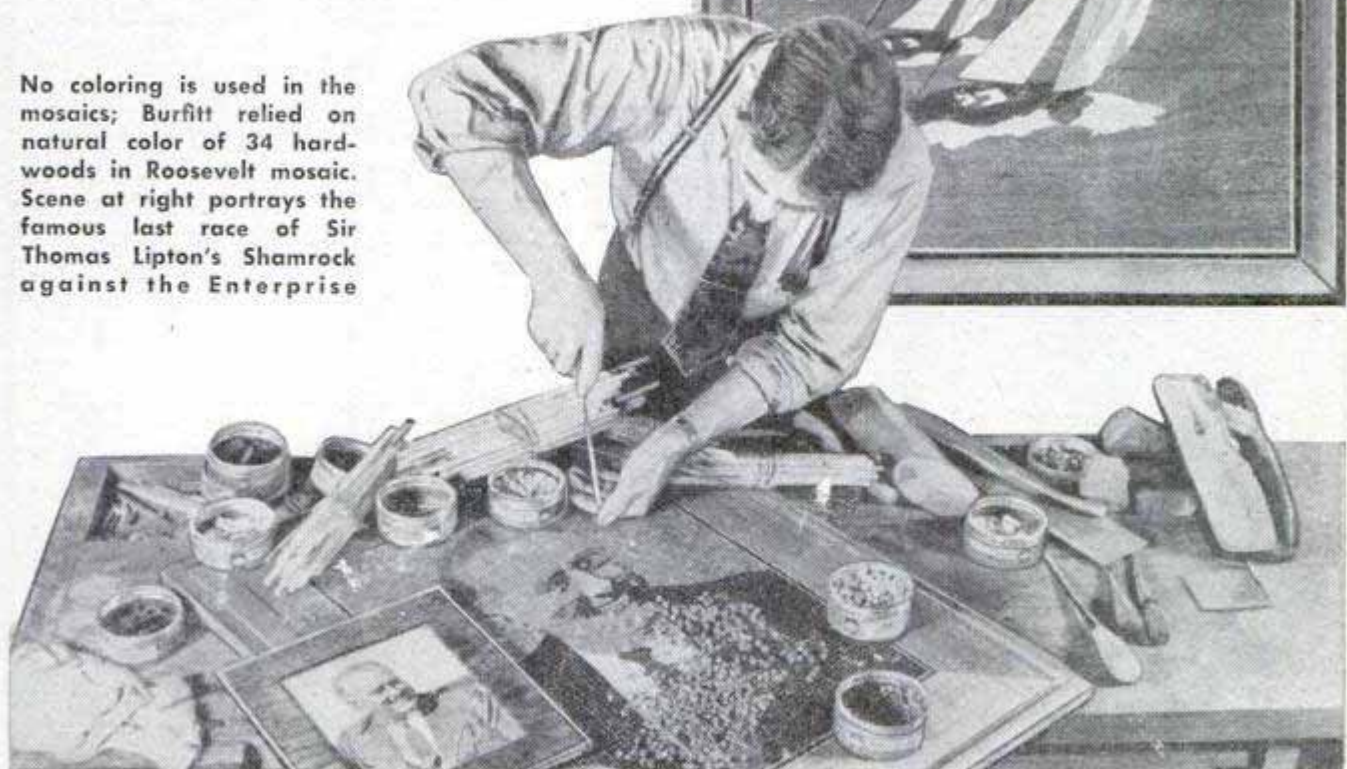


More than 600 pieces of wood, representing over 20 varieties, were used in this inlay of the Parthenon

celebrities with brown eyes. At the present time Burfitt is considering a mosaic made entirely of jade. Burfitt says jade can be found in every color from white to dark green and the possibility of creating a full-color mosaic from just one material delights him not only from a practical standpoint but artistic as well.

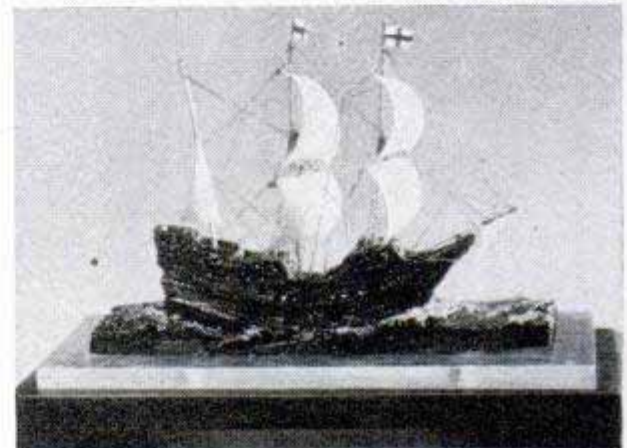
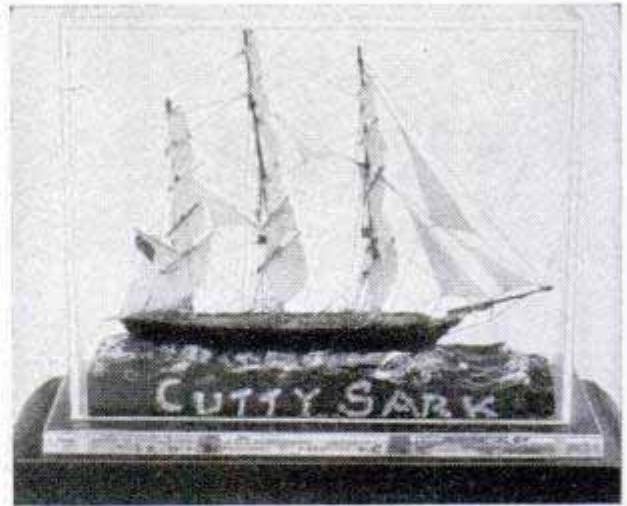
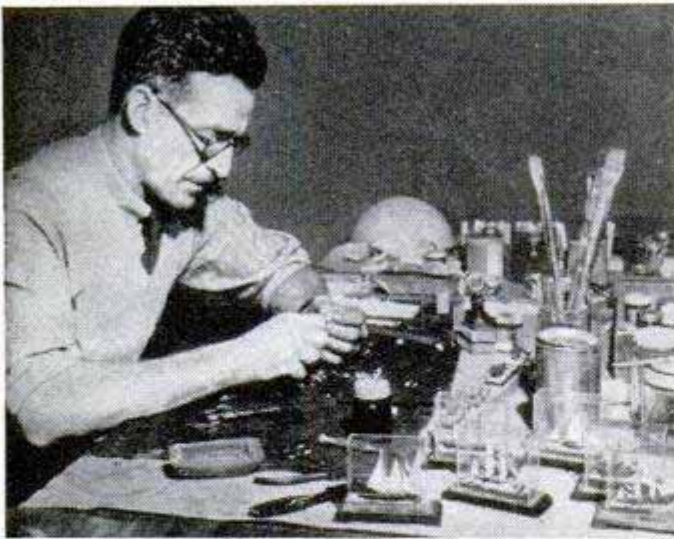
Burfitt has honestly tried to teach his skill to several students but has found no one with all three requirements: mechanical ability, patience, and an artistic touch.

No coloring is used in the mosaics; Burfitt relied on natural color of 34 hardwoods in Roosevelt mosaic. Scene at right portrays the famous last race of Sir Thomas Lipton's Shamrock against the Enterprise





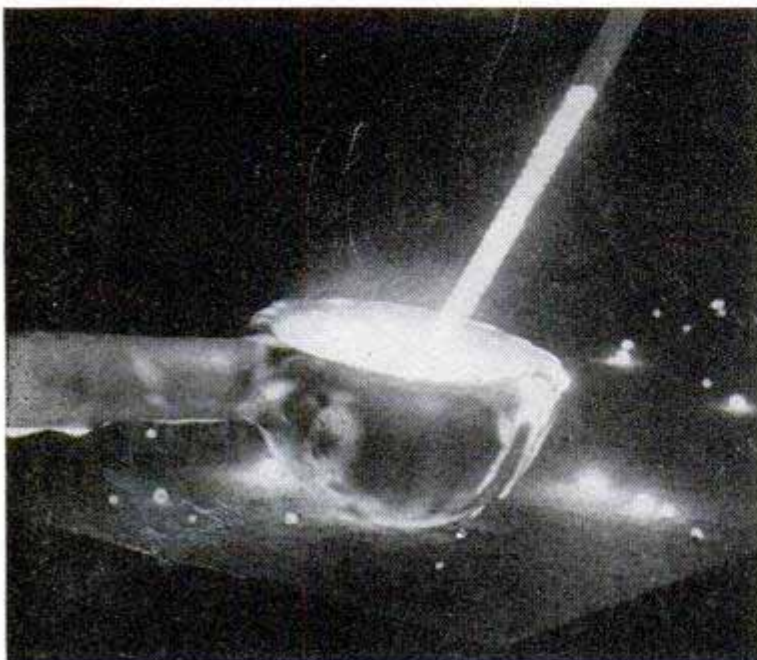
## Slivers and Tissue Paper Become Masts and Sails of Ship Models



Making ship models is not only the hobby but the business of William Parker of Victoria, B. C. After Parker had whittled a one-inch boat for his son he decided to make a career of marine-model building. Now he's loaded with orders from casual purchasers as well as collectors. Parker's stockroom is the corner of a drawer and his matchbox bins are filled with binnacles, fighting tops and riding lights so small they must be picked up with tweezers. In order to save time he carves a master hull and makes a rubber mold of it. The mold is filled with plaster to make each ship model. The resulting hulls, when stained, appear to be wood and show even the grain irregularities. Slivers of bamboo are fashioned into masts and yardarms. Cigarette paper is lacquered and clipped to form wind-filled sails. The mainstays and all fixed rigging are made from horsehair. Once the masts and the horsehair are in place, Parker dips a bamboo sliver

**Top left, Parker makes sails from cigarette papers and masts from seasoned bamboo. Some ships have more than 20 sails. Above, two models show the detailed work. Plastic case seals finished ships**

into a plastic solution and quickly spins a complicated web of rigging. The models have a main mast only two inches high, yet some ships support more than 20 sails and 90 lines.



## Eye Dropper Samples Steel

Sampling molten steel at a temperature of 2700 degrees Fahrenheit is now done with an eye dropper made of heat-resistant glass tubing. Drawn into the glass tube by suction created by a rubber bulb, the liquid steel solidifies into a smooth rod in about five minutes. The glass is cracked from it and the test rod is checked for quality. Older sampling techniques required long hours and involved cutting and machining a rod from a steel block.

❏ Ice "pyramids" six inches thick form on airplane antenna masts in an hour's flight during moderate icing conditions.





## Mystery Plane Revealed to Be B-17 With Gas-Turbine Engine in Nose

For months observers along the East Coast have been wondering about the identity of a five-engined airplane which looked strangely like a B-17 Flying Fortress with an extra power plant buttoned on its nose. The secret came out recently, and the guessers were right. The Air Force had been using the B-17 as a flying lab-

oratory to test Wright Aeronautical Corporation's new T-35 Typhoon gas-turbine engine. To accommodate the test engine the cockpit was moved aft four feet, the nose extended and the fuselage, frame and skins reinforced. Results of the high-altitude tests of the gas-turbine engine have not yet been disclosed by the Air Force.

## Plastic Icicles for Tree Made in Varied Shapes

Artificial icicles made of transparent plastic lend an out-of-doors effect to Christmas-tree decorations. The icicles, made in many sizes and shapes including canes, have both smooth and "bubble" surfaces. Viewed from a few feet away and when lighted from behind by artificial light, they look like real icicles. Because of an unusual production method, no two of the icicles are alike.



## Toy Grader Scrapes Miniature Roads Out of Dirt and Sand

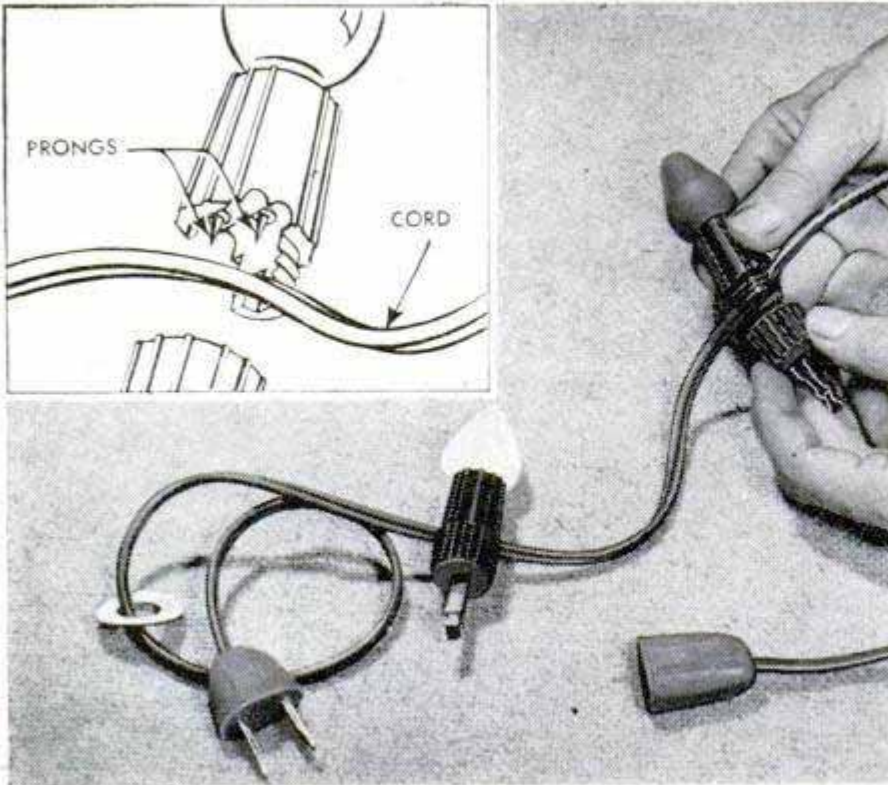


Children can scrape miniature roads out of dirt and sand with a toy road grader that looks and operates like the real machine. Another new toy is a cement mixer that actually turns out concrete. Both toys are patterned after full-size machinery. They reflect a trend toward toys that can be manipulated, according to toy manufacturers at a recent exhibition.

☐ Since 1923, when 12 chinchillas were brought here from the Andes Mountains for breeding purposes, the number has increased until today 50,000 of the valuable fur-bearing animals are alive in this country.



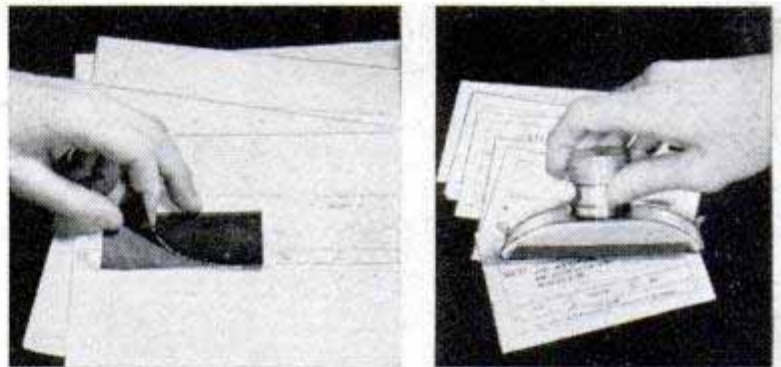
## Screw-On Christmas-Tree Bulbs Are Attached Anywhere on Cord



Christmas-tree lights that can be attached anywhere on the cord offer greater flexibility in lighting arrangements. Each socket has two threaded parts. In decorating a tree, the cord is strung through the branches as desired. When a spot for a bulb has been chosen, the two parts of the socket are unscrewed and the cord placed between them. Screwing the parts together pierces the insulation for contact. Each light socket is independent of the others so one bad bulb has no effect on the others. The set includes 12 feet of cord, 8 bulbs and sockets.

## Stencil on Invoice Saves Retyping Address for Labels

Address stencils for labeling packages are cut at the same time the address is typed on the invoice by means of a miniature stencil that fastens to the printed form. The stencil is then sent to the shipping department where it is inserted in a holder containing an ink supply. The holder prints the address on the label, eliminating the need for printing or retyping.



## Pilot of "Smallest" Airplane Lies Prone When in Cockpit

Described by its designer as the world's smallest airplane, a tiny craft weighing only 170 pounds is being tested near San Diego, Calif. The pilot, sole occupant of the plane, lies prone on a foam-rubber

cushion and maneuvers with a conventional control stick and two rudder pedals. A panel in front of the pilot's face has three instruments—an air-speed indicator, altimeter and tachometer. The plane has a wingspan of 15 feet and a fuselage of the same length. Powered by an 18-horsepower engine, the craft has a two-gallon gas tank which provides fuel for one hour. The plane was designed by an engineer, Ken S. Coward, who built it with the aid of two friends.



Electricity is now helping the farmer do his chores on 68.6 percent of the nation's farms.



In race between fast quarter horse and motorcycle, the horse was in the lead for the first 90 yards



# DON'T BET AGAINST A COW PONY

By Thomas E. Stimson, Jr.

Quarter horse slides to fast stop as cowboy throws his rope to catch a running calf to be branded



WHEN AN ARIZONA cow pony beats a famous race horse, that's news.

When a California mustang outraces a motorcycle, that, too, is news.

But when the average Western rancher hears of events like these he doesn't get excited. The chances are that he remarks quietly, "Well, what did you expect?"

The modern cow horse, he tells you, is the fastest animal in the world for short distances. It is bred and trained to start fast and to reach top speed in a couple of jumps. Known as the quarter horse, it can't be beaten for distances of up to a quarter of a mile.

A lot of people didn't know that last fall when, after an argument with a rancher, Charles S. Howard of Seabiscuit fame entered his famous Irish sprinter, Fair Truckle, against a quarter horse in a special match race at Hollywood Park. The race was to prove, once and for all, the superiority of the thoroughbred. To make it interesting the two owners each put up \$50,000. Distance: 440 yards. Winner: Barbara B, a quarter horse, owned by Roy Gill of Tucson, by 2½ lengths.

Recently, too, M. L. Taylor of Long Beach, Calif., matched his quarter horse, Red Ben, against a racing motorcycle ridden by Bud Hare. The motorcycle won, of course, but for the first 90 yards the quarter horse was in the lead. The horse got away so rapidly the motorcycle couldn't accelerate fast enough to overtake it until just before the finish of the race.

What kind of animal is the quarter horse, anyway? It is an old breed now being brought back to national recognition by the American Quarter Horse





As calf springs from training chute, the cowboy and horse get some good practice in roping animals. Most ranches maintain special training area

Association and affiliated groups. It is a working animal with extraordinary cow sense, ideal for range and rodeo work. The fastest quarter horses are valued at thousands of dollars. Some enthusiastic owners use their best horses only for racing.

The quarter horse got its start in colonial days when the holding of impromptu races along village streets was a popular sport. The average street was hardly more than a quarter of a mile long and the horses were bred and trained for this distance. In the late 1700s the owners would sometimes bet 100,000 pounds of tobacco on the out-

come of a match race. The best quarter horses were distinguished in books of the period by the abbreviation C.A.Q.R.H., meaning "Celebrated American Quarter Running Horse."

Later on, when the long-distance thoroughbred race horses were imported, the "short" horses fell out of popularity. Then, with the opening of the West, it was found that the quarter horse was a perfect saddle animal for working cattle. No other horse had the early speed for racing after cows that were breaking away from a herd; no other horse could start as fast or maneuver as rapidly when rounding up calves for the branding iron.

Over the decades, the quarter horse was bred to Spanish stock and, in some cases, a small amount of thoroughbred was brought into the blood lines.

"The quarter horse," says Tom Harris, secretary of the Pacific Coast Quarter Horse Association, "is a compact, blocky animal with powerful muscles that give it the strength for short bursts of high speed. Most quarter horses are smaller than other saddle horses and stand no more than 14 or 14.2 hands high. Short heads, shallow mouths and small ears are common.

"A good quarter horse is tractable and

An overhead sprinkling system irrigates this grass pasture for quarter-horse brood mares and their colts







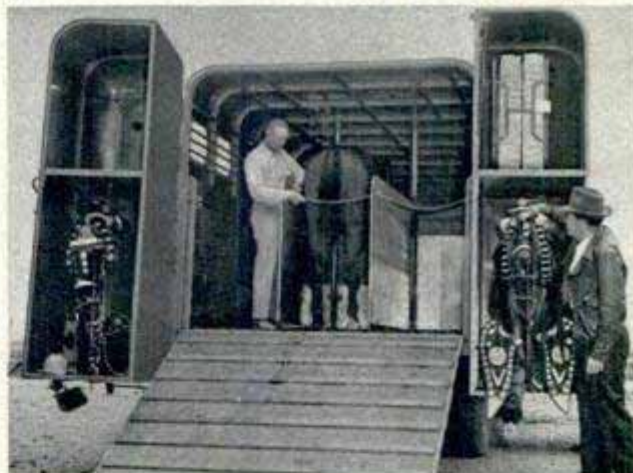
intelligent. He isn't skittish on a narrow trail and will stand quietly at the end of a hard run. At the same time he is always on the trigger, ready for action. The quarter horse is the top working animal on ranches all the way from east Texas to the Pacific."

Cattle ranching is pretty well mechanized these days. Ranchers use small aircraft for getting into town and back and they use trucks and jeeps for carrying salt blocks out onto the range and for hauling supplies and equipment. But no one has ever found a substitute for the man on horseback when cattle must be worked. Cowhands have tried jeeps and even helicopters but found the horse most efficient.

With a horse a man can push through heavy brush to round up stray animals and can work his way up into small ravines and gullies, combing the country. With a horse he can travel along narrow trails and across steep hillsides. Not even a motorcycle could ford some of the deep streams or pick its way through heavy timber. In the cattle country the horse is indispensable, even though it often rides to work in a horse trailer towed behind a truck or automobile.

In the old days, a big cattle ranch often grazed as many as 2000 horses from which riding stock

Look at 'em go! Ranchers come for miles to the quarter-horse races held at modern Del Rio, Tex., track



Door panels on horse truck have racks for saddles and other gear. Note folding bed. Below, cow pony changes mind of a deserter fleeing from the herd. Quarter horses are trained to start and stop quickly







Even a jeep would find rough going over some of the terrain on ranges

was drawn at need. Now the same ranch may require no more than 300 head, and yet, the same amount of work gets done. The reason is that second-rate range animals of the past have been weeded out and quarter horses have come into more general use. Instead of having to depend on natural forage, the horses now are fed hay, grain and oats, and this diet gives them the stamina and endurance for working from sunup to sundown, day after day. Now that all ranch horses are shod with the proper shoes, they no longer become tenderfooted.

Big outfits, such as the King Ranch in Texas, breed their own strains of quarter horses to bring out characteristics suited to the country. Medium-size animals seem to be preferred on ranches that are fairly flat, while an owner whose property is hilly or mountainous is apt to select horses with

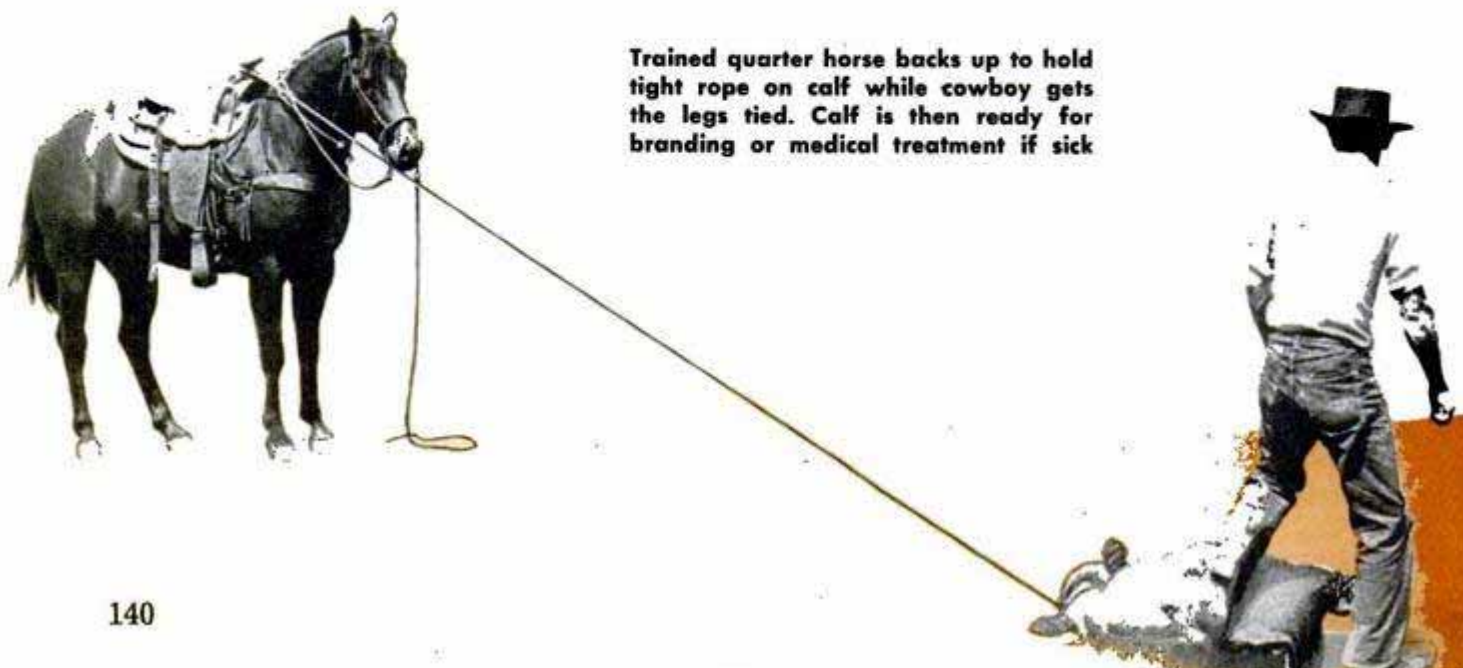
at least a little thoroughbred blood in them because of the longer legs, useful in climbing, that the thoroughbred line contributes. Too much "hot" blood, however, produces a nervous temperament that makes the animal unsuited for working stock. Some ranchers have found that it pays to design new shapes of snug-fitting saddles for quarter horses that do much climbing.

Another owner likes the heavier "bulldog" animal that excels at calf roping and rodeo work. The big horse can absorb the shock of the sudden tightening of the rope when a heavy calf is lassoed and stopped.

Quarter horses that are to be used for working cattle begin their schooling while they are still colts. First they are gentled by being led around with older horses, then they are gradually accustomed to the bridle and saddle. By the time they are two-year-olds they have become used to being ridden and the trainer starts to bring out their hidden talents. Most of the training consists simply in working the horse in practical maneuvers. The horse is urged into sudden starts, is spun around in tight turns and is pulled back in abrupt stops.

An exhibition by a champion quarter horse always attracts spectators. Western horsemen will drive miles out of their way to visit the W. F. Stoddy ranch near Whittier, Calif., just to watch foreman Charlie Shields ride TipTop in a demonstration. TipTop's movements are coordinated to

Trained quarter horse backs up to hold tight rope on calf while cowboy gets the legs tied. Calf is then ready for branding or medical treatment if sick







Quarter horse and cowboy show a rodeo crowd how it's done. Here the cowboy is getting ready



the desires of his rider and the horse responds to the slightest pull of the reins or pressure of the knees and feet. When a cow is breaking away from the herd, TipTop races ahead of it and dodges back and forth to stop the animal and turn it back. When a cow is to be separated from the herd, the horse moves in and seems to know which animal Shields is after, blocking its path so that the cow automatically moves off to one side.

The best part of the exhibition is the calf-roping demonstration in which TipTop stands quietly until a calf is released from a chute and then pounds after it at top speed. Shields throws his rope and the horse sets his feet and slides through the dust to a fast stop. The horse is stopping even before the rope has settled over the calf's neck and Shields dismounts while

(Continued to page 244)

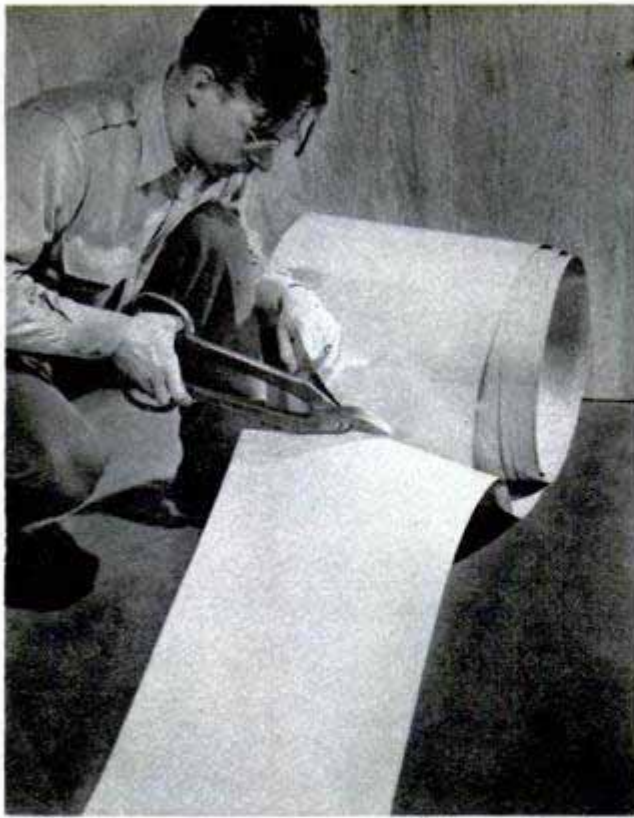
He lets the rope fly in perfect throw over the calf's head. His horse has already slowed up



As horse backs off to hold rope tight, cowboy leaps off to run and tie up the struggling calf





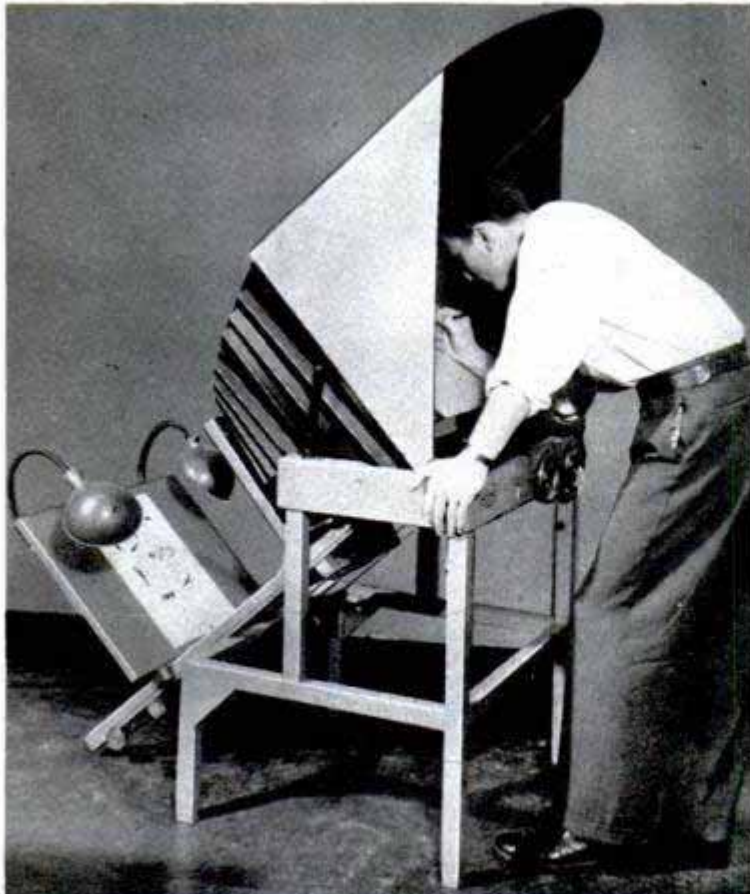


Photos courtesy Steelways

## Damp Cloth Cleans Enameled-Steel Wallpaper

Steel wallpaper coated with flexible porcelain enamel can be cleaned with a damp cloth. The new wallpaper is made of 32-gauge steel so flexible it can be rolled into coils with a minimum radius of six inches. It is cut with tin shears and can be fastened to the wall with cement, nails or trim strips.

The material is heat and acid resistant and is proof against rust, moisture, discoloration, insects and rodents. Designed for home use in kitchen, bathroom, laundry, recreation room and nursery, it is also being applied to hospital rooms and medical offices. It is available in several colors.



## Camera for Tracing

Tracings of drawings, photographs or lettering are made in enlargement or reduction with a tracing camera that projects the image on the underside of the paper, thus eliminating shadows and interference by the hand. Even solid objects such as packages, tools and other small articles can be placed on the easel and accurate drawings made by tracing the projected image. The device also can be used for projecting transparencies. No darkroom is necessary and the machine has a maximum enlargement and reduction range of four diameters.

☐ Although developed primarily for use in foggy weather at sea, radar equipment on ships is proving valuable for navigation on the Persian Gulf during dust storms that frequently cut visibility to one mile or less for prolonged periods.



## "Honor" Gas Station

When a motorist runs out of gasoline on the superhighway between Amsterdam and The Hague in the Netherlands, he helps himself to as many gallons as he needs from the nearest emergency self-



service gas station. The unattended stations were installed by the government. If the motorist hasn't enough change for the gas, he signs a receipt and sends the money later. In three months of operation, not one gallon of gas has been stolen.

## Glass Defies Sudden Heat and Cold

Suitable for use in sun lamps and laboratory glassware, a new type of glass can be heated to 1800 degrees Fahrenheit and rapidly cooled without breaking. The glass, developed by the Corning Glass Works, consists almost entirely of silica. It is made from a soft glass which is molded in the conventional way, then immersed in hot acid. When the glass is heated, the pores close and the glass shrinks to about two thirds its original volume. The final product can be heated to 1800 degrees without losing its strength.



## Pocket-Size Flash Unit

Small enough to be carried in the shirt pocket, a stroboscopic flash unit for photographers operates on four regular flashlight batteries. It uses a half-size gas bulb that has 25 percent more efficiency than previous models and has a life expectancy of 30,000 flashes. The four batteries will produce about 90 flashes, each having a light output equivalent to a "peanut" bulb. Weighing 2 $\frac{3}{4}$  pounds, the unit recharges itself in 12 seconds after each flash.

## Writing Board for the Blind

Blind persons can write neat, legible letters with the aid of a writing board equipped with a paper clamp and two guide lines, one for longhand and the other for printing. The board guides the hand of a sightless person so his words cannot run off the edge of the paper or his lines run together. It also is recommended by some hospitals for those who have a manual handicap which impairs their writing.

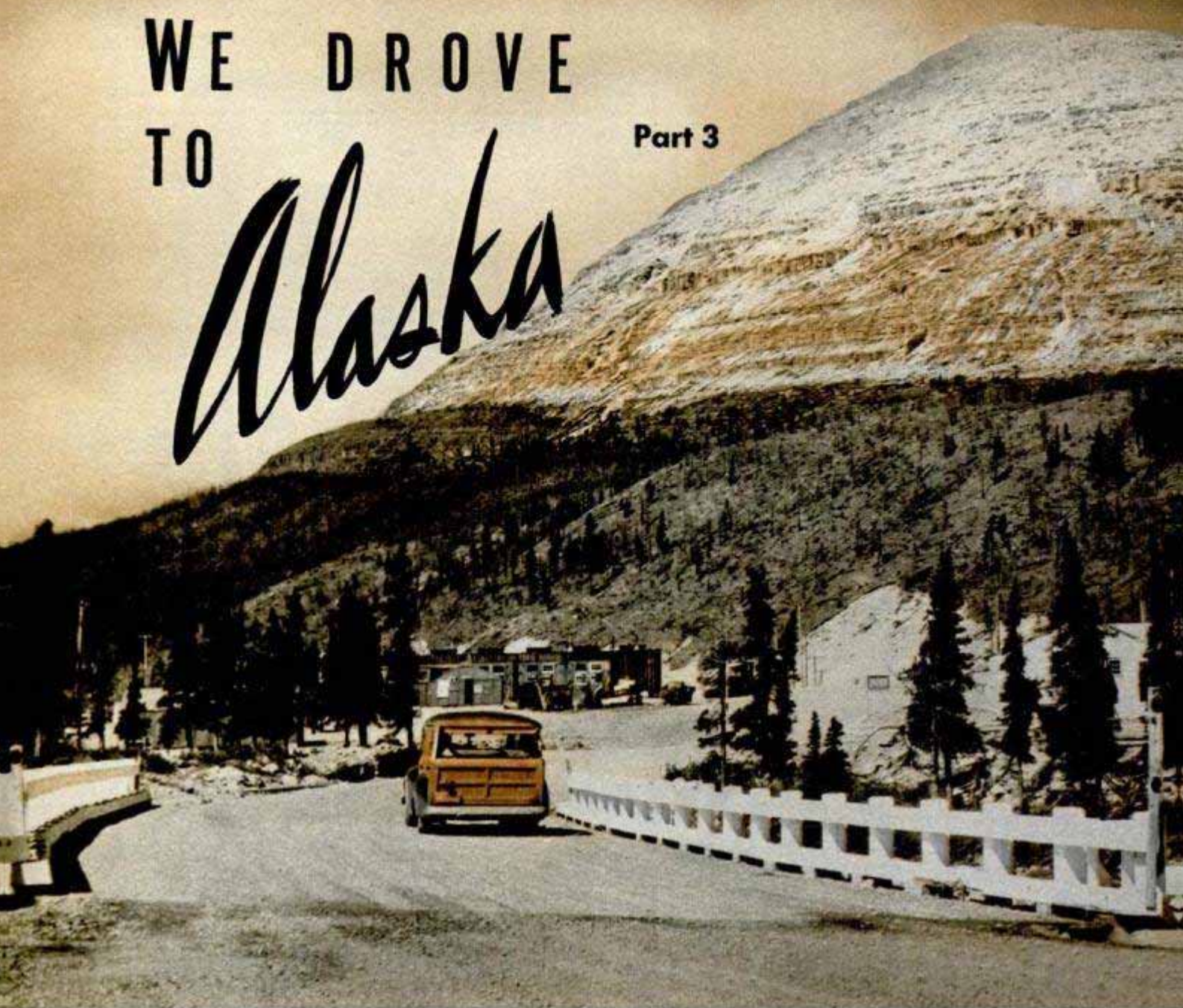




# WE DROVE TO

# Alaska

Part 3



By Aubrey O. Cookman, Jr.  
Photos by Frank Fritz

**A**LL THE WILD life and spectacular scenery we had been hoping for sprang into view during the final 600 miles of our drive from Chicago to Fairbanks, Alaska.

Surprised while moping along the Alaska Highway, a red fox pup whisked by our Plymouth, headed in the general direction

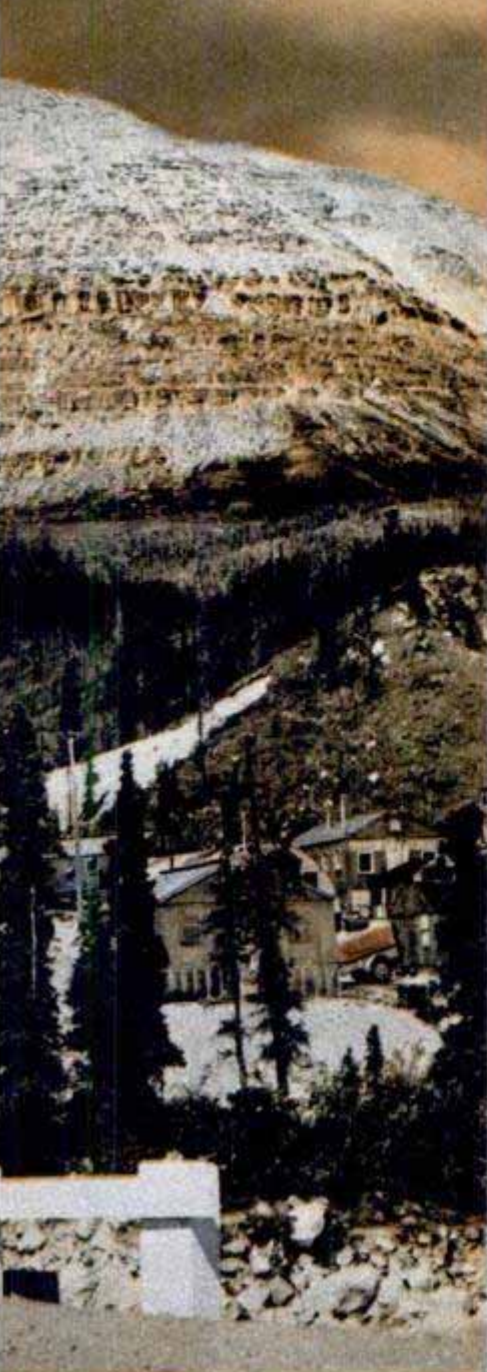
of Chicago. A large beaver matched our pace for some 75 yards before angling off into the brush. Most cooperative of all was a cow moose that politely paused while we stopped the car, then "mugged" by the roadside until photographer Frank Fritz made the shot that appears on page 145.

North of Whitehorse is the scenic cream of the entire trip. There are towering peaks of the St. Elias range, thickly coated with snow, miles of pines broken only by swift

Relics of town's wartime role, one of Quonset huts in background housed magazine's travelers at Whitehorse



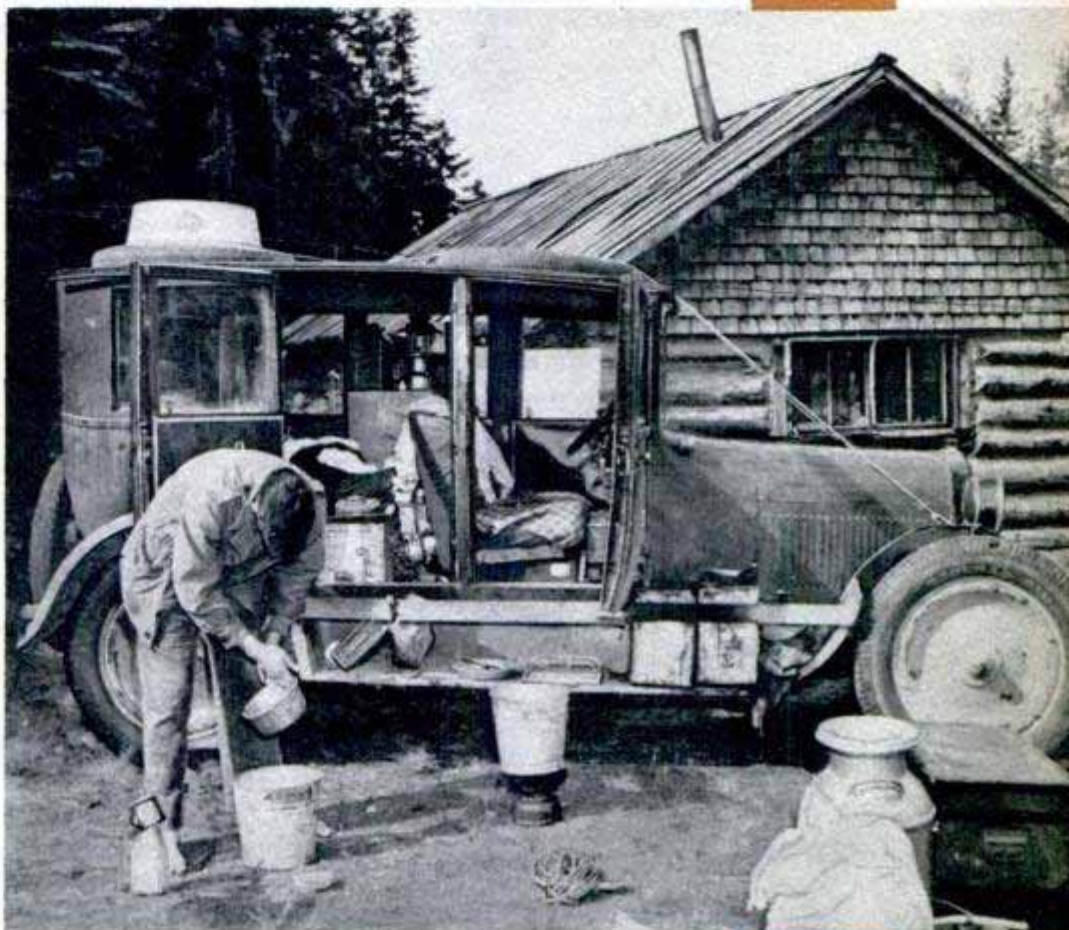




← Though mountains 9000 feet high tower above it for many miles, highway's greatest altitude is 4256 feet at Summit Lake, Mile 392. One of the road's 18 maintenance stations in Canada is in the background



Everything but the kitchen sink might describe the interior fittings of this 1923 Reo. Its young owner was en route to school at the University of Alaska. Cow moose below was photographed along the road



streams and beautiful lakes like Kluane, and one of the small but picturesque imprints man has made on the vast wilderness—an old trading post and a mission at Burwash Landing, Mile 1094.

The only town of any size along the Alaska Highway, Whitehorse, centers much of its activity around its Canadian air force and army detachments. The houses are neat, gaily painted and small, except for a couple of curious two and three-story log cabins. The 100-room Whitehorse Inn equals hotels in American cities of 50,000 population. Improvements nearing completion while we were there included a spacious ballroom and totaled \$300,000. The town also is an important link on Pan American Airways' northern route.

Whitehorse is an excellent stop for side trips. One is over the White Pass and Yukon Railroad, 110 miles to Skagway, a colorful gold-rush boom town half a century ago. It is a twisting six or seven-hour run over narrow-gauge tracks for a closeup view of spectacular mountain scenery that delights camera fans. The other choice, a ride on one of the big stern-paddle steamers on the Lewes and Yukon Rivers to Dawson, requires several days.

At Whitehorse, Maj. George K. Wade, senior superintendent of the highway's maintenance on its 1221 miles in Canada, said about 200 men, divided among 18 camps, are busy all year long keeping the road open.

Washouts in April and May give the most trouble. During 1947 most of them were around Coal River, Mile 533, but this year it was the Swift River section, Miles 680 to 770. Worst single delay of 1948 has been the







10 days it took to put a new bridge over the Lower Rancheria River, Mile 687. In addition to patrolling constantly for trouble spots, the crews regravell about 200 miles of the highway yearly.

Trucks and busses, Major Wade pointed out, are big users of the highway and their number is growing. Three young Indiana war veterans, for example, have applied for permission to send convoys of 10 to 15 trucks to Alaska the year around, hauling



Title to homesteads like this one near Fairbanks, above, is gained by living on the land three years, building a house and cultivating a prescribed acreage. Left, a "must" stop is Canadian customs office at Snag, where it was 81 degrees below zero in 1947

tractors, bulldozers and heavy construction equipment from midwestern cities.

There are two schools of thought on the best time of the year to drive to Alaska. One insists that the winter cover of several inches of smooth, hard-packed snow is an ideal surface. Some of these snow travelers claim they average 70 miles an hour and better with perfect safety. Snow is unquestionably easier on tires than summer's sharp, exposed gravel.

A few, however, admit they'd face a serious problem if a mechanical mishap stranded them along an isolated stretch at temperatures around 50 degrees below zero. As we discussed this, driving north from Whitehorse, going 171 miles before seeing another car headed in either direction, I confess our own preference leaned to warm weather, despite the dust and possible washout delays.

Take your time as you wind the 45 miles along the edge of blue Kluane Lake, Mile 1053, because it will prove one of the trip's unforgettable sights. We were there at sunset, when lights and shadows heightened the scene's rugged splendor. In the heart of wild, big-game country, it is reputed to be well-populated with caribou, moose and grizzlies. The lake has trout weighing up to 50 pounds.

At the end of our "loneliest"—and most beautiful—day of driving we

Faulty wooden culverts put the regularly used span at Mile 907 temporarily out of commission







This is what the Alaska Highway looks like near Fairbanks. The Tanana River is flowing along at the left

headed for the government-maintained camping ground at Lake Creek, Y. T., Mile 1152. In one of those once-in-a-million probabilities, we found the sole occupants to be Mr. and Mrs. L. C. Risk of Hillsdale, Mich., probably the only people we knew within several thousand miles. We'd first struck up an acquaintance with them two days before, helping to pull their car out of sand at a campground, a favor they promptly repaid by transporting our punctured spare tire on ahead to Rancheria for repairs.

A retired businessman, Risk and his wife are ardent motorists, spending a couple of months each year enjoying new scenery. In addition to complete cooking equipment, their car had a full-length double bed over the back seat, a comfortable precaution for wilderness touring.

We were impressed by the well-ordered appearance of Lake Creek, as we were by six other campgrounds en route. Each was near water and had neat stacks of firewood, which users are on their honor to replenish. Lake Creek had a green frame building also, with picnic tables and a cookstove inside, which could be an excellent haven in cold or wet weather.

We got an early start the next morning for the Canadian immigration and customs office at Snag, Mile 1206. It was there in 1947 that the temperature plunged to 81




Projected paving of the final 70 miles, next year, will eliminate hazardous dust clouds shown above

degrees below zero, the coldest ever recorded in the Western Hemisphere. It was a brief stop, with no inspection, and mainly involved relinquishing our vehicle permit, a safeguard against unauthorized sale of cars in Canada.

As a side light on traffic flow, the Snag inspector said 571 northbound and 240 southbound passengers cleared his station the month before, in addition to 25 Alaska-bound trucks and 71 trucks headed south.

END  
ALASKA MILITARY HIGHWAY  
ENTERING  
FAIRBANKS CITY LIMITS  
SPEED LIMIT 15 MPH  
PLEASE DRIVE CAREFULLY





Twenty-one busses also had passed the station.

On his recommendation we paused a short distance ahead at the Sourdough Inn, run by Miss Neeta Eakin, for a midmorning meal. A pretty, young woman in her early twenties, native of Portland, Ore., she is the lone operator of a 14-bed inn and restaurant in what seemed the middle of nowhere.

She doesn't think her role surprising. "I like plenty of elbowroom and beautiful scenery, and I get both here," she explained. "Besides, there are always new folks driving through and it is interesting to talk with them." Keeping the place neat and doing the cooking keep her busy, but she finds time to exercise an excellent shooting eye, as pelts on the wall attest.

At the Alaska border, Mile 1221.4, we began looking for the U. S. customs station, thinking about the probable penalty for illegal entry. Finally, some 40 miles into Alaska, a gas-station attendant ended our worries by explaining that the customs office was at Tok Junction, nearly 100 miles north of the border. Gasoline, by the way, costs about the same on either side of the border. Our previous gas at Burwash Landing had come to 56 and a fraction cents for a five-quart imperial gallon. The first Alaska pump charged 45 cents an American four-quart gallon. In Fairbanks, the price was 40 cents a gallon.

The final 100 miles to Fairbanks was probably the poorest section of the entire

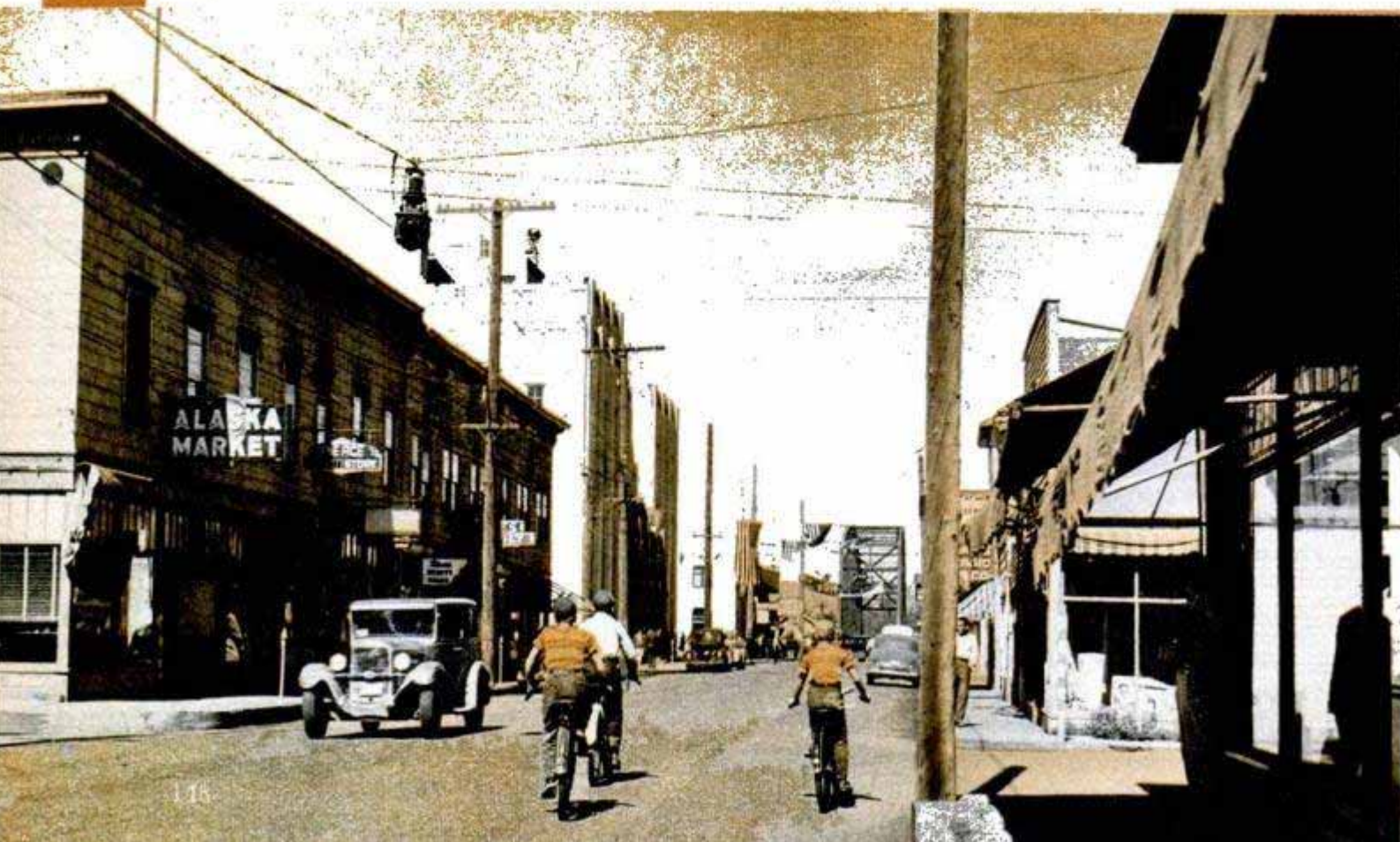
Alaska Highway. There the gravel road's ever-present dust changed from a minor nuisance to a driving hazard. Aggravating the problem was added traffic from local airfields and the Richardson Highway to Anchorage, the territory's biggest city. Passing around vehicles that were laying a constant dust screen wasn't safe, so we spaced ourselves as comfortably distant behind other cars as possible and groped along the rest of the way to Fairbanks.

That experience, happily, is one tourists probably won't have to face next year. Frank Nash, Alaska Road Commission superintendent at Fairbanks, said Congress had approved paving the highway's heavily traveled last 70 miles and the job would be done in 1949.

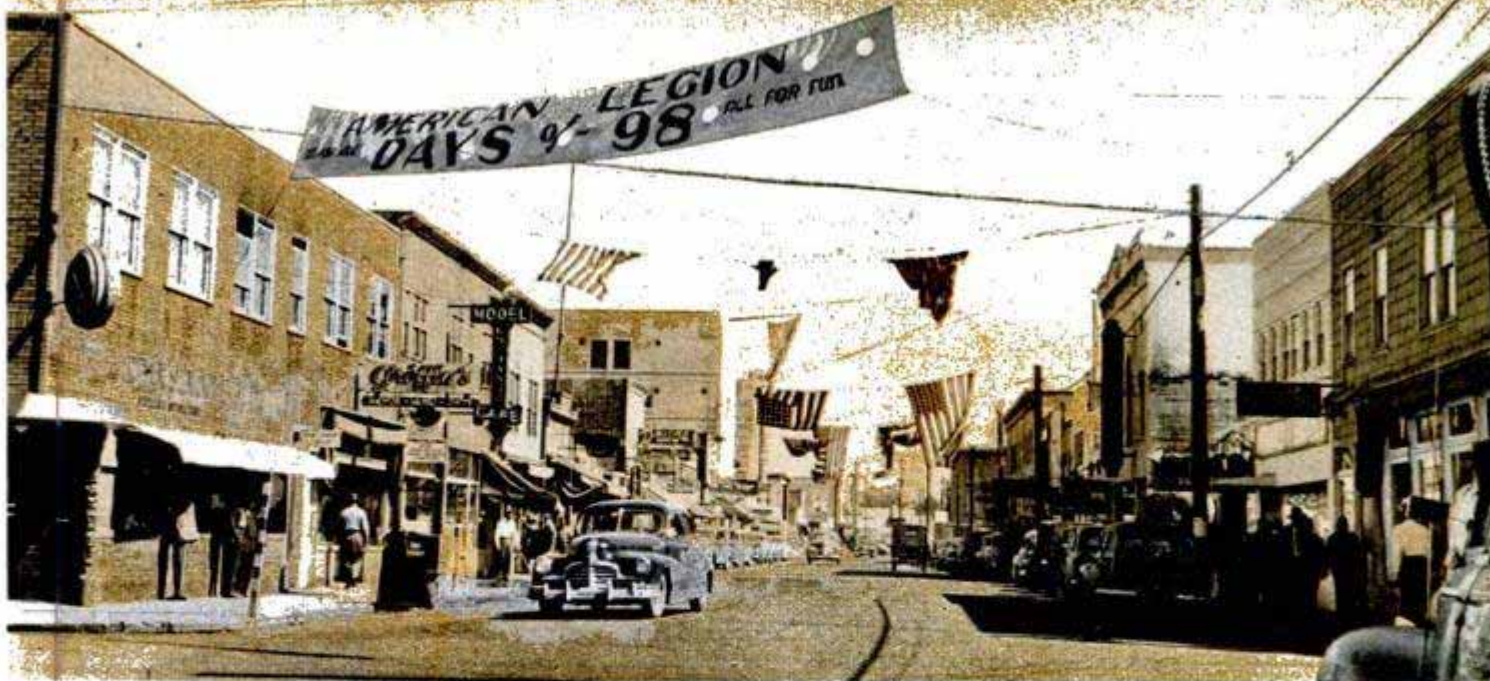
The sign marking the end of the Alaska Highway was a welcome sight. We had covered 4115 miles from Popular Mechanics' home office in Chicago in 13 driving days, with no ill effects that 48 hours of sleep in comfortable beds wouldn't correct.

From our experience we offer these suggestions: (1) don't start unless you are 100 percent certain of your car mechanically, whether it is old or new; (2) have good tires, preferably six-ply; (3) wear comfortable clothes, remembering that Alaska temperatures will average in the 60s and 70s during May, June, July and August; (4) carry mosquito repellent, and tent netting if you camp out; (5) allow plenty of time, plan on making no more than 200 to 300 miles daily to enjoy the trip; (6) take

Only 125 miles from the Arctic Circle, but well-stocked shops line both sides of this street in Fairbanks







Because of a sizable military population nearby, Fairbanks is much busier than most towns of 8500 people

along several hundred dollars in safe and easily negotiable form for expenses and emergencies and (7) accept the fact that some nights will be spent in very plain accommodations.

Our 1948 Plymouth behaved perfectly all the way, so we had no problems on that score. The brand-new tires were six-ply, but we collected six punctures by driving too fast over gravel and clay. After slowing to about a 40-mile-an-hour average we had none.

Blue jeans, khaki shirts, Army shoes and lightweight jackets proved useful all-purpose touring clothes. Mosquitoes, while never the menace we feared, were made much less bothersome by a repellent smeared over exposed skin. War-surplus head nets were also helpful.

Expenses for two men from Chicago to Fairbanks ran about \$300, with gasoline accounting for about a third. Food and lodging were the next two most expensive items. We kept the bulk of our funds in U. S. and Canadian travel checks, which were readily accepted everywhere.

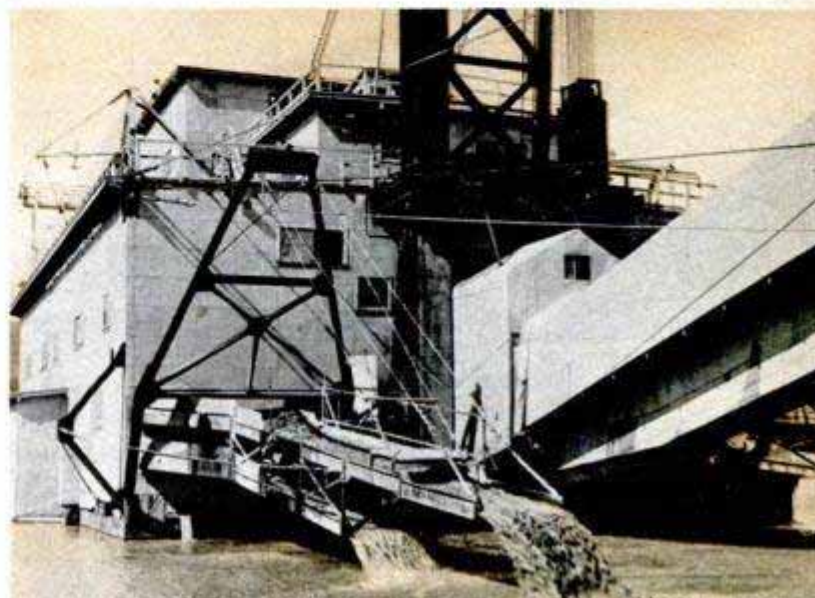
We were fortunate in finding excellent and reasonably priced tourist cabins, particularly at Calgary and Edmonton. Once the next day's driving goal is determined, it is a wise move to telephone ahead—and there are telephone facilities all the way—for accommodations. Carrying camping equipment affords an alternate solution in case space isn't available.

Starting in late June should insure no delays from washouts and promise good weather. Nature's attractions are also putting on a colorful show at that time of the year. After August there are many nights when, for most people, sleeping outdoors

(Continued to page 248)



Modern counterparts of the old prospectors are the enormous gold dredges working north of Fairbanks. Gravel is scooped up and carried inside where the ore is separated, and waste is expelled at the rear



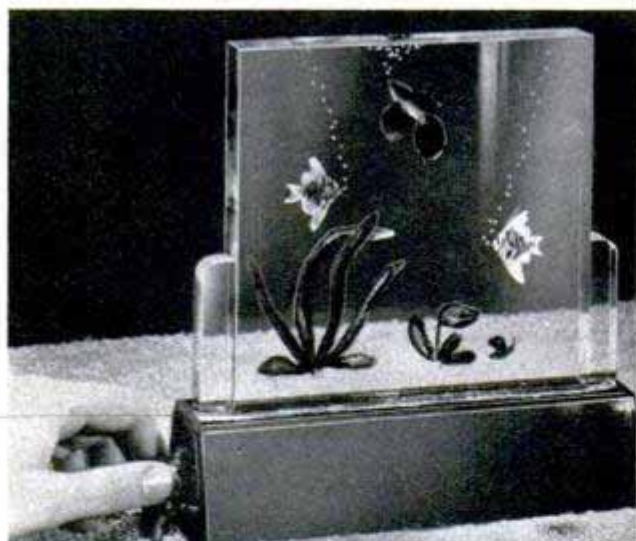




### Mobile Blacksmith Shop Makes On-the-Job Repairs

Blacksmith and welding jobs, too big to be taken to a shop, are repaired on the site with a truck equipped with a forge and all the necessary tools. The mobile shop is

operated by Kern County, Calif., and covers jobs over an area of 8170 square miles. The truck-shop was designed for such areas that require on-the-job repairs.



### Edge-Lighted Plastic Forms Novel Lamp

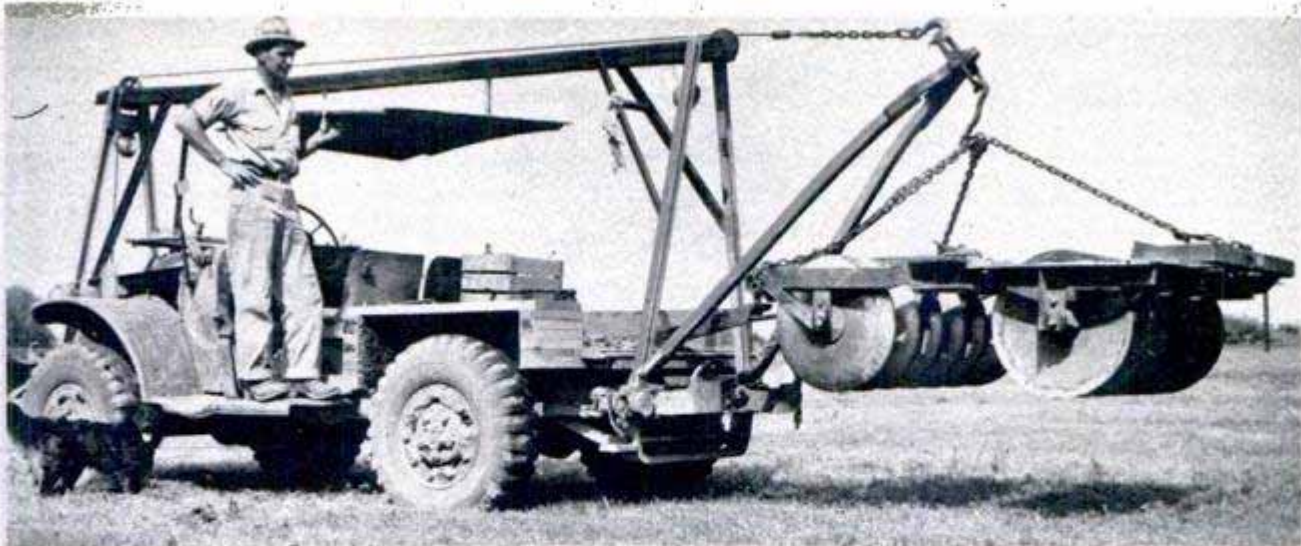
Adding decorative lighting to hall tables or corner settings, an edge-lighted plastic carving shows a group of tropical fish in natural colors. The fish are actual size and are hand-carved for realistic reproduction. The light is hidden in the black base. Because of its low wattage, the light can also be used as a night light.



### Synthetic-Rubber Gas Nozzle Prevents Explosions

Made of static-conducting synthetic rubber, a new gasoline-hose nozzle outwears metal nozzles two to one and prevents fire or explosion from static electricity. No metal reinforcement is used in the flexible hose. It can't mar automobile finishes and its smooth lining reduces drip and turbulence. The nozzle fits any type of valve.





### Tractor With Lift Frame Built From War Surplus

By converting an Army-surplus weapons carrier, Liggett Richardson of White Swan, Wash., built himself a versatile tractor that not only pulls standard farm implements, but also picks them up for traveling over the highway. A hinged A-frame at the rear of the truck raises the implements and holds them off the ground when not in use. The cable from the front winch runs over pulleys on a horizontal girder above the truck body to raise and lower the A-frame. The tractor's complete cost was about \$750. Richardson now has a machine that plows, disks, cultivates and ditches.



Top, built from an Army weapons carrier, this versatile tractor not only pulls farm implements but lifts them for road travel. Above, A-frame drops disk to the ground ready for use



### Blindfolded "Pilot"

Guided entirely by radio signals, a blindfolded "pilot" carries a model plane through a maze of chairs, simulating off-course mountains, in a demonstration of on-the-beam flying. It is one of the techniques used by lecturer Glen Morris to popularize some of the scientific aspects of aviation. For it, he has devised a miniature radio range station that can be set up on a stage. Morris uses a volunteer pilot from the audience for the demonstration after explaining how the beam signal functions and how it is followed.

☐ About half the nation's output of primary aluminum is produced with power generated at the Bonneville and Grand Coulee Dams on the Columbia River.



Because he liked to do chemistry experiments in his home workshop, Fred V. Richardson of Victoria, B. C., now has a prosperous cracker business. Each year his 30 employees turn out millions of Christmas crackers — not the eating kind, but those cylindrical party favors that bang when cardboard strips at the ends are yanked. Essential to the Christmas celebrations in British Columbian homes, the crackers are popular all over the world for

other festive occasions. They consist of cardboard tubes covered with gaily colored papers and containing favors, paper hats and fortune-telling cards.

Richardson first made crackers as an experiment with the chemicals in the snappers. Since 1939 he has been producing them commercially. Several machines used are of his own design. No longer limited to Canada for a market, Richardson now sends his crackers as far as South Africa.

## cracker maker

his business outgrew the home workshop



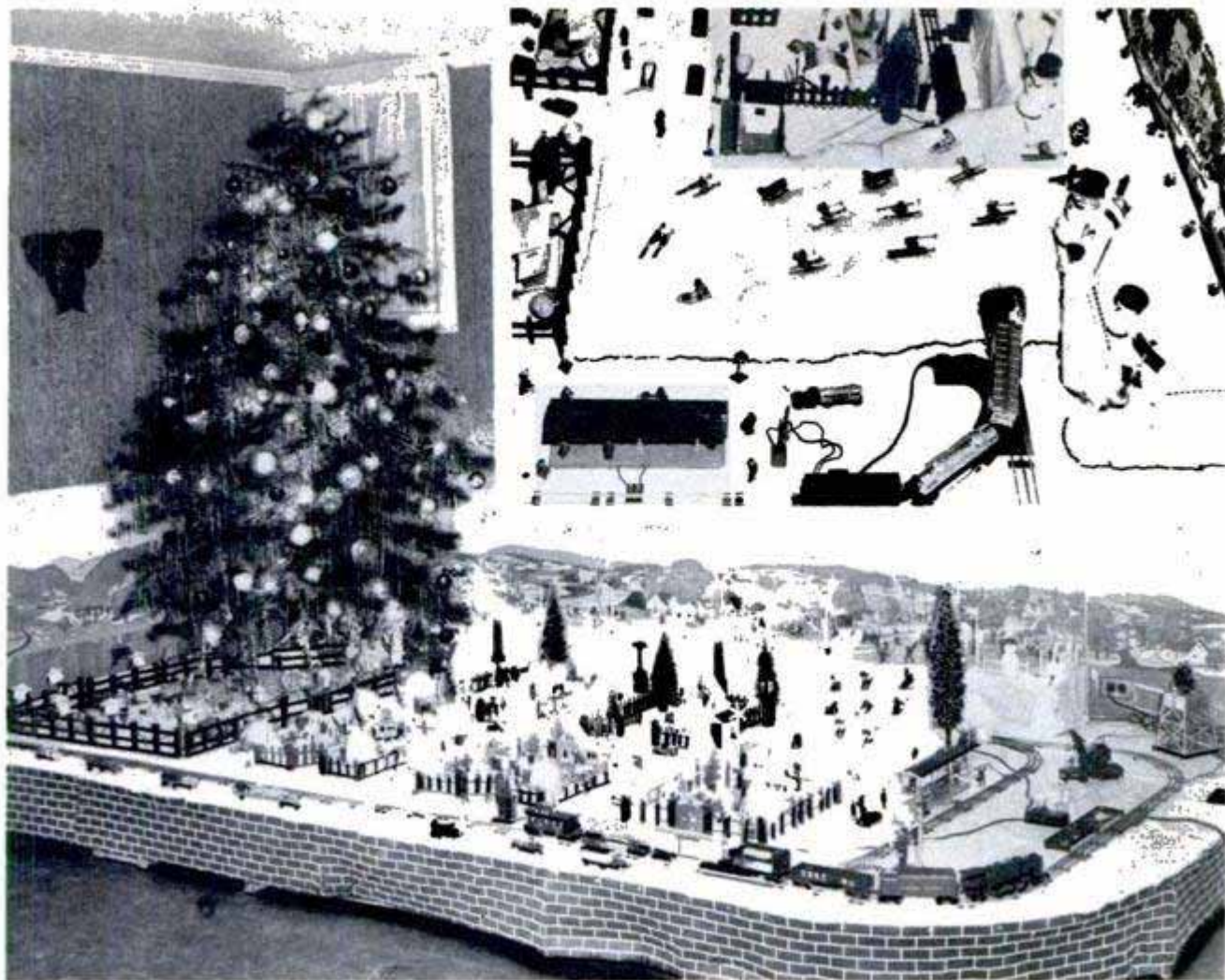
Crimping machine designed by Fred V. Richardson and built in his shop puts the crimp in sheets of crepe paper used in making the crackers. Below, "squeeze" machine puts the final touch on these party favors



Gaily colored Cellophane is laid over the crimped paper so just the fluted ends are thrust out. Below, core of the cracker is cardboard tube which contains paper hat, plastic toy and "your fortune"







## Christmas Town Beneath Tree

Christmas begins a month early for Nicholas Del Balso of New York, who starts in November to build a complete town beneath his Christmas tree. The scene is a miniature village in winter and includes cardboard houses, figures skiing

down a cotton hill, a railroad, automobiles and snowmen. Del Balso builds the village from materials he has accumulated for 20 years. The project is assembled on a platform measuring 10 by 20 feet. The fences are made of twigs and dowels; the lights are tree bulbs, and most of the figures and vehicles came from the dime store.

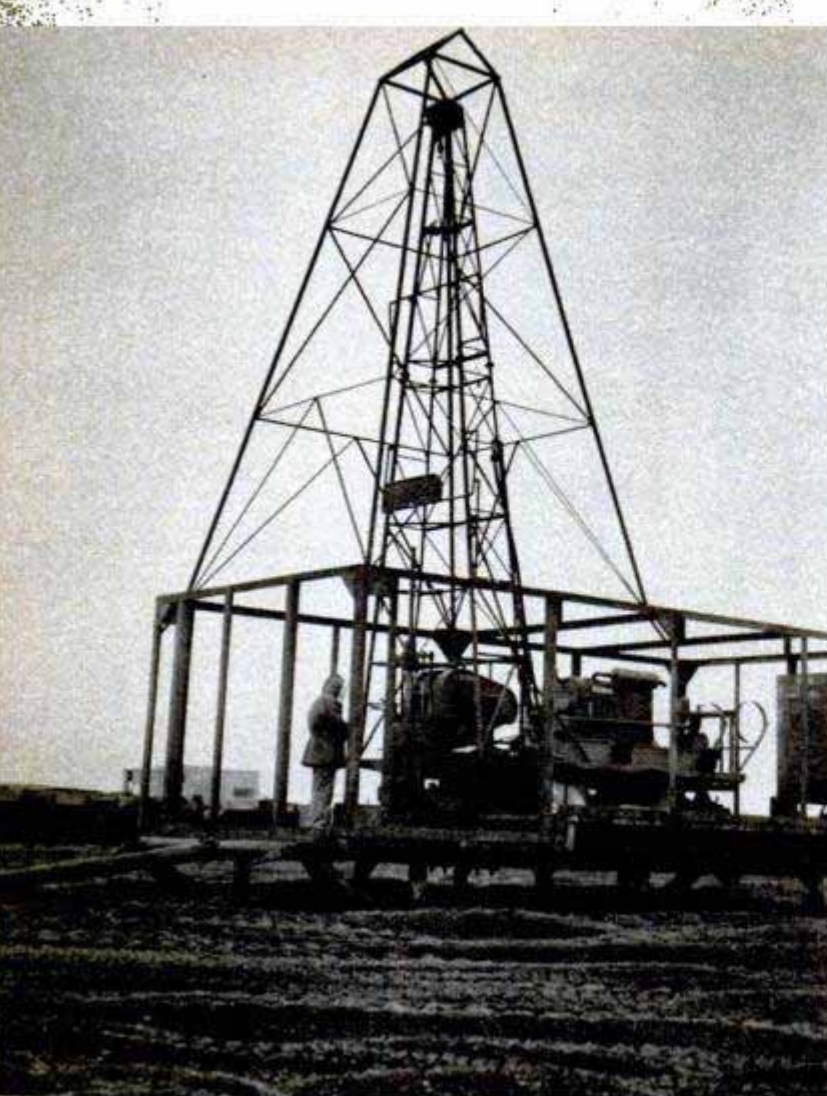


## Bricklayers' Brackets Hold Sill Strips

Bricklayers save time and labor in setting brick sills with a pair of adjustable brackets that clamp the edging strip in place and permit accurate adjustments by means of thumbscrews. One man can make the necessary adjustments for a perfectly aligned sill in a few minutes, saving considerable time and labor as compared with the usual methods. When not being used, the compact brackets fit easily in the tool kit.

Every day new products for homes and workshops, farms and factories, are appearing on the nation's markets, and every month you'll find them described in Popular Mechanics. For additional information about any of these products, write to Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois





Official U. S. Navy photo

Left, the skeleton of an enclosed portable drilling rig. Plywood housing and specially insulated canvas will protect workers from intense cold. Right, seismograph "shooter" placing fuse in a charge of explosives



## BLACK GOLD UNDER ARCTIC ICE

By Aubrey O. Cookman, Jr.

**O**ILMEN expect their troubles underground, but they are experiencing something new in northern Alaska. There, where the United States Navy is directing an extensive search for petroleum, they face a grim day-to-day battle above-ground as well.

The Navy says only that its Far North oil sleuthing has been "promising"—with no hint of having discovered the 400 to 500-million-barrel reserve believed necessary to make the operation economically self-supporting—but they are unquestionably learning valuable know-how in cold-weather petroleum exploration. Congress has granted \$14,600,000 for the search.

Before they even scratch the surface, oil detectives have to contend with weather that drops under 50 degrees below zero and winds that whip across the arctic waste at 70 miles an hour. In the 35,000-square-mile Naval Petroleum Reserve No. 4, Petfour to the Navy and oilmen, there are no rail

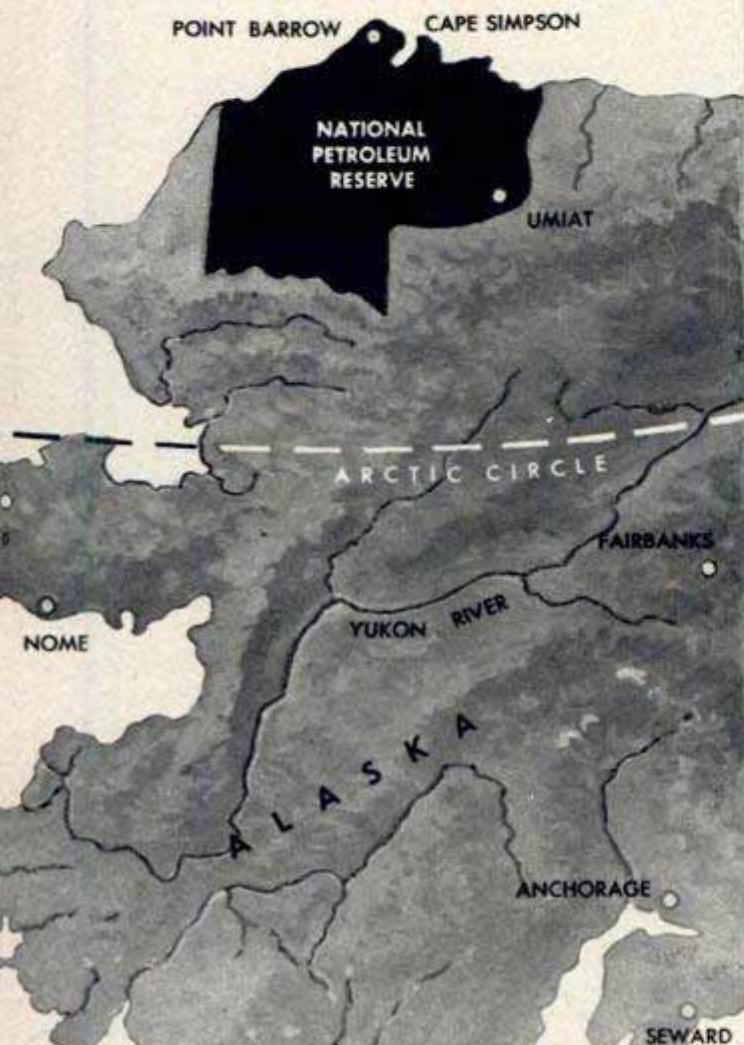
lines, roads or even trails. Every piece of heavy equipment, tools of the trade, has to be freighted hundreds of miles over ice and snow on tractor-towed sled trains. Summer thaws change that same surface to a marsh of knee-deep mud.

After the labored effort of getting it to the scene, the equipment runs into more difficulties. Drill bits that have to chew their way through ground frozen as deep as 900 feet last only half as long. With precision work sometimes making gloves impractical, there is the constant, painful danger of metal surfaces freezing to the skin. Wounds heal slowly in the cold, where the blood's reduced circulation promotes the development of gangrene. To solve this problem, the Navy is trying to develop a plastic coating for metals.

A special kind of dirt, needed in making mud that is circulated in drill holes, has to be brought all the way up from Merced, Calif. Twenty-seven tons of it were hauled



Ice, snow, high winds and temperatures 50 degrees below zero are just a few of the problems facing the U. S. Navy in its search for vast, hidden oil deposits on our 35,000-square-mile arctic reserve

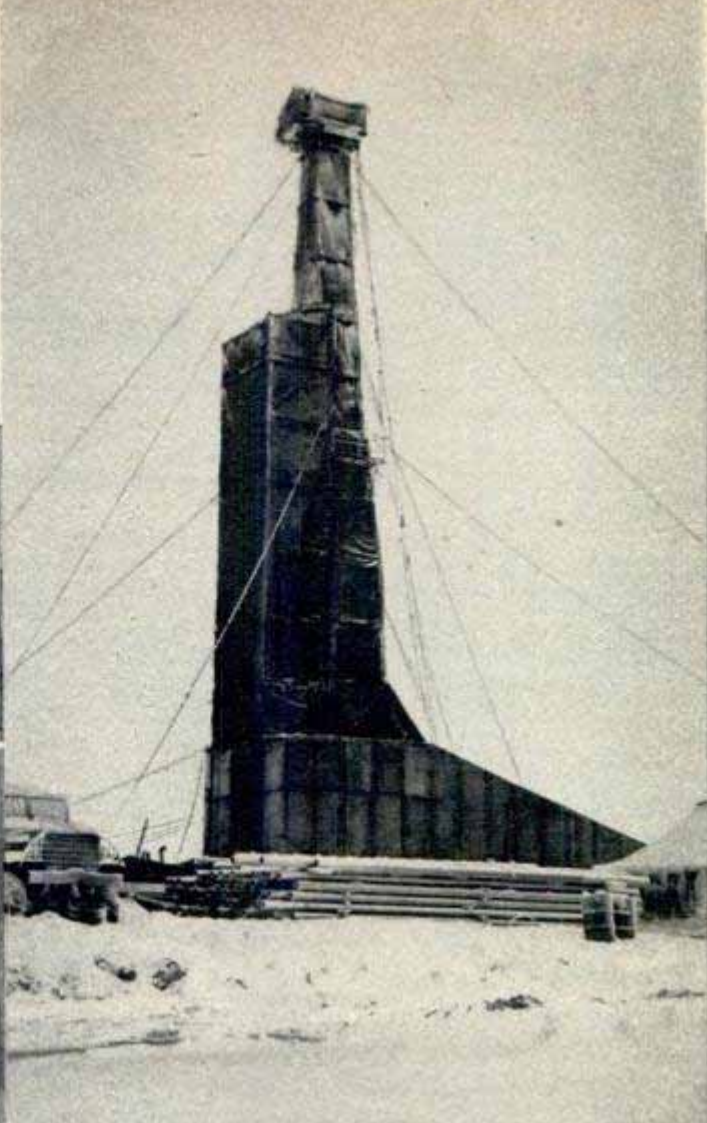


in recently by a water, rail and air route.

Another problem is moving up as much as 40,000 tons of supplies on the single flotilla of supply ships that can outrun the ice hazard each year. Barrow has no dock and the entire cargo has to be raced ashore in a week, before ice can lock the ships in for the winter. It is virtually an invasion exercise for supply ships, transferring about twice as much cargo as any beach received in wartime.

Geologists for more than a quarter of a century have considered northern Alaska potentially oil-rich. It has thousands of feet of sedimentary rock of marine origin, a formation similar to those in Montana and the Gulf Coast area, and Eskimos early told of surface oil seepage.

On the heels of a short-lived exploration by two California oil companies, President Harding, in 1923, set the area aside as a government reserve. For the next three years U. S. Geological Survey parties roamed the area, mapping seepages and



Official U. S. Navy photos

Exploration at Petfour continues the year around. For winter, equipment has to be weathertight against temperatures 50 degrees below zero. Below, drill rig on a Weasel, the "jack of all trades" in the Arctic







Always on guard at the remote Barrow base is "cat"-borne fire equipment, manned by a former Seabee officer

river outcroppings. Despite encouraging results, the project was dropped in 1926 because of new finds in the states and the Barrow Basin's cold weather.

It stayed dormant until revived by wartime oil shortages in 1944, when a Seabee battalion was sent to Alaska's northernmost tip to build a base, set out landing strips and reopen the oil hunt. A new technique, trimetragon aerial photos, was used in making a preliminary base map of the reserve. The very first test well—spudded in at Umiat in June 1945—revealed oil in small amounts at several levels.

Shortly afterward, the work was put on its present basis with civilian firms doing the actual exploration and drilling under Navy contracts. One of the civilians in charge is former Navy captain, Bart W.

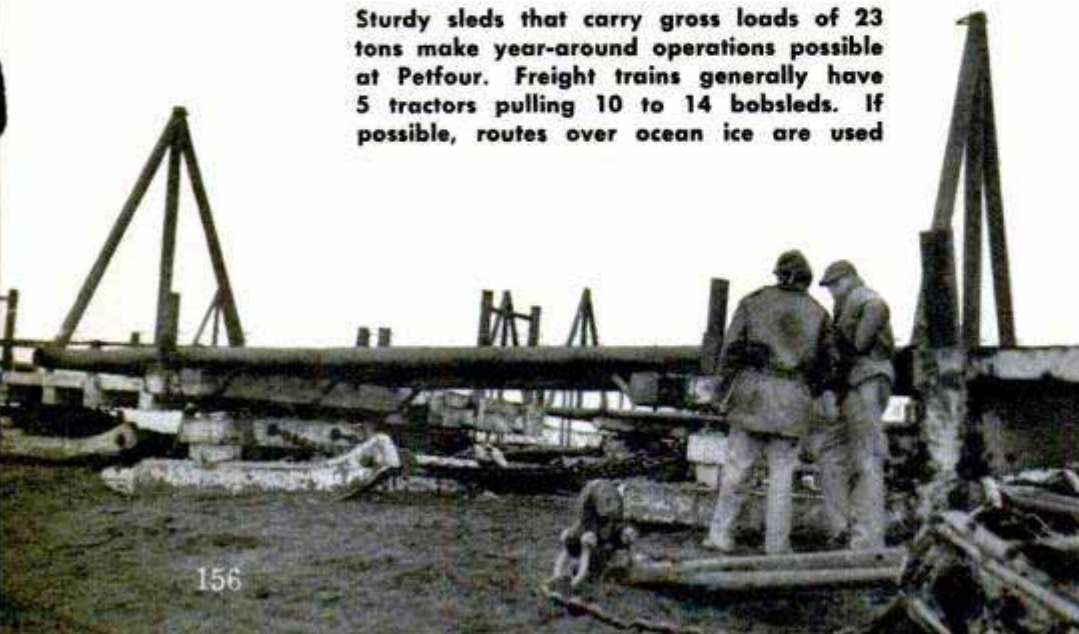
Gillespie, who headed the wartime Seabee venture there. At the top is Commodore William G. Greenman, director of Naval Petroleum Reserves, who frequently shuttles by air between Washington and Barrow to check the progress. From 300 to 400 men are based at Barrow, Alaska, on the Arctic Ocean.

Virtually all except light cargo movement has to be completed during the coldest months, January, February, March and April, since most of the sled routing is over Arctic Ocean, lake and river ice. Ski-equipped bush planes fly out first, scanning carefully for traces of weak ice and dropping weighted stakes with red flags every mile to mark a route.

Next a Weasel-trailer combination on skis moves out over the air-marked route.

Pressure cracks and glaciers are an ever-present danger, so the two-man crew is required to radio reports back to the base every morning and evening, with the Barrow station always monitored to pick up emergency calls. Visibility is generally less than a mile during this twilight period. As the Weasel pushes ahead, further marking the route and testing the ice with an auger, food and gasoline are air-dropped to its occupants.

Sturdy sleds that carry gross loads of 23 tons make year-around operations possible at Petfour. Freight trains generally have 5 tractors pulling 10 to 14 bobsleds. If possible, routes over ocean ice are used





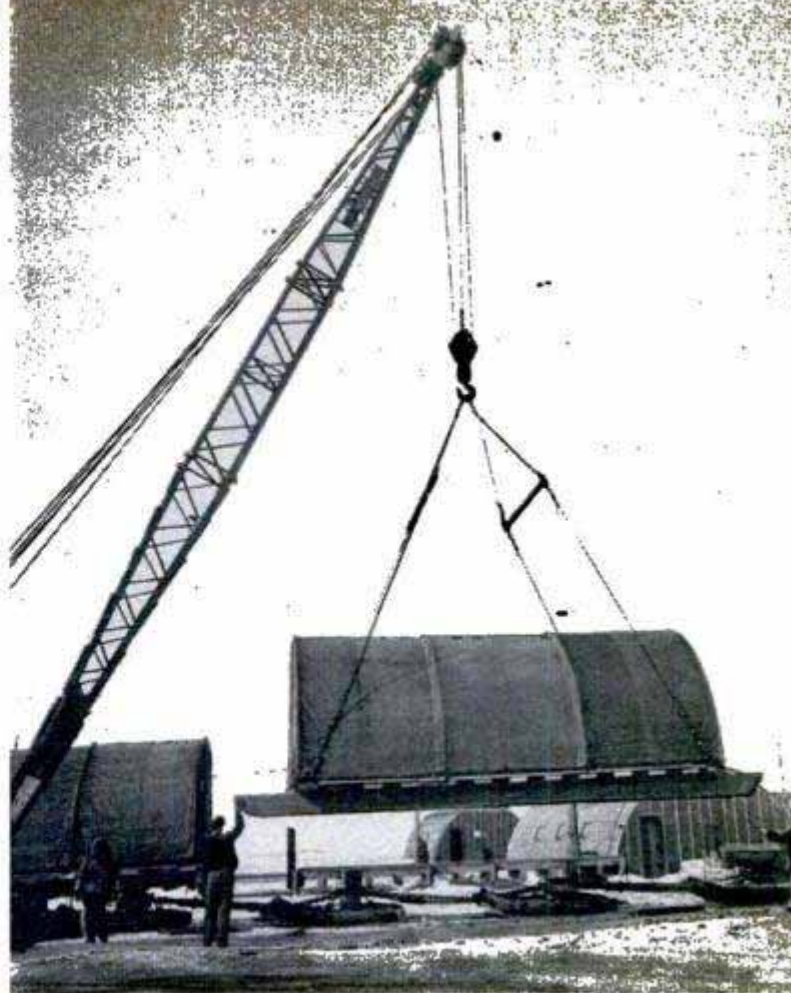
Behind the scout Weasel follows the supply train, usually composed of 5 tractors pulling 10 to 14 bobsleds, each with a net capacity of close to 18 tons. They move from 5 to 15 miles an hour for 15 hours daily, sometimes on routes that extend 400 miles or more from Barrow. Wanigans, 16 by 24-foot wooden shacks mounted over two sleds, provide sleeping quarters and a galley.

Though the Barrow Basin's yearly snowfall is only about 15 inches, it remains dry and powdery, swirling into drifts that make it necessary to build the sturdy sleds high off the surface. This also makes it dangerous for men to venture far from shelter or travel any distance without a compass.

Three test wells have been drilled, the most recent at Simpson No. 1 going below 7000 feet and showing signs oilmen regard as promising. Low-viscosity oil, at the rate of 24 barrels daily, has been pumped from a shallow hole in the permafrost at Umiat.

To enable men to work at extreme temperatures, derricks and drilling rigs are protected with plywood housing and specially insulated canvas. Dynamite charges have to be nonfreezing, water-resistant and packaged to withstand severe exposure. There are no dry storage magazines and the boxed explosives have to be stacked outdoors like cordwood.

Every new technique of expediting oil exploration is used at Petfour. The flying magnetometer, which is suspended from a plane, flying at low altitude, to gauge the magnetic strength of the earth over which it flies, was first tested in Alaska. The measurements, electronically recorded within the plane, can be translated into contour maps that reveal in some areas oil-bearing geological structures. The device



Lowering mobile hut onto sled runners. Materials for all construction have to be shipped from the U. S.

doesn't locate oil, but it can point a finger to its probable presence.

An added scientific aid is the gravimeter, which measures the earth's gravitational pull as a clue to rock structure and denseness in the area.

The Navy is playing a hunch in the shadow of the North Pole, backed by the best scientific reasoning available. If it proves right, we may own an ice-capped oil trove that ranks with the richest in the world.

Only about 15 inches of snow fall yearly in the Barrow Basin, but drifts make plows for lead "cat" a must

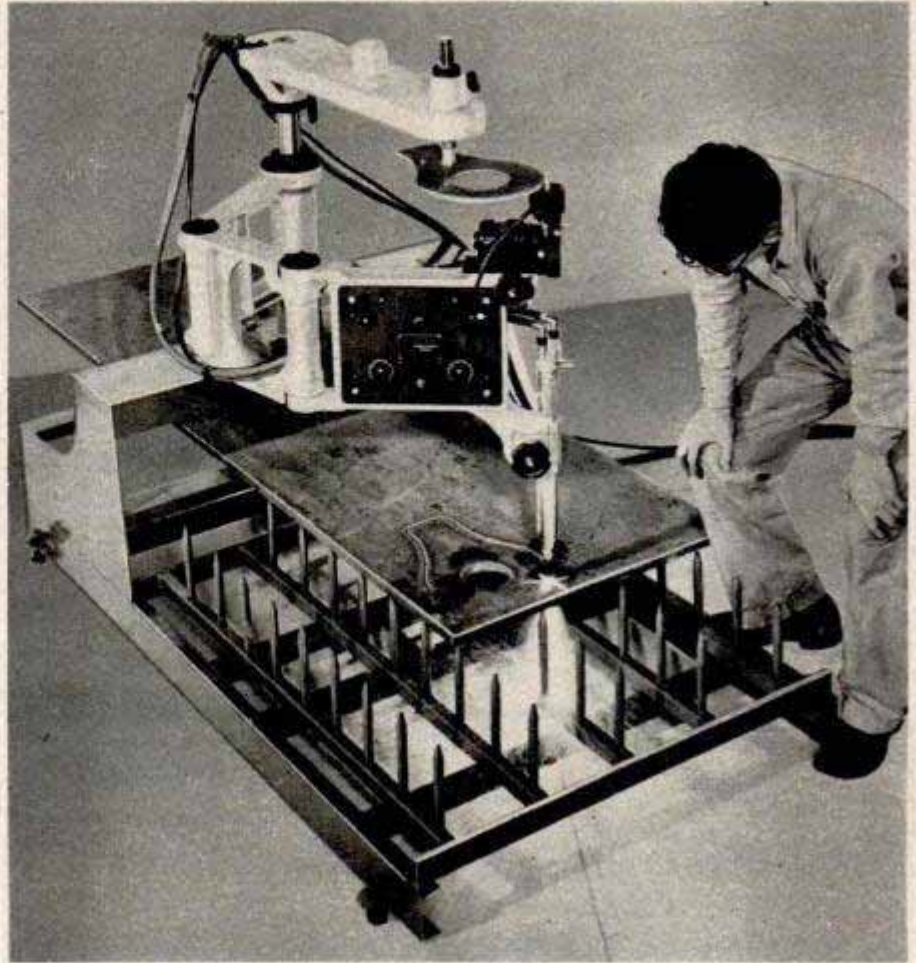




# TALKING



**CLAMP-ON STOOL** gives drill-press operators and other industrial workers a chance to relax on the job. The stool has a padded seat and can be adjusted six inches both laterally and vertically. Another model of the same stool can be used with a barber chair

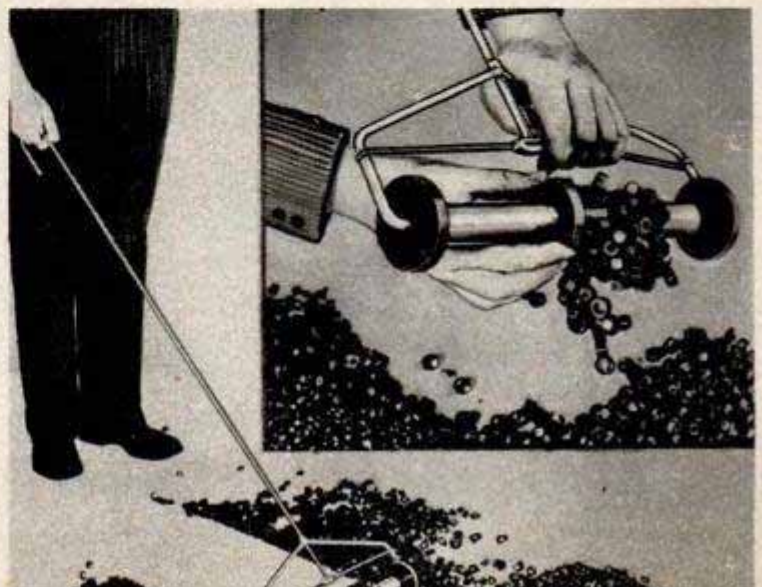


**FLAME CUTTER** melts through metal plate to cut out intricate shapes. A tracer follows a master template in guiding the cuts. When a steel template is used, the tracer follows the edge magnetically to make the flame-cutting operation automatic. Templates that are shaped from plywood also can be used

**SAW "TABLE"** for portable saw consists of sliding arms that clamp to a sawhorse. Saw can be operated with one hand and adjusted to make bevel cuts to 45 degrees

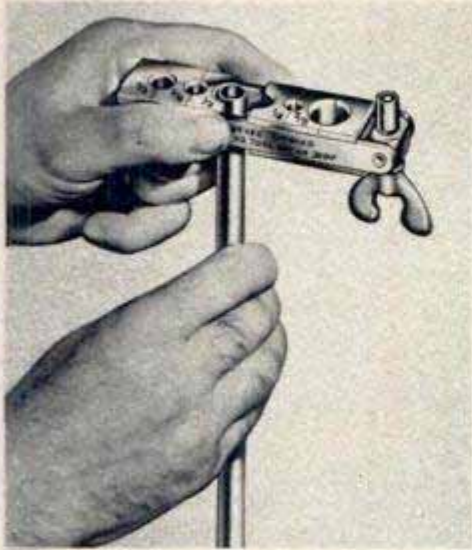


**ROLLING MAGNET** picks up small objects made of ferrous material. The rotary magnet, which is permanent and requires no electric supply, is mounted on plastic wheels. The operator removes the load by pushing a plastic wiper ring along the tube, which forces all the material across a nonmagnetic area





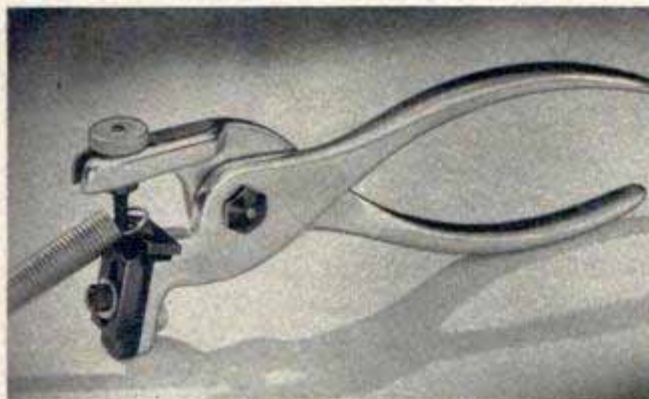
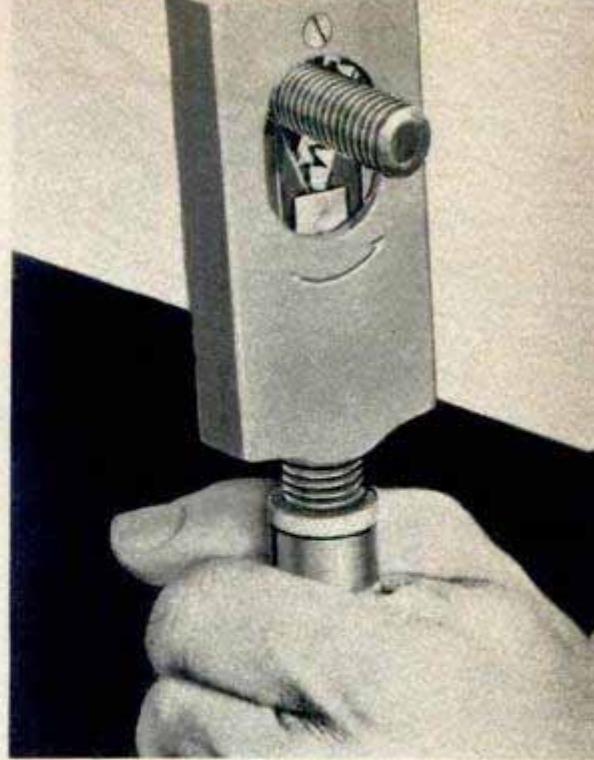
# SHOP . . .



**FLARING TOOL** has a series of sliding dies for soft-metal tubing of standard diameters. Tubing is clamped between the two halves of the proper die, and the yoke slid over the die. When the operator screws down the cone firmly, the die forms a precise 45-degree flare without scoring the soft tubing



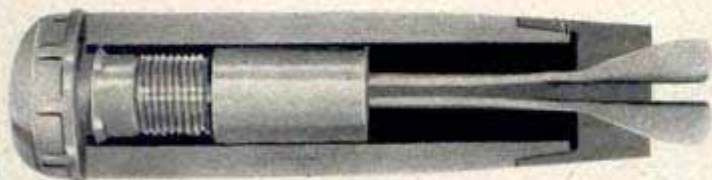
**THREAD CLEANER** scrapes rust and dirt ↑ from bolt threads. The cleaner reconditions right or left-hand threads on bolts or studs up to 2-9/16 inches in diameter. A locknut on the handle adjusts the cleaning blades to size. Flattened and damaged threads also can be restored with the tool



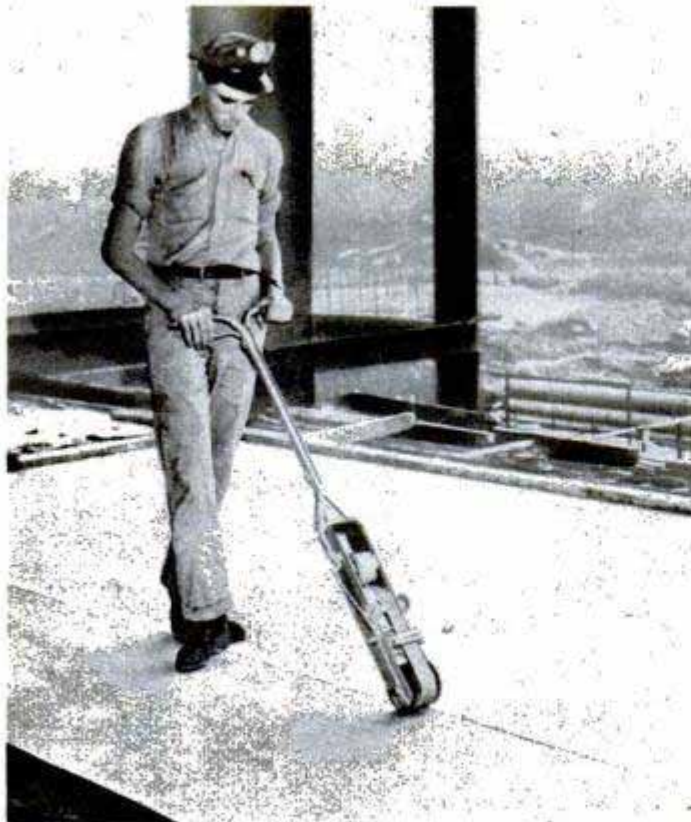
← **SPRING LOOPER** forms the last coil of a spring into a hook or loop. When the handles are squeezed, a forming punch and anvil shape the loop. Tool forms single or double loops and hooks, and side loops

↓ **ADAPTER FOR DRILL PRESS** converts it into a jigsaw that cuts wood, light metal, plastic and leather. The adapter comes complete with table top and saw blade. It can be used on any speed drill press up to 3800 revolutions per minute. Rotated 90 degrees, the saw will rip any length

**TOOL HANDLE** has a gripping mechanism that operates similar to a drill chuck. Any shape shank can be slipped into the mechanism, which is tightened by turning the hilt. The handle can be installed on most hand tools such as hacksaw blades, various sizes of files, reamers, bits, scrapers or razor blades







### Tape Seals Paper Blankets to Cover Fresh Concrete

Applied by a roller machine, a masking tape provides a bond between strips of asphalt paper used to cover newly poured concrete. The concrete is covered to cure it properly by retarding evaporation from the surface. The strips of paper are held

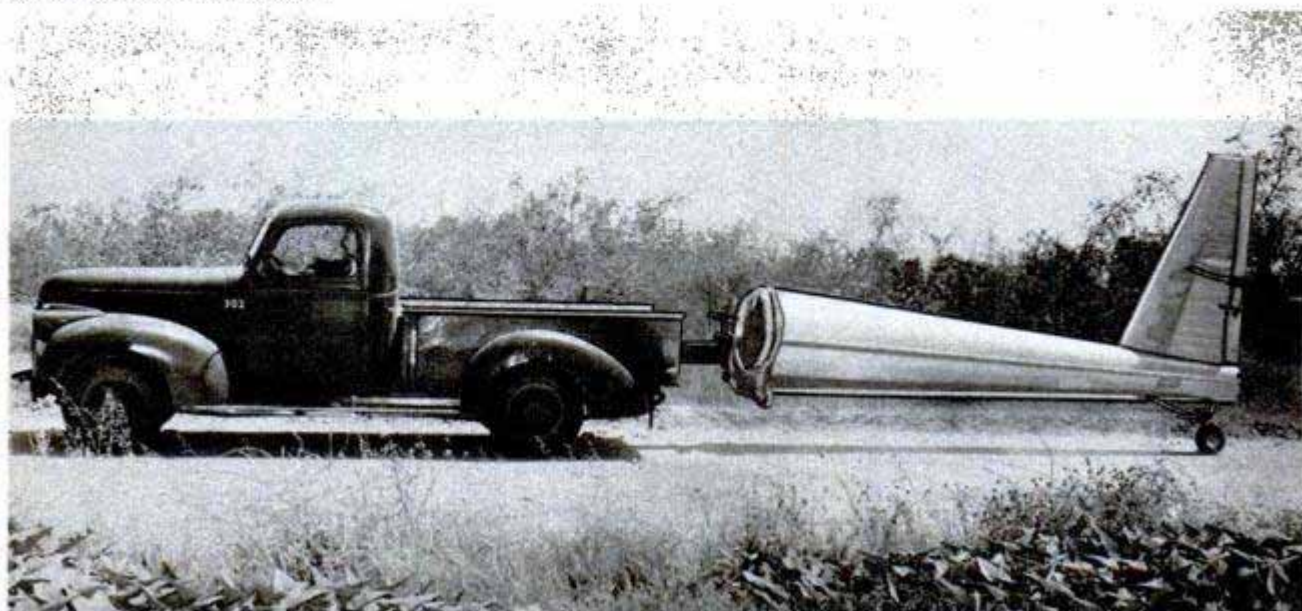
together to make them wind resistant and impervious to rain. The 1½-inch tape is rolled along the joint by an applicator which presses it down firmly. At the end of the curing period, the tape can be stripped away without damaging the paper.

### Shimmy Test Made for Airplane Tail Wheel

To make sure it could stand rough operational use, Convair engineers towed a newly designed L-13 tail wheel over 724 miles of the roughest roads in southern California. Their only problems en route were answering what-is-it questions posed by curious ranchers and farmers. The new

design has a hydraulic cylinder which prevents shimmy by changing the oscillation frequency of the tail-wheel fork. With the assembly pulled along at speeds ranging from 10 to 40 miles an hour, the test simulated approximately 1400 landings and take-offs, with attendant ground handling.

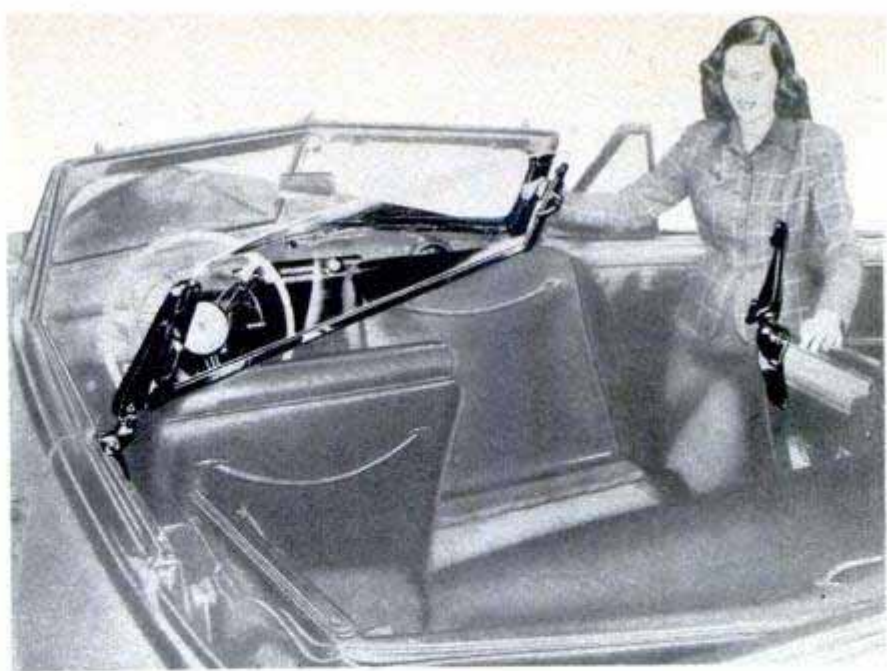
Consolidated-Vultee Aircraft photo





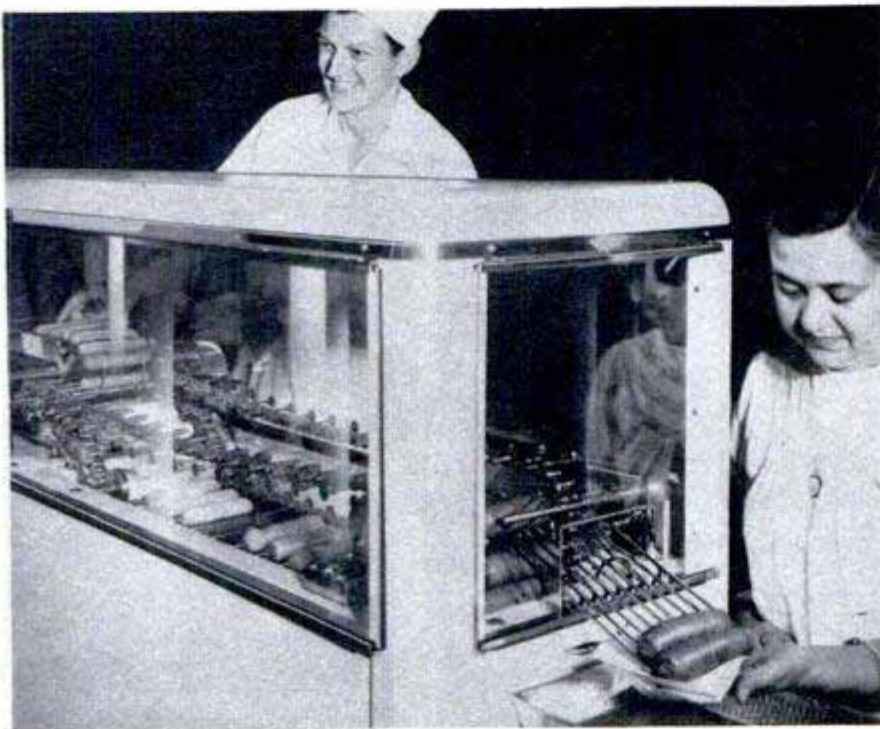
## Back-Seat Windshield Swings Out of Way

Ingenious side brackets support a rear windshield for convertibles and permit it to be swung from either side to allow passengers ready access to the back seat. Each bracket has a cam-locking, rattleproof hinge mechanism and a turn of the handle releases the lock. The windshield, made of optical-quality Plexiglas, can be quickly removed by unlocking both ends.



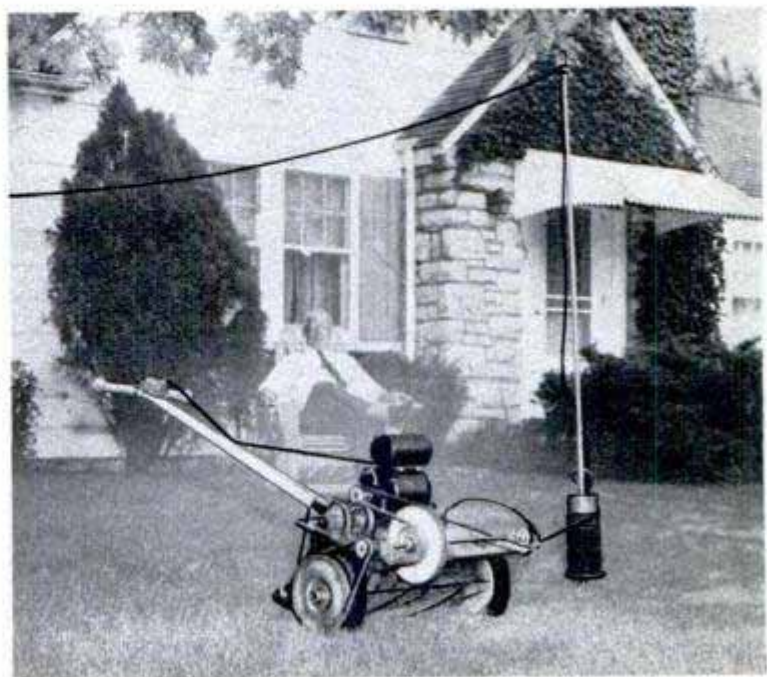
## Bun-Wiener Cooker Makes Hot Dogs

Hot dog and bun are rolled into one by a mechanical cooker that turns out "red hots" in assembly-line fashion. Carried by conveyors, the frankfurters are rolled in batter and then plunged into a long vat of hot grease that cooks the roll and wiener simultaneously. At the end of the cooking vat, the hot dogs roll down a ramp ready to eat. Where do you put the mustard and relish? Small paper cups of condiments are provided and you dunk the wiener between bites to suit your taste!



## Self-Piloting Lawn Mower Cuts Grass in Circles

When his lawn needs mowing, M. B. Hansell of Independence, Mo., just sits in the shade and watches his lawn mower go round in circles. Powered electrically, the lawn mower goes round and round a stake set in the lawn. The power cable is wound on a drum at the base of the stake and as it unwinds it guides the mower in a spiral course around the stake until a 56-foot circular area has been mowed. Hansell has six sockets for the stake scattered around his half acre of lawn. By moving the stake to each of the sockets, Hansell gets all the mowing done, except for border trimming, with a minimum of effort.



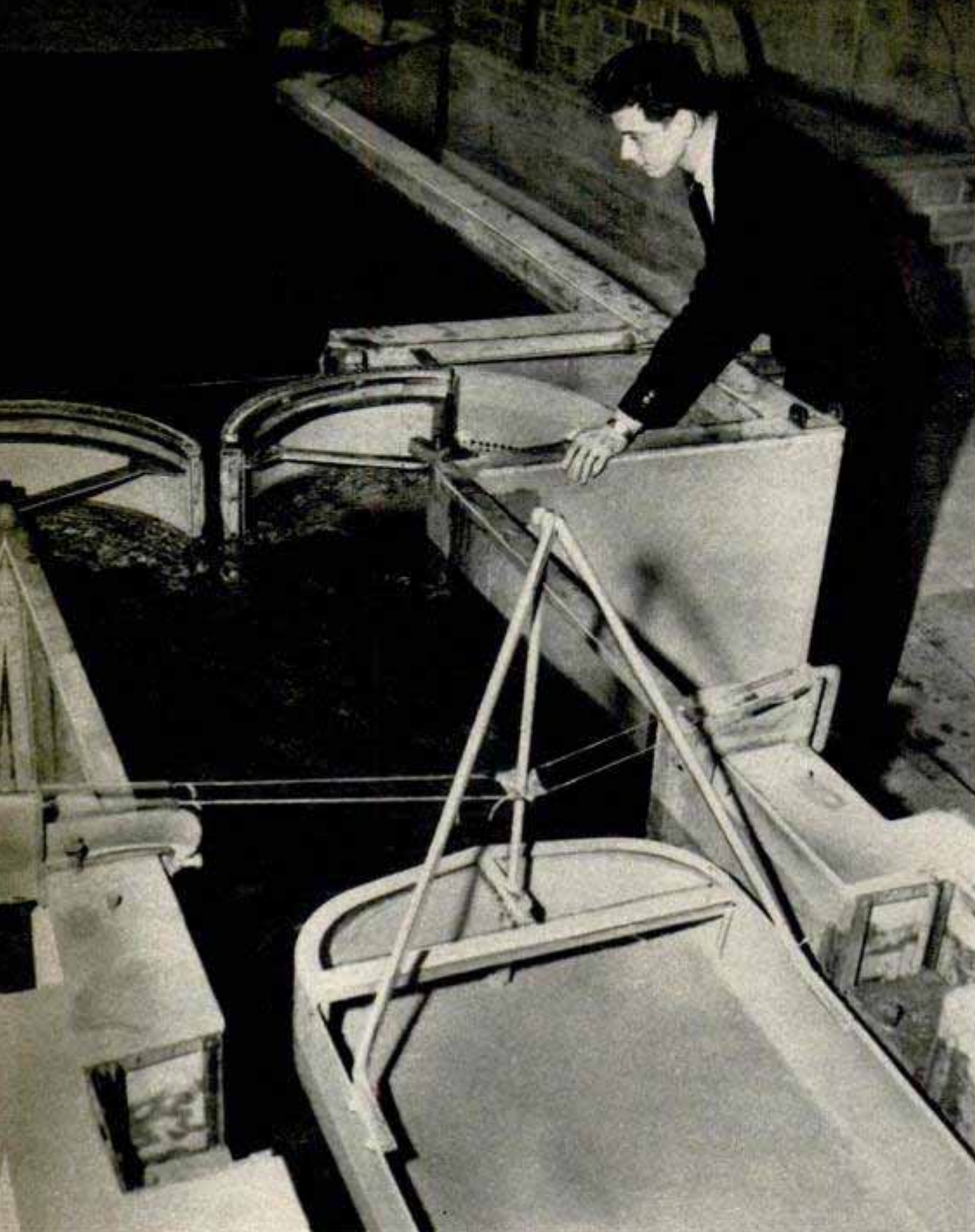


## Paris Engineers Try New Designs By Scale Models In Hydraulic Lab

← Scale models of harbors, dams, hydroelectric installations help engineers of the Central Hydraulic Laboratory near Paris solve European water problems. Here a worker checks gates of a lock that will be installed on Flanders canal

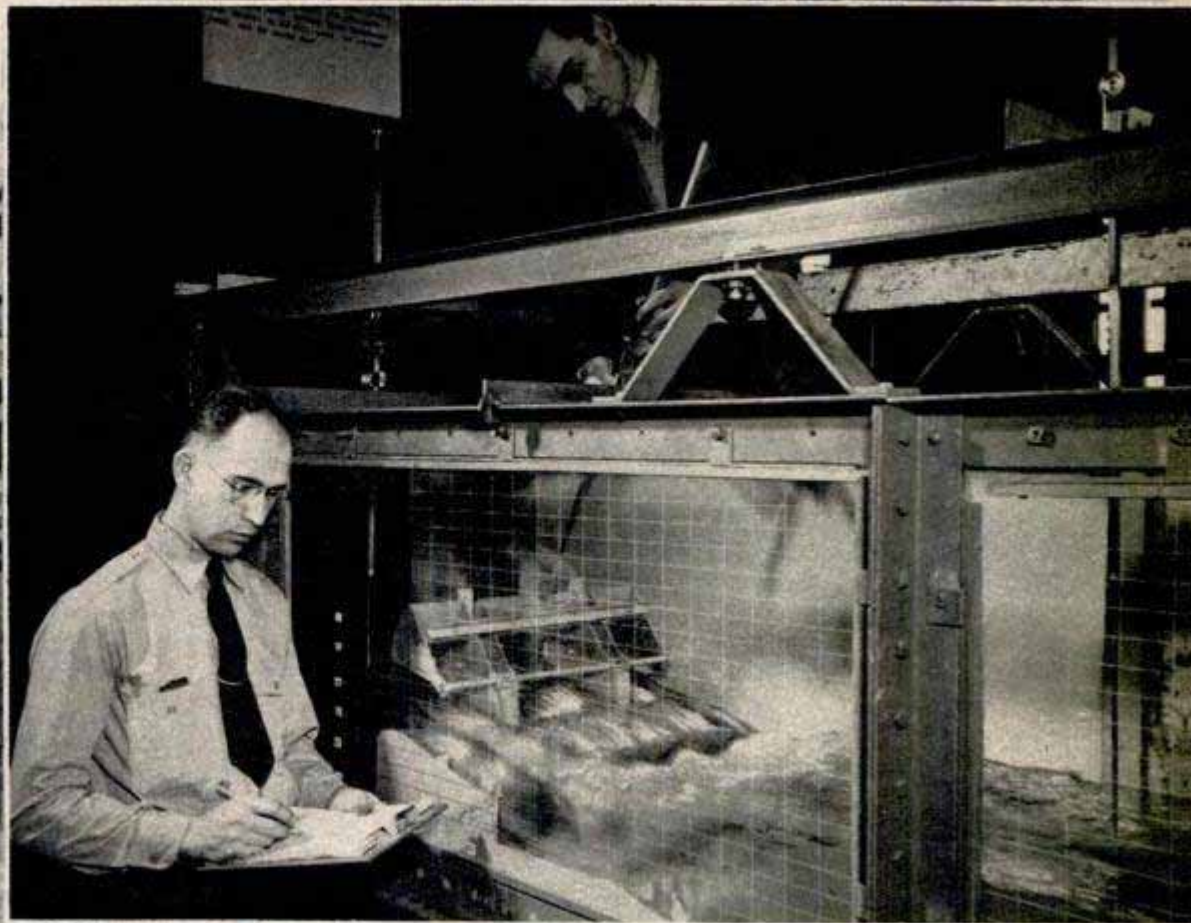
Below, left, technician floats candles on the water of a model harbor to determine the direction of currents. Candle movements are recorded on photographic film

Worker uses the liminimeter, a measuring instrument, to check the swell behind breakwater





Water in a glass-walled channel pours across a miniature spillway during a design experiment



## RUNNING WATER IS THEIR PROBLEM:

Puzzles of liquid behavior flow into this Minneapolis hydraulic laboratory. Answers flow out in the form of better street drains or million-dollar dams

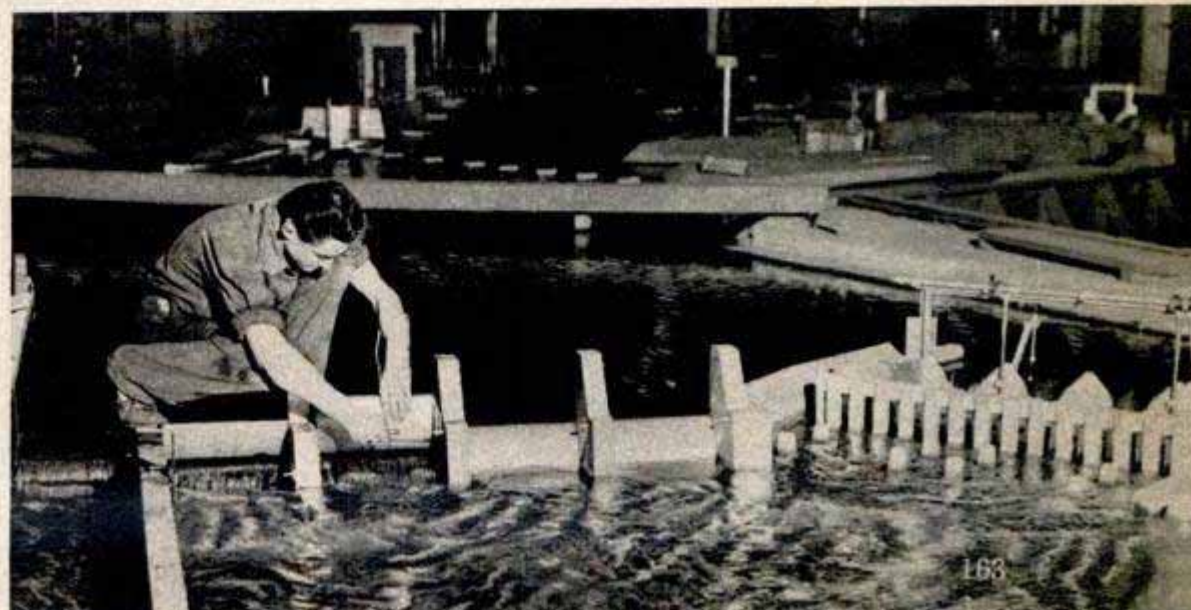
**A** MINNESOTA FARMER watched as spring rains gushed from a pipe outlet and cut a deep gully across his fields. He put in a call to the district engineer of the Soil Conservation Service to explain that water was draining away his land. The engineer, after an examination of the silt-laden stream, tossed the problem to the St. Anthony Falls Hydraulic Laboratory for a solution.

When research men of the laboratory examined the land they found that this single problem was typical of the conservation problems of many other farmers across the country. So they undertook the project because a solution not only would

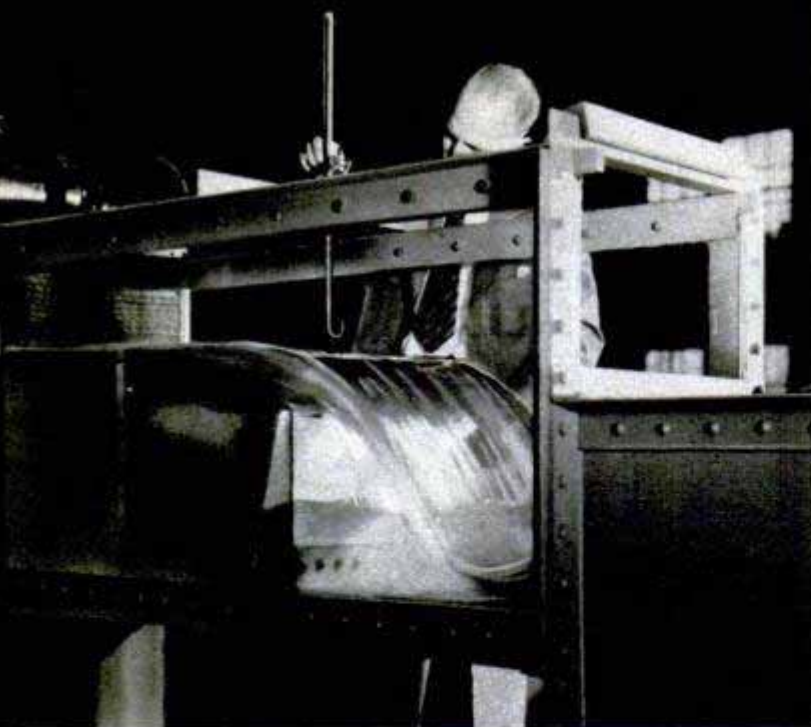
By  
Clifford B. Hicks

Proposed locks for Mississippi River are tested by regulating the flow of water through models

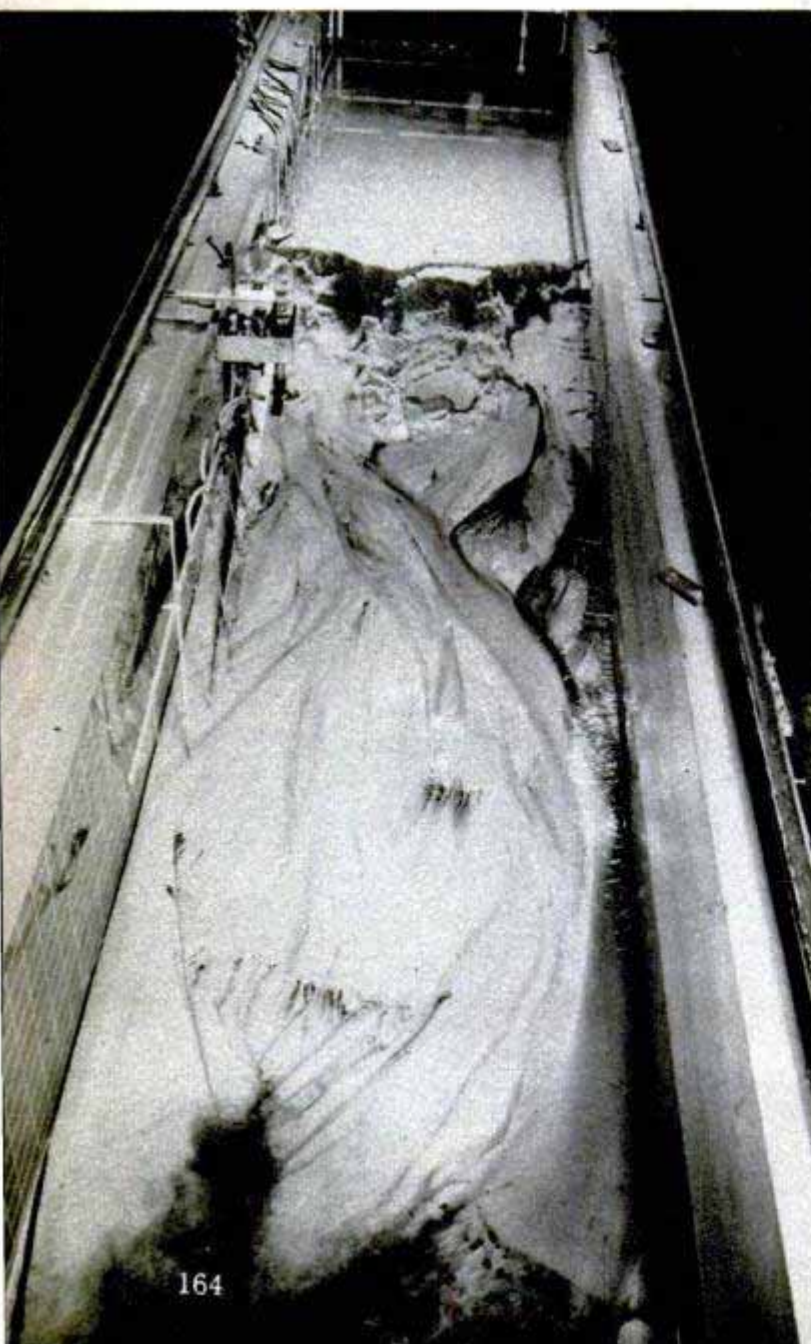
DECEMBER 1948







Doctor Straub checks depth of flow over a sharp-crested weir mounted in the glass-walled channel. ↓ Model sand dam failed due to erosion of downstream slope. Model's failure showed flaw in design



save a few acres of Minnesota farmland but could prevent loss of thousands of tons of rich earth over the country.

Laboratory workers built models of various types of culverts and outlets to find one which would break up the energy of the farmer's stream. They came up with a new design which can be installed on thousands of erosion-threatened farms.

This research was a lifesaver to the farmer, who could not pay a staff of scientists to solve the conservation problems of his land. Neither could he afford to stand by and watch his fields float away.

Soil conservation is only one of the many fields of research undertaken at the St. Anthony Falls Hydraulic Laboratory of the University of Minnesota. How do liquids behave? Why? How can these behavior patterns help in designing a simple street drain or a multimillion-dollar dam to be built halfway around the world?

Through this Minneapolis laboratory flows the Mississippi River. Water from above St. Anthony Falls is diverted into flumes, conducted through a maze of rooms and then passed back into the river after a total drop of 50 feet. Scientists put this flow to work to predict how water will act as it flows across a given construction project. They break basic textbook rules by making water run uphill and flow at full capacity through a sloping drainpipe.

Director of the laboratory is Dr. Lorenz G. Straub. He supervised its design and construction and has been in charge of its operation since it was completed in 1938 except for a period during the war when the laboratory was dormant and he worked with the British on undersea ordnance.

Locked in flowing water is energy. Scientists of the laboratory attempt to harness this energy for human use, or to see that Nature does not release it in a way that causes disaster.

Take one research problem as a typical example. The Government plans to build a huge flood-control dam on the south fork of the Park River in North Dakota. This dam's spillway must be built on a very loose foundation material that is subject to deep erosion and underscour. Army engineers tossed the problem of controlling this erosion to the laboratory, where a time-tested method was used to find a solution. A large model of the proposed dam was built to an exact 1 to 36 scale. When all was ready, engineers opened a valve and the waters of the Mississippi came rolling down on the model. More and more water flowed against the dam until the spillway was releasing water at a rate that corresponds to 23,500 cubic feet per second in nature. Workers tossed confetti on the water to discover the flow pattern. When



the flow was cut off, the stream bed, dam and spillway were examined for damage. By using the model, the Army engineers could predict exactly what will happen to the Park River dam.

Houston, Tex., brought in a project concerning the design of a city reservoir. A model was built. Water flowed across the spillway corresponding to a flood rate in nature of 650,000 cubic feet and engineers stationed on a movable carriage measured the downstream erosion to check the design.

Some problems, says Doctor Straub, are easier than others to solve with experimental models. In many situations, his models give results that enable him to predict the behavior of water and underwater structures within three percent. In other words, he can tell engineers that the underscour of a dam will be a certain number of feet, and hit the figure practically on the button.

The scientist currently is working on the design for a dam that will be the second largest in the world. It will be built on the Godavari River in India at a cost of 300 million dollars. It will provide two-crop irrigation for more than a million acres of land now barren for lack of water, one-crop irrigation for another million acres, and a tremendous amount of hydroelectric power. Eight million cubic yards of concrete will be required.

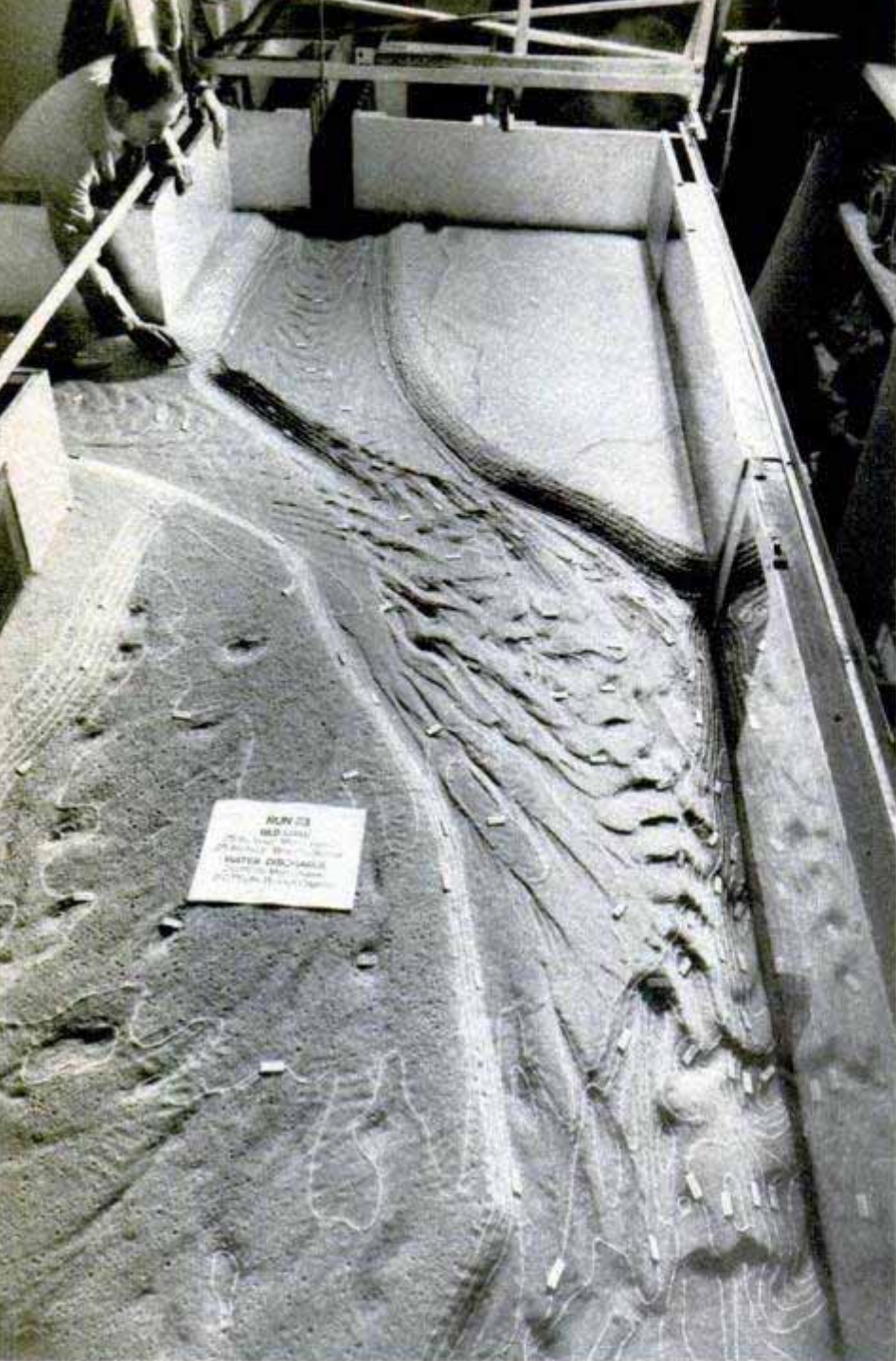
The most difficult problem in constructing the dam is to divert the river for two years. There is a tremendous annual variation in flow, from a minimum of 3000 cubic feet per second to



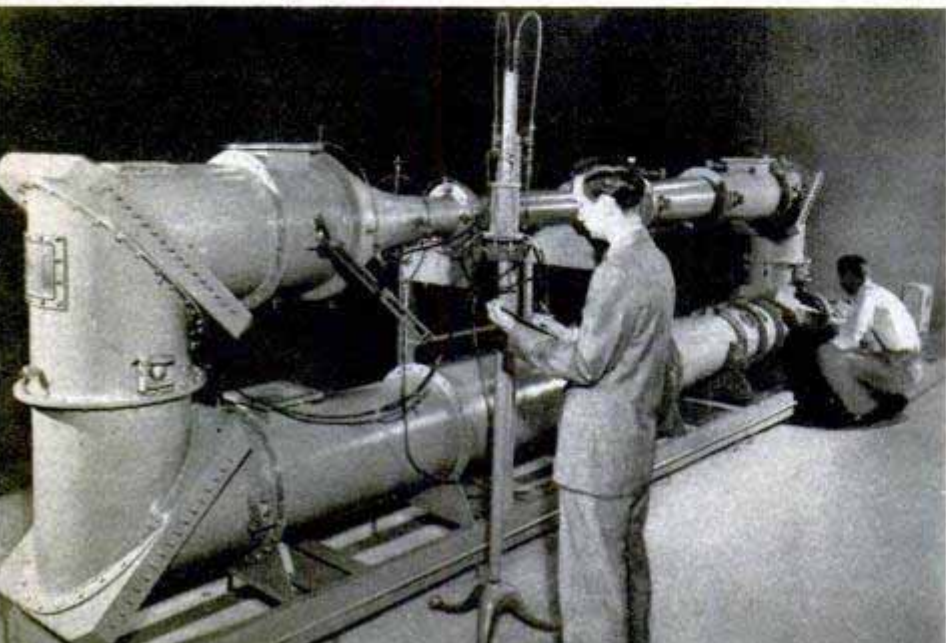
Laboratory, shown at right center, is a hospital for sick dams. Water from the Mississippi flows through maze of channels and back to river. ↓ Torpedolike instrument picks up an exact specimen of sediment. The sample then is used to calculate the amount of sediment in the stream







Study with models shows how sediment is carried away at junction of two streams. Note deep channel where the streams converge. Below, small water tunnel was built to check design of a larger one for the Navy, which will test underwater missiles



a maximum of three million cubic feet per second.

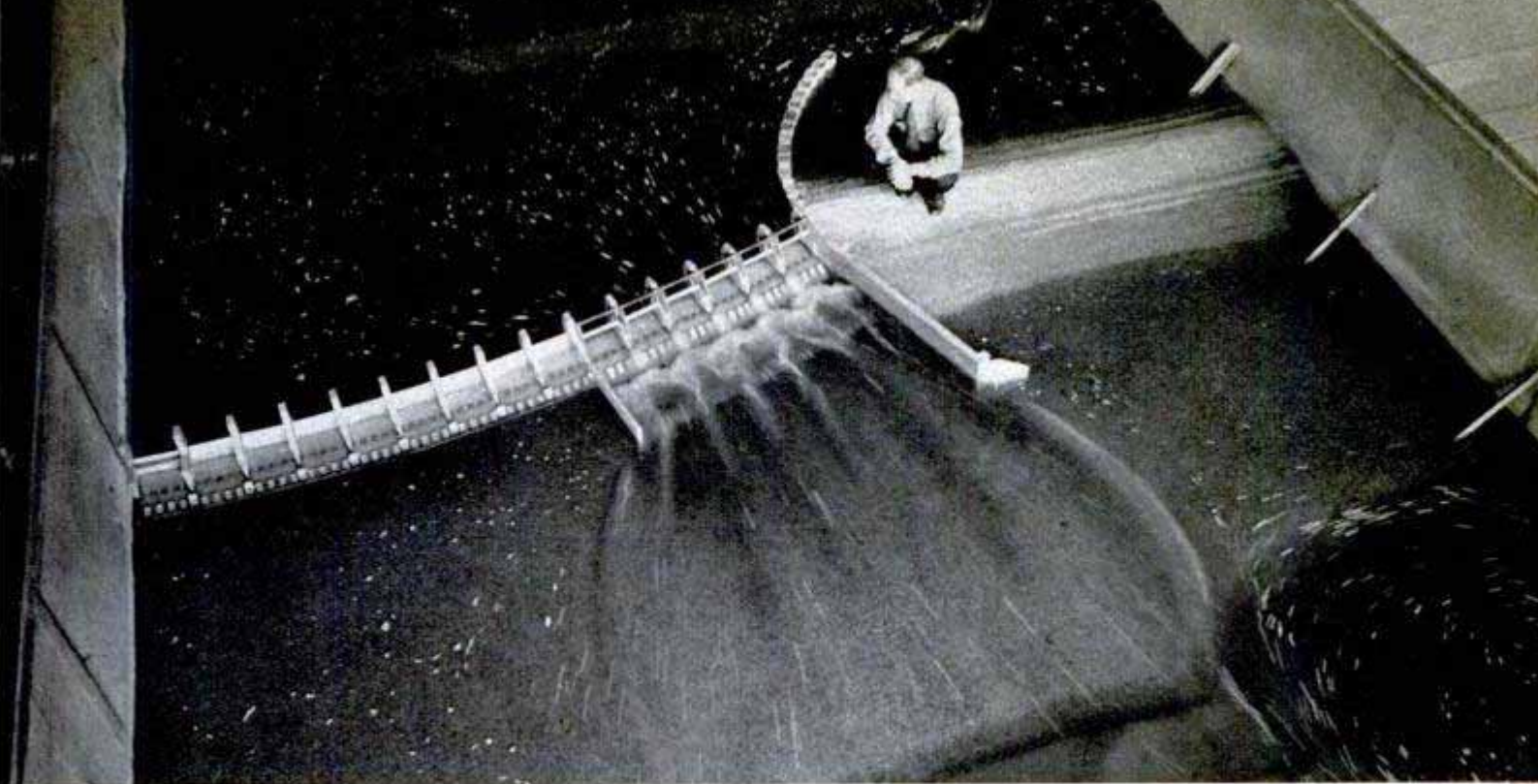
Doctor Straub went to India as a consulting engineer to discover methods for controlling this flow. As a result of his studies, he is recommending that a certain type of cofferdam be built which will handle the variation. He's now building a large model of the Godavari River in the laboratory to discover exactly what can be expected when the cofferdams are used.

"The project is so tremendous that it will be a major achievement of the new government of India," says Doctor Straub. "Although it will cost 300 million dollars, it will yield crops and hydroelectric power estimated at more than 100 million dollars a year, so it will pay for itself in a very short time."

Another laboratory project under scrutiny is a model water tunnel. Such water tunnels are used for hydraulic research in the same way that wind tunnels are used for aerodynamic research. Model submarines and torpedoes are suspended in the tunnel and water circulated at high speed to determine flow characteristics. The Navy plans to build a huge tunnel capable of circulating water at a speed of 80 feet per second. The tunnel, five feet in diameter at the smallest throat, will cost several million dollars. In order to predict the exact efficiency of this tunnel and to find out whether changes should be made in its design, the Navy commissioned the laboratory to build a model on a scale of 1 to 10.

The model, recently completed, has a test section six inches in diameter which can be viewed through a transparent window. Actually the tunnel is a closed pipe built in the shape of a rectangle through which the water is circulated at high speed. Guide vanes turn the flow around the corners. Models suspended in the test section resist this flow of water. The pattern made by the flow shows what will happen if that particular torpedo or other underwater device is launched and moves at a certain speed. In exchange for a grant of \$100,000 to build and





Confetti tossed across the water as it approaches a spillway model indicates the direction of the currents

test the smaller tunnel, the Navy stands to save money on its multimillion-dollar project and to improve its design.

One of the most down-to-earth projects completed at the laboratory recently is a design for a simple street drain for the Minnesota Highway Department. The efficiency of any drain corresponds to the amount of water it will pass. This efficiency is cut down when leaves and trash clog the openings. The new drain is self-cleaning because the bars are mounted in the frame at a 45-degree angle to the line of water flow. The force of the water pushes trash diagonally along the bars to the drainage opening at the curb. This simple drain has an efficiency 75 to 100 percent greater than former drains. Because of its increased capacity, fewer drains are required along any given stretch of pavement. Doctor Straub estimates that the cost of this research can be saved in a few miles of highway construction.

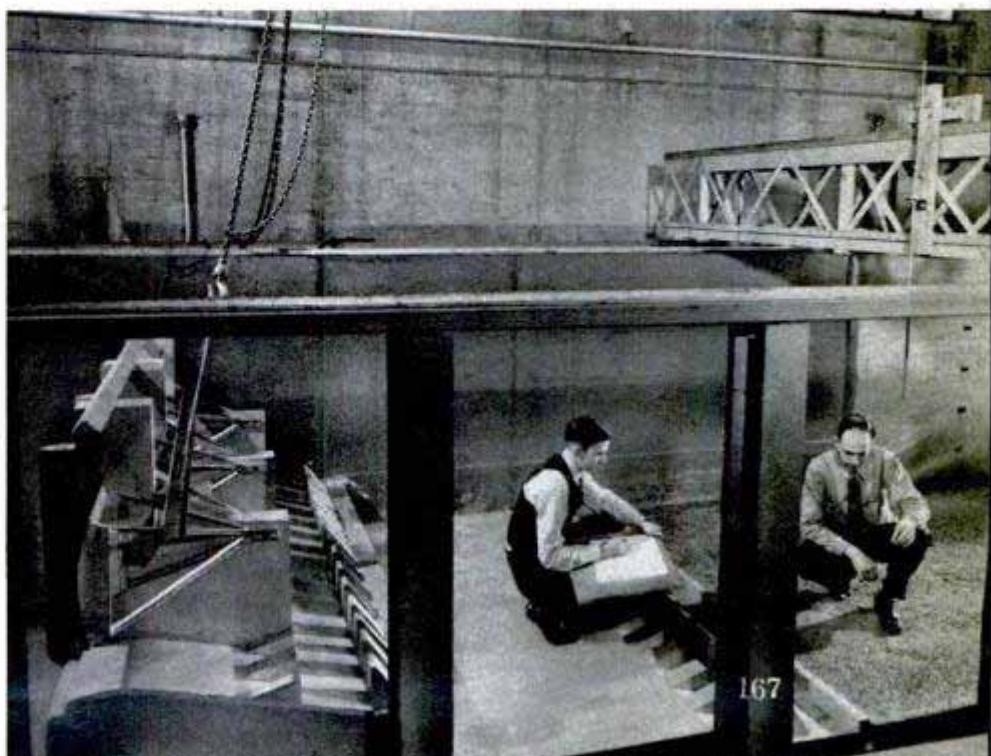
Soil scooped up by flowing water often is deposited in downstream reservoirs or on fertile fields at flood time, thus causing double damage. One farmer's field may be lifted, carried and dropped like a blanket across a downstream farmer's crops. How much sediment will a stream carry when it flows at a given rate? How permeable are the materials carried by the water? The answers to these questions are

sought in other projects, some in collaboration with the Soil Conservation Service.

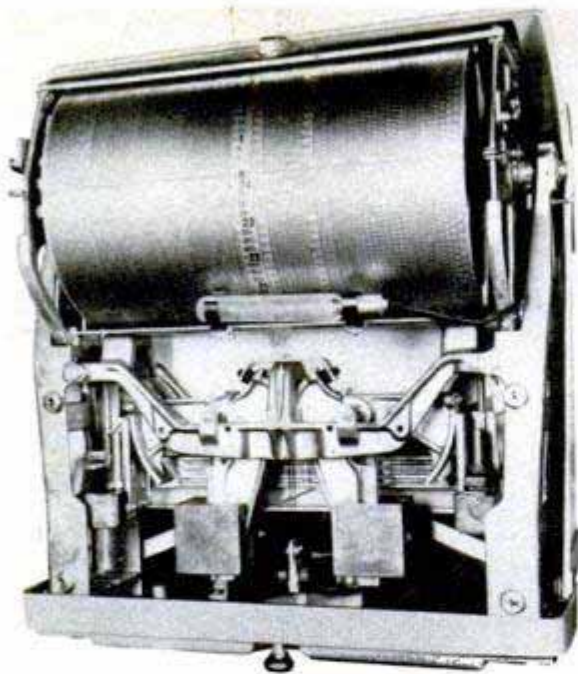
Doctor Straub's latest project is a study of airport-drainage problems in the Arctic, in cooperation with the Army Corps of Engineers. Arctic drainage is a much different problem from drainage in a temperate climate. There's 100 percent difference in viscosity, or resistance to flow, of water at 50 degrees and water at 150 degrees. Still lower temperatures naturally increase the viscosity even more.

There's a backlog of five years' work awaiting Doctor Straub, his staff and his models. Working with models will eliminate costly failures in future constructions.

Erosion below baffles is measured by gauge on movable carriage







### Scale Shows 129,000 Weight and Price Figures

More than 129,000 computation characters appear on the weight and price chart of a new scale for food stores. There are 70 prices indicated for each pound, eliminating the need for doubling, adding or subtracting by the store clerk. Despite the large number of characters, the chart

measures only 13 inches by 27 $\frac{1}{4}$  inches. A series of lenses magnifies the small figures to make them easily readable. The scale need not be on a perfectly level surface, as two pendulums in the mechanism compensate for out-of-level conditions or the yield of the shelf or counter.

### Earth Loader Dumps Ton Per Second Into Trucks

Maximum discharge capacity of a huge earth-loading machine is one ton per second. The loader, which handles most types of dirt and gravel, scrapes the surface off the ground, loads the material on a conveyor belt and then dumps it into waiting trucks. The machine is being used on the Cherry Creek Dam project near Denver. It is pulled by a tractor with the dump truck moving beside the unit, receiving the dirt as fast as it is scraped and lifted on the belt. Crawler tracks support the unit at

the rear. The 54-inch belt is powered by a 150-horsepower Diesel engine with all controls mounted so that one man can drive the tractor and operate the machine. The blade scrapes to a maximum depth of 24 inches and can be set at an angle for slope and grading work. The Cherry Creek Dam is a \$15,000,000 flood-control project, part of a plan for the Missouri Valley. The rolled-earth dam will be built of 13,000,000 cubic yards of sandy clay. It will hold back cloudbursts of the mountain foothills.





**O**UT IN THE OKLAHOMA portion of the Red Plains, a pair of agricultural agencies are doing away with the ax and muscle and are doing an old job the modern way by using mowers, beaters, cutters and various types of saws and chemicals.

The work is returning some eight million acres of woodland pastures to higher beef production by removing rank growths of weeds, shrubs and trees. In most instances where the undesirable growth was removed, the areas more than doubled their cattle-carrying capacities and are now producing upwards of 90 pounds of beef per acre. Other fully cleared lands are producing five times as much grass as land 90 percent shaded.

The brush situation does not concern the Sooner state alone. The Red Plains involves some 36 million acres of level-to-rolling lands in south-central Kansas, western Oklahoma and northwest Texas. An estimated 50 percent of the total is classed as woodland pastures, with each state bearing a near equal burden of the low-quality areas.

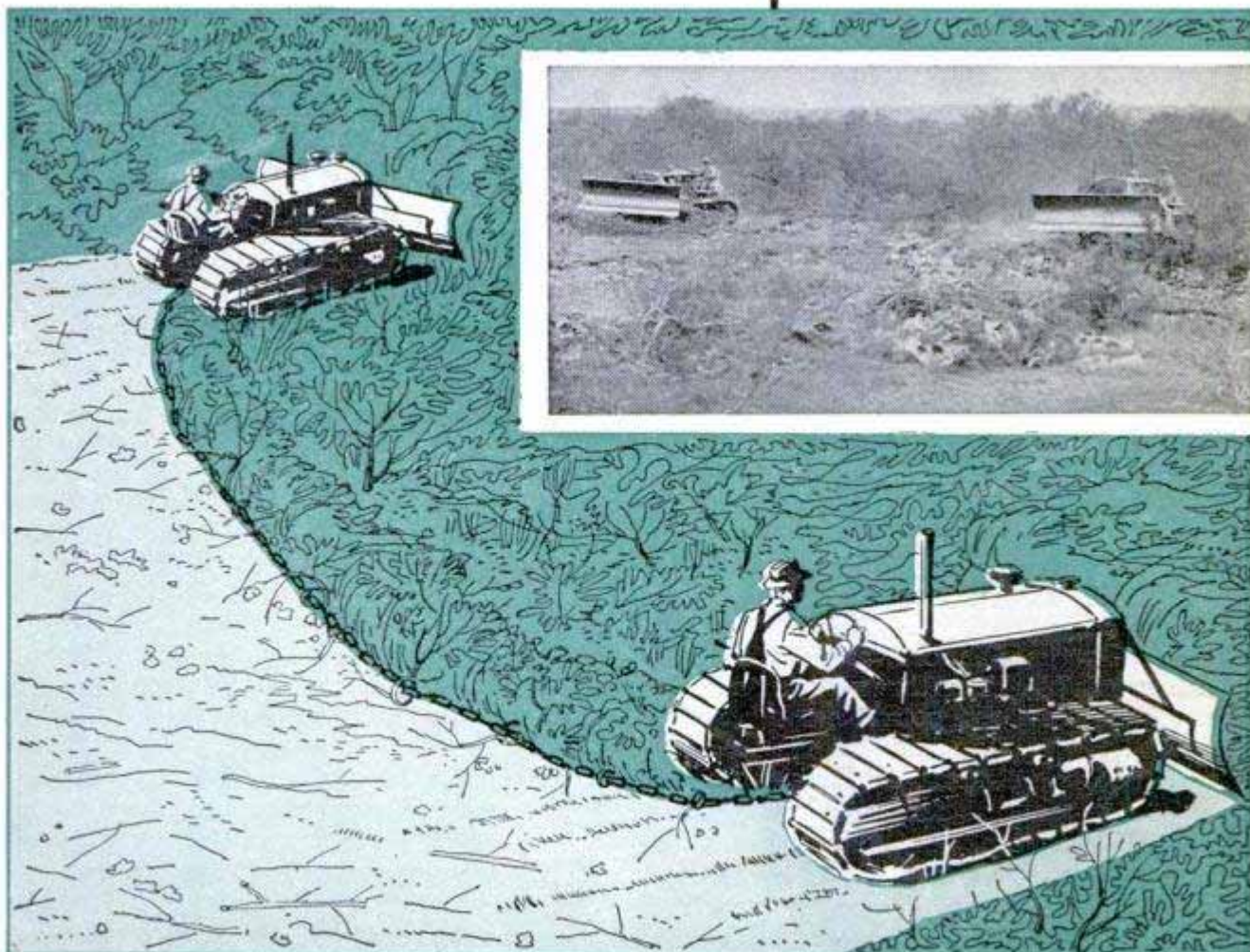
Texas is also concerned with 60 million acres of mesquite, and Kansas is in a position similar to that of Oklahoma. Other states in the timber areas of the nation have similar problems.

What brought about this brush problem? The introduction of agriculture into these areas marked its beginning. Settlers broke the sod, starting the rapid decrease of soil fertility and the rapid increase of erosion and land abandonment. Lands not plowed were turned to pastures, which were improperly managed and overgrazed. As the native grass

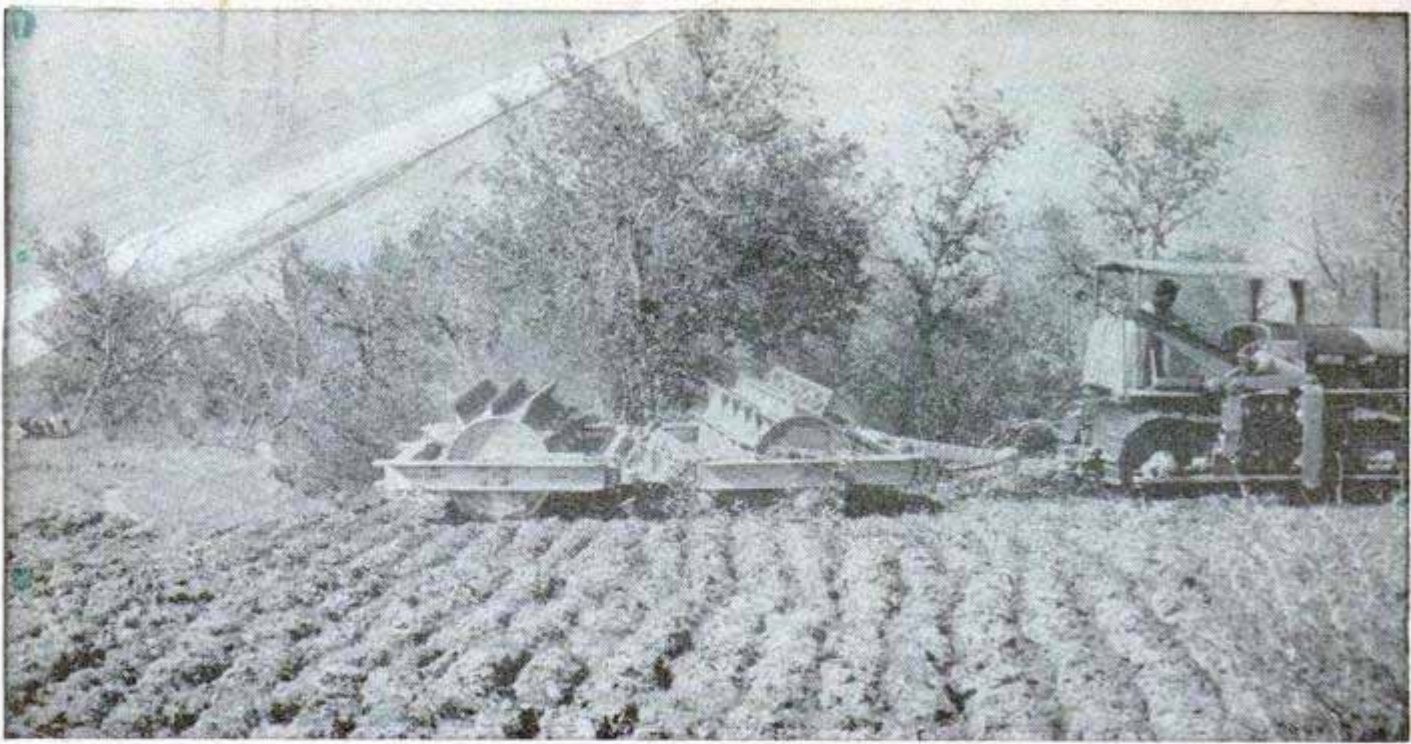
# *Clearing the range for beef*

By Norris A. Jackson

Crawler tractors pull heavy cables over mesquite lands in Texas to clear 100 acres a day. Dozer blades uproot tree







Three-ton brush cutter clears a seven-foot swath through the heavy brush; it also lightly cultivates the soil

was destroyed and the competition removed, the brush came in.

Today, the area consists of small amounts of native grass intermingled with scrubby, woody vegetation ranging through sage, sassafras, mesquite, persimmon, creosote brush and blackjack and live-oak thickets to large trees such as elm, honey locust, hickory and hackberry—a marked contrast to the former lush green native-grass pastures consisting of big and little bluestem, Indian switch and side oats grama grasses.

The first large-scale land-clearing work in Oklahoma was conducted in 1935 at the Red Plains Conservation Experiment Station near Guthrie. Since then the program has expanded until the problem now is being attacked by both machines and chemicals. Characteristics of the work make it possible for the information obtained from the studies to have wide application.

Located in the heart of the “cross timbers” of Oklahoma (on lands typical of the Red Plains), the station was established in 1929 and is operated cooperatively by the U. S. Soil Conservation Service and the Oklahoma Agricultural Experiment Station. It was the first station of its kind in the world.

Machines used most extensively for brush removal in the three-state area include brush mowers, portable and tractor-operated power saws, dozers, brush beaters, giant stalk cutters, cables attached to heavy crawler tractors and brush buck rakes. The type of brush determines the type of machine, for a piece of equipment designed to handle brashy material such as sage and creosote brush is quite different

from one for tough, taller growing material such as blackjack or persimmon.

Vegetation such as sage and creosote brush and low growths of tough brush and weeds are easily removed and controlled by the universal mowing machines found on practically all farms throughout the nation. When equipped with special stub guards and heavy sections, the machine can be operated through fairly dense growths of brush (up to 1½ inches in diameter) at a cost of \$2 per acre. Additional mowings are about the same as for mowing alfalfa, while returns from the mowed lands amount to \$3.50 per acre under present beef prices. The machine is especially useful for annual spring mowings of areas initially cleared by other machines. Cattle may be turned in for grazing after the third or fourth mowing.

The “Iron Billy Goat” or brush beater, which literally beats the brush and weeds to pieces with whirling chains, also works efficiently on small shrubs. Its chief advantage is for use on rough or stony ground where mowing machines cannot operate.

Designed and built at the Red Plains station, the beater consists of a series of weighted chains driven by a horizontal shaft. The shaft receives its power from a tractor power take-off. Station agricultural engineers are in the process of building a new low-slung beater with an eight-inch horizontal shaft that is expected to prove more efficient than the older model.

Trees ranging in trunk size from 2 to 10 inches are felled with portable power saws, while larger trees are more easily handled with saws mounted on tractors. The tractor

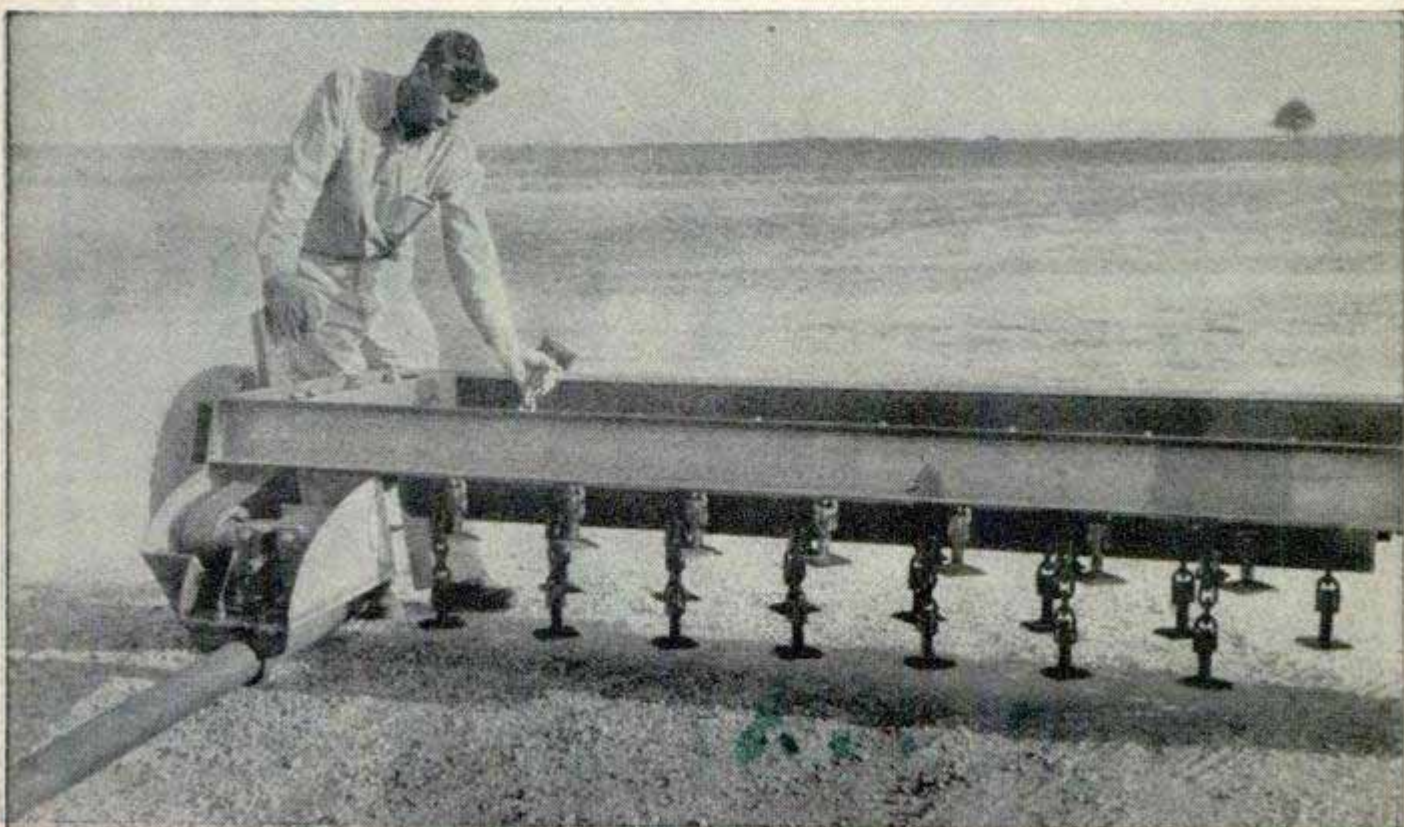




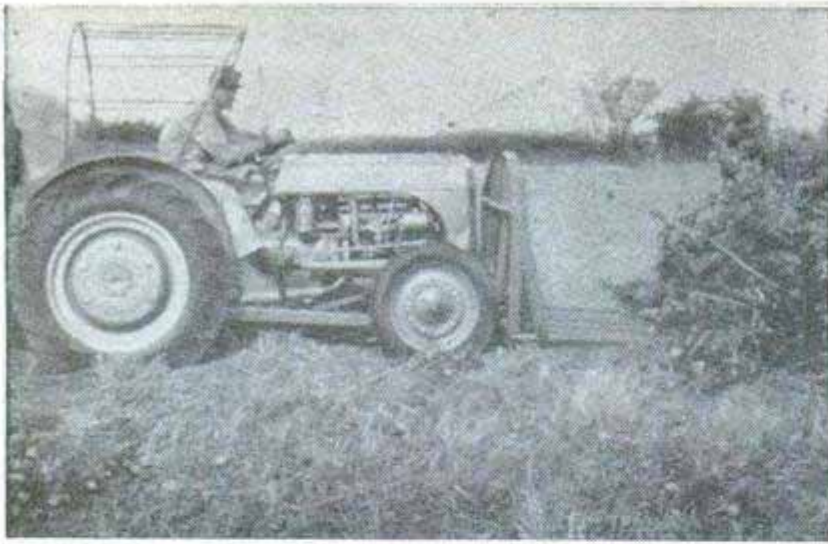
saws also work well on smaller trees, and can be operated when the tractor is in motion or by swinging the saw into the tree trunk. A high dozer bar or push frame prevents the tree from falling on the tractor or operator. Either portable or tractor-operated saws may be turned from a horizontal to a vertical cutting position for logging felled trees.

Texas research workers are using bulldozers and treedozer to clear mesquite and other woody vegetation, but the methods increase soil erosion if the area is not quickly replanted to either fast-growing

Above, brush beater or "Iron Billy Goat" flails low growths of shrubs with whirling chains. New beater below has shorter chains and shaft with power unit







This small power-lift buck rake can lift and transport 1000 pounds of brush. It has a power saw mounted on rear of tractor. The rake-saw combination can clear an acre of woodland pasture in 2½ hours

grasses or legumes. The dozers often strip the ground of all vegetation, frequently leaving huge holes in the earth where the trees were uprooted.

Mesquite also is cleared by use of two bulldozers pulling four strands of 1¼-inch cable, 400 feet long, through the underbrush. The method works best when the ground has sufficient moisture to let the trees fall over, thereby pulling out most of the roots. This method also strips the ground of all vegetation, making erosion more probable.

A new machine that does a light cultivation of the soil as it removes the brush and trees is gaining popularity in the cross timbers. It is an extra-heavy stalk cutter, which consists of 12 cutter blades, seven feet long, mounted on large water-filled steel cylinders. The manufacturers recommend the use of two or more seven-foot cutters pulled at high speeds.

Used extensively in Texas for removing mesquite, the cutter works satisfactorily on all types of brittle plants. It also is very effective for breaking down small trees and brush that have been killed with chemicals.

The brush which has been cut up and partially stirred into the soil by the cutter will lie in place pending complete disintegration, resulting in soil improvement. The mulch formed by the cut brush also will conserve moisture and reduce erosion.

Three years ago, the Red Plains station began using chemicals as a means of brush control, and interest in the method is growing steadily. Chemicals now being tested are 2,4-D and ammonium sulfamate, or "Ammate." The latter material is not

(Continued to page 238)

Blades on the portable saws can be turned to a vertical position for logging the felled trees and brush





## Front-Seat Back Rest Drops Down to Form Double Bed in Auto

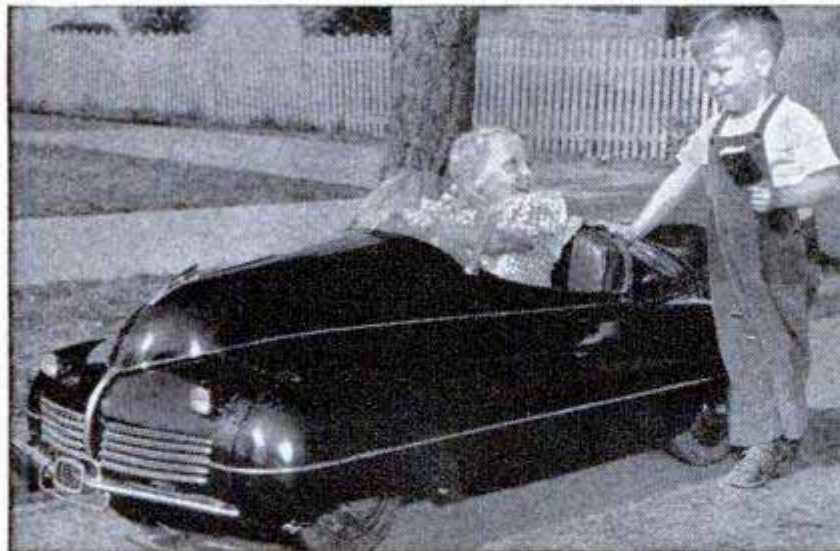


Within one minute, a six-foot double bed can be formed in any standard car equipped with a special front seat. This seat is installed in the framework of the original seat. A fingertip release causes the back rest to be lifted out of its frame and placed horizontally against the rear seat. Adjustable legs fold down to hold it in a level position. The bed then consists of three units, the front and back seats and the back rest. The special seat is available in two styles; one can be used as a single or double bed or can be tilted back for the most comfortable riding position. The bed seat can be removed and reinstalled in another car without damage to the original seat or its framework. Doctors have used the seats to convert their cars into emergency ambulances.



Top left, fingertip release is pressed and the seats fold down and out. Legs support the back rest. Top, readjusted seats form a double bed. Above, in another model, half of seat folds back for single bed

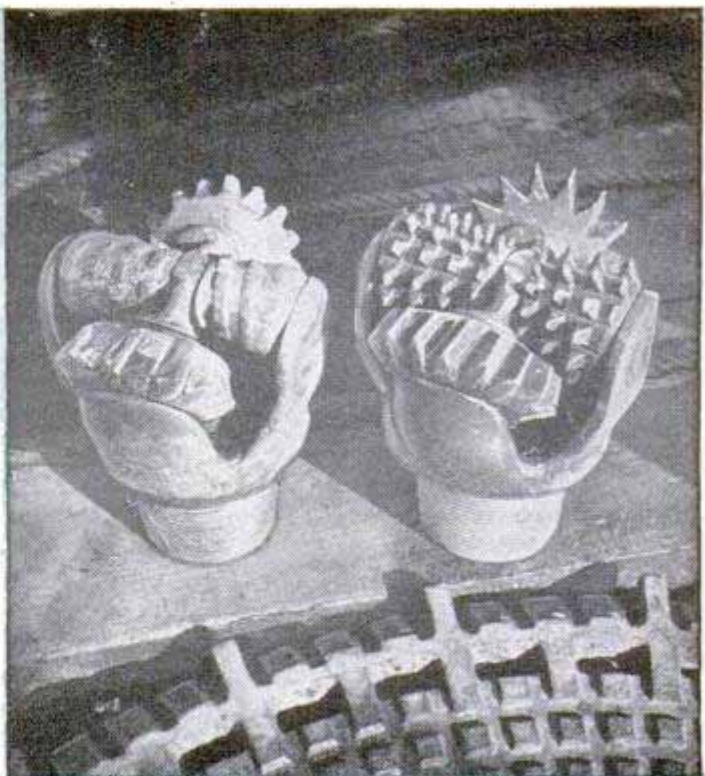
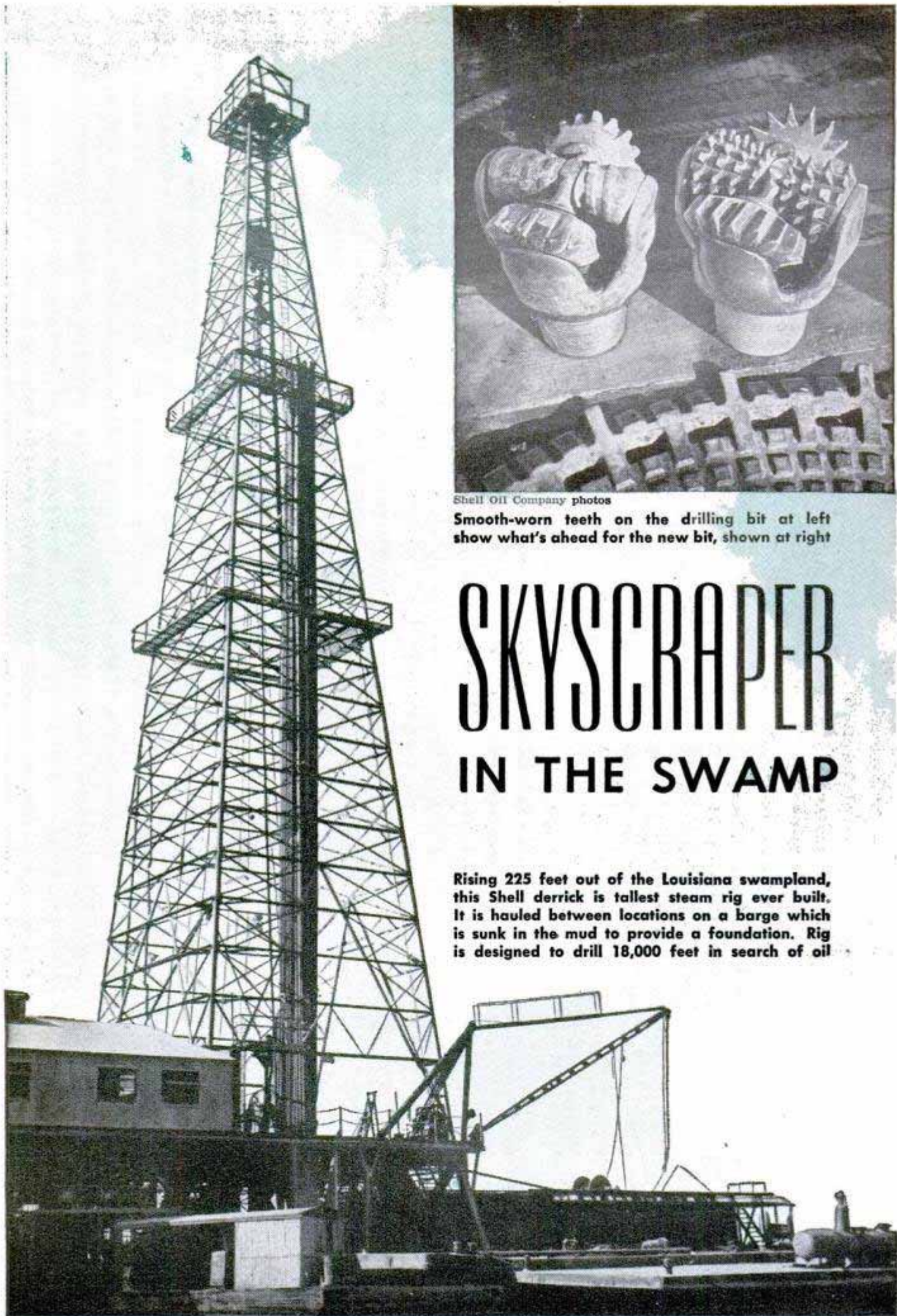
## Child's Electric Automobile Has Brakes That Are Applied Automatically



Just about foolproof in operation, a tiny, electric-motor-driven automobile provides the four-year-old daughter of a Northrop-Aircraft-plant worker with her own car. Built of discarded parts, the miniature car is driven by an automobile starter motor. A six-volt battery provides the current.

Only one control pedal is used. When the pedal is depressed, it acts as an accelerator. When released, it automatically shuts off the motor and applies the brakes. The car has a top speed of 13 miles an hour and the motor, located in the rear, runs for one hour on a charge.





Shell Oil Company photos

Smooth-worn teeth on the drilling bit at left show what's ahead for the new bit, shown at right

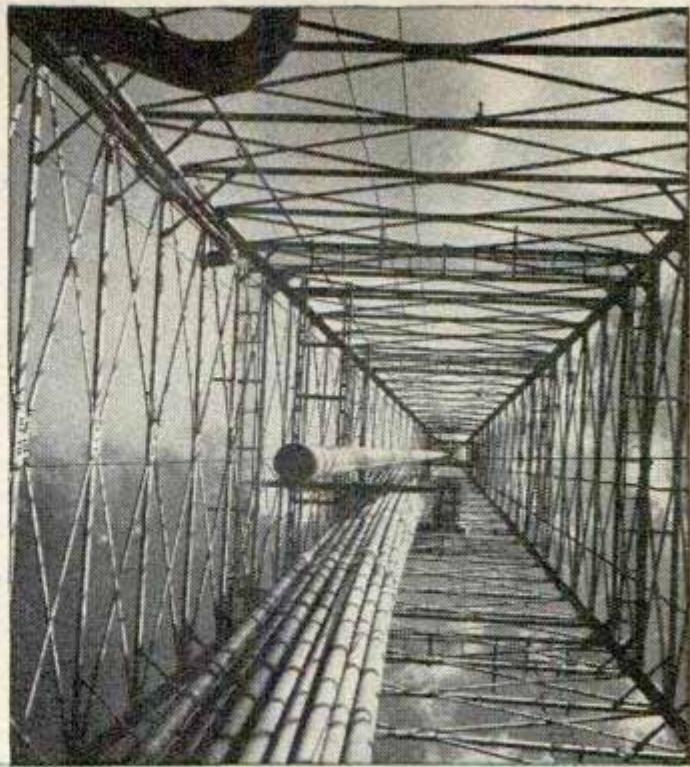
# SKYSCRAPER IN THE SWAMP

Rising 225 feet out of the Louisiana swampland, this Shell derrick is tallest steam rig ever built. It is hauled between locations on a barge which is sunk in the mud to provide a foundation. Rig is designed to drill 18,000 feet in search of oil





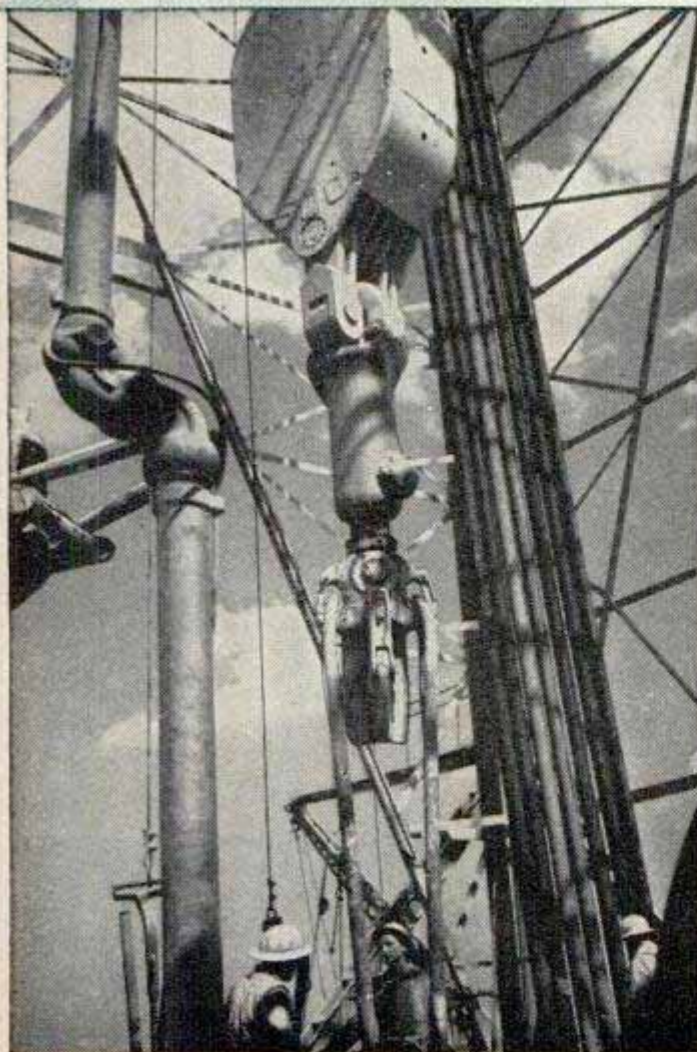
Working 125 feet above the derrick floor, a worker manhandles a 135-foot stand of 5-inch pipe



Pipe 135 feet long dangles from the crown block. It will be fastened to pipe already in the well hole

Rig's traveling block tips the scales at 19,000 pounds, has working capacity of 950,000 pounds

Dial panel tells the driller the weight of pipe, pump pressure, torque and revolutions per minute





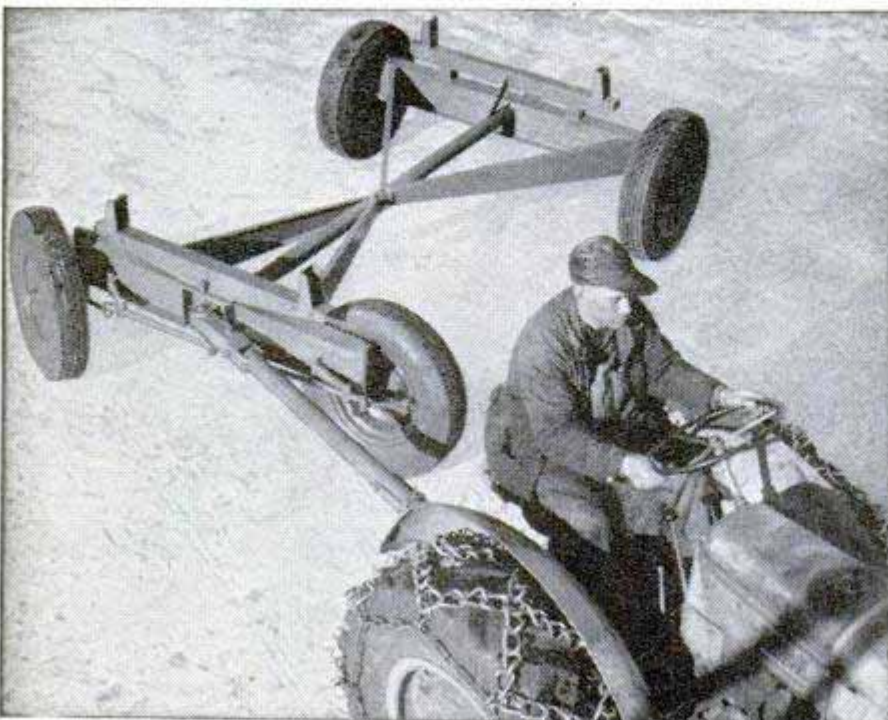
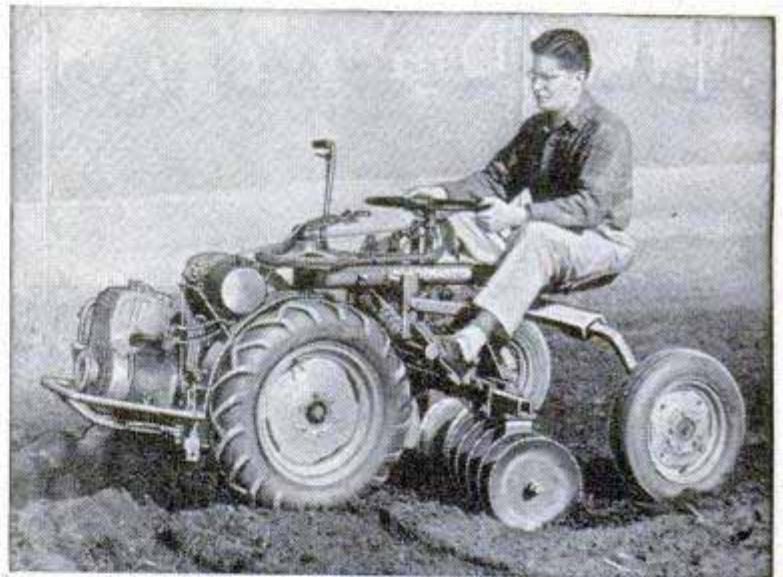


## Brazier for Cooking Built From Tank

When Smiley Burnette of the movies needed a brazier for outdoor cooking, he made one from scrap metal in his home workshop. The main part of the brazier is the rounded end cut from a large metal tank found in a junk yard. Burnette built a base by welding together angle irons. A hole was cut in the bottom of the brazier to prevent the accumulation of rain water, and an iron handle was welded to each side. The result is an attractive outdoor fireplace.

## Lightweight Tractor Has Front-Wheel Drive

With its five-horsepower engine mounted ahead of the front wheels, a 725-pound tractor has front-wheel drive and excellent visibility. The operator rides just above the implements and can make tool adjustments while the tractor is in motion. The two front driving wheels are mounted close together to give the tractor maneuverability. The rear wheels can be adjusted for widths from 38 to 72 inches. For night operation, the tractor has a headlight and a floodlight under the frame.



## 90-Degree Turn Made by Wagon

Through a secondary arm attached to its front wheels, a farm wagon can make space-saving, 90-degree turns without upsetting. The rubber-tired wheels are interchangeable with those on other pieces of farm equipment. The wagon weighs 837 pounds and has a capacity of 5000 pounds.

☞ Death Valley in California is the hottest spot in North America, and records indicate a high of 180 degrees on the valley floor can be expected once every seven years.

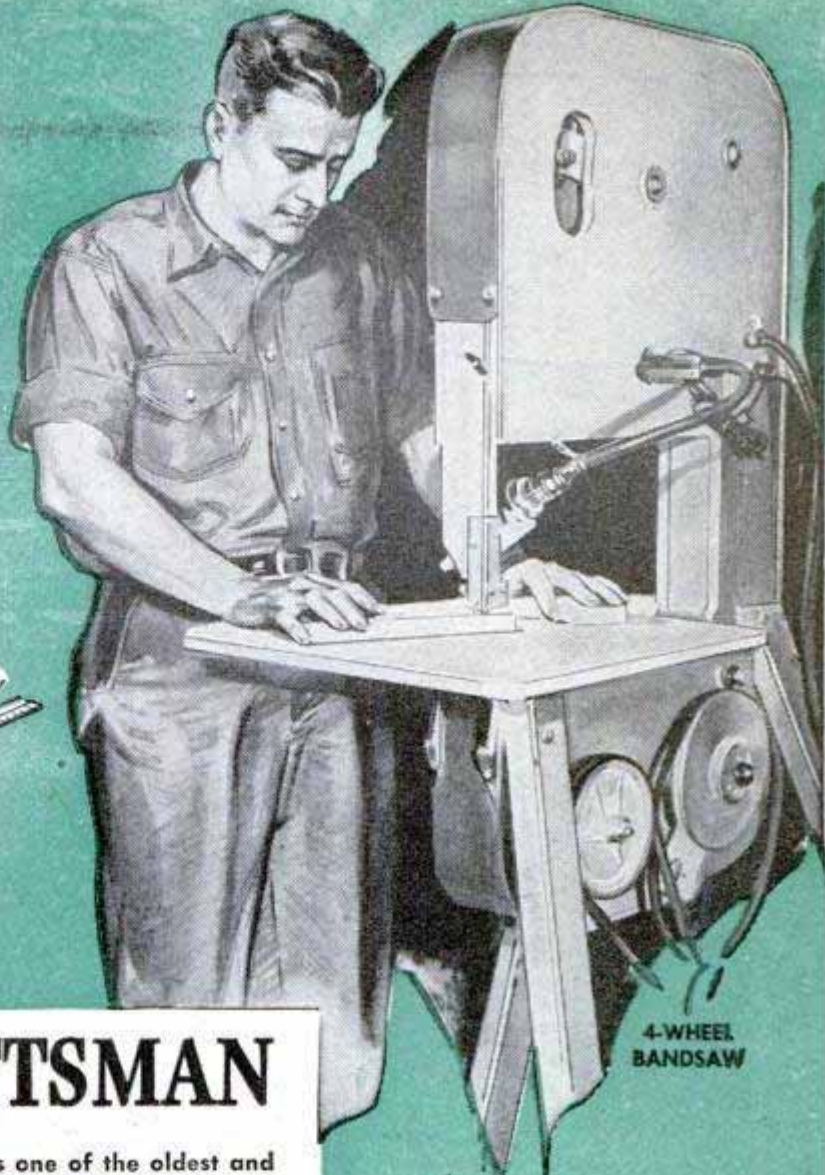




BRAIDING



GLASS CUTTING



4-WHEEL  
BANDSAW

## The CRAFTSMAN

★ Braiding with colored gimp is one of the oldest and simplest of the handicrafts. Once you acquire the knack of laying the braid, it takes only a few minutes to produce novelties and apparel accessories that are durable, colorful and attractive. Color design and types of braiding are the important points. An article on page 188 pictures the process in complete detail.

★ Have you ever watched a glazier cut glass to the exact size he needs? A quick sweep of the glass cutter along a straightedge, or a curved pattern, a light pressure of the fingers and he gets a clean, true break every time. It's easy—if you know how. A story on page 198 takes you through the procedure step by step.

★ Craftsmen know the advantages of having a bandsaw with a deep throat and variable speeds. The 4-wheel bandsaw detailed on page 225 has an 18-in. throat, which means that it will work to the center of material 36 in. wide. The machine is supported on three sturdy legs that give it unusual stability.

★ Candid baby photos are easy to take if you do some quick thinking and use a bit of ingenuity. Only the simplest lighting and camera equipment are needed. A professional photographer gives you the essential pointers on page 209.



PHOTOGRAPHING  
BABIES



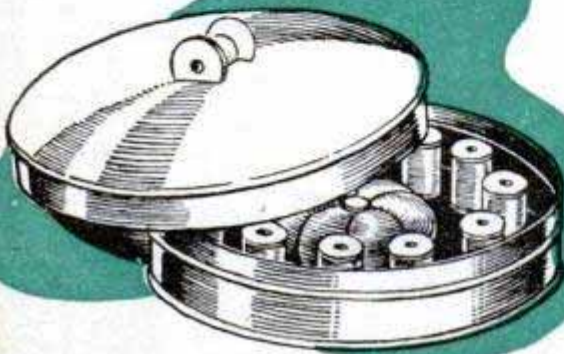
# TIN-CAN

There is no limit to the number of useful and decorative items that can be made for practically nothing from common tin cans. Here are a few to get you started

By W. Clyde Lamme



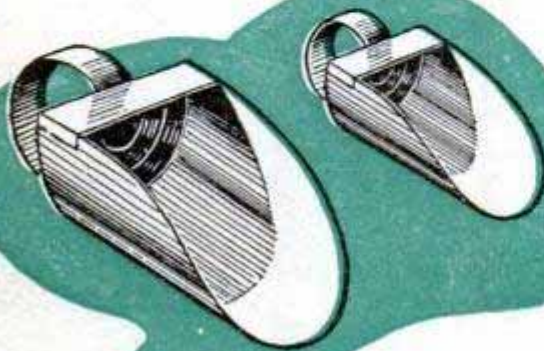
KITCHEN FILE



SEWING KIT



COOKIE CAN  
SALT AND PEPPER SHAKERS



HAND SCOOPS

1

USING ordinary tin cans for material and employing the simplest techniques of the tinsmith and metalcraft worker, any hobbyist can make home accessories that are both useful and attractive. These range from the simple recipe file shown in Fig. 1, which merely requires cutting off the top half of a rectangular can, to the more involved candle lanterns, lamps and sconces used in colonial days.

The sewing kit, cookie can, and salt and pepper shakers in Fig. 1 are made without altering the cans except that holes are punched in the lids of the shakers. Screw-top cans, lacquered in bright colors, are used for the shakers and cookie can. The sewing kit is made from a metal candy box. A spool, cut to fit the contour of the lid and attached with a small screw, forms an appropriate handle. Next, a wooden bottom is cut from  $\frac{1}{4}$ -in. plywood to fit snugly inside the box. Spindles to hold the spools of thread are  $\frac{1}{8}$ -in. hardwood dowels glued in holes equally spaced in the plywood false bottom. A suitable pincushion can be added if desired. Enamel or lacquer the can in a color that suits your fancy.

A rectangular  $\frac{1}{2}$ -gal. can is the right size for the recipe file. Measure and mark the required height of the file. Then remove the top of the can and, with tin snips, cut straight down the corners of the can to the marks. Cut all the way around the can  $\frac{1}{2}$  in. above the marks. Then bend the  $\frac{1}{2}$ -in. projections down inside the can and hammer the bends flat to make a smooth edge. Solder spacers inside the can so that the file cards can be separated according to subject matter. Lacquer the file inside and out and add the decal letters of the label and a decal decoration. The cookie can is labeled and decorated in the same way. Handy scoops for sugar, flour and coffee are made from cans of various sizes simply by cutting away the can as in the lower detail of Fig. 1 and soldering on a handle and finger guard cut from that part of the can which is cut away. File cut edges smooth.

Youngsters who like to play store should

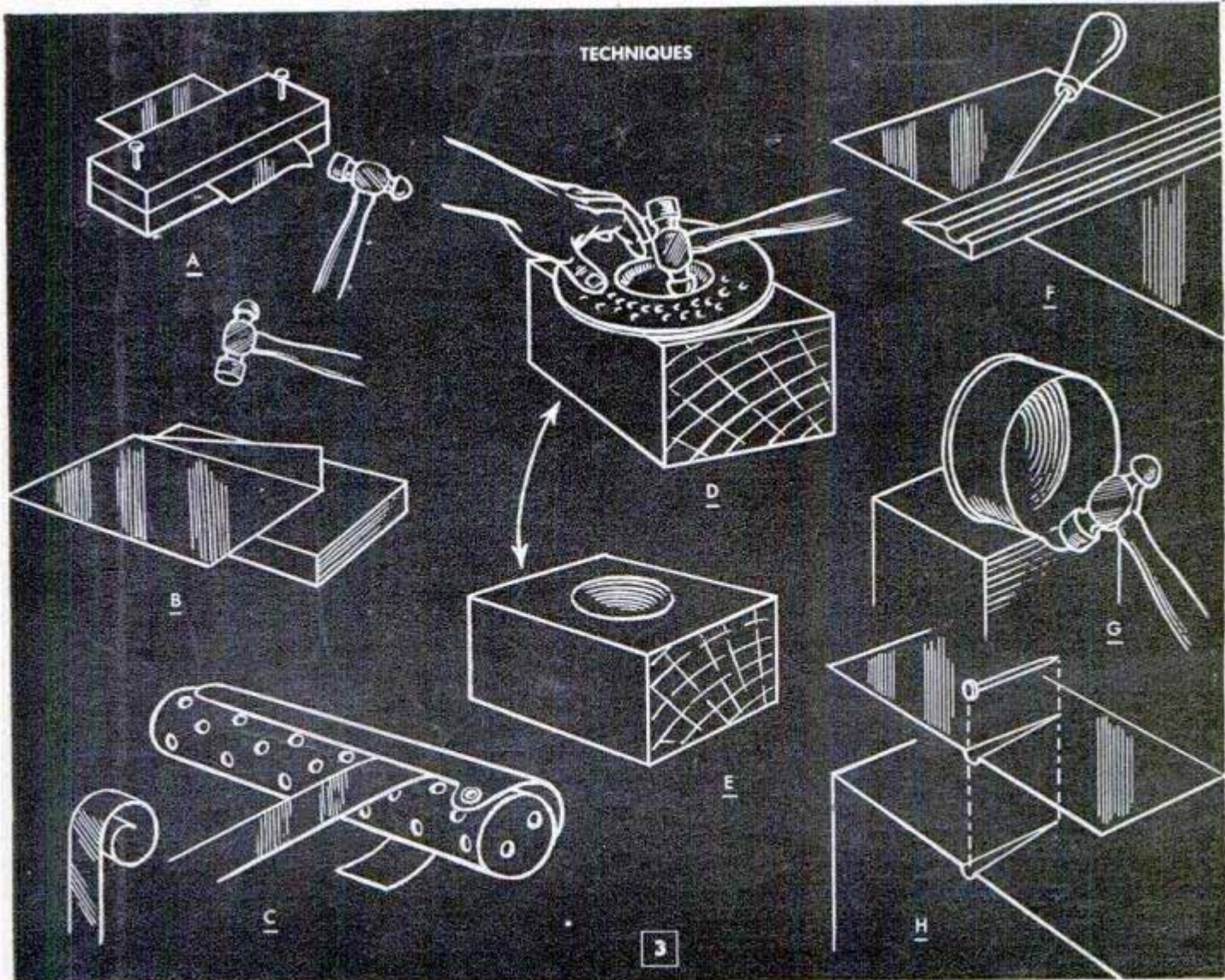


# CRAFT

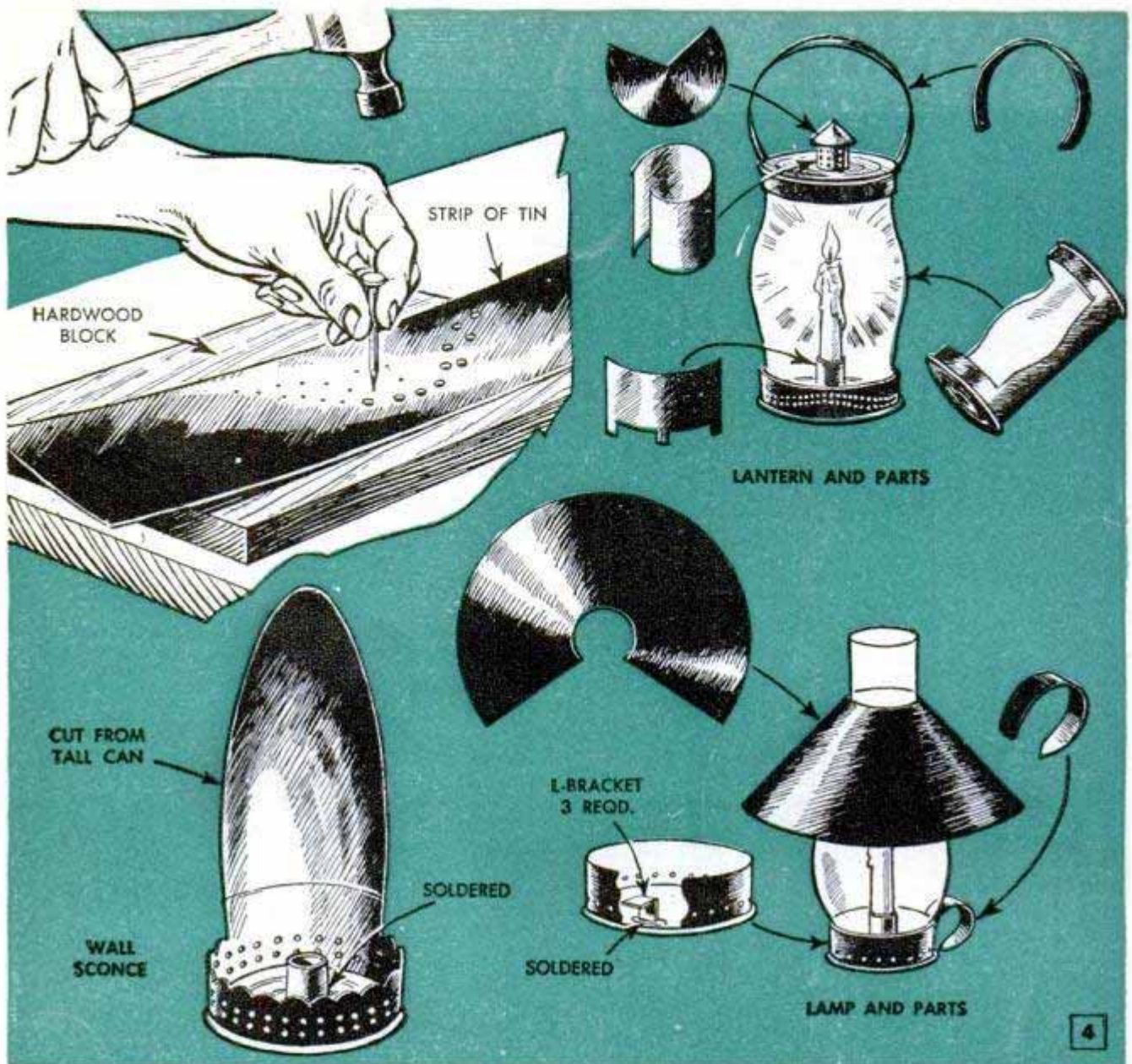


BUD VASE

## TECHNIQUES







ask mother to open cans from the bottom and try not to damage the labels. In this way, the cans may be stacked as in Fig. 2 or placed on shelves with the labels right side up.

The base of the bud vase, also shown in Fig. 2, is made from the bottoms of two cans, one larger than the other as shown. Before cutting off the bottom of the larger can, invert it and depress the bottom by tapping with a wooden mallet. Repeat the process on the smaller can. Then cut the bottoms off, smooth the cut edges, and fasten the parts together with a small stove bolt. Cut a strip of tin 2 in. wide, roll it around a broom handle and solder the joint. Then solder to the base. Purchase a glass test tube to fit in the holder.

Fig. 3, details A to H inclusive, shows simple methods of bending, marking, flaring, dishing and beading sheet metal which will be found useful when one tackles such projects as those shown in Fig. 4. It should be understood that these are not reproduc-

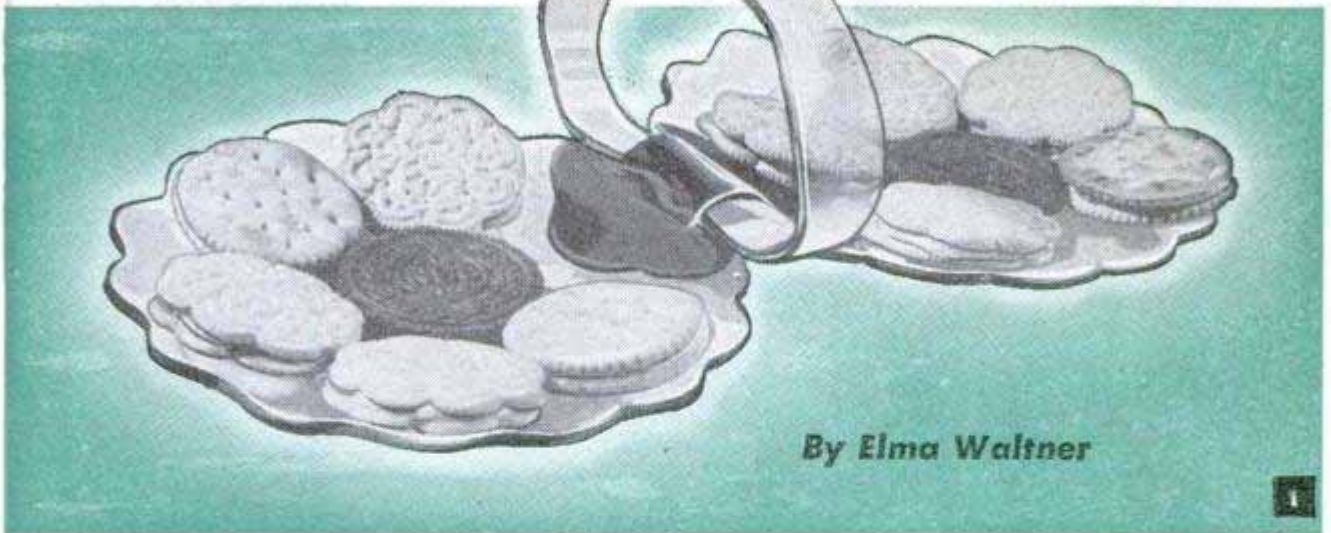
tions, but are merely typical of the pierced sheet-metal ware of colonial times. The candle sconce, Fig. 4, is made from a single can of a large size. Don't try to cut the reflector to shape in one pass of the snips. Make vertical cuts first, then trim to shape. Form the scalloped edge of the tray by making equally spaced V-cuts with the snips and then trim to the curved form. Smooth all cut edges with a fine file. Piercing of the metal can be done with a nail as in the upper left-hand detail or with a hand-operated metal punch. The lantern also is made from a single large can. The flared edges of the reflector are formed by holding the work on a hardwood block as in Fig. 3, detail G. Construction of the lamp is very similar. Various types of trays also can be made by cutting up cans and peening the metal on dishing blocks as in Fig. 3, detail D. Very attractive work can be produced by wire-brushing the peened surface and finishing with metal lacquer.

Certain information and construction details courtesy Rival Mfg. Co.



# TIDBIT

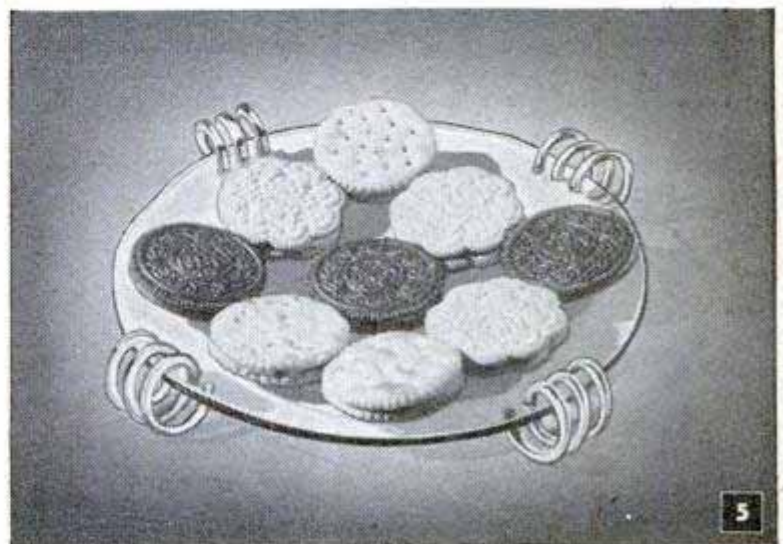
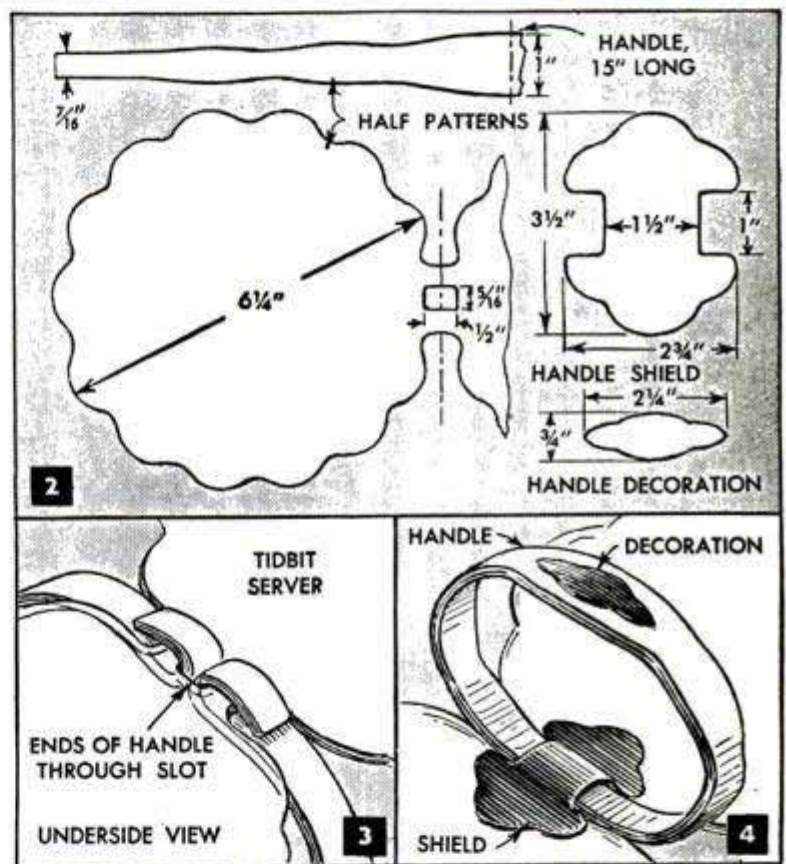
# SERVERS



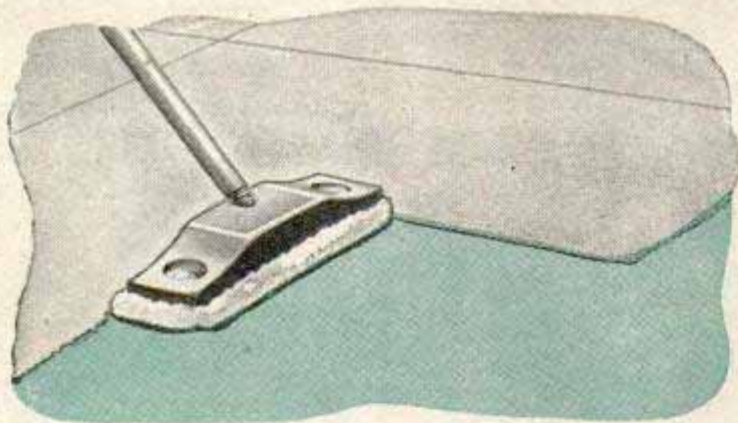
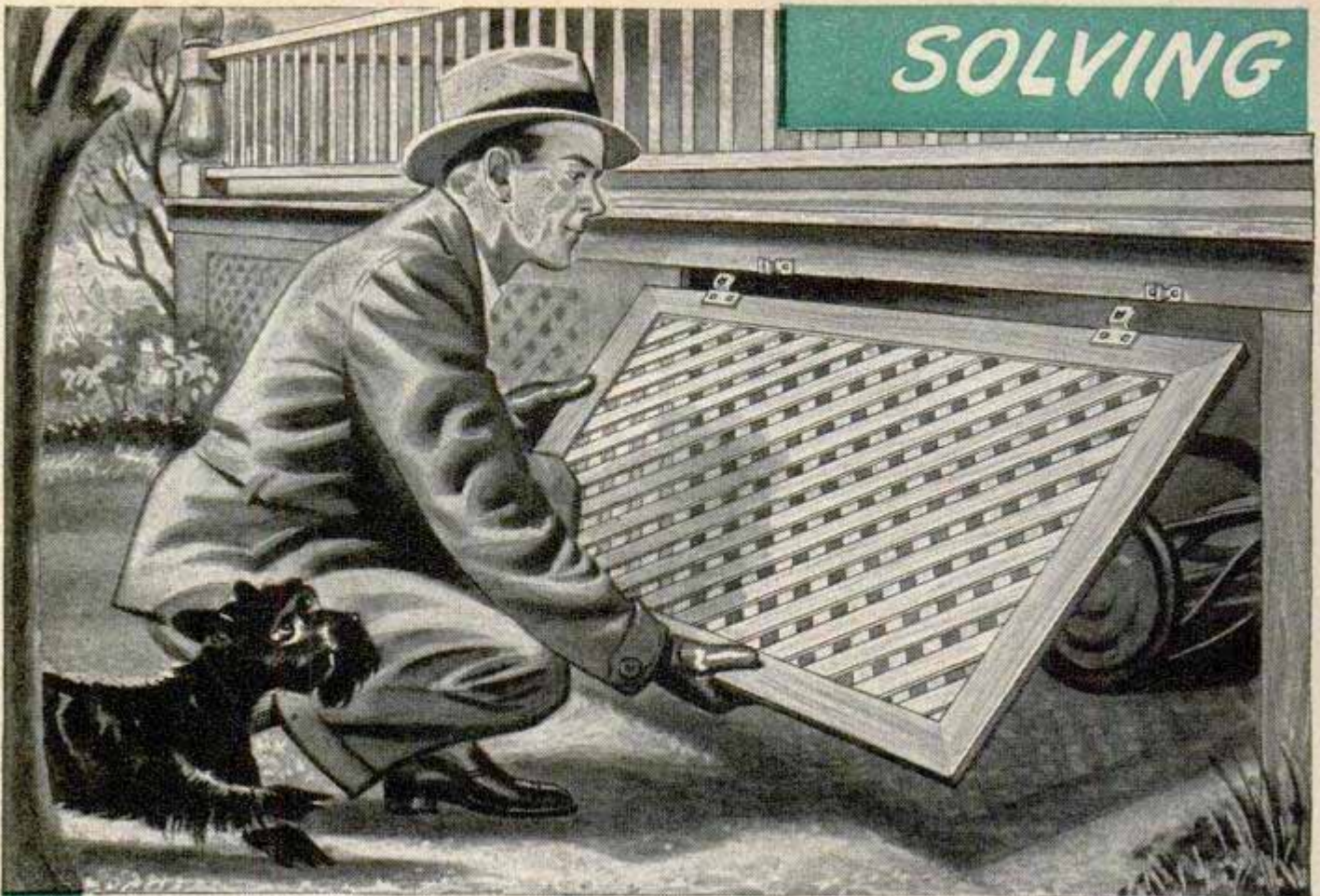
By Elma Waltner

**P**OSSESSING the novelty and simplicity of items found in expensive gift shops, these two plastic tidbit servers provide excellent projects for the beginner. Both trays of the server shown in Fig. 1 are formed from a single sheet of clear  $\frac{1}{8}$ -in. heat-forming plastic. The pattern for the tray, Fig. 2, is traced directly onto the protective paper which covers the plastic, making it easy to follow the line in sawing the parts to shape. The paper covering is removed after sawing and the edges of the plastic are smoothed with a fine file and polished on a cloth buffer charged with rouge. To dish the trays, the plastic is first heated in the kitchen oven at 250 deg. F., which makes it very pliable. Then, handling it with gloves, lay the plastic over two saucers placed side by side. Only light pressure is required to make it conform to the shape of the saucers. Work rapidly as the plastic cools quickly. The handle is heated and attached to the server as in Fig. 3, the ends being bent upward against the underside of the trays. Finally, the hole through which the handle passes is covered with a shield of colored plastic, Fig. 4, and a colored decoration is cemented to the top of the handle.

The server in Fig. 5 is dished in the manner described above and four feet are added by heating and coiling  $\frac{1}{8}$ -in. plastic rod around a broomstick and threading it through holes drilled in the edge of the server as indicated.







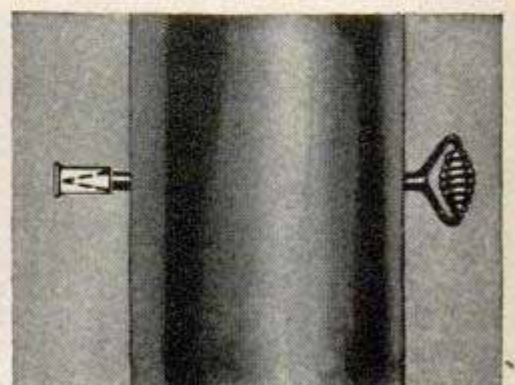
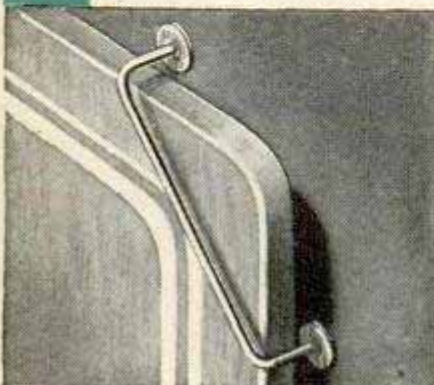
**WASTE SPACE** under a porch is put to good use for storing garden tools by hinging a section of the lattice. Storm-sash hangers permit the lattice panel to be removed when access is desired

**FLOOR-WAX APPLICATOR** makes play of applying paint to concrete floor. It spreads the paint evenly and permits the job to be done from a standing position. Pour the paint in a shallow pan to apply

**A CARD TABLE** stored on end against a closet wall will not fall if a towel bar is used as a cleat under which a corner of the table can be placed

**RUST RINGS** caused by setting scouring-powder cans on porcelain fixtures in the kitchen or bathroom are prevented by covering the bottom edges of the cans with strips of cellulose tape

**THE POINTED SHAFT** of a stove-pipe damper will be less likely to cause injury if it is shielded with an empty .22-caliber cartridge. In addition, the brass cartridge adds a neat finish to the tip

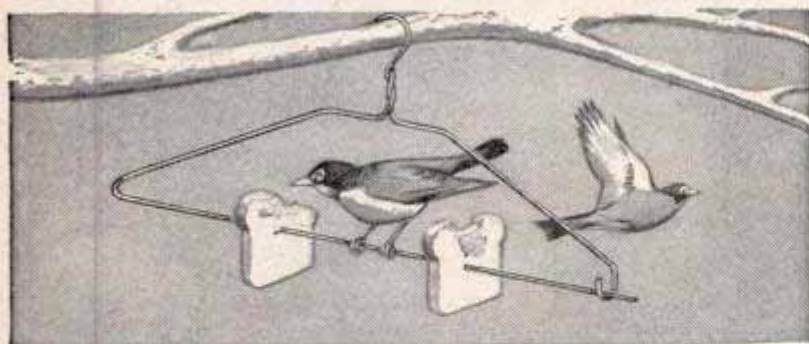
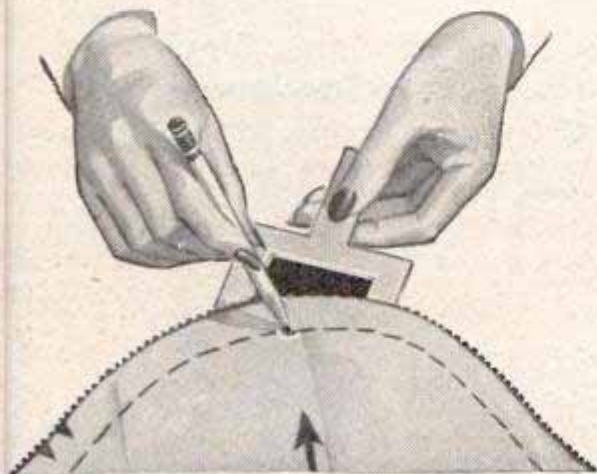




# HOME PROBLEMS

**USE TALL CANDLES** for wicks when molding large holiday candles. Simply stand the candle upright in the center of the mold before the wax solidifies

**MARKING A PATTERN** on two pieces of cloth at the same time is made easy by inserting carbon paper between the pieces of material. Place two squares of carbon back-to-back and mount in a cardboard frame



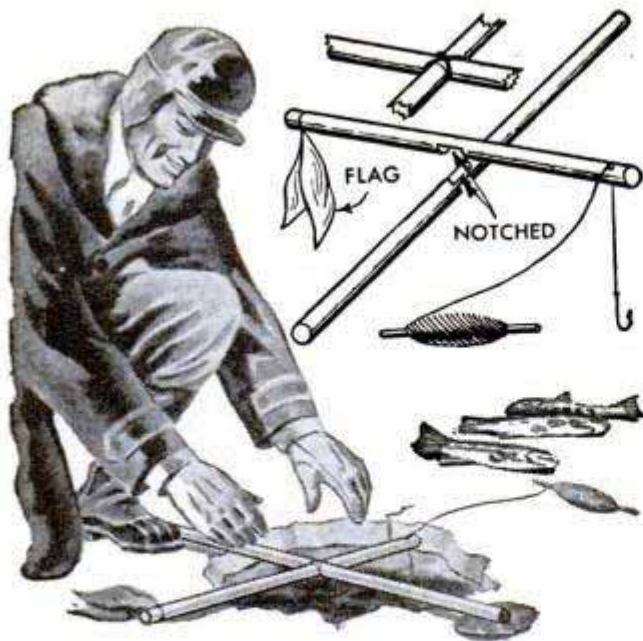
**DAMP KITCHEN MATCHES** that are difficult to light will ignite readily if they are rubbed through the bristles of a clothesbrush several times before striking. The friction produced by rubbing a match briskly, in most cases, dries it sufficiently

**FEEDING BIRDS** in wintertime by impaling bread on wire coat hanger suspended from a tree limb allows the birds to feed out of the reach of cats. One end of the hanger is cut apart and bent so that it can be opened and closed like a safety pin

**COFFEE-CREAM STAINS** on the tablecloth will be considerably reduced if a small amount of butter or lard is placed just under the spout of the pitcher. This keeps the drippings from running down the side of the pitcher and soiling the tablecloth



## Semaphore for Ice Fishing



Two saplings or  $\frac{3}{4}$ -in. dowels, one 12 in. long and the other 24 in., and a flag make up this simple semaphore for ice fishing. The sticks are notched and half-lapped at the center, then bound together with cord to form a cross. The signal flag is tied to one end of the short stick, and the fishline is threaded through a  $\frac{1}{4}$ -in. hole in the opposite end. The line is given a half hitch around the stick to keep it from slipping. In use, the ends of the long stick rest on the edge of the hole and pivot to raise the flag when a tug is made on the line.

R. A. Jenkins, Los Angeles, Calif.

## Storing Sweet Potatoes

Sweet potatoes will remain firm if they are first cleaned and then stored by packing them in a basket between layers of oats. The basket of potatoes should be kept in a warm, dry place.

## Tin Can Holds Electric Drill On Tool Panel or Wall



Wanting to get my small electric drill out of the way and protect it from possible damage, I hit upon the idea of placing it in a holder made from an empty tobacco can. After cutting the bottom from the can, I nailed the can to

the wall at a convenient height from the floor. In this way, the drill is always within easy reach when needed and is not exposed

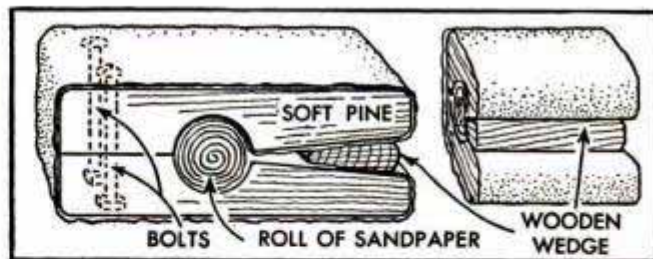
to rough handling when not being used. Disconnect the drill before placing it in the holder.—H. Leeper, Canton, Ohio.

## Flour Sifter Separates Chaff From Home-Shell'd Popcorn

When shelling popcorn it's usually difficult to remove the chaff thoroughly. However, an easy way to do this is to pour the popcorn into an ordinary flour sifter and turn the handle. This will separate the chaff which will drop from the bottom of the sifter.—G. E. Hendrickson, Argyle, Wis.

## Refill-Type Sanding Block Takes Roll of Sandpaper

Changing sandpaper in this block is just a matter of forcing out a small wedge, tearing off the old paper, pulling new paper onto the sanding surface and wedging it. The paper is cut into a long strip of suitable



width, rolled tightly and inserted in the opening in the center of the block. The block consists of two pieces of soft pine shaped as indicated, bolted together and then drilled through the sides to provide a container for the sandpaper roll. The bolt heads and nuts are countersunk below the surface of the blocks. The paper, of course, is unrolled and pulled over the top, bottom and one end of the block and held by the wedge in the slotted end.

John W. Cook, Park Rapids, Minn.

☞ To mend leather gloves, use cotton thread instead of silk as the latter will tend to tear the leather.

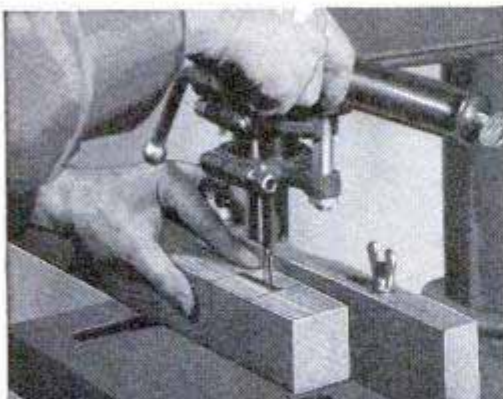


# QUARTER-ROUND LEGS

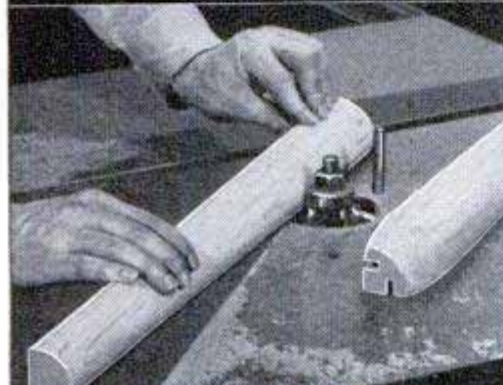
Easy way to turn tapered and straight furniture legs four at a time. The pieces are screwed together in the waste at the ends and then turned as a single block



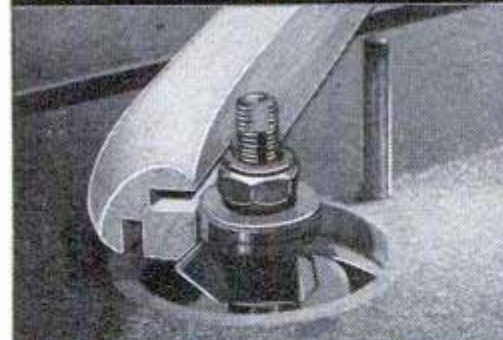
Above, mount the work in the lathe, turn as required, sand and cut off. Below, blocks are screwed together through waste ends



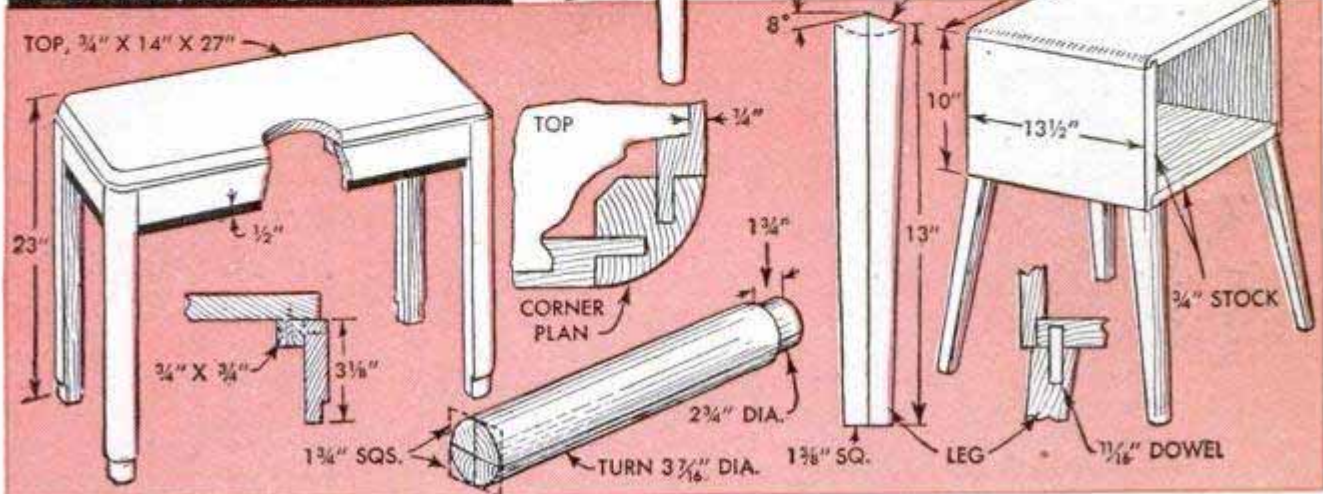
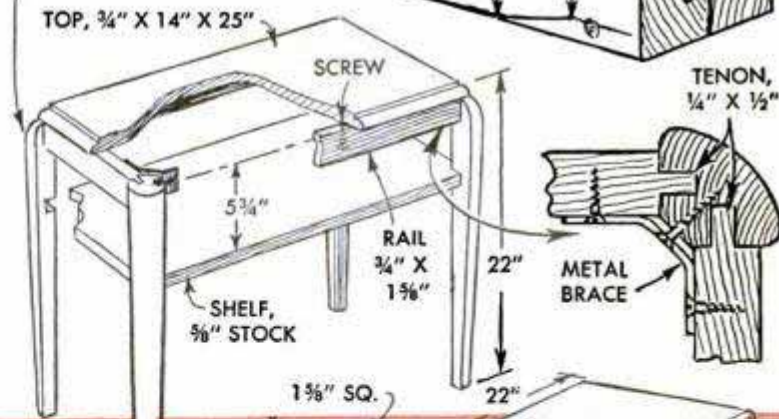
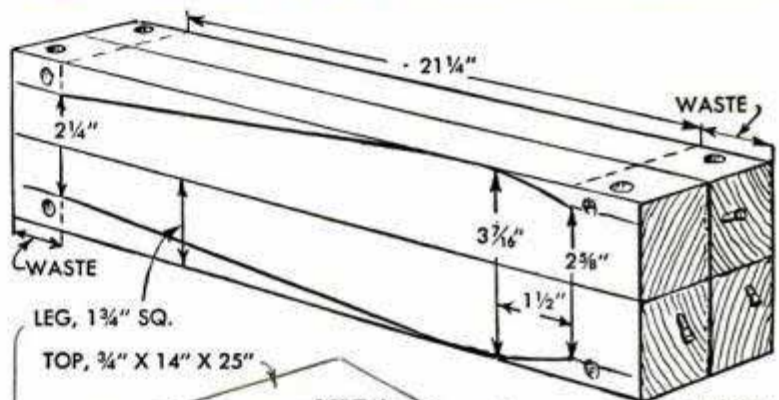
If mortises are needed, cuts should be made while the work is "in the square"



If it is desired to round the inside corners of the legs, form with shaper



Beveling inner corner of legs also is done on shaper, using a V-type cutter





# Suggestions for a MERRY CHRISTMAS



**Dry pine cones** painted in gay colors provide beautiful Christmas-tree ornaments at little cost. Tied with ribbon and combined with holly, they also make attractive

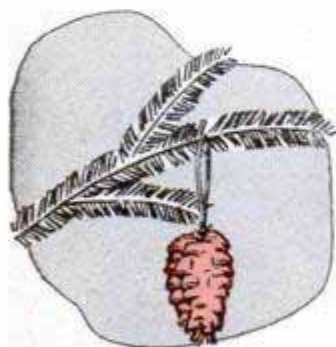


table decorations for parties and novel window or wall ornaments for the holiday season. Dip the cones in silver or gold paint or brightly colored enamel and place on a piece of old window screen to dry.

## Standing a Christmas tree in water

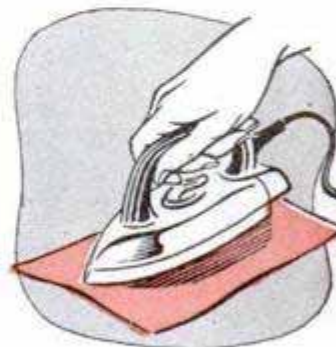
is a practical and satisfactory method of keeping the fire hazard to a minimum while prolonging the fresh, green appearance of the tree. To use the water treatment, obtain a tree that has been cut as recently as possible. Then, saw off the end of the trunk diagonally at least 1 in. above the original cut. After doing this, immediately stand the tree in a container of water and keep the water level above the diagonal cut during the entire time the tree is in the house. Even though the tree is not to be set up and decorated for several days, stand it in water, as above, and keep it in a cool place. If started in time, this will prevent the needles from drying out and thus becoming flammable. In addition, it retards the fall



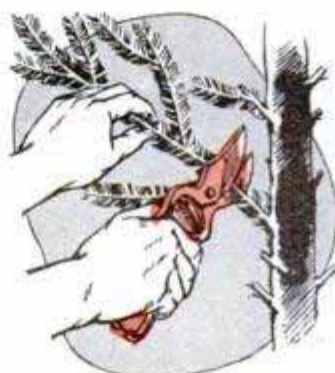
of needles from types of trees which ordinarily lose them quickly. Although freshly cut spruce or balsam-fir trees kept in water are not easily ignited by candle or match fires, they, of course, will not withstand intense heat. For this reason, take all possible fire precautions in the vicinity of the tree, including the elimination

of defective electrical connections, and special care to see that combustible material does not accumulate on or beneath the tree.

**Removing candle drippings** from clothing or furniture upholstery is done in the following way. First, scrape off the excess with the fingernail or a knife. Then, place a piece of blotter over the spot and press a hot iron over the blotter to melt the wax. Repeat this as often as necessary. If any of the wax remains in the fabric, remove it by sponging the spot with alcohol.

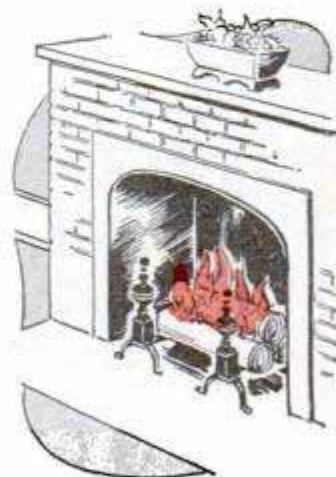


**Scattering needles** throughout the house when carrying out the Christmas tree can be eliminated simply by cutting off the



branches with pruning shears while the tree is still in its stand. Cut the branches in pieces small enough to fit in a bushel basket. In this way they are easily carried to the rubbish pile or saved for burning in the fireplace.

**Yule logs** that burn with a beautiful, multicolored flame add a novel touch to holiday gatherings around the fireplace. The logs are made by immersing tightly rolled newspapers in a strong solution of salt, blue vitriol (copper sulphate) and water. This solution should be kept either in a wooden barrel or a large earthenware crock. After the rolls have soaked for a week and are dried thoroughly, they will burn for a long time, giving off flames of various colors. *Caution:* As it is poisonous, keep the solution out of the reach of children.



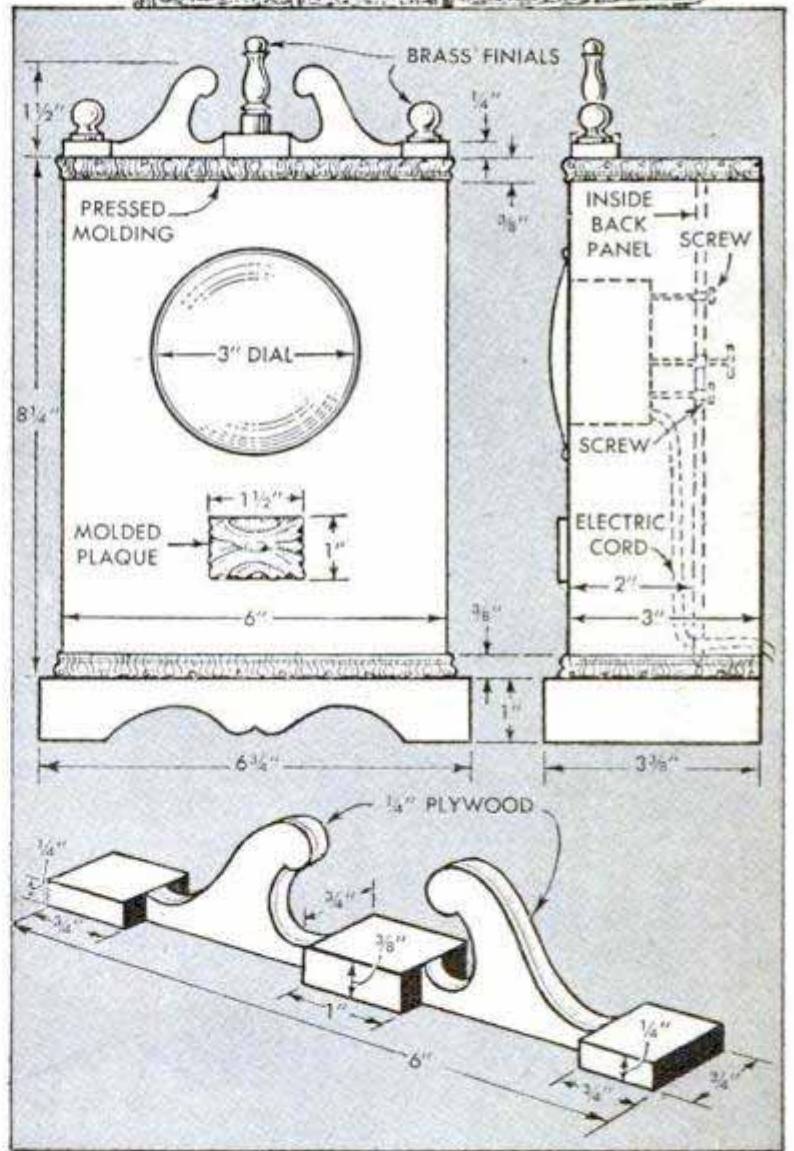
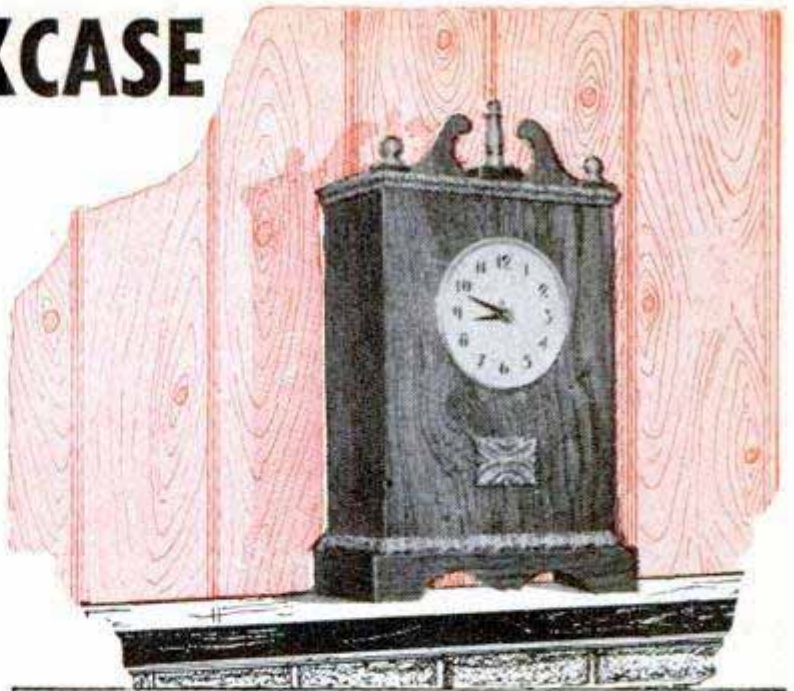


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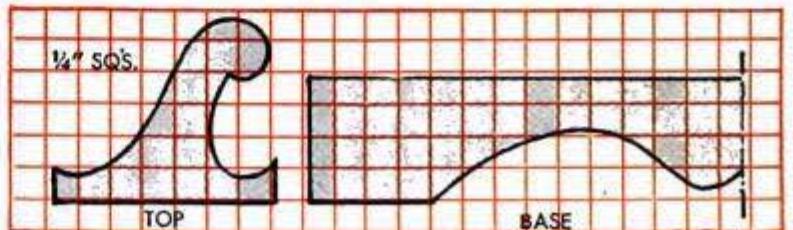
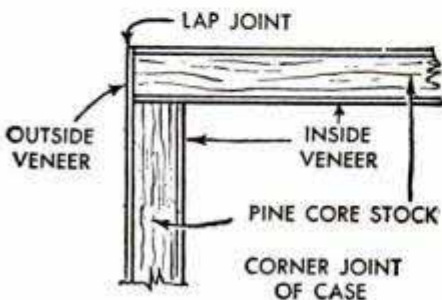
# PERIOD CLOCKCASE

By Ralph A. Hinde

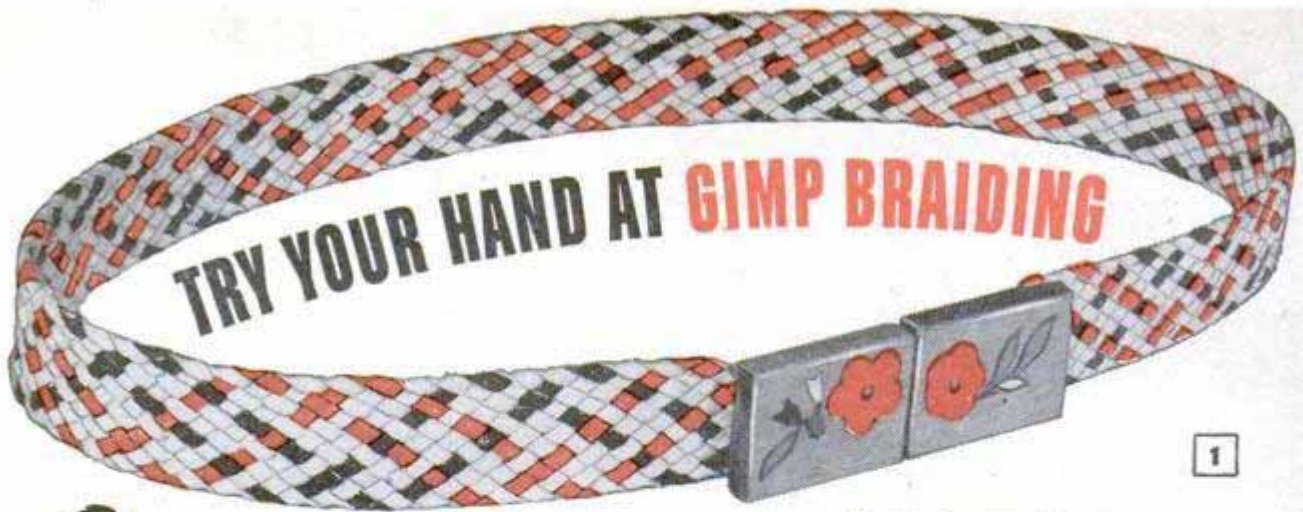
THIS SMALL clockcase is just the project for the craftsman who likes to work with fine veneers. The original case was made from flame-grained rosewood veneer glued to a core of  $\frac{1}{4}$ -in. pine with a backing veneer of mahogany. The case is proportioned for an electric movement having a 3-in. dial. First, cut the pine core stock  $\frac{3}{4}$  in. oversize. Next, select the face veneers and trim roughly to the size of each piece of core stock. Also, cut the backing veneers to size. Then glue the veneers to both sides of the core. Scrolled parts of the broken-pediment top are of  $\frac{1}{4}$ -in. plywood which is faced on one side with a matching veneer. When the work is dry, cut the opening for the dial and run a  $\frac{3}{8}$ -in. rabbet along each edge of the front piece of the case, the depth of the rabbet being equal to the thickness of the piece less the face veneer. Then join the sides to the front with a butt joint as in the lower left-hand detail, using glue and glue blocks. Finish the corner of the joint by sanding carefully. With this method of joining, the end grain is not exposed. The scrolled parts of the base are veneered with the grain running vertically to match the case and the pediment top. Use  $\frac{1}{4}$ -in. plywood as a core and join at the corners in the same manner as described above. Pressed moldings add decorative detail but plain, straight moldings can be used. Finish the wood in the natural color and add the finials which are the brass type used on table lamps. These are attached to the case in the positions shown with dowels which are turned into the threaded holes of the finials.



Furniture you can build p/35

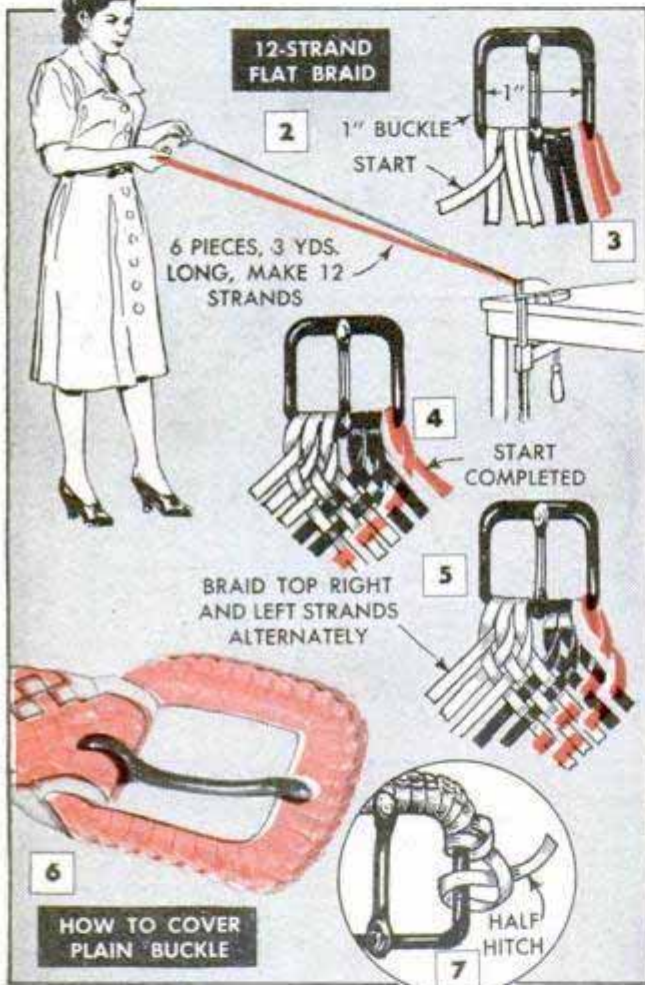






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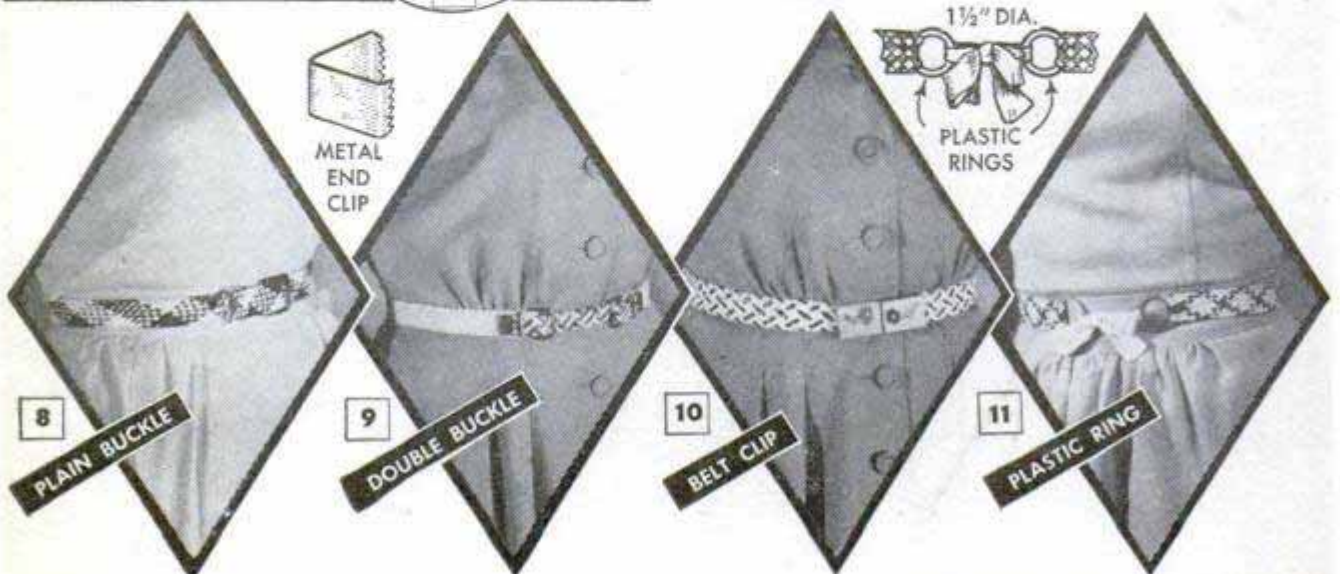
By Lela M. Brown



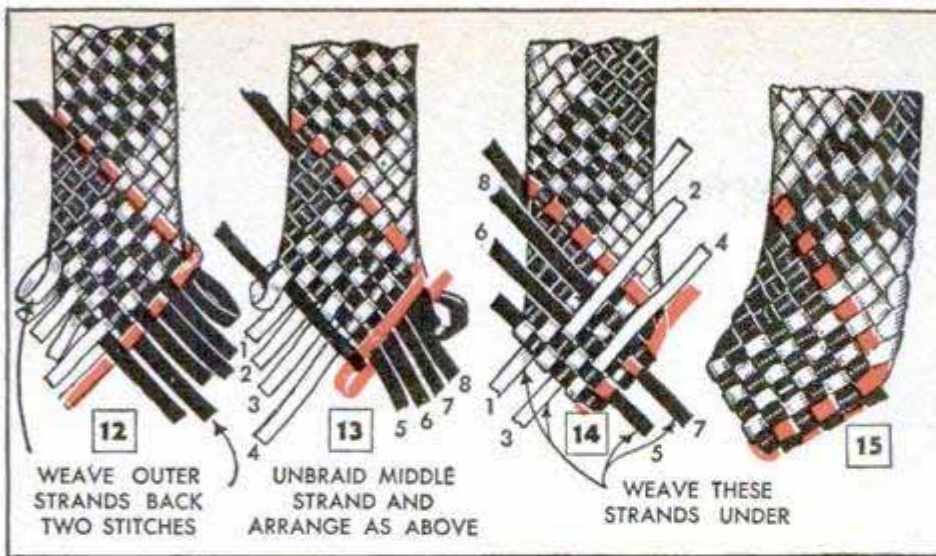
FEW CRAFTS require so little equipment as gimp braiding for, in addition to the gimp, about all that is needed is a pointed stick. In this article, the steps in braiding belts and bracelets are given but, with a little practice, you can braid many other attractive and useful articles.

**Materials:** Gimp consists of cotton tape covered with tough, flexible lacquer and is available by the yard or in 50 and 100-yd. spools in various colors. Standard widths are  $\frac{3}{8}$  and  $\frac{1}{8}$  in., although wider gimp can be obtained. Plastic gimp also is available. Most of the projects pictured in this article were braided from  $\frac{1}{8}$ -in. flat gimp.

**Flat braid (12-strand):** To make a belt braided with 12 strands, use six pieces of gimp 3 yds. long and loop them through a suitable buckle as shown in Fig. 2. The buckle is slipped over nails driven into a block of wood which is clamped to a table as in Fig. 16. Start braiding by turning the left-hand strand over itself, Fig. 3. Then braid the remaining strands as in Fig. 4. This is the completed starting position. Now, tighten the braid and then start the running braid. This is done by taking the top right-hand strand and weaving it over







and under the others as shown in Fig. 5. Repeat the procedure with the top left-hand strand and braid right and left-hand strands alternately in this way until the belt reaches the desired length. To finish the braid, Fig. 12, tuck the two outer strands, shown by loops, back under the braid, for about two stitches. Unbraid the two middle strands (red and black) and turn them under and through the loops as in Fig. 13. Then braid the even-numbered strands back over the top for a distance of one or two stitches, Fig. 14, and cut off the excess gimp. Braid the remaining strands in the same way, but turn them under. This will produce the belt shown in Figs. 15 and 17.

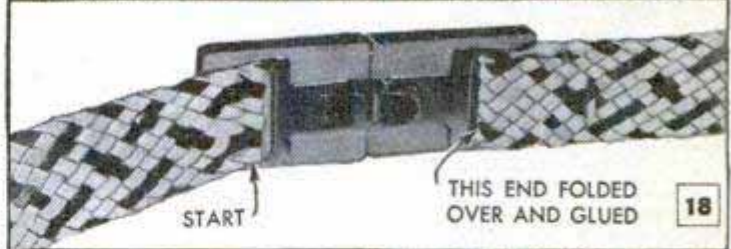
**Belt styles:** Many different kinds of belts can be made with 12-strand flat braiding. The pattern itself has numerous variations and depends upon arrangement of strands at the beginning. The strongest pattern is produced with two colors braided as in Fig. 19. Popular variations are



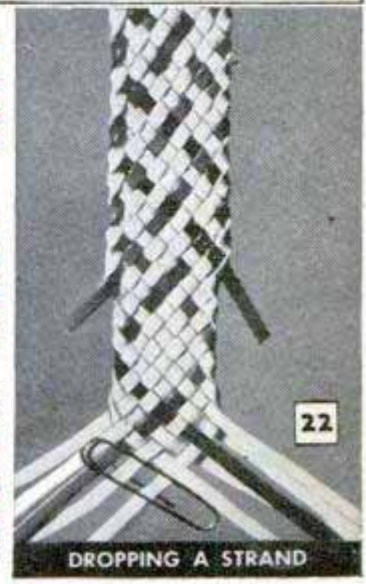
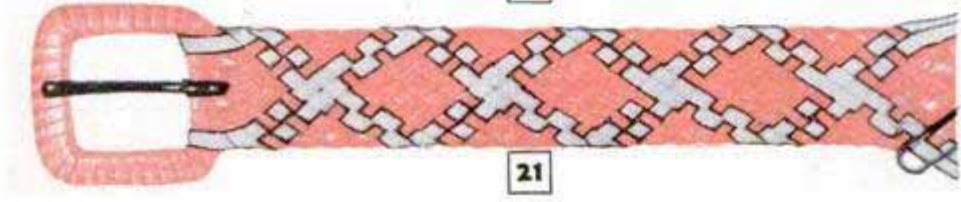
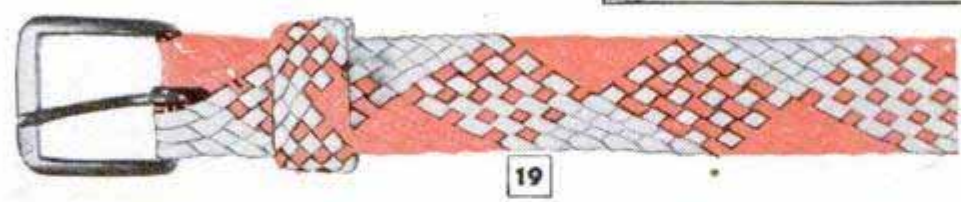
16 BELT PATTERNS DEPEND ON HOW STRANDS ARE ARRANGED AT START. FIGS. 19, 20 AND 21 SHOW THREE VARIATIONS



17 END THE BRAID BY WEAVING EACH STRAND BACK ALONG ITSELF

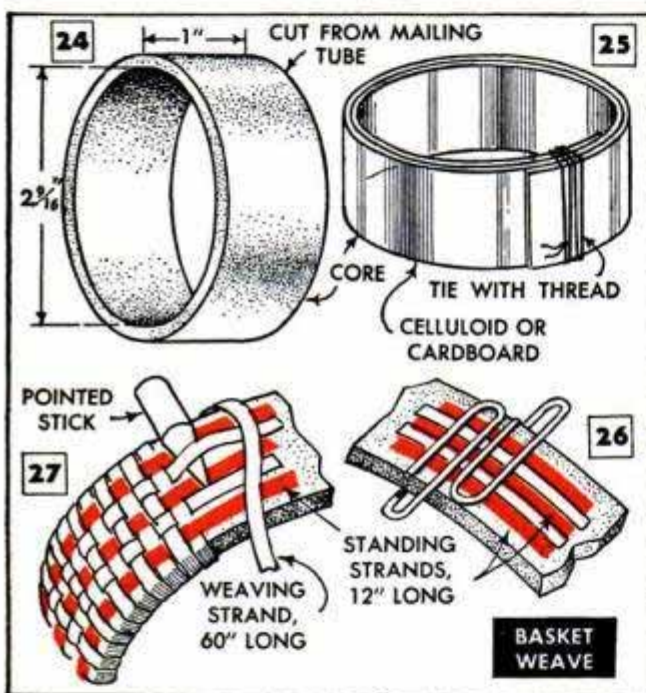
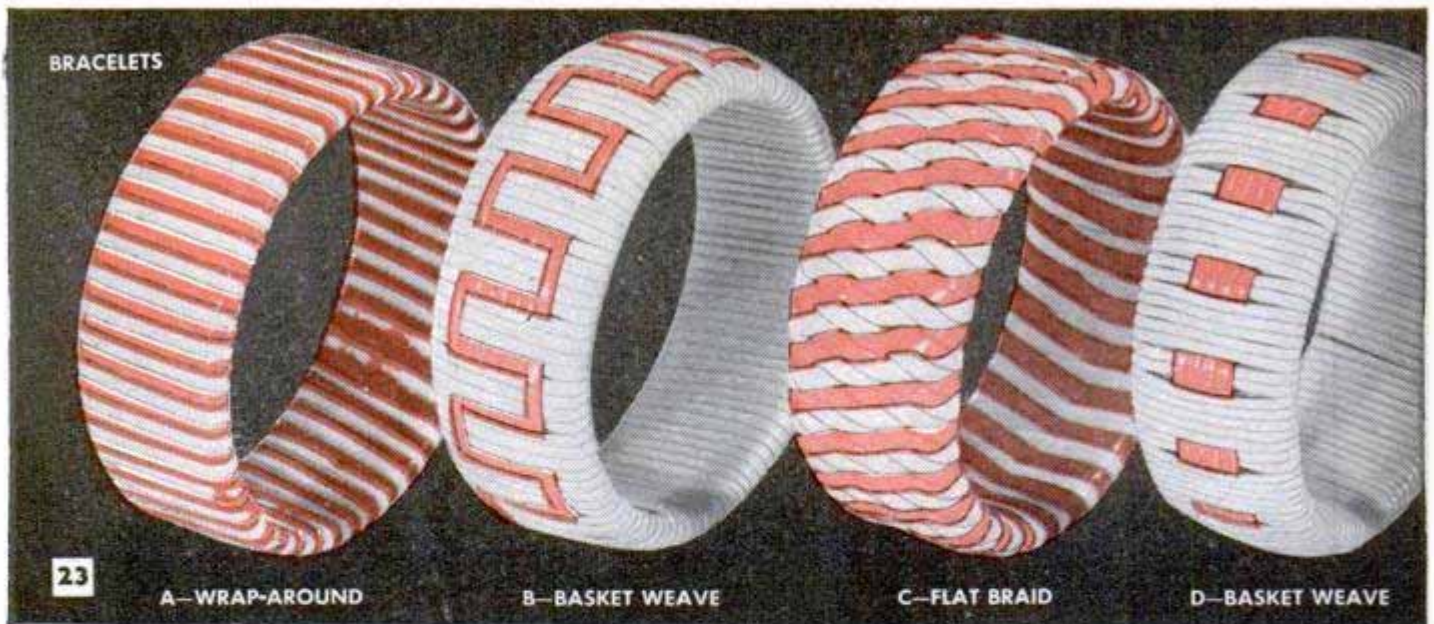


18 THIS END FOLDED OVER AND GLUED



22 DROPPING A STRAND





shown in Figs. 20 and 21. Belts are most effective when the pattern is simple and of not more than three colors. One-color belts are very attractive. Fig. 8 shows a conventional buckle style. In Fig. 9 the belt has a buckle at both ends, the second buckle being fastened by folding the braid over and cementing or sewing it. The two buckles are spanned by a short length of flat braid, the ends of which are finished with metal clips. The belts in Figs. 1 and 10 are fitted with a belt clip set. Method of attaching the clips is shown in Figs. 18 and 20. The belt in Fig. 11 is braided and glued around plastic rings and is fastened with a tie ribbon. A 12-strand flat braid of  $\frac{1}{8}$ -in. gimp will produce a belt 1 in. wide. If you want a narrower belt, do the braiding exactly the same but use 8 or 10 strands instead of 12. If the end is to be folded over a buckle, it is best to drop one strand, as shown in Fig. 22. Plain buckles are much more at-

tractive if covered with gimp as in Fig. 6. To do this, the gimp is applied by the half-hitch method as in Fig. 7.

**Bracelets:** Various styles of bracelets are shown in Figs. 23 and 28; all are braided around a cardboard core. This can be cut from a mailing tube, Fig. 24, or made up from a strip of cardboard tied or held with gummed tape as in Fig. 25. The wrap-around style, Fig. 23, detail A, is the simplest, and is made by wrapping two strands of different colors around the core, tucking the ends under. The wrapping can be straight across as in detail A, or diagonal, as in detail E.

**Basket weave:** This popular style of braiding is done with any number of short standing strands fastened to the core with paper clips as shown in Fig. 26, after which the single weaving strand is carried round and round and over and under to make the pattern. The fastest method of working is to pick up the standing strands with a pointed stick, Fig. 27, rather than lace the weaving strand under. The basket-weave pattern looks best when  $\frac{3}{16}$ -in. gimp is used because it is thinner than the  $\frac{1}{8}$ -in. gimp and permits closer weaving. Plastic gimp, being tough and elastic, can be laced with a needle after the entire core is covered in a wrap-around manner. In either case, the ending is made by weaving the standing strands double and carrying the weaving strand to the inside where it is tucked under or glued.

**Flat braid (8-strand):** This takes more time than any other kind of braiding but is very effective, especially with narrow gimp. Start by looping four strands of gimp through the bracelet core, as in Fig. 29. Braid the strands together, Fig. 30, to complete the starting end and tighten the braid. Then proceed with the running braid. This is done by passing the top right-hand





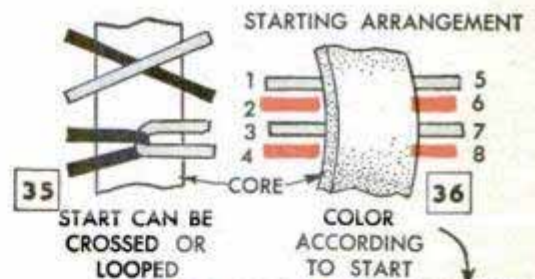
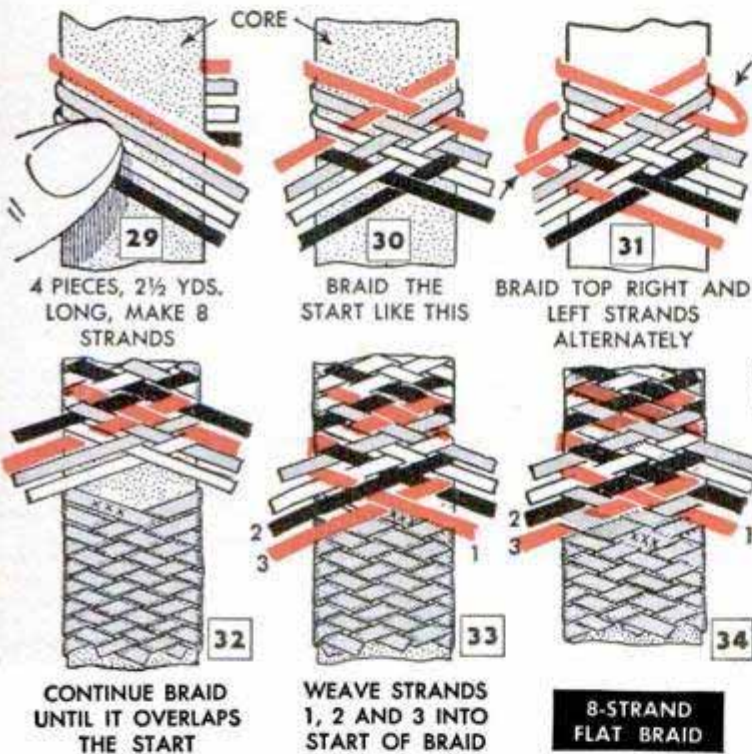
E—WRAP-AROUND (DIAGONAL)

F—FLAT BRAID



28

COLORFUL BRACELETS ARE EASY TO MAKE IN WRAP-AROUND, BASKET WEAVE OR 8-STRAND FLAT BRAID

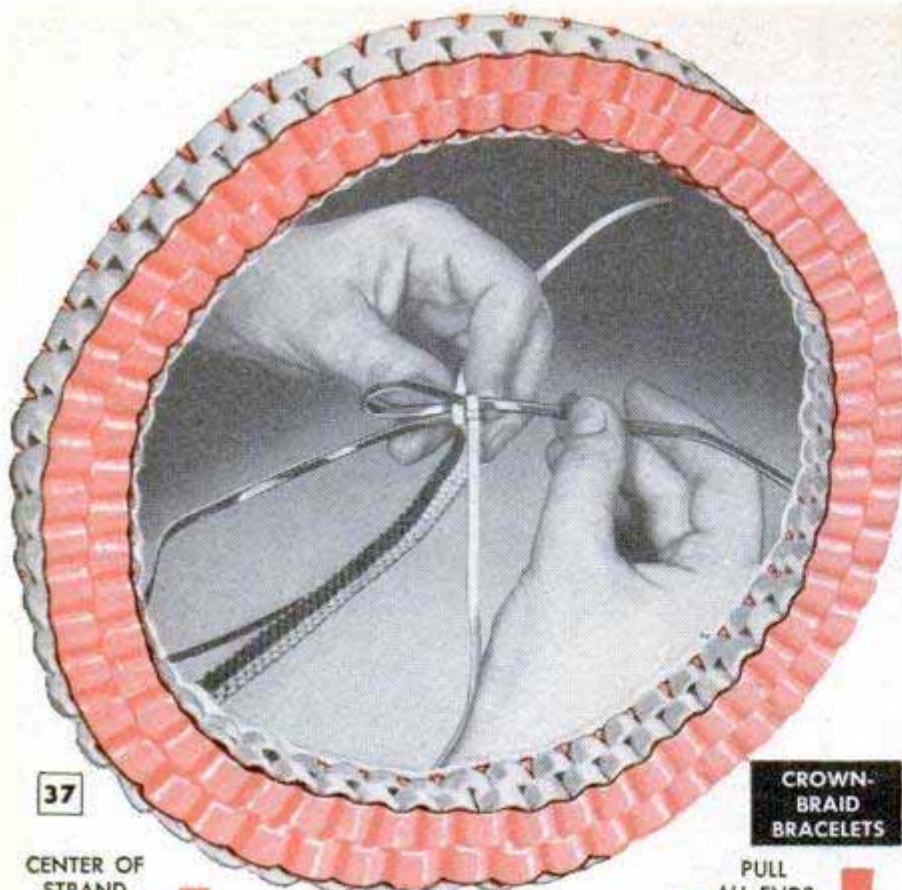


strand through the inside of the core and out between the two middle strands on the opposite side, Fig. 31. The left-hand top strand is worked in the same way and from then on the braid alternates right and left. Fig. 32 shows the braid nearly completed. Continue until you completely cover the starting end as in Fig. 33, and then weave strands 1, 2 and 3 into the beginning ends of the braid, Fig. 34. This brings all strands to the outside where they can be cut off or folded to the inside and glued. Numerous patterns can be made with 8-strand flat braid, the pattern depending on how the strands are arranged at the start. Fig. 35 shows two starting methods and Fig. 36 gives a pattern chart. Make a tracing of the chart and color the diamonds to form the desired pattern. Then arrange the strands of gimp according to the numbers in the chart and the starting arrangement. Each number must always appear in the same color of diamond.

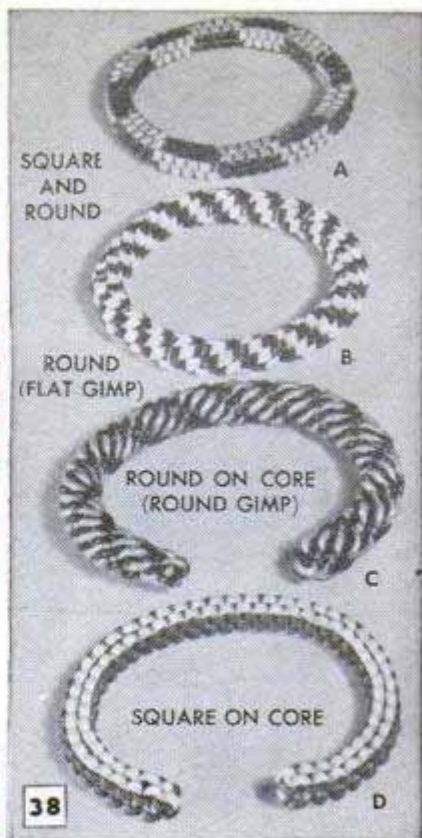
**Crown braid:** This can be either square or round. Both use the same starting knot, Figs. 39 to 42, inclusive. After making the knot, turn it over as in Fig. 43, and begin braiding. The square crown is made by carrying each strand squarely

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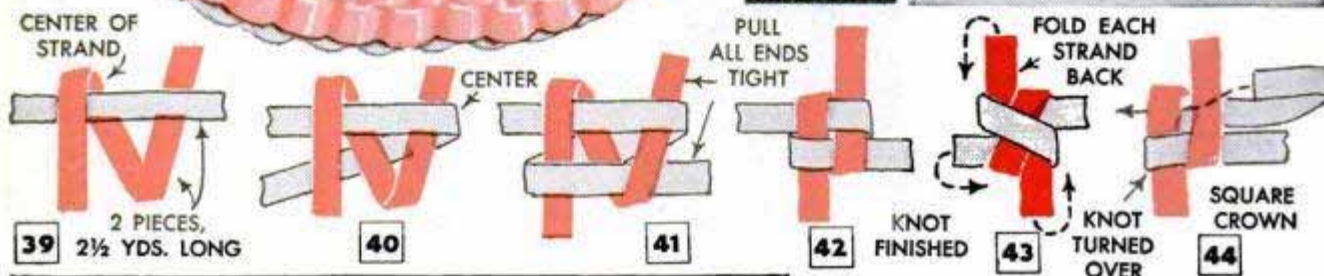


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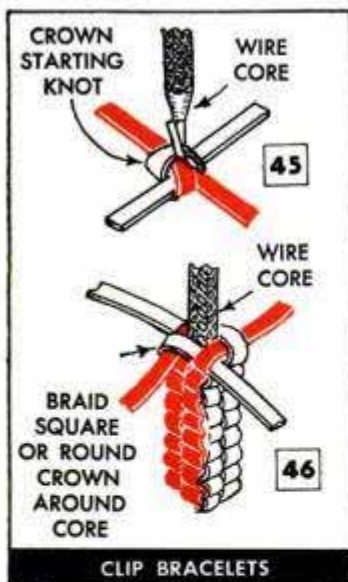


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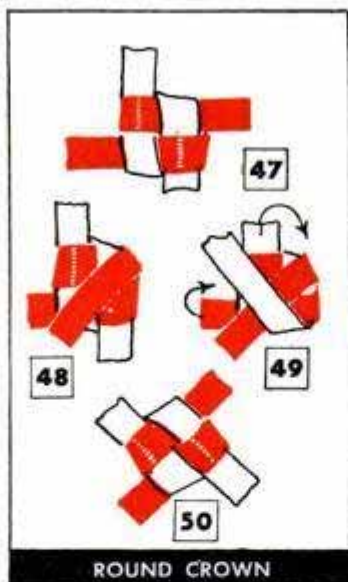
CROWN-BRAID BRACELETS



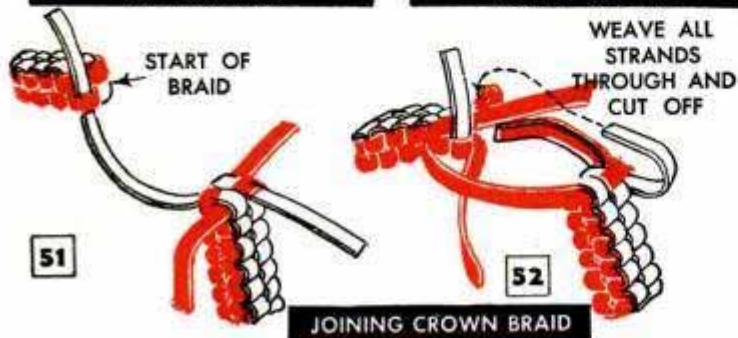
SAME STARTING KNOT IS USED FOR SQUARE OR ROUND CROWN



CLIP BRACELETS



ROUND CROWN

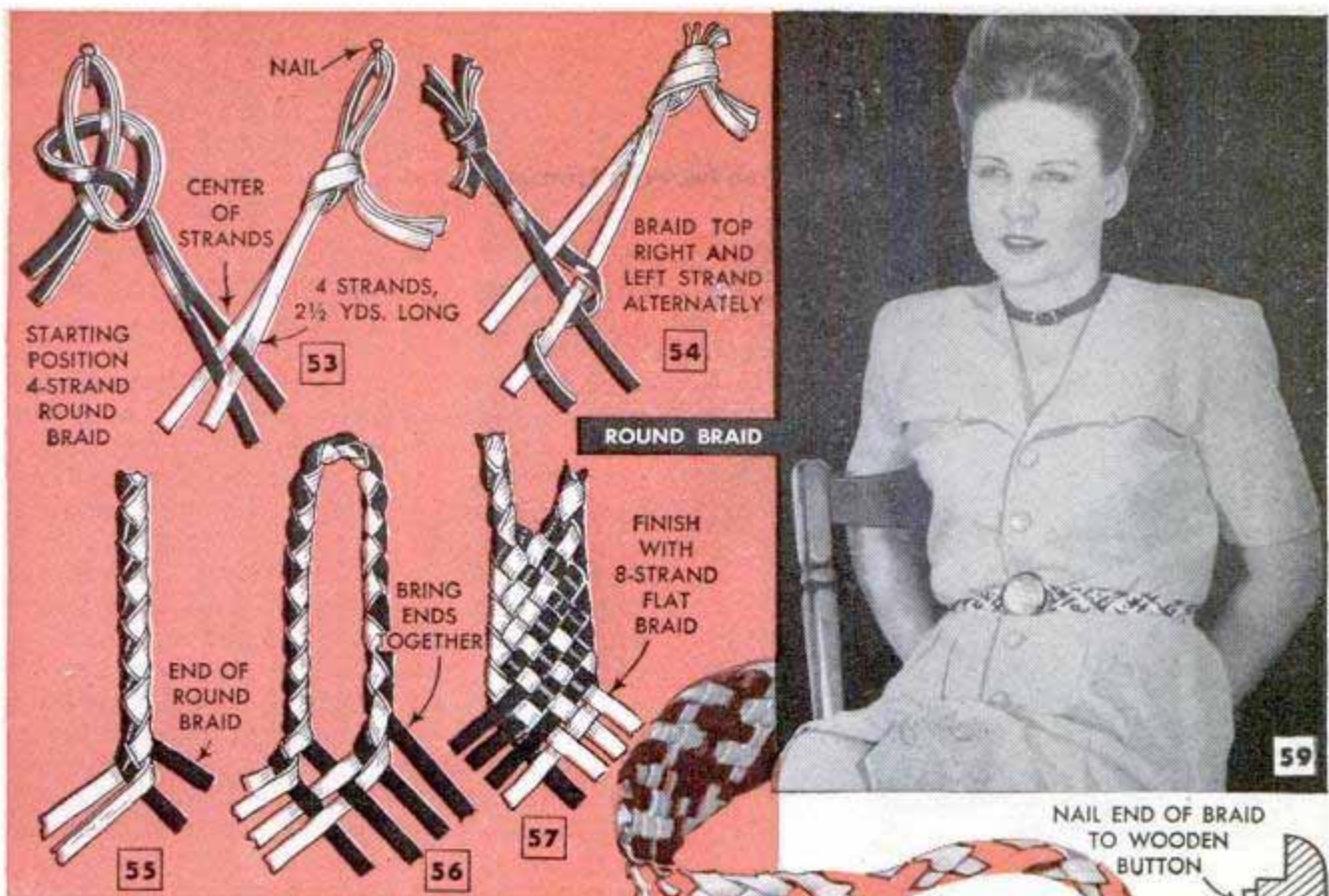


JOINING CROWN BRAID

across, as shown in Fig. 44. This produces the square, braided effect shown in Fig. 37. Although the round crown is done with flat braid, it results in a round, ropelike braid. At any stage of braiding the round crown, the top braid looks just like the square braid, Fig. 47. However, each succeeding layer is made by carrying the strands across diagonally, as in Figs. 48, 49 and 50. This braid often is called a spiral braid because it turns like a corkscrew, as can be seen in Fig. 38, details B and C. By braiding several layers of square crown and then one layer of round crown, the color pattern can be changed, producing the effect shown in Fig. 38, detail A.

**Clip bracelets:** These bracelets, Fig. 38, details C and D, fit snugly on the wrist and are popular for that reason. They can be made in either round or square crown, the braiding being done around a wire core. Begin by hooking the wire into the starting knot, as shown in Fig. 45, and work the braid exactly





as previously explained. Fig. 46 shows the square crown. After desired length is reached, the wire core is cut off and the braiding continued for two or three layers beyond the end of the wire, at which point the final layer is pulled tight and the ends woven back into the main part of the braid.

**Joining crown braid:** Figs. 51 and 52 illustrate the joining of crown braid to make a complete ring or bracelet. This is done by weaving the strands back into the starting braid. Crown bracelets can be made a fairly close wrist fit because the braid has a certain amount of stretch which permits slipping the bracelet over the hand.

**Round braid:** This braid is used mainly for leashes, but is shown worked into a loop-and-button belt. To do this, start by locating the center of four strands. Tie off one end and arrange the four strands as shown in Fig. 53. From this position, take the top right-hand strand and carry it under the braid and over between the two

strands, Fig. 54. Do the same with the top left-hand strand and continue right and left alternately until the desired length is attained. The result is an attractive round braid, Fig. 55. Bring the two ends of the braid together and arrange the strands as shown in Fig. 56. You now have an 8-strand flat braid. Run this to the length desired, Fig. 57, and then staple the end to a wooden button. The loop also can be made 6-strand round braid, running into a 12-strand flat braid, the effect being as shown in Fig. 58. Besides showing the loop-and-button belt, Fig. 59 pictures the currently popular "dog collar." This one is 8-strand flat braid, dropped to 6-strand at the end to permit easy threading through a small chrome-plated buckle.

## Airtight Seal of Paraffin Preserves Oil Paint in Partially Filled Cans

Ordinary methods of resealing partially used cans of oil paint usually fail to preserve the paint for long periods of time. However, one man found that covering the paint with an airtight seal of paraffin keeps it in perfect condition. To do this, melt the paraffin in a can which is placed in a saucepan filled with water. This is done because paraffin melted directly over the fire may

burst into flame. After the paraffin has melted, pour a 1/8-in. layer over the paint. When this cools, pour a second layer, tilting the can slightly so the wax forms a seal with the sides of the can.

H. M. Nichols, Mattapan, Mass.

☛ A few drops of gun oil will prevent garment slide fasteners from sticking.

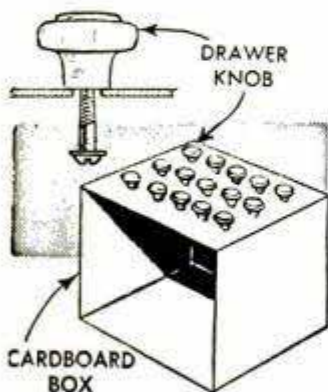


## Flashlight Bulbs Illuminate Tree If Electricity Is Not Available



One man, whose home is not wired for electricity, illuminates his Christmas tree with a battery-operated string of flashlight bulbs, thus eliminating the fire hazard of candles. He removed the male plug from an ordinary light string and connected the ends of the string to the terminals of a car battery. For convenience, he wired a feed-through switch into the circuit. The length of the base of the flashlight bulbs was increased to fit the sockets by adding a drop of solder to the contact point of each bulb. To give the tree a more pleasing appearance, he tinted each one of the bulbs with water colors.—Gilbert S. Hesse, St. Calixte de Kilkenny, Que., Can.

## Box Aids Painting Drawer Knobs



When hand painting a number of drawer knobs, one home craftsman found that the job was simplified greatly by using a cardboard box to support the knobs. Rows of holes to take the knob screws are first punched through

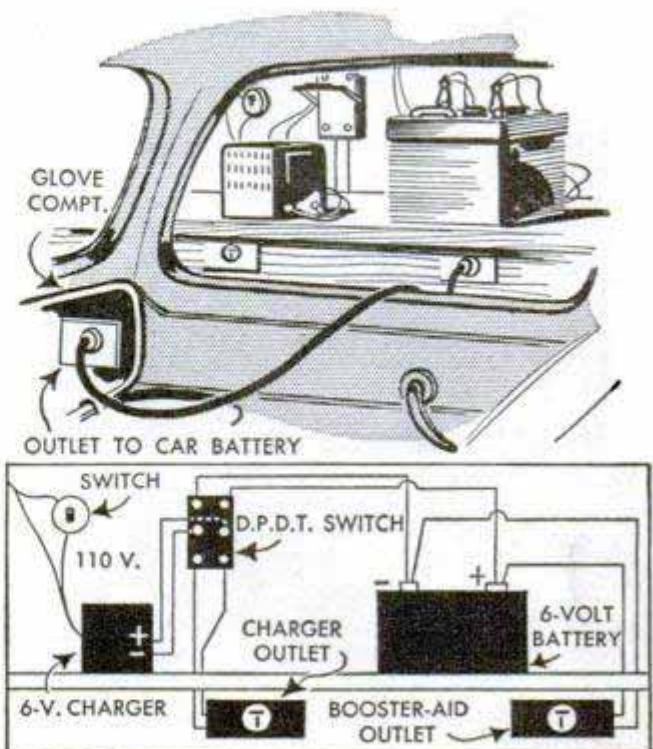
the side of the box and then the screws are inserted in the holes in the manner shown. Thus, by reaching in through the open side of the box, each knob can be rotated by its screw without actually handling the knob itself. This not only makes the job less

messy but it permits each knob to be coated evenly. The cardboard box catches drippings and allows the painted knobs to be set aside for drying without touching them. This stunt is particularly useful for production painting in small shops.

Joseph A. Knight, Oneonta, N. Y.

## Car-Battery Charger and Booster Assure Cold-Weather Starting

For the man whose car is a "must" for year-round driving, here is a compact booster unit for those cold-morning starts, along with a charger to keep the car battery in its best condition. The unit consists of a 6-volt charger and battery, a d.p.d.t. (double-pole, double-throw) switch, a toggle switch for the 110-volt line, three polarized outlets and a rubber extension cord with polarized plugs. The d.p.d.t. switch permits charging either the car battery or the booster battery, and the latter provides the increased amperage needed for cold starting. Positive to positive and negative to negative is the method used for connecting the charger through the switch to the booster battery and charger outlet, the booster battery to the booster-aid outlet, and the car battery to its outlet in the car. The glove compartment is an excellent, out-of-the-way place for the car-battery outlet, and the extension cord may be stored in the compartment so it is always at hand. When using the booster circuit to start the car, be sure that the d.p.d.t. switch is in the "off" position and, after the motor is running, disconnect the extension cord from the booster-aid outlet.—Alfred J. Seymour, Jr., Salmon Falls, N. H.



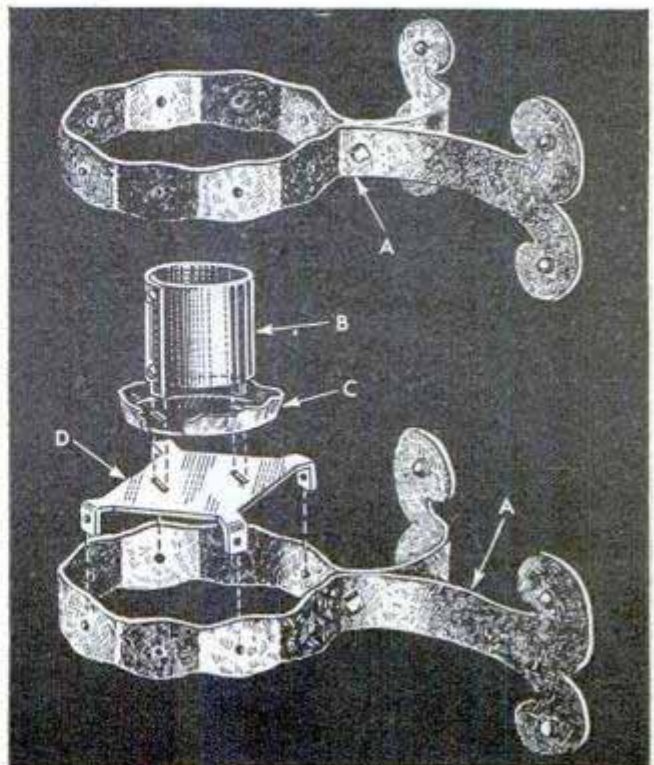
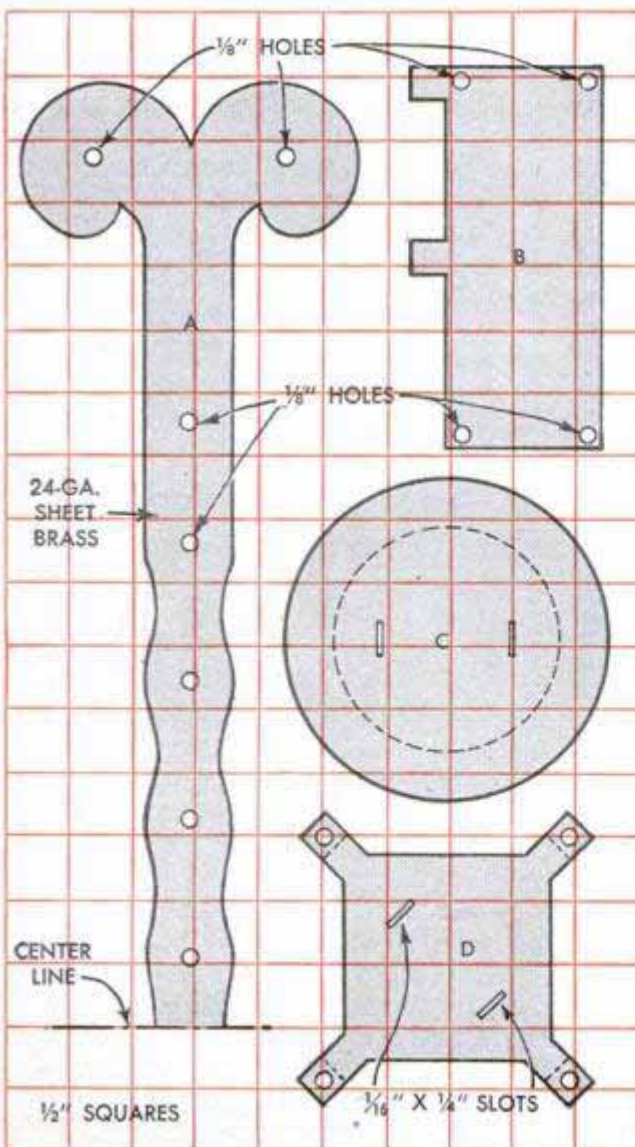
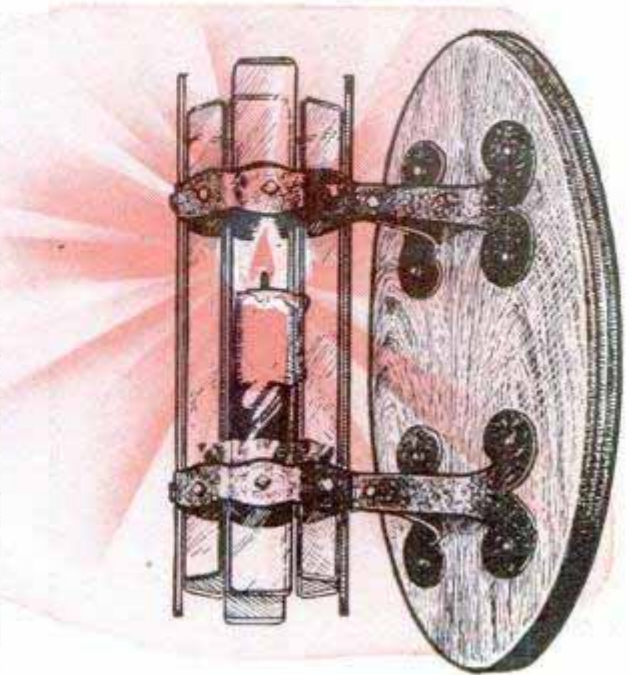


# BRASS CANDLE SCONCE

## *gives emergency light*

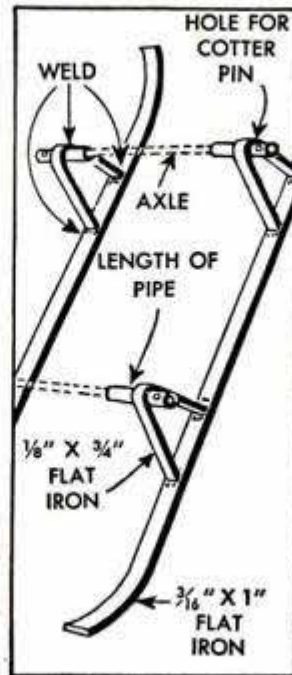
WHEN STORMS damage the power lines and leave you in the dark, you'll appreciate this attractive candle sconce to furnish an emergency light while service is being restored. It consists of a chimney of eight strips of glass held vertically by two bands of hammered brass, part A, the bands being attached to an oval plaque of fancy wood. Four of the glass strips measure 1 x 8 in. and the others are cut about 1 in. shorter. Each one is drilled for attaching to the bands with short machine screws. One of the best ways to drill glass is with a piece of rod chucked in a drill press. Putty is used around the hole to retain an abrasive mixture of turpentine and emery which is used to grind through the glass. Parts B, C and D are cut according to the patterns and assembled in the order given. Drip cup, C, is formed over the edge of a wooden disk as shown in the photo.

Bertram Brownold, Woodmere, N.Y.





## Replacing Wheels With Improved Runners Converts Stroller Into Easily Handled Sled

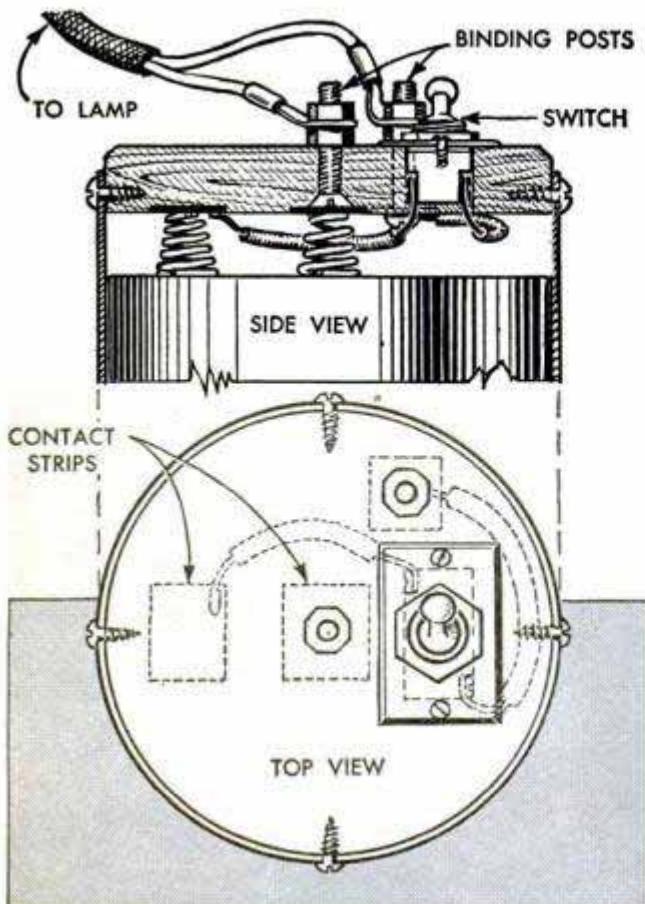


If the baby's stroller is fitted with removable sled runners, snow-covered sidewalks will no longer present an obstacle to his daily airing. U-shape brackets of flat iron are welded to runners, also of flat iron. Then, a short length of pipe, having an inside diameter large enough to fit over the axle, is drilled for a cotter pin and welded to the upper part of each bracket. After the wheels are removed from the stroller, the runner assemblies are attached by slipping the pieces of pipe over the axles and locking them in place with the cotter pins which are normally used to hold the wheels.—C. H. Thomas, Taunton, Mass.

## Lantern-Type Battery Housed in Tin-Can Case Operates Bicycle Headlight

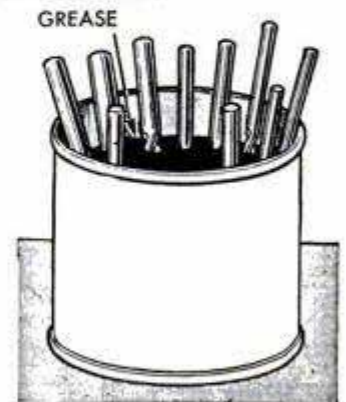
A tin can fitted with a wooden cover, two binding posts and a toggle switch makes a weatherproof case for a 6-volt lantern battery. This is ideal for a bicycle headlight and excellent for general-purpose lanterns. Both the battery and the wooden-disk

cover should be a snug fit in the can. The cover is held in place with small wood screws. Flat-headed bolts, countersunk in the underside of the cover, form binding posts, one of them making direct contact with the center terminal of the battery. Two contact strips of sheet metal are soldered to the bolt heads flush with the bottom of the cover and a third strip is embedded in the cover over the other battery terminal. This strip is wired to one side of the switch, the other side of which is wired to the off-center binding post.



## Grease "Pincushion" Holds Drills To Protect Them From Rust

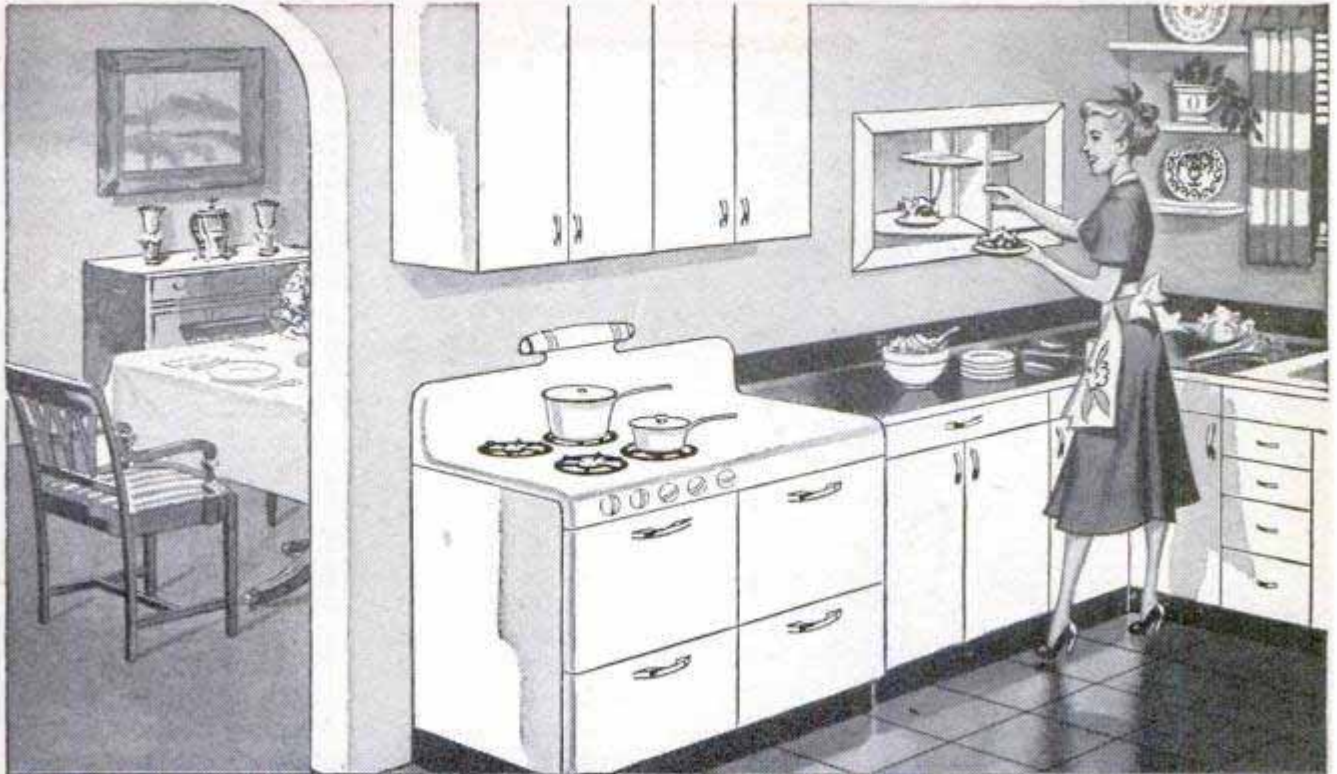
Here's a novel and practical way of storing twist drills to promote the best of care. In addition to protecting their cutting edges from rust and wear, it prelubricates them for drilling metal. Select a shallow can to suit the length of the longest drill, fill the can with cup grease and stick the drills in the lubricant. Before using a drill, wipe off the excess grease to prevent splattering.



Simon S. Palestrant, Bronx, N. Y.

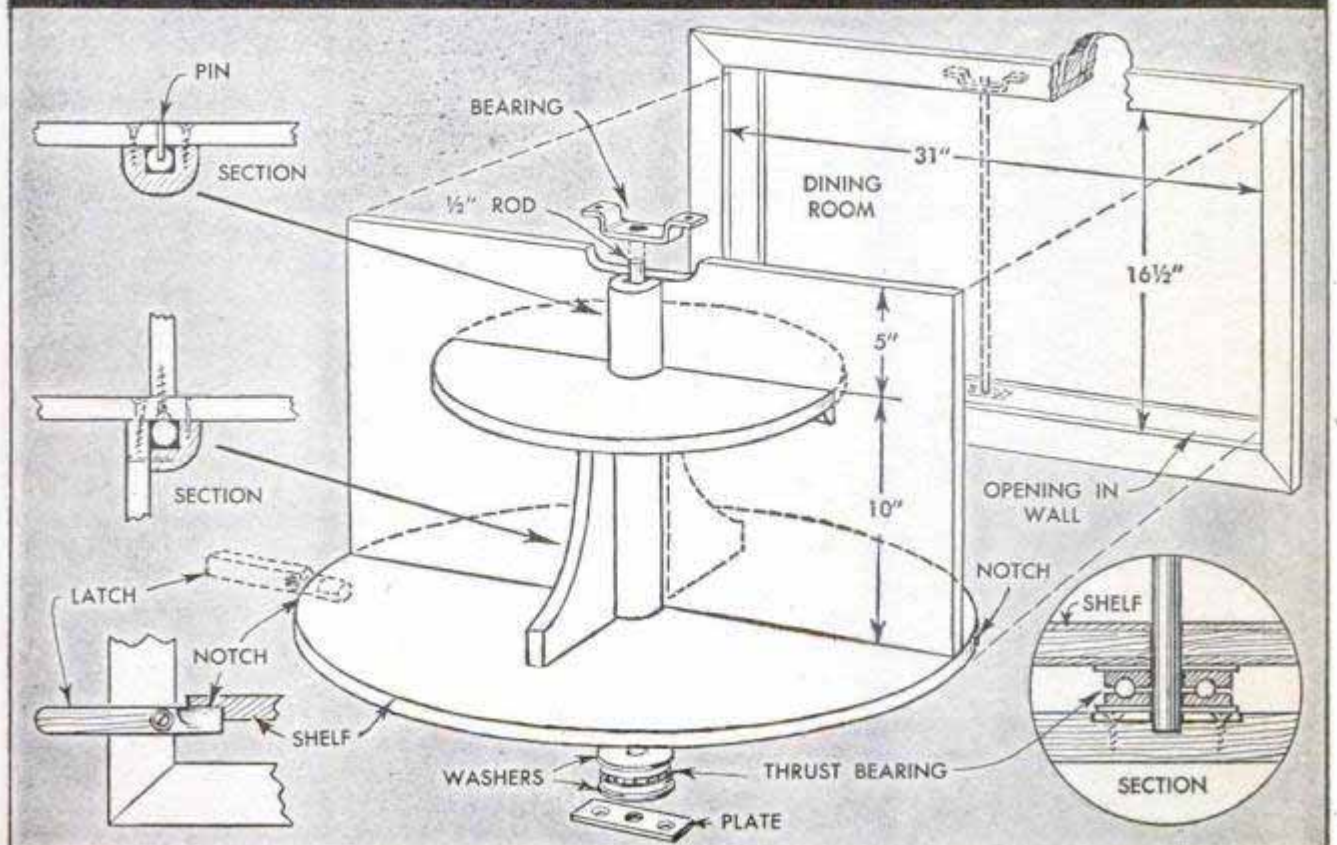


# LAZY SUSAN'S BIG SISTER



WHEN it comes to serving dinner or clearing the table after a meal, a Lazy Susan set in the wall between the kitchen and dining room is a real step-saver. The unit rotates on a  $\frac{1}{2}$ -in. rod held to the top of the opening with a bearing bracket and to the bottom with a plate set flush with the framing. A ball thrust bearing carries the weight for smooth operation.

Disks of  $\frac{1}{2}$ -in. plywood form two shelves which are braced with plywood uprights. Note how the uprights and plywood partition are fastened around the rod, and also how the partition is pinned to the rod. A cleat under the upper shelf adds rigidity to the partition. The unit is locked by a simple latch which engages notches in the bottom of the lower shelf.





# GLASS CUTTING



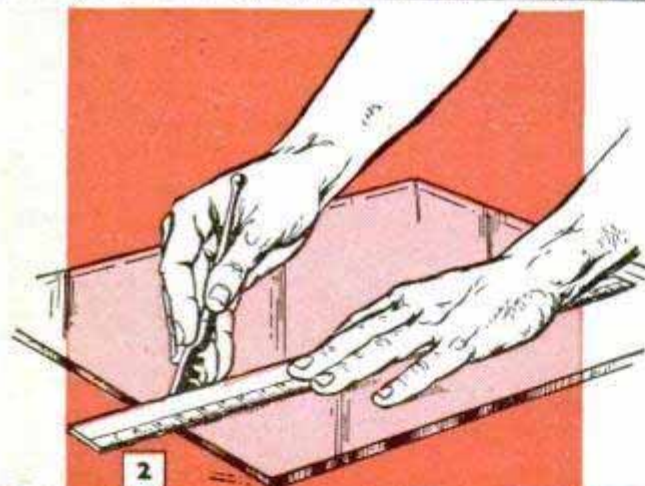
While it is true that most homeowners can have window glass cut to exact size at the store where they buy it, many times scrap glass around the home will do to reglaze a window. That's when it pays to know how to cut the glass yourself

By Ralph E. Moore

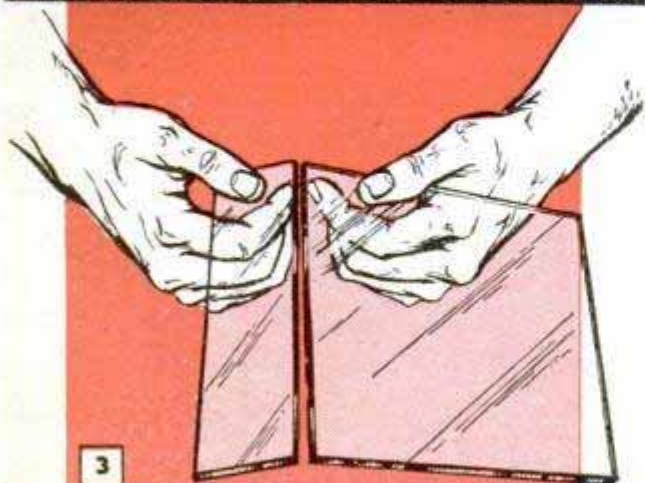
**I**F I EVER TRIED to cut a piece of glass like that I would break it in a thousand pieces." No doubt you have heard this said before and, perhaps, have even found it so. But cutting window glass is as easy as the professional glazier makes it look, and not necessarily because his cutter may have a diamond point. It is due more to the way the cutter is held and to the tricks of the trade. With a little practice anyone can become adept at using a glass cutter and score a clean break every time.

First of all, get the feel of holding the cutter properly and recognize the sound it should make when it is actually cutting. When the tool is cutting properly, it should sound similar to paper or cloth being torn. The best way to get the feel of the cutter is to practice on an old piece of glass. Never try to cut dirty glass. Grit will prevent uniform cutting of the wheel. The glass should be placed on a flat surface. A small carpet or a piece of old rug, Fig. 1, makes the best surface on which to cut glass. Fig. 2 shows the proper way to hold the cutter. Note that it is not held vertically but at a slight, backward angle and also that the notches point downward.

To make a trial cut, first apply kerosene along the line of cut. Kerosene has been found to give "bite" to the cutter. A small brush or swab on a stick is handy to apply the kerosene to the glass. Next, using a yardstick as a straightedge, dip the cutter in light oil and start the cut at the far edge of the glass. Draw the cutter toward you with a swift, continuous movement, bearing down with a steady, firm pressure. The amount of pressure required is determined by the sound of the cutter. If it skips, pressure should be increased. Remember that the cutter actually cuts the glass and does not merely scratch it. *Never go over the same cut twice.* This is an important point to remember. Besides dulling the cutting wheel, scoring the glass a second time blunts the taper on the inside of the first cut and the glass will not break cleanly. For this reason, if the cutter does



For a clean break, dip the cutter in light oil and apply kerosene to the glass before scoring



Break off scored strip 1 to 2 in. wide by placing index fingers on score and bending downward



# MADE EASY

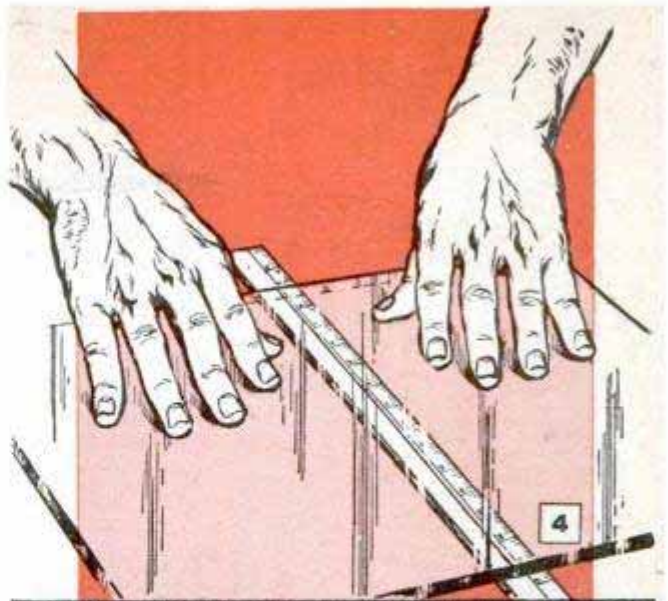
skip, run it over only the spots missed.

The professional glazier classifies glass as being either window glass (single or double strength) or plate glass. In cutting window glass it is advisable to use a sharp cutter as window glass, being lighter than plate glass, will not stand great pressure.

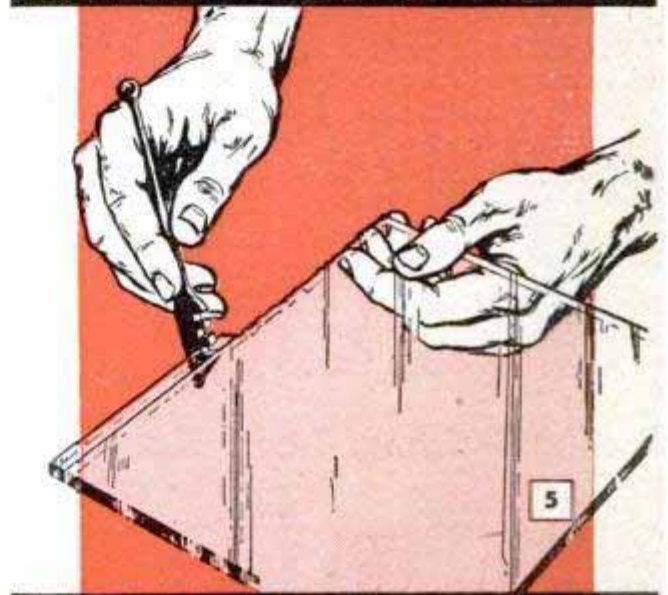
Where it is required that a strip as narrow as  $\frac{1}{8}$  in. be cut from the edge of window glass, lay the yardstick  $\frac{1}{16}$  in. to the left of the line of cut to allow for the overhang of the cutter. Next, apply kerosene to the glass where it is to be cut, using a small brush or an oilcan, and dip the cutter in oil to lubricate the wheel. If this is not done, the wheel may "freeze" when the cut is half completed and merely slide the rest of the way. To break off the strip, use the notches provided in the cutter as shown in Fig. 5, selecting the notch that fits the thickness of the glass. Don't insert the edge of the glass all the way in the notch of the cutter. The proper distance varies with the width of the strip. In most cases, strips less than  $\frac{3}{16}$  in. break off in little pieces. When breaking off strips 1 to 2 in. wide, grip the glass as shown in Fig. 3. Place the fingers and thumb of each hand close together on each side of the cut. Then, using the index fingers as pivots, snap off the waste piece by bending the glass downward with a quick twist of the wrists. To break off pieces wider than 2 in., place the yardstick directly under the cut, as shown in Fig. 4, and press downward on each side.

The procedure for cutting plate glass is the same as that used for cutting window glass. However, a somewhat different method is used to break off narrow pieces. Where the waste strip is 1 in. wide or less, parallel-jaw pliers with paper between the jaws are used to remove the strip as in Fig. 6. Strips 1 to 4 in. wide are snapped off in a manner similar to the yardstick method, except that in the case of plate glass, it is recommended that a pencil be placed directly under the cut.

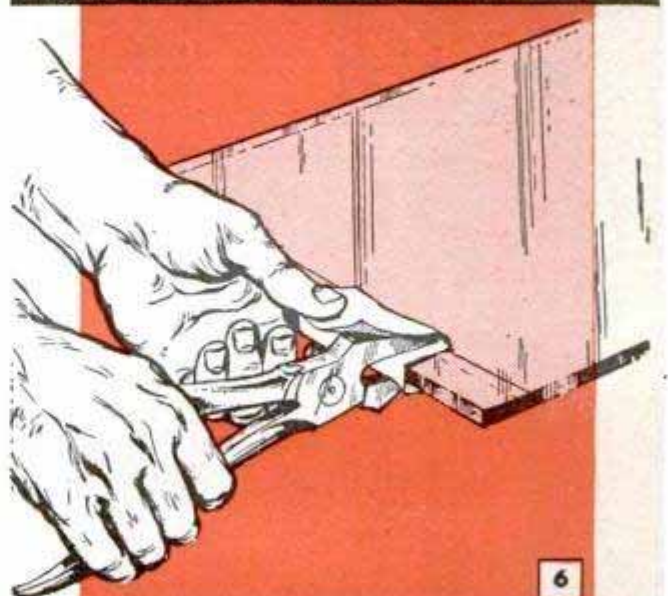
If glass is being cut for purposes other than glazing, such as a new top for a coffee table, the sharp edges of the glass may require rounding slightly. This can be done with an oilstone and water. The stone is soaked in water and then rubbed across the edge of the glass with the stone held at a 45-deg. angle. Rubbing is done with a circular motion and the stone is dipped in water occasionally as the work progresses. In polishing the edges of plate glass, the stone is held lengthwise and at right angles to the surface of the glass.



When parting large pieces, place a yardstick under the scored line and press down on each side



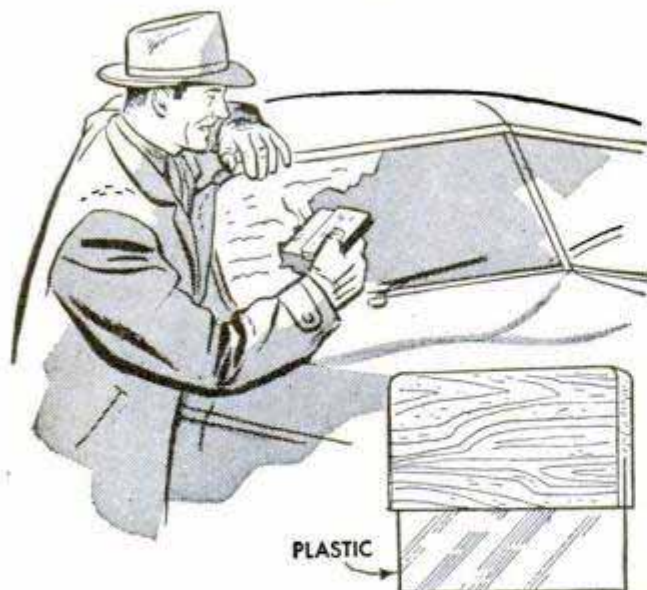
Narrow strips  $\frac{1}{16}$  to  $\frac{1}{8}$  in. wide are pried off by inserting edge of glass in notches of cutter



Parallel-jaw pliers provide greater leverage for removing narrow strips from edge of plate glass



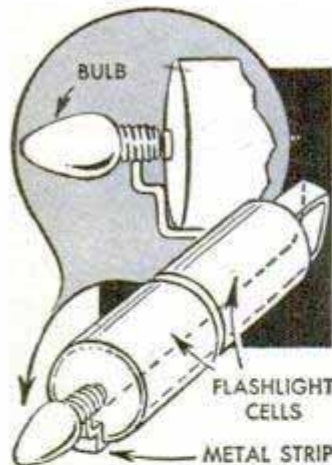
## Windshield Sleet Scraper Will Not Scratch Glass



If you have had the unhappy experience of returning from shopping or a movie to find the windshield of the car covered with ice, you'll appreciate this efficient little scraper. It features a plastic blade which will not scratch the glass. One edge of the plastic is beveled 45 deg. and the other edge is forced tightly in a saw cut made in the edge of a wooden block. Make the blade from  $\frac{1}{8}$ -in. plastic, about 3 x 5 in.

Richard Hanscom, Elmhurst, Ill.

## Testing Christmas-Tree Bulbs



Locating a burned-out lamp bulb in a string of series-wired Christmas-tree lights is done quickly with this little tester. It consists of two flashlight cells and a metal strip bent as shown to hold the cells. To test a bulb, hold the bottom contact

against the front-cell contact and let the threaded part of the base touch the metal strip. The flashlight cells are strong enough to make the bulb glow dimly if it is not burned out.

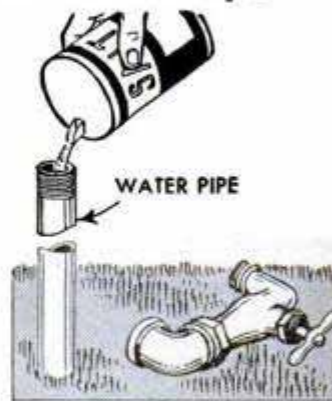
## Solution for Fireproofing Fabric

In many cases it's a wise safety precaution to fireproof garments or household articles such as curtains and drapes. These can be fireproofed by immersing them in a solution made by dissolving boric acid, 3 oz., and borax, 7 oz., in hot water, 2 parts by

volume. After the article is thoroughly saturated, wring it out and allow it to dry. This treatment must be repeated after each laundering.—I. M. Fenn, Chicago.

## Salt Thaws Vertical Water Pipe

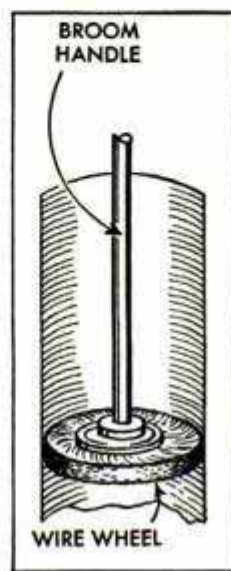
When water is piped to a poultry house, barn or other building it may freeze in the exposed portions of the pipe during a sudden cold snap. Usually the water freezes at a point just below the tap and you can save the trouble of carrying hot water from the house to thaw out the pipe by using ordinary table salt. Remove the faucet, chip away some of the ice and pour in a little salt. Then replace the faucet and turn it to the "on" position. The salt will thaw the ice in a short time.—Opie Read, Jr., Chicago.



## Stovepipes Thoroughly Cleaned With Wire Scratch Wheel

Looking for something with which to give the inside of my stovepipes a thorough cleaning, I found that a wire scratch wheel is the ideal tool for the job. In addition to removing the accumulation of soot, the wire wheel loosened the hard crust that, in the past, had seemed almost impossible to clean out. To permit working the brush through the lengths of pipe, I fastened a broom handle to the wheel hub with a long screw, using two wooden washers for additional strength. Although a wheel of the same diameter as the pipes is most suitable, a smaller one will serve the purpose.

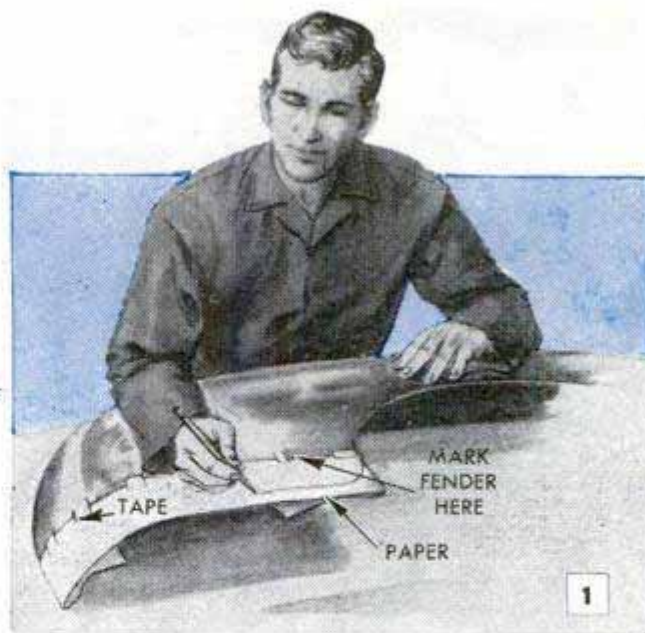
Arthur F. Hird, Lakeview, Ont., Can.



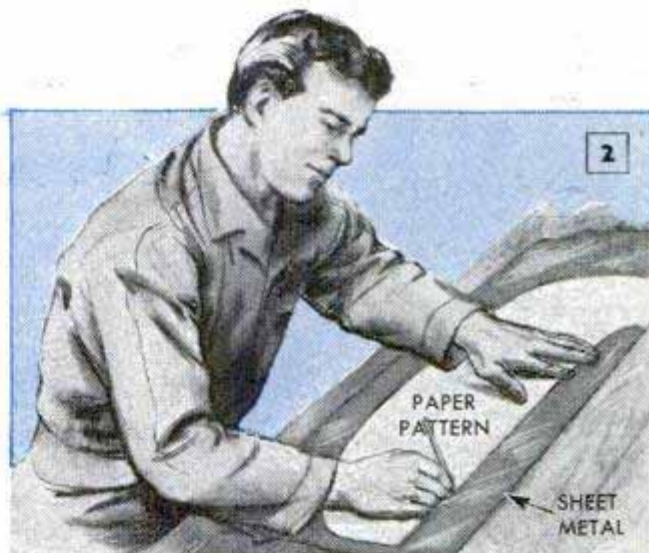


# FENDER REBUILDING

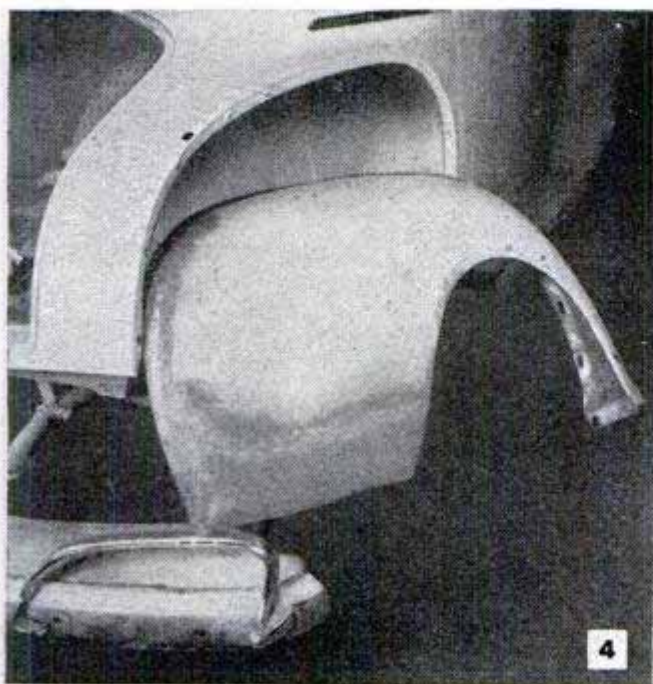
**H**AVE you noticed that the right rear fender of a car usually is the first one to rust through? Small stones and fine abrasive material thrown up by the wheel wear away the protecting finish and expose bare metal to water and road chemicals which tend to wash toward the curb in stormy weather. In time, rust eats away the metal to a paper thinness, necessitating either a new fender or a repair patch. Such a repair is made in a short time by following the simple procedure shown in Figs. 1, 2 and 3. Remove the fender, lay it on a bench as in Fig. 1, and place a sheet of heavy paper over the damaged area, holding the paper in place with tape. Mark the paper as indicated, the heavy pencil line following the lower edge of the fender. Also mark the fender along the top edge of the paper. Then cut the paper on the pencil line to get a pattern. Lay this on a piece of sheet metal of the same gauge as the fender, Fig. 2, mark, and cut to size with snips. Cut the fender along the line previously marked at the top edge of the pattern. Then weld the parts as in Fig. 3. Grind the joint flush and hammer the lower edge to shape over a bumping dolly, taking special care to draw the metal to the exact shape of the original fender to assure an accurate fit on the body. Fig. 4 shows the completed fender ready for installation and refinishing to match the body color.



Paper is taped over the damaged area of the fender and the outline of the damaged portion is marked on it to make a pattern for cutting the repair part



Then the pattern is cut out and its outline transferred to soft sheet metal of the same gauge as the fender. After marking, the sheet metal is cut to size



Finally, the repair part is welded to the fender and hammered to conform to shape at the lower edge



# STRETCH

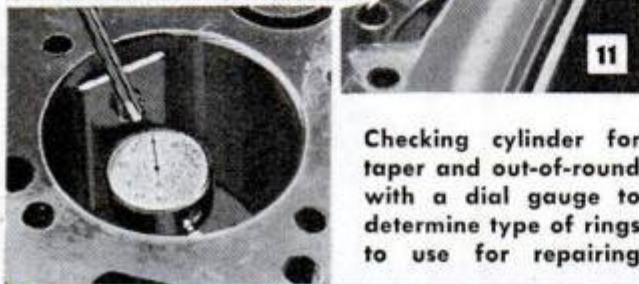
Four major parts of your car require careful periodic checks if you are to get top performance and best possible fuel economy

## Part II

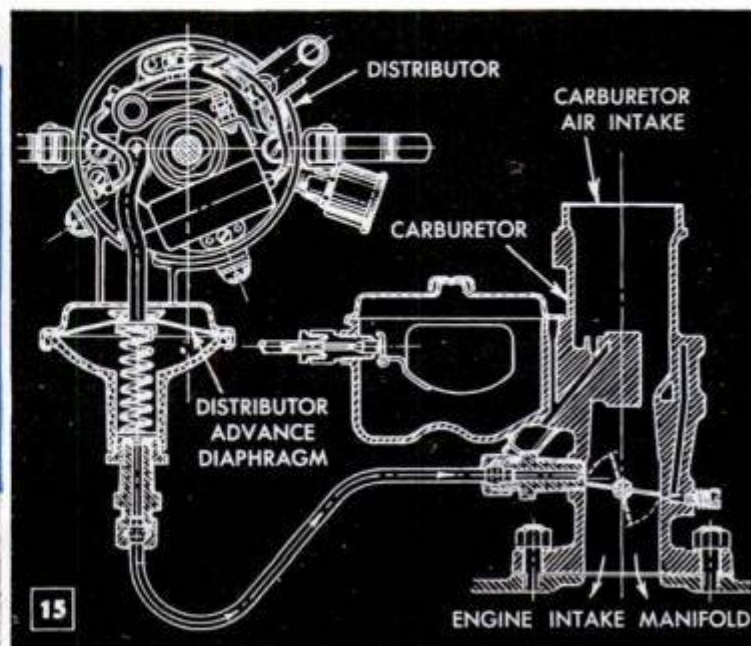
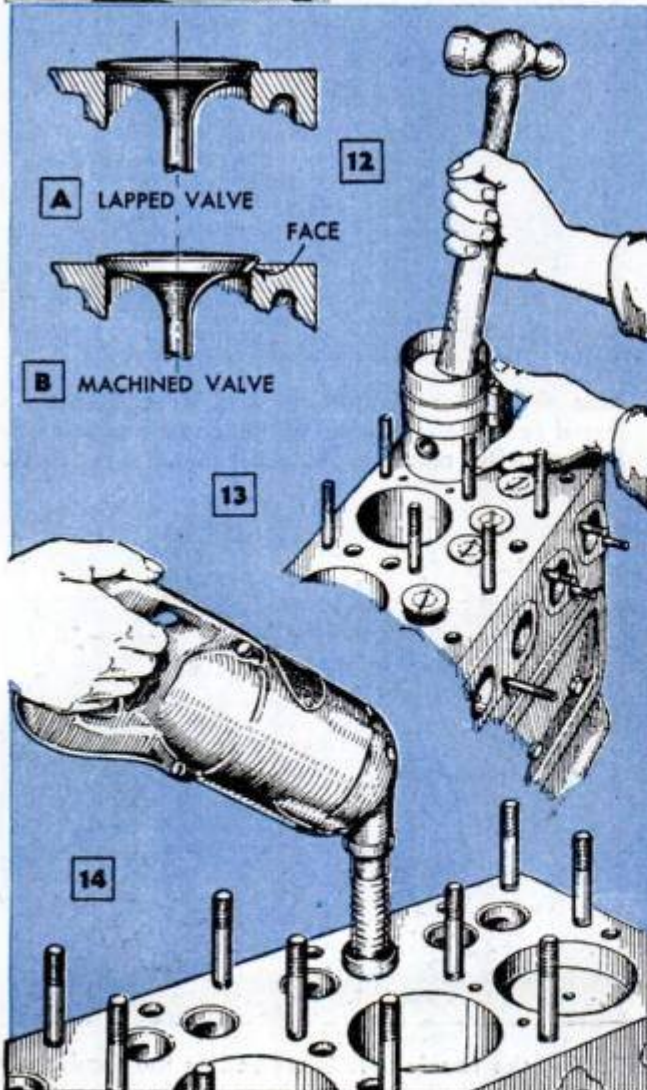
**I**N MAKING your car-fuel dollar go as far as possible, it isn't enough to check brakes, wheel alignment and lubrication as described in Part I. To get high operating efficiency and economy from your car, it is necessary that the service and repair schedule include the engine and the ignition, fuel and cooling systems. Servicing and repairing only one or two units and neglecting others that may need attention is not likely to make any noticeable difference in either performance or economy. It's the regular servicing of all units of the power plant that pays off in the long run.

The engine cannot operate efficiently unless it quickly warms to normal operating temperature after starting. Ordinarily, this should range from 160 to 180 deg. F. If the temperature ranges below 160 deg. F., the thermostat should be adjusted. If it runs above 180 deg. F., the cooling system likely needs a thorough check. The carburetor heater valve, generally located in the exhaust manifold, warms the fuel-and-air mixture coming from the carburetor. When the engine is cold, a maximum amount of exhaust heat is deflected to warm the incoming fuel. As the engine warms up, the bimetallic spring, one end of which rests on the anchor pin and the other in the valve shaft, causes the valve to open.

Check this mechanism often to make certain it is working properly. The com-



Checking cylinder for taper and out-of-round with a dial gauge to determine type of rings to use for repairing





# your **GASOLINE DOLLAR**

pression of all cylinders should be tested regularly and recorded. Cylinders with pressure noticeably above average no doubt are badly carboned and any that are 10 lbs. below the average pressure may have scored walls, worn rings or bad valves. Such conditions call for the removal of the head. Careful mechanics start engine overhaul with an instrument check of cylinder condition, Fig. 11. The dial gauge shows at a glance how much each cylinder bore is out of round and also records the degree of taper. If taper exceeds .015 in., most mechanics will recommend a complete reboring job. When putting in special oil rings, breakage will be prevented by removing the ridge at the top of the cylinder bore before the pistons are pulled. And, of course, a ring compressor, Fig. 13, is used when installing pistons fitted with new rings. While the engine is open, the water jackets should be flushed out.

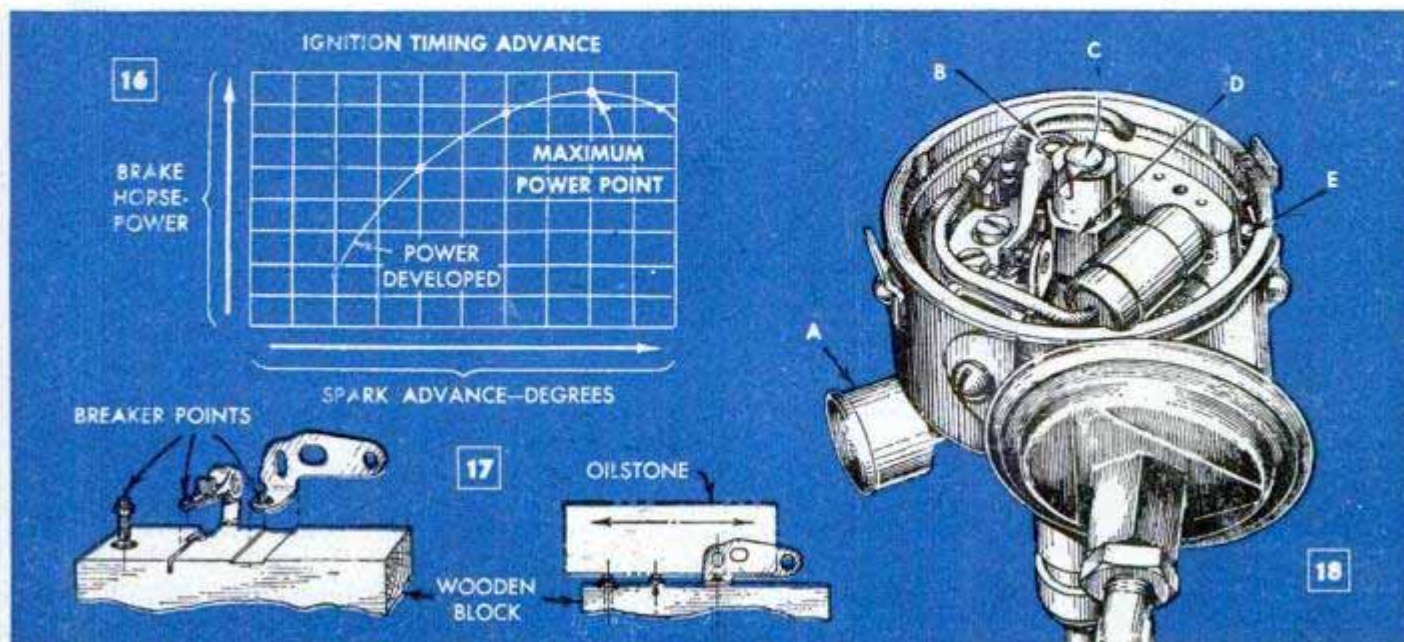
Having the valves refaced and resealed, Fig. 14, usually results in greatly improved gasoline mileage. Fig. 12, detail A, shows a valve with a groove worn in the face. If such a valve is "lapped in" with the engine cold, it may not seat properly when engine temperature rises. The valve face should be machined as in Fig. 12, detail B, and the seat in the block renewed by grinding.

A worn timing chain causes what mechanics call "valve lag"; that is, the intake valve opens after the piston passes top dead center on the intake stroke. This creates a partial vacuum inside the cylinder that tends to pull oil past the piston. Many stubborn cases of oil pumping are traceable to a worn timing chain.

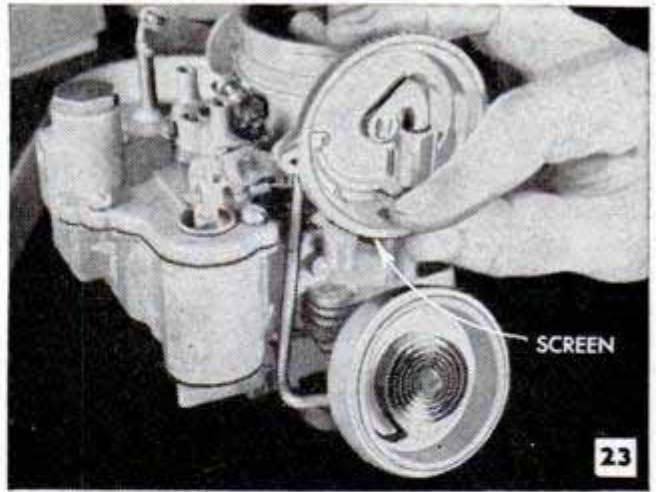
With the engine in good mechanical

shape, the ignition generally is rated next in importance in a thorough tune-up. If a spark plug "oils up," it often means that it is running cold. Install plugs of the correct heat range. Sometimes the high-tension wire to the oily plug is in bad condition or making poor contact. Replacing the wire often cures the trouble. If the inside of the distributor cap shows evidence of arcing and is dirty or cracked, it will pay to install a new one. On some distributors there are five places, Fig. 18, that need lubricating at regular intervals. The grease cup, A, should be turned down regularly. Also, place a drop of oil at B every 1000 miles. An occasional smear of grease applied to the breaker cam, D, will prolong the life of the fiber bushing. At 5000-mile intervals, a drop of oil applied with a toothpick at C is desirable. And, at the same time, a drop of oil on the ball bearings of the advance mechanism, E, is recommended. A typical vacuum spark-advance mechanism is shown in Fig. 15. The importance of proper spark advance in efficient engine operation is illustrated by the ignition timing-advance curve in Fig. 16. The straight arrow at the bottom indicates the spark advance in degrees as engine speed and power increase.

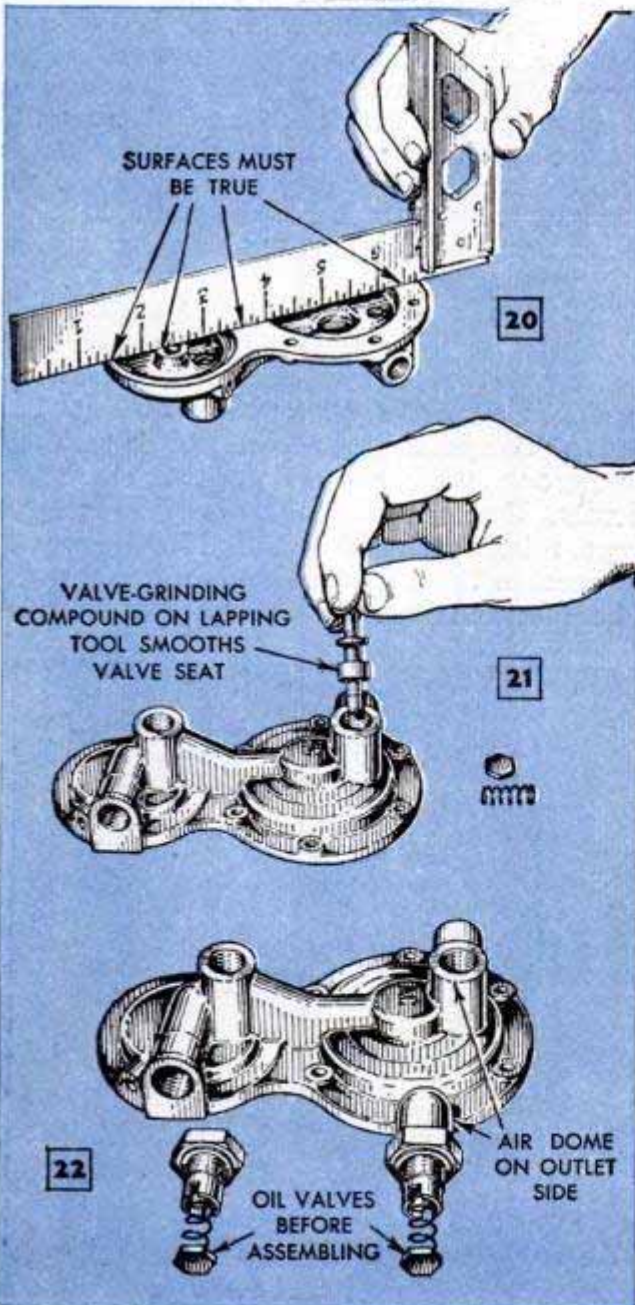
Although burned breaker points should be replaced, those only slightly pitted can be removed from the distributor and resurfaced with an oilstone as in Fig. 17. Mount the points on a block of hardwood and groove the block to support the bracket firmly. If the ground point is of the screw type, a hole should be drilled in the wood to receive the threaded end in a tight fit. The distance that the points open in any







Above, checking screen in choke-control heater. Left, testing fuel pump. It should lift fuel 30 in.



particular distributor determines the cam angle. If there is any doubt about the correctness of the cam angle, have the mechanism checked on a precision tester.

Complete service kits for most fuel pumps and carburetors can be purchased from auto-supply dealers. When overhauling either of these units, lay the parts out in order on a tray. Then the new parts from the repair kit can be substituted for the old ones as the unit is rebuilt. In servicing the fuel pump, a very important check is made with a straightedge to see that the joining surfaces of the housing are true, Fig. 20. If only slightly distorted, they may be made serviceable by rubbing them on a sheet of coarse emery cloth.

Fuel-pump service kits include diaphragms, and these should be soaked in kerosene before assembling. See that the holes are correctly lined up and held in alignment while tightening the diaphragm nut. Also, see that the glass sediment bowl makes a gasoline-tight contact with the gasket. New valves should be used in rebuilding the fuel pump. Always examine the valve port to see if the brass valve seat is smooth. If not, a lapping tool, Fig. 21, coated with valve-grinding compound will restore the seat. These seats, in many cases, are small brass rings, and can be forced out of the pump casting and replaced. When building up the valve assembly, the parts should go in the order shown in Fig. 22. The composition valves lie flat on the brass seats, the springs bear on the valves and the port plugs are tightened firmly in place. The airdome type of port plug must always be on the outlet side of the pump to equalize the fuel-pump pressure and to prevent surging. Test the pump by hand as in Fig. 19. It should lift gasoline at least 30 in. Fuel-pump pressure suitable for slow driving will tend to starve the engine at high speeds. But, you cannot have maximum fuel economy and high-speed performance.



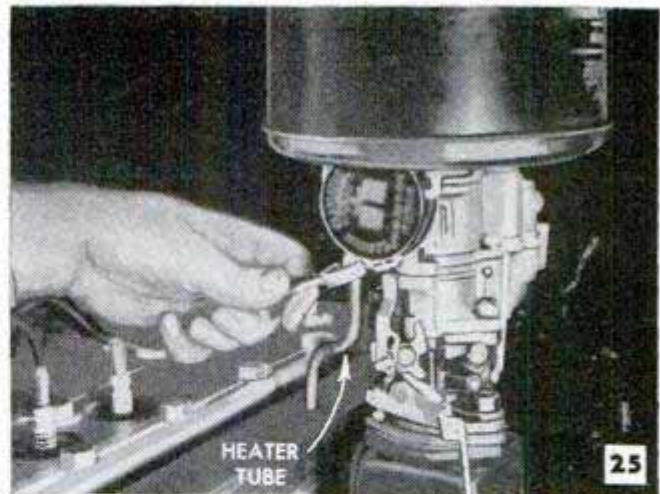


Carburetor-float level, A, is adjusted by bending the float arm. Consult instruction book for dimension

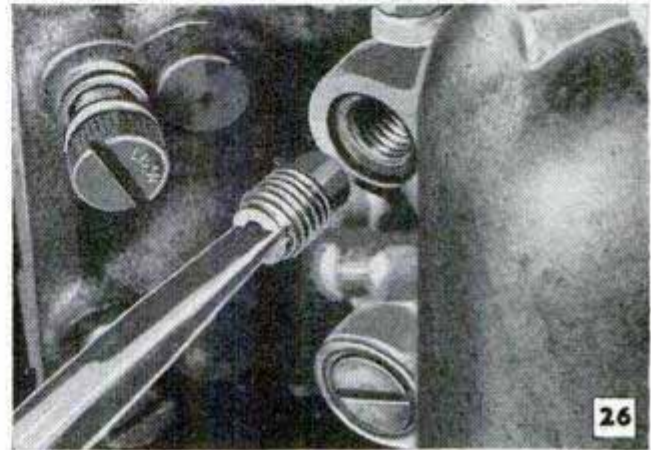
One or the other must be sacrificed. For greatest economy some motorists cut one turn off the fuel-pump diaphragm spring or use extra shims under the fuel-pump flange to move it out farther from the camshaft. This reduces the stroke of the pump.

Complete carburetor repair kits are available for the common later types. Carburetor jets can be removed with a screwdriver, but the sides of the blade should be ground as in Fig. 26 so that the threads in the carburetor bowl will not be damaged. After disassembling, wash all passages and clean the parts with alcohol or acetone to remove any gum deposits. Then blow out the passages with air from a tire pump. Using a jet one size smaller than standard saves fuel. When inserting the leather accelerator plunger, a feeler gauge can be used to help slide this part into place. In Fig. 24, A indicates the float level which is adjustable by bending the float arm. Just how and where the arm is bent, and what the dimension A is, will vary in different cars. Consult instruction data. When assembling the carburetor, all plugs below the gasoline level should have the threads lightly coated with shellac before being installed. With the carburetor installed on the car, the engine should be warmed up thoroughly and the low-speed idle adjustment set so the engine just "ticks" over. The mixture adjustment should be as lean as it can be set without having the engine die or pop back through the carburetor when accelerating. One method of adjusting the length of the accelerating-pump stroke is shown in Fig. 27. With the linkage in position A, pump movement is at a minimum. For more powerful acceleration and cold-weather performance, the linkage is changed to position B.

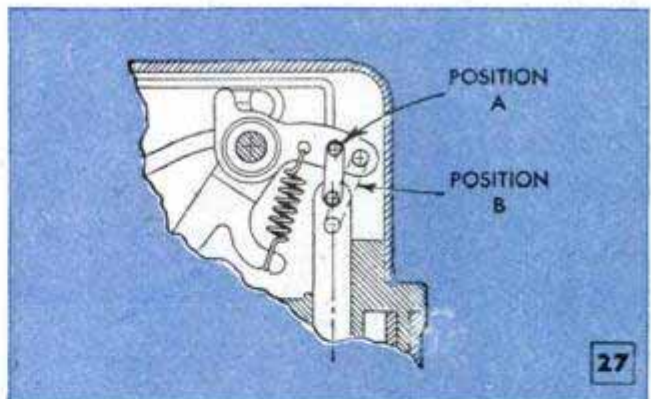
Some types of automatic chokes depend for operation on the heating of a coiled bimetallic spring, Fig. 23, to open and close the choke valve. Sometimes the screen



Remove choke-heater tube and blow out with compressed air to make sure it is not clogged with carbon



When removing the carburetor jets, grind the screwdriver blade to prevent damaging the fine threads



Accelerating-pump linkage has two settings, A and B. The former gives best economy with slow acceleration

over the end of the heater tube, Fig. 23, becomes clogged and cuts off the flow of heat. This lack of heat causes the valve to be held in a semichoked position, wasting a great amount of fuel. The heater tube, Fig. 25, running from the exhaust manifold to the control should be checked to be sure that it is not clogged. Automatic chokes generally have a winter and summer setting. It's important that they be properly reset at the end of each season. By carefully following manufacturer's directions, the car owner can adjust the choke himself.

THE END



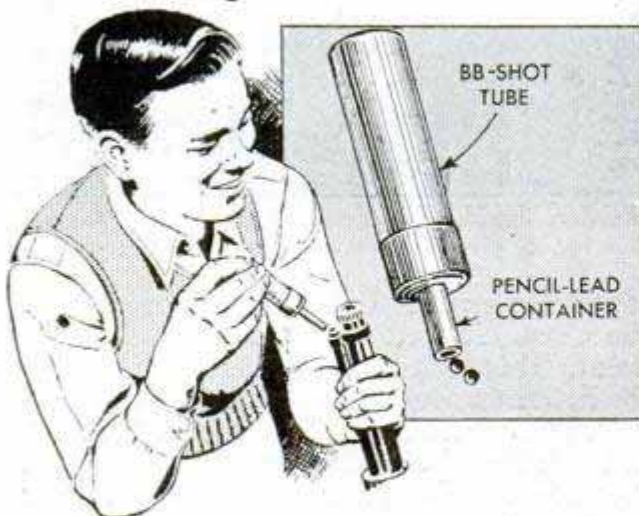
## Burring Simulates Hammered Effect On Cylindrical Metalwork



Producing a hammered finish on cylindrical metalwork with a ball-peen hammer is likely to cause distortion which is difficult to remove. However, if the walls of the metal are thick enough, a similar effect can be attained without the possibility of distortion simply by using a small ball-shape burr or rotary file chucked in a hand grinder. Use the file as shown, holding it at right angles to the length of the cylinder.

A. C. Saffron, Pittsburgh, Pa.

## Funnel for BB-Shot Container Aids Loading Air Rifle



You can load the magazine of your air rifle in a jiffy and without spilling a single BB if you use the cap from an empty BB-shot tube as a funnel. Just punch a hole in the center of the cap and glue a pencil-lead container over the hole to form a

spout. Of course, the bottom first must be cut from the pencil-lead container. Then, simply place the cap on the full tube of shot and invert it over the magazine opening, shaking the tube slightly to release the shot.

Richard Almquist, Fayetteville, N. Y.

## Increasing Blowtorch Efficiency

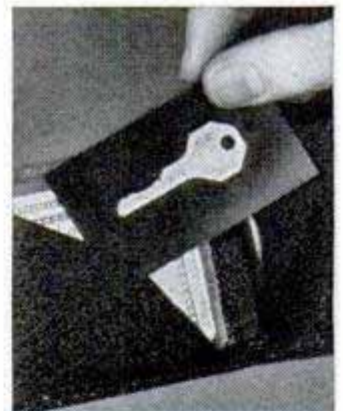
As the performance of a blowtorch depends on the maintenance of the proper generating temperature, it can be improved by insulating the nozzle with asbestos paper. Wrap two or three layers of this paper around the nozzle, covering about 1 in. of the end, and fasten it with wire. In addition to insulating, the asbestos paper will permit the torch to be relighted without preheating if the flame is extinguished accidentally.



## Pattern of Car-Door Key Carried in Wallet

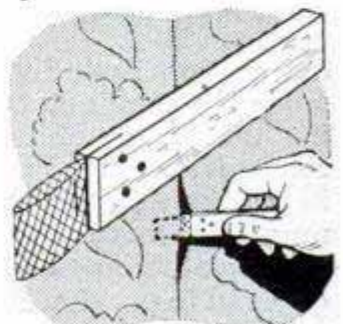
A pattern of the car-door key silhouetted on a piece of photo or blueprint paper is a handy item to carry in your wallet. Then, if the door is locked with the key still in the ignition switch, a new key can be duplicated from the pattern. This will save the cost of removing the door lock or breaking a window.

R. F. Donovan, Jersey City, N. J.



## Repasting Wallpaper Seams

If some of the seams on a papered wall have loosened, try an applicator like this one to repaste them. It will enable you to do the job without getting paste on the exposed surface of the paper. It consists of a short strip of screen wire folded double and nailed into a slotted wooden handle.





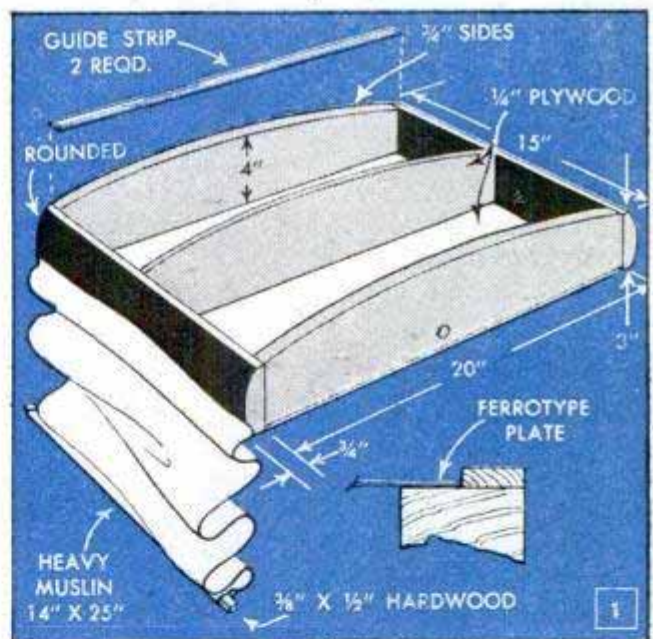
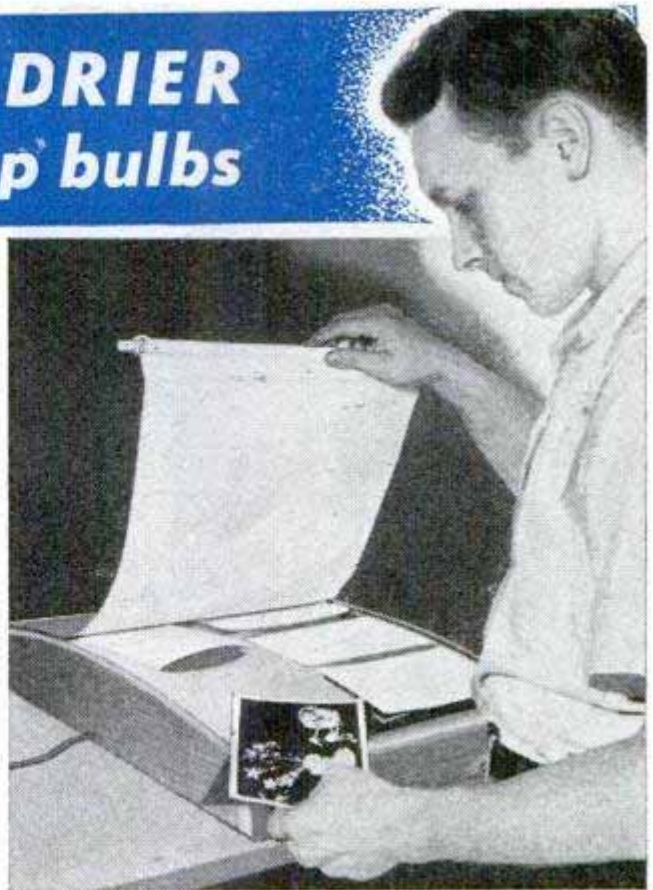
# PHOTOPRINT DRIER heated with lamp bulbs

By J. Allen Martin

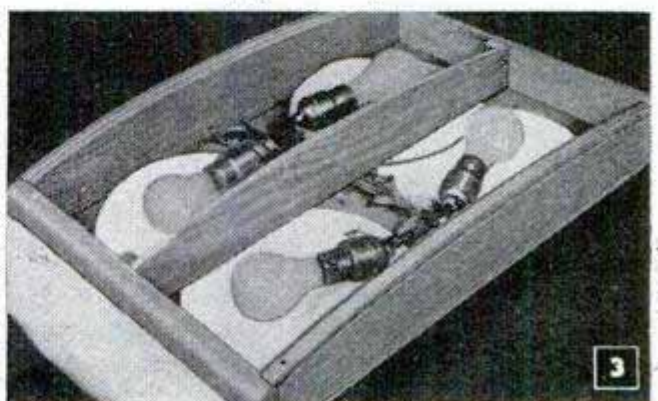
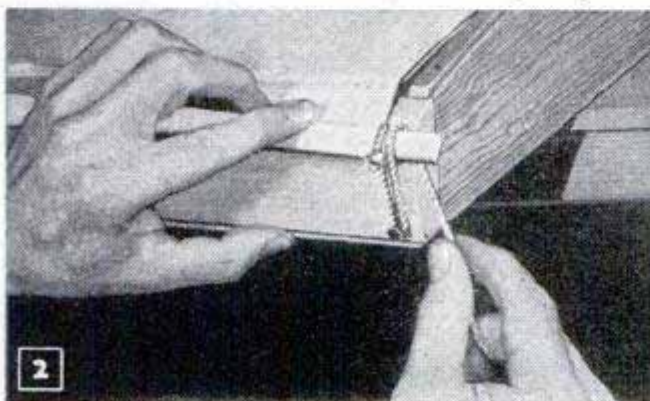
WAITING for glossy prints to come off a ferrotype plate is the slowest part of processing photos at home when they are being air-dried on one or two plates. Not only is this a slow process, but the prints curl and many times stick like glue to the plate. This was my trouble until I made a simple and inexpensive electric drier. Now, the prints dry in about eight minutes, and with two plates I can really speed the process by keeping one loaded to place in the drier when the other is ready to come out.

Instead of using a Nichrome element to heat the plate, I used the heat from four lamp bulbs as shown in Fig. 3. This made the drier economical to operate and provided ample heat, as the latter is transmitted directly to the underside of the ferrotype plate. The wooden box which houses the lamp bulbs, Fig. 1, is made to fit a standard ferrotype plate. The one shown was made to take the 14 x 20-in. size. Note that the sides and center partition of the box are curved and that guide strips are nailed to the outer edges of the sides to provide a rabbeted edge for the ferrotype plate. The latter merely rests on top of the drier and is held curved by a canvas curtain which is brought down over the plate and tied at the front as shown in Fig. 2. Thus, when pulled down firmly, the canvas keeps the prints in constant contact with the ferrotype plate, preventing excessive curling. Curling can be reduced also by immersing the prints in a solution of glycerin before squeegeeing them to the ferrotype plate. Any slight curl usually will straighten upon cooling.

The canvas cover serves the dual purpose of holding the prints in contact with the ferrotype plate and also curving the plate to minimize curling of prints



Four 60-watt lamp bulbs wired in parallel provide the heating element for this print drier. Note that disks of asbestos paper are placed under the bulbs







### Vise Aids Loading Roll-Film Tank

If you process your own photos, you know what an irksome job it can be to load the reel of a roll-film tank, especially when it involves film of No. 120 or 620 width and working in total darkness. The most difficult part of the job usually is starting the film in the grooves of the reel, and that's when you wish you had three hands—an extra one to hold the reel itself. Holding the reel between the knees is not always convenient. However, a little bench vise will do the trick. Simply clamp the reel lightly between the jaws and both hands will be free to feed the film.

### Avoiding Squint Due to Sunlight

To keep a model from squinting when taking pictures in bright sunlight, one photographer has him close his eyes for a moment before the picture is snapped. The picture must be taken the instant the model opens his eyes.

A. M. Wettach, Mt. Pleasant, Iowa.

### Premeasuring Developer Solution



Premeasuring amounts of stock solution required to fill a roll-film tank and keeping the amounts in brown-glass jars will permit saving slightly used developer from one day to the next without contaminating the concentrated supply. The stock solution stored in each jar is diluted only at the time of use, and if a mark is made on the side of

the jar indicating the amount of water to be added to the developer, it is a simple matter to dilute the stock solution according to the proportions recommended by the manufacturer. This saves measuring so many ounces of stock and so many ounces of water each time. You merely add water to the mark.

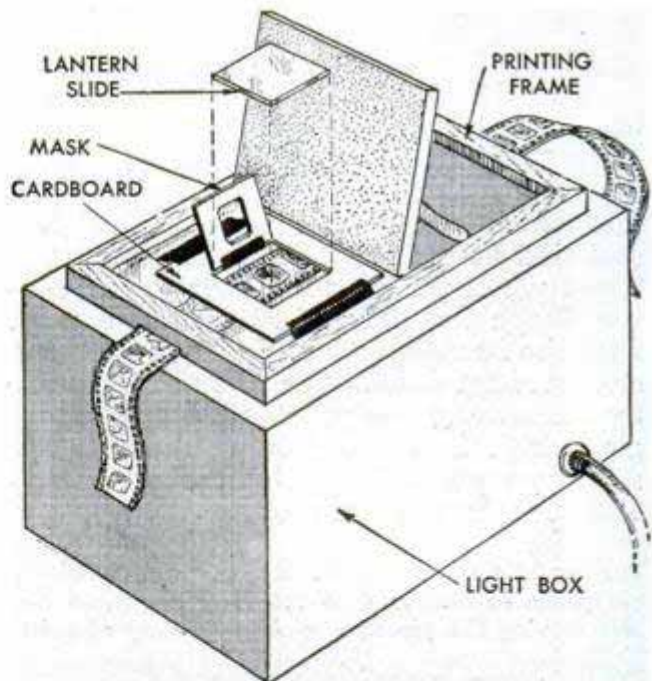
### Repairing Focal-Plane Shutter

Until the worn curtain of a focal-plane shutter can be replaced, coating it with a thin film of rubber cement and rubbing powdered graphite over the cement will keep out unwanted light. This repair does not affect the flexibility of the curtain.

Marion Schwerman, Sylvan Lake, Ill.

### Centering Guide on Printing Frame Aids Production of Lantern Slides

When printing 2 x 2-in. lantern slides from small-size roll film, this cardboard guide permits quick and easy centering of the image on a sensitized glass plate. To make the guide, take a 4 x 4-in. piece of cardboard and cut a 2-in.-square hole in its center to take a transparency mask. Then fasten the mask with a piece of tape. The thickness of the cardboard should



equal the combined thickness of the mask and glass plate. After taping the cardboard to the glass top of the contact printer, slide the film under the cardboard and center the image in the opening of the mask. When this has been done, place the glass plate in the square and make the exposure in the usual way. Note that the printing frame must be notched at each end to permit the film to slide through flat on top of the glass.

George Lauer, Chicago.



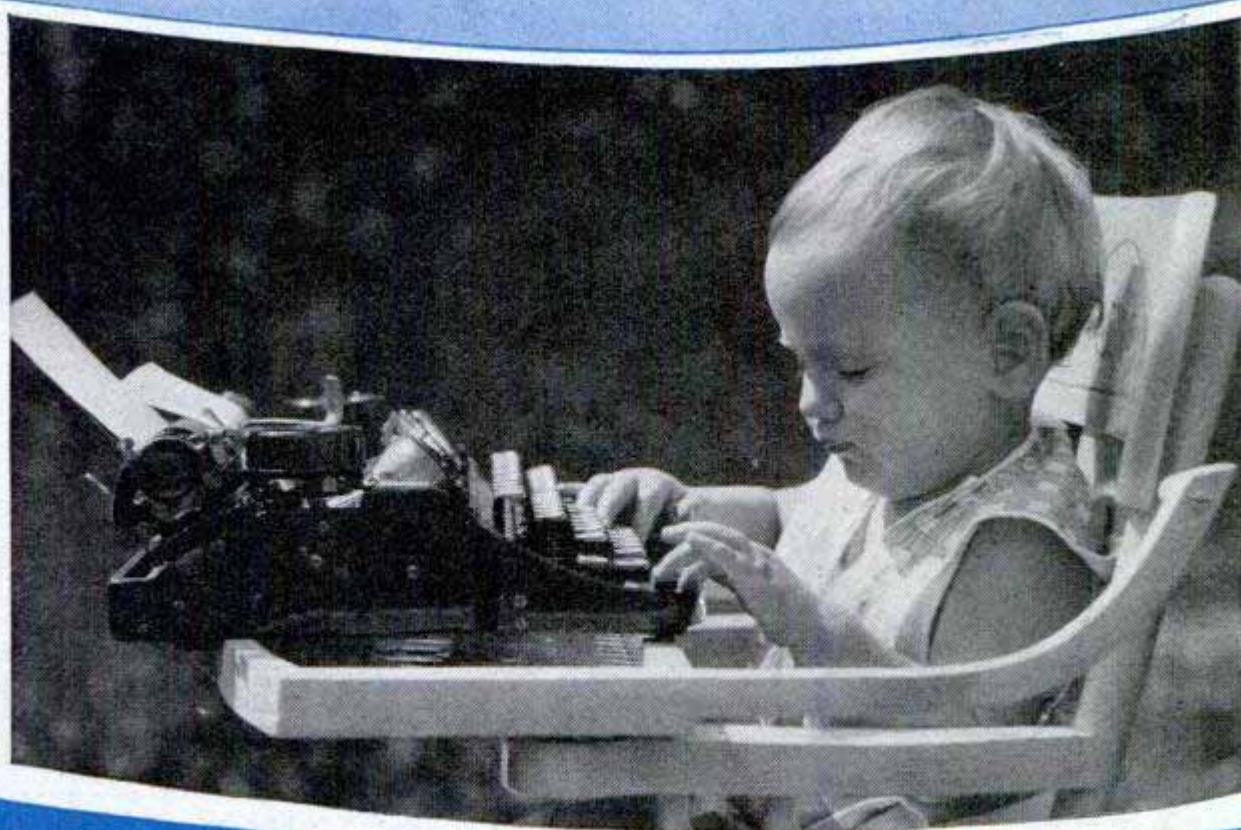
# FOCUS ON BABY

**G**OOD BABY PICTURES are not difficult to shoot, but they do require advance planning, quick thinking and fast action on the part of the photographer. Lack of preparation or hesitation at the wrong moment may result in the loss of a photo possibility seldom if ever again to be presented. The following pointers will help you capture baby in action.

Infants photograph best when they are relaxed and absorbed in whatever they are doing. For this reason, the easiest way to get a child to assume a natural pose is to let him play outdoors in bright sunlight. If possible, restrict the movements of the baby to a particular area, as this facilitates focusing and makes taking the picture simply a matter of waiting for the right expression. The two photos on this page are excellent examples of an obviously planned setup which was accomplished without making the baby suspicious. The chair in each case sufficiently limits all movements of the subject, while the typewriter holds the attention of the baby in the lower photo. However, there is one problem presented by outdoor shots. This is the tendency



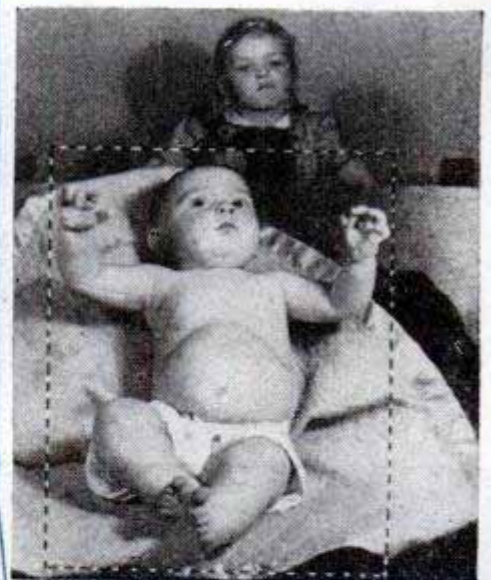
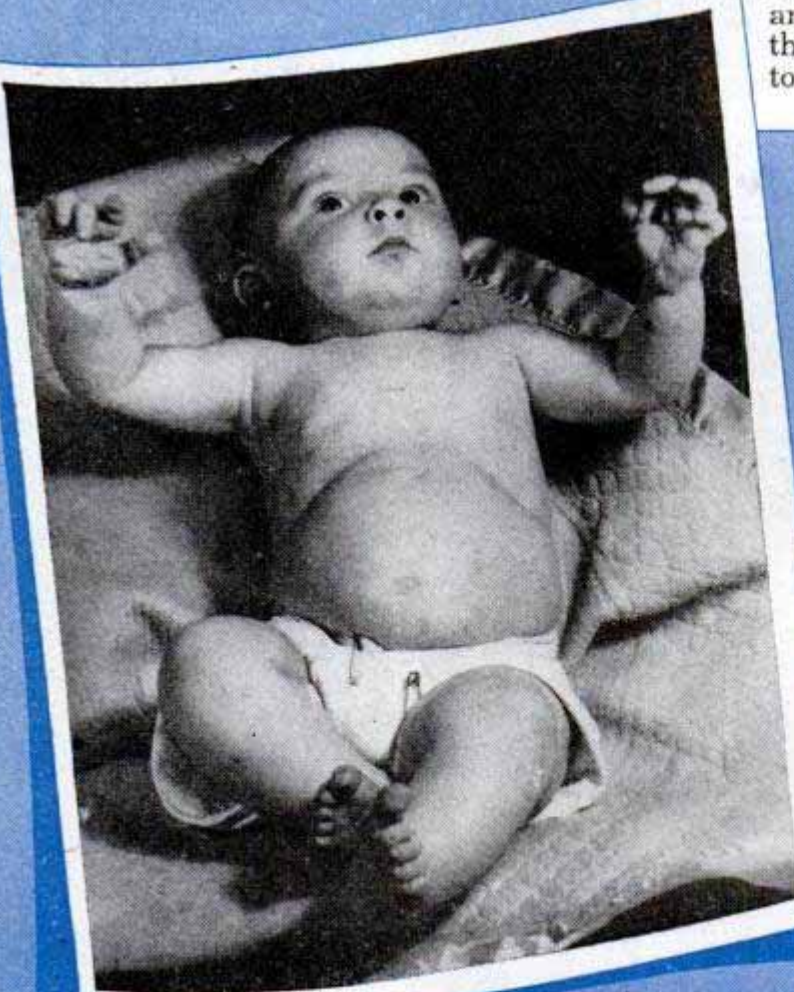
Above, chair which limits baby's movements permits easy focusing outdoors. Below, child's interest is held by typewriter, resulting in an unassumed pose







The baby in the photo above was too young to sit by himself, so he was placed prone on a couch cushion tilted upward toward the camera. The shiny flash equipment aroused his curiosity, affording this striking picture



This unusual shot was achieved by having the baby's older sister raise his back with a blanket-covered prop. Enlargement at left was made from area included within the dotted lines. Note that the top of enlargement was overprinted to exclude background

of children to look down and away from the sunlight, thus placing their faces in deep shadow. Where possible, highly reflecting surfaces such as water, light beach sand or concrete sidewalks can be used to soften the shadow on the features. Keeping these ideas in mind, patience and a little forethought will be rewarded with outdoor shots that are your most prized baby pictures.

Photographing babies indoors becomes more complicated due to the necessity of having to provide artificial light. Photofloods permit easy focusing and allow lighting flexibility but children, like pets, do not enjoy posing when they are confronted with bright lights. If photofloods are used, it is a good idea to have a helper who knows how to amuse the baby, the logical person being the child's mother. Photograph the baby in his high chair, crib or any place where he is likely to be in a happy frame of mind. Giving him a favorite toy usually will result in the desired expression. If the child cannot be coaxed into sitting alone, having his mother hold him may be the answer to the problem. However, the mother should turn her back to the camera so as not to detract

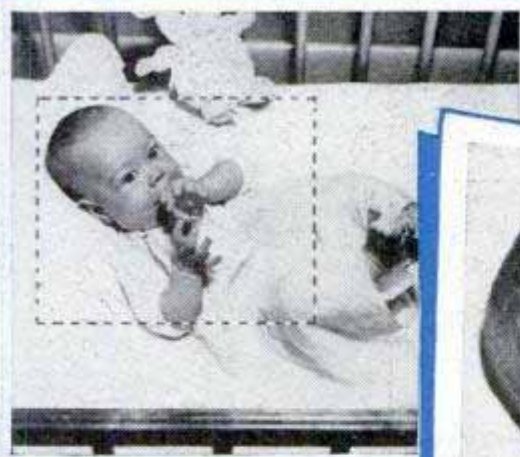


attention from the baby. Good procedure is to have the baby face in the general direction of the main lamp, focus accurately, and use fast film and short exposures. Keep the subject under the lights no longer than is absolutely necessary. If you want the baby to look in the direction of the camera, keep talking to him to hold his interest. Don't try for close-ups, but take the picture from a distance and enlarge the best portion of the negative. This is preferable because the depth of focus at a given lens stop decreases the closer the camera is to the subject.

One way to be fairly certain of good results indoors is to use photoflash lamps. With these you are less dependent on the baby's constant urge to move and, in addition, the pupils of the child's eyes will be larger and his expression more radiant and less forced. Flash pictures are particularly suitable when photographing baby in his crib as the reflection from white sheeting will provide enough back lighting to soften shadows. A good stunt to remember in getting baby's attention is to show him something he hasn't seen before. A lighted candle seldom fails to produce the right expression.



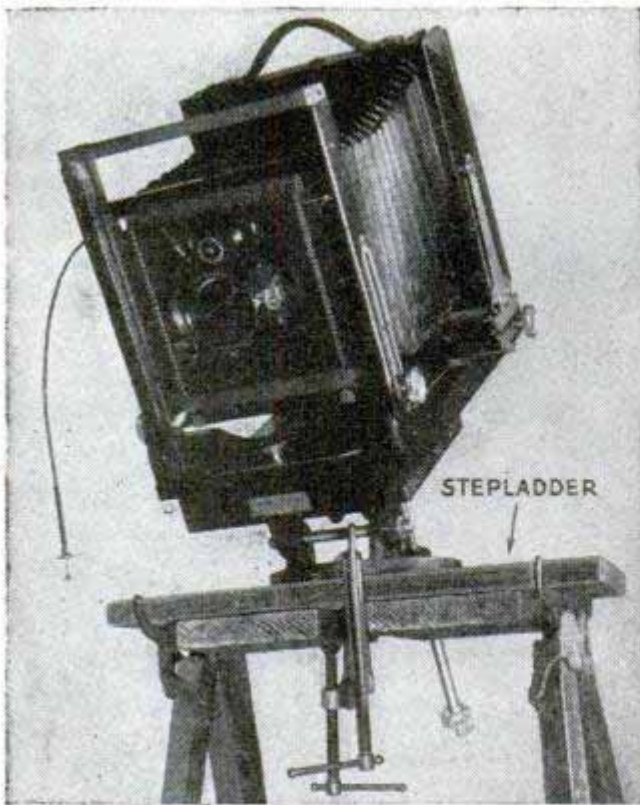
Above, when child refuses to pose for photo alone, a good shot can be taken by having mother hold her. Mother should turn away from camera to minimize distraction



Above right, reflecting surfaces, such as water or concrete, help reduce shadow on features when subject faces downward. Above, photo in crib was taken with flash gun, utilizing reflection from sheets to soften shadow. Enlarged portion of negative provided interesting photo at right. The crib is an excellent place to take a pleasing photograph



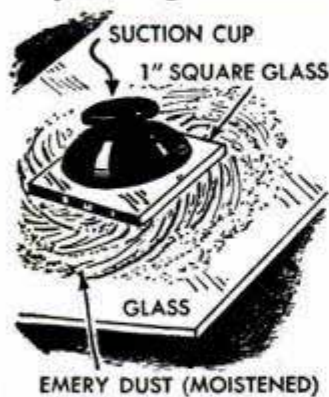




### Stepladder Serves as Tall Tripod When Taking Overhead Shots

If an overhead shot must be made from a height greater than your tripod will permit, a household stepladder provides an excellent support for the camera. Besides the additional height, the steps of the ladder make it convenient to focus and load the camera. The camera is left on the pan head and C-clamps are used to clamp the head securely to the top step. Unless the ladder is so tall that you must stand on it to reach the shutter release, it is best to stand on the floor when clicking the shutter to avoid any movement.

### Replacing Broken Ground Glass

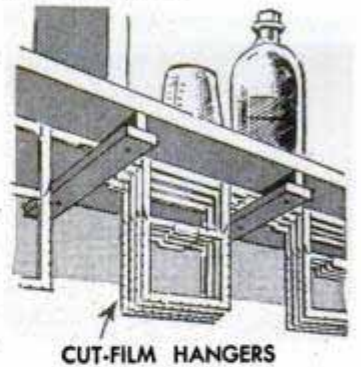


When a replacement for a broken ground glass on a camera or contact printer cannot be found at the photo-supply store, one can be made from a piece of ordinary window glass cut to size. Just sprinkle a small amount of fine abrasive over the surface of the glass and wet with water. Then, attaching a rubber suction cup to the back of a 1-in.-square piece of glass, rub the square in a circular motion over the entire surface of the glass to be ground. Do this until the glass is made sufficiently opaque. If a suc-

tion cup is not available, a block of wood attached to the glass with sealing wax will provide a suitable handle.

### Rack for Cut-Film Hangers

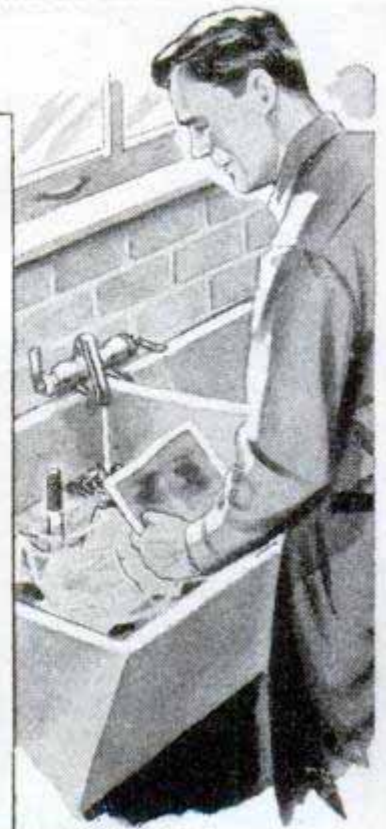
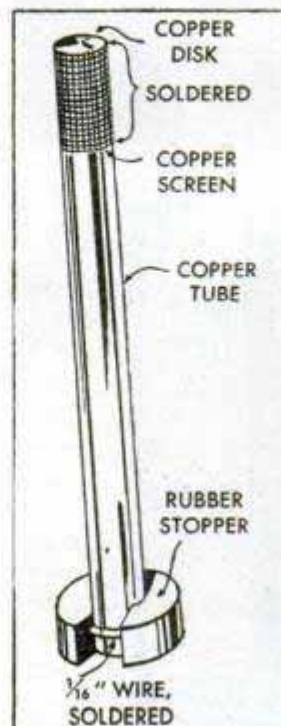
One photographer found that a handy place to keep cut-film hangers is on a rack under the shelf over the darkroom sink. The hangers are suspended between T-shaped rails made by nailing together two strips of wood and fastening them with screws to the underside of the shelf.



Madison Devlin, San Francisco, Calif.

### Sink Converted to Print Washer With Drain-Plug Extension

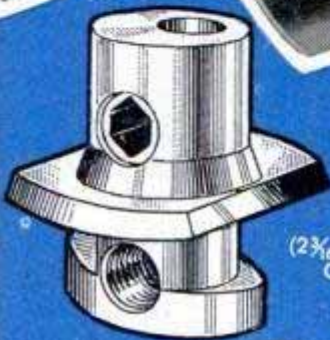
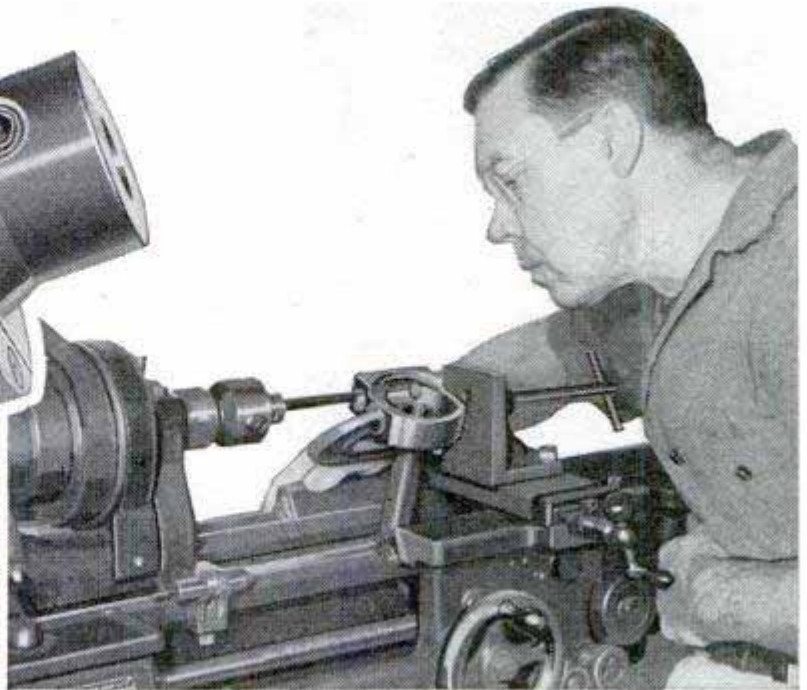
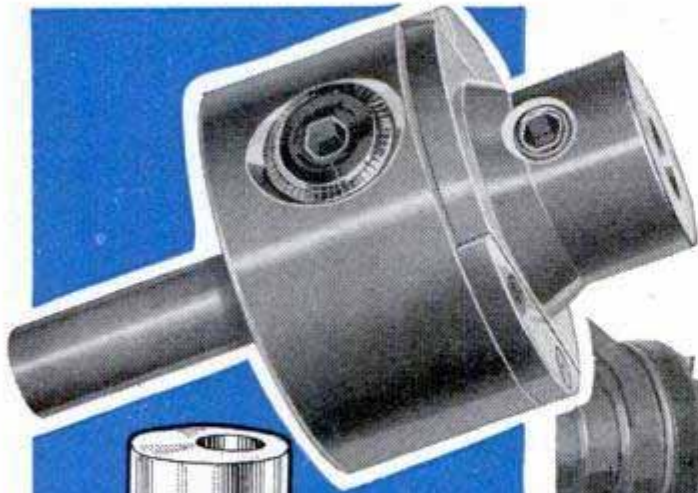
Any convenient washbasin or laundry tub can be converted to a print washer by fitting it with this copper drain-plug extension. The extension consists of a length of tubing with copper screen wire soldered around the top to provide an overflow. Then, a disk is soldered over the top of the screen wire. A solid-rubber stopper is drilled about  $\frac{1}{32}$  in. smaller than the outside diameter of the tube, and this is held in place by pressing it over a retainer ring of  $\frac{1}{16}$ -in. wire, soldered to the tube near the lower end, as shown in the detail.







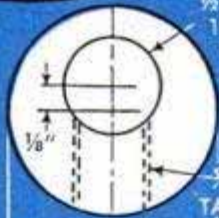
# Shop Notes



1

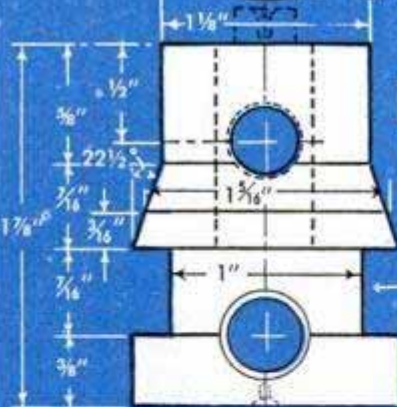
COLLET  
(2 7/16" DIA. X 2 1/4"  
C. R. STEEL)

1/2" BORE,  
1" DEEP



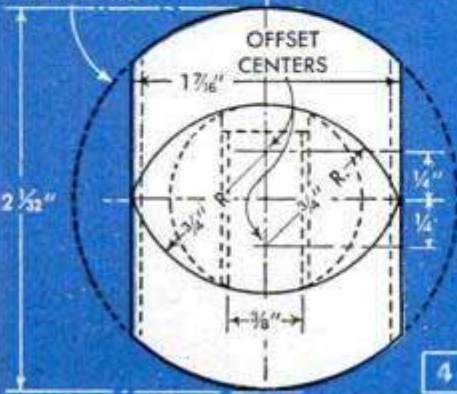
2

3/16" DRILL  
TAP 3/16" - 16



3

REMOVE  
SEGMENTS



4

## OFFSET BORING HEAD

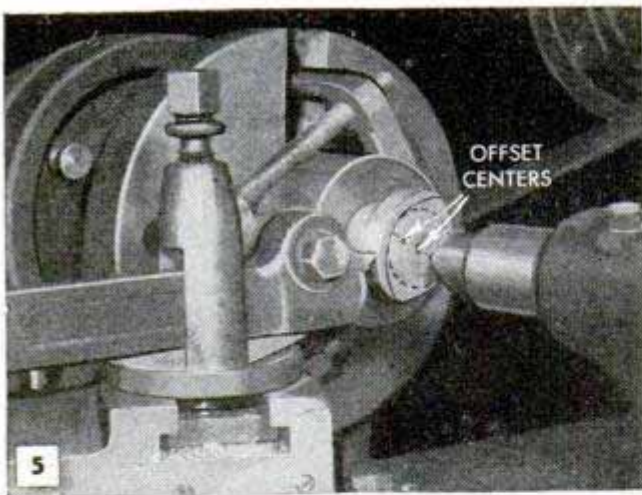
By E. W. Holt

AN ADJUSTABLE offset boring head is an attachment that greatly increases the range of work that can be done on a small metal lathe or a drill press. Used in a drill press, it permits boring holes of greater size than are possible with common-size drill bits. When chucked in a lathe, the offset head will handle many boring jobs otherwise beyond the swing of the lathe. Also, where a lathe is not equipped with a taper attachment, the boring head can be used in the tailstock spindle for taper turning, thereby eliminating the time-consuming operation of resetting the tailstock.

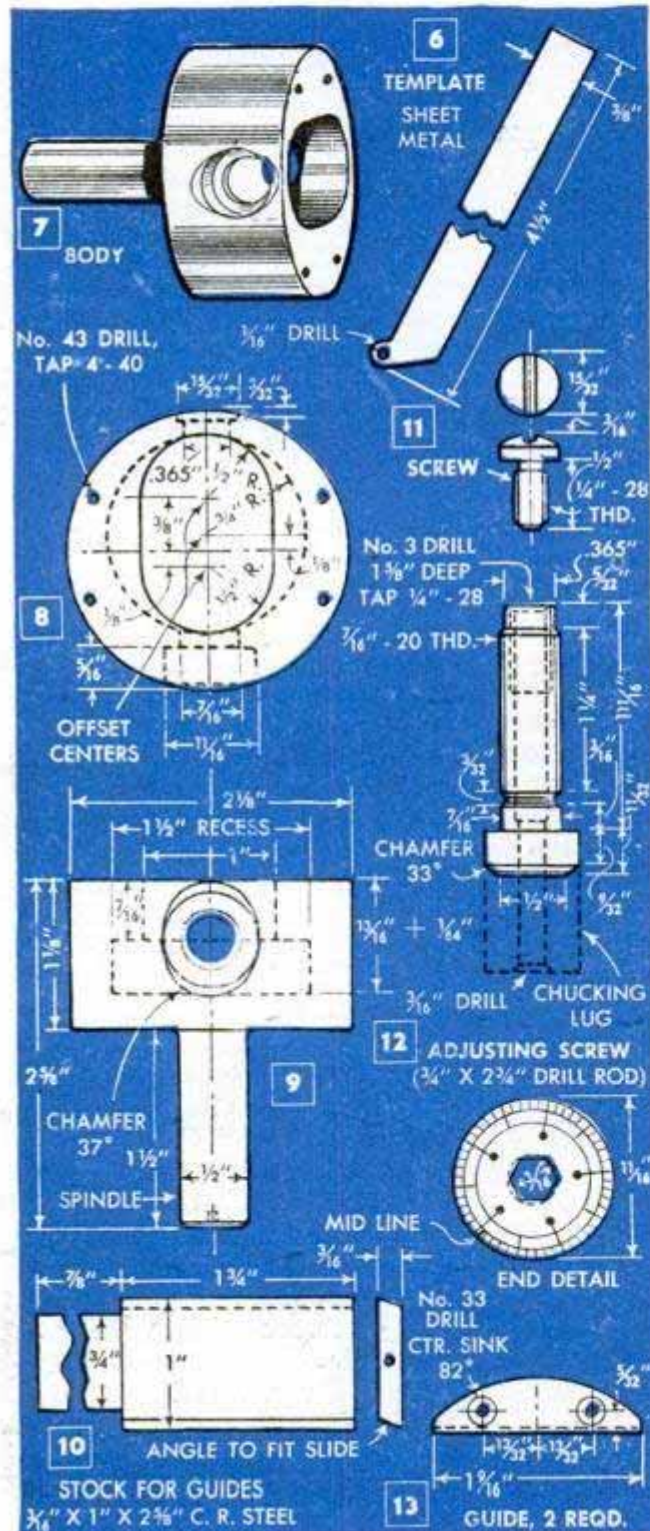
Beginning with the collet, Fig. 1, turn a piece of 2 7/16-in. stock to 2 1/32 in. in dia. and face both ends. Scribe a center line completely around the work and center-drill two offset center marks on each end as indicated in Fig. 4. Scribed lines on metal will stand out more clearly if the work is coated with a saturated solution of sulphate crystals and water. After turning the 7/16-in. groove in the collet, Fig. 3, A, mount the work first on one offset center and then the other to turn the bottom flange elliptical shape, as in Fig. 5. Set aside the collet for the time being.

Next, center-drill 2 1/4-in. stock for the body, Fig. 7, and turn it down to 2 1/8 in. in dia. Turn the spindle to 1/2 in. and face the large end. If a tapered spindle is preferred, it should be made somewhat shorter than the standard length for a Morse taper and the end tapped for a draw-in rod. A threaded plug will bring it up to the standard length required for ejection





5 Mount collet off center to turn elliptical flange



from the tailstock spindle. When this is done, scribe a center line across the face and along both sides. Then lay out the elongated hole and the two outer offset center marks, Fig. 8. After center-drilling the offset marks, mount the body in a four-jaw chuck and scribe index marks on two opposite jaws to align with the marks on the side of the body. With the work mounted off center, using the  $\frac{1}{2}$ -in. radius, run up the tailstock center to locate and hold the turning while chucking. Use a band of copper or other thin stock to protect the work from jaw marks and tighten the chuck so that the scribed lines (witness marks) on both chuck and work coincide. Bore a hole in the face 1 in. in dia. and  $1\frac{3}{16}$  in. deep. Then rechuck the work on the other offset center and bore another hole of the same size and depth. This will produce two overlapping holes which are formed into one elongated hole by filing away the remaining waste. Now locate the middle offset center ( $\frac{3}{4}$ -in. radius). The work is mounted on this center and the bottom of the hole is undercut on two sides, as indicated by the dotted lines in Figs. 8 and 9. The boring-bar cutter, used to form the undercut, should not be more than  $\frac{1}{8}$  in. wide and the recess formed by undercutting the work should fit the elliptical end of the collet in a snug, twist fit.

Next, a hole is made in the thick side of the body and the collet for an adjusting screw, Fig. 12. To bore this hole, place the collet inside the body and align the center lines of each one. Then, using a V-block, clamp the work to an angle plate. Next, clamp the whole assembly to a lathe faceplate, Fig. 14. Check to see that the work is centered by running up the tailstock center and balance the setup with a counterweight. Now, drill a  $\frac{3}{16}$ -in. hole through the thick side of the body and completely through the shank of the collet. Next, bore and ream a  $\frac{7}{16}$ -in. hole through the opposite side of the body. This hole provides a bearing for the end of the adjusting screw. The  $\frac{3}{16}$ -in. hole in the thick side of the body is reamed to  $\frac{7}{16}$  in., after which the hole is counterbored  $1\frac{1}{16}$  in. for a depth of  $\frac{5}{16}$  in. to provide a recess for the head of the adjusting screw. Then the work is remounted and the  $\frac{365}{1000}$ -in. hole is counterbored. Finish by removing the collet and tapping the hole  $\frac{7}{16}$  in.-20.

The adjusting screw, Fig. 12, is drilled through its center, one end being tapped for a threaded retaining screw, detailed in Fig. 11. The shank of the adjusting screw is threaded to fit snugly in the tapped hole in the collet. Next, a midline is scribed on the chamfered edge of the adjusting screw and the  $\frac{3}{16}$ -in. hole in the screwhead is filed to take a socket-head setscrew wrench.

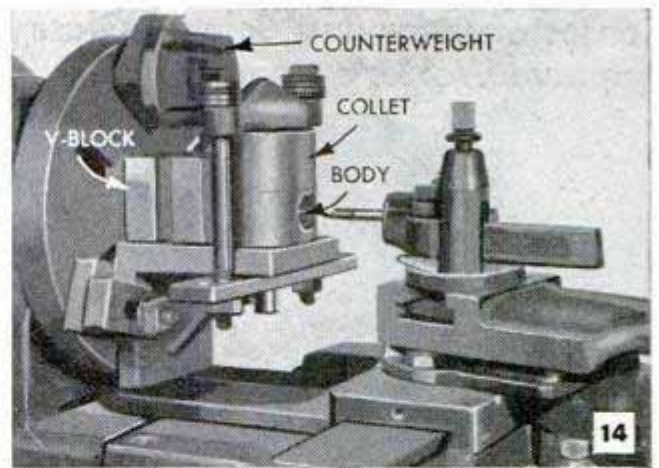


The graduations on the chamfered edge of the head of the adjusting screw are scribed in the following manner: Draw a 6-in. circle on sheet metal or heavy paper. Mark five equal spaces around the circle and divide each space into ten equal parts. Draw two additional circles of any radius and lay out the graduations as shown in the end detail below Fig. 12. Next, make the template, Fig. 6, and turn a plug for a push fit in the hexagon hole. A  $\frac{1}{16}$ -in. pivot pin in one end of the template fits a hole in the plug. Fasten the paper to a board and drill a  $\frac{7}{16}$ -in. hole through the board at the center of the circle. Insert the adjusting screw and, with the template pivoted on the pin, proceed around the circle using a sharp scriber to mark the graduations on the edge of the screw, Fig. 15.

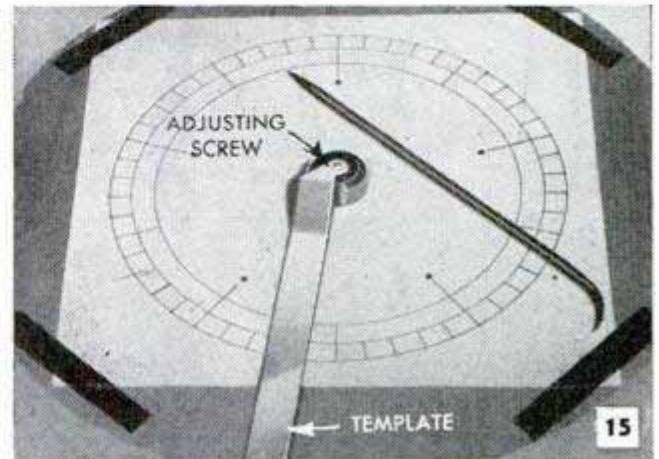
The next step is to machine the two beveled edges on the flange of the collet. These are cut roughly with a hacksaw first, leaving enough stock to finish to size. Beveling the edges is done in the lathe by mounting the collet on a  $\frac{7}{16}$ -in. threaded arbor, 3 in. long, held between centers, and clamping the collet to a faceplate. Position the work at a  $22\frac{1}{2}$ -deg. angle with a protractor and clamp a cutting tool to an angle plate bolted to the cross slide as in Fig. 16. The edges are beveled by traversing the lathe carriage by hand, using the cross-feed to advance the tool each stroke. Depth of the cut is adjusted by tapping the tool lightly with a hammer.

The guides for the collet, Fig. 13, are machined from one piece, Fig. 10, using the same setup as before to bevel the edges to match the ones on the collet. The stock for the guide is mounted edgewise between centers and at a  $22\frac{1}{2}$ -deg. angle. Then it is clamped to the faceplate, the edges milled as in Fig. 17, and the piece sawed lengthwise into two parts. Drill two holes in each guide in the position indicated and then place the collet in the body, at the same time installing the adjusting screw and retainer screw. Clamp the guides to the body temporarily with paper between. Drill and tap four holes with a No. 43 drill and a No. 4-40 tap, and countersink. Saw away the waste stock around the outer edges of the guides leaving enough stock to finish-turn the parts flush with the body.

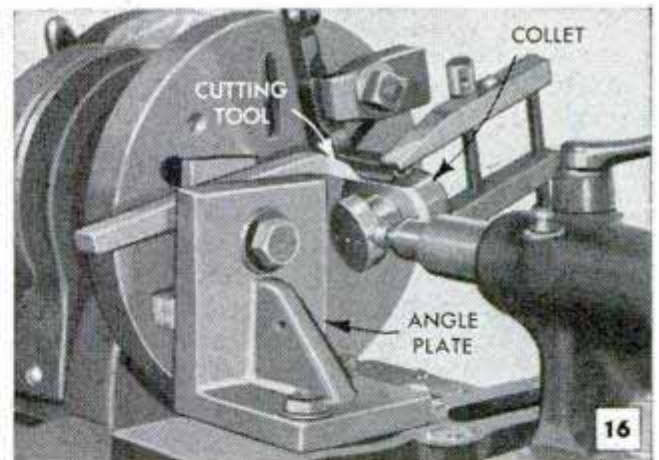
Now, fasten the guides permanently to the body. The collet should fit snugly between the guides. A  $\frac{1}{2}$ -in. hole, Fig. 2, is bored in the end of the collet to take a  $\frac{1}{2}$ -in. tool shank. This is done after turning the adjusting screw clockwise as far as possible. Then the collet is returned to the center position and the outer edges of the guides are turned. Finally, drill and tap the collet for a  $\frac{3}{8}$  in.-16 socket-head set-screw which locks the tool bit in position.



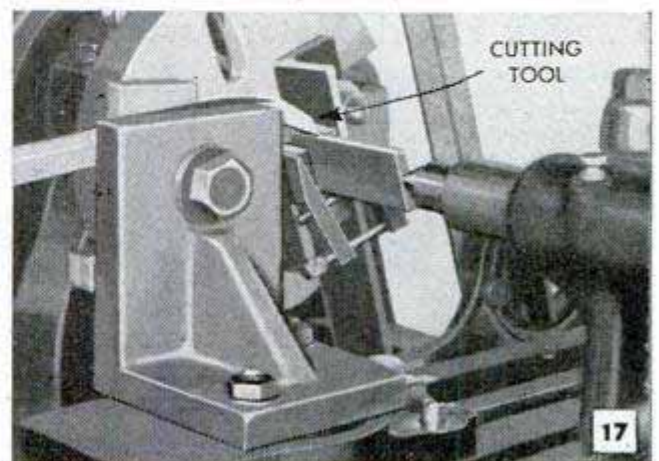
Collet and body bored together for adjusting screw



Template is used to calibrate head of adjusting screw



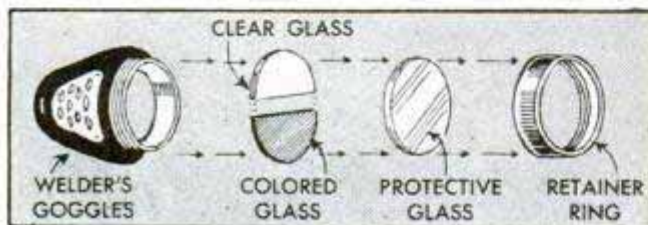
Setup for milling beveled edges on flange of collet



Manner of chucking stock for beveling collet guides

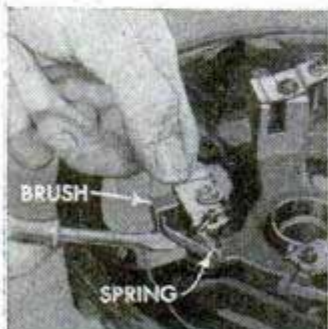


## Lenses of Clear and Colored Glass Improve Welder's Goggles



A pair of ordinary welder's goggles can be converted for both clear and protected vision by fitting them with lenses of half-clear and half-colored glass. This is excellent for burning or welding jobs that require occasional unobstructed vision. A clear lens and a colored one are cut in half and mounted in the goggles as shown. A paper disk cut the same size as the lens and folded in half will indicate the line along which the lens should be cut. To convert the goggles back to all-clear or all-colored glass, just place both halves of the particular lens in one side of the frame and insert an unbroken matching lens in the other side.—Andrew Vena, Philadelphia, Pa.

## Brushes Held in Released Position Simplify Electric-Motor Assembly



Assembly of some induction motors or generators is facilitated if the brushes are wedged in a released position so they will slide over the commutator without trouble when the bell, or end cap, is replaced. Each brush is pushed back in its holder to the point where the pressure of the spring will bear against the

side of the brush. Then, after the motor is completely assembled, the brushes are pushed down with a screwdriver, inserted through the opening in the cap, until the spring returns to its normal position.

## Adapting Spray-Gun Suction Tube For Use With Smaller Jars

The standard, 1-qt. jar of a spray gun often is too cumbersome for touch-up jobs that require only a small amount of paint. However, jars of a convenient size can be used with the gun if the suction tube is cut off to fit



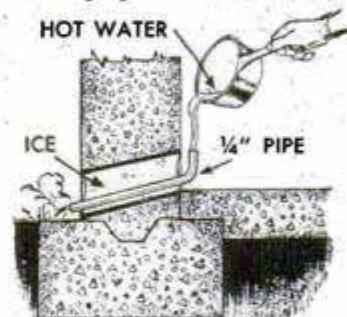
them and a connecting sleeve is employed to permit bringing the tube back to its original length when desired. The saw cut is made at an angle and a short length of copper tubing pressed over the cutoff section of the suction tube provides the connecting sleeve. With the tube cut at a suitable angle to fit close to the bottom of the jar, practically all the paint can be siphoned.—Ken Murray, Colon, Mich.

## Lubricating Windshield Wiper

Brake fluid is an excellent lubricant for a sluggish windshield wiper as it will not thicken and clog like motor oil. Simply remove the wiper unit and immerse the whole unit in the fluid. Then move the wiper arm back and forth until fluid has been pumped through the unit several times.—R. O. Griffith, Atkins, Ark.

## Thawing Short Drainpipes

Drains for barns and other out-buildings consisting only of a short length of pipe running through the wall at the floor line can be thawed quickly if a piece of 1/4-in. pipe or tubing slightly longer than the drain is placed inside the drainpipe. The end of the tubing which will be inside the building is bent to point upward when in place, and the tubing is set in asphalt or tar in the bottom of the pipe. Then, when the drain freezes over, hot water is poured into the upright end of the tubing.





# ADAPTER PLATE

By Frank Faber

OWNERS of small metal-turning lathes will find an adapter plate a handy accessory to have when machining duplicate parts and work that is too large to be chucked. Mounted on top of the compound rest in place of the tool post, the adapter plate becomes an integral part of, and swings with, the compound so that duplicate machining operations on multiple setups can be done in a manner similar to using a turrethead. In addition, the adapter plate permits a drill vise or angle plate to be used to hold the work. This arrangement provides a fast and positive means of clamping the work at just the right height. A few of the various setups that the adapter plate makes possible are pictured in the series of three photos.

The adapter plate consists of three main parts: a surface plate which has tapped holes in the top and edges for hold-down fixtures, a tongue which fits the narrow width of the T-slot, and an anchor plate which clamps the unit to the compound by means of two socket-head machine screws. The tongue is fastened to the underside of the plate with two flat-headed screws set flush in tapped holes. Dowel pins, in addition to the screws, are used to anchor the tongue rigidly. The tapped holes in the plate are located according to the drawing and are chamfered slightly.

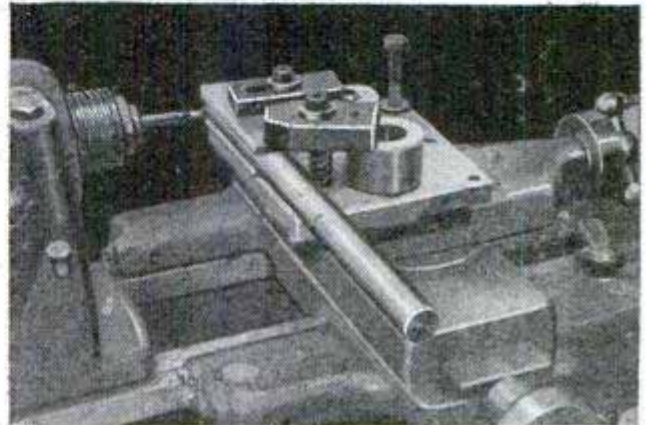
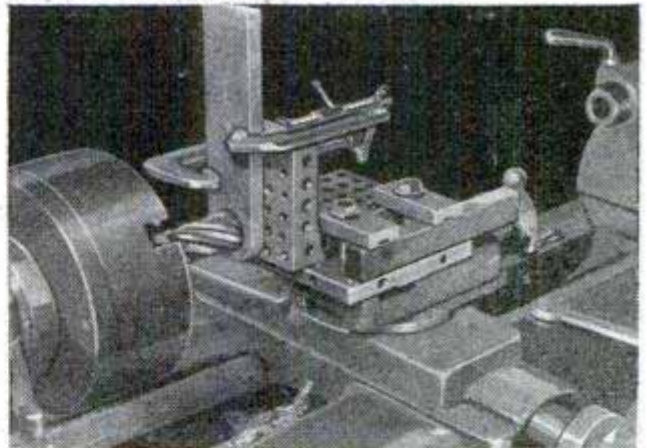


Plate permits milling keyways in round or bar stock



Reaming and boring is done with aid of angle plate

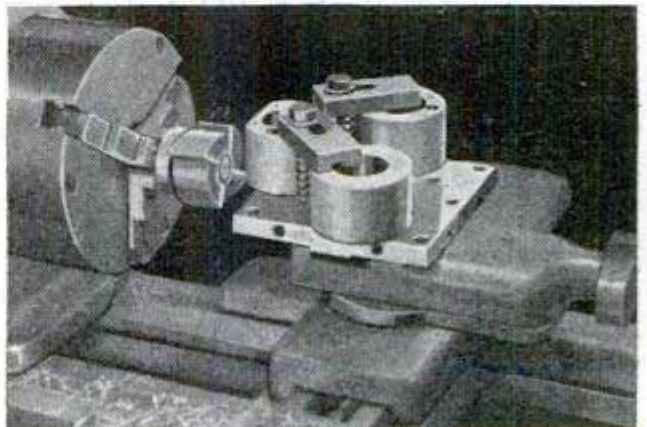
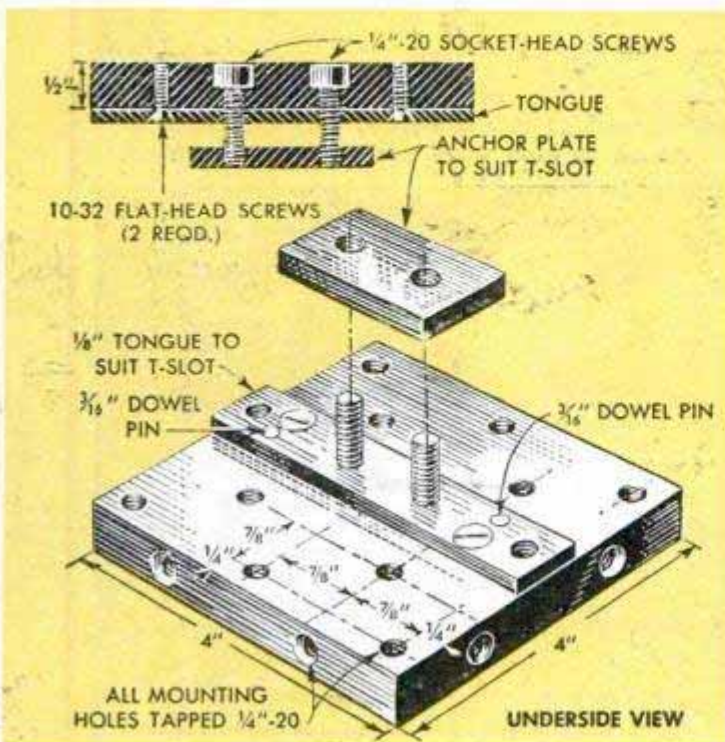


Plate speeds machining of work in multiple setups





# MILLING PRACTICE

**PRODUCING accurate work efficiently with a** **By H. J. Chamberland**

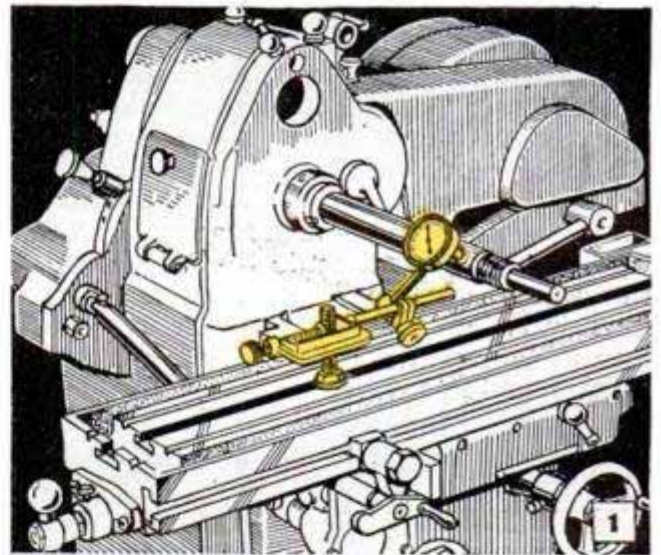
horizontal-spindle milling machine requires accessories that clamp and support the work rigidly on the machine table. These are necessary to resist the machining forces caused by the milling cutter removing material from the work, as these forces create vibration which results in chatter, the worst enemy of machining.

Maximum rigidity is attained when the table and the cutter are as close to the frame of the machine as possible. Before clamping the work to the table, the arbor, which is the "heart" of the milling machine, should be tested for runout with a dial indicator fastened to the table as in Fig. 1. Runout, which is the difference in parallelism between the arbor and the table and ways, should not exceed .002 in. A runout of .005 or .006 in. increases with higher spindle speed and, if permitted to exist, will ruin the arbor and its support bearing, shorten cutter life and result in poor work. Arbor runout is due to various causes, such as a bent arbor, resulting from taking excessively deep cuts or too fast a feed, wear in the arbor-support bearing and burrs on the arbor shank or in the tapered bore of the spindle. When making a cutter assembly, the arbor support should be positioned before tightening the arbor nut. If the arbor was true when tested with the dial indicator and the cutter is untrue after assembly, check between the collars for chips or dirt. If the cutter runs out radially, its bore is larger than the diameter of the arbor. The bearing in the arm support must be kept well-lubricated. When the arbor is removed, it should be cleaned thoroughly and when not in use it should be wrapped in cloth and placed in a drawer or cabinet.

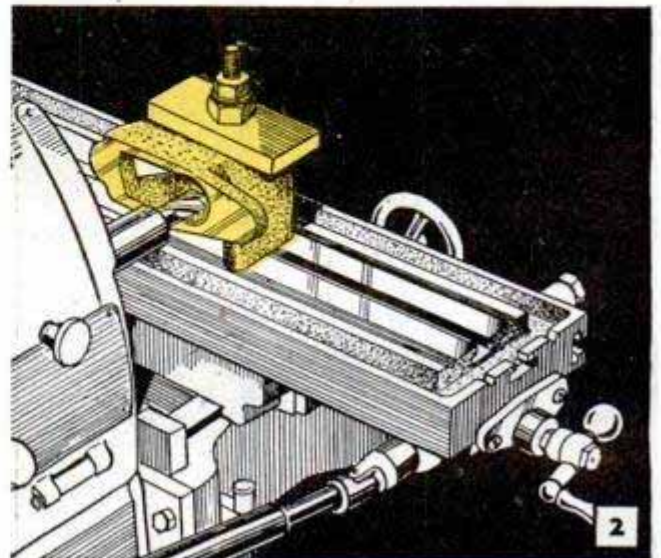
Accessories for clamping the work consist of simple T-slot bolts and strap clamps, as in Figs. 5 and 6; a milling-machine vise, Fig. 8, or the more complicated indexing equipment shown in Figs. 11 and 12. The correct and incorrect locations of the T-slot bolt in relation to the work are shown in Fig. 3. The casting being machined internally with an end mill in Fig. 2 presents no clamping problem, as the flat surfaces of the casting rest on the table and the T-slot bolt projects through a hole in the work. The comparatively larger casting in Fig. 5, also being machined internally, is clamped at each end with a T-slot bolt and blocks. Milling forces in this case are much less than in Fig. 6 where

they are increased by the wider cut being taken with a shell end mill. Where a number of different machining operations are to be done, the clamping naturally should be sufficient to take care of the heaviest load. An irregularly shaped casting, such as the one shown in Fig. 7, must be blocked at the bottom to align the work accurately and prevent distortion due to clamping. Machining forces are reduced to a minimum when the milling machine is used, as in Fig. 4, to lay out and center-drill holes that are to be drilled and bored later. Nevertheless, the high degree of accuracy involved still makes clamping a major factor.

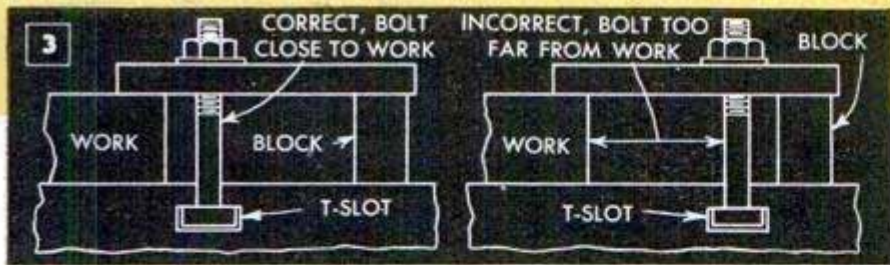
The milling vise, shown in use for contour milling, Fig. 8, offers an efficient method of holding some types of work. The base of the vise is bolted to the milling-ma-



Above, a dial indicator is used to test accuracy of milling-machine arbor. Below, only one T-slot bolt is needed to hold small casting in place on table

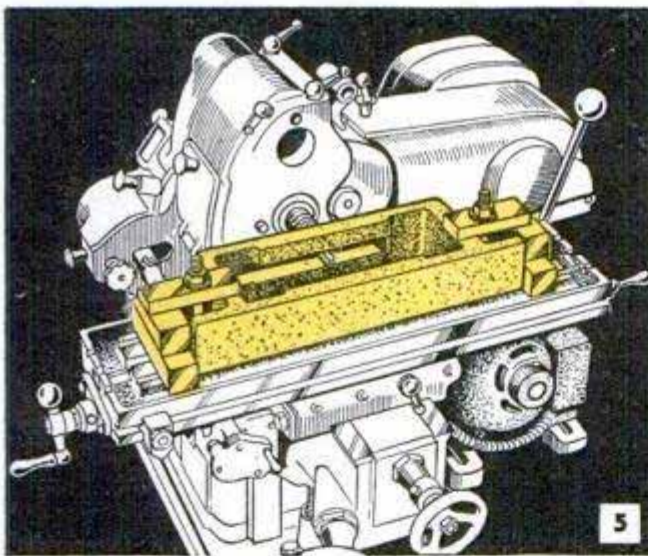
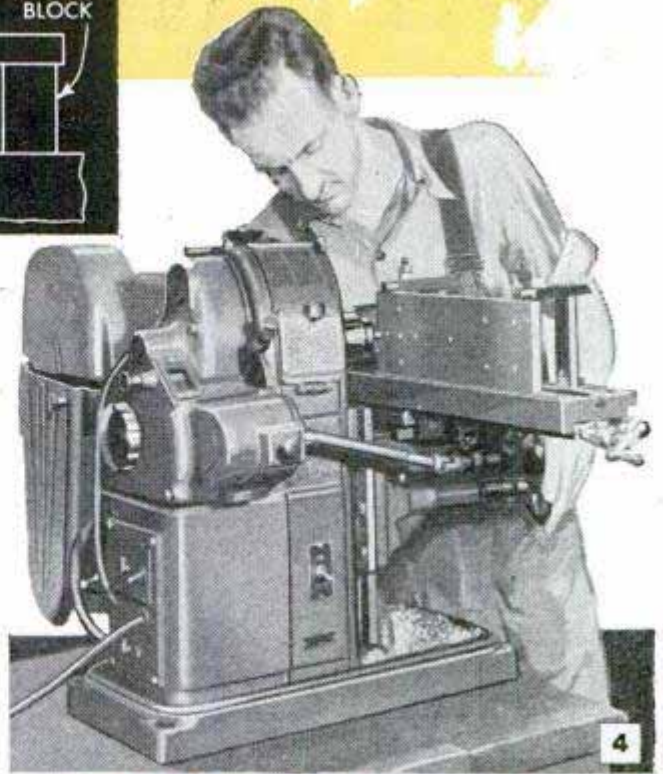




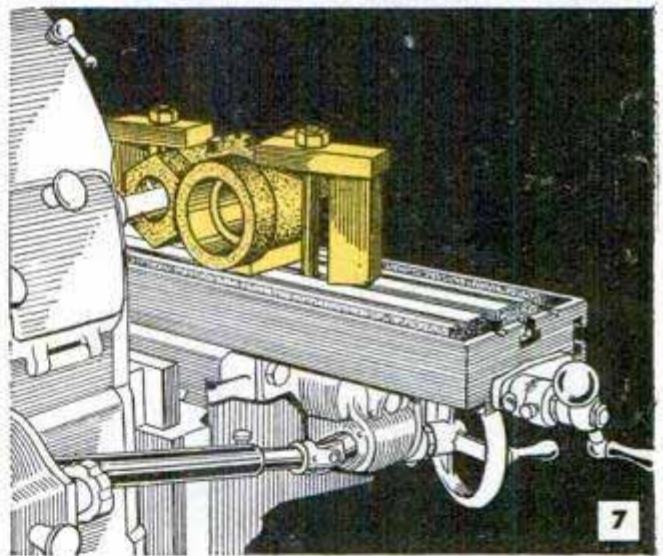


chine table and the work is held between the vise jaws. Many such vises are equipped with a graduated swivel base which permits the work to be set at any angle to the table ways.

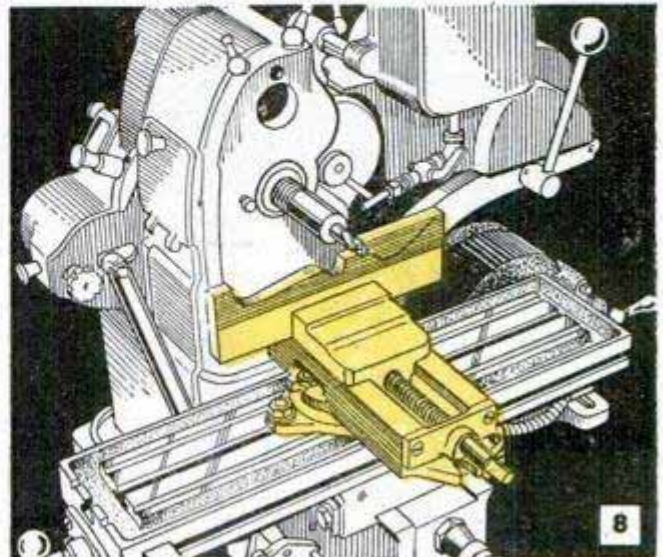
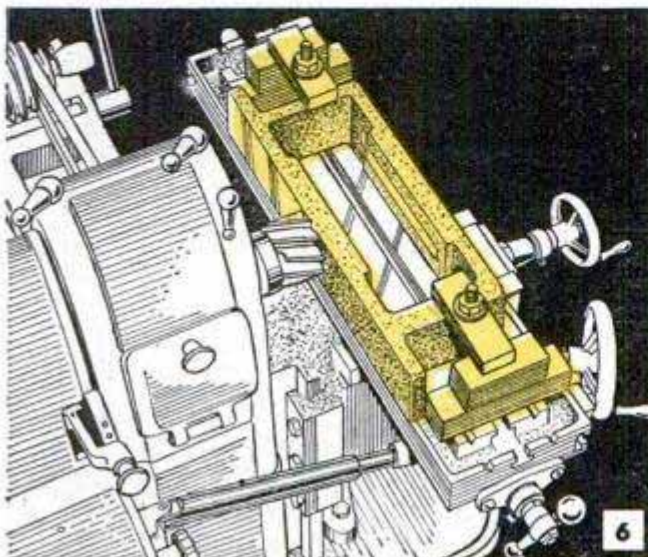
Two types of indexing equipment are in general use. These are the rotary indexing table, Fig. 11, and indexing heads, or centers, Figs. 9 and 13. The rotary indexing table is used for cutting straight or circular slots and grooves in flat work, usually circular in shape. The base of the indexing table is bolted to the milling-machine table and the work is clamped to the indexing table, which can be rotated and locked



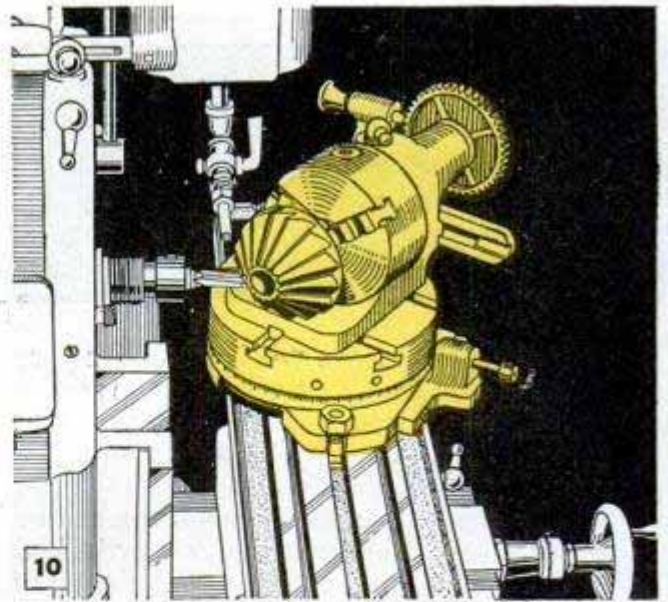
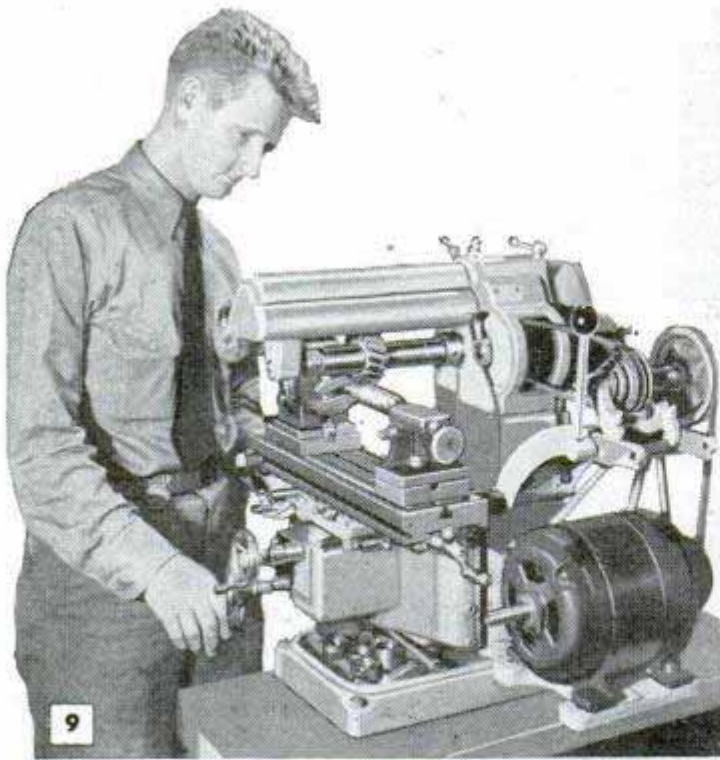
Large castings, as shown above and below, must be clamped down at each end. See Fig. 3 for the correct position of T-slot bolt in relation to the workpiece



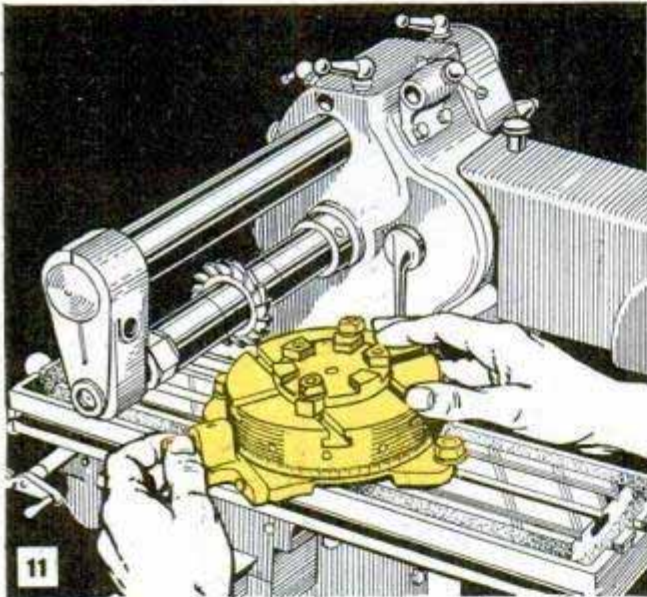
Above, irregularly shaped work is blocked at bottom. Below, milling-machine vise, which is bolted to top of table, is used to hold work for contour milling



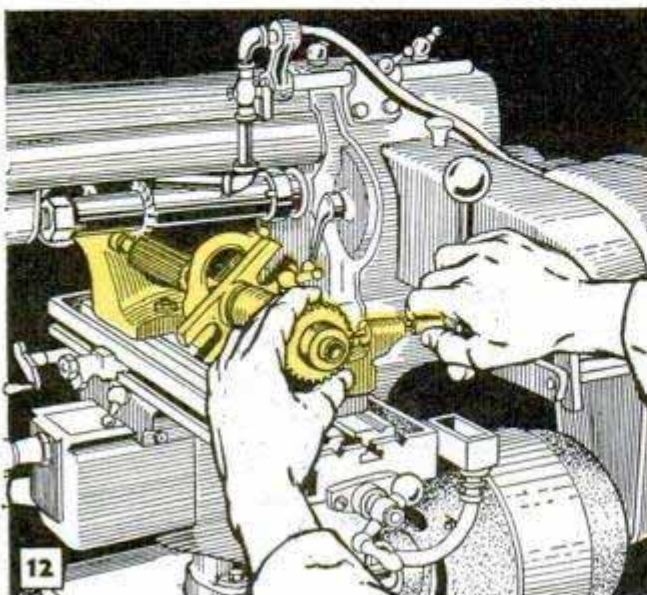




Accurate spacing for milling the teeth of an angular cutter is accomplished by mounting the work in a chuck fastened to an indexing center which, in turn, is bolted to an indexing table. Angular cutter is then heat-treated and ground



Above, work is clamped to a rotary indexing table which is bolted to milling machine. Below, gear is used to position work held between indexing centers

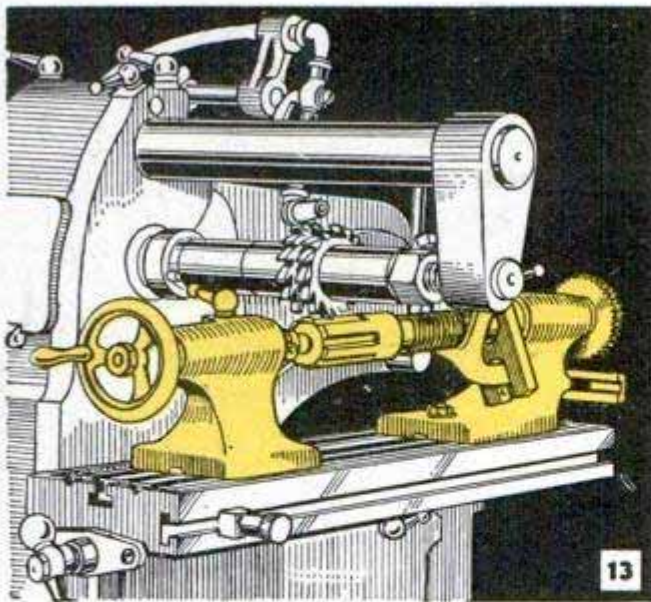


in place at the desired position. Indexing centers, which resemble the head and tailstock assemblies of a lathe, are used to position work, ordinarily cylindrical in form, for machining equally spaced grooves or surfaces across the periphery of the work. Milling splines on a shaft, as in Fig. 13, and making a gear, as in Fig. 18, are good examples. The method of indexing or positioning the work varies with the type of centers used. With the centers shown in Fig. 12, this is accomplished by rotating a gear fastened to the spindle of the headstock indexing center. A sliding pin, which engages the teeth of the gear, locks it in position. The lockpin support bracket is adjustable for various gear diameters, thus making accurate indexing merely a matter of selecting a gear on which the number of teeth is divisible by the number of spacings required on the work. The tailstock indexing center has a handwheel for adjusting its center longitudinally.

Angular indexing is accomplished by mounting a headstock indexing center, equipped with a chuck to hold the work, on a rotary indexing table. Fig. 10 shows this type of setup being used. Here the rotary table provides the angular adjustment and the indexing center permits accurate spacing to produce the teeth of an angular cutter.

On a production basis, teeth or flutes are milled with special-formed cutters. However, as an ample supply of these cutters would be expensive, an assortment of standard cutters is, in most cases, sufficient for small shops. Gear cutting requires a formed milling cutter. Fig. 14 shows what is known as an involute spur-gear cutter.



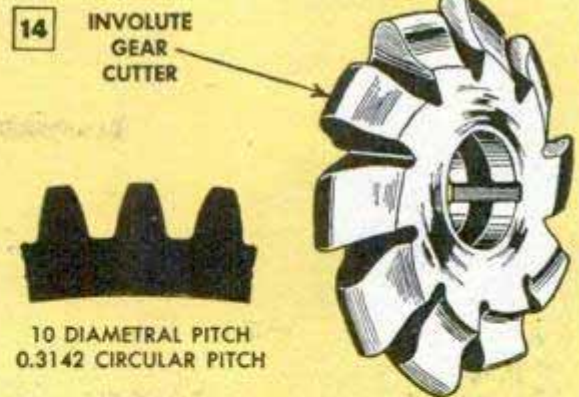


13 Milling spline on shaft with side milling cutters. Shaft held between indexing centers is rotated the required amount and locked in position for each cut

Eight different forms of these cutters comprise a set that will handle gear-cutting jobs within the ranges indicated in Fig. 16. These cutters are designed so their forms are correct for the lower numbers of teeth in each range, but if extreme accuracy is desired in the higher range, intermediate-numbered cutters, such as  $1\frac{1}{2}$ ,  $2\frac{1}{2}$ ,  $3\frac{1}{2}$ , etc., should be used.

Therefore, knowing the exact diameter and number of teeth required for a gear, the mill operator can readily select a cutter of the correct diametral pitch for the job. The exact diameter of a gear is neither the outside diameter of the gear blank nor the diameter at the bottom of the teeth. Instead, it is the pitch diameter, indicated in Fig. 17 as P.D. Circumference of this diameter is an imaginary line known as the pitch circle. To find the diametral pitch of a given gear, simply divide the number of teeth by the pitch diameter. The diametral pitch is not an actual dimension but the ratio between the number of teeth in a gear and its pitch diameter. For example, a four-diametral-pitch gear has four times as many teeth as it has inches of pitch diameter. The two details of Fig. 15 show the actual sizes of gear teeth of five and ten diametral pitch.

For accurate work, gear cutters must be sharp. Frequent sharpening by removing only a slight amount of metal is better than allowing the cutter to become so dulled that a single sharpening will depreciate it from 10 to 15 percent. In sharpening, only the faces of the cutter teeth are ground. This must be done on a machine equipped with a dish-type grinding wheel and a sliding toolholder that will permit cutter movement as indicated in Fig. 19. Gear cutters having radial faces, Fig. 20, upper

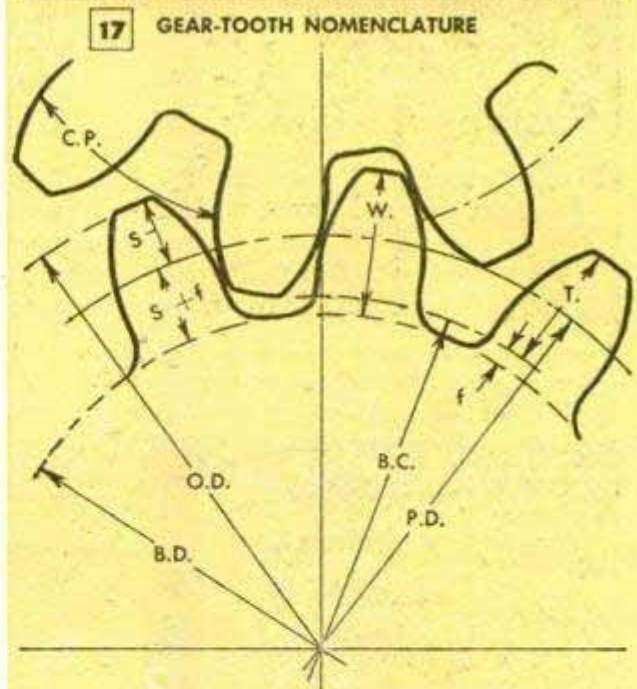


14 INVOLUTE GEAR CUTTER  
10 DIAMETRAL PITCH  
0.3142 CIRCULAR PITCH



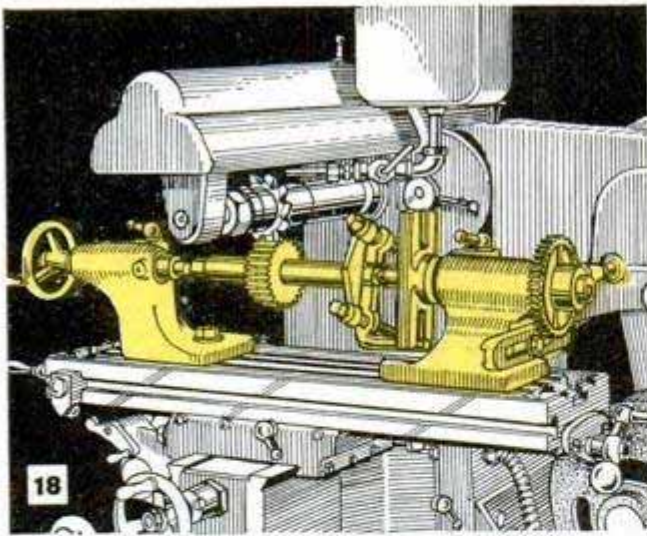
15 5 DIAMETRAL PITCH  
0.6283 CIRCULAR PITCH

16	SIZE OF CUTTER	GEAR-CUTTING RANGE
No. 1	will cut gears from	135 teeth to a rack
No. 2	will cut gears from	55 teeth to 134 teeth
No. 3	will cut gears from	35 teeth to 54 teeth
No. 4	will cut gears from	26 teeth to 34 teeth
No. 5	will cut gears from	21 teeth to 25 teeth
No. 6	will cut gears from	17 teeth to 20 teeth
No. 7	will cut gears from	14 teeth to 16 teeth
No. 8	will cut gears from	12 teeth to 13 teeth



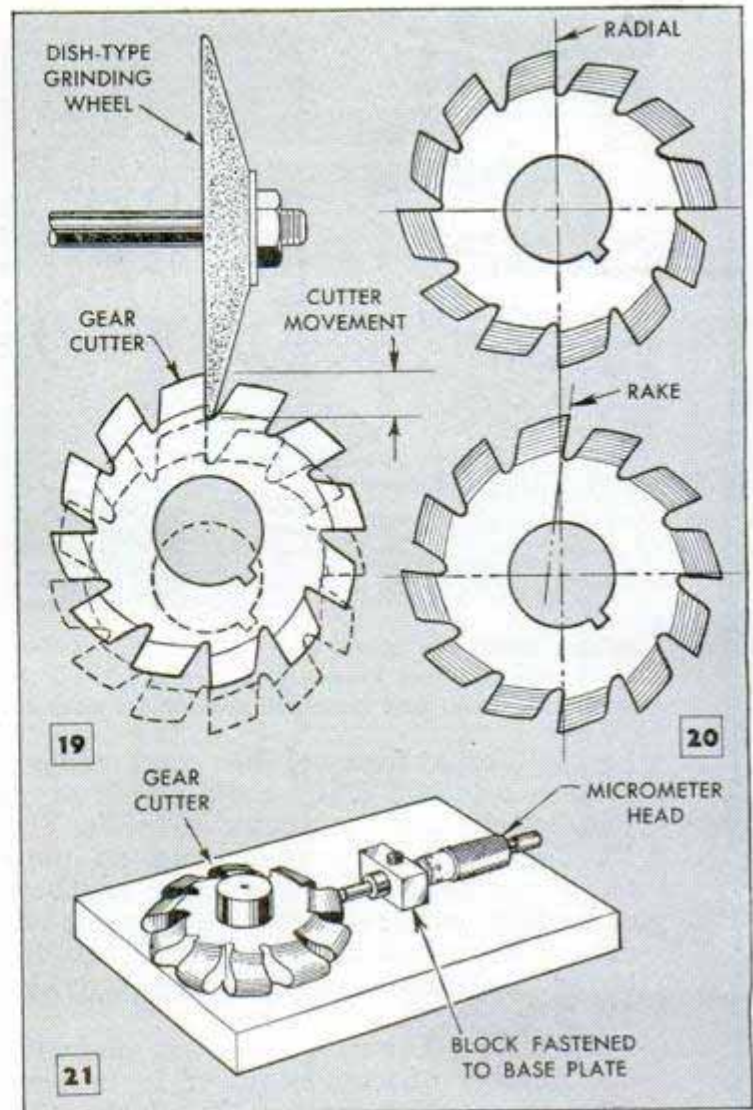
- O.D. ———— OUTSIDE DIAMETER
- P.D. ———— PITCH DIAMETER
- B.C. ———— BASE CIRCLE
- B.D. ———— BOTTOM DIAMETER
- C.P. ———— CIRCULAR PITCH
- W ———— WHOLE DEPTH OF TOOTH
- T ———— WORKING DEPTH OF TOOTH
- f ———— CLEARANCE
- S ———— ADDENDUM
- S+f ———— DEDENDUM





18 Typical setup for making gears with milling machine

detail, must always be sharpened radially. Gear cutters with rake—faces back of center—as in Fig. 20, lower detail, must be ground to the rake angle stamped on the side of the cutter. After sharpening, the cutter should be checked for uniform depth of cut. A suitable fixture for checking this can be made as shown in Fig. 21. In use, the cutter is rotated and each tooth checked with the micrometer head. A variation of .001 in. is permissible between the extreme high and low teeth. Gear cutters, when properly sharpened, will produce duplicate work throughout their entire lives. Place gear cutters on individual racks when not in use. Never store loosely in a drawer.

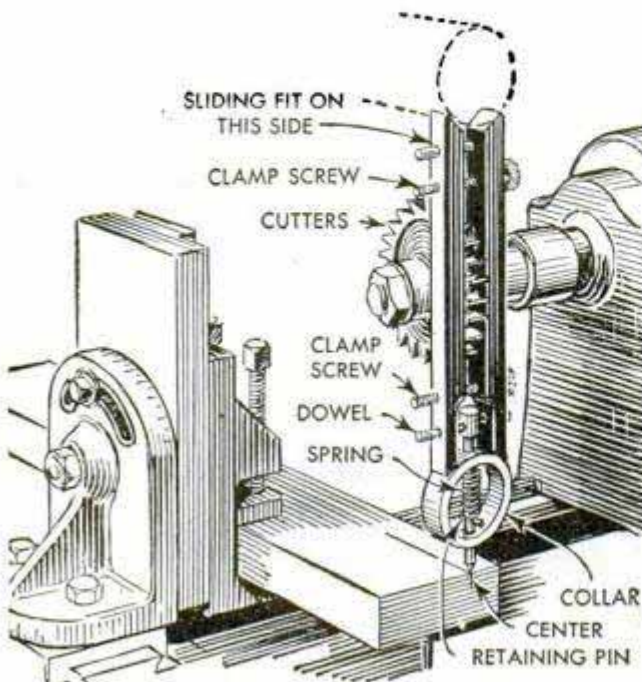


## Adjustable Fixture Locates Milling Cuts on Round and Flat Work

Milling cuts are accurately located on both round and flat work with this adjustable double-end fixture which is designed to clamp over a milling cutter in the position shown. One end of the fixture forms a

vee to take round work while the other end contains a spring-loaded pointer for locating the cut on flat surfaces. Using the fixture for centering the cutter over a line scribed on the work, is merely a case of advancing the work until the line and the pointer coincide. This automatically centers the cutter over the line. When a keyway is to be cut in round work, the fixture is turned end-for-end and the work is positioned to cradle in the vee formed by the ends of the fixture. Construction is apparent from the drawing. Dowel guide pins and clamping screws are fitted in each end of the fixture which is made from two pieces of square bar stock beveled at the ends. The pointer, crosspinned by the dowel, passes through the exact center of a collar which is held by spring tension against the end of the fixture.

H. Moore, Leeds, England.

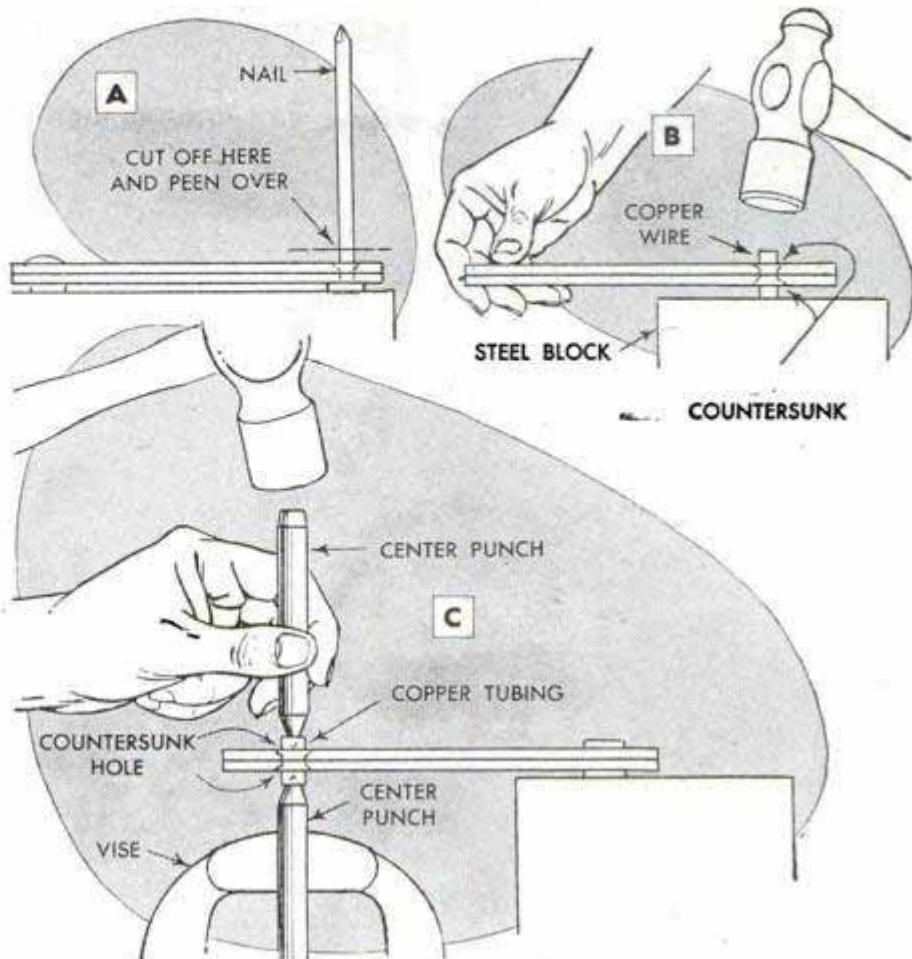


☞ To detach a badly corroded car-battery terminal from the battery post, drench with boiling-hot water to remove the corrosion. Then, loosen the nut, spread the terminal with a screwdriver and lift off.



# Common Materials Provide Substitute Rivets

If you need a few rivets and none are at hand, they can be improvised from nails, wire or small-diameter copper or brass tubing. The wire and nails provide solid rivets and the tubing supplies hollow ones. Detail A shows how to use a nail as a rivet. Countersink the top hole in the work and, inserting the nail from the bottom, cut off its shank about  $\frac{1}{8}$  in. above the surface of the work. Then, just peen the projecting end of the nail flat. Roundheaded brass nails make excellent rivets for model work and ornamental metal projects. Detail B describes the method of riveting with short pieces of copper, aluminum, brass or steel wire. Note that in this case the hole on each side of the work is countersunk. The wire should fit the hole snugly, projecting an equal distance at each end, and a sharp hammer blow flattens both sides at the same time. Copper or brass tubing is used as in detail C. The operation is similar to that for wire,



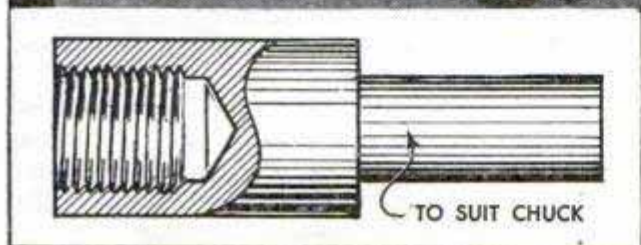
except that two center punches are used to bend over the ends of the tubing. After this is done, they are flattened by hammering on a steel block.

Arthur Trauffer, Council Bluffs, Iowa.

## Adapter Chucks Spark Plug in Drill Press for Cleaning of Exterior



After cleaning the inside of a spark plug, one mechanic chucks it in a drill press and gives the outside of the plug a quick and thorough cleaning by rotating it against a wire brush. He uses several adapters, like the one shown, to fit various sizes of plugs. The shank is turned to suit the chuck and a blind hole is drilled and tapped in the other end to take the threaded base of the spark plug. When the outside of a plug is clean, he applies a little black lacquer to the steel shell, which makes the plug look like new. In using the wire brush be careful that the porcelain insulator is not damaged.—Ed. Packer, Chicago.



## Try This When Grinding Bolts

Before reshaping a bolt head on a grinder, one auto mechanic turns a nut halfway up the threads. The nut absorbs sufficient heat to permit him to hold the lower end of the bolt comfortably with his fingers.

John W. White



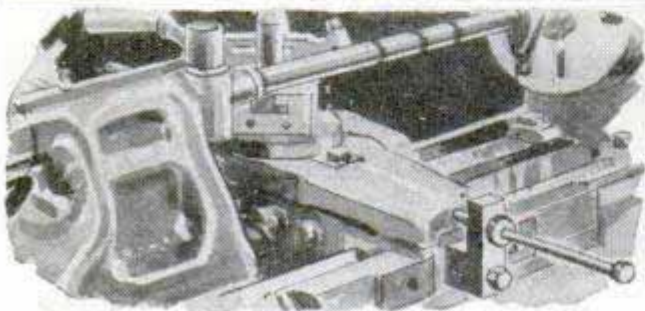
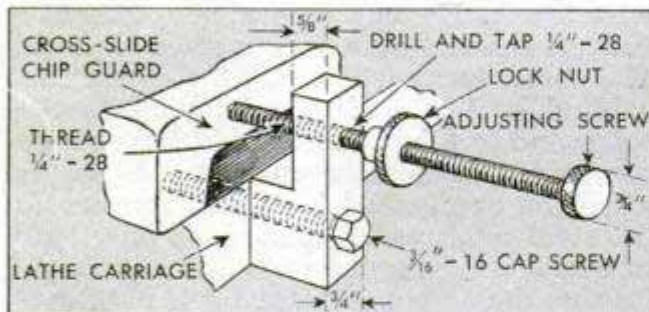
## Temporary Signs Lettered Rapidly With Shoe Polish and Swab



Where neatness of lettering is not too important, shoe polish applied with a cloth swab will be found more convenient for lettering temporary signs than a brush and paint. It saves the job of cleaning a brush, the polish will not run, and opening and stirring paint is eliminated. The swab is made by wadding a piece of cloth around the end of a pencil and tying it with string.

## Stop Attached to Lathe Carriage Limits Travel of Cross Slide

If your metal lathe is not equipped with a threading stop, here's a simple one consisting of only three parts. It is designed to fasten to the rear side of the carriage, and a knurled adjusting screw, set to suit the work, restricts travel of the cross slide. Such a stop is especially useful as a depth stop either in threading or machining duplicate parts. The L-shape bracket for the stop is fashioned from a

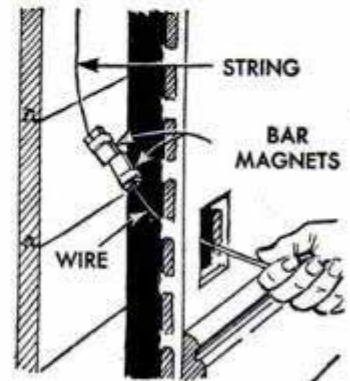


piece of 3/4-in. cold-rolled steel. It has a tapped hole at the top for the adjusting screw, which bears against the cross-slide chip guard, and also a hole at the bottom for bolting it to the lathe carriage. The original stop was mounted by using a pre-tapped hole that was provided for a taper-turning attachment. If a similar hole is not provided, it's not a difficult job to drill and tap one for a small cap screw.

Jesse Oppenheimer, Kansas City, Mo.

## Fishing Wires Between Walls Aided by Bar Magnets

When fishing electrical wires or cable between walls, try using two strong bar magnets instead of the usual wire and hook. Tie one magnet to the string that is dropped from above and tape the other one to a stiff



wire which is inserted through the switch or convenience-outlet opening. You will find that it is much easier to bring the two magnets in contact and thus pull the string through the opening than it is to use a hook on one end of the wire with which to get hold of the string. As soon as the magnets come reasonably close together, they will attract each other and thus save considerable probing, which often is necessary when using a wire hook.

M. Freeman, Clinton, Iowa.

## Alcohol Damages Fuel Pump

Frequent fuel-pump breakdown in cold weather may be due to the practice of putting alcohol in the gas tank. The alcohol settles to the bottom of the tank and, when pumped through in quantity, causes the fuel-pump diaphragm to become porous.

Marion L. Rhodes, Knightstown, Ind.

## Cloth-Lined Wire Picker Protects Ripe Fruit

Padding a fruit picker with cloth protects ripe fruit from being bruised by the wire arms. To make the pad, sew one end of a piece of cloth to the bottom of the picker and, stretching the cloth taut, sew its other end to the arms near the top of the picker.

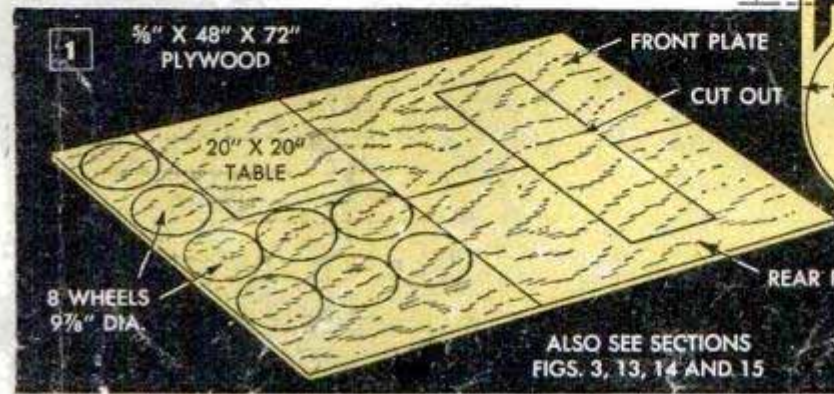
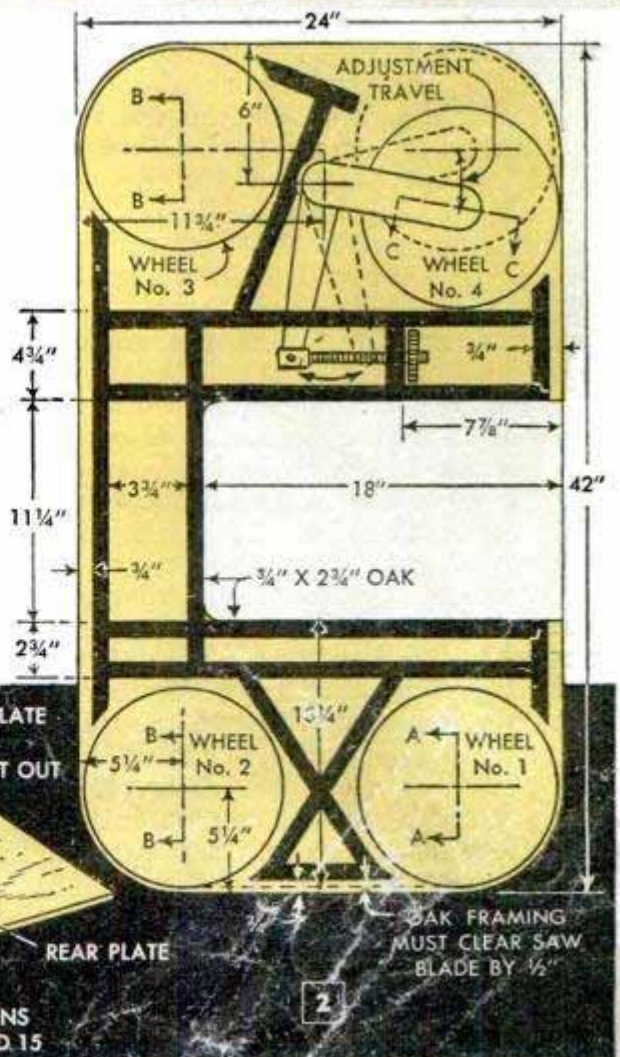
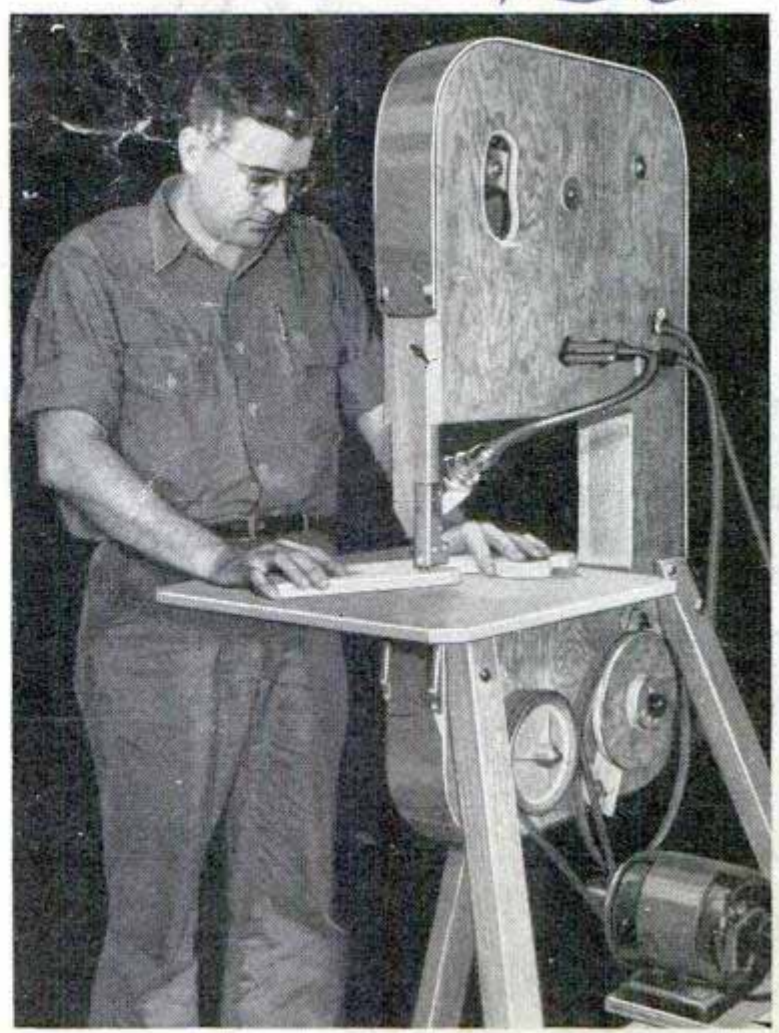




# 4-Wheel BANDSAW

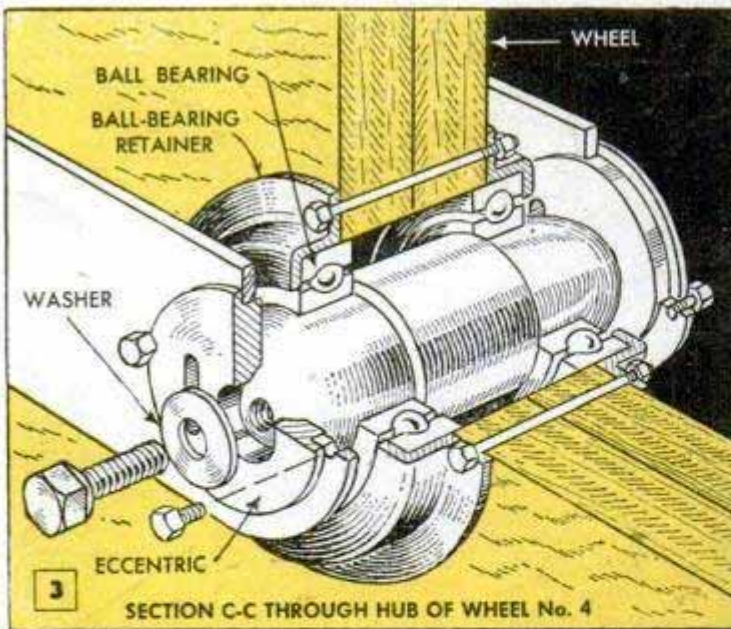
By  
**H. Tuttle and R. E. Knoll**

**BY USING** four band wheels instead of two, big-machine capacity is built into this bandsaw of home-workshop size. The 18-in. throat makes it possible to work at the center of panels up to 36 in. wide. Except for ball bearings and retainers, metal yokes, sheet-metal cover, and such shafts and bolts as are necessary in the assembly, the machine is made entirely of wood. Most of the parts are cut from a single piece of  $\frac{5}{8}$ -in. plywood as in Fig. 1. The box-type spacer frame between the front and back plywood cover plates, Figs. 2 and 8, is made from oak. When assembling the frame, special care must be taken to build it to exact dimensions, as the frame alone is depended upon for strength and rigidity to maintain exact alignment of the band wheels. Attach all the hardwood parts of the box frame to the back plate first, using screws and glue at all the joints. Next, make each band wheel by gluing together two disks of  $\frac{5}{8}$ -in. plywood. True up the wheels in the lathe and crown each tread  $\frac{1}{16}$  in. The wheels are fitted with rubber treads which consist of bands cut from a truck-tire inner tube. Details of the ball-bearing wheel hubs are shown in Figs. 3, 13, 14 and 15. Construction of the idlers, wheels No. 2 and 3 in Fig. 2, is shown in Fig. 14, but it should be noted that the bearing construction of wheel No. 2 can be the same as that of wheel No. 1. This provides two driving wheels and each can be fitted with a V-pulley of a different size, thus permitting two speeds by merely shifting the belt. Fig. 3 shows how the tracking wheel is tilted by two eccentrics



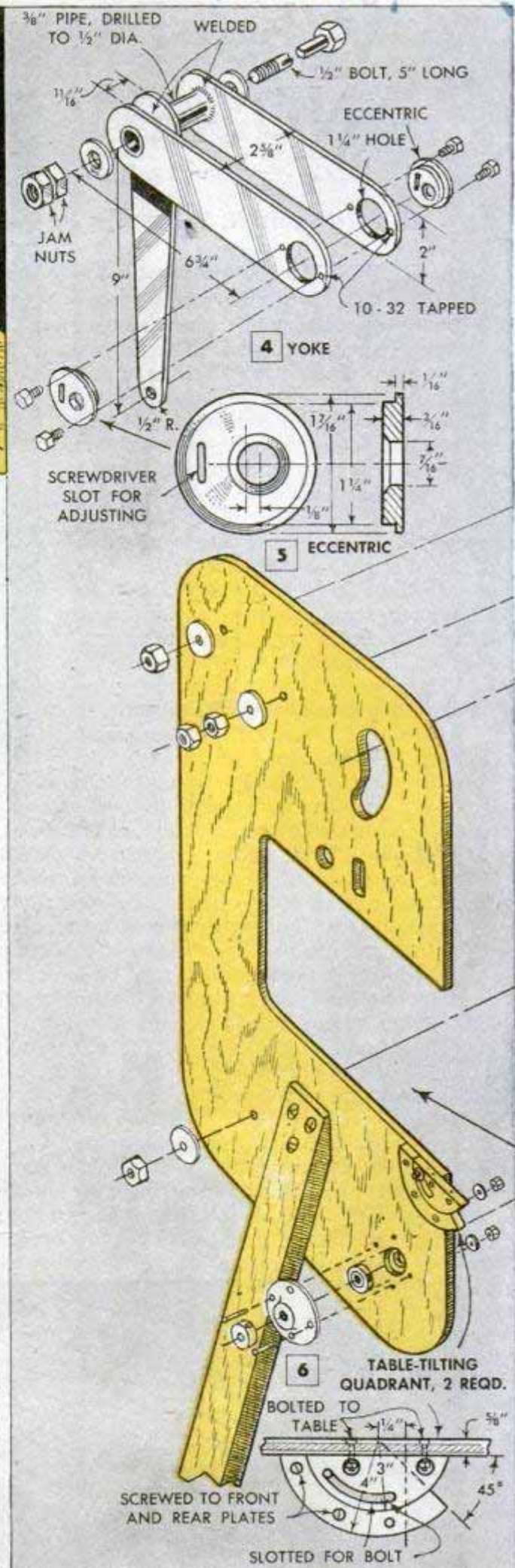
ALSO SEE SECTIONS  
FIGS. 3, 13, 14 AND 15





which support the shouldered shaft on which the wheel bearings are mounted. The sectional view, Fig. 15, shows the assembly of the bearing with the eccentrics mounted on the tensioning yoke. Construction of the eccentrics and yoke is shown in Figs. 4 and 5.

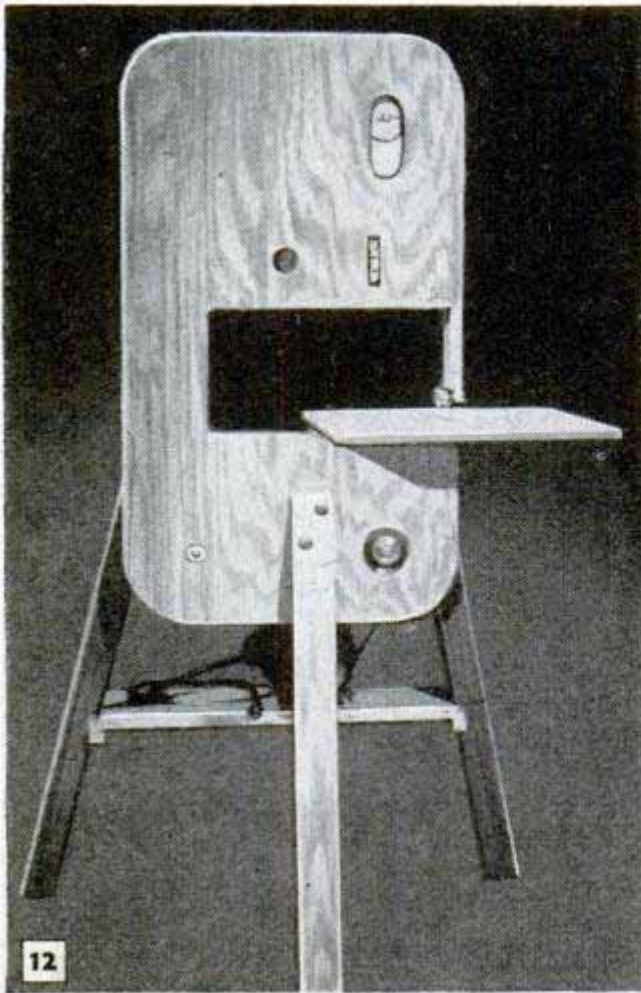
Locate the wheel centers on both the front and back plates and cut the curved access slots in both plates to expose the hub of the tracking wheel. Then mount the tracking wheel on the yoke and pivot the wheel unit in the frame. After attaching the clevis bolt and the thumb nut, Fig. 7, mount the front plate with screws only, so that it may be removed if necessary. Install the upper and lower idlers, checking to see that they line up. Note that holes for the driving-wheel bearings are counterbored in both the front and back plates, Fig. 13. This must be done with care so that when in place the wheel will line up with the other three wheels. Now, mount the machine on its three hardwood legs to stand at a convenient working height. The table, Fig. 8, is slotted in from one edge to a hole drilled at the center to allow easy removal of the blade. Swivel latches are fitted near the edge on the underside to level the adjoining sections of the table. Hardwood tilting quadrants, or trunnions, are bolted to the bottom of the table in the manner shown in Fig. 6. Lower halves of the trunnions are screwed to the front and rear plates. A locking bolt, passing through curved slots cut in the upper halves of the two trunnions, provides a means of locking the table in both the level and tilted positions. A leveling bolt is attached to the frame at some point under the table. Both blade guides, the upper one being detailed in Fig. 11, consist of three ball bearings mounted between the legs of a piece of channel iron. The lower guide is the shorter of the two and is bolted to the box frame, Fig. 8, while the upper guide is bolted to a length of hardwood, grooved as in Fig. 9 to allow for





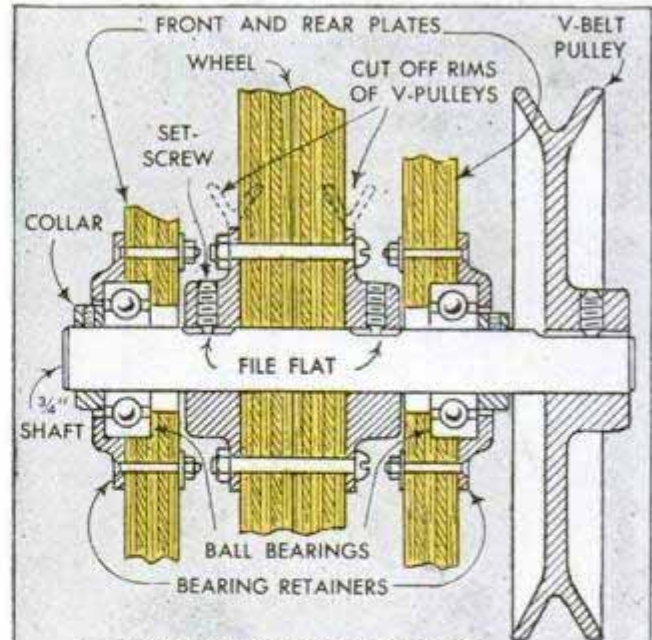




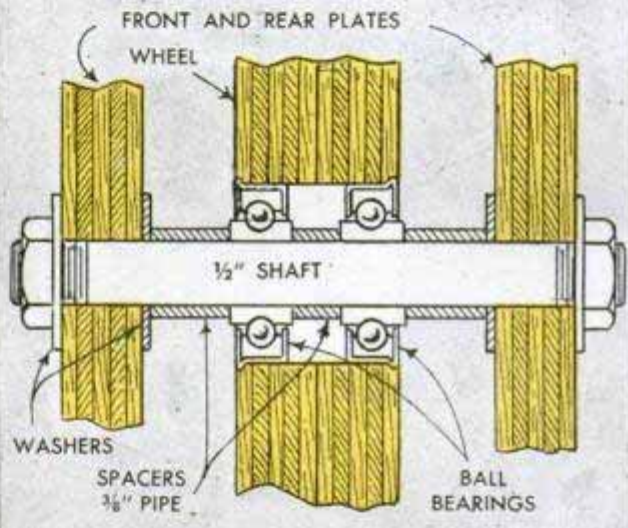


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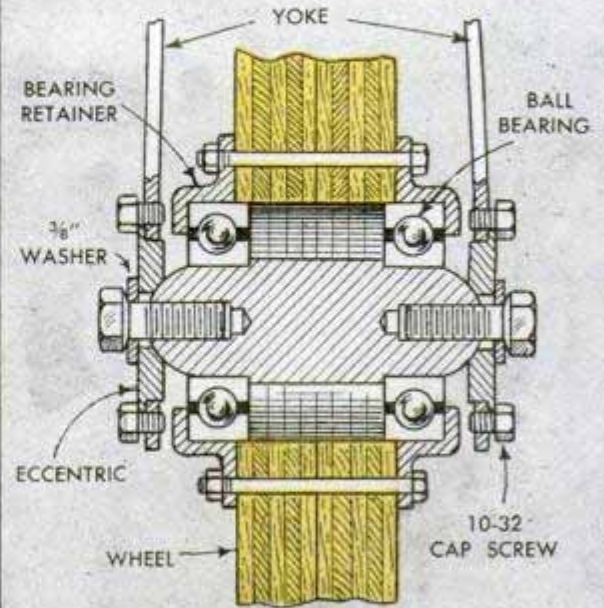
clear passage of the blade. Note how the hardwood support is slotted and attached to the frame so that the guide can be moved up and down to clear different thicknesses of stock. Projecting edges of the front and back plates serve as a guide for the hardwood supports. Blade length on the original machine is 10 ft. (120 in.), and blades up to 1/2 in. wide may be used, although narrower blades have a somewhat longer life. After installing the blade, check alignment on the wheels, adjusting the tracking wheel and guides so that the blade runs smoothly and centers on the wheels. Set the guides so that all three rollers turn when the blade is moved, but be sure that they are not too tight, as this will cause the blade to vibrate and possibly break. Then, make and fit the sheet-metal cover. The toggle handle, Fig. 10, provides a quick, easy way of locking the cover in place. Attach the motor support to the two back legs, as in Fig. 12. The position of the support depends on the length of V-belt used. Although a 1/3-hp. motor will supply ample power for light work, a 1/2-hp. motor is recommended as being more satisfactory for all-around work. The speed of the band wheels should not exceed 600 r.p.m. for the best results in average woodworking. For cutting light metals the speed of the band wheels should be reduced and a metal-cutting blade used.



13 SECTION A-A THROUGH HUB OF WHEEL No. 1 (DRIVING WHEEL)



14 SECTION B-B THROUGH HUBS OF WHEELS No. 2 AND No. 3 (IDLERS)



15 SECTION C-C THROUGH HUB OF WHEEL No. 4 (TRACKING WHEEL)



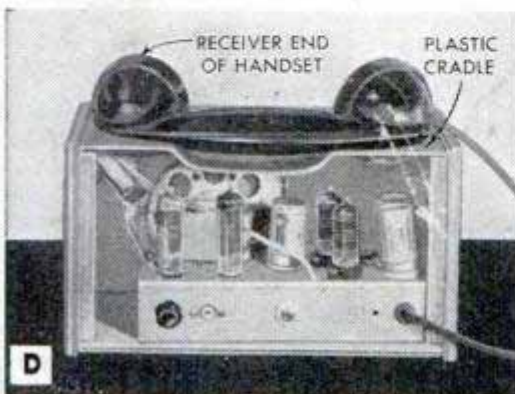
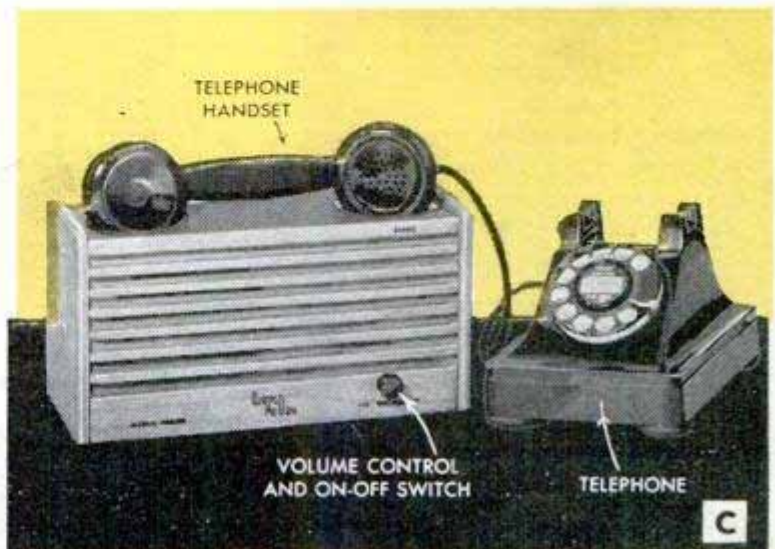
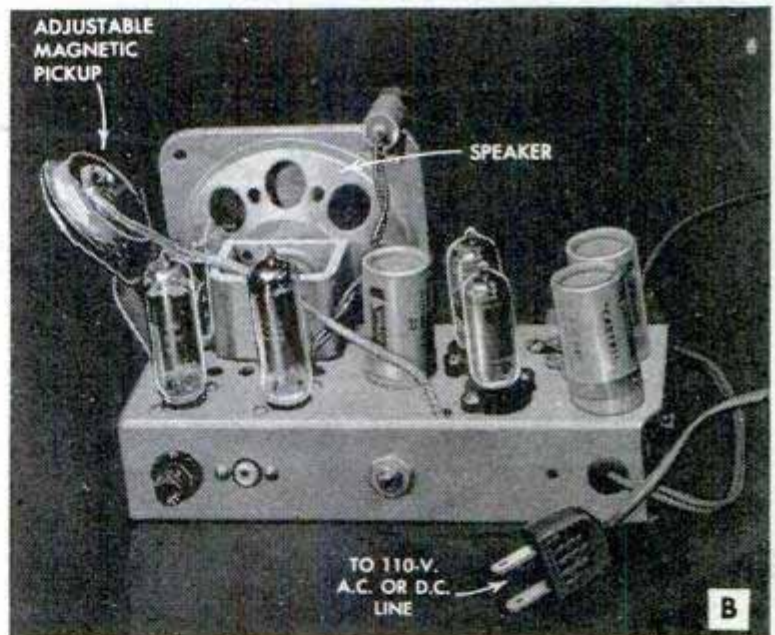


## Amplifier and Loudspeaker For Phone Conversations

**N**OW YOU can rest your telephone handset on what resembles a small table-model radio and have both hands free for taking notes or typing a stenographic record of the conversation, as shown in photo A. This compact desk-telephone amplifier also provides group-listening facilities. You merely place your handset in a molded plastic cradle on top of the instrument in the position indicated in photos D and C and the voice of the person on the other end of the line comes to you through a loudspeaker.

A rear view of the chassis base appears in photo B. The circuit consists of a well-filtered four-tube amplifier with an adjustable magnetic pickup coil mounted on a bracket directly under the receiver end of the telephone handset, as illustrated in photo D. Quick-heating tubes bring the amplifier in operation almost at once by means of the combination line switch and volume control.

The instrument is self-powered and operates from 110-120-volt a.c. or d.c. power lines. Housed in a cabinet approximately  $4\frac{1}{2} \times 5 \times 9\frac{1}{2}$  in., it is available in finishes to harmonize with office furniture and fixtures. The manufacturer suggests several other applications, for example, its use for invalids, because it will make it unnecessary to bring the phone to the patient's ear.

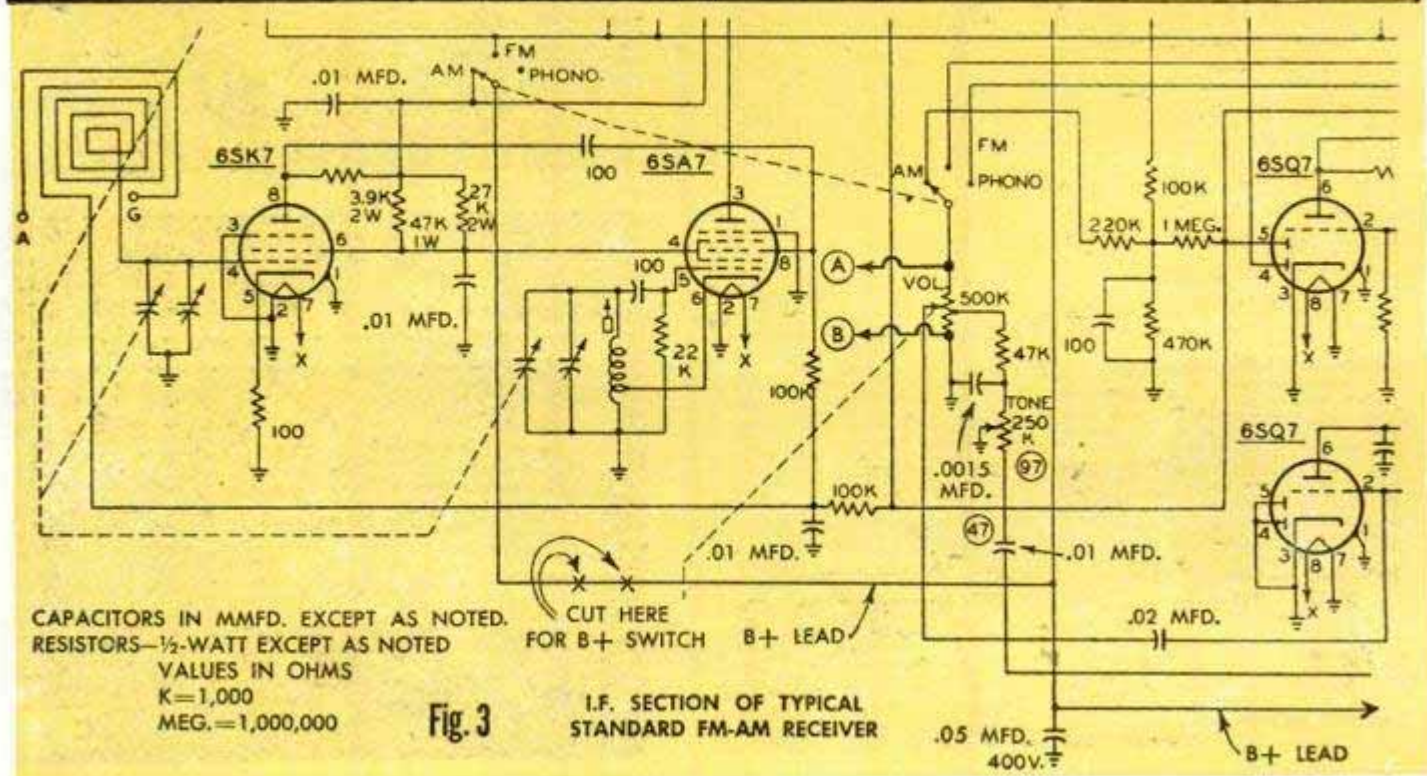
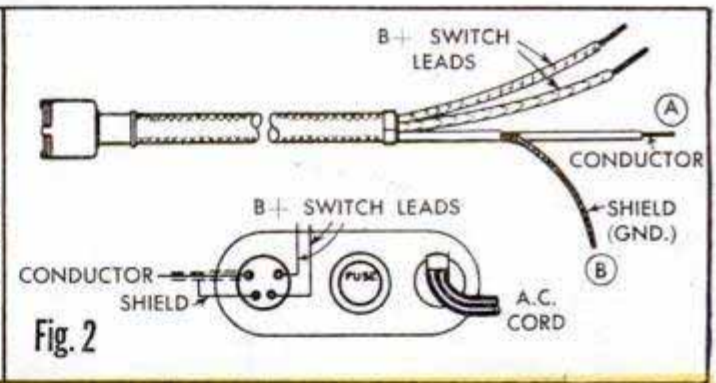
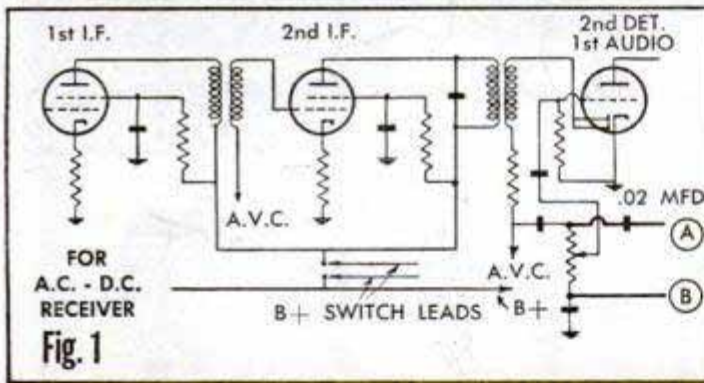
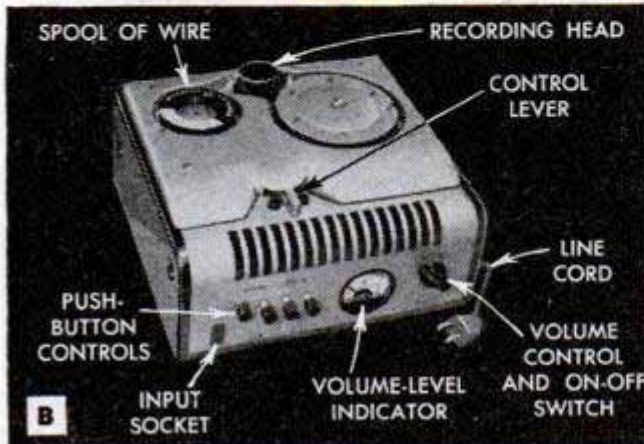




# HOW TO CONVERT YOUR RECEIVER



MAGNETIC recording on a wire has interested every radio experimenter and set owner ever since it came to general public notice during the war when correspondents carried portable wire recorders into battle areas. Such recorders have been quite expensive as they usually include a speaker and an audio amplifier. The average student, experimenter and set owner already has a good amplifier and speaker in his receiver, and many have a separate high-fidelity amplifier, so there has been an insistent demand for a wire-recorder foundation unit that could be employed with the equipment at hand. These foundation units have been available for some time but they were not complete and had to be fitted into a receiver circuit by a skilled engineer. A new "front end" model which is not a foundation device alone, but a complete wire-recorder unit which includes the necessary oscillator and bias circuits and lacks only the audio stages and speaker, is now available. This is the self-





# INTO A WIRE-RECORDER COMBINATION

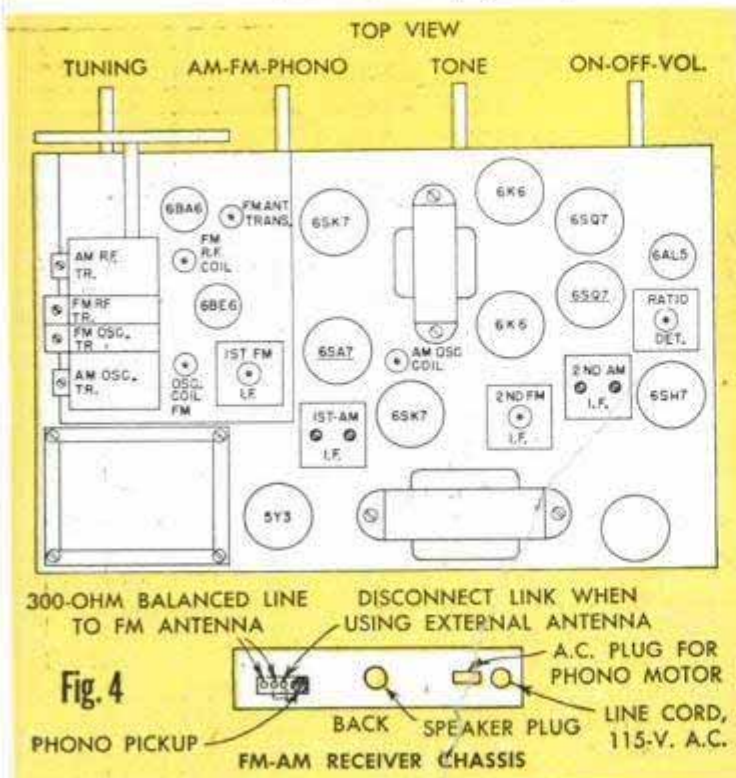
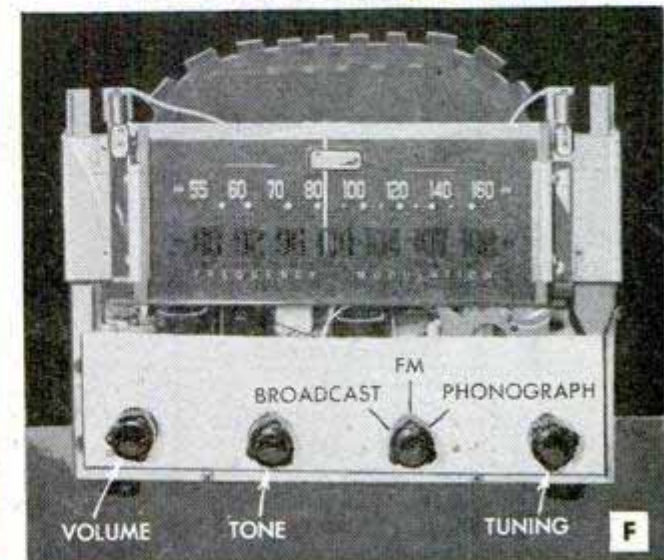
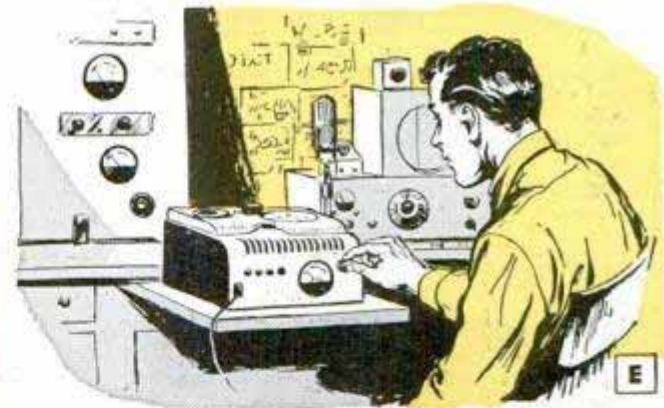
contained unit shown in photos B, C and D.

Any radio experimenter or serviceman can install this Webster-Chicago model-78 unit, the operation of which is far less critical than disk recording. Programs as long as one hour in length are possible, however, in most cases the recording will be shorter. If desired, recorded material may be "erased" with no damage whatever to the wire. Among the many useful applications in the home is the recording of the voices of relatives and friends at birthday parties, wedding celebrations and other important events. In addition to its entertainment value in the home, it also serves as an aid to students of singing or speech.

These units are also being used for recording favorite FM and AM programs as received by your radio. Installation in the ordinary console set is usually practicable, as illustrated in sketch A. Amateur radio operators are using these versatile wire-recorder units with their short-wave receivers to make recordings of phone and CW transmissions from their fellow operators at distant points, sketch E.

Although the wire-recorder unit can be used with practically any receiver, even a.c.-d.c. sets as indicated by the connections shown in Fig. 1, best results are obtained with a high-grade receiver of standard type, a portion of the circuit of which appears in Fig. 3. By means of simple push-button controls, recording can be made either with a microphone or off-the-air.

(Continued to page 234)





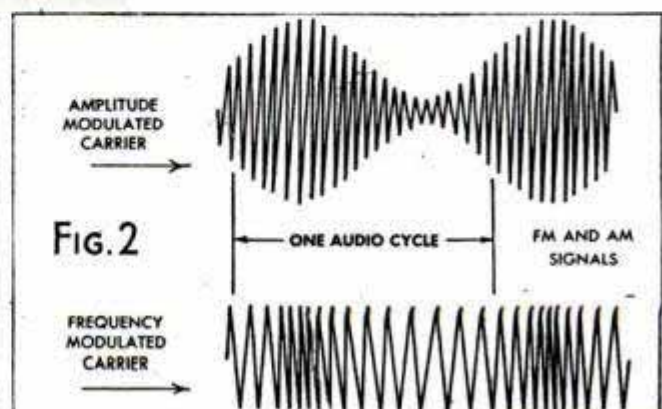
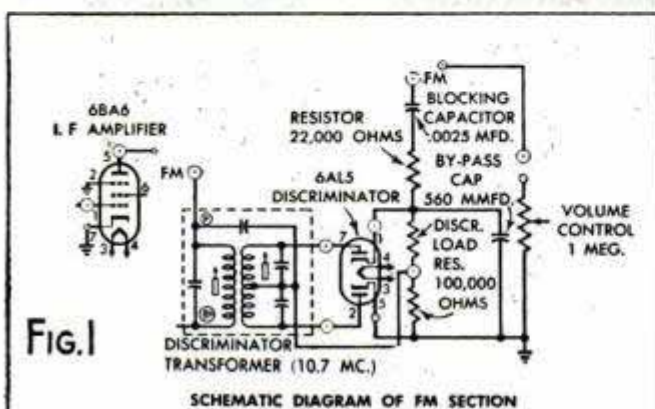
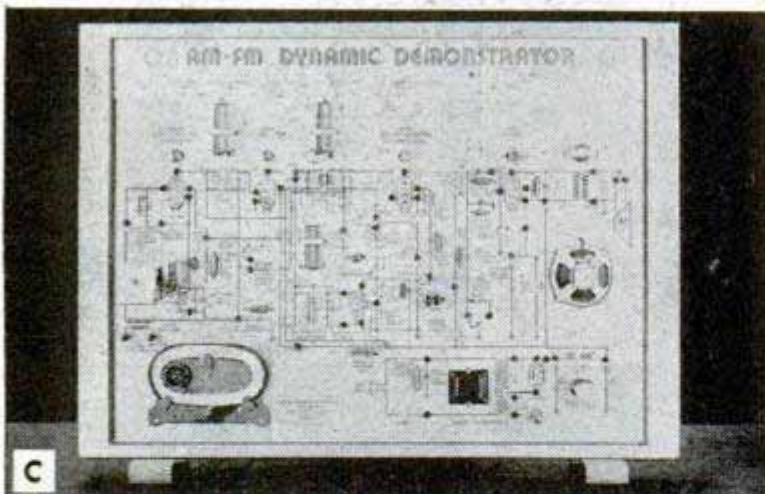
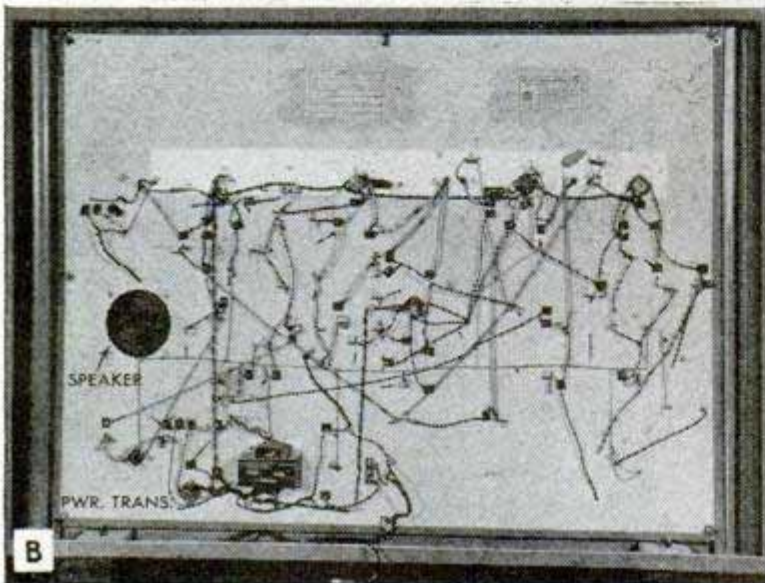
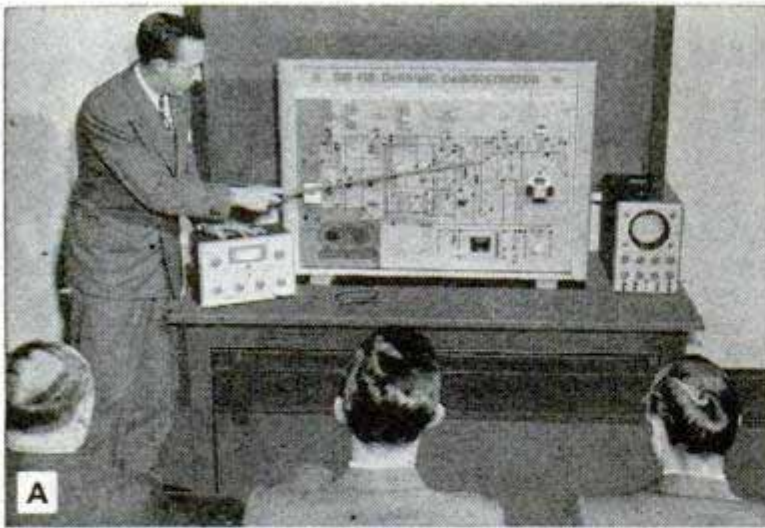
## Dynamic Demonstrator Aids Teaching AM-FM Radio

CONSIDERED a most practical and efficient tool for the teaching of radio theory, operation and maintenance for which earlier models were used during the war, this improved unit that now includes an FM section is also useful for demonstrating the application of test equipment to radio servicing. Developed by the test-and-measuring-equipment division of the RCA Tube Department, the instrument is a complete, operating, six-tube radio receiver with its circuits and components laid out flat on a panel 45 in. long and 33 in. high. All parts are easily accessible and clearly exposed for study while in operation.

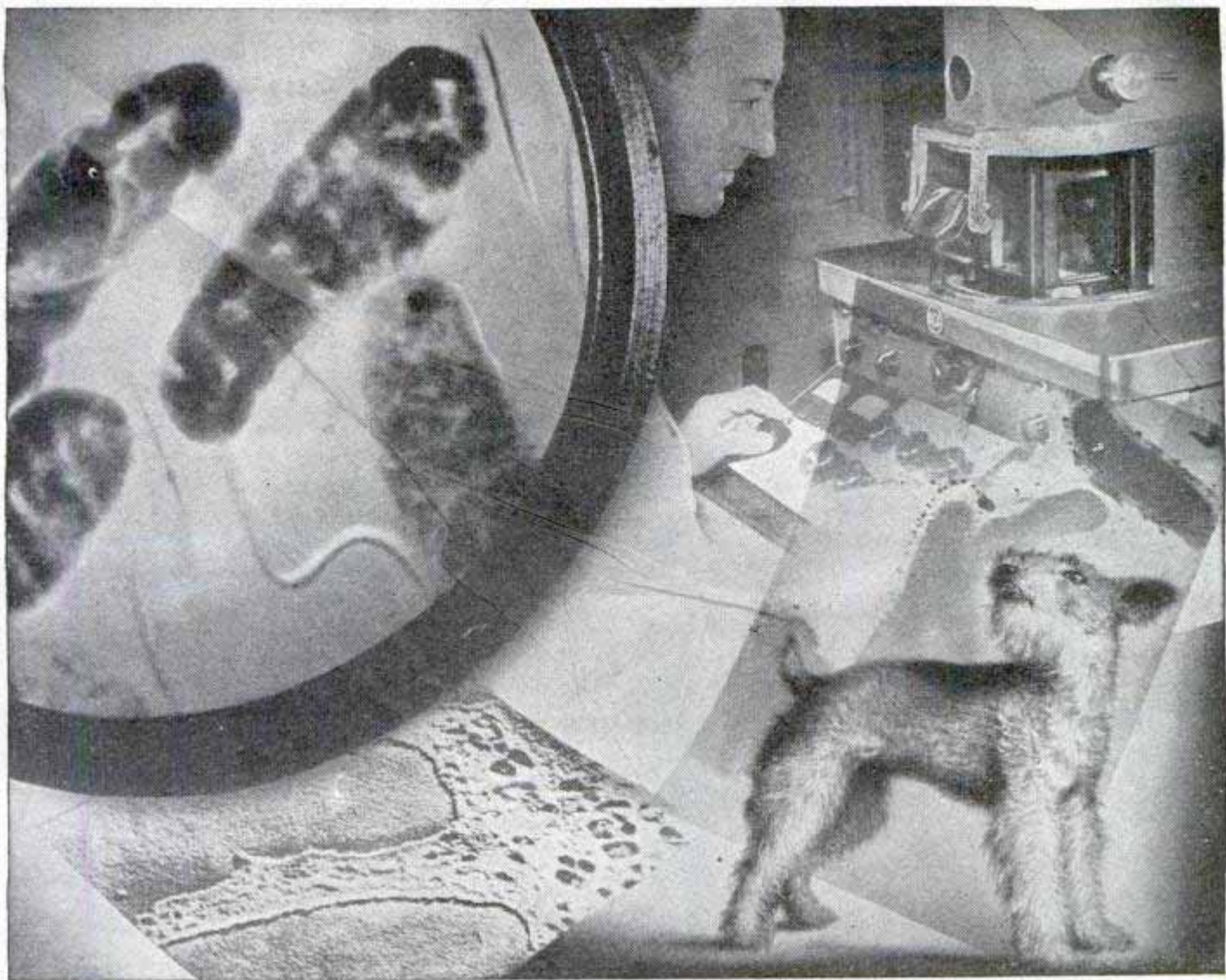
Photo A shows the dynamic demonstrator in use before a classroom group. It includes all possible aids to a clear understanding of the function of the elements in a radio receiver. The background of the panel is divided into six large color blocks, defining the six basic functional sections of a six-tube AM-FM radio. Each radio part is accompanied by its schematic symbol to familiarize the students with the reading of circuit diagrams and technical data. Jumpers to close or break the operating circuit are inserted at selected points on the panel to permit easy demonstration of the functions of circuits and parts.

To demonstrate the effect of faulty circuits, switches have been located on the back of the panel which is shown in photo B. These switches enable the instructor to simulate certain failures. The students then trace the signal on its

(Continued to page 234)







*Electron microscope, perfected at RCA Laboratories, reveals hitherto hidden facts about the structure of bacteria.*

## ***Bacteria bigger than a Terrier***

Once scientists, exploring the invisible, worked relatively "blind." Few microscopes magnified more than 1500 diameters. Many bacteria, and most viruses, remained invisible.

Then RCA scientists opened new windows into a hidden world—with the first commercially practical electron microscope. In the laboratory it has reached magnifications of 200,000 diameters and over. 100,000 is commonplace...

To understand such figures,

picture this: A man magnified 200,000 times could lie with his head in Washington, D. C., and his feet in New York... A hair similarly magnified would appear as large as the Washington monument.

Scientists see both bacteria, and viruses—and have even photographed a molecule! Specialists in other fields—such as industry, mining, agriculture, forestry—have learned unsuspected truths about natural resources.

Development of the electron microscope as a practical tool of science and industry is another example of RCA research at work. This leadership is part of all instruments bearing the names RCA, and RCA Victor.

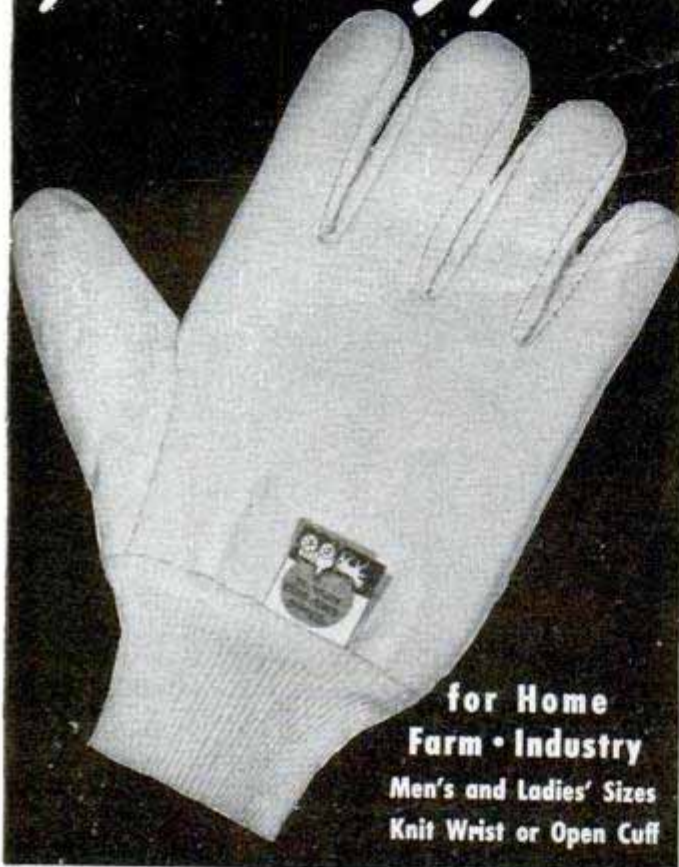
*When in Radio City, New York, you are cordially invited to see the radio, television and electronic wonders at RCA Exhibition Hall, 36 West 49th Street. Free admission. Radio Corporation of America, RCA Building, Radio City, New York 20.*



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342 Madison Avenue  
New York 17, N. Y.



**"THIS TRADE MARK IS YOUR GUARANTEE OF VALUE"**

## **AM-FM Dynamic Demonstrator Simplifies Radio Teaching**

*(Continued from page 232)*

path through the circuits from the time it enters the receiver at the loop or antenna post until it energizes the speaker shown on the right of the panel in photo C. The demonstrator is further designed to operate from an input signal of 550 to 1600 kc. from a signal generator. The FM i.f. section, Fig. 1, will operate on a 10.7 mc. signal from an FM sweep generator. This FM portion of the dynamic demonstrator is designed to enable the user to understand the chief difference between a conventional AM receiver and the FM receiver.

An amplitude-modulated (AM) signal is one in which the amplitude of the carrier is varied in accordance with the information being transmitted; the carrier frequency remains constant. A frequency-modulated (FM) wave is one in which the carrier frequency is varied in accordance with the information being transmitted. The amplitude of the signal in this case is kept constant. Fig. 2 illustrates the FM and AM signals. The circuits preceding the second detector in the FM receiver are essentially the same as those found in the more familiar AM unit, the main difference being the band-pass characteristic required.

Contained in a gray metal frame with removable feet, the demonstrator stands upright on any table or it can be hung on a wall. It weighs 25 pounds and is portable.

## **How to Convert Your Receiver Into a Wire-Recorder Combination**

*(Continued from page 231)*

Experimenters who wish to assemble their own combination either in an old console cabinet or modern built-in wall cabinet will find excellent FM-AM-broadcast-receiver units available in complete chassis form with matching PM speaker. A typical receiver of this description is the Lafayette-Concord chassis shown in photos F and G. The chassis layout appears in Fig. 4; the phono-input provision and extra a.c. outlet into which the wire-recorder line cord may be plugged make it ideal for the new combination installation. With the wire-recorder unit listed at \$99.50 and the chassis and speaker at about \$77.00, the handy experimenter can assemble his own high-grade combination with very little effort. In making the wire-recorder-cable connections in the receiver, it will be noted that the B-supply lead is cut at X and X in Fig. 3 for the B-positive

*(Continued to page 236)*



Dependable

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America's Favorite Spark Plug



The Christmas tree harvest is on, bringing with it all that is implied by "Christmas spirit." Our Christmas spirit extends to the vast public we serve, for it is they who have made Champion America's Favorite Spark Plug. This preferred position is, we feel, due above all to Champion's inherent and traditional dependability, outstanding quality and value—marks which we pledge will always distinguish every spark plug to bear the name CHAMPION. Champion Spark Plug Company, Toledo 1, Ohio.

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## Homecrafters' Choice

This is it—the famous Tool of 1001 Uses — first tool of this type and today's finest. It's the tool for you whether you're an eager beginner or an expert.

GRINDS  
DRILLS  
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There's Only One  
GENUINE HANDEE

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64-Page  
Manual



### FOR PLEASURE OR PROFIT

You'll enjoy making ship, train and plane models, puppets, costume jewelry, wood carvings, bookends. You'll engrave monograms on glassware, tool leather billfolds, handbags, etc. And it's a dandy for all kinds of repairs. Used by industry for exacting production jobs — preferred by craftsmen and mechanics.

**EASY TO USE** as a pencil. Fits your hand comfortably. Lightweight, only 12 oz.

**WORKS ON ANY MATERIAL.** Metal, alloy, glass, plastics, wood, horn, bone, leather, etc.

**PACKED WITH POWER AND SPEED.** Runs at a cool 25,000 r.p.m. AC or DC current.

**DESIGNED RIGHT** in every detail—result of 50 years' experience. Close-fitting motor, non-breakable housing, 7-segment commutator, interchangeable spring collet clutch. Every part triple-tested to make Handee the perfect tool. With 7 accessories \$20.50. In carrying case with 40 accessories \$27.50.

**PLASTIC-CRAFT KIT.** All materials needed for internal carving (Handee not included) \$6.95.

**500 ACCESSORIES.** Start with a few, add more as needed.

With its Attachments and Accessories, Handee Performs More Operations with Greater Accuracy than any other Tool of this Type.

**GET AT STORES OR SENT POSTPAID**

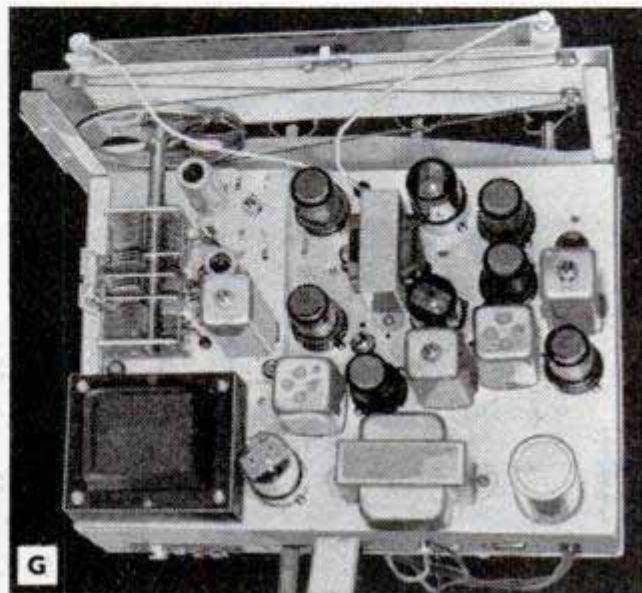
CHICAGO WHEEL & MFG. CO.  
1101 W. Monroe St., Dept. PM, Chicago 7, Ill.

Send  Handee Kit  Handee Tool  Plastic-Craft Kit  
 C.O.D.  Remittance enclosed  Send Manual

Name \_\_\_\_\_

Address \_\_\_\_\_

switch leads indicated in Fig. 2. Conductor A in Fig. 2 and its shielded lead, B, are connected across the volume control at A and B, as shown. This places the signal from the wire recorder in the audio section for reproducing through the set speaker. The same position is used also to take phonograph pickup or radio signal from the receiver for the purpose of recording it on the wire. The reason for doing this is that when the proper push button is pressed for



reproducing the wire recording it automatically cuts off radio reception so that the wire recording is heard without radio or other background. When any of the other buttons on the recorder unit is pressed, this circuit is restored so that radio reception is possible. As a suggestion for accurate editing on the wire recorder, a small piece of paper may be ruled as shown in photo H and glued to the plastic recording-head cap. By counting the strokes as the recording head moves up and down, the exact place on the wire to be erased and changed can be observed so that the control lever may be thrown to stop the recorder in position for editing.





# How to focus your Camera for Photoflash Pictures

Here's another of the dozens of photography jobs your flashlight, packed with "Eveready" batteries, does for you.

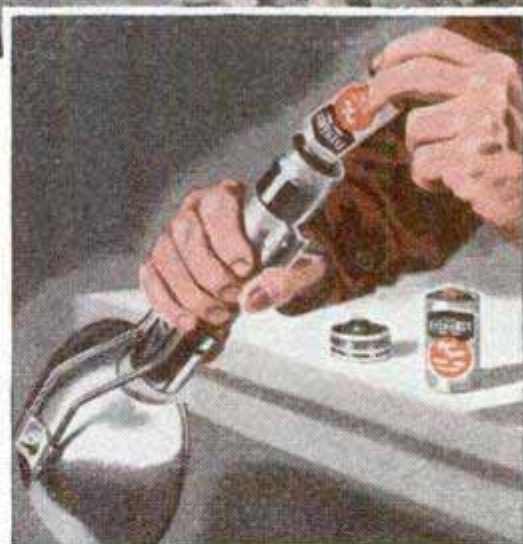
When you're taking photoflash pictures, it isn't easy to focus—or get good composition—in dim light. Prop your "Eveready" flashlight pointing at the subject to be photographed. Or, if somebody's around to help, have him hold it. Of course, once your picture is set, the flashlight should be turned off.



## How to get longer life and brighter light in your flashlight



- Reload with "Eveready" batteries—they last longer, give brighter light—and they're the largest-selling flashlight batteries in the world!



IN THE PHOTOFLASH itself, be sure to use "Eveready" No. 950 flashlight batteries.

## "EVEREADY" FLASHLIGHT BATTERIES

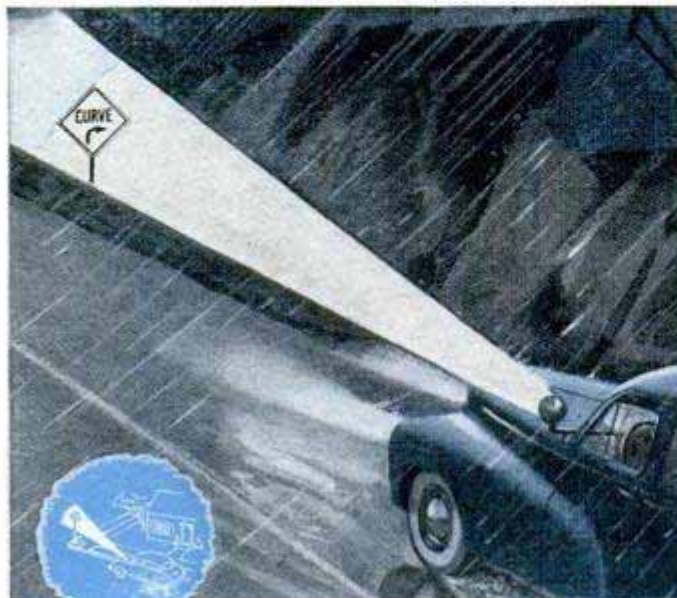
The trade-mark "Eveready" distinguishes products of **NATIONAL CARBON COMPANY, INC.**

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Unit of Union Carbide  and Carbon Corporation



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## WORLD'S FINEST DRIVING LIGHT

Sharp curve ahead! But you've got a Lorraine and you're ready for it. The sealed beam spotlight unit in your powerful Lorraine casts a concentrated, glareless ray over a range of half a mile.

Lorraine wireless construction prevents shorts. Machined bronze bevel gears assure lasting wear. Why is it called the World's Finest Driving Light? Ask your nearest Lorraine Dealer today.

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Manufacturers of Lorraine and  
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Easily Installed;  
Complete  
Instructions  
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**DRESS UP  
HIS CAR FOR  
CHRISTMAS**

**FITS ANY CAR OR TRUCK**

## Clearing the Range for Beef

(Continued from page 172)

selective and will destroy native grasses in the area, but it is effective on all brush.

Best results with chemicals have been obtained by compounds of 2,4-D. Mixtures of 2,4-D and Diesel oil get good kills on larger trees. The heavy stalk cutter and brush beater knock down the deadened brush the second and third years after applying the chemicals.

Disposal of the felled brush goes one of three routes on the Red Plains. It is worked into a mulch and subsequently returns minerals to the soil as occurs when the stalk cutter is used, or it is piled into gullies for erosion control. Some brush is burned.

A power-lift buck rake capable of lifting and transporting half a ton of brush and operating over rough terrain and in close quarters was designed and built at the Guthrie station to reduce the man hours required for assembling and piling the brush. An acre of brush can be cleared in 2½ hours by using a tractor-saw and buck-rake combination.

Adaptable for use on any tractor with an adjustable power lift, the rake head is five feet two inches wide, with teeth four feet six inches long. The teeth are spaced 12 inches, center-to-center, and are made of two-inch pipe instead of wood so they will bend or give without breaking if they strike a stump or stone.

Costs of clearing vary. Saws for portable operation cost about \$400 each, while those for tractor mounting range from \$700 upwards. Complete brush bars for tractor-drawn mowers recently were quoted at \$30 by major farm-machinery manufacturers. The brush beater can be built for approximately \$300, exclusive of labor, and the brush cutter is quoted at \$890 for two 7-foot cutter sections. Costs of poisoning with chemicals vary from \$15 to \$25 per acre.

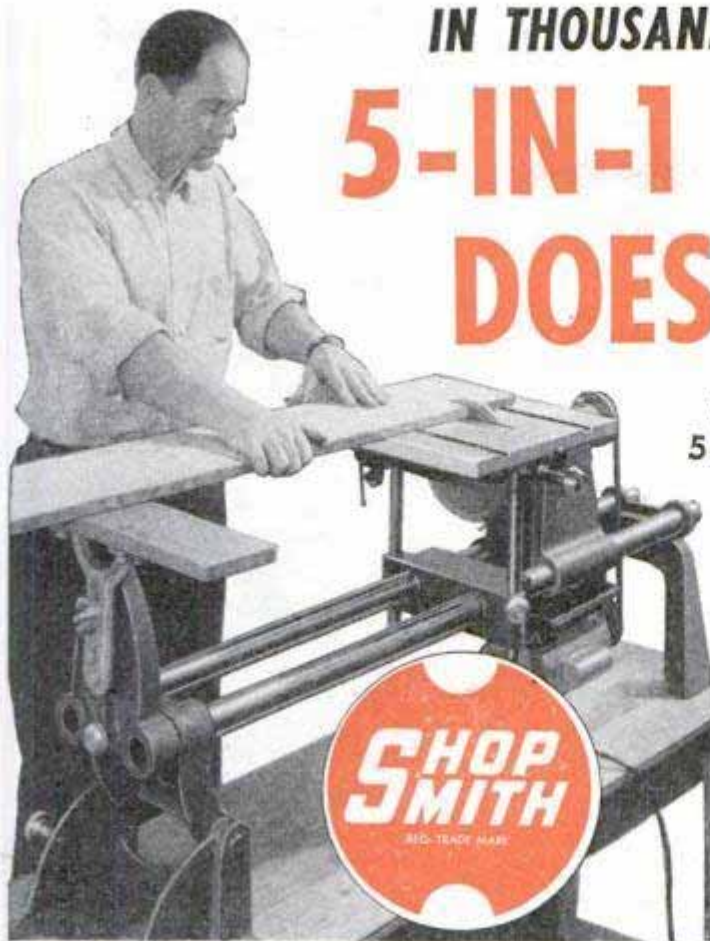
Interest in the brush-removal program is evidenced by the increase in numbers of brush-removing contractors and the attendance at field days where farmers and livestockmen view results of the work and see the equipment operate under actual conditions. This year, more than 3100 farmers and ranchers attended the event at Guthrie.

Last year, a bit of drama was added to the station's brush-removal program when Herman Morton, a flying farmer from Grandfield, Okla., landed his light plane on a 40-acre pasture at Guthrie. His smooth landing was made on a tract which was producing over 60 pounds of beef per acre. Ten years earlier, the area was covered with brush and other undesirable growths.



IN THOUSANDS OF HOME WORKSHOPS...

# 5-IN-1 SHOPSMITH DOES BIG JOBS



COMPLETE 5-IN-1 TOOL **\$159<sup>50</sup>** With special 1/2 H. P. ball bearing motor \$195.50

Do your present power tools balk at big stock? Do they hold you back from the jobs you really want to do?

Then take a look at *SHOPSMITH* — the new, big capacity circular saw, wood lathe, disc sander, vertical and horizontal drill press all in one. Each has big capacity . . . built to husky specifications. And see what big jobs *SHOPSMITH* does in limited home workshop space.

With all its big capacity and rugged construction *SHOPSMITH* stands just 59" long by 18" wide.

Check *SHOPSMITH* against your wood-working needs. See it demonstrated. For name of nearest *SHOPSMITH* dealer, and free folder, write Department M, Magna Engineering Corporation, 465 California Street, San Francisco 4, California.

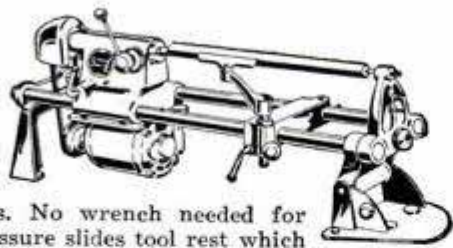
**1. SHOP SMITH AS CIRCULAR SAW** Has 8" saw blade; depth of cut 2 1/4"; 14 1/2" x 17" table, with extension 54" x 17"; up to 46" between blade and fence . . . so you can cut to center of 92" board. Table tilts to any angle — positive lock. Takes work on either side of blade. New principle provides micro-adjustment of distance between fence and saw blade.

*Includes:* 8" combination saw blade and arbor. Table extension. Mitre gauge. Rip fence. Saw guard. And in less than one minute you can change from saw to lathe, disc sander or drill press!

**2. SHOP SMITH AS WOOD LATHE**

Has 34" between centers. Fifteen-inch swing. Also turns light metals, plastics. No wrench needed for setup. Finger-tip pressure slides tool rest which locks in position. Variable speeds. Quill feed 4 1/4".

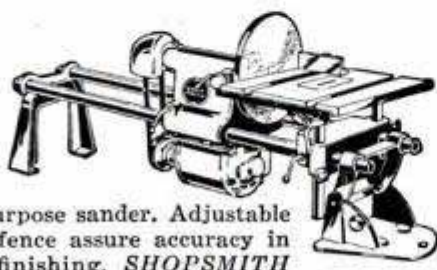
*Includes:* Tool rest, Drive center, Cup center. *SHOPSMITH* is precision-machined, factory-tested for accurate work.



**3. SHOP SMITH AS DISC SANDER**

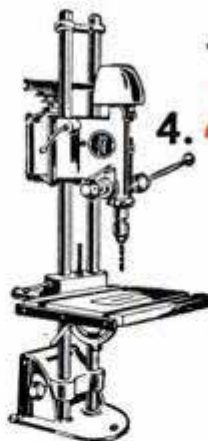
Has 12" disc; 14 1/2" x 17" tilting table . . . supplies more work support than single-purpose sander. Adjustable mitre gauge and rip fence assure accuracy in squaring, mitering, finishing. *SHOPSMITH* discs can be removed and replaced in seconds . . . so you can sand a job with various grits.

*Includes:* 12" disc; balanced dynamically and statically. Mitre gauge. *SHOPSMITH* is sturdily constructed . . . will take all the wear and tear you would ever give it.



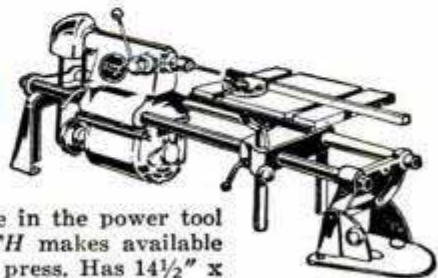
**4. SHOP SMITH AS VERTICAL DRILL PRESS**

Drills to center of 15" circle. Has 27" table-to-chuck clearance. Drills big stock. Has 4 grease-sealed Fafnir ball bearings. Quill can be fed from left or right side. Spindle: 5/8" Dia., 6 spline, hardened tip. Spindle feed: 4 1/4". Variable speeds. *Includes:* 1/2" Jacobs key chuck. Fence.



**5. SHOP SMITH AS HORIZONTAL DRILL PRESS**

For the first time in the power tool field, *SHOPSMITH* makes available a horizontal drill press. Has 14 1/2" x 17" table; extends to 34 1/2" x 17". Provides accurate method of drilling for doweling. And the only limit to length of work is size of your shop. *Includes:* 1/2" Jacobs key chuck. Mitre gauge. Table extension. *SHOPSMITH* is also convertible to grinder, buffer, router, drum sander, shaper, scratch brusher.





# Clinic



## for Homemakers

As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

### Garage Doors of Knotty Pine

**Q**—I would like my garage doors to be built of knotty pine in board-and-creak construction and finished in the natural color like interior woodwork. However, my carpenter does not recommend this; he says doors of this type and finish will soon warp and be difficult to open and close. Is he right? Or is there some finish that will prevent this?  
M.E., St. Paul, Minn.

**A**—We are inclined to agree with your carpenter, although it is true that natural-finished garage doors of knotty pine are now quite widely used.

If sound, well-seasoned stock is obtained and if the doors can be built and the finish applied immediately to protect the wood from undue moisture absorption, then it is probable that doors of this construction would be satisfactory. A door built up from a number of narrow strips of 1 3/8-in. stock, doweled and edge-glued with waterproof glue, would, we think, prove more durable than one of board-and-creak construction. The wood should be stained lightly to bring out the grain and knots and should be finished all over—top, bottom, edges and both sides—with at least two coats of spar varnish.

### Painting Wooden Cabinet Doors

**Q**—My linen closet has flush doors of fir plywood. I recently enameled the doors with two coats of good-quality enamel. I sanded the doors before applying the enamel, and also between coats, but the grain still shows on each door. What can I do to hide the grain?  
B.W., Brooklyn, N.Y.



**A**—Certain kinds of wood used in facing plywood have a mixed hard and soft grain. The hard grain is built up during the latter part of the growing season, while the soft portions are formed during the early-season period of rapid growth. The soft grain absorbs the paint, but the paint film builds up a thickness on the hard grain. The best method of getting a smooth enamel finish on such surfaces is to coat the bare wood with a sealer. Sand the sealer, when dry, with medium-grit sandpaper, then follow with two applications of enamel undercoater and only one finishing coat of enamel. Smooth the second coat of undercoater and also the enamel coat lightly with fine sandpaper. Then rub the enamel coat with rottenstone mixed to a thin paste with either rubbing oil or water.

(Continued to page 242)



THE GIFT I REALLY WANT!

The World's Greatest Hand Tool!

- Most POWERFUL
- Most USEFUL
- Most COMPLETE



Every man will be thrilled to receive a gift of the New Model VISE-GRIP! For never before has so much USEFULNESS been packed into a single hand tool. Wonderful for a thousand jobs about the home, shop, factory, farm, and for the sportsman. Does those "impossible" jobs. Adjusts to plier action or LOCKS to the work with Ton-Grip! The New VISE-GRIP has **added**, important features: **INVOLUTE JAW CURVE** gives even greater gripping power, all shapes. **KNURLED JAW TIPS** hold to the very tip. Powerful **WIRE CUTTER** cuts wire and small bolts. **THIN NOSE** gets into close quarters. Opens easier from locked position. Made of finest alloy steel. Nickel plated. Guaranteed. Get yours now.

If your dealer doesn't have it, order direct.  
Postage paid if price accompanies order.

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The Perfect Gift for HIM!

NEW VISE-GRIP WRENCH

WITH Cutter: 7", \$2.25; 10", \$2.50  
WITHOUT Cutter: 7", \$1.85; 10", \$2.25



# NEW GILBERT CHEMISTRY LABS

put hundreds  
of thrilling  
experiments  
at your  
finger tips



**No. 6 Senior Laboratory**—Big, three compartment blue metal cabinet crammed with chemicals and apparatus. Large manual describes 389 experiments. \$7.95. Price Denver and West slightly higher.

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The New Gilbert Labs have all these advanced features.

- NEW**—All metal cabinet—rugged, easy to carry.
- NEW**—Each section designed as complete laboratory with trays and racks.
- NEW**—Tip racks for test tubes, for easier handling.
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- NEW**—Rectangular shaped bottles and shelf spaces, holding bottles with label side out.
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BOOK WILL  
HOLD YOU  
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The new Gilbert Chemistry Labs are far more than "toy" labs. Range of chemicals and apparatus are based on real laboratory technique. Make strange chemicals change color. Transform a liquid into a gas—then into a solid—finally to a liquid again. Write messages in invisible ink or fire ink. Make a chemical weather flag. Do fingerprinting. Turn a salt cellar into a miniature gas volcano. Hundreds of spectacular experiments in organic, inorganic and electro chemistry.

**\$200.00 IN ANNUAL AWARDS** To the boy doing what, in my opinion, is the most important research in Chemistry, Microscopy or Electricity in 1949, I will award \$100.00 in cash. To the ten boys doing the next most important research, I will award \$10.00 each. Applicants must not be over 17 years old and must send me a full description of their experiments by May 1, 1949.

*A.C. Gilbert*

Founder of the Gilbert Hall of Science

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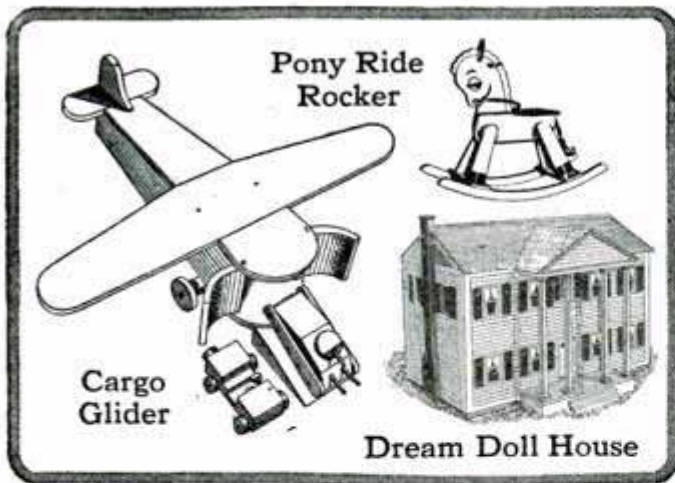
This 32-page book—illustrated in full color—tells you all about it. Mail coupon today.

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Rush free book "With Superman at the Gilbert Hall of Science."

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**For boats, outdoor furniture, sports equipment**—joints that must withstand outdoor exposure—**CASCOPHEN** (Resorcin Resin Glue). The first completely durable glue available to homecraftsmen!



**For furniture, toys, heavy-duty home repairs**—strong, stain-free, moldproof, highly water-resistant **CASCAMITE** (Urea Resin Glue). Mixes quickly with cold water!



**For models, photo prints, labeling**—general home, school, or office gluing, use the new, clean, white, fast-setting **CASCOREZ** (Polyvinyl Resin Glue). Liquid ready to use!

Send Coupon for Toy Patterns to

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Enclosed is \_\_\_\_\_¢ for patterns checked below.

- ( ) Dream Doll House, Pattern #33-50¢  
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**THE BORDEN CO. • CHEMICAL DIVISION**  
Makers of Casco Glues

### Removing Paint Mildew From Window Sash

**Q**—Windows in my kitchen steam over, or "sweat," in the winter and the water running down the glass has stained the enamel on the sash rails a dirty-brown color. In some places, the enamel has peeled, exposing the bare wood. How can I remove this stain preparatory to repainting?  
P.R., Waterloo, Iowa.

**A**—The condition you describe is the result of a fungus growth which stops when the wood and paint dry out. To remove the stain, use an ordinary paint cleaner or a few drops of household ammonia on a cloth. In repainting you can use a mildew-proof paint, but the better way is to remove the cause of the condensation by reducing the humidity in the room and installing tight-fitting storm sash. In installing the storm sash, line the edges of the stiles and rails with felt strips and use metal turn buttons rather than hangers to fasten the sash in place.

### Stopping Floor Squeaks

**Q**—I have oak floors in my living and dining rooms. The floors in both rooms squeak when walked on, not just in certain areas, but all over the floor. In many places the top floor seems to be springy but the floor boards are in good condition and all joints are tight. How can I remedy this trouble?  
H.B., Rochester, N.Y.



**A**—You do not say whether the house is old or new, nor do you give the thickness of the flooring. If the floor has been laid a number of years, it is probable that the nails holding the bridging between the joists have loosened, permitting the floor to spring irregularly as you walk through the room. This has the effect of loosening the nails holding the top floor to the subfloor. Slight movements between the two floors produce most of the squeaks. Raise the floor slightly with screw jacks and wooden extensions placed under the joists. Tighten the bridging, driving in additional nails if necessary. Then drill a line of small holes midway between each pair of floor joists, spacing the holes about 6 in. apart and taking care not to drill through the top floor. Select flat-headed screws of a size to fit these holes and of a length that will enter the floor board but will not go through. Drive screws in all holes and draw them uniformly tight. If the finish is worn, the floors then should be sanded, filled and varnished.

### Repairing Damaged Brick Wall

**Q**—My house is about 15 years old and of brick-veneer construction. There are two cracks in the wall on one corner running diagonally upward to the cornice. In the basement there is a crack in each wall and also plaster cracks in the room directly above. How do I repair the damage? J.M., Springfield, Ill.



**A**—Your description makes this sound like a major repair. One very probable cause is an artificial fill under the foundation footing at the corner. This could be cinders, loose stone, broken concrete and possibly even wood that has rotted. Another possibility is that water from an underground spring has filtered into the area under the corner of the foundation. If we interpret your description correctly, it will be necessary to excavate under the old footing and put in a new fill, a new, wider footing and a new section of foundation wall. It probably will be necessary to rebuild the brickwork. The wall should be rigidly supported while the work is being done.

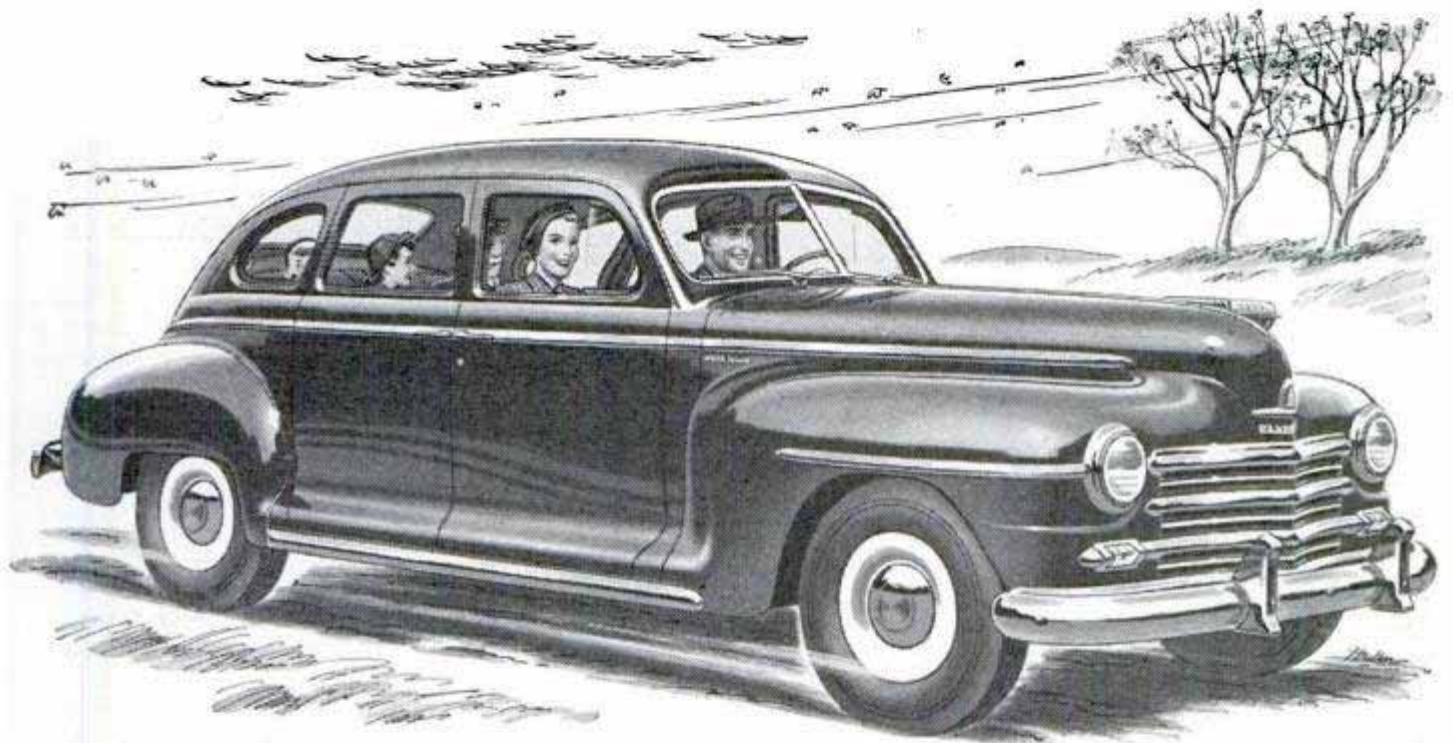


# Who makes the Plymouth so safe?



## YOU DO :

When you drive carefully—observe all traffic laws—keep your car in good running condition—you make the most important contribution to your Plymouth's safety.



## WE DO :



**Plymouth Builds Great Cars . . .  
Good Service Keeps Them Great.**

Your nearby Plymouth dealer will provide the service and factory-engineered parts to keep your present car in good condition while you're waiting for your new Plymouth.

PLYMOUTH Division of  
CHRYSLER CORPORATION,  
Detroit 31, Michigan.

Built into your Plymouth is a combination of safety features you find in no other car in the lowest-priced field.

Plymouth gives you *Super-Cushion Tires* as standard equipment at no extra cost. These bigger, softer tires run cooler, are less likely to blow out. If the unexpected should happen—even at high speeds—Plymouth's *Safety-Rim Wheels* enable you to slow to a sure, safe stop.

Plymouth also gives you quicker, smoother stops with *Safe-Guard Hydraulic Brakes*. Plymouth's *Safety-Steel Body*—welded into a rugged, single unit—offers added protection.

Even in minor details, Plymouth engineers keep your safety first. The improved *Safety-Signal Speedometer* helps you maintain safe speeds for night driving. The running boards are floor-level so you can't trip. There are safety catches on the rear doors which can be set to guard against accidental opening. The luggage compartment lid lifts and lowers with finger-touch ease and is so counter-balanced it *can't* fall.

These features—and many more like them—are the reasons why in safety, too, *there's a lot of difference in low-priced cars—and it's Plymouth that makes the difference!*



More people choose

**PLUMB**

than all  
others  
combined

Every group of tool users, homecraftsmen, farmers, artisans, prefer Plumb over all others. Independent surveys have brought out this fact many times.

Plumb tools are made better. Special analysis steel is used in the one-piece head. The handles are made of tested, shock-absorbing hickory. The real reason for Plumb's popularity, however, is that Plumb tools do jobs faster and better.

Fayette R. Plumb, Inc., Philadelphia 37, Pa.

The red handle with the black head  
—exclusively Plumb

**PLUMB**

HAMMERS • HATCHETS • AXES • FILES

## Don't Bet Against a Cow Pony

(Continued from page 141)

TipTop is still coming to a stop. Shields runs forward to tie the calf's legs together and the horse meanwhile backs up to keep the rope tight in order to prevent the calf from struggling. It's fast split-second action all the way through, with man and horse working as a perfect team to do the job expertly and in record time.

Many of the big ranches of the cattle country maintain their own racing stables. Ranch boys are trained as jockeys and some owners employ professional jockeys who wear the ranch colors. The race-type quarter horses are smaller and more slender than the big bulldog type, which is favored for rodeo work.

Because of the emphasis on quick starts and early speed, some of the races are for distances of only 50 or 100 yards, though distances of 220 and 440 yards are much more common.

Quarter-horse racing is a widespread sport all through the Southwest from eastern Texas to the Pacific. Some of the race meets are completely informal, some are highly organized and have all the glamour and thrills of big-time thoroughbred racing. A well-advertised meet attracts thousands of spectators.

Typical of the big meets are the races held by the Del Rio Livestock Association, a nonprofit organization made up of 100 ranchers in western Texas. The Del Rio track has a covered concrete grandstand, judges' stand, a mechanical starting gate, and photo-finish apparatus. It is a small edition of such famous tracks as Churchill Downs or Santa Anita.

At Del Rio, the quarter horses race for purses that are made up of the entry fees plus portions of the gate receipts. Owners who have gotten into arguments as to which owns the fastest horse may put up special purses amounting to \$10,000 or so, winner take all, for special match races that are inserted in the regular racing programs. Sometimes, too, they make side bets as to which horse will break first from the gate, which will lead at 10 yards, and which will be in the lead at 50 yards.

The outstanding difference between the quarter-horse races and ordinary thoroughbred races is that all commercial gambling is unknown at the short-horse tracks. No pari mutuels or formal betting facilities are present. Friends who are watching a race may arrange a wager on the outcome between themselves and that's as far as it goes. Modern quarter-horse racing follows the amateur traditions of early colonial times.



**THE SMOOTHEST RIDE  
ON TWO WHEELS!**

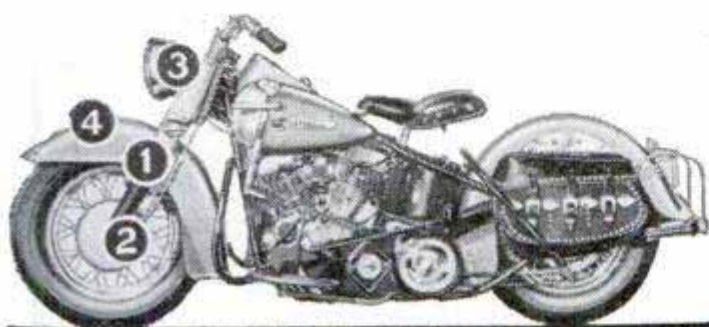


**1949**

**HARLEY-DAVIDSON**  
with the New *HYDRA-GLIDE* FORK

- ① NEW Hydra-Glide Fork irons out bumps like magic!
- ② NEW powerful front brake takes hold at a touch!
- ③ NEW sealed ray headlight turns night into day!
- ④ NEW air flow fenders for streamlined beauty.

SMOOTH is the word for it . . . comfortably smooth, even on rough roads! Remarkably stable and easier than ever to handle. Takes off like a "jet-job" . . . amazing new performance! All this and more is yours in the New Harley-Davidson with the Hydra-Glide Fork. You'll ride with new road-hugging security, steer with new effortless ease, stop at a touch of the brakes, enjoy the great sport of motorcycling as never before! You'll enter a new world of motorcycling performance, as you thrill to the "flying-feel" of your Harley-Davidson wheeling you swiftly, securely and comfortably to exciting race meets, hillclimbs, endurance runs, sightseeing tours and faraway places. See your Harley-Davidson dealer today. Take a ride. Mail coupon now.



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Dept. P, Milwaukee 1, Wis.  
Send literature on 1949 models, also  
free copy of ENTHUSIAST Maga-  
zine filled with motorcycle action  
pictures and stories.

Name.....

Address.....

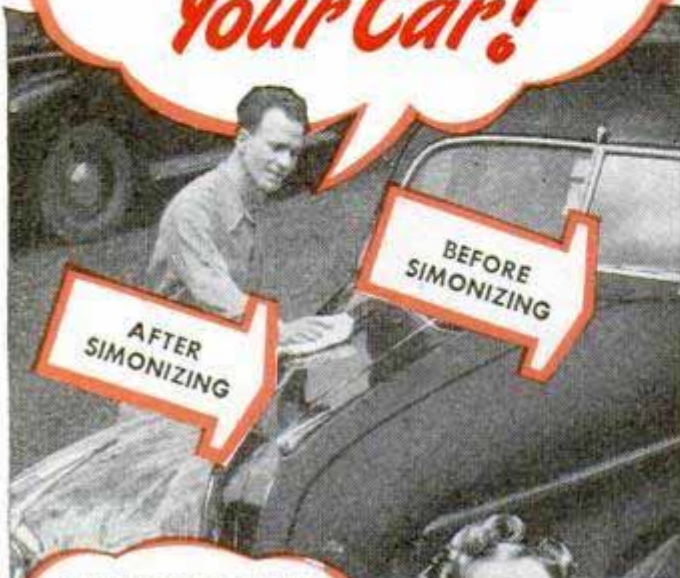
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proof why **You**  
**Should Simoniz**  
**Your Car!**



GIVES TWICE THE  
SHINE IN 1/2 THE  
TIME!



KEEPS COLORS  
FROM FADING!



### Simoniz Kleener makes dull cars look new again

Nothing equals wonderful Simoniz Kleener—for safely cleaning the finish and making cars look really new again. Anyone can do a professional job of Simonizing without a buffer—just inexpensive Simoniz and Simoniz Kleener. Use Liquid Kleener for a "quickie slick-up" or before applying Simoniz. Extremely dull cars require Paste Kleener. To protect the finish and make it last longer—follow up with famous Simoniz!

THE SIMONIZ COMPANY, CHICAGO 16, ILL.



MOTORISTS WISE  
**SIMONIZ**

T. M. REG. U. S. PAT. OFF.

MAKES THE FINISH LAST LONGER

## Building the Parade of Flowers

(Continued from page 104)

down a proposed flower-decorated helicopter that would cruise along at the standard parade speed of three miles per hour while hovering four or five feet off the ground.

No float is permitted in the parade until the float-construction committee has approved its strength and safety. Tires, ignition system, battery and other mechanical parts are scrutinized to make sure that no avoidable breakdown will occur. Each float must be equipped with a built-in tow bar so that it can be removed from the line of march in case of failure.

Early on the morning of the parade, the floats are assembled into divisions on side streets that lead into Orange Grove Avenue. When the parade begins, the leading division moves out into Orange Grove Avenue, proceeds along it for a few blocks, and turns on Colorado Boulevard, Pasadena's main thoroughfare, leading the other divisions as they move through the city. The parade lasts for about 2½ hours.

Pasadena has a population of 106,000 people and yet, for a few hours each year, it becomes one of the largest cities in the United States. In addition to the 1,500,000 million spectators at the parade, another 200,000 visit the post-parade area where the floats are on display for the balance of New Year's Day. Meanwhile, the Rose Bowl game in the afternoon draws 99,000 spectators and the Santa Anita races at adjoining Arcadia attract about 70,000 people.

All these events in a few hours create the world's greatest traffic problem. The regular Pasadena police force of 400 men is augmented by 1100 additional officers recruited mostly from the Los Angeles force and the county sheriff's department.

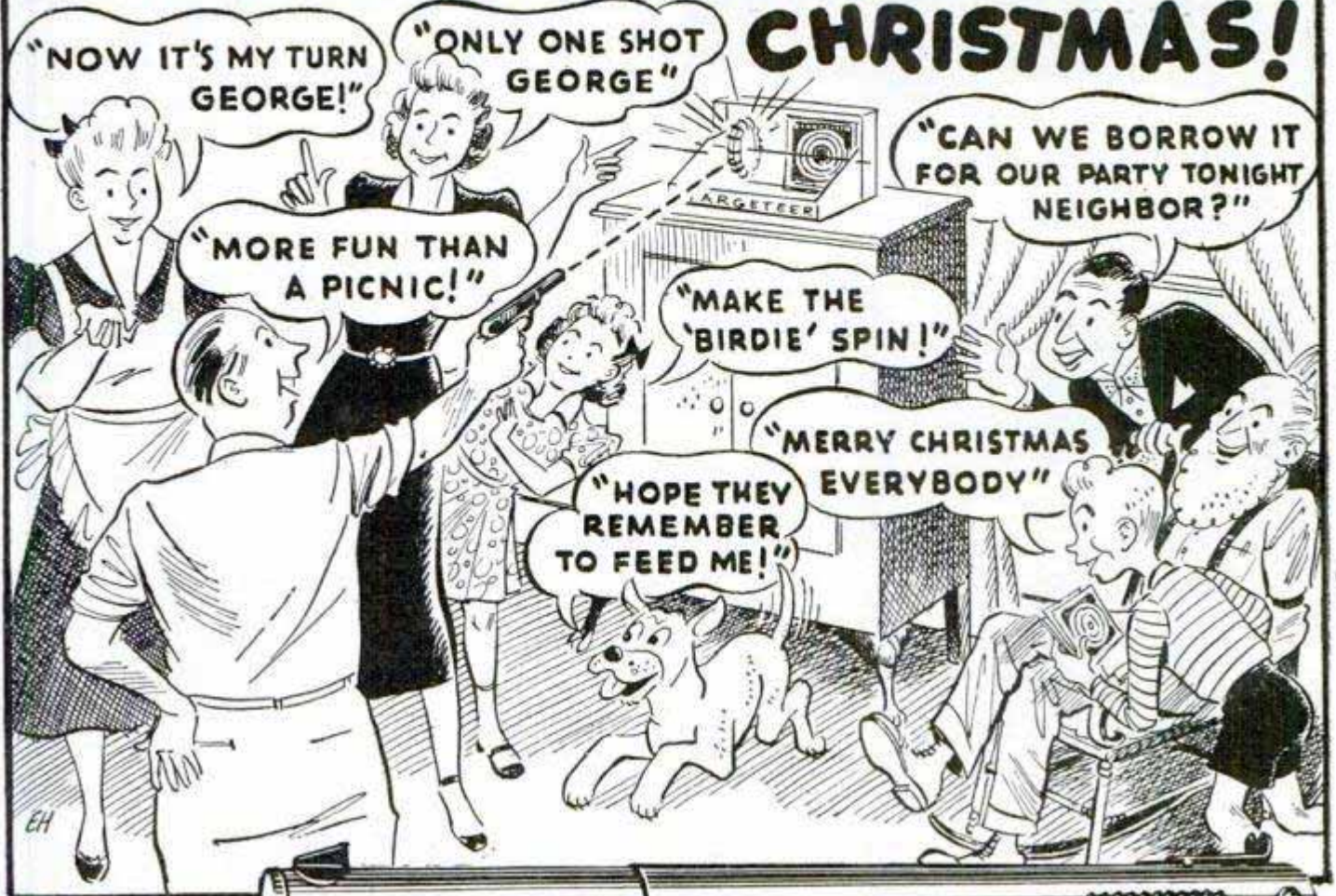
All the highways leading to Pasadena are turned into one-way streets in the early morning to accommodate the incoming crowd; the flow is reversed when the parade ends. Clarence Morris, chief of police of Pasadena, spends the day in a blimp spotting traffic jams as they occur.

The history of the parade goes back to 1890, when residents of Pasadena decorated their surreys and wagons with garlands of roses on New Year's morning and drove out to a picnic area for an afternoon of games. With the years, the drive to the picnic grounds evolved into a formal parade and the afternoon of games developed into the Rose Bowl football classic.

These days the parade is sponsored and staged by the Tournament of Roses Association, a nonprofit community group of about 1000 members and 30 committees.



# TOMMY GETS A TARGETEER FOR CHRISTMAS!



## DAISY'S SAFE FAMILY FUN GUN!



Daisy Targeteer Target Pistol Outfit offers harmless, exciting shooting fun for all the family! Complete Outfit includes: TARGETEER—famous, low velocity, blued steel air pistol—big, balanced and very accurate at short range; 500 rounds special .118 calibre ammunition (tiny B-B's); 2 metal spinning "birdie" targets; target cards; backstop.

Buy Targeteer AT SPORTING GOODS and TOY DEPARTMENTS

Only  
**\$2<sup>95</sup>**

No. 118

**WANT A DAISY FOR CHRISTMAS? TRY THIS:**

**DAISY AIR RIFLES CATALOG** - FEATURING THE DAISY 1000 SHOT RED RYDER COWBOY CARBINE



See New Daisy B-B Guns, Targeteer, in Catalog Section of Handbook No. 2

My Handbook May Help You Get a Daisy!



128 PAGES

LICENSED BY STEPHEN GLENNER, INC. N.Y.

(All prices higher in Mont., Wyo., Colo., N.M., Texas and West. Duty added in Canada.)

Send for Daisy Handbook No. 2 with latest Daisy Air Rifle, Targeteer Catalog bound in! Show Catalog to the person most likely to get you a Daisy for Christmas or anytime! Also enjoy reading 128 pages of comic strips, jokes, cowboy lore, camp tips, etc. in this handy, thick, pocket-size Handbook. Rush only one thin dime (10c), unused 3c stamp—we'll send Handbook No. 2 postpaid!



No. 25 DAISY PUMP GUN \$6<sup>95</sup>

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**DAISY AIR RIFLES**

DAISY MANUFACTURING CO., 1898 UNION ST., PLYMOUTH, MICHIGAN

Do not order air rifles or Targeteer direct from the factory, please. See your dealer.



*The Christmas  
he'll remember!*

**Model  
TOYS**

SCALED FROM MACHINES  
YOUR CHILD HAS SEEN ...  
AND BUILT TO LAST ... AND LAST!



**Model ROAD GRADER**

\*Other **Model** Toys Shown Below

As real to your child as the original Adams Road Grader! Sturdily-built of heavy gauge steel, electrically welded. Adjustable scraper blade and steering wheel; double-action axles; six Goodyear-tired wheels! **Model** Toys are quality... designed for hard usage, years of constructive fun, indoors and outdoors!

## **Model Toys**

*well worth the difference!*

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**Model** BUCKET LOADER



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**AT STORES WHEREVER TOYS ARE SOLD**



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FIND THEIR WAY

- To Discriminating Gift Lists
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BEACONLITE ILLUMINATED \$5.95

STREAMLINE STANDARD \$3.95

At your Dealer's.

HULL MFG. CO. P. O. Box 246-D12  
Warren, Ohio

## We Drove to Alaska

(Continued from page 149)

would be uncomfortably cold. You won't have to worry about heavy traffic from the states—we saw only 35 U. S. license plates from Dawson Creek to Fairbanks.

Fairbanks was busier and more modern than we expected. With 8500 residents, it is Alaska's second-largest community in a total population of between 90,000 and 94,000. Paved streets, theaters, auto showrooms, two radio stations, two newspapers, well-stocked shops and a railway to Anchorage quickly dispel any notion you had about seeing a typical frontier town.

Winters are dark and cold, with the thermometer plunging to 50 degrees or more below zero for long periods. Summers are warm, with an average maximum of 72 degrees for July, when it is light 20 hours a day. Light-sleeping visitors cover bedroom windows with blankets.

Meal prices were not excessive by U. S. standards and many articles, like tires, cost about the same as in Chicago. Housing is scarce and you should confirm hotel reservations in advance if you expect to spend much time in Fairbanks. Large U. S. Air Force bases nearby, at Ladd and Eielson, put an added strain on the eating and housing facilities. Homesteading, one of the pioneer touches in this wilderness country, still hasn't attracted as many takers as the government hoped.

Two of the most interesting local attractions are a display of Alaskan natural history at the University of Alaska and large-scale gold-dredging operations, both short distances north of Fairbanks.

Between Fairbanks and Anchorage is 20,300-foot Mt. McKinley, highest peak in North America, in the center of a national park with 112 species of birds and 34 kinds of animals. It is open from mid-June to mid-September.

All these things, plus firsthand experience in one of the few great wildernesses left in the world, are yours to enjoy if you follow our lead along the Alaska Highway.

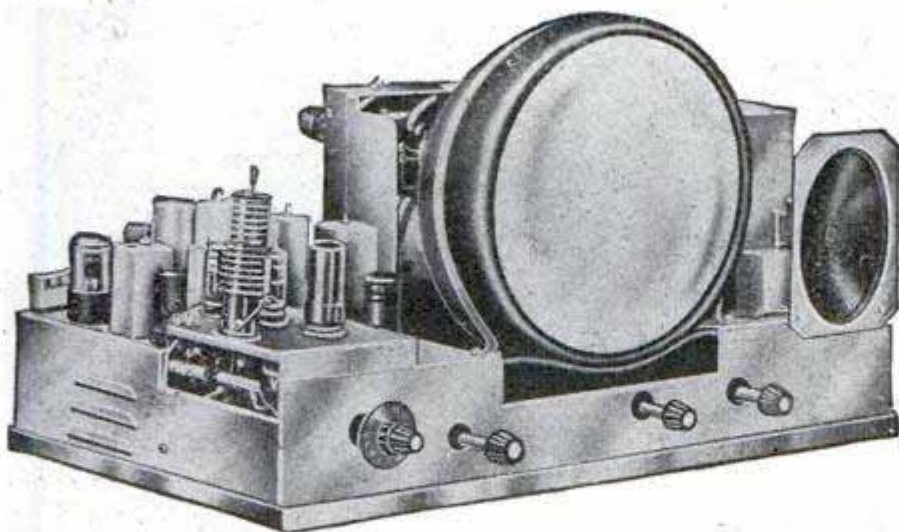
## Radio Programs for Bus Riders

Bus riders in Cincinnati, Ohio, are entertained, as they ride, by radio programs picked up on FM receivers. The installation on Cincinnati buses was made at the expense of a broadcasting company to increase its listening audience during commuting and shopping hours. In a recent poll, 96 percent of the riders said they enjoyed listening to the programs while riding the buses.



# Men... Get into the Television Business in a Big Way!

Assemble and Sell Transvision TV Kits and Cabinets—Make Big Money!



## TRANSVISION

offers ambitious men an opportunity to get into Television now, and make big money.

Here's our 3-Point DEALER PLAN:

1. Sell high-quality television sets constructed by you from our TV kits, at competition-beating prices.
2. Feature our beautiful line of exclusive custom-built cabinets, designed and finished to your customers' specifications.
3. Make profits from resale of the nationally advertised Transvision line of TV Kits and Accessories.

Write for Dealer Folder No. D-1, or see your distributor.

## New... Transvision 10" TV Kit (Model 10A)—a Sensational Value!

Gives Bright, Stable 52 Sq. In. Picture—Continuous Tuning  
EASY TO ASSEMBLE — SAVES YOU 1/2 THE COST!

Want a television set for yourself? Want to assemble them for resale at a profit? The new Transvision Model 10A electromagnetic Television Kit (illustrated above) is ideal: Gives a bright, stable 52 sq. in. picture. Has 10" picture tube, and **CONTINUOUS TUNING** on all 12 channels. Its high sensitivity makes for improved long-distance reception; especially good on high channels. Comes complete with all-channel double-folded dipole antenna and 60 ft. of lead-in wire.

Transvision **MODEL 10A TV KIT**, less cabinet.....Net \$199.00

Transvision **MODEL 12A TV KIT**, same as above, but has a 12" picture tube.....Net \$263.00

**NEW STREAMLINED CABINETS** for Transvision Model 10A or 12A TV Kit. Made of select grain walnut with beautiful rubbed finish. Fully drilled, ready for installation of assembled receiver.

Walnut Cabinet for 10A or 12A (Specify).....Net \$44.95  
Mahogany and Blonde slightly higher.

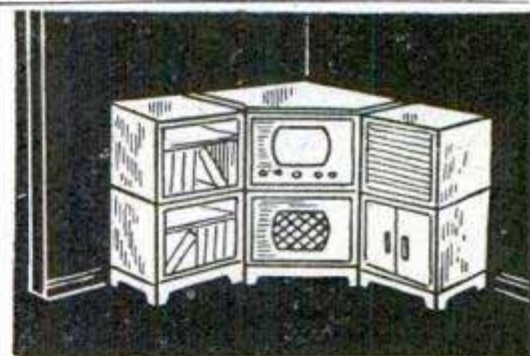
### NO TECHNICAL KNOWLEDGE REQUIRED FOR ASSEMBLY!

Transvision's simple step-by-step Instruction Sheet makes assembling a Television Kit a pleasure. Each kit comes complete with all-channel double-folded dipole antenna and 60 ft. of lead-in wire.

Nothing else to buy!

## FREE 162 p. Transvision TELEVISION COURSE with purchase of any Transvision TV Kit.

You don't need this course to assemble a Transvision TV Kit, because the job is easy enough and our instruction sheet is simple and clear. BUT, if you want a good introduction to television fundamentals as a basis for further study, the Transvision Television Home-Study Course is ideal. Remember, you pay nothing extra for this course. Ask your distributor.



## NOW... A Complete Line of "MODULAR" KNOCKDOWN, UNPAINTED CABINETS

that you can assemble and paint in a jiffy!

Transvision's "MODULAR" Cabinets come in knockdown, unpainted units, offering an unlimited range of combinations, including even a bar. Finish them off to suit any living room, den, office, etc. The units are simple and practical in design, and require as little as 1/2 hour per unit for assembly.

Corner piece, shown above, has room for Television, Phono, Record Storage, and Open Book Case... COMPLETE Net \$84.00. For other units and prices, write for "Modular" Catalog.

All Transvision Prices are fair traded; subject to change without notice. Prices 5% higher west of the Mississippi.

**TRANSVISION, INC., Dept. PM, NEW ROCHELLE, N. Y.**

For FREE 20 p. TV BOOKLET, Dealer Folder D-1, and Catalog, See Your Distributor!

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### HOLLYWOOD, CALIF.

TRANSVISION OF CALIFORNIA  
8572 Santa Monica Blvd.



## Our 70-Group Air Force Emerges

(Continued from page 95)

fully assembled. When used as an ambulance plane, the C-119 will have room for 36 litter patients with attendants.

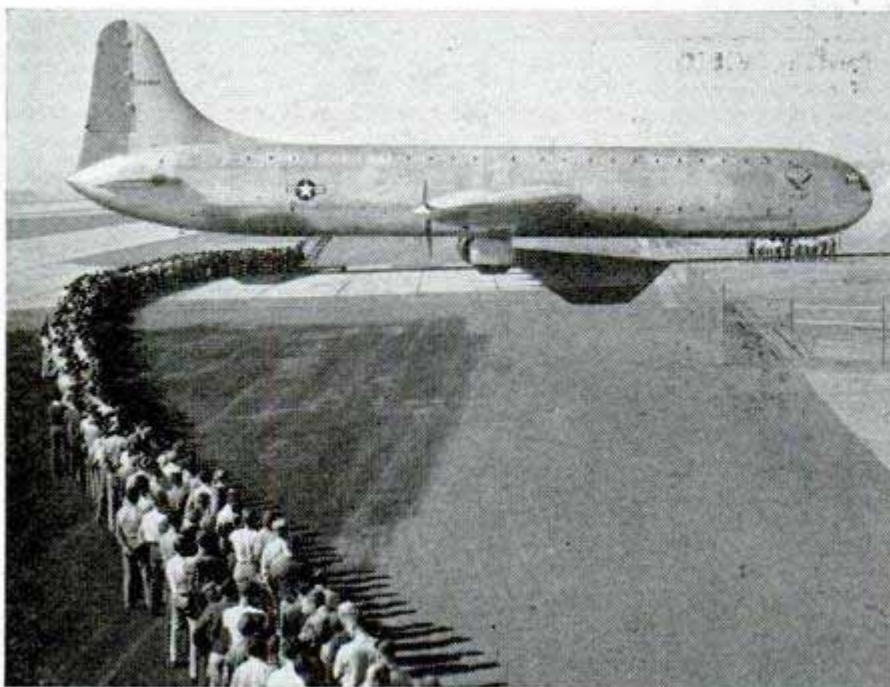
The Boeing C-97, a cargo version of the B-29, can carry 40,000 pounds of cargo 4000 miles at speeds in excess of 300 miles per hour. As a troop transport, it carries 134 fully equipped troops; as an ambulance plane, it holds 83 litter patients and 4 attendants.

The Douglas C-124 is a new aircraft developed from the C-74. It can be converted into a two-decker for 222 fully equipped troops. Fifty-thousand pounds of cargo can be carried, including tanks, guns and fully loaded trucks. The C-99, a cargo version of the B-36, has been completed, and is under test. This giant plane has a range of 8100 miles and a cargo capacity of over 100,000 pounds, or 400 fully equipped troops, or 335 litter patients.

### SPECIALIZED SQUADRONS

The 22 specialized squadrons will have aircraft designed to perform functions such as liaison and rescue. Helicopters will be used to some extent for both purposes, but other planes are being developed. Some rescue aircraft will continue to be

Simulating troops, 400 employees of Consolidated-Vultee line up to show passenger capacity of their company's big XC-99. The transport version of the world's largest bomber, the B-36, it has six pusher-type engines



World's largest helicopter, the Piasecki XH-16 will function as a troop or cargo carrier. It will be approximately the size of a Douglas C-54. It features a quickly detachable capsule which about doubles its load

modified tactical planes, designed to carry equipment, such as lifeboats, and para-rescue teams, necessary for their mission.

### RESEARCH AIRCRAFT

Research is constant in the Air Force as we seek to extend the horizon of flight for man and machine, and assure the United States of the best aerial weapons in the world. We now have four research aircraft designed to explore the realm of supersonic speed. The Bell X-1 has already paid dividends by piercing the sonic barrier many times at speeds hundreds of miles greater than that of sound. It is designed for speeds of 1700 miles an hour at 80,000 feet. The Bell X-2 is also a research and development laboratory to explore the problems of transsonic and supersonic flight. Like the X-1, it is rocket-powered but has a swept-back wing and is designed for greater speeds.

The Douglas X-3 is directed toward the development of a design capable of speeds three times that of sound and at altitudes of 200,000 to 300,000 feet. Over 60 different design studies have been made, ranging from a stubby, blunt-nosed model to a long, slender fuselage that comes to a sharp, bulletlike point in the front and rear. Ramjet, pulsejet, and turbojet propulsive units, singly and in combination, have been studied as possible propellants.

The Northrop X-4, newest of the group, is similar to their XB-35

(Continued to page 252)



# GENIUS at WORK



12" DRILL PRESS



12" BAND SAW



## SHOPMASTER TOOLS

**gives ease of operation  
with professional results**

Whatever it is you make, a simple stool or an elaborate cabinet, it will contain that indefinable extra craft touch only you can put into it.

Most Americans have this ability to design and make things. They like to work with their hands. They know and take pride in good tools.

Shopmaster Tools have been designed to meet the needs of American craftsmen, both amateur and professional. Expertly engineered to give precise results with ease of operation, they have the rugged construction necessary for long years of service. And, best of all, they are priced within the reach of all.

See Shopmaster Tools at your dealer, or for free catalog, illustrated in full color, write to:

**SHOPMASTER, INC.**

1214 Third St. South, Minneapolis 15, Minn.

LATHE



8" TILTING ARBOR SAW



15" JIG SAW



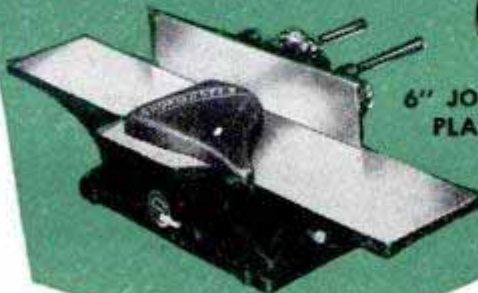
SABER SAW



8" TABLE SAW



6" JOINTER-PLANER



*P.S. Christmas is coming. Leave this ad where the rest of the family can take the hint.*



PERFORMANCE GOES UP IN SMOKE . . .

*"You haven't missed  
the boat, MATE*

... IT'S A CAR THAT NEEDS  
**FEDERAL-MOGUL  
ENGINE BEARINGS"**



**WORN CONNECTING ROD BEARINGS  
CAUSE OIL PUMPING**

Smoky exhaust means oil pumping. Don't miss the boat! When having your engine overhauled, make sure the connecting rod and main bearings are checked. Worn bearings let excess oil reach combustion chambers. It burns to carbon on plugs, rings, pistons, valves—steals power. Replace with Federal-Mogul Oil-Control Bearings to restore power, pep, economy!

**FEDERAL-MOGUL SERVICE**  
(DIVISION OF FEDERAL-MOGUL CORPORATION)  
COLDWATER, MICHIGAN

Replace in Sets with Genuine  
**FEDERAL-MOGUL**  
Oil-Control Bearings  
in your car



and the B-49 Flying Wing. It is one of the smallest planes built for the Air Force in recent years, being approximately 20 feet long with wingspan of 25 feet. The X-4 is designed to explore characteristics of aircraft of different designs and power plants in the high-subsonic, transsonic and supersonic ranges.

**PERSONNEL**

The 70-group *air-force-in-being* will require 502,000 men, with training as modern as the planes they fly, maintain and command. Rapid demobilization after



Transport sister ship of the B-29, the Boeing C-97 will move loads of about 40,000 pounds at 300 m.p.h.

World War II depleted our ranks of specialists and we have been faced ever since with the problem of plugging those gaps.

Approximately 50 percent of the men in the Air Force must be technically trained, and this training covers more than 100 specialties. At present 18,000 technical trainees can be handled annually. This number, however, must be increased to meet our minimum requirements. Technical training has been changed from the wartime



Fairchild C-119 Packets carry 42 troops with gear. Track-type gear permits landings on rough fields

policy, which necessitated a high degree of specialization, to that of providing the individual with a broad technical background, giving him a greater usefulness in a variety of assignments. Specialization is accomplished in on-the-job training.

(Continued to page 254)



**A HOME YOU'LL REALLY ENJOY!**  
**ROYAL** *Super Fine* Coaches



It's Royals plan and purpose to build America's most satisfying trailers. Continual search for perfection in manufacturing methods and materials gives you a coach of unusual quality and beauty. A Royal abounds with conveniences for extra home comfort and more enjoyable living. Live the modern way in a completely furnished Royal. They are surprisingly low priced. Send for free literature. Dept. PM.

**ROYAL COACH CO. INC., Hastings, Michigan**



**NONE BETTER! SUPER DRILL GRINDER**



Sharpens round shank drills from 3/32" to 1/2" in diameter, up to 6" long. Grinds old drills like new in 4 different point angles, using hand or power grinding wheels. Money-back guarantee.

Price only \$2.95

At Dealers or Postpaid

**CRANDALL MFG. CO. 1512 W. Slauson, Dept. FA-36, Los Angeles 44, Calif.**

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**FOSTER MFG. CO., M KINSEY AVE., BUFFALO 17, N. Y.**

**LIQUID MARBLE**

Mold, Brush, Trowel, Spray It!



material makes \$1 seller. Make Marbleized floors, Tile Walls. Colorful, glossy, amazing! Easily learned; start in garage or basement. Particulars free.

**MARBLEIZING SERVICE, Dept. 10-F, Edwardsville, Ill.**

**COMPOSITION FLOORS**

**FLEXIBLE MOLDS**

Mold Novelties, Statuary, Art Goods in Flexible Plastic Molds; 5c material makes \$1 seller. Make Marbleized floors, Tile Walls. Colorful, glossy, amazing! Easily learned; start in garage or basement. Particulars free.

**BUILD YOUR OWN TILTING ARBOR SAW!**



**SAVE \$50 OR MORE**

- 27x28 in. table stays level. Blade tilts full 45 degrees
- 10 in. blade cuts 3 3/4 in. deep, jackscrew depth adjustment
- Floor model, 34 in. table height

- New Departure ball bearing arbor, 3/4 in. precision shaft, ready to run, 5/8 in. bore blades
- Quick-positioning, self-aligning rip fence guide
- Sturdy wood, steel and aluminum construction
- No machining—Build easily with hand tools only
- Capacity and performance of floor saws selling for \$150.00 and up!

GIL-BILT Step-by-Step Plans—pictorial drawings, full size patterns, actual photographs \$ 1.00

GIL-BILT Metal Parts Kit—includes Plans, ball bearing arbor, cast aluminum miter gauge, rip fence guide, jackscrew with 4 1/2 in. handwheel, and all other metal parts. . . . . 20.95  
 Same kit with 10" combination blade. . . . . 25.95  
 Same kit with 8" combination blade. . . . . 24.95

**GILLIOM POWER TOOLS** P.O. Box 1-PN, Lambert Field St. Louis 21, Missouri

**THIS EASY WAY to SCREEN YOUR HOME**

*-costs dollars less\**



wash windows without removing screens

**DURALL**

WITH

**ALUMINUM TENSION SCREENS**  
**A FULL-LENGTH SCREEN FOR DOUBLE-HUNG WINDOWS**

YOU SAVE up to dollars per screen on the price alone with Durall!\*

YOU GET a good looking, top quality, all metal screen . . . It's aluminum—never rusts, stains or needs painting. Tension design prevents sagging.

YOU CAN install Durall easily from inside your house . . . it's light, flexible—has no side frames! Just snap a catch here, turn a thumbscrew there and it's in, taut and trim. No outside ladders to climb, no cutting, no fitting.

YOU ENJOY lifelong freedom from maintenance troubles with Durall. Wipe it off with a damp cloth or toss it in a tub for cleaning. Leave it up the year round or roll it up for compact storage—it will stay attractive!

\*The popular 28" x 54" size retails at only

**\$4.35**

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PM-12

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Pilot training was virtually suspended in 1946 and present training rates are approximately only one half that required. But by the middle of 1949, the Air Force expects to be training an input of 3000 pilots annually.

The functions of bombardier, navigator and radar observer—insofar as practicable—are being consolidated in the modern aircrew, so that one man can perform all three. At present, navigators and bombardiers are being cross-trained in the other specialties. The training rate is being increased to meet the requirement of 70 groups.

Operational training is a constant process. Units of the Strategic Air Command are rotated for training in the overseas theaters to acquaint them with varying problems. The Tactical Air Command participates in joint maneuvers with the Army and Navy to develop tactics and techniques of cooperative action. The Air Defense Command conducts training exercises in the air defense of the continental United States and coordinates the training of civilian air components.

The education of officers has an important place in the Air Force program. Selected air officers attend schools and colleges of the Air University, such as the Air War College, the Air Command and

Staff School, the Air Tactical School, the Air Special Staff School, and the Aviation School of Medicine. There is an educational program under which officers are sent to civilian universities and technical schools for graduate and undergraduate training. Specific courses of instruction are selected and the student is monitored throughout his schooling.

The Air Force is organized as a team with the Air Defense Command, the Strategic Air Command, the Tactical Air Command and the Military Air Transport Service, performing special missions, but coordinated so that the over-all mission may be accomplished in the shortest possible time and with the greatest economy of manpower, natural resources and wealth.

The continental commands, the Air Training Command, the Air Materiel Command, the Air Proving Ground, and the Air University are organized to furnish the combat commands with the trained personnel and the best planes and equipment required by them to discharge their missions.

The planes we build, the airmen we train and educate, and the organization we develop are designed to assure security of the United States and to discharge our responsibilities to world peace.

*"Company's more fun . . .  
since Paw glued his chair to the door with Weldwood Glue"*

When you want a wood-to-wood bond that will really hold . . . remember Weldwood Glue. It's quick to mix . . . easy to use . . . tremendously strong . . . stain-free . . . rot-proof . . . and permanent. At hardware stores, lumber yards, chain stores, in 15¢, 35¢, 65¢, 95¢ and larger sizes.

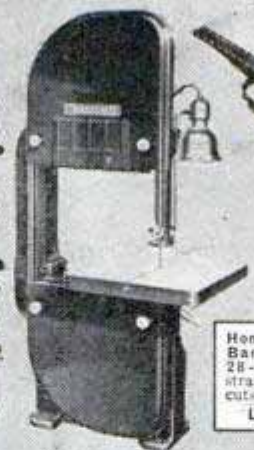


**WELDWOOD**  
PLASTIC RESIN GLUE

United States Plywood Corporation, New York 18, N. Y.



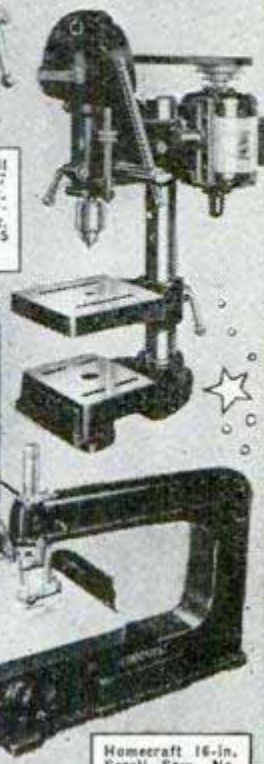
**DELTA  
MILWAUKEE**



Homecraft 4-in. Jointer, No. 37-110 — for forming straight, true edges without the drudgery of hand planing...\$32.95

Homecraft 10-in. Band Saw, No. 28-110 — for straight or curved cuts...\$39.95  
Lamp extra.

Homecraft 11-in. Drill Press, No. 11-120 — 7 tools in 1. For drilling, shaping, routing, carving, sanding, grinding, mortising...\$43.95  
Motor Extra.



Homecraft 16-in. Scroll Saw, No. 40-110 — for all curved sawing, in making toys, shelves, etc. Also for filing and sanding...\$41.95  
Motor, belt, and lamp attachment extra.

**THE Gift of Happiness:**  
**HOMECRAFT® POWER TOOLS**  
(Made by Delta)

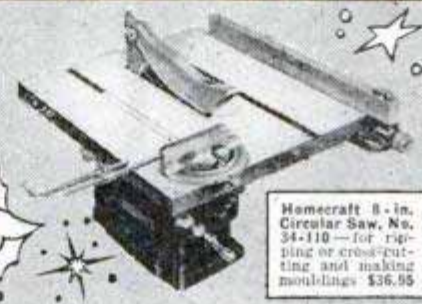
It's sure to thrill him (or her) — your gift of one or more Homecraft Power Tools. It's a gift that provides years of fun and healthful relaxation.

These popular tools are easy to use. And the range of jobs you can do on them is truly amazing—especially when you add the many attachments that only Delta offers in complete variety.

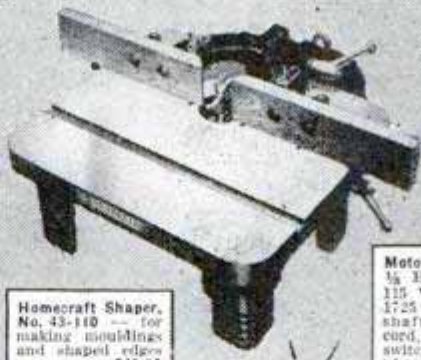
Homecraft Power Tools are designed and built specifically for off-and-on use in the home shop — which explains their low cost. Yet they're "a lot of tool for the money" — as thousands of Homecraft users can testify.

Look over the selection of Homecraft Power Tools at your dealer's store — and ask about the time-payment plan. ...This Christmas, put happiness in his (or her) hands.

**Hinting Season Is Here**  
If you happen to read this ad first, leave it around where the right people will see it.



Homecraft 8-in. Circular Saw, No. 34-110 — for ripping or cross-cutting and making mouldings \$36.95



Homecraft Shaper, No. 43-110 — for making mouldings and shaped edges...\$49.95



Homecraft Buffing Head and Grinder — for sharpening tools and knives, polishing household metals. Complete with attachments as shown...\$9.80



Motor No. 60-030 — 1/2 H.P. Single Phase, 115 V., 60 cycle, A.C., 1725 r.p.m., 1/2" single shaft, complete with cord, plug, and toggle switch. This is a split phase sleeve-bearing motor for light use \$16.45



Homecraft 10-in. Lathe, No. 46-110 — for spindle and faceplate turning to make lamps, toys, etc...\$36.95

**DELTA MANUFACTURING DIVISION**  
ROCKWELL MANUFACTURING COMPANY  
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General Sales Office • 4 NORTH MICHIGAN AVENUE CHICAGO 3, ILLINOIS

**HOMECRAFT®  
POWER TOOLS**

All tool prices shown are without motors and lamp attachments. Prices subject to change without notice.



Send 10¢ . . .  
— for woodworking handbook and catalog of Homecraft Power Tools.

\*Trade Mark Reg. U. S. Pat. Off.

**Made by Delta**  
Homecraft Power Tools are made by the world's leading manufacturer of light power tools, the same company that makes the famous Delta® Power Tools. Delta tools are famous for quality, dependability, and safety. They are widely used in industrial plants, schools, and in home shops of people who want the best in heavy-duty quality.

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**DELTA MANUFACTURING DIVISION**  
681N E. Vienna Ave., Milwaukee 1, Wis.  
Enclosed is 10¢. Send me copy of new Homecraft Catalog HC-1.

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# ALADDIN ANNOUNCES . . .

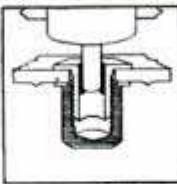
A sensational new line of

## LOW-COST WOODWORKING TOOLS

for home and industry!

Now, at amazingly low cost, you can get heavy duty wood-working tools that outperform much more expensive tools! Look over the models below—compare the quality, the price, and the sound, safe design. Then order the model best suited to your needs and watch for further announcements of new wood-working tools by Aladdin.

Exclusive! On many Aladdin drill press tools, there's an exclusive new feature—a pilot bearing that eliminates dangerous side thrust, chatter and vibration. Pilot bearing feature assures same smooth cutting action you'd only expect to find in shapers selling for several hundred dollars.



### ALADDIN Wood Shapers for your Drill Press



U. S. Pat. Pend.

MODEL #60—Originally designed for heavy industrial use, now priced for home workshop. Can be attached directly in chuck of your drill press. Exclusive pilot bearing eliminates side thrust, chatter and vibration—assures smooth cutting action. Blades can't come out—set screws hold them securely. Complete, with your choice of any 6 pair double-ground blades shown below, only \$12.95.



U. S. Pat. Pend.

MODEL #50—Same as Model #60, but without exclusive pilot bearing. Designed for intermittent shaping. Cuts rabbets and joints, planes wood with blade P-810. Adjustable hole-cutter with blade H-911, adjustable wheel-cutter with blade W-910—together, cuts holes and wheels at same time. Over 100 different shapes can be cut. Complete, with any 6 blades of your choice shown below, only \$8.95.

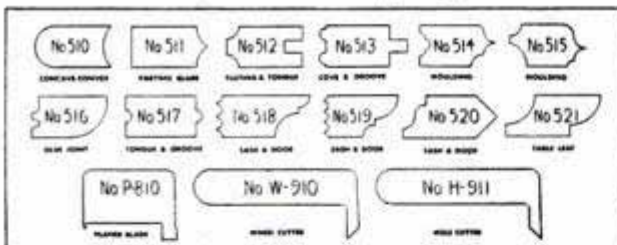
### ALADDIN Wood Shaper for your Circle Saw

MODEL SA-10—Heavy-duty, industrial-type shaper of solid steel, now priced in home workshop range. Absolutely safe—blades locked in position with set screws all the way through. When ordering, state diameter of shaft. Complete with arbor and any 6 pair of ready-ground blades shown below, only \$14.95.



U. S. Pat. Pend.

### ALADDIN Wood-Shaping Blades



Specify by number the six blades you want when ordering ALADDIN Wood Shapers. Additional blades—\$1.50 ea.

### NEW! Model SDS-8 Three-In-One Drum Sander



U. S. Pat. Pend. sleeves, medium, fine or coarse, 1 x 3, 20c ea.; 2 x 3, 25c ea.; 3 x 3, 30c ea.

Here's a one-inch, two-inch, and three-inch drum sander *all in one!* Now you no longer need to hunt for the right diameter—just slip the telescoping diameters on or off till you have the diameter you want. Diameters can be changed in a matter of seconds. Comes with pilot bearing that eliminates side thrust, chatter and vibration. Complete with a sandpaper sleeve for each diameter, only \$6.95. Extra sanding

#### HERE'S HOW TO ORDER

Be sure to specify Model No. of Aladdin tool you want. When ordering wood-shapers also specify 6 blades by number. When ordering blades only, specify whether to be used with drill press or circle saw. When ordering shaper for circle saw, specify diameter of shaft.

All Aladdin tools are *guaranteed*. Postage prepaid with all cash orders. C.O.D. plus postage. GET YOUR ORDER IN TODAY.

### ALADDIN MFG. CO., INC.

3121 Main St. Kansas City, Mo.

Dealers Write Today

## Warning: Earthquake Ahead

(Continued from page 127)

full-size buildings to artificial earthquakes to learn their vibration periods. To create the needed vibration they use a machine, consisting of two heavy metal disks, deliberately out of balance, that are rotated in unison by an electric motor. The push-pull effect of the whirling disks vibrates the structure to which the machine is attached. The vibrations are recorded by seismographs placed at carefully selected locations in other parts of the building.

Disks that weigh 10 pounds, spun by a 1/3-horsepower motor, will vibrate a 10-story office building when the machine is clamped to a low point on the building. A big 200-pound model, operated by the Coast and Geodetic Survey, has been used to vibrate and test several of the West's large dams, including Hoover Dam. The motion of a big dam when vibrated by the machine is sometimes strong enough to ripple the surface of the water in the reservoir behind the dam.

All large buildings should have two-fold mass-rigidity symmetry to avoid the destructive twisting effects that may occur to odd-shaped buildings. A structure of rectangular shape will experience minimum damage while an L-shaped or U-shaped building tends to twist when subjected to vibration, increasing the damage. Unsymmetrical buildings should be especially strong or be built as several units, each symmetrical in itself.

Earthquake engineers try to minimize the damage a quake will cause but they don't try to avoid it entirely. Minor cracks and scaling are considered unavoidable. What the engineers try to prevent is the collapse of structures and walls, even the falling of a single brick. They design stairways with extra strength and insist on vertical steel reinforcements in chimneys to prevent their falling over.

The ability of a structure to withstand a shock depends on the quality of the workmanship. Tests of damaged and undamaged buildings after the Long Beach earthquake showed that good workmanship could make one building 16 times stronger than another. This was found true in the recent Japanese earthquake.

Fire is always an immediate threat after a destructive quake. One precaution being taken is the requirement that all new chimneys be lined with fire-clay materials. Schools and public buildings should have earthquake valves that immediately shut off the flow of gas from the mains when a

(Continued to page 258)



# Snap-on

# Bench Grinders

With the famous **Blue-Point** Trade Mark

... have the construction features that guarantee smoother, more powerful operation



**GRINDING WHEELS**  
of natural aluminous oxide abrasive . . . fully vitrified. From 60 grit for fine grinding to 24 grit for heavy work.



**WIRE WHEEL BRUSHES**  
High quality wire and metal, bound to prevent chips flying loose. Crimped bristles cannot bend or break.



**WHEEL DRESSER**  
Quickly trues, cleans grinding wheels. Protective hood over cutters. Includes extra set of easily inserted cutter wheels.



**EYE SHIELDS**  
Thick safety glass for clear vision, protection. Sturdy aluminum frame. Easily attached to grinder.

**COMPLETELY ENCLOSED MOTOR:** Super powered, precision balanced motors enclosed to prevent dirt, grit, etc. from entering.

**BALL BEARING CONSTRUCTION:** Oversize grease sealed ball bearings used throughout, assure smooth, motor operation.

**LARGE RUGGED BASE:** Rubber feet provides solid mounting free from vibration. Recessed bolt openings for permanent mounting.

**INDUCTION RUN MOTOR:** Develops less heat in the windings — more desirable for continuous operation.

**LARGE WHEEL GUARDS:** Allow use of special shape grinding wheels or wire brushes. Guards fitted with chip breakers.

**BELL TYPE CONSTRUCTION:** Provides full clearance so that long straight pieces may be ground across the face of the machine.

**STURDY TOOL RESTS:** Adjustable for any type of work with ample take-up for wheel wear.

**CAPACITOR START MOTOR:** Uses low starting current . . . actually less than 15 amps. is consumed.

**VOLTAGE:** Standard models of the 1/3 H.P. and 1/2 H.P. grinder require 110 Volts, 50/60 cycle AC current. Standard 1 H.P. grinder takes 220 Volts, 50 or 60 cycle AC current.

## SNAP-ON TOOLS CORPORATION

8062-L 28th AVENUE • KENOSHA, WISCONSIN

International Division: Kenosha, Wis., U. S. A.



### SNAP-ON TOOLS CORPORATION

8062-L 28th Ave., Kenosha, Wisconsin

Please send catalog containing Bench Grinder details.

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# Sure as Shootin'!



**MERCURY**  
**OUTBOARD MOTORS**  
 are built the way you  
 Engineers and Mechanics  
 know they should be!



Ball and Roller Bearings Throughout.

Proved  
**FULL JEWELLED**  
**POWER\***

You can stop hunting for that "dream" outboard now . . . Kiekhaefer Engineers have applied the sound, modern proved principles of ball and roller bearings, into a portable power plant that gives you the advantages of anti-friction performance, in a light, easy to handle, highly maneuverable outboard motor of matchless versatility. The Full-Jeweled construction\* throughout the modern Mercury gives moving parts a ride on ball and roller bearings so Mercury's parts stay younger, perform smoother. Let your dealer show you the Mercury. You'll find the type of engineering you've always wanted in an Outboard Motor . . . with those who know mechanics . . . Mercury's Miles Ahead.

Write for Brochure Kiekhaefer Corporation, Cedarburg, Wis. U.S.A.

NAME \_\_\_\_\_  
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 CITY \_\_\_\_\_ STATE \_\_\_\_\_



quake occurs. One type of valve consists of a heavy metal ball balanced on top of a needlelike pedestal. Dislodged by the shock, it falls from the pedestal and into a seat where it seals off the flow of gas.

It is estimated that 90 percent of the seismic activity in the United States occurs in the California-Nevada region. Southern California alone, including Owens Valley, has about one half of one percent of the seismic activity of the entire globe. Hundreds of shocks strong enough to be felt, all local in nature, occur every year.

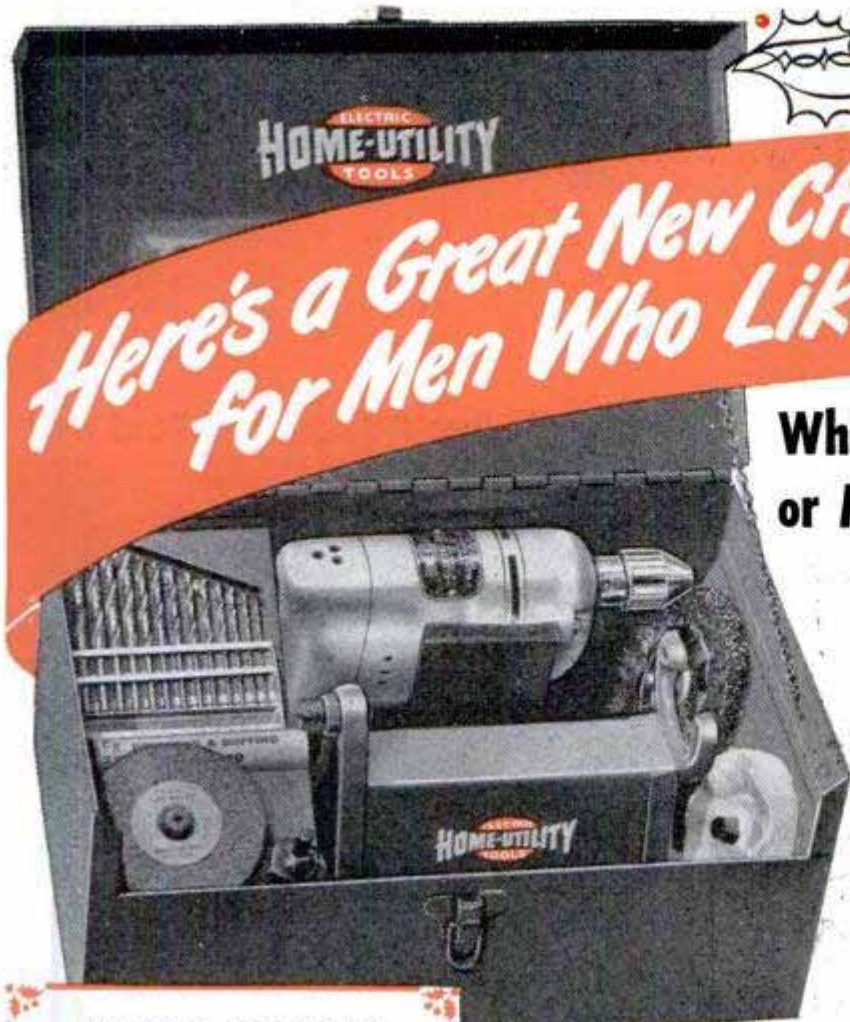
Earthquakes are measured by a scale in which the numeral 2 corresponds to the smallest shocks ordinarily reported, the numeral 6 corresponds to moderately destructive earthquakes and the numeral 12 corresponds to the largest recorded earthquakes. On this basis, eight quakes of a magnitude of around 7 to 8, roughly equal in intensity to the Long Beach quake, have occurred in southern California in the last 15 years. Fortunately these took place in the mountains, desert or offshore and little damage was done. In the last hundred years four great quakes of a magnitude of 9 or greater have taken place in California and Nevada.

One phase on which more information is desired is the actual motions that occur near the epicenter of a quake and especially the motions that occur in buildings near the epicenter. Ordinary seismographs can't give a true picture of these motions.

To find out more about what happens at the epicenter, the Coast and Geodetic Survey has installed a number of "strong motion" accelerographs at locations along the West Coast where earthquakes may be expected. Insensitive to minor shocks, the accelerographs make a record of the east-west, north-south and up-down motions that occur when a strong quake sets them in operation. Displacement meters also have been installed at various places to aid in this important research.

Recently the Coast and Geodetic Survey asked a number of engineers, university research people and other earthquake experts to serve as a committee that would make recommendations concerning future earthquake studies. The committee is creating an Earthquake Engineering Research Institute that will coordinate and centralize much of the research on the effects of earthquakes on structures. To be located in California, the institute's findings will help designers and engineers to design buildings that are even more resistant to earthquakes than the best of today.





**Here's a Great New CHRISTMAS GIFT  
for Men Who Like TOOLS!**

**Whether You're on the Giving  
or Receiving End . . .**

Looking for the ideal gift for someone who likes to build or repair things around the house? Passing out hints for your own present? In either case, this versatile Home-Utility Electric Drill Kit is a *natural!* It's the handiest collection of tools you've ever seen for drilling holes, sharpening cutlery and tools, removing rust and old paint, buffing and polishing and a 100-and-1 other jobs. It features a husky, well-built Home-Utility 1/4" Drill . . . plus a handy Horizontal Stand, twist drills, grinding and buffing wheels, an arbor and buffing compound . . . all in a sturdy steel kit. A real value at \$39.95! Built by BLACK & DECKER, world's largest maker of quality electric tools, with 27 Factory Branches to give speedy, nationwide repair service! At your hardware, electrical or implement dealer. Products of The Black & Decker Mfg. Co., Dept. H12M, Towson 4, Maryland.

*P. S.—A swell idea, too, if you're giving yourself a Christmas present!*

**HOME-UTILITY  
Electric Tool KIT  
ONLY \$39.95  
FOR ALL THIS!**

1/4" Home-Utility  
Electric Drill

Horizontal Stand

13 High-Speed  
Twist Drills (1/16" to 1/4")

3" Grinding Wheel,  
3" Buffing Wheel; 4" Wire  
Wheel Brush with Arbor

Buffing Compound

DRILLS—GRINDS—SHARPENS  
WIRE BRUSHES—BUFFS—POLISHES

**Here's what  
HOME-UTILITY  
Owners Say . . .**



"It's amazing how my Home-Utility 1/4" Drill speeds up so many jobs. Drilling, sanding, grinding . . . it does them all!"



"Dad says good tools really make a workshop. I know he's right every time I use my Home-Utility Drill."



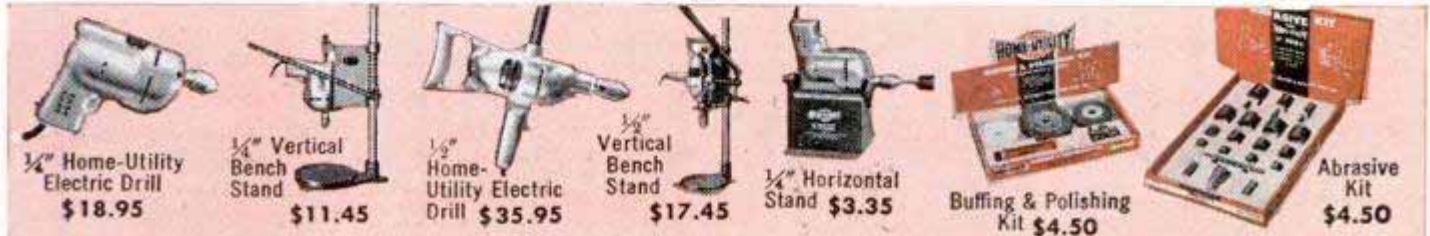
"My Home-Utility Drill is mighty handy when one of my farm machines comes down with a broken bolt."

**SEE YOUR HARDWARE, ELECTRICAL OR IMPLEMENT DEALER**

**ELECTRIC  
HOME-UTILITY  
TOOLS**

**FOR HOMES • HOBBY SHOPS • FARMS • TOOL KITS**

**These Other HOME-UTILITY Tools Make Ideal Christmas Gifts, Too!**





**INSTANTLY CONVERTS  
LINEAR FEET  
TO BOARD FEET**



**Solves many other  
woodworking problems  
in seconds**  
only **10¢**

Easy to use. Fast . . . simply set dial of GREENLEE Handy Calculator to get measurements; slope per foot in degrees; comparative hardness, weights and workability of various woods; bit sizes; nail specifications; tool sharpening hints. 6" diameter heavy varnished cardboard. Special offer by maker of famous GREENLEE tools. Send 10¢ to Greenlee Tool Co., 2112 Columbia Avenue, Rockford, Illinois.



## Yellow Powder Gives Off Oxygen To Sustain Human Life

Man now can carry his atmosphere with him in the form of a yellow powder that gives off life-sustaining oxygen. The powder, a potassium oxide, was developed by chemists at the Naval Research Laboratory. It may be used for fire fighting, high-altitude flying, in submarines and to supply oxygen in a mask.

## Electric De-Icer Attached to Roof Melts Snow Along the Edge



Electric heating cable can prevent damage to homes from snow and ice on the roof. Often the snow forms "dams" which prevent water from running off the roof when the snow begins to melt. The water then may back up under shingles and eaves causing damage to walls and ceilings by seepage. According to General Electric engineers, the cable melts the snow along the edges, permitting the water to run off. Easy to install, the cable is placed along the eaves in a saw-tooth pattern. It can be plugged into an ordinary home outlet; a 60-foot length uses about a penny's worth of electricity per hour. The current need be turned on only during a snowstorm or immediately afterward. The same cable also can be used to heat soil in greenhouses, warm poultry houses and clear driveways of ice and snow.



# LAFAYETTE CONCORD KIT-QUARTERS FOR 500,000 BEGINNERS HAMS and PROFESSIONALS AMERICA'S GREATEST RADIO VALUES

You still have time to order Xmas gifts from Lafayette, if you don't delay. Rush the handy order coupon to the mail order center nearest you (Chicago—New York—Atlanta). We'll give you same-day service! Or shop in person at any one of our outlets, listed below. You'll save plenty either way.



**THIS IS IT!**  
FM-AM CHASSIS & SPEAKER  
Save at least \$25!

PROFESSIONAL  
TYPE HIGH  
FIDELITY

The set you've been reading so much about! Fine 12 tube plus rectifier high fidelity chassis of advanced design, for your custom installation. Covers the 88-108 MC FM band, as well as the 550-1600 KC AM standard broadcast band. Large 12" Alnico V PM speaker for outstanding tone quality. Tone control, automatic volume control. Phono selection switch and phono input. Modernize your present radio, or build a new custom job you'll be proud of with this remarkable value. Chassis dimensions: 11" deep x 13 1/2" wide x 7" high. Operate on 105-125 volts, 60 cycles AC. Complete with tubes, 12" speaker and antenna. No. 1N1300P. Shipping weight 23 lbs. .... \$7750

## NEW! DRAFTING MACHINE AN EXCEPTIONAL BUY!

Eliminates use of T-square, protractor, and triangles. Makes sharp, accurate drawings up to 16" x 22". Combination 90° angle, calibrated scale moves at any angle to any point on the masonite board. Includes 17 1/2" x 23 1/2" x 3/4" board, steel arms, fittings, rubber feet. No. 1N15092P. Ship wt. 8 lbs. ... \$663



FOR MECHANICS, DRAFTSMEN,  
DESIGNERS, INVENTORS, ETC.



## A DIFFERENT GIFT! BEDLAMP RADIO

Here's a Christmas gift that shows imagination and good sense too! It's a beautifully-designed Bed Lamp & Radio combination. Enables her to read under light that's kind to her eyes—while she listens to her favorite band. Superhet circuit. Built-in "air-magnet" Complete broadcast band coverage. AC or DC. Lamp has frosted lens for glareless light. Lamp and radio operate separately or together, as desired. Streamlined walnut bakelite. Brackets fit any type of bed. It's a \$29.95 value! No. 1-533P. Ship. wt. 9 lbs. ... \$2195



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world's largest radio supply organization

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901 W. JACKSON BLVD., CHICAGO 7 • 24 CENTRAL AVE., NEWARK 2  
229 W. MADISON ST., CHICAGO 6 • 265 PEACHTREE ST., ATLANTA 3  
110 FEDERAL ST., BOSTON 10 • 542 E. FORDHAM RD., BRONX 58

## AMAZING, MULTI-PURPOSE SHAFT TOOL IT'S FLEXIBLE! TRY ONE!

For engraving, buffing, grinding, polishing. Precision balanced 1/20 HP motor, 15,000 rpm at handpiece—with power to spare when using any of the 10 standard tools included. Pencil-size handpiece permits professional workmanship. Takes any standard 3/32" or 1/8" shank tool. 3' flexible shaft, plastic-covered or oil-free operation. Complete with accessory tools, 2 wrenches, shaft, motor, motor bracket. No. 18N15645P — in blonde wood cabinet—wt. 7 lbs. .... \$1595



## WONDER GUN



FOR  
BETTER HIGH  
SPEED SOLDERING

No waiting for iron to heat—merely pull the trigger. Heats and cools in 5 seconds. New pistol-type grip is easy to hold, easy to handle, even in tight corners. Built-in spotlight prevents "dark-spot" errors. Tips stay tinned, solder easily, bend by hand. 100 watts on 115 V., 60 c. AC. A new low price. No. 18N15183P—3 lbs. Only ..... \$1269  
No. 18N15181P—Extra Long Life Tips—2 oz.—6 for 50c

## ELECTRIC SAW



MOTOR-DRIVEN VALUE  
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## Fish With Acute Sense of Smell May Prevent "Chlorine Taste"

Keen-nosed minnows, trained for the job, may be the best means of keeping the objectionable "chlorine taste" out of urban drinking water. It results when phenols, dumped into natural waters as waste products by many industries, combine with chlorine. Purification plants aren't able to detect small amounts of phenols in water until it is too late—when users complain. Two sets of bluntnose minnows have been trained at the University of Wisconsin in an effort to find a solution. They detect phenol long before it reaches concentrations humans can taste. One group has been conditioned to rush to a food trough whenever they smell phenols in the water. The others have been trained to fear an electric shock if they venture near the trough when the phenol smell is prevalent. If water samples put into an aquarium containing the trained fish have phenols, the behavior of the minnows instantly indicates its presence.

## Mildew Preventive Saves Linens

Linens last 60 percent longer when a new process for locking a mildew-preventing chemical into the fabric is used in

laundering. Several hundred pounds of laundry can be treated for a few cents. A modification of an old method for fireproofing textiles, the process consists of adding eight ounces of a 30-percent solution of sodium pentachlorophenate to about 40 gallons of water, in which the clothes to be treated are rinsed for five minutes. This "souring" rinse converts a chemical in the fibers into a fixed mildew inhibitor. It lasts until the fabric is re-washed, when sudsing redissolves the chemical.

## Mosquitoes "Fly" Glued to Wire

In an experiment to study wing motions during flight, live mosquitoes recently were glued to the ends of slender brass wires without harming the insects. Prof. Marshall Laird of Victoria University College, New Zealand, developed the technique in order to make the insects fly "in place" before the lens of an ultra-high-speed camera. Wing motions then were studied by projecting the film. The mosquitoes first were lightly anesthetized, then attached to the wires with a touch of quick-setting glue on the backs of their chest regions. When the photos had been taken, the insects were released by sharp taps on the wire.

# SCREW DRIVER TIPS

Choose a screw driver just as carefully as you pick a plane, chisel or other fine tool. And don't try to make one screw driver do for all jobs. The best costs so little, it's a real economy to have a full range of sizes and styles . . . long ones for more powerful driving, short ones for close-quarter work and the correct tip width to fit all sizes of screws. Blades tempered entire length. Stanley makes them all the Stanley way.

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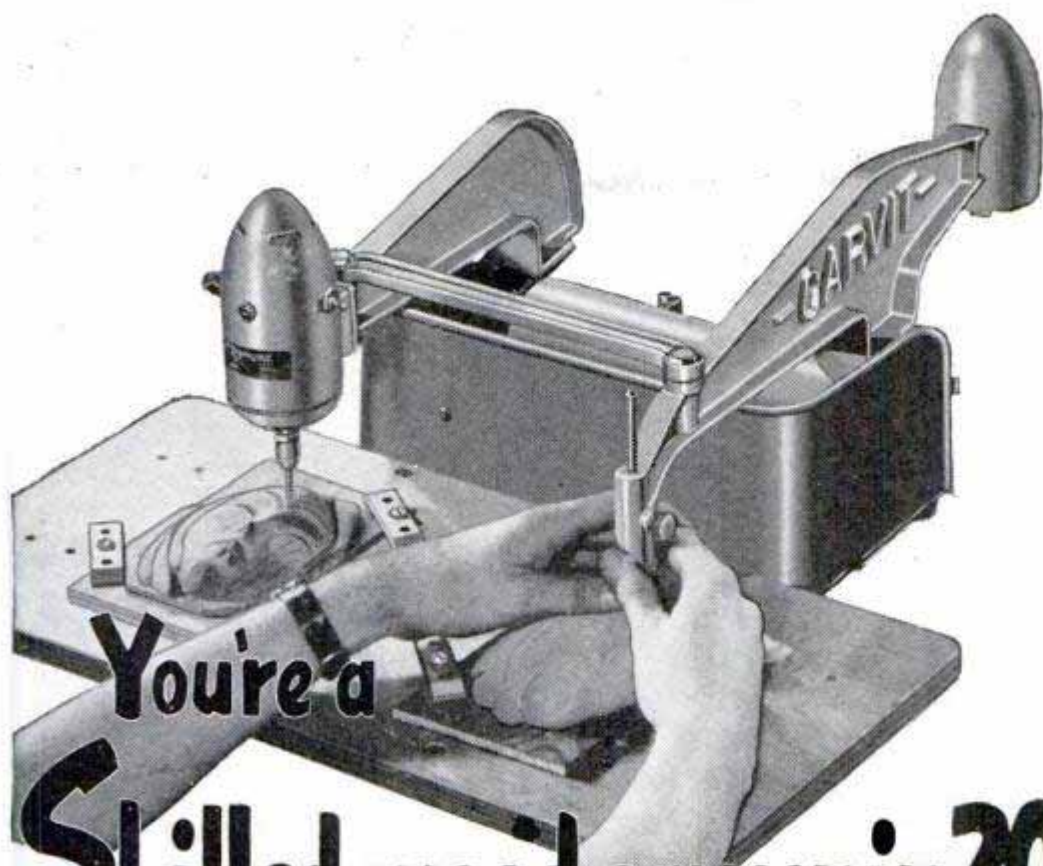
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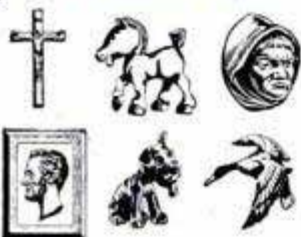
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Wind velocity and direction are recorded by a portable electric instrument which can be left unattended in isolated places a month at a time. The instrument was developed for the Army Signal Corps. It records the data on a moving roll of paper which is long enough to make an 800-hour recording. Moving arms connected to a conventional velocity-measuring instrument and to a weather vane mark sensitized paper by sending sparks through it. The instrument can register wind velocities up to 150 miles an hour and direction within 1.5 degrees.

### Television Crew for Football Outnumbers Players on Field

More men are needed to televise a football game than to play it. Station WMAL-TV of Washington, D.C., uses 27 men, five more than there are on the football field. Eighteen are required at the scene of the game and nine are needed to operate equipment at the studio.



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Anyone can quickly learn to use the new P&H Dial-lectric welder. There is only one control — the dial is clearly marked and a ¼ turn of the radio-like knob covers the entire welding range. There are no plug-ins to make, no wheels or levers to crank or adjust — welding is just plain easy with a P&H Dial-lectric machine. A clearly illustrated, easily understood welding manual is supplied with each machine so that beginners can learn to weld in an extremely short time. Old hands may pick up some new tricks, too.

#### No maintenance is needed

Dial-lectric control eliminates all moving parts. That is why P&H AC Welders require no attention or maintenance — why operating costs are lower — why so many industrial users are switching to this new welder. Also, NEMA rating assures you of long life and dependable operation.

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The P&H remote control feature permits proper heat selection at the job. You waste no time or energy walking back and forth to the machine to make adjustments. There is no temptation to skimp — remote control lets you use the right heat. Welds are sound and better looking. Work is done faster. Additional features that make for better, faster welding are: Easy quick-start arc. High-low welding range. Elimination of arc blow.

#### Requires only 2¼ feet of floor space

You can put a Dial-lectric welder most any place — it is connectible for 220 or 440 volts. Despite its weight of 307 lbs., it is remarkably compact. The Dial-lectric is easy to move around, too — it's mounted on wheels, you handle it just like a hand truck.

#### A complete electrode service is provided by convenient P&H Shop Packs

P&H Shop Packs contain eight different packages of electrodes. Detailed instructions are printed on each individual package so that you can use the right electrode for every

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It pays to use P&H electrodes. No matter what make of welder you have, order a P&H shop pack today from your nearby P&H distributor.

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If you are connected with, or are interested in welding, use your influence to bring in a P&H Dial-lectric AC Welder. A comparison of its performance with that of other units quickly shows that a Dial-lectric improves the quality of the welds, speeds the work, and reduces costs.

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Mixing rubber powder with asphalt makes road surface longer-lived, more wear-resistant and improves its anti-skid qualities, according to the British Rubber Development Board. Experimental stretches of road in the Netherlands, after 10 years of use including heavy wartime traffic, are in first-class condition compared with stretches of rubberless asphalt. The rubber makes the asphalt more elastic and reduces its tendency to flow.

## Recipe for Synthetic Glycerine Calls for Salt and Petroleum

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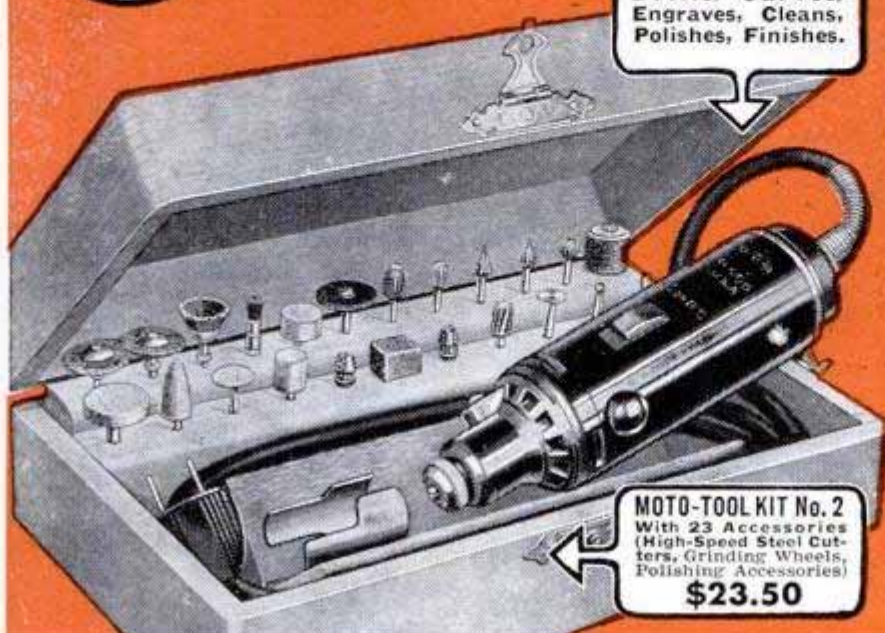
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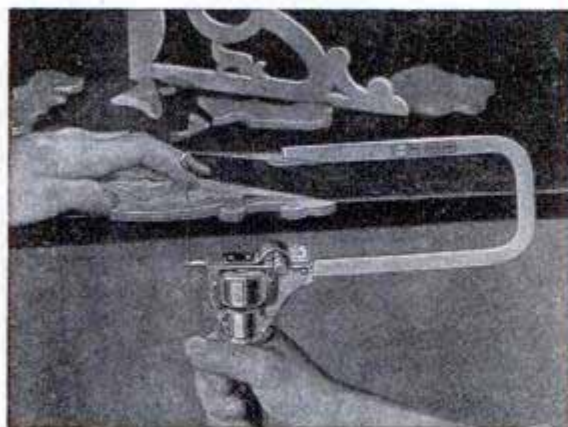
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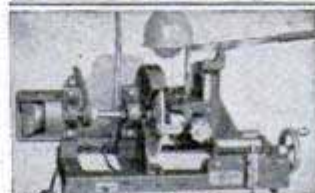


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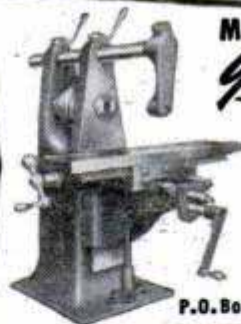
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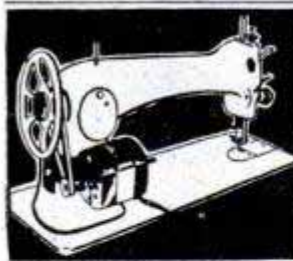


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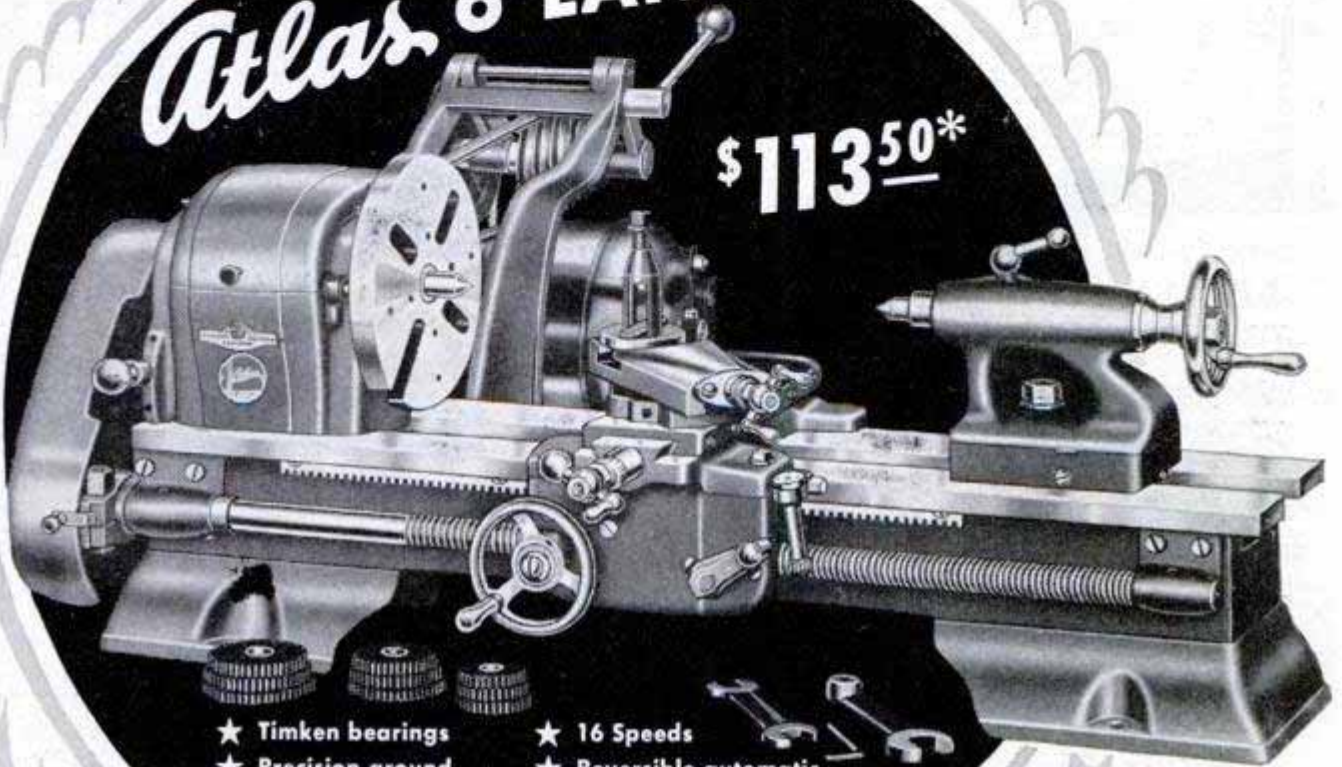
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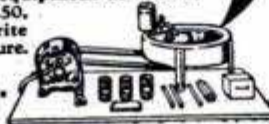
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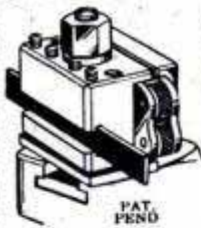
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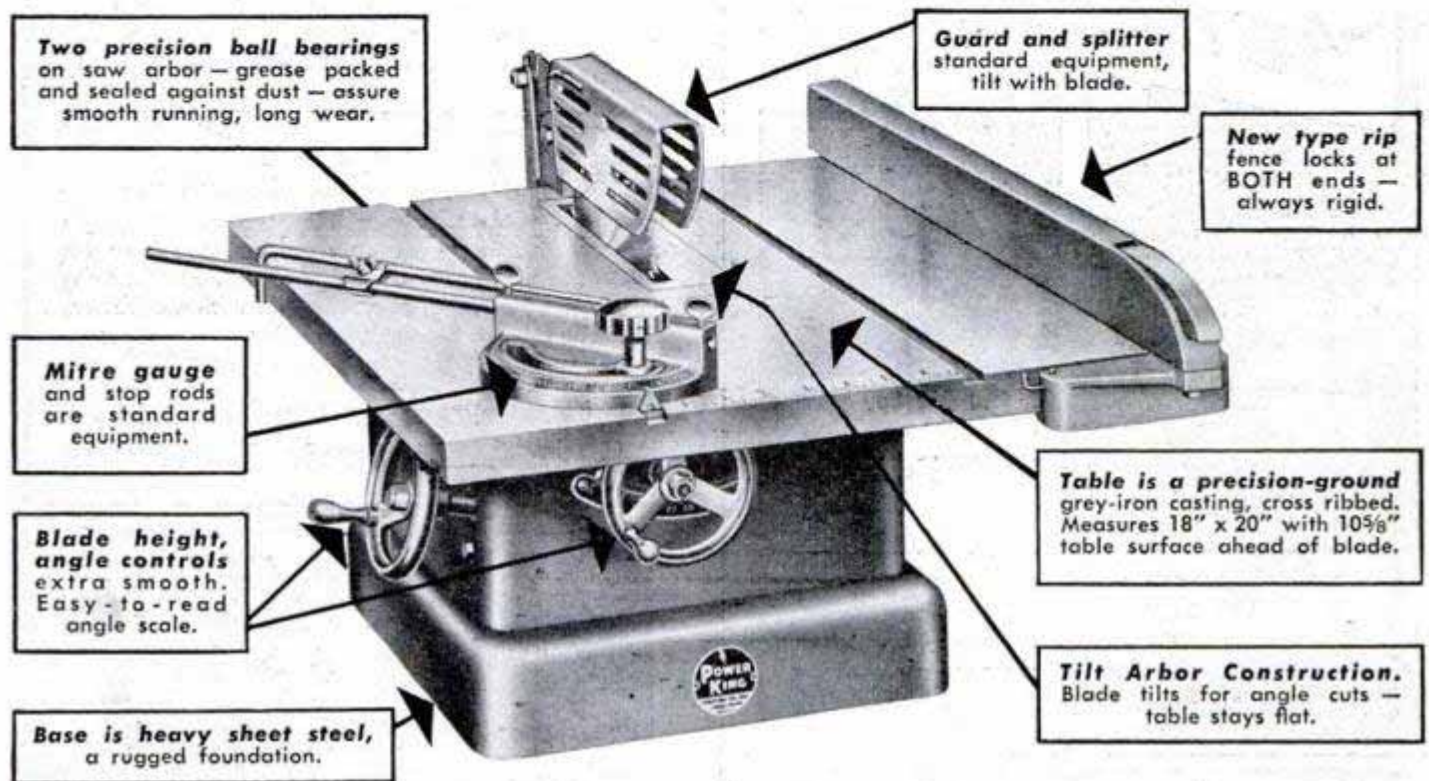
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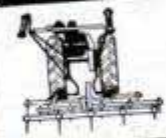
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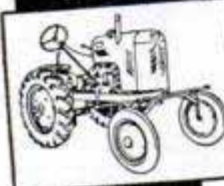
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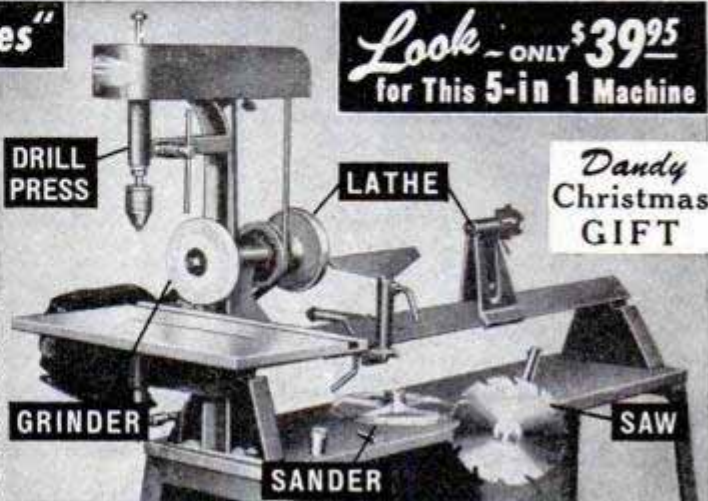
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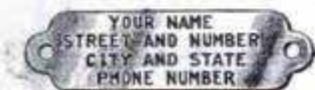
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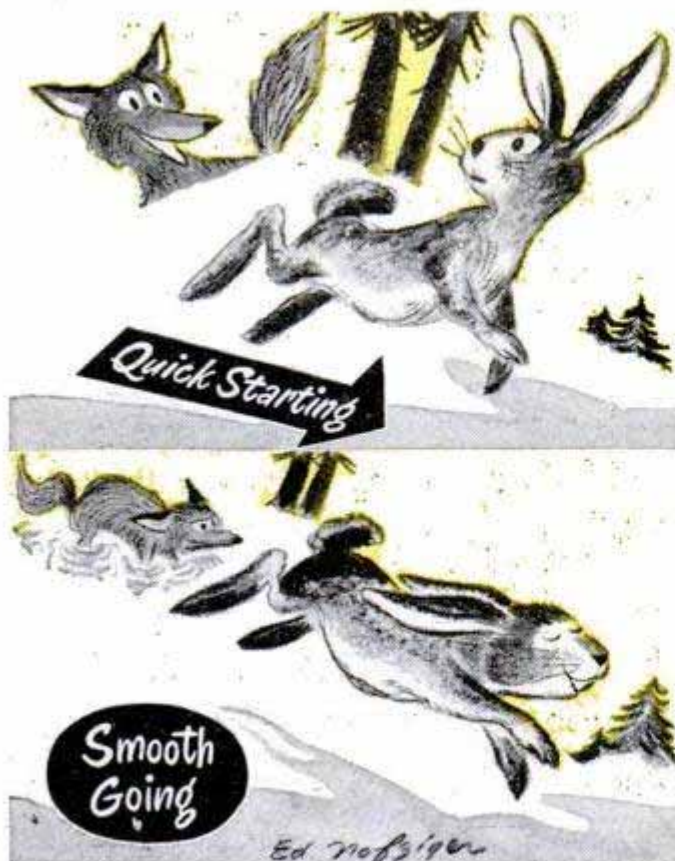
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Ice can be scraped off car windshields and windows without scratching the glass with a small scraper made of Plexiglas. The scraper's blade is two inches wide and has a handle shaped to fit the fingers. A miniature compass is mounted in the center of the scraper and a key chain is looped through a hole in the handle. The scraper is decorated with an engraved initial.

### Scientists Record Chewing by Moth

Preserved on a phonograph record, the sound of a moth chewing a piece of cloth sounds like someone eating corn flakes, according to a scientist at Cornell University where the recording was made. By sewing the larva inside a tiny cloth sack, the scientists were able to make it chew its way out. The sound of the chewing was picked up by a supersensitive microphone and recorded. Last year, the scientists produced an album of 72 bird songs and they have just completed an album featuring the calls of 26 varieties of frogs and toads. The moth-chewing record was made at the request of a moth-ball manufacturer.

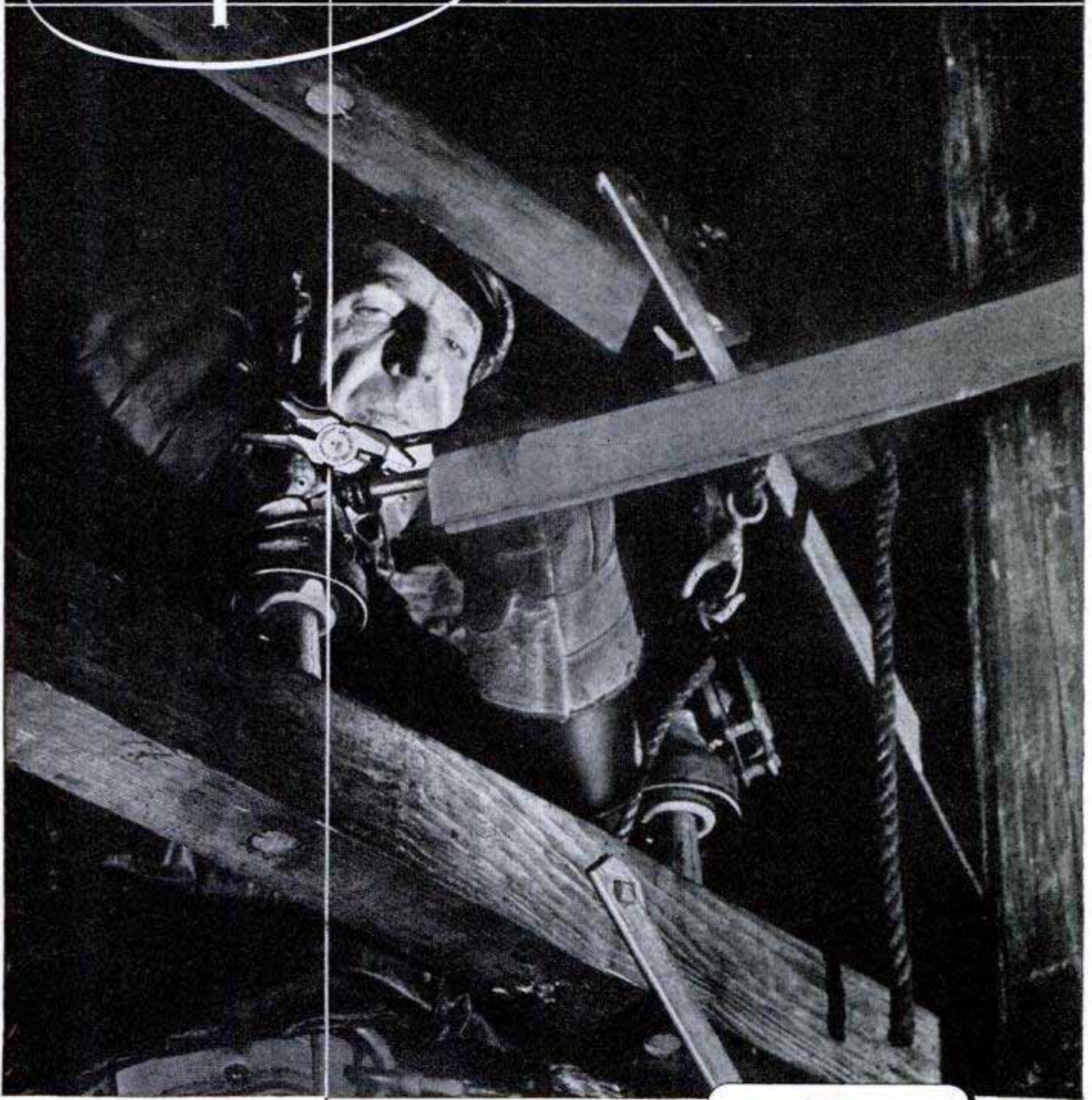
### Rival for Stainless Steel

Titanium metal, used only for laboratory research in the past, now is being produced for commercial development. The metal is similar to stainless steel in strength and corrosion resistance but weighs only a little more than half as much. It probably will be used where a high ratio of strength to weight is needed, such as in the production of high-speed planes. A Du Pont pilot plant is turning out 100 pounds daily and the output is expected to increase as new uses are found for the metal. Although titanium is the ninth most common element in the earth's crust, it is very difficult to separate in pure form from its ores.



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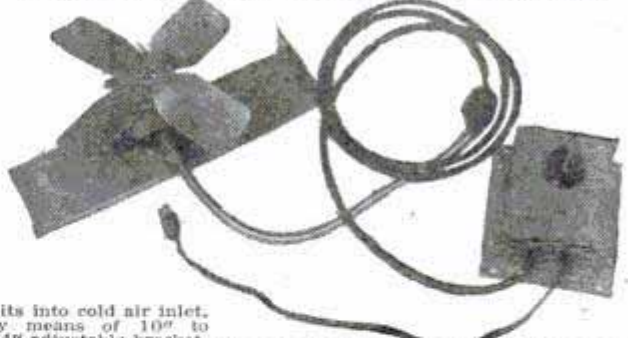
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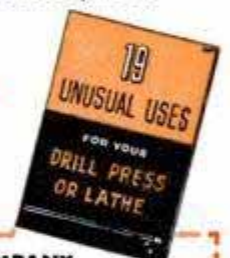


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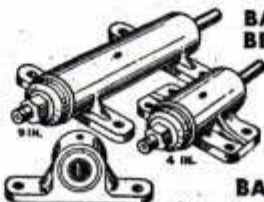
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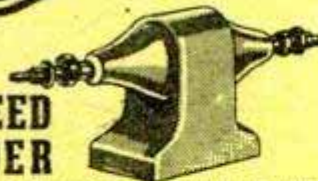




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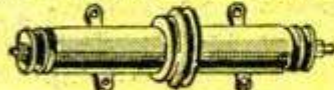


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150 ft. reels, 3 wire #6 with 4, 60 amp Crouse & Hines connectors—2 male & 2 female. Perfect for welders, hay loaders, saws, electric ranges, etc. List price **\$65.00** \$190. per reel. OUR PRICE **\$65.00** (Stock #313)

## JARVIS GRINDERS



2 HP, 60 cycle, 220-440 volt, 3450 RPM. Totally enclosed G.E. motor with 6 ft. flexible shaft. List price **\$285.00**. Used—like new. **\$85.00** (Stock #326)

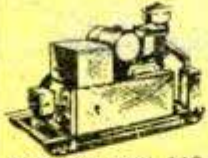
AS ABOVE with 1 1/2 HP motor **\$75.00** (Stock #330)

AS ABOVE with 1 HP motor **\$65.00** (Stock #331)



## All Bronze GEAR PUMP

All bronze corrosion resistant gear pump. Will lift water 25 ft. Will deliver 1020 gal. per hour at 1200 RPM. Develops 110 lbs. pressure or 250 ft. head. Self-locking packing nuts, drain cock, reversible head. Will pump brine, salt water, oil, vinegar, gasoline, etc. Dimensions: 10" L x 7" H x 5 1/2" W. Base holes 1 3/4" x 3". Shaft 1 1/16", 1" x 1" inlet & outlet. Wt. 24 lbs. Mfg. by Sherwood Brass Works. Requires 1/2 to 3 HP motor. \$80. value for only **\$2495** now (Stock #314)



## AC ARMY LIGHT PLANTS

New 750 watt 110 volt 60 cy. light plant with Briggs-Stratton model AP gas engine. (Stock #315) **\$145.00**

New 1000 watt 110 volt 60 cy. light plant with Briggs-Stratton model BP gas engine. (Stock #316) **\$175.00**

New 2500 watt 110 volt 60 cy. light plant Briggs-Stratton model Z 6 HP gas engine. (Stock #317) **\$265.00**

Rebuilt 5000 watt 110 volt 60 cy. light plant with automatic remote control. Powered by Jeep 4 cyl. gas engine. Rebuilt like new and guaranteed. (Stock #318) **\$625.00**

10,000 watt 110 and 220 volt 60 cy. light plant with automatic remote control. Powered by Jeep 4 cyl. gas engine. Rebuilt like new and guaranteed. (Stock #319) **\$725.00**

## PORTABLE DC LIGHT PLANT

3000 watt 110 volt DC powered by new 6 HP Briggs-Stratton model ZXP gas engine. Rebuilt generator. Generator alone lists at \$243.00. Has volt meter, rheostat, 4 female plugs, and ball bearing 2.75 x 10 rubber wheels. Guaranteed. (Stock #320) **\$165.00**

## GENERATORS

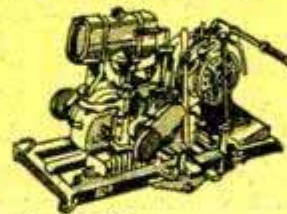
DC—3000 watt, 110 volt. Has voltmeter, rheostat & 4 female plugs. Lists at \$243.00. (Stock #321). OUR PRICE **\$60.00**

AC—750 watt 110 volt 60 cycle with voltmeter, rheostat, 3/4" shaft. Dimensions: 9"H x 12"W x 13"L. Wt. 52 lbs. Shielded to prevent radio interference. Mfg. by Eicor. \$125.00 value. **\$49.50** OUR PRICE, new (Stock #322)

DC—300 watt, 12 volt, 2000 RPM. Heavy duty, with current cut-out relay, high and low switch, 30 amp meter, charge and discharge, Mfg. for the Army by the Marathon Elect. Co. Can be used for boats, trucks, tractors, light plant, wind mills, cabins. 3/4 HP gas or 1/2 HP electric motor will drive it. Sleeve bearings. Dimensions: 11 1/2"L x 10 1/2"W x 7"H. Base holes 4 3/4" long, 6" wide. Can be bought less shaft and base to be used direct mounted to Briggs-Stratton 1 HP engine. (Stock #323) **\$7.00** new Complete with base, shaft and bearing. (Stock #324) **\$15.95** new

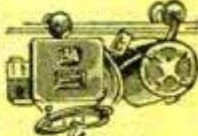
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Stock #303

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5 to 7 HP model ZXP... list price \$102.00. OUR PRICE **\$137.00** (Stock #309)

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Heavy duty, designed to pump water, oil, gas, lime, etc. Will pump 35 gal. per min. Also used as vacuum pump. 3/4" outlet and inlet on bottom. Dimensions: 7 1/2"W x 5"D x 7"H. Compact and sturdy. Four mounting holes in base. Can be used with 1/4, 1/3, or 1/2 HP motors. Ship. wt. 17 lbs. (Stock #325) only. **\$16.95** new



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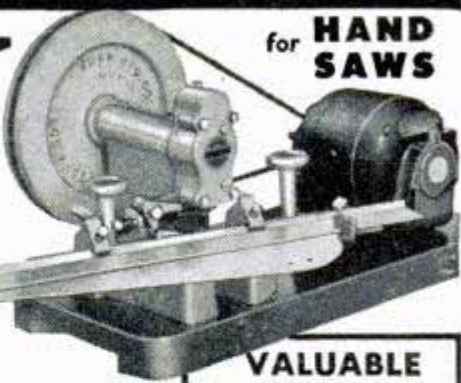
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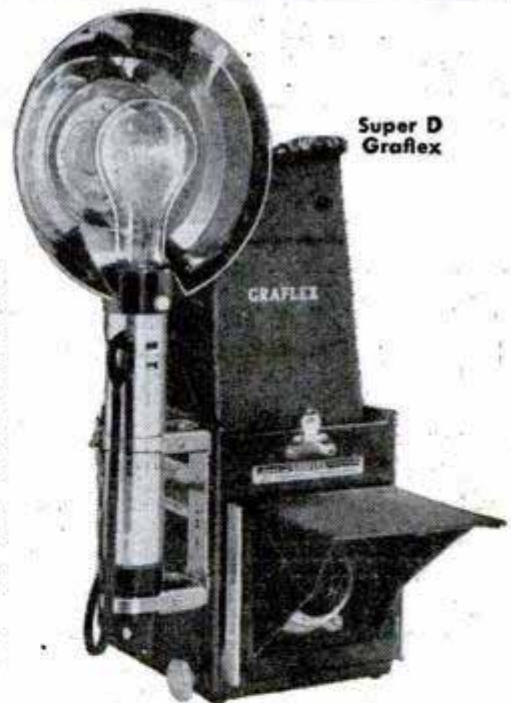
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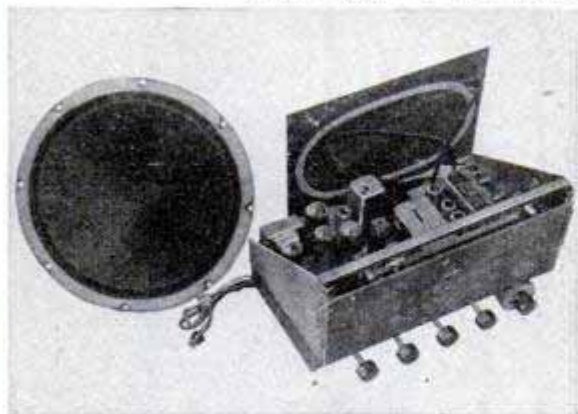
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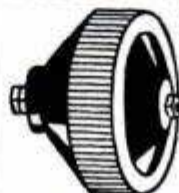
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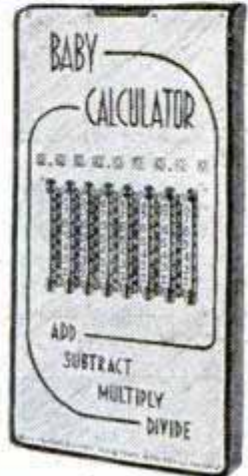
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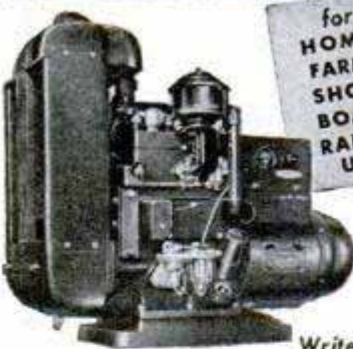
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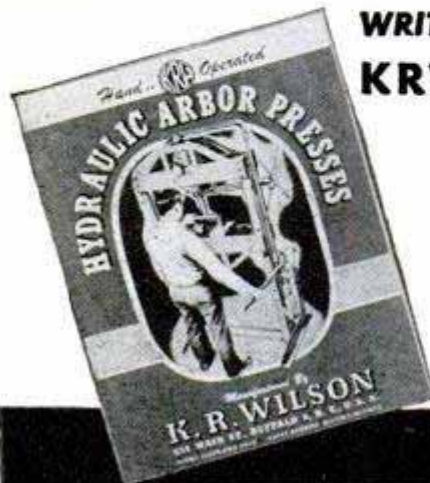
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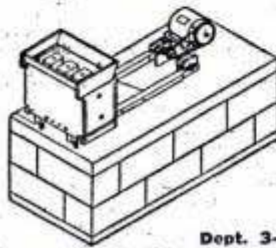
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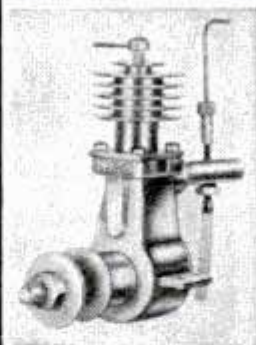
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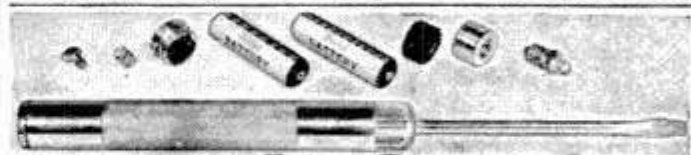


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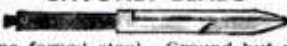
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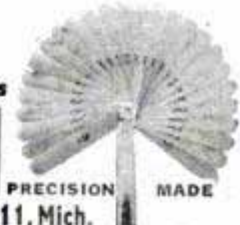
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With  
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These magnificent 7x50 prism binoculars were obtained through the Supreme Commander of the Allied Powers. They have the brilliant luminosity, precise clarity, and wide, undistorted field of view obtainable only with a good large glass. Because 7x50 glasses give the highest performance obtainable they are now the official choice of the Army, Navy and Marine Corps. This is your opportunity to purchase a brand new 7x50 AT 1/3 OF THE USUAL COST. Lifetime construction. Lightweight aluminum body. Ultra-precise optics, sealed against moisture and dust. Unsurpassed by any other binoculars, regardless of price. Sold with a guarantee of complete satisfaction or money refunded.

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ALUMINUM or CARDBOARD DRAWERS



32 DRAWER  
MODEL PICTURED  
ONLY  
**\$5.95**  
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SO HANDY  
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HANDY WAY TO KEEP SMALL PARTS, NUTS, WASHERS, BOLTS, NAILS, SCREWS, STAMPS, PHOTO SUPPLIES, HOBBYIST'S NEEDS, ETC.

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**\$8.95** POST PAID

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### SPECIFICATIONS

6" DEEP  
12 3/4" WIDE  
15 1/4" HIGH

### DRAWER SIZE

1 1/4" DEEP  
2 3/4" WIDE  
6" LONG

6" DEEP  
25 1/2" WIDE  
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6" LONG

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### WITH HEAVYWEIGHT CARDBOARD DRAWERS

Suitable for most home uses. Heavy reinforced cardboard with kraft covering. Metal drawer pulls.

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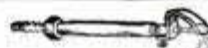
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6,000 B.T.U. attaches to any gas hose; furnished with 2 jets for natural and bottled gas; equipped with adjustment set screw. **\$2.00** Postpaid



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Jet Power, Self-Acting (Pat. pending), 24,000 B.T.U. for natural and bottled gas, industrial and home use. **\$2.00** Postpaid

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**MAKE THINGS FOR THE HOME or FOR SALE**

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CUTS RAPIDLY AND CLEANLY THROUGH WOOD AND OTHER MATERIALS . . . AN IDEAL GIFT!

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Operates on 110 volt Alternating Current: 50 to 60 cycle.



Machine Measures 11x4x3 1/2" High. Throat 7" Deep. PATTERN FREE. Postpaid **ONLY \$4.95**

COMPLETE SAW outfit as illustrated with transformer and 12 spare blades. READY TO USE.

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## GN 58

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No. 215. Western Electric 24 Volt input, 220V at 60 MA out. With filter assembly. Ship. weight, 6 lbs.



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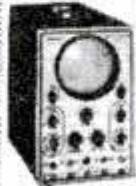
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# HEATH COMPANY BENTON HARBOR 17, MICHIGAN



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NEW. Rugged, comfortable. Reversed uppers, full oak leather inner sole, extra composition outer sole. Add 22c post.



67012

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13.99

B-15  
STYLE



SIZES  
34  
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46

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6 TO 12



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PARACHUTE CORD PER HANK  
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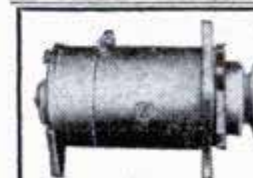
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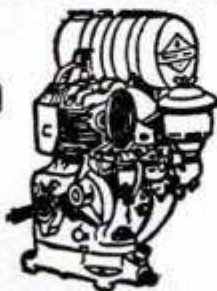
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Ship. wt. 13 pounds

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PILLOW BLOCKS

Ball Bearing

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3/4 \$4.25

2 1/2 x 8 \$9.45 pp.

2 5/8 x 11 \$18.75 pp.

3 inches between collars

C4-1/2 \$14.25

C5-5/8 \$14.25

C6-3/4 \$15.25

D8-1 \$23.00

B25-1 1/2 x 2" capflange mounts \$5.95

Ball Bearing

1/2 \$3.50

5/8 \$3.50

3/4 \$4.25

2 1/2 x 8 \$9.45 pp.

2 5/8 x 11 \$18.75 pp.

3 inches between collars

C4-1/2 \$14.25

C5-5/8 \$14.25

C6-3/4 \$15.25

D8-1 \$23.00

B25-1 1/2 x 2" capflange mounts \$5.95

Ball Bearing

1/2 \$3.50

5/8 \$3.50

3/4 \$4.25

2 1/2 x 8 \$9.45 pp.

2 5/8 x 11 \$18.75 pp.

3 inches between collars

C4-1/2 \$14.25

C5-5/8 \$14.25

C6-3/4 \$15.25

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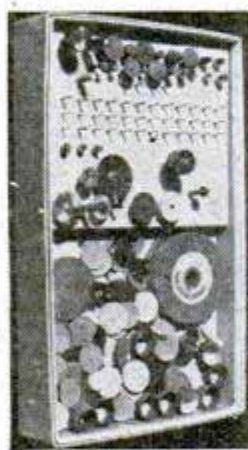
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The only drills expressly made to drill holes up to 1/2" Dia. in wood with 1/4" electric drills.

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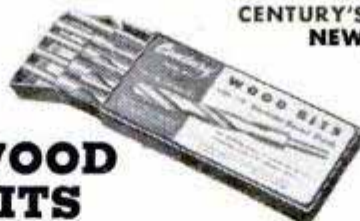
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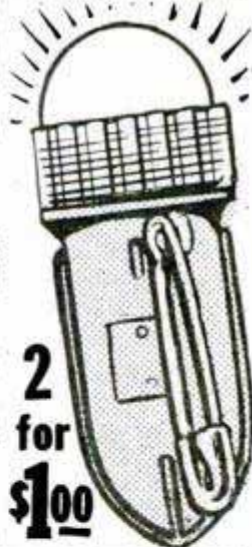
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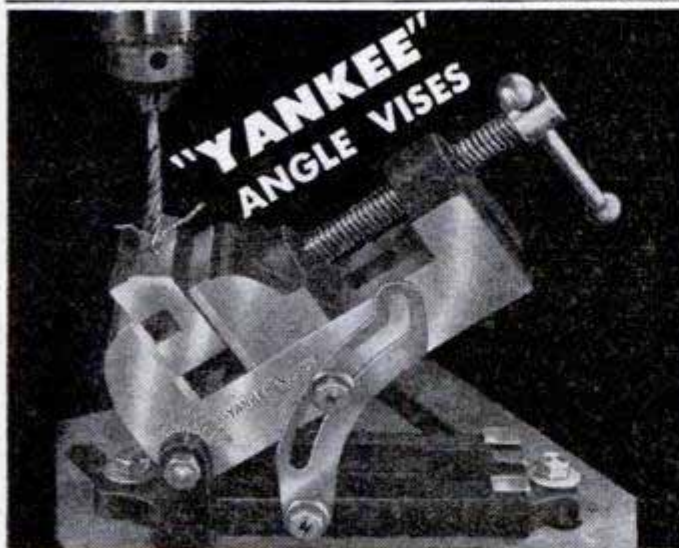
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Enclosed is 25c. Please send me your complete catalog on Porter dual tone and Porter "Life Time" mellow tone mufflers.

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# Flex-O-Shaft

HANDLES LIKE  
A PEN\*

**\$35<sup>00</sup>**



Flex-O-Shaft is an improved all-purpose machine for homes, schools, shops, or factories. The slender, light-weight aluminum hand piece is ideal for grinding, drilling, sawing, buffing, scoring, etching, polishing, and scores of other uses. There is no bulky, throbbing, pulling motor in your hand. The light-weight motor can hang on the wall, or can be set down on working table. Speed is controlled by foot-operated rheostat, leaving hands free. This precision ball-bearing tool is as easily guided as a pen, speeding up operation because of ease in handling. It is a wonderful, compact, power house for making all kinds of objects. This unit consisting of Flex-O-Shaft with 6-ft. cord, 1/16 H. P. Motor, Rheostat with cord and plug, all for \$35.00. Send for complete information today! Use coupon below. Men will appreciate this unique Tool Kit as a Christmas gift.

Flex-O-Shaft and complete Tool Kit with 66 accessories only

**\$50<sup>00</sup>**



**FLEX-O-SHAFT SALES CO. (Dept. C)**  
Prairieview, Illinois

- Please send complete information on the Flex-O-Shaft Kit.
- Please send one Flex-O-Shaft Kit. \$50.00 enclosed. Shipping charges C.O.D.

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**Say You Saw It in Popular Mechanics**

HOW FAR  
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CAR GO?



Truck and Fleet Owners Stretch Car Miles, Prolong Motor Life, Cut Engine Repairs and Save Gas and Oil with

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PRICE  
**\$2<sup>80</sup>**

The Original **E-Z**  
DRILL SHARPENING FIXTURE  
(PAT. NO. 2,411,609)

Sharpens drills 3/32" to 1 1/2" dia. to factory precision in 30 seconds. Made of cold rolled steel (no pot metal). Aluminum protractor. Production or home workshop.

**E-Z MFG. CO.** 4406 San Fernando Rd. Glendale 4, Calif.

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The best signal-powered set ever offered. Single control actually separates stations, even in large cities! New circuit developed by leading electronics company. Costly precision parts—Germanium detector, Leitz coil, modern capacitors. Beautiful durable enclosed cabinet 2 1/2" long! Uses no batteries or electricity—lasts indefinitely—reception guaranteed. Set alone with leads and directions, \$3.60. Trim single headset included \$1.00 more. Foreign orders 10% extra, prepaid only.

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## SPECIAL OFFER ON ELECTRIC MOTORS

1/15 HP capacitor induction type motors available now complete with cord, plug, condenser, and mounting plate. This 115 volt, 60 cycle, single-phase motor develops 1600 RPM. Mfg. by Eastern Air Devices. Price: 1 to 12 motors, \$5.75. 12 or more, \$5.25 each. Take advantage of this special offer! FOB Los Angeles. Send cash, check, or money order. No C.O.D.



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**PALMGREN** ROTARY, INDEX, MILLING TABLE

Has 8" table, 360° movement and 4" cross feed travel. Adjusting wheels and dials graduated in degrees and thousands. Slotted for bolting to table. No. 83 Priced \$49.50. No. 82 without rotary feed \$39.75.

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# See the IMPROVED SALSBURY MOTOR SCOOTER

Dependable—6 H. P. Engine  
Easy to Drive—Automatic Shift  
65 or more miles to the gallon

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DEPT. PM-12 POMONA, CALIFORNIA







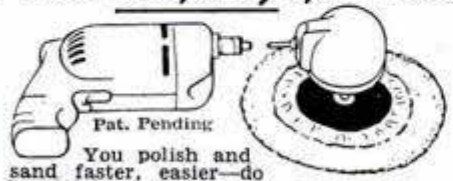
SANDING

The only attachment for angle-head electric drilling.

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**Why Pay More and Get Less? Only the BULL BUFFER**

*Has everything you want in a polisher-sander!*



You polish and sand faster, easier—do beautiful, professional work—with this amazing attachment for your electric drill. (You can also drill up to 1/2" with your 1/4" drill and at right angles never before possible!) Bull Buffer more than pays for itself the very first time you make your car, floors, woodwork, furniture gleam like new. It's built of lifetime materials and *guaranteed*. Thousands and thousands of satisfied users. At your dealer or send cash, check or money order for your Bull Buffer, complete as pictured. Only

**\$9.95**

1. Fits any chuck on an electric drill or flexible shaft—no extra power unit to buy!
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3. Only Bull Buffer has *swivel action*—turns in complete circle when drill is stationary!
4. Only Bull Buffer has *angle head* for electric drill—gets to all hard-to-reach surfaces, curved or flat!
5. Only Bull Buffer has 3 speeds\*—“same as,” 1/2-speed, or twice speed of your drill!

\*See description under photo of Bull Buffer kit.

*Special priority given Christmas orders—just let us know.*

**BERTRAM H. ENGINEERING CO.**  
3121 MAIN ST. Dealers Write for Information KANSAS CITY, MO.



Bull Buffer comes complete with sheepskin bonnet and two sanding discs, only \$9.95. Bull Buffer alone cuts drill speed 1/2; for direct drive (or “same as”) drill speed, order Adapter A with Bull Buffer; for twice drill speed, order Adapter B.

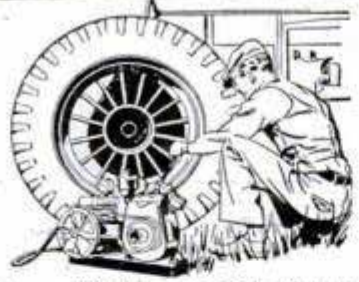
**ORDER THESE ACCESSORIES FOR YOUR BULL BUFFER**

1/2" Jacobs No. 6425 key chuck; increases 1/4" drill to 1/2" capacity—reduces speed, increases power.....	\$5.00
Extra sanding discs (000-00-0-1-2 1/2-3-4) each .....	.10
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Adapter B Set—for sanding at twice drill speed.....	2.00
Bull Buffer car cleaner.....	.50
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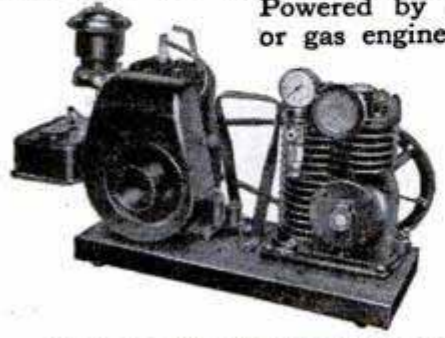
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**Y**OU have never seen a single cylinder portable air compressor that packs so much power as this one. Built by the makers of the famous 4 cylinder Pressure Queen, the Princess will do any job, from inflating tires to painting buildings. Compact, simple and rugged, it will last your lifetime and pay for itself over and over again.



Powered by electric motor or gas engine.



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SAY YOU SAW IT IN POPULAR MECHANICS

**No More Stalling on Icy Streets!**



**GET GOING QUICK WITH AMAZING NEW**

**MAGIC ICE CARPET**

4-PLY KNITTED GALVANIZED STEEL WIRE



**Grips the road! Gives your spinning wheels traction! Save time and expensive towing charges. Just slip a strip of MAGIC ICE CARPET in track of each of your rear wheels—and get rolling in a jiffy!**

**ICE ON THE WAY—DON'T DELAY!**

**EASY TO USE, AGAIN AND AGAIN!**

*An Ideal Xmas Gift!*

Only **\$1** per pair

LETRAW MFG. CO. Dept. P 229 W. Illinois St., Chicago 10 Add 25c for postage and handling.

Rush me.....pairs of amazing MAGIC ICE CARPET at \$1.00 per pair, (No C.O.D. orders, please).

Name.....

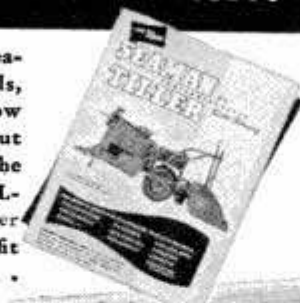
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Write for our latest illustrated Seaman Tiller Bulletin NST. It tells, in Seaman users own words, how they have increased crop yields, cut costs and increased profits with the help of SEAMAN ROTARY TILLAGE. It tells how the Seaman Tiller prepares an ideal seedbed . . . to fit your crop and soil conditions . . . providing fine pulverization, coarse, or "in between." Learn, also, how you can use this machine for soil aeration, conserving and holding moisture in the seedbed, weed and pest control, pasture renovation, erosion control mixing-in cover crops and fertilizer for more effective plant utilization, etc. Seaman farm-size Rotary Tillers are available in 20 different models, (gas- or diesel-powered and power take-off types), in 3 ft. to 7 ft. tillage widths. Write for Bulletin NST today!



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**\$1.98** per 24 ft. length

New Government surplus. Resistant to oil, gas, grease. Two-ply, made to exact government specifications. Superior even to highest grade air hose. Can be coupled to any desired lengths. Complete with standard fittings — \$2.57.

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Bendix-Westinghouse with all accessories — for home or commercial use. Built to rigid government specifications.

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Non-rusting stainless steel; 12" diameter, 24" length; 10 gallons liquid capacity; holds up to 400 lbs. safe air pressure. Write for description of hundreds of uses and list of accessories.

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Not Connected with Firms of Similar Names

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Car owners who are wasting money and not getting proper gas mileage due to over-rich mixtures will be pleased to learn how to save gasoline by **VACU-MATING** over-rich mixtures. **VACU-MATIC** fits all cars, trucks and tractors. It is **automatic** and operates on the supercharge principle. Easily installed in a few minutes.

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Send name, address on penny postcard for free particulars and how to get yours for introducing.

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### The Voice of Authority on The Highway

One blast and those "road hogs" really move over. Superette Horns compare favorably to air horns costing \$75 to \$100. Can

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Kit contains carved hull and complete set of fittings. Send today for kit #1225 which will be sent postpaid for \$15.00. Our 40 page illustrated catalog mailed on receipt of 25c.

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smooth sparkling surfaces



NOW . . . the Home Worker can cover his Sinks — Counters — Tables and Bars with colorful hardwearing decorative Laminates.

## EASY TO APPLY

This tough, durable plastic comes in panels 1/16" thick and is the same superlative surface you have seen on modern kitchen tables, cabinets, and in high-class restaurants. Ideal for splash panels in bath rooms and kitchens. Countless other uses. This plastic top is washable—color fast—highly resistant to stains, alcohol, abrasion and cigarette burns.

**10 BEAUTIFUL COLORS**—Linen: tan, red, blue, green. Patterns: bleached mahogany, mother of pearl. **Solid Colors:** red, green, blue, yellow, black.

Instructions for easy application included.

Shipped prepaid east of the Mississippi; west of the Mississippi add 90c per panel. Send check or money order.

Price for 30" x 48" panel

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# BALL BEARING STEEL WHEELS

Complete With Wheels, Tires & Bearings Made To Outwear Other Type Wheels

SIZE	TIRE	BEARINGS	LOAD Lbs.	ONE	TWO	FOUR
6" x2"	Solid	Ball 1/2", 5/8"	300	\$ 3.25	\$ 6.25	\$12.00
8" x2"	Solid	Ball 1/2", 5/8"	250	\$ 4.25	\$ 8.00	\$15.50
10" x1 3/4"	Semi-Pneu.	Ball 1/2", 5/8"	125	\$ 3.00	\$ 5.50	\$10.50
10" x2 1/2"	Semi-Pneu.	Ball 5/8"	250	\$ 5.50	\$10.00	\$19.00
12" x2 1/2"	Semi-Pneu.	Ball 1/2", 5/8"	150	\$ 5.50	\$10.50	\$20.00
12" x2 3/4"	Semi-Pneu.	Ball 1/2", 5/8"	225	\$ 5.75	\$11.00	\$21.00
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16"(4.00x8)	Pneumatic	Roller 3/4"	520	\$12.50	\$24.50	\$48.00
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NOTE: Other wheels from 3" dia. to 23" with loads from 100 lbs to 1700 lbs. in fibre, solid rubber, semi-pneu., pneumatic 2 to 8 ply, axles to match.

**ORDER NOW** Add 10% for Prepaid Shipment in U.S.A. 25% DEPOSIT ON C.O.D. ORDERS

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## The New 1949 Model "E" CHASSIS

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36" Wide x 76" Long

COMPLETELY ASSEMBLED with 14" Steering Wheel and Dual Brakes  
**READY TO RIDE**

12" x 3" Wheels Semi-Pneumatic Tires  
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**340 lb. Load Per Wheel**

Arranged For Chain Drive With Sprocket Attached. Will take up to 4 H.P. Engine.

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**1/2 H.P. Cap.**  
INCLUDES ALL THE WORKING FEATURES AND SAFETY FACTORS NECESSARY FOR AN IDEAL HOME WORKSHOP MOTOR

**ONLY \$35.00**  
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- Double 5/8" Shafts
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GUARANTEED FOR ONE YEAR. ON NON-CONTINUOUS DUTY

Tool Jobs Rated 1 hour 55 C. 115 V. 60 C., A.C., 1750 or 3450 RPM

**Here's a Real Boys Christmas Gift**  
**A GENUINE TRAINING REPLICAS**  
of the U. S. ARMY'S OFFICERS CARBINE RIFLE



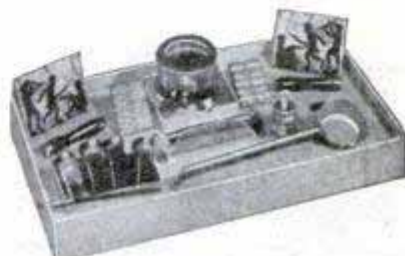
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\$11.80



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Made in widths from 1/8" to 1-3/4"

Make your band saw do more work for you. The proper width of blade will extend the scope of this important machine. Burrill's Paramount Blades are made from tough Nickel Alloy Steel properly tempered. Teeth accurately set and filed, and all saws carefully straightened. Send order and check today. Delivery will be made as promptly as conditions permit, from a few days to a week or two. You can obtain these saws at the following prices:

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Your satisfaction is guaranteed

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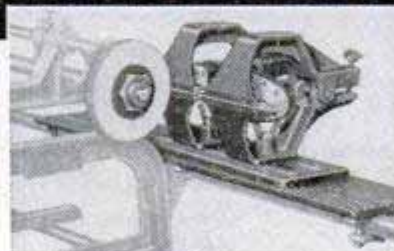
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The simple sensible Red-i-Kut way as thousands have - **SAVE HALF. SHOP TESTED PLANS "SPIRIT OF THE CENTURY"** - Narrow waist 83" tall or stately **"SPIRIT OF AMERICA"** - straight side model with pictures. **EASY-TO-FOLLOW PLANS** tell all - plus **BROCHURE** of fine brass weight Westminster, tube chime, movements, dials and mahogany case kits. Send **\$1.00** today - Both Plans **\$1.50 NOW**. **KUEMPEL CHIME CLOCK CO.**, #10 Kuempel Bldg., Minneapolis 16, Minn.

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Skates

WITH IDEAL  
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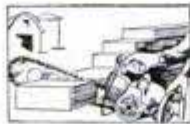
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POUNDS OF  
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Hundreds of case histories prove that a man with a Woodboss Saw is always in demand. You and Woodboss can earn \$200 to \$300 a week! Contract logging or sawing for city, county or construction companies; contract falling and bucking, cutting cordwood, to mention a few. *Be your own boss with a WOODBOSS*

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SLIP A CARBOLOY MASONRY DRILL INTO  
YOUR ROTARY DRILL, HAND BRACE OR  
DRILL PRESS AND WATCH IT GO—AND  
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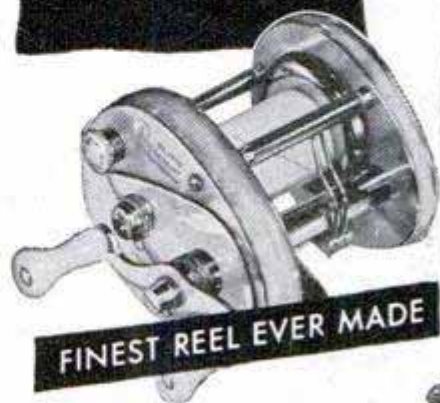


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than the hard-  
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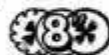
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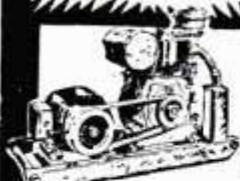
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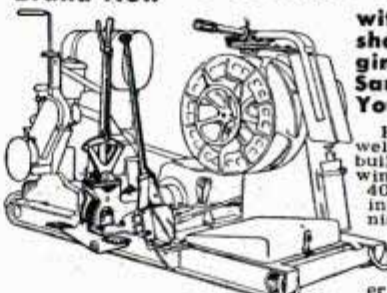
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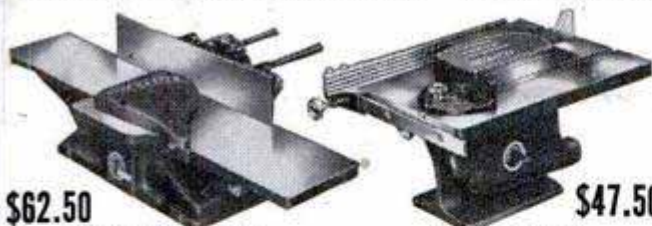
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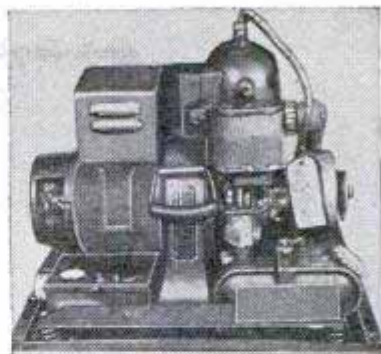
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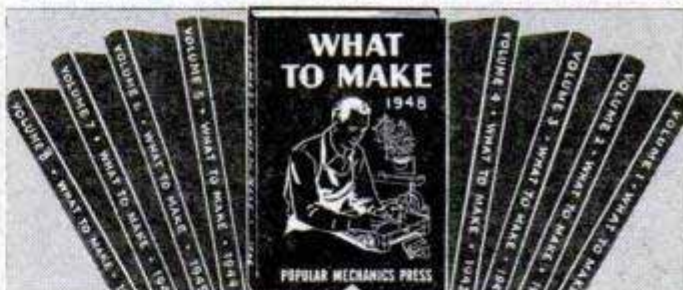
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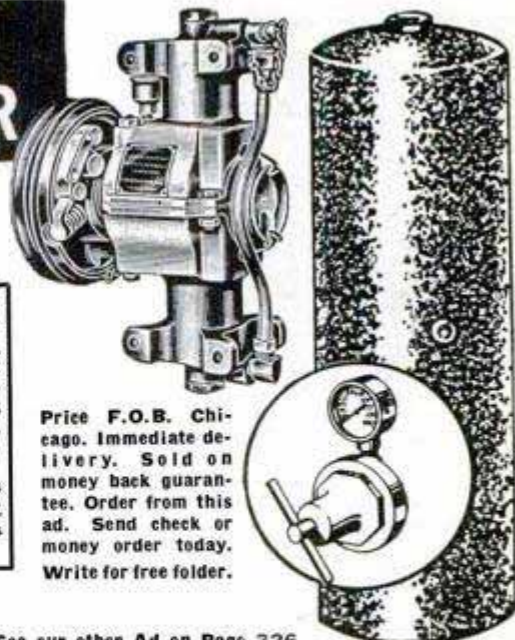
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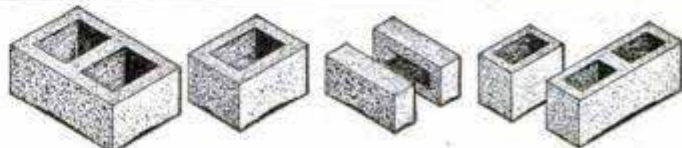
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# GAGETEER TOOL KIT

So ideal for fishermen, hunters, householders, mechanics, professional men, etc. . . .

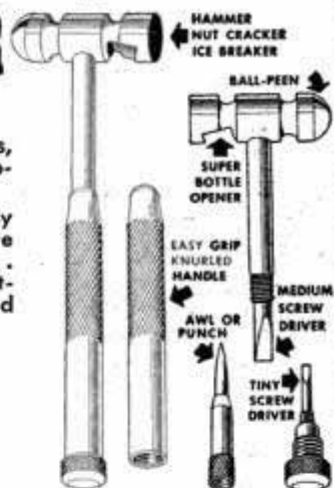
A "Quickee," compact, handy Tool Kit, always ready, to serve in so many everyday needs . . . It's 5 inches long and rust-proofed. Made of hardened steel . . .

**MAKES AN ORIGINAL  
XMAS GIFT . . .**

Sent postpaid upon receipt of  
**\$1.00**

No COD'S or postage stamps. . . . Money cheerfully refunded if not satisfied.

**THE McINTYRE CO.**  
Dept. P-1168  
209 S. La Salle St., CHICAGO 4, ILL.



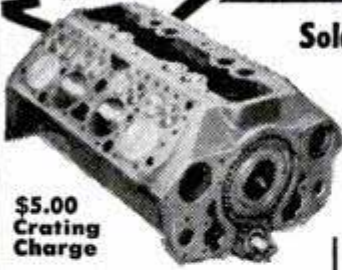
**GIVE YOUR FORD OR MERCURY THAT CUSTOM LOOK**  
Install a pair of our Polished Aluminum Head Covers. Fits all 24 stud motors from 1938-1948—10 minute installation—  
Only **\$3.95** pair  
**TARZIAN AUTOMOTIVE**  
730 ELLIS STREET SAN FRANCISCO, CALIF.

**BUILD OR BUY A Rotary SNOW-PLOW**  
**No More Strenuous Snow Shoveling!** PLAN 35¢  
Clean off your snow the easy LeJay Way. It is easy to build your own Snow Plow. Operates from small gas engine or electric motor. Cleans an 18 inch path. Swirls the snow to either side. Plan is thorough and easy to follow. Enjoy making one of these Snow Plows from new or used parts. Mail 35¢ today for complete plans and catalog.  
**LEJAY MFG.**  
247 LeJay Bldg. Minneapolis 8, Minn.



Carries the Same 90 DAY GUARANTEE As a New Motor Assy.

## Our Finest Precision REBUILT MOTOR BLOCK ASSEMBLIES



\$5.00 Crating Charge

### Sold Outright or Exchange

Rebuilt by skilled mechanics. Assembly has Reborn Block with New Pistons, Pins, Rings, Reground Crankshaft, all New Bearings. Guaranteed 90 Days. Allowance on Old Motor We ship at outright price. Send your motor prepaid, must be suitable for rebuilding. Send in notarized bill of sale showing title number if any. We refund difference when we receive your motor.

<b>BUICK</b>	Outright	Exch.
34-47 8 cyl.	\$219.00	\$175.00
<b>CHEVROLET</b>	Outr.	Exch.
29-47 6 cyl.	135.00	105.00
<b>CHRYSLER</b>	Outright	Exch.
34-47 6 cyl.	174.50	142.00
35-47 8 cyl.	219.00	175.00
<b>DE SOTO</b>	Outright	Exch.
34-47 6 cyl.	174.50	142.00
<b>DODGE</b> —3 1/4" bore	Exch.	
33-47 6 cyl.	165.00	130.00
3 3/8" bore	Outright	Exch.
34-47 6 cyl.	174.50	142.00
<b>FORD</b>	Outright	Exch.
28-31 4 cyl.	129.00	97.00
32-34 V8	149.00	119.00
35-47 V8	169.00	119.00
37-39 60 HP.	169.00	119.00

<b>HUDSON-TERRA</b>	Outright	Exch.
35-36 6 cyl.	\$191.00	\$147.00
37-42 6 cyl.	209.50	159.50
<b>LINCOLN-ZEPHYR</b>	Outr.	Exch.
36-37 also fits 38-39	252.00	202.00
39-40	394.00	244.00
<b>MERCURY</b>	Outright	Exch.
39-47 V8	169.00	119.00
<b>Oldsmobile</b>	Outright	Exch.
37-47 6 cyl.	187.50	147.50
35-47 8 cyl.	219.00	175.00
<b>PLYMOUTH</b>	Outr.	Exch.
1932 4 cyl.	149.00	124.00
33-47 6 cyl.	160.00	130.00
<b>PONTIAC</b>	Outright	Exch.
37-47 6 cyl.	187.50	147.50
35-47 8 cyl.	219.00	175.00
<b>Studebaker</b>	Outright	Exch.
35-47 Comm.	191.50	147.50
39-46 Cham.	169.50	136.50
35-47 8 cyl.	219.00	175.00

### 60 HP. JEEP Engines



\$5.00 Crating Charge

Reconditioned, Tested and Guaranteed in perfect running order and ready to run. Every part is checked to be perfect and carries a 90 Day Guarantee same as a new engine.

**COMPLETE** with . . . Generator, Starter, Distributor, Coil, Fan and Fan Belt, Water Pump, Fuel Pump, Intake and Exhaust Manifolds, Carburetor, Oil Filter, Spark Plugs, Flywheel, Clutch and Pressure Plate, Wiring.

Outright, PG58R-003, Ea. **\$179.50**

SEND 25% CASH WITH ORDER, BALANCE C.O.D.

### JEEP FRONT FLOOR MATS

Rubber with Felt Back. For all Jeeps. Ea. **\$3.95**

**J.C. WHITNEY & Co.**  
1917 Archer Ave. Chicago 16, Ill.

1935-48 FORD V8 & 1939-48 MERCURY

### DUAL MUFFLERS

Increases power. Reduces back pressure. Saves gas. MD20N-208—Complete Set **\$17.95**

## NEW CONVERTIBLE TOPS

Choice of Black or Tan. All Tops Tailor Made for Easy Installation. Instructions for Simple Installation with Each Top

As Low as **\$24.95**



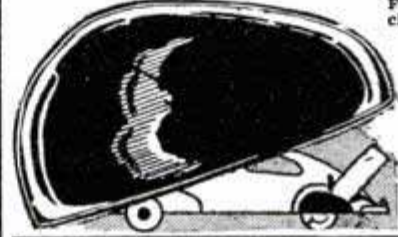
### "ZIPPER TYPE" REAR CURTAIN

Each top packed complete and consists of main top proper, rear curtain and all needed binding and fittings. (Glass is not supplied—use glass from top being replaced). Best quality, laboratory tested—equal to or better than the original. All metal parts are of heavy bright chrome plated rust resistant. Tops are heavily stitched with treated thread and sewed for durability and appearance.

Car	Year	Price	Car	Year	Price
BUICK	1936-48	\$41.75	Hudson also		
CADILLAC	1936-48	41.75	Terra. to '38	1936-40	\$39.95
CHEVROLET	1936-48	39.50	HUDSON	1941-47	46.95
CHRYSLER	1935-38	33.00	LASALLE	1936-40	41.75
CHRYSLER	1940-48	39.50	MERCURY	1939-42	37.95
DE SOTO	1938-38	33.00	MERCURY	1946-49	39.95
DE SOTO	1940-48	39.50	NASH & LAFAYETTE	1937-41	39.95
DODGE	1935-38	33.00	OLDSMOBILE	1936-48	41.75
DODGE	1940-48	39.50	PACKARD	1936-48	45.95
FORD			PLYMOUTH	1935-39	33.00
1928-31 Roadster & Cpe.	24.95		PLYMOUTH	1940-48	39.50
1933-39-Rdstr. & 2 pas. Cpe.	33.00		PONTIAC	1936-48	41.75
1928-39-Phaet. & Sedan	42.95		STUDEBAKER 1948		44.15
1936-42-5 Pas. Cib. Cpe.	37.95				
1946-48-6 Pas. Cib. Cpe.	39.95				

NOTE: Specify color wanted also Model or Series. Body Style, Year & Make when ordering.

### FENDER SKIRTS for Modern Beauty



For most makes of cars including '49 Ford & Mercury. Made of all metal, prime finish, with Rubber beading to prevent rattle. Easy to Install.

MC31N-9  
Per Pair **\$12.95**  
Be sure to specify year, make & model of car.

### GUTTED MUFFLERS FOR ALL CARS



Gives that Motorboat Tone  
MD20N-210  
Universal type to fit all cars. **\$4.95** ea.

Say You Saw It in POPULAR MECHANICS

## BUILT TO LAST HANDSOME RUGGED

Your Third Driving Eye! Wide View of Rear Traffic

Send For It TODAY!

**SUPER-VU \$1.95**

### Side View Mirror

Beautiful, durable, theft proof. Four way swivel adjustment; ball joint fully weathersealed; mirror has polished stainless steel back for protection against rust. Clamp will not mar, holds arm rigid. 5" dia.



- A. Non-glare glass sealed against moisture.
- B. Extra large tripod base. Full theft protection.

**ORDER NOW: E. M. DIETRICH**  
13619 Maple Ridge Detroit 5, Mich.  
Postage prepaid with check or money order

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## Ball-Bearing SPEED WHEELS



### JUVENILE WHEELS

(No bearing, solid tires)

4"	45c	6"	65c
7"		7"	75c

(Semi-pneumatic tire, ball bearing)

6x1	1.65	8x2	2.20
8x1.25	1.85	10x1.25	2.20
8x1.75	1.95	10x1.75	2.30
12x1.75	3.45		

### INDUSTRIAL WHEELS FOR HEAVY LOADS

6x2 Welded	3.45	10x2.75 HC.	5.70
6x2 Bolted	4.35	10x2.75 Pne.	7.60
8x1	5.25	12x2.00	6.90
8x2.00	5.20	12x3.00	10.60
8x2.50	5.40	4.00x8-2	14.70
10x2.00	6.10	4.00x8-4	15.85
16x4.00	15.15		

DEALERS, JOBBERS, AND MANUFACTURERS! OUR NEW PRICES WILL INTEREST YOU.

WRITE US NOW FOR COMPLETE NEW CATALOG  
Send check with order. No C.O.D.

**JIM BROWN TOY COMPANY**  
1097 Home Ave. Akron 10, Ohio



**FOR X-MAS DELIVERY—ORDER AIRMAIL!**



**ELECTRIC HOME-UTILITY TOOLS**

PRODUCTS OF BLACK & DECKER

**NEW ELECTRIC DRILL KIT \$39.95 in U. S. A. (HU-1004)**

Here's what you get with this big kit: 1—Home-Utility 1/4" Electric Drill (HU 1) A.C.-D.C., 110 Volt, Jacobs hex key-type chuck. Weighs only 3 1/4 lbs. Fine for wood, plastics and steel. 1—1/4" Horizontal Stand, 13—High-Speed Drill Bits, 1/16" to 1/4" inclusive, 1—4" Wire Wheel Brush, 1—3" General Purpose Grinding Wheel, 1—3" Cotton Buffing Wheel, 1—Tube of Polishing and Buffing Compound, 1—Wheel Arbor (1/2" Diam., 1/4" Shank), 1—Steel Kit Box with supports to hold all of the above items in place.

**HU-1—1/4" AC-DC DRILL, \$18.95 in U. S. A.**  
**HU-2302, HORIZONTAL STAND ONLY, \$3.35 in U. S. A.**  
**HU-20—1/2" AC-DC DRILL, \$35.95 in U. S. A.**  
**HU-2301—1/2" STAND ONLY, \$17.45 in U. S. A.**



**HU-1—1/4" AC-DC DRILL, \$18.95 in U. S. A.**

**HU-2302, HORIZONTAL STAND ONLY, \$3.35 in U. S. A.**

**HU-20—1/2" AC-DC DRILL, \$35.95 in U. S. A.**



This is the most practical "all-purpose" Electric Drill for all kinds of drilling—in all kinds of material—in all sizes from 1/8" to 1/2" in steel. It drives wood-augurs up to 7/8"; Hole Saws up to 2 1/2". 110 Volt. 375 RPM Jacobs Chuck.

**HU-2301—1/2" STAND ONLY, \$17.45 in U. S. A.**



"DUFAST" Sander attachment for HU-1—1/4" "Home-Utility" Drills No. BDHU-1, \$14.95 in USA. SANDS, BUFFS, POLISHES.

**SANDING AND POLISHING SET—Fits any Drill—\$2.95 Set in USA.** 1—5" Rubber sanding pad with lamb's wool bonnet. 3—Sanding discs. POLISHES CARS, FURNITURE, ETC.



**ORDER TODAY—We'll pay postage in USA if you send full amount, or send \$2.00 now and pay postman balance plus postage.**

**SATISFACTION GUARANTEED**

HEALE'S, 5605 East Beverly Blvd. • PM 12-8, Los Angeles 22, California  
 Gentlemen: Enclosed is \$..... for which please send me  
 Complete Electric Drill Kit  1/4" Electric Drill  Horizontal Stand only  1/2" Electric Drill  1/2" Stand only  Sander attachment  Sanding and Polishing Set .

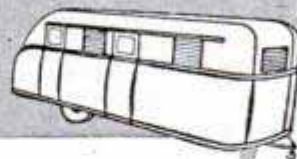
NAME \_\_\_\_\_

STREET \_\_\_\_\_ ZONE \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

**SAY YOU SAW IT IN POPULAR MECHANICS**

**It's EASY!  
ECONOMICAL!**



**Build Your Own Trailer with NATIONAL'S Simplified Plans**

Beat the housing shortage with a full-size house on wheels or add new pleasure to your vacations and week-ends with a sleek sport trailer. Step-by-step instructions and complete bill of materials with every plan. *Three different models.*

**NATIONAL MODEL 27: A 27-ft. luxury liner with 3 rooms, lavatory, sleeping space for six. Plans \$1.00**

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**NATIONAL CAMPER: The sport trailer you've wanted for hunting, fishing, vacations. Sleeps two. Plans .50**

**ORDER ALL THREE—AND GET ONE FREE Complete set \$2.00**

**Big parts catalog FREE with any order!**

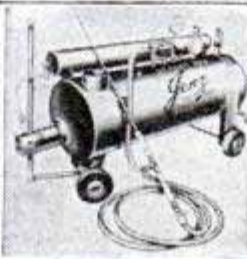
**NATIONAL TRAILER STORES**  
 Dept. 51 • Box 2353 Terminal Annex • Los Angeles 54, Calif.

**W. S. W. Auto Curb Signals**



At last—positive protection against curb damage. No more damaged fenders, dented hub caps, scraped tires from curbs. Make parking a pleasure and a dead cinch. Two flexible, coiled chrome springs attached to front and back fenders touch curb when you park and sound buzzer under dash. Fits all makes of cars and is easily and quickly installed. Factory guarantee. Price only \$4.95. Postpaid for cash or sent C.O.D. Not only beautifies your car but adds many times their cost to its value.

**THE PROTECTUROD COMPANY Dept. 152**  
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**LOW PRICED STEAM CLEANER**

**Jenz Super Chief**

Portable—No moving parts—Cleans anything—Motors—Chassis—Machinery—Floors—Buildings—Remove wallpaper—Dairy & Creamery—Oil Rigs etc. Oil fired—Economic—fully tested and warranted. 75± Steam in less than 10 min. Model 70, Complete as illustrated. **\$276.50**

F.O.B. factory.  
**HI-PURE LABORATORIES EVANSVILLE, IND.**

**AMATEUR ASTRONOMERS AND SURVEYORS**



The ideal "star-spotter" for the amateur astronomer. Gives altitude and bearing at same time. Easy to operate—no conversion. Divides circle in 6400 parts, making triangulation problems easy to solve. Originally used for aiming artillery. Has precision mounted telescope and comes with leather case. Excellent for simple surveying and map-making. Good condition.

**AIMING CIRCLE, with case, FOB Chicago, each \$12.95**

**THE MART, 11 E. Harrison St., Chicago**

**The "GRAB ALL" TOOL The Most Useful Tool in the World!**



**Precision Work On Objects Too Small to Hold in Hands**



**Recovering That Nut That Always Falls Into the Pan**

Truly the Tool of a 1000 uses. Mechanics, Radio and Appliance Repair Men, Hobbyists, Electricians, Machinists, Handy Men—Yes, even housewives say: "Wouldn't be without it." Precision-made of steel. Picks up any-shaped object from hard-to-reach places. Flexible—to work at any angle, around corners, any direction, even S turns. Grips and holds securely by tempered-spring action. Almost a million in use.

Mfg'd Since 1908



**The "GRAB ALL" is guaranteed against ANY Mechanical Defect—with reasonable care it will last a lifetime.**

**ONLY 75c**

If your dealer can't supply you, SEND 75c DIRECT TO FACTORY—WE WILL SEND POSTPAID. C.O.D. ACCEPTED.

**DEALERS**  
 Here is a BIG PROFIT DEAL—write for complete information.

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**Fishing Object From Sink**



**Getting Things Within Reach In the Oven**

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**AN IDEAL AND PRACTICAL GIFT FOR ANY MAN!**

*The New Improved  
All-Purpose*

**DYNAMIC Super Charged ARC WELDER**

Industrial Transformer Type

ONLY  
**\$28.50**  
COMPLETE



**IDEAL FOR AUTO HOME APPLIANCE AND FARM IMPLEMENT REPAIRS**  
WORKS ON IRON, STEEL and other metals. Does work you'd expect from a larger costlier machine. Portable, easily carried. OPERATES from any properly wired 110 Volt Line. Also available for 220 volt current at slight additional cost.

**IT WELDS • IT BRAZES • IT SOLDERS**

EASY TO OPERATE TRANSFORMER TYPE WELDER. If inexperienced you can learn to do professional work by following the SIMPLIFIED WELDING and OPERATING INSTRUCTIONS FURNISHED—comes complete ready to operate with helmet, rods, cable, instructions. SAVE TIME and MONEY—Do your own welding. Just a few repair jobs will pay for this machine. A practical and profitable machine tool for any workshop. Make money doing repair work for others. Write today for full particulars.

**DYNAMIC WELDER CO., Dept. 128-S, 15 E. 23rd St., Chicago 16, Ill.**

**SPECIAL GIFT OFFER! ARC TORCH WORTH \$6.80 YOURS at NO EXTRA COST!**

**TWIN CARBON TORCH** (illustrated) for use with DYNAMIC is unsurpassed for brazing, soldering, pre-heating and cutting iron, steel, brass, bronze and other metals. With it you greatly increase profitable uses of your welder. Does work of oxy-acetylene torch. Comes complete with instructions, carbons and cables. For LIMITED TIME ONLY we are giving a

Twin Carbon Electric Arc Torch worth \$6.80 with every DYNAMIC WELDER. Act now to get this valuable premium at the single low price of welder alone.



**—Mail Coupon FOR FREE FACTS—**

**10-DAY TRIAL OFFER**

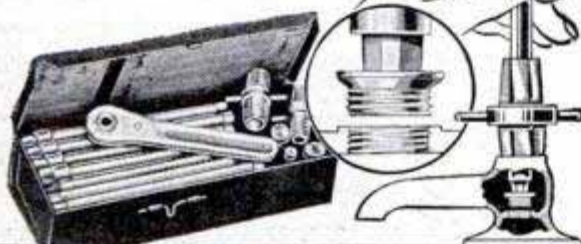
DYNAMIC WELDER CO., Dept. 128-S, 15 E. 23rd St., Chicago 16, Ill. Send me FREE details of your ELECTRIC Arc Torch Gift Offer and Dynamic Welder 10-Day TRIAL OFFER.

NAME \_\_\_\_\_  
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**STOPS LEAKS PERMANENTLY**

Cut your fixture replacement, water and fuel bills with Economy Renewable Seats. Make economical, permanent repairs quickly and easily with the Junior Kit (illus.). Repair bathroom, kitchen and laundry fixtures. Everything you need incased in steel box. This is a natural for the "Fixit" shops—get extra income from making permanent repairs on your customers' faucets.

Senior Master Kit also available—repairs faucets and valves up to 1" pipe. At Better Jobbers and Hardware Stores . . . or Write Direct



**ECONOMY VALVE SEAT CO.**

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**FASTEST PLANER in the WORLD at this Low Price... \$215.00**

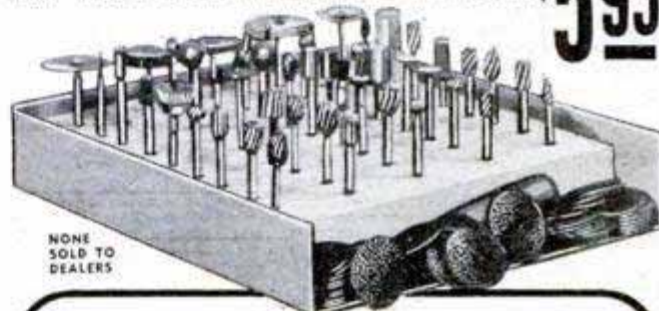
**BELSAW Multi-Duty Planer**

Speed up production! Increase your profits! BELSAW power self-feeds at 24 feet per minute... The lowest-priced surfacer that will handle 12 x 6 in. stock. Planes green or dry sawed lumber into smooth, worked forms. Three high-speed steel knives make 42 cuts per inch. Multi-duty BELSAW takes inexpensive attachments for all planing mill operations—Jointing, Rabbeting, Grooving, Matching. BELSAW is the only 12 in. planer providing attachments for jointing and grinding its own knives. Start planning NOW for BIGGER VALUE and BETTER PERFORMANCE, with BELSAW. Write for FREE specifications, illustrations and low prices.



● LARGER CAPACITY ● FASTER OUTPUT ● KNIFE SHARPENING ATTACHMENT  
**BELSAW MACHINERY CO.**  
B1012 Field Bldg., 315 Westport Rd. Kansas City, Mo.

**MASTER HOBBY ARBOR TOOL KIT AT THE GIVE-AWAY PRICE \$5.95**



NONE SOLD TO DEALERS

3/32nd 1/8 shanks—the best gift you can give to the hobby worker. We give you saws, drills, routers, carvers, emery disks, polishing compound, reamers, borers, shapers, stone polishers, stone points, grinding points. Over 150 pieces that we want out and priced in other stores for over \$20.00 for half of what we sell for \$5.95. After receiving set, if you don't think it is worth at least \$20.00, send it back. Your money refunded.

Send C. O. D., check, cash or money order.

**GENERAL AIRE CO.**

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**START—BUILD 23' CRUISER**

Cut-to-Fit for Quick Home Assembly. Everything Complete Plus Illus. Instructions. No Experience Necessary. Simple as A, B, C.

**ALSO 18 FT. RUNABOUTS, OUTBOARDS, INBOARDS, ROWBOATS & DINGHIES.**



SEND 25c (COIN) FOR ALL COLORFUL ILLUSTRATED CATALOGS SHOWING '49 MODELS

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U-MAK-IT MARINE PRODUCTS

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**M-SCOPE TREASURE-MINERAL LOCATORS**

WRITE FOR FREE, ILLUSTRATED 16-PAGE BOOKLET

M-SCOPE TREASURE-MINERAL LOCATORS. Low priced, unsurpassed efficiency, lightweight models. Factory guaranteed. Immediate shipment. Credit plan available. Write for free 16-page booklet.

GEIGER COUNTERS for finding Uranium ores. Several models. Simple operation. Low priced. Immediate shipment. Interesting free literature.



**URANIUM**

**FISHER RESEARCH LAB., INC., PALO ALTO, CALIF.**

**GOLD**



Thousands of Parts  
For Military

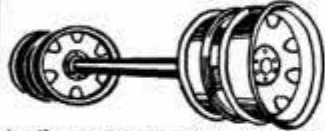
# TRUCKS

We have for immediate delivery genuine parts for all makes and models, 4x2 - 4x4 - 6x4 and 6x6. All models from 1/4 ton to 20 tons. All makes: Autocar, Biederman, Brockway, Chevrolet, Diamond T, Dodge, Federal, Ford, GMC, International, Mack, Oshkosh, Reo, Studebaker, White, Willys and Jeeps. We have parts lists available on some models. Write stating model of Truck.



## TRAILER AXLE

Heavy duty trailer axle suitable for many types of trailer construction. Also excellent for building of heavy farm trailers and wagons. It is a 15,000 lb. capacity square type straight

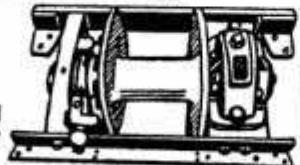


trailer axle complete with Timken roller bearings, hubs, and 6 hole 750 x 20 Budd Wheels. Without brakes. Axle is 2 1/2 inches square and 70 inches between wheel mounting flanges. Std. width. AN EXCELLENT BUY.

With Single Wheels. \$59.50 With Dual Wheels. \$69.50

## NEW POWER WINCHES

Govt. Surplus. All are Brand New and Suitable for front or rear mounting.



WINCH CABLE—With Chain and hook. 1/2" in diameter. 200 ft. length.

**\$2500**

New WINCH, GARWOOD OR HEIL—15,000 lb. capacity.

**\$15000**

A 25,000 lb. Winch with 3 speed power take-off, shafts, joints and attaching parts for International TD-9 and TD-14. For Front only. Shipping weight 1700 lbs. Only.

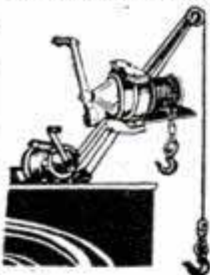
**\$25000**

Above Winch adaptable to front or rear of H. D. Trucks. Available cables, power-take-offs, shafts and joints reasonable

New All Purpose

## WINCH

3,000 LBS. RATED CAPACITY  
— IDEAL FOR JEEP



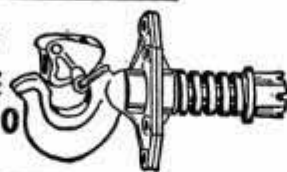
Spur gear type winch complete with crank, 50 ft. 1/4 inch cable and hook and 89 inch boom with pulley. Ideal for lifting or pulling. Winch bracket can be mounted on truck or at material location. Plenty of power. 27 to 1 ratio. Weight of entire unit unpacked 142 lbs., boxed 238 lbs. Special, each....

**\$59.50**

## Austin Pintle Hooks

For all Trucks and Trailers. 25,000 lbs. capacity, shipping wght. 30 lbs. List price \$47.50. Single ea. only \$8.95. Lots of 12, each only

**\$7.50**



All prices quoted are FOB, Kansas City. 25% deposit required on COD orders.

**American AUTO PARTS CO.**

1830 LOCUST — DEPT. PM  
KANSAS CITY, MISSOURI.



Say You Saw It in  
POPULAR MECHANICS

## HIGH QUALITY SURPLUS LENS KIT



Assemble your own telescope, 6 precision ground lenses

LARGE FIELD  
HIGH ILLUMINATION

HIGH MAGNIFICATION

Has been assembled to give up to 40 power. Lenses range from 1 1/2" to 2 1/4" dia. Complete assembly about 30" over-all length. LENSES ONLY, PER KIT.

**\$22.50**

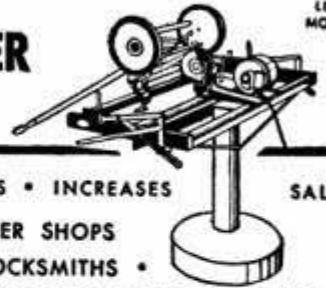
Instructions furnished — free surplus list. Satisfaction guaranteed or your money back.

DICK ROSE—ERECO, 2912 Hewitt Ave., Everett 21, Wash.

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## THE MODERN LAWN MOWER SHARPENER

PRICE  
**\$241.50**  
LESS  
MOTOR



INCREASES PROFITS • INCREASES SALES!

FOR LAWN MOWER SHOPS  
FIXIT SHOPS • LOCKSMITHS •  
HARDWARE STORES • GOLF COURSES • SCHOOLS  
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Sharpens All Reel Type Mowers • Hand, Power or  
Gang • 10 to 20 Minutes • No Dismantling  
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All reel type mowers, from 5-inch edgers to 36-inch power mowers, are quickly sharpened to extreme ends of both left and right twist reel blades. Handle, wheels, roller and motor remain in place when sharpening is in process. Bed knife is sharpened in same brackets that hold mower in grinding position. No extra attachments required. One lever puts mower or bed knife in grinding position. 100% steel construction. Grinding head rides on five ball bearing races. Small, compact, easy to operate. Sharpens wood chisels, joiner knives and planer blades without extra attachments.

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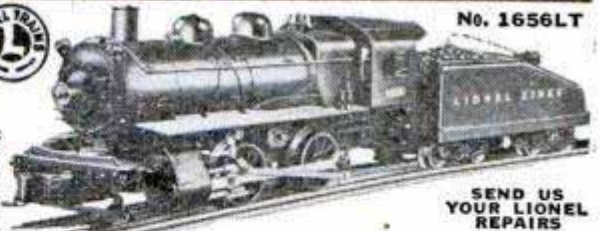
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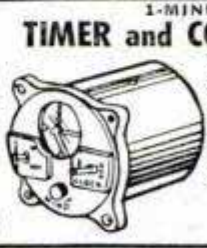
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Combines a standard size Phillips (No. 1) Cross Point and regular (3/8") bit in ONE driver. Ends the hunt for that missing tool! Break and shock-proof plastic handle... oil tempered chrome vanadium steel blade. Precision-built throughout... no play or wobble. Fully Guaranteed. Finest tool you ever owned! Only 75¢



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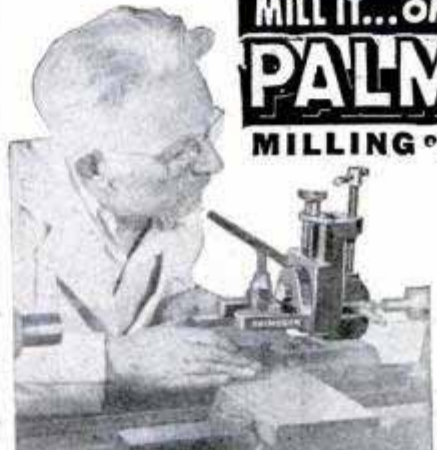
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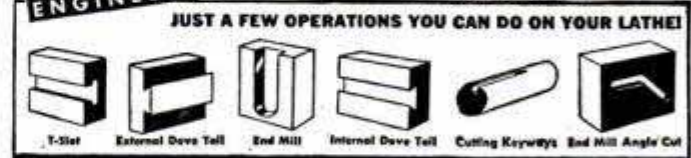
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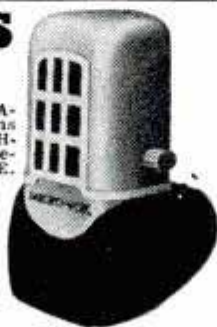
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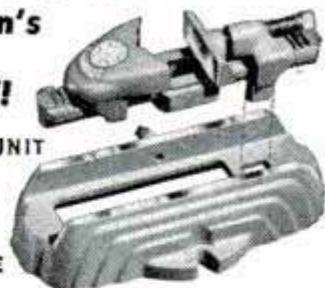
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**JAW UNIT**



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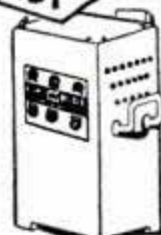
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Use For All Types of Liquids, Gases, Chemicals, etc.



May Be Used For Air Pressure Up to 500 Lbs.

### STAINLESS STEEL TYPE

Formerly used by the AAF for oxygen storage. Shatterless design permits internal pressures up to 500 lbs. They may be used as air pressure tanks for inflating tires, operating horns, air motors, etc. May also be used as a buoy or float or for water supply storage on boats, trailers, trucks, etc. Makes an ideal shipping container for gases, chemicals and other liquids. Made of stainless steel through-out with threaded plug at each end. Approximate size 12x22 inches. Guaranteed brand new! Each only.....

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in transparent leatherette roll. Made of hi-grade alloy steel and heat treated. 9 sizes 13/64 to 7/16. At your local dealer.

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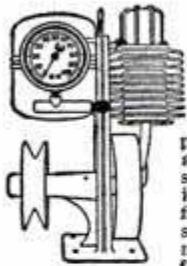
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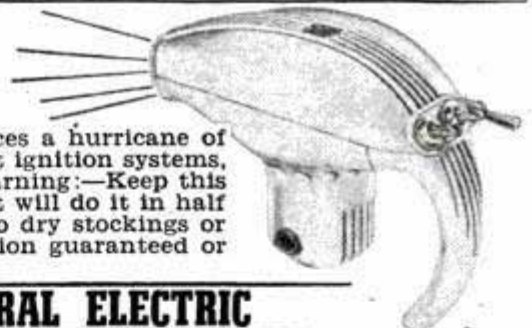
Equipped with 1/4" Jacobs Geared Chuck and Key  
**PORTABLE ELECTRIC DRILL**  
(Sold at less than established factory price so we cannot mention brand name)

Not an intermittent duty drill, but a full size rugged tool. Most convenient type switch, natural grip handle, and balance like a six shooter. Precision cut gears—turbine type cooling blower—extra long brushes. No stalling under heaviest pressure because of powerful 110 Volt AC or DC motor and multiple ball bearing thrust. Other bearings self-aligning lifetime-lubricated Ollite type. Made for toughest year-in and year-out service in plant or on construction jobs. Amazing perpetual factory guarantee assures you of a lifetime of trouble-free use.

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Streamlined pistol grip heat gun in vivid red housing, that delivers a powerful 20 Cubic Ft. per minute blast of hot air at 160° Fahrenheit. Ordinary blowers have small fan motors, but this has a lifetime-lubricated AC-DC motor of the rugged vacuum cleaner type, that produces a hurricane of either hot or cold air. Perfect for blowing out dirt or dust, drying out ignition systems, warming up carburetors, drying paint, thawing out radiators, etc. Warning:—Keep this away from your wife, or she will be using it to dry her hair because it will do it in half the time of her ordinary hair dryer, to say nothing of her using it to dry stockings or clothing, or defrost the refrigerator instantly. Only \$12.95. Satisfaction guaranteed or money refunded if returned prepaid within 5 days.



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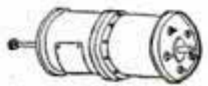
**RT-1655 — 11 tube crystal controlled SUPERHETERODYNE RECEIVER** that covers the FM band. The ultra modern circuit uses the latest types of tubes. Beautiful chassis and aluminum cabinet. Tubes and schematic supplied—\$14.95.

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## GENERAL ELECTRIC 150 WATT TRANSMITTER

Cost the Government \$1800.00 —  
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The most famous of all surplus transmitters. Was used by air force ground stations and bombers during the war. Will work on all important bands or frequencies. Complete with power supply. Send for free descriptive literature. Quantity limited.

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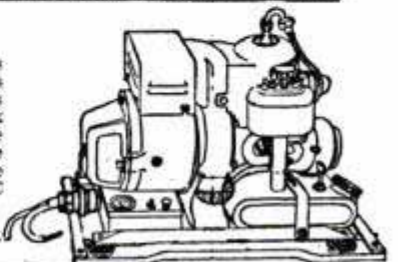
Product of a famous aircraft radio manufacturer who has abandoned the manufacture of home radios because of the flood of new government orders. All in 5 ply genuine mahogany cabinets, both regular and bleached. 6-tube models have tone control. Original list price given first—then your cost. Sensational discounts.

5-tube Mah. or Blonde.....\$ 34.95 \$ 16.97  
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This power plant consists of a gasoline engine that is coupled to a 2000 watt 32 volt DC generator. This unit is ideal for use in locations that are not serviced by commercial power or to run many of the surplus items that require 24-32v DC for operation. The price of this power plant tested and in good condition is only \$79.95 F. O. B. Buffalo, or we can supply strictly "as is" condition for \$58.95 F. O. B. New York City. These latter are exactly as received, in heavy steel-strapped gov't cases, and we are unable to determine if the individual units are new, used or what the condition is if used, while the \$79.95 are some of the same that we have brought to Buffalo for testing and repair if necessary. We do not recommend gambling on the "as is" condition, except for quantity purchasers. We can also supply a converter that will supply 110V AC from the above unit or from any 32V DC source for \$12.95.

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SAVE \$30.00 ON THIS "WELLWORTH" PORTABLE SPRAY OUTFIT

1/3 H.P.

ELECTRIC MOTOR DRIVEN

Complete With Base



\$79.50 Value

Well balanced Portable Spray Painting Outfit for use where painting job requires a larger quantity of material. Sprays all types of average viscosity paints, enamels, lacquers, varnishes, etc. Piston type, single cylinder air compressor has 2 in. bore by 1 3/4 in. stroke. Displacement 2.86 C.F.M.; maximum working pressure 40 lbs. Mounted on sturdy wood base with rubber feet attached. Pulsation chamber is equipped with safety valve, drain cock. 1/3 H.p. G-E motor, 110-volt AC, with cord and plug; 20 ft. air hose and fittings. Spray Gun is pressure feed type, internal atomizing, with one quart metal cup. Fan and round spray nozzle furnished. Shipping Wt. 50 lbs.

Price only  
**\$49.95**

## PNEUMATIC AIR TOOLS

SAVE \$64.00 AND UP

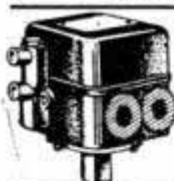
Ideal fender and bumping hammers, and for riveting brake lining, concrete breaking and many other uses. Like new. At these unheard of low prices it pays to order a good supply.



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CP4X Pistol grip handle, with air control. Takes up to 3/16" rivet. Weight 6 lbs. List price \$73.00. SPECIAL PRICE..... **\$8.95**

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Automatic Pressure Switch with Unloader

Double pole, with 2 way release valve. Set at 125 to 150 lbs. pressure. For use on compressor units 1/2 to 3 H.P. Pressure range 20 to 200 lbs. Weight 4 lbs. only **\$10.25**

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"Wellworth" 1/4" REDUCING VALVE & GAUGE

Oil resistant, pressure 0-to-200 lb. Reduced pressure 0 to 75 lb.; 3 outlets 1/4". Wt. 2 lbs. **\$5.75**

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8" x 42" Welded Steel. 3/4" opening on each end. 1/4" and 3/8" openings at centers. Convex Head and Bottom; 100 lbs. working pressure. Shipping Wt. 35 lbs. SPECIAL **\$875** PRICE only .....

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MERGED WITH C & M EQUIPMENT CO.

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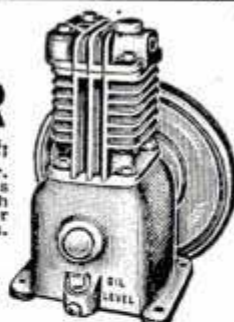
Chicago 16, Ill.

See our other ad on page 317

"Wellworth" PISTON TYPE AIR COMPRESSOR

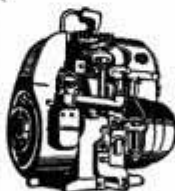
Piston type, size 2 x 1 3/4, head in valves, bronze bearings, splash lubrication, "V" Belt drive, Intake muffler and cleaner. Capacity 2.8 c.f.m. at 100 lbs. continuous pressure or 150 lbs. Intermittent, with 1/2 HP motor. Can be used with 1/4 HP or 1/3 HP at lower speed. Weight 14 lbs. Operating instructions furnished.

only **\$17.95**



ONAN LIGHT PLANT

1 K.W. 110 volt AC Air cooled engine. Rope start. Shipping wt. 275 lbs. Regular Price \$295.00. SPECIAL PRICE **\$195.00**



Save \$15.00 on an ESSEX LUBRICATOR

Automatic Sight feed. All brass. Oil Chamber, 3 1/2". Pipe thread 3/8". Regular price, \$20.00. Wt. 4 lbs. SPECIAL — ONLY **\$4.95**

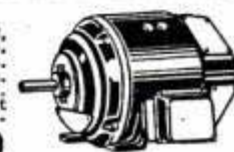
HEAVY DUTY ELECTRIC MOTORS

Ball Bearing 110/220 volts—1 phase—60 cycle—1750 R.P.M.—Continuous duty, 300% full load starting Torque, outlet box, operates clockwise or counter-clockwise, carries one year guarantee against mechanical defects. Also in 3450 R.P.M. at same price.  
1/2 HP Wt. 36 lbs. ....\$33.50  
3/4 HP Wt. 50 lbs. .... 42.00  
1 HP Wt. 80 lbs. .... 54.00  
1 1/2 HP Wt. 80 lbs. .... 56.00  
Note: 1 1/2 h.p. in 3450 r.p.m. only.

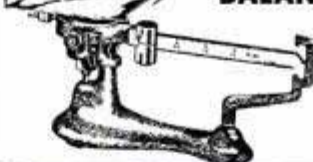


G. E. MOTORS

1 h. p.—115 Vt. DC, 1725 RPM Comp. shunt wound, 1 h.p. Wound. B. Bearing, at 1750 RPM. B. Bearing, 40° cont. List price \$132.00. Special **\$67.50**  
2-SPEED 115 V. DC, shunt wound, 1 h.p. at 1750 RPM. B. Bearing, 40° cont. Wt. 225 lbs. List price, \$325.00. Special **\$87.50**



BALANCE TYPE POSTAL SCALE



"DETECTO" Nationally known. Weighs every 1/2 ounce, up to 4 lbs. Regular Price \$20.00. Special Price. Wt. 20 lbs. **\$5.95**

4 for \$20.00



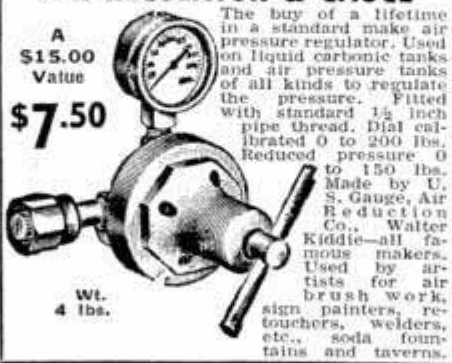
Wellworth Air Gauge —2 1/2" 0 to 200 lb. Pressure **\$1.75**

AIR GAUGE — Same as above, 0 to 160 lbs. back connection..... **\$1.75**



POP TYPE VALVES 150 lbs. pressure. Has a close range of closing after pop-off pressure is reached. 1/4" pipe thread. **\$1.50**

AIR REGULATOR & GAUGE



The buy of a lifetime in a standard make air pressure regulator. Used on liquid carbonic tanks and air pressure tanks of all kinds to regulate the pressure. Fitted with standard 1/2 inch pipe thread. Dial calibrated 0 to 200 lbs. Reduced pressure 0 to 150 lbs. Made by U. S. Gauge, Air Reduction Co., Walter Kiddie—all famous makers. Used by artists for air brush work, sign painters, restorers, welders, etc., soda fountains and taverns. A \$15.00 Value **\$7.50**  
Wt. 4 lbs.

6 FT. STOW FLEXIBLE SHAFT

Heavy Duty, 3/8" Core. Best piano wire. Ball bearing handle and arbor, rubber covered housing; for 1/2" motor shaft; for 1/4" bore wheels. Operates on 1/4 H.P. Motor at 1725 or 3450 R.P.M. \$29.00 Value, only **\$16.50**. Wt. 8 lbs.



Only \$16.50



MOTOR BARGAIN

1/30 HP 24 volt DC motor 2450 R.P.M. .95 amps **\$2.45**  
3/4" shaft size overall 3" x4", Weight 3 lbs.

USE AS 6 VOLT GENERATOR—Generate your own power. Can be operated on your bicycle wheel. Furnishes sufficient power for two 6 volt bulbs. Resistor furnished free with each motor enables you to maintain constant voltage. Special Price \$2.45, or 4 for \$7.50. Lots of 24 for \$36.00



# SAVE UP TO 85% IN WAR SURPLUS-SENSATIONAL VALUES

at "GADGETEER'S HEAVEN" IN MANY ITEMS WE HAVE THE WORLD'S LARGEST SUPPLY

HERE'S AN AD FULL OF XMAS GIFTS

### NEW HYDRAULIC CYLINDERS, VALVES, PUMPS, FITTINGS, HOSE & TANKS

51 sizes & types. World's Largest Supply

1001 Labor Saving Adaptations for pulling, pushing, lifting operations. Finest precision workmanship and materials. Liquid and air operation, developing terrific power.

20,000 Available WRITE FOR CATALOGUE PRICED TO SELL AT 15% GOV'T. COST.

### PUMPS NEW HYDRAULIC VACUUM AIR

For every purpose at 15% of Value.

#### P.V.-1

May be used as air or fuel pump for pressure or vacuum. Will pump 1 1/2 gals. oil at 300 R. P. M. Builds air pressure 30 lbs. per sq. in. at 1500 R.P.M. Vacuum draws 28 in. Hg. at 1500 R. P. M.

**\$9.49**

### ROMECH FUEL

800 GPH at 30 PSI. can also be used as hydraulic for 4 GPM at 400 PSI. or for Vacuum drawing 15 in. mercury at 1500 RPM.

**\$6.29 ea.**

### NEW PRESSURE TANKS

Stainless steel - Shaver proof. Rustless. 16,000 available in 6 different sizes. 2001 models.

C-1 2 1/2 x 24 inches	Capacity 25 cu. in.	\$4.75
D-2 3 1/2 x 24 in.	300 Cu. in. capacity	\$2.49
F-1 10" x 18" 1000 Cu. in. Capacity	Cu. in. capacity	\$3.95
F-2 8" x 48 in.	1000 Cu. in. capacity	\$3.95
A-4 5" x 8" 164 cu. in. Capacity		\$1.35
A-8 5 1/2" x 15" 380 cu. in. Capacity		\$1.95

Excellent portable tanks for carrying air in car or trailer. Ideal for painting, cooking, spraying, steam, bores, underwater fishing or diving.

MOB-1 Oxygen Regulator with 500 lb. queue will fit all tanks **\$1.39**

### DC GENERATOR NEW 140 AMP

Direct Current Generator. especially suited for adaptation to homemade welding unit.

A fast moving item at **\$17.95**

P-1 GENERATOR 200 AMP **\$22.50 ea.**

K-1 GENERATOR 75 AMPS. **\$14.50 ea.**

### GADGET MIX

Especially prepared for the MOBBIEST. Rivets, Spacers, Bolt, Screws, Nuts, Gear, etc. A gold mine.

#104. 1 LB. **\$1.19**

### BEARING MIX

Roller, Ball & Roller Bearings in excellent assortment. Sizes from 1/2" to 2". One of our "BEST SELLERS".

15 BEARINGS #170. 1 LB. ONLY **\$2.95**

### HINGE MIX

32 pieces of steel and brass hinges. Sizes 1" x 1" to 1 1/2" x 4" in length to 8" strap.

#170H. A \$3.00 Value FOR ONLY **\$1.09**

### ABRASIVE AND GRINDING WHEEL MIX

38 Pieces including honing stone, pencil rolls, wheels, Abrasive sheets, etc. A real sharp value.

#170AG. **99c**

### SPRING MIX

Torsion Compression & Tension Springs, ass'd. sizes.

A treasure house for every mechanic. #208. 1 LB. ONLY **89c**

### COMBO-MIX

Combination of all above, all in one package deal. At special introductory price **\$5.79**

### WINCH HOIST

now equipped with mounting frame, handle, cable, etc. complete. Thousands of Satisfied Users! Hundreds have written, telling us it's the most wonderful tool in the world!

Capacity 2500 lbs. 20-1 ratio. Bronze Worm Gear. Ideal for Garages, Truck Loading, Machine Shops, Boat Builders, etc.

\$100 Value for ONLY **\$18.99**

### TINY MITE WINCH HOIST

1000 lb. Capacity, with 30 to 1 Bronze worm gear, 4"x1 1/4" Cable drum. Ratchet on handle, safety factor to hold load, with pin release lowering loads, tightening lances, etc.

**\$7.49 ea.**

### Continental Gas Engine

Genuine Red Seal 4 Cycle Air Cooled L head standard equipment inc. Mesh type air cleaner, flywheel, magneto, float type carburetor, blower housing, muffler, fuel tank, fuel filter with shut off valve, starter pulley, etc. The ideal power package for light tractors, lighting plants, compressors, boats, lawn mowers, etc. And cost your eyes at this price A \$75.00 VALUE While they Last. Net weight 63 lbs. for only **\$48.49**

### FIRE EXTINGUISHER

Kidde Lux Col Type. Built to Gov't spec. windshield shatterproof Heavy Case. Fully recharged 2 1/2 lb. 28" x 4" Tanker control with hose 478 in. #421A **\$13.25**

3 lb. Col type #421A Value **\$11.75**

10 lb. Charged with brass Col #421A Value **\$25.75**

15 lb. Break Disc type New #421A Value **\$29.75**

11 lb. Wheel Control #421B Value **\$32.95**

15 lb. Squeeze grip. New #421C Value **\$39.95**

All above Col type fully charged and with hose. Indispensable for small or large planes, Trucks, Auto, Home, Factory, Etc.

### New Electric Motors

#500 new 1/2 H.P. 27 Volt D. C. 24 Volt A. C. This motor can be readily adapted to 110 A. C. by the simple method of rearranging armature brush leads. We furnish free diagram of instructions with each order. A Sensational Value @ **\$5.95**

### NEW FLEXIBLE GOOSENECK LAMP

110 V. A. C. 13 ft. wire with socket, switch and plug. In mounting bracket suitable for home or workshop. Wire alone worth our price of **99c each.**

### Vickers Hydric Transmission

VT-1 Self contained, 2 H. P. constant torque of all speeds with variable volume reversible piston pump (controlled by outside lever) supplying piston hydraulic motor. Automatic pressure, dash pot for smooth control. Power output R. P. M. .O to 1/2 input R. P. M. in both directions. Input R. P. M. 1800 continuous 4000 intermittent. Dash pot can be removed for greater R. P. M. Ideal for Lathes, Duplicator Setup on Mills, Conveyors, Small Cars, Drives, Gearing, Etc.

COST GOVERNMENT APP. \$400.00 You'll Chortle when you get it for ONLY **\$19.50**

### GREENLEE - HAND TUBE BENDER

Designed for fast, free action, in bending steel, copper, brass, aluminum tubing. Fits in std. vise up to 180 degree bend, makes smooth, small radius bends, free of kinks, scratches, etc. Available in the following sizes:

1/4" @ \$4.50, 5/16" @ \$4.95, 3/8" @ \$6.95, 1/2" @ \$8.25, 5/8" @ \$9.75, 3/4" @ \$11.25

Comp. Set of 6 Benders **\$43.95**

### PLASTIC PARALLEL STRAIGHT EDGE

with ends and rubber pads for use alligator on work surface. A must for navigators, mechanics, draftsmen, engineers. . . You'll never see 'em at **97c ea.**

### PNEUMATIC AND AIR TOOLS

10,000 in various popular makes, sizes, types. Cleco, Aero, Ingersoll Rand, Chicago, Pneumatic, Buckeye, etc.

### RIVET GUNS

Pistol & Goose-neck Type. 101 Gas Chipping, 102 Gas Chipping, 103 Breaking cement and auto body work.

Chicago Pneumatic, Cleco, Ingersoll Rand Makes. E3, E2, 3X, 2X, OY. \$55 Value **\$8.95**

#186 Squeezer **\$15.95**

### AIR DRILLS OR MOTOR SPECIAL

with 1/4" JCB Chuck

THOR #210R Model 4526 REVERSIBLE AIR DRILL 1000 R.P.M. Xlnt. for Tapping **\$19.95**

### PNEUMATIC ANGLE DRILL

With Terry Adapter ea. **\$12.50**

### CHI. PNU. IMPACT WRENCH

Model 337rs 3/8" sq. dr. hwd. & sevsrs. 6 spd. catfl. **\$19.50**

Send for Catalogue and List of Other Sizes, Types of Pneumatic Tools.

### HIGH PRESSURE OXYGEN BOTTLE

New. Will hold up to 3,000 lbs. PSI. with Co2 used as tire inflator or fire extinguisher, with oxygen for sick room or deep-water diving, etc. Completely equipped with brass valve, 3/8" hose, dial gauge, & canvas bag **\$2.29 ea.**

### TANK

Capacity 21.7 gallons. Aluminum 4 threaded parts. Filler Capacity. Size 7" x 28" x 28". Ideal for Water or Gas Tank on Auto, Boat, Truck, Tractor, Etc. New. #126 **\$5.29**

### PIANO HINGE

Overall Width	Length	Price
1 1/4" (3/4" side)	72" alum.	\$1.00 ea.
2" (1" side)	72" alum.	\$1.13 ea.
1 1/2" (3/4" side)	53" cad. steel	.75 ea.
2 1/2" (1 1/2" side)	33" steel	\$1.00 ea.

### AIRCRAFT CABLE

Alloyed steel, rust resistant. 3/16" dia. 18 ft. long, with turnbuckle ends. 99c

On reels in any length

1/16" 3c ft.	5/32" 5c ft.
3/32" 4c ft.	3/16" 8c ft.
1/8" 4 1/2c ft.	9/32" 8c ft.

### RUBBER GOODS

NEOPRENE SHEET RUBBER

Thick.	Price per sq. yd.
#325 .020"	1.64
#325 .032"	1.72
#325 .125"	1.88

Item #323 is laminated rubber sheet with cloth center. Flexible but very firm for heavy work. Rubberized Hoop, or Bed Shts. **\$2.29**

54"x72" \$10.00 Value Only

### ELECTRIC SOLDERING IRON

#198 110 Volt A. C. Vulcan **\$8.50 Value**

#198 200 Watt **\$3.95**

#198A 100 Watt **\$2.95**

**PALLEY THE LARGEST FIRM OF ITS TYPE SUPPLY CO. IN THE WORLD**

Order from this Ad. All sales final. All Prices F. O. B. Los Angeles. Pay by M. O. or Check. P. O.'s Accepted. from D & B firms. 1/2 deposit with C. O. D's. FREE LARGE ILLUSTRATED CATALOG

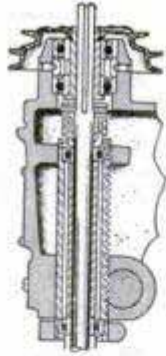
DEPT. P. M. 128 - 6321 SAN FERNANDO RD GLENDALE 1, CALIF.

We wish each and everyone of you a Merry Xmas and a Happy, Peaceful New Year.



#### FOUR PRECISION BALL BEARINGS

Two on spindle, two on drive sleeve. Pre-lubricated and sealed precision type, no oiling required.



#### ADJUSTABLE QUILL RETURN SPRING

Retracts quill instantly upon release of feed lever. Tension of spring adjustable.



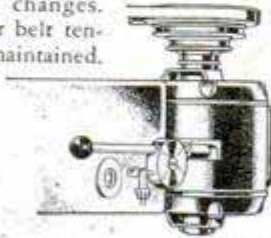
#### DEPTH GAUGE

Controls feed depth, length of return stroke, or locks spindle in any position. 16th graduations.



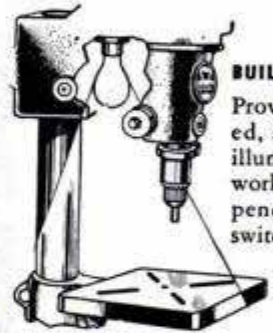
#### BELT TENSION RELEASE

Flip of lever removes tension from belt for easy speed changes. Proper belt tension maintained.



#### BUILT-IN LIGHT

Provides shielded, shadowless illumination on work area. Independent on-off switch is built-in.



# NEW!

**SOUTH BEND**  
**14" Drill Press**



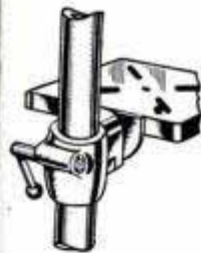
#### INTERCHANGEABLE SPINDLES

Spindles available to take No. 2 Morse taper shank tools, and for 1/2" straight shank tools, router bits, shaper cutters, etc.



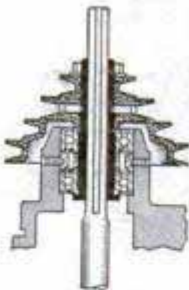
#### TABLE LOCK

Double-plug binder securely locks table to column. Eliminates misalignment. Column bearing is NOT split.



#### FREE-FLOATING SPINDLE

Design prevents misalignment, side thrust and whip. Precision splines in spindle and sleeve.



#### QUILL BEARING ADJUSTMENT

Shoe-type take-up provides feather-touch tension and secure locking. Quill bearing is NOT split.



#### CAPACITIES — SPECIFICATIONS

##### CAPACITY

Maximum drill size in iron or steel—1/2". Drills to center of 1 3/4" circle.

##### CHUCK

Capacity—0 to 1/2"

##### SPINDLE

Regular drill chuck type supplied. Travel..... 4"

##### CHUCK TO BASE DISTANCE

Bench Model—17" Floor Model—46 1/2"

##### SPINDLE SPEEDS

Four—655 to 4530 r. p. m.

##### TABLE SIZE

10" x 10". Tilts to any angle.

Bench Model **\$129<sup>30</sup>**

Floor Model **\$144<sup>30</sup>**

Prices, f.o.b. factory, include drill chuck and 1/2" b. p., 115 or 230 v., 1 pb., 60 cycle motor and switch.

#### ONE-PIECE HEAD CASTING

Insures perfect alignment. Double-plug binder locks the head to column. Column bearing is NOT split.

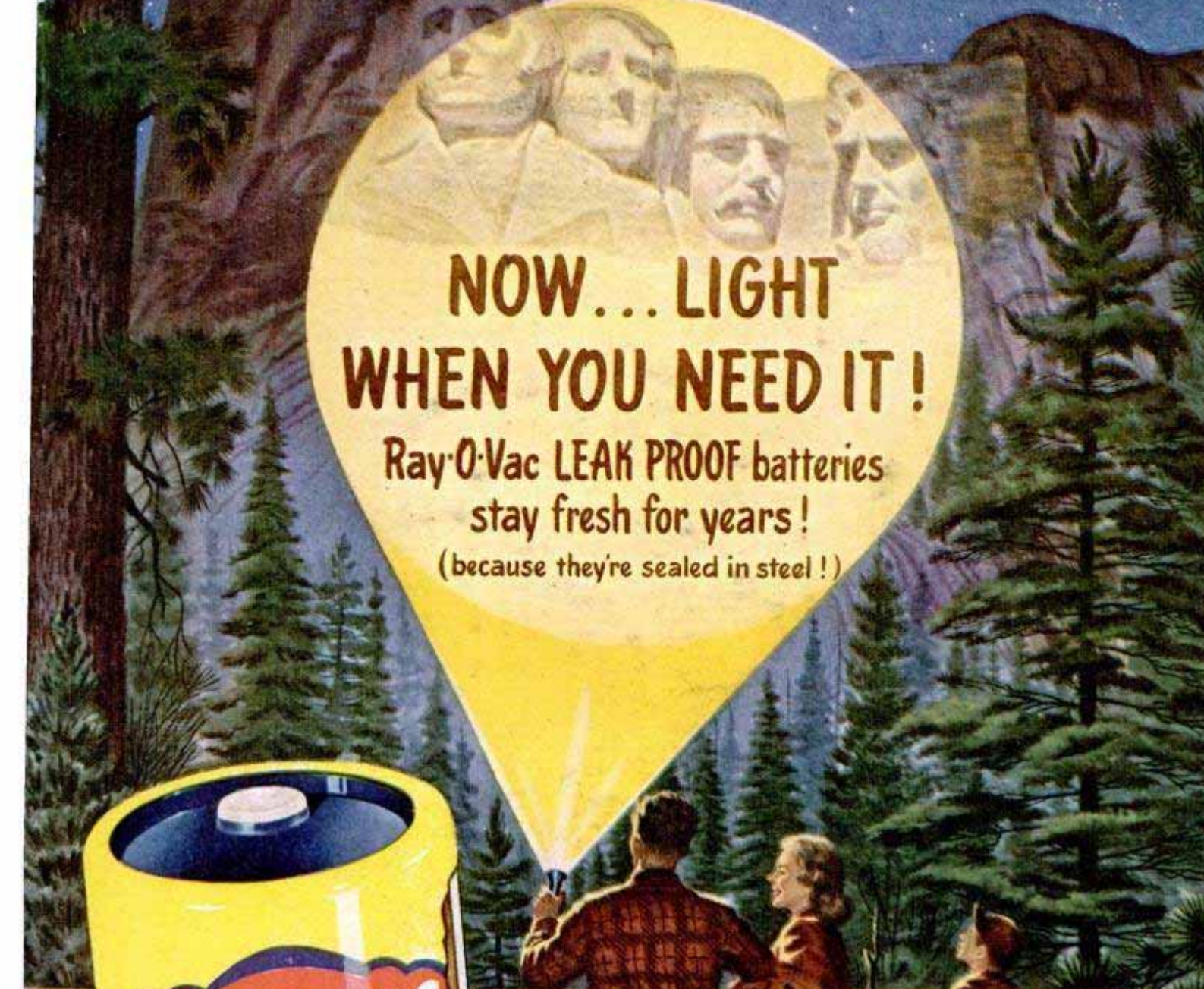


# SOUTH BEND LATHE WORKS

BUILDING BETTER TOOLS SINCE 1906 • 455 EAST MADISON ST., SOUTH BEND 22, INDIANA

Printed by Popular Mechanics Company, Chicago, Ill., U. S. A.

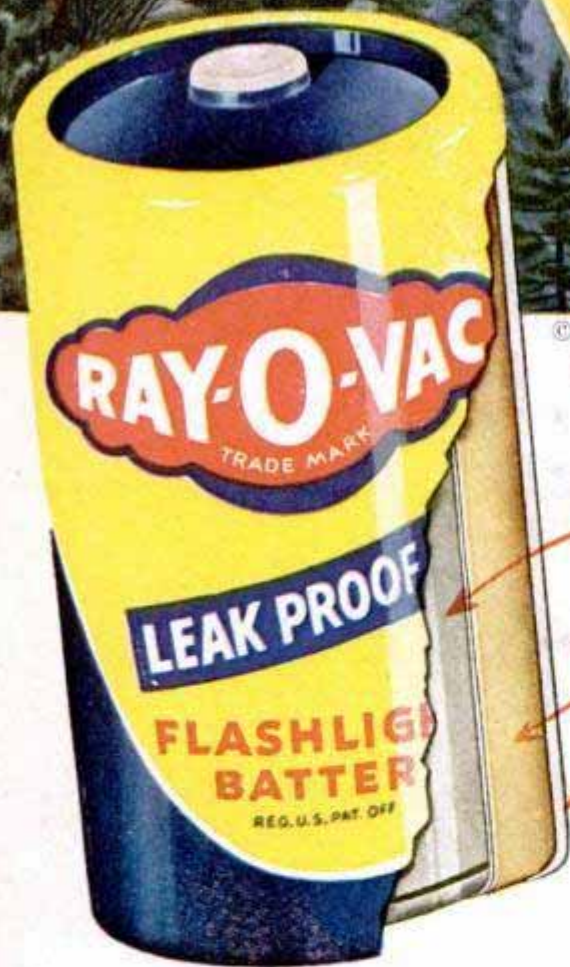




**NOW... LIGHT  
WHEN YOU NEED IT!**

**Ray-O-Vac LEAK PROOF batteries  
stay fresh for years!**

**(because they're sealed in steel!)**



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### See how much more you get

in these truly modern batteries. Each Ray-O-Vac Leak Proof starts with a powerful, well made battery. Then . . .

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

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

*Ask for Ray-O-Vac Leak Proofs*

**Buy Spares... they stay fresh**



# BLUEPRINT OF THE PERFECT GIFT FOR HER!

Beauty \_\_\_\_\_  
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 Superior Quality \_\_\_\_\_  
 Pride of Possession \_\_\_\_\_  
 Desirability \_\_\_\_\_  
 Value \_\_\_\_\_

OK  
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 OK  
 OK  
 OK  
 OK



Crest DeLuxe Tuckaway Threesome. Gold filled caps richly chased. Truly distinctive! Pen, \$17.50 — Pencil, \$6.00 — Stratowriter, \$12.50. Complete Set, \$36.00; plus fed. tax.



Sentinel DeLuxe Tuckaway Threesome. Mirror finish—caps strikingly chased. An outstanding gift. Pen, \$15.00 — Pencil, \$5.00 — Stratowriter, \$10.00 — Complete Set, \$30.00; no fed. tax.



Stratowriter Tuckaway—Gold filled. America's most dependable ball-tip writer. Slip-on cap — tucks in purse or pocket! \$15.00 fed. tax included.



Tuckaway Ensemble. Smart distinctive colors — Persian Blue—Burnt Umber Brown—Aristocratic Black. Pen, \$10.00—Pencil, \$4.00—Complete Set \$14.00; no fed. tax.



A GIFT MEANS MUCH MORE WHEN IT'S MADE BY SHEAFFER



"Triumph" Desk Set shown \$17.50. Sheaffer Desk Sets available with pen—pen and pencil—pen, pencil and stratowriter. From \$10.00 to \$108.00.

Every Sheaffer Writing Instrument, handsomely boxed, individually or in sets, makes a magnificent gift. For sale at all good dealers throughout

the United States and Canada.